EC-01

Auto Start Module for Gasoline Engine Generators
Operation Manual

KUTAI

KUTAI ELECTRONICS INDUSTRY CO., LTD.
TEL : +886-7-8121771 FAX : +886-7-8121775 Website : www.kutai.com.tw
Headquarters : No.3, Ln. 201, Qianfu St., Qianzhen Dist., Kaohsiung City 80664, Taiwan

SECTION 1 : SPECIFICATION

DC Power Input
Voltage 12 / 24 Vdc

AC Power Input
Voltage 110 / 220 Vac, 1 phase
Frequency 50/60 Hz

Start-up Signal Output
6 A (Battery Positive Output)

Shutdown Signal Output
4 A (Battery Negative Output)

Auxiliary Dry contact Output
4 A

Static Power Dissipation
Max. 3 watts

Environment
Operating Temperature -20 to +60 ˚C
Relative Humidity Max. 95%

Dimensions
107.0 (L) x 75.0 (W) x 29.0 (H) mm

Weight
180 g +/- 2%

SECTION 2 : APPLICATION

The EC-01 Auto Start Module adds remote start / stop capability to gasoline generators equipped with electric start motors. The EC-01 enables a gasoline generator to be started and stopped remotely with signals from any Automatic Transfer Switch (ATS) controller.

Application : The EC-01 controller provides only remote start and stop functions and does not have any of the protection functions of a generator controller. If you require generator protection functions then please contact Kutai for advice on a suitable generator controller for your application.

SECTION 3 : FEATURES

3.1 Small size, low cost, and low power consumption.

3.2 Connects by a terminal board for easy installation and replacement.

3.3 A single chip micro controller is utilized, providing full digital processing and high reliability.

3.4 Engine Cranking Attempts are provided with an indicator lamp for a failed start (Ex-factory setting is 3 attempts, however, the customer can request a custom setting when ordering)

SECTION 4 : WIRING AND NOTES

4.1 Terminals 1 & 2 : Generator AC power input (110V/220V). When AC input voltage frequency reaches 18 Hz or higher the controller will cut the signal to the starter motor. (Refer to Figure 2 Terminal Diagram)

NOTE

In order to avoid operating the controller without AC power input, and to avoid the starter motor making repeated engine cranking attempts when the generator is operating, the AC signal from this module must be connected directly to the generator and cannot be under the control of an external circuit breaker or ON/OFF switch. The maximum withstand voltage is 300 Vac.

4.2 Terminal 3 : connects to the " + " terminal of the generator battery (12V/24V). Max Input volt 40 Vdc (Refer to Figure 2 Terminal Diagram)

4.3 Terminal 4 : connects to the " – " terminal of the generator battery (12V/24V). (Refer to Figure 2 Terminal Diagram)

4.4 Terminal 5 : Starter motor output. Output during engine start (+) 12V/24V, 6A DC (Refer to Figure 2 Terminal Diagram)

NOTE

Maximum starting current capacity is 6 Amps. In order to avoid damage to the controller from excessive current do not directly connect the controller to the starter motor - it is necessary to use an auxiliary relay. If the gasoline engine driving the generator has a choke then the choke lever can be controlled in parallel with the start signal.

4.5 Terminals 6 & 7 : Engine Stop auxiliary contacts. This is a set of dry contacts (i.e. no voltage signal). These terminals will be shorted when the engine is not running. The contacts will be in an open state until the Stop countdown timer is complete (Refer to Figure 2 Terminal Diagram)

Open – normal status
Close – engine stop

NOTE

This is an "energize to stop" type controller. The capacity of the Engine Stop auxiliary contacts is 4 Amps. If engine stop solenoid operates at a current over 4 Amp then install an auxiliary relay to avoid excessive current damaging the controller. In most gasoline engines the Engine Stop signal is a negative (-) voltage. If a positive voltage (+) is required for Engine Stop signal these contacts can be used.

4.6 Terminal 8 : Engine Stop signal output. When engine is stopped this will be a negative (–) voltage. During engine shut down process this terminal will not have a voltage. (Refer to Figure 2 Terminal Diagram)

NOTE

The power relay inside the control unit will damage from the current over 4 amp. An auxiliary relay is necessary when operate current is high.

4.7 Terminals 9 & 10 : Remote Engine Start input signal. When these terminals are shorted the engine is in cranking mode. When open the engine is in a stop state. (Refer to Figure 2 Terminal Diagram)

Open – engine stop
Close – engine start

NOTE

The external remote control connection must be a pair of uncharged (dry) contacts. To avoid damaging the controller do not input any AC or DC signals.

SECTION 5 : TIMER SETTINGS AND ADJUSTMENTS

5.1 **VR1 : Engine Start Cranking Time.** Setting range of 1 to 20 seconds. The cranking time increases with clockwise (CW) adjustment. For initial installation please refer to the generator User Manual to obtain recommended cranking time. In general a setting of 4 to 8 seconds is recommended. (Refer to Figure 2 Terminal Diagram)

5.2 **VR2 : Engine Cranking Time Interval.** This is the time interval between engine start attempts with a range of 1 to 10 seconds. In general a setting of 5 seconds is recommended. (Refer to Figure 2 Terminal Diagram)

5.3 **VR3 : Engine Shutdown Time Delay.** This time can be set from 1 to 20 seconds and increases in the clockwise (CW) direction. The EC-01 is an energize-to-stop controller. This is the time that EC-01 energizes the solenoid to close the fuel valve. For initial installation please refer to the generator User Manual to obtain the start time. In general, an engine shut down time of 3 to 5 seconds is recommended. (Refer to Figure 2 Terminal Diagram)

NOTE

If the Engine Shutdown Time Delay setting is not long enough, the engine could start again after the countdown timer has completed. In this situation the user must manually stop the engine and adjust the setting clockwise to increase the stop time, and then repeat the operation at the new setting.

SECTION 6 : PROTECTIVE FUSE AND INDICATOR LEDS

6.1 **Fuse** : 6.3A DC fuse. Use only fuses according to this specification in order to avoid excessive current damage to the controller.

6.2 **L1 : Remote Start LED**. When the engine start contacts close this lamp will illuminate, indicating that an engine start signal has been received from the ATS (Refer to Figure 2 Terminal Diagram).

6.3 **L2 : Engine Running LED**. During remote engine start sequence this lamp will illuminate when the generator AC input voltage frequency reaches 18Hz or greater (Refer to Figure 2 Terminal Diagram).

6.4 **L3 : Engine Fail to Start LED**. This lamp will illuminate if the engine fails to start within a preset number of crank attempts or fails to establish rated AC voltage. The control unit will execute engine stop procedure. (Refer to Figure 2 Terminal Diagram).

NOTE

If AC power is lost while generator running normally and supplying a load, L1, L2, and L3 will all illuminate, indicating a system failure, but the controller will not shutdown the engine. Manual operate switch before you check the AVR and AC power input wires. In this situation the AVR may have malfunctioned or the AC signal connection may not be good.

WARNING

Do not disconnect the controller from the battery when the engine is running. To prevent damage to the controller from excessive voltage do not connect the controller directly to the battery charging motor.

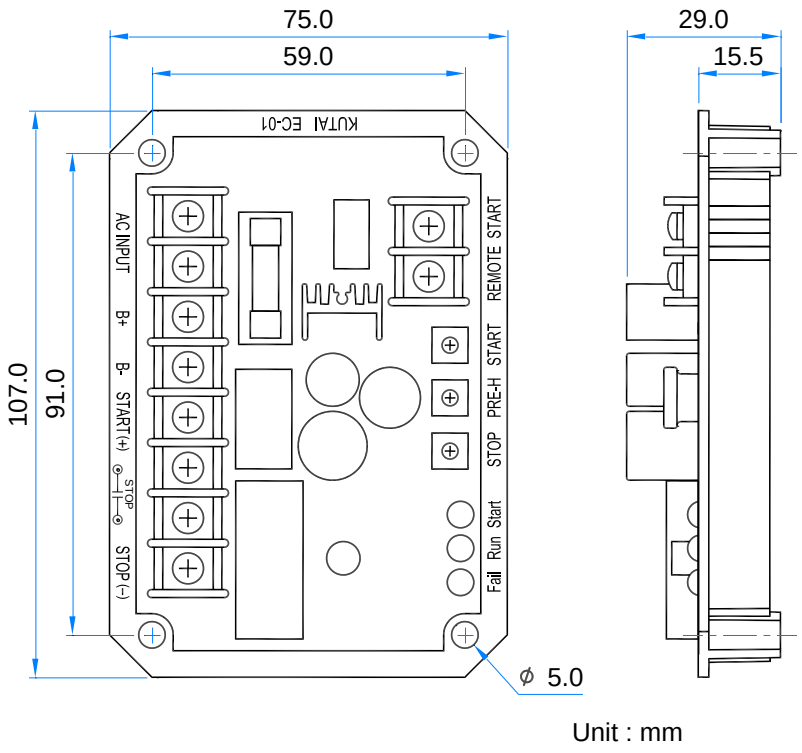

Figure 1 Outline Drawing

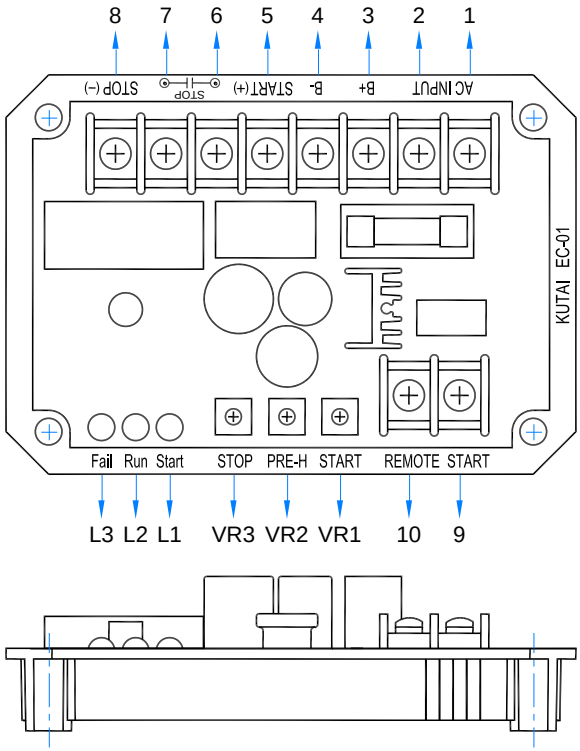

Figure 2 Terminal Diagram