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1. WARNING

To prevent personal injury or equipment damage, only qualified technicians/operators should install, operate or service this device.

2. CAUTION

1. Megger and high potential test equipment should not be used.
2. Incorrect use of such equipment could damage components contained in the unit.

3. APPLICATION

It has been designed to start, stop and protect diesel engine generator wirelessly or manually.

4. FEATURES

- 4.1. Control power can be used for 12Vdc or 24Vdc.
- 4.2. Engine start or stop wirelessly.
- 4.3. Engine mode is changable to low speed or high speed wirelessly.
- 4.4. Preheating plug of preheat wirelessly.
- 4.5. Wireless manipulating range : Open land – about 700M, if blocked by buildings – about 300M
- 4.6. In case of low speed, operating power of AVR can be blocked out (In case of more than 1300RPM, power is supplied).
- 4.7. Engine is stopped by over speed, low oil pressure and high water temperature.
- 4.8. Setting over speed at the field is easy and over speed test PB is inside.
- 4.9. RPM METER is available.
- 4.10. Receives MPU(Magnetic Pickup) signal as engine starting signal.
- 4.11. Protects starter motor by detecting idle speed signal or oil pressure switch.
- 4.12. Operation state is easily recognizable by indicator lamp.
- 4.13. Simplified circuit by design using MICOM.
- 4.14. Surge voltage protecting circuit.
- 4.15. Durable against damp and vibration by silicon molding.
- 4.16. Use selectively from ETR or ETS(modes to stop engine).
- 4.17. Dry contacts of engine operation signal and fault signal included.
- 4.18. Stop solenoid circuit to prevent from being burnt down included.

5. BASIC SPECIFICATIONS

- 5.1. Power Input – 8 ~ 30 Vac
- 5.2. Method of MPU Detection → 0 ~ 7,000 Hz ,2 ~ 20 Vac
- 5.3. RPM METER output – FS/5V, 500uA



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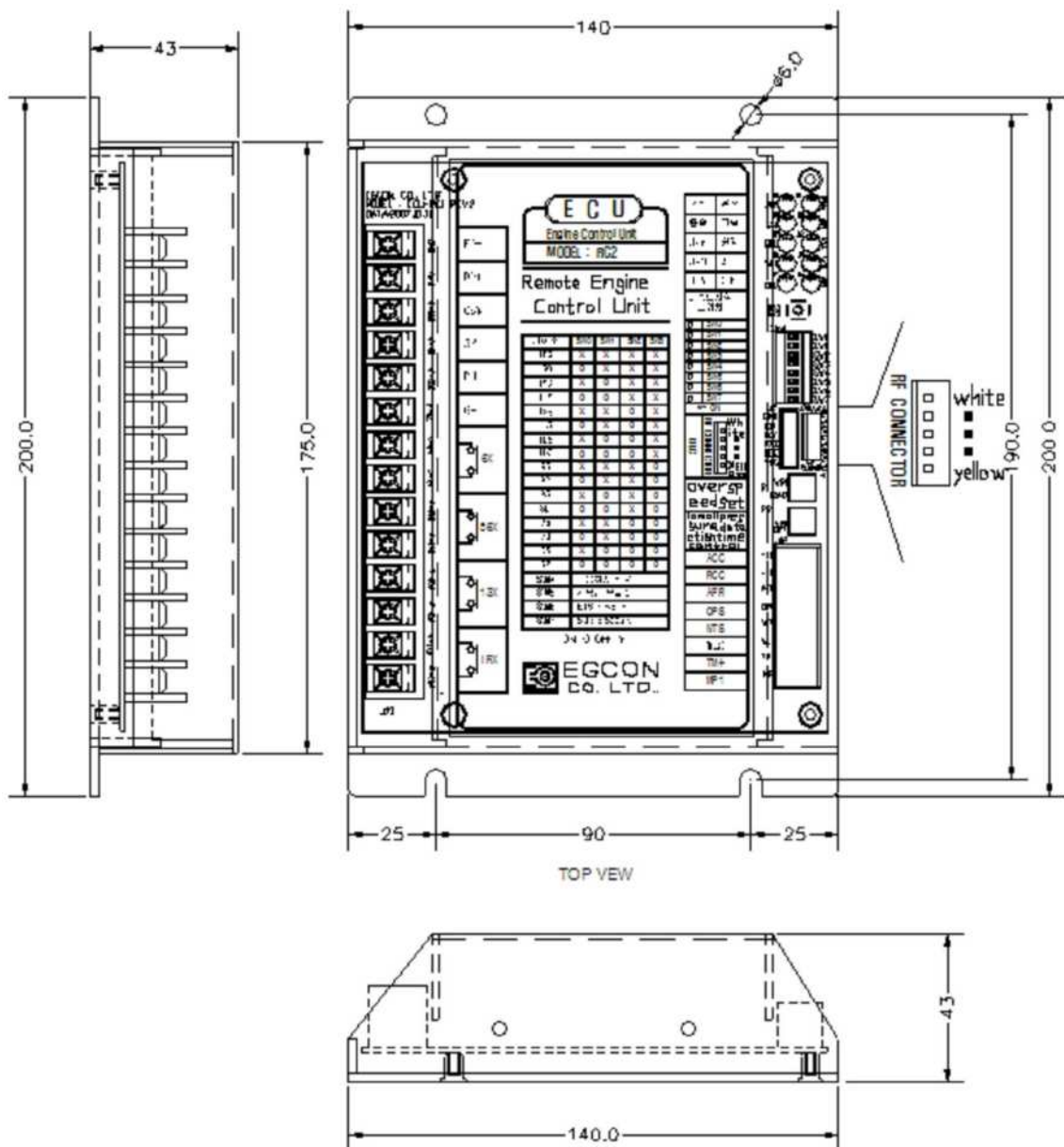
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6. STRUCTURE

- 6.1. Dimension : W140 * H200 * D43 (mm)
- 6.2. Mounting Holes : W90*H196 / 5Φ-4Holes
- 6.3. Color : Bottom - dark gray / Cover - ivory
- 6.4. Weight : 700g.

7. APPEARANCE



8. INDICATOR LAMP

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- 8.1. Power : Turned on when control power is input (GREEN)
- 8.2. Run : Turned on at more than engine Idle speed – about 600rpm (GREEN)
- 8.3. Synchro speed : Turned on at more than engine synchro speed – about 1,300rpm (YELLOW)
- 8.4. Run speed : Turned on when engine mode is changed to run speed (YELLOW)
- 8.5. Remote : Turned on when wireless control signal is input (YELLOW)
- 8.6. Low oil pressure : Turned on when Low oil pressure error is detected (RED)
- 8.7. Low water level : Turned on when Low water level error is detected (RED)
- 8.8. High Water temperature : Turned on when high water temperature error is detected (RED)
- 8.9. Over speed : Turned on when Over speed error is detected (RED)
- 8.10. Reserved : Turned on when error of reserved error input terminal is detected (RED)

9. DIP S/W AND OTHER PBs

9.1. Over speed test : OVER SPEED TEST PUSH BUTTON

When this button is pressed, Engine stops regardless of input values of real speed. In this state, if you RESET after varying OS ADJ. variable resistance and so after changing setting value, OVER SPEED SETTING is set as varied values.

9.2. Over speed setting : over speed adjustment(OVER SPEED ADJ.)


Governor to adjust operating speed of overspeed protection circuit

Adjustable range : 1800RPM – 2400RPM

9.3. Waiting time adjustment of low oil pressure detection : Waiting time of detecting Low oil pressure fault.(5 ~ 25sec)

9.4. RPM meter adjustment

For adjusting Rpm meter in accordance with Engine speed


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9.5. DIP S/W

GEAR NUMBER	SW0	SW1	SW2	SW3
182	X	X	X	X
160	0	X	X	X
152	X	0	X	X
140	0	0	X	X
128	X	X	0	X
115	0	X	0	X
108	X	0	0	X
100	0	0	0	X
95	X	X	X	0
92	0	X	X	0
85	X	0	X	0
80	0	0	X	0
75	X	X	0	0
70	0	X	0	0
65	X	0	0	0
52	0	0	0	0
SW4	Nonuse			
SW5	Idle/Run Speed Setting			
SW6	ETS<->ETR			
SW7	5V<->500uA			

ON : 0, OFF : X


- ▶ SW0 ~ SW3 : Use for setting Ring gear number
- ▶ SW4 : Nonuse
- ▶ SW5 : Use for run/idle speed setting
 - ON : Use when IDLE/RUN contact of governor is CLOSE.
In case of IDLE and OPEN, it is run speed.
 - OFF : Use when IDLE/RUN contact of governor is OPEN.
In case of IDLE and CLOSE, it is run speed.
- ▶ SW6 : ETS/ETR setting
 - ON : ETS, OFF : ETR
- ▶ SW7 : RPM METER setting

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- ON : 5V, OFF : 500uA

10. IN/OUTPUT TERMINALS

- 10.1. BP+, BP- : Input terminal of operating power (DC 8~30V input)
- 10.2. 88X : Output terminal of Engine starting signal (DC power "+"output , DC30V, 10A Max) (Necessarily, the assistant magnet is needed to be attached)
- 10.3. 5X : Output terminal of Engine stopping signal(DC power "+"output, DC30V, 10A Max)
- 10.4. PH+ : Preheating signal terminal of preheat plug (DC power "+" output, DC30V, 10A Max)
- 10.5. G+ : Gauge power terminal (DC power "+" output, DC30V, 2A Max)
- 10.6. 6X : Engine operating signal contact
(dry contact, NORMAL OPEN, DC30V/ 3A Max)
- 10.7. 86X : Fault signal contact
(dry contact, NORMAL OPEN, DC30V/ 3A Max)
- 10.8. 13X : AVR contact for operating power
(dry contact, NORMAL OPEN, AC300V/ 10A Max)
- 10.9. IRX : Changing contact of run/idle speed mode of governor
(dry contact, NORMAL OPEN, DC30V/ 3A Max)
- 10.10. ACC : KEY ACC connecting terminal (DC "+" input)
- 10.11. RCC : Input terminal for remote operation selecting (DC "-" input)
- 10.12. AFR : Reserved fault input terminal (DC "-" input)
- 10.13. OPS : Input terminal of oil pressure switch (DC "-" input)
- 10.14. WTS : Input terminal of high water temperature switch (DC "-" input)
- 10.15. WLS : Input terminal of coolant level switch (DC 24V "-" input)
- 10.16. TM+ : RPM METER connecting terminal (connecting to RPM METER "+" FS : 5V)
- 10.17. MP1 : MPU connecting terminal.

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11. PREPARATIONS FOR USE

11.1. Connect the circuit to in/output terminal of ECU-RC2, same as below Drawing1

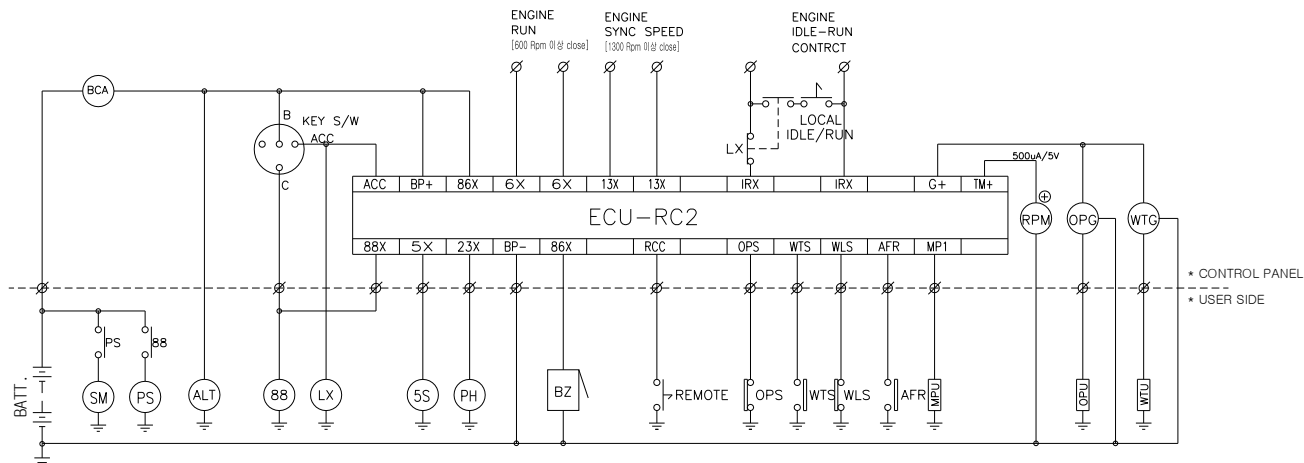
11.2. Set DIP S/W settings of ECU-RC2 in accordance with Engine.

- ▶ Engine stop mode – ETS/ETR
- ▶ Governor switch to select idle/run speed mode

11.3. Supply power

11.4. After confirming the connector color of Wireless receiver, connect Exactly.

11.5. If OPS terminal connection of ECU in/output terminals differ from the drawing, OPL lamp and 86X relay repeat ON/OFF.




12. MANUAL START TEST

- 12.1. OFF the REMOTE selection switch.
- 12.2. Using Key switch, operate Engine, and check Engine/Body for defects.
- 12.3. If Engine is normally operated, Run lamp of ECU-RC2 is turned on.
- 12.4. After checking for defects, stop Engine.

13. WIRELESS START TEST

- 13.1. Set Receiver and Remote.
- 13.2. Set REMOTE selection switch to ON.
- 13.3. Press KEY1 button of Remote controller for about 2sec..
- 13.4. If starting button is released before 2sec., Engine does not start.
- 13.5. During pressing remote controller for 2sec. Remote lamp of ECU-RC2 keeps being turned on.
- 13.6. After pressing start button for about 2sec., Engine starts.
 - ▶ When engine operation signal is more than 30% of rated, the power of

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starting motor is cut off.

▶ When engine starts, if oil pressure switch is detected owing to its operating, the power of starting motor is cut off after 3sec even without engine operating input.

▶ If engine normally operates, and therefore if operating signal over 30% of rated speed is input to MP1 terminal, RUN lamp is turned on.

▶ When oil pressure switch does not operate for more than OPT waiting time at more than 30%(IDLE SPEED) of rated speed, OPL(low oil pressure) lamp is turned on and Engine stops.

▶ If no engine operating signal and no oil pressure switch signal, start output is put out for 7sec. and then cut off.

▶ If engine operating signal has no input(less than 30% of regular speed) and if oil pressure switch operates, starter motor output is cut off and engine operates normally.

▶ If RUN lamp is turned on, battery “+” is output from G+ terminal, and operating power of gauge is supplied, and 6X operates, and so operating signal is sent remotely.

13.7. ENGINE STOP

- ▶ Press KEY2 button of remote controller for about 2sec..
- ▶ If starting button is released before 2sec., Engine does not start.
- ▶ During signal inputting of Transmitter, Remote lamp of ECU-RC2 keeps being turned on.

ETR : If electricity is supplied to Fuel Solenoid, engine operates, and if electricity is cut off to Fuel Solenoid, engine stops.

ETS : Engine stops when electricity is supplied to Fuel Solenoid.

If oil pressure switch is OFF, the power output is cut off. If oil pressure switch is not OFF, the power is output only for about 20sec. and cut off.

13.8. When engine operates normally, if engine protection circuit(over speed, high water temperature, low oil pressure) runs, engine stops.

14. CHANGING ENGINE MODE OF IDLE/RUN SPEED

14.1. Set REMOTE selection switch to REMOTE.

14.2. Using Transmitter, Start Engine.

14.3. If SW5 selection switch is set exactly, Engine runs in idle speed mode. If Engine runs in run speed mode, stop Engine, and change mode of GOV selection switch.

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14.4. If KEY3 button of Remote controller is pressed for more than about 1sec. in idle speed operation, Engine mode is changed to run speed mode, and Engine operates in run speed.

14.5. If KEY3 button of Remote controller is pressed for more than about 1sec. in run speed operation, Engine mode is changed to idle speed mode again.

14.6. If REMOTE selection switch is set as OFF in REMOTE mode, Engine stops.

15. Operating test of Engine and Generator protection devices (same at both local and remote operation)

▶ After operating protection device, both KEY S/W and Remote selection switch should be RESET as OFF.

15.1. OVER SPEED TEST

▶ Over speed test can be performed in all state.

▶ If OST(OVER SPEED TEST) PB is pressed during stop, Buzzer sounds, and RPM METER indicates OS value set at present.

▶ Both KEY S/W and Remote selection switch should be RESET as OFF.

▶ Changed OS value is applied.

15.1.1. Start Engine.

15.1.2. Confirm whether RUN lamp was turned on and whether RPM METER indicates normal RPM of ECU .

15.1.3. Press OST (OVER SPEED TEST) PB.

15.1.4. OSL lamp is turned on, and stop Engine.

15.1.5. Both KEY S/W and Remote selection switch should be RESET as OFF.

15.2. OPL (LOW OIL PRESSURE)

▶ Oil pressure switch is related to starter motor and stop output of ETS TYPE.

▶ If Oil pressure switch operates after starting, starter motor output is cut off, and if Oil pressure switch is "OFF" after stopping, stop output is cut off in ETS TYPE.

15.2.1. Start Engine.

15.2.2. Confirm whether RUN lamp of GCU was turned on and whether RPM METER is indicating normal RPM.

15.2.3. Earth OPS terminal.


15.2.4. Stop Engine.

15.2.5. Both KEY S/W and Remote selection switch should be RESET as OFF.

15.3. WTL (HIGH WATER TEMPERATURE)

15.3.1. Start Engine.

15.3.2. Confirm whether RUN lamp of ECU was turned on and whether RPM METER is indicating normal RPM.

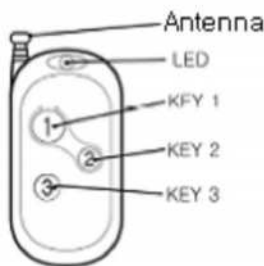
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- 15.3.3. Earth WTS terminal.
- 15.3.4. WTL lamp is indicated, and Engine stops.
- 15.3.5. Both KEY S/W and Remote selection switch should be RESET as OFF.
- 15.4. WLL (WATER LEVEL LOW)
 - 15.4.1. Start Engine.
 - 15.4.2. Confirm whether RUN lamp of ECU was turned on and whether RPM METER is indicating normal RPM.
 - 15.4.3. Open WLS terminal.
 - 15.4.4. WTL lamp is turned on and engine stops.
 - 15.4.5. Both KEY S/W and Remote selection switch should be RESET as OFF.

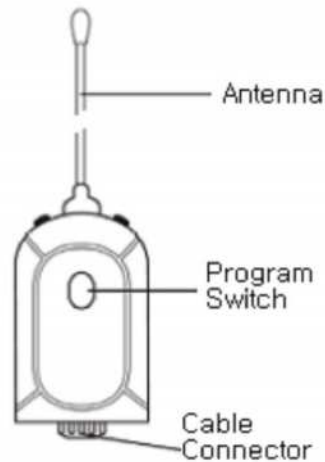
16. APPEARANCE OF REMOTE RECEIVER/TRANSMITTER AND HOW TO SET UP

16.1. APPEARANCE

1) Transmitter (FM)




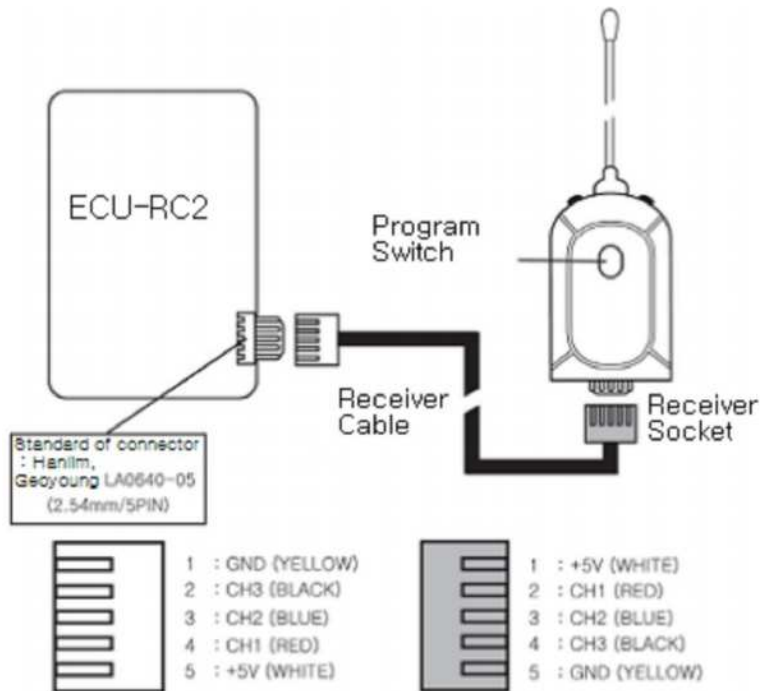
2) RF Receiver



- 16.1.1. KEY1 : Remotely starting key (When it is pressed for more than about 2sec., Engine starts.)
- 16.1.2. KEY2 : Remotely stopping key (When it is pressed for more than about 2sec., Engine stops.)
- 16.1.3. KEY3 : Selection key of engine run/idle speed (When it is pressed for more than about 1sec., Engine operates in idle/run speed.)

16.2. RECEIVER

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16.3. SETTINGS

16.3.1. When Program Switch at the front of receiver is pressed five times consecutively, LED blinks once.(registration mode of Remote controller's code)


16.3.2. Transmitter remote controller can be registered to max 10 devices. When KEY1 of transmitter remote controller is pressed, code is input to receiver, and LED in receiver blinks once. If you want to register more remote controllers, please press KEY1 within 5 sec and then code is added to receiver.

16.4. FEATURES

16.4.1. Transmitter can be registered to max 10 devices. Receiver's waiting time for registration is within 5 sec. When current transmitter is registered, automatically 5 sec is added, and so you have enough time to register max 10 transmitters correctly.

16.4.2. When Program Switch of Receiver is pressed once in registering Transmitter, LED blinks twice, and then input mode is canceled without 5sec. passing.

16.4.3. In case of additional registration of Remote controller, the previous registrations are deleted, so you should register all remote controllers to

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use at one go.

16.4.4. Additional switch input cannot be received while Transmitter Switch is pressed, because the same frequency bend is used.

16.4.5. When receiver operates as usual, LED lamp of Receiver does not blink.

17. ABBREVIATIONS

17.1. ECU-RC2 : ENGINE CONTROL UNIT

17.2. MPU : MAGNETIC PICKUP

17.3. ETS : ENERGIZED TO STOP, fuel line is closed when Engine stops

17.4. ETR : ENERGIZED TO RUN, fuel line is opened when Engine runs

17.5. RPM : Tachometer

17.6. 5S : Stop Solenoid

17.7. 86X : Operation relay in case of heavy faults input.

17.8. 6X : IDLE SPEED relay

17.9. 13X : Heavy speed detecting relay

17.10. IRX : Governor relay to select idle/run speed mode