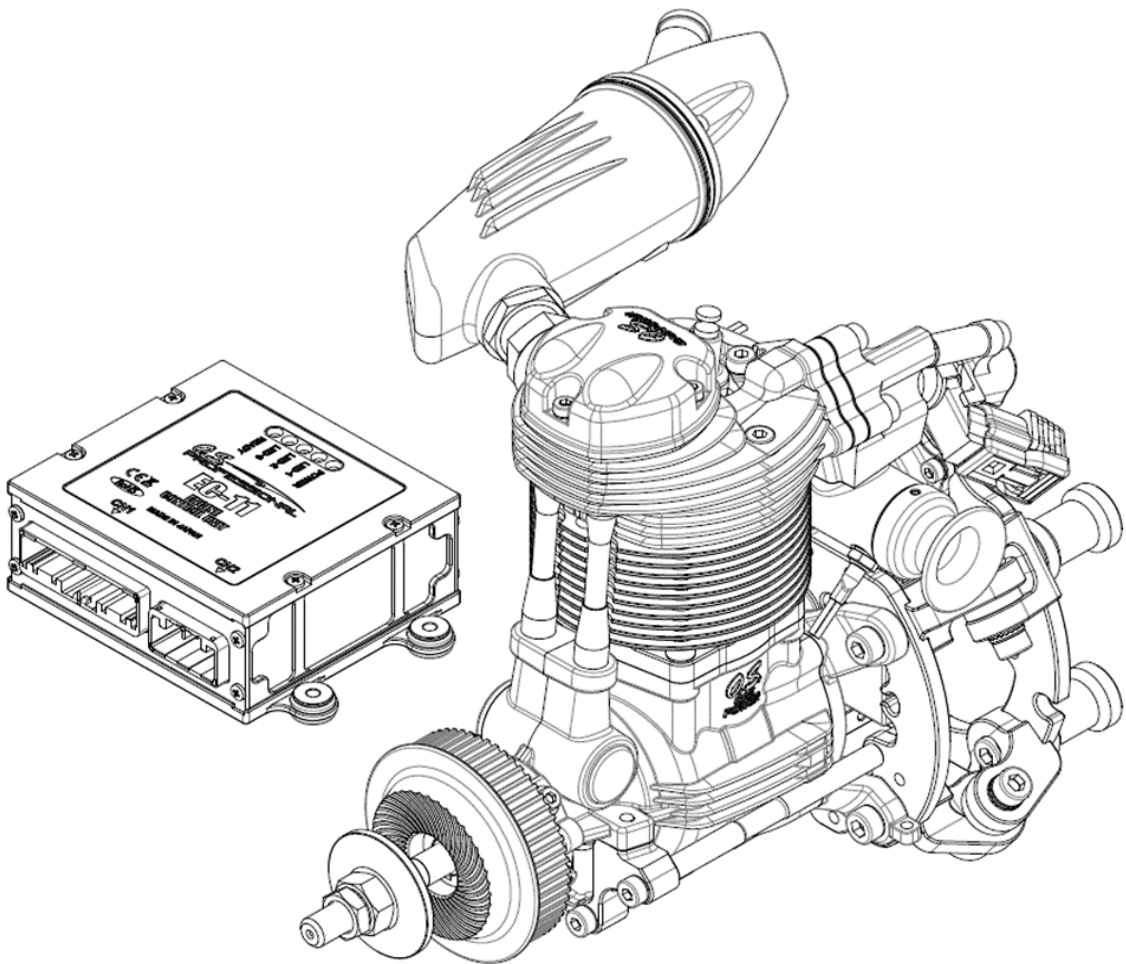**4 stroke gasoline engine for UAV**

GF40U-FI
With EC11 (ECU)
3AD03

INSTRUCTION MANUAL

version 3.0E
2022.12.01

O.S. ENGINES MFG. CO., LTD.

Table of contents

・ Please read this instruction manual and all attached instructions carefully before handling the engine.

【ENGINE】
・The engine is equipped with electronic fuel injection system to correspond to environmental changes during a long flight.
・This is a four stroke gasoline engine, but runs on a premixed gasoline/2-stroke engine oil.
・Use high quality commercially available 2-stroke engine oil.
・Follow the oil manufacturer's recommedation concerning the mixture ratio of gasoline and oil. In case of no recommendation by manufacturer, use a 30 : 1 gasoline-to-oil mixture.
・The engine runs counter-clockwise when viewed from the front.
・Recommended propellers are 18x6-12，19x6-10，20x6-8 (DxP Inch). We recommend a propeller whose rpm is within range of 7500rpm～9000rpm at full throttle.
・Start the engine with a safety stick or an electric starter (recommendation for safety reason).
・Periodical inspection after 50, 100 hours are necessary. Follow the maintenance manual, which is separately provided.

【ECU (Engine Control Unit)】
・The EC-11 is an engine control unit (ECU), which contains a 32-bit CPU. It collects the data of throttle opening, rpm, induction manifold pressure, atomospheric pressure, induced air temperature, cylinder head temperature and run the engine in the most suitable condition.
・ECU internal information such as engine speed, cylinder head temperature, throttle opening, fuel pressure, etc. can be output to the outside of the ECU in real time by CAN and serial communication.
・The EC11-LINK software, which enables to change the parameters and to monitor the data in real time in Windows® platform, is included as a standard accessory.

CAUTION：
・After overhauling the engine, after disconnecting the throttle linkage, reset the throttle position using the EC11-LINK.

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*The specifications are subject to alteration for improvement without notice.
*Consult us for any questions on this product and return for repair.
*This instruction manual was created bThis instruction manual was created based on the product specifications as of December 2022.

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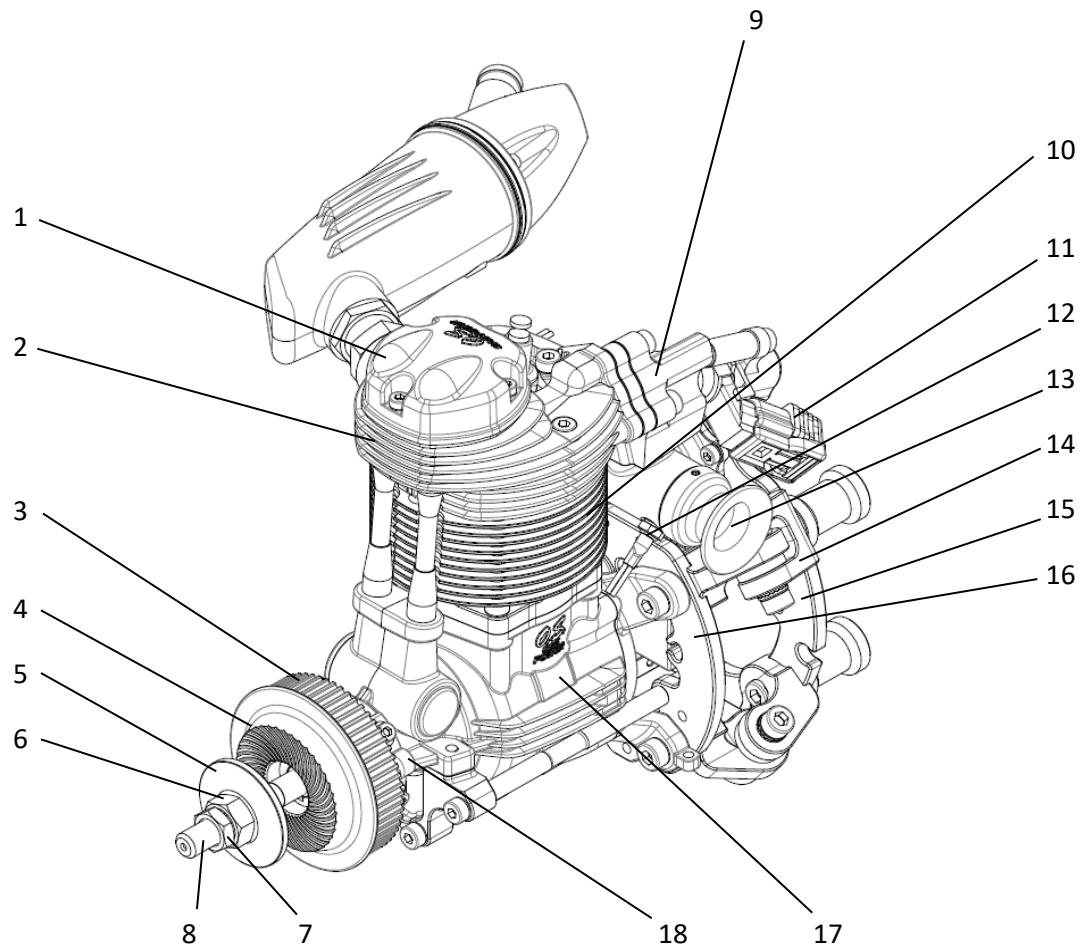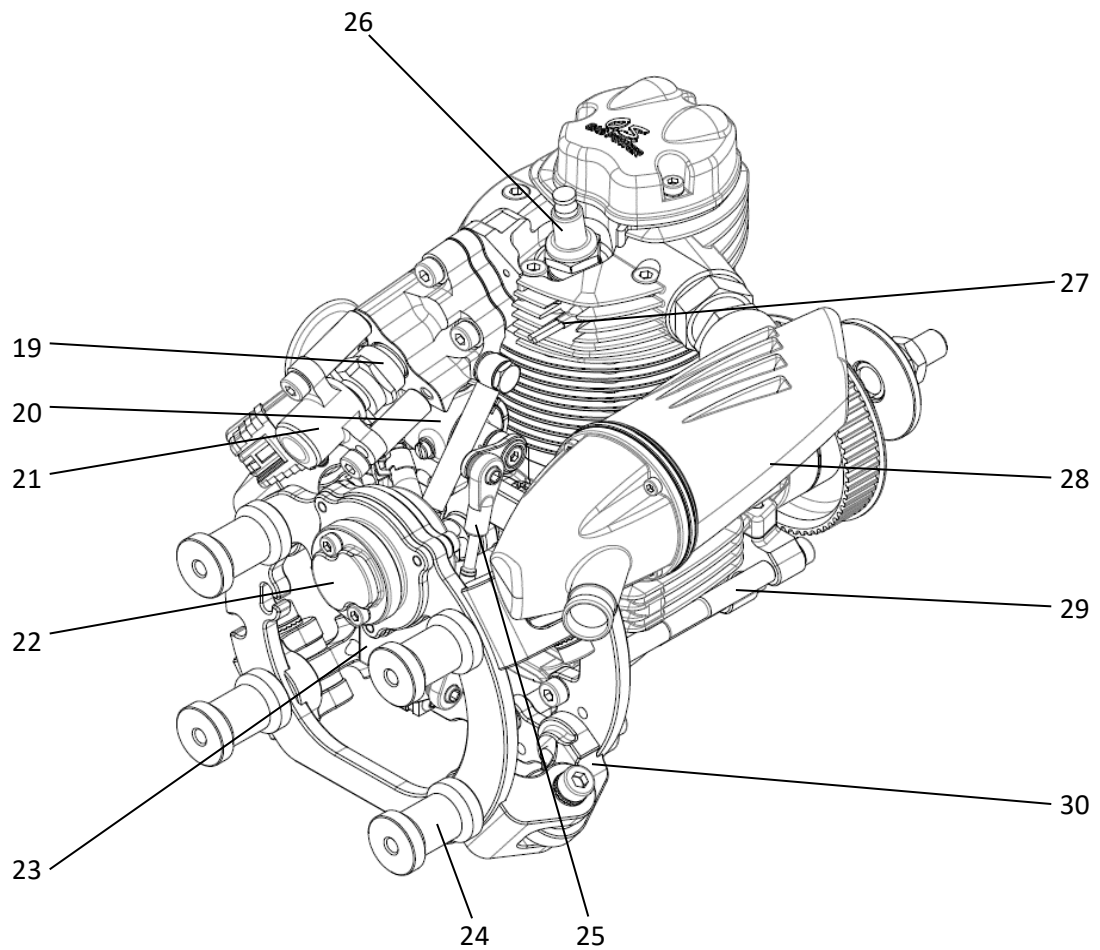
1. Rocker cover
2. Cylinder head
3. Drive pulley (for generator drive)
4. Drive hub
5. Propeller washer
6. Propeller nut
7. Lock nut
8. Crankshaft
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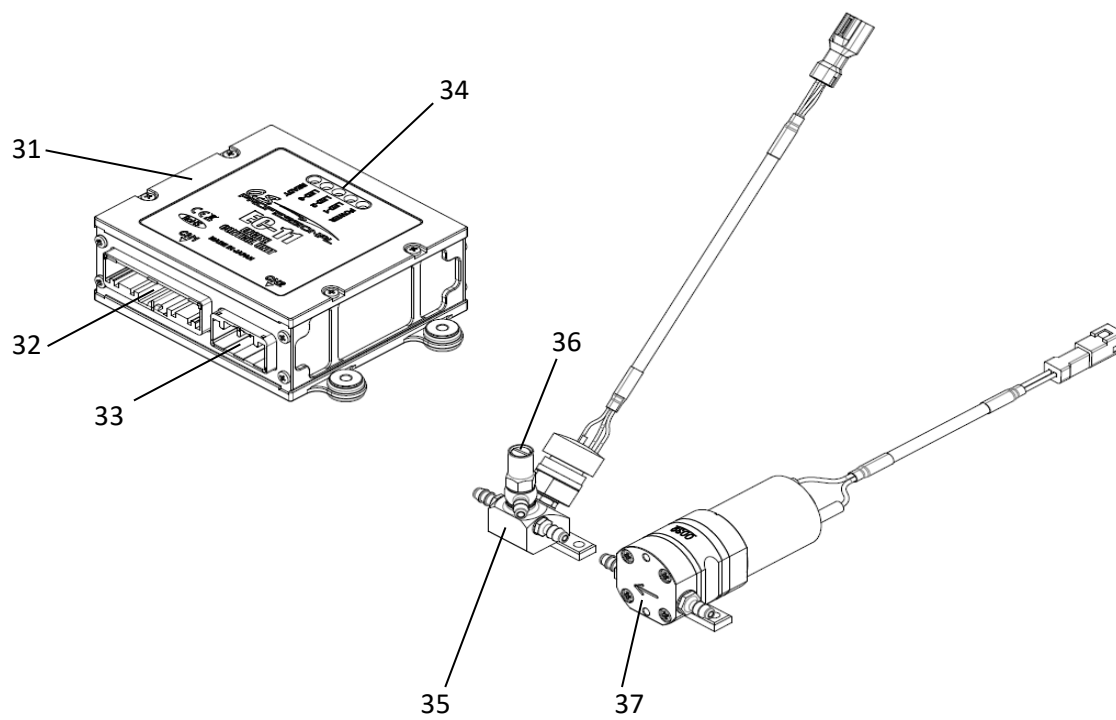
31. Engine control unit (ECU)
32. ECU connector [CN1]
33. ECU connector [CN2]
34. Status display LED
35. Fuel pressure sensor unit
36. Pressure release valve
37. Fuel pump unit

【ECU】Model：IG-11
・Engine Control Unit(ECU)

【ECU WIRING HARNESS】
・Wiring harness that connect ECU and the engine.

【PUMP CONNECTION CORD】
・Connect the ECU to the fuel pump and fuel pressure sensor unit.
・Install the fuel pump and fuel pressure sensor unit near the fuel tank.

【Power supply code】
・Supply power.
・DC10V～17V(MAX1.5A)
・(Red+/Black-)
・Connector is JST SMP-02V-BC

【CAN communication code】
・the connector for CAN communication.
・Connector is JST SMR-04V-B
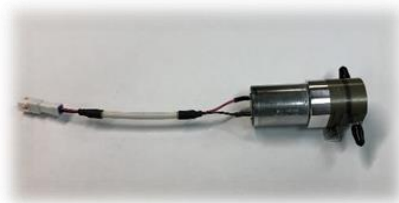
【FUEL PUMP UNIT】Model：PM-02
・Fuel is pumped from the tank.

【FUEL PRESSURE SENSOR UNIT】Model：SP-01
・Comes with a sensor that measures fuel pressure and a RELEASE VALVE that bleeds air.

【Igniter】Model:IG-08A
・The red connector is a power connector. Supply DC6V～12.6V (MAX1A) for operation. The ignitor requires a separate power source from that of the ECU. Install a power switch outsidfe of a fuselage between Ignitor and power source for safety.
・Connect the black connector to Ignition signal cable of ECU

【Spark plug】Model:NGK CM-6
・Screw into the engine's cylinder head.
・NGK CM-6 Spark plug.
・the hexagon size is 14mm.
・Tightening torque is 12N・m

【Connector lock】(3PCS)
・For crankshaft rotation sensor, the power connector of Igniter, and Ignition signal connector to prevent connectors from disconnecting.

【FLUORINE (ETFE) RESIN TUBING】(2m)
・ Be sure to use this high pressure fuel tube for the fuel tube where positive pressure is applied.
・ We also sell as parts.
  Code No.28382303 FLUORINE(ETFE) RESIN TUBING (2m)

【Hose clamp】(6PCS)
・To be used to fix pressurized tubes to joints.

【Non-bubble weight】
・Non-bubble weight to be used in a fuel tank to avoid air bubbles in fuel line.
* For details on how to use, see the section on mounting in the manual.

【Fuel filter】
・Inline fuel filter to be used between a fuel tank and a pump. The arrow mark shows the direction of fuel flow.
* For details on how to use, see the section on mounting in the manual.

【F-6040 Silencer】Model：F-6040
・Silencer.
・The pipe thread size is M16 pitch 1..

【Socket wrench (SST)】
・A special tool for attaching and detatching the temperature sensors. (intake air temperature sensor and cylinder head temperature sensor)
・Attach this tool to 1/4"(6.3mm) Socket wrench handle. (Socket wrench handle is not included in this set)

【Serial signal converter】
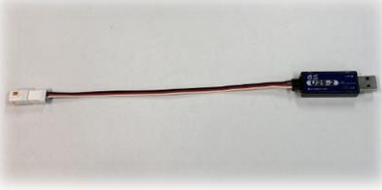
・To be used to convert UART serial signal from ECU to USB serial signal when ECU is connected to a computer.

■Cap screw (Hex socket head bolts)

screw size	N･m
M2.6	1.1
M3.0	1.5
M4.0	3.6
M5.0	7.2

※ Follow the above tightning torque unless otherwise specified.
※ However, please note that there are places where the specified torque is used instead of the standard tightening torque.

Standoff mount

Standoff mount

Firewall

4-M5x0.8 Thread depth 13 or more

54mm

70mm

Aluminum(A2017)made
⌀18 recommended

min20 (25 to 30 mm recommended)
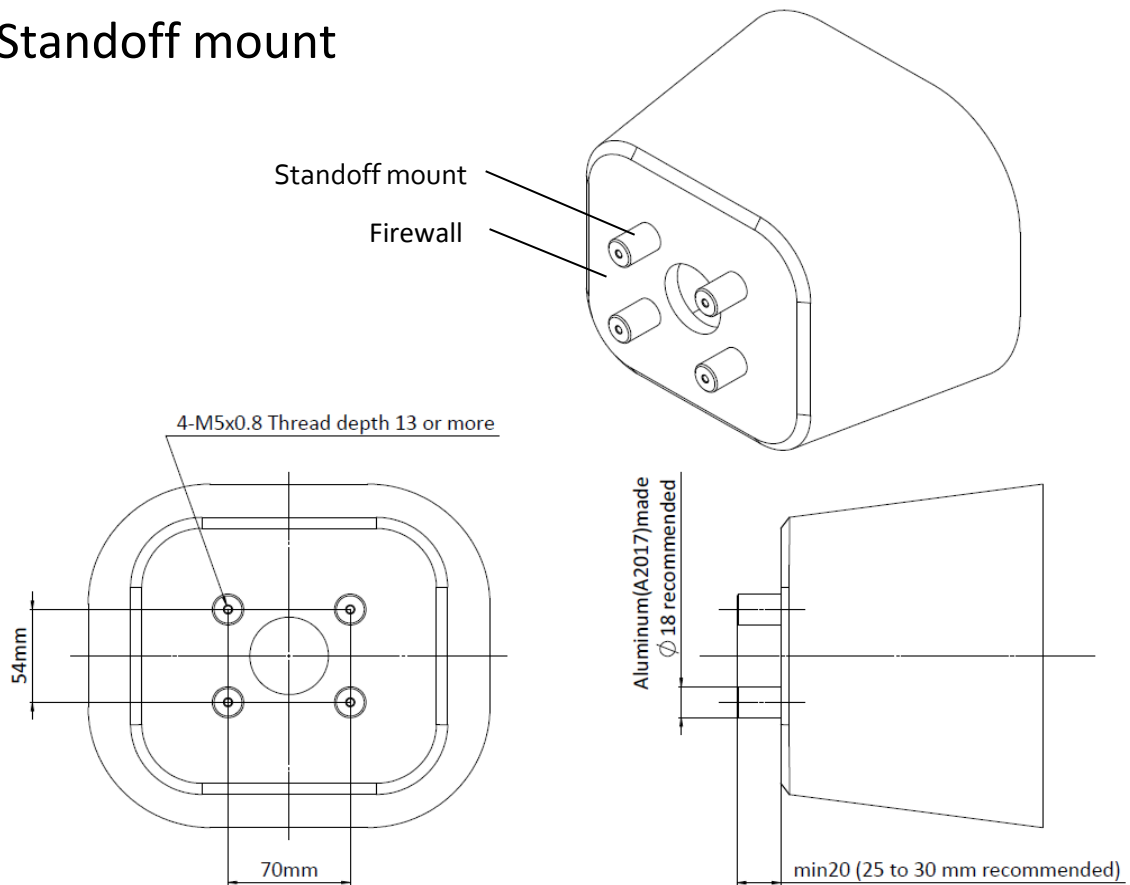
・Drill holes as shown above and bolt the engine to the firewall with standoff mounts and M5 bolts.

・Use standoff mounts with 18mm or more outer diameter made of A2017 aluminum or stronger material.

・Use 25mm in length standoff mounts to be able to detatch the injector connector, to space the engine from the fire wall.

・We recommend standoff mounts tobe within 25-30mm length.

Mounting plate (R)

Mounting plate(R)

Standoff mount

M5x20 Bolt
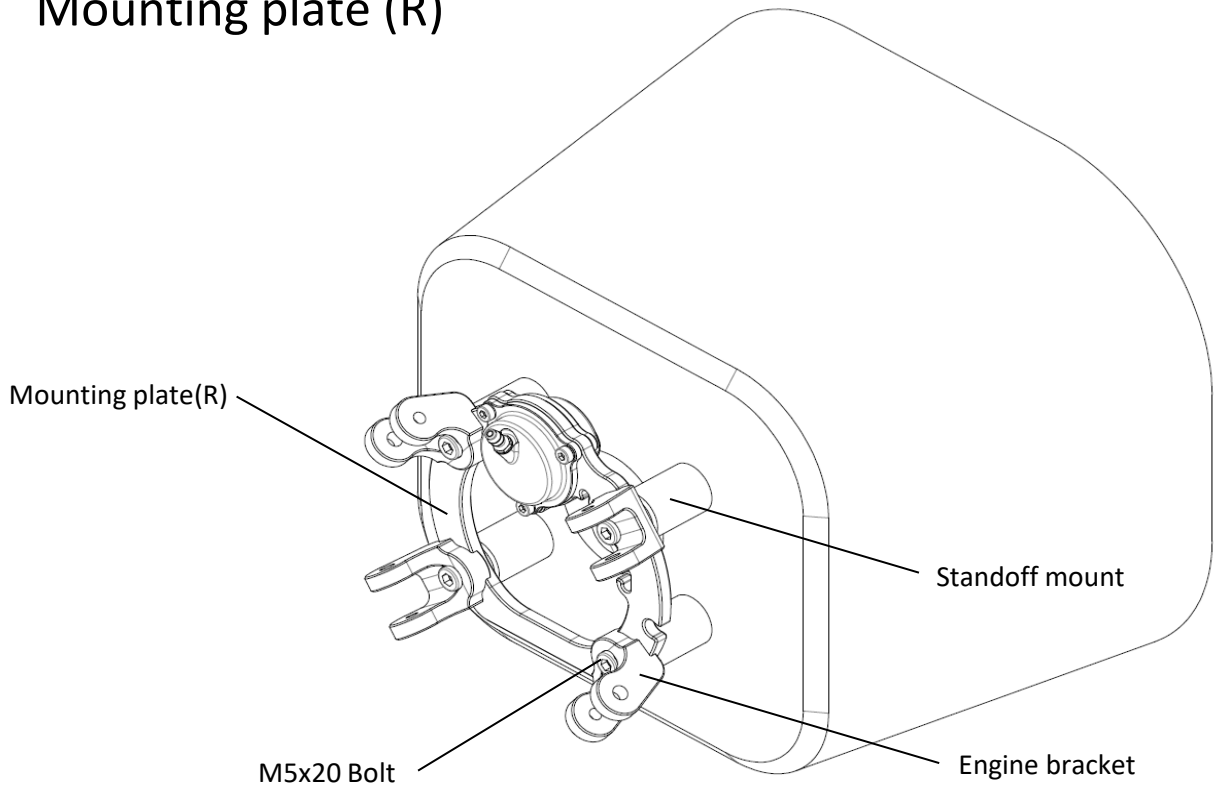
Engine bracket

・Attach Mounting plate(R) to the Standoff mounts with M5x20 cap screws.

・There are two types of Engine brackets: Engine bracket A and B are different in direction of Engine support bolts. Choose the proper engine bracker (A or B) to use on the Mounting plate (R) as shown below.

Engine bracket　A

Engine bracket　B

Threaded hole

Unthreaded hole

Engine support bolt

Unthreaded hole

Threaded hole

Engine bracket　B

Engine bracket　A

Engine support bolt

Add the pair of Nord-Lock Washers to the support bolt.
Check this step very carefully. The key faces on inner surface,
 and radial teeth on the outer suraface.
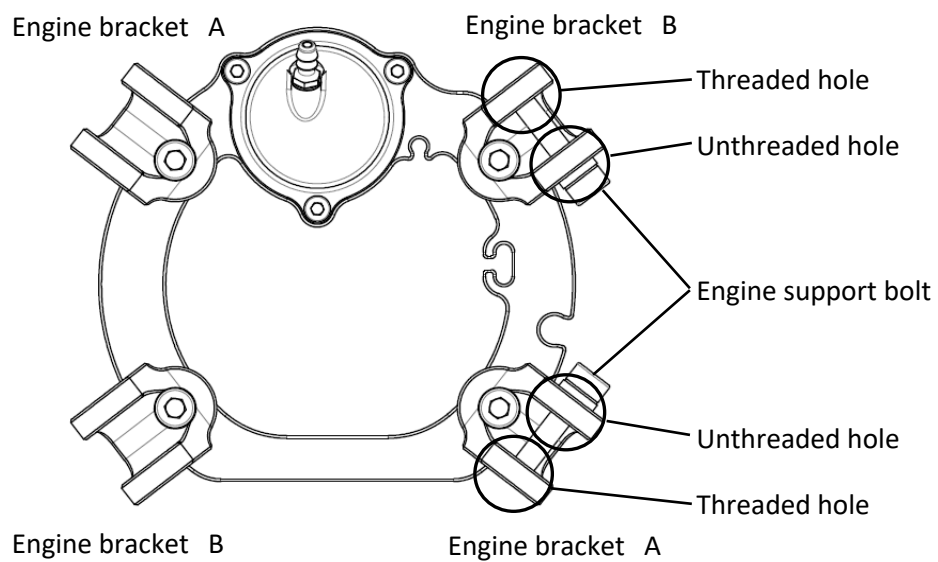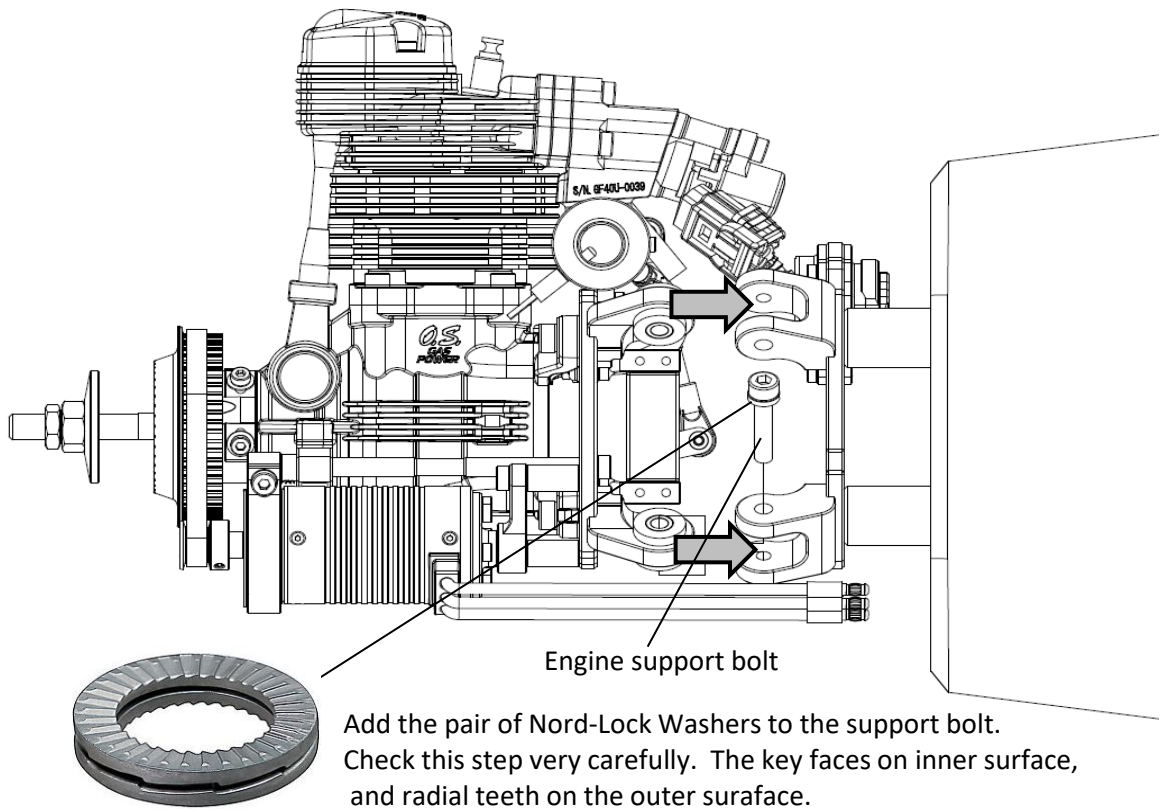
・Fit the engine to four Engine brackets simultaneously.

・Fasten the four engine support bolts only hand tight at first to align the engine. Then tighten the bolts with a hex wrench.

・Fasten the engine support bolts next. Do not forget to use Nord-Lock washers otherwise engine vibration will loosen the bolts and cause a failure.

・Make sure of the Manifold pressure tube is installed as shown below.

The tube to measure the manifold pressure
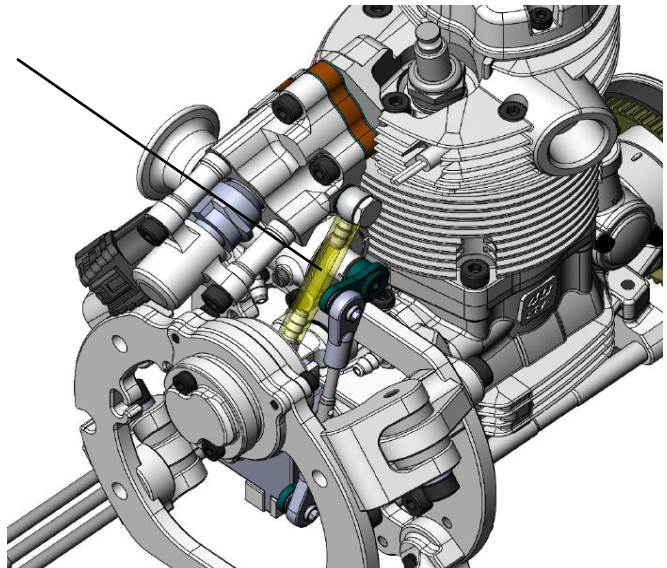
Mounting & Dismounting

・When the fuel tubes are disconnected, open the Pressure release valve and release the residual pressure in the fuel system.

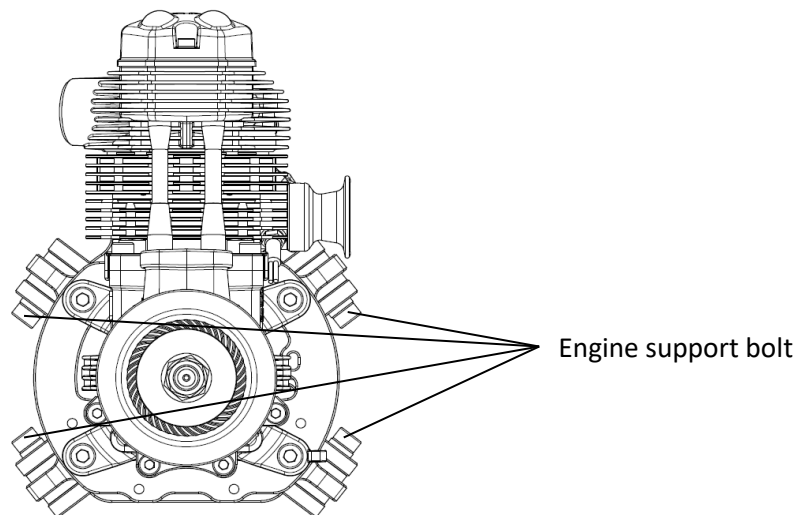・Remove the four engine support bolts shown below. Disconnect the cable connectors and the fuel tubes before removing the bolts. After removing the bolts, disconnect the Manifold pressure tube to separate the Engine mount from the Engine brackets.

Engine support bolt

・If it is difficult to remove the engine with the engine bracket due to your layout, remove the four bolts (M5 x 20) circled in the drawing below. Disconnect the cable connectors and the fuel tubes before removing the bolts. After removing the bolts, disconnect the Manifold pressure tube to separate the Mounting plate(F) from the Engine mount.

Engine bracket

Manifold pressure tube

Engine mount
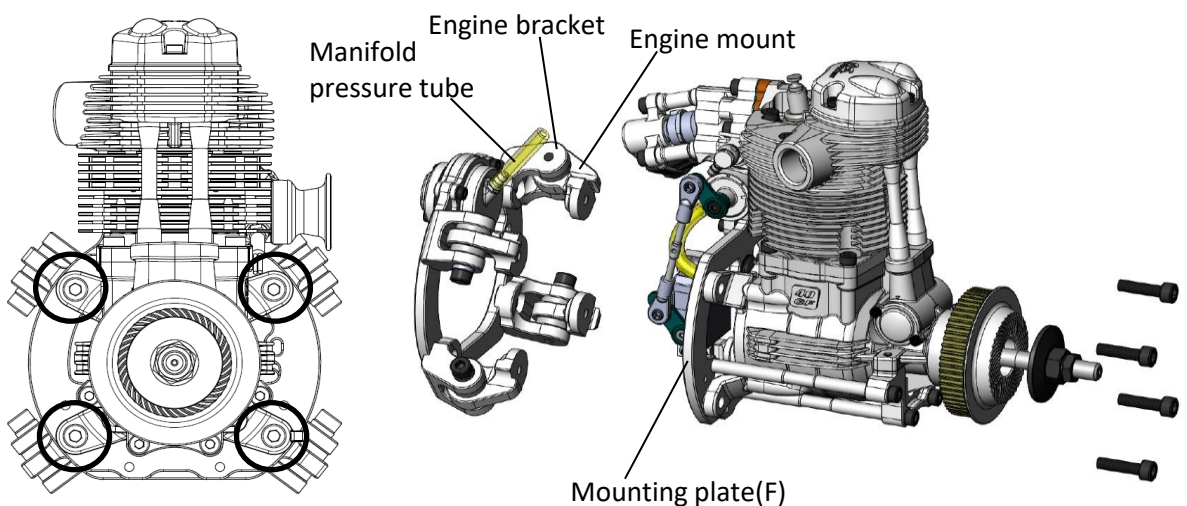
Mounting plate(F)

・Follow the procedures shown on the next page to mount the engine again.

How to tighten the screws

・When the Mounting plate(F) and the Engine mount are detached and are attached again, follow the procedures below to avoid giving uneven tension to the Reinforcement beams.
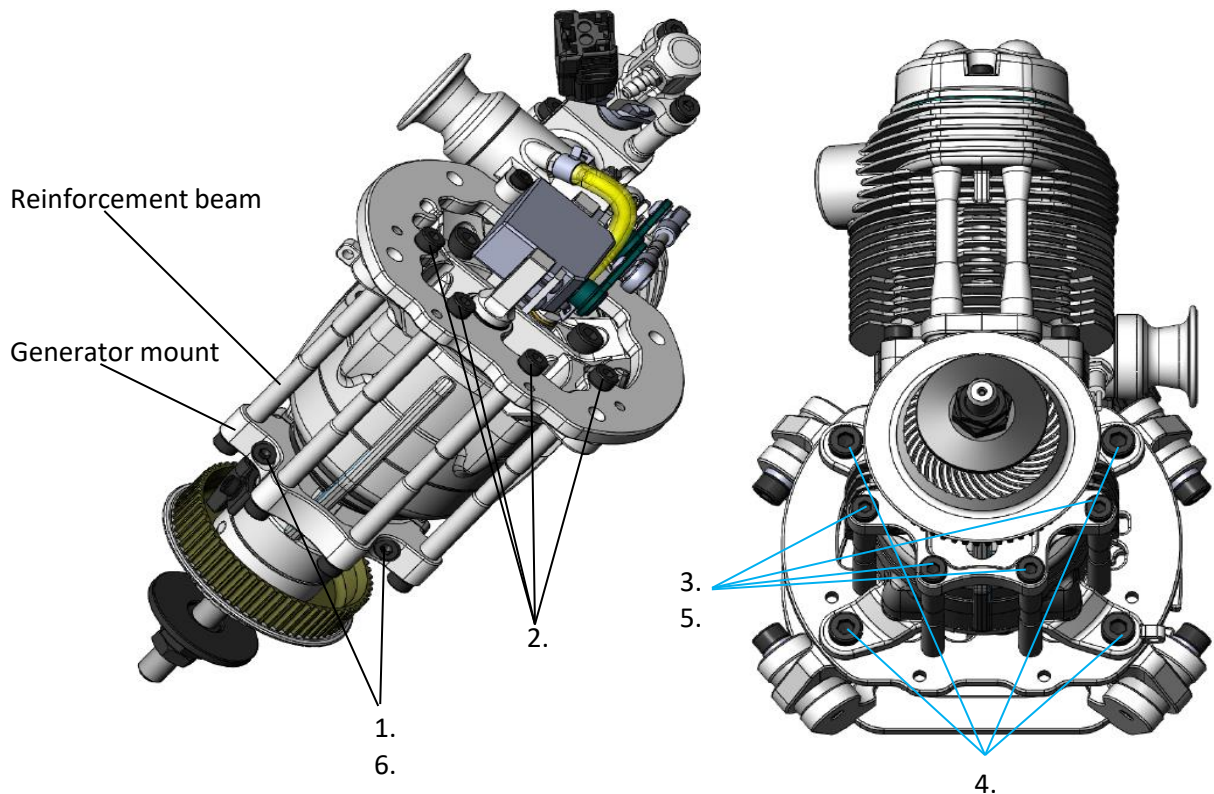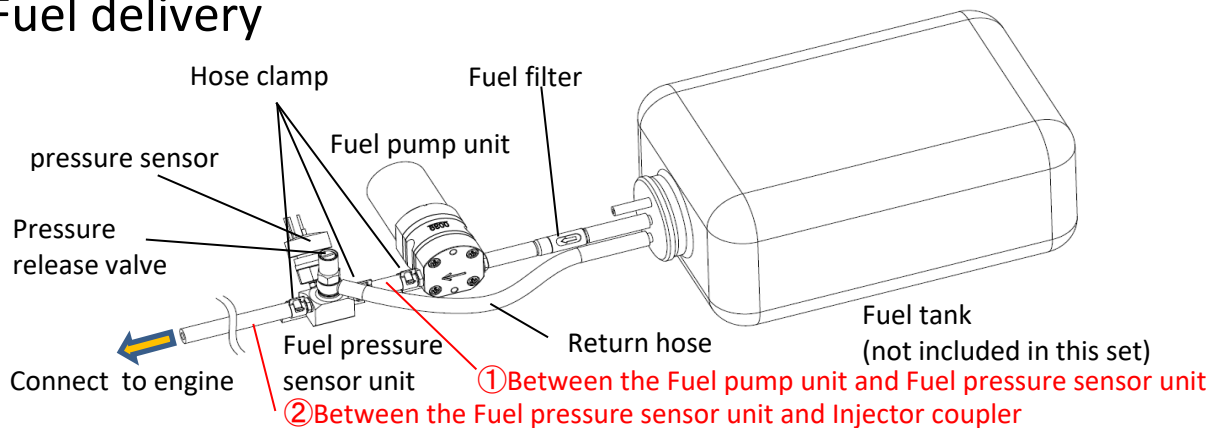
1. Loosen the two bolts, which are connecting the Generator mount and the Engine crankcase to make it possible to move the Generator mount. Keep them loose until the following Step 6.

2. Tighten the 4 bolts (M4 x 10) on the rear of the Reinforcement beams if you loosened them.   It is difficult to tighten them later in the process. Tighten the 4 bolts on the front of the reinforcement beams temporarily so that the Reinforcement beam and the front bolt does not turn together when you tighten the rear bolt.

3. Loosen the four bolts (M4 x 15) temporarily, which are fixing the Reinforcement beams from the front.

4. Tighten the four bolts (M5 x 20) to fix the engine to the mount.

5. Tighten the 4 bolts on the front of the Reinforcement beams again. Tighten them even if you are going to mount the Generator later on.

6. Tighten the 2 bolts loosened in the above Step 2.

7. Connect the Manifold pressure tube.

8. Follow the procedure in Page 13-14 When you mount the Generator.

Reinforcement beam

Generator mount

3.
5.

2.

1.
6.

4.

Fuel delivery

Hose clamp   Fuel filter

pressure sensor   Fuel pump unit

Pressure
release valve

Fuel tank
(not included in this set)

Connect to engine   Fuel pressure   Return hose
sensor unit   ①Between the Fuel pump unit and Fuel pressure sensor unit
②Between the Fuel pressure sensor unit and Injector coupler

・Connect the Fuel pump unit and the Fuel pressure sensor unit close to the Fuel tank.
・Use a Fuel filter between Fuel tank and Fuel pump unit
・Fuel pump unit creates 300kPa pressure. Apply a hose clamp to each hose joint.
・Be sure to use [Code No. 28382303 FLUORINE (ETFE) RESIN TUBING (2m)] for piping between the fuel
pump unit and engine(①&②), through which pressurized fuel passes.

・Connect the Pressure release valve nipple to the Fuel tank with a Return hose.

Fuel tank 【Example piping】

Teflon rubber tube

Air vent
Connect fuel pump
Connect return hose
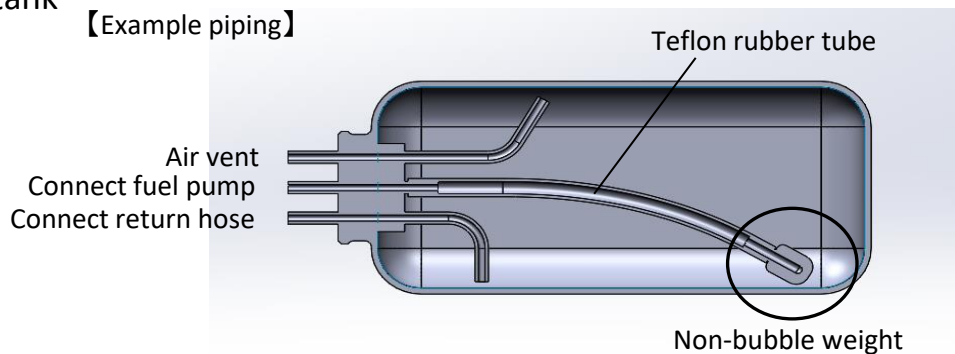
Non-bubble weight

・Use a Non-bubbleweight in the tank to avoid creating air bubbles in the fuel supply tube. Air bubbles
may cause engine misfire and stalling.

・Connect the tubes in the fuel tank firmly to the pipes in a fashion in which they will not easily come off.
Use clamps or wire ties if necessary.

Fuel pump

Hose clamp

Connect
Fuel pressure
sensor unit

Connect fuel tank
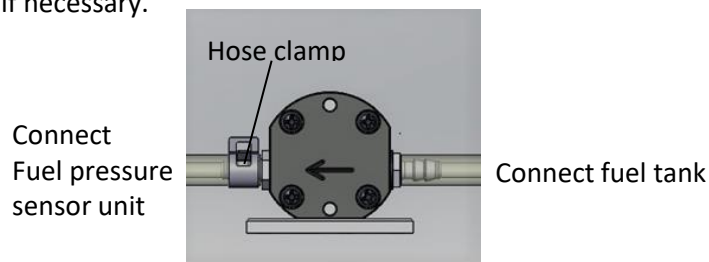
・The arrow mark shows the direction of fuel flow.
・ Apply a hose clamp to the pressurized side of the hose.

・A one-way valve is built in the fuel pump so pressure remains in the fuel supply line even after stopping
the pump. Open the Pressure release valve to remove residual pressure.

Fuel pressure sensor unit

Hose clamp   Pressure release valve

Hexagon head

Valve holder

A

B

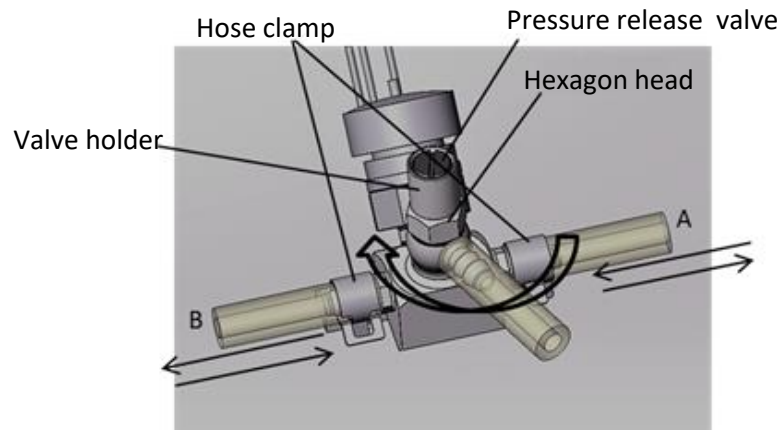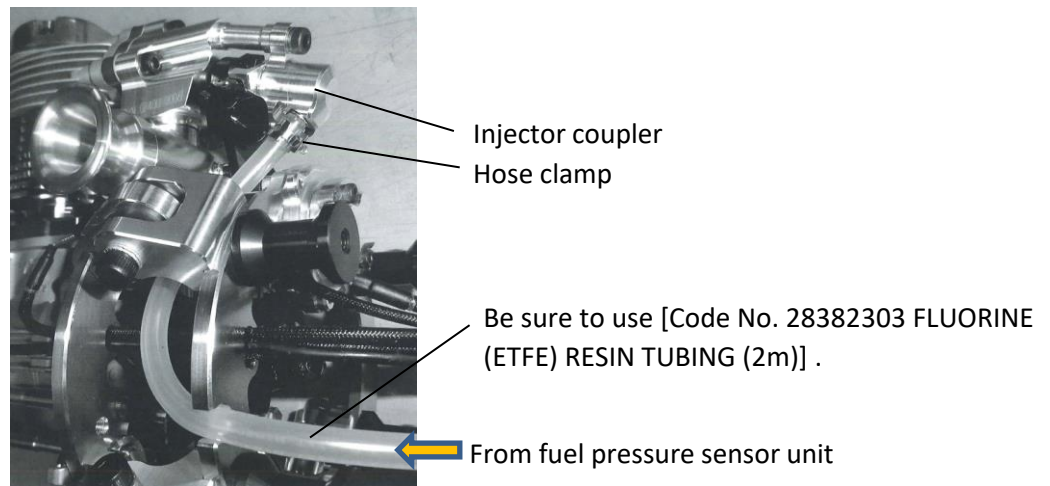・The Pressure sensor works both from A to B and B to A. Decide the mounting direction according to your fuselage layout. Apply Hose clamps to both sides of the Pressure sensor.

・To change the direction of Pressure release valve nipple, loosen the Hexagon head with an 8mm wrench. Tighten the Hexagon head again after deciding the direction.

・If there are air bubbles in the tube between the fuel tank and the fuel pressure sensor unit after filling up the fuel tank, when the ECU switch is turned on for the first time, open the valve until the screw top becomes flush with edge of the valve holder as shown below. After eliminating the air bubbles, close the valve. Do not open the valve more than the flush position to avoid the pressurized fuel from coming out of the valve.

・Air bubbles beween the Fuel pressure sensor unit and the engine (Injector) are of no concern as they do no harm since they are discharged through the Injector.

Pressure release valve (slotted screw)

Do not open past this line.

Valve holder
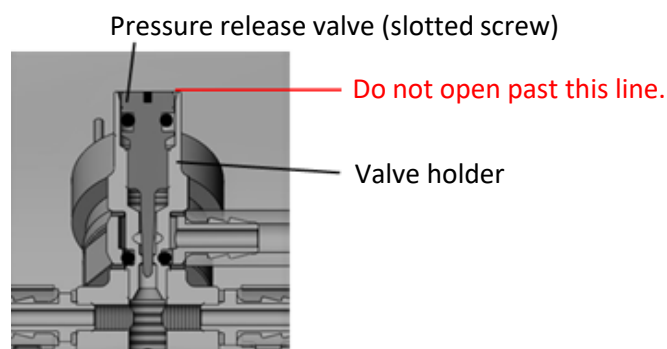
・Release the residual pressure in the fuel system after a days use to avoid fuel expanding the fuel joints and causing leaks.

Injector coupler
Hose clamp

Be sure to use [Code No. 28382303 FLUORINE
(ETFE) RESIN TUBING (2m)] .

From fuel pressure sensor unit

・Connect the tube from the Fuel pressure sensor unit to the Injector joint nipple. Use a Hose clamp. It is a must.

・Once a tube is connected to a nipple, an end of the tube is expanded and deformed. Cut the end when you use the same tube again.

CUT
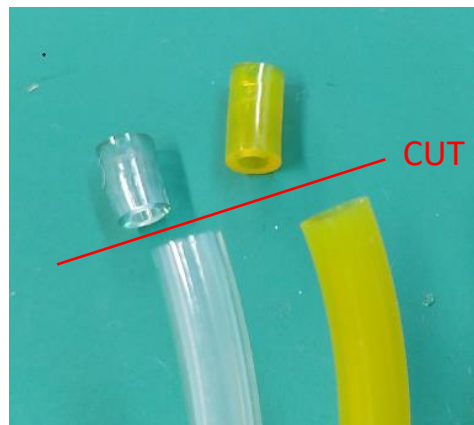
・Cut off an end of the tube when it is difficult to pull out from a nipple. Do not pull and twist the tube strongly to pull it out. Do not give damage to a nipple when you use a nipper or a knife to cut the end of the tube.

CUT
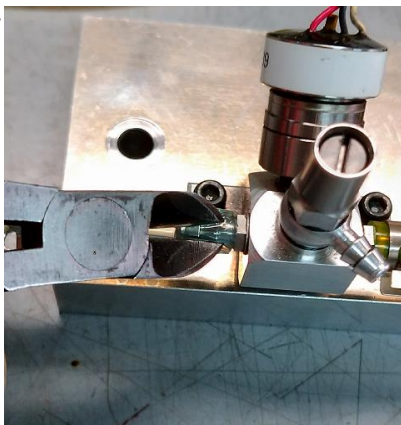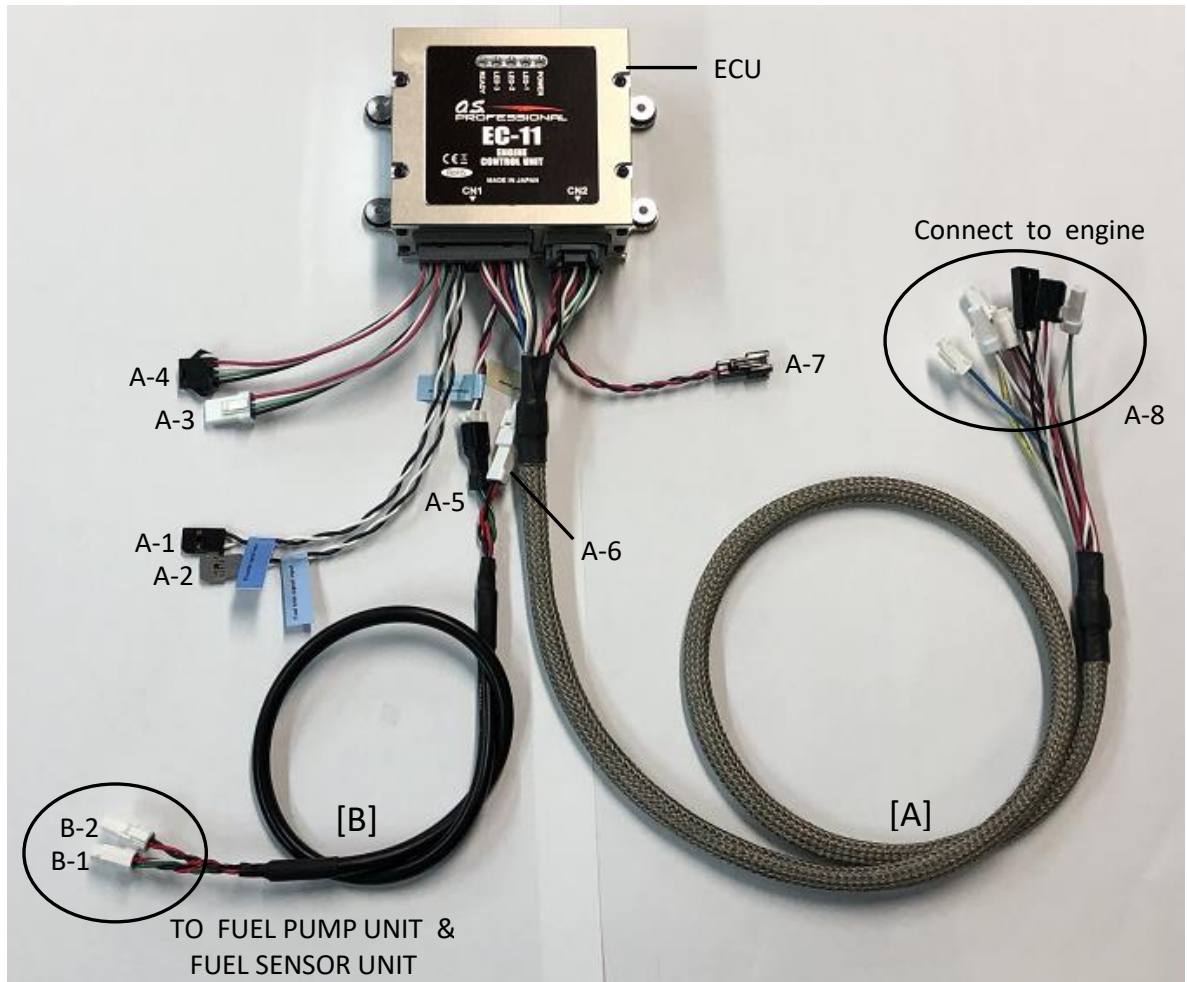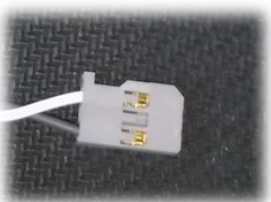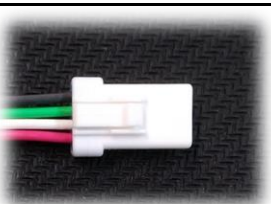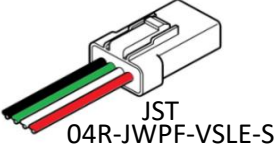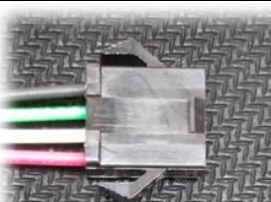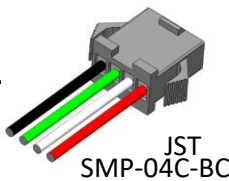
[A] Wiring harness
- A-1 ・ Throttle signal input (PWM VIH=2.6V, VIL=0.4V, MAX5.5V)
- A-2 ・ Fuel trim signal input (PWM VIH=2.6V, VIL=0.4V, MAX5.5V)
- A-3 ・ Serial communication (UART, TTL logic level is 3.3V)
- A-4 ・ CAN communication
- A-5 ・ Fuel pressure sensor
- A-6 ・ Fuel pump
- A-7 ・ Power supply (DC10V～17V, MAX 1.5A)
- A-8 ・ Cylinder head temperature sensor
  - ・ Intake air temperature sensor
  - ・ Injector
  - ・ Throttle servo
  - ・ Ignition signal
  - ・ Crankshaft rotation sensor
  - ・ Manifold air pressure sensor

[B] pump connection cord (extendable)
- B-1 ・ fuel pressure sensor
- B-2 ・ fuel pump unit

[A]	A-1	Throttle signal input	・To be connected to a receiver or throttle signal cable from flight controller. **Specification**　　PWM signal Set the travel width so that the PWM signal width is 1100 μs or less on the throttle closed side and the PWM signal width is 1900 μs or more on the throttle opening side. [W：Signal ／ B：GND] VIH=2.6V, VIL=0.4V, MAX5.5V
	A-2	Fuel trim signal input	・In case manual adjustment of fuel injection is necessary, connect to a receiver or fuel injection signal cable from flight controller. ・ECU controls quantity of fuel injection normally, so correction signal from the outside is not necessary.　Leave it unconnected or connect 1520μs (neutral) PWM signal.When pulling out during operation, it holds the state just before. **Specification**　　PWM signal　　1520μs (neutral) ±420μs PWM + →increase fuel supply The range of increase and decrease is ±30%. [W：Signal ／ B：GND] VIH=2.6V, VIL=0.4V, MAX5.5V
	A-3	Serial communication	・the connector for serial communication ・To be used to monitor parameters or to connect to a computer for initial setting. **Specification**　　UART(TTL logic level is 3.3V.) [R：DC+5V ／ W：TX ／ G：RX ／B：GND] JST 04R-JWPF-VSLE-S
	A-4	CAN communication	・the connector for CAN communication **Specification**　CAN JST SMP-04C-BC [R：DC+5V ／ W：Signal(High) ／ G：Signal(Low) ／B：GND]
	A-5	Fuel pressure sensor	・To be connected to Fuel pressure sonsor via Pump connection cord. **Specification**　Pressure sensor [R：DC+5V ／ W：Signal ／ B：GND]
	A-6	Fuel pump	・To be connected to Fuel pump via Pump connection cord. **Specification** [R：DC+12V ／ B：GND]
	A-7	Power supply	・Supply power. **Specification**　　DC10V～17V (MAX 1.5A) [R：Power supply ／ B：GND]

[A]	A-8	**Injector**	・To be connected to Injector harness. **Specification** [W：DC+12V ／ G：GND (open-drain)]
	A-8	**Throttle servo**	・To be connected to Throttle servo. **Specification** [W：Signal ／ R：DC+5V ／ B：GND]
	A-8	**Crankshaft rotation sensor**	・To be connected to Crankshaft rotation sensor. **Specification**　Hall-effect switch. [W：Signal ／ R：DC+5V ／ B：GND]
	A-8	**Ignition signal**	・To be connected to the rotation signal input cable of Igniter. **Specification** [W：Signal ／ B：GND]
	A-8	**Manifold air pressure sensor**	・To be connected to Manifold pressure sensor. **Specification**　Negative pressure sensor [W：Signal ／R：DC+5V ／ B：GND]
	A-8	**Intake air temperature sensor**	・To be connected to the temperature sensor of the intake port of the throttle valve. **Specification**　PT100 Platinum resistance thermometer [L：No polarity ／ W：No polarity]
	A-8	**Cylinder head temperature senso**	・ To be connected to the temperature sensor of the cylinder head. **Specification**　PT100 Platinum resistance thermometer [Y：No polarity ／ W：No polarity]

[B]	**B-1**	Fuel pressure sensor	・To be connected to Fuel pressure sensor. **Specification**　Extension cord [R-W：DC+5V ／ G：Signal ／ B-W：GND]
	B-2	Fuel pump	・To be connected to Fuel pump. **Specification**　Extension cord [R：DC+12V ／ B：GND]
	(A-5)	Fuel pressure sensor	・To be connected to (A-3). **Specification**　Pressure sensor (Fuel pressure sensor) [R-W：DC+5V ／ G：Signal ／ B-W：GND]
	(A-6)	Fuel pump	・To be connected to (B-2). **Specification**　Extension cord (Fuel pump) [R：DC+12V ／ B：GND]

Wiring color	
R	**Red**
W	**White**
B	**Black**
G	**Green**
Y	**Yellow**
L	**blue**
GY	**Gray**
BR	**Brown**
-W	**White Stripe**

・Using EC11-LINK, you can monitor the parameter data in real time and change the parameters.
After overhauling the engine, after disconnecting the throttle linkage, reset the throttle position
using the EC11-LINK.

【EQUIPMENT YOU NEED】
・PC with Windows® (7/8.1/10) and USB port. The included U2S-2 (serial signal converter) uses an FTDI
chip, the driver is registered in Windows® Update. Therefore, in internet environment, the driver is
automatically downloaded and installed by connecting the USB serial converter to the PC. Install the
driver in advance in an internet environment.

【INSTALLATION OF THE SOFTWARE】
・Copy the EC11-LINK_xxxx.exe(xxxx:Version number) file to any file in the PC, then execute the file.
・When you intend to delete the software, just delete the EC11-LINK_xxxx.exe file.

【CONNECTING】
 ・ Connect the 4-pin connector of U2S-2 to the ECU's serial communication connector (A-3).

 ・ Connect the U2S-2 main unit to the USB port of the PC.
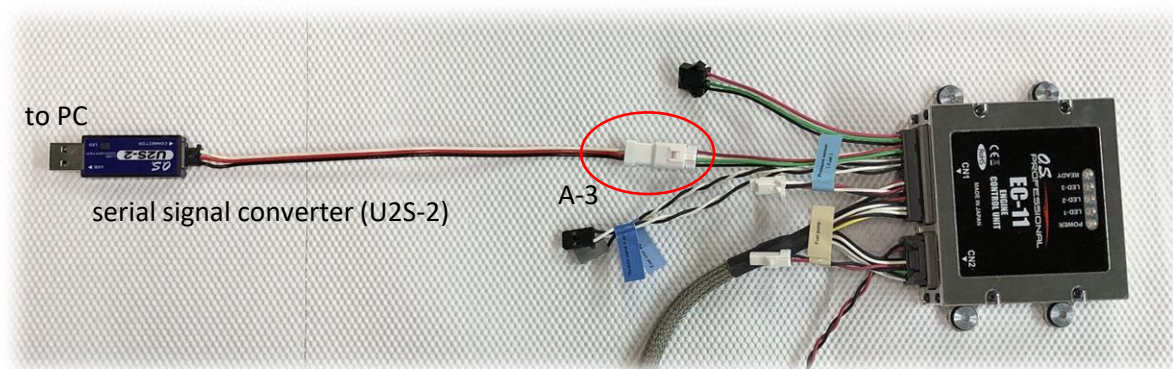
・Connect the ECU to the engine.

・EC11-LINK can be activated without connecting any sensors to the ECU. For example, in teaching of
throttle positions, you can activate the throttle servo as long as it is connected to the ECU.

> **CAUTION**：
> ・Do not turn on the ECU when the fuel tank is empty.Operating the pump without fuel may damage the pump.
> ・In case you need to turn on the ECU without fuel supply, for example, to rewright the settings by EC11-LINK, disconnect the connector of the pump not to let the pump activate.Thirty seconds after disconnecting the connector, the buzzer rings alarming abnormality of fuel pressure, but you can stop it by clicking "BUZZ OFF" button in EC11-LINK display.

《**connecting to EC11-LINK** 》

【1】 connecting the ECU to the engine
・Check the connectors of both the ECU and the engine.

【2】 connecting the ECU to the PC
・Check the connection of the ECU and the PC.

【3】 turning of the ECU
・Turn on the ECU.

【4】 starting up the software
・Execute the file EC11-LINK_xxxx.exe, which you copied to the PC. The following window will open.
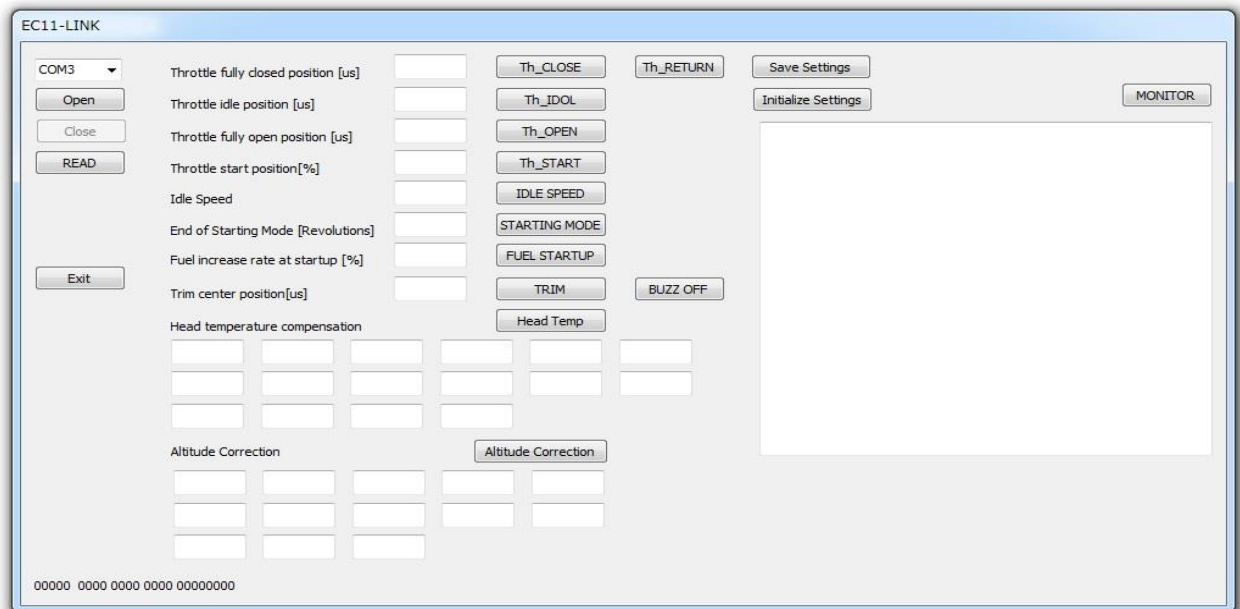
【5】 confirmation of COM port assignment
・Check which COM port the serial connection to the ECU is assigned using Windows® device manager. Refer to the operation manual of the Windows®.
・In case the serial connection is assigned to other than COM1〜 COM20, assign it manually to one of them. Refer to the operation manual of the Windows® how to assign a COM port number.

【6】 setting of a COM port number
・Select the same COM port you have assigned from the pull down nenu. Then click [OPEN] and the connection is completed.

Select the same COM port number as you have confirmed by Device manager.
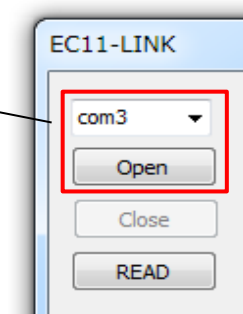
[Close] button
・for disconnecting a COM port connection. Do not click until you finish EC11-LINK.

[READ] button
・for reading the current setting value in the ECU

NOTE:
   The setting values are stored in the flash memory in the ECU, and are read out in the memoty when the ECU is turned on. When you change the setting values via EC11-LINK, the new values are memorized in the momories at first, then by clicking [Save Settings] button, the new values are memorized the teh flash memories.
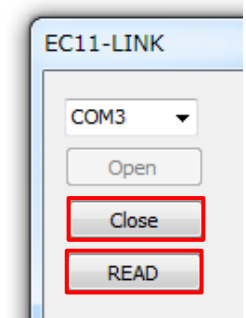
[Exit] button
・for exiting EC11-LINK
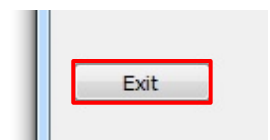
【ERROR MESSAGE】
・The following are error messages and what they mean.
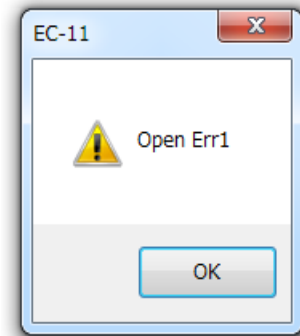
Open Err1	① The serial port does not open. ② Check if the COM number of the serial port is correct. ③ Check the connection between the ECU and the PC.
RES TO	① Response signals from EC-11 are not received ② Check if the ECU is turned on and electric power is properly supplied. ③ Check the connection between the ECU and the PC.
Now Open	① The serial port is open. ② Click [OK] button and continue the operation.
Open Err2	① It failed to acquire the serial port settings from the PC. ② Check the connection between the ECU and the PC.
Open Err3	① It failed the serial port setting in the PC. ② Check the connection between the ECU and the PC.
Open Err10	① The serial port is still closed. Open the serial port.
RES SUM ERR	① There is an error in the received data from the ECU. ② Check the connection between the ECU and the PC.

《**setting of the each value**》
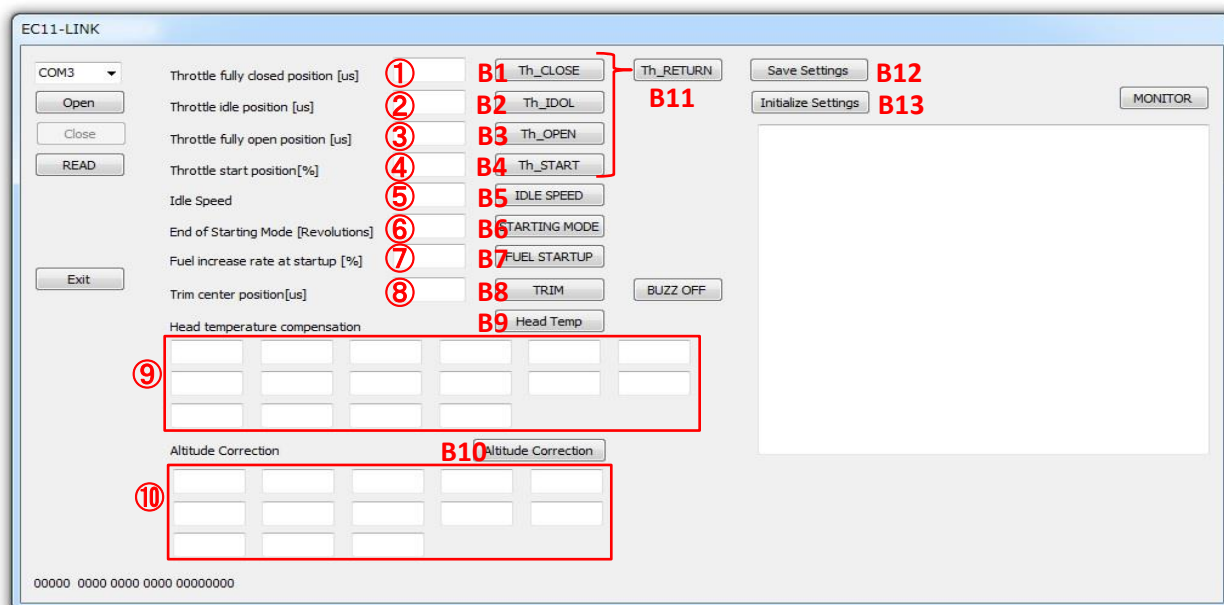
Input parameters in the edit boxes shown above (①〜⑩), and click each button corresponding to each number (B1 – B10) to transfer the data to the ECU memory. For example, input value in edit box ① and click B1 button to transfer the input value to the ECU memory. ①〜④ are for throttle servo settings. After inputting values in ①〜④ and clicking B1 – B4, the throttle servo moves according to the input values. Please be careful about pinching such as fingers. To return the operation of the throttle servo normal (control by throttle signals), click [Th_RETURN] button (B11). After setting all the above parameters, you must always click [Save Settings] button (B12) to write the input data in the ECU memory into the flash memory. Turning off the ECU without doing so causes loss of all the input parameters. You can initialize the settings by clicking [Initialize Setting] button (B13) to return to the default settings, but when you initialize the settings, you need to set "Teaching processes" of throttle position again (setting items ①〜④ below).

[Setting Items]
①Throttle full close position [μs]
・Setting of the full close position by pulse width of PWM signal.

full open position

full close position
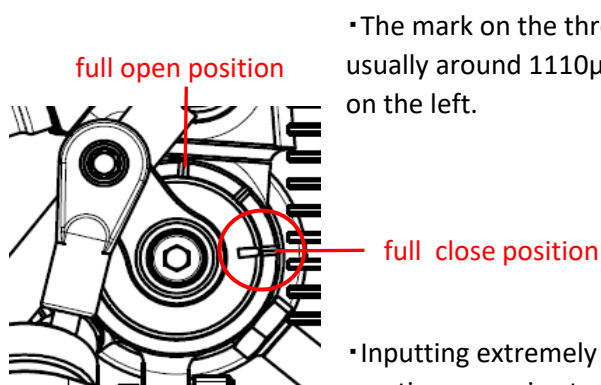
・The mark on the throttle valve aligns with the mark at full close position usually around 1110μs. Change the parameter to align each mark as shown on the left.

・Inputting extremely small value may cause damage to the throttle servo creating excessive tension on the throttle linkage. So change the parameter ±10μs or less at each adjustment.

②**Throttle idle position [us]**
・Setting of the idling position by pulse width of PWM signal. The position of the throttle valve is usually +50μs(+40μs～+50μs) from the fully close position.
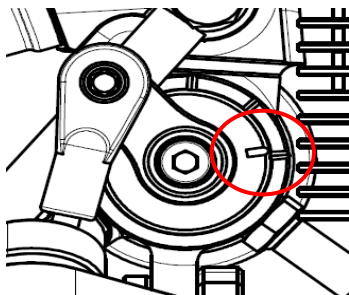
・This position, slightly open from the full close position is the reference position. The throttle valve is automatically controlled by the ECU to hold the idling rpm you have set when the throttle valve position is at idling position, in case you use a transmitter, the throttle stick of the transmitter is moved down to the bottom.

・In case the ECU could not hold the idling rpm and the engine stalls, add +5μs to the current parameter. When the aircraft is diving with the throttle control signal at the idling position, in case you use a transmitter, the throttle stick of the transmitter is moved down to the bottom, the propeller turns at higher rpm than the set rpm at idling by airflow to the propeller created by the dive. In this case, the ECU closes the throttle valve excessively until the engine stalls trying to reduce the propeller rpm. If it happens, add +5μs to the parameter also.

・In case the idling rpm doesn't decrease to the value you set in the prosess ⑤, even if temperature of the engine goes over 100℃, reduce the value by -5μs each time until the rpm decreases.

③**Throttle full open position [μs]**
・Setting of the full open position by pulse width of PWM signal.
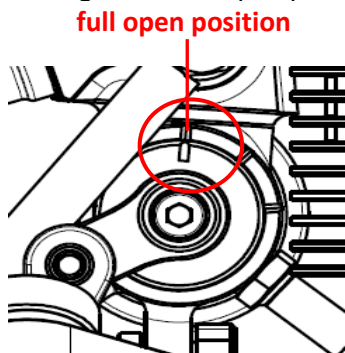
full open position

・The mark on the throttle valve aligns with the mark at full open position usually around 1880μs. Change the parameter to align each mark as shown on the left.

・Inputting extremely large value may cause damage to the throttle servo creating excessive tension on the throttle linkage. So change the parameter ±10μs or less at each adjustment.

④**Throttle start position[%]**
・Setting of the throttle valve position when you start the engine. To start the engine easier, the ECU opens the throttle valve at this position even throttle signal from your flight controller ordered to close more, in case you use transmitter, you move down the throttle stick of the transmitter and close the throttle valve more than this position. Parameter is to be set 0%～100%representing fully close to fully open with 0%～100%. The parameter is usually 20%.

⑤**Idling speed[rpm]**
・Setting of the idling rpm when the throttle stick of the transmitter is moved down to the bottom, or throttle signal from your flight controller ordered the throttle valve to stay at idling position. The parameter varies depending on your propeller choice and an aircraft. Although the rpm at idling depends on propeller, the parameter is usually between 1600 and 2400 rpm. In case you input the parameter beyond the range, the ECU controls the idling rpm between lower and upper limit. The ECU aim at the idling rpm you have set once the engine is warmed up. But the idling rpm is slightly higher than the set parameter when the engine is still cold.

⑥End of starting mode[revolutions]

Setting of the timing to release "engine starting mode". The counting starts when engine rpm excess 960rpm. You input the parameter to decide how many revolutions after the first 960rpm "engine starting mode" is released. The parameter is usually 50 revolutions.

⑦Fuel increase rate at startup

・Setting of extra fuel injection at engine start. The parameter shows how much percentage (%) of fuel is to be added to the basic fuel injection. Usually the parameter is 100%. Double quantity of fuel is injected when the parameter is 100%.

⑧Trim center position[us]

Setting of the central parameter (neutral) of Fuel increase/decrease adjustment signal (PWM). Set the parameter according to a receiver or flight controller you use. The pulse width parameter input here is the neutral position. Fuel increases/decreases ±30%in the range of ±420μs. Positive (+) side increases fuel injection and negative (-) side decreases. The default setting is 1520μs, which is the neutral position of Futaba receiver.

⑨Head temperature compensation

・Increasing fuel injection according to the rise of Cylinder Head temperature (CHT).
This is the function to stabilize engine operation at low temperature and prevent the engine from overheating at high temperature. The parameter can be input at 16 points, by 20℃ interval between 0～300℃. The parameter shows how much extra fuel is added to the basic fuel injection by percentage (%). The temperature between the points is complemented by the lower and higher points. The parameter at 0℃ is applied to below 0℃, and the one at 300℃ is applied to more than 300℃. Use the default settings in an ordinary case.

Head temperature compensation					Head Temp
@ 0℃ 50	@ 20℃ 50	@ 40℃ 40	@ 60℃ 30	@ 80℃ 10	@ 100℃ 0
@ 120℃ 0	@ 140℃ 0	@ 160℃ 0	@ 180℃ 0	@ 200℃ 0	@ 220℃ 0
@ 240℃ 0	@ 260℃ 5	@ 280℃ 10	@300℃ 20		

⑩Altitude correction

・Increase/decrease fuel injection according to altitude. The parameter can be input at 13 points by 500m interval from -1000～5000m. The parameter shows how much extra fuel is added to the basic fuel injection by percentage (%). The altitude between the points is complemented by the lower and higher points. The parameter at -1000m is applied to below -1000m, and the one at 5000m is applied to more than 5000m.

Altitude Correction				Altitude Correction
@-1000m 112	@-500m 106	@ 0m 100	@ 500m 94	@1000m 89
@ 1500m 84	@ 2000m 80	@ 2500m 75	@ 3000m 71	@ 3500m 67
@ 4000m 64	@ 4500m 61	@ 5000m 58		

CAUTION：

・Do not miss to click [Save Settings] button (B12) to write the input data in the ECU memory into the flash memory. Turning off the ECU without doing so causes loss of all the input parameters.
・Setting items ①〜④ are the "Teaching processes" of throttle position.
・Do not change the parameters except for ①〜⑤ unless it is needed. The engine performance might get worse.
・Settings of input side of throttle signal is adjusted using the following "MONITOR" function.

《MONTOR》

・Press [MONITOR] button with the ECU connected to the PC, and you can monitor the updated information in the ECU. To exit the MONITOR mode, click [Mon Stop] button ([MONITOR] is switched to [Mon Stop] during the MONITOR mode).
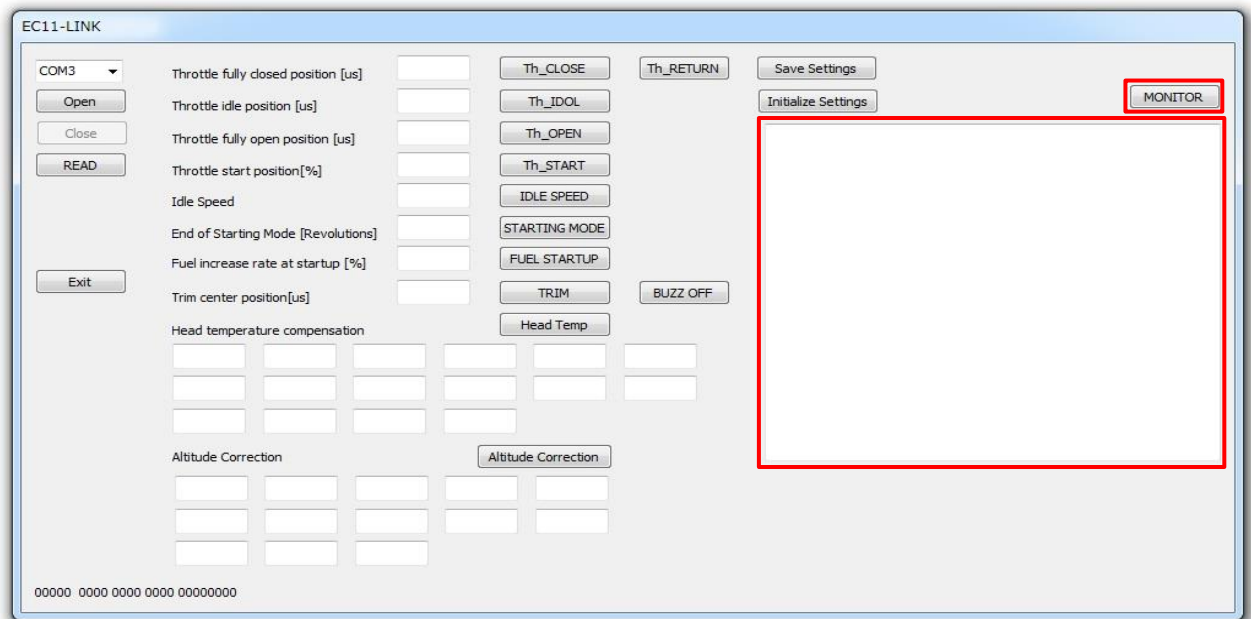
【information shown during the MONITOR mode】
(1) Pressure (hPa）
 Atmospheric pressure measured by the sensor in the ECU.

(2) Fuel pressure（kPa）
 Fuel pressure after the fuel pump.

(3) Negative pressure（hPa）
 Pressure in the intake manifold.

(4) Negative pressure peak（hPa）
 Peak pressurepulse of the negative side in the intake manifold, which is updated per each engine revolution.

(5) 3.3V voltage（mV）
 Voltage of the 3.3V power supply line of the ECU.

(6) 5V voltage（mV）
 Voltage of 5v power source line in the ECU.

(7) 12V voltage（mV）
 Voltage of the 12V power supply line of the ECU.

(8) Head temperature（℃）
 Temperature measured by the temp. sensor in the cylinder head

(9) Intake port temperature（℃）
 Temperature measured by an intake air temp. sensor.

(10) Throttle signal input（%）
 Throttle position (0 - 100%) controlled by throttle signals from a receiver or a flight controller.

> NOTE:
> ・Adjust the travel amount (end point) of the throttle signal input from the receiver or flight controller by looking at the value on this monitor.
> ・The end points of throttle fully open and fully closed positions are to be set 0% and 100%, or -1% and 101% with some torelance. (signals 0% or less and 100% or more are recognized as 0% and 100% respectively.)

(11) Throttle signal output（%）
 The signal output to the throttle servo; how much throttle is open, is shown as 0% through 100%.

(12) Trim signal Width（μs）
  Input value (the width of PWM signal) of the fuel adjustment correction from a receiver or a flight controller.

(13) Rotation speed（rpm）
 Revolutions of the engine per minute

Pressure	1014 hPa
Fuel pressure	300 kPa
Negative pressure	0 hPa
Negative pressure peak	0 hPa
3.3V voltage	3280 mV
5V voltage	4980 mV
12V voltage	11990 mV
Head temperature	30 ℃
Intake port temperature	30 ℃
Throttle signal input	0 %
Throttle signal output	20 %
Trim signal Width	1520 us
Rotation speed	0 rpm
*	

(Example of display)

Starting the engine

【1】Fill the fuel tank with fuel before turning on the switches of the ECU and the Igniter.

【2】If there are air bubbles in the tube between the fuel tank and the fuel pump unit after filling up the fuel tank, open the pressure release valve and eiminate the air bubbles.

> Locate the pressure release valve in a place easily accessible to open and close it before/after a day's use.
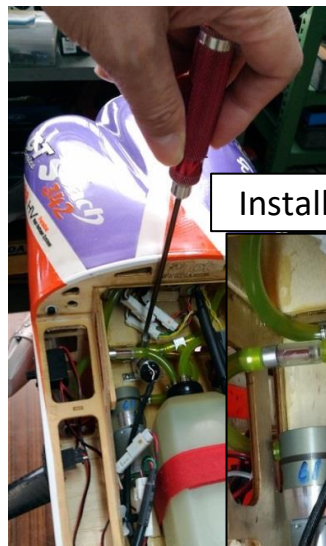
Installation example

【3】Turn on the ECU.

【4】Power LED is lit and Operation status LED blinks.

【5】The Fuel pump starts working as soon as the ECU is turned on. If the Pressure release valve is open, close it only after airbubles in the system are gone. When fuel pressure reaches specified value, the Pump works intermittently or stops.

> In case the the fuel pressure to the injector doesn't reach the specified value after turning on the switch within 30 seconds, the ECU beeps intermittently and the pump stops. (Turn off the switch and turn it on again when you reset theECU)

【6】Move the throttle stick to check the movement of the throttle servo. If the ECU is in starting mode and the Operation status LED is blinking, you can't close the throttle completely but it still remains open a little even if you move the throttle stick fully down.

【7】Position the throttle stick fully down when you start the engine.Preparation is complete.

【8】Turn on the ignitor and start the engine with a starter.

【9】Engine rpm goes up right after starting the engine, but it goes down immediately.

ECU Status display LED

Power LED (on)
LED 1(off)
LED 2 (off)
LED 3 (off)
Operation status LED (brink)

【10】Idling rpm control system starts working when cylinder head temperature reaches the set temperature otherwise the idling rpm is kept at the set rpm.
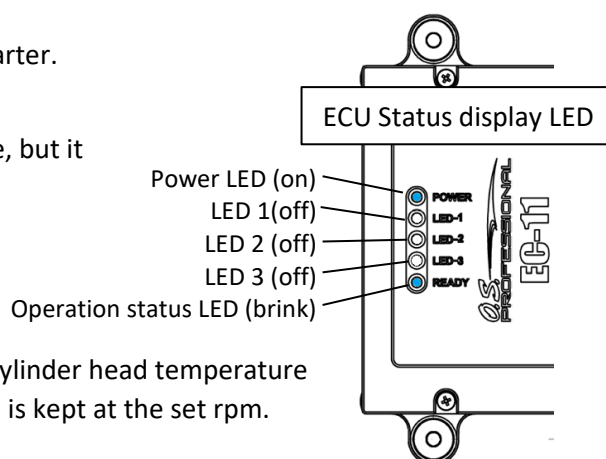
・the followings are display LED message's meaning.

Power LED —— LED 1 LED2 LED3 —— Operation status LED

	Power LED	LED 1	LED2	LED3	Operation status LED	
engine start mode	On	Off	Off	Off	Blink	
engine operation	On	Blink	Blink	Blink	On	(note 1.)
fuel pressure abnormal (pressure low)	On	Blink	Off	Off	Off	at the same time, a buzzer sounds
engine stop	On	Off	Off	On	Off	at the same time, a buzzer sounds
The set parameters are damaged	On	Off	Off	Blink	Off	at the same time, a buzzer sounds
System error 1	On	Blink	Blink	Blink	Blink	at the same time, a buzzer sounds
System error 2	On	Off	Blink	Blink	Off	at the same time, a buzzer sounds

Note 1. since the LED1, LED2 and LED3 are the monitor lamp of each signal, so they flashes at high speed during engine operation.

LED1	Crankshaft rotation sensor signal input
LED2	Injector drive signal output
LED3	Igniter started signal output

Power LED [On：Power ON／Off：Power OFF]
LED 1
LED 2
LED 3
Operation status LED
[Blinking：Ready／On：Working／Off：Stopped]
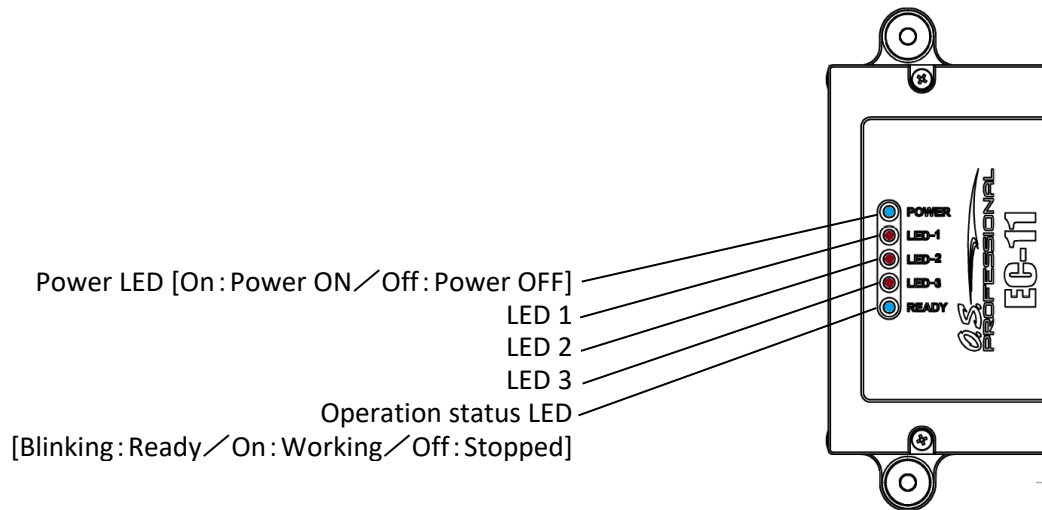
Stopping the engine

【1】Turn off the Ignitor switch to stop the engine.
・In the current specification, the fuel injection cut, throttle cut, and ignition cut is not set.

【2】The ECU stops the fuel pump and emits Beep sound intermittently when it detects engine stop.

【3】Turn off the ECU.

【4】Even if the power is turned off and the pump is stopped, residual pressure remains in the fuel line. In order to prevent unexpected fuel blowout, when the last flight of the day is finished, open the pressure release valve to release the residual pressure.

・The internal data of the ECU can be collected by other external devices through its serial communication function. The communication protocal would show as followings.

《**communication specification**》
　・UART
　・TTL logic level　3.3V
　・Pin assignment (ECU side connector)
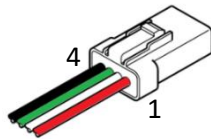
1	red	+5V power supply output
2	white	TXD
3	green	RXD
4	black	GND

　　　connector : JST 04R-JWPF-VSLE-S

　・protocol

bit rate	38400 bps
data length	8 bit
parity bit	none
stop bit	1bit
flow control	none
frame length	changeable

《**communication procedure**》
　・normal

　　　　　PC　　　　　　　ECU
　　　　　　　command
　　　　　　　response
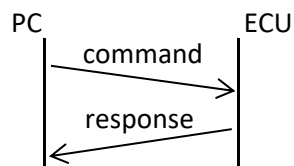
　・abnormal (response postpone)

　　　　　　PC　　　　　　ECU
　　　　　　　command
　　response　　　　　　　　1sec
　　time postpone
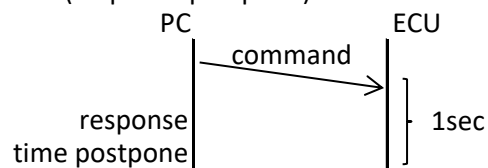
　・abnormal（command BCC error）

　　　　　PC　　　　　　ECU
　　　　　　command
　　　　　　　　　　　　BCC error
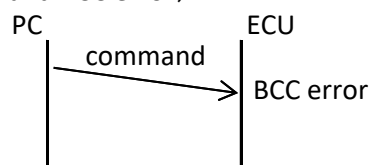
　・abnormal（response　BCC error）

　　　　　　PC　　　　　ECU
　　　　　　command
　　　　　　response
　　BCC error
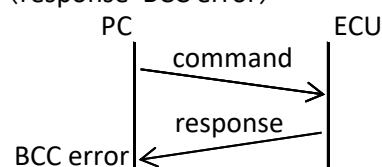
《**communication format**》

・command format

item	size	data	range
start mark	1 byte	02h	02h（2）
command	3 byte	”MOR”	4Dh、4Fh、52h
end mark	1 byte	03h	03h（3）
BCC（XOR from command to end mark）	1 byte		

・response format

	item		size	data	range
start mark			1 byte	02h	02h(2)
status			1 byte	"0"	30h(48)
			1 byte	" "	20h(32)
DATA	① barometric pressure	unit: hPa	4byte	"8000"～"7FFF"	8000h～7FFFh (-32768～32767)
			1 byte	" "	20h(32)
	② fuel pressure	unit: kPa	4byte	"8000"～"7FFF"	8000h～7FFFh (-32768～32767)
			1 byte	" "	20h(32)
	③ intake manifold air pressure	unit: hPa	4byte	"8000"～"7FFF"	8000h～7FFFh (-32768～32767)
			1 byte	" "	20h(32)
	④ intake manifold air pressure (the value of negative pressure peak when engines rotates once)	unit: hPa	4byte	"8000"～"7FFF"	8000h～7FFFh (-32768～32767)
			1 byte	" "	20h(32)
	⑤ power supply (ECU internal 3.3V)	unit: mV	4byte	"8000"～"7FFF"	8000h～7FFFh (-32768～32767)
			1 byte	" "	20h(32)
	⑥ power supply (ECU internal 5V)	unit: mV	4byte	"8000"～"7FFF"	8000h～7FFFh (-32768～32767)
			1 byte	" "	20h(32)
	⑦ power supply (ECU internal 12V)	unit: mV	4byte	"8000"～"7FFF"	8000h～7FFFh (-32768～32767)
			1 byte	" "	20h(32)
	⑧ cylinder head temperature	unit: ℃	4byte	"8000"～"7FFF"	8000h～7FFFh (-32768～32767)
			1 byte	" "	20h(32)
	⑨ intake air temperature	unit: ℃	4byte	"8000"～"7FFF"	8000h～7FFFh (-32768～32767)
			1 byte	" "	20h(32)
	⑩ throttle signal input from receiver (fully close～fully open 0%～100%)	unit: %	4byte	"8000"～"7FFF"	8000h～7FFFh (-32768～32767)
			1 byte	" "	20h(32)
	⑪ signal output to throttle servo (fully close～fully open 0%～100%)	unit: %	4byte	"8000"～"7FFF"	8000h～7FFFh (-32768～32767)
			1 byte	" "	20h(32)
	⑫ fuel trim signal input from receiver (PWM signal pulse wide range)	unit: μs	4byte	"8000"～"7FFF"	8000h～7FFFh (-32768～32767)
			1 byte	" "	20h(32)
	⑬ engine rotation speed	unit: rpm	4byte	"8000"～"7FFF"	8000h～7FFFh (-32768～32767)
end mark			1 byte	03h	03h(3)
BCC（XOR from status to end mark）			1 byte		

・The internal data of the ECU can be collected by other external devices through its CAN communication function. The communication protocal would show as followings.

《communication specification》
・CAN
・Pin assignment (ECU side connector)

1	red	+5V power supply output
2	white	Signal(High)
3	green	Signal(Low)
4	black	GND
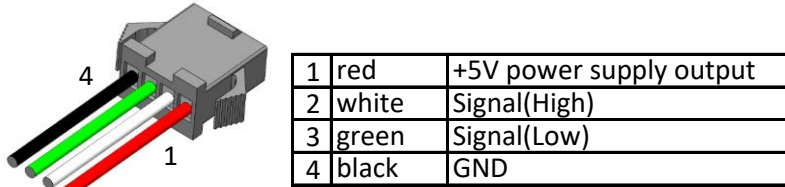
connector : JST SMR-04V-BC

《data format》
・Data frame

Recessive(1)

SOF	ID10～0bit (11bits)	RTR	IDE	RB0	DLC3	DLC2	DLC1	DLC0
	ID	0	0	0	DATA LENGTH			

Dominant(0)

Control Field

DATA0～7(MSB) MAX 8byte	CRC14~0bit (15bits)	CRC DEL	ACK	ACK DEL	EOF	IFS
DATA Field	CRC Field					
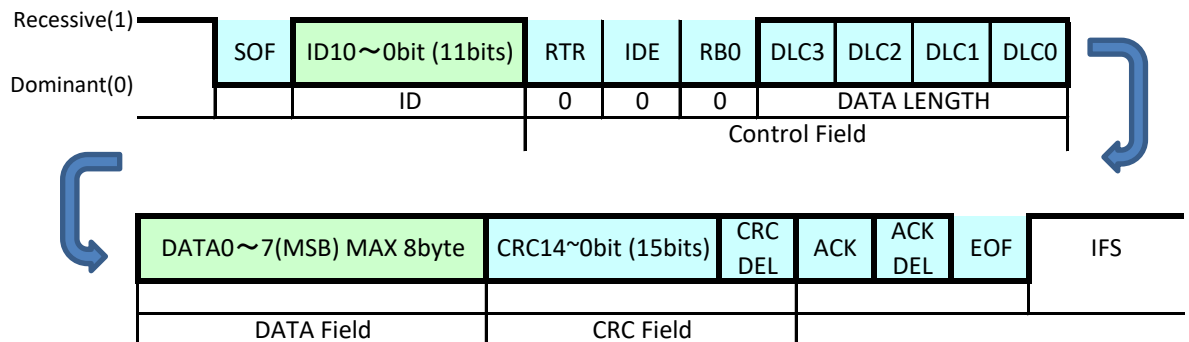
・DATA

NAME	ID		DATA LENGTH	DATA 0～7		DATA RANGE
				0～5	6～7	
Pressure (hPa）	768	0x0300	8	0x000000000000	DATA	
Fuel pressure（kPa）	769	0x0301	8	0x000000000000	DATA	
Negative pressure（hPa）	770	0x0302	8	0x000000000000	DATA	
Negative pressure peak（hPa）	771	0x0303	8	0x000000000000	DATA	
3.3V voltage（mV）	772	0x0304	8	0x000000000000	DATA	0x8000 (-32768)
5V voltage（mV）	773	0x0305	8	0x000000000000	DATA	～
12V voltage（mV）	774	0x0306	8	0x000000000000	DATA	0x7FFF (32767)
Head temperature（℃）	775	0x0307	8	0x000000000000	DATA	
Intake port temperature（℃）	776	0x0308	8	0x000000000000	DATA	
Throttle signal input（％）	777	0x0309	8	0x000000000000	DATA	
Throttle signal output（％）	778	0x030A	8	0x000000000000	DATA	
Trim signal Width（μs）	779	0x030B	8	0x000000000000	DATA	
Rotation speed（rpm）	780	0x030C	8	0x000000000000	DATA	

《CAN setting software》
・CAN setting of the ECU is made by using a serial signal converter and CAN setting software{CAN setting_xxxx.exe}(xxxx:Version number) .

【EQUIPMENT YOU NEED】
・PC with Windows® (7/8.1/10) and USB port. The included U2S-2 (serial signal converter) uses an FTDI chip, the driver is registered in Windows® Update. Therefore, in internet environment, the driver is automatically downloaded and installed by connecting the USB serial converter to the PC. Install the driver in advance in an internet environment.

【INSTALLATION OF THE SOFTWARE】
・Copy the CAN setting_xxxx.exe file to any file in the PC, then execute the file.
・When you intend to delete the software, just delete the CAN setting_xxxx.exe file.

《Setting method》
【1】serial communication port connection
・Connect the 4-pin connector of U2S-2 to the ECU's serial communication connector (A-3).
 ・ Connect the U2S-2 main unit to the USB port of the PC.
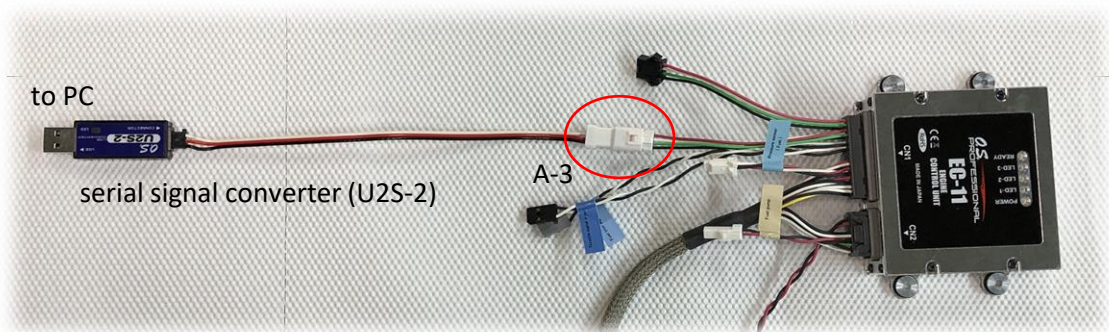
【2】turning of the ECU
・Turn on the ECU.

CAUTION：
・Do not turn on the ECU when the fuel tank is empty.Operating the pump without fuel may damage the pump.
・In case you need to turn on the ECU without fuel supply, for example, to rewright the settings by CAN Setting software, disconnect the connector of the pump not to let the pump activate.Thirty seconds after disconnecting the connector, the buzzer rings alarming abnormality of fuel pressure, but you can stop it by clicking "BUZZ OFF" button in CAN setting_xxxx.exe display.

【3】Starting up the software
・Execute the file {CAN setting_xxxx.exe} and open the following window.
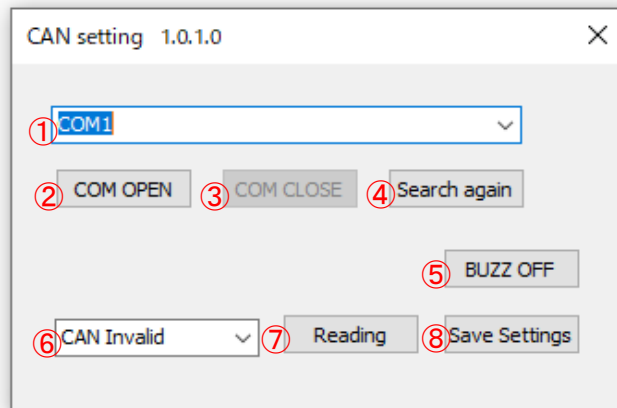
【4】Confirming COM port assignment
・Make sure which COM port is assigned to the ECU serial connection by Windows® device manager.
・In case the assigned COM port is other than COM1〜COM10, reassign it to one of the port from COM1 to COM10. Refer to the instruction manual of the Windows® you are using how to assign a COM port.

【5】Setting the COM port
・Select the confirmed COM port from the pull-down menu (① in the above picture). Click the [COM OPEN] button (② in the above picture) and the connection is completed.
・In the pull-down menu of ①, you can see what kind of connection ("USB serial port" in this sample below) next to port number (COM3 in this case). You can make a choice from the pull-down menu. In case you cannot find a connection, click ④ [Search again]. If you still can't see it, check Windows® Device Manager and set the port number.
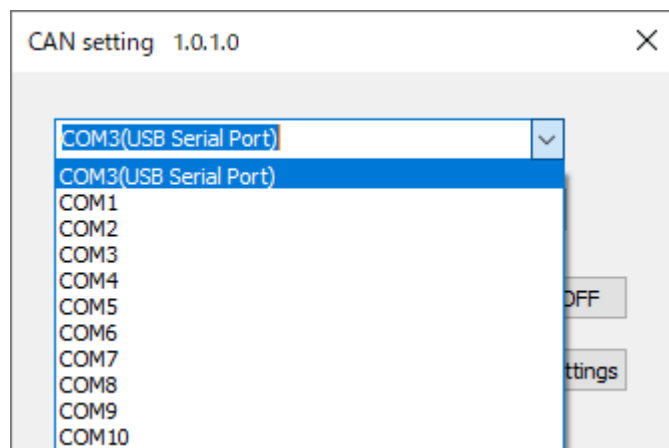
【6】Select 'CAN Invalid' or a desired baud rate from the pull-down menu (⑥ in the above picture).
・'125Kbps', '250Kbps', '500Kbps', or 'CAN Invalid' can be chosen from the pull-down menu.
・After choosing a baud rate, CAN becomes valid and the ESC sends the data at intervals of around 100ms. With this CAN system, the data cannot be resent in case of an error.
・Refer to page 38 about the dataformat.
【7】Click the [Save Settings](⑧ in the above picture).

【8】Turn off the ECU and turn it on again to make the setting valid.

【CN1】

17   32

1   16
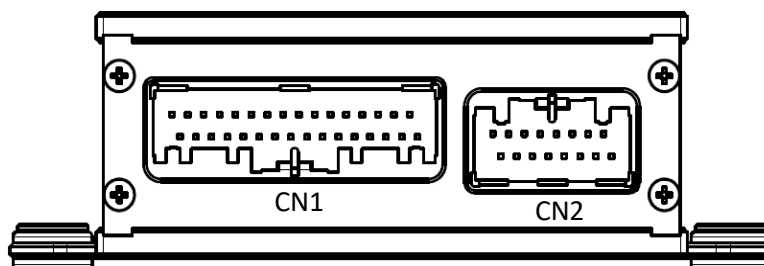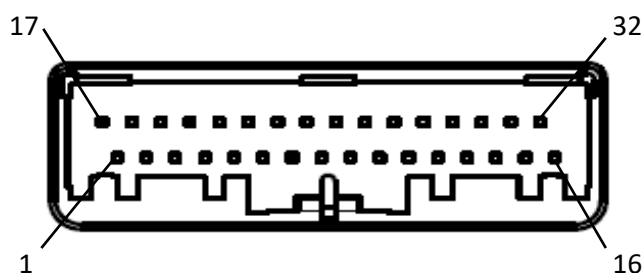
1	CAN〔High〕		17	CAN〔Power supply DC+5V〕
2	CAN〔GND〕		18	CAN〔Low〕
3	Serial communication〔TX〕		19	Serial communication〔Power supply DC+5V〕
4	Serial communication〔GND〕		20	Serial communication〔RX〕
5	Throttle signal input〔SIGNAL〕		21	Power supply DC+5V (Expansion)
6	Fuel trim signal input〔SIGNAL〕		22	Throttle signal input〔GND〕
7	External input〔Digital 0-5V〕		23	Fuel trim signal input〔GND〕
8	External output〔Open collector max10V, IOL=max5mA〕		24	External input〔GND〕
			25	External output〔GND〕
9	Crankshaft rotation sensor〔+5V〕		26	Crankshaft rotation sensor〔SIGNAL〕
10	Crankshaft rotation sensor〔GND〕		27	Fuel pressure sensor〔+5V〕
11	Fuel pressure sensor〔SIGNAL〕		28	Fuel pressure sensor〔GND〕
12	(GND)		29	Manifold air pressure sensor〔+5V〕
13	Manifold air pressure sensor〔SIGNAL〕		30	Manifold air pressure sensor〔GND〕
14	Intake air temperature sensor〔+〕		31	Intake air temperature sensor〔-〕
15	Cylinder head temperature sensor〔+〕		32	Cylinder head temperature sensor〔-〕
16	GND(Shield)			

Not connected except to enclose with 　　　.

【CN2】
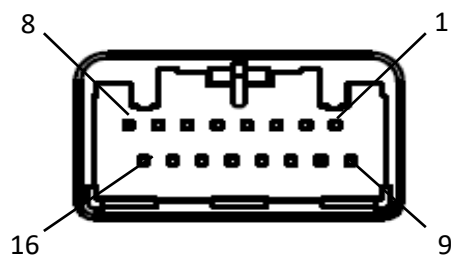
1	Ignition signal output〔GND〕	9	Ignition signal output〔IOL=max7mA〕
2	Injector〔SIGNAL IOL=max1A〕	10	Injector〔Power supply DC+12V〕
3	Fuel pump〔SIGNAL IOL=max1A〕	11	Fuel pump〔Power supply DC+12V〕
4	Throttle servo〔SIGNAL〕	12	Throttle servo〔Power supply DC+5V〕
5	Power supply DC+5V (Expansion)	13	Throttle servo〔GND〕
6	External output〔GND〕(Expansion)	14	External output〔Digital 0-5V〕(Expansion)
7	Power supply〔DC10〜17V・MAX1.5A〕	15	Power supply〔DC10〜17V・MAX1.5A〕
8	Power supply〔GND〕	16	Power supply〔GND〕

Not connected except to enclose with ⬜ .

Engine parts list

■ENGINE PARTS LIST / GF40U-FI（1/3）

No.	Code No.	Description	
1	4AD01000	CRANKCASE GF40U	
2	74002A20	ROTATION SENSOR IG-10	
3	74002321	ROTATION SENSOR FIXING SCREW (2pcs.)	
4	29431000	BALL BEARING(F)	
5	4AD30000	BALL BEARING(R) GF40U	
6	45231100	CAMSHAFT BEARING (1pcs.)	
7	4AD02000	CRANKSHAFT GF40U	
8	49402100	CRANK PIN STOP SCREW GF40	
9	4AD62000	CAMSHAFT GF40U	
10	49401100	CAM COVER	
11	44514110	CAM COVER O-RING	
12	4AD08000	DRIVE WASHER (A) GF40U	
13	4AD08001	DRIVE WASHER (B) GF40U	
14	4AD08002	DRIVE PULLEY (60T) GF40U	
15	29208200	WOODRUFF KEY	
16	45520000	THRUST WASHER	
17	28310000	LOCK NUT SET	
17-1	45910101	LOCK NUT 1 (UNF5/16-24)	
17-2	45910102	LOCK NUT 2 (UNF5/16-24)	
18	28309000	PROPELLER WASHER	
19	4AD03300	CYLINDER GF40U	
20	49403200	PISTON	
21	49403400	PISTON RING	
22	49406010	PISTON PIN	
23	29717000	PISTON PIN RETAINER (2pcs.)	
24	49405000	CONNECTING ROD	
25	4AD07000	COVER PLATE GF40U	
26	29122540	COVER GASKET (1pcs.)	
27	4AD07001	PCV VALVE SET GF40U	
28	4AD04100	CYLINDER HEAD GF40U	
29	49404160	HEAD GASKET	
30	49404200	ROCKER COVER	
31	49414300	ROCKER COVER GASKET	
32	45761600	ROCKER ARM RETAINER (2pcs./1pair)	
33	49464000	ROCKER SUPPORT	
34	4AD61100	ROCKER ARM GF40U (1pcs.)	
35	44561200	TAPPET ADJUSTING SCREW (1pcs.)	
36	45560410	SPLIT COTTER (2pcs./1pair)	
37	49460400	VALVE SPRING RETAINER (1pcs.)	
38	49460200	VALVE SPRING (1pcs)	
39	49460100	INTAKE VALVE	
40	49460110	EXHAUST VALVE	
41	4AD66000	PUSH ROD GF40U (2pcs.)	
42	49466100	PUSH ROD COVER (1pcs.)	
43	45566310	PUSH-ROD COVER O-RING (2pcs.)	
44	44564000	CAM FOLLOWER (2pcs.)	
45	49469450	THERMO INSULATOR	
46	49414010	INTAKE MANIFOLD GASKET (2pcs.)	
47	4AD69400	INTAKE MANIFOLD GF40U	
48	4AA07410	O-RING	
49	4AD81952	MANIFOLD PRESSURE OUTLET	
50	4AD84000	INJECTOR GF40U	
50-1	4AD84003	INJECTOR RING SEAL	
50-2	4AD84004	INJECTOR O-RING	

Engine parts list

No.	Code No.	Description	
51	4AD84014	INJECTOR WIRE HARNESS	
52	4AD84005	INJECTOR SPACER (2pcs.)	
53	4AD83300	INJECTOR COUPLER GF40U	
54	4AD81950	FUEL INLET (1set)	
55	4AD81100	THROTTLE BODY GF40U	
56	4AD81950	FUEL INLET (1set)	
57	54056014	ST-02 TEMPERATURE SENSOR (1pcs.)	
58	4AD12000	VELOCITY STACK GF40U	
59	45581820	ROTOR GUIDE SCREW	
60	4AD81200	THROTTLE VALVE	
61	4AD81400	THROTTLE ARM	
62	4AD81221	THROTTLE SERVO	
63	4AD81202	THROTTLE SERVO MOUNT (1pcs.)	
64	4AD81205	THROTTLE SERVO PLATE (1pcs.)	
65	4AD81401	THROTTLE SERVO HORN	
66	4AD81225	THROTTLE LINK ROD	
67	4AD50010	GENERATOR MOUNT GF40U	
68	4AD50011	REINFOCING BEAM (1pcs.)	
69	4AD28000	MOUNTING PLATE (F)	
70	4AD28002	ENGINE MOUNT GF40U (1pcs.)	
71	4AD28003	ENGINE BRACKET (A) (1pcs.)	
72	4AD28004	ENGINE BRACKET (B) (1pcs.)	
73	4AD28001	MOUNTING PLATE (R)	
74	4AD69401	OIL CATCH FILTER CASE	
75	4AD81950	FUEL INLET (1set)	
76	72403121	OIL CATCH FILTER (3pcs.)	
77	84323000	O-RING	
78	4AD69409	MANIFOLD PRESSURE SENSOR	
91	55500004	NORD LOCK WASHER M5 (10pcs.)	
92	74003540	M5 STAND OFF ENGINE MOUNT 1″ 25.4mm (4pcs./1sets)	
93	49425100	SILENCER BODY F-6040	
94	44525110	SILENCER BODY GASKET (2pcs.)	
95	4AD25200	EXHAUST HEADER PIPE ASSY GF40U	
96	4AD26000	EXHAUST HEADER PIPE NUT(M16) t=7mm	
97	44525210	EXHAUST HEADER PIPE NUT(M16) t=4mm	
C1	79871020	CAP SCREW SET M2.6X7 (10pcs./set)	
C2	79871040	CAP SCREW SET M2.6X12 (10pcs./set)	
C3	79871109	CAP SCREW SET M3.0X 6 (10pcs./set)	
C4	79871110	CAP SCREW SET M3.0X 8 (10pcs./set)	
C5	79871120	CAP SCREW SET M3.0X10 (10pcs./set)	
C6	79871140	CAP SCREW SET M3.0X12 (10pcs./set)	
C7	79871410	CAP SCREW SET M4.0X10 (10pcs./set)	
C8	79871415	CAP SCREW SET M4.0X15 (10pcs./set)	
C9	79871420	CAP SCREW SET M4.0X20 (10pcs./set)	
C10	79871425	CAP SCREW SET M4.0X25 (10pcs./set)	
C11	79871430	CAP SCREW SET M4.0X30 (10pcs./set)	
C12	79871515	CAP SCREW SET M5.0X15 (10pcs./set)	
C13	79871520	CAP SCREW SET M5.0X20 (10pcs./set)	
C14	79871525	CAP SCREW SET M5.0X25 (10pcs./set)	
E1	75003200	EC-11 ENGINE CONTROL UNIT	
E2	75003201	EC-11 ECU	
E3	75000007	MOUNT COLLAR EC-11 (4pcs.)	
E4	75000209	ECU WIRE HARNESS (N) EC-11	
E5	75005012	POWER SUPPLY CORD (N)	

Engine parts list

No.	Code No.	Description	
E6	75000206	CAN COMMUNICATION CORD	
E7	74001210	U2S-2 SERIAL SIGNAL CONVERTER	
P1	54057032	PM-02 FUEL PUMP UNIT	
P2	72500010	PUMP MOUNTING PLATE (1set)	
S1	54058013	SP-01 FUEL PRESSURE SENSOR UNIT	
S2	54058014	PRESSURE SENSOR	
S3	54058006	PRESSURE SENSOR ADAPTER	
S4	54058007	PRESSURE SENSOR BLOCK	
S5	54058010	PRESSURE RELEASE VALVE	
S6	4AD81950	FUEL INLET (1set)	
F1	75001009	PUMP CONNECTION CORD (50cm)	
F2	74002F10	IGNITION MODULE (IG-08A)	
F3	54056001	SOCKET WRENCH FOR TEMPERATURE SENSOR	
F4	71669000	SPARK PLUG CM-6(NGK)	
F5	70000001	HOSE CLIP 6 (5pcs.)	
F6	78300000	GASOLINE FUEL FILTER S	
F7	71531010	NON-BUBBLE WEIGHT S	
F8	70000002	CONECTOR LOCK (5pcs.)	
F9	28382303	FLUORINE(ETFE) RESIN TUBING (2m)	
F10	72200210	VALVE ADJUSTING TOOL KIT GF	

Tightening torque:1.5 N・m
(Use Loctite 242 or 243)

Tightening torque:1.0 N・m
(Use Loctite 242 or 243)

Tightening torque:2.2 N・m
(Use Loctite 242 or 243)

Tightening torque:0.6 N・m

8 (left-hand thread)

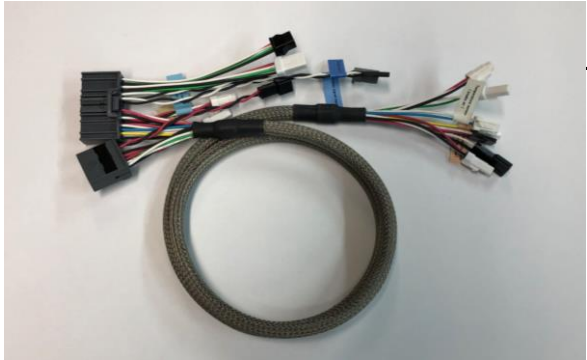57 (INTAKE AIR TEMP.)

57 (CYLINDER HEAD TEMP.)

GF40U-FI

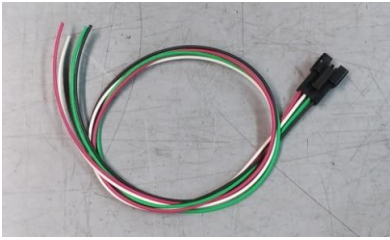EC-11 ENGINE CONTROL UNIT

E3

E2

E1

ECU WIRE HARNESS EC-11

E4

POWER SUPPLY CORD

E5

CAN COMMUNICATION CODE

E6

SERIAL SIGNAL CONVERTER

E7

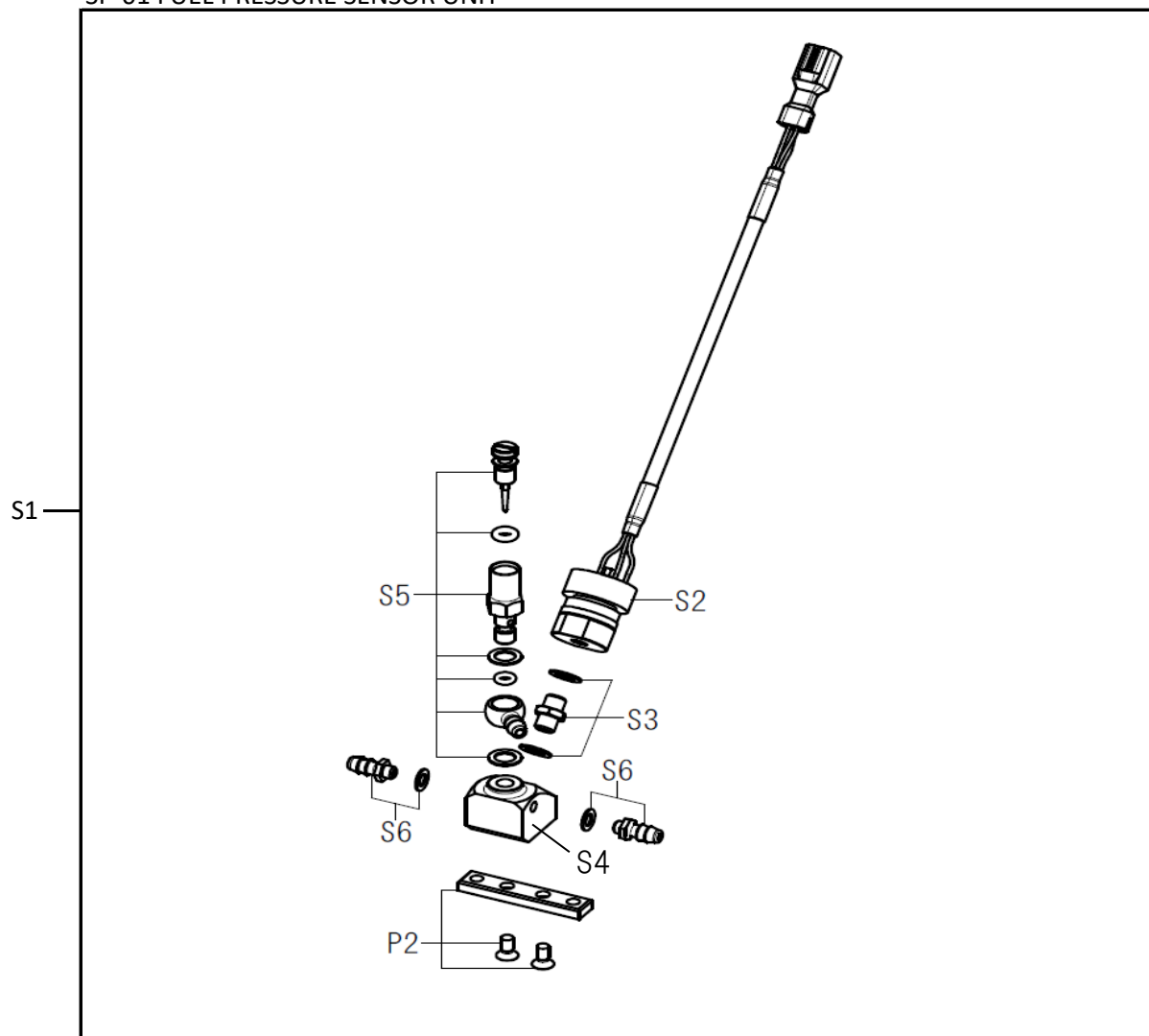PM-02 FUEL PUMP UNIT

P1

P2

SP-01 FUEL PRESSURE SENSOR UNIT

S1

S5

S2

S3

S6

S6

S4

S6

P2
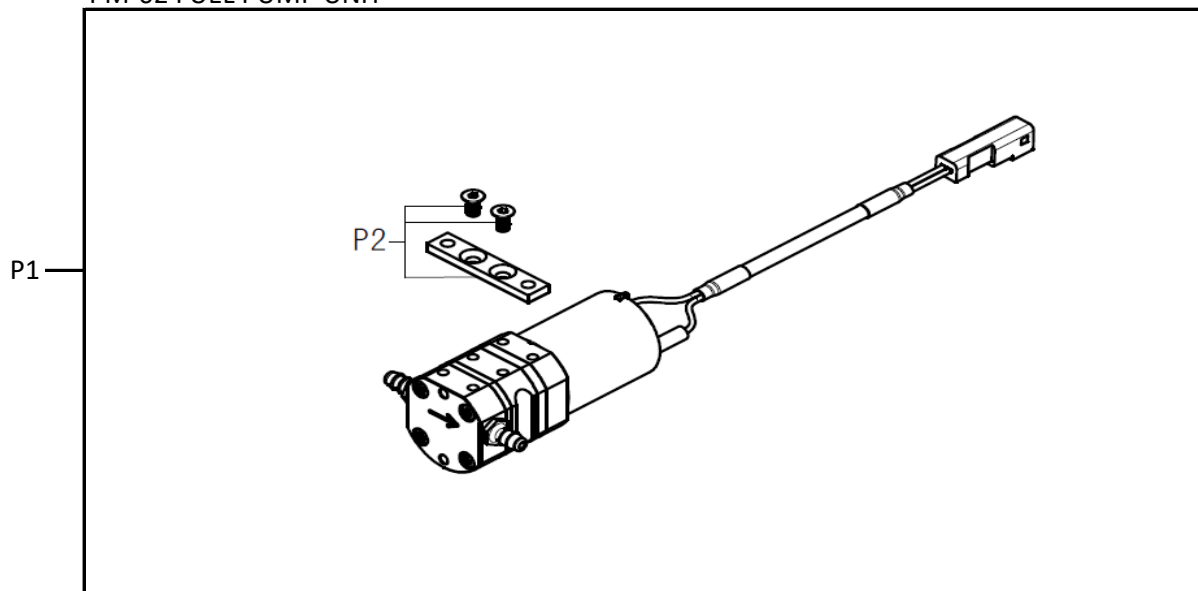
F1 — PUMP CONNECTION CORD (50cm)

F2 — IGNITION MODULE (IG-08A)

F3 — SOCKET WRENCH FOR TEMPERATURE SENSOR

F4 — SPARK PLUG CM-6(NGK)

F5 — HOSE CLIP 6 (5pcs.)

F6 — GASOLINE FUEL FILTER S

F7 — NON-BUBBLE WEIGHT S

F8 — CONECTOR LOCK (5pcs.)

F9 — FLUORINE(ETFE) RESIN TUBING (2m)
(EIGHTRON Flexible Fluorine (ETFE) Resin Tubing Clear
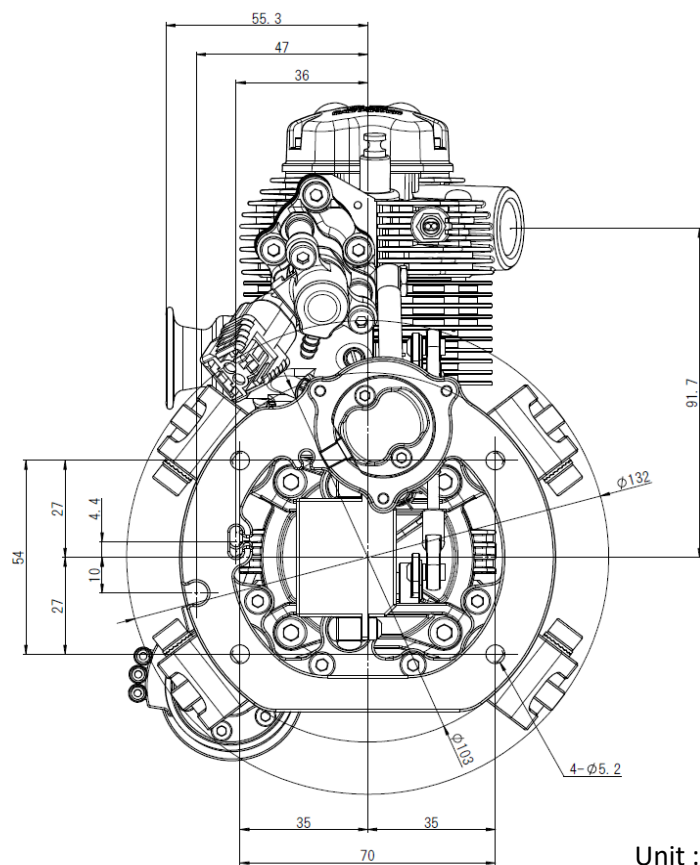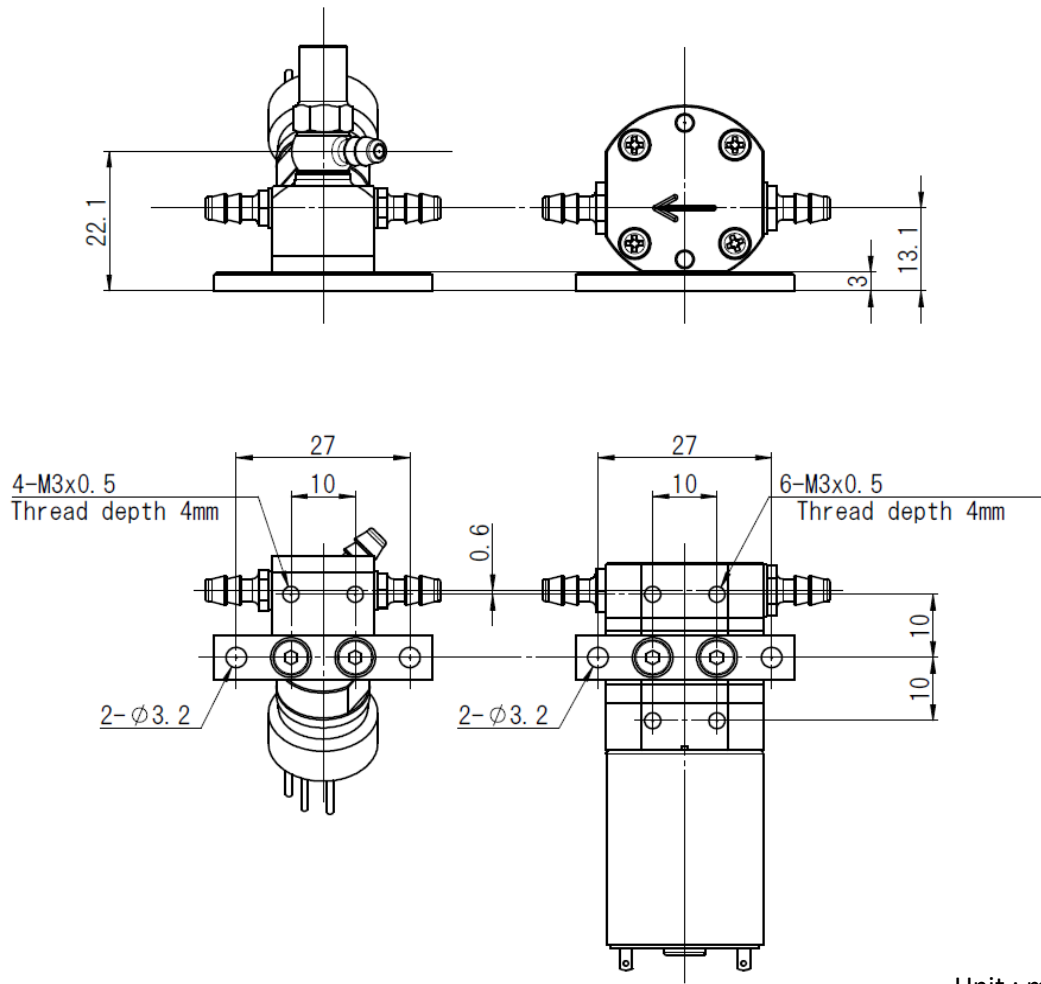made by HAKKO CORPORATION / JAPAN)
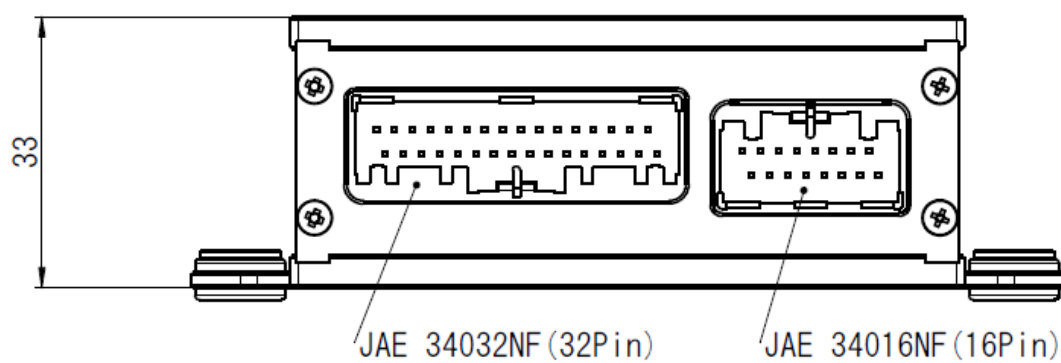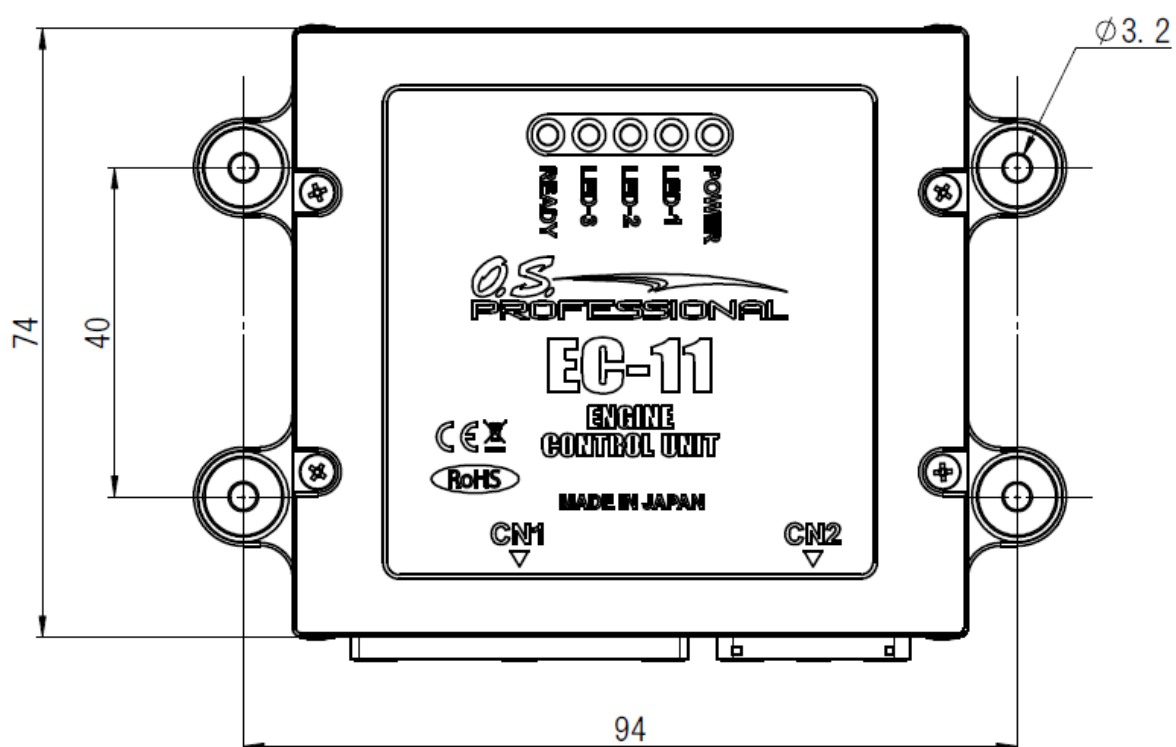
F10 — VALVE ADJUSTING TOOL KIT GF
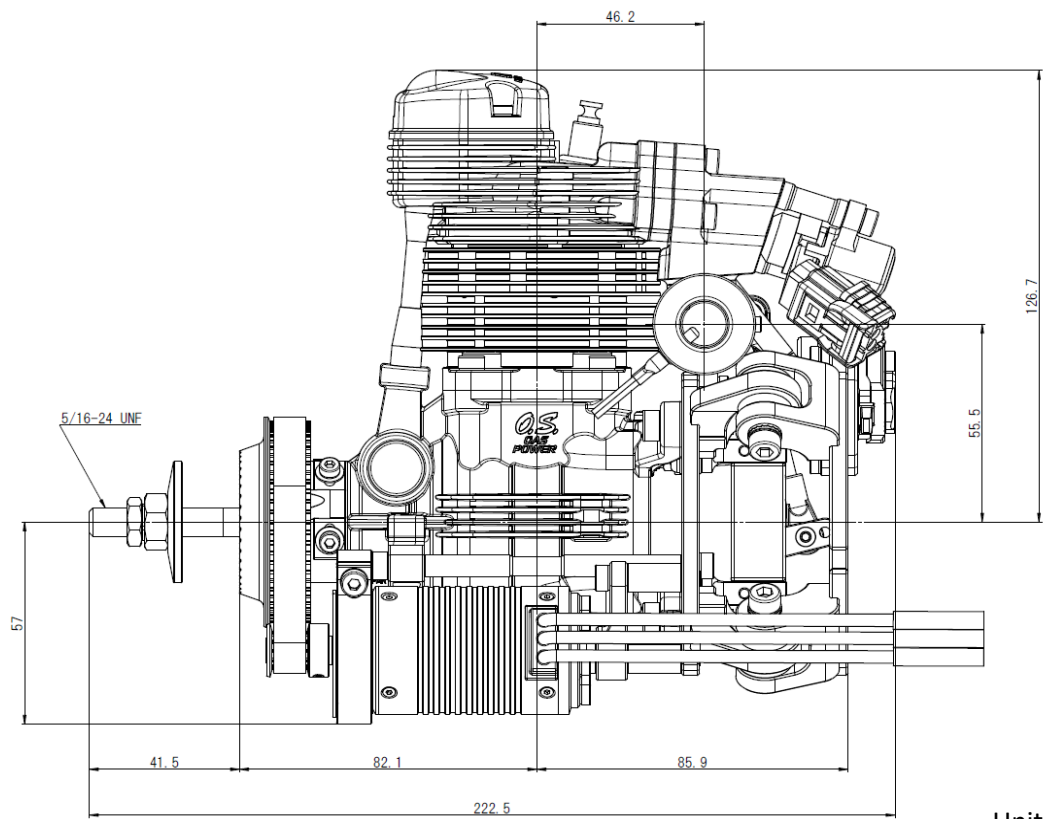
Unit : mm

Unit : mm

* Generator is optional item.

4-M3x0.5
Thread depth 4mm

6-M3x0.5
Thread depth 4mm

2-Ø3.2

2-Ø3.2

Unit : mm

MEMO