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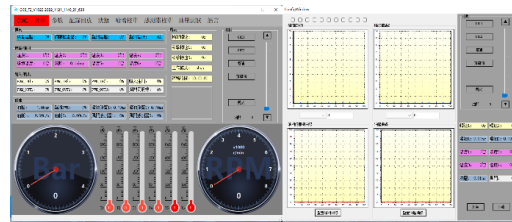
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## UAV Multi-Fuel Electronic Fuel Injection (EFI) Control System



### 1. Overview

The EX Multi-Fuel Electronic Fuel Injection (EFI) Control System is designed specifically for UAV two-stroke and four-stroke engine applications. It eliminates the need for numerous sensors by incorporating intelligent computation, optimized fuel-air mixture intake, and an electronic fuel pump. This system transforms traditional carburetor-based engines into modern, electronically controlled engines with active fuel injection.

The EFI system is lightweight, weighing only 330g, making it ideal for UAVs where weight and precision are critical. Its compact design minimizes the concern of sensor placement and weight, while still providing robust control over the engine's fuel system.

### 2. System Features

- **Fuel Control:**
  - Dynamic fuel pressure adjustment.
  - Mixture fuel adjustment based on atmospheric pressure.
  - Control over fuel pump voltage output.
  - Support for outputting two channels of fuel injection signals, allowing independent selection of corresponding RPM signals.
- **Temperature & Pressure Management:**



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- Exhaust temperature monitoring.
- Cylinder head temperature monitoring.
- Built-in atmospheric pressure sensor and air pressure compensation.
- Environmental temperature sensor for engine overheat protection and environmental temperature compensation.
- **User Interface & Connectivity:**
  - Visual interface for clear curve presentation.
  - USB / TTL interface for data communication.
  - Support for SBus signal input and channel mapping.
  - Bluetooth connectivity for parameter adjustments.
- **Operational Logging & Maintenance:**
  - Built-in operational log recording with up to 32GB TF card support for data storage.
  - Log data playback for analyzing engine performance.
  - Recording of engine operation time and cumulative working hours.
  - Engine maintenance reminder system.
- **Ignition & Power Supply:**
  - Support for two ignition devices with individually controllable CDI power supply switches (7V output).
  - ECU power supply voltage range: 16.8V to 28V.
  - Full load power consumption: <45W.
- **Heat Management:**
  - Active system heat control and engine temperature compensation.
  - Support for two channels of CDI power supply at 7V (same voltage as the servo power supply).

### 3. Software Functionality

- **Control & Configuration:**
  - Setting of minimum and maximum positions for throttle servo, idle throttle setting.
  - Configuration of signal ranges for 3-channel PWM output, supporting bidirectional functionality.
  - SBus functionality includes channel mapping for easy setup with UAV systems.



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- Abnormal power outage restart warning system.
- **Adjustments & Monitoring:**
  - 11 mixture adjustment points within the RPM range.
  - Exhaust temperature, cylinder head temperature, and environmental temperature monitoring.
  - Fuel injection parameter curve display and adjustment via the visual interface.
- **Firmware & Connectivity:**
  - Support for firmware upgrades through USB Type-C interface.
  - Connection to computer for log reading and firmware updates.

#### 4. Hardware Specifications

- **ECU (Engine Control Unit):**
  - **Weight:** 120g
  - **Dimensions:** 90mm x 80mm x 17.6mm
  - **Input Voltage:** 16.8V – 28V (Recommended: 24V)
  - **Power Consumption:** <45W
  - **Servo Port Output Voltage:** 7V (<3A)
  - **Idle Power Consumption:** 0.6W
  - **Analog Acquisition Port Output Voltage:** 5V (<0.5A)
- **Fuel Pump:**
  - **Weight:** 130g
  - **Operating Voltage:** 10V – 14V (<3A)
  - **Fuel Pump Port Output Voltage:** 13.5V – 14.5V (<5A)
  - **Dimensions:** 90mm x 39mm x 42mm

#### 5. Supported Sensors & Inputs

- **Temperature Sensors:**
  - Support for up to 4 channels of PT100 temperature sensors (2-wire configuration).
  - Support for 2 channels of K-Type temperature sensors (2-wire configuration).
- **RPM Signals:**
  - Support for 2 channels of RPM signal input.



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- **PWM Inputs:**
  - Support for 3 channels of PWM signal input.
- **Additional Inputs:**
  - Support for 2 channels of intake position sensors.
  - Built-in support for environmental temperature and air pressure collection.

## 6. Electrical Specifications

- **Fuel Pump Voltage:** 13.5V – 14.5V (<5A)
- **ECU Power Supply Voltage Range:** 16.8V to 28V
- **Servo Port Output Voltage:** 7V (<3A)
- **CDI Control Port Output Voltage:** 7V (<3A)

## 7. Exterior Specifications

- **ECU Dimensions:** 90mm (Length) x 80mm (Width) x 17.6mm (Height)
- **Fuel Pump Dimensions:** 90mm (Length) x 39mm (Width) x 42mm (Height)



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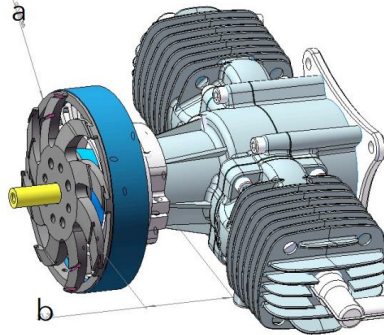
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## Starter-Alternator and RPM Range



### 1. Overview

The EX Starter-Alternator Kit integrates engine start and power generation for small and medium-sized UAVs. Its compact design makes it suitable for space-constrained installations. Available in models ranging from 20cc to 150cc engines with DC 24V/48V outputs.

### 2. Model Specifications

Model	Diameter (mm)	Length (mm)	Weight (g)
EX38	101	48.7	495
EX61	101	47.2	680
EX76	101	47.2	680
EX88	101	50.3	850
EX123	101	56.3	1045
EX178	119	53.0	1360



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### 3. Control Module Specifications



Version	Voltage Output	Max Current	Power Rating	Weight (g)
China-made	24V / 48V	15A	350W / 700W	465
Taiwan-made	24V / 48V	10A	240W / 480W	465

- **Dimensions:** 135mm x 52mm x 63mm
- **Control Mode:** PWM1, Manual Button1

### 4. RPM Range

Model	Minimum RPM for Power Generation	Maximum RPM
EX38	4400	8000
EX61	4400	7000
EX76	4400	7000
EX88	4400	7000
EX123	3800	7000
EX178	3800	6600