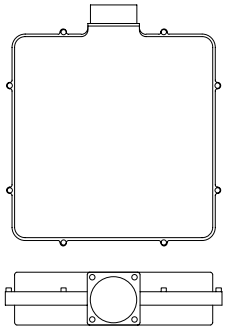
MF3S

Engine Control Unit

Description



The MF3S ECU is a versatile engine control unit designed for universal installation on 1, 2, 3, 4, 5, 6 and 8 cylinder engines. This ECU is user configurable for most common crank signal patterns with a single tooth on the cam.

All ignition, injection and sensor electronics are integrated in a single box, with no need for additional external devices or power stage electronics.

The system uses a set of user definable engine maps and constants which are used to control the actuators based upon specific sensor inputs. All the lookup maps use linear interpolation between user definable breakpoints.

The ECU uses a single 32 bit microprocessor. All analogue to digital conversion is 10 bit resolution. The system firmware is stored in flash EEPROM and the calibrations stored in EEPROM ensuring that the unit is "sealed for life".

Technical Data

Mechnical characteristics

Overall dimensions (approx) ..... 164x184x40 mm
Weight ..... 0.75 kg
Container ..... machined aluminium
Connector ..... 6020 22 55 pin
Operating temperature range ..... -30 to +70 °C
Power supply ..... 8 to 16 V

Analogue inputs

Voltage
- No. 6
- range ..... 0 to 5 V
- typical uses ..... throttle position
- ..... air pressure
- ..... barometric pressure
- ..... fuel pressure
- ..... oil pressure
- ..... gear position

Temperature
- type ..... NTC
- No. 3
- typical uses ..... coolant
- ..... fuel
- ..... air

Lambda
- No. 1
- type ..... ON/OFF

Digital inputs

Speed pick-ups
- ..... crankshaft
- ..... camshaft
- ..... wheel speed

Switches 3

Outputs

Injector Drivers
- No. 8
- type ..... ON/OFF
- max. current ..... 3 A
- clamp ..... 60 V

Ignition drivers
- No. 3
- type ..... inductive
- max. charge current ..... 12 A

Electrovalve drivers
- No. 2
- max. current ..... 3 A

Rev Counter
- No. 1
- max. current ..... 300 mA

Fuel pump
- No. 1
- max. current ..... 300 mA

Communications

CAN line 1
Serial RS232 line 1

Applications Software

Fully configurable 1,2,3,4,5,6,8 cylinder
normally aspirated or pressure charged

Ordering information

Part No.	Description	Order Code
MF3S	Engine Control Unit	83800627000

For further details please contact

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Features

- Sequential or semi-sequential fuel injection for 1,2,3,4,5, 6 and 8 cylinder applications
- Variable phase fuel injection
- Double bank fuel injection for up to 4 cylinder applications
- Integral inductive drivers for plug top or wasted spark distributorless ignition coils.
- Multi function input / output drivers
- Turbo wastegate control
- CAN communications suitable for Magneti Marelli data acquisition
- Gear change algorithm
- Launch algorithm

Fuel Control

For normally aspirated engines, the MF3S uses engine speed and throttle position as primary inputs to determine fuel injection quantity. Pressure charged engines use engine speed and inlet air pressure as primary inputs.

The injection quantity may be corrected for:

- Manifold air pressure (or air box pressure)
- Throttle position (pressure charged variant)
- Barometric air pressure
- Fuel pressure
- Air temperature
- Coolant temperature
- Fuel temperature
- Lambda - either ON/OFF
- Battery voltage
- Individual cylinder
- Cockpit mounted trimmer
- Number of crankshaft revolutions from engine start

Fuelling system notes

For up to four cylinder applications it is possible to split the quantity of fuel injected between two injector banks allowing an improved compromise between engine torque and throttle response.

Sequential fuel injection is applied to all injectors ensuring optimum torque and fuel consumption at all times.

The start of each injection pulse may be optimised to a particular point in the cylinder 4-stroke cycle; the optimised point may vary with engine speed and be different for each bank of injectors.

Both positive and negative throttle transient add or subtract fuel quantity to modify the injection time appropriately. These are corrected by engine speed, throttle position and coolant temperature. Closed throttle fuel cut off may be used.

Fuel consumption is continually calculated and available on the CAN data stream allowing accurate fuelling strategy / consumption prediction.

Multi-function Output Drivers

The multi function auxiliary input / output drivers are fully configurable by the user, for activation during any defined input or output condition.

Rev Limiters

The in built rev limiter can be set at different levels depending upon gear position for ignition, injection or both. The rev limiter is modified by a switch input for pit lane speed.

Turbo Waste-gate Driver

A Pulse Width Modulated signal is used to control one or two turbo waste-gate valves. This signal is controlled as a function of engine speed and inlet manifold air pressure.

Ignition Control

Normally aspirated engines use engine speed and throttle position as primary inputs to determine spark advance, whilst pressure charged engines use engine speed and inlet air pressure as primary inputs.

The spark advance may be corrected for

- Throttle position (pressure charged variant)
- Air temperature
- Coolant temperature
- Individual cylinder
- Cockpit mounted trimmer
- Ignition coil dwell uses battery voltage and ambient temperature to determine charge time.

Gear Change Algorithm

The system provides correction to fuel quantity, spark advance and ignition coil activation during a detected gear change.

Gear change indicator lamps may be illuminated at and above engine speed thresholds.

Launch Algorithm

The system provides correction to spark advance during a detected vehicle launch.

Other Functions

The ECU provides a fuel pump relay.

The ECU provides a configurable alarm lamp output.

On board logging of certain engine parameters enables engine builders to easily assess engine life.

CAN Communication

A user definable data stream of engine parameters is continuously transmitted via CAN, which interfaces directly with the Magneti Marelli data acquisition product range.

The MF3S can directly set the display options and alarm conditions that control a Magneti Marelli dashboard.

System Calibration

Calibrations for fuel quantity, fuel injection phasing, fuel injection bank split, spark advance and waste-gate duty cycle can be interactively implemented via a computer (PC) keyboard. Alternatively, the corrections may be stored in real time to the ECU as each individual map point is derived, using a potentiometer bank linked to a PC.

The calibrations can be modified with an editor program which uses a combination of graphical and text displays, allowing tuning of all system features. The calibrations can be downloaded to the MF3S EEPROM.