



## M142 ECU



**MoTeC's M1 ECU range begins a new era in engine control. The M1's unique technology redefines the meaning of customisation, delivering total control without compromise, and highly advanced security strategies make these ECUs ideal for both category managed and unrestricted applications.**

**The M142 and M182 are Diesel / Direct Injector ECUs that offer full control for most modern high pressure injectors, without the need for additional amplifier boxes.**

### ► FEATURES

- Small and light in robust magnesium enclosure
- Diesel and Direct injection control without the need for an external controller
- Large logging memory
- Latest generation high performance processor
- Suitable for modern engines with DBW, Cam Control and multiple CAN buses
- Advanced logging features, high speed, multiple logs (with access logins)
- I/O expansion using E816, E888 expanders
- Flexible tuning software
- Robust and comprehensive security features
- Programmable injector drive characteristics

- Programmable digital input system for Ref/Sync, wheel speeds etc.
- Programmable trigger levels, diagnostics
- All Low Side and Half Bridge outputs have PWM capability

### ► CONFIGURATION

The M1 series ECUs come with three configuration options.

#### Locked Configuration

A locked configuration is appropriate when an ECU contains specific firmware to suit the application. The user can tune the engine in the normal way but the ECU cannot be re-configured for another application.

#### Standard Configuration

The standard configuration allows the user to load a selection of firmware packages available from MoTeC. They incorporate different levels of functionality and the user can choose one to suit their requirements. Additional packages can be loaded into the ECU as and when requirements change.

#### Open Configuration

The open configuration provides a fully flexible ECU solution that can be precisely tailored to individual requirements. Third party developers can be trained to use MoTeC M1 Build software to develop their own control strategies.

Intellectual property is protected by the M1 ECU's security system and remains with the ECU owner.

## ► SECURITY

The M1's advanced security system is based on public-key cryptography, the cornerstone of secure internet transactions, so it is virtually impossible to change the ECU function without authorised permission.

Security is enforced by the ECU and protected by a microprocessor with integrated measures to prevent tampering.

A password feature grants different levels of access for different users e.g. an engine tuner, a drive train tuner, and a data analysis engineer.

This is also suitable for Control ECUs. Scrutineering teams can have access to extra information and are able to lock down selected parts of the ECU, while other team members can access selected tuning parameters.

## ► CATEGORY MANAGEMENT

The combination of an advanced security strategy, configurable firmware and a high performance processor make the M1 ECU an ideal choice for categories with restrictions in place for either performance parity or cost containment. Firmware can be written specifically for the category, limiting the functionality to the class requirements.

Multiple data logging sets are available, which can be partitioned with restricted access to allow generation of both judicial (scrutineering) and team data from the same device. The M1 ECU's security system prevents unauthorised access to data and implementation of unspecified functionality.

## ► UPGRADES

- Various Logging Options are available.  
The logging licence determines the number of channels and the sample rates available, there are 3 levels available:
  - Logging Level 1 Licence  
Comes standard with the product. This diagnostic logging includes a fixed log set and rate.
  - Logging Level 2 Licence  
Is an optional upgrade which includes one fixed log set, 200 channels (including diagnostics) and a maximum 200 Hz sample rate.
  - Logging Level 3 Licence  
Is an optional upgrade which includes eight fixed log sets, 2000 channels and a maximum 1000 Hz sample rate.
- Configuration:
  - Locked Configuration
  - Standard Configuration
  - Open Configuration

## ► SOFTWARE

- Microsoft Windows™ based software
- PC Tuning software 'Tune' - Used to tune fuel and ignition, set up sensors, outputs and available functions
- PC Software 'Build' - Used to create a custom software package with user specific functions

## ► BASIC SPECIFICATIONS

### Injector

- Direct Injector Outputs: 8
- Low Side Outputs: 6
- Injector max hold current: 12 A
- Injector max voltage: 90 V

### Ignition

- Outputs: 8

### Auxiliary Outputs

- Half Bridge: 10

### Inputs

- Universal Digital: 12
- Digital: 4
- Analogue Voltage: 17
- Analogue Temperature: 6
- Knock: 4
- Lambda (narrow band): 2

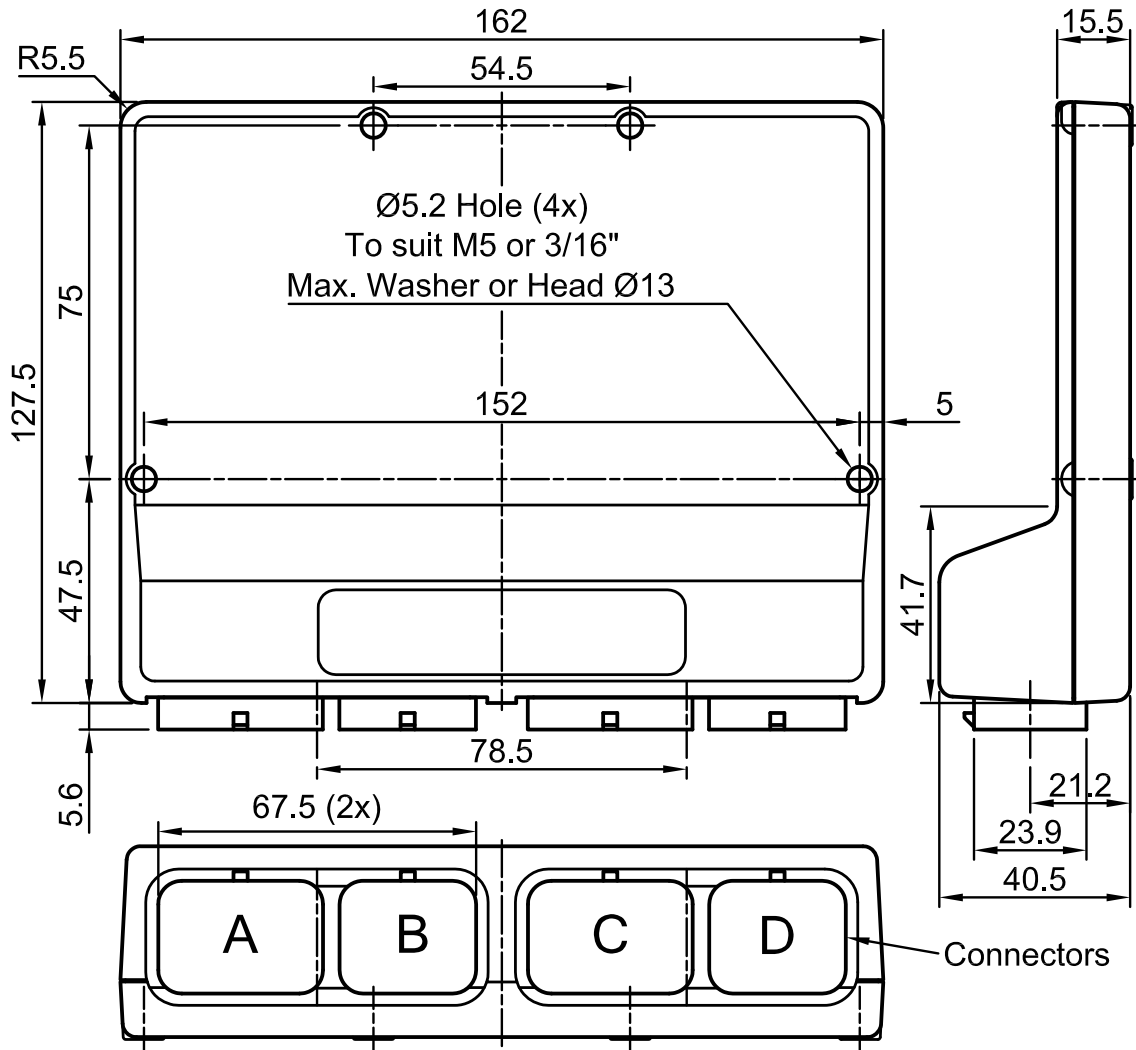
### Data

- CAN bus: 3
- RS232: 1
- LIN: 1
- Logging Memory: 250 Mb

### Physical

- Dimensions: 162 x 127.5 x 40.5 mm
- Weight: 480 g
- Connectors:
  - 2 x 34 pin plastic
  - 2 x 26 pin plastic

► DIMENSIONS AND MOUNTING



▶ **M142 PINOUT****M142 Connector A - 34 Way**

Mating Connector: Tyco Superseal 34 Position Keying 2 – MoTeC #65067

Pin Number	Designation	Full Name	OE Pin	Function	Description
A01	AT5	Analogue Temperature Input 5		1k Pull up to SEN_5V_C	
A02	AT6	Analogue Temperature Input 6		1k Pull up to SEN_5V_C	
A03	AV15	Analogue Voltage Input 15			
A04	AV16	Analogue Voltage Input 16			
A05	AV17	Analogue Voltage Input 17			
A06	INJ_D1A_NEG	Direct Injector 1A -			
A07	INJ_D1A_POS	Direct Injector 1A +			
A08	INJ_D1B_POS	Direct Injector 1B +			
A09	INJ_D1B_NEG	Direct Injector 1B -			
A10	SEN_5V0_C1	Sensor 5.0V C			
A11	LA_NB1	Lambda Narrow Input 1			
A12	LA_NB2	Lambda Narrow Input 2			
A13	KNOCK3	Knock Input 3			
A14	KNOCK4	Knock Input 4			
A15	DIG2	Digital Input 2			
A16	DIG3	Digital Input 3			
A17	DIG4	Digital Input 4			
A18	SEN_5V0_C2	Sensor 5.0V C			
A19	SEN_5V0_B2	Sensor 5.0V B			
A20	LIN	LIN Bus			
A21	RS232_RX	RS232 Receive			
A22	RS232_TX	RS232 Transmit			
A23	DIG1	Digital Input 1			
A24	BAT_NEG3	Battery Negative			
A25	BAT_NEG4	Battery Negative			
A26	SEN_0V_C1	Sensor 0V C			
A27	SEN_0V_C2	Sensor 0V C			
A28	CAN3_HI	CAN Bus 3 High			
A29	CAN3_LO	CAN Bus 3 Low			
A30	CAN2_HI	CAN Bus 2 High			
A31	CAN2_LO	CAN Bus 2 Low			
A32	BAT_NEG5	Battery Negative			
A33	SEN_0V_B1	Sensor 0V B			
A34	SEN_0V_A1	Sensor 0V A			

**M142 Connector B - 26 Way**

Mating Connector: Tyco Superseal 26 Position Keying 3 – MoTeC #65068

Pin Number	Designation	Full Name	OE Pin	Function	Description
B01	OUT_HB9	Half Bridge Output 9			
B02	OUT_HB10	Half Bridge Output 10			
B03	UDIG8	Universal Digital Input 8			
B04	UDIG9	Universal Digital Input 9			
B05	UDIG10	Universal Digital Input 10			
B06	UDIG11	Universal Digital Input 11			
B07	UDIG12	Universal Digital Input 12			
B08	INJ_LS5	Low Side Injector 5			
B09	INJ_LS3	Low Side Injector 3			
B10	AV9	Analogue Voltage Input 9			
B11	AV10	Analogue Voltage Input 10			
B12	AV11	Analogue Voltage Input 11			
B13	BAT_POS	Battery Positive			
B14	INJ_LS6	Low Side Injector 6			
B15	INJ_LS4	Low Side Injector 4			
B16	AV12	Analogue Voltage Input 12			
B17	AV13	Analogue Voltage Input 13			
B18	AV14	Analogue Voltage Input 14			
B19	BAT_POS	Battery Positive			
B20	OUT_HB7	Half Bridge Output 7			
B21	OUT_HB8	Half Bridge Output 8			
B22	INJ_D2A_NEG	Direct Injector 2A -			
B23	INJ_D2A_POS	Direct Injector 2A +			
B24	INJ_D2B_POS	Direct Injector 2B +			
B25	INJ_D2B_NEG	Direct Injector 2B -			
B26	SEN_5V0_A	Sensor 5.0V A			

**M142 Connector C - 34 Way**

Mating Connector C: Tyco Superseal 34 Position Keying 1 – MoTeC #65044

Pin Number	Designation	Full Name	OE Pin	Function	Description
C01	OUT_HB2	Half Bridge Output 2			
C02	SEN_5V0_A	Sensor 5.0V A			
C03	IGN_LS1	Low Side Ignition 1			
C04	IGN_LS2	Low Side Ignition 2			
C05	IGN_LS3	Low Side Ignition 3			
C06	IGN_LS4	Low Side Ignition 4			
C07	IGN_LS5	Low Side Ignition 5			
C08	IGN_LS6	Low Side Ignition 6			
C09	SEN_5V0_B	Sensor 5.0V B			
C10	BAT_NEG1	Battery Negative			
C11	BAT_NEG2	Battery Negative			
C12	IGN_LS7	Low Side Ignition 7			
C13	IGN_LS8	Low Side Ignition 8			
C14	AV1	Analogue Voltage Input 1			
C15	AV2	Analogue Voltage Input 2			
C16	AV3	Analogue Voltage Input 3			
C17	AV4	Analogue Voltage Input 4			
C18	OUT_HB1	Half Bridge Output 1			
C19	INJ_D3A_POS	Direct Injector 3A +			
C20	INJ_D3B_POS	Direct Injector 3B +			
C21	INJ_D4A_POS	Direct Injector 4A +			
C22	INJ_D4B_POS	Direct Injector 4B +			
C23	INJ_LS1	Low Side Injector 1			
C24	INJ_LS2	Low Side Injector 2			
C25	AV5	Analogue Voltage Input 5			
C26	BAT_POS	Battery Positive			
C27	INJ_D3A_NEG	Direct Injector 3A -			
C28	INJ_D3B_NEG	Direct Injector 3B -			
C29	INJ_D4A_NEG	Direct Injector 4A -			
C30	INJ_D4B_NEG	Direct Injector 4B -			
C31	OUT_HB3	Half Bridge Output 3			
C32	OUT_HB4	Half Bridge Output 4			
C33	OUT_HB5	Half Bridge Output 5			
C34	OUT_HB6	Half Bridge Output 6			

**M142 Connector D — 26 way**

Mating Connector D: Tyco Superseal 26 Position Keying 1 – MoTeC #65045

Pin Number	Designation	Full Name	OE Pin	Function	Description
D01	UDIG1	Universal Digital Input 1			
D02	UDIG2	Universal Digital Input 2			
D03	AT1	Analogue Temperature Input 1		1k Pull up to SEN_5V_A	
D04	AT2	Analogue Temperature Input 2		1k Pull up to SEN_5V_A	
D05	AT3	Analogue Temperature Input 3		1k Pull up to SEN_5V_B	
D06	AT4	Analogue Temperature Input 4		1k Pull up to SEN_5V_B	
D07	KNOCK1	Knock Input 1			
D08	UDIG3	Universal Digital Input 3			
D09	UDIG4	Universal Digital Input 4			
D10	UDIG5	Universal Digital Input 5			
D11	UDIG6	Universal Digital Input 6			
D12	BAT_BAK	Battery Backup			
D13	KNOCK2	Knock Input 2			
D14	UDIG7	Universal Digital Input 7			
D15	SEN_0V_A	Sensor 0V A			
D16	SEN_0V_B	Sensor 0V B			
D17	CAN1_HI	CAN Bus 1 High			
D18	CAN1_LO	CAN Bus 1 Low			
D19	SEN_6V3	Sensor 6.3V			
D20	AV6	Analogue Voltage Input 6			
D21	AV7	Analogue Voltage Input 7			
D22	AV8	Analogue Voltage Input 8			
D23	ETH_TX+	Ethernet Transmit+		Ethernet Green/White	
D24	ETH_TX-	Ethernet Transmit-		Ethernet Green	
D25	ETH_RX+	Ethernet Receive+		Ethernet Orange/White	
D26	ETH_RX-	Ethernet Receive-		Ethernet Orange	