

EM80



Advanced engine management system with 8 coil drivers, gearshift control and high-speed logging

Specifications

Parameter	Value
Operating Voltage	4V - 35 Volts
Power Consumption	≈ 250mA
Outputs	
8 Ignition Coil Drivers	20A Peak - May be used as low side outputs
8 Injector Drivers	3A Peak programmable peak and Hold
4 PWM ½ bridges	5A May be used as high side outputs
12 PWM Low side drivers	3A, 5 software selectable destination
1 Low side driver	6A (Lambda Heater)
3 Sensor Supply	5V, 50mA Current limited
Inputs	
16 Analogue Inputs **	0-5V 12bit, 3 can be used as logic level timing inputs
12 Timing Inputs **	8 Logic level, 4 Software selectable logic or VR
1 Knock Input	Microphone Type
2 Differential inputs	
Wideband Lambda Input	Supports LSU4.2, LS4.9, LSU5.2, LSU ADV, software selectable
2 Battery sense inputs	
Internal	
3-Axis G sensor and Yaw	Accelerometer: +/-2g 31Hz filter, Gyro-meter: +/-125°/s 12Hz filter
Internal Barometric	
Battery Volts	
ECU temperature	
Comms	
2 CAN Bus	CAN 2.0B
PC Comms	Ethernet
Internal Logging Memory	256MByte up to 1ms resolution
Metrics	
Anodised Aluminium Case	Sealed against water and dust ingress
Size	158 x 131 x 35 mm (including connector)
Weight	380g

**Some analogues & timing inputs are shared

Connectors

ID	Connector	Loom/Mating Connector
1	Molex 502225-0801	Molex 64319-3211 (32 pin)
2		Molex 64320-1319 (48 pin)

Pin Out

Connector	1 (32pin)		
Pin	Name	Software Code	Notes
A1	Knock Input +	A00 / A02	Knock Microphone (A00) / 0-5V Differential Pair (A02) – input for inverted signal
B1	Knock Input -	A00 / A02	
C1	Active Throttle Feedback 2	A09	47K Pull
D1	Active Throttle Feedback 1	A10	47K Pull
E1	MAF Input	A12, T5	0-5V, 47K Pull, *48 gain selector
F1	Coolant Temp Input	A11	0-5V, 2K2 Pull-Up
G1	Bridge Driver A +	O12, P5	5A Continuous, 7A Peak
H1	Ignition Coil Driver 8	O6	20A Peak 400V or logic level
A2	CAN 2 Low		120Ohm load
B2	CAN 2 High		
C2	Active Throttle Feedback 3	A18	47K Pull
D2	Active Throttle Feedback 4	A19	47K Pull
E2	5V Sensor Supply 1	A24	50mA
F2	Sensor Ground		
G2	Bridge Driver A -	O13, P6	5A Continuous, 7A Peak
H2	Ignition Coil Driver 7	O5	20A Peak 400V or logic level
A3	CAN 1 Low		120Ohm load
B3	CAN 1 High		
C3	MAP Input	A05	0-5V, 47K Pull, *48 gain selector
D3	Lambda Input 1	A03, T8	47K Pull 1M Pull Down Narrowband
E3	Lambda Input 2	A04, T6	47K Pull 1M Pull Down Narrowband
F3	Sensor Ground		
G3	Ignition Coil Driver 6	O4	20A Peak 400V or logic level
H3	Ignition Coil Driver 5	O3	20A Peak 400V or logic level
A4	Ethernet Rx -		Ethernet Orange (Pin6)
B4	Ethernet Rx +		Ethernet Orange/White (Pin3)
C4	Ethernet Tx -		Ethernet Green (Pin2)
D4	Ethernet Tx +		Ethernet Green/White (Pin 1)
E4	Differential Analogue Input -	A01	0-5V Differential Pair – input for inverted signal
F4	Differential Analogue Input +	A01	
G4	Secondary 12V Supply	A13	Ignition Switch Input
H4	Power Return		

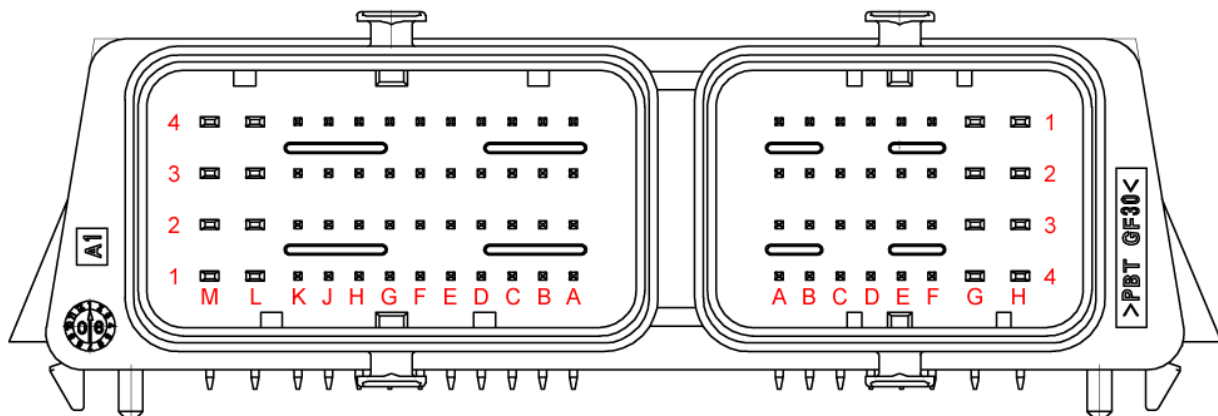
Connector	2 (48pin)		
Pin	Name	Software Code	Function
A1	PWM Driver 3	O10, P3	3A Peak
B1	PWM Driver 4	O11, P4	
C1	Fuel Injector Driver 1	O31	3A Saturation Type, Software selectable Active Re-circulation, peak and hold.
D1	Fuel Injector Driver 2	O30	
E1	Fuel Injector Driver 3	O29	
F1	Fuel Injector Driver 4	O28	
G1	Fuel Injector Driver 5	O27	
H1	Fuel Injector Driver 6	O26	
J1	Fuel Injector Driver 7	O25	
K1	Fuel Injector Driver 8	O24	
L1	Main 12V Supply	A14	
M1	Power Return		
A2	5V Sensor Supply 3	A25	50mA
B2	Timing Input 12	T12, A20	Logic 4K7 Pull-Up
C2	Timing Input 11	T11, A23	Logic 4K7 Pull-Up
D2	Timing Input 10	T10	Logic 4K7 Pull-Up
E2	Timing Input 9	T9	Logic 4K7 Pull-Up
F2	Timing Ground		
G2	Wideband Lambda 1		
H2	Wideband Lambda 2		A21 Lambda
J2	Wideband Lambda 3		A22 Sensor resistance
K2	Wideband Lambda 4		
L2	Ignition Coil Driver 2	O2	20A Peak 400V or logic level, Multiplex 2
M2	Ignition Coil Driver 4	O2	20A Peak 400V or logic level, Multiplex 2

A3	Sensor Ground		
B3	Air Inlet Temp Input	A8	4K7 Pull-Up 0-5V
C3	Accelerator Pedal Input 1	T7 A7	47K Pull
D3	Accelerator Pedal Input 2	A6	47K Pull
E3	Timing Input 1	T1 A28	Logic 1K Pull-up or VR 10K Pull-Down
F3	Timing Input 2	T2 A30	Logic 1K Pull-up or VR 10K Pull-Down
G3	Timing Input 3	T3 A29	Logic 1K Pull-up or VR 10K Pull-Down
H3	Timing Input 4	T4 A31	Logic 1K Pull-up or VR 10K Pull-Down
J3	5V Sensor Supply 2		50mA
K3	WB Lambda Heater	O32	3A Continuous, 7A Peak
L3	Bridge Driver B -	O9, P2	5A Continuous, 7A Peak
M3	Ignition Coil Driver 3	O1	20A Peak 400V or logic level, Multiplex 1
A4	PWM Driver 7	O14, P7	3A Peak with recirculation diode to Main Power
B4	PWM Driver 8	O15, P8	
C4	PWM Low Side Driver 15	O23, P15	
D4	PWM Low Side Driver 16	O22, P16	
E4	PWM Low Side Driver 14	O21, P14	
F4	PWM Low Side Driver 13	O20, P13	
G4	PWM Low Side Driver 12	O19, P12	
H4	PWM Low Side Driver 11	O18, P11	
J4	PWM Low Side Driver 10	O17, P10	
K4	PWM Low Side Driver 9	O16, P9	
L4	Bridge Drive B +	O8, P1	5A Continuous, 7A Peak
M4	Ignition Coil Driver 1	O1	20A Peak 400V or logic level, Multiplex 1
-	Internal Barometric Sensor		
-	Internal ECU Temperature		
	3Axis G and Yaw		

High current pins marked in bold

Software Codes: A = Analogue Input, O = Output, P = PWM Output, T = Timing Input

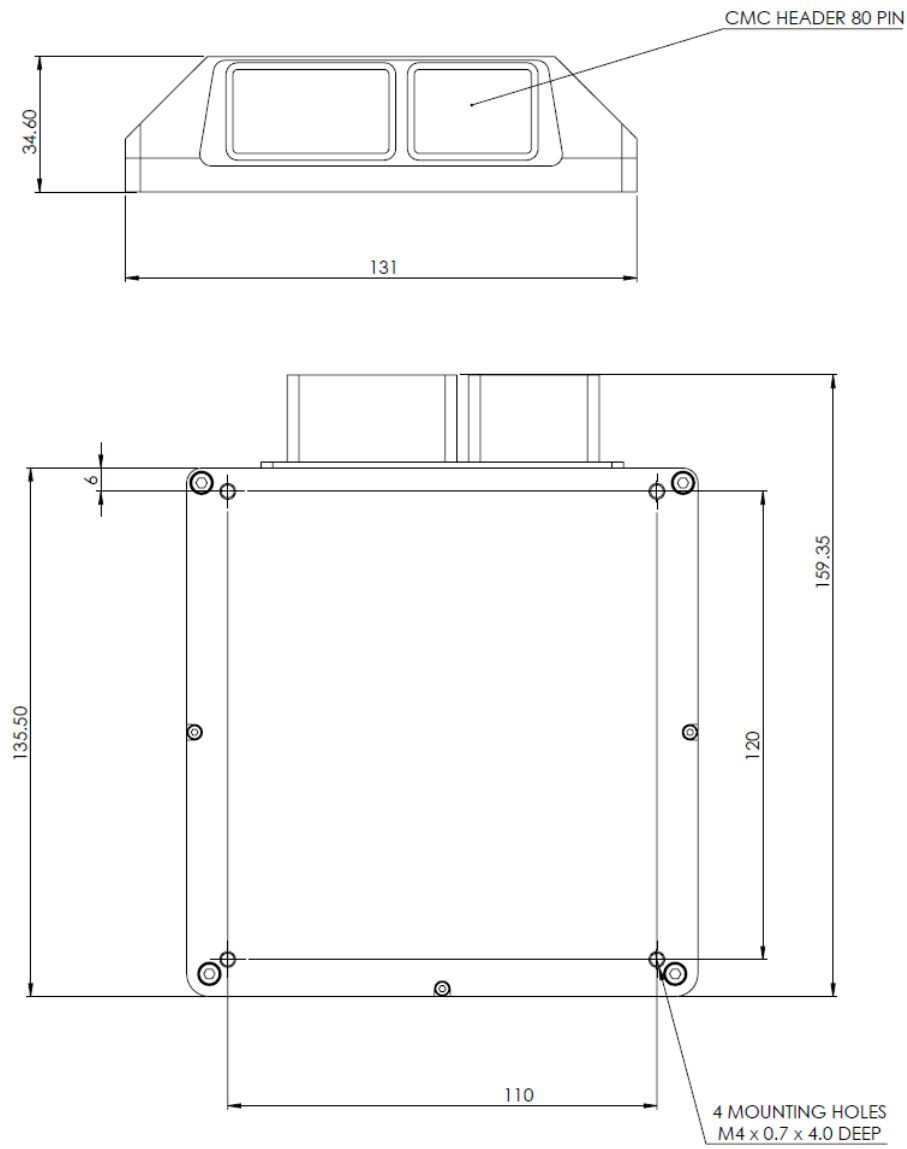
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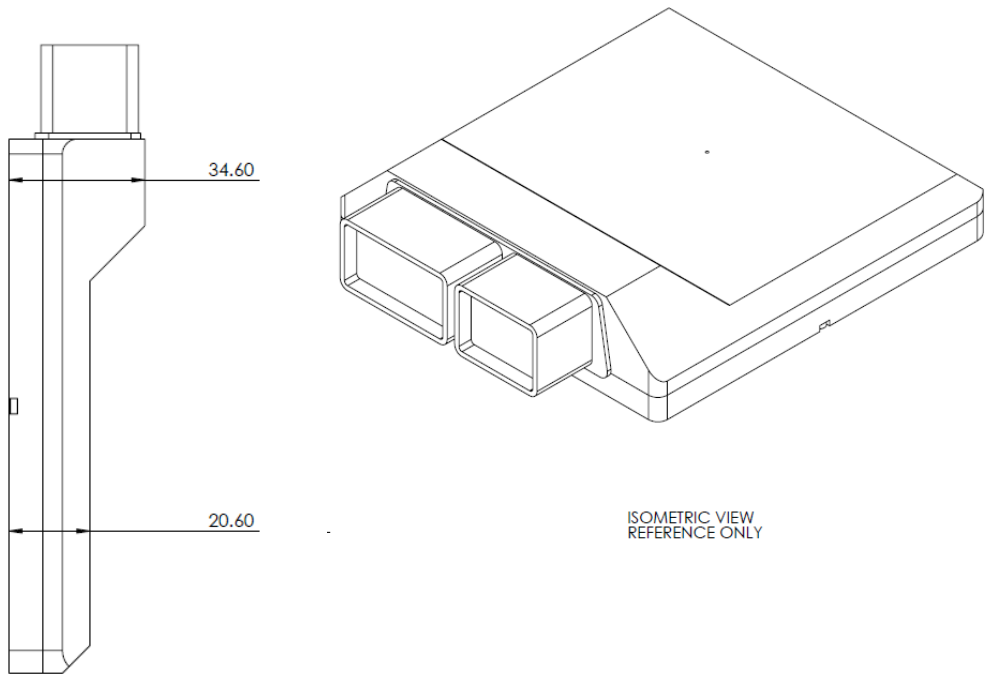


Connector Accessories

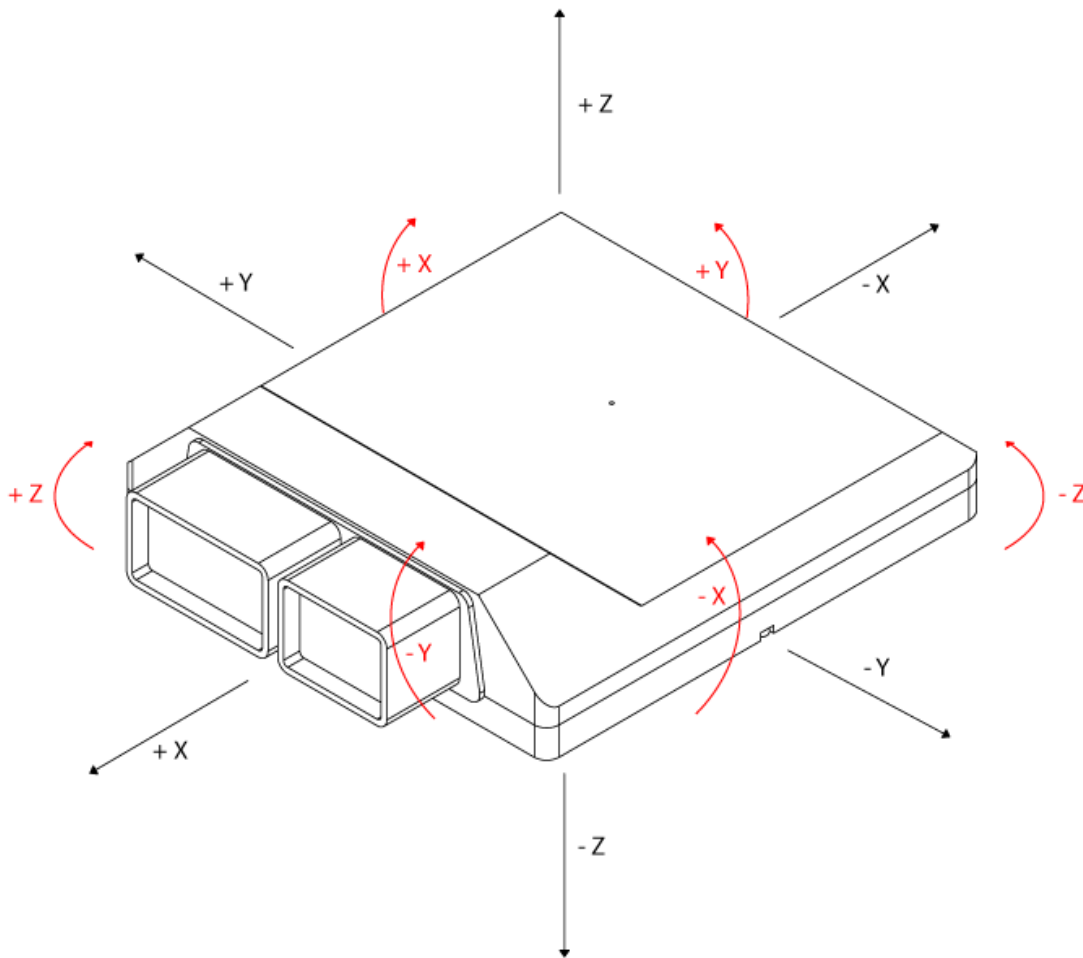
Description	Manufacturer	Part No
Wire cap (32 way)	Molex	64319-1201
Wire cap (48 way)	Molex	64320-1301
0.635mm Blind cavity plug	Molex	64325-1010
1.50mm Blind cavity plug	Molex	64325-1023
CP Female terminals (for standard pins)	Molex	64322
1.5mm CP Female terminals (for high current pins)	Molex	64323

Dimensions





Directions for internal G and **angular speed** sensor:



Open Source Software Licenses

The product firmware uses a number of open source software components. Details of the open source software components and their licenses may be viewed at the following address:

<https://gems.co.uk/home/open-source-licence-usage/#EM80-M>