

## GDi80



Advanced engine management system for four-cylinder GDi engines with active throttle, knock control, wideband lambda, gear shift control, high speed data logging with a large data logging memory and high speed ethernet comms.

### Specifications

Parameter	Value
Operating Voltage	4-35V
Power Consumption	≈ 250mA @ 12V
Processors	3
<b>Outputs</b>	
4 Ignition Coil Signals	For use with active coils TTL type
4 Direct Injection Drivers	High voltage boost 70V, peak and hold programmable
4 Port Injection Drivers	Saturation type
1 High Pressure pump drive	Peak and Hold programmable
4 PWM H-bridges	3A PWM possible for throttle motor. May be used for high side outputs
8 PWM Low side drivers	3A PWM possible some with 0-5V analogue inputs
1 Low Side driver	6A (Lambda Heater)
2 Sensor Supply	5V 100mA
<b>Inputs</b>	
22 Analogue Inputs	0-5V 12bit, 6 shared with logic level timing inputs,
2 Differential Analogue	1 Knock
12 Timing Inputs	8 Logic level, 4 software selectable logic or VR
Wideband Lambda Input	LSU4.2, LS4.9, LSU ADV software selectable
<b>Internal</b>	
3-Axis G sensor and Yaw	Accelerometer: +/-2g 31Hz filter, Gyro-meter: +/-125°/s 12Hz filter
Internal Barometer	
Battery Volts	
<b>Comms</b>	
2 CAN Bus	CAN 2.0B
PC Comms	Ethernet
Internal Logging Memory	256Mbyte 1000Hz
<b>Metrics</b>	
Anodised Aluminium Case	Sealed against water and dust ingress
Size	159 x 131 x 35 mm (including connector)
Weight	456g

## Connectors

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

## Pin Out

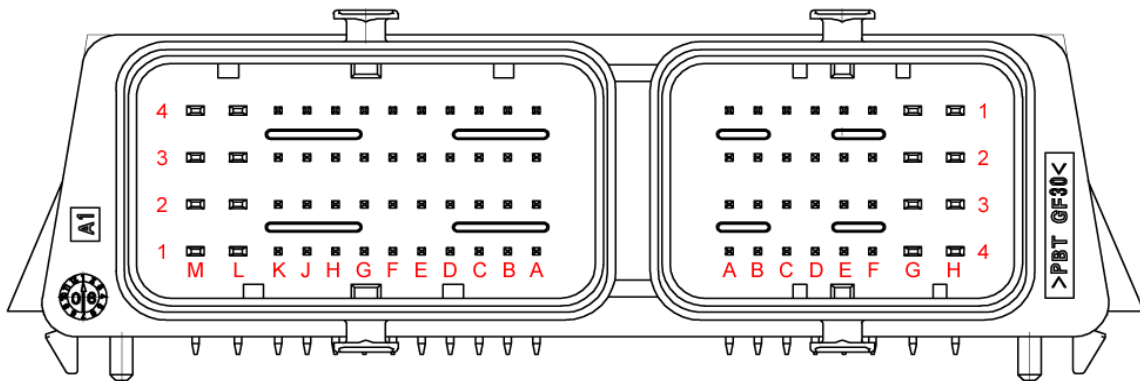
Connector	1 (32pin)			
Pin	Name	Software Code	Notes	
A1	Knock Input +	A00	0-5V Differential Analogue Microphone Type	
B1	Knock Input -	A02		
C1	Active Throttle Feedback 2	A09	0-5V 47K Selectable Pull-Up/Down	
D1	Active Throttle Feedback 1	A10	0-5V 47K Selectable Pull-Up/Down	
E1	MAF Input	A12, T5	0-5V, 47K Selectable Pull-Up/Down, x48 gain selector	
F1	Coolant Temp Input	A11	0-5V, 2K2 Pull-Up	
G1	Bridge Driver A +	O12, P5	Active Throttle1 Drive +5A Continuous, 7A Peak	
H1	Main 12V Supply	A14	Power In, A14 reads 0-39V	
A2	CAN 2 Low		120Ohm load	
B2	CAN 2 High			
C2	Active Throttle Feedback 3	A18	0-5V 47K Selectable Pull-Up/Down	
D2	Active Throttle Feedback 4	A19	0-5V 47K Selectable Pull-Up/Down	
E2	5V Sensor Supply 1	A24	100mA	
F2	Sensor Ground			
G2	Bridge Driver A -	O13, P6	Active Throttle1 Drive -5A Continuous, 7A Peak	
H2	Main 12V Supply	A14	Power In, A14 reads 0-39V	
A3	CAN 1 Low		120Ohm load	
B3	CAN 1 High			
C3	MAP Input	A05	0-5V, 47K Selectable Pull-Up/Down, x48 gain selector	
D3	Narrowband Lambda Input 1	A03, T8	0-5V 1M Pull Down, 47K Selectable Pull-Up/Down	
E3	Narrowband Lambda Input 2	A04, T6	0-5V 1M Pull Down, 47K Selectable Pull-Up/Down	
F3	Sensor Ground			
G3	HPP+		Peak and hold drive for High Pressure Pump control valve	
H3	HPP-			
A4	Ethernet Rx -		Ethernet Orange (Pin6)	Twisted Pair
B4	Ethernet Rx +		Ethernet Orange/White (Pin3)	
C4	Ethernet Tx -		Ethernet Green (Pin2)	Twisted Pair
D4	Ethernet Tx +		Ethernet Green/White (Pin 1)	
E4	Analogue Input 17	A17	0-5V 47K Pull-Up	
F4	Analogue Input 27	A27	0-5V 47K Pull-Up	
G4	Power Return		Main power 0V	
H4	Power Return		Main power 0V	

Connector	2 (48pin)		
Pin	Name	Software Code	Function
A1	PWM Driver 3	O14, P7	General purpose low side PWM drivers with Flyback diodes
B1	PWM Driver 4	O15, P8	
C1	Bridge D -	O21, P14	3A peak Bridge drives can be used as Half Bridge or High Side Drives
D1	Bridge D +	O20, P13	
E1	Bridge C -	O23, P15	
F1	Bridge C +	O22, P16	
G1	PWM Low Side Driver	O19, P12, A30	General purpose low side PWM drivers with Flyback diodes. Can be used as Analogue Inputs
H1	PWM Low Side Driver	O18, P11, A28	
J1	PWM Low Side Driver	O17, P10, A26	

K1	PWM Low Side Driver	O16, P9, A2	
<b>L1</b>	Direct Injector 1 -	O26	Injector 2.1 Fuel3 (Cylinder 3)
<b>M1</b>	Direct Injector 2 -	O27	Injector 2.2 Fuel4 (Cylinder 4)
A2	Sensor Ground		
B2	Air Inlet Temp Input	A8	0-5V 4K7 Pull-Up
C2	Accelerator Pedal Input 1	T7 A7	0-5V 47K Selectable Pull-Up/Down
D2	Accelerator Pedal Input 2	A6	0-5V 47K Selectable Pull-Up/Down
E2	Timing Input 1	T1	Logic 1K Pull-Up or VR 10K Pull-Down
F2	Timing Input 2	T2	Logic 1K Pull-Up or VR 10K Pull-Down
G2	Timing Input 3	T3 A29	Logic 1K Pull-Up or VR 10K Pull-Down 0-5V Analogue
H2	Timing Input 4	T4 A31	Logic 1K Pull-Up or VR 10K Pull-Down 0-5V Analogue
J2	Secondary 12V Supply	A13	Ignition Switch Input, A13 reads 0-39V
K2	WB Lambda Heater	O32	3A Continuous, 7A Peak
<b>L2</b>	Direct Injector 1 +	O26	Injector 2.1 Fuel3 (Cylinder 3)
<b>M2</b>	Direct Injector 2 +	O27	Injector 2.2 Fuel4 (Cylinder 4)
A3	5V Sensor Supply 3	A25	
B3	Timing Input 12	T12, A20 O5	Logic 1K0 Pull-Up, TOC5 (5V PWM Signal) 0-5V Analogue
C3	Timing Input 11	T11, A23	Logic 4K7 Pull-Up, 0-5V Analogue
D3	Timing Input 10	T10	Logic 4K7 Pull-Up
E3	Timing Input 9	T9	Logic 4K7 Pull-Up
F3	Timing Ground		
G3	Wideband Lambda 1		yellow
H3	Wideband Lambda 2	A21	Red Lambda
J3	Wideband Lambda 3	A22	Black Sensor resistance
K3	Wideband Lambda 4		violet
<b>L3</b>	Direct Injector 3 +	O24	Injector 1.1 Fuel1 (Cylinder 1)
<b>M3</b>	Direct Injector 4 +	O25	Injector 1.2 Fuel2 (Cylinder 2)
A4	Bridge Driver B -	O9, P2	Active Throttle2 Drive -5A Continuous, 7A Peak
B4	Bridge Driver B +	O8, P1	Active Throttle2 Drive +5A Continuous, 7A Peak
C4	Port Injector Fuel8	O31	3A Saturation Type
D4	Port Injector Fuel7	O30	
E4	Port Injector Fuel6	O29	
F4	Port Injector Fuel5	O28	
G4	Ignition Coil Drive Cylinder 3	O4	5V logic
H4	Ignition Coil Drive Cylinder 4	O3	
J4	Ignition Coil Drive Cylinder 2	O2	
K4	Ignition Coil Drive Cylinder 1	O1	
<b>L4</b>	Direct Injector 3 -	O24	Injector 1.1 Fuel1 (Cylinder 1)
<b>M4</b>	Direct Injector 4 -	O25	Injector 1.2 Fuel2 (Cylinder 2)
-	Internal Barometric Sensor		
-	Internal ECU Temperature		
	3Axis G and Yaw		

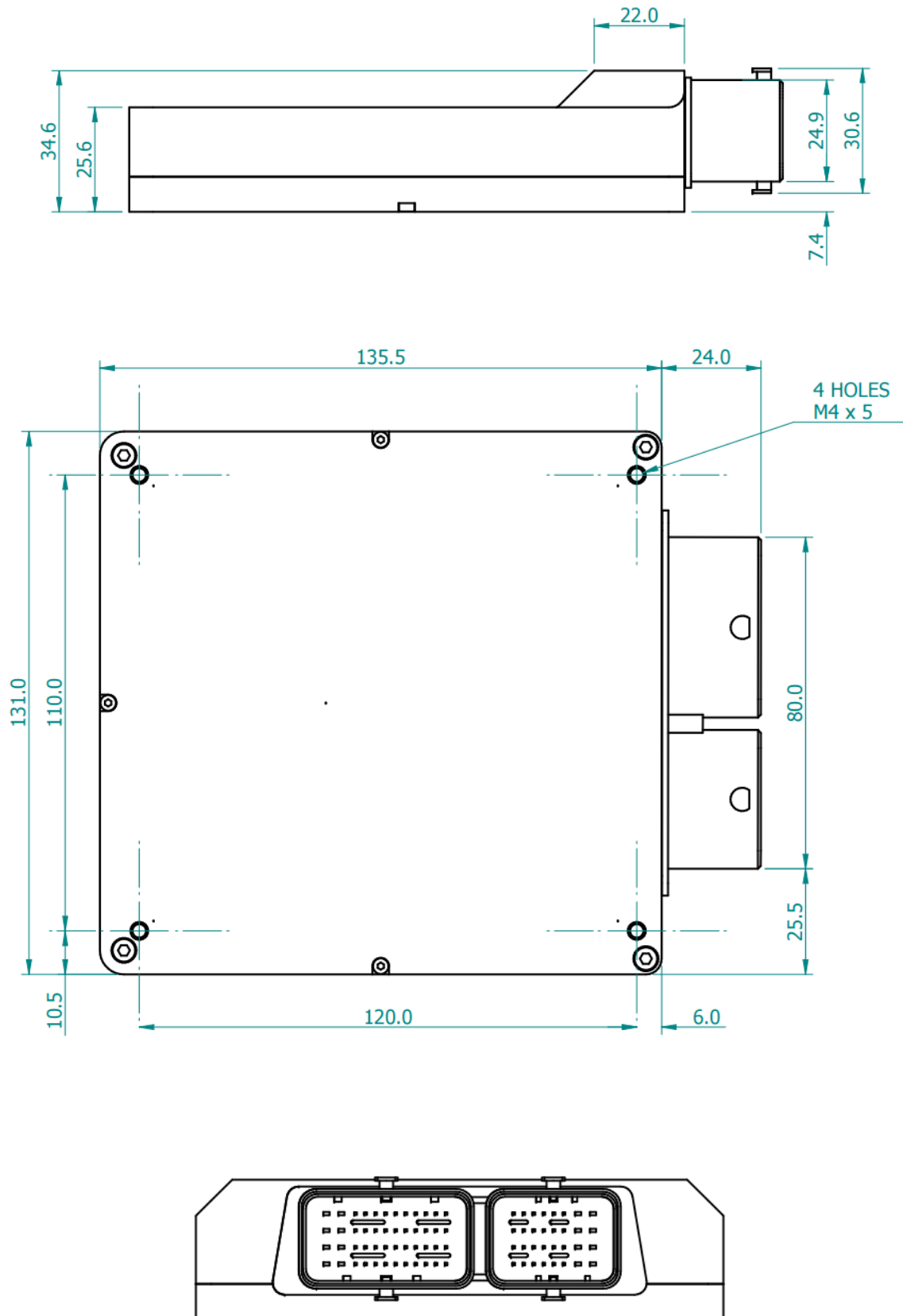
Assume **Firing Order 1 3 4 2**  
High current pins marked **in bold**

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

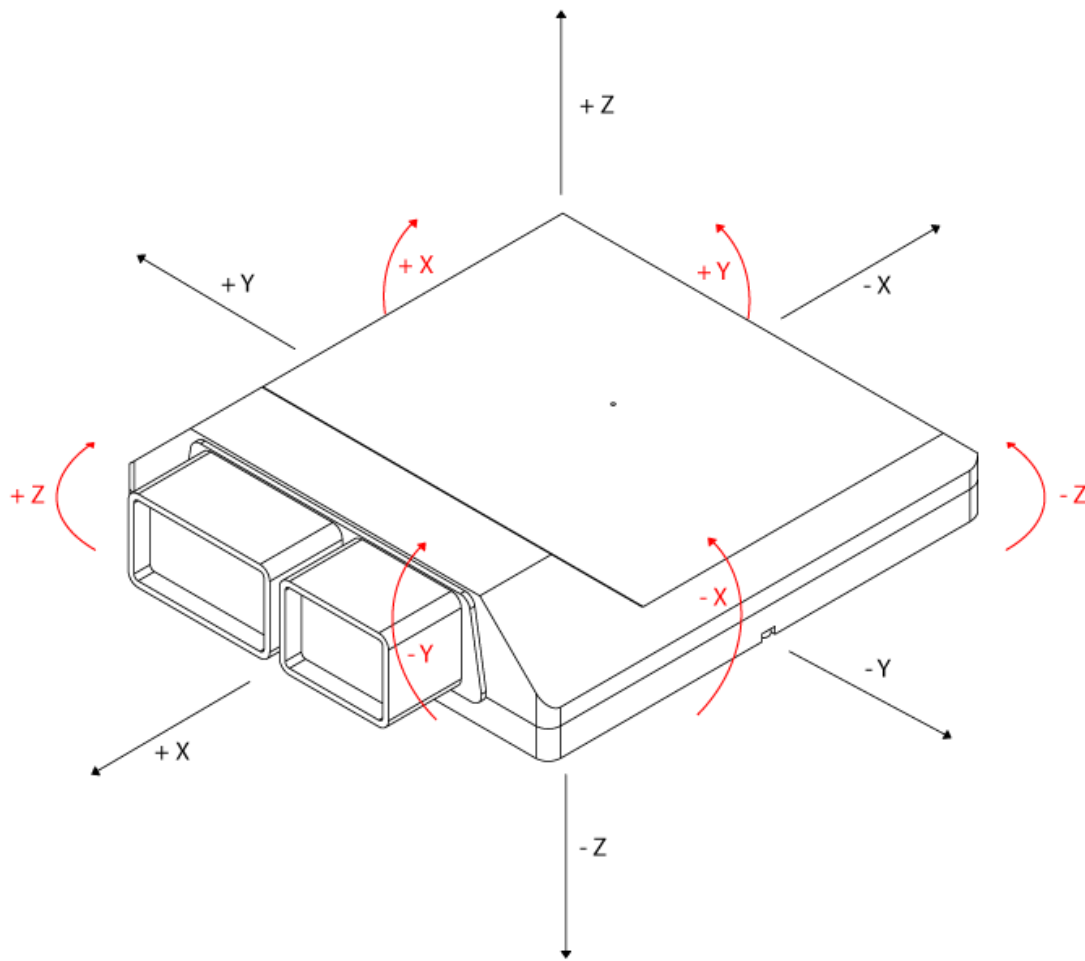


## Dimensions

All dimensions in mm



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>