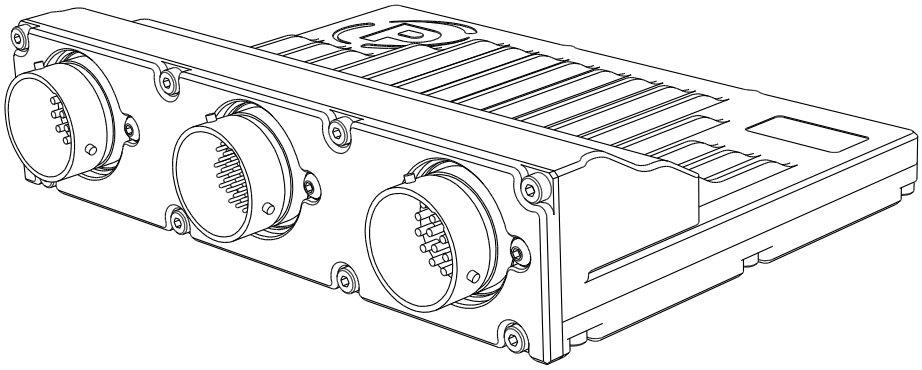
Pectel SQ6M ECU



Introduction

The Pectel SQ6M sets the benchmark for high-performance engine management systems. Its Freescale MPC565 microprocessor and dedicated timer co-processor bring class leading performance in a cost-effective package. No other ECU offers the same combination of price, power, performance and flexibility.

Twelve configurable injector drivers combined with eight IGBT ignition outputs AND eight logic level coil driving outputs make this ECU capable of fully sequential fuelling on normally aspirated, turbo and supercharged engines from one to twelve cylinders. Fly-by-wire capability is included, with Stepper and DC motors catered for.

Put all of this functionality in one small light box and you have an ECU capable of working with almost any combination of coil, injector, OEM sensor and actuator.

An all new crank and camshaft pattern recognition system allows the SQ6M to be used with virtually any OEM timing wheel. This sophisticated pattern recognition algorithm also facilitates synchronisation during slow and uneven cranking conditions.

Hugely flexible, the SQ6M has two, and sometimes three functions on many of its pins:

- unused injector and IGBT ignition outputs can be used as digital outputs
- unused digital inputs can be used as 10 bit analogue inputs
- H-bridge outputs can be used in either full or half bridge mode, H-bridge outputs can be combined to drive a stepper motor or used to provide additional high or low-side drive capability.

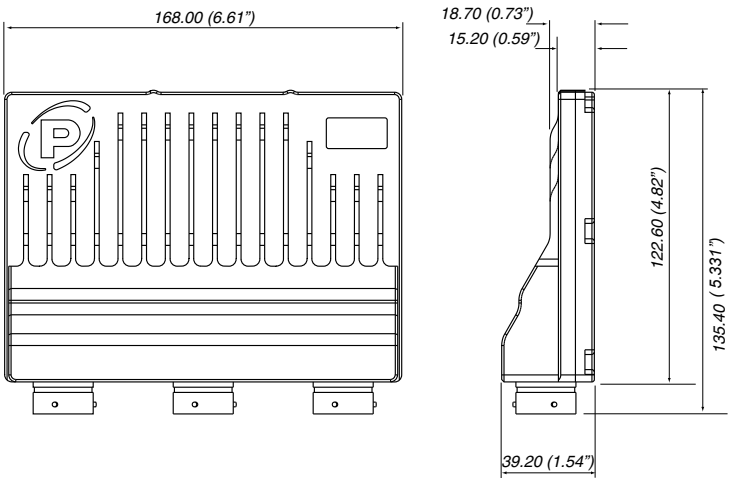
All of these features are enabled by software—there are NO hardware build options. Designed to be robust, the SQ6M has reverse-battery, over-voltage and load dump protection built in as standard. Sensor supply and signal ground pins are also protected against shorts to battery positive and negative.

Advanced software features include traction control, launch control, gearshift strategies, variable valve timing of up to four camshafts (including BMW VANOS), high speed data logging and scrutineering modes for single make championships.

The ECU has optional highly advanced control strategies for semi-automatic/paddle-shift gearboxes which include FBW throttle blip and over rev protection. Customers who have used this have extended gearbox life by 100%.

OE Calibrated with calibration support available on quotation.

Dimensions



Dimensions in millimetres (and inches)

Specifications

Description	Value
Processor	Freescale MPC565 @ 56MHz, 5 MB flash memory & 4MB non-volatile RAM
Supply Voltage	8V to 18V reverse battery, over-voltage and load dump protection
Engine Configuration	1 to 12 cylinders 2/4 stroke or rotary Natural/Forced induction
Digital Outputs	6 PWM dedicated. (10A peak) 8 PWM alternate. (5A peak) 8 Relay alternate function
Digital Inputs	10 dedicated
Data Logging	4MB standard 2000 samples/second
Crank & Cam Sensor	3 Hall Effect/Inductive
Note: Quoted currents are peak rating	

Description	Value
Analogue Inputs	12 dedicated (12 bit) 2 x Wide band lambda (12 bit) 2 x Knock sensor (12 bit) 2 x K-type thermocouple (12 bit) 10 alternate function (10 bit
Internal Sensors	ECU Internal Temperature x 4 Battery Voltage
Ignition Drivers	8 IGBT Internal Clamp (400V 20A peak) 8 Logic Level driven
Auxiliary Outputs	1 Full Bridge (7A peak) 2 Full Bridge (4A peak) **OR** 1 Stepper Motor alternate function
Communication	1 RS232 3 CAN 2.0B 1 Ethernet (10MBit)
Case Operating Temp	–40°C to +70°C
Weight	570 grams
Environmental	IP67

Connector Details

ECU Connector	Mating Connector
AS2-16-26PN	AS6-16-26SN
AS2-16-26PA	AS6-16-26SA
AS2-16-35PN	AS6-16-35SN

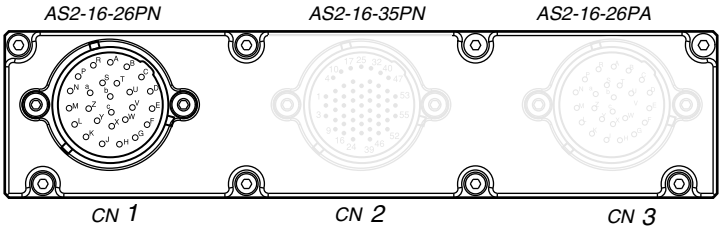
See below for pinout information.

Ordering Information

Product	Part number
Pectel SQ6M ECU	01E-500720
Optional extra at time of order:– Gearbox upgrade	E011
Pectel download, Autosport to Ethernet 1.5m	60E-500905
Pectel download, Autosport to Ethernet 10m	60E-500906
Pectel download, Autosport to Serial COM port	60E-500909

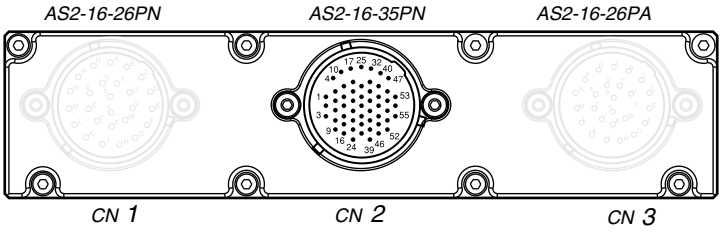
Pinout Details

AS216-26PN Pin information



Pin	Dir	Function	Function	Notes
L	Battery	VBAT	ECU Battery Positives	7.5A cont. (per pin)
M	Battery	VBAT		
Y	Battery	ECU GND	ECU Battery Negatives	7.5A cont. (per pin) Must be Engine Ground
Z	Battery	ECU GND		
a	Battery	ECU GND		
K	O	IGN1	Ignition Coils	IGBTs clipped to 450V. 20A peak
J	O	IGN2		
H	O	IGN3		
G	O	IGN4		
F	O	IGN5		
E	O	IGN6		
X	O	INJ1	Injector Outputs	Low side drivers clipped to 45V. 5A peak, 2.5A hold
W	O	INJ2		
A	O	INJ3		
R	O	INJ4		
B	O	INJ5		
T	O	INJ6		
C	O	INJ7		
U	O	INJ8		
D	O	INJ9		
V	O	INJ10		
b	O	PWM1	PWM Outputs	Low side drivers. 10A peak. 10k Ohms Pullup to VBAT. Recirculation diode to VBAT.
c	O	PWM2		
P	O	PWM3		
S	O	PWM4		
N	O	PWM5		

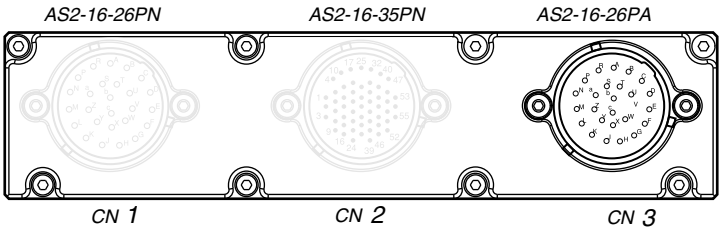
AS216-35PN Pin information



Pin	Dir	Function	Function	Notes
20	I	AIN1	12bit Analogue Inputs	Software pullups 3kOhms & 33kOhms
6	I	AIN2		
27	I	AIN3		
2	I	AIN4		
19	I	AIN5		
7	I	AIN6		
18	I	AIN7		
3	I	AIN8		
24	I	AIN9	12bit Analogue Inputs	Software pullups 3k Ohms & 240 Ohms
8	I	AIN10		
23	I	AIN11		
9	I	AIN12		
11	I	TC1 POS	Thermocouples Positive (12bit)	
4	I	TC2 POS		
13	I	TC NEG	Themocouple Negative	
12	I	LAMV1	Lambda	
17	O	LAMI1	Lambda Current Pump	
5	I	LAMV2	Lambda	
10	O	LAMI2	Lambda Current Pump	
39	I	DET1	Knock Sensor	
38	I	DET2		
40	I	CRANK1	Crank Inputs	Software Pullup 3k Ohms
31	I	CRANK2		
41	I	CAM	CAM Input	
49	I	DIN1	Digital Inputs	Software Pullup 3k Ohms
53	I	DIN2		
50	I	DIN3		
54	I	DIN4		
47	I	DIN5		
44	I	DIN6		
42	I	DIN7		
48	I	DIN8		
35	I	DIN9		
51	I	DIN10		

Pin	Dir	Function	Function	Notes
29	O	RS232TX	RS232 port	
36	I	RS232RX		
21	O	ETHER TXPOS	Ethernet PC comms	
28	O	ETHER TXNEG		
22	I	ETHER RXPOS		
14	I	ETHER RXNEG		
45	I/O	CAN1 LOW	CAN Communication ports	Terminated
52	I/O	CAN1 HIGH		
26	I/O	CAN2 LOW		
32	I/O	CAN2 HIGH		
33	O	OUT 5V0 / 12V	Programmable Sensor Supply Output 1	5V, 50mA or 12V, 1A
55	O	OUT 5V0 / 12V		
15	O	OUT 5V0 / 12V	Programmable Sensor Supply Output 2	5V, 50mA or 12V, 1A
16	O	OUT 5V0 / 12V		
46	-	Unused		
1	I/O	ANG GND	Protected Sensor Grounds	1A cont.
37	I/O	ANG GND		
25	I/O	CRANK/CAM GND		
30	I/O	DIG GND		
34	I/O	DIG GND		
43	I/O	COMMS GND		

AS216-26PA Pin information



Pin	Dir	Function	Function	Notes
A	Battery	VBAT	ECU Battery Positives	20V, 7.5A cont. (per pin)
B	Battery	VBAT		
S	Battery	ECU GND	ECU Battery Negatives	20V, 7.5A cont. (per pin) Must be Engine Ground
T	Battery	ECU GND		
U	Battery	ECU GND		
C	O	IGN7	Ignition Coils	400V, 20A peak
D	O	IGN8		
V	O	INJ11	Injector Outputs	100V, 5A peak, 2.5A hold
W	O	INJ12		
c	O	PWM6	PWM Output	20V, 10A peak. 10k Ohms Pullup to VBAT
F	O	HB3A	DC Motor drivers	20V, 10A peak
E	O	HB3B		
P	O	HB1A	2 Full Bridge (5A) **OR** 1 Stepper Motor alternate function	20V, 5A peak
R	O	HB1B		
a	O	HB2A		
b	O	HB2B		
M	O	IGNT1	“TTL” Ignitions	5V, 20mA cont.
N	O	IGNT2		
L	O	IGNT3		
Z	O	IGNT4		
K	O	IGNT5		
Y	O	IGNT6		
J	O	IGNT7		
X	O	IGNT8		
G	I/O	CAN3 LOW	CAN Communication port	No termination
H	I/O	CAN3 HIGH		

Recycling and Environmental Protection

Cosworth Electronics is committed to conducting its business in an environmentally responsible manner and to strive for high environmental standards.

Manufacture

Cosworth products comply with the appropriate requirements of the Restriction of Hazardous Substances (RoHS) directive (where applicable).

Disposal

Electronic equipment should be disposed of in accordance with regulations in force and in particular in accordance with the Waste in Electrical and Electronic Equipment directive. (WEEE)

Battery

This equipment contains a battery. (Lithium Thionylchloride)

The equipment may be returned to Cosworth Electronics for a replacement battery. (A charge may be made for this service)

Removal of the battery by the user may void any warranty on the equipment.

To remove the battery for recycling:

- Remove the case cover(s).
- Remove the printed circuit boards from the case.
- Remove the battery from the printed circuit board.

Dispose of the battery in accordance with regulations in force.

Declaration of Conformity

We, the undersigned,

Pi Research
Brookfield Motorsports Centre,
Cottenham,
Cambridgeshire, CB4 8PS
United Kingdom

Certify and declare under our sole responsibility that the following equipment:

SQ6M – part number 500720
An ECU for use only in motorsport applications

Conforms to the following EC directives including applicable amendments:

EMC Directive 89/336/EEC, 72/245/EEC (last amended 2004/104/EC)

The following standards have been applied:

2004/104/EC

Cottenham, 27th February 2006

George Lendrum - Director of Motorsport