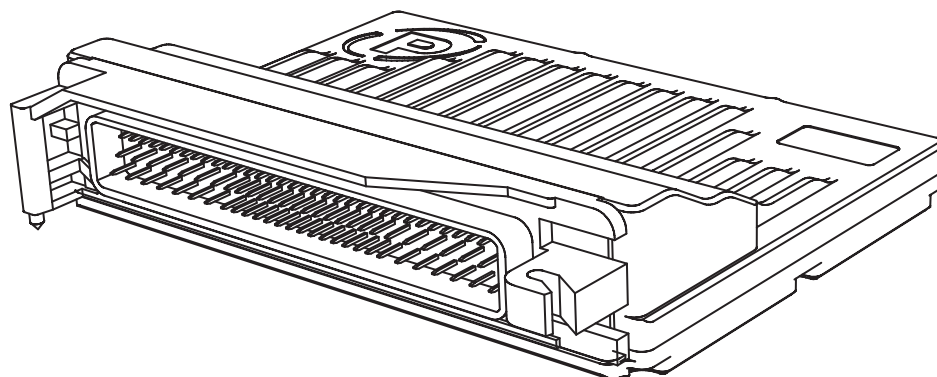




Pectel SQ6 ECU



Introduction

The Pectel SQ6 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 SQ6 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 SQ6 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.

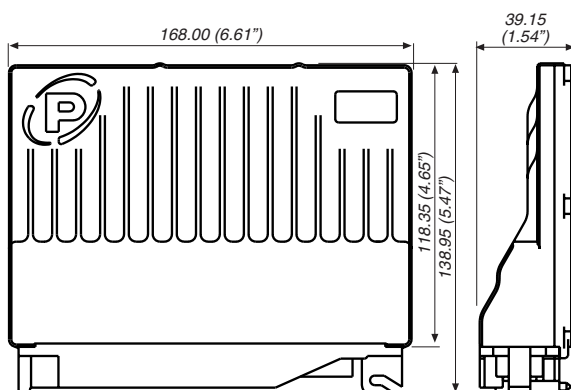
Designed to be robust, the SQ6 has reverse-battery, over-voltage and load dump protection built in as standard. Sensor supply and signal ground pins are also protected against shorts to battery positive and negative.

Advanced software features include traction control, launch control, gearshift strategies, variable valve timing of up to 4 camshafts (including BMW VANOS), high speed data logging and scrutineering modes for single make championship.

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, 5MB flash memory and 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) 16 Relay alternate function
Data Logging	1MB standard (Upgrade to 2MB available) 2000 samples/second
Digital Inputs	8 dedicated
Crank & Cam Sensor	3 Hall Effect/Inductive
Injector Drivers	12 peak and hold (0-5A)
Note: Quoted currents are peak rating	

Description	Value
Analogue Inputs	10 dedicated (12 bit) 2 x Wide band lambda (12 bit) 2 x Knock sensor (12 bit) 2 x K-type thermocouple (12 bit) 8 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 (5 or 12 V)
Auxiliary Outputs	1 Full Bridge (10A peak) 2 Full Bridge (5A peak) OR 1 Stepper Motor alternate function
Communication	1 RS232 2 CAN 2.0B 1 Ethernet (10MBit)
Case Operating Temp.	-40°C to +70°C
Environmental	IP40
Weight	500g

Connector Details

ECU Connector	Mating Connector
88 way	88 way

See below for pinout information

Ordering Information

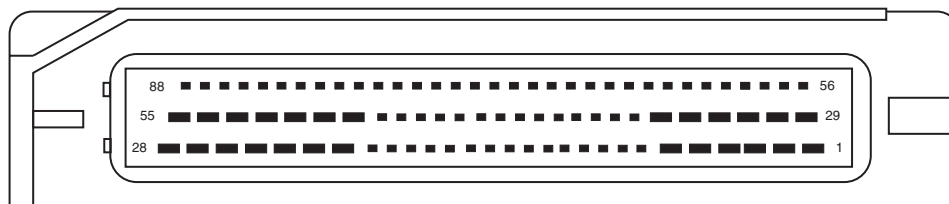
Product	Part number
Pectel SQ6 ECU	01E-500700
Pectel SQ6 ECU with gearbox upgrade	01E-500700-E011
Pectel download, Autosport to Ethernet 1.5m	60E-500905
Pectel download, Autosport to Ethernet 10m	60E-500906
Pectel download, Autosport to Serial COM port	60E-500909



The following options are also available:

- Second Wideband Lambda Input
- 2 MB memory upgrade
- Gearbox control upgrade
- Traction control
- Fly by wire Throttle

88 Way Connector Pinout Details



View looking into the 88 way connector

Grey shading in the following table indicates pins which have a higher current rating than the other pins.

Pin	Dir	Function	Function	Notes
12	I	AIN1	12bit Analogue Inputs	Software pullups 3k Ohms & 33k Ohms
13	I	AIN2		
72	I	AIN3		
73	I	AIN4		
40	I	AIN5		
42	I	AIN6		
43	I	AIN7		
14	I	AIN8		
15	I	AIN9	12bit Analogue Inputs	Software pullups 3k Ohms & 240 Ohms
16	I	AIN10		
71	I	TC1 POS	Thermocouple Positive (12bit)	
41	I	TC2 POS		
70	I	TC NEG		
68	I	LAMV1	Lambda	
38	O	LAMI1	Lambda Current Pump	
69	I	LAMV2	Lambda	
39	O	LAMI2	Lambda Current Pump	
10	I	DET1	Knock Sensors	
11	I	DET2		
46	I	CRANK1	Crank Inputs	Software Pullup 3k Ohms
18	I	CRANK2		
17	I	CAM	CAM Input	
78	I	DIN1	Digital Inputs	Software Pullup 3k Ohms
77	I	DIN2		
48	I	DIN3		
21	I	DIN4		
20	I	DIN5		
47	I	DIN6		
19	I	DIN7		
76	I	DIN8		

Grey shading in the following table indicates pins which have a higher current rating than the other pins.

Pin	Dir	Function	Function	Notes
36	O	RS232TX	RS232 port	
66	I	RS232RX		
75	O	ETHER TXPOS	Ethernet PC comms	
45	O	ETHER TXNEG		
74	I	ETHER RXPOS		
44	I	ETHER RXNEG		
37	I/O	CAN1 LOW	CAN Communication ports	Terminated
67	I/O	CAN1 HIGH		
8	I/O	CAN2 LOW		
9	I/O	CAN2 HIGH		
55	O	INJ1	Injector Outputs	100V, 5A peak, 2.5A hold
88	O	INJ2		
87	O	INJ3		
86	O	INJ4		
85	O	INJ5		
54	O	INJ6		
84	O	INJ7		
52	O	INJ8		
83	O	INJ9		
82	O	INJ10		
81	O	INJ11		
80	O	INJ12		
26	O	IGN1	Ignition Coils	400V, 20A peak
25	O	IGN2		
22	O	IGN3		
28	O	IGN4		
27	O	IGN5		
53	O	IGN6		
51	O	IGN7		
50	O	IGN8		
56	O	IGNT1	"TTL" Ignitions	5V, 20mA cont.
57	O	IGNT2		
58	O	IGNT3		
59	O	IGNT4		
60	O	IGNT5		
61	O	IGNT6		
62	O	IGNT7		
63	O	IGNT8		



Grey shading in the following table indicates pins which have a higher current rating than the other pins.

Pin	Dir	Function	Function	Notes
34	O	PWM1	PWM Outputs	20V, 10A peak. 10k Ohms Pullup to VBAT
6	O	PWM2		
33	O	PWM3		
2	O	PWM4		
4	O	PWM5		
31	O	PWM6		
30	O	HB1A	2 Full Bridge (5A) OR 1 Stepper Motor alternate function	20V, 5A peak.
5	O	HB1B		
1	O	HB2A		
29	O	HB2B		
32	O	HB3A	DC Motor driver	20V, 10A peak.
3	O	HB3B		
65	O	OUT 5V0 / 12V	Programmable Sensor Supply Outputs	5V, 50mA or 12V, 1A
64	O	OUT 5V0 / 12V		
35	I/O	ANG GND	Protected Sensor Grounds	20V, 1A cont.
7	I/O	CRANK/CAM GND		
79	I/O	DIG GND		
24	Battery	ECU GND	ECU Battery Negatives	20V, 10A cont. (per pin) Must be Engine Ground
23	Battery	ECU GND		
49	Battery	VBAT	ECU Battery Positive	20V, 10A cont.

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:

SQ6 – part number 500700
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