Autronic
FUEL INJECTION — ADVANCED CONTROLS

SMCMR ECU - SPECIFICATIONS

IMPORTANT: Please note that this product is intended for high performance motor sport applications and compliance with statutory regulations when used on public roads cannot be guaranteed.

Features.

1. Eight injector drivers for full sequential operation on engines up to eight cylinders. Staging injection possible in some applications. May be set for 'semi-sequential' operation on engines that have more than 8 cylinders (e.g. 12 cylinder engine using 6 groups of two cylinders). All common port injector types catered for (0.9 ohm to 16 ohm coil resistance) with selectable Low or High current driver. When ordering, request an initial configuration to suit injectors. Drive current selection is field re-configurable.
2. Four open collector outputs for triggering Capacitor Discharge or Smart Inductive Ignition Modules.
   Note: Standard product does NOT provide dwell control (installation of optional dwell control interface module/s is required).
3. Single coil distributor, twin coil distributor or multicoil distributor-less ignition configurations are possible on most engines.
4. Fuel pump safety shut-off. Pump stops 3 to 4 seconds after the engine stops.
5. One auxiliary output in addition to Fuel Pump control. Auxiliary output is PWM and On-Off capable and can be used for Boost Control, Nitrous oxide, Staged Injectors, Camshaft timing (2 position), Cooling Fan control, Charge Cooling control (Water Spray or intercooler fan), Idle valve, Fuel Used Pulse, Gear Shift Light, etc...
6. Spare Injector Outputs can be used as additional On-Off Outputs.
7. User choice of Manifold absolute pressure or Throttle position as Engine load input. Internal absolute pressure sensor for simplified installation 0 to 200 kPa (0 to 29.4 PSI) and 0 to 300 kPa (0 to 44.1 PSI) available from stock. 0 to 450 kPa (0 to 66.1 PSI) available on request.
8. Autronic 'Mass-flow determination method' simplifies fuel delivery calibration, especially for multi-butterfly or variable inlet geometry engines equipped with forced induction. This method, combined with other measures, ensures precise fuel delivery matching, irrespective of altitude.
9. Compensation of engine control parameters for engine operation over a wide altitude range (fuel delivery, ignition timing and boost pressure).
10. Unique transient calibration strategy allows accurate control of fuel delivery under both acceleration and deceleration.
11. Direct connect a narrow band O2 sensor for closed loop emissions control, or a compatible wide band Air-fuel ratio meter (e.g. Autronic MAFM1) for full range engine tuning.
12. Autronic '**Autotune**' self-tune software feature for air-fuel ratio calibration requiring minimal user intervention (compatible with firmware versions from v1.13).
13. Closed loop (feedback) boost pressure control for turbocharged engines with calibration curve.
14. Closed loop (feedback) idle speed control.
15. Adaptive learning (with memory) to minimize the number of user setups required and to provide optimal control of air/fuel ratio, boost pressure and idle stability.
16. Precise compensation for injector dead-time and non-linearity. Large library of predefined compensations for popular injector types.
17. Precise spark advance control strategy for both static and dynamic operating conditions.
18. User selectable spark and fuel delivery strategies for abnormal engine operating conditions (e.g. over heated or over boosted) that allow continued engine use with reduced risk of engine damage.
19. Comprehensive limp-home functions with user selectable default settings that, whenever possible, ensure engine operation can continue after sensor failure has occurred.
20. Coolant temperature dependent Rev Limiter with soft characteristic that uses a combination of fuel delivery and spark control.
21. Flat Shift & Anti-Lag (Turbo boost enhancement) are available (depending on Firmware version fitted).
22. Diagnostic/Error indicator light with memory for reporting sensor or ECU fault conditions. Ideal for detection of intermittent fault conditions. Error history information is also accessible from P.C. screen.

23. User configurable internal data logging of up to 17 channels with the selected channels being sampled as fast as 50 times a second. 24k bytes of non-volatile memory. Peak capture feature aids detection of over-rev, over-boost and over-temperature conditions.
24. Serial data port can be used in a bi-directional communication mode for P.C. calibration, monitoring and data logging, or in unidirectional mode for data streaming output to a Dash / Data logger. Remote adjustment and/or monitoring are possible if Radio modems are added to the serial link.
25. Simultaneous and independent operation of the internal data logger and serial port data link is allowed.
26. Compatible with optional No.1 cylinder spark plug pick-up interface unit that allows sequential injector operation on engines equipped with distributor ignition, without the need for separate crank/camshaft sensors or a special multi-sensor distributor.
27. Sealable Billet Anodized Aluminium Case.

Note: The above list describes the product family capability. Individual product feature set depends upon firmware version fitted. See 'SMC ECU FIRMWARE VERSION - FEATURE MATRIX' document.

Interface Requirements.

INPUTS
Sensors:

1. Crankshaft position input. Hall Effect pickup (use optional Reluctor interface for compatibility with magnetic reluctor type pickups)
2. No.1 cylinder reference. Hall Effect pickup (use optional Reluctor interface for compatibility with magnetic reluctor type pickups)
3. Digital Pulse I/P for connection of Digital Air /flow meter (Requires additional hardware and compatible firmware version)
4. Manifold pressure (Internal to ECU)
5. Barometric pressure derived from Manifold pressure sensor
6. Throttle position
7. Intake air temperature
8. Engine coolant temperature
9. Exhaust oxygen sensor (or optional Air/Fuel Ratio meter for wide band measurement)

Switches:

 1 x Switch I/P (Switch to Ground)

Adjustments:

1 x Overall / Idle mixture adjustor. (Configurable, internal to ECU and screwdriver adjustable from outside)

OUTPUTS

8 x injector drivers:
- User selectable 4A/1A or 2A/0.5A Peak/Hold switching type
- Spare Injector Outputs usable for alternate functions

(Note: Early SMC production. ECUs were fitted with fixed current peak/hold drivers. These variants can only have injector driver current rating changed by performing complete driver replacement. The AUTRONIC service facility can perform this service, subject to drive availability)

4 x ignition outputs:

Each are open collector output type compatible with**:**
- 'Smart' Inductive high energy ignitions that have internal dwell control
- Autronic Capacitor Discharge Ignitions
- Other capacitor discharge ignitions e.g. MSD 6A etc...

(Note: The SMC ECU is primarily intended for extreme performance applications and is best suited for use with capacitor discharge ignitions. Optional dwell interface module/s can be installed that will provide compatibility with non-dwell controlled inductive high energy ignition systems)

Fuel Pump:
- Dedicated Fuel pump/injector fuel shut off. For safety relay control

Auxiliary:

1 x Duty Cycle or On-Off O/P (1A Open collector) suitable for:
- Engine Cooling Fan relay control
- Idle speed actuator (variable duty cycle type)
- Turbocharger waste gate control duty cycle valve (suits Autronic low & large high capacity & most OEM types)
- Spare variable PWM output with user define characteristic
- Spare On/Off output with user define characteristic
- Fuel Used Pulse output (for trip computer function)

SERIAL I/O

- RS232 communication port for connection to P.C., Dash or Data logger

SOFTWARE COMPATIBILITY

- SMC firmware versions v1.10 to v2.00
  Software available for P.C.s running Win XP, Vista, Win7 & Win8 32 & 64 bit (requires x86-32bit code support), & MS-DOS

- Early SMC to firmware versions to v1.08
  Software only available for P.C.s running MS-DOS only (Recommend ECU firmware update to >= v1.10)

Specifications

Microcomputer	.	Intel 16 bit running @ 16MHz
Supply Voltage	Normal operation Safe limits	6.2V to 23V DC continuous +/- 24V (5 min) +/- 80V alternator load dump (0.5 SEC) +/- 1000V inductive spike (10 µSEC)
Current Drain	@ Standby (Ign off) @ Engine idle @ Max Engine Load	< 1 mA < 1 Amp < 16 Amp (less depending on injector type and number)
Outputs	Injector	8 x User selectable 4A/1A or 2A/0.5A (Peak/Hold)
	Ignition	4 x Open collector 1A (standard product does not have dwell control)
	PWM / On-Off	1 x Open collector 1A
Inputs	Digital Pulse	1 x Crankshaft 1 x Camshaft 1 x Digital Air /flow meter (special version only)
	Switch	1 x Switch to Gnd
	Analog	1 x Throttle Position 1 x Manifold Air Intake Temperature 1 x Engine Coolant Temperature 1 x O2 Sensor or Air/Fuel Ratio Meter
	Serial Data	1 x RS232
Operating Temperature Range	Min Max	- 40 deg C + 85 deg C
Engine Cylinder Number Settings	Number of cylinders	1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 14 & 16
Engine RPM Range	0 to 30,000 RPM 0 to 16,000 RPM 0 to 15,000 RPM	Engines up to 4 cylinders Engines 5 to 8 cylinders Engines 10 to 16 cylinders
Injection Duration Timing	Min Max Accuracy Setting resolution	0.7 msec 30 msec +/- < (10 µSEC + 1%) 0.1% approx
Injection Timing	Range Accuracy Setting resolution	0 to 720 deg (crank angle) +/- < (1.4 deg + 0.3 mSEC) 2.8 deg
Ignition Timing	Advance range Accuracy Setting resolution	0 to 45 deg (crank angle) +/- 0.2 deg (crank angle) 0.5 deg (crank angle)
Fuel Delivery and Ignition Mapping	No. Load sites No. RPM sites	16 (max) both Load and RPM sites 32 (max) are freely selectable
Size	L * W * H	155 * 109 * 43 mm 179 * 109 * 62 mm (overall, including mounts & connector)
Weight	.	0.80 kg
External Connectors	36 way 'AMP'	Water & dust sealed
	Serial Data	3.5mm stereo (in Wiring Loom)