



MOTEC USA SPORTSCAR



MoTeC USA Sportscar Package is a highly specialized platform focused on providing a complete solution for vehicles utilized in circuit racing. Our solution offers an immense level of versatility that handles various applications from simple naturally aspirated engines to split bank forced induction engines with quad variable camshafts and electronic throttle bodies.

Included are several ancillary features commonly found on race vehicles such as anti-lag, rolling launch, driver switches, sequential gearbox control, knock control, intercooler spray-bars, launch control, coolant pumps, and traction control.

User definable outputs are also provided for with user definable axis for systems that do not fall within MoTeC USA Sportscar standard functionality.

The product fully integrates with other MoTeC devices, providing pre-defined CAN messaging for all current Displays/Loggers, LTCs, E888, GPS devices, and SLMs.

▶ SPORTSCAR SPECIFIC FEATURES

- Torque limiting model allowing for precision control of engine output under any circumstance, including torque reduction shift tuning.
- **BETA** - Vehicle Acceleration Control system that assists in clean, fast, and repeatable corner exits.
- Advanced sequential transmission control strategies allowing for proper paddle shift control of sequential transmissions including those using half-shift style neutral positions.
- Throttle blip control using both Drive-by-wire and mechanical throttle blipper setups
- Rolling launch functionality allows for turbo spool-up in a rolling launch scenario through use of variable boost aim and ignition timing adjustments.

- Auxiliary outputs with X & Y user-selectable axis of relevant package channels as well as PID control for Outputs 1-3.
- Generic input user-defined channels for use with output functions that allow axis selection.
- Wastegate CO2 control with main target and scramble target functionality.
- Differential ground speed traction control allowing for ignition timing adjustments and cut events based on user-defined allowable slip between driven and non-driven wheels.
- Launch control with ignition timing adjustment functionality, engine speed limiting, and spool mode to aid in build-up of turbo speed on the launch
- Race Time channel for use of time-based functions/compensations following the launch
- Engine efficiency compensation system for exhaust back pressure.
- Multi-plenum twin turbo boost pressure control allowing for independent boost control and independent fueling per bank
- Selectable Engine Efficiency table load axis allowing for native AlphaN functionality to simplify ITB and turbo over trumpets tuning.
- General purpose fuel trim and ignition trim tables that allow user selection of X & Y axis of relevant package channels.

▶ STANDARD FEATURES

- Applicable to port injected engines from 1 to 12 cylinders
- Configurable engine synchronisation modes for many common engine types.
- Configurable top dead centre for each cylinder allows for odd-fire engines
- Configurable ignition output pin for each cylinder allows for coil-on-plug or wasted spark and distributor ignition systems.
- Configurable on-board knock for each cylinder with up to 4

▶ STANDARD FEATURES

- Physical settings for engine displacement, fuel density + molar mass, stoichiometric ratio, and injector characteristics allow for simplified engine start up prior to tuning.
- Dual bank lambda control supported; requires optional LTCD with Bosch LSU4.9 sensor or LTCD NTK with NTK sensor
- Configurable camshaft control from 1 to 4 cams, plus 1 basic On/Off camshaft position switch
- Engine efficiency load based on either manifold pressure, throttle position, or a ratio of manifold pressure and ambient pressure
- Engine load modelling based on inlet manifold pressure and inlet manifold temperature or throttle position
- Control of 2 port injectors (peak and hold or saturated) per cylinder with tuneable contribution table
- Tuneable delay of the secondary injection system
- Built-in calibrations for common automotive sensors/actuators
- Transient fuelling compensations using a throttle rate of change-based calculation
- Entry/exit parameters for closed loop against transient events
- Turbocharger boost pressure control using standard pneumatic valves
- Turbocharger bypass valve control
- Control of 2 PWM Fans with parameters for independent and combined control of each fan
- Coolant pump control with after-run functionality
- Engine speed limiting with ignition and/or fuel cut
- Multiple fuel pump switched outputs
- Closed loop PWM fuel pressure control
- Gear position detection via sensor or engine speed/wheel speed estimate, or a dedicated gear position sensor
- Gear shift request via Up/Down Shift switch or Gear Lever Force sensor
- GPS acquisition and logging via CAN or RS232
- Intercooler temperature and spray control based on differential temperature with dedicated temperature sensor and switched pump output
- Differential oil temperature control with dedicated temperature sensor and switch pump output
- Engine Charge Temperature calculation to compensate for heat soak and cooling due to injection events
- Closed loop Idle control using ignition, drive by wire, actuation or an idle solenoid
- Flex Fuel support for use with an ethanol composition sensor to vary fuel properties, ignition timing, and boost levels with ethanol content.
- Closed loop alternator control
- Configurable security for multiple users
- ECU CAN Transmission of major channels to allow for centralized data logging (see associated DBC)
- ECU CAN Receive for various MoTeC and RaceGrade devices such as E8xx expanders, LTC lambda modules, TC8 thermocouple amplifiers, and RG IMU inertial measurement units.

- Eight configurable switches and eight rotary switches (wired or CAN input) as well as CAN keypad functionality all mappable to race functions such as rolling launch, traction control, and launch control
- Dual bank Drive by Wire throttle servo control
- Throttle Pedal sensor with translation table
- Vehicle speed measurement using wheel speed sensors, estimation, or GPS
- Configurable warning system with light and CAN output

▶ ENGINE SPEED MODES

- Aston Martin AJ37
- BMW M54
- BMW N55
- BMW S1000RR MY2015
- BMW S50 – BMW S50B32
- BMW S62 – BMW E36 M3 S52B32, BMW E46 M3 S54B32, BMW E39 M5 S62B50 NOTE: not tested – please contact MoTeC before running this engine
- BMW S85 – BMW E60 M3 S85B50, BMW E90 M3 S65B40
- Bosch 140 40 – General Motors LLT, Audi BXA / Lamborghini LP560, Mazda L3-VDT
- Bosch 140 40 36M1
- Bosch 140 40 Alternate
- Bosch 60 120 180
- Camshaft One Missing Four Stroke
- Camshaft Two Missing Four Stroke
- Chrysler Pentastar
- Chrysler SRT8 2005 – Chrysler 6.1l Hemi 2005-2010
- Chrysler SRT8 2011 – Chrysler Apache 6.4l Hemi 2011
- Corvette C4 ZR1 – GM LT5 (1990 – 1995)
- Crankshaft 12P15 Two Stroke
- Crankshaft One Missing Four Stroke
- Crankshaft One Missing Two Stroke
- Crankshaft Two Missing Four Stroke
- Crankshaft Two Missing Two Stroke
- Custom EJ20G – Subaru GC8 WRX and STi (EJ20G, EJ20K, EJ207 etc.) form MY95 – MY00 with the MY01 crankshaft sprocket (part number 13021AA141)
- Denso 270 90
- Denso 270 90 Magnetic
- Dodge Viper
- Dodge Viper MY2008
- Fiat TwinAir
- Ford Cosworth YB
- Ford Coyote
- Ford Duratec Synchronisation – Duratec, EcoBoost, BA Cams
- Ford Sigma TiVCT
- Ford Windsor – with PIP sensor in distributor

▶ ENGINE SPEED MODES

- Gastech TX2
- General Motors DMAX LMM – General Motors 6.6L Duramax LMM diesel engines (late 2007 – early 2011) when the eighth digit of the VIN number is 6
- General Motors LS1 – (Gen 3 V8)
- General Motors LS7
- Gibson ZA348
- Honda Bike Synchronisation
- Honda CBR250RR
- Honda F20C
- Honda J35A
- Honda K20
- Honda K20C1 – Civic Type 2015+
- Honda K24AZ7
- Honda L15B7
- Hyundai Gamma T GDI
- Hyundai Lambda II RS GDI Engine
- Isuzu 4JK1
- Kia G4TH
- Lamborghini V10 – Experimental mode for 5.0L port injected Gallardo 2003-2007
- Lamborghini LP520
- Mazda L3 - Mazda L3 VVTi (example Mazda 3 Sports SP23, Mazda 6), Ford Duratec 23EW iVCT (e.g. Ford Fusion CD338)
- Mazda MX5 2006: Mazda LF (MZR family) in MX5 NC (2006-), Suzuki M16A VVT in Swift spot (2012-)
- Mazda RX8 - Mazda Renesis 13B-MSP
- Mazda SkyActiv G - Mazda6 GJ 2012+, MX5 ND 2015+, Mazda3 BM 2014+, Mazda2 DJ 2014+
- Mercedes M120 - 6.0l V12 (S600 1992 - 2001)
- Mercruiser 1075
- Mitsubishi 4B11 - Lancer Evolution X
- Mitsubishi 4G63T
- Mitsubishi 6A12 - 6A12, 6A13, 6G74, 6G75
- Mitsubishi Fuso 4P10 (also Agco Sisu Power 49G)
- Mitsubishi Fuso 6M60 - 2015 Fuso TKG-FK61F
- Multi Tooth Four Stroke
- Multi Tooth Two Stroke
- Nissan MR16DDT
- Nissan RB26 - Nissan RB26 and other six-cylinder engines with 360-degree optical trigger on camshaft
- Nissan SR20 – Nissan SR20, CA18DET, and other four-cylinder engines with 360-degree optical trigger on camshaft
- Nissan One wide slot – Nissan RB30 and other engines with 360-degree optical trigger on camshaft
- Nissan VK50VE
- Nissan VK56DE
- Nissan VQ35 – Nissan VQ35HR, Nissan VR38DETT engine as used in the R35 GTR 2007
- Nissan YS23DDT
- Porsche 997: Porsche Direct Injected engine, 2009 Porsche GT2 with 3.6l engine (Variocam PLUS)
- Private 1 – Private 6
- PSA EP6DTS - Mini Cooper S Turbo (2007-2010) and Peugeot 207 RC/GTI (2006-2010)
- Rover K Series
- Scania DC16
- Scania SGL12A
- Subaru EJ207AVCS - Subaru EJ205, EJ207, EJ255, EJ257 from MY01 to MY05
- Subaru EJ20G - Subaru GC8 WRX and STi (EJ20G, EJ20K, EJ207 etc.) from MY95 – MY00
- Subaru EZ30 – EZ30D with Dual AVCS
- Subaru FA20D – Subaru EJ205, EJ20 etc. with dual AVCS (MY06-), Subaru FA20D for BRZ and FT86 (2012-)
- Subaru FA20DIT – Subaru Forester 2014, WRX 2015
- Suzuki K6A
- Toyota 1FZ FE – Toyota Landcruiser
- Toyota 1GD FTV

▶ M150 EXAMPLE PINOUT

M150 Connector A – 34 Way

A1	AT5	Analogue Temperature Input 5	-
A2	AT6	Analogue Temperature Input 6	-
A3	AV15	Analogue Voltage Input 15	-
A4	AV16	Analogue Voltage Input 16	-
A5	AV17	Analogue Voltage Input 17	-
A6	IGN9	Low Side Ignition 9	COOLANT FAN LO
A7	IGN10	Low Side Ignition 10	COOLANT FAN HI
A8	IGN11	Low Side Ignition 11	ALTERNATOR CONTROL
A9	IGN12	Low Side Ignition 12	-
A10	SEN_5V0_C	Sensor 5.0V C	SENSOR 5V C
A11	LA_NB1	Lambda Narrow Input 1	-
A12	LA_NB2	Lambda Narrow Input 2	-
A13	KNOCK3	Knock Input 3	KNOCK BANK 2
A14	KNOCK4	Knock Input 4	KNOCK BANK 2
A15	DIG2	Digital Input 2	-
A16	DIG3	Digital Input 3	-
A17	DIG4	Digital Input 4	-
A18	SEN_5V0_C	Sensor 5.0V C	-
A19	SEN_5V0_B	Sensor 5.0V B	-
A20	LIN	LIN Bus	-
A21	RS232_RX	RS232 Receive	-
A22	RS232_TX	RS232 Transmit	-
A23	DIG1	Digital Input 1	OUTPUT SHAFT SPEED
A24	BAT_NEG	Battery Negative	GROUND
A25	BAT_NEG	Battery Negative	GROUND
A26	SEN_0V_C	Sensor 0V C	SENSOR 0V C
A27	SEN_0V_C	Sensor 0V C	-
A28	CAN3_HI	CAN Bus 3 High	-
A29	CAN3_LO	CAN Bus 3 Low	-
A30	CAN2_HI	CAN Bus 2 High	-
A31	CAN2_LO	CAN Bus 2 Low	-
A32	BAT_NEG	Battery Negative	GROUND
A33	SEN_0V_B	Sensor 0V B	-
A34	SEN_0V_A	Sensor 0V A	-

▶ M150 EXAMPLE PINOUT

M150 Connector B – 26 Way

B1	HB9	Half Bridge Output 9	THROTTLE SERVO -
B2	HB10	Half Bridge Output 10	THROTTLE SERVO +
B3	UDIG8	Universal Digital Input 8	FLEX FUEL SENSOR
B4	UDIG9	Universal Digital Input 9	-
B5	UDIG10	Universal Digital Input 10	-
B6	UDIG11	Universal Digital Input 11	-
B7	UDIG12	Universal Digital Input 12	-
B8	INJ_LS5	Low Side Injector 5	SECONDARY INJECTOR 5
B9	INJ_LS3	Low Side Injector 3	SECONDARY INJECTOR 3
B10	AV9	Analogue Voltage Input 9	-
B11	AV10	Analogue Voltage Input 10	CYLINDER HEAD TEMPERATURE
B12	AV11	Analogue Voltage Input 11	-
B13	BAT_POS	Battery Positive	BATTERY POSITIVE
B14	INJ_LS6	Low Side Injector 6	SECONDARY INJECTOR 6
B15	INJ_LS4	Low Side Injector 4	SECONDARY INJECTOR 4
B16	AV12	Analogue Voltage Input 12	AMBIENT TEMPERATURE
B17	AV13	Analogue Voltage Input 13	-
B18	AV14	Analogue Voltage Input 14	-
B19	BAT_POS	Battery Positive	BATTERY POSITIVE
B20	HB7	Half Bridge Output 7	-
B21	HB8	Half Bridge Output 8	-
B22	PH9	Peak Hold Injector 9	SECONDARY INJECTOR 7
B23	PH10	Peak Hold Injector 10	SECONDARY INJECTOR 8
B24	PH11	Peak Hold Injector 11	-
B25	PH1	Peak Hold Injector 12	-
B26	SEN_5V_A	Sensor 5.0V A	SENSOR 5V A

▶ M150 EXAMPLE PINOUT

M150 Connector C – 34 Way

C1	HB2	Half Bridge Output 2	-
C2	SEN_5V_A	Sensor 5.0V A	SENSOR 5V A
C3	IGN1	Low Side Ignition 1	IGNITION COIL 1
C4	IGN2	Low Side Ignition 2	IGNITION COIL 2
C5	IGN3	Low Side Ignition 3	IGNITION COIL 3
C6	IGN4	Low Side Ignition 4	IGNITION COIL 4
C7	IGN5	Low Side Ignition 5	IGNITION COIL 5
C8	IGN6	Low Side Ignition 6	IGNITION COIL 6
C9	SEN_5V_B	Sensor 5.0V B	-
C10	NEG1	Battery Negative	GROUND
C11	NEG2	Battery Negative	GROUND
C12	IGN7	Low Side Ignition 7	IGNITION COIL 7
C13	IGN8	Low Side Ignition 8	IGNITION COIL 8
C14	AV1	Analogue Voltage Input 1	THROTTLE SERVO POSITION TRACKING
C15	AV2	Analogue Voltage Input 2	THROTTLE SERVO POSITION MAIN
C16	AV3	Analogue Voltage Input 3	-
C17	AV4	Analogue Voltage Input 4	-
C18	HB1	Half Bridge Output 1	-
C19	PH1	Peak Hold Injector 1	PRIMARY INJECTOR 1
C20	PH2	Peak Hold Injector 2	PRIMARY INJECTOR 2
C21	PH3	Peak Hold Injector 3	PRIMARY INJECTOR 3
C22	PH4	Peak Hold Injector 4	PRIMARY INJECTOR 4
C23	INJ_LS1	Low Side Injector 1	SECONDARY INJECTOR 1
C24	INJ_LS2	Low Side Injector 2	SECONDARY INJECTOR 2
C25	AV5	Analogue Voltage Input 5	OIL PRESSURE
C26	BAT_POS	Battery Positive	BATTERY POSITIVE
C27	PH5	Peak Hold Injector 5	PRIMARY INJECTOR 5
C28	PH6	Peak Hold Injector 6	PRIMARY INJECTOR 6
C29	PH7	Peak Hold Injector 7	PRIMARY INJECTOR 7
C30	PH8	Peak Hold Injector 8	PRIMARY INJECTOR 8
C31	HB3	Half Bridge Output 3	BANK 1 EXHAUST CAM CONTROL
C32	HB4	Half Bridge Output 4	BANK 1 INTAKE CAM CONTROL
C33	HB5	Half Bridge Output 5	BANK 2 EXHAUST CAM CONTROL
C34	HB6	Half Bridge Output 6	BANK 2 INTAKE CAM CONTROL

▶ M150 EXAMPLE PINOUT

M150 Connector D – 26 Way

D1	UDIG1	Universal Digital Input 1	CRANKSHAFT POSITION
D2	UDIG2	Universal Digital Input 2	EXHAUST CAMSHAFT BANK 1 POS
D3	AT1	Analogue Temperature Input 1	INLET AIR TEMPERATURE
D4	AT2	Analogue Temperature Input 2	-
D5	AT3	Analogue Temperature Input 3	-
D6	AT4	Analogue Temperature Input 4	-
D7	KNOCK1	Knock Input 1	KNOCK BANK 1
D8	UDIG3	Universal Digital Input 3	INTAKE CAMSHAFT BANK 1 POS
D9	UDIG4	Universal Digital Input 4	EXHAUST CAMSHAFT BANK 2 POS
D10	UDIG5	Universal Digital Input 5	INTAKE CAMSHAFT BANK 1 POS
D11	UDIG6	Universal Digital Input 6	ENGINE RUN SWITCH
D12	BAT_BAK	Battery Backup	-
D13	KNOCK2	Knock Input 2	KNOCK BANK 1
D14	UDIG7	Universal Digital Input 7	-
D15	SEN_0V_A	Sensor 0V A	SENSOR 0V A
D16	SEN_0V_B	Sensor 0V B	SENSOR 0V B
D17	CAN_HI	CAN Bus 1 High	CAN 1 HI
D18	CAN_LO	CAN Bus 1 Low	CAN 1 LO
D19	SEN_6V3	Sensor 6.3V	-
D20	AV6	Analogue Voltage Input 6	-
D21	AV7	Analogue Voltage Input 7	THROTTLE PEDAL MAIN
D22	AV8	Analogue Voltage Input 8	THROTTLE PEDAL TRACKING
D23	ETH_TX+	Ethernet Transmit+	WHITE/ORANGE
D24	ETH_TX-	Ethernet Transmit-	ORANGE
D25	ETH_RX+	Ethernet Receive+	WHITE/GREEN
D26	ETH_RX-	Ethernet Receive-	GREEN