

EMU

ENGINE MANAGEMENT UNIT



USER MANUAL

ATTENTION !

- **The ECUMASTER EMU is designed for motorsport applications only and cannot be used on public roads!**
- **Electronic throttle modules are only to be used for operating stationary engines (generators, test benches). For safety reasons, do not use electronic throttle modules in vehicular applications!!!**
- **The installation of this device should be performed only by trained specialists. Installation by untrained individuals may cause damage to both the device and the engine!**
- **Incorrect tuning with the ECUMASTER EMU can cause serious engine damage!**
- **Never modify the device's settings while the vehicle is moving as it may cause an accident!**
- **ECUMaster assumes no responsibility for damage caused by incorrect installation and/or tuning of the device!**
- **To ensure proper use of ECUMASTER EMU and to prevent risk of damage to your vehicle, you must read these instructions and understand them thoroughly before attempting to install this unit.**

IMPORTANT !

- **The manual below refers to the firmware version 1.1 of the ECUMASTER EMU**
- **Modification of the tables and parameters should be performed only by people who understand the operation of the device and operation of modern fuel injection and ignition systems.**
- **Never short-circuit the wires of the engine's wiring loom or the outputs of the ECUMASTER EMU.**
- **All modifications to the engine's wiring loom must be performed with the negative terminal of the battery disconnected.**
- **It is critical that all connections in the wiring loom are properly insulated.**
- **All signals from the variable reluctant sensors and knock sensors should be connected using shielded cables.**
- **The device must be disconnected before performing any welding on the vehicle!**

Plug and Play connector allows to connect EMU standalone engine management system to stock engine wiring harness without any cutting and soldering. Calibration file if it is available, is already prepared for factory sensors, injectors, coils, actuators and solenoids.

Disclaimer

We put all our effort for proper p&p connector preparation. Hardware and software was tested with stock cars. But wiring could be changed during years and different models. It's highly advised to check engine wiring before connecting p&p connector for EMU standalone. Due to electrical and mechanical component wear, additional control is required.

Company do not take responsibility for engine and wiring damages.

Technical support

Most answers to questions can be found in manual, or in EMU software help file.

With any concerns please contact our customer support or our nearest dealer.

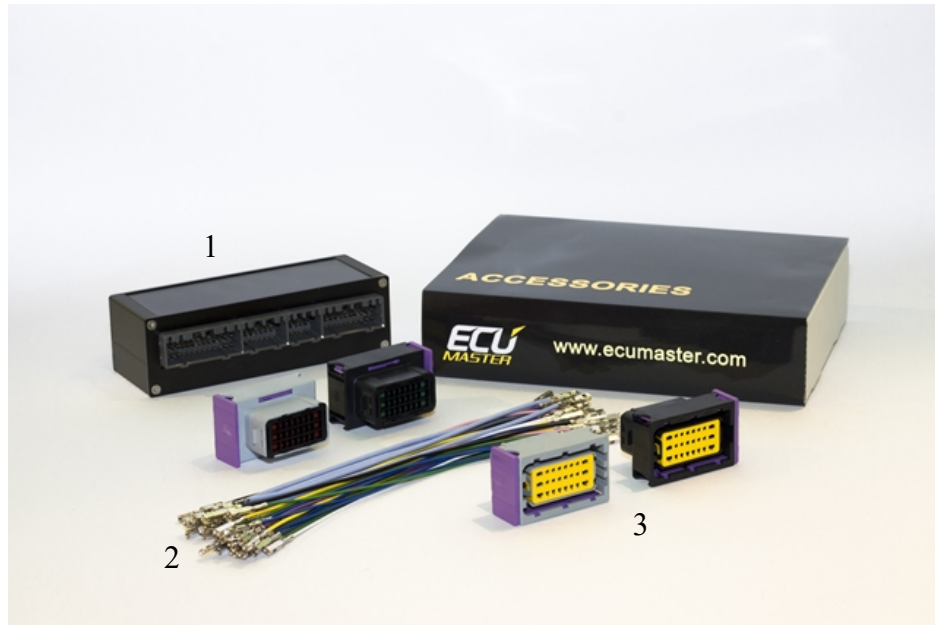
Check for latest firmware at www.ecumaster.com/en/download

Technical support email: tech@ecumaster.com

Technical support phone: +48 12 3565336

Plug and play connector installation

Box content



(adapter example photo)

- 1) Plug and play adapter PCB board
- 2) Wire harness
- 3) Plugs

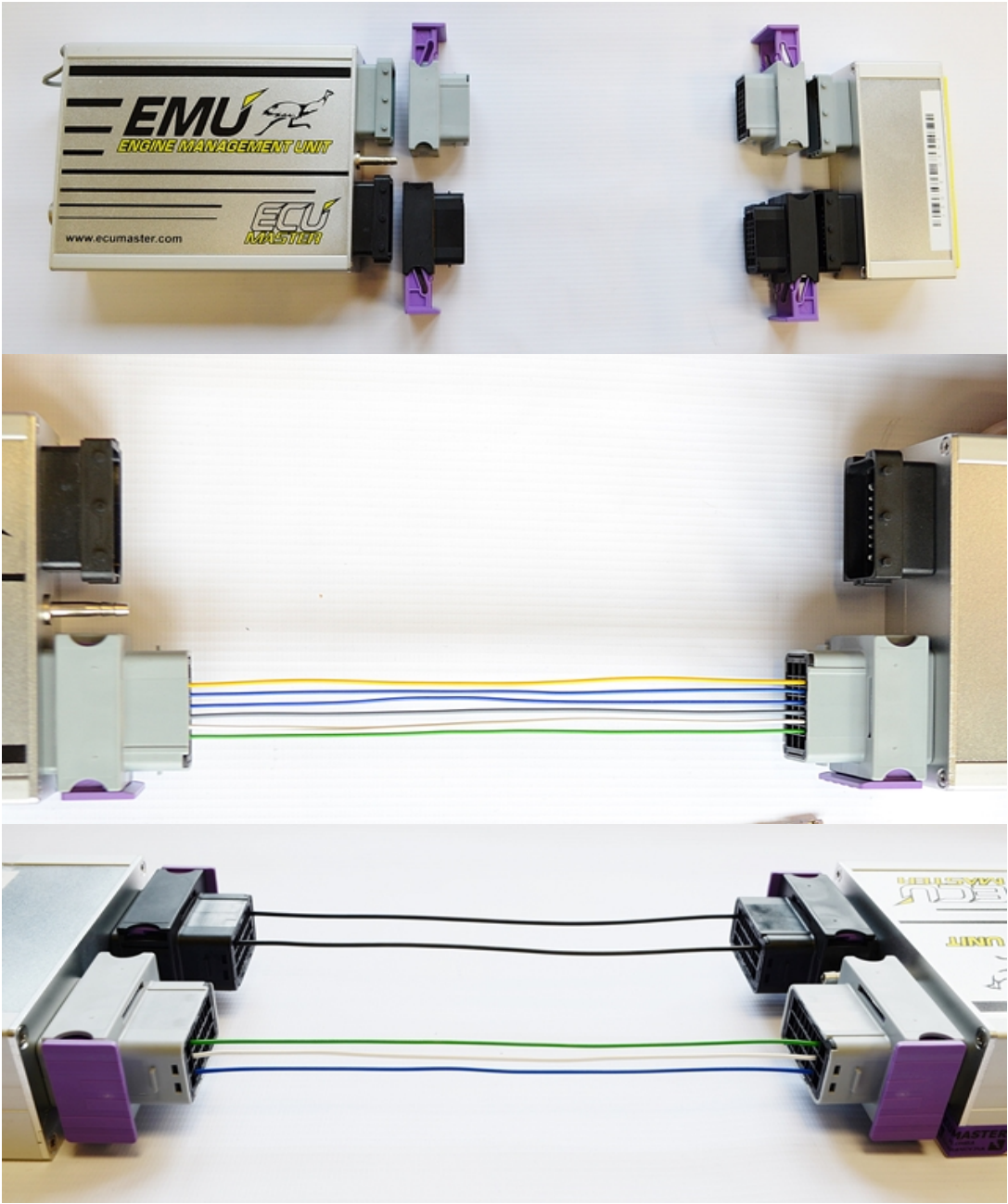
Wiring

One set of connector fit to EMU ECU and other to p&p adapter. Violet connector locker must face outside as in picture.

Connectors pin out in adapter is mirrored to EMU. Outputs in connectors must be connected directly to each other. Wires goes in straight line without crossing.

Wires set contain 6 wires dedicated for ignition outputs and 4 wires for grounding. Those wires has pins in different size. Usually not all inputs and outputs are in use. Unused slots in connectors can be left empty.

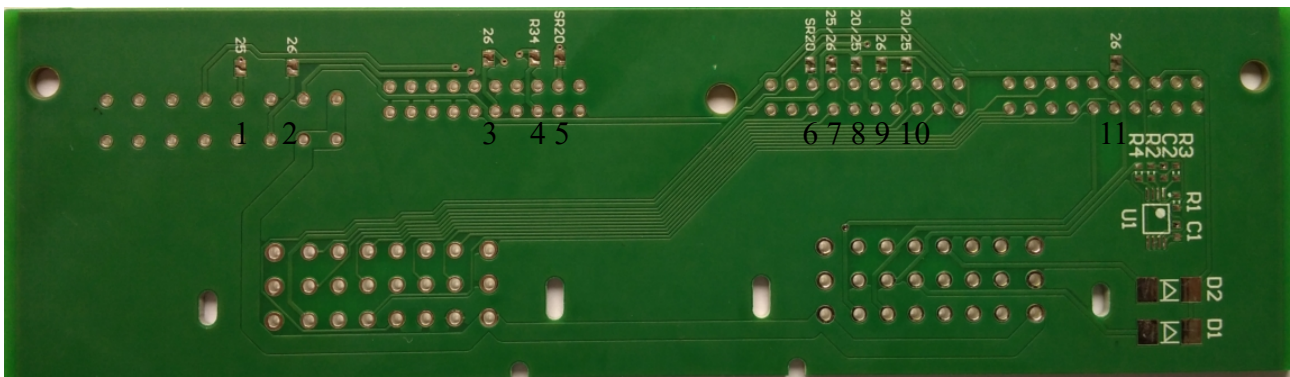
P&P adapter Nissan RB20/25/26DETT – SR20DET Rev. C



Configuration

It is universal adapter for RB20DET, RB25DET, RB26DETT and SR20DET engines, but require additional internal configuration.

- 1) Disassemble adapter enclosure and remove PCB board.
- 2) Turn PCB board upside down. 8 jumpers pad should be visible.
- 3) Depending on to which engine adapter must fit, solder proper jumpers, marked with engine symbols.



RB20DET	configuration jumpers - 8 10
RB25DET	configuration jumpers - 1 7 8 10
RB26DETT	configuration jumpers - 2 3 7 9 11
SR20DET	configuration jumpers - 1 5 6 7 8 10
R34 RB26	configuration jumpers - 2 3 4 7 9 11

- 4) Check continuity with multimeter between pins.
- 5) Assemble adapter.

Installation

IMPORTANT !



Before installation please disconnect negative terminal of battery!

- 1) Disconnect stock ECU and remove it.
- 2) Connect P&P adapter to stock wiring loom.
- 3) Connect EMU ECU with prepared wiring looms to adapter
- 4) Disconnect AFM sensor from the wiring loom. (EMU use intake pressure and intake air temperature for load calculation, so AFM is not required)
- 5) Connect negative terminal of the battery.

IMPORTANT !



RB20DET, RB25DET, SR20DET are missing IAT sensor which is crucial for fuel mixture calculation. It requires installation of an additional sensor in the intake manifold. Wiring for the sensor can be connected to AFM plug not directly to EMU. P&P adapter use AFM sensor ground and AFM sensor signal as a intake air sensor wiring. RB26DETT has stock IAT sensor so no additional work is required.

AFM pin	Description	ECU Pin
1	+12 volt power supply	
2	Sensor ground	26
3	Intake air quantity signal	27

Pre starting configuration and checks

All new EMU units have latest official firmware versions. Factory default configuration is present without any base maps and outputs assigned.

Connecting to ECUMASTER EMU EMS

Install software to computer and open windows client. Connect computer to EMU device using USB cable supplied with the device.

During first connection to the EMU device, window with the device name will appear.

By default there will be device unique serial number which can be changed for any name. Based on this name there will be sub-directory created in directory *My Documents / EMU*. In this sub-directory, the configuration for the given EMU, projects and logs will be saved.

Base calibration maps (for stock unmodified engines) are on the included CD.

Upload calibration map and save it in memory by pressing F2 button or by pressing processor icon on task bar.

Additional sensors

EMU ECU offers various option for additional sensors installation and devices. Additional sensors and extension modules must be connected directly to EMU not to p&p adapter (exp. WBO sensor, EGT sensor, fuel pressure sensor, DBW module ...)

For additional information's about connecting and configuring sensors please see manual and EMU client software help file.

Sensors

MAP sensor check

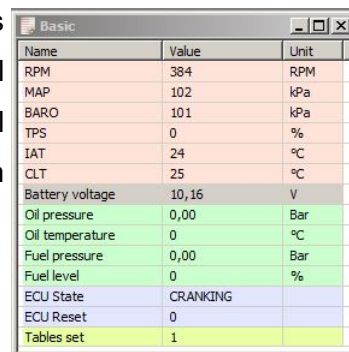
Manifold absolute pressure sensor is used to measure pressure in the engine's intake manifold. Proper calibration is crucial for proper ignition timing and mixture preparation in speed density load calculation. Before first engine start, compare values of MAP sensor to actual local barometric pressure, they should match. The pressure could be read in Basic Group Log. When the engine is not running the pressure should be around 100kPa (current barometric pressure).



Name	Value	Unit
RPM	384	RPM
MAP	102	kPa
BARO	101	kPa
TPS	0	%
IAT	24	°C
CLT	25	°C
Battery voltage	10,16	V
Oil pressure	0,00	Bar
Oil temperature	0	°C
Fuel pressure	0,00	Bar
Fuel level	0	%
ECU State	CRANKING	
ECU Reset	0	
Tables set	1	

TPS

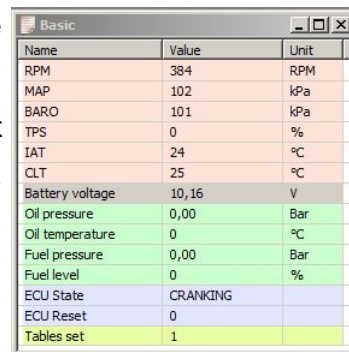
Throttle position sensor is taking part in various ECU calculations (acceleration enrichment, load alpha-n algorithm boost correction, fuel cut, idle). It is important that TPS readings should match to actual throttle position. 0% means closed throttle and 100% means fully open throttle.



Name	Value	Unit
RPM	384	RPM
MAP	102	kPa
BARO	101	kPa
TPS	0	%
IAT	24	°C
CLT	25	°C
Battery voltage	10,16	V
Oil pressure	0,00	Bar
Oil temperature	0	°C
Fuel pressure	0,00	Bar
Fuel level	0	%
ECU State	CRANKING	
ECU Reset	0	
Tables set	1	

CLT, IAT

Coolant temperature sensor and intake temperature sensor also take part in calculations for mixture preparation and proper ignition timing. Readings from sensor should match to actual temperature of coolant and air in intake manifold. These reading could be checked in Basic Group Log window.



Name	Value	Unit
RPM	384	RPM
MAP	102	kPa
BARO	101	kPa
TPS	0	%
IAT	24	°C
CLT	25	°C
Battery voltage	10,16	V
Oil pressure	0,00	Bar
Oil temperature	0	°C
Fuel pressure	0,00	Bar
Fuel level	0	%
ECU State	CRANKING	
ECU Reset	0	
Tables set	1	

Outputs

Base configuration for P&P adapter has dedicated outputs to certain devices. Fuel pump, coolant fan, boost solenoid, etc. The proper work of the devices connected to the EMU outputs should be checked before engine first start.

Fuel Pump

Open window *Outputs / Fuel pump* and select invert output option. The fuel pump should start to work (its sound should be hear-able)

Coolant Fan

For low speed coolant fan operation, open window *Outputs / Coolant fan* and select invert output option. The coolant fan should start to work with the low speed and the power steering fan should start to work.

Wide band oxygen sensor (WBO)

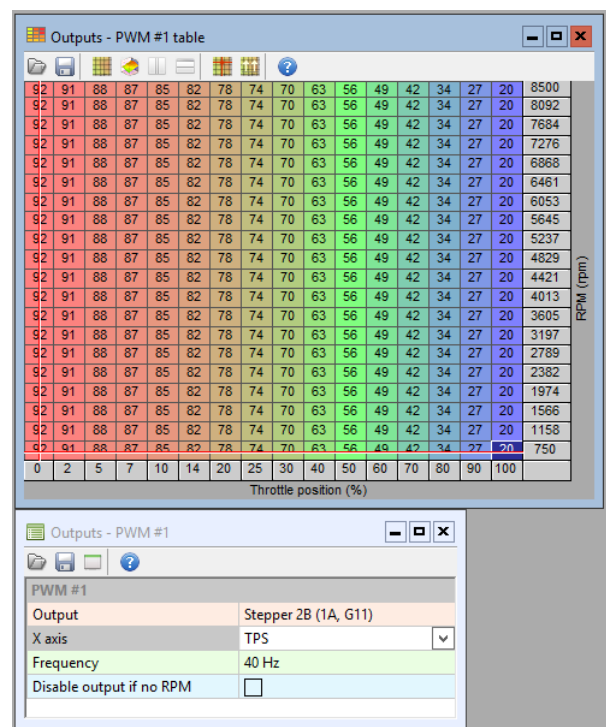
The factory narrow band sensor is used but we strongly recommend using wide band oxygen sensor.

For proper WBO sensor calibration sensor Rcal value must be measured between terminals 2 and 6 of LSU 4.2 connector.

RB26 GTR – all wheels drive

Special electronic circuit inside adapter, convert digital signal from EMU ECU PWM#1 table to analog signal expected by ATTESA ECU. ATTESA ECU expect 0.4 volt at close throttle, and 3.4 at wide open throttle. Correct table values, guarantee expected voltage on pin 56 of stock wiring.

- PWM #1 table is TPS based.
- Stepper 2B is assign to the output.
- Frequency: 40 Hz



SR20DET ignition and fuel output configuration

SR20DET engine share pinout with RB25DET engine but different cylinders number are assign to different pins. With wiring already done, only modification in ignition outputs with windows client is necessary for proper engine operation.

Ignition

SR20DET
Pin 1 - Ign #1
Pin 2 - Ign #2
Pin 11 - Ign #3
Pin 12 - Ign #4

RB26DET
Pin 1 - Ign #1
Pin 2 - Ign #5
Pin 11 - Ign #6
Pin 12 - Ign #2

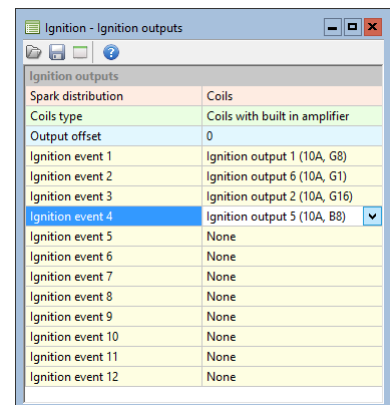
Cylinder #1 – ignition out #1

Cylinder #2 – ignition out #5

Cylinder #3 – ignition out #6

Cylinder #4 – ignition out #2

Firing order is 1 3 4 2, ignition output should be set to 1 6 2 5



Injectors

SR20DET

Pin 101 - Inj #1

Pin 110 - Inj #2

Pin 103 - Inj #3

Pin 112 - Inj #4

RB26DET

Pin 101 - Inj #1

Pin 110 - Inj #5

Pin 103 - Inj #3

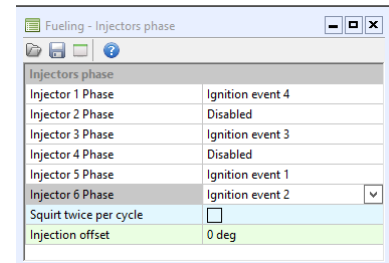
Pin 112 - Inj #6

Cylinder #1 – injector out #1

Cylinder #2 – injector out #5

Cylinder #3 – injector out #3

Cylinder #4 – injector out #6



Firing order is 1 3 4 2, injector phase output should be used 1 3 5 6, and order should be 4 3 1 2.

First Engine startup

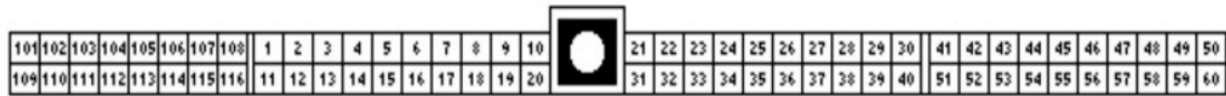
After all necessary checks and adjustments engine is ready to start.

Factory engine, with correct configuration and correct ECU to p&p adapter wiring should start after couple of crank rotation. Additional throttle opening may be required during first start.

Please let the engine to warm up coolant to working temperature. Check coolant temperature through whole warming up process to avoid engine damage caused by overheat.

Check log file for information about any trigger errors. If any errors appears control wiring and condition of crank and camshaft sensors. Save log file and send it to technical support at tech@ecumaster.com. Don't try to tune engine with trigger errors it can cause serious engine damage.

After all verifications have been completed, performance tuning can be done.

Interconnector pinout Name: Nissan RB20/25/26DETT

Plug as viewed from edge of computer

EMU PIN	EMU DESCRIPTION	R32 R33 RB20DET	R32 R33 RB25DET	R32 R33 RB26DETT	R34 RB26DETT	DESCRIPTION	WIRE SIZE
B17	EMU GROUND	50	50	50	50		0,75mm
G17	POWER GROUND	107	107	107	108		0,75mm
G24	POWER GROUND	108	108	108	108		0,75mm
B24	POWER GROUND	116	116	116	116		0,75mm
G18	POWER +12V	45	45	45	8		0,5mm
B18	SENSOR GROUND	30,26	30,26	30	30	26 AFM ground for IAT	0,5mm
G8	IGNITION COIL 1	1	1	1	1		0,75mm
G16	IGNITION COIL 2	12	12	12	12		0,75mm
G9	IGNITION COIL 3	3	3	3	3		0,75mm
B16	IGNITION COIL 4	13	13	13	13		0,75mm
B8	IGNITION COIL 5	2	2	2	2		0,75mm
G1	IGNITION COIL 6	11	11	11	11		0,75mm
G7	INJECTOR 1	101	101	101	101		0,75mm
G15	INJECTOR 2	105	105	105	105		0,75mm
G23	INJECTOR 3	103	103	103	103		0,75mm
G6	INJECTOR 4	112	114	114	115		0,75mm
G14	INJECTOR 5	110	110	110	110		0,5mm
G22	INJECTOR 6	114	112	112	112		0,5mm
G21	AUX1			106	106	FPCM PWM signal	0,5mm
G13	AUX2		113	6	6	113 VTC solenoid/ 6 fan	0,5mm
G5	AUX3		25	25	25	Boost solenoid	0,5mm
G20	AUX4	9	9	9	9	A/C clutch relay	0,5mm
G12	AUX5	4	4	4	4	AAC solenoid	0,5mm
G4	AUX6	16	16	16	16	ECCS relay	0,5mm
G2	STEPPER MOTOR #1A	32	32	32	32	MIL	0,5mm
G10	STEPPER MOTOR #1B	18	18	18	18	Fuel pump relay	0,5mm
G3	STEPPER MOTOR #2A	7	7	7	7	Tacho output	0,5mm
G11	STEPPER MOTOR #2B				56	ATTESA 4wd signal	0,5mm
G19	WBO HEATER	115	115	115	115	Oxygen sensor heater	0,5mm
B5	WBO VS	29	29	29	29	Oxygen sensor signal	0,5mm
B4	CLT	28	28	28	28	Coolant sensor	0,5mm
B21	IAT	27	27	36	36	27 AFM signal for IAT	0,5mm
B12	TPS IN	38	38	38	38	TPS	0,5mm

P&P adapter Nissan RB20/25/26DETT – SR20DET Rev. C

B2	KS #1	23	23	23	23	Knock 1-3	0,5mm
B10	KS #2	24	24	24	24	Knock 4-6	0,5mm
B23	+5V	48	48	48	48	+5 tps supplay	0,5mm
B14	VSS IN	53	53	53	53		0,5mm
B7	PRIMARY TRIGGER	42	42	42	41		0,5mm
B15	CAMSYNC #1	41	41	41	42		0,5mm
B20	ANALOG #1	46	46	46	46	A/C switch	0,5mm
B3	ANALOG #2		104	104	104	FPCM voltage control	0,5mm

Interconnector pinout Name: Nissan S14 SR20DET

EMU PIN	EMU DESCRIPTION	S14 SR20DET	DESCRIPTION	WIRE SIZE
B17	EMU GROUND	50		0,75mm
G17	POWER GROUND	107		0,75mm
G24	POWER GROUND	108		0,75mm
B24	POWER GROUND	116		0,75mm
G18	POWER +12V	45		0,5mm
B18	SENSOR GROUND	30,26	26 AFM ground for IAT	0,5mm
G8	IGNITION COIL 1	1		0,75mm
G16	IGNITION COIL 2	12		0,75mm
B8	IGNITION COIL 5	2		0,75mm
G1	IGNITION COIL 6	11		0,75mm
G7	INJECTOR 1	101		0,75mm
G15	INJECTOR 2	105	Radiator Fan high	0,75mm
G23	INJECTOR 3	103		0,75mm
G6	INJECTOR 4	114	Radiator Fan Low	0,75mm
G14	INJECTOR 5	110		0,5mm
G22	INJECTOR 6	112		0,5mm
G13	AUX2	113	113 VTC solenoid	0,5mm
G5	AUX3	25	Boost solenoid	0,5mm
G20	AUX4	9	A/C clutch relay	0,5mm
G12	AUX5	4	AAC solenoid	0,5mm
G4	AUX6	16	ECCS relay	0,5mm
G2	STEPPER MOTOR #1A	32	MIL	0,5mm
G10	STEPPER MOTOR #1B	18	Fuel pump relay	0,5mm
G3	STEPPER MOTOR #2A	7	Tacho output	0,5mm
G19	WBO HEATER	115	Oxygen sensor heater	0,5mm
B5	WBO VS	29	Oxygen sensor signal	0,5mm
B4	CLT	28	Coolant sensor	0,5mm
B21	IAT	27	27 AFM signal for IAT	0,5mm
B12	TPS IN	38	TPS	0,5mm
B2	KS #1	23	Knock 1-2	0,5mm

P&P adapter Nissan RB20/25/26DETT – SR20DET Rev. C

B10	KS #2	24	Knock 3-4	0,5mm
B23	+5V	48	+5 tps supplay	0,5mm
B14	VSS IN	53		0,5mm
B7	PRIMARY TRIGGER	42		0,5mm
B15	CAMSYNC #1	41		0,5mm
B20	ANALOG #1	46	A/C switch	0,5mm