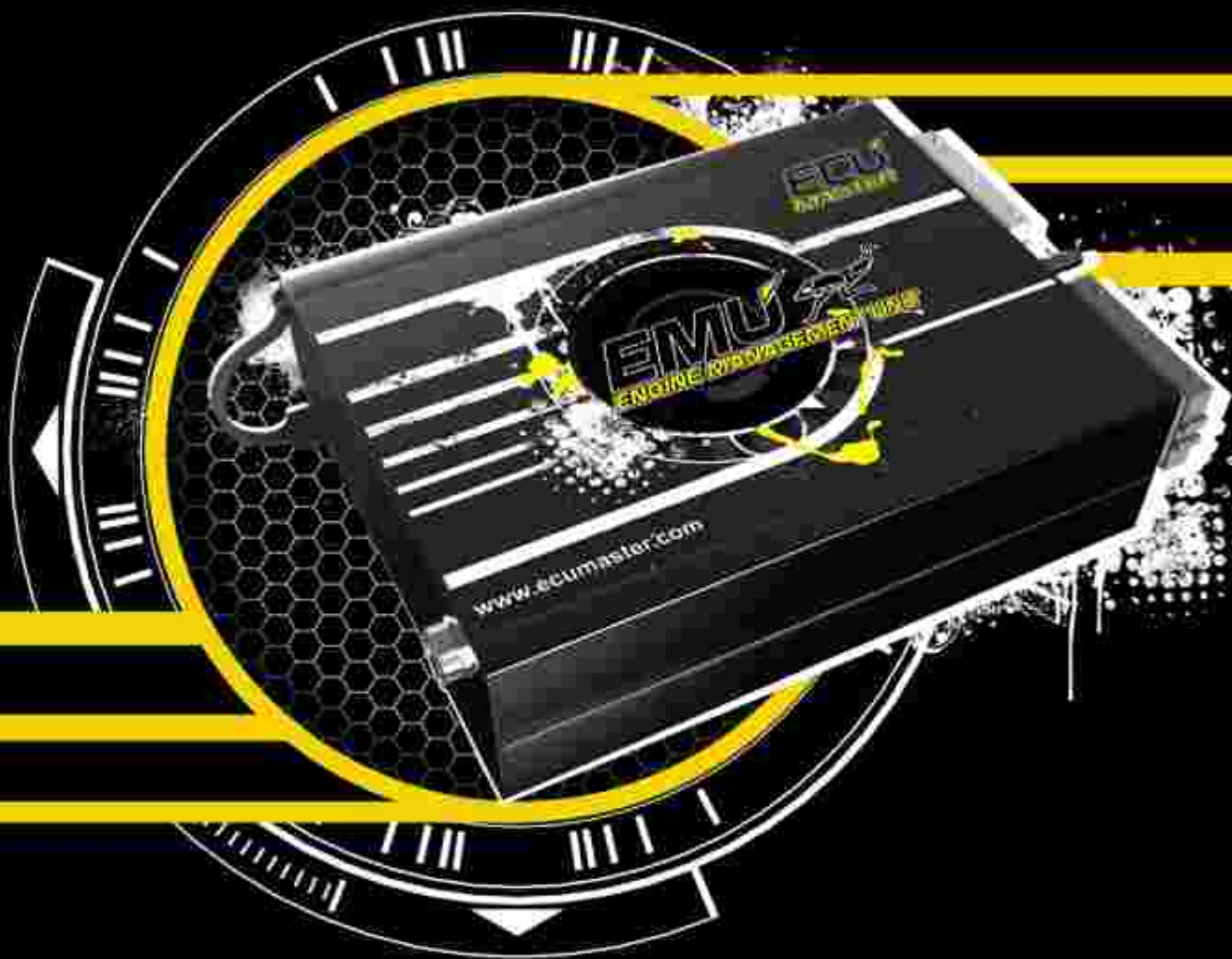# EMU
ENGINE MANAGEMENT UNIT

USER MANUAL

ECU MASTER

www.ecumaster.com

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!**

P&P adapter Mitsubishi Evolution 4 5 6 7 8

Introduction

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 electronical 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.
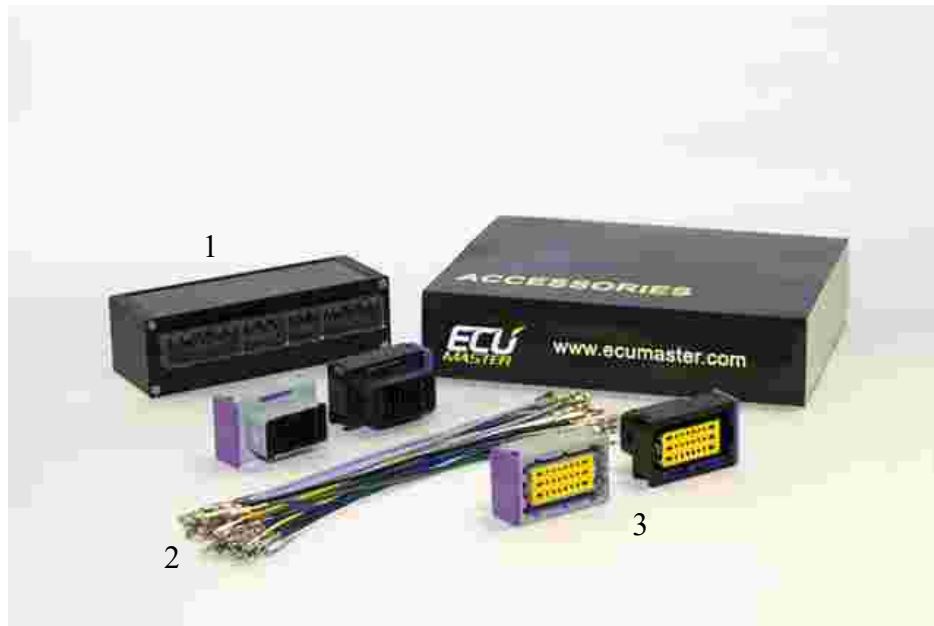With any concerns please contact our customer support or our nearest dealer.
Check for latest firmware at *www.ecumaster.com/en/download*

Technical support email: tech@ecumaster.com
Technical support phone: +48 12 3565336

P&P adapter Mitsubishi Evolution 4 5 6 7 8

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 Mitsubishi Evolution 4 5 6 7 8
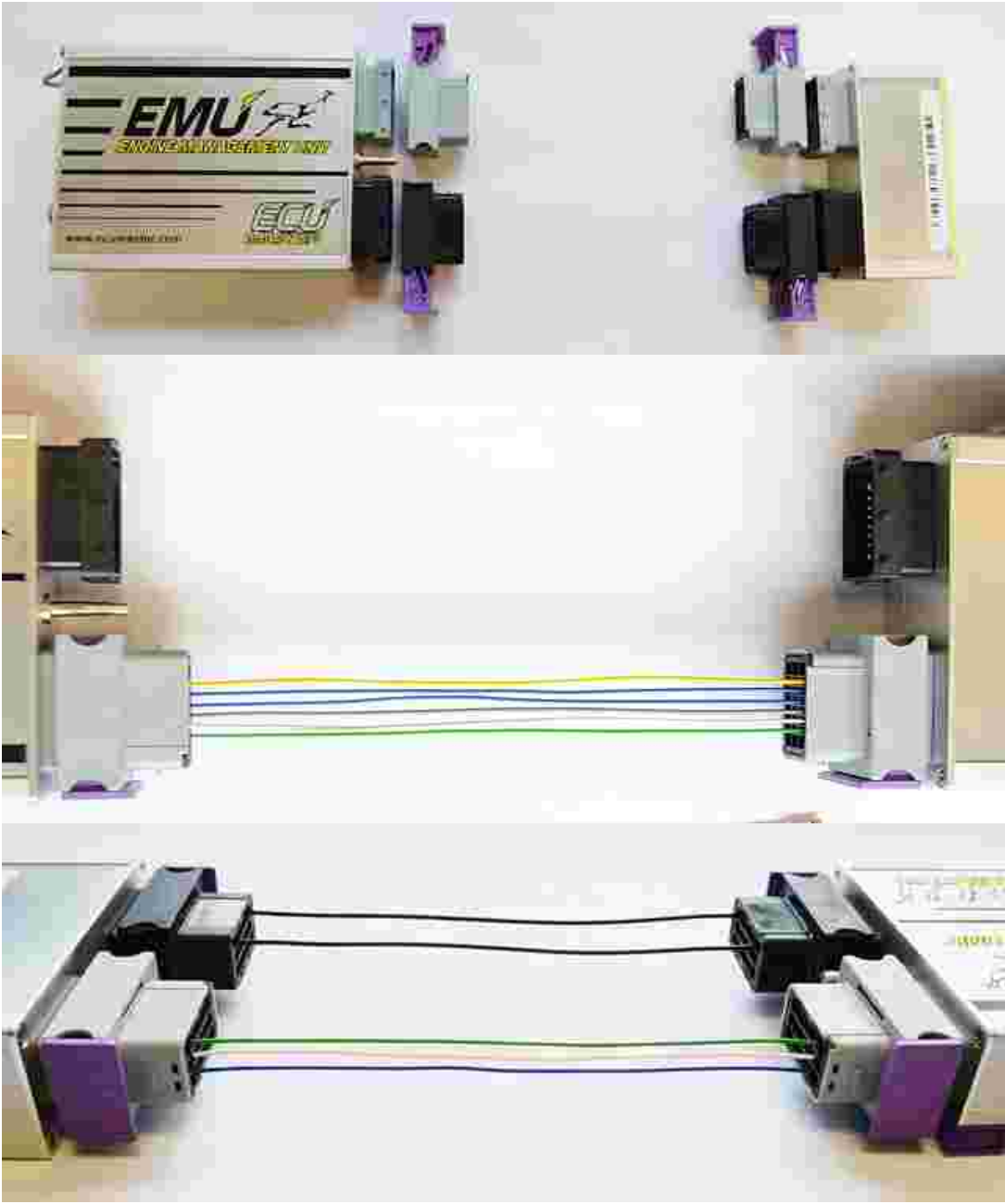
P&P adapter Mitsubishi Evolution 4 5 6 7 8

It is universal adapter for 4G63 engines, but require additional internal configuration.

1) Disassemble adapter enclosure and remove PCB board.
2) 14 jumpers pad should be visible on both sides of board.
3) Depending on to which engine adapter must fit, solder proper jumpers, marked with engine symbols.
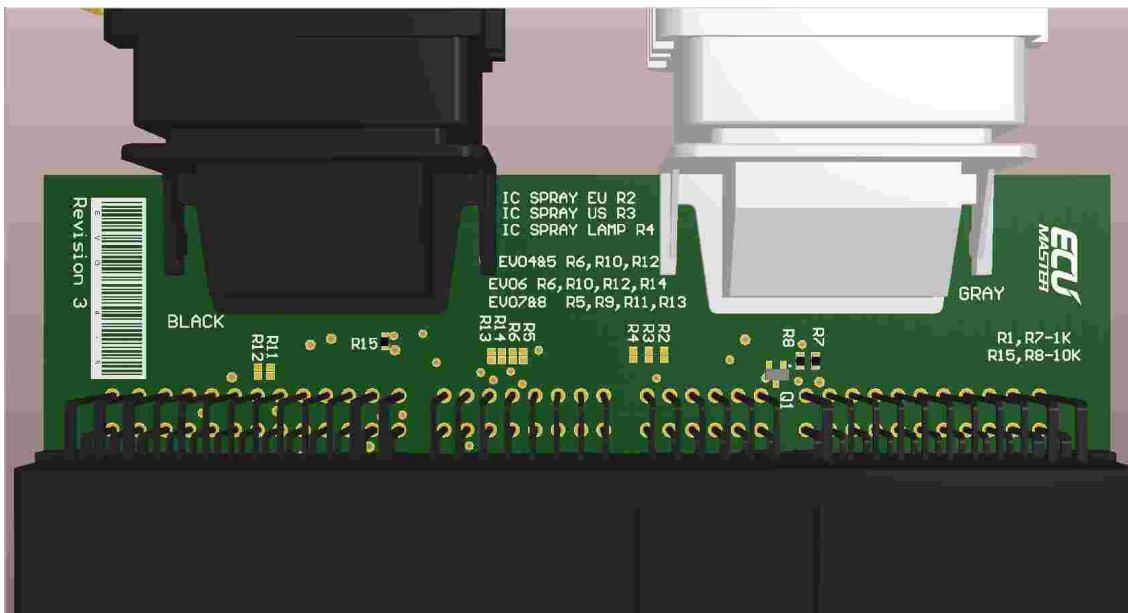
EVO 4&5   configuration jumpers – 6 9 12

EVO 6   configuration jumpers – 6 9 12 14

EVO 7&8   configuration jumpers – 5 10 11 13

If Car is equipped with intercooler water spray, additional jumpers must be connected:

IC SPRAY LAMP   jumper – 4

IC SPRAY for EU version   jumper – 2

IC SPRAY for US version   jumper – 3

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

P&P adapter Mitsubishi Evolution 4 5 6 7 8

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 MAF sensor from the wiring loom. (EMU use intake pressure and intake air temperature for load calculation, so MAF is not required)
5) Connect negative terminal of the battery.

IMPORTANT !
4G63 IAT sensor is build in MAF sensor before turbocharger. Correct sensor readings 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 MAF plug not directly to EMU. P&P adapter use MAF IAT sensor ground and MAF sensor signal as a intake air sensor wiring.

MAF pin	Description	ECU Pin
5	Sensor ground	34
6	Intake air temperature signal	62

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.
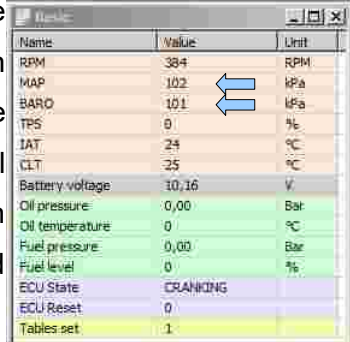
Additional sensors

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.
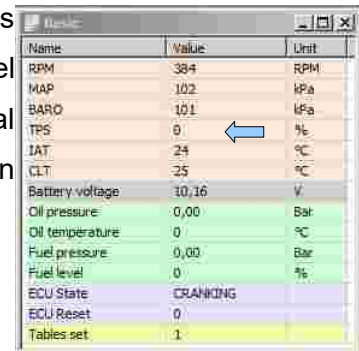
Sensors

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).

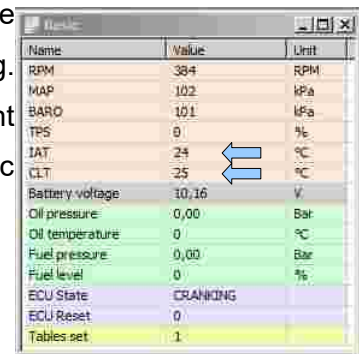P&P adapter Mitsubishi Evolution 4 5 6 7 8

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.

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.

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.

P&P adapter Mitsubishi Evolution 4 5 6 7 8

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.

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.

P&P adapter Mitsubishi Evolution 4 5 6 7 8

Interconnector pinout Name: Mitsubishi EVO 4 5 6 7 8
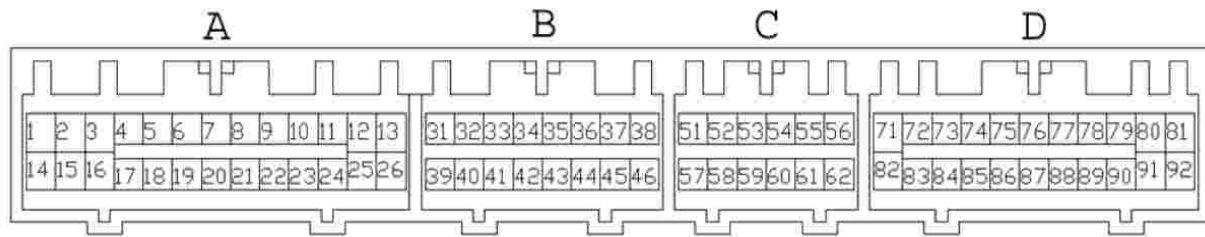
EMU PIN	EMU DESCRIPTION	ECU PIN	DESCRIPTION	WIRE SIZE
B17	EMU GROUND	A13	ENGINE GROUND	0,75 mm
B24	POWER GROUND	A26	POWER GROUND	0,75 mm
G24	POWER GROUND	A26	POWER GROUND	0,75 mm
G18	POWER +12V	D82	POWER SUPLAY	0,5 mm
B18	SENSOR GROUND	B40, D92	SENSOR GROUND	0,5 mm
G8	IGNITION COIL 1	A10	IGNITION #1	0,75mm
G16	IGNITION COIL 2	A23	IGNITION #2	0.75mm
G7	INJECTOR 1	A1	INJECTOR 1	0,75 mm
G15	INJECTOR 2	A14	INJECTOR 2	0,75 mm
G23	INJECTOR 3	A2	INJECTOR 3	0,75 mm
G6	INJECTOR 4	A15	INJECTOR 4	0,75 mm
G12	AUX5	A11	BOOST SELENOID	0,5mm
G21	AUX1	B32/B34	AC CON. FAN E7,8/6 EVO4,5 RAD FAN	0,5mm
G13	AUX2	A22	FUEL PUNP RELAY 2, 3	0,5mm
G5	AUX3	C57(US), C55(EU), B35 (EVO 7,8)	FMIC spray EU C55, US c57, spray ind. B35	0,5mm
G4	AUX6	A21, A20 (E4,5,6)	FAN EVO 7,8 EVO 4,5,6	0,5mm
G14	INJ 5	A8 / A22	AC CLUTCH E7,8 / E4,5,6	0,5mm
G22	INJ 6	B36	CHECK ENGINE	0,5mm
G20	AUX4	C58	TACHO	0,5mm
G2	STEPPER MOTOR #1A	A4	ISC COIL A1	0,5mm
G10	STEPPER MOTOR #2A	A17	ISC COIL A2	0,5mm
G3	STEPPER MOTOR #1B	A5	ISC COIL B1	0,5mm
G11	STEPPER MOTOR #2B	A18	ISC COIL B2	0,5mm
G19	WBO HEATER	C60	FRONT O2 HEATER	0,5mm
B5	WBO VS	D76	OXYGEN SENSOR	0,5mm
B4	CLT	D83	WATER TEMP	0,5mm
B21	IAT	D72	INTAKE AIR TEMP	0,5mm
B12	TPS IN	D84	TPS IN	0,5mm
B2	KS #1	D78	KNOCK SENSOR	0,5mm
B23	+5V	D81	SENSOR POWER (TPS, PRESS)	0,5mm
B14	VSS IN	D86	SPEED SENSOR	0,5mm
B7	PRIMARY TRIGGER	D89	CRANCKSHAFT POSITION SENSOR	0,5mm
B15	CAMSYNC #1	D88	CAMSHAFT POSITION SENSOR	0,5mm
B20	ANALOG #1	B43	CLUTCH POSITION SWITCH (pullup +5v)	0,5mm
B3	ANALOG #2	B45	A/C switch (pulldown 10k to ground)	0,5mm