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, testbenches). 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!**

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

Plug and play connector installation

Box content

INTERCONNECTOR WITH HARNESS PICTURE HERE

1) Plug and play adapter PCB board
2) Wire harness

IMPORTANT !
The interconnector has built in drive by wire module.

Installation

IMPORTANT !

Before installation please disconnect negative terminal of battery!

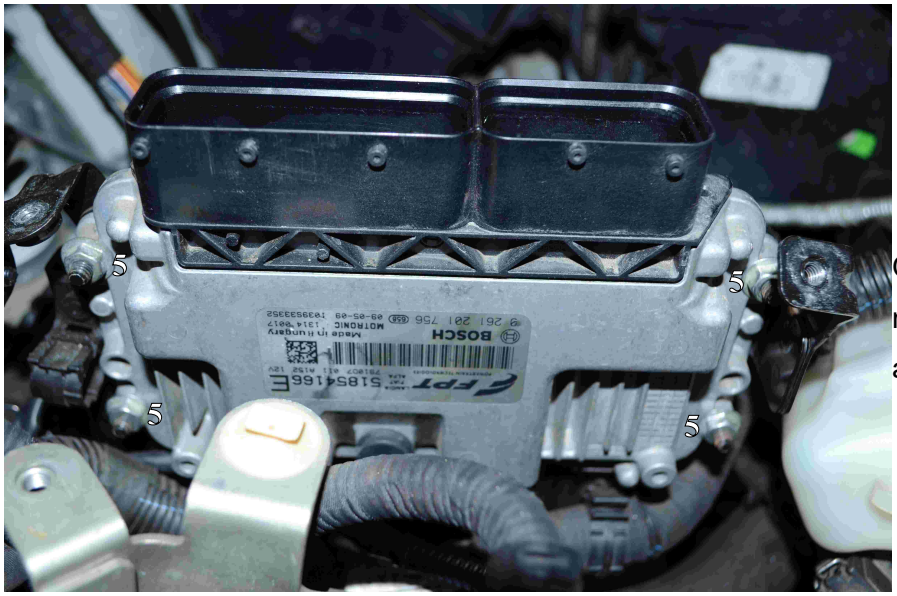
Remove positive and negative terminal of the battery (1).

Remove plugs from OEM ECU (2) .

Remove heat shield, unscrewing two M6 bolts (3).

Remove windshield washer fluid reservoir and unscrew M8 nut holding fluid reservoir mount (4).

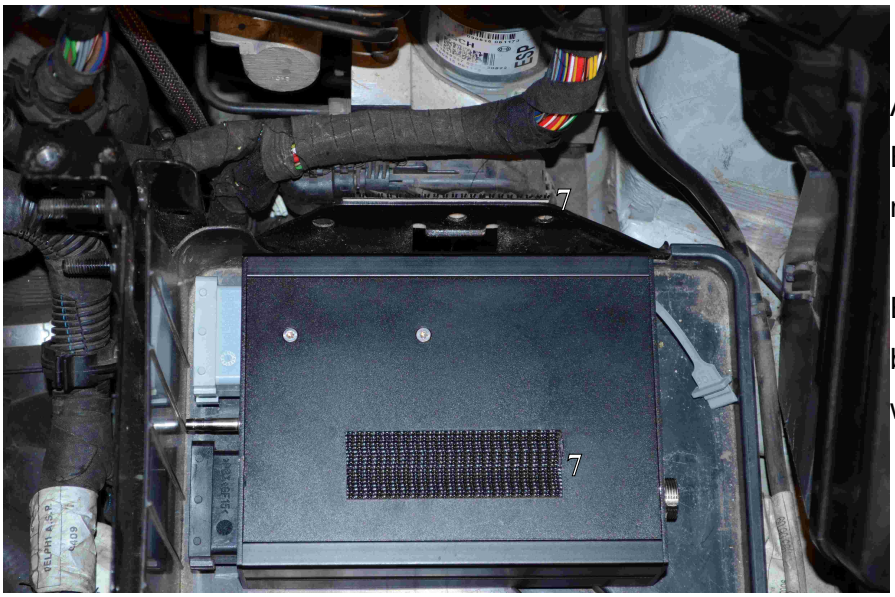
Remove battery.



OEM ECU is hold by four M6 nuts (5). Unscrew all four nuts and remove ECU

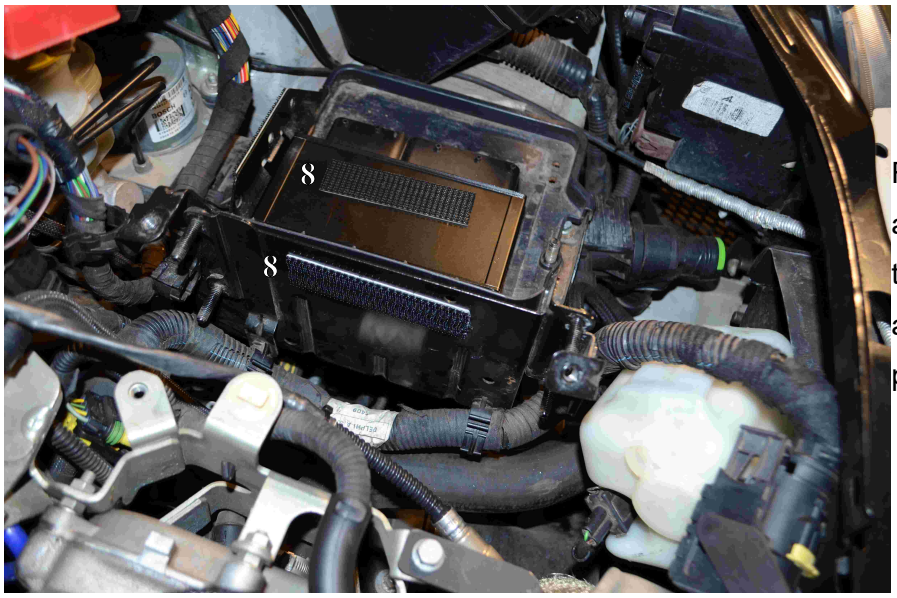
Remove plastic mount holding stock wiring harness by pressing out bolt (6).

Gently move wiring harnes from the metal mounting, making place for EMU ECU.

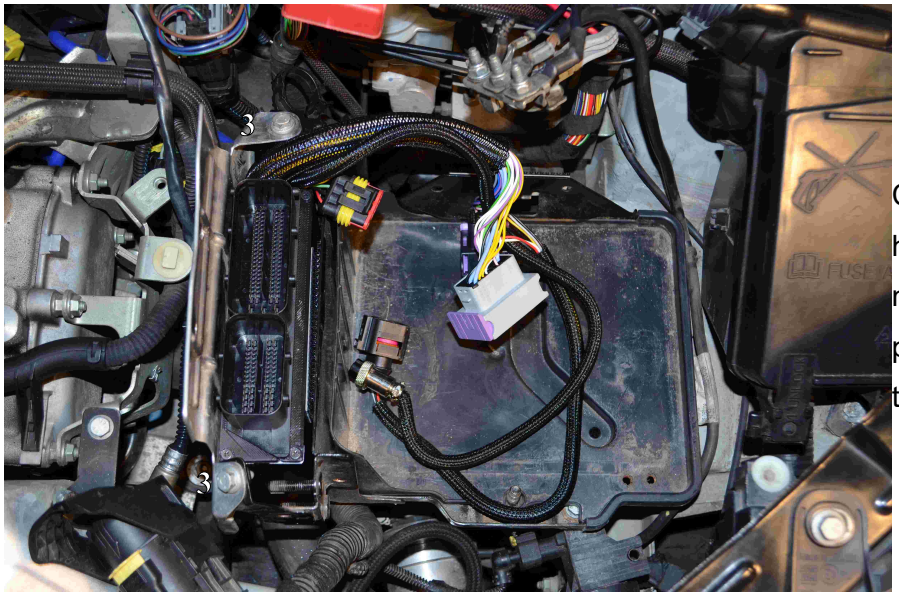


Apply 3M dual lock tape on EMU ECU and metal mounting element (7).

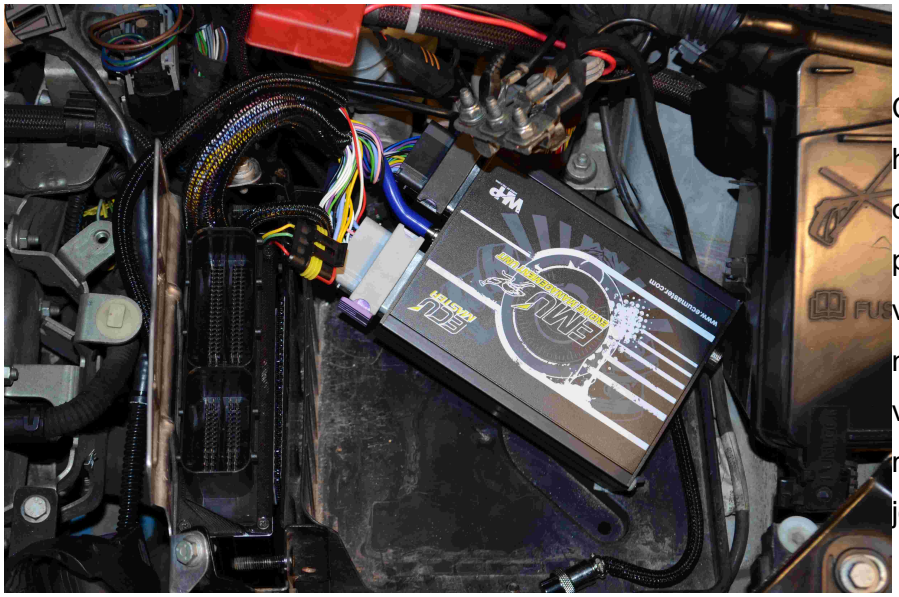
EMU ECU must be fitted between mounting and stock wiring harness.



Repeat operation with adapter. Apply 3M dual lock tape on stock ECU mounting, and adapter itself. Check proper side of the adapter (8).

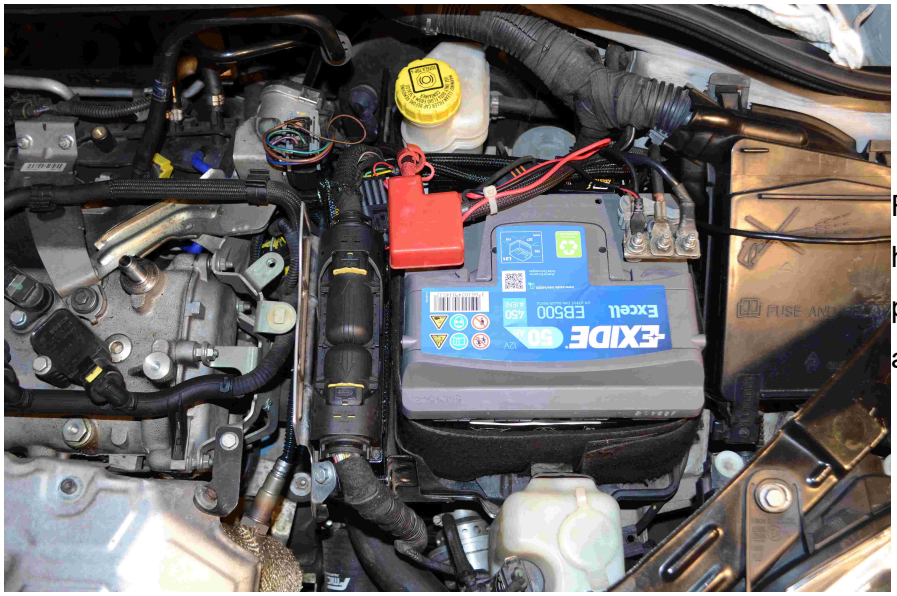


Connect supplied wiring harness to adapter, and mount adapter in stock ECU place. Mount heat shield and tighten M6 bolts (3) 12Nm.



Connect EMU to wiring harness. Connect CAN BUS communication to extension port. Connect supplied vacuum hose from intake manifold to EMU ECU (cut vacuum hose to fuel pressure regulator and connect with T-joint).

Attach EMU behind battery holder. arrange harnesses no to tight. Connect OEM harness ECU plugs to adapter.



Reinstall battery, washer fluid holder, fluid reservoir. Connect positive terminal of the battery and negative.

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.

CAN BUS

IMPORTANT !
 **For CAN operation EMU CAN or CAN Module is required!**

Fiat 500 Abarth uses CAN Bus to communicate between ECU and car subsystems like Dashboard, ABS, etc. EMU device is capable to send appropriate data over can bus and read some information like wheels speed or AC request. The following table contains all CAN data that is transmitted / received by EMU.

Channel	Comment
RPM	Current engine RPM for RPM gauge
Coolant temperature	Current engine temperature for coolant temperature gauge
Coolant temperature warning light	Indicates exceeded coolant temperature.
Fuel consumption	Instant fuel consumption
Check engine light	Check engine indicator when sensor(s) fail detected
Oil pressure	Oil pressure indicator when no oil pressure detected
Wheels speed	Read wheels speed from ABS computer
Gear light	Gear light indicator for Shift Light value
Immobilizer	Signal for BCM
Handbrake	Read Handbrake switch state. This switch is accessible via CAN switch #2
Sport Request	Read Sport request switch state. This switch is accessible via CAN Switch #1
AC Request	Read AC request switch state. This switch is accessible via CAN Switch #0

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.

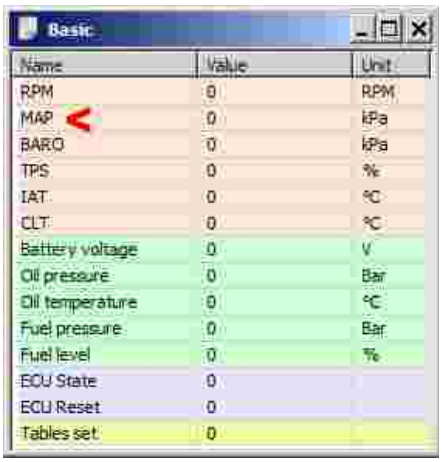
During first connection to the EMU device, window with the device name will appear.
By default there will be device unique serial number which can be changed for any name. Based on this name there will be sub-directory created in directory *My Documents / EMU*. In this sub-directory, the configuration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

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

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).

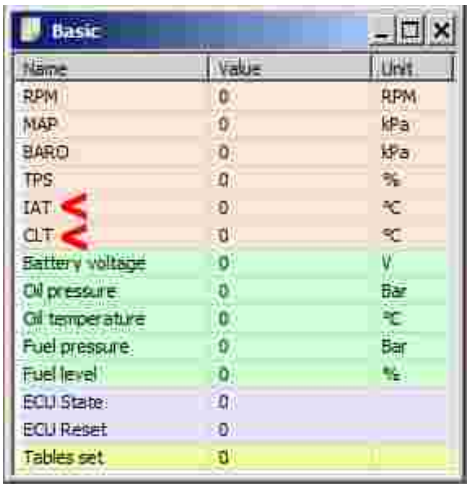


TPS and electronic throttle

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.
Mini Cooper S is equipped with electronic throttle. Before first engine start please check if the throttle plate follows the throttle target. It could be done by using graphical log window and DBW preset.

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.



AC Pressure

The AC pressure sensor is used to read pressure in AC system to control AC Clutch work. More information about AC clutch could be found in AC control.

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.

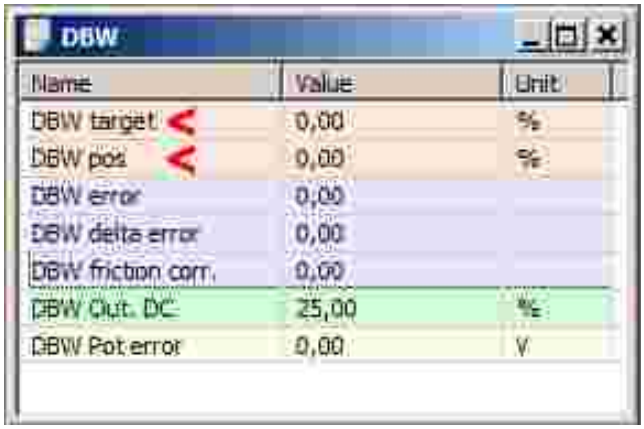
For high speed coolant fan operation, open window *Outputs / Parametric Output #1* and select invert output option.

Wide band oxygen sensor (WBO)

Fiat 500 abarth P&P adapter supports WBO LSU 4.2 sensor instead of factory narrow band sensor. The proper LSU 4.2 connector is included in wire harness. The factory narrow band sensor could also be 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.

Drive by wire

Before engine start the drive by wire subsystem needs to be checked. Press the throttle pedal and read the current throttle position, current throttle position and target position. The throttle position should follow the target position.



First Engine startup

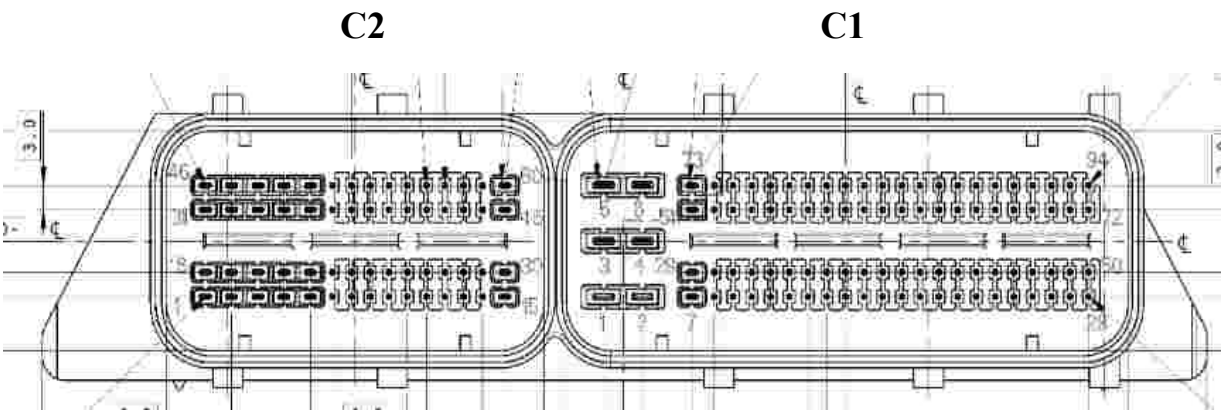
After all necessary checks and adjustments engine is ready to start.
Factory engine, with correct configuration and correct ECU to p&p adapter wiring should start after couple of crank rotation. Additional throttle opening may be required during first start.

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: Fiat 500 abarth 1.4T



EMU PIN	EMU DESCRIPTION	Name:	DESCRIPTION	WIRE SIZE
B17	EMU GROUND	C1 – 1	ECU Ground	0,75mm
G17	POWER GROUND	C1 – 4	Power Ground	0,75mm
G24	POWER GROUND	C1 – 4	Power Ground	0,75mm
B24	POWER GROUND	C1 – 2	Power Ground	0,75mm
G18	POWER +12V	C1 – 6	+12v supply	0,5mm
B18	SENSOR GROUND	C1 – 7,30 C2 – 29,28,13,36,37,44,52	Sensor Ground	0,5mm
G8	IGNITION COIL 1	C2 – 31	Coil 1	0,75mm

G16	IGNITION COIL 2	C2 – 48	Coil 2	0,75mm
G9	IGNITION COIL 3	C2 – 46	Coil 3	0,75mm
B16	IGNITION COIL 4	C2 – 47	Coil 4	0,75mm
G7	INJECTOR 1	C2 – 17	Injector 1	0,75mm
G15	INJECTOR 2	C2 – 4	Injector 2	0,75mm
G23	INJECTOR 3	C2 – 2	Injector 3	0,75mm
G6	INJECTOR 4	C2 – 19	Injector 4	0,75mm
G14	INJECTOR 5	C2 – 5	Blow off valve	0,5mm
G22	INJECTOR 6	C1 – 19	Wastegate valve	0,5mm
G21	AUX1	C1 – 72	Main relay	0,5mm
G13	AUX2	DBW AUX	DBW module control signal	0,5mm
G5	AUX3	C1 – 11	A/C compressor relay	0,5mm
G20	AUX4	C1 – 13	FAN low speed	0,5mm
G12	AUX5	C1 – 12	FAN high speed	0,5mm
G2	STEPPER MOTOR #1A	C1 – 68	Fuel pump	0,5mm
G19	WBO HEATER	C2 – 16	WBO heater [1]	0,5mm
B5	WBO VS	C2 – 55	WBO signal [1]	0,5mm
B4	CLT	C2 – 43	Coolant temp sensor	0,5mm
B21	IAT	C2 – 24	Air temp sesnor	0,5mm
B12	TPS IN	C1 – 79	Accelerator position signal	0,5mm
B2	KS #1	C2 – 51	Knock sensor	0,5mm
B23	+5V	C1 - 28, 49 C2 – 11, 10, 9	Sensors +5v supply	0,5mm
B7	PRIMARY TRIGGER	C2 – 38	Crankshaft position sensor	0,5mm
B15	CAMSYNC #1	C2 – 12	Camshaft position sensor	0,5mm
B20	ANALOG #1	C1 – 57	A/C pressure sensor	0,5mm
B3	ANALOG #2	C2 – 35	Oil pressure switch	0,5mm
B11	ANALOG #3	C2 – 42	DBW pot	0,5mm
B19	ANALOG #4	C2 – 22	DBW pot inv	0,5mm
B8	CAN ANALOG #1	C1 – 87	Stop switch [2]	
G1	CAN ANALOG #2	C1 – 61	Clutch switch [2]	
B9	CAN HIGH	C1 – 89	CAN bus high signal [2]	0,5 mm
B1	CAN LOW	C1 – 88	CAN bus low signal [2]	0,5 mm
	DBW motor +	C2 – 49	DBW motor +	
	DBW motor -	C2 – 50	DBW motor -	

1) **For wire harness without LSU 4.2 connector**

2) Interconnector terminals used for wiring CAN connector

Free inputs / outputs

EMU TERM.	EMU SIDE
B8	IGNITION COIL 5
G1	IGNITION COIL 6
G22	INJECTOR 6
G4	AUX 6
B1	EGT 1
B9	EGT 2
B6	CAM #2 input
G10	Stepper 1B
G3	Stepper 2A
G11	Stepper 2B
CAN MODULE 4	CAN ANALOG #3
CAN MODULE 6	CAN ANALOG #4