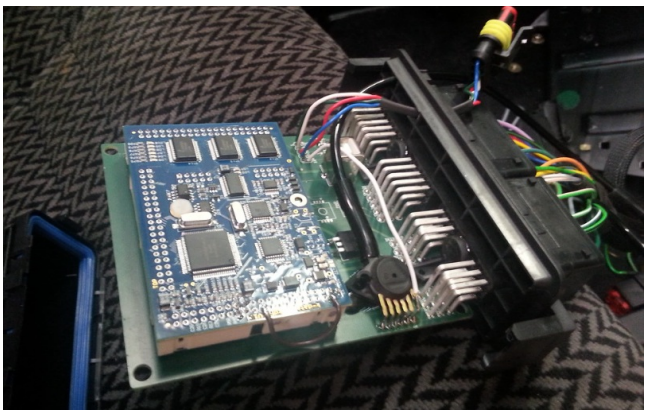

KPERFORMANCE M20 SM3+ PnP Models User Manual

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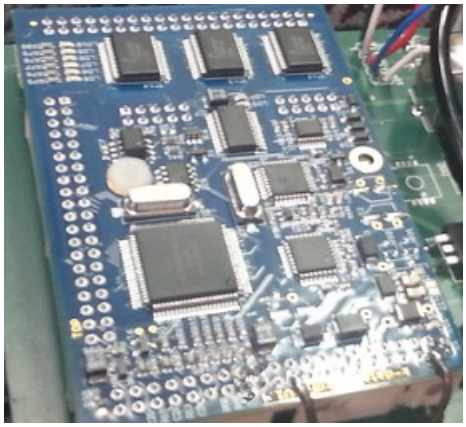


Product Information

The SM3+ PnP is an ECU (Engine Control Unit) manufactured by KPerformance. It is based on the Megasquirt 3 circuit and is built to be 100% AEC-Q100 compliant and IP65 grade. The SM3+ ECU includes a KPerformance Wideband Lambda Controller, which eliminates the need for an extra controller when connecting a Bosch LSU 4.9 sensor. The package includes the SM3 ECU, a USB cable, a user manual, connector pins and terminals, and recommended software for tuning.

Product Usage Instructions

1. Download the necessary software, drivers, and latest information from the KPerformance website (**www.Kperformance.be**).
2. Connect the SM3 ECU to your computer using the provided USB cable.
3. If Bluetooth is installed, the SM3 ECU will automatically switch to Bluetooth connection when there is no USB connection.
4. The SM3 ECU's USB port is equipped with 8kV ESD protection for VBUS and Data lines. It is powered by USB and is compatible with USB 3.0, 2.0, and 1.0.
5. Ensure that the recommended input fuse is installed to protect the SM3 ECU from excessive current.
6. Make the necessary electrical connections using recommended cable types.
7. Refer to the provided pinout information for additional connections and functionalities.

Introduction

Congratulations buying the SM3 ECU. The circuit is based on Megasquirt 3. It was refined build 100% AEC-Q100 compliant and IP65 grade! A KPerformance Wideband Lambda Controller is also part of the SM3 ECU. A Bosch LSU 4.9 sensor can be connected directly without the need to buy a extra controller.

Included in Delivery

- SM3 ECU
- USB cable
- User manual
- Connector pins and terminals

Software
Recommended free tuning software TUNERSTUDIO and/or Megalog viewer.

USB Driver
The onboard FTDI chip simulates a serial RS232 connection:

- Tunerstudio – Communications – Settings:
- USB and Wireless (registered Version), Auto , 115200 Baud

Data Connections
Our SM3 is smart, it will automatic revert to master USB connection as soon as the USB cable is plugged in! Without USB connection it will switch to Bluetooth(if installed).

OnBoard Bluetooth (optional)

Its Pre-configured and ready to use simulating a serial RS232 connection.
Name: SM3+ with pin: 1234 or 0000

USB Port
The USB port of the SM3 is equipped with 8kV ESD protection of VBUS and Data lines. The data chip and ESD protection is “USB powered”. This fact simplifies the optimization of the start-up behaviour significantly when you restart the ignition, the PC wont download the USB driver each time. The USB chip is of course downwards compatible, which means it can be used both with USB 3.0, 2.0 and 1.

Fuses
Recommended input fuse for protecting the SM3 :

- 3A slow blow single lambda
- 5A slow blow dual lambda

A automated 5A PTC SMD fuse is integrated on the board. It will reset itself after cooling down/solving issue or short circuit.

Electrical connections

Like all other voltage supplied parts – must be preceded by a fuse in function of cable section.

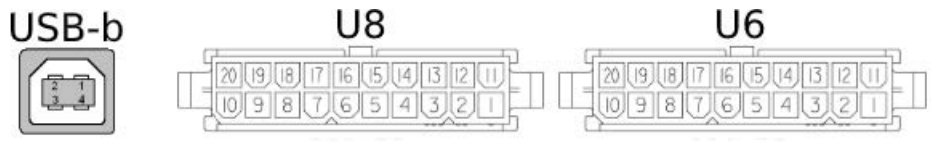
Recommended cable types:

- **Ignition:** min 1.5 mm²
- **Injection:** min 1.5 mm²
- **VR sensor:** min 0.5 mm²
- **Shielded** Sensors: min 0.35 mm²
- **Others:** min 0.35 mm²

Internal LED’s functions

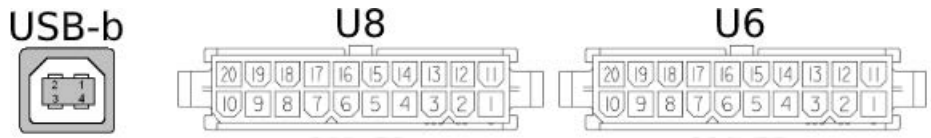
LED Label	Color	Function
LD2	GREEN	5V power supply
LD3	GREEN	O2 controller standby/power
LD4	RED	O2 controller heating/measering
LD5	GREEN	USB Data packets
LD6	RED	USB Data packets
LDA	RED	Ignition pulse A
LDB	RED	Ignition pulse B
LDC	RED	Ignition pulse C
LDD	RED	Ignition pulse D
LDE	RED	Ignition pulse E
LDF	RED	Ignition pulse F

Additional Pinout



U6	Function
1	LSU4,9 GREEN
2	LSU4,9 BLACK
3	LSU4,9 RED
4	LSU4,9 YELLOW
5	LSU4,9 WHITE
6	OXY1 INPUT/EGO1
7	LSU4,9 GREY/ 12V OUTPUT
8	KNOCK 1 INPUT
9	+5V OUTPUT
10	GND
11	IGN1 TTL /ACTIVE COIL OUTPUT
12	IGN2 TTL /ACTIVE COIL OUTPUT
13	IGN3 TTL /ACTIVE COIL OUTPUT
14	IGN4 TTL /ACTIVE COIL OUTPUT
15	IGN5 TTL /ACTIVE COIL OUTPUT
16	IGN6 TTL /ACTIVE COIL OUTPUT
17	EGT+ INPUT
18	EGT- INPUT
19	AD7/AIN3
20	JS12/AIN2

- DIN = Digital Input
- AIN = Analog Input
- GPO = Generel Purpose Output

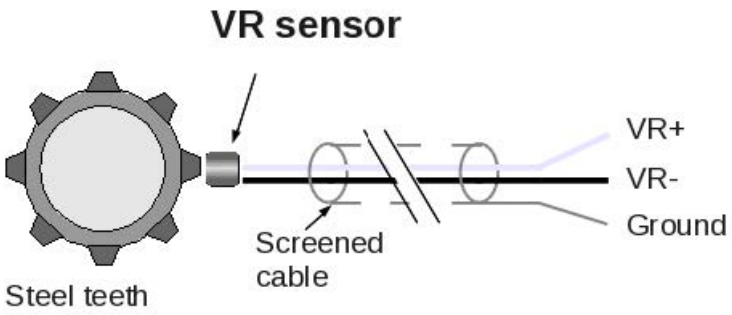


U8	Function
1	NA
2	FLEX/AIN1
3	NA
4	DATALOG/DIN6
5	JS7/DIN2
6	TABLE SWITCH/DIN3
7	NITRO/DIN1
8	CAN LOW
9	CAN HIGH
10	PP0/GPO3
11	PP1/GPO2
12	PK7/GPO11
13	PT1/GPO12
14	NITRO1/GPO3
15	NITRO2/GPO2
16	IDLE /GPO8
17	LAUNCH/DIN4
18	BOOST/GPO4
19	IAC1 OUTPUT/GPO10
20	IAC2 OUTPUT/GPO109

- DIN = Digital Input
- AIN = Analog Input
- GPO = Generel Purpose Output

Engine Speed Measurement
VR sensors inputs:

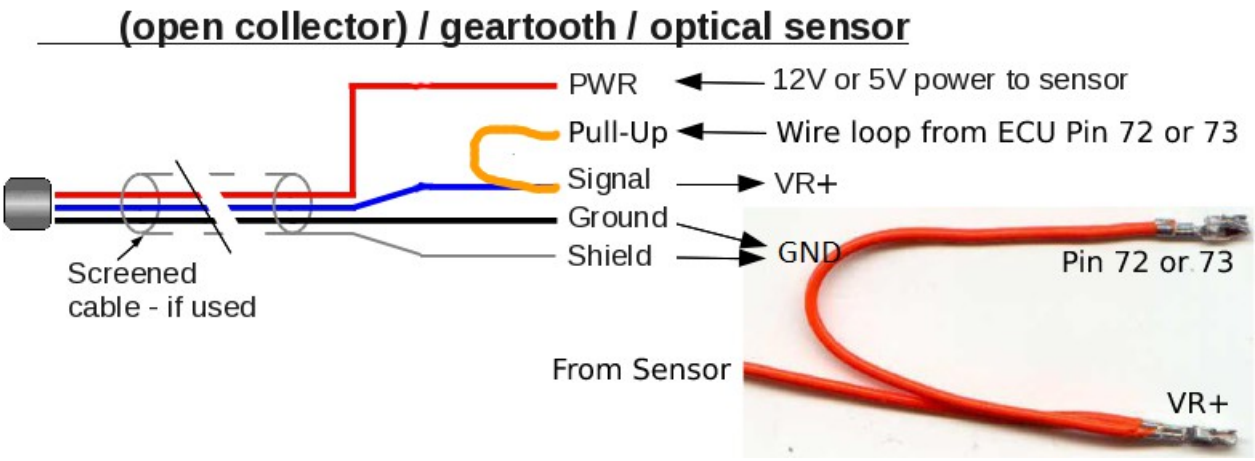
- **CRANK:** VR-1N&VR-1P
- **CAM:** VR-2N&VR-2P



Rising Edge is most accurate for VR-type sensor !Very hot VR signals: only connect VR positive inputs.

Hall & Optical inputs:

- **CRANK:** VR-1P
- **CAM:** VR-2P



Throttle Position Sensor

REMOVE old TPS switch before pluging in the SM3 PnP
The throttle potentiometer is connected up by a 3-wire cable. +5V and GND are connected to the outer static pins of the potentiometer. The corresponding calibration is done under TunerStudio via “Tools” – “Calibrate TPS”

Temp Sensor Inputs (CLT+IAT)
This sensor measures the temperature of the engine coolant, It is primarily used to provide additional fuel during engine warm-up.
Common sensor presets available under TunerStudio!

Digital Input
There are digital inputs(DIN) that can be used for example as “Launch Control”. The corresponding function has to be defined in Tunerstudio. Preferable use Ground activated.
Never connect more than 5V on any input!

Analog Input
There are analog inputs(AIN) that can be user programmed The corresponding function has to be defined in Tunerstudio. Additional pressure, Flex, temp sensors can all be connected.
Never connect more than 5V on any input

Programmable Output
There are General Purpose Outputs(GPO) that can be user programmed and have to be defined in Tunerstudio.

Tacho Ouput
The output “Tacho ” is routed for standard tachometers and already configured in software

Idle Speed Controller (Fidle)
Stock idle valve can be used and needs to be dialed in, in PWM, open or closed loop function by the user

Ignition
The ignition coils can be activated directly by the integrated power drivers. We recommend using a shielded multi-conductor cable . The SM3 is equipped with power drivers enabling activation of passive ignition coils
Do not connect/use both Ignition methods at the same time!
Spare un-used Ignition outputs can be used as additional programmable outputs.
TTL level outputs = smart coils
High Power IGN outputs = passive coils
SM3 firing sequence ABCDEF,please wire accordingly
We prefer active coils to keep high feedback voltages out of the SM3 ECU!
12V powering of coils and injectors is done by relays, PMU, switches etc ,never via the ECU pins!

Injection

There are 6 injector outputs (INJ1-6) ; The injection valves are supplied with +12 V via the ignition switch and the ground side of the injectors are activated via the SM3 ECU

Attention:
The setting whether the injection valves are of high or of low resistance has to be entered in Basic Settings” – “Injector Characteristics” strictly before the first test run because wrong settings can cause destruction of the injection valves or of the SM3a.
Starting values (no guarantee):

High impedance:

- **PWM Current Limit (%):** 100
- **PWM Time Threshold (ms):** 25.5

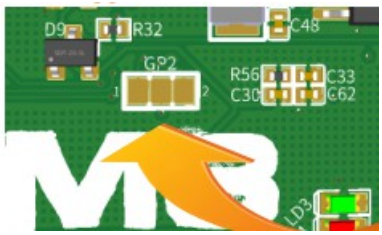
Low impedance:

- **PWM Current Limit (%):** 30
- **PWM Time Threshold (ms):** 1.5

12V powering of coils and injectors is done by relays, PMU, switches etc ,never via the ECU pins!

Onboard Wideband Lambda Controller (Optional Dual)
A Bosch LSU 4.9 sensor can be connected directly without the need to buy a further controller. (connect according onboard LSU4.9 pin numbers)
Calibration data TUNERSTUDIO custom linear wideband:
0V = Lambda 10.20 = AFR 22.35 4V = Lambda 0.650 = AFR 9.50

Starting of the Lambda controller is done by grounding :
Solder Bridge GP2 to be closed on the board, (done from factory)



Not grounding the output will result in standby lambda controller(s).

Onboard Knock

The knock IC uses a purpose designed dual knock sensing amplifier chip to filter knock signals.
If the DME/engine is equipped with knock sensors, they are routed on the PCB and ready to be used without any modifications!

Inputs Knock1 & GND & Knock2
Onboard EGT
The EGT IC uses a purpose designed amplifier chip to filter K-type sensor signals and uses EGT/AD6 input selectable via tunerStudio.

CAN Bus
CAN Bus hardware is populated on the board, but has to be setup accordingly by the user/hardware if desired.
Couple of pre-sets are available under TunerStudio
User Remarques and info

Documents / Resources

 SM3+ PnP User manual M20-M30-M40-S36	KPERFORMANCE M20 SM3+ PnP Models [pdf] User Manual M20 SM3 PnP Models, M20, SM3 PnP Models, Models

References

- KPerformance
- KPerformance