Motronic/Wire-in DIY r2 User manual

Software,drivers and latest info can be downloaded at
www.Kperformance.be

Introduction

Congratulation for buying the base board. The circuit is based on MegaSquirt 3 and pinout of the KdFi1.4 modules. Making the SM3 backwards compatible with the MS2 KdFi1.4 users and boards. It was refined and build 100% AEC-Q100 compliant. A KPerformance Wideband Lambda Controller is also part of the SM3 board. A Bosch LSU 4.9 sensor can be connected directly without a extra controller.

Included in Delivery

- SM3+ Module/KdFi and/or additional PCB

- USB plug*

- User manual

Software

Recommended tuning software TUNERSTUDIO and/or Megalog viewer

USB Driver

The onboard FTDI chip simulates a serial RS232 connection:

TunerStudio – Communications – Settings: USB and Wireless (only in registered Version), Auto , 115200 Baud

USB Port

The 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).

The USB chip is downwards compatible, it can be used both with USB 3.0, 2.0 and 1. Each standard USB cable can be used as connection cable, but preferable with FERRIT core further avoiding ESD spikes.

Electrical connections

Like all other voltage supplied parts - must be preceded by a fuse in function of cable section.
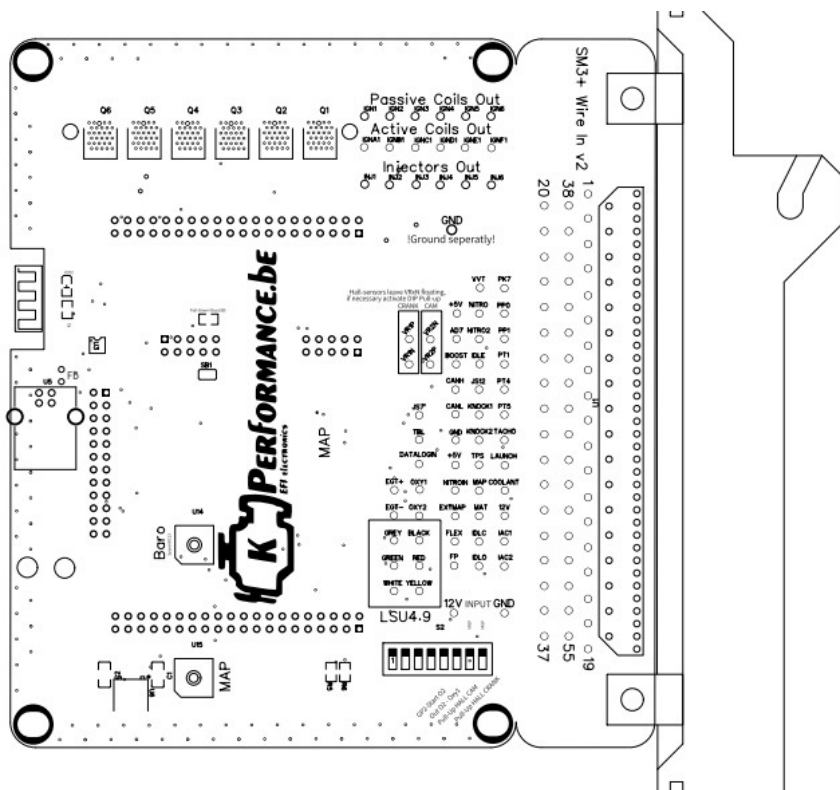
Recommended cable types:

- 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

Fuses

Recommend using a 3A fuse for protecting the SM3. A automated 5A PTCC fuse is integrated on the board. It will reset itself after cooling down/solving issue or short circuit.

Board Layout

Pinouts

KdFi Pin Label	In-/Output	Function
IGN1	IGN output	Passive coil cylinder 1
IGN2	IGN output	Passive coil cylinder 2
IGN3	IGN output	Passive coil cylinder 3
IGN4	IGN output	Passive coil cylinder 4
IGN5	IGN output	Passive coil cylinder 5
IGN6	IGN output	Passive coil cylinder 6
INJ1	INJ output	Injection valve 1
INJ2	INJ output	Injection valve 2
INJ3	INJ output	Injection valve 3
INJ4	INJ output	Injection valve 4
INJ5	INJ output	Injection valve 5
INJ6	INJ output	Injection valve 6
IGNA1	IGN output	Active coil cylinder 1
IGNB1	IGN output	Active coil cylinder 2
IGNC1	IGN output	Active coil cylinder 3
IGND1	IGN output	Active coil cylinder 4
IGNE1	IGN output	Active coil cylinder 5
IGNF1	IGN output	Active coil cylinder 6
12v	Power input	Input Voltage 8-16V
GND	Power Input	Input Voltage GND
FP	Fuel Pump	Fuel Pump Relay
FDLC	FIdle Valve Output	Idle controller 3-pin -CLOSED
FDLO	FIdle Valve Output	Idle controller 3-pin -OPEN
RPM1	Trigger input	Input speed Crankshaft
GND_RPM	GND VR input	Ground speed sensor
RPM2	Trigger input	Input speed camshaft
IAC1	General Output	General Output 1 max2A
IAC2	General Output	General Output 2 max2A
AIR	Sensor input	Air temperature sensor

CLT	Sensor input	Coolant Temp sensor input
TPS	Sensor input	Throttle Position Signal
OXY	Input	Lambda sensor signal bank 1
OXY_2	Input	Lambda sensor signal bank 2
LSU BLACK	O2 Sensor input	Bosch LSU BLACK
LSU YELLOW	O2 Sensor input	Bosch LSU YELLOW
LSU RED	O2 Sensor input	Bosch LSU RED
LSU GREY	O2 Sensor Heating	Bosch LSU GREY
LSU WHITE	O2 Sensor Heating	Bosch LSU WHITE
LSU GREEN	O2 Sensor input	Bosch LSU GREEN
5V	Sensor Supply	5V Power Supply
TBL	Input	Table Switch
Additional P1 connector pinout SM3 (see image pg7)		
EGT+	K-Type Input	EGT sensor input+
AIN1/Flex	Analog Input	General analog input
AIN2/JS12	Analog Input	General analog input
PP1	Analog Input	General analog input
PT4	Spare CPU pin	!!!Direct CPU pin!!!
DIN1/NitroIN	DigitalInput	NitroIn input
AIN0/ExtMap	Analog Input	General analog input
DIN6/PT6/Datalog in	Digital Input	Digital logging start input
PT1	Spare CPU pin	!!!Direct CPU pin!!!
DIN4/Launch	Digital input	Digital launch input
GPO4/Boost	General Output	Programmable Output 1A
GPO2/Nitro2	General Output	Programmable Output 2A
GPO7/VVT	General Output	Programmable Output 2A
GPO5/Tacho	General Output	Programmable Output 2A
GPO8/Idle	General Output	Programmable Output 2A
GPO3/Nitro	General Output	Programmable Output 2A
PK7	Spare CPU pin	!!!Direct CPU pin!!!
AIN3/AD7	Analog Input	General analog input
PT3	Spare CPU pin	!!!Direct CPU pin!!!

Knock1	Knock Input	Knock Sensor Input1
Knock2	Knock Input	Knock Sensor Input2
PP0	Spare CPU pin	!!!Direct CPU pin!!!
PT5	Spare CPU pin	!!!Direct CPU pin!!!
EGT-	K-Type Input	EGT sensor input-

Engine Speed Measurement

1. VR Sensor The measurement via VR sensor is the most widespread way in Europe for car engines. An AC voltage is induced in the coil of the VR sensor by a trigger wheel with 60-2 or 36-1 tooth. Connect VR-1N & VR-1P and/or VR-2N & VR-2P.

2. HALL sensor may require a pull-up resistor of 1k to 10k ohm between signal-out and +5V. Leave VR-1N & VR-2N floating (do not connect)

Please use the DIP switches to activate HALL-sensor Pull-Up's

Throttle Potentiometer

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 voltage relating to the throttle position is tapped via the sliding contact and connected to the input TPS (Throttle Position Sensor). The covered distance of the potentiometer may be longer than the rotation of the throttle axle. The corresponding calibration is done via "Tools" – "Calibrate TPS"

Digital Inputs

There are digital inputs that can be used for example as "Launch Control". The corresponding function has to be defined in TunerStudio.

Spare CPU pins

BE very careful when using these !!Direct CPU Pins!! they have no RC-filtering nor safety components. Incorrect usage can destroy CPU inputs,

Preferable use GND activated inputs

Analog Inputs

There are analog inputs that can be used for example as "Additional temp". The corresponding function has to be defined in TunerStudio.

Idle Speed Controller (Fidle)

Supports both the 2-pin and the 3-pin idle speed valves.

Pin connections of the idle speed control:

2-pin: +12V & FDLO

3-pin: +12V & FDLO (open) & FDLC (closed)

The FDLO & FDLC are automatic inverted on the PCB, use Fidle control under TunerStudio,

Ignition

The Passive ignition coils can be activated by the integrated power drivers the PCB is equipped with 6 power drivers enabling sequential activation of passive ignition coils.

The active coils can also be activated, by using the active coil solder pads.

Injection

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

> **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

Bluetooth or Wifi Connection

Optional bleutooth or wifi connection **only** in combination with Full SM3+ ECU

Onboard Wideband Lambda Controller

A Bosch LSU 4.9 sensor can be connected directly without the need to buy a further controller.

Starting of the controller is done by:

- activating DIP switch GP2-GND

- activating DIP switch OUTO2-OXY1

Calibration data TUNERSTUDIO custom linear wideband:

0V = Lambda 10.20 = AFR 22.35

4V = Lambda 0.650 = AFR 9.50

Onboard Knock

The knock IC uses a purpose designed knock sensing amplifier chip to filter knock signals.

Knock Wiring:

Knock Sensor1-> Knock1 ECU input and ECU ground

Knock Sensor2-> Knock2 ECU input and ECU ground

Onboard datalogging

The board is equipped with 1Gb of onboard SMD-sized memory.

Ready to be used under SD datalogging menu

Onboard RTC (real time clock)

The board is equipped with a very accurate RTC, giving the possibility to add 'time stamps' to the onboard data logging feature!

Making data logs easier to read, easier fault and/or tuning improvements.

CAN Bus

Like MegaSquirt the CAN Bus hardware is populated on the board, but has to be programmed accordingly by the user if desired. For further information on this item please read the respective Megasquirt /MSextra websites.

User Remarques and info