

## SM3+ User manual

Software, drivers and latest info can be downloaded at  
[www.Kperformance.be](http://www.Kperformance.be)

### Introduction

Congratulation for buying the SM3+. 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 and/or additional PCB
- USB plug\*
- User manual
- Molex connector,inserts & solder header

### 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 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 simplifies the start-up behaviour significantly when you restart the ignition, the PC won't download the USB driver each time. 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 mm<sup>2</sup>
- Injection: min 1.5 mm<sup>2</sup>
- VR sensor: min 0.5 mm<sup>2</sup>
- Shielded Sensors: min 0.35 mm<sup>2</sup>
- Others: min 0.35 mm<sup>2</sup>

### 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.

**Onboard LED functions**

LED Label	Color	Function
<b>LD2</b>	ORANGE	5V power supply
<b>LD3</b>	ORANGE	O2 controller standby blinking/power solid
<b>LD4</b>	ORANGE	O2 controller heating 2Hz/measuring blinking 1hz
<b>LD5</b>	ORANGE	USB Data packets
<b>LD6</b>	ORANGE	USB Data packets
<b>LDA</b>	ORANGE	Ignition pulse A
<b>LDB</b>	ORANGE	Ignition pulse B
<b>LDC</b>	ORANGE	Ignition pulse C
<b>LDD</b>	ORANGE	Ignition pulse D
<b>LDE</b>	ORANGE	Ignition pulse E
<b>LDF</b>	ORANGE	Ignition pulse F

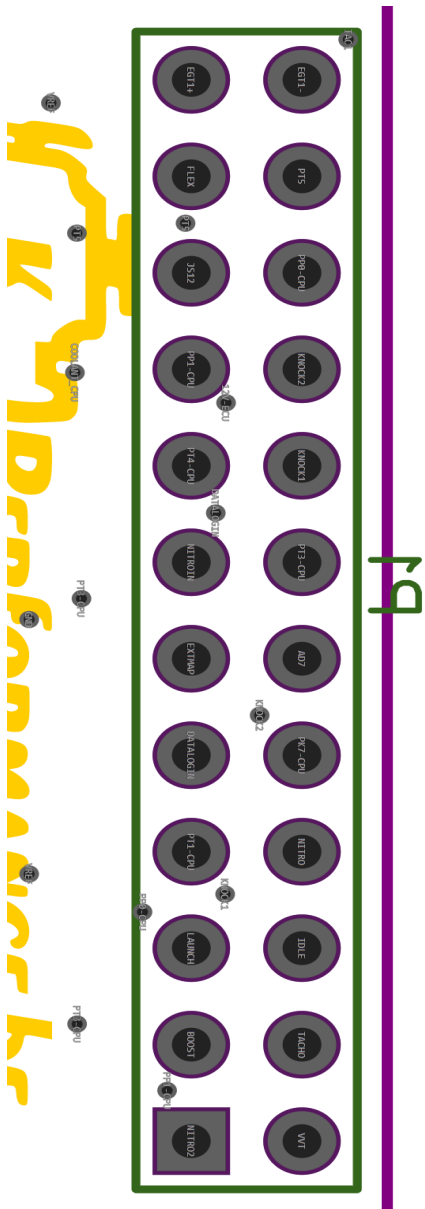
**Onboard O2 controller LED functions**

LED	Status	Function
<b>STS</b>	Blinking Fast	Heating sensor status
<b>PWR</b>	Solid	
<b>STS</b>	Blinking Slow	Operational measuring status
<b>PWR</b>	Solid	
<b>STS</b>	Blinking	Standby and/or error status
<b>PWR</b>	Blinking	

## Pinouts

KdFi Pin Label	In-/Output	Function
<b>A1</b>	IGN output	Ignition output cylinder 1
<b>B1</b>	IGN output	Ignition output cylinder 2
<b>C1</b>	IGN output	Ignition output cylinder 3
<b>D1</b>	IGN output	Ignition output cylinder 4
<b>E1</b>	IGN output	Ignition output cylinder 5
<b>F1</b>	IGN output	Ignition output cylinder 6
<b>INJ1</b>	INJ output	Injection valve 1
<b>INJ2</b>	INJ output	Injection valve 2
<b>INJ3</b>	INJ output	Injection valve 3
<b>INJ4</b>	INJ output	Injection valve 4
<b>INJ5</b>	INJ output	Injection valve 5
<b>INJ6</b>	INJ output	Injection valve 6
<b>12v</b>	Power input	Input Voltage 8-16V
<b>GND</b>	Power Input	Input Voltage GND
<b>FP</b>	Fuel Pump	Fuel Pump Relay
<b>FDLC</b>	Fidle Valve Output	Idle controller 3-pin -CLOSED
<b>FDLO</b>	Fidle Valve Output	Idle controller 3-pin -OPEN
<b>RPM1</b>	Trigger input	Input speed Crankshaft
<b>GND_RPM</b>	GND VR input	Ground speed sensor
<b>RPM2</b>	Trigger input	Input speed camshaft
<b>IAC1</b>	General Output	General Output 1 max2A
<b>IAC2</b>	General Output	General Output 2 max2A
<b>AIR</b>	Sensor input	Air temperature sensor
<b>CLT</b>	Sensor input	Coolant Temp sensor input
<b>TPS</b>	Sensor input	Throttle Position Signal
<b>OXY</b>	Input	Lambda sensor signal bank 1
<b>OXY_2</b>	Input	Lambda sensor signal bank 2

<b>LSU BLACK</b>	O2 Sensor input	Bosch LSU BLACK
<b>LSU YELLOW</b>	O2 Sensor input	Bosch LSU YELLOW
<b>LSU RED</b>	O2 Sensor input	Bosch LSU RED
<b>LSU GREY</b>	O2 Sensor Heating	Bosch LSU GREY
<b>LSU WHITE</b>	O2 Sensor Heating	Bosch LSU WHITE
<b>LSU GREEN</b>	O2 Sensor input	Bosch LSU GREEN
<b>5V</b>	Sensor Supply	5V Power Supply
<b>TBL</b>	Input	Table Switch
<b>Additional P1 connector pinout SM3 (see image pg7)</b>		
<b>EGT+</b>	K-Type Input	EGT sensor input+
<b>AIN1/Flex</b>	Analog Input	General analog input
<b>AIN2/JS12</b>	Analog Input	General analog input
<b>PP1</b>	Analog Input	General analog input
<b>PT4</b>	Spare CPU pin	!!!Direct CPU pin!!!
<b>DIN1/NitroIN</b>	Digital Input	NitroIn input
<b>AIN0/ExtMap</b>	Analog Input	General analog input
<b>DIN6/PT6/Data logging in</b>	Digital Input	Digital logging start input
<b>PT1</b>	Spare CPU pin	!!!Direct CPU pin!!!
<b>DIN4/Launch</b>	Digital input	Digital launch input
<b>GPO4/Boost</b>	General Output	Programmable Output 1A
<b>GPO2/Nitro2</b>	General Output	Programmable Output 2A
<b>GPO7/VVT</b>	General Output	Programmable Output 2A
<b>GPO5/Tacho</b>	General Output	Programmable Output 2A
<b>GPO8/Idle</b>	General Output	Programmable Output 2A
<b>GPO3/Nitro</b>	General Output	Programmable Output 2A
<b>PK7</b>	Spare CPU pin	!!!Direct CPU pin!!!
<b>AIN3/AD7</b>	Analog Input	General analog input
<b>PT3</b>	Spare CPU pin	!!!Direct CPU pin!!!
<b>Knock1</b>	Knock Input	Knock Sensor Input1
<b>Knock2</b>	Knock Input	Knock Sensor Input2
<b>PP0</b>	Spare CPU pin	!!!Direct CPU pin!!!
<b>PT5</b>	Spare CPU pin	!!!Direct CPU pin!!!
<b>EGT-</b>	K-Type Input	EGT sensor input-



## Engine Speed Measurement

Please use the DIP switches(Retro-Fit KdFi v1.4 boards) to select the type of inputs you need.

Switches 1 and 2 are for the primary input which can also be the CAM signal e.g. in the distributor if you don't have a Cranksignal.

Switches 3 and 4 are for the second input if you use crank (1) and cam (2) input. Please do not activate VR and HALL for one sensor at the same time. This will not work properly.

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.

2. HALL sensor may require a pull-up resistor of 1k to 10k ohm between signal-out and +5V.

## 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)

The SM3 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 ignition coils can be activated by the integrated power drivers in combination with bottom PCB equipped with 4-5or6 power drivers enabling sequential activation of passive ignition coils.

### 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.

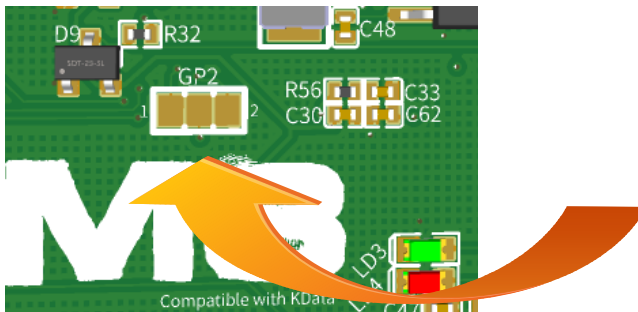
**Calibration data TUNERSTUDIO custom linear wideband:**

**0V = Lambda 10.20 = AFR 22.35**

**4V = Lambda 0.650 = AFR 9.50**

Starting of the controller can be done by grounding GP2(left solder bridge) via dipswitch (Retro-Fit KdFi v1.4 boards) or software wise by selecting Output "Ignition G"(right solder bridge) with customer requirements setting. Ie start lambda controller after 30sec of engine start under tunerstudio

**Not grounding GP2 will result in a standby lambda controller.**



### **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**