



# SPTRONICS

Spark Performance Electronics

Installation Instruction for SEM103  
Standalone Engine Management

# Warning

The SEM103 allows for total flexibility in engine tuning, misuse of this product will destroy your engine

SPTRONICS holds no responsibility for any engine damage that may results from the misuse of this product

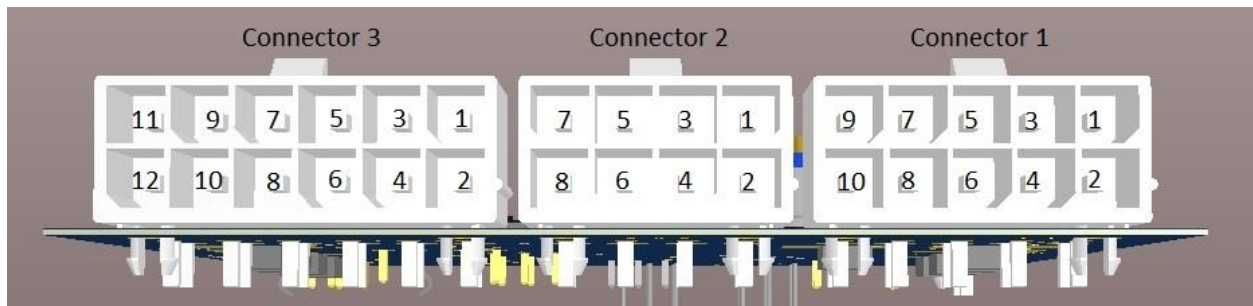
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## SEM102 Specifications:

Trigger Inputs:	2 x Differential Inputs Hall, VR and Opto
Injector Drivers:	4 x Saturated (8 ohm minimum, <b>High Impedance Only</b> )
Coil Drivers:	4 x 0-5V,12V Falling Edge Fire 1.5A max <b>(do not connect directly to coil primary)</b>
Fuel Pump Output	1 x Low Side Output
Tachometer Output	1 x 5V,12v Digital Output
Outputs:	3 x 2.5A Low Side Output
Inputs:	2 x inputs can be used as analog or digital.
Knock Sensor Input	1x programmable knocking.
Throttle Position Input	1 x 0-5V
Manifold Pressure Sensor	1 x 0-5V
Internal 4 bar Map sensor	Internal sensor
Coolant Temperature Sensor	1 x analog
Inlet Air Temperature Sensor	1 x analog
O2 Sensor	1 x 0-5V
USB	1 x PC Communication
CAN	1 x Programmable Send / Receive
5 Volt Reference	1 x

## Wiring Diagram:



Looking at PCB connectors

## Connector 1:

Pin	Name	Wire Color	Comment
1	Injector 1 output	Orange	
2	Injector 2 output	Orange	
3	Injector 3 output	Orange	

4	Injector 4 output	Orange	
5	Fuel pump output	Brown	FP
6	Low side output 1	Brown	FIDLE
7	Output 1 complementary	Brown	
8	Low side output 2	Brown	IAC1
9	Low side output 3	Brown	IAC2
10	GND	Black	

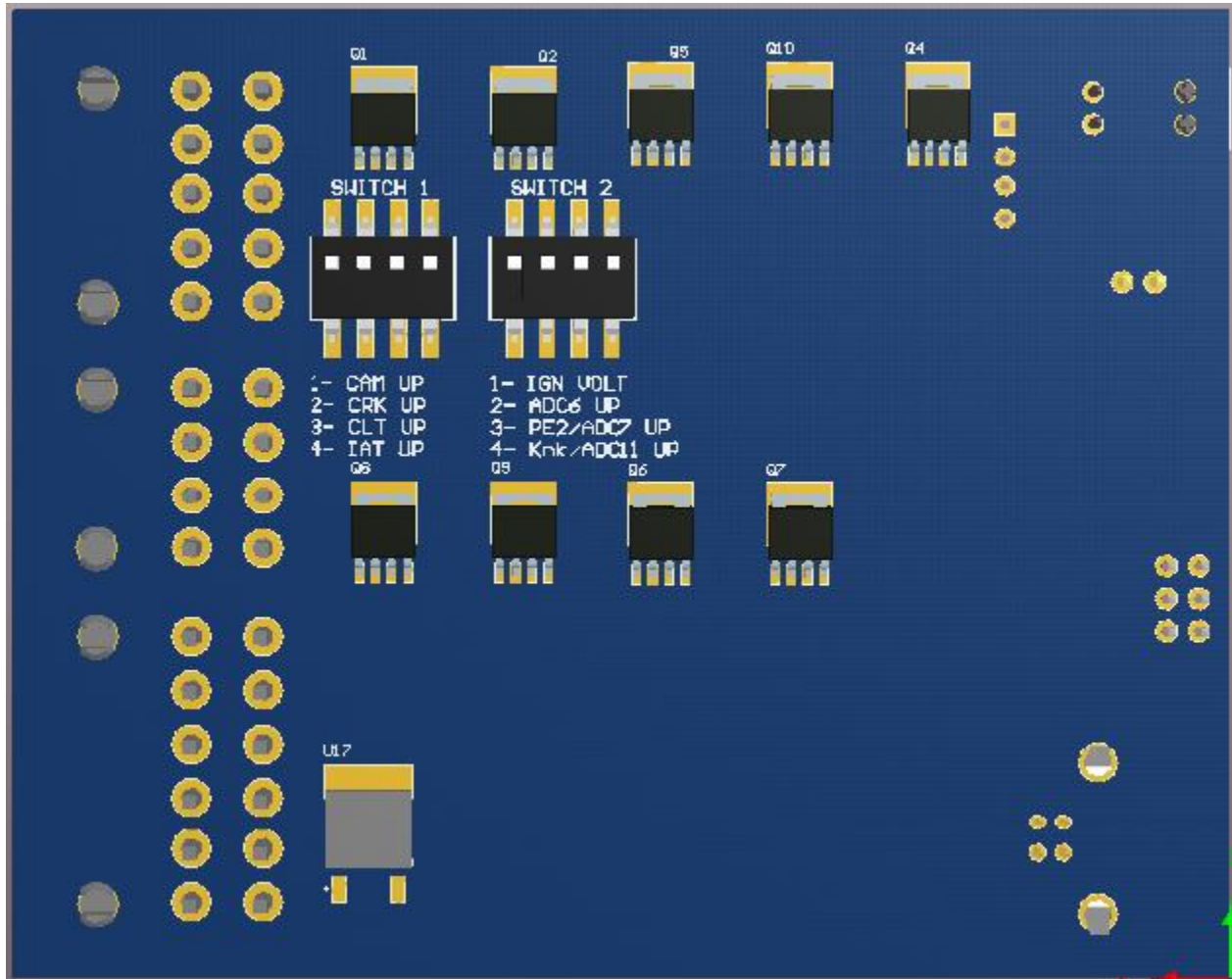
## Connector 2:

Pin	Name	Wire Color	Comment
1	Ignition output 1	Green	
2	Ignition output 2	Green	
3	Ignition output 3	Green	
4	Ignition output 4	Green	
5	Tachometer output	Blue	
6	Sensors Reference Voltage (+5V)	Grey	
7	Switched +12V	Red	
8	GND	Black	

## Connector 3:

Pin	Name	Wire Color	Comment
1	Crank input +	Yellow	
2	Crank input -	Light Brown	
3	Cam input +	Yellow	
4	Cam input -	Light Brown	
5	MAP/MAF input	White	
6	Intake air temperature input	White	
7	Coolant temperature input	White	
8	O2 sensor input	White	
9	Throttle position input	White	
10	Knock sensor input	White	Knocking/ADC11
11	External input 1	White	ADC6
12	External input 2	White	PE2/ADC7

## Switches Settings:



Switch 1 control the following functions:

Pin1, when it is ON, it pulls up the CAM input CAM+

Pin2, when it is ON, it pulls up the CRK input CRK+

Pin3, when it is ON, it pulls up the CLT input.

Pin4, when it is ON, it pulls up the IAT input.

Switch 2 control the following functions:

Pin1, when it is ON, the ignition outputs will be 12V otherwise it is 5V

Pin1, when it is ON, it pulls up ADC6 Connector 3, 11

Pin3, when it is ON, it pulls up PE2/ADC7 Connector 3, 12

Pin4, when it is ON, it pulls up Knocking/ADC11 (in case knocking not installed) Connector 3, 10

## Installation:

### Grounding:

The ECU must have an electrically secure ground connection, which means that the battery negative must be properly grounded to the chassis AND engine. The ground wire, whether it is from the battery or to the chassis and engine, must have perfect electrical conductivity. This means that there must not be any paint or rust under the wire terminal. Make sure that when you install the ground wire there is bare metal exposed where the wire contacts the vehicle component. Both of black wires should be connected to secure ground and we also recommend that the ground wire be as short as possible.

### Power Requirement:

The SEM103 requires a minimum supply voltage of 10V or greater to run. We recommend that the ECU be supplied with 13.8V nominal operating voltage. Ensure that the vehicle's charging system is in perfect operating condition prior to installation. The red wire should be connected to ignition switched and fused to the battery source.

### Sensors Reference Voltage:

The SEM103 has one 5V sensor voltage supply that will be needed during standalone installation. The pink wire output has resettable fuse rated at 0.5A max

### Trigger Inputs:

SEM103 has two differential trigger input crank input+ and crank input- for the Crank signal and cam input+ and cam input- for the CAM signal. Each one has an option to be connected as differential or as single input. The following table summarize trigger connection:

Mode	Connection
Opto Input	<ul style="list-style-type: none"> <li>• Input Signal to Input+</li> <li>• Leave Input- unconnected.</li> </ul>
VR Sensor	<ul style="list-style-type: none"> <li>• Connect VR Sensor to Input+/Input- for Standalone connection</li> <li>• Connect VR+ Sensor to Input+ and leave Input- unconnected for Piggyback connection.</li> </ul>
Hall Input	<ul style="list-style-type: none"> <li>• Connect Hall sensor (Collector/Drain) to Input+, Close CRK/CAM UP jumper for pull-up resistor for standalone connection.</li> <li>• Connect Hall sensor to Input+ for piggyback connection.</li> <li>• Leave Input- unconnected.</li> </ul>

There are 2 jumpers for each trigger input. The CRK UP/CAM UP jumper is for connect the input signal to 10K ohm pull up resistor in case if using open drain sensor.

## Throttle Position Sensor (TPS):

Name	Wire	Color	
+5.0 volts, Vcc	Connector 2,6	Pink	<b>5V Sensor Reference Voltage</b>
TPS Signal	Connector 3,9	White	TPS 0-5V signal
Ground	GND	Black	Connect to GND

## MAP Sensor: (if there is no built in MAP sensor)

Name	Wire	Color	
+5.0 volts, Vcc	Connector 2,6	Pink	<b>5V Sensor Reference Voltage</b>
MAP Signal	Connector 3,5	White	MAP 0-5V signal
Ground	GND	Black	Connect to GND

## Air Temp Sensor (IAT):

Name	Wire	Color	
IAT Signal	Connector 3,6	White	IAT 0-5V signal

Ground	GND	Black	Connect to GND
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IAT UP jumper connects the IAT Signal to pull up resistor 2.49K ohm that will be needed in standalone setup.

## Coolant Temp Sensor (CLT):

Name	Wire	Color	
CLT Signal	Connector 3,7	White	CLT 0-5V signal
Ground	GND	Black	Connect to GND

CLT UP jumper connects the CLT Signal to pull up resistor 2.49K ohm that will be needed in standalone setup.

## O2 Sensor:

Name	Wire	Color	
O2 Signal	Connector 3,8	White	O2 0-1V signal
Ground	GND	Black	Connect to GND

## Knock Sensor:

Name	Wire	Color	
Knock Signal	Connector 3,10	White	
Ground	GND	Black	Connect to GND

Can be used as knocking input or ADC11 input(in case knocking chip not installed) ADC11 can be used as analog or digital input, and it can be pulled up through switch.

## External Input 1,2:

Name	Wire	Color	
ADC6	Connector 3,11	White	



PE2/ADC7	Connector 3,12	White	Table Switch, Launch Control, Nitrous In, Seq. Shift In or AC Idle IN.
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Can be used as analog or digital input and can be pulled up through switches.

## Injectors:

Name	Wire	Color	
Injector 1	Connector 1,1	Orange	
Injector 2	Connector 1,2	Orange	
Injector 3	Connector 1,3	Orange	
Injector 4	Connector 1,4	Orange	

Four low side output each rated at 2.5A, can be connected for 4 cylinder in sequential configuration or to 6, 8 cylinder in semi sequential/batched configuration.

## Ignition:

Name	Wire	Color	
Ignition 1	Connector 2,1	Green	
Ignition 2	Connector 2,2	Green	
Ignition 3	Connector 2,3	Green	
Ignition 4	Connector 2,4	Green	

Four 5V or 12V 1.5A max outputs, can be connected for 4 cylinder in sequential configuration or to 6, 8 cylinder in semi sequential/batched configuration. Only high impedance igniter should be used. Do not connect to coil directly.

## Fuel Pump:

Name	Wire	Color	
FP	Connector 1,5	Brown	Low side output connected to fuel pump relay

## Tachometer:

<b>Name</b>	<b>Wire</b>	<b>Color</b>	
Tach	Connector 2,5	Blue	Tachometer output 5V or 12v pulses

## General Purpose Outputs:

<b>Name</b>	<b>Wire</b>	<b>Color</b>	
FIDLE	Connector 1,6	Brown	PWM Idler, boost control, Nos output, Seq. shift output, AC idle output
FIDLE comp.	Connector 1,7	Brown	Complementary out for FIDLE for 3 to be used with 3 wire IDLER setup
IAC1	Connector 1,8	Brown	Boost control, Nos output, Seq shift output, Programmable output
IAC2	Connector 1,9	Brown	Boost control, Nos output, Seq shift output, Programmable output

4 Low side outputs rated at 2.5A each, can be used for general purpose as mentioned above.

## Warranty

SPTRONICS warrants to the consumer that all High Performance products will be free from defects in material and workmanship for a period of twelve (12) months from date of the original purchase. Products that fail within this 12-month warranty period will be repaired or replaced at SPTRONICS's option, when determined by SPTRONICS that the product failed due to defects in material or workmanship.

This warranty is limited to the repair or replacement of the SPTRONICS part. In no event shall this warranty exceed the original purchase price of the SPTRONICS part nor shall SPTRONICS be responsible for special, incidental or consequential damages or cost incurred due to the failure of this product. Warranty claims to SPTRONICS must be transportation prepaid and accompanied with dated proof of purchase. This warranty applies only to the original purchaser of product and is non-transferable. All implied warranties shall be limited in duration to the said 12-month warranty period. Improper use or installation, accident, abuse, unauthorized repairs or alterations voids this warranty. SPTRONICS disclaims any liability for consequential damages due to breach of any written or implied warranty on all products manufactured by SPTRONICS.

SPTRONICS will not be responsible for electronic products that are installed incorrectly, installed in a non-approved application, misused, or tampered with.

Any SPTRONICS electronics product can be returned for repair if it is out of the warranty period. There is a minimum charge of \$20.00 for inspection and diagnosis of SPTRONICS electronic parts. Parts used in the repair of SPTRONICS electronic components will be extra. SPTRONICS will provide an estimate of repairs and receive written or electronic authorization before repairs are made to the product.