

Instruction Manual



P/N 30-2224 8 CHANNEL K-TYPE CAN MODULE



STOP! - READ THIS BEFORE INSTALL OR USE!

WARNING:

THIS INSTALLATION MAY REQUIRE WELDING OR INTEGRATION INTO A VEHICLE'S ELECTRICAL SYSTEM. DAMAGE TO SENSITIVE ELECTRONICS, FIRE, OR EXPLOSION MAY OCCUR IF PROPER PRECAUTION IS NOT TAKEN. IF THERE IS ANY DOUBT, **DO NOT** ATTEMPT THE INSTALLATION AND CONSULT A PROFESSIONAL.

NOTE: IT IS THE RESPONSIBILITY OF THE ENGINE TUNER TO ULTIMATELY CONFIRM THE CALIBRATION USE FOR ANY PARTICULAR ENGINE IS SAFE FOR ITS INTENDED USE. AEM HOLDS NO RESPONSIBILITY FOR ANY ENGINE DAMAGE THAT RESULTS FROM THE MISUSE OF THIS PRODUCT.

The AEM 8 Channel K-Type CAN Module enables a user to put eight K-type thermocouples on to an AEMnet or CAN bus. K-type thermocouples are suitable for various applications such as exhaust gas temperature (EGT) measurement, pre/post intercooler temperatures, cylinder head temperatures, and more. All measurements are cold junction compensated with a range of -200 to +1372 degC / -328 to +2501 degF. The Module is provided with a four-pin DTM connector to provide CAN, power connectivity, and eight miniature style K-type sockets. The Module supports the Bosch CAN 2.0b standard with flexible CAN configuration jumpers making it compatible with many third-party devices. Note: The only AEMnet devices that are compatible with the CAN Sensor Module are the CD-series dash displays.

Features

- Eight (8) K-Type Cold Junction Compensated Thermocouple Inputs
- AEMnet/CAN Output (Thermocouple and Cold Junction Temperatures)
- -200 to +1372 degC / -328 to +2501 degF
- $\pm 0.15\%$ (Max) Thermocouple Full-Scale Error
- 0.1 degC Resolution
- Open Circuit / Fault Detection
- 'Miniature' Style Thermocouple Sockets
- Jumper selectable CAN bus speeds: 250k, 500k, 1M
- Jumper selectable header length, 11 bit or 29 bit
- Jumper selectable base address, two units can be on the same bus

PN	QTY	Description
35-2224	1	MODULE, CAN K-TYPE MODULE
10-2224	1	INST, 30-2224
4-4083	1	2.0" x 1.5" VELCRO
35-2624	1	4 WAY DTM PLUG KIT

Installation

Mounting

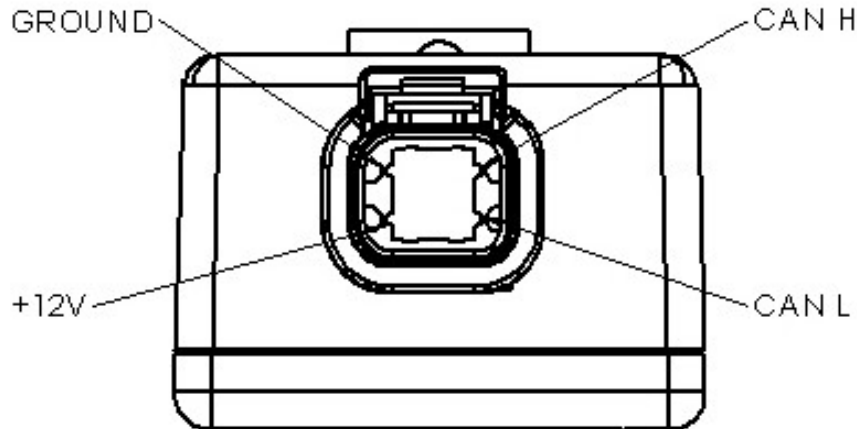
The Module should may be mounted within the vehicle using the supplied hook-and-loop fastener or cable ties. The Module's circuit board has a water-resistance coating applied and thus has some tolerance to a humid or condensing atmosphere, however the thermocouple connectors are **not** sealed so a dry and cool mounting location should be chosen.

Power / AEMnet (CAN)

A four pin Deutsch DTM receptacle is integrated into the Module's enclosure to provides power and AEMnet/CAN connectivity. This allows a straightforward "Plug and Play" installation when adding to an existing AEMnet network.

General Wiring Guidelines

- Route wiring away from sources of noise such as alternators, ignition components, or other high power/frequency wiring
- Shielded wire is suggested to reduce the susceptibility of noise; the shield should only be grounded/drained on one end of the wiring harness
- CAN wiring should utilized twisted pairs (> 1 TPI); shielding is recommended



Pin	Name	Function
1	AEMnet+ / CANH	AEMnet / CAN bus output
2	AEMnet- / CANL	AEMnet / CAN bus output
3	12V Battery Power (+)	Primary ignition/battery power input
4	Ground (-)	Power Ground

Thermocouple Sensor Wiring

- K-type thermocouples have an industry standard marking in North America: Red is negative (-), yellow is positive (+). Despite this, some sensors and/or wiring come with alternative coloring. If in doubt, contact the manufacturer.
- Specific K-Type thermocouple wire (**not** copper) must be used for all wiring, extensions, and connections. Failure to do so will result in inaccurate readings.
- Connect K-Type sensors to each of the numbered (1 - 8) yellow 'miniature' thermocouple receptacles on the Module.
- The receptacles are polarized, positive (+) and negative (-). Reversing this connection will result in inaccurate readings.
- Route wiring away from sources of noise such as alternators, ignition components, or other high power/frequency wiring
- Shielded wire is suggested to reduce the susceptibility of noise; the shield should only be grounded/drained on one end of the wiring harness

Cold Junction Compensation

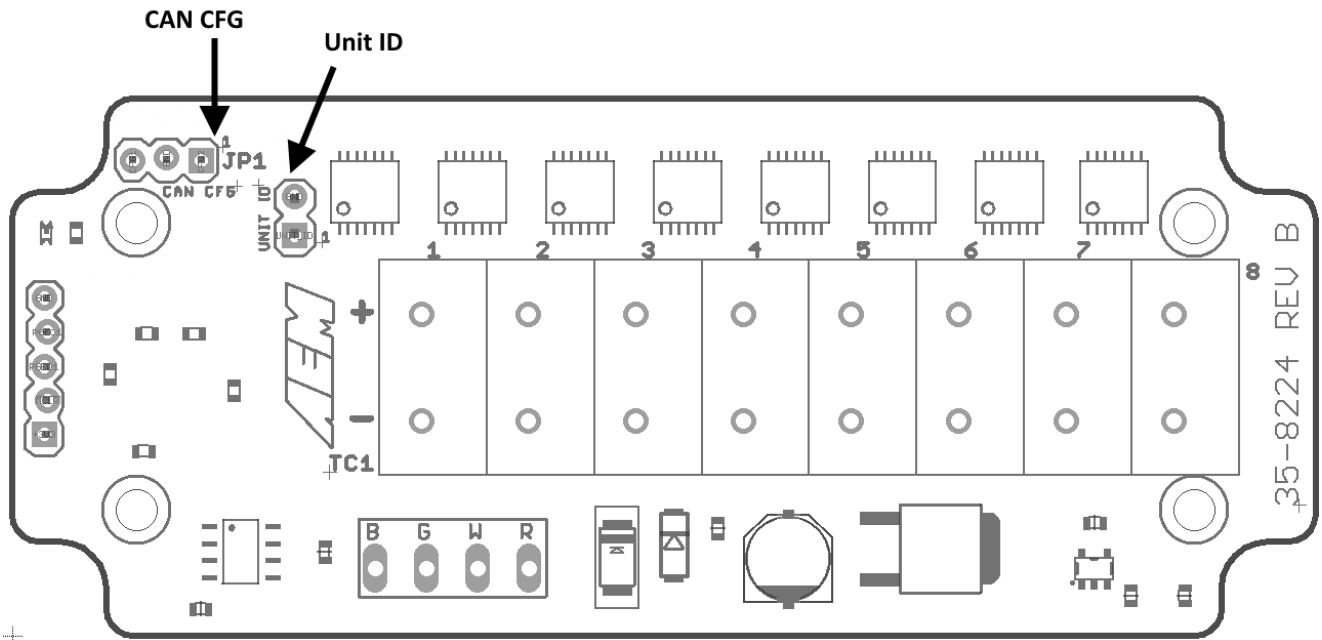
Due to the nature of thermocouples, a "cold" junction sensor has been implemented to provide the most accurate temperature measurements. This sensor is embedded within the device, all compensations are automatically applied, and no further action is required by the user. The output of the cold junction sensor is equivalent to the temperature within the Module and is provided via CAN for reference purposes. The thermocouple sensors' temperature measurements output via CAN are *already* CJ compensated and require no further manipulation by the user.

Jumper Configuration

Two configuration jumpers are located inside the enclosure of the Module. The cover may be removed by unscrewing the four external screws to change the jumper positions if needed. The Module is delivered from the factory in the most common configuration suitable for use with AEMnet (and other) devices; changing the jumper positions is not typically necessary.

CAN CFG - The default position of 500 kb/s & 29 bit ID is correct for AEMnet. Please refer to the manufacturer's documentation if you are using any third-party devices.

UNIT ID - The default position is correct if there is only a single AEM K-Type CAN Module installed on your network. If you are using two Modules, the first unit must be set to 'UNIT 1' and the second to 'UNIT 2'.



	No Jumper	1 - 2	2 - 3	Description
UNIT ID	UNIT 2	UNIT 1*		First or Second Unit on Bus
CAN CFG	250 kb/s 11-bit ID	500 kb/s* 29-bit ID	1000 kb/s 29-bit ID	Bus Speed / ID Type

Jumper Position (* = Default Position)

Compatible Sensor and Accessory Part Numbers

The following is a list of compatible sensors and accessories.

AEM PN	Description
30-2065	K-Type Closed Tip Thermocouple Sensor Kit. Inconel Sheath. 1/8" NPT Compression Fitting. Includes: K-Type Closed Thermocouple Sensor, 1/8" Compression Fitting & Ring Terminal Harness
30-2066	K-Type Closed Tip Thermocouple 10' Wiring Extension Kit. Includes: 10' Wiring Extension, 2 X 4-40 Hex Nut, 2 X 4-40 Screw & 6" Heat Shrink Tubing
30-2068 30-2068-2 30-2068-4	K-Type Closed Tip Thermocouple Kit. Inconel Sheath. 1/8" NPT Compression Fitting. Includes: AEM Part Numbers 30-2065 & 30-2066, (-2) and (-4) versions include either 2 or 4 sensor and extension combinations
30-3606	AEMNet Extension Cable 2 feet Kit
30-3607	AEMNet Extension Cable 5 feet Kit
30-3608	AEMNet Extension Cable 10 feet Kit
35-3440-F	AEMnet Female Termination Plug
35-3440-M	AEMnet Male Termination Plug
35-2624	DTM-Style 4-Way Plug Connector Kit. Includes Plug, Plug Wedge Lock & 5 Female Pins
35-2625	DTM-Style 4-Way Receptacle Connector Kit. Includes Receptacle, Receptacle Wedge Lock & 5 Male Pins
35-2626	DTM-Style 4-Way Connector Kit. Includes Plug, Receptacle, Plug Wedge Lock, Receptacle Wedge Lock, 5 Female Pins & 5 Male Pins

Specifications

Dimensions	width	1.8 / 45.8	in / mm
	length (excl. connector)	4.0 / 103	in / mm
	height	1.4 / 35	in / mm
	mass	3.8 / 110	oz / g
Supply Voltage	min	7	VDC
	max	18	VDC
Supply Current (13.8V)	nominal	70	mA
Operating Temperature	min	-4 / -20	degF / degC
	max (16V Supply)	185 / 85	degF / degC
K-Type Thermocouple Inputs	Input Protection	+/- 45	VDC
	Minimum	-328 / -200	degF / degC
	Maximum	2501 / 1372	degF / degC
	Resolution	0.1	degC
	Full-Scale Error	+/- 0.15 (Max)	%
Cold Junction Sensor	CAN Transmit Rate	10	Hz
	Minimum	-67 / -55	degF / degC
	Maximum	257 / 125	degF / degC
	Resolution	0.1	degC
	Accuracy	+/- 0.7 (Max)	degC
CAN	CAN Transmit Rate	2	Hz
	Bit Rate (User Configurable)	250 / 500 / 1000	kb/s
	ID Type (User Configurable)	11 / 29	bits
	Termination	None	Ohm
	DLC	8	Bytes

FAQ / Troubleshooting

My Module doesn't seem to be outputting anything.

Confirm that your CAN bus is properly terminated and that all nodes are configured for the right bus speed. In addition, any receiving devices/nodes must be specifically configured to receive as the Module is configured to transmit; specifically, the CAN ID, bus speed, and number of ID bits.

The temperatures that my module is outputting don't make sense.

Thermocouple wires have polarity meaning there is a positive (+) and negative (-) wire. Please ensure that the polarity is correct from the sensor, through any extensions, and to the correct terminal on the Module. The polarity is marked on the top of the enclosure of the Module. All sensor wiring and/or extensions must be constructed of the proper K-type alloy wire. The Module will output a temperature of "3276.7 degC" when a channel does not have a sensor plugged in.

Can I use the Module with my AEM AQ-1, AEM CAN Gauge, or AEM ECU?

No, the CAN Sensor Module is only compatible with CD-series dash displays and other third-party devices at this time.

Where can I find AEM .dbc files?

AEM dbc files are available via the AEM Forum and within the AEM CD-series dash display software installer. Please visit www.aemelectronics.com for more information and downloads.

For support, contact AEM Technical Support at 1-800-423-0046 or gentech@aemelectronics.com.

AEMnet (CAN Bus) Output

WHITE WIRE = AEMnet+ / CANH

GREEN WIRE = AEMnet- / CANL

Bus Termination

All AEMnet/CAN networks must be terminated to have an equivalent of approximately 60 Ohms of resistance.

Generally, this means a 120 Ohm resistor connected in parallel to AEMnet+/AEMnet- (or CANH/CANL) at both physical ends of the bus run.

CAN DBC definition files are available at www.aemelectronics.com

bit rate	Selectable via Jumper	kb/sec
format	Selectable via Jumper	bit ID
terminating resistor	NONE	
endianness	big / Motorola	
DLC	8	

Unit 1: 0x0000BA00 (29) / 0x5A0 (11) at 10Hz

Unit 2: 0x0000BB00 (29) / 0x5B0 (11) at 10Hz

Byte	Label	Data Type	Scaling	Offset	Range
0	Thermocouple1	16 bit signed	0.1 degC/bit	0	-3276.8 to +3276.7 degC
1					
2	Thermocouple2	16 bit signed	0.1 degC/bit	0	-3276.8 to +3276.7 degC
3					
4	Thermocouple3	16 bit signed	0.1 degC/bit	0	-3276.8 to +3276.7 degC
5					
6	Thermocouple4	16 bit signed	0.1 degC/bit	0	-3276.8 to +3276.7 degC
7					

Unit 1: 0x0000BA01 (29) / 0x5A1 (11) at 10Hz

Unit 2: 0x0000BB01 (29) / 0x5B1 (11) at 10Hz

Byte	Label	Data Type	Scaling	Offset	Range
0	Thermocouple5	16 bit signed	0.1 degC/bit	0	-3276.8 to +3276.7 degC
1					
2	Thermocouple6	16 bit signed	0.1 degC/bit	0	-3276.8 to +3276.7 degC
3					
4	Thermocouple7	16 bit signed	0.1 degC/bit	0	-3276.8 to +3276.7 degC
5					
6	Thermocouple8	16 bit signed	0.1 degC/bit	0	-3276.8 to +3276.7 degC
7					

Unit 1: 0x0000BA02 (29) / 0x5A2 (11) at 2Hz

Unit 2: 0x0000BB02 (29) / 0x5B2 (11) at 2Hz

Byte	Label	Data Type	Scaling	Offset	Range
0	Cold Junction Temperature	16 bit signed	0.1 degC/bit	0	-3276.8 to +3276.7 degC
1					

2	Battery Voltage	8 bit unsigned	0.1 V/bit	0	0 - 25.5 V
3	n/a	n/a	n/a	n/a	n/a
4	n/a	n/a	n/a	n/a	n/a
5	n/a	n/a	n/a	n/a	n/a
6	n/a	n/a	n/a	n/a	n/a
7	n/a	n/a	n/a	n/a	n/a

12 Month Limited Warranty

Advanced Engine Management Inc. warrants to the consumer that all AEM 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 AEM's option, when determined by AEM that the product failed due to defects in material or workmanship. This warranty is limited to the repair or replacement of the AEM part. In no event shall this warranty exceed the original purchase price of the AEM part nor shall AEM be responsible for special, incidental or consequential damages or cost incurred due to the failure of this product. Warranty claims to AEM 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. AEM disclaims any liability for consequential damages due to breach of any written or implied warranty on all products manufactured by AEM. Warranty returns will only be accepted by AEM when accompanied by a valid Return Merchandise Authorization (RMA) number. Product must be received by AEM within 30 days of the date the RMA is issued.

UEGO oxygen sensors are considered wear items and are not covered under warranty.

Please note that before AEM can issue an RMA for any electronic product, it is first necessary for the installer or end user to contact the EMS tech line at 1-800-423-0046 to discuss the problem. Most issues can be resolved over the phone. Under no circumstances should a system be returned or a RMA requested before the above process transpires.

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

Any AEM electronics product can be returned for repair if it is out of the warranty period. There is a minimum charge of \$50.00 for inspection and diagnosis of AEM electronic parts. Parts used in the repair of AEM electronic components will be extra. AEM will provide an estimate of repairs and receive written or electronic authorization before repairs are made to the product.