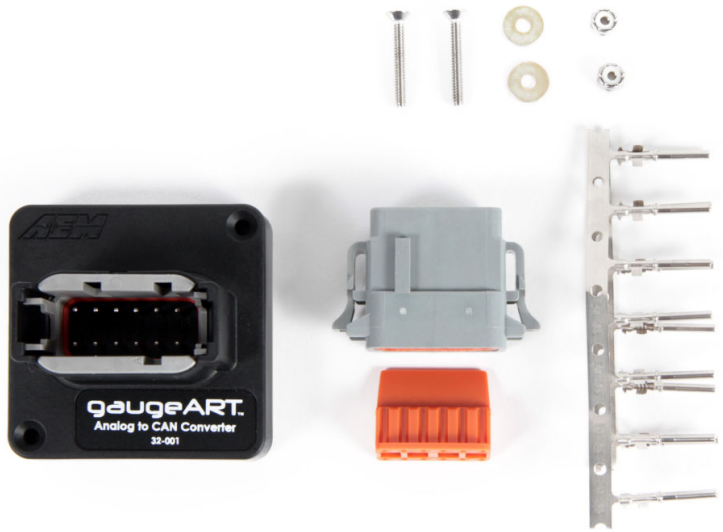
gaugeART™
BY RUSH RACING DEVELOPMENT



gaugeART Analog to CAN Converter (Version 2)
part number 32-001

USER MANUAL

Version 1.2

Included Contents:

1 - gaugeART Analog to CAN Converter (Version 2)
1 – Deutsch 12 position plug connector
1 – Deutsch 12 position terminal lock
13 – Deutsch socket terminal (22-18 AWG)
1 – hardware kit (2 x 4-40x7/8 FLT screw, 2 x 4-40 washer, 2 x 4-40 nut)
1 - 3/16” expanded shrink tube, 2” long
1 - 20 AWG shielded twisted pair data and power cable, 5’ long*
*replaced if an optional cable is purchased

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Introduction to gaugeART Analog to CAN Converter

The gaugeART Analog to CAN converter, manufactured by AEM with a protocol compatible with gaugeART devices, allows analog sensors to be displayed on gaugeART display products (gaugeART CAN Gauge and gaugeART Video Gauge Adapter).

The CAN Converter is also compatible with the gaugeART OBD Link – which allows both analog sensors as well as OBD readings from a factory ECU to be displayed on gaugeART devices.

Available inputs:
Two (2) 0-5V analog inputs
Two (2) temperature inputs
One (1) dedicated fuel level input (0-250 Ohm range)
One (1) tachometer/coil input engine speed input

Requirements

- **Installation location:** the gaugeART Analog to CAN Converter is IP67 weather sealed and can be placed in the vehicle's engine compartment, but should be placed away from heat and vibration.
- **To read and display CAN messages:** compatible gaugeART product (gaugeART CAN Gauge or gaugeART Video Gauge Adapter).
- **Compatible sensors:** see the next page for a complete list.
- **Double barrel rolling crimper:** Installation of wires to the connector requires a wire stripper and an open barrel double rolling crimper (see photo to right). Using an improper tool and not producing a proper crimp may result in terminal failure. Crimp tools are available online, including from Amazon.com (search "IWISS SN-28B").

Compatible Sensors

All compatible sensors are available directly from gaugeART or are available commercially.

Compatible 0-5V sensors: up to two supported – any combination of the following:

Pressure sensors:

- AEM: 30-2131-100 or 30-2130-100 (0-100 PSI)
- AEM: 30-2131-150 or 30-2130-150 (0-150 PSI)

Wideband oxygen sensor:

- AEM 30-0310
- Innovate LC2
- PLX SM-AFR
- Zeitronix ZT-3

0-5v sensors:

- Other 0-5v sensors may be used, but the signal will be displayed as a voltage only.

Compatible temperature thermistor type sensors: up to two supported – any combination of the following:

Air temperature sensor:

- AEM: 30-2010 or 30-2014
- Delphi: 25037334
- AC Delco: 213-190

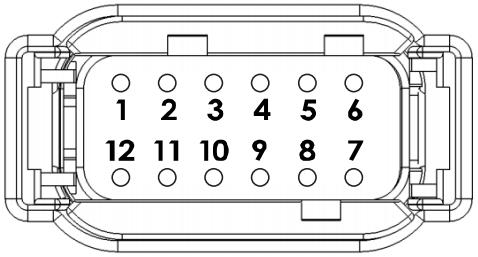
Fluid temperature sensor:

- AEM: 30-2011, 30-2012, or 30-2013
- Delphi: 12160855 or RS10075
- AC Delco: 213-928

Tachometer: digital pulsed ground output signal (such as an ignition coil's negative terminal or an ignition/ECU's tachometer output) to measure engine speed. Do not connect to aftermarket high-output or multi-strike ignition systems, or the unit can be damaged. VR sensors are not compatible with this input. Range: 0-1,500Hz.

Fuel level: fuel level is displayed as a percentage of 0-250 ohms. Because the device does not know the range of your sensor, if your fuel level sensor does the not use that full range (0-125 ohms for example) the gaugeART display device will display your range as 0-50%. However, the bar gauge can be configured to show 0-50, which would then display your complete range on the bar graph. The digital gauge however will still display 0-50%.

Pin Locations



(viewed from wire side – also imprinted on connector)

Pin	Name
1	12V Ignition power (+)
2	Ground
3	CAN High
4	CAN Low
5	Analog Temperature 1
6	Analog Temperature 2
7	0-5v Analog Input 1
8	0-5v Analog Input 2
9	Tachometer Engine Speed Input
10	Fuel Level (0-250 Ohm Fuel Level)
11	Sensor Ground *
12	Sensor +5v Reference *

* Sensor ground and sensor +5v reference can be split and shared between multiple sensors. See more information in following pages.

Damaged caused by improper wiring is not covered by the gaugeART Limited Warranty.

Installing Wires into Connector

Required:

Installation of wires to the connector requires a wire stripper and an open barrel double rolling crimper (see photo to right). Using an improper tool and not producing proper crimp may result in terminal failure. Crimp tools are available online, including from Amazon.com (search “IWISS SN-28B”).

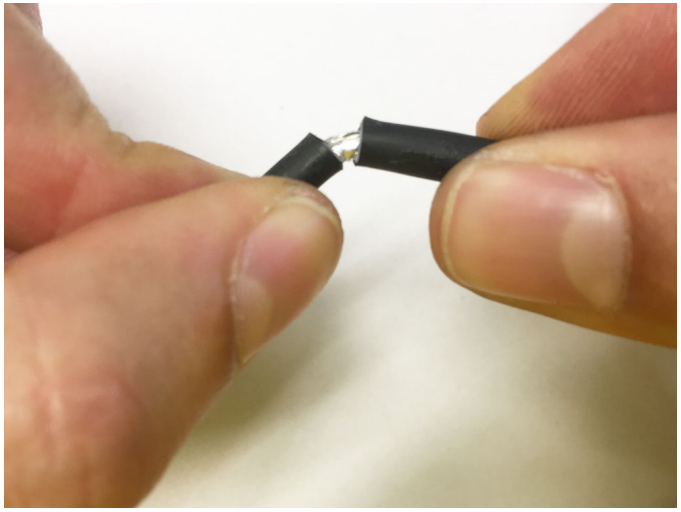
Preparing connector:

The gaugeART Analog to CAN Converter includes a Deutsch 12 position DTM plug connector. Deutsch connectors are popular connectors in the automotive aftermarket. The supplied socket terminals are size 20 and are intended for 22-18 AWG wire. To install terminals into the connector, remove the terminal lock by gently prying out of the connector if it is already installed.

Demonstration video:
https://www.youtube.com/watch?v=jE712DGw8CY

Prepare wire:

1. A 5’ cable of two separated shielded twisted wire pairs is included. This cable is replaced if one of the optional cables is purchased. Skip these steps if an optional cable is purchased, or if you are using this device with another gaugeART product which include a cable that has exposed wires. One pair for power and ground, the other for CAN high and CAN low. To strip off the cable’s black jacket, cut a small slit in to the circumference of the cable’s jacket with a razor 1-2” from end. Do not cut all the way through the jacket. Bend the cable as shown, and the slit will allow the jacket to separate.

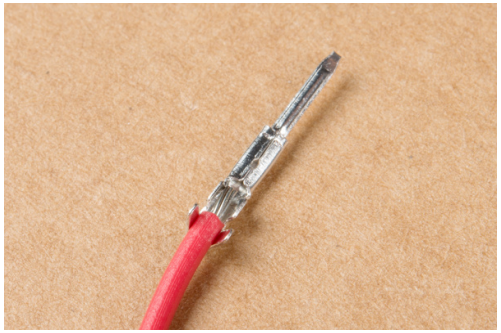


2. The two wire pairs and the drain wire (the single uninsulated stranded wire) will then be exposed. Peel back the aluminum foil exposing the wire pairs. Strip off ¼” of insulation from the end of each wire.

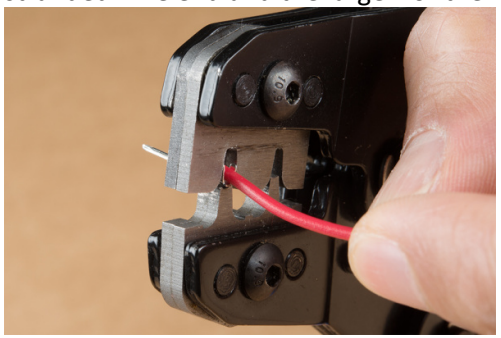
3. Cut supplied 3/16” shrink tube in to two 1” sections. Slip two sections on to end of cable. The shrink tube will be secured in a later step.

Strip & crimp wire:

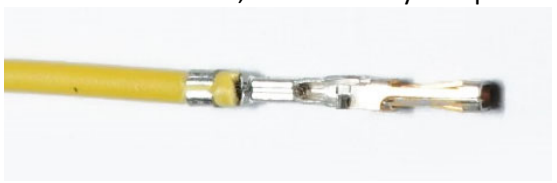
- 22-18 AWG wire is acceptable.
- Strip off 1/8 – 3/16” of wire insulation.
- Place the stranded end of the wire in the first set of tabs, and the wire insulation in the second set of tabs as shown.



- Select the die for the wire size used and install the terminal into the die as shown. The smaller end of the die is used for the stranded wire end and the larger for the insulation end.



- Carefully remove the crimped terminal out of the crimp tool. Observe the crimped tabs. You should see something similar to the crimped terminal below. If necessary, you may need to re-insert the pin back into the die, or use a smaller die, to sufficiently crimp the tabs.



Demonstration video:
https://www.youtube.com/watch?v=wdMnvfcR6pI

Installing terminals into connector:

- With the silicone seal pre-installed into the connector, and the terminal lock removed, push the terminal and wire into the appropriate position.
- The terminal will click in to place once fully inserted.
- Once the terminal is fully inserted, install the terminal lock to lock the terminals in place.

To remove terminal:

- Using a pick, remove the terminal lock.
- Using a pick or terminal removal tool, lift up on the terminal retainer tooth while pulling the wire gently from the rear of the connector.

Connect to gaugeART Display Device

The Analog to CAN Converter is attached to the gaugeART display device (CAN Gauge or Video Gauge Adapter) using the same connector and terminals included with the Analog to CAN Converter.

The cable configuration varies by which gaugeART products you are connecting to. gaugeART will include these optional cables when purchased together. If you purchased the Analog to CAN Converter separately, these optional cables may be purchased separately.

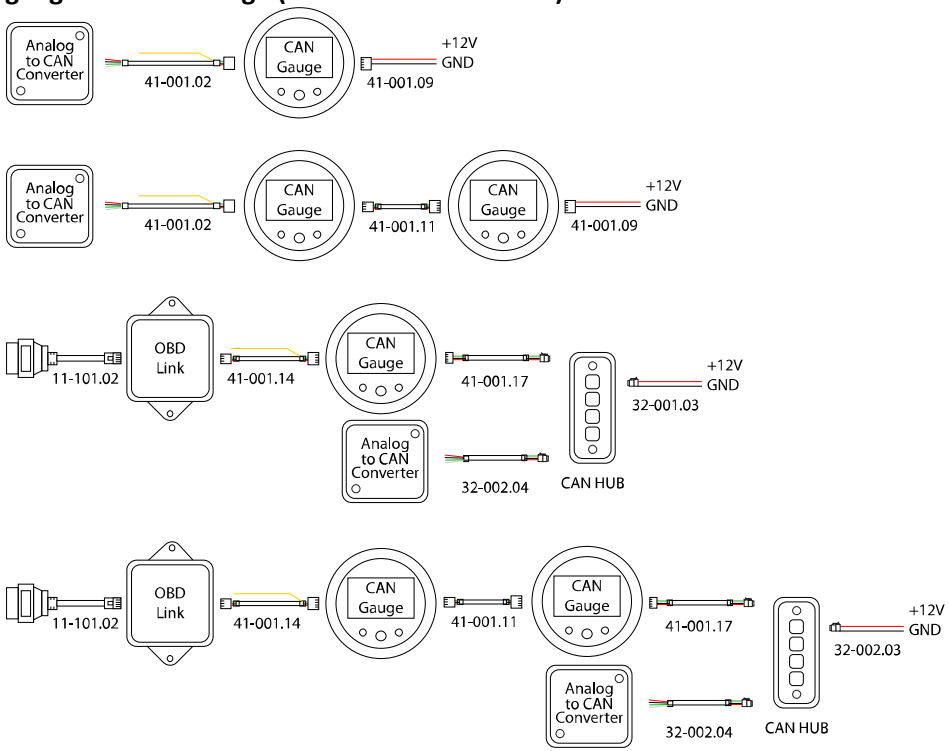
The gaugeART display device is connected to the Analog to CAN Converter using these four wires:

Color	PIN	Name
Red	1	12V Ignition power (+)
Black	2	Ground
White	3	CAN High
Green	4	CAN Low

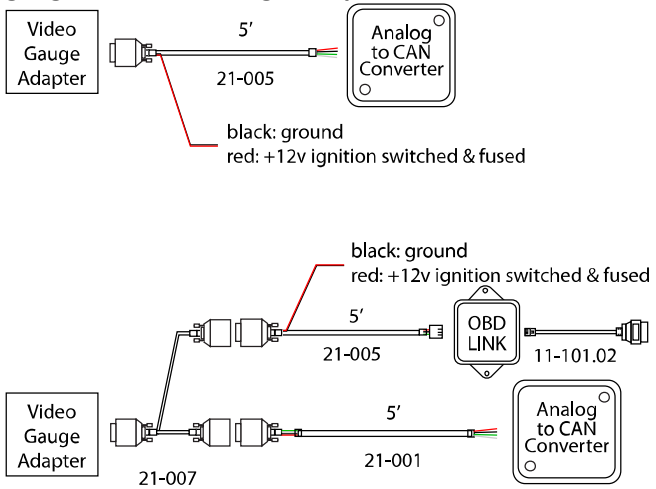
- Using the same technique described in the last section, connect the wires to the Analog to CAN Converter connector.
- Terminating resistor: install the terminating jumper in the CAN gauge if not already pre-installed.

Cable Configurations

gaugeART CAN Gauge (52mm & Panel Mount):



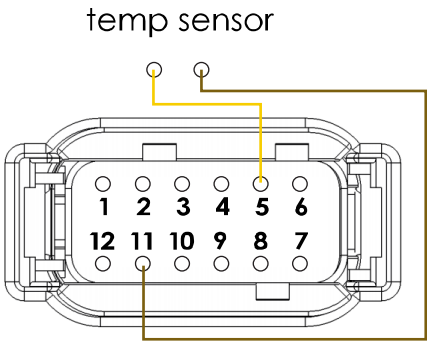
gaugeART Video Gauge Adapter:



Connecting Sensors

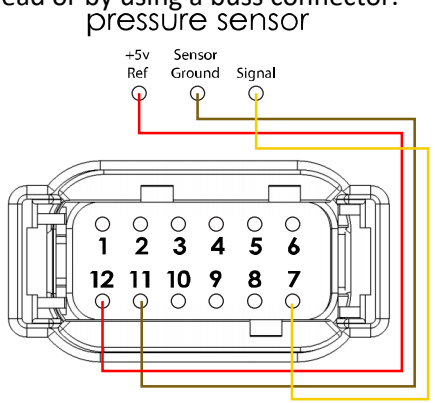
Temperature sensors:

- Wire as shown in diagram below. Temperature sensors do not have polarity (position does not matter).
- Signal output from sensor can be wired to pin 5 or 6.
- Sensor ground will need to be split if using more than one sensor. This can be accomplished by installing one wire into the terminal location 11 and then soldering multiple wires to that lead or by using a buss connector.



Pressure sensors:

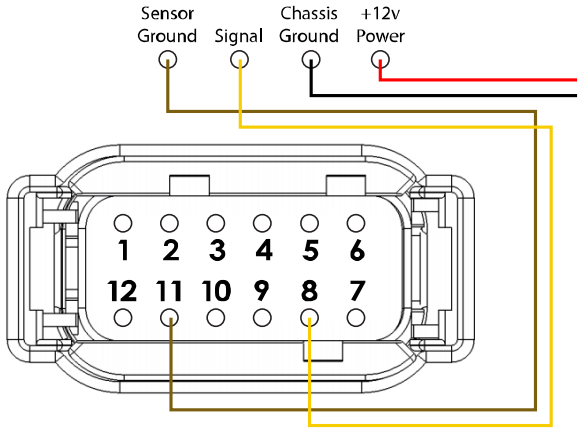
- Wire as shown in diagram below.
- Signal output from sensor can be wired to pin 7 or 8.
- +5v reference and sensor ground will need to be split if using more than one sensor. This can be accomplished by installing one wire into the terminal location 11 or 12 and then soldering multiple wires to that lead or by using a buss connector.



Wideband oxygen sensor:

- Wire as shown in diagram below.
- Signal output from sensor can be wired to pin 7 or 8.
- +12V source should be separately fused from gaugeART devices (see instructions included with wideband for proper wiring).
- Sensor ground will need to be split if using more than one sensor. This can be accomplished by installing one wire into the terminal location 11 and then soldering multiple wires to that lead or by using a buss connector.

wideband sensor



Tachometer:

- Connect pin 9 to a digital pulsed ground output signal (such as an ignition coil's negative terminal or an ignition/ECU's tachometer output) to measure engine speed.
- Do not connect to aftermarket high-output or multi-strike ignition systems, or the unit can be damaged. VR sensors are not compatible with this input.

Fuel level sensor:

- Connect pin 10 to a fuel level sensor's 0-255 Ohm output.
- Fuel level is displayed as a percentage of 0-250 ohms. Because the device does not know the range of your sensor, if your fuel level sensor does the not use that full range (0-125 ohms for example) the gaugeART display device will display your range as 0-50%. However, the bar gauge can be configured to show 0-50, which would then display your complete range on the bar graph. The digital gauge however will still display 0-50%.