Carbon Monoxide (CO) Detectors

SAE-1101/1102/1151/1152

Installation Guide

Mounting

SAE-1101/1102 Space Mount

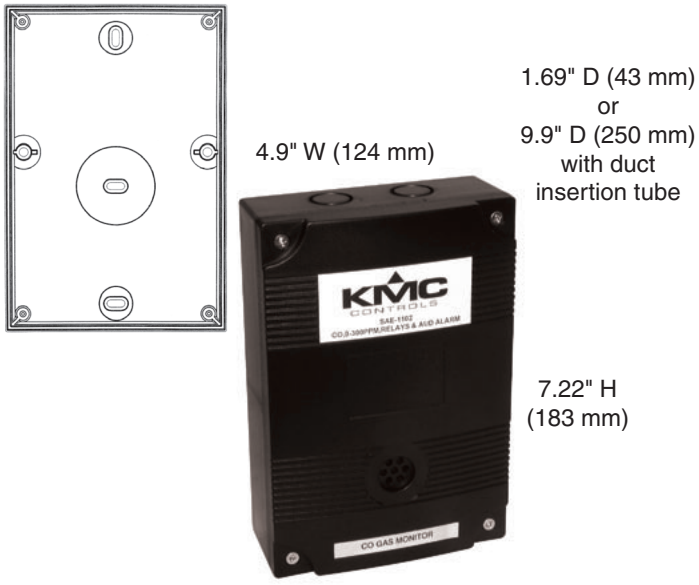
Install the unit at least five feet above the finished floor of the area to be controlled. Do not install near doors, windows, supply air diffusers of other known air disturbances. Avoid areas prone to vibration or rapid temperature change.

1. Remove the cover by loosening and removing the four screws.
2. Remove a knockout from the top or bottom for wiring.
3. Attach the universal backplate directly to a standard electrical box using two screws.
4. After wiring, configuring, and testing the unit, reinstall the cover.

SAE-1151/1152 Duct Mount

Choose a mounting location in a straight section of a return air duct. Mount at least 5 feet (or 7.5 duct diameters) from corners and other items that may cause disturbances in the air flow. Avoid areas prone to vibration or rapid temperature change.

1. Cut a 1⅛-inch hole in the duct for the air sampling tube.
2. Remove the cover by loosening and removing the four screws.
3. Remove a knockout from the top or bottom for wiring.
4 . Insert the sampling tube into the duct. Use the foam plug (included) to prevent air from entering the enclosure, causing false readings.
5. Centering the sensor over the hole in the ductwork, attach the unit to the ductwork by threading four screws through the self-sealing rubber gaskets on the backplate of the housing.
6. After wiring, configuring, and testing the unit, reinstall the cover.



NOTE: These instructions apply to units manufactured after the corresponding dates shown in the Models list. For older units (with a row of LEDs on the left side of the board), see the *original* version of this installation guide available on www.kmccontrols.com.

Models

SAE-1101	Space CO sensor (after 5/2007)
SAE-1102	Space CO sensor with two relays and audible alarm (after 2/2007)
SAE-1151	Duct CO sensor (after 12/2006)
SAE-1152	Duct CO sensor with two relays and audible alarm (after 11/2004)

Accessories

IEI-1001	LCD Display Module (required for configuration)
XEE-6111-040	Transformer, 120-to-24 VAC, 40 VA, **single**-hub
XEE-6112-040	Transformer, 120-to-24 VAC, 40 VA, **dual**-hub

Wiring

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Use 22 AWG shielded wiring for all connections. Do not locate device wires in the same conduit with wiring used to supply inductive loads.

1. Connect the positive DC voltage, or the hot side of the AC voltage, to the terminal marked **POWER** (but **do not apply power until all wiring is completed**).
2. Connect the power supply common to the terminal marked **COM**. The device is reverse voltage protected and will not operate if connected backwards.

NOTE: The detectors have a half-wave power supply with the common the same as the output signal common. If several units are connected to one power supply, output signals share the same signal common. However, KMC recommends using a separate transformer for each device.

⚠ CAUTION

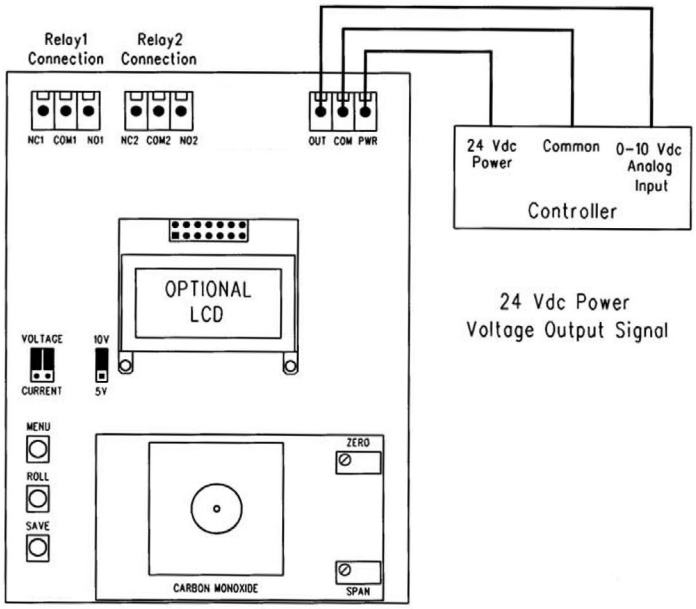
Use caution when grounding the secondary of an AC transformer, or when wiring multiple devices, to ensure that the circuit ground point is the same on all devices and the controller. See Application Note AN0604D "Tips for connecting-volt power" available from the KMC Controls web site or in the SP-022 Digital Designer Guide.

3. Select the desired analog signal output jumper for either Current (4–20 mA) or Voltage. A second jumper selects either 0–5 VDC output or 0–10 VDC.

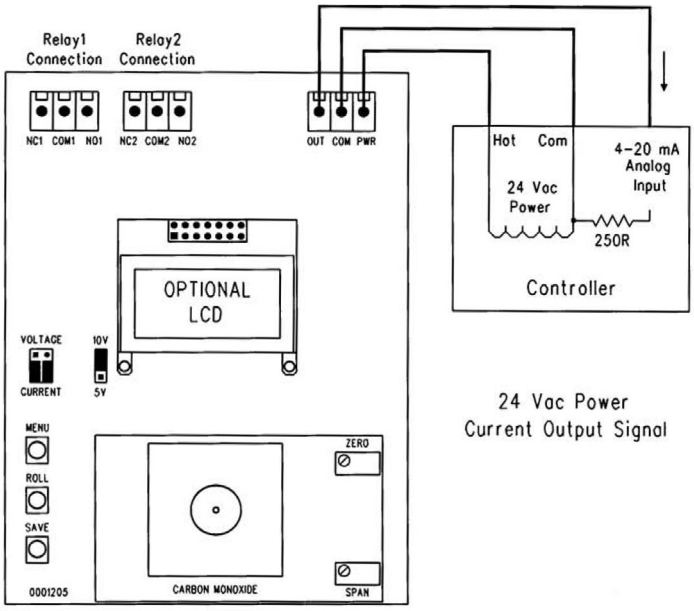
⚠ CAUTION

The 4-20 mA current output signal operates in the active mode and does not require a loop power supply. The signal current is generated by the SAE-1100 series detector and must not be connected to a powered input or device damage will result.

4. Set the input jumpers/pull-up resistors on the KMDigital or BACnet controller for the desired active voltage or current according to the controller's instructions.
5. Connect the detector's **OUT** terminal to the controller's input (referenced to the COM terminal) according to the illustration below.



24 Vdc Power
Voltage Output Signal



24 Vac Power
Current Output Signal

NOTE: The sets of form "C" relays feature Normally Open (NO), Normally Closed (NC), and Relay Common (R.COM) terminals. The relay output is completely isolated and has both NO and NC signals. The R.COM terminal is **NOT** connected to the signal or power supply COMMON terminal.

NOTE: See also Application Note AN0504L "Connecting inputs and outputs to KMC controllers" available from the KMC Controls web site or in the SP-022 Digital Designer Guide.

Set-Up

Warm-Up

1. Verify that the detector is properly wired and all connections are tight.
2. Apply power.

If an LCD display option is installed, it will indicate the software version number and then begin a warm-up period. **During the warm-up, the output is fixed at 4 mA or 0 VDC and the relays are off.** After the warm-up period, the sensor will begin reading the CO level, output the correct analog signal, and display the value on the LCD.

Operation

In normal operation, the sensor measures the CO level in the surrounding air and displays this value on the LCD (IEI-1001) if present. The measurement range is 0 to 300 ppm. The analog output is proportional to the measured concentration of CO. The signal type must be selected during installation via the jumpers. One jumper selects either 4–20 mA or voltage output, and if voltage is selected, the other jumper determines the full scale value as either 5 or 10 VDC.

Two optional relays (in SAE-1102/1152 models) are used to indicate alarm conditions. The trip point, hysteresis, and delay time of each relay can be programmed. For example, the first relay defaults to 50 ppm trip point, 10 ppm hysteresis (deadband), and 2 minute delay time. Values can be changed via the Normal (Configuration) menu (when an IEI-1001 is installed). In this example, a timer is started when the CO level exceeds 50 ppm (the trip level). If the level drops below 50 ppm before 2 minutes (the delay time) has expired then the relay is not activated. If the CO level exceeds 50 ppm for 2 minutes, the relay is activated. The relay will remain activated until the CO level drops below 40 ppm (hysteresis/deadband trip level). This relay can be used to signal a "low alarm." The second relay operates in the same manner and has independently programmable trip point, hysteresis, and delay time. This relay can be used to signal a "high alarm."

The optional buzzer (in SAE-1102/1152 models) trip point and delay time can be programmed similarly to the relays to indicate an alarm condition. When the trip point is exceeded for a time longer than the delay time, then the buzzer will sound until the CO level falls below the trip point. The buzzer can be disabled in the Normal Menu.

Menu Configuration/Testing/Calibration

NOTE: These instructions apply to units manufactured after the corresponding dates shown in the Models list. For older units (with a row of LEDs on the left side of the board), see the *original* version of this installation guide available on www.kmccontrols.com.

Navigating Menus (LCD Display Required)

NOTE: The IEI-1001 LCD display module can be temporarily installed for configuration and then moved among different **compatible** detectors. Otherwise, the default configuration must be accepted.

The menus may be accessed any time after the initial warm-up period. The menus are used for setup, testing and calibration and are controlled by using the three buttons on the circuit board labeled MENU, ROLL, and SAVE.

Press and release the MENU button to enter the configuration menu. Then press the MENU button to step through the selections.

Use the ROLL button to make changes.

The SAVE button saves the current setting to memory, exits the current menu (with the exceptions below), and returns to normal operation.

There are three sub-menus available from the Main Menu as shown below. Press and release the MENU button to enter the Main Menu.

NOTE: The SAE-1100/1150 series detectors do not have the Modbus option that displays on the menu.

1. **NORMAL (CONFIGURATION) MENU:** Press the SAVE button here to enter.
   Press the MENU button.
2. **TEST MENU:** Press the SAVE button here to enter.
   Press the MENU button.
3. **CALIBRATION MENU:** Press the SAVE button here to enter.
   Press the MENU button. Returns to normal operation.

Normal (Configuration) Menu

Press and release the MENU button to enter the configuration menu:

1. **BUZZER TRIP=150:** The factory default for the buzzer trip level is 150 ppm. This can be changed by using the ROLL button from 100 to 400 ppm in increments of 10 ppm. Use the SAVE button to save any change to memory.

   Press the MENU button.

2. **BUZZER DEL=5MIN:** The factory default is 5 minutes and this can be changed with the ROLL button to 0, 1, 2, 3, 4 or 5 minutes. Use the SAVE button to save any changes to memory.

   Press the MENU button.

3. **BUZZER ENABLE:** The factory default is ENABLE. It can be changed to DISABLE with the ROLL button. Use SAVE to save any changes to memory. If this is set to DISABLE the buzzer will never sound.

   Press the MENU button.

4. **RELAY1 TRIP=50:** The factory default Relay1 trip level is 50 ppm. Use the ROLL button to change it to 25 or to 40–350 ppm in increments of 10 ppm. The SAVE button saves any changes.

   Press the MENU button.

5. **RELAY1 HYST=10:** The factory default for Relay1 hysteresis (deadband) is 10 ppm. Change using the ROLL button to 10, 15, 25, 50, or 75 ppm. Save using the SAVE button.

NOTE: RELAY1 HYST is always less than RELAY1 TRIP and may not display all options.

   Press the MENU button.

6. **RELAY1 DEL=2MIN:** The factory default is 2 minutes and this can be changed with the ROLL button to 0, 1, 2, 3, 4, or 5 minutes. Save using the SAVE button.

   Press the MENU button.

7. **RELAY2 TRIP=150:** The factory default Relay2 trip level is 150 ppm. Use the ROLL button to change it to 100–400 ppm in increments of 10 ppm. The SAVE button saves any changes.

   Press the MENU button.

8. **RELAY2 HYST=25:** The factory default for Relay2 hysteresis (deadband) is 25 ppm. Change using the ROLL button to 10, 15, 25, 50, or 75 ppm. Save using the SAVE button.

   Press the MENU button.

9. **RELAY2 DEL=2MIN:** The factory default is 2 minutes and this can be changed with the ROLL button to 0, 1, 2, 3, 4, or 5 minutes. Save using the SAVE button.

   Press the MENU button. Returns to normal operation.

Test Menu

1. **OUTPUT TEST 4mA/0V:** This item tests the analog output (current or voltage depending on the jumper position). Use the ROLL button to change the output signal to 4, 8, 12, 16, or 20 mA or 0, 1, 2, 3, 4, or 5 VDC.

NOTE: If 10 VDC output is selected by jumpers, the output voltage will be double the display.

   Press the MENU button.

2. **BUZZER TEST OFF:** If installed, use the ROLL button to turn the buzzer ON or OFF. Use SAVE to exit the menu.

   Press the MENU button.

3. **RELAY1 TEST OFF:** If installed, use the ROLL button to turn the relay ON or OFF. Use SAVE to exit the menu.

   Press the MENU button.

4. **RELAY2 TEST OFF:** If installed, use the ROLL button to turn the relay ON or OFF. Use SAVE to exit the menu.

   Press the MENU button. Returns to normal operation.

Calibration Menu

1. **SENSOR (ECON300):** The sensor type and range are indicated on the LCD. Do not change this setting.

   Press the MENU button.

2a. **CALIBRAT 20mA x:** If set for current output, this item allows calibration of the 20 mA output signal. Connect a meter to the output and use the ROLL button to set the output to exactly 20.0 mA. Use the SAVE button to save any change.

   Press the MENU button.

2b. **CALIBRAT 5V x:** If set for current output, this item allows calibration of the 5 VDC output signal. Be sure the 5VDC output jumper positions are selected, connect a meter to the output, and use the ROLL button to set the output to exactly 5.0 VDC. Save using the SAVE button.

   Press the MENU button.

3. **RESTORE DEFAULTS:** Press the SAVE button here to restore all factory defaults to their original settings as when shipped from the factory.

   Press the MENU button. Returns to normal operation.

Calibration

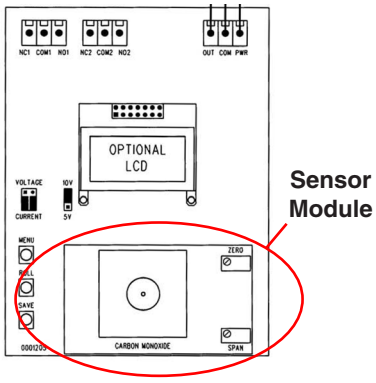
Output Calibration

If necessary, the current and voltage outputs can be calibrated as described previously in the Menu Configuration section by using the buttons and a meter connected to the output. See the Set-Up section.

CO Calibration

The detector features a precalibrated, replaceable sensor module. The sensor module can be unplugged and a new calibrated module installed in its place. To swap sensor modules:

1. Disconnect the device power.
2. Remove the screws and cover.
3. Unplug the old sensor module.
4. Install the new module, ensuring the module's connector is properly aligned.
5. Reinstall the cover and screws.
6. Reconnect power.



Making adjustments or applying gas to the transmitter is unnecessary using the sensor swap method.

Calibration of sensor modules should be left to experienced professionals. Calibration with gas requires an LCD display, a bottle of gas (250 ppm CO in air), a tank pressure regulator with flow restrictor, and the necessary tubing with a cap to cover the sensor. KMC Controls recommends returning sensor modules to the factory for calibration. Having a spare, compatible SAE-1100 series detector makes the swap easy, and the spare module can be conveniently returned to the factory for recalibration.

NOTE: Newer style boards (without LEDs) are incompatible with older style sensor modules and vice versa. See Models section.

Maintenance

Careful installation will also ensure long-term reliability and performance. Remove dust as necessary from holes. Clean with a soft, damp cloth and mild soap.

Specifications

Range 0–300 ppm

Accuracy and Operation Conditions ±3% of reading @ 32 to 122° F (0 to 50° C) or ±5% of reading @ –4 to 122° F (–20 to 50° C), 15 to 95% RH, non-condensing

Response Time < 35 seconds for 90% step change

Warm-up Time 200 seconds

Pressure Coefficient 0.020 ±0.008% signal/mbar

Typical Coverage Area 7500 ft^2 (700 m^2)

Power Supply 15–30 VAC/VDC (non-isolated half-wave rectified)

Consumption 80 mA max. @ 24 VDC with all options on, 150 mA average @ 24 VAC

Protection Circuitry Reverse voltage protected and output limited, transient protection

Wiring Connections Screw terminals (14–22 AWG)

Output Signal 4–20 mA active (sourcing), 0–5 VDC, or 0–10 VDC, jumper selectable

Output Drive Capability 500 ohm max. for current output, 10K ohm min. for voltage output

Relay Outputs (Optional)

- Configuration: Two form "C" contacts (NO and NC), 5 A @ 250 VAC, 5 A @ 30 VDC, power factor = 1
- Relay Trip Point: Relay 1: Programmable 25 or 40–350 ppm in 10 ppm increments; Relay 2: Programmable 100–400 ppm in 10 ppm increments
- Relay Hysteresis/Deadband: Programmable 10, 15, 25, 50, or 75 ppm

Weight 1.05 lbs. (0.47 kg)

NOTE: For additional specifications, see the SAE-1100 Series Data Sheet.

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