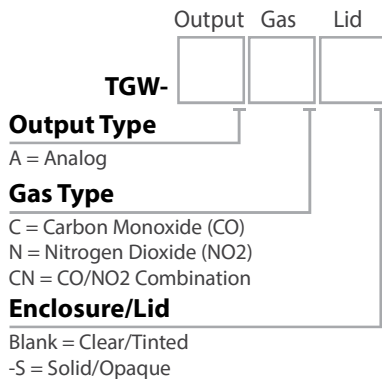


INSTALLATION INSTRUCTIONS

TG SERIES

Analog CO/NO2 Sensor

PRODUCT IDENTIFICATION



WARNING

- Only qualified trade installers should install, program, maintain and test system incorporated therein. Installer is responsible for compliance of all applicable codes.
- Read, understand, and follow instructions thoroughly.
- The unit and associated systems require routine test and maintenance as prescribed in the TG Series User's Manual section 'Periodic Test and Maintenance'
- Do not install in hazardous or classified locations.
- De-energize power supply prior to installation.
- CO/NO2 sensors should not be used as a substitute for proper installation, use, or maintenance of CO/NO2 emitting equipment.
- This CO/NO2 sensor is designed to detect conditions that could result in acute effects of carbon monoxide or nitrogen dioxide exposure. It will not fully safeguard individuals with specific medical conditions. If in doubt, consult a medical practitioner.
- Conduit is prone to condensation if it passes from one temperature zone to another, such as from indoors to outdoors or from one part of a building to another. This condensation may actually drip into the sensor if mounted below, causing damage and/or poor readings.

In order to prevent condensation and water egress, seal both the top and bottom of the conduit with a suitable expanding foam product (such as Polywater™ Zipseal™ ZIP-50KIT1) to prevent warm air from entering cold conduit.

Alternatively, fiberglass insulation may be inserted in the conduit between the cold and warm sections using a rigid wire or other method if both ends cannot be sealed. Sealing is the preferred method.

- Conduit air flow entering sensor may prevent sensor from reading ambient air properly, resulting in under measurement of gasses. Plug sensor conduit in all installations with a foam plug or seal as noted above in order to prevent airflow from the conduit.

LIMITATION OF LIABILITY

Senva's liability, whether in contract, in tort, under any warranty, in negligence or otherwise shall not exceed the amount of the purchase price paid by the purchaser for the product. Under no circumstances shall Senva be liable for special or consequential damages.

FEATURES

Visual/Audible Indicators - Standard LCD, LED indicators (green, yellow, red), audible alarm.

Installation Flexibility - Dual outputs available that can be programmed for CO, NO2, and internal enclosure temperature signals. Programmable fan and alarm relays for occupant warnings.

Daisy Chain Wiring - Supports parallel connection of multiple sensor voltage outputs.

Dual Gas Monitoring - Measure CO, NO2 or both in one compact product. Sensor can be added or replaced in the field for easy upgrade.

Easy Quick Start - TG Series has 3 Quick Start configurations that modify fan and alarm relay settings to common ranges.

Faster Commissioning - Test Mode Quick Start configuration lowers relay and alarm thresholds for faster field commissioning.

Stand Alone Controller - Wire one or more devices for direct control of an exhaust fan or VFD without costly controller.

INSTALLATION

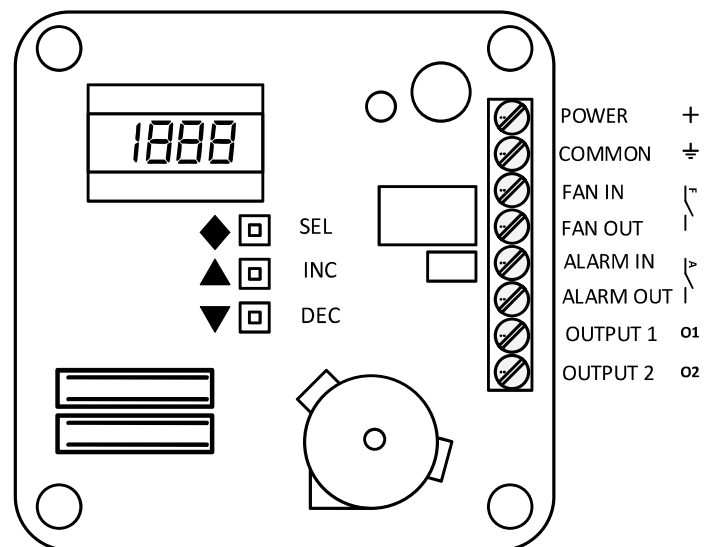
****Prior to installation please be sure to review the Warning section at the beginning of this installation manual****

1. Locate sensor near traffic areas, away from sources of ventilation or drafts. One sensor per 5000-7500 square feet is normally required.

2. Mount the sensor directly to conduit or fasten the unit securely to the wall with the appropriate fasteners.

Recommended mounting height is 5 feet. Check with local and state building codes to ensure mounting height is in compliance.

3. Wire the sensor as required for your application:



Senva recommends 14-24 AWG shielded twisted pair. For runs over 200 feet use a minimum of 22 AWG.

4. Apply power. Sensor may require up to 2 minutes of warmup time prior to displaying valid gas measurements.

FACTORY DEFAULT SETTINGS

Analog Outputs

Output 1: 0-10V
Output 2: 0-10V

Output Channels

TGW-AC: CO = Output 1
TGW-AN: NO2 = Output 1
TGW-ACN: CO = Output 1
NO2 = Output 2

Output Scaling

CO: 0-200ppm
NO2: 0-10ppm

Fan Relay Setpoint

CO: 25ppm
NO2: 1ppm

Alarm Relay Setpoint

CO: 100ppm
NO2: 3ppm

To change default settings, refer to the User's Guide available online at www.senvainc.com/TGUG

SUPPORTING DOCUMENTS

TG Series User's Guide

www.senvainc.com/TGUG

- Periodic Test and Maintenance
- Device Configuration
- Diagnostic Codes



OPERATION

The following section details daisy chain wiring support, LCD function, LED function, fan/alarm relay functions, and the sensor element lifetime clock.

Daisy Chain Wiring

Both voltage outputs are internally equipped to permit parallel connection of multiple sensor voltage outputs. Resulting voltage will be the greater of all connected sensors.

LCD Function

The LCD rotates between readings for each gas type populated on the board. Toggling can be modified using the TG Series User's Guide⁽¹⁾.

LED Function

The LED indicators track the fan and alarm relay thresholds. LEDs will change state if either gas reaches the setpoint.

Green	Normal readings below the fan setpoint
Yellow	Warning level above the fan setpoint and below the alarm setpoint
Red	Alarm level above the alarm setpoint

Fan/Alarm Relay

If a device has both CO and NO2 gas sensors, then the relay(s) will activate if either gas reaches the corresponding setpoint.

Status	LED	Fan Relay	Alarm Relay	Buzzer
Off	-	Closed	Closed	Silent
Below Fan Setpoint	Green	Open	Open	Silent
Above Fan Setpoint	Yellow	Closed	Open	Silent
Above Alarm Setpoint	Red	Closed	Closed	Silent
Above Alarm Setpoint for 30 minutes	Red	Closed	Closed	On

The duration of the fan/alarm relays and alarm buzzer operation are as follows:

Relay Activation Timing	
Fan/Alarm Relays	Value
Minimum ON time	60 seconds
Minimum OFF time	60 seconds
Maximum OFF time	0 (inactive)
Audible Alarm Activation Timing	
Buzzer	Value
Delay	30 minutes
Minimum ON time	0 seconds
Minimum OFF time	0 seconds

To modify these values, refer to the TG Series User's Guide⁽¹⁾.

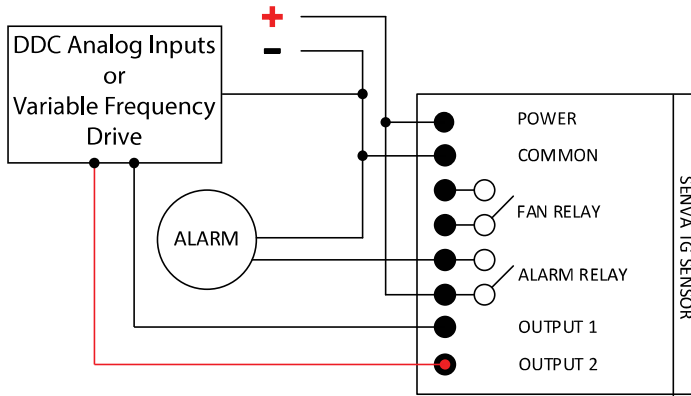
Sensor Element Lifetime Clock

With 30 days remaining on the element lifecycle, the green LED will blink once every 10 seconds. The actual sensor remaining life can be viewed in the LCD menu. Contact Senva for replacement elements.

(1) TG Series User's Guide available at www.senvainc.com/TGUG

ONE SENSOR PER CONTROL LOOP

Diagram shows a standard connection between a single TGW, alarm, and controller or variable frequency drive:



DAISY CHAIN OF OUTPUTS

Diagram shows connection between multiple TG sensors wired in parallel to a controller or variable frequency drive using analog outputs.

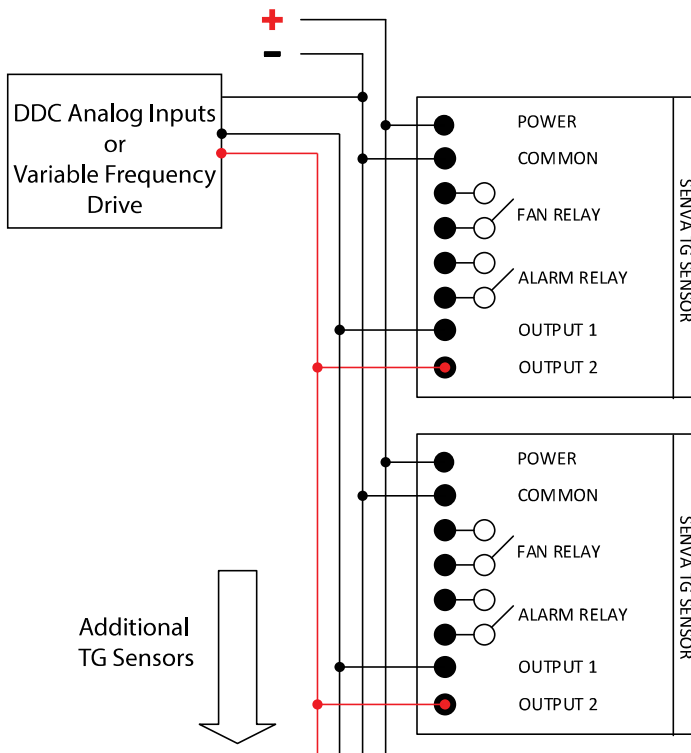
Analog Outputs

The analog outputs (0-5/10V) must be uniform on each TG sensor in the daisy chain. The 4-20mA output mode is not compatible with daisy chain wiring.

Output Scaling

Senva recommends using uniform output scaling for each TG sensor connected to the same daisy chain.

Note: There is no limit to the number of sensors that can be daisy chained, but wire resistance on long runs should be taken into account.

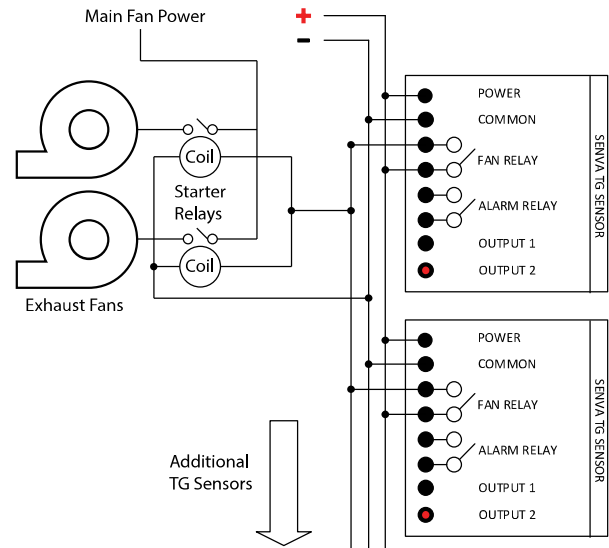


DAISY CHAIN OF FAN RELAYS

Diagram shows connection between one or more devices wired to an exhaust fan using the fan setpoint relay(s). This function can be performed by a single TG sensor or a sequence of multiple TG sensors wired in parallel.

If wiring multiple sensors, ensure that the fan relay setpoints are uniformly set. The fan relay will activate if any sensor reaches the warning setpoint.

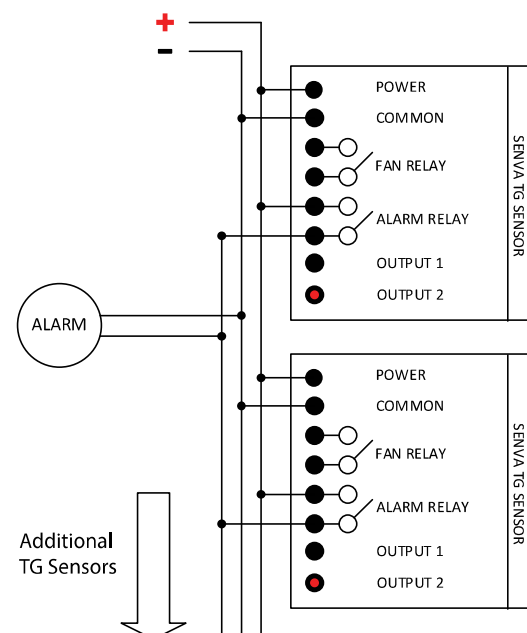
Device also features a maximum off timer for the fan relay, to ensure a minimum number of air changes within the monitored space. See TG Series User's Guide to enable this feature.



DAISY CHAIN OF ALARM RELAYS

Diagram shows connection between one or more devices wired to an alarm using the alarm relay(s) in parallel.

If wiring in a daisy chain, ensure alarm relay setpoints are uniformly set. The alarm will activate if any sensor reaches the alarm setpoint.

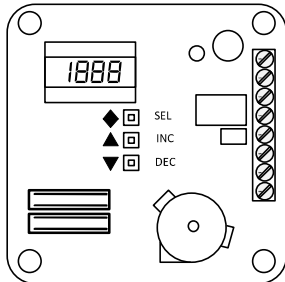


RELAY/OUTPUT SETUP

This section will focus only on the following items:

- 'Quick Start' options for changing fan/alarm settings
- Altering output type for Outputs 1 and 2.

Setup will timeout and return to normal operation after 60 seconds of no activity, so it is recommended to fully read through this section before proceeding. *(This is an abbreviated section of the TG Series User's Guide. Do not attempt to change any other parameters without utilizing the full TG Series User's Guide found online at www.senvainc.com/TGUG)*



LCD Menu Buttons

- ◆ 'Select' button
- ▲ 'Increase/Up' button
- ▼ 'Decrease/Down' button

Quick Start

Quick Start allows the user to quickly select from three preconfigured parameters for the fan and alarm settings for CO and NO₂. There is also a 'test mode' for commissioning.

Press the select button ◆ until *QStArT*, scrolls across the LCD.

Press the select button ◆ again and LCD will read *A*. This corresponds to the default fan/alarm settings. From the table below, choose which quick start parameter best fits your application using ▲ and ▼. Press the select button ◆ to activate the Quick Start configuration and proceed to the 'Output Type' section below.

LCD	CO Fan	CO Alarm	NO ₂ Fan	NO ₂ Alarm	Buzzer Delay
<i>A</i>	25ppm	100ppm	1ppm	3ppm	30 minutes
<i>B</i>	15ppm	50ppm	0.7ppm	2ppm	30 minutes
<i>C</i>	35ppm	100ppm	1ppm	5ppm	30 minutes
<i>ESL</i>	5ppm	10ppm	0.5ppm	1ppm	2 minutes
<i>ESC</i>	Exits back to main User Menu screen				

Output Type

After activating Quick Start configuration, the LCD will display *10V* (the default 0-10V output scale for Output 1 and Output 2). If required, choose an alternate output scale using ▲ and ▼. Press the select button ◆ with your desired output type displayed.

LCD	Output Type (Output 1 & Output 2)
<i>10V</i>	0-10V Output
<i>1.5</i>	1-5V Output
<i>420</i>	4-20mA Output
<i>0.5</i>	0-5V Output

After selecting the output type, the LCD will return back to the Quick Start selection. Press ▼ button to scroll to *ESC* and press the select button ◆. Display will now show *QStArT*. Again, press ▼ button to scroll to *ESC* and press the select button ◆, or allow the device to timeout (approximately 60 seconds) to return to normal operation.

SPECIFICATIONS

Power supply	15-30VDC/24VAC ⁽¹⁾ , 4W max, 120mA max.	
Analog Outputs	2 programmable outputs	0-10V (default), 0-5V, 1-5V and 4-20mA (menu selectable)
	CO output scaling	0-200ppm (default), ranges up to 1000ppm (menu selectable)
	NO2 output scaling	0-10ppm (default), ranges up to 20ppm (menu selectable)
	Temperature output scaling	-20 to 85°C
Fan Relay	Fan relay characteristics	N.C. 10A@125VAC, 5A@30VDC
	CO fan relay setpoint	25ppm (default), 0-1000ppm (menu selectable)
	NO2 fan relay setpoint	1ppm (default), 0-20ppm (menu selectable)
Alarm Relay	Alarm relay characteristics	N.C. 1A@30VDC
	CO alarm relay setpoint	100ppm (default), 0-1000ppm (menu selectable)
	NO2 alarm relay setpoint	3ppm (default), 0-20ppm (menu selectable)
Display	3-1/2 digit LCD	Indicates CO ppm, NO2 ppm, Temp (menu selectable)
LED's	Green, Yellow, Red	Green = Normal, Yellow = Relay, Red = Alarm
Audible exposure alarm	85dB Piezo transducer	30 minutes above alarm setpoint per UL2034 (menu selectable)
CO Sensor Performance	Type	Electrochemical
	Accuracy	+/-5% of full scale ⁽²⁾ @ 20°C
	Reproducibility	<+/-2% of reading
	Response time (T90)	<30 seconds
	Certifications	UL2034 Recognized Component
	Long term stability	<+/-5% per year
	Life expectancy	>5 years
	Coverage area	5000-7500 square feet
NO2 Sensor Performance	Type	Electrochemical
	Accuracy	+/-5% of full scale ⁽³⁾ @ 20°C
	Reproducibility	+/-2% (same day)
	Response time (T90)	<25 seconds
	Long term stability	<2% per month
	Life expectancy	>5 years
	Coverage area	5000-7500 square feet
Operating Environment	Temperature, continuous	-20 to 40°C
	Temperature, intermittent	-30 to 55°C
	Humidity	15-95% continuous, 0-95% intermittent
Enclosure	Material	ABS/Polycarbonate
	Dimensions	4.0"h x 4.4"w x 2.1"d
	Conduit Opening	Tapped 1/2" NPT

(1) One side of transformer secondary is connected to signal common. Dedicated transformer is recommended.

(2) Carbon Monoxide full scale is 200ppm.

(3) Nitrogen Dioxide full scale is 20ppm.

TROUBLESHOOTING

Symptom	Solution
No output	Check wiring. Ensure power supply meets requirements.
CO reading error	Verify control panel software is configured for correct output scaling.
	Sensor contaminated or at end of 5-year life. Replace sensor.
NO2 reading error	Verify control panel software is configured for correct output scaling.
	Sensor contaminated or at end of 5-year life. Replace sensor.
Relay Function	Verify setpoint. Verify test gas concentration. Cover sensor to prevent drafts and dilution during test.