

# INSTALLATION INSTRUCTIONS

## TG SERIES

### Analog CO/NO2 Sensor



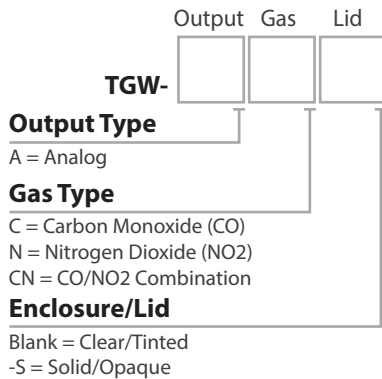
#### IMPORTANT WARNINGS

- Only qualified trade installers should install this product
- This product is not intended for life-safety applications
- Do not install in hazardous or classified locations
- The installer is responsible for all applicable codes
- De-energize power supply prior to installation or service

#### PRODUCT APPLICATION LIMITATION:

Senva products are not designed for life or safety applications. Senva products are not intended for use in critical applications such as nuclear facilities, human implantable device or life support. Senva is not liable, in whole or in part, for any claims or damages arising from such uses.

#### PRODUCT IDENTIFICATION



#### 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.

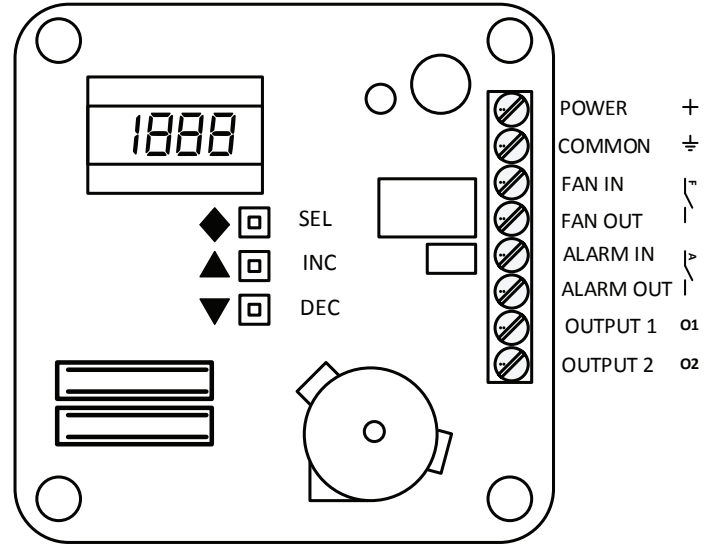
#### INSTALLATION

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](http://www.senvainc.com/TGUG)

#### SUPPORTING DOCUMENTS

##### TG Series User's Guide

[www.senvainc.com/TGUG](http://www.senvainc.com/TGUG)

- 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<sup>(1)</sup>.

### 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<sup>(1)</sup>.

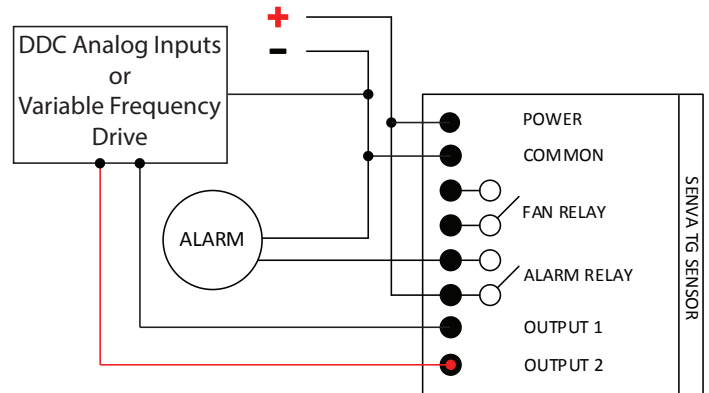
### Sensor Element Lifetime Clock

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](http://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.

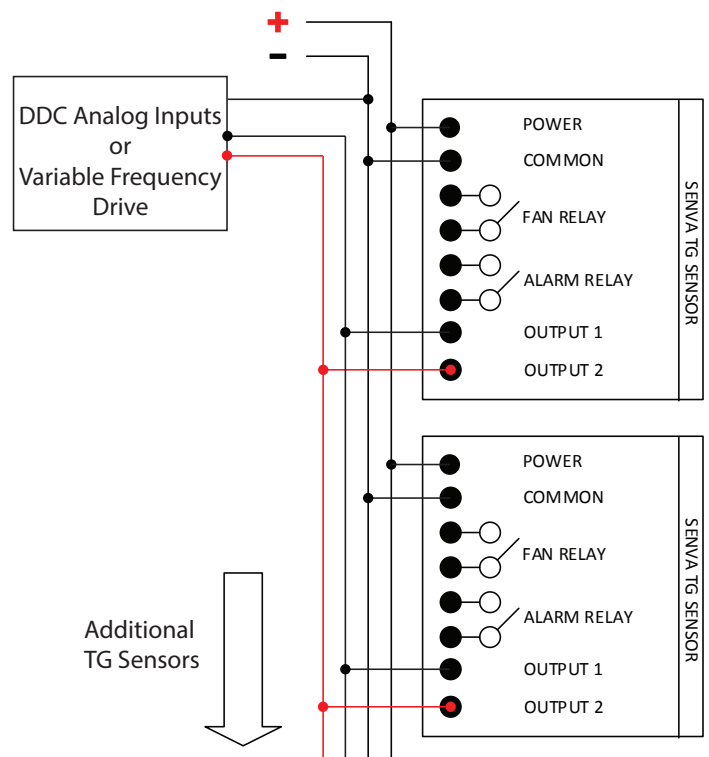
### Analog Outputs

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.

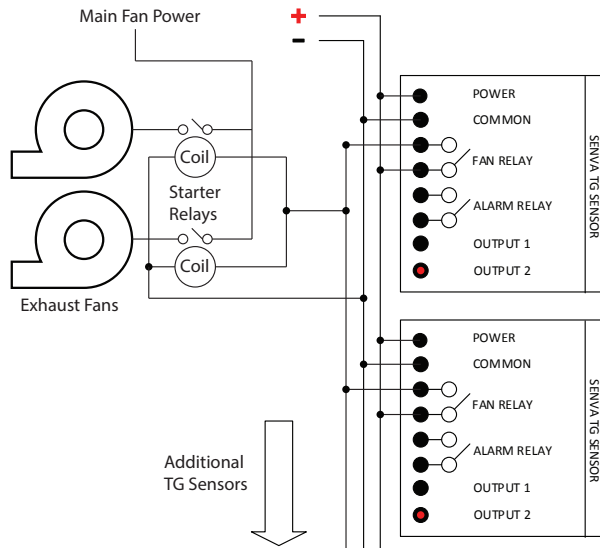


## DAISY CHAIN OF FAN RELAYS

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.

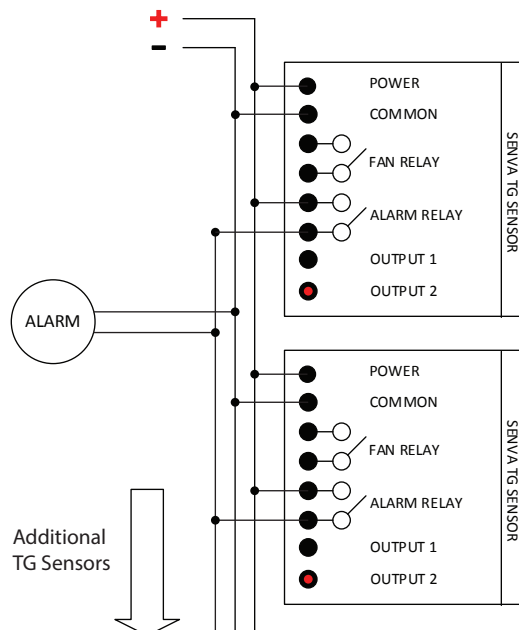
Device also features a maximum off timer for the fan relay, to ensure a minimum number of air changes within the monitored space. See TG Series User's Guide to enable this feature.



## 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.

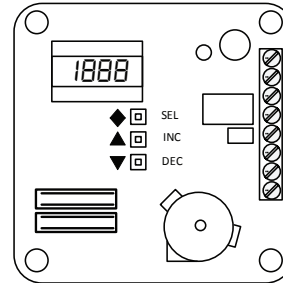


## RELAY/OUTPUT SETUP

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](http://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 95LR, scrolls across the LCD.

Press the select button ◆ again and LCD will read R. 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 | NO2 Fan | NO2 Alarm | Buzzer Delay |
|-----|-------------------------------------|----------|---------|-----------|--------------|
| R   | 25ppm                               | 100ppm   | 1ppm    | 3ppm      | 30 minutes   |
| B   | 15ppm                               | 50ppm    | 0.7ppm  | 2ppm      | 30 minutes   |
| C   | 35ppm                               | 100ppm   | 1ppm    | 5ppm      | 30 minutes   |
| LR  | 5ppm                                | 10ppm    | 0.5ppm  | 1ppm      | 2 minutes    |
| ESC | 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) |
|-----|-----------------------------------|
| 10V | 0-10V Output                      |
| 1.5 | 1-5V Output                       |
| 420 | 4-20mA Output                     |
| 0.5 | 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 95LR. 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 <sup>(1)</sup> , 4W max, 120mA max.           |
| Analog Outputs         | 2 programmable outputs      | 0-10V (default), 0-5V, 1-5V and 4-20mA (configurable)        |
|                        | CO output scaling           | 0-200ppm (default), ranges below 200ppm (configurable)       |
|                        | NO2 output scaling          | 0-10ppm (default), ranges below 10ppm (configurable)         |
|                        | Temperature output scaling  | -20 to 85°C  |
| Fan Relay              | Fan relay characteristics   | N.C. 10A@125VAC, 5A@30VDC                                    |
|                        | CO fan relay setpoint       | 25ppm (default), 0-200ppm (menu selectable)                  |
|                        | NO2 fan relay setpoint      | 1ppm (default), 0-10ppm (menu selectable)                    |
| Alarm Relay            | Alarm relay characteristics | N.C. 0.5A@125VAC, 1A@30VDC                                   |
|                        | CO alarm relay setpoint     | 100ppm (default), 0-200ppm (menu selectable)                 |
|                        | NO2 alarm relay setpoint    | 3ppm (default), 0-10ppm (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                    | +/-10% of reading @ 20°C                                     |
|                        | Reproducibility             | +/-2% of reading   |
|                        | Response time               | <15 seconds  |
|                        | Certifications              | UL2034 Recognized Component                                  |
|                        | Long term stability         | <+/-5% per year  |
|                        | Life expectancy             | >5 years   |
| NO2 Sensor Performance | Type                        | Electrochemical  |
|                        | Accuracy                    | +/-10% of reading @ 20°C                                     |
|                        | Reproducibility             | <+/-3% of reading  |
|                        | Response time               | <15 seconds  |
|                        | Long term stability         | <+/-5% per year  |
|                        | Life expectancy             | >5 years   |
| 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  |

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

## 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. |