

## Model TSGA SMART Gas Analyzer

### IMPORTANT

Refer to Technical Data Sheet TFP2300 for warnings pertaining to regulatory and health information.

Scan the QR code or enter the URL in a web browser to access the most up-to-date electronic version of this document. Data rates may apply.



[docs.jci.com/tycofire/TFP1270](http://docs.jci.com/tycofire/TFP1270)

### General Description

The TYCO Model TSGA SMART Gas Analyzer provides a continuous real-time monitoring of nitrogen (N<sub>2</sub>)/oxygen (O<sub>2</sub>) concentration levels within a dry/preaction fire protection system. The analyzer samples discharge gas from an adjacent TYCO Model TAV-D Air Vent Dry or TYCO Model TSV-D Smart Air Vent Dry. The gas flows out of a restricted orifice on the vent through pressure-rated tubing to provide slow, controlled flow to the analyzer. One analyzer is recommended with each TYCO Nitrogen Generator.

The analyzer has many different functions. It is equipped with a programmable contact closure for one of three different oxygen concentration levels (1%, 3%, and 5%), which will provide early warning to a user when the nitrogen concentration within the fire protection system falls below the desired level.

The analyzer is also equipped with an RS-485 port for optional remote control and monitoring. The analyzer can also display either oxygen or nitrogen concentration. The analyzer is equipped to protect itself from damage, and can detect if the sensor performance is degraded. This condition indicates an error and activates the alarm relay. The sensor begins a self-diagnostic test five minutes after being powered on. If the oxygen level is below 0.3%, the alarm relay energizes and the sensor automatically shuts itself down. The sensor reboots automatically after 24 hours and resumes reading gas concentration levels. This prevents sampling at extremely low oxygen levels which can eventually cause damage to the sensor. If the sensor detects rapid deviation in oxygen content it signals an error and energizes the alarm relay without shutting down.

### NOTICE

*The TYCO Model TSGA SMART Gas Analyzers described herein must be installed and maintained in compliance with this document, in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the performance of the related devices. The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions.*



### Technical Data

#### Dimensions, W x D x H

8 in. x 3.5 in. x 8 in.  
(203 mm x 89 mm x 203 mm)

#### Temperature Range

40 °F to 105 °F (5 °C to 40 °C)

#### Electrical Connections

120 VAC, 60 Hz/0.5 A  
230 VAC, 50 Hz/0.5 A  
24 VDC/2 A

#### Sensor Type

Zirconium Dioxide

#### Signal Output

0 VDC to 5 VDC linear output,  
4 mA to 20 mA linear output

#### Output Display

%O<sub>2</sub> or %N<sub>2</sub>

#### Percentage of O<sub>2</sub> Contact

Closure Level  
1%, 3%, or 5%

#### Resolution

1 dp (nn.n%)

#### Accuracy

1%

#### Sample Connection

5/32 in. plastic tubing quick connect

# Installation

**NOTICE**

When connecting the TYCO Model TSGA SMART Gas Analyzer to a fire protection system using the TYCO Model TAV-D Air Vent Dry, a dedicated TAV-D air vent is required to provide a continuous gas stream to analyze. The muffler in the TAV-D air vent must be removed and replaced with a 5/32 in. push-connect fitting.

When connecting the TYCO Model TSGA SMART Gas Analyzer to a fire protection system using the TYCO Model TSV-D Smart Air Vent Dry, the quick disconnect sampling port in the TSV-D smart air vent must be removed and replaced with a 5/32 in. push-connect fitting.

The TYCO Model TSGA SMART Gas Analyzer must be installed in accordance with this section.

**Step 1.** Mount the SMART Gas Analyzer on a wall adjacent to the TYCO Model TAV-D Air Vent Dry or the TYCO Model TSV-D Smart Air Vent Dry (not included).

**Step 2.** Once mounted, connect the 5/32 in. tubing to the push-connect fitting on the top of the SMART Gas Analyzer.

**Step 3.** Connect the opposite end of the tubing to the push-connect fitting on the outlet of the TYCO Model TAV-D Air Vent Dry or TYCO Model TSV-D Smart Air Vent Dry.

**Step 4.** With the incoming power off, connect the incoming 120 VAC/60 Hz or 230 VAC/50 Hz power supply to BLOCK J6 on the PC Board as shown in Figure 1.

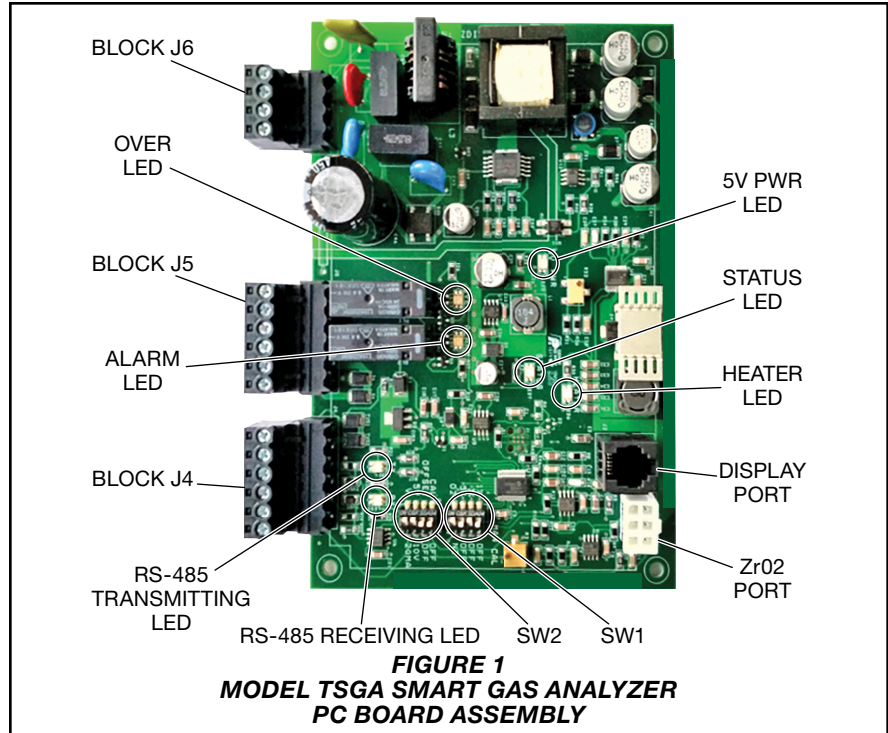
**Step 5.** Select the appropriate gas concentration level to be displayed on the SMART Gas Analyzer using SW1 DIP1: Nitrogen (N<sub>2</sub>) or oxygen (O<sub>2</sub>).

**Note:** N<sub>2</sub> is recommended.

**Step 6.** When monitoring the purity of the sample gas stream and a Normally Open (NO) contact closure is required, connect to the OVER contacts on BLOCK J5 (J5-1 and J5-2) as shown in Figure 2.

- a. If a LOW Nitrogen (N<sub>2</sub>)/HIGH Oxygen (O<sub>2</sub>) percentage alarm is desired, select the corresponding O<sub>2</sub> concentration level using SW1 DIP2 (5%), DIP3 (3%), or DIP4 (1%) to energize the OVER relay output.

**Note:** A 5% O<sub>2</sub> concentration level (SW1 DIP2) is recommended.



**FIGURE 1**  
**MODEL TSGA SMART GAS ANALYZER**  
**PC BOARD ASSEMBLY**

Status LED Color	Flash Code	Condition
RED	1	ERROR: Low O <sub>2</sub> Level (<0.3%)
RED	2	ERROR: Asymmetry (>5%)
GREEN	1	Normal Operation
GREEN	2	Heater Warming Up
GREEN	3	Averaging Calibration Value
GREEN	4	Set Calibration Value if Needed

**TABLE A**  
**MODEL TSGA SMART GAS ANALYZER**  
**PC BOARD STATUS LED CONDITIONS**

**Step 7.** When monitoring the purity of the sample gas stream and an analog output is required, connect the positive lead to A\_OUT+ (J4-1) and the negative lead to A\_OUT- (J4-2) of BLOCK J4.

- b. Turn on SW2 DIP1 to select a 4-20 mA output.
- c. Use SW2 DIP2 to select 5V (for 0-5V) or 10V (for 0-10V).

**Step 8.** If RS-485 remote control/monitoring is desired, connect RS-485 leads to D+ (J4-4), D- (J4-5) and D\_GND (J4-6) of BLOCK J4.

**Alarm Bypass While Nitrogen Inerting Feature**

The OVER contacts can be bypassed from transmitting a low nitrogen signal to the building monitoring system

during the 14-day nitrogen inerting process when the SMART Gas Analyzer is used in conjunction with the TYCO Model TSV-D Smart Air Vent Dry. See Figure 3 for terminal connections.

**Step 1.** Connect the spare normally closed (NC) contacts (terminals 8 and 11) in the TYCO Model TSV-D Smart Air Vent Dry to the normally open (NO) contacts of the SMART Gas Analyzer, Terminals J5-1 and J5-2 of BLOCK J5.

**Step 2.** Connect the output of the SMART Gas Analyzer and TYCO Model TSV-D Smart Air Vent Dry to the building monitoring system.

**Step 3.** Connect the building monitoring system's end-of-line supervision device (if needed).

## Operation

The TYCO Model TSGA SMART Gas Analyzer must be operated in accordance with this section.

**Step 1.** Once the analyzer is verified to be wired correctly, power-on the unit. The Status LED (see Figure 1 and Table A) will repeatedly flash green two times quickly for two minutes. The sensor heater is warming up during this period.

**Step 2.** After the two minute warm-up period, the sensor and Status LED will flash green one time repeatedly indicating normal operation. At this time, the display shows the current average concentration of the sample gas.

## Care and Maintenance

The TYCO Model TSGA SMART Gas Analyzer must be maintained and serviced in accordance with this section.

Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, permission to shut down the affected fire protection systems must first be obtained from the proper authorities. All personnel who may be affected by this decision must be notified.

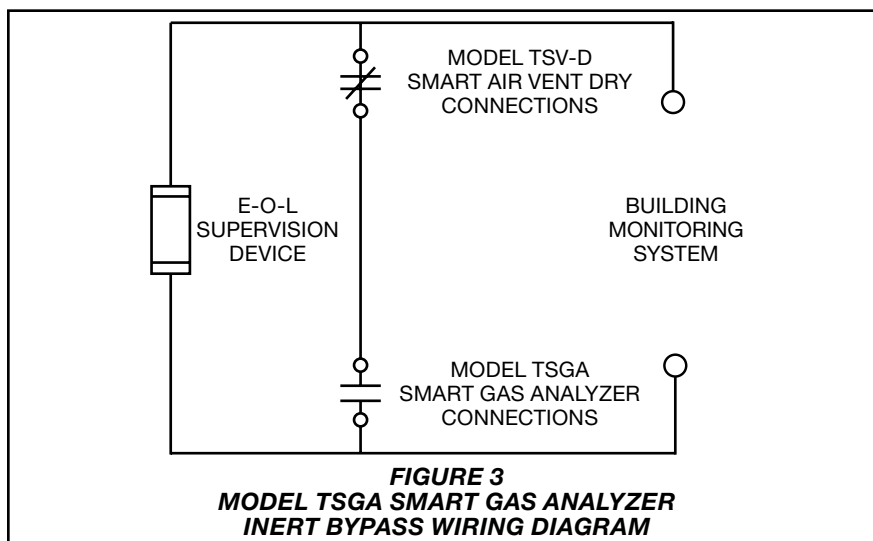
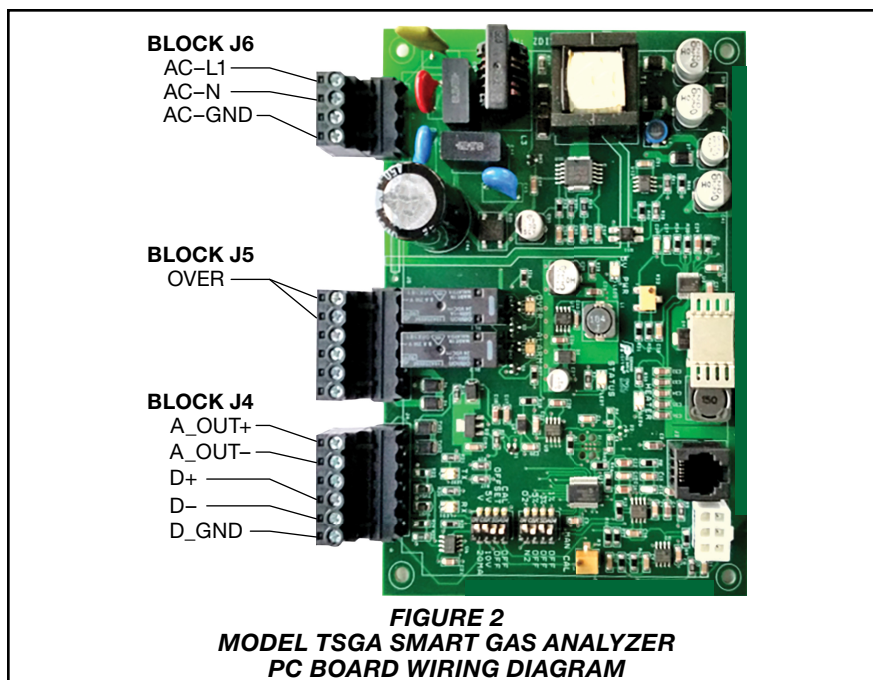
Inspection, testing, and maintenance must be performed in accordance with the requirements of the NATIONAL FIRE PROTECTION AGENCY (NFPA), and any impairment must be immediately corrected.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of any authorities having jurisdiction. Contact the installing contractor or product manufacturer with any questions.

### Calibration

The TYCO Model TSGA SMART Gas Analyzer is factory calibrated to read a 20.9% oxygen level. As elevation increases, the density of the oxygen molecules in the air decreases. Decreased oxygen molecules in the air can cause the SMART Gas Analyzer to display slight inaccuracies in the displayed oxygen/nitrogen percentage concentration value.

*Note: Contact Johnson Controls before performing any calibration adjustment.*



Recalibrate the TYCO Model TSGA SMART Gas Analyzer:

**Step 1.** Verify the SMART Gas Analyzer is connected to a sprinkler system that is pressurized with fresh compressed air.

**Step 2.** Verify the SMART Gas Analyzer is sampling fresh compressed air for a minimum of 10 minutes.

**Step 3.** Switch the N<sub>2</sub>/O<sub>2</sub> switch (SW1 DIP1) to the O<sub>2</sub> position, if the digital display is not reading approximately 20.9%, switch the “CAL” switch (SW2 DIP4) to the “CAL” position.

**Step 4.** Allow the SMART Gas Analyzer to remain in the “Calibrate Mode” and sample the gas for 10 minutes to allow the TSGA to re-calibrate.

**Step 5.** Switch the “CAL” switch (SW2 DIP4) to the “Off” position.

**Step 6.** Verify the digital display is reading approximately 20.9%.

**Step 7.** Switch the N<sub>2</sub>/O<sub>2</sub> switch (SW1 DIP1) to the N<sub>2</sub> position.

## **Limited Warranty**

For warranty terms and conditions, visit [www.tyco-fire.com](http://www.tyco-fire.com).

## **Ordering Procedure**

Contact your local distributor for availability. When placing an order, indicate the full product name and Part Number (P/N).

### **Smart Gas Analyzer**

Specify: Model TSGA SMART Gas Analyzer, P/N TSGA01

### **Air Vent Dry**

Specify: Model TAV-D Air Vent Dry, P/N TAVD01

**Note:** Refer to Technical Data Sheet TFP1262 for more information.

### **Smart Air Vent Dry**

Specify: Model TSV-D Smart Air Vent Dry, Voltage Input (specify 120 VAC/60 Hz or 230 VAC/50 Hz), P/N (specify):

120 VAC/60 Hz . . . . . TSVD01

230 VAC/50 Hz . . . . . TSVD01E

**Note:** Refer to Technical Data Sheet TFP1263 for more information.



Worldwide  
Contacts | [www.tyco-fire.com](http://www.tyco-fire.com)

## **TFP1270 Change History Appendix**

ISSUE DATE	NOTES
08-22	Page 1, added QR code and URL to allow convenient access to electronic version from printed document; Page 4, changed corporate address and telephone number to 1467 Elmwood Avenue, Cranston, RI 02910   Telephone +1-401-781-8220, formerly 1400 Pennbrook Parkway, Lansdale, PA 19446   Telephone +1-215-362-0700.
09-19	New Technical Data Sheet TFP1270 describes Model TSGA Smart Gas Analyzer.