



# GENERAL MONITORS

*Protection for life.*

## MODEL TS4000

### Intelligent Sensor For Toxic Gas Detection



#### Features

- Integral Galvanic Isolation
- One Person Adjustment-Free Calibration
- Two Discrete LED Indicators
- Sensor can be remote mounted up to 2,000 ft. (610m)
- Sensor Life Indication
- 4-20 mA Analog Output
- Dual Redundant MODBUS RS-485 User Interface
- Three discrete relays for status indication

#### Benefits

- Design permits hot swapping of electrochemical sensors, simple installation with low cost of ownership.
- Uses a magnetically activated, non-intrusive, calibration method.
- Indicates alarm and warning conditions
- Increased installation flexibility
- Reduces downtime by providing an estimate of remaining sensor life
- Industry standard output for remote alarm and fault indication
- Provides remote operation of TS4000, using 2 redundant channels, to change alarm and warning relay settings, clear selected faults, issue calibration requests and other functions.
- Easy connection to commonly used indicators such as beacons, horns and sounders

#### Description

The TS4000 is a 24 VDC-powered toxic gas detector comprised of a base unit, sensor interface module and electrochemical cell (sensor). The TS4000 monitors a variety of toxic gases in the parts per million (ppm) range, including: ammonia, carbon monoxide, chlorine, chlorine dioxide, hydrogen chloride, hydrogen sulfide, nitric oxide, nitrogen dioxide, oxygen deficiency, ozone, and sulfur dioxide. Configuring the TS4000 to detect a specific target gas is accomplished by simply installing a new sensor and calibrating.

The microprocessor-based electronics of the interface module process information at the sensor site and communicate detected gas values to the base unit for data control and display.

The TS4000 is certified as explosion-proof with intrinsically safe inputs for use in hazardous locations. It can also be used for general-purpose, non-hazardous applications.

#### Applications

- Oil and Gas Production, Processing, Refining
- Chemical Plants
- Agriculture—Fertilizer Production
- Public Utilities
- Wastewater Treatment Plants
- Refineries
- Pulp and Paper
- Pharmaceuticals
- Food and Beverage
- Automotive Plating Processes, Engine Test Cells
- Primary Metals Processing



## MODEL TS4000

### Sensor Specifications

**Sensor Type:** Electrochemical cell

**Typical Life:** 2 to 3 years under typical conditions  
(Electrochemical Cell)

**Warranty:** Two years for the base unit and interface module; One year for the electrochemical cell

**Malfunctions**

**Monitored:** Calibration Errors, Data Memory Errors

**Measuring Ranges:**

Ammonia (NH<sub>3</sub>)\*: 0-50ppm, 0-100ppm  
Carbon Monoxide (CO): 0-100 ppm, 0-500 ppm  
Chlorine (Cl<sub>2</sub>)\*: 0-10 ppm, 0-20 ppm  
Chlorine Dioxide (ClO<sub>2</sub>)\*: 0-3 ppm  
Hydrogen Chloride (HCl)\*: 0-20 ppm  
Hydrogen Sulfide (H<sub>2</sub>S): 0-100 ppm  
Nitric Oxide (NO): 0-100 ppm  
Nitrogen Dioxide (NO<sub>2</sub>): 0-20 ppm  
Oxygen (O<sub>2</sub>): 0-25% by volume  
Ozone (O<sub>3</sub>): 0-1 ppm  
Sulfur Dioxide (SO<sub>2</sub>): 0-20 ppm

**Response Time (100% FS Gas Applied):**

Cl<sub>2</sub> and ClO<sub>2</sub>: T90 < 60 sec  
CO, H<sub>2</sub>S and NO<sub>2</sub>: T90 < 30 sec  
HCl: T90 < 100 sec  
NH<sub>3</sub> and O<sub>3</sub>: T90 < 90 sec  
NO and SO<sub>2</sub>: T90 < 10 sec  
O<sub>2</sub>: T90 < 15 sec

**Repeatability:** ± 2% of full scale except ± 0.1 ppm for O<sub>3</sub>, ± 0.2 ppm for ClO<sub>2</sub> and ± 1% of full scale for O<sub>2</sub>

**Zero Drift:** < 5% per year

**Approvals:** CSA, ATEX, CE Marking, GOST

### Environmental Specifications

**Operating Temperature Range**

(For all gases other than NH<sub>3</sub> and H<sub>2</sub>S):  
-4°F to +122°F (-20°C to +50°C)  
(For NH<sub>3</sub>): -40°F to +104°F (-40°C to +40°C)  
(For H<sub>2</sub>S): -40°F to +122°F (-40°C to +50°C)

**Storage Temperature Range**

(Base Unit and Interface Module) -40°F to +185°F (-40°C to +85°C)

(Electrochemical Cells) 32°F to +68°F (0°C to +20°C)

**Humidity Range\*** 15% to 90% relative humidity, non-condensing

**Pressure Range** Atmospheric ± 10%

\* Electrochemical cells are sensitive to changes in humidity, particularly at temperatures above 25°C. For these applications, consult our factory.

### Mechanical Specifications

**Base Unit**

**Length** 6.4 inches (161 mm)  
**Height** 3.4 inches (86 mm)  
**Width** 4.4 inches (112 mm)  
**Weight** 5.5 pounds (2.5 kg)  
**Mounting Holes** 4.9 inches (124 mm) center to center

**Interface Module**

**Length** 6.6 inches (168 mm)  
**Diameter** 1.75 inches (44 mm)  
**Weight** 1.0 pounds (0.45 kg)  
**Mounting** 0.75 inch NPT  
**Housing** Anodized Aluminum

### Electrical Specifications

**General Purpose**

**Installations:** Maximum distance between the TS4000 and the power source @ 24VDC nominal (600 Ω load resistor maximum) is 3,000 feet (910 meters)

**Input Power:** 20 to 36VDC range; +24VDC nominal 0.120 amps

**Relay Ratings:** 8A @ 250 VAC / 8A @ 30 VDC res. max. (Optional) (3X) SPDT – Warning, Alarm & Fault

**Output**

**Current:** (600 Ω maximum @ 24VDC)  
Signal Range: 4-22mA  
Fault: < 1.0mA  
Start-up: 1.5mA  
Calibration: 1.5mA  
Detection Range: 4-20mA  
Over-range: 22mA

**Electrical**

**Classification:** Class I, Div. 1 & 2, Groups B, C & D; Class II, Div. 1 & 2, Groups E, F & G; Class III; Ex d ib IIB + H<sub>2</sub> T5, Type 4X with Remote Interface Module; EEx d mb IIC (-40°C ≤ Ta ≤ +75°C)

**Status**

**Indicator:** LED Display with Normal, Gas Present, Fault and Calibration Cues

**RS-485**

**Output:** Dual redundant MODBUS RTU, suitable (Optional) for linking up to 128 units or up to 247 units with repeaters

**Baud Rate:** 2400, 4800, 9600, or 19200 BPS

**Cable**

**Requirements:** 3 wire shielded cable. Maximum distance for analog output from the base unit (600 ohms max):

14 AWG - 9000 ft. (2740m)

Remote mounting of the interface module requires a 4 wire shielded cable to the base unit:

14 AWG - 2000 ft. (610m)

**Standard**

**Configuration:** TS4000-1-03-01 (CO w/relays, Modbus)

*Specifications subject to change without notice.*

**Represented by:**

## GENERAL MONITORS WORLDWIDE



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