



**GENERAL MONITORS**  
*Protection for life.*

# MODEL TS4000H

## Intelligent Sensor For Toxic Gas Detection



### Features

- Integral galvanic isolation
- Event logging
- One person adjustment-free calibration
- 4-20 mA output
- Warning, Alarm, and Fault Relays
- Sensor life indication
- Modbus and HART user interface

### Benefits

- Design permits hot swapping of electrochemical sensors, simple installation with low cost of ownership
- Stores fault, gas check, calibration, and alarm event history
- Uses a magnetically activated, non-intrusive, calibration method
- Industry standard output for remote alarm and fault indication
- Provides local alarm capability
- Reduces downtime by providing an estimate of remaining sensor life
- Provides complete status and control capability in the control room

### Description

The TS4000H is a 24 VDC-powered toxic gas detector comprised of a base unit, interface module, and electrochemical cell (sensor). The TS4000H 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 TS4000H 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. In addition, the TS4000H includes warning, alarm, and fault relay contacts that can be used to indicate an alarm or fault condition and dual redundant Modbus or HART communication. Configurations with relays, Modbus, and HART are available to meet many needs.

The TS4000H is certified as explosion-proof with intrinsically safe sensor inputs for use in hazardous locations. It can also be used for general-purpose, non-hazardous applications.

### Applications

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



## MODEL TS4000H

### Sensor Specifications

**Sensor Type:** Electrochemical cell

#### Measuring Ranges:

Ammonia*	0-50, 0-100 ppm
Carbon Monoxide	0-100, 0-500 ppm
Chlorine*	0-10, 0-20 ppm
Chlorine Dioxide*	0-3 ppm
Hydrogen Chloride*	0-20 ppm
Hydrogen Sulfide	0-20, 0-50, 0-100 ppm
Nitric Oxide	0-100 ppm
Nitrogen Dioxide	0-20 ppm
Oxygen	0-25% by volume
Ozone	0-1 ppm
Sulfur Dioxide	0-20, 0-100 ppm

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

**Repeatability:** ±2% of full scale (FS) for all gases except ±0.1 ppm for O<sub>3</sub> and ±0.2 ppm for ClO<sub>2</sub> and ±1% FS for O<sub>2</sub>

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

#### Typical Response Time:

(with 100% FS gas applied)  
 CO, H<sub>2</sub>S, NO<sub>2</sub>: T90 < 30 sec,  
 NO, SO<sub>2</sub>: T90 < 10 sec,  
 HCl: T90 < 100 sec,  
 Cl<sub>2</sub>, ClO<sub>2</sub>: T90 < 60 sec,  
 NH<sub>3</sub>, O<sub>3</sub>: T90 < 90 sec,  
 O<sub>2</sub>: T90 < 15 sec

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

**Accessories:** Flow block, splash guard, plastic junction box, aluminum junction box, multi-channel controller, calibration kits

**Warranty:** One year (cell), Two years (electronics)

**Approvals:** CSA, ATEX, GOST, and CE Marking. HART registered. SIL 2 suitable.

### Environmental Specifications

#### Operating Temperature Range:

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

#### Storage Temperature Range:

Base unit and interface module: -4°F to 185°F (-20°C to 85°C)  
 EC Cells: 32°F to 68°F (0°C to 20°C)  
 EC Cells (CO & O<sub>2</sub>): 60°F to 80°F (16°C to 27°C)

#### Operating Humidity Range\*:

15% to 90% RH, non-condensing

#### Pressure Range:

Atmospheric ± 10%

### Mechanical Specifications

#### Base Unit

**Length:** 6.6 in (168 mm)  
**Height:** 3.3 in (84 mm)  
**Width:** 4.4 in (112 mm)  
**Weight:** 5.5 lbs (2.5 kg)  
**Mounting Holes:** 4.9 in (124 mm) center to center

### Interface Module

**Length:** 6.6 in (168 mm)  
**Diameter:** 1.75 in (44mm)  
**Weight:** 1.0 lbs. (.45 kg)  
**Mounting:** ¾" NPT  
**Housing:** Anodized aluminum

### Electrical Specifications

**Input Power:** 20-36 VDC  
 +24 VDC nominal 0.120 amps

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

**Power Consumption:** Start-up: 125 mA, Normal: 120 mA

**Analog Signal:** 0-22 mA (500 Ohms max. load)  
 Fault 0 mA†  
 Calibration 1.5 mA†  
 Setup mode 1.5 mA†  
 Detection range 4-20 mA  
 Over-range 20-21.7 mA

#### RFI/EMI Protection:

EN 55011, EN 50270

**Status Indicators:** Three-digit LED display with gas concentration, Warn and Alarm LED's, calibration prompts, fault codes, and setup options

**RS-485 Output:** Dual redundant Modbus RTU, suitable for linking up to 128 units or up to 247 units with repeaters  
 (Optional)

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

**HART:** HART 6, HART Device Description  
 (Optional) Language available. AMSAware

**Faults Monitored:** Calibration errors, data memory errors

**Cable Requirements:** Three-wire shielded cable. Max. distance between TS4000H and power source @ 24 VDC nominal:  
 14 AWG - 3430 ft (1040 m)

Max. distance for analog output (500 Ohms max):  
 14 AWG - 9000 ft (2740 m)

Max. distance between base unit and interface module:  
 14 AWG - 2000 ft (600 m)

**Wireless Communication:** Available with ELPRO Technologies wireless transmitters

**Standard Configuration:** TS4000H-1-03-01-1  
 (CO w/relays, Modbus)

Specifications subject to change without notice.

### Represented by:

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† Under HART, current values can be either 3.5 mA or 1.25 mA, depending on user selection  
 ‡ Under HART, current value can be either 3.5 mA or 1.5 mA, depending on user selection

## GENERAL MONITORS WORLDWIDE



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