



**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, 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.

### 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	0-500 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% v/v
Ozone	0-1 ppm
Sulfur Dioxide	0-20, 0-100 ppm

**Accuracy:** ±2 ppm or ±10% of reading, whichever is greater for all gases, except ±3% of FS for CO (0-500 ppm) and H<sub>2</sub> or ±5 ppm or ±10% of reading, whichever is greater for NH<sub>3</sub>, or ±20% of reading for O<sub>3</sub> and ClO<sub>2</sub>, or ±1% v/v for O<sub>2</sub>.

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

### Response Time: (with 100% FS gas applied)

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

### Classification:

#### Base Unit

CSA: Class I, Div 1 & 2, Groups B, C & D; Class II, Div 1 & 2, Groups E, F & G; Class III, Type 4X  
ATEX/IECEX: Ex d IIB + H<sub>2</sub> T5 Gb (-40°C ≤ Ta ≤ +70°C)

#### Interface Module

CSA: Ex d ia IIB + H<sub>2</sub> T5  
ATEX/IECEX: Ex d mb ib IIC Gb (-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).  
Fifteen years (aluminum housing)

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

## Environmental Specifications

### Operating Temperature Range:

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

### Storage Temperature Range:

TS4000H: -40°F to 185°F (-40°C to 85°C)  
EC Cells: 32°F to 68°F (0°C to 20°C)  
EC Cells (CO, H<sub>2</sub>, NH<sub>3</sub> & 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%

\*Electrochemical cells are sensitive to changes in humidity, particularly at temperatures above 25°C. For these applications, consult our factory.  
† Under HART, AO values can be either 3.5 mA or 1.25 mA, depending on user selection. ‡ Under HART, AO value can be either 3.5 mA or 1.5 mA, depending on user selection.

## Mechanical Specifications

### Base Unit

**Length:** 6.3 in (161 mm)  
**Height:** 3.2 in (81 mm)  
**Width:** 4.3 in (110 mm)  
**Weight:** 5.5 lbs (2.5 kg) - AL; 14.1 lbs (6.38 kg) - SS  
**Mounting Holes:** 5.0 in (127 mm) center to center  
**Housing:** Aluminum alloy or stainless steel

### Interface Module

**Length:** 6.37 in (162 mm)  
**Diameter:** 1.75 in (44 mm)  
**Weight:** 1.0 lbs. (0.45 kg)  
**Mounting:** 3/4" NPT  
**Housing:** Anodized aluminum A356-T6

## Electrical Specifications

**Input Power:** 20-36 VDC  
24 VDC nominal @ 0.120 A

**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 Ω 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

**EMC:** EN 50081-2, EN 50270

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

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

**HART:** HART 6, HART Device Descriptor 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 Ω 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-1-0-03-01-1 (CO, without relays, without Modbus, without HART)

*Specifications subject to change without notice.*

**Represented by:**

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