

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



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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 $\pm 10\%$ of reading whichever is greater for FS ≤ 50 ppm. $\pm 3\%$ of FS for scale > 100 ppm for all gases except $\pm 20\%$ for NH_3 , O_3 and ClO_2 and $\pm 1\%$ v/v for O_2

Zero Drift: $< 5\%$ per year

Response Time: (with 100% FS gas applied)

CO , H_2 , H_2S , NO_2	T90 < 30 s
NO , SO_2	T90 < 10 s
HCl	T90 < 100 s
Cl_2 , ClO_2	T90 < 60 s
NH_3 , O_3	T90 < 90 s
O_2	T90 < 15 s

Classification:

Base Unit

CSA: Class I, Div 1 & 2, Groups C & D; Class II, Div 1 & 2, Groups E, F & G; Class III, Type 4X
ATEX: II 2 G EEx d IIB + H_2 T5
($-40^\circ\text{C} \leq \text{Ta} \leq +70^\circ\text{C}$)

Interface Module

CSA: Ex d ia IIB + H_2 T5
ATEX/IECEx: II 2 G Ex d mb ib IIC Gb ($-40^\circ\text{C} \leq \text{Ta} \leq +75^\circ\text{C}$)

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, IECEx, GOST, 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_2S): -40°F to 122°F (-40°C to 50°C)
(for NH_3): -40°F to 104°F (-40°C to 40°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_2 & O_2): 60°F to 80°F (16°C to 27°C)

Operating Humidity Range*:

15% to 90% RH, non-condensing

Pressure Range: Atmospheric $\pm 10\%$

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)
Mounting Holes: 5.0 in (127 mm) center to center

Interface Module

Length: 6.37 in (162 mm)
Diameter: 1.75 in (44mm)
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

RFI/EMI

Protection: 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.

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*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.