



Smart Gas Sensor Device

StoxPro

Datasheet

» Overview

Easy solution for gas detection

The StoxPro Gas Sensor Device is an intelligent gas sensor device from EC Sense with a two-wire 4-20 mA and RS485 Modbus-RTU output signal, where one of the two signals can be selected. The device utilizes a smart microprocess with high-reliability Solid Polymer Electrochemical Gas Sensing Technology and intelligent algorithm calculation. The StoxPro is a smart solution that combines temperature and humidity in one Sensor Device for industrial safety applications.

The StoxPro Gas Sensor Device is suitable for indoor and outdoor environments. It detects gas, temperature and humidity and easily receives all data simultaneously. The changing state of gas is closely related to temperature and humidity, for which this combination of the StoxPro Gas Sensor Device provides a professional solution with a RS485 and temperature and humidity signal output.

The intelligent Gas Sensor Device provides a self-test which evaluates the sensor performance without a gas measurement. Therefore, it is the perfect solution for smart home and IoT applications. The data is put out through the output signal or RS485 transmission command, which makes it easy and convenient to determine the right time to perform maintenance and replacement.

Each StoxPro Sensor Device has been professionally calibrated with the gas. It can be instantly used without prior warm-up time and the calibration information is stored in the flash chip. There is a calibration software from EC Sense in case a recalibration with the RS485 output is required or the 4-20 mA output signal needs to be corrected.

The front cover of the StoxPro is designed with three different structural forms: Diffusion Cover, Flow Cover, Duct Mounting Cover. The Diffusion Cover is suitable for gas detection in open spaces, where the gas reaches the sensor by diffusion and convection. The Flow Cover is suitable for detecting gas that is actively pumped to the sensor by a gas sampling pump, or for the gas that is under positive pressure (or at a flow rate) in the vicinity of the detected gas to reaching the sensor by flow. The Duct Mounting Cover is suitable for installations that measure gas concentrations in confined spaces and are sealed with threads or flanges.

The StoxPro Gas Sensor Device has the standard 4-20 mA two-wire or RS485 Modbus-RTU output signal that allows for quick instrument and system setup or connection to display, DCS, PLC and other systems.

» Key Features

- ☞ 4-20 mA standard two-wire and RS485 Modbus-RTU output, 24V DC. power supply
- ☞ Detects single gas + temperature and humidity at the same time
- ☞ With calibration, sensor performance and life-testing output
- ☞ Fast signal stability time at power on
- ☞ Suitable for indoor and outdoor environments, sensor can work in -40 °C to +55 °C
- ☞ Long lifetime, anti-poisoning
- ☞ Response time is fast and has a stable zero point without drift, anti-electromagnetic interference ability
- ☞ Integrated safety protection enables use in potentially explosive environments
- ☞ Electronic circuit boards have a dust and corrosion resistant coating
- ☞ Small size
- ☞ CE EN61326-1:2013, EMI, RoHS approved



» Applications

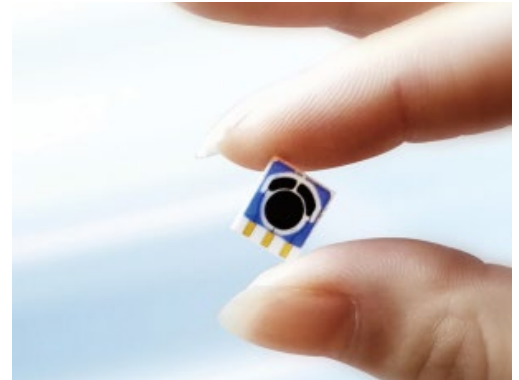
- ☞ Industrial Gas Safety Monitoring
- ☞ Industrial Process Gas Monitoring
- ☞ Air Exchange System and Air Purifier
- ☞ Food Storage Insecticides Monitoring
- ☞ Wastewater Treatment, Garbage Disposal, Biogas Safety Monitoring
- ☞ Medical & Health Care
- ☞ Semiconductor Gas Monitoring
- ☞ Transformer Failure and Power Chamber Environment Monitoring
- ☞ Warehouse Logistics Environment Monitoring



» Principle

The StoxPro Sensor Device is a durable product. It converts the original small current signals of the gas sensors into a standard 4-20 mA or RS485 Modbus-RTU output through a digital circuit.

The Sensor Device uses the Solid Polymer Electrochemical Sensing Technology. It employs a three-electrode arrangement - the working, the counter and the reference electrodes - in which concentration measurements can be performed continuously and the sensor operates at a fixed potential. The gas of interest (target gas) diffuses through a diffusion barrier, like a capillary, into the cell to the working electrode, where an electrochemical reaction takes place. There are oxidation and reduction reactions. The current flowing through the cell is direct proportional to the concentration of the target gas. A reference electrode keeps the potential constant together with a potentiostat.



» Mechanical Diagram

Diffusion Cover



Duct Mounting Cover

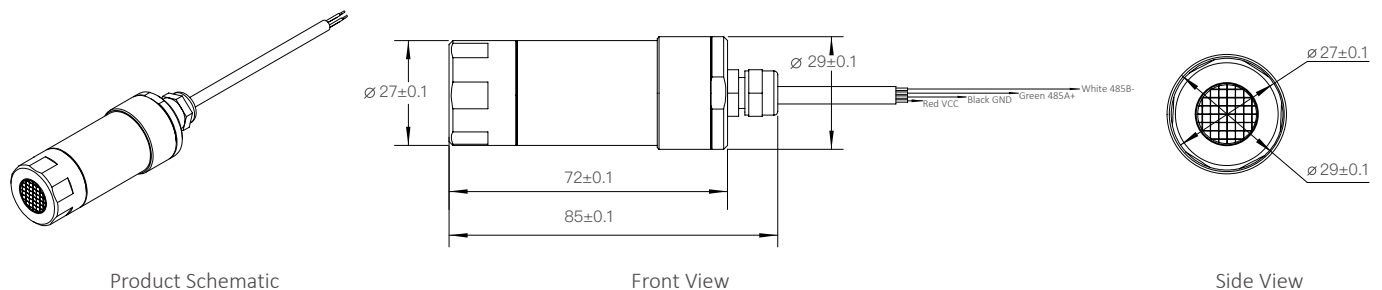


Flow Cover

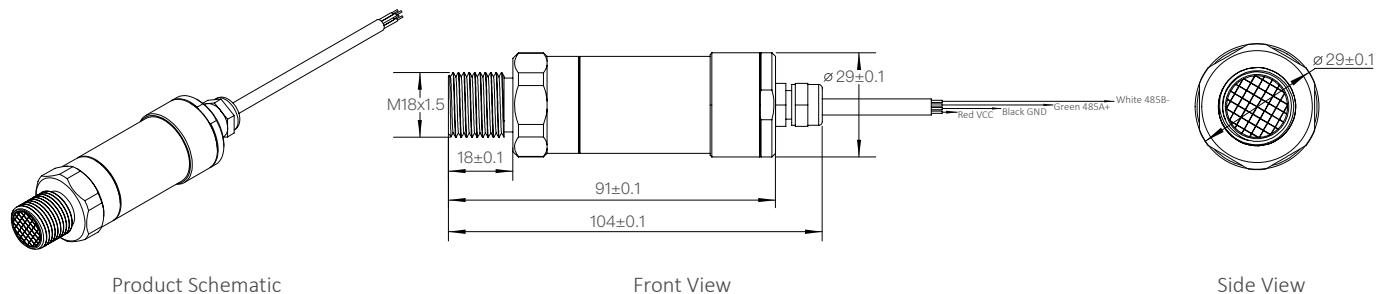


» Mechanical Diagram

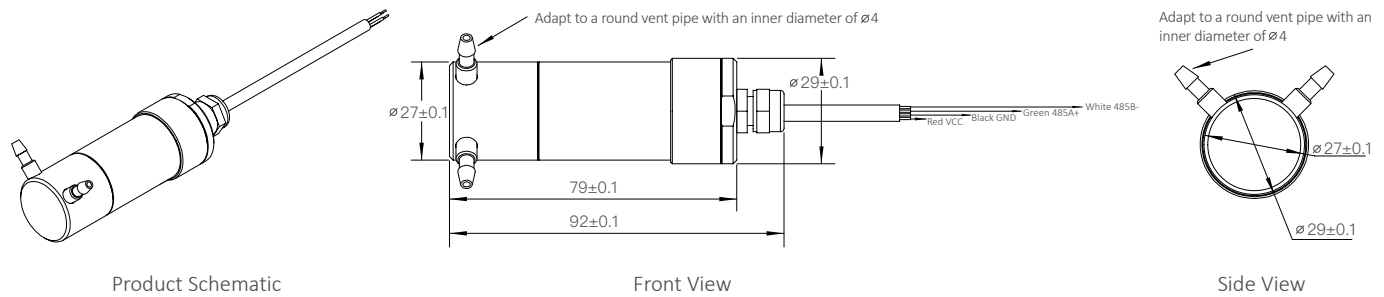
Structural schematic diagram of the StoxPro series intelligent gas sensor device (Diffusion Cover) unit: mm



Structural schematic diagram of the StoxPro series intelligent gas sensor device (Duct Mounting Cover) unit: mm



Structural schematic diagram of the StoxPro series intelligent gas sensor device (Flow Cover) unit: mm



» Technology Specifications

Gas Sensor Specifications

Principle	Solid Polymer Electrochemical Sensing Technology / Electrochemical Sensing Technology
Accuracy	± 5% (Measurement value)
Repeatability	< 2 %
Long-Term Drift	< 5%/year
Sensor Life Expectancy	> 3 years
Warranty	12 months

Temperature & Relative Humidity Sensor Specification (Inside housing)

Parameters	Range	Resolution	Accuracy	Response Time	Long-Term Drift
Temperature	-40 °C to +85 °C	0.01 °C	± 0.2 °C	< 5s to 30s @ t63%	< 0.02 °C/year
Humidity	0-100% RH	0.01% RH	± 2% RH	8s @ t63%	< 0.25% RH/year

Note: The temperature and humidity sensor is located inside the StoxPro housing. If the temperature parameters are to be used for external environmental measurements, please calibrate the measured value. The ambient gas cannot be exchanged with the gas inside the StoxPro housing, so the humidity is only used for the measurement inside the enclosure. This parameter cannot be obtained when the 4-20 mA output is selected. It is only applicable to the RS485 output.

Electrical Parameters

Output Signal Interface	4-20 mA two-wires (Only gas sensor output, without Temperature and Humidity) Or RS485 Modbus-RTU (Gas, with temperature and humidity sensor signal output)
Fault Output	3.5 mA Fault Signal: Sensor signal is weak 3 mA Fault Signal: Sensor failure or sensor disconnection RS485 Modbus-RTU output with sensor life and performance detection and early sensor failure warning
Supply Voltage	12 to 24V DC
Supply Current	3 to 22 mA
Power Consumption	< 0.6 W
Maximum Loop Resistance	< 500R @ 24V DC

Environmental Parameters

Operating Temperature	Sensor can work from -40 °C to +55 °C
Operating Humidity	15-95% RH non-condensing
Working Pressure	Air pressure $\pm$ 10 %
Storage Temperature	0 °C to 20 °C

Mechanical Parameters

Size	Please see "Mechanical Diagram"			
Power Cable Length	1 m			
	Red: VCC	Black: GND	Green: RS485 A+	White: RS485 B-
Warranty	12 months			
Package Size	185 x 150 x 108 mm			

Certification

Ex ia IIC Ga Intrinsic safety (certificated Temperature T6 -40 °C to + 55 °C)
CE Certificated EN61326-1:2013, EMC, 2014/30/EU

» Order Information

 05-StoxPro- **A** - **B** - **C** -01

Gas	Range	Housing Material
O ₂	25%	SS
H ₂ S	5	
SMELL	500	
CH ₄ S	5000	
.....		

Gas: Gas Type

O₂: Oxygen
 H₂S: Hydrogen Sulfide
 SMELL: Odor Gas
 CH₄S: Methyl Mercaptan

Range: Measurement Range in ppm/% vol./ppb

25: 0-25% vol.
 5: 0-5 ppm
 500: 0-500 ppm
 5000: 0-5000 ppm

Housing Material

SS: Stainless Steel

Example Part Number1

05-StoxPro-H₂S-1000-SS-01
 05-StoxPro: Smart Gas Sensor Device
 H₂S: Detects Hydrogen Sulfide (H₂S)
 1000: Measurement range is 0-1000 ppm
 SS: Stainless Steel

Example Part Number2

05-StoxPro-O₂-25%-SS-01
 05-StoxPro: Smart Gas Sensor Device
 O₂: Detects Oxygen (O₂)
 25%: Measurement range is 0-25% vol.
 SS: Stainless Steel

Housing Cover

Item	Cover Type
1	Diffusion Cover (standard)
2	Duct Mounting Cover
3	Flow Cover

» Gas List

Gas	Gas Formula	Range	Resolution	Response Time
Arsine	AsH ₃	0-1 ppm	0.001 ppm	< 3 s (T90 < 80 s)
Diborane	B ₂ H ₆	0-1 ppm	0.001 ppm	< 3 s (T90 < 80 s)
Bromine	Br ₂	0-1 ppm	0.001 ppm	T90 < 60 s
Methyl Mercaptan	CH ₄ S	0-10 ppm	0.001 ppm	< 3 s (T90 < 80 s)
		0-100 ppm	0.01 ppm	< 3 s (T90 < 80 s)
		0-5000 ppm	0.1 ppm	< 3 s (T90 < 80 s)
Chlorine	Cl ₂	0-5 ppm	0.001 ppm	T90 < 60 s
		0-50 ppm	0.01 ppm	T90 < 60 s
		0-100 ppm	0.01 ppm	< 3 s (T90 < 30 s)
Chlorine Dioxide	ClO ₂	0-5 ppm	0.001 ppm	T90 < 60 s
Carbon Monoxide	CO	0-10 ppm	0.001 ppm	< 3 s (T90 < 80 s)
		0-100 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		0-1000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		0-2% vol.	0.001% vol.	< 3 s (T90 < 30 s)
Ethylene Oxide	ETO (C ₂ H ₄ O)	0-10 ppm	0.001 ppm	< 3 s (T90 < 30 s)
		0-200 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		0-1000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
Fluorine	F ₂	0-5 ppm	0.001 ppm	T90 < 60 s
Germane	GeH ₄	0-5 ppm	0.01 ppm	< 3 s (T90 < 80 s)
Hydrogen	H ₂	0-1000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		0-5000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		0-5% vol.	0.001% vol.	< 35 s (T90 < 90 s)
Hydrogen Sulfide	H ₂ S	0-5 ppm	0.001 ppm	< 3 s (T90 < 30 s)
		0-10 ppm	0.001 ppm	< 3 s (T90 < 30 s)
		0-100 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		0-1000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		0-5000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
Formaldehyde	HCHO	0-5 ppm	0.001 ppm	< 3 s (T90 < 80 s)
		0-100 ppm	0.01 ppm	< 3 s (T90 < 60 s)
Hydrogen Chloride	HCl	0-30 ppm	0.001 ppm	T90 < 60 s
Hydrogen Cyanide	HCN	0-50 ppm	0.01 ppm	< 3 s (T90 < 30 s)
Hydrogen Fluoride	HF	0-10 ppm	0.001 ppm	T90 < 60 s
Ammonia (Long lifetime)	NH ₃	0-10 ppm	0.001 ppm	< 3 s, no T90
		0-100 ppm	0.01 ppm	< 3 s, no T90

» Gas List

Product	Gas Formula	Range	Resolution	Response Time
Ammonia (Fast response)	NH ₃	0-100 ppm	0.01 ppm	T90 < 60 s
		0-500 ppm	0.1 ppm	T90 < 60 s
		0-1000 ppm	0.1 ppm	T90 < 60 s
Nitrogen Dioxide	NO ₂	0-5 ppm	0.001 ppm	< 3 s (T90 < 80 s)
		0-50 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		0-100 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		0-1000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		0-2000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
Oxygen	O ₂	0-25% vol.	0.01% vol.	< 3 s (T90 < 30 s)
Ozone	O ₃	0-5 ppm	0.001 ppm	< 3 s (T90 < 80 s)
		0-50 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		0-100 ppm	0.01 ppm	< 3 s (T90 < 30 s)
Phosphine	PH ₃	0-5 ppm	0.001 ppm	< 3 s (T90 < 80 s)
		0-20 ppm	0.01 ppm	< 3 s (T90 < 80 s)
		0-100 ppm	0.01 ppm	< 3 s (T90 < 80 s)
		0-2000 ppm	0.1 ppm	< 3 s (T90 < 80 s)
Silane	SiH ₄	0-10 ppm	0.001 ppm	< 3 s (T90 < 80 s)
Odor	SMELL	0-5 ppm	0.001 ppm	< 3 s (T90 < 30 s)
		0-10 ppm	0.001 ppm	< 3 s (T90 < 30 s)
		0-200 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		0-500 ppm	0.01 ppm	< 3 s (T90 < 30 s)
Sulfur Dioxide	SO ₂	0-5 ppm	0.001 ppm	< 3 s (T90 < 30 s)
		0-50 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		0-100 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		0-1000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		0-2000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
Volatile Organic Compounds	TVOC	0-10 ppm	0.001 ppm	< 3 s (T90 < 30 s)
		0-200 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		0-1000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		0-2000 ppm	0.1 ppm	< 3 s (T90 < 30 s)

Disclaimer

The EC Sense performance data stated above is based on data obtained under test conditions using the EC Sense gas distribution system and EC Sense test software. In the interest of continuous product improvement, EC Sense reserves the right to change design features and specifications without notice. We are not responsible for any loss, injury or damage caused by this. EC Sense assumes no responsibility for any indirect loss, injury or damage resulting from the use of this document, the information contained therein or any omissions or errors herein. This document does not constitute an offer to sell. The data it contains are for informational purposes only and cannot be considered a guarantee. Any use of the given data must be evaluated and determined by the user to comply with federal, state and local laws and regulations. All specifications outlined are subject to change without notice.

 Warning

EC Sense devices are designed for use in a variety of environmental conditions. However, due to the principles and characteristics of sensors and to ensure normal use, users must strictly follow this article during storage, assembly and operation of the device. Although our products are highly reliable, we recommend checking the device's response to the target gas prior to utilization to ensure on-site use. At the end of the products service life, please do not discard any electronics in the domestic waste, instead follow the local governments electronic waste recycling regulations for disposal.



**Business Centre
Europe and the Rest of the World**

EC Sense GmbH
Wangener Weg 3
82069 Hohenschäftlarn, Germany
Tel: +49(0)8178-99992-10 Fax: +49(0)8178-99992-11
Email: office@ecsense.com
www.ecsense.com

**Business Centre
Asia**

Ningbo AQSystems Technology Co., Ltd.
6 Building, Zhong Wu Technology Park No.228,
Jin Gu North Road, Yinzhou District NingBo,
Zhejiang Province, P.R. China Post Code: 315100
Tel: +86(0)574 88097236, 88096372
Email: info@aq-s-de.com
www.ecsense.cn