4-20 mA
Smart Gas Sensor Module

TB420-EC4
Datasheet

EC Sense
Easy Gas Sensors

❯❯ Overview

Easy solution for gas detection instruments and systems

The TB420 Gas Sensor Module is an intelligent two wire 4-20 mA digital gas sensor module, which utilizes a smart microprocess with high-reliability Electrochemical gas sensing technology and intelligent algorithm caculation. The TB420 is designed to comply with the relevant standards for gas safety monitoring in the industrial application.

The intelligent Gas Sensor Module 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, which makes it easy and convenient to determine the right time to perform maintenance and replacement.

Each TB420 Sensor Module 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 is required or the 4-20 mA output signalneeds to be corrected.

The TB420 Gas Sensor Module effectively shortens gas instrument development time, reduces costs and risks in new product development, saves production time, avoids complex gas calibration steps and ensures high reliability and accuracy. The standard 4-20 mA two-wire module allows for quick instrument and system setup or connection to display, DCS, PLC and other systems.

❯❯ Key Features

☞ 4-20 mA standard two-wire output, 24V DC power supply

☞ Detects single gas

☞ Pre-calibration with sensor performance and lifetime self-test output

☞ Fast signal stability time at power on

☞ Suitable for indoor and outdoor environments, sensor can work in -40 ℃ to +55 ℃

☞ Fast response time and 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

☞ Intrinsic safety, RoHS approved

❯❯ Applications

☞ Industrial Gas Safety Monitoring

☞ Industrial Process Gas Monitoring

☞ Semiconductor Gas Purification Monitoring

» Principle

TB420 Sensor Module is a durable product. It converts the original small current signals of the gas sensors into standard 4-20 mA outputs through a digital circuit. It is also possible to convert an external resistor to a 40-200 mV voltage output.

The Sensor Module uses 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.
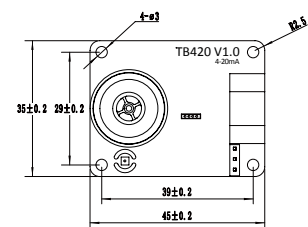
» Mechanical Drawing (Unit: mm)

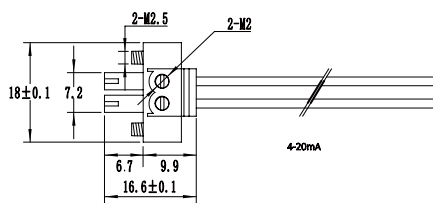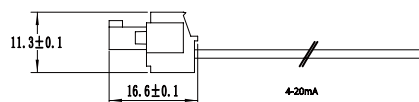TB420-EC4 Gas Sensor Module
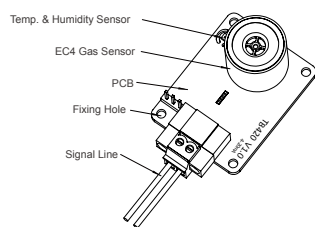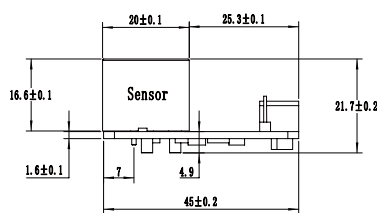
| Product Schematic | Side View | Top View |

4-20mA Connector

| Product Schematic | Side View |

≫ Technology Specifications

Gas Sensor Specifications

Principle	Electrochemical Sensing Technology
Accuracy	± 5 % (Measurement Value)
Repeatability	< 2 %
Linearity	Linear
Long-Term Drift	< 5%/year
Expected Lifetime	> 2 years

Electrical Specifications

Output Signal	4-20 mA two-wires
Sensor Lifetime Self-Test	The TB420 module starts the self-test after being switched on for 30 seconds, the test lasts 20 seconds and the module continuously emits a signal of 3.8 mA. Once the test is complete, the module returns to the normal measuring state.
Fault Output	3.5 mA Fault Signal: Sensor signal weak
	3 mA Fault Signal: Sensor failure or sensor disconnection
Supply Voltage	9 to 24V DC, 24V DC recommended
Supply Current	3 to 22 mA
Power Consumption	< 0.6 W
Maximum Loop Resistance	< 500 R @ 24V DC
Protection	Reverse polarity protection

Environment Specifications

Operating Temperature	-40 ℃ to +55 ℃
Operating Humidity	15 - 95 % RH. non-condensing
Operating Pressure	Atmospheric pressure ± 10 %
Storage Temperature	0 ℃ to 20 ℃

Mechanical Specifications

Size (Including Gas Sensor)	45 x 35 x 21.7 mm
Size (Without Gas Sensor)	45 x 35 x 11.9 mm
Weight (Including Gas Sensor)	11.0 g
Weight (Without Gas Sensor)	7.1 g
Warranty	12 months
Package	ESDBAG Size: 120 x 150 mm

Certification

Ex ia IIC Ga Intrinsic safety (certificated Temperature T6 -40 ℃ to + 55 ℃)

RoHS Directive 2011/65/EU with amendment (EU)2015/863

» Order Information

Product	Gas Formula	Partnumber	Range	Resolution	Response Time
Smart Bromine Sensor Module	Br_2	04-TB420-EC4-Br$_2$-1-01	0-1 ppm	0.001 ppm	T90 < 60 s
Smart Chorine Sensor Module	Cl_2	04-TB420-EC4-Cl$_2$-5-01	0-5 ppm	0.001 ppm	T90 < 60 s
		04-TB420-EC4-Cl$_2$-50-01	0-50 ppm	0.01 ppm	T90 < 60 s
Smart Chlorine Dioxide Sensor Module	ClO_2	04-TB420-EC4-ClO$_2$-5-01	0-5 ppm	0.001 ppm	T90 < 60 s
Smart Fluoride Sensor Module	F_2	04-TB420-EC4-F$_2$-5-01	0-5 ppm	0.001 ppm	T90 < 60 s
Smart Hydrogen Chloride Sensor Module	HCl	04-TB420-EC4-HCl-30-01	0-30 ppm	0.001 ppm	T90 < 80 s
Smart Hydrogen Fluoride Sensor Module	HF	04-TB420-EC4-HF-10-01	0-10 ppm	0.001 ppm	T90 < 80 s
Smart Ammonia Sensor Module	NH_3	04-TB420-EC4-NH$_3$-100-01	0-100 ppm	0.01 ppm	T90 < 60 s
		04-TB420-EC4-NH$_3$-500-01	0-500 ppm	0.1 ppm	T90 < 60 s
		04-TB420-EC4-NH$_3$-1000-01	0-1000 ppm	0.1 ppm	T90 < 60 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 AQS 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 sensors are designed for use in a variety of environmental conditions. However, due to the principles and characteristics of electrochemical sensors and to ensure normal use, users must strictly follow this article during storage, assembly and operation of the module. General-purpose PCB circuit board application methods and illegal applications or violation of the application will not be covered by the warranty. Although our products are highly reliable, we recommend checking the module'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.

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