

# TGS 5042 - for the detection of Carbon Monoxide

### Features:

- \* Battery operable
- \* High repeatability/selectivity to CO
- \* Linear relationship between CO gas concentration and sensor output
- \* Simple calibration
- \* Long life
- \* UL recognized component
- \* Meets UL2034, EN50291, and RoHS requirements

### Applications:

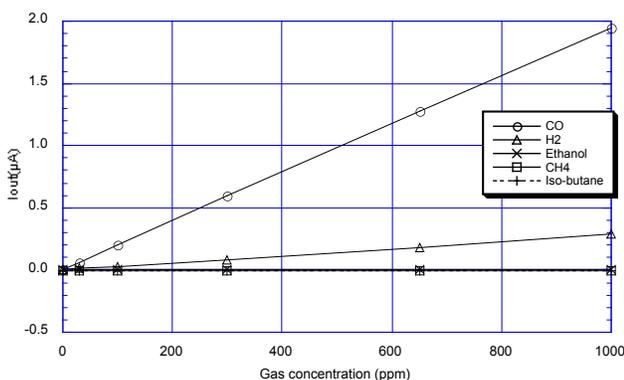
- \* Residential and commercial CO detectors
- \* CO monitors for industrial applications
- \* Ventilation control for indoor parking garages
- \* Fire detection

Figaro's **TGS5042** is a battery operable electrochemical sensor which offers several advantages over traditional electrochemical sensors. Its electrolyte is environmentally friendly, it poses no risk of electrolyte leakage, can detect concentrations as high as 1% CO, operates in a range from -5° and +55°C, and it has lower sensitivity to interferant gases. With a long life, good long term stability, and high accuracy, this sensor is the ideal choice for CO detectors with digital display. OEM customers will find individual sensors data printed on each sensor in bar code form, enabling users to skip the costly gas calibration process and allowing for individual sensor tracking. TGS5042 utilizes a standard AA battery-sized package.



The figure below represents typical sensitivity characteristics, all data having been gathered at standard test conditions (see reverse side of this sheet). The Y-axis shows the output current of the sensor ( $I_{out}/\mu A$ ) in each gas. Output current is linear to CO concentration, with a deviation of less than  $\pm 5\%$  in the range of 0~500ppm.

### Sensitivity Characteristics:

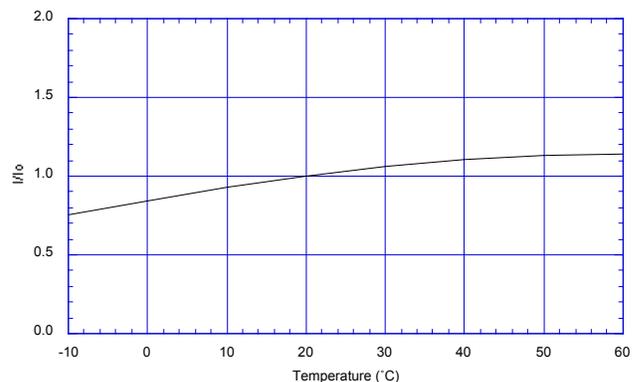


The figure below represents typical temperature dependency characteristics. The Y-axis shows the sensor output ratio ( $I/I_0$ ) as defined below. The linear relationship between  $I/I_0$  and CO concentration is constant regardless of the CO concentration range.

$I$  = Sensor output current in 400ppm of CO at various temperatures

$I_0$  = Sensor output current in 400ppm at 20°C/50%RH

### Temperature Dependency:



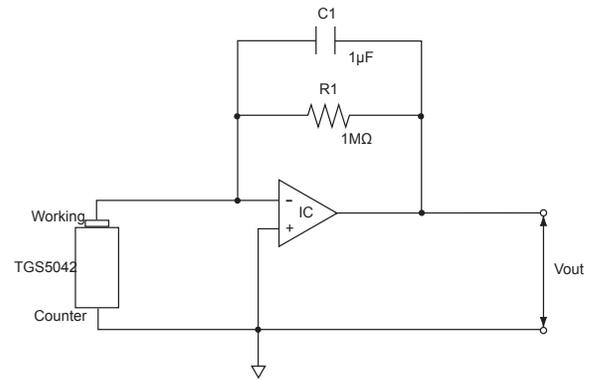
### Basic Measuring Circuit:

The diagram at the right shows the basic measuring circuit of TGS5042. The sensor generates a minute electric current which is converted into sensor output voltage ( $V_{out}$ ) by an op-amp/resistor ( $R_1$ ) combination.

Figaro recommends the following electrical parts:

R1 : 1M $\Omega$   
C1 : 1 $\mu$ F  
IC : AD708

**NOTE:** When voltage is applied to the sensor output terminal, the sensor may be damaged. Voltage applied to the sensor should be strictly limited to less than  $\pm 10$ mV. An additional resistor or FET is required to prevent polarization of the sensor when  $V_c$  is off.



**Basic measuring circuit of TGS5042**

### Specifications:

Item	Specification
Model number	TGS5042-A00 (pin version) TGS5042-B00 (ribbon version)
Target gases	Carbon monoxide
Typical detection range	0 ~ 10,000ppm
Output current in CO	1.2~2.4nA/ppm
Baseline offset(*1)	< $\pm 10$ ppm equivalent
Operating temperature(*2,*3)	0°C ~ +50°C (continuous) -5°C ~ +55°C (intermittent)
Operating humidity	5 ~ 99%RH (no condensation)
Response time (T90)	within 60 seconds
Storage conditions (*2,*3)	-5°C ~ +55°C
Weight	approx. 12g
Standard test conditions	20 $\pm$ 2°C, 40 $\pm$ 10%RH

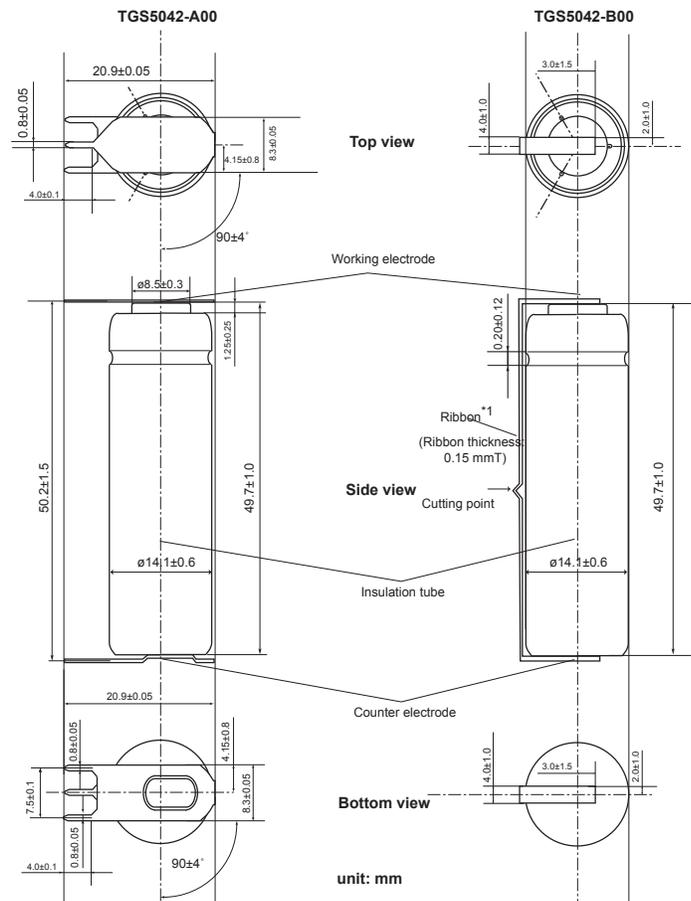
(\*1) Represents sensor output in air under operating conditions

(\*2) If the water in the reservoir should freeze very rapidly (typically occurs only under artificially created conditions), irreversible change to sensor characteristics would occur. To avoid this risk, the sensor is recommended to be positioned with its cap (working electrode) facing up.

(\*3) Please contact Figaro for more information if the required temperature range would exceed the specified limits.

**NOTE:** When ordering, please be sure to specify the full model number, including the suffix.

### Structure and Dimensions:



**NOTE 1:** When the -B00 sensor is shipped, the working electrode and counter electrode are connected (i.e. short circuited) by a metal ribbon (-B00) in order to avoid polarization of the electrodes. To measure the sensor output, the ribbon should be cut (-B00) and the sensor connected to a measuring circuit (see example above). The cutting point as indicated can be used to cut the ribbon easily. The -A00 sensors are shipped in an open-circuit condition, so stabilization time of one hour (typical) is recommended (please refer to Technical Information for TGS5042 for further information).

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