



# OEM Digital NDIR Carbon Monoxide Sensor

## Model 2015SPI-CO-N

### Flow Through Gas Cell, Full Scale 0-100% CO

The **VALTRONICS** Model 2015SPI-CO-N is an OEM **NDIR CO** sensor with digital signal processing and temperature compensation. The **SPI** (Serial Peripheral Interface) is described in Note A59 & A64. Each serial numbered sensor is individually gas calibrated and temperature compensated at the factory.

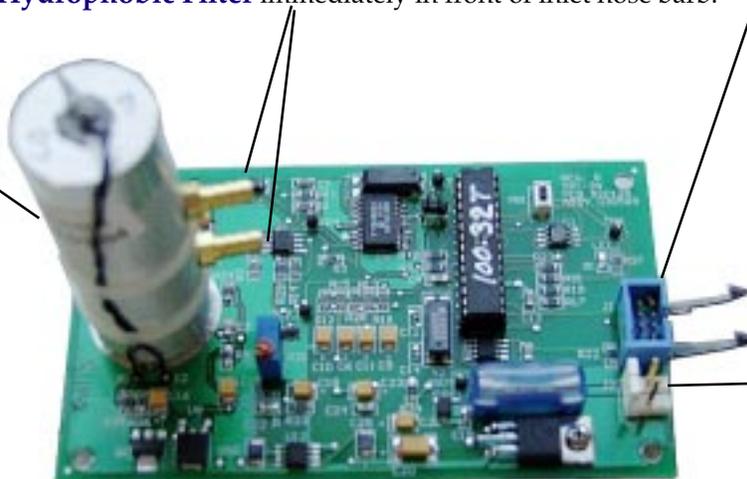
**RS-232 Test Board** for field gas calibration and diagnostic use (See **Application Note A66** ).

### Model 2015SPI-CO-N Specifications:

- Method: ..... **NDIR** with Digital Signal processing and temperature compensation
- Gas: ..... **Carbon Monoxide (CO)**
- Full scale & **RANGE**: ..... **0-100% CO** 16 bit A/D converter: Delta-Sigma Conversion Method
- CAUTION**: ..... **Lower Explosive Limit ( LEL )** is **12.5 %** CO by volume in air
- ..... **Upper Explosive Limit ( UEL )** is **74%** CO by volume in air
- Note**: **CO** levels near or above the LEL, unit should be enclosed in an **explosion proof housing** with flame arrestors in the gas path.
- Input Power: ..... **+12 VDC** (@ 0.250 amp max., 0.135 amp typ, 16.0 volts max, 8.0 volts min)
- Accuracy: ..... 0 to **20.0±1.0% CO** and 5% of reading from **20 to 100% CO** .
- Resolution / Repeatability : ..... **±0.1% CO** (challenge with same gas sample multiple times & assure zero)
- Stability: ..... Short term < 0.1% CO in 20 sec .at constant temperature
- ZERO Temperature stability: ..... Less than 0.1% of full scale per degree C change from calibration temperature
- Output/Input Signals: ..... Digital **SPI** (16 bit Serial Digital): See Notes **A59 & A64**
- RS232 Test Board**: ..... Required for diagnostic & test use , see **Application Note A66**
- LED** Indicators: ..... **IR** Source ON/OFF Indicator, Power ON indicator
- Operating Temperature Range: ..... 0 to 50°C (32° to 122°F) see **Application Note A12**
- Ambient Relative Humidity: ..... 0 to 95% RH non-condensing: see **Application Note A30**
- CO<sub>2</sub>** Interference: ..... Less than 2% **CO** response to 100% **CO<sub>2</sub>**
- ..... Less than 2% **CO** increased response with a mixture of 20% **CO** & 1.6% **CO<sub>2</sub>**
- Storage Temperature range: ..... -40 to +70°C (-40 to +158°F)
- Weight: ..... Less than 0.25 pound (<0.11 kilogram )
- Clearance Dimensions**: PCB Card: **5.75 inch x 3.0 inch x 3.25 inch** vertical see page 3 for mounting

**Hose barbs** for 1/8 inch ID tubes, **push** gas into cell at a rate between 0.3 to 1.0 LPM. Use **Hydrophobic Filter** immediately in front of inlet hose barb.

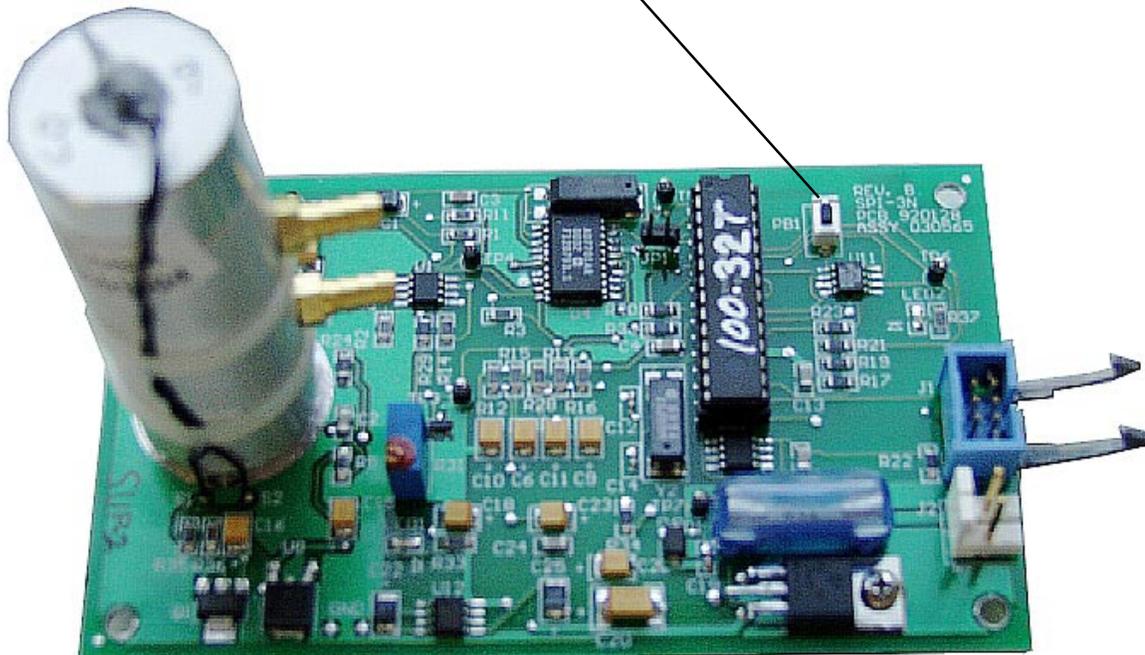
**Model # & Serial # label** on gas cell



**J1: I/O connector**: Thomas & Betts 501-6-27ESR a 6 pin keyed header with ejector latches. See **Application Note A75** for interface connector part numbers

**J2: 12 VDC input power** 2 pin, 0.156 inch center header

**Note:** If JP1 is installed the sensor will go into **SLAVE** mode after a power on reset or the **RESET** switch is pressed



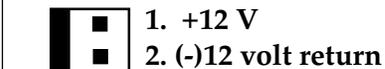
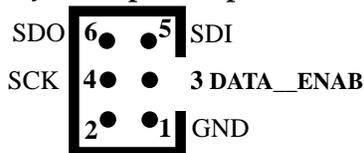
See **Application Note A67** for gas conditioning requirements and information about gas sample pumps and filters. Use a **Hydrophobic Filter** immediately in front of gas inlet hose barb. **Push gas through the gas cell at a rate between 0.3 to 1.0 liter per minute.**

**Important Note:** Digital ground **Pin# 1** MUST be directly connected to the Master Microprocessor's digital ground, **NOT** just connected via the DC power supply common.

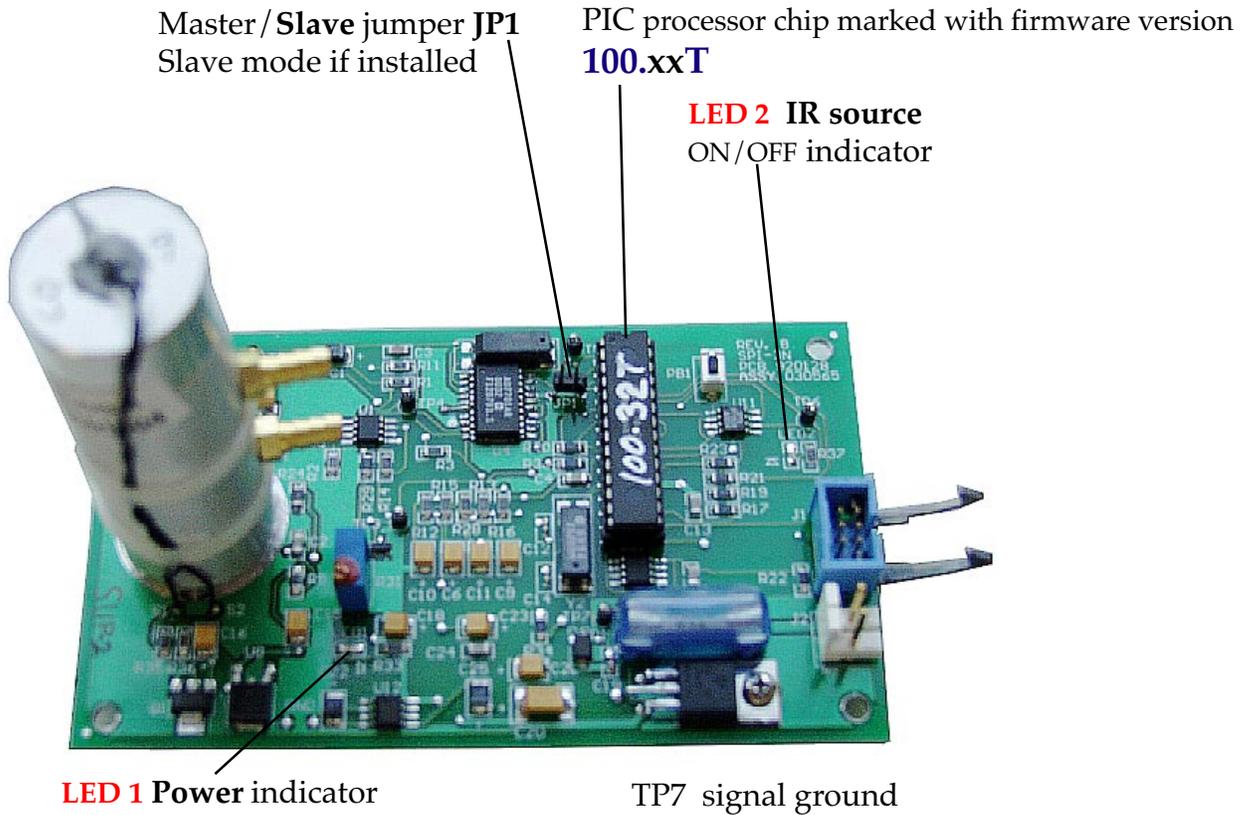


See **Application Note A75** for interface connector part numbers. Keep **J1** interface cable shorter than 18 inches. See **Application Note A64** for 16 bit serial digital output timing diagram. See Note A59 for input control.

**J1: Output / Input**

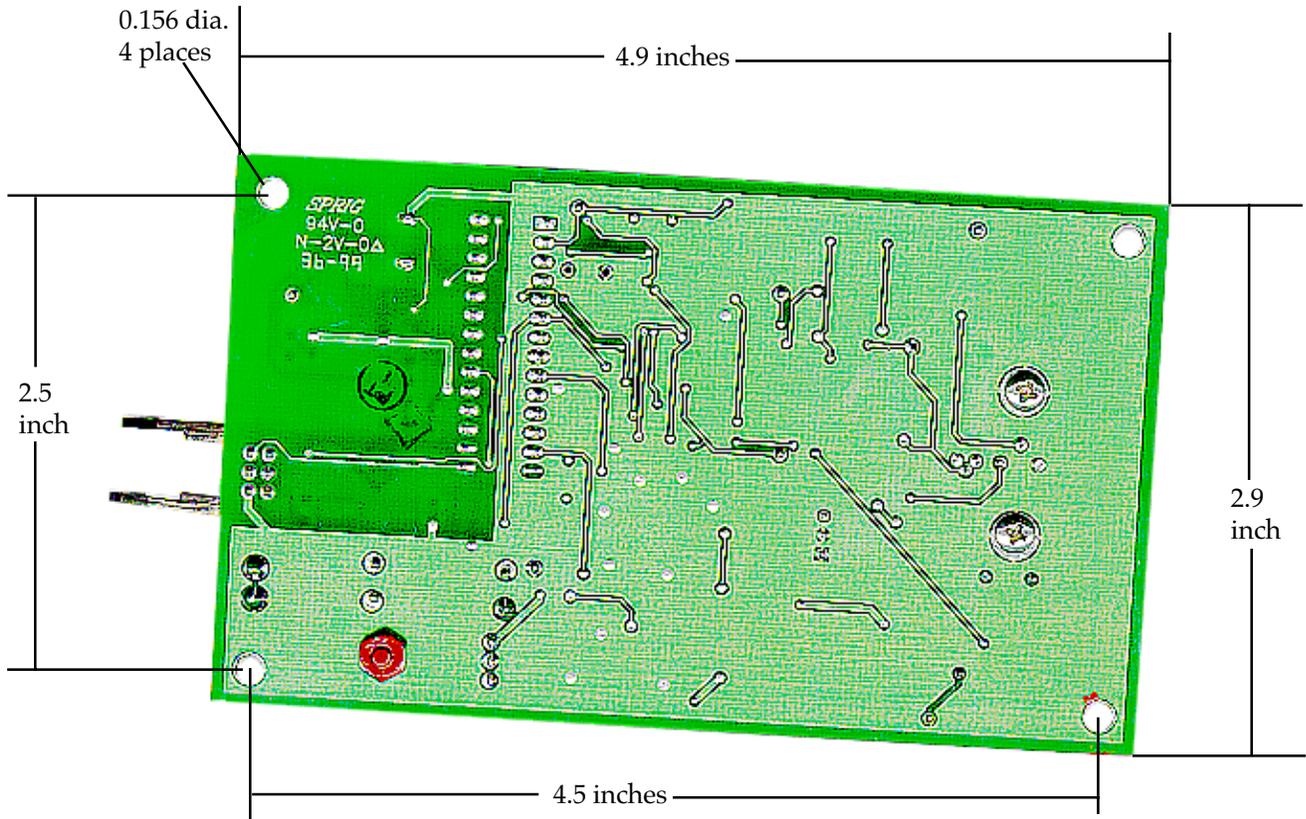


**J2:** 12 VDC input power, 2 pin, 0.156 inch center header Panduit MLSS156-2-D-B.



Clearance Dimensions: 5.75 inches x 3.0 inches x 1.5 inches

**Note:** Provide **clearance** for the output hose barb, input flow adjust needle valve and an additional **0.75 inch** clearance for connector **J1** latches



## Model 2015SPI-CO-N 0-100% CO ( Carbon Monoxide )

See **Application Note A67** for information about gas conditioning and parts for filtering the gas and preventing water droplets from entering the gas cell. A **hydrophobic filter** in front of the gas inlet hose barb is required as a minimum to prevent particles & droplets from getting into the gas cell. See **Application Note A79** for more info about the hydrophobic filter.

It is important that gas is **pushed** through the gas cell and **NOT drawn** through it, since the gas cell is not hermetically sealed. If you push gas through the cell at a flow rate between about 0.3 to 1.0 liter per minute, you will create a slight positive gauge pressure inside the cell. Flow rates higher than about 1 liter per minute may result in pressures inside the cell that increase the gas density. The outlet hose barb should have as little flow restriction after it as is possible to minimize the build up of pressure inside the cell. See **Application Note A12** for effects of pressure & temperature on gas density.

**CAUTION:** ..... **Lower Explosive Limit ( LEL )** is **12.5 % CO** by volume in air  
..... **Upper Explosive Limit ( UEL )** is **74% CO** by volume in air

**Note:** For **CO** levels near or above the LEL, the unit should be enclosed in an **explosion proof housing** with flame arrestors in the gas path.

**CAUTION:** ..... **CO** is **TOXIC**

The **Threshold Limit Value ( TLV )** : (TLV is the maximum recommended continuous exposure for an 8 hour period)

TLV<sub>1</sub> for **CO<sub>2</sub>** = **0.5%** (5000 ppm) Carbon Dioxide is **NOT** toxic but does displace oxygen (see App Note A11)

TLV for **CO** = **0.005% (50 ppm)**

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*1: Threshold Limit Values for Chemical Substances in the Work Environment Adopted by ACGIH* is obtainable from the Publications Office, American Conference of Governmental Industrial Hygienists, 6500 Glenway Avenue, Building D-7, Cincinnati, OH 45211-4438 (see Ref C-1; ref C-2 is the West German counterpart). This publication provides 8-hour, 15-minute, and instantaneous case limits. It is a source of concentration limits for many chemical substances and physical agents for industrial hygiene use. In light of the constantly changing state of knowledge, the document is updated annually. It cautions the user, " The limits listed in this book are intended for use in the practice of industrial hygiene as guidelines or recommendations in the control of potential health hazards and for no other use."

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