

## REFRIGERANT SENSOR

## MODEL TOX-REFRIG/ANA

### REFRIGERANTS MONITORED

R-11	R-22	R-123	R-141b	R-500
R-12	R-113	R-134a	R-152a	R-502

*\*Many Others\**

### GENERAL DESCRIPTION:

Toxalert's refrigerant sensor/transmitter is designed for use in conjunction with Toxalert and other standard 4 to 20 mA loop or voltage controllers.

The Tox-Refrig/ANA refrigerant sensor is a metal oxide semi-conductor (solid state) cell with extremely long element life. The Tox-Refrig/ANA transducer requires 24 vdc power and has a 4 to 20 mA output current which is proportional to the refrigerant gas concentration. The cover plate inside the explosion proof enclosure contains: test points (which are receptacles for voltage meter probes) for measurement of sensor signal, heater voltage; visual indicator for sensor check; and potentiometers adjustments for zero and span.



### BACKGROUND:

ANSI/ASHRAE Standard 15-1994, Safety Code for Mechanical Refrigeration, lays out requirements for the monitoring of mechanical equipment rooms containing refrigeration equipment. Paragraph 8.13.2 reads in part:

“Each machinery room shall contain a detector, located in an area where refrigerant from a leak will concentrate, which shall actuate an alarm and mechanical ventilation in accordance with 8.13.4 at a value not greater than the corresponding TLV-TWA (or toxicity measure consistent therewith).”

### FEATURES

- Sensitivity check indicator
- Low voltage circuits
- 4 to 20 mA output signal
- Meets ASHRAE Std. 15-1994
- Explosion Proof Housing
- Current output may be read as a voltage during calibration
- Sensor failure indicator
- Interfaces directly to DDC systems

Also paragraph 7.4.2, Rules:

“(d) detectors (refrigerant, oxygen, etc.) are located in area where refrigerant vapor leak will be concentrated so as to provide warning at a concentration not exceeding the refrigerant(s) TLV-TWA (detectors are not required for ammonia due to its self-alarmed character);”

&

“(f) when the quantity of refrigerant, except Groups A1 and B1 and ammonia exceeds Table 1 quantities, the area shall be classified as a hazardous location and all electrical equipment shall conform to the requirements of Class 1, Division 2, of the National Electrical Code. 9.”

Because of the requirements in Rule 3(f), all of Toxalert’s refrigerant sensors are supplied in an explosion proof housing.

**TABLE #1**

*REFRIG. ID#	*SAFETY CLASSIF.	TLV (PPM)	AEL (PPM)	PEL (PPM)	IDHL
R-11	A-1	1000		1000	
R-12	A-1		1000	1000	
R-22	A-1	1000			
R-113	A-1	***C1000			
R-123	B-1		30		1000
R-134a	A-1		1000	1000	
R-142b	A-2		1000		
R-152a	A-2		1000		
R-500	A-1			1000	
R-502	A-1	1000		1000	
**R-717(NH <sub>3</sub> )					
AMMONIA	B-2	25			

\* The Refrigerant designation number and Safety Classification are from ANSI/ASHRAE Standards 34-1992.

\*\* Toxalert has Ammonia Sensors to monitor for ammonia refrigerant (model TOX-NH<sub>3</sub>/ANA).

\*\*\* The concentration that should not be exceeded during any part of the working exposure.

TLV - Threshold Limit Value, established for industrial chemicals by American Conference of Government Industrial Hygienists, is the time weighted average concentration of an airborne chemical to which nearly all workers may be exposed during an 8 hour day, 40 hour week without adverse effect.

AEL - Acceptable Exposure Limit - TWA - 8 hours/day, 40 hours/week.

PEL - Permissible Exposure Limit - TWA - 8 hours/day, 40 hours/week.

IDHL - (Immediately Dangerous to Life and Health) the maximum concentration from which unprotected persons are able to escape within 30 minutes without impairing symptoms or irreversible health effects.

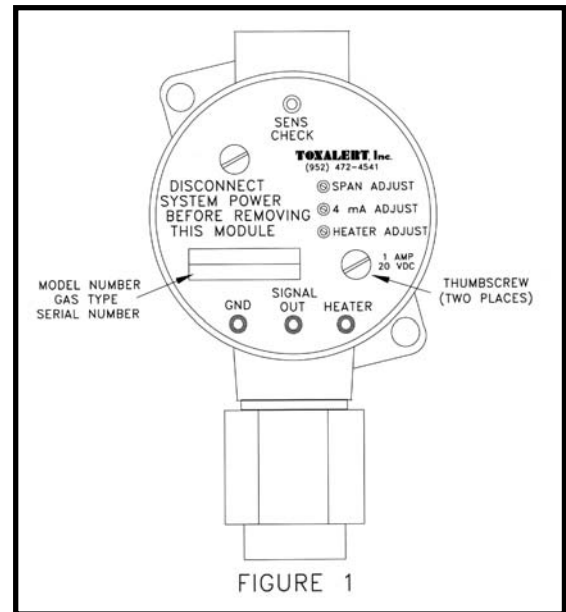
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## UNIT INDICATORS:

Refer to Figure 1.

The Tox-Refrig/ANA has the following to assist in installation and system diagnostics:

1. Test points (which are receptacles for voltage meter probes):
  - Signal out (voltage)
  - Heater voltage
2. Visual indicator (LED) of sensor check
3. Potentiometer adjustments for
  - Zero
  - Span
  - Heater voltage



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## SPECIFICATIONS

- **Type:** Metal oxide semi conductor sensor
- **Range:** 10 to 500 PPM
- **Response Time:** 80% in less than 30 seconds
- **Sensing Element Life:** 4 years in normal service
- **Electrical Data:**
  - Input voltage:** 24VDC nominal (14 to 30VDC)
  - Input power:** 2.1 Watts
  - Output signal:** 4-20 mA DC non-linear
- **Unit Construction:**
  - Housing:** Division 1, Class 1, Group C & D
  - Physical:** 6.75" x 4" x 3.5" (HxWxD)  
(17.1cm x 10.2cm x 8.9cm)

- **Operating Temperature:** 14°F to 104°F  
(-10°C to 40°C)
- **Storage Temperature:** -67°F to 185°F  
(-55°C to 85°C)
- **Relative Humidity:** 5 to 95% non-condensing

**Loop Resistance:** 800 ohms maximum  
**Input current:** 86 mA at 29VDC  
**Wiring:** 3 wire non-isolated

**Mounting style:** Surface  
**Weight:** 2 pounds (0.9kg)  
**Material:** Cast aluminum epoxy painted

# SAMPLE GUIDE SPECIFICATIONS

Provide a refrigerant leak detection sensor(s) to monitor for R-xxx refrigerant leaks. The sensing element shall be solid state metal oxide semiconductor type and have a typical life of at least 4 years. The sensor shall be powered by 24 vdc and have a 4 to 20 mA output signal.

The sensor shall be housed in an industrial style, explosion proof housing and have explosion proof conduit connections to the housing to maintain system integrity.

**NOTE:**

1. Refrigerant R744 is Carbon Dioxide (CO<sub>2</sub>) - Use a Toxalert CO220 sensor which has both a digital and a 4 to 20 mA output. See catalog section 3.
2. Refrigerant R717 is Ammonia (NH<sub>3</sub>) - Use a Toxalert Tox-NH<sub>3</sub>/ANA sensor which as a 4 to 20 mA output. See catalog section 6.
3. Refrigerant R764 is Sulfur Dioxide (SO<sub>2</sub>) - Use a Toxalert Tox-SO<sub>2</sub>/ANA sensor which has a 4 to 20 mA output. See catalog section 6.

## How to order

R-11	= Tox-Rfg/1/M/A	R-113	= Tox-Rfg/1/R/A
R-12	= Tox-Rfg/1/N/A	R-142b	= Tox-Rfg/1/S/A
R-22	= Rox-Rfg/1/O/A	R-152a	= Tox-Rfg/1/T/A
R-123	= Tox-Rfg/1/P/A	R-500	= Tox-Rfg/1/U/A
R-134a	= Tox-Rfg/1/Q/A	R-502	= Tox-Rfg/1/V/A

\* For other refrigerants consult factory \*

