

REFRIGERANT MONITOR MECHANICAL ROOM REFRIGERANT LEAK DETECTION SYSTEM

MODEL: TOX-REFRIG

TYPICAL APPLICATIONS:

- Mechanical Rooms in:
 - Commercial Buildings
 - College/Universities
 - Hospitals
 - Sports Facilities
- Refrigerant Warehouses
- Industrial Chemical Plants
- Resorts
- Supermarkets
- Blood Banks

GENERAL DESCRIPTION:

TOXALERT'S Model TOX-REFRIG Refrigerant Leak Monitoring System consists of a remote refrigerant sensor or sensors and a controller/annunciator panel. The TOX-REFRIG system is designed to continuously monitor mechanical refrigeration equipment rooms for refrigerant leaks and upon detecting a leak, the unit shall start ventilation equipment and annunciate alarm conditions. ANSI/ASHRAE Standard 15-2010 calls for the use of refrigerant leak detectors.

The controller's first stage or "Warning (Purge) Stage" activates a set of relay contacts to operate exhaust fan(s) or other mechanical equipment, and the sensor LED on panel front will light green. The second stage or "Alarm Stage" activates an audible alarm with reset and silence pushbutton switch, an auxiliary set of relay contacts, and the sensor LED on panel front will light red. On a decrease in refrigerant concentration, the alarm stage automatically resets and the warning stage is field selectable for manual or automatic reset- (manual reset select). If the manual reset select option is turned on and the sensor detects a warning or alarm condition, the warning relay will remain activated and the sensor LED on panel front will blink green, even after the concentration has decreased. That function can be manually reset via a reset button located on panel front.

A "Purge" switch on the controller front has two positions- ON & AUTO. In the AUTO position, the warning stage relay energizes automatically from sensor monitoring; in the ON position, the warning contacts are manually energized.



Tox-Refrig



Tox-Refrig/ANA

The remote refrigerant sensor(s) is continuously monitored by the controller for sensor failure. If the sensor malfunctions, the controller shall cause the sensor LED to blink red, and activate the warning stage relay as well as a sensor malfunction relay contact.

FEATURES

- Warning (purge) stage indication
- Alarm stage indication
- Sensor malfunction indication
- Relay outputs for control of ventilation equipment and remote alarming (Warn, Alarm, Sensor Malfunction)
- Optional auxiliary relay contacts for shutdown of combustion equipment
- Operation meets ANSI/ASHRAE 15-2010
- Digital readout (Refrigerant in PPM)
- Field adjustable setpoints with security
- Test function
- Field selectable warning stage reset (manual/auto)
- Audible alarm (integral to control unit)
- Interface to automation system (digital and/or optional analog)
- Multiple sensor inputs (optional)
- Remote Alarm Capabilities
- BACnet MS/TP Protocol
- Optional Strobe Light

MECHANICAL ROOM REQUIREMENTS

In the Forward of ASHRAE Standard 15-2010, it states in part, “All machinery rooms are required to have detectors that actuates an alarm and mechanical ventilation at a value not greater than the corresponding TLV-TWA (or toxicity measure consistent therewith”. ASHRAE Standard 15-2010, section 7 & 8 requires detectors to monitor for refrigerant leaks. The standard reads as follows:

Paragraph 8.11.2.14 reads-

“Each machinery room shall contain a detector, located in an area where refrigerant from a leak will concentrate, that actuates an alarm and mechanical ventilation in accordance with 8.11.4 at a value not greater than the corresponding TLV-TWA (or toxicity measure consistent therewith).”

Paragraph 8.11.6

“Combustion equipment shall not be installed in the same machinery room with refrigerant containing equipment except under one of the following conditions:

- (b) a refrigerant detector is employed to automatically shut down the combustion process in the event of refrigerant leakage.

Exception: For ammonia refer to paragraph 8.12(h).

SENSOR LOCATION:

ASHRAE Std. 15-2010- “locate in an area where refrigerant from a leak will concentrate” is very ambiguous and for good reason. There are a wide variety of equipment room configurations and sizes.

A few keys to locating refrigerant sensors are: (1) remember that occupant safety is the primary motive for installing the sensor; (2) determine the air flow pattern in the room; (3) the primary hazard of a refrigerant to a room occupant is the inhalation of the toxic refrigerant.

Mounting height of refrigerant sensors should be within 20 inches of the floor. The Forward of Std. 15-2010 states , “(all commonly used refrigerants, except ammonia (R-717)..... are heavier than air).” By placing the sensor below the common breathing height of 5 to 6 feet, you will provide and added margin of safety.

Floor Plan Location- If ventilation equipment is running continuously, the sensor should be located between the refrigeration system and room exhaust, as close to the refrigerant equipment as possible. One sensor will usually be adequate for applications with two (or less) chillers, provided chillers are aligned for good air flow and both chillers use the same refrigerant. If ventilation equipment is NOT running continuously or if the direction of airflow is not obvious- locate the sensor(s) next to the refrigeration system. As a general guideline, a refrigeration system should not be more than 50 feet from a refrigeration sensor.

NOTE: See Toxalert Technical Bulletins- “ToxRefrig InstRec- Section 5 (of the product catalog)”.

The following is a partial list of refrigerants that Toxalert monitors.

TABLE 1

<u>Refrigerant</u>	<u>Name</u>	<u>TLV-TWA^(a) PPM</u>	<u>Refrigerant</u>	<u>Name</u>	<u>TLV-TWA PPM</u>
Safety Group A1^(b)					
R-11	Trichlorofluoromethane	1100	R-402A	R-125/290/22	1000
R-12	Dichlorodifluoromethane	18000	R-404A	R-125/143a/134a	1000
R-13	Chlorotrifluoromethane	1000	R-407C	R-32/125/134a	1000
R-13B1	Bromotrifluoromethane	1000	R-410A	R-32/125	1000
R-14	Tetrafluoromethane (Carbon Tetrafluoride)	1000	R-500	R-12/152a	1000
R-22	Chlorodifluoromethane	1000	R-502	R-22/115	1000
R-113	Trichlorotrifluoroethane	1000	R-503	R-23 & R-13	1000
R-114	Dichlorotetrafluoroethane	1000	R-507	R-125 & R-143a	1000
R-115	Chloropentafluoroethane	1000	R-740	Argon
R-134a	1,1,1,2-Tetrafluoroethane	1000	R-744	Carbon Dioxide	5000
Safety Group A2^(b)					
R-142b	1-Chloro-1, 1-Difluoroethane	1000	R-152a	1,1-Difluoroethane	1000
Safety Group A3^(b)					
R-170	Ethane	1000	R-600a	2-Methyl propane (Isobutane)	1000
R-290	Propane	1000	R-1150	Ethene (Ethylene)	200
R-600	Butane	1000	R-1270	Propene (Propylene)	500
Safety Group B1^(b)					
R-123	2,2-Dichloro-1, 1,1-Trifluoroethane	50	R764	Sulfur Dioxide
Safety Group B2^(b)					
R-40	Chloromethane (Methyl Chloride)	R-717	Ammonia	25
R-611	Methyl Formate	100			

(a) threshold limit value time weighted average: the time – weighted average concentration for a normal 8-hour workday and a 40 hour work week to which nearly all works may be repeatedly exposed, day after day, without adverse effect (as defined by ACGIH®). TLV® is a trademark of the American Conference of Governmental Industrial Hygienists (ACGIH®).

(b) Defined by ANSI/ASHRAE Standard 34-2010

Note – See Toxalert Technical Bulletin Refrig for more information on refrigerant classifications.

SPECIFICATIONS

TOX-REFRIG CONTROLLER-

Input Power: 120VAC, 60Hz, 1 Amp(fused)
Warning Setpoint: Field adjustable, factory set
Alarm Setpoint: Field adjustable, factory set
Warning Stage: Visual indication, Form C relay contacts
Alarm Stage: Visual indication, Form C relay contacts
Sensor Malfunction: Visual indication, warning stage activation, and separate Form C relay contacts
Digital Readout: 3 1/2 digit, red LED, in PPM

Relay Contacts: Rated for 5 Amps @ 120VAC, resistive load
BACnet: MS/TP communications
Operating Range: 32°F to 120°F (0°C to 49°C)
Mechanical:
 Dimensions: 14”H x 12”W x 4”D
 Classification: NEMA 1
 Weight: 12 lbs

TOX-REFRIG/ANA SENSOR: (specs for most Toxalert refrigerant sensors) – [Order Sensor Separately]

Method: Semiconductor cell diffusion barrier type
Range: 15 to 500 PPM
Response: 90% of concentration in less than 30 sec.
Operating Range:
 Temp: 14°F to 104°F. (-10°C to 40°C)
Humidity: 5 to 95% non-condensing

Typical Life: Four years in normal service
Maintenance: Periodic calibration
Mechanical:
 Dimensions: 6.75”H x 4”W x 3.5”D
 Material: Cast aluminum epoxy painted
 Classification: Class I Division I Groups C, D
 Weight: 2 lbs.

TOX – REFRIG MONITOR

FIELD WIRING & FUNCTION DISPLAY

