

**REFRIGERANT LEAK AND CHILLER MALFUNCTION
MONITORING SYSTEM**

OPERATION MANUAL

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- 1. Master Panel Layout Dwg No. 976601**
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- 4. Starter Control Circuit Dwg No. 976604**
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- 7. Refrigerant Leak Alarm Module Dwg No. 976603**

REFRIGERANT LEAK AND CHILLER MALFUNCTION MONITORING SYSTEM

1.0 SEQUENCE OF OPERATION

The Refrigerant Leak and Chiller Malfunction Monitoring System is comprised of a Master Panel, Remote Panel and Refrigerant Sensor(s).

Up to four chillers may be accommodated per system. Two alarm conditions are monitored:

1. Refrigerant leak.
2. Chiller malfunction.

Either one of the Alarm conditions causes a flashing light and buzzer to be activated on the Master Panel and Remote Panel and also closes a relay contact for connection to a BAS. A "RED" pilot light will indicate if this alarm condition has been caused by a refrigerant leak. Alarm conditions are latched and may only be reset by depressing the Alarm Reset Push-button on the Master Control Panel. Refrigerant Leak alarm contacts are available for connection to a BAS and Mechanical Ventilation System. Either of the Alarms may be tested by depressing the Chiller Alarm Test or the Leak Alarm Test Push-button.

24VAC at 2A power is available at the Master Panel.

The "System Power" switch must be in the "ON" position.
The "System Power On" green pilot light will be on.

1.1 NORMAL MODE

- 1.1.1 With the refrigerant concentration in the MR lower than the TLV-TWA for the refrigerant used, the system will be in normal mode.
- 1.1.2 The "Ventilation Fan" switch may be set to "Normal" or "Emergency". In "Normal" the MR exhaust fan runs at reduced airflow. A gas alarm will override this mode and run the fans at full airflow. In "Emergency" mode or during a gas alarm the MR exhaust fan runs at full airflow. The "Ventilation Fan" switch may be set at either panel. The remote panel switch is key locked.
- 1.1.3 The "Chiller" switch should normally be set to "Auto". If it is set to "OFF" all chillers will turn off. The "chiller" switch may be set at either panel. The remote panel switch is key locked. The chiller will not be able to run during a gas alarm condition in either mode.
- 1.1.4 The "Refrigerant Leak Alarm Test" push button may be pushed to test the control circuit to ensure the audible and visual alarms activate as well as the emergency mode of the Ventilation system. This push button must be held in to test the Ventilation system.

- 1.1.5 The "Chiller Alarm Test" push button may be pushed to test the control circuit to ensure the audible and visual alarms activate. The chillers will NOT be shut off.
- 1.1.6 The "Alarm Reset" button will reset the audible and visual alarms activated as long as the concentration of refrigerant has been reduced to lower than the TLV-TWA of the refrigerant used. It should be noted that the emergency mode of the mechanical ventilation system will automatically reset after the concentration of refrigerant has been reduced to lower than the TLV-TWA for the refrigerant used.
- 1.1.7 The "Ventilation Fan Normal" green pilot light will be illuminated as long as the mechanical ventilation fan is NOT in the emergency mode.
- 1.1.8 The "Refrigerant Leak" red pilot light will be off.
- 1.1.9 The audible and visual alarms will be off unless one of the test push buttons has been pushed.

1.2 EMERGENCY MODE (Refrigerant Leak)

- 1.2.1 With the refrigerant concentration in the MR equal to or higher than the TLV-TWA for the refrigerant used the system will be in the emergency mode.
- 1.2.2 The audible and visual alarms on both panels will be activated.
- 1.2.3 The emergency mode of the mechanical ventilation fan will be activated.
- 1.2.4 The "Ventilation Fan Normal" green pilot light will be off.
- 1.2.5 The "Refrigerant Leak" red pilot light will be on.
- 1.2.6 The CSA-B52 code does not require the chillers to be shut off if there is a refrigerant leak. However, this may be done manually by the operator at either panel by switching the "Chiller" switch from "Enabled" to "Off".
- 1.2.7 The "Alarm Reset" push button will reset the audible and visual alarms on both panels as long as the concentration of refrigerant has been reduced to lower than the TLV-TWA of the refrigerant used.
- 1.2.8 A set of dry contacts within the master panel will close. This can be used to indicate to the BAS that a refrigerant leak has occurred. These contacts will automatically reset once the refrigerant concentration is lower than TLV-TWA of the refrigerant used.
- 1.2.9 The "Alarm Silence" push button on either panel may be pushed to silence the audible alarm. This circuit will automatically reset itself to ensure the audible alarm sounds at the next emergency mode.

1.3 EMERGENCY MODE (Chiller Malfunction)

- 1.3.1 If any one chiller has a malfunction it will cause a control relay within the master panel to change its state resulting in the audible and visual alarms being activated. The emergency mode of the mechanical ventilation fan will NOT be activated.
- 1.3.2 The "Ventilation Fan Normal" green pilot light will be on.
- 1.3.3 The "Refrigerant Leak" red pilot light will be off.
- 1.3.4 A set of dry contacts within the master panel will close. This can be used to indicate to the BAS that a chiller malfunctioned has occurred.
- 1.3.5 The "Alarm Silence" push button on either panel may be pushed to silence the audible alarm. This circuit will automatically reset itself to ensure the audible alarm sounds at the next emergency mode.

2.0 REFRIGERANT LEAK DETECTOR THEORY OF OPERATION

- 2.1 The refrigerant sensor employs a metallic oxide semiconductor (MOS) sensing element in its detector head. In the presence of HFC-134a, HCFC-22, HCFC-123, CFC-11, CFC-12, HFC-407, or HFC-410a an output is produced as the sensor resistance decreases, enabling the activation of alarm, relays, etc., at specific levels. This is a broad range sensor. High concentrations of toxic substances will cause the sensor to go into alarm.

3.0 REFRIGERANT LEAK DETECTOR DESCRIPTION

- 3.1 The system is a multiple channel dual level gas detector consisting of up to six sensors connected together in parallel. The alarm module has three indicating lights. See Section 8.0 for details.
- 3.2 The alarm module has a pair of SPDT 5 amp. relay contacts.

4.0 UNPACKING & INSPECTION

- 4.1 Inspect all parts of the gas detector upon receipt for any damage that may have occurred during shipping and that all parts ordered were received. Contact your local representative if anything is in error or damage is suspected.

5.0 INSTALLATION

- 5.1 This manual includes the necessary drawings to install and service your gas detector.
- 5.2 The control panel containing the alarm module is installed in a central or convenient location, and the sensors are wired in parallel with a maximum distance between sensors of 100 feet. The maximum number of sensors per alarm module (zone) is 10. The sensors are to be wired with a four strand 16-18 gauge wire.
- 5.3 The sensors should be mounted 18" above the floor.
- 5.4 If you have an unusual or difficult problem, please contact your local representative for further details.
- 5.5 Mechanical Installation:
Refer to Dwg No. 976601 for the Master Panel mechanical details.
Refer to Dwg No. 976600 for the Remote Panel mechanical details.
Refer to Dwg No. 974900 for the Refrigerant Sensor mounting details.
- 5.6 Electrical Installation
Refer to Dwg No. 93005003 and 976601 for the Master Panel connection details.
Refer to Dwg No. 976600 for the Remote Panel connection details.
Refer to Dwg No. 976604 for details on connecting the Master and Remote Panels to the Mechanical Ventilation MCC.
Refer to Dwg No. 976602 for Alarm Interconnection Wiring Diagram.

6.0 CONFIGURATION & CALIBRATION

6.1 BEFORE POWERING UP THE MASTER PANEL

6.1.1 "VENTILATION FAN NORMAL" INDICATOR LIGHT

The Ventilation Fan Normal Indicator Lamp on the door of the Master and Remote Panel lights when the Ventilation Fan is running in the NORMAL mode. **BEFORE POWERING UP UNIT, MAKE SURE THAT THE VOLTAGE RATING OF THE INDICATOR LAMP MATCHES THAT OF THE FAN MCC, i.e., 24VAC or 115VAC. BULBS ARE LOCATED ON INSIDE OF PANEL DOOR.**

(Gold base = 24VDC, Silver Base = 115VAC)

- 6.1.2 Set the service interrupt switches on the control PCB corresponding to unused chillers to the "OFF" position to prevent false chiller alarms. The service interrupt switches for used chillers must be in the "AUTO" position.

6.2 REFRIGERANT LEAK ALARM CALIBRATION & TEST

- 6.2.1 Before calibrating the system, run the ventilation system on high speed for 24 hours to purge any toxic gases that may give false alarms during calibration.
- 6.2.2 The Refrigerant Leak Alarm Sensor is factory tested for the requested Refrigerant gas. The gas type is indicated on label at the Master Panel and at the Sensor. Calibration and operation verification is required once the unit is installed.
- 6.2.3 If the Refrigerant Alarm level needs to be changed, then the Sensor will have to be recalibrated for the new value. Refer to item 6.5. Only the High and Low Alarm Relay contacts are available. The Sensor Fault relay contacts on the Alarm Module are not available, however the indicator operates as normal.
- 6.2.4 To test the Alarm System: Press the Refrigerant Leak Alarm Test Push-button on the door of the Master Panel. The Buzzer, the Flashing Light and the Red Refrigerant Leak pilot light on the Master and Remote Panels should turn on and stay on until the Alarm Reset Push-button is pressed. In addition, the sensor should be gassed with Refrigerant gas at the desired concentration to verify the sensor operation.

6.3 DISABLING CHILLER ENABLE & CHILLER ALARM RELAYS

The Chiller Enable Relay and Common Chiller Alarm Relay coils may be disabled by removing jumpers (JP1 & JP2) on the control PCB located on the backplate of the Master Control Panel. Refer to Dwg No. 976601 for the location of the jumpers.

6.4 CHILLER ALARM SETUP & TEST

- 6.4.1 Up to four chillers may be connected. If the common Chiller Alarm Relay is not disabled (JP2 still connected), then the Service Interrupt switches on the CONTROL PCB should be in the Auto position for normal operation. Refer to Dwg No. 976601 for the location of these switches. Any switch in the OFF position disables a Chiller Alarm condition from the corresponding chiller. The OFF position is used when a chiller is being serviced.
- 6.4.2 With Service Interrupt switches to the Auto position, press the Chiller Alarm Test Push-button on the door of the Main Panel. The Alarm Buzzer and Flashing Light on the Master and Remote Panels should turn on and stay on until the Alarm Reset Push-button is pressed.

6.5 REFRIGERANT LEAK SENSOR CALIBRATION

- 6.5.1 Before calibrating the system, run the ventilation system on high speed for 24 hours to purge any toxic gases that may give false alarms during calibration.
- 6.5.2 After proper connection to the unit, the sensor voltages must then be set. Leave the system powered up for at least 48 hours prior to proceeding with the following adjustment. With a digital voltmeter set on D.C. volts, measure the voltage across TP1 and TP4 (see remote sensor Dwg No. 974900) and adjust "N" pot to 3.0 VDC \pm 0.05 VDC.

7.0 GAS TEST

- 7.1 Before calibrating the system, run the ventilation system on high speed for 24 hours to purge any toxic gases that may give false alarms during calibration.
- 7.2 To properly test the instrument, a standard calibration kit consisting of the following is required: 1 canister of calibration gas, a calibration adapter and case.
- 7.3 This calibration kit as well as replacement gas cylinders and parts are available from your local representative. Please specify gases and concentrations when ordering.
- 7.4 Your Refrigerant Monitor system should be checked for proper calibration on a regular basis, or if there has been an alarm module, sensor module or sensor change. Always ensure that the gas detector has been turned on for at least 48 hours prior to gas test. Follow these procedures closely and always allow 15 minutes clearing time for re-testing the same sensor.
 - 7.4.1 Connect the calibration adapter to the canister. Fill the humidifier bowl with clean water to 1/2" above the bottom of the bubbler tube.
 - 7.4.2 Open the gas valve slowly and adjust the flow so that the gas bubbles through the water just faster than you can count. DO NOT OPEN THE VALVE FULLY. The rotameter on the humidifier should read approximately .5 SCFH.
 - 7.4.3 Firmly place the calibration cup over the sensor allowing the gas to pass over the sensor until the DC voltage reading across TP1 and TP4 has stabilized (Usually this reading is below 1.0 vdc).
 - 7.4.4 Due to the deadband action of the gas detector, there are approximately three full turns between tripping in and out of alarm. To turn the alarm off, turn the appropriate pot clockwise (H-1 on the sensor board). Turn the pot counterclockwise until the unit trips back into alarm. Adjusting for instantaneous alarm when the gas is first applied, or using excessively high flow rates, will result in improper calibration and extremely high sensitivity. Allow 15 minutes clearing time and gas the sensor again to confirm proper setting.

8.0 VISUAL ALARMS

- 8.1 The PC-Board in main control panel has three LED alarms.
- 8.2 GREEN: Gas concentration is below alarm set points.
- 8.3 YELLOW: Gas concentration has reached the lower level (if used).
- 8.4 RED: Gas concentration has now reached high level and both LED's will be on, Refrigerant leak alarm will be activated.

9.0 ALARM CONTACTS

- 9.1 The PC-Board includes one 5 amp SPDT non-latching relay contact for each level of alarm. A time delay "ON" or time delay "OFF" may be selected on the zone card. See calibration drawing.
- 9.2 DELAY "ON" RELAY: This will delay the relay action for up to 20 minutes to ignore momentary alarms. Fully adjustable, the time delay provides a 5 amp SPDT control contact. It should normally be set to 30 - 60 seconds.
- 9.3 DELAY "OFF" RELAY: This will lock in the 5 amp SPDT relay for up to 20 minutes when gas alarm level is reached. The relay is fully adjustable. It should normally be set to 0 minutes.

10.0 FAULT INDICATION

- 10.1 Should a sensor fail, the green LED on the sensor housing will go out and the red fault light will begin to flash. Should there be a break in the sensor wiring, the green LED's on all sensors after the break will go out.

11.0 PARTS & SUPPLIES

Replacement parts are available from the unit manufacturer. Contact HTS Engineering Ltd.
@ 416-661-3400 with model & serial number.

12.0 MAINTENANCE & TROUBLESHOOTING

12.1 PERIODIC CALIBRATION OF REFRIGERANT SENSOR

The Refrigerant sensor calibration should be checked at least every 4 months by gassing the sensor as described in the this Operation Manual and verifying that the Leak Alarm is activated. Re-calibrate the sensor if necessary.

Re-calibration stickers have been included for future use. Ensure stickers are affixed to panel after each re-calibration.

12.2 TROUBLESHOOTING

12.2.1 If the SYSTEM POWER ON indicator on the door of the Master Panel does not light, then check the 2 fuses located on the CONTROL PCB. See Drawing No. 976601 for fuse locations.

12.2.2 If the Leak Alarm is not activated when gassing the sensor with the Refrigerant gas at the alarm concentration, then check the Master Panel indicators by pressing the Refrigerant Leak Alarm Test Push-button.

If the Buzzer and Flashing Light on both Master and Remote Panels are not turned on, then the problem is in the corresponding Panel.

If all alarm indications turn on, then the problem is either at the Sensor or the Alarm Module.

If the High Alarm indicator at the Sensor is not ON while gassing it with Refrigerant gas, then recalibrate the sensor. If this problem still persists, the sensor is faulty.

If the High Alarm indicator is ON at the Sensor but not at the Alarm Module, then the problem is at the Alarm Module. Call the factory for assistance.

12.3 FUSES

There are 2 fuses, both located on the CONTROL PCB in the Master Panel. Fuse F2 is on the 115 VAC line and is connected before the System Power switch on the door of the Master Panel. Fuse F1 is on the +24VDC line from the power supply. Refer to Dwg No. 976601 for the locations and ratings of these fuses.

<p style="text-align: center;">WARNING REPLACE FUSES WITH THE POWER OFF AND WITH THE CORRECT RATING Failure to do so may result in injury or damage to the system.</p>

13.0 REFRIGERANT MONITORING SYSTEM OVERVIEW

13.1 GENERAL

- The chiller uses a refrigerant
- Refrigerant is heavier than air. It can displace all the air from a closed room by filling the space with refrigerant from the ground up.
- The main risk with a leak is suffocating because there is no air to breath. Being poisoned is a low possibility.
- Refrigerants exposed to flame become far more toxic. This is why chillers are now removed from the boiler rooms.

13.2 CODE REQUIREMENTS

- Chiller machinery rooms in Canada are required to meet CSA-B52. This is the Canadian version of ASHRAE 15 and ASHRAE 34.
- The code requires refrigerant relief valves piped to atmosphere.
- The code requires Doors to machinery room.
- The code requires general and emergency exhaust ventilation.
- The code requires appropriate signage.
- The code requires a Refrigerant Alarm Panel.

13.3 REFRIGERANT ALARM PANEL

- The Refrigerant Alarm panel consists of a Master Panel in the machinery room and a Remote Panel at the entrance to the room. There is also a refrigerant sensor calibrated for the refrigerant used mounted near the chiller low to the floor.
- Both the Master and Remote panels have audio and visual alarms.
- Both panels can operate the exhaust fan and make up air systems.
- Both panels can enable/disable the chiller.

13.4 SEQUENCE OF OPERATION

- The Refrigerant Monitoring System should be on all the time.
- If the system detects a refrigerant concentration over the allowable limit, the exhaust system will be activated and the audio and visual alarms will sound. The chiller will still be enabled.

- The chiller control panel will shut down the chiller if the refrigerant charge drops too much.
- The Master and Remote panels can be used to shut down the chillers manually.
- If the ventilation fan lowers the refrigerant concentration below the allowable limit, the ventilation fan will return to normal but the alarm will continue to sound. The alarm must be reset at the master panel.

13.5 WHAT TO DO IN CASE OF AN ALARM

- If you are in the machinery room, leave immediately.
- If you are outside the machinery room, do not enter.
- If you think there is someone in the machinery room and the alarm has sounded, do not go in after them. Instead call 911 and explain the situation, follow their instructions. If you go into the room to get someone, there will be two people in the room and no one getting any help.
- Shut down the chiller from the Remote Panel.
- Ensure the ventilation is in emergency mode.
- You may silence the alarm at the Remote Panel if you can ensure no one else will enter the mechanical room unaware of the alarm condition.
- Do not leave the emergency ventilation on overnight during freezing weather, you may freeze something in the machinery room.
- Call your chiller service company and explain the situation to them. They are trained to deal with the situation. It is okay for them to enter the machinery room when they are ready.
- If anyone has been exposed to a refrigerant leak, take them to the hospital and have a doctor check them out.
- The SCBA is for service and emergency personnel. As a building owner, you are obliged to provide this equipment for emergency and service personnel.

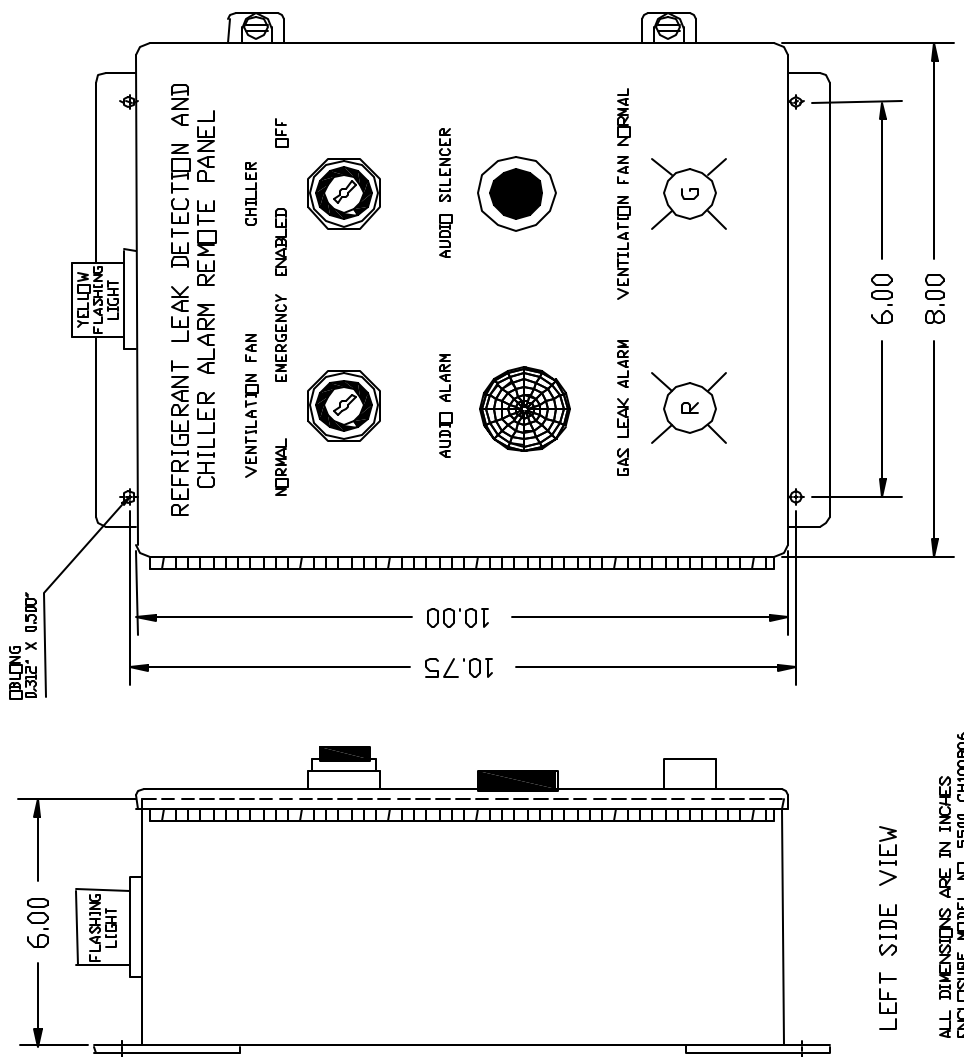
MISCELLANEOUS

- The Refrigerant Monitor Panel requires regular service. Failure to do this will make the panel unreliable.
- The SCBA requires service and the air to be replaced at regular intervals.

Field Installation Checklist

Confirm the following after the unit has been installed to and wired to the remote panel and chiller controls.

1. Power up the unit. If the unit alarms, press **Audio Silence**. Allow the unit to warm-up. The LEDs at the sensors will turn to green to indicate the alarms have cleared.
- 2.(a) Press **Chiller Alarm Test** button. Unit should go into alarm. Terminals 16 - 17 should close while the **Chiller Alarm Test** button is pushed.
 - (b) Reset
- 3.(a) Press **Refrigerant Leak Alarm Test** . Unit should go into alarm. Terminals 14 - 15 and 18 - 19 should close while **Refrigerant Leak Alarm Test** button is pushed.
 - (b) Reset
- 4.(a) Turn ventilation fan to **Emergency** position on the main panel (MP). Terminals 18 - 19 should close
 - (b) Turn ventilation fan to **Normal** on main panel (MP).
 - (c) Repeat 4.(a) on remote panel (RP)
 - (d) Turn ventilation fan to **Normal** on remote panel (RP)
- 5.(a) Turn **Chiller** switch (MP) to off position (**NOTE : Chiller** switch on remote panel (RP) is in the **Enable** position). Terminals 22 - 23, 24 - 25, 26 - 27, 28 - 29 should now open.
 - (b) Turn **Chiller** switch (MP) to **Enable** position. Terminals 22 - 23, 24 - 25, 26 - 27, 28 - 29, should now close.
 - (c) Repeat 5.(a) using **Chiller** switch on remote panel (RP)
 - (d) Repeat 5.(b) using **Chiller** switch on remote panel (RP)
6. Test Interrupt switches – all switches should be in **Off** position.
 - i. Flick Switch A1 (auto) Unit goes into alarm Reset
 A2 (auto) Unit goes into alarm Reset
 A3 (auto) Unit goes into alarm Reset
 A4 (auto) Unit goes into alarm Reset
 - ii. Keep switches on **Off** position
- 7.(a) AC Testing: Connect 24 VAC from Terminals 4 & 5 to Terminals 30 & 31 respectively. Switch A4 to AUTO – Alarm should remain off.
**** NOTE SWITCHES ARE READ RIGHT TO LEFT ****
Switch A4 back to **Off** – Alarm remains off
 - (b) Repeat steps above using Terminals: 32 - 33 With Switch A3, 34 - 35 With Switch A2, and 36-37 With Switch A1



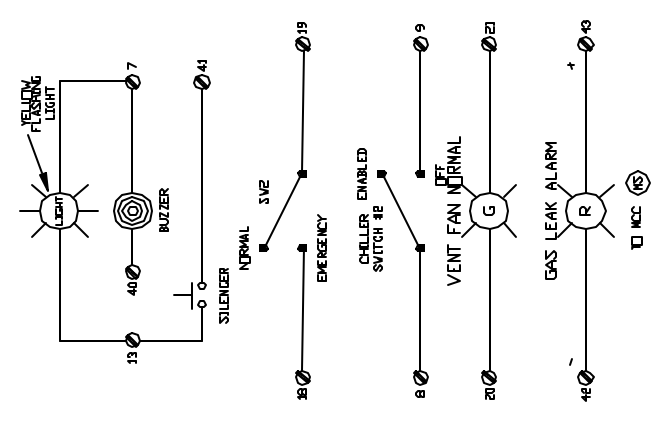
ENCLOSURE FRONT DOOR

LEFT SIDE VIEW

ALL DIMENSIONS ARE IN INCHES
 ENCLOSURE MODEL NO 5500 CH100B06
 EDWAC/ENEA 12 - 13

NOTE: SUBPLATE CONSISTS OF ONLY ONE (1) TERMINAL BLOCK OF SIX (6) TERMINALS

NOTE: ALL CONTACTS & SWITCHES RATED FOR 10 AMPS @ 240 VOLTS

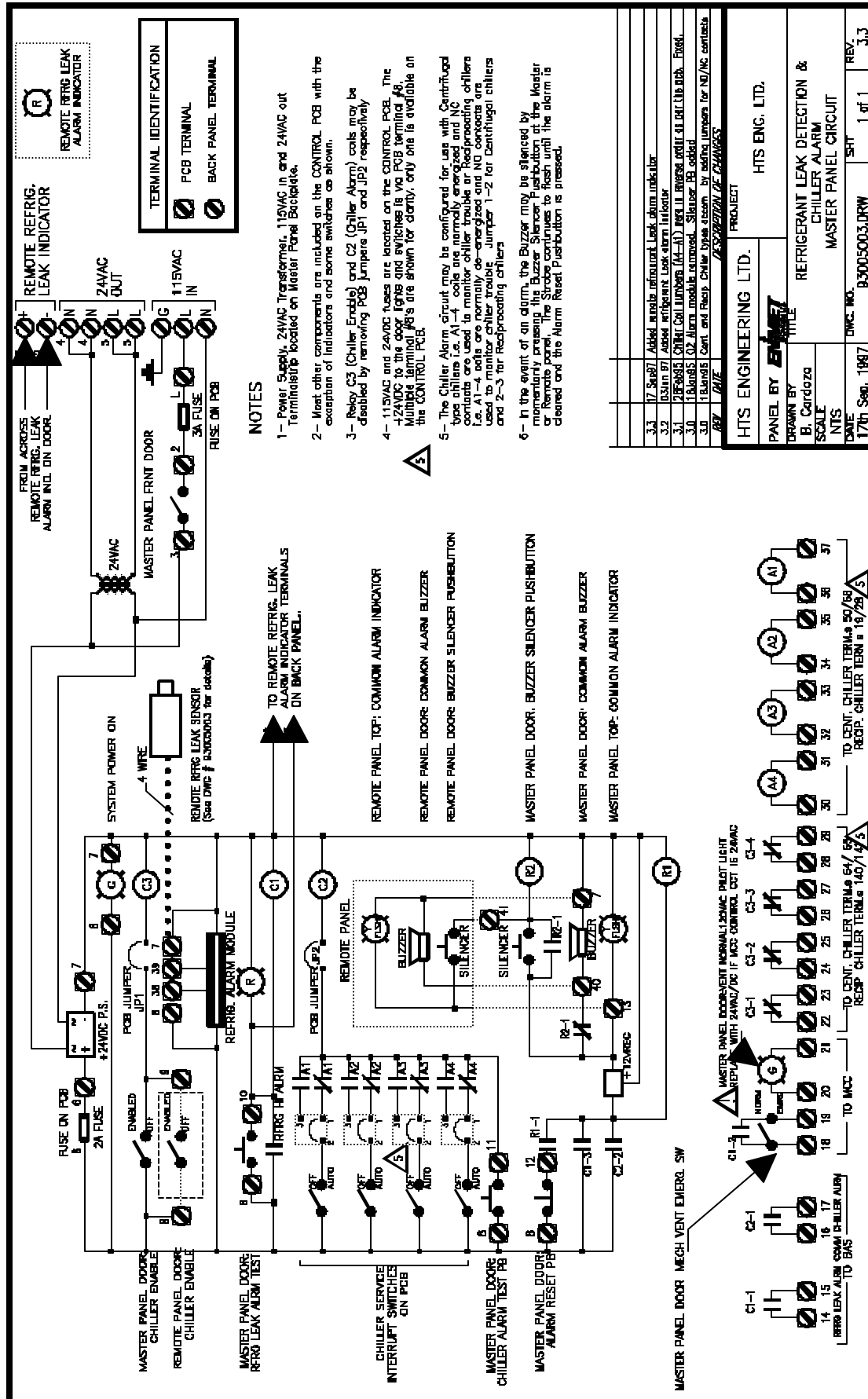


NOTE: 120 VAC PILOT LIGHT, REPLACE WITH 24 VAC/VDC IF MCC CONTROL CIRCUIT IS 24 VAC

REV	DATE	DESCRIPTION	CHKD	APP'D
1	2/19/01	CHANGED MECH. VENT LABEL TO VENTILATION FAN		

REVISIONS				
NO.	DATE	BY	DESCRIPTION	SCALE
1	10/99	ANJ	REFRIGERANT LEAK DETECTION AND CHILLER ALARM REMOTE PANEL AND CONTROL CIRCUIT	1:1

HTS ENGINEERING LTD.		PROJECT:	
PANEL BY ENMET CANADA		HTS ENG. LTD.	
SCALE	OFF DWS	ENG NO	REV
N.T.S.		976600	1



REMOTE REFRIG. LEAK ALARM INDICATOR

TERMINAL IDENTIFICATION
 ○ PCB TERMINAL
 ⊗ BACK PANEL TERMINAL

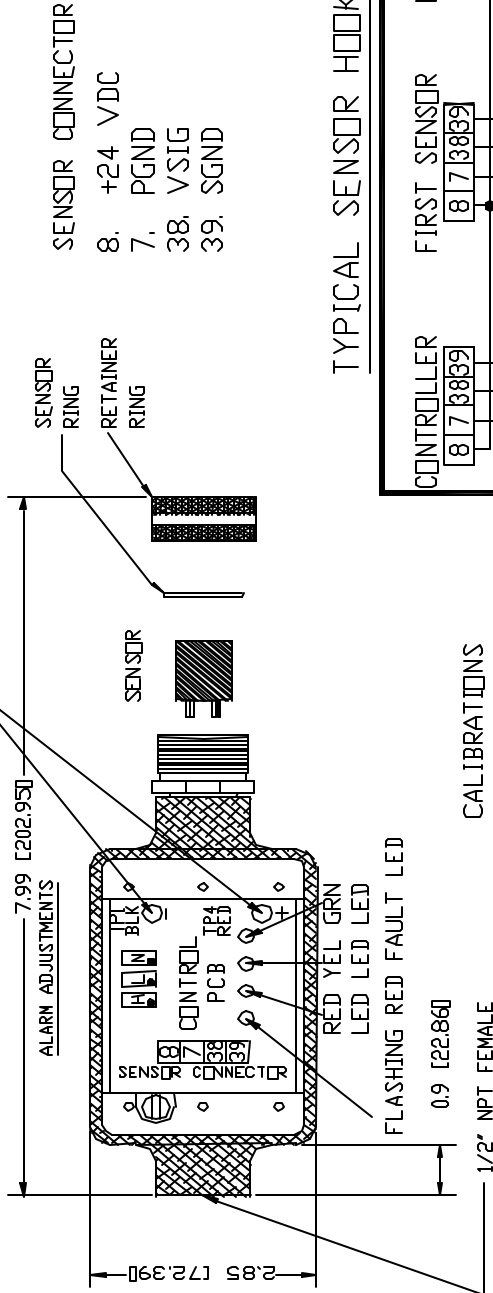
NOTES

- 1- Power Supply, 24VAC Transformer, 115VAC in and 24VAC out Terminals located on Master Panel Backplate.
- 2- Most other components are included on the CONTROL PCB with the exception of indicators and some switches as shown.
- 3- Relay C3 (Chiller Enable) and C2 (Giller Alarm) coils may be disabled by removing PCB jumpers JP1 and JP2 respectively
- 4- 115VAC and 24VAC buses are located on the CONTROL PCB. The 124VDC to the door lights and switches is via PCB terminal J6. Multiple terminal J6's are shown for clarity, only one is available on the CONTROL PCB.
- 5- The Chiller Alarm circuit may be configured for use with Centrifugal type chillers i.e. A1-4 coils are normally energized and NC contacts are used to monitor chiller trouble or Recirculating chillers i.e. A1-4 coils are normally de-energized and NO contacts are used to monitor chiller trouble. Jumper 1-2 for Centrifugal chillers and 2-3 for Recirculating chillers
- 6- In the event of an alarm, the Buzzer may be silenced by momentarily pressing the Buzzer Silencer Pushbutton at the Master Panel. The Buzzer Silencer Pushbutton is reset until the alarm is cleared and the Alarm Reset Pushbutton is pressed.

3.3	17 Sep87	Added remote refrig. leak alarm indicator
3.2	03 Jun 87	Added sufficient leak alarm indicator
3.1	28 Feb 85	CHILLER COIL JUMPER (A1-A4) per I.I. REVISED and I.I. DELTA I.I. REV. EWSL.
3.0	18 Jun 85	C2 Alarm module removed. Silencer PB added
3.0	18 Jun 85	Cent. and Recip. Chiller types added by adding jumpers for NO/NC contacts
REV	DATE	DESCRIPTION OF CHANGES

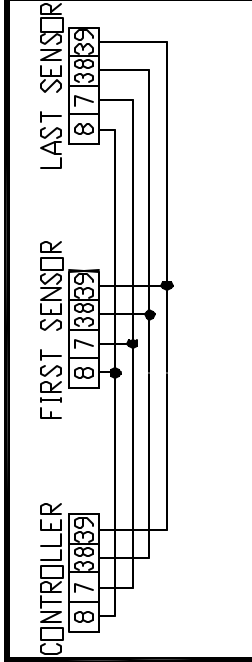
HTS ENGINEERING LTD.
 PROJECT
 HTS ENG. LTD.
 DRAWN BY
 TITLE
 B. Cardozo
 REFRIGERANT LEAK DETECTION & CHILLER ALARM MASTER PANEL CIRCUIT
 SCALE
 NTS
 DATE
 17th Sep. 1987
 DWG. NO.
 B-3005003.DRW
 SHEET
 1 of 1
 REV.
 3.3

SENSOR VOLTAGE TEST POINTS



- SENSOR CONNECTOR
- 8. +24 VDC
 - 7. PGND
 - 38. V SIG
 - 39. SGND

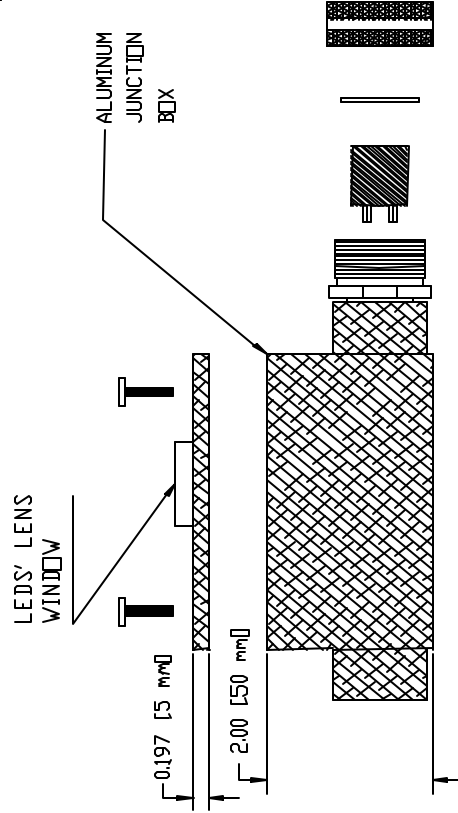
TYPICAL SENSOR HOOKUP



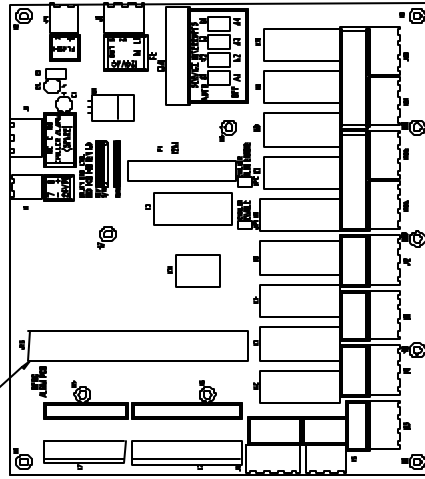
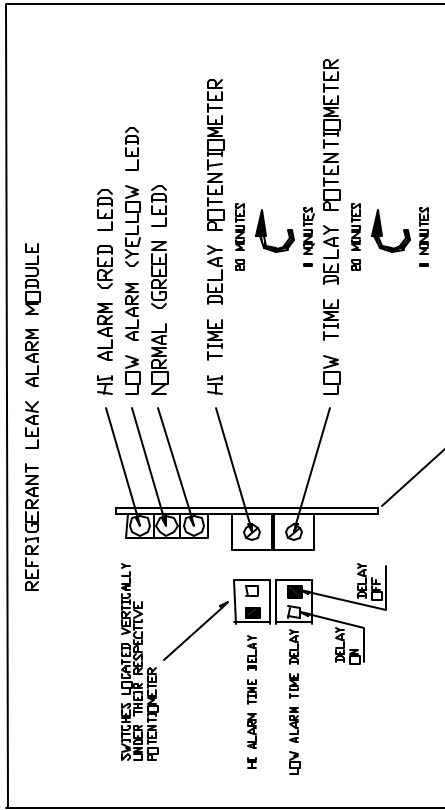
CALIBRATIONS

- HIGH _____ PPM
- LOW _____ PPM
- REFRIGERANT _____

INCHES [mm]



1	1/23/00	CHANGED TP2 TO TP4 & TP3 TO TP1	CHKD/APTD
REV	DATE	DESCRIPTION	REVISIONS
ENMET CANADA LTD.		PROJECT: HTS	
TITLE		REMOTE SENSOR ASSEMBLY	
DESIGNED	BY	DATE	SCALE
ENMAN	AN.B.	04/06/97	N.T.S.
DRAWN			
CHECKED			
APPROVED			
SCALE	EST. NOS.	PAGE NO.	SHEET
N.T.S.		974900	1



REV	DATE	DESCRIPTION	CHKD	APP'D
REVISIONS				
HTS ENGINEERING LTD.		PROJECT:		
PANEL BY ENMET CANADA		HTS ENG. LTD.		
ENG. DESIGNS	BY	DWG. NO.	TITLE	
FORM	A.N.B.	18/09/97	REFRIGERANT LEAK	
CHK'D			ALARM MODULE DETAILS	
APPROVED			DWG. NO.	REV
SCALE			976603	1
N.T.S.				0