CPC LEAK DETECTOR SYSTEM

Model LDS

P.N. 809-1060

Installation and Operation Manual

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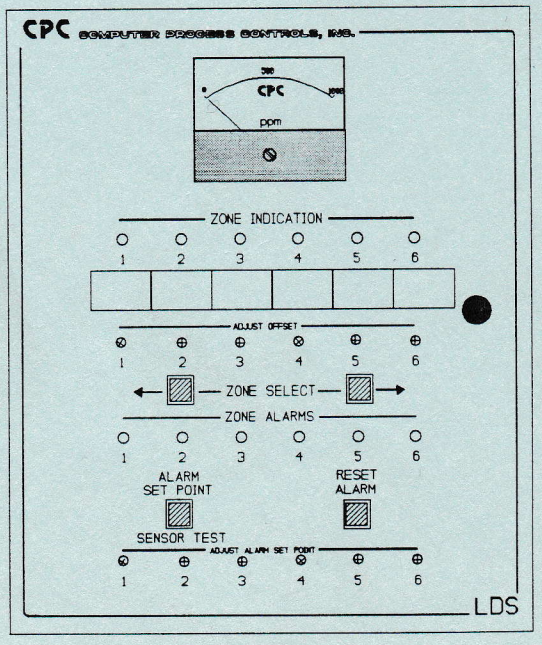

LDS

L D S ZONE LIST

ZONE	DESCRIPTION
1	
2	
3	
4	
5	
6	

STORE # _____

ADDRESS _____

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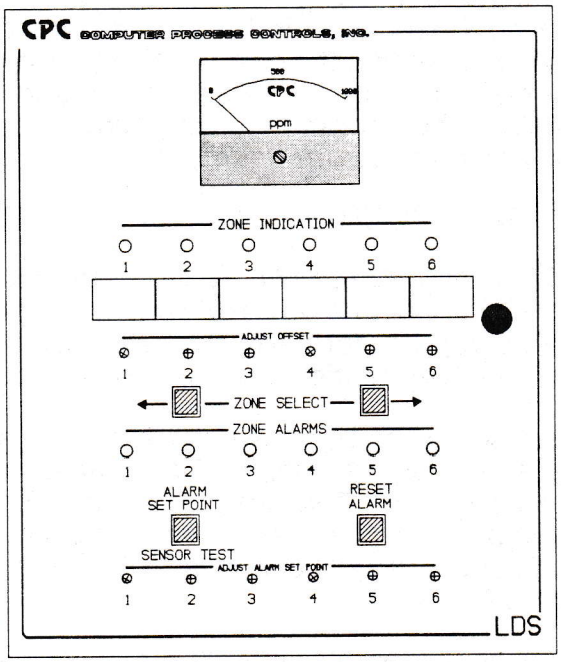
What is the LDS?

The L D S Leak Detector System is a six channel refrigerant leak detector. It has a control box and one to six remotely mounted sensors. It continuously monitors all sensors connected for alarm conditions and provides a continous analog output for each sensor.

It is powered by normal line voltage and has alarm output contacts which may be used in line voltage or low voltage circuits.

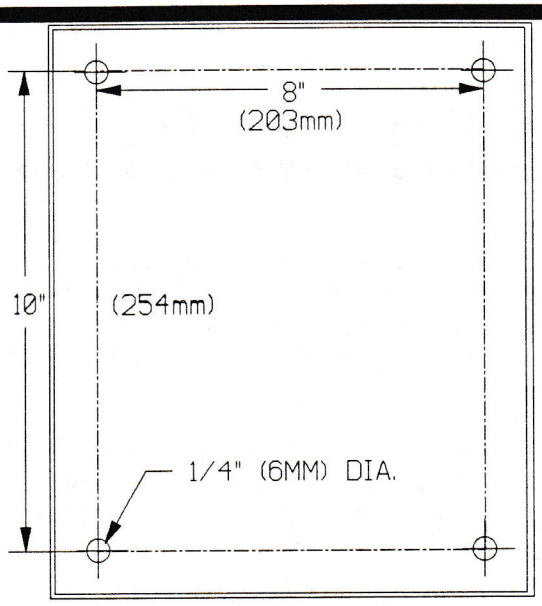
The alarm trip point is separately adjustable for each sensor. A meter on the front of the control unit shows refrigerant concentrations detected, and is also used to show alarm trip points.



1. INSTALLATION

- A. MOUNTING CONTROL UNIT

The control unit (the blue box with a meter and buttons marked L D S, CPC part no. 809-1060) should be mounted on a wall in an upright position. Do not mount it to vibrating machinery because the meter movement will not function correctly. Mount the control box using four screws in the mounting holes provided. The mounting holes are spaced 8.0 inches (203mm) apart horizontally, and 10.0 inches (254mm) apart vertically. The correct mounting screw size is 1/4 inch diameter (or 6mm diameter).



MOUNTING DIMENSIONS

- B. MOUNTING SENSOR

Each sensor assembly (CPC part no. 809-1070) should be securely mounted in a place appropriate for detecting leaks. Consideration should be given to air flow patterns in the area, which affect the ability of a detector to find a leak.

The sensor assembly may be mounted by screws through two holes in the extended flat surface, or may be mounted by means of a stainless steel hose clamp (available at hardware stores). The hose clamp method is for attaching the sensor assembly to a conduit or other pipe. The hose clamp may be routed through the two side notches for attachment to vertical conduits, or through the slot and over the top for attachment to a horizontal conduit.

The sensor assembly should be mounted with the sensor down and the mounting area up, unless air flow conditions require a different orientation. Experimentation may be required to determine optimum sensor location.

Be careful not to damage the sensor while handling and mounting the sensor assembly.

The sensor plugs into a socket on the sensor assembly bracket. It may be plugged into its socket either of the two ways it will go.

2. POWER

- A. LINE VOLTAGE, FREQUENCY, AND POWER

The L D S control unit may be powered by 100 to 125 volts AC, or by 200 to 250 volts AC. Jumpers (described later) set the line voltage range). The line voltage's frequency may be 50 Hertz or 60 Hertz. See Paragraph 7.B for 120V/208V Jumpers.

The L D S draws up to 50 watts maximum. Typical power consumption will be 38 watts with six sensors and all in alarm, down to 9 watts with one sensor connected and no alarm.

- B. GROUND

The L D S control unit should be properly grounded using the ground terminal on the power input terminal block. This ground is also connected to signal common in the control unit. the grounded signal common will be connected to all sensors and is connected to the common the common negative of the analog outputs.

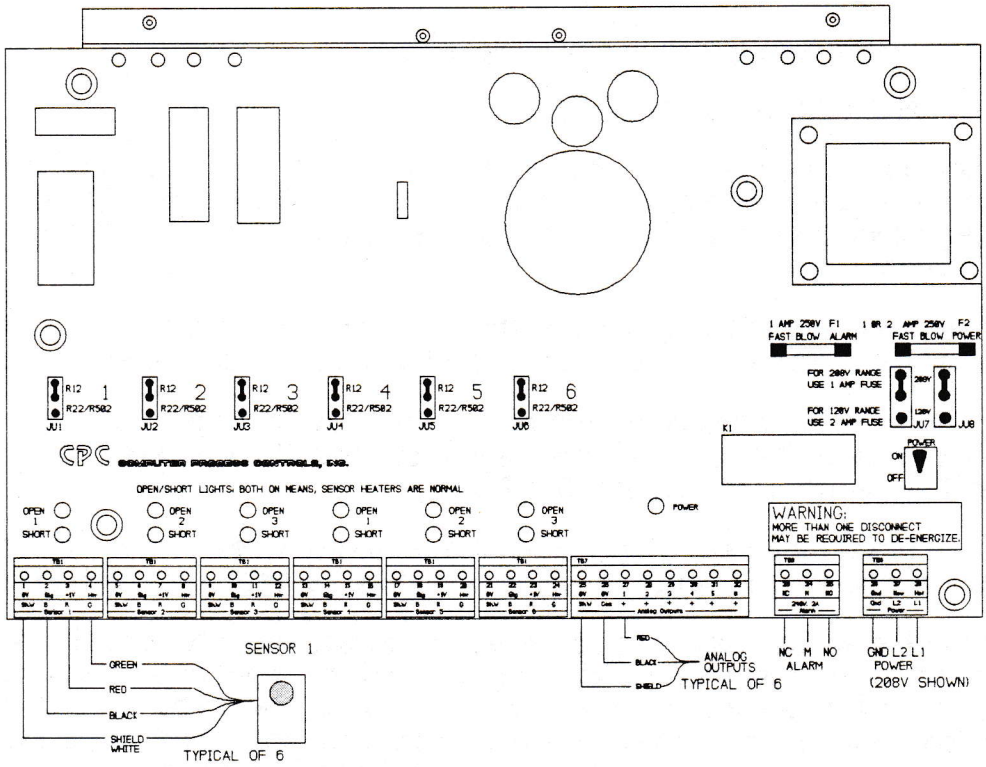


Fig. 1 L D S Wiring

3. SENSOR CONNECTIONS

- A. DISTANCE AND CABLE SIZE

Each sensor assembly is to be connected to the control unit by a four-conductor-plus-shield-cable. The cable may be almost any practical length, but longer lengths require larger guage cable.

Conductor Guage	Maximum Length
24 AWG	300 feet
22 AWG	500 feet
20 AWG	750 feet
18 AWG	1250 feet
16 AWG	2000 feet

There is no minimum length limit for any cable guage.

- B. WIRE COLORS AND SHIELD

It is recommended that the cable have white, black, red, and green insulation on its conductors, plus a foil shield with a separate drain wire for the shield. Stranded conductors (including the drain wire) will be easier to handle and less likely to break in most installations.

The white wire and the shield drain wire should be connected together at the control box end. The shield drain wire may be left disconnected at the sensor end.

The proper order of the wires is marked on the board in the back of the control unit at the terminal blocks for the sensors. Each sensor connects to a separate terminal block, sensor 1 to TB1, sensor 2 to TB2, etc. See Fig. 1.

Each terminal block may be unplugged without removing wires from it if desired. It will also fit through a hole in the bottom of the enclosure while wires are attached to it.

Any splices in the sensor cable should be well insulated, kept dry, and should connect all four colored conductors and also the shield drain wires together between cable ends. A splice is an unshielded section of the overall cable, so should be located away from other electrical conductors. If the splice must be close to other conductors, locate it in a separate grounded metal box with nothing else in it (except other sensor cables {splices or cable just passing through} to the same L D S control unit).

SENSOR CONNECTIONS Continued

All sensor cables should be shielded and isolated from power circuits. Do NOT put them in conduits containing power. They may be run in conduits containing other shielded analog signal cables to other equipment. Do not run together with digital data busses such as RS232 or RS485.

4. ANALOG OUTPUTS

- A. OUTPUT VOLTAGE

Each analog output has a 0 volt to +5.0 volt DC range representing 0 to 1000 ppm refrigerant concentration measured.

Sensor offsets (especially if not properly adjusted) can cause an analog output to go as low as -0.10 volt. The analog outputs can not go any lower due to a clamping circuit in each output.

Analog outputs can go higher than +5.0 volts if refrigerant concentration exceeds 1000 ppm. The highest possible output voltage is about +10.5 volts.

A shorted analog output will not be damaged (unless it is shorted to a power source), and will not interrupt the alarm and meter functions of the L D S. Unused (open circuit) analog outputs also do not affect the alarms and the meter.

- B. COMMON NEGATIVE, SIX POSITIVES

All six analog outputs share a common negative, marked 0V (zero volts). There are two terminals for it.

The six analog outputs each have a separate terminal (on TB7) for the positive side.

The terminal block may be unplugged without removing wires from it if desired. It will also fit through a hole in the bottom of the enclosure while wires are attached to it.

- C. CABLING

Shielded cable is recommended when using the analog outputs. One of the 0V terminals may be used for the common, and the other for the shield. The terminals are marked (on terminal block TB7) accordingly. See Fig. 1.

ANALOG OUTPUTS Continued

The analog outputs cable(s) should be located away from electrical interference. Do NOT put them in conduits containing power to anything. They may be run in conduits containing other shielded analog signal cables to other equipment, but not together with digital data busses such as RS232 or RS485).

If the analog outputs cable(s) must be spliced, follow the recommendations above for sensor cable splices.

5. FRONT PANEL

- A. METER

The meter at the top has a 0 to 1000 ppm (parts per million) scale. The meter is used to view refrigerant concentrations and alarm trip points.

- B. ZONE SECTION

The operation of leak detection is controlled by the "ZONE INDICATION", "ADJUST OFFSET" AND "ZONE SELECT" indicators and controls on the front panel. It has six green lights to show which zone's (which sensor's) data is displayed on the meter; a label for marking where the sensors are located; six offset adjustments; and two zone select buttons. The zone select buttons select the zone to be displayed on the meter. It also selects one of two scanning modes as described in Paragraph 6.B.

- C. ALARM SECTION

The alarm section of the panel is the bottom portion, from ZONE ALARMS to ADJUST ALARM SET POINT. It controls all alarm functions, and also the sensor test mode. These are described further, below.

- D. DOOR LATCH

Turn the silver colored door latch knob fully counter-clockwise until it stops to open the door, and after closing the door turn it fully clockwise until it stops to hold the door shut.

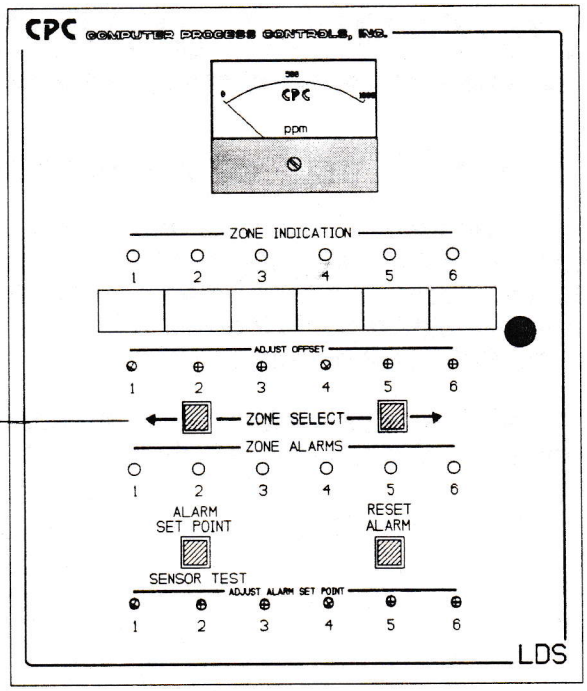
6. SCAN MODE

- A. FOR METER ONLY

The scan mode is for the meter only. The scan mode is indicated by all six green lights being on, with one flashing brighter. The scan modes go slowly through zones which have a sensor to allow the meter to be read before proceeding to another zone, and go quickly through unused zones and through zones which have a fault condition with the sensor, since valid data cannot be obtained from such zones.

There are two scan modes: 1) scanning from zone 1 to zone 6, then repeating; 2) scanning in reverse direction from 6 to 1, then repeating. Choose the direction preferred, the data is identical either way.

NOTE: The analog outputs and the alarm functions are six independent circuits which operate full time without any scanning. This is true also when not scanning and the meter is showing data for only one zone.



- B. SELECTING SCAN MODES AND NON-SCAN MODES

To select the scan-up mode (zone 1 first, then zone 2, etc.) push the left zone select button enough times to make all six green lights turn on. Scanning up will then begin. To select the scan-down mode (zone 6 first, then zone 5, etc.) press the right zone select button enough times to make all six green lights turn on. Scanning down will then begin.

It is also permissible to press and hold either zone select button which has the same effect as pressing it several times.

To select a single zone for display on the meter press either zone select button until the green light of the desired zone is on steadily and all other green lights are off.

- C. WHEN TO USE SCAN MODE

Use the scan mode for normal operation of the L D S after it has been installed and adjusted.

- D. WHEN NOT TO USE SCAN MODE

Stop the scanning and select one zone when making adjustments to offsets or to the alarm trip points, or when closely observing a leak in one zone.

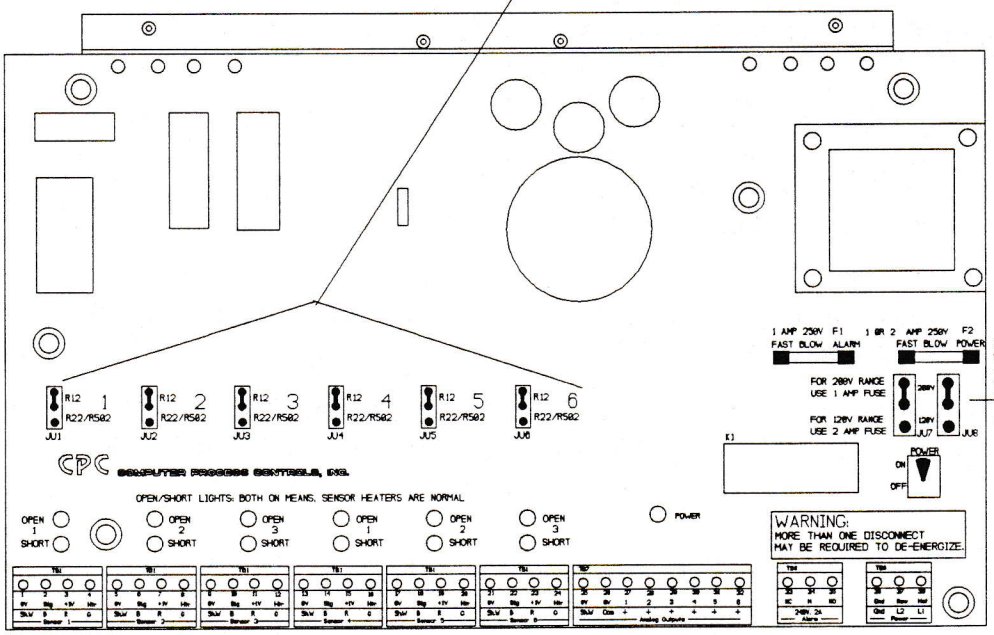
The alarm and analog output functions are not altered by selecting scanning or a single zone. All zones continue to be monitored by all but the front panel meter. It is not vital that the unit be left in a scan mode when un-attended, but normally it should be.

7. INTERNAL JUMPERS

- A. JU1 THROUGH JU6: REFRIGERANT R12 OR R22/R502

Sensing refrigerant R12 takes more sensitivity than R22 or R502. If a zone (sensor) is to monitor R12, then a jumper on the board in the back of the control unit must be plugged onto the upper two pins (marked R12) for the corresponding zone. Otherwise, the jumper should be put in the R22/R502 position. (A missing jumper is the same as setting it to the R22/R502 position).

There are six such jumpers, one for each zone marked 1, 2, 3, 4, 5, and 6. These jumpers are also marked JU1 through JU6.



See Para. 7.B.

- B. JU7 AND JU8: POWER INPUT VOLTAGE

The larger jumpers at the right side of the board in the back of the control unit marked JU7 and JU8 are for selecting the line voltage range.

The MUST be set correctly BEFORE applying power to the L D S.

They must both be set to the same position (never one up and one down).

They should be set to the 120V position (down) for line voltage in the range 100 to 125 volts AC.

They should be set to the 208V position (down) for line voltage in the range 200 to 250 volts AC.

- C. JU9: ALARM LATCH OR NO-LATCH

On the board mounted on the door of the control unit is one jumper, marked JU9. It selects whether all six alarms will operate as LATCH or NO_LATCH.

LATCH (the upper position of the jumper) will cause any alarm to remain on until it is manually reset by a front panel button, even if the leak that was detected has ceased.

NO LATCH (the lower position of the jumper) will cause any alarm to reset itself if a detected leak ceases.

A missing jumper on JU9 will cause the last-selected mode at JU9 to remain selected.

No alarm can be reset if the detected leak is still present and above the alarm set point level, regardless of the position of JU9.

8. SENSOR TEST FUNCTION

- A. FRONT PANEL DISPLAY

The ALARM SET POINT and SENSOR TEST button causes the meter to show the alarm set point on the meter, which is described further below. It also causes the six red lights on the front panel to indicate the status of the sensors.

While showing sensor status, the six red lights cease showing alarms. This action does NOT reset alarms. Any alarms present will again be shown when the SENSOR TEST button is released.

- B. SENSOR HEATER PROBLEMS

There are two conditions indicated by the SENSOR TEST function. The first is the state of the sensor's heater. If a sensor is present and correctly connected, it will show no problem. If it is not connected, or connected but open-circuited or shorted, it will indicate a problem. This same heater detection circuit will also cause the scanning modes to go quickly through a zone with a heater problem.

- C. SENSOR ELEMENT PROBLEMS

Sensor element problems (open circuit or short circuit) will also be shown by the SENSOR TEST function in the front panel red lights.

- D. ONE OR TWO PROBLEMS

If just one of sensor heater or sensor element problems exist it will be shown in the red light for a zone by a series of long single flashes while the SENSOR TEST button is pressed.

If both sensor heater and sensor element problems exist it will be shown in the red light for a zone by a series of short double flashes while the SENSOR TEST button is pressed.

NOTE: an unused zone (no sensor installed) is open circuit on both the sensor heater and the sensor element, so the double flash is normal for such a zone.

If all six sensors are used and all have NO problem, all red lights will not light up at all when pressing the SENSOR TEST button.

9. INTERNAL INDICATORS

- A. SENSOR HEATER OPEN

On the board in the back of the control unit there are six pairs of red and yellow lights. These indicate the status of the six sensor heaters.

If a sensor heater is open circuit (which includes not installed) the corresponding yellow light will be on and the red light will be off.

- B. SENSOR HEATER SHORTED

If a sensor heater is shorted the corresponding red light will be on and the yellow light will be off.

- C. SENSOR HEATER OK

A normally functioning sensor heater will cause both red and yellow lights to be on.

A normally functioning sensor will be warm to the touch.

10. ALARMS

- A. SIX INDICATORS

The six red lights on the front indicate individual alarms for the six zones.

- B. ALARM RELAY OUTPUT

The relay output at Terminals 33, 34, and 35 indicates that any one or more of the zones has an an alarm.

11. CALIBRATION

- A. METER ZERO

The meter on the front must be carefully zeroed before other adjustments are made.

Open the door and unplug the meter cable from the circuit board. Close the door and carefully adjust the screw on the front of the meter until the meter reads exactly zero.

Open the door and plug the meter cable back in as it was.

NOTE: do this with the control unit installed in its correct and final operating position.

- B. OFFSETS

The offset of each sensor must be adjusted after installing the L D S. To do this:

1. Place the unit in operation. **2.** Select one zone for display. **3.** Using a small screwdriver adjust the offset of that zone, only, slowly until the meter reads zero. **4.** Very slowly turn the screwdriver counterclockwise until the meter pointer stops, then turn clockwise until the meter just reaches zero.

- OFFSETS Continued

Repeat this for each zone in use with a sensor.

For zones with no sensor, turn the offset adjustment fully clockwise.

NOTE: The zones with sensors must NOT be indicating a leak while adjusting offsets.

- C. ALARM SET POINTS

With a single zone selected (not scanning) press the ALARM SET POINT button. While holding it, adjust the corresponding ADJUST ALARM SET POINT with a small screwdriver until the meter shows the desired alarm trip on point. When the button is released the meter will show for 1 second the alarm trip off point for that zone which is 80% of the alrm set point adjusted above.

12. WARM UP

The sensors have to be powered for one minute before they are able to provide useful information.

The control unit goes through a one minute warm-up cycle each time it is powered up.

This warm up cycle is indicated by slow flashing of the green lights, and by a downward movement of the meter which indicates how much warm up time remains.

While in the warm-up cycle, the analog outputs go to zero, and no alarms will occur.

Note: The warm-up can be defeated by unplugging a sensor, letting it cool, and then plugging it back in while the control unit had remained on. When this occurs, the sensor will show a very high reading (perhaps even pegging the meter) and will trip the alarm circuit. No harm results except for the false alarm.

13. Battery

The scanning logic is powered by a lithium battery to retain memory of the preset scanning or non-scanning mode in the event of a power failure.

This battery has a safe long life. If it is ever replaced, use CPC part no. 119-2320 to avoid damage to the L D S circuitry. The battery is installed with the positive (+) side away from the circuit board. DO NOT ATTEMPT TO RECHARGE THE BATTERY.