026-1701 Rev 0 01-05-98

CPC Peripherals Installation and Operation

COMPUTER PROCESS CONTROLS

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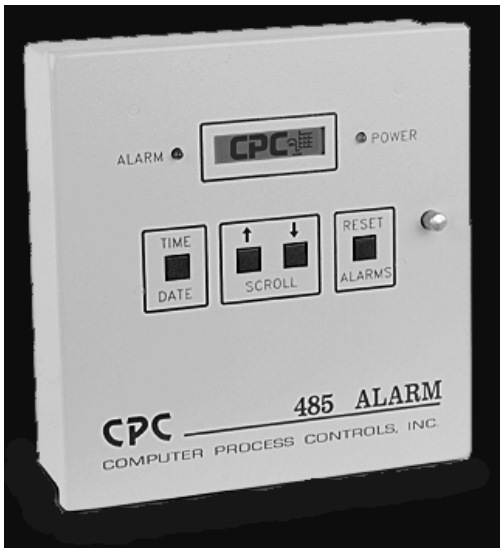
Introduction

This manual describes how to wire and configure various peripheral devices that are commonly used with CPC control networks. Each section gives a brief overview of the device and provides device specifications. Sections also include information on installing (mounting and wiring) and configuring the device within the proper CPC controller (RMCC, BCU, BEC).

485 Alarm Panel

For 120/240 VAC–P/N 811-4850
For 24 VAC–P/N 811-4855

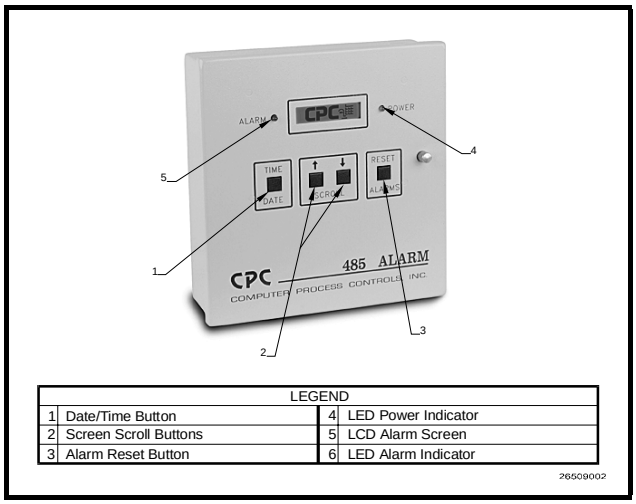


Overview

One of the most important requirements of any network environment is its ability to notify personnel of system failures or possible problems. REFLECS controls are designed with sophisticated logging, graphing, notification, and alarming features that put system data at the fingertips of the service technician or store manager. However, no network is complete without the basic ability to provide annunciated alarms in the event of serious system problems.

CPC uses the 485 Alarm Panel ***(Figure 1)*** to accomplish this task. The 485 Alarm Panel is linked to all REFLECS Controllers through the RS485 COM B Host Network. Although the alarm panel has many features that make it a powerful notification tool, the primary and most important function of the alarm panel is to receive signals from the REFLECS and deliver an alarm annunciation.

The REFLECS constantly compares real time system conditions against user-defined alarm set points. When a system reading falling outside of these set points is detected by the REFLECS, a signal is sent to the alarm panel, which in turn emits an alarm signal and displays the alarm information on the notification screen.



LEGEND			
1	Date/Time Button	4	LED Power Indicator
2	Screen Scroll Buttons	5	LCD Alarm Screen
3	Alarm Reset Button	6	LED Alarm Indicator

26509002

Figure 1 *- 485 Alarm Panel*

Features

- Alarm reset
- Date and time adjustment
- Storage of twenty separate alarms
- Audible annunciation can be set to either pulsed or continuous mode
- Interfaces with existing facility alarm system
- 25-pin parallel printer interface port.

Installation

Mounting

The 485 Alarm Panel is supplied with four mounting holes in the rear panel of the enclosure. These holes are ac-

cessible without removal of any boards inside the enclosure. ***Figure 2*** shows the enclosure dimensions and weight.

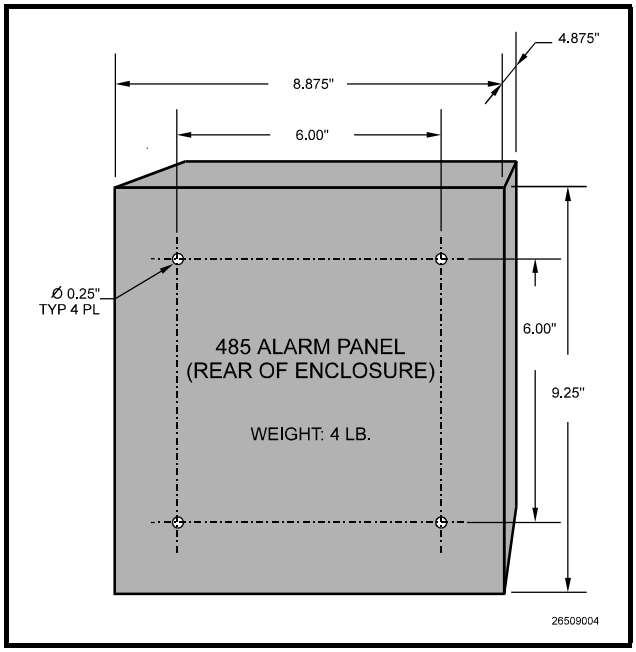


Figure 2 *- 485 Alarm Panel Mounting Dimensions*

Power Wiring

Connect the 485 Alarm Panel to the power supply at the three terminals labelled POWER IN. Connect the ground to terminal G, the neutral to terminal N, and the hot wire to terminal H.

Power Jumpers

If 120VAC power is being used, set jumpers JU1 and JU2 to the DOWN position as shown in ***Figure 4*** on page 6. If 208VAC power is being used, set jumpers JU1 and JU2 in the UP position.

If you ordered the 24VAC alarm panel, jumpers JU1 and JU2 will be hard-wired to the correct position. No adjustment will be necessary.

Network Wiring

The 485 Alarm Panel connects to one or more REFLECS units via the RS485 Host Network (COM B). Using a Belden #8641 or equivalent cable, connect the three terminals labelled RS485 Network on the 485 Alarm Panel to the three COM B terminals on the REFLECS Power Interface Board (PIB), as shown in ***Figure 3***.

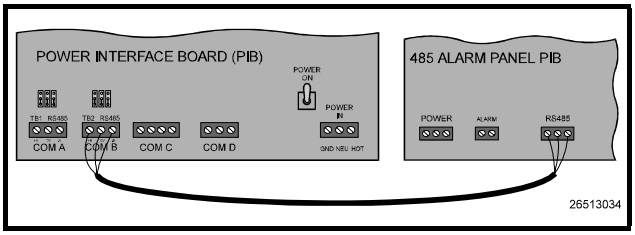


Figure 3 *- COM B Wiring - REFLECS to 485 Alarm Panel*

1. Using the RED wire, connect the positive terminal (+) on the alarm panel to the positive (+) terminal on COM B.
2. Using the BLACK wire, connect the negative terminal (-) on the alarm panel to the negative (-) terminal on COM B.
3. Connect the cable shield wire from the common terminal (0V) on the alarm panel to the common (0V) terminal on COM B.

Network Terminating Resistance Jumpers

If the 485 Alarm Panel is connected to only one REFLECS via its RS485 Network terminals, place jumpers JU3, JU4, and JU5 in the UP position.

Otherwise, if the panel is connected in between two REFLECS units (i.e. NOT at the end of the RS485 Host Network), place jumpers JU3, JU4, and JU5 in the DOWN position.

Device ID Numbering

The 485 Alarm Panel must be given a COM B network device number. Refer to your REFLECS Installation and Operation Manual for more details on COM B device numbering.

Rockers 1 through 5 on switch SW2 on the 485 Alarm Panel board are used to set the 485 Alarm Panel's device number. To set the device ID, set the switches as shown in ***Table 1***.

ID	ROCKER POSITION				
	1	2	3	4	5
1	UP	DN	DN	DN	DN
2	DN	UP	DN	DN	DN
3	UP	UP	DN	DN	DN
4	DN	DN	UP	DN	DN
5	UP	DN	UP	DN	DN
6	DN	UP	UP	DN	DN
7	UP	UP	UP	DN	DN
8	DN	DN	DN	UP	DN
9	UP	DN	DN	UP	DN
10	DN	UP	DN	UP	DN
11	UP	UP	DN	UP	DN
12	DN	DN	UP	UP	DN
13	UP	DN	UP	UP	DN
14	DN	UP	UP	UP	DN
15	UP	UP	UP	UP	DN
16	DN	DN	DN	DN	UP

***Table 1** - 485 Alarm Panel Dip Switch Settings*

Baud Rate

Rockers 6 and 7 on switch SW2 on the 485 Alarm Panel determines the baud rate at which alarm messages will be received across the COM B network. The 485 Alarm Panel can only communicate at 4800 baud; therefore, both switches 6 and 7 must be set to the DOWN position as shown in ***Figure 4***.

Printer Setup

The 25-pin female socket located at the bottom of the 485 Alarm Panel (labelled DB25S) may be used to connect a printer. Connecting a printer will allow the 485 Alarm Panel to dump alarms to the printer in ASCII format.

To connect a printer:

1. Connect the printer's communication cable to DB25S.
2. Locate the Mode switch on the 485 Alarm Panel board (labelled SW3). Switch rocker #1 on SW3 to the UP (ON) position as shown in ***Figure 4***.

Audible Annunciation

The 485 Alarm Panel comes equipped with a buzzer that can be configured to sound when an alarm is present on the controller. To enable this buzzer, locate the Mode switch on the 485 Alarm Panel board (labelled SW3). Switch rocker #2 on SW3 to the DOWN position as shown in ***Figure 4***.

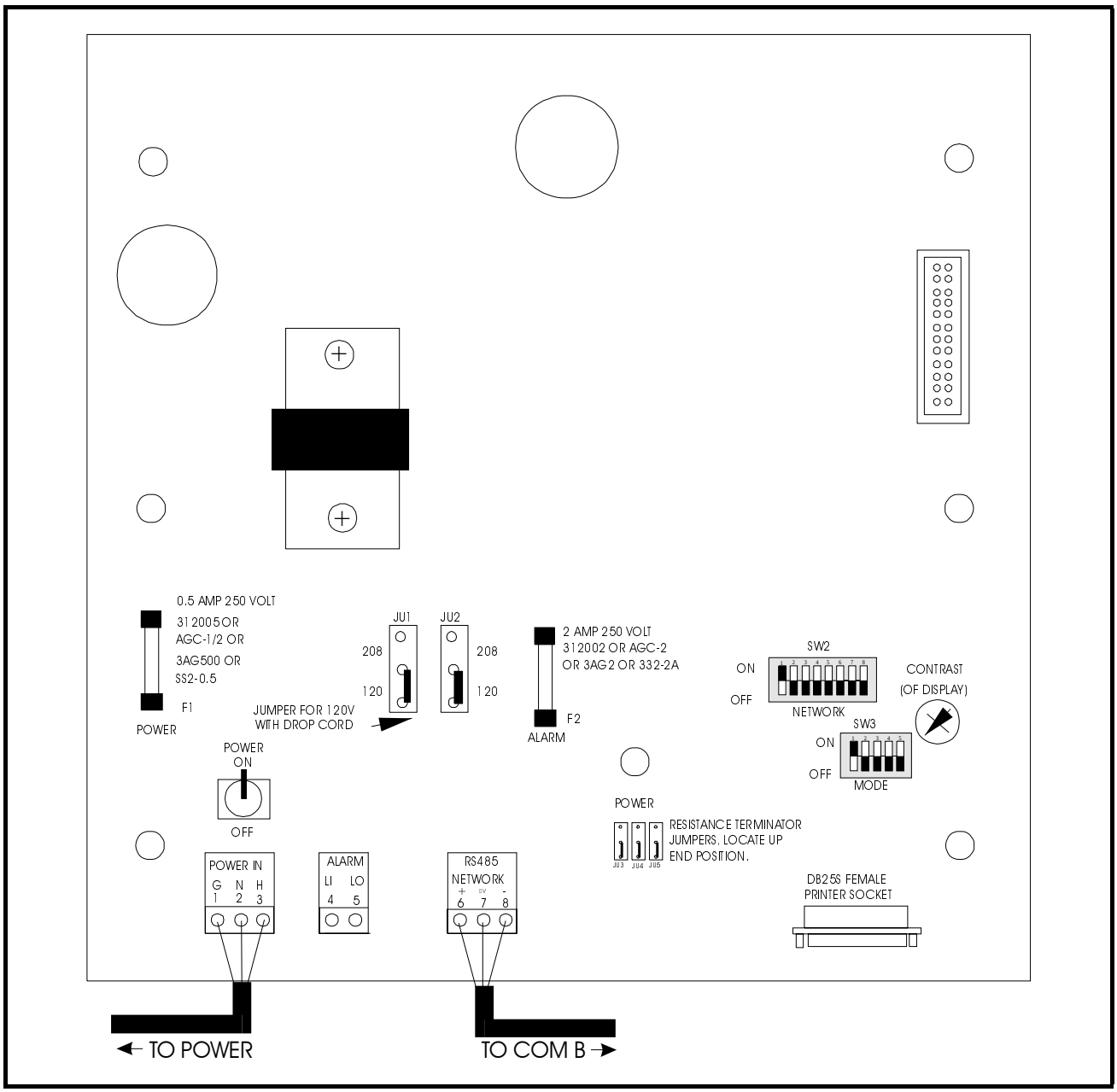


***Figure 4** - 485 Alarm Panel Board*

Setting the Clock

To set the 485 Alarm Panel's on-board clock:

1. Be sure that the display shows NO ALARMS. If the display shows ALARMS, the unacknowledged alarms will have to be cleared before the clock can be set (see "Acknowledging and Resetting Alarms," page 7).
2. Press and hold down the Time/Date button on the front panel. Do not release the Time/Date button until the clock is properly set.
3. Press and release the Reset button on the front panel.
4. Use the arrow buttons to select the month.
5. Quickly press and release the Reset button. The indicator on the second line moves to the DATE position.
6. Repeat steps 4 and 5 to set the day, hour, minute, and AM/PM indicator.
7. When finished, quickly press and release the RESET button.

8. Release the Time/Date button.

Operation

Modes of Operation

There are two basic modes of operation for the alarm unit.

No Unacknowledged Alarms

When there are no unacknowledged alarms, the display will show the date/time and the message NO ALARMS. During this mode of operation, users may view the previous 20 alarm messages in the 485 Panel's log by using the UP and DOWN arrow keys (see "Displaying Alarms" for information about viewing alarms).

Unacknowledged Alarms

When there are unacknowledged alarms, the display will show the date/time and the message ALARMS. Pressing the arrow keys will display the unacknowledged alarms. From this screen, you may also reset the unacknowledged alarms (see "Acknowledging and Resetting Alarms" below for more).

Acknowledging and Resetting Alarms

When the unit receives an alarm message, the display will show the word ALARMS, and the alarm LED will illuminate. The buzzer will sound if the 485 Alarm Panel is set up to do so (see "Audible Annunciation," page 5).

Pressing the Reset button once will silence the audible alarm. At this time, users may view the new alarms by using the arrow keys (see "Displaying Alarms" for more specific instructions).

Once the conditions that caused the alarms have been corrected, pressing the Reset button a second time will acknowledge and reset all new alarms. The alarm messages are saved in the 485 Alarm Panel's memory as "old" alarms. If an alarm reoccurs after it has been reset, the annunciator will sound again.

Displaying Alarms

A single alarm message consists of four lines (two screens) of information. The first two lines give information about the time, date, and unit number for the alarm, and the last two lines give a description of the alarm.

Since the 485 Alarm Panel display can only display two lines at a time, users must use the arrow keys to view all four lines of an alarm message.

Alarm messages may be thought of as a list on a sheet of paper. The display is simply a window moving up or down the page viewing the first two or the second two lines of each alarm. Press the UP and DOWN arrow keys to scroll through this list and view the alarms.

Pressing both arrow keys simultaneously will bring the display back to the screen that says ALARMS or NO ALARMS. From this screen, users may begin viewing alarms again starting with Alarm #1.

Network Loss

If the 485 Alarm Panel loses communications, it will turn on both the LED and audible alarms and display NETWORK DOWN on the display. This may be acknowledged by pressing the Reset button. This error suggests a wiring or switch setting problem.

If this error occurs, follow the checklist below:

- Check for loose cable connections at both the RS485 NETWORK terminals on the 485 Alarm Panel and the REFLECS COM B terminal(s).
- Ensure that the network cable is properly wired (see "Network Wiring," page 4).
- Check that the Device ID number chosen for the 485 Alarm Panel is not being used by another unit on the network. Refer to "Device ID Numbering," page 4.
- Check that the 485 Alarm Panel's baud rate is set to 4800 baud. Rockers 6 and 7 on switch SW2 should be in the DOWN (OFF) position. All REFLECS units on the network must also have their baud rates set to 4800 (refer to the unit's I&O Manual for more).

If the problem still exists after the above checklist has been followed, contact CPC support.

Clearing Alarms

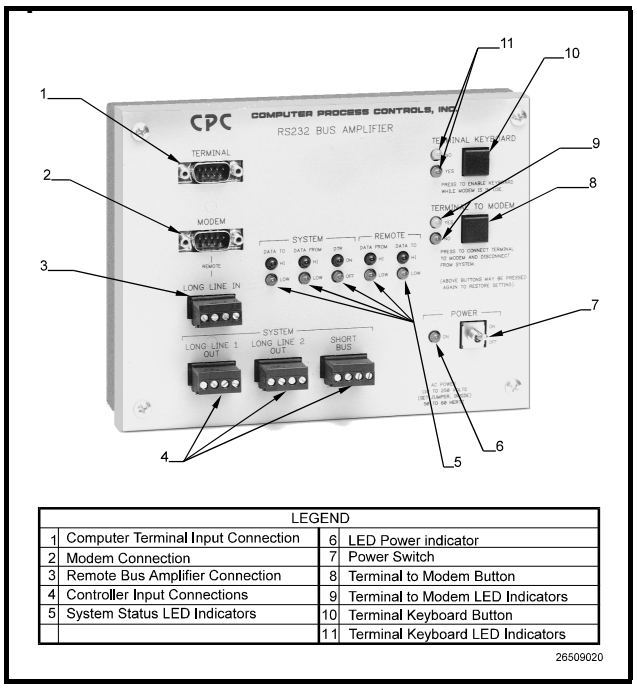
To clear all alarms from the 485 Alarm Panel's memory, remove power from the panel by turning the power switch OFF or by unplugging the power cord, and power up the unit while holding down all four buttons on the front panel. All alarms will be cleared.

If the unit goes into CLOCK SET mode when powered up, press the RESET button until NO ALARMS appears on the display.

RS232 Bus Amplifier (P/N 812-1800)

Overview

The RS232 Bus Amplifier (P/N 812-1800), shown in ***Figure 5***, is used to connect CPC products together as an integrated communications system. Communication problems sometimes associated with large computer systems—such as limited cable lengths, data rate limitations, and terminal and modem communication interference—are eliminated through the use of the RS232 Bus Amplifier



LEGEND			
1	Computer Terminal Input Connection	6	LED Power indicator
2	Modem Connection	7	Power Switch
3	Remote Bus Amplifier Connection	8	Terminal to Modem Button
4	Controller Input Connections	9	Terminal to Modem LED Indicators
5	System Status LED Indicators	10	Terminal Keyboard Button
		11	Terminal Keyboard LED Indicators

26509020

Figure 5 *- RS232 Bus Amplifier*

Features

- Allows the use of long cable runs
- Works with high data rates (9600 baud) Allows for remote modem set-up
- Eliminates modem interference while using the local terminal
- Eliminates terminal interference when accessing the site from a remote computer
- Improves local terminal data retrieval from CPC products
- Eliminates the use of custom cables for modems and local terminals

Installation

Power

Power is supplied to the RS232 Bus Amplifier through a standard power cord, allowing the amplifier to use the same wall outlet as the modem and local terminal. The RS232 Bus amplifier may be powered by 120 volts or 208 to 250 volts. An internal jumper selects which voltage range will be used. AC power may be either 50hz or 60hz.

Location

Although there are no specific location requirements for installation of the RS232 Bus Amplifier, it is recommended that the amplifier be located close to the bussed CPC controllers to prevent data loss over long cable lengths. It is also recommended that the bus amplifier be located adjacent to the modem and, if present, the local computer terminal to provide easy access to all components necessary for refrigeration system monitoring.

Mounting

To mount the RS232 Bus Amplifier, an installation envelope eight inches wide, nine inches high, and three inches deep is required.

1. Remove the four front panel screws.
2. Remove the front panel (with circuit board attached)
3. Mount the empty amplifier body with the plain edge down using four #8 (4mm) or #10 (5 mm) screws.
4. Remount the front panel.

System Connections

The RS232 Bus Amplifier can be connected to the existing refrigeration system in a variety of ways depending upon the relative proximity of the compressor racks, other CPC controllers, and the local computer terminal to each other.

Table 2 provides a brief description of the RS232 Bus Amplifier ports, connecting components, and the cable type required for system connection:

Port	Description	Cable Type
Terminal	Local Computer Terminal	Standard 9-25 pin
Modem (Remote)	Modem Satellite	Standard 9-25 pin Determined by satellite system
Long Line In (Remote)	Laptop Computer Remote Bus Amplifier to Main Bus Amplifier	DB9 REFLECS Laptop Cable (P/N 535-1190) Belden #8771 (Three Conductor Shielded 22AWG)
Long Line 1 Out	Stand-alone CPC Controller Main Bus Amplifier to Remote Bus Amplifier	Belden #8771 (Three Conductor Shielded 22AWG)
Long Line 2 Out	Stand-alone CPC Controller Main Bus Amplifier to Remote Bus Amplifier	Belden #8771 (Three Conductor Shielded 22AWG)
Short Bus (System)	Multiple Bussed CPC controllers	Belden #8771 (Three Conductor Shielded 22AWG)

Table 2 *- RS232 Bus Amplifier Port and Cable Description*

Single-Amplifier Layout

In general, the RS232 Bus Amplifier will be installed in close proximity to the CPC controllers, modem, and local computer terminal. ***Figure 6*** shows this layout.

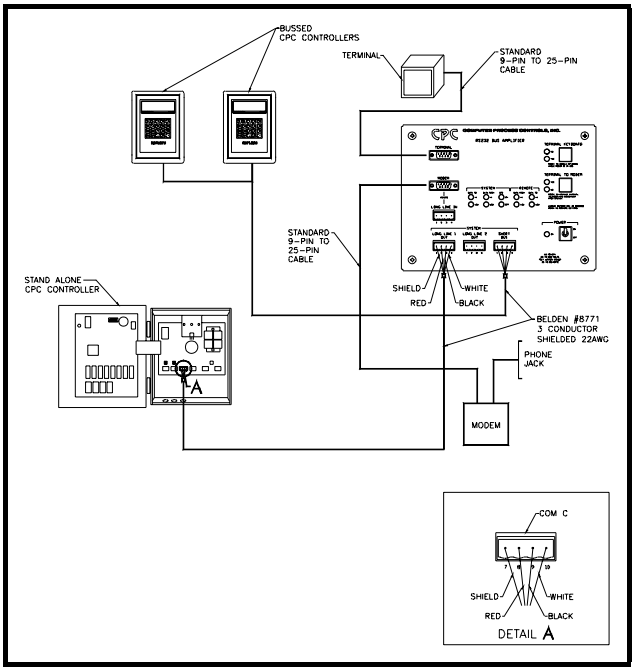


Figure 6 *- Typical Single-Amplifier Layout*

If the CPC controllers, modem, and local computer terminal are located adjacent to one another, connect the RS232 Bus Amplifier to the system as follows:

1. Connect the modem to the REMOTE MODEM PORT using a standard 9-pin to 25-pin cable.
2. Connect the computer terminal to the TERMINAL PORT using a standard 9-pin to 25-pin cable.
3. Connect the bussed CPC controllers to the SYSTEM SHORT BUS PORT using a Belden #8771 (three conductor shielded 22AWG) cable.
4. Connect any stand-alone CPC controller (such as a BEC) to the SYSTEM LONG LINE 1 OUT PORT using a Belden #8771 (three conductor shielded 22AWG) cable.

Two-Amplifier Layout

In some cases, location of the modem and local terminal will not allow location of the bus amplifier to both the modem and local terminal and the CPC controllers. Since data loss is possible when multiple CPC controllers transmit data over long cable lengths, it may be necessary to connect the CPC controllers to a remote amplifier adjacent

to the controllers, and then connect the remote amplifier to a main amplifier connected to the modem and local terminal. This two-amplifier installation is shown in ***Figure 7***.

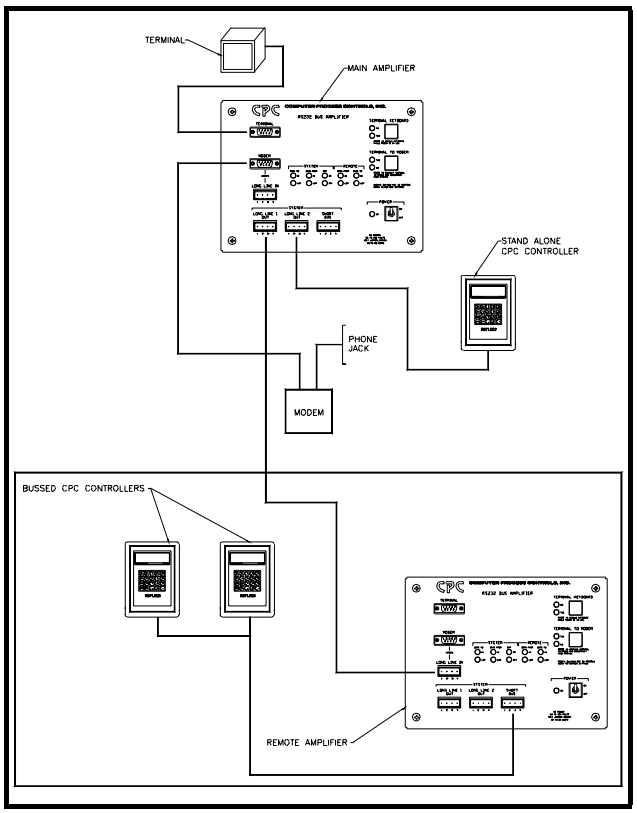


Figure 7 *- Typical Two-Amplifier Layout*

If the CPC controllers, modem, and local computer terminal are not located adjacent to one another, install a remote and main RS232 Bus Amplifier as follows:

1. Install the main RS232 Bus Amplifier adjacent to the modem and local computer terminal as described in steps 1 and 2 above.
2. Install the remote RS232 Bus Amplifier adjacent to the bussed CPC controllers as described in steps 3 and 4 above.
3. Connect the main bus amplifier to the remote bus amplifier using a Belden #8771 (three conductor shielded 22AWG) connected to the SYSTEM LONG LINE 1 OUT PORT on the main bus amplifier, and the REMOTE LONG LINE IN PORT on the remote bus amplifier.

System Description

Once connected to the system and a power source, the RS232 bus amplifier will automatically perform the functions necessary to improve system performance and communication. However, there are a number of status lights that will provide useful information concerning amplifier operation and aid in troubleshooting if necessary. A brief description of these indicators is provided below:

Indicator Lights

Power

A single green light to the left of the power switch illuminates when power is being supplied to the RS232 Bus Amplifier.

System Data To Lights

The red SYSTEM DATA TO light, shown in Figure 4, flashes when data are being transmitted to a CPC controller or additional bus amplifier. If no data are being transmitted, the green light remains illuminated. These lights are associated with the RX output of each SYSTEM PORT.

System Data From Lights

The red SYSTEM DATA FROM light, shown in Figure 4, flashes when data are being received from a CPC controller or additional Bus amplifier. If no data are being received, the green light remains illuminated. These lights are associated with the TX input of each SYSTEM PORT.

System Data Terminal Ready (DTR) Lights

The red SYSTEM DTR light, shown in Figure 4, illuminates when DTR is on. The green light illuminates when the DTR OFF command is received from any CPC controller or other bus amplifier. These lights are associated with the DTR input of each SYSTEM PORT.

Remote Data From Lights

The red REMOTE DATA FROM light, shown in Figure 4, flashes when data are being received from the MODEM PORT or the LONG LINE IN PORT. If no data are being received from the modem, the green light remains illuminated. These lights are associated with the RX input of the REMOTE LONG LINE IN PORT and REMOTE MODEM PORT.

Remote Data To Lights

The red REMOTE DATA TO light, shown in ***Figure 8***, flashes when data are being transmitted to the REMOTE MODEM PORT or REMOTE LONG LINE IN PORT. If no data are being transmitted to the modem, the green light remains illuminated. These lights are associated with the TX output of the REMOTE LONG LINE IN PORT and REMOTE MODEM PORT.

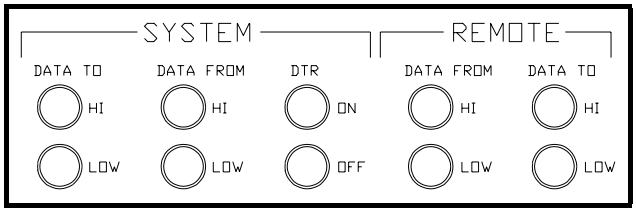


***Figure 8** - System Indicator Lights*

System Override Buttons

Terminal Keyboard Button

The TERMINAL KEYBOARD button, shown in Figure 5, allows the user to regain use of the local terminal when the modem is on-line. If the accompanying yellow light is illuminated--indicating that the terminal has been locked out by the modem-- pressing the TERMINAL KEYBOARD button will allow use of the local terminal keyboard while the modem is on-line. If the modem is off-line, pressing the TERMINAL KEYBOARD button will have no effect on the system.

Terminal to Modem Button

The TERMINAL TO MODEM button, shown in ***Figure 9***, allows the user to disconnect the modem and local terminal from the CPC controllers. By pressing the TERMINAL TO MODEM button, the user can either program the modem or communicate with another computer terminal. The accompanying yellow light will remain illuminated until the button is pressed again--reconnecting the terminal and modem to the system, or if the terminal keyboard is not used for twenty (20) seconds. When the terminal and modem are connected to the system, the accompanying green light remains illuminated.

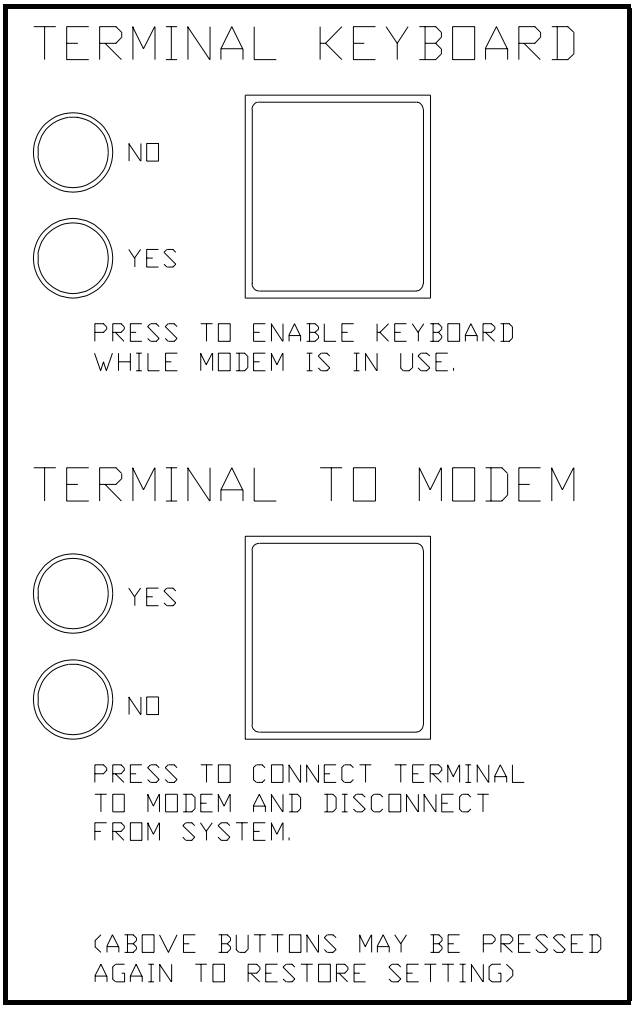


***Figure 9** - System Override Buttons*

Modem (P/N 370-9600)

Overview

Modems are used for remote communication. Sites that will be called via UltraSite from a remote location must have a modem installed on the network.

Hardware Setup

A modem may be used to connect the REFLECS to an outside phone line via the three-wire COM C network cable. ***Figure 10*** shows how to properly connect the modem.

If a CPC bus amplifier is used in the network, the 535-1015 cable is not used (see RS232 Bus Amplifier (P/N 812-1800) on page 9).

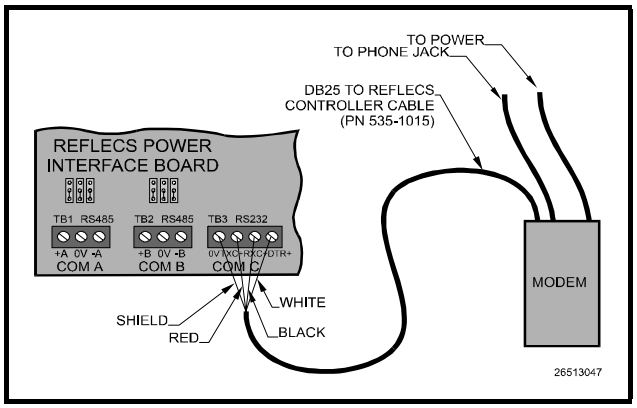


Figure 10 *- COM C Network Connection*

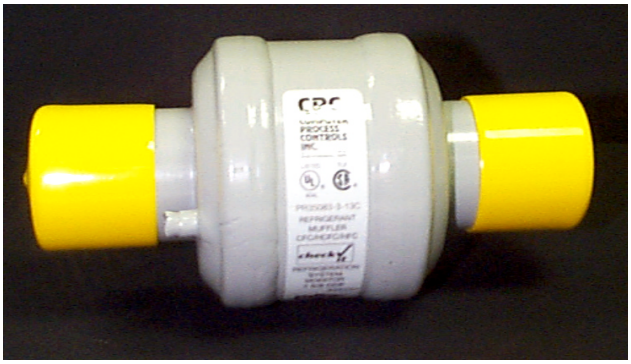
Software Setup

All newer versions of REFLECS software (RMCC, BEC, and BCU) are preset to use this modem without any additional setup. To make sure the Hayes Accura 28.8K/33.6Kbaud modem will work correctly with the REFLECS, log on to the REFLECS and select 7) Configuration followed by 4) Remote Communication. The text in the Initialization String field should match the string below:

AT&FE0S0=1&C1&D2&K0&Q6S95=60&W

If the Initialization String field does not match the above string, change it

Checkit Refrigeration System Monitor (P/N 508-2000)



Overview

The Checkit Refrigeration System Monitor (RSM) (P/N 508-2000), shown in ***Figure 11***, is a UL listed, in-line sensor that provides early warning of refrigeration system problems. In general, an alarm signal sent by Checkit will indicate any of the following:

- Low refrigerant
- Condenser failure
- High liquid temperature
- Flash gas.

When connected to the Refrigeration Monitor and Case Control (RMCC) unit, the Checkit sensor continuously monitors the refrigeration system to ensure efficient, peak performance and provide invaluable real time notification of possible system failures. In addition, special software algorithms within the RMCC further enhance Checkit sensor operation by simultaneously monitoring several system variables before indicating an alarm condition.

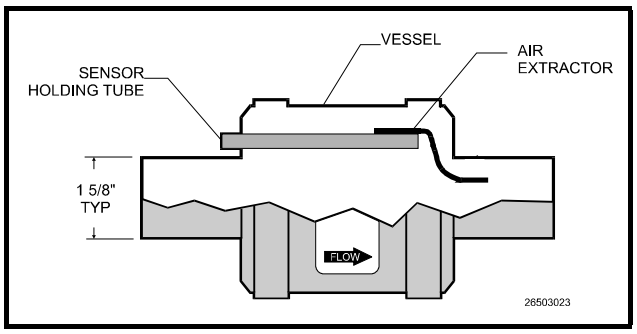


Figure 11 *- Checkit Refrigeration System Monitor*

Features

- Easy installation
- Immune to refrigerant type
- Works with conventional or parallel systems
- Maintenance-free
- Protects against product and refrigerant loss
- Detects refrigerant loss from any part of the system

Installation

Location

Checkit should be installed in a convenient location on a horizontal liquid line, preferably between the liquid receiver and the evaporator. ***Figure 12*** shows typical installation of the Checkit Sensor Assembly.

Orientation

The Checkit Sensor Assembly has a specific inlet and outlet to ensure that gas trapped in the vessel is vented downstream of the sensor. The flow arrow on the Checkit vessel label shows the correct orientation. In addition, the sensor holding tube should always be located toward the top of the vessel. See ***Figure 12***. In addition, the Checkit canister must be mounted horizontally as shown in ***Figure 11***.

Unit Fitting Sizes

The Checkit vessel is sized to fit a 1-5/8" refrigerant line. Since refrigerant flow restriction could occur, a bypass line is required for lines larger than 1-5/8." See ***Figure 13***. If bypass installation is used, locate Checkit either above or to the side of the main line. In no instance should the sensor be mounted below the main line. For lines smaller than 1-5/8", use a standard reducing fitting to complete installation.

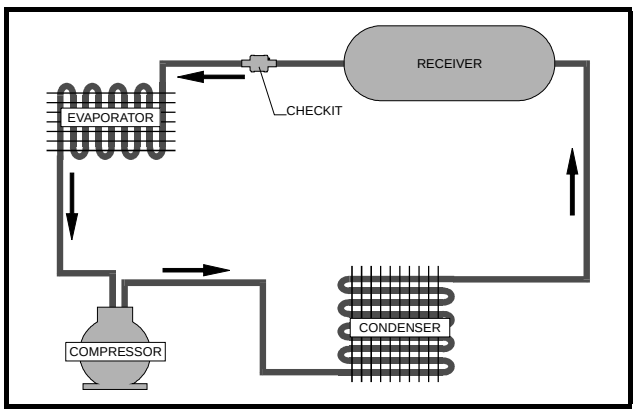


Figure 12 *- Typical Checkit Sensor Location*

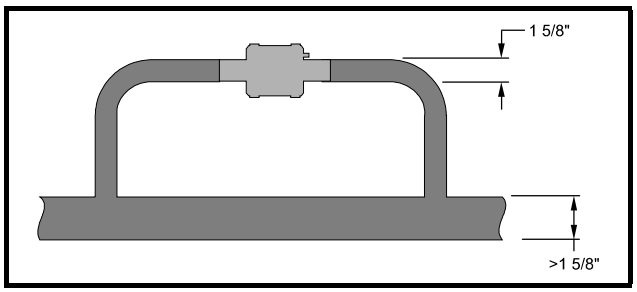


Figure 13 *- Installation of Checkit and Bypass for Lines Larger than 1 5/8"*

Installation Procedure

The Checkit sensor assembly may become hot during the soldering process.

1. Remove the sensor from the holding tube on the vessel.
2. Solder the vessel directly into the refrigeration line, or on a bypass line if the main line is larger than 1-5/8".
3. After the vessel and refrigeration line have cooled completely, apply Wakefield Thermal Joint Compound #120-5 (CPC P/N 020-7120) or equivalent on the sensor and re-insert the sensor into the holding tube. (If necessary, silicone sealer may be applied to the end of the sensor after installation to help ensure the sensor remains in the holding tube.) When installed, the sensor should fit completely within the holding tube.
4. Secure the sensor leads to the refrigeration line with a standard cable tie located adjacent to the sensor.
5. The Checkit sensor requires 24 VAC. Connect the sensor leads as follows: (a)Connect the two black leads to the 24 VAC output on the 16AI board, as shown in ***Figure 14***, or to an alternate 24 Volt power source. (b)Connect the two gray leads to an input on the 16AI board (the polarity of each of the leads is not important). Set the corresponding input's dip switch to the UP position.
6. Checkit installation is complete.

Power to the sensor should be shut-off and the sensor allowed to cool completely if it becomes necessary to remove the sensor from the holding tube for inspection or replacement.

If a damaged Checkit sensor needs to be replaced, follow the instructions above, skipping Step 2, using a replacement sensor (CPC P/N 201-2010).

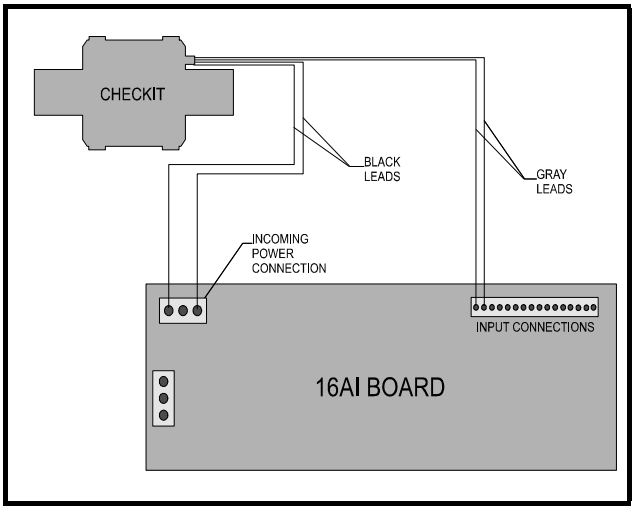


Figure 14 *- Checkit Typical Power Connections*

Set-up

Board and Point Settings

Before monitoring of the Checkit sensor by the RMCC can begin, the location of the Checkit sensor must be identified. The following procedure should be used for location identification:

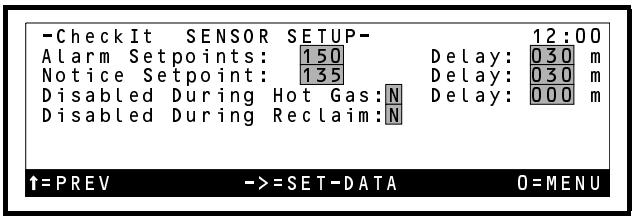
1. Return to the Main Menu.
2. Select 7) Configuration from the Main Menu.
3. Select 1) Input Definition from the Configuration Menu.
4. Page down the Input Definitions Pages to the Checkit Page.
5. Input the 16AI board number and point number for the Checkit sensor.
6. Checkit sensor setup is complete.

Set Points and Time Delays

To configure the RMCC unit for Checkit monitoring, the following procedure should be followed:

1. Log on the RMCC unit with the proper password.
2. Select 1) Pressure Control from the Main Menu.
3. Select 3) Alarms from the Pressure Control Menu.
4. Page down the Alarms Pages to the Checkit Page.

The Checkit Sensor Setup screen for the RMCC is shown below, along with the recommended settings.



Alarm Setpoint/Notice Setpoint

The Checkit sensor continuously monitors the refrigeration system for a temperature increase indicating low liquid levels within the system. The RMCC may be configured to generate an alarm and/or a notice when the measured Checkit temperature rises to a defined value.

The value at which an alarm will be generated is defined in the Alarm Setpoint field. The value at which a notice will be generated is defined in the Notice Setpoint field. Any value from 0 to 240 degrees may be entered in these fields.

Alarm Delay/Notice Delay

Delays are defined for alarms and notices in the Delay fields. The Checkit temperature must be above the Alarm Setpoint or above the Notice Setpoint for the entire defined delay period before an alarm or notice will be generated. Any value from 0 to 240 minutes may be entered in these fields.

Disabled During Hot Gas

The Checkit sensor monitors the system for all temperature increases, regardless of cause. Therefore, Checkit may detect normal flash gas occurrences as a result of hot gas defrosts. To disable Checkit monitoring during hot gas defrost, enter a Y in this field.

If desired, Checkit monitoring may be disabled for a few minutes after a hot gas defrost cycle is complete. To activate this feature, enter a delay from 0 to 240 minutes in the Delay field to the right of the Disabled During Hot Gas field.

Disable During Reclaim

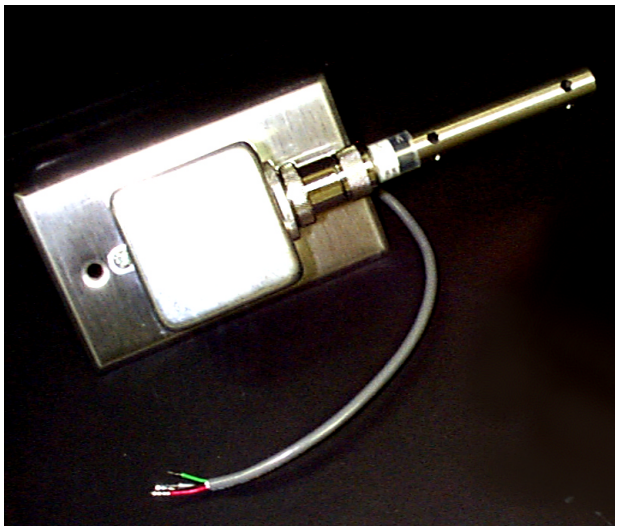
Users in northern climates—where heat reclaim is in constant use during winter months—should carefully consider the use of the "Disable During Heat Reclaim" function of the RMCC.

Because heat reclaim may temporarily introduce flash gas into the system, the RMCC allows disabling of the Checkit sensor during Heat Reclaim. To disable Checkit monitoring during reclaim, enter a Y in the Disabled During Reclaim field.

Other Environmental Management Systems

Although the Checkit sensor provides optimum performance when used in conjunction with the RMCC unit, Checkit is adaptable to other environmental management systems. Contact CPC concerning specific setup information for non-RMCC units.

Dew Cell Dew Point Probe (P/N 203-1902)



Overview

The dew cell dew point probe can be used to monitor the dew point of a particular area. The probe should be mounted in a relatively dust free area with the probe in an "up" position.

Mounting

The dew cell dew point probe should be located four to six feet from the floor with the probe pointing up. An area with minimum exposure to dust is recommended.

Mount the probe using the standard switch cover supplied with the unit, as shown in ***Figure 15***.

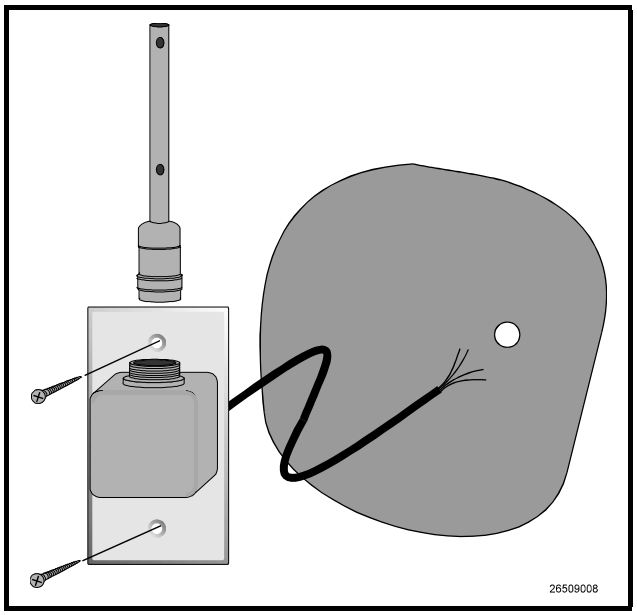


Figure 15 *-Dew Cell Dew Point Probe Mounting*

Wiring

Wire the Dew Cell Dew Probe to the 16AI board as shown in ***Figure 16***.

1. Wire the black lead to an odd-numbered terminal.
2. Wire the red leads to even-numbered terminal.
3. Wire the green lead to AC1.
4. Wire the white lead to AC2.
5. Make sure the corresponding Input Dip Switch is UP.

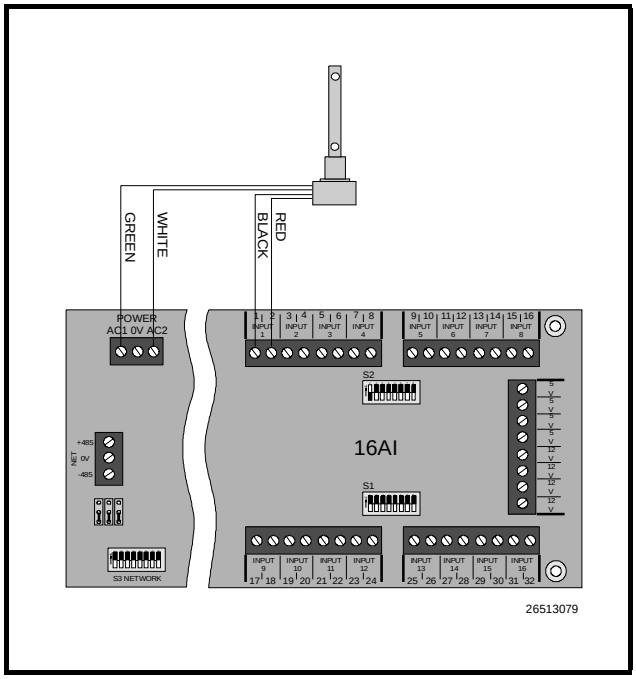


***Figure 16**-Dew Cell Dew Point Probe Wiring*

Software Setup

Input Board and Point Configuration

Set up the Dew Cell Dew Point Probe by assigning the board and point address to the appropriate input. Refer to the REFLECS Installation and Operation manual for more information.

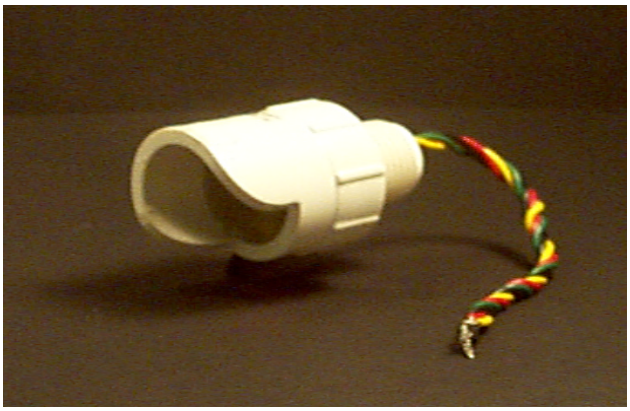
Sensor Control Setup

If the Dew Cell Dew Point Probe is being set up in Sensor Control, the Sensor type must be defined as (D)ewpoint in the Sensor Setup screen. In some older versions of REFLECS software, the (D)ewpoint option will not be available; in this case, set the sensor up as a (L)inear sensor with a Gain of -58.4 and an Offset of -1523.

Maintenance

The dew point probe uses a heated salt dewcell. Therefore, it requires regular maintenance. The probe should be inspected every 3-6 months. Remove the outer sleeve of the probe and inspect the wick area. If it is dirty or if it has a build-up of salt crystals, the probe needs to be cleaned and recoated. To clean the probe, immerse it in a clean container of boiling distilled or de-ionized water for 10 minutes, empty the water and replace with fresh water and repeat. Once the probe is clean, it can be recoated with the a couple of drops of a solution of 5 parts distilled water to 1 part Lithium Chloride crystals on a weight basis. This solution can be made or it can be ordered through CPC (P/N 203-1925).

Light Level Sensor (P/N 206-0002)



Overview

CPC stocks a low voltage light sensor designed to provide input to 16AI boards. The light level sensor provides the controllers with information that allows controllers to switch lights on or off, or provide continuous signals to electronic dimming ballasts for fluorescent fixtures. ***Table 3*** lists the specifications for all light level sensors supplied by CPC.

Operating Temp.	13° F to 140° F (-11° C to 60° C)
Sensor Type	Blue-enhanced Photo Diode with amplifier
Input Voltage	12 V DC from controller
Output Voltage	0 V DC at darkness to 10 V DC at full output
Sensitivity	Approximately 1 V per 175 FC

Table 3*-Specifications for Light Level Sensors*

Mounting

The Light Level Sensor should be mounted facing north, for locations in the northern hemisphere, away from direct sunlight. For locations in the southern hemisphere, the Light Level Sensor should be mounted facing south.

CPC does not supply mounting hardware along with the light level sensor. The sensor should be mounted horizontally through the knockout of a standard weather-resistant junction box. ***Figure 17*** shows a typical mounting configuration.

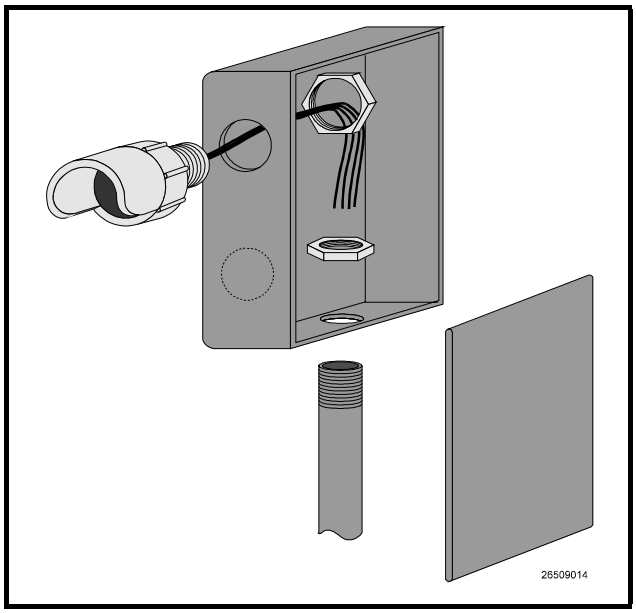


Figure 17 *- Light Level Sensor Mounting*

Wiring

Wire the Light Level Sensor to the 16AI board as shown in ***Figure 18***.

1. Connect red and yellow leads to the even-numbered terminal.
2. Connect green lead to the odd-numbered terminal.
3. Connect the black lead to +12V.

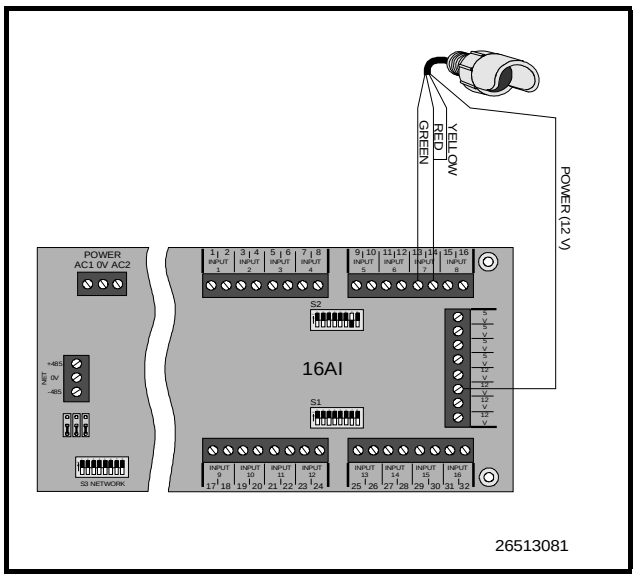


***Figure 18**-Light Level Sensor Wiring Diagram*

Software Setup

Input Board and Point Configuration

Set up the Light Level Sensor by assigning the board and point address to the appropriate input. Refer to the RE-FLECS Installation and Operation manual for more information.

Sensor Setup

If the Light Level Sensor is being set up in Sensor Control, the Sensor type must be defined in the Sensor Setup screen as a (L)inear sensor with a Gain of 175 and an Offset of 0.

Indoor Relative Humidity Sensor (P/N 203-5750)

Overview

The indoor relative humidity sensor uses a capacitor-based humidity sensor for measurement of relative humidity. The indoor humidity sensor (P/N 203-5750) comes with an enclosure designed to be mounted on a wall.

The sensing element for indoor humidity sensor is a General Eastern bulk resistance type sensor. ***Table 4*** lists the sensor's specifications:

	Specifications
Operating Range	10% to 99% RH (noncondensing) -40° to 170° F (-40 to 76° C)
Storage Temperature	-85° to 158° F (-65° to 70° C)
Hysteresis	Less than 1% RH
Supply Voltage	9.5 to 36 VDC
Signal Outputs	0 to 5 volts (0 to 100% RH linear)
Accuracy Range	±3%

Table 4 *- RH Sensor Specifications*

Installation

Mounting the Indoor RH Sensor

The indoor relative humidity sensor should be mounted in a central location within the zone to be measured, away from doors, windows, vents, heaters, and outside walls that could affect temperature readings. The sensor should be between four and six feet from the floor.

Mount the sensor as follows:

1. Remove the two screws from the sides of the enclosure, and remove the cover.
2. Mount the sensor to the wall using the two mounting holes near the flattened corners of the mounting plate (as shown in ***Figure 19***).
3. Replace the cover and the cover mounting screws.

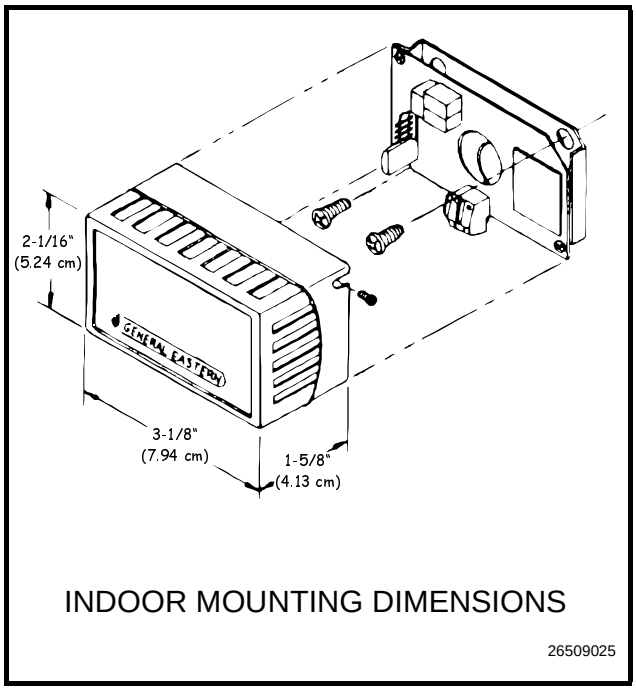


Figure 19 *- Indoor RH Mounting Dimensions*

Wiring

Wire the relative humidity sensor to an input board as shown in ***Figure 20***.

1. Wire the terminal labelled "P" to one of the 12V supply terminals on the input board (POWER).
2. Wire the terminal labelled "GND" to the odd-numbered terminal of an input board point (GND).
3. Wire the terminal labelled "OUT" to the even-numbered terminal of an input board point (SIG).
4. Jumper the terminal labelled "N" to the "GND" terminal.

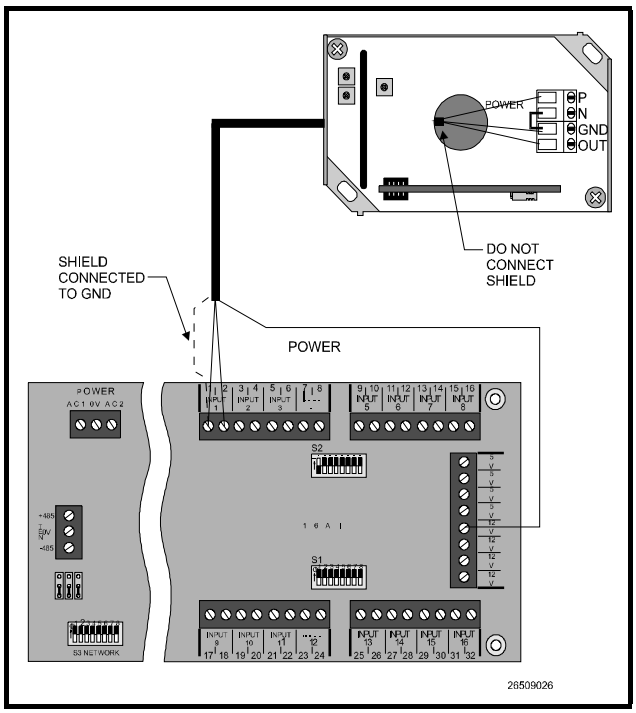


Figure 20 *- Relative Humidity Sensor Wiring*

Software Setup

Input Board and Point Configuration

Set up the relative humidity sensor by assigning the board and point address to the appropriate input. Refer to the REFLECS Installation and Operation Manual for more information.

Sensor Control Setup

If the relative humidity sensor is being set up in Sensor Control, the Sensor type must be defined as (H)um in the Sensor Setup screen. Refer to the REFLECS Installation and Operation Manual for more information.

Outdoor Relative Humidity Sensor (P/N 203-5760)

Overview

The outdoor relative humidity sensor (P/N 203-5760) comes in a weather-proof enclosure designed to be mounted on an outside wall.

The sensing element for the outdoor humidity sensor is a General Eastern bulk resistance type sensor. ***Table 5*** lists the sensor's specifications:

	Specifications
Operating Range	10% to 99% RH (noncondensing) -40° to 170° F (-40 to 76° C)
Storage Temperature	-85° to 158° F (-65° to 70° C)
Hysteresis	Less than 1% RH
Supply Voltage	9.5 to 36 VDC
Signal Outputs	0 to 5 volts (0 to 100% RH linear)
Accuracy Range	±3%

Table 5 *- RH Sensor Specifications*

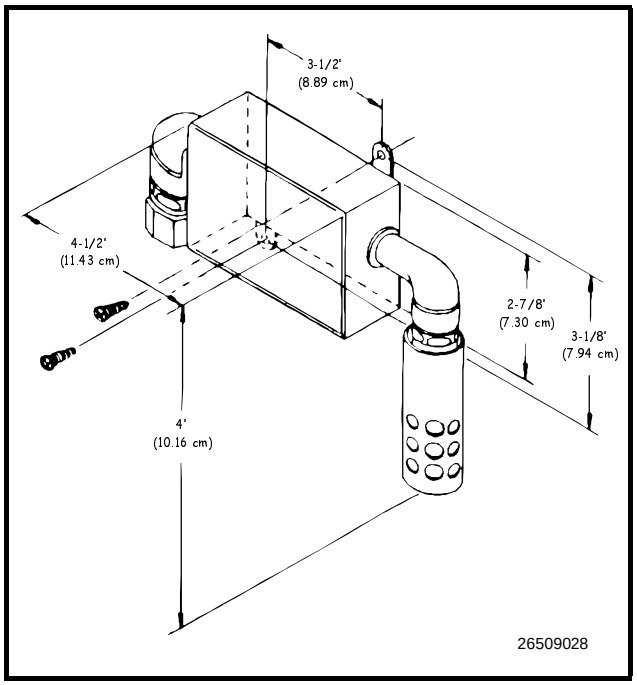


Figure 21 *- Outdoor RH Sensor Mounting Dimensions*

Installation

Mounting The Outdoor RH Sensor

When mounting outdoors, point the transmitter down so that water does not collect in the sensor cavity.

The outdoor sensor should be mounted in a sheltered area, preferably on the north side of a building under an eave. This prevents sun-heated air from rising up the side of the building and affecting the relative humidity at the sensor.

Mount the sensor using the two screw holes shown in ***Figure 21***.

Wiring

Wire the relative humidity sensor to an input board as shown in ***Figure 22***.

1. Wire the terminal labelled "P" to one of the 12V supply terminals on the input board (POWER).
2. Wire the terminal labelled "GND" to the odd-numbered terminal of an input board point (GND).
3. Wire the terminal labelled "OUT" to the even-numbered terminal of an input board point (SIG).
4. Jumper the terminal labelled "N" to the "GND" terminal.

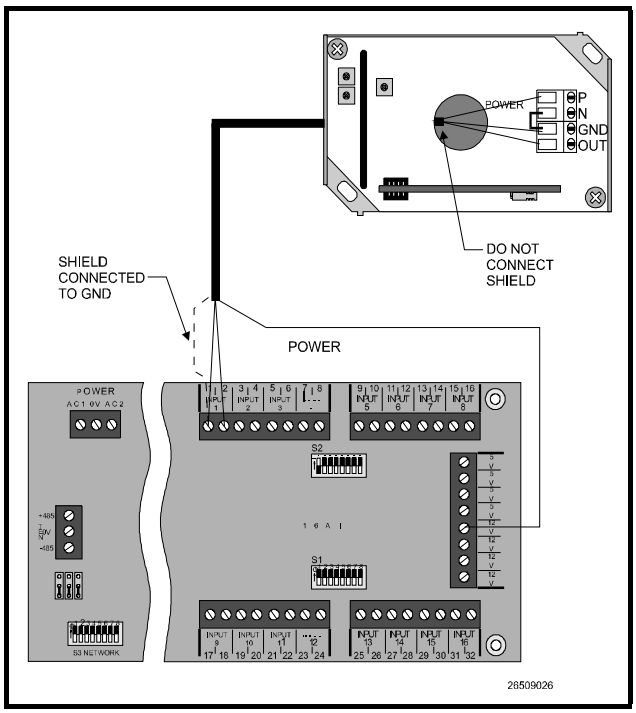


Figure 22 *- Relative Humidity Sensor Wiring*

Software Setup

Input Board and Point Configuration

Set up the relative humidity sensor by assigning the board and point address to the appropriate input. Refer to the REFLECS Installation and Operation Manual for more information.

Sensor Control Setup

If the relative humidity sensor is being set up in Sensor Control, the Sensor type must be defined as (H)um in the Sensor Setup screen. Refer to the REFLECS Installation and Operation Manual for more information.

Refrigerant Transducer (P/N 809-1550)

Overview

The Refrigerant Transducer (RT) (P/N 809-1550), shown in ***Figure 23***, monitors a specified area for the presence of refrigerant. When refrigerant is detected, the RT sends a signal to a 16AI input board, and to a CPC controller such as the Building Environmental Control (BEC) or Refrigeration Monitor and Case Control (RMCC). The 16AI input board is capable of supporting up to sixteen RTs, although an additional power supply is required if more than one RT is connected to a 16AI board. The clearing cycle, warm-up cycle, and temperature compensation are unique CPC RT features that reduce false leak signals and improve leak detection capabilities. The transducer is enclosed in a protective case to prevent damage to the refrigerant sensor.

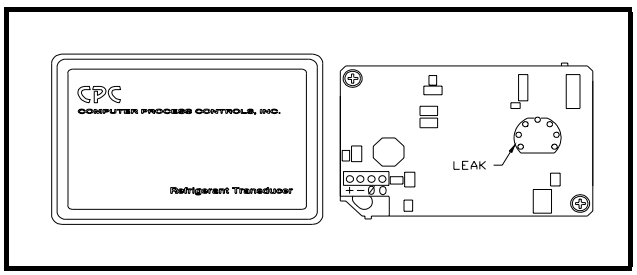


Figure 23 *- Refrigerant Transducer (Sensor Removed)*

Refrigerant Transducer Sensor Type

The refrigerant transducer is supplied with either of two sensors depending on the refrigerant to be detected. ***Table 6*** shows the refrigerant type and the sensor part number that should be used.

Product Number	209-0830	209-0832
Heater Voltage	5.0 V ± 0.2 V (AC or DC)	
Circuit Voltage	Max. 24 V (AC or DC, PS ≤ 15 mW)	
Load Resistance	Variable (PS ≤ 15 mW)	
Sensor Resistance	1 kΩ ~ 5 kΩ for R-22 at 1000 ppm/Air	4 kΩ ~ 40 kΩ for R-134a at 100 ppm/Air
Change Ratio of Sensor Resistance	0.30 ± 0.10 (Rs/Ro)	0.50 ~ 0.65 (Rs/Ro)
Heater Resistance	30.0 Ω ± 3.0 Ω at Room Temperature	
Heater Power Consumption	VH=5.0 V (835 ± 90 mW)	
High Sensitivity To	R-113, R-22, R-12, R-11	R134a, R-22, R-12

Table 6 *- Refrigerant Transducer Sensor Part Numbers*

Features

- Can be used with long cable runs
- Compact design
- Low power consumption
- Clearing Cycle eliminates effects of prior refrigerant exposure
- Warm-up Cycle prevents false signals during initial power-up
- Temperature Compensation reduces false signals during large temperature change conditions
- No calibration adjustments required

Installation

Power

RTs require special power considerations during power-up. Do not substitute other power supplies for CPC Power Supply (P/N 258-1000).

If only one RT is to be used per 16AI board, then the RT may be powered directly by the 16AI power output connec-

tion. However, it is likely that multiple RTs will be installed and, therefore, an additional power supply must be provided. Because RTs draw high current during power up, a power supply with delayed foldback current limiting is required. Delayed foldback current limiting prevents current limiting long enough for the power supply to reach 12 volts. If more than one transducer per 16AI board is to be installed, connect the RTs to CPC Power Supply (P/N 258-1000).

Location

The RT is designed to monitor an area of 1000 cubic feet, and should be mounted to allow the leak sensor to detect a refrigerant leak quickly. Consideration should be given to air flow patterns, proximity to doorways, and interference that could limit the ability of the transducer to sense a refrigeration leak. Since refrigerant is heavier than air, the lower the location of the RT, the more quickly the RT will detect a refrigerant leak.

Non-Refrigerant Gas Detection

The refrigerant transducer uses a metal oxide coated resistor for detecting refrigerants. Although highly sensitive to CFCs and HCFCs, the sensor will also detect other gases present in the sensing area. By programming alarm and notice delay set points within the CPC controller, detection of these gases can be filtered to ensure only CFC or HCFC detection causes alarm or notice conditions. Some of the gases that will be detected by the RT are listed below:

- Methyl Chloride
- Methylene Chloride
- Chloroform
- Carbon Tetrachloride
- Ethyl Chloride
- Ethylene Chloride
- Trichlorothane
- Tetrachloroethyelane
- Chlorobenzene
- Ethanol
- Octane
- Hexane
- Carbon Monoxide
- Isobutane
- Carbon Dioxide

Mounting

The RT is 3.2 inches wide, 2.1 inches high, and 1.6 inches deep.

1. Loosen the cover set screw on both sides of the protective cover, and remove the cover.
2. Loosen the two board mount screws, and remove the board from the mount plate.
3. Secure the mount plate using four screws.
4. Remount the board using the two mount screws.
5. After wiring, replace the protective cover and set screws.

System Connections

A total of 16 refrigeration transducers may be installed on one 16AI board. This limitation is due to the total number of input terminals on the board. In addition, no more than 16 RTs may be connected to one external power supply. Regardless of the number of sensors connected to the input terminal of the 16AI, only one RT may be connected to the power output connection of the board. The following layouts should be used when installing single or multiple RTs.

The RT and the 16AI board do not need to be located close to each other. ***Table 7*** lists the maximum cable lengths and required cables for RT connection to the 16AI board.

Max Cable Length	Cable Type
700	Belden #8729 (22AWG or equiv.)
1800	Belden #9418 (18AWG or equiv.)

Table 7 *- RT Connection Cable Lengths*

Single Refrigerant Transducer Layout

Do not jumper the -V and 0V terminals of the refrigerant transducer.

Connect the refrigerant transducer to the 16AI input board as shown in Figure?.

1. Attach the black wire to the -V terminal of the RT and attach the green wire to the 0V terminal of the RT.
2. Tie the back and green wires together at an odd terminal of the 16AI input connection.
3. Attach the white wire to the OUT terminal of the RT and an even terminal of the 16AI board input connection.
4. Attach the red wire to the +V terminal of the RT and a 12V terminal on the 16AI power output connection.

5. Cut off the shield at the transducer and ground at either a ground lug or an odd terminal on the 16AI board.
6. Set the corresponding 16AI Input Type Dip Switch to the DOWN position, as shown in ***Figure 24***.

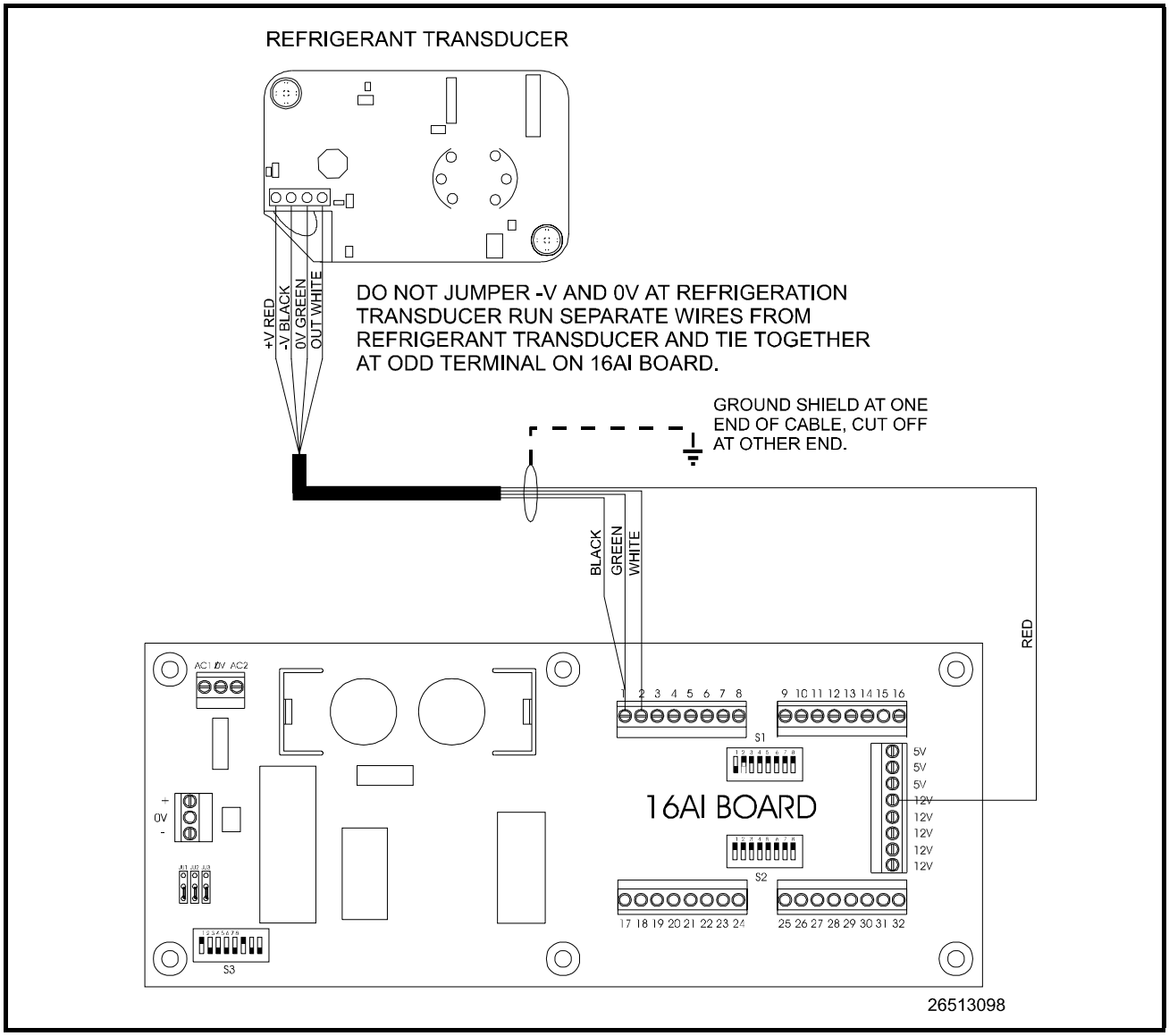


Figure 24 *- Single Refrigerant Transducer Layout*

Multiple Refrigerant Transducers Layout

A maximum of sixteen RTs may be connected to one power supply.

Do NOT jumper the -V and 0V terminals of the refrigerant transducer.

Connect the refrigerant transducers to the 16AI input board and power supply as shown in ***Figure 25***.

1. Attach the black wire to the -V terminal of each of the RTs and the 0V terminal to the power supply.
2. Attach the green wire to the 0V terminal of each of the RTs and an odd terminal on the 16AI input connections.

3. Attach the white wire to the OUT terminal of each of the RTs and an even terminal on the 16AI board input connections.
4. Attach the red wire to the +V terminal of each of the RTs and the 12V terminal of the power supply.
5. Cut off the shield at the transducer and ground at either a ground lug or an odd terminal of the power supply.
6. Ground the negative output of the power supply to one of the odd terminals of the 16AI input connections.
7. Set the corresponding input switches to the down position.

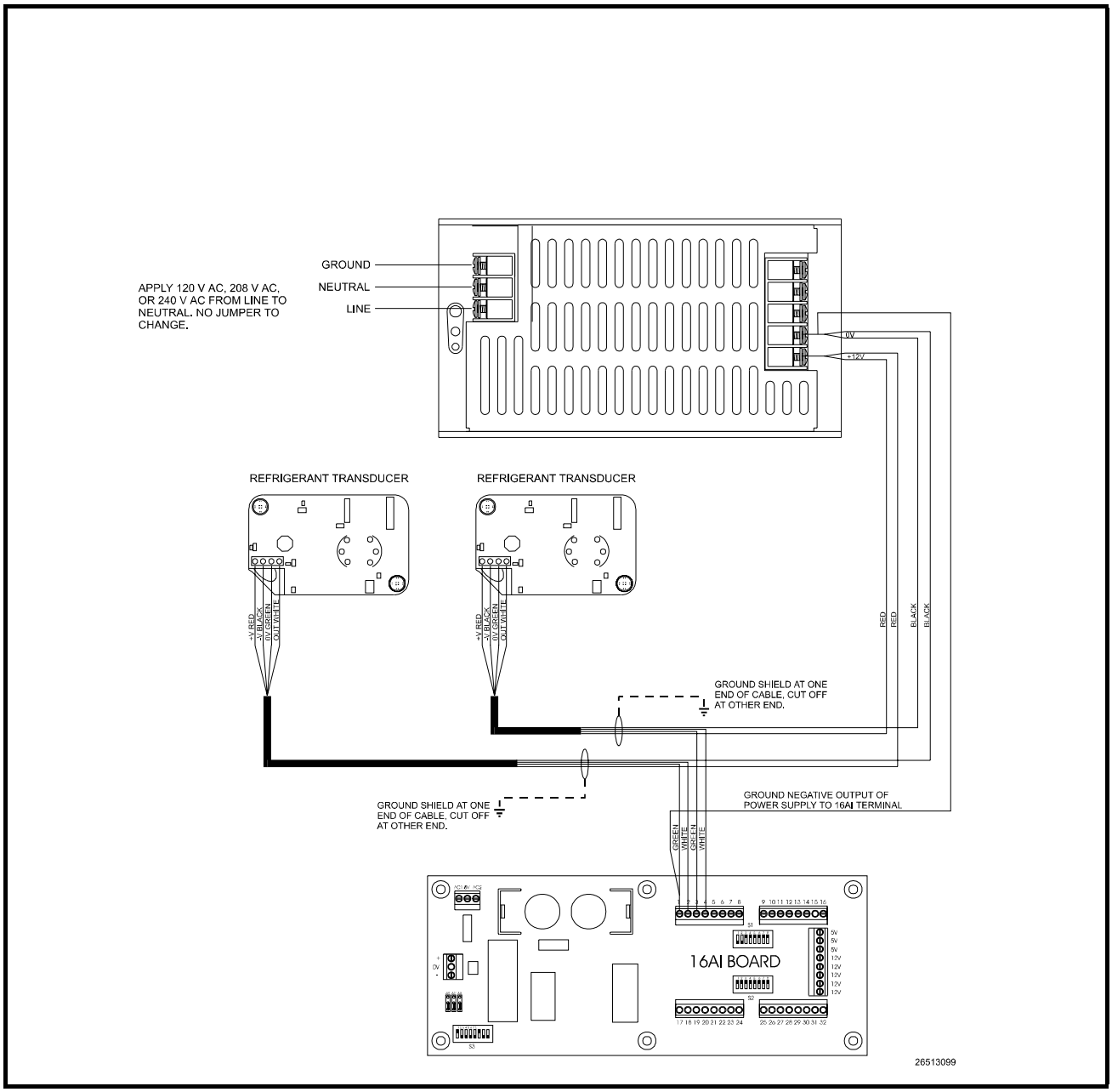


Figure 25 *- Multiple Refrigerant Transducer Layout*

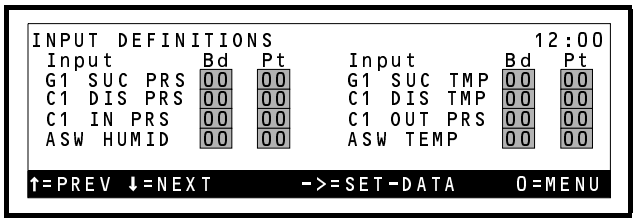
System Description

Once connected to the system and power supply, the refrigerant transducer monitors the immediate area for refrigerant leakage. When refrigerant is detected, the refrigerant transducer sends a signal to the CPC controller via the 16AI input board and RS485 communication network. The CPC controller then sends a signal to the 485 alarm and writes an alarm or notice to the alarm log within the CPC controller. In order for the CPC controller and refrigerant transducer to interact, the CPC controller must be configured to recognize the RT network location. The following section provides basic information for configuring a Refrigeration Monitor and Case Control (RMCC) to interact with the RT. Configuration of other CPC controllers is similar. Refer to the specific controller manual for additional information.

Programming the RMCC

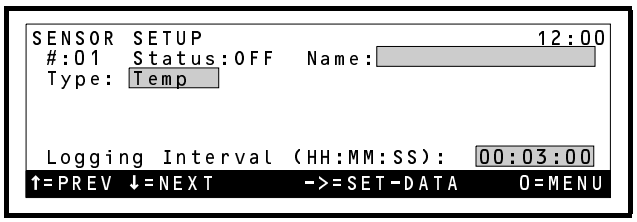
Refer to *P/N 026-1102, RMCC Installation and Operation Manual,* **Section 7,** *System Navigation,* for specific RMCC log-on and system navigation procedures.

Input Configuration



The first step in setting up an RT is assigning its board and point location to one of the 48 sensor control inputs (SENS01 - SENS48). From the Input Definitions screen (see **Section 7.9.1.** in the RMCC manual), scroll through the inputs using the DOWN ARROW key until the sensor control inputs are shown. Select the desired input and enter the board and point address in the appropriate fields.

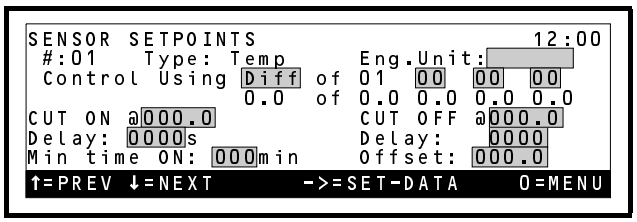
Sensor Setup



The Type field in the Sensor Setup screen (see **Section 7.6.2.** of the RMCC manual) must be set to "RefrLk". To do this, press the RIGHT ARROW key until the Type field is highlighted, and scroll through the list of possible sensor types using the "." or "-" buttons.

If desired, a 15-character name for the sensor may also be entered in the Name field.

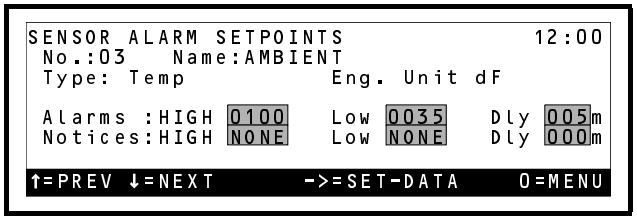
Offset Adjustment



Once on-line, the RT may generate small ambient readings that do not constitute an actual refrigerant leak. To offset the RMCC to account for this normal background reading, an offset may be entered in the Sensor Setpoints screen (see **Section 7.6.5.** of the RMCC manual).

Press the RIGHT ARROW key until the Offset field is highlighted, and enter the necessary offset.

Alarm Setup



If an alarm or notice is required when a particular RT reading level is reached, the sensor alarm and notice set points need to be defined in the Sensor Alarm Setpoints screen (see **Section 7.6.2.** of the RMCC manual).

Exhaust Fan Setup

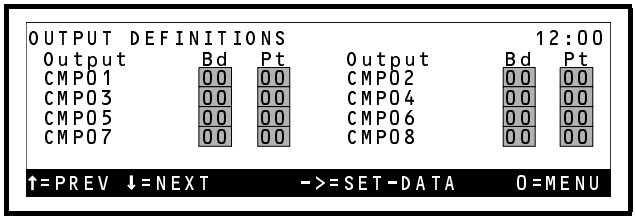
In some refrigeration control environments, it may be necessary to activate an exhaust fan when a refrigerant leak is detected. To control an exhaust fan with a signal sent by an RT, a set of ON and OFF set points must be defined, and the relay output of the fan must be identified within the RMCC Output Definitions screen.

Cut-On/Cut-Off Setpoints

Cut-on and cut-off set points for sensor-controlled outputs are defined in the Sensor Setpoints screen—the same screen as the RT offsets (see "Offset Adjustment", above).

In the Cut On field, enter the refrigerant level that, when exceeded, will turn on the fan. In the Cut Off field, enter the refrigerant level that will deactivate the fan once it has been activated. For both set points, a delay may be specified.

Output Definitions



The fan's output board and point address will need to be assigned to a sensor control output (SEN CTL 01 - SEN CTL 48). Press the DOWN arrow key from the Output Definitions screen (see **Section 7.9.2.** in the RMCC manual) until the SEN CTL outputs are shown. Choose the output number that matches the RT's input number; in other words, if an RT is set up in the Input Definitions screen as SENS04, enter the exhaust fan's board and point address in SEN CTL 04.

Eclipse Pressure Transducers

0–100 PSIG–P/N 800-1100
0–200 PSIG–P/N 800-1200
0–500 PSIG–P/N 800-1500

Overview

Do NOT connect an Eclipse® Pressure Transducer to a 12V supply. Eclipse® transducers are rated for 5V DC.

CPC supplies Eclipse® Pressure Transducers for use in some refrigeration control systems. All 100, 200, and 500 PSIG pressure transducers ordered for use with RMCC systems or shipped with new RMCC systems will be Eclipse® transducers.The part numbers and hardware specifications are listed in ***Table 8***. Software setup is described below.

Part Number	800-1100	800-1200	800-1500
Pressure Range	0 - 100 PSIG	0 - 200 PSIG	0 - 500 PSIG
Max Overload PSIG (w/o Damaging xducer)	200 PSIG	400 PSIG	750 PSIG
Max Overload PSIG (w/o Bursting)	500 PSIG	1000 PSIG	2500 PSIG
Excitation	+5 VDC ±0.25 V, 20 mA max		
Accuracy	±1% Span from best fit straight line. Includes effects of non-linearity, hysteresis, and repeatability.		
Operating & Storage Temperature Range	-40° F to 221° F (-40° C to 105° C)		
Compensated Temperature Range	-0° F to 180° F (-18° C to 82° C)		
Total Error	±4% of full scale. Includes effects of temperature, non-linearity, hysteresis, and repeatability.		

Table 8*-Specifications for Eclipse® Pressure Transducers*

Description

The Eclipse® pressure transducer is a pressure-sensing device that converts pressure readings to a proportional electrical signal between 0.5 - 4.5 volts DC. The transducer is designed with a 1/8” male national pipe thread (NPT) fitting for connection to a standard access fitting.

If the access fitting is configured with a Schrader valve, this fitting will have to be replaced with a standard 1/8” NPT female fitting. Each transducer is supplied with 20 feet of cable for connection to a 16AI input board. ***Table 9***-shows pressure/voltage ranges for each transducer.

The Eclipse® pressure transducer can safely handle an applied vacuum. With the Eclipse, there is no need to remove or valve off the transducer before a vacuum is applied. In addition, the Eclipse pressure transducer is compatible with ammonia.

Output Voltage (V)	Pressure in PSIG		
	0 to 100 PSIG Eclipse Transducer	0 to 200 PSIG Eclipse Transducer	0 to 500 PSIG Eclipse Transducer
0.50	0	0	0
0.70	5	10	25
0.90	10	20	50
1.10	15	30	75
1.30	20	40	100
1.50	25	50	125
1.70	30	60	150
1.90	35	70	175
2.10	40	80	200
2.30	45	90	225
2.50	50	100	250
2.70	55	110	275
2.90	60	120	300
3.10	65	130	325
3.30	70	140	350
3.50	75	150	375
3.70	80	160	400
3.90	85	170	425
4.10	90	180	450
4.30	95	190	475
4.50	100	200	500

***Table 9**-Voltage-Pressure Table for 100, 200, & 500 PSIG Eclipse Pressure Transducers*

Mounting

In high-humidity environments, mount the transducer so that the cable is at the bottom or side. This creates a moisture trap away from the transducer. However, if pressure media might freeze, mount the transducer with the pressure port pointing down.

Installation

1. Wrap the port threads with Teflon® tape to ensure tight seal.
2. Screw the transducer onto the access valve. Tighten by using a wrench on the hex nut behind the port. Do not use the transducer casing to apply torque.
3. Connect the transducer to the 16AI board as shown in ***Figure 26***.

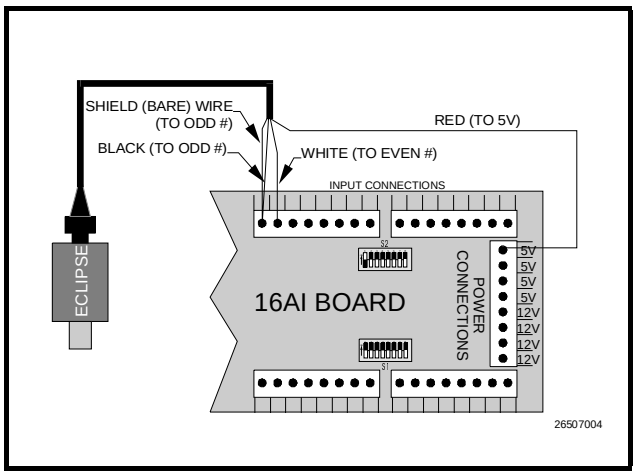


***Figure 26**-Typical Wiring Scheme for the Eclipse® Pressure Transducer*

4. On switch S1 or S2 on the 16AI, set the rocker corresponding to the input number to the DOWN position.

Software Requirements for Eclipse® Pressure Transducers

CPC supplies Eclipse pressure transducers with all new refrigeration control orders. If using RMCC v. 2.10 or above, the controller will by default read Eclipse transducers; no additional setup is required.

All versions of the RMC software after and including v. 6.08 and all versions of the RMCC software may be configured to accept input from either a standard or Eclipse transducer. Users may set transducer types from the front panel in all versions EXCEPT RMCC 2.00, 2.01, 2.02, 2.03, and 2.04 – these versions require UltraSite to set up Eclipse transducer compatibility.

To choose Eclipse or Standard transducer type from the front panel:

1. Enter the transducer's board and point address in the Input Definitions screen.
2. From the main menu, choose the Configuration option, followed by the Xducer Types option. Your screen should appear similar to the following:

```
    PRESSURE TRANSDUCER TYPE          12:00
Input          Board  Point   Type
SPARE           00     00     ECLIPSE
SPARE           00     00     ECLIPSE
SPARE           00     00     ECLIPSE
SPARE           00     00     ECLIPSE
SPARE           00     00     ECLIPSE
↑=PREV ↓=NEXT  ->=SET                 0=MENU
```

3. Using the DOWN and UP arrow keys, scroll through the Pressure Transducer Type screens until the desired transducer is shown. The Pressure Transducer Type screen is shown below.
4. Press the RIGHT arrow key, and then use the arrow keys to move the cursor on to the transducer's Type field.
5. Select the desired type (either ECLIPSE or STANDRD).

To choose Eclipse or Standard transducers using UltraSite (v. 2.00 - 2.04), contact CPC for assistance. All other REFLECS controllers use standard pressure transducers. See "Standard Pressure Transducers," page 37.

Standard Pressure Transducers

0–100 PSIG–P/N 800-0105
0–200 PSIG–P/N 800-0205
0–500 PSIG–P/N 800-0505

Overview

Standard transducers are available as replacements for BEC, BCU, and RMCC systems.

Table 10 lists the part numbers for the 100, 200, and 500 lb. pressure transducers along with pressure/voltage ranges for each CPC standard pressure transducer type.

Standard pressure transducers should be mounted in a vertical position (pressure port down) above crank case oil level to prevent accumulation of oil in the transducer port.

Part Number	800-0105	800-0205	800-0505
Pressure Range	0-100 PSIG	0-200 PSIG	0-500 PSIG
Max Overload PSIG (w/o Damaging xducer)	200 PSIG	400 PSIG	750 PSIG
Max Overload PSIG (w/o Bursting)	1000 PSI	2000 PSI	2500 PSI
Supply Voltage	12 VDC		
Full Scale Output	5±0.1 V DC @ 25° C (1-6 V)		
Excitation	<500 PSI 9 to 24 V DC @ 15 mA nominal; 500 PSI 9 to 24 V DC @ 20 mA nominal		
Accuracy	±1% F.S.O. from best fit straight line including effects of non-linearity, hysteresis and non-repeatability		
Operating Temperature Range	-40° to 105° C (-40° to 221° F) Hirschmann -40° to 90° C (-40° to 194° F)		
EMI Error	Typically less than 1% full scale output error over the frequency range from 20 mHz to 1 gHz at field strengths up to 10 volts/meter		

Table 10*-CPC Standard Pressure Transducer Specifications*

Description

Computer Process Controls pressure transducer is a pressure sensing device that converts pressure readings to a proportional electrical signal between one and six volts DC. The transducer is designed with a 1/4” flare fitting for connection to a standard access fitting. If the fitting is configured with a Schrader valve, installation of a shut-off valve is not required. If the access fitting is not configured with a Schrader valve, install a shut-off valve between the transducer and the system. The standard pressure transducer is not compatible with ammonia however, the standard pressure transducer may be subjected to a vacuum without damage.

Each pressure transducer is supplied with 20 feet of cable for connection to a 16AI input board. ***Table 11*** shows the corresponding output voltage for each transducer.

Output Voltage (VDC)	Pressure in PSIG		
	0-100 PSIG Standard Transducer	0-200 PSIG Standard Transducer	0-500 PSIG Standard Transducer
1.00	0	0	0
1.25	5	10	25
1.50	10	20	50
1.75	15	30	75
2.00	20	40	100
2.25	25	50	125
2.50	30	60	150
2.75	35	70	175
3.00	40	80	200
3.25	45	90	225
3.50	50	100	250
3.75	55	110	275
4.00	60	120	300
4.25	65	130	325
4.50	70	140	350
4.75	75	150	375
5.00	80	160	400
5.25	85	170	425
5.50	90	180	450
5.75	95	190	475
6.00	100	200	500

Table 11*-Voltage-Pressure Table for 100, 200, 500 PSIG Standard Pressure Transducers*

Installation

1. Ensure that the copper gasket supplied with the unit is properly seated at the base of the flare fitting.
2. Screw the transducer onto the access valve. Do not exceed a maximum torque of 11 ft-lb. Do not apply torque to the case.Use a wrench on the wrench flats.
3. Connect the transducer to a 16AI board as shown in ***Figure 27***.

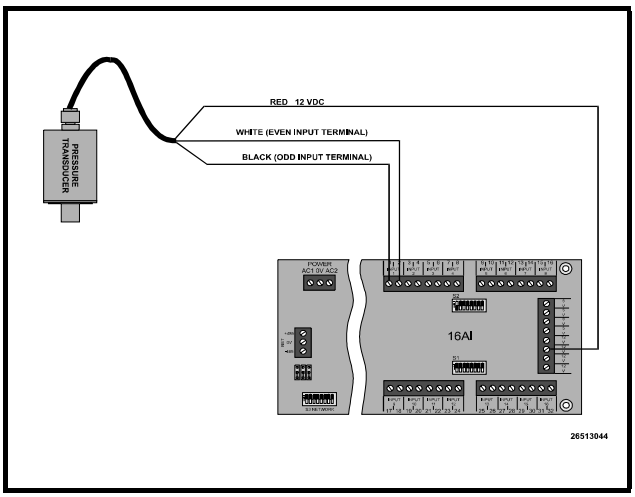
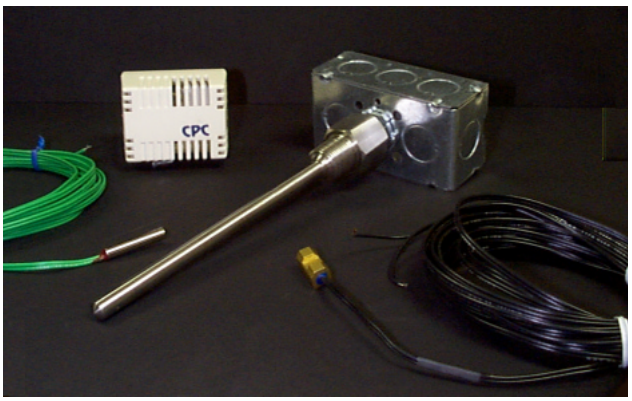


Figure 27*-Standard Pressure Transducer Wiring Diagram*

Software Requirements

All BEC, BCU, and RMCC software (except version 2.10 and above) are pre-configured to accept standard pressure transducers; therefore, no software setup is required for SPTs.

Temperature Sensors



Overview

CPC supplies a variety of temperature sensors for use in a number of different applications. Most temperature sensors are alike in their basic functions: they are polarity-insensitive 10kΩ thermistors that provide accurate temperature readings within a range of -40° F to 150° F (-40° C to 65° C).

Table 12 gives a list of all temperature sensors offered by CPC.

	P/N	Description
General Purpose Bullet Sensor, with nickel-plated brass shell, epoxy potting material & AWG #22 twin lead wires.	501-1121	10-foot green leads (Discharge Air & General Purpose)
	501-1122	20-foot green leads (Discharge Air& General Purpose)
	501-1129	20-foot green leads with connector (Discharge Air & General Purpose)
	501-1127	20-foot orange leads with connector (Defrost Termination)
	501-1128	20-foot purple leads with connector (Return Air)
	501-1130	20-foot green leads (moist air)
	501-1131	20-foot green leads with connector (moist air)
Pipe-mounted sensor, for refrigerant temperature monitoring	501-1125	20-foot blue leads with connector (Coil Inlet)
	501-1126	20-foot red leads with connector (Coil Outlet)
Indoor Space Temp Sensors	809-6565	In wall-mounted enclosure
	809-6566	In wall-mounted enclosure, with reset button (BCU)
Temperature Probes	201-2012	12-inch temp probe (for HVAC ducts and walk-in boxes)
	201-2008	8-inch stainless steel immersion temp probe
	201-2009	8-inch stainless steel insertion temp probe
High-Temp Sensors	201-5000	32° to 300° F (0° to 150° C) sensor (for Condenser Outlet, etc.)
Banana Sensor	501-1220	20 foot leads (pointed, 4 inches long, 1/8" diameter)

Table 12 *- Temp Sensor Types/Part Numbers*

Mounting and Location

Inside Temp Sensor

The inside temperature sensor is supplied within a wall-mounted enclosure that is attached to a standard switch plate.

The temperature sensor should be located in a central location—within the zone to be measured—away from doors, windows, vents, heaters, and outside walls that could affect temperature readings. The sensor should be between four and six feet from the floor.

Mount the sensor using the screws provided as shown in ***Figure 28***.

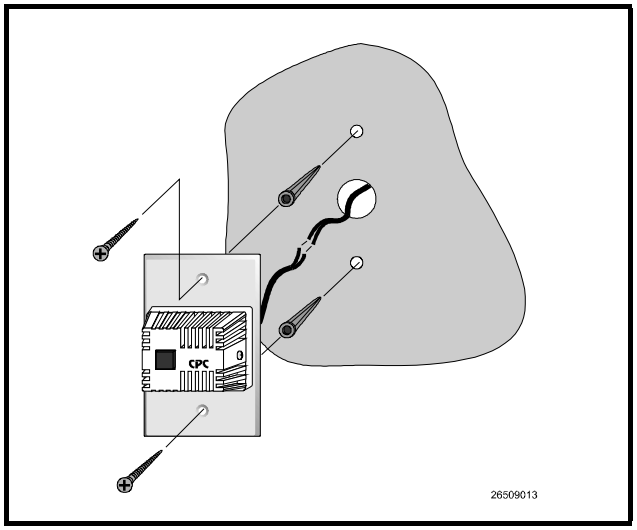


***Figure 28**-Inside Temperature Sensor Mounting*

Outside (Ambient) Temperature Sensor

The outside or ambient temperature sensor should be located on the north side of the building (for locations in the northern hemisphere), preferably under an eave to prevent sun-heated air from affecting the temperature at the sensor. For locations in the southern hemisphere, the temperature sensor should be mounted on the south side of a building in a similar fashion.

The temperature sensor may be mounted using a rubber-lined tubing clamp. CPC also offers an aluminum cover and clamp which may be mounted as shown in ***Figure 29*** (fasteners are not provided).

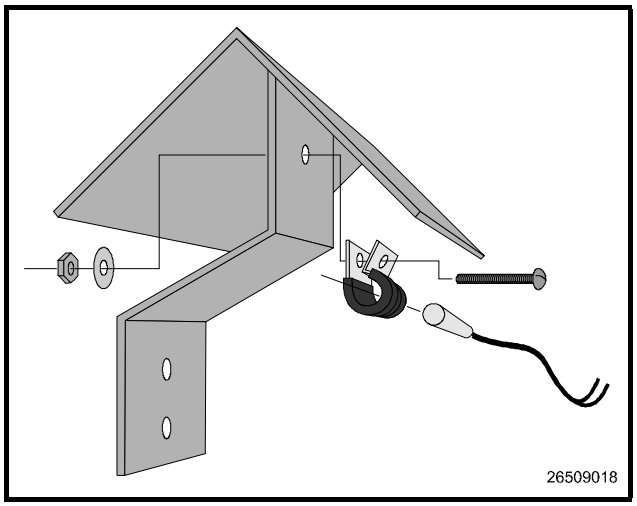


***Figure 29**-Outside Temperature Sensor with Cover and Clamp*

Temperature Probe for Duct and Walk-In Box

The 12-inch insertion temperature probe may be used to monitor temperature in either the supply or return air ducts of the AHU or RTU.

The probe may be mounted in any orientation within the duct and should be secured using self-tapping screws. A 0.250" diameter hole is required for the probe. ***Figure 30*** shows the installation of the insertion probe (self-tapping screws are not provided).

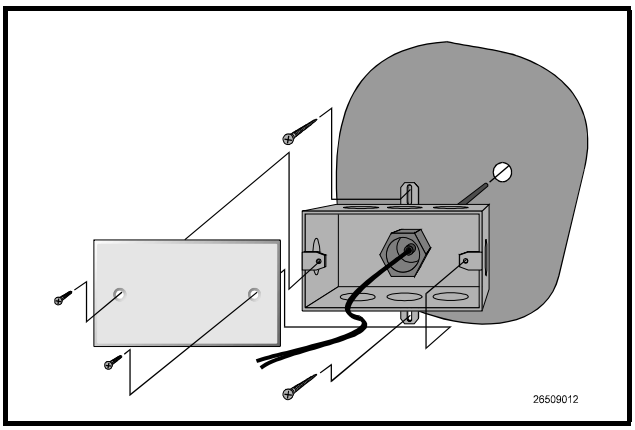


***Figure 30**-12-Inch Insertion Probe Mounting*

Insertion and Immersion Probes

The insertion and immersion temperature probes may be used to monitor temperature. Insertion probes are for use in ducts and are not to be used with liquids. The immersion probe is designed to be used in liquids and comes with an extra sheath.

Drill a hole to accommodate the insertion or immersion probe's sheath (tap if necessary). After creating the hole for the probe or sheath, screw the insertion probe or sheath directly into the hole that was created.

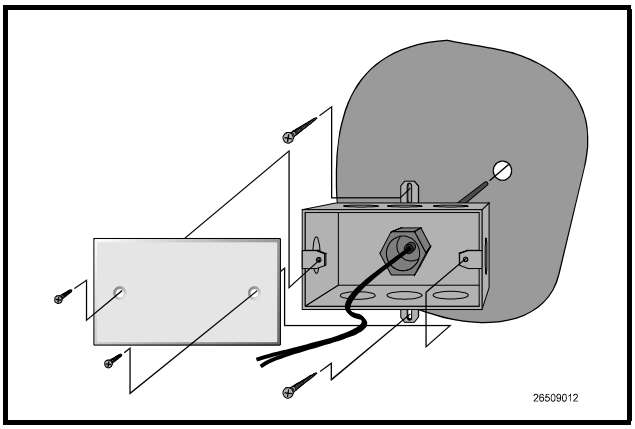


***Figure 31**-12-Inch Insertion Probe Mounting*

After creating the hole for the sheath, screw the sheath into the hole. Be sure that a water tight seal is made for the

immersion probe's sheath. After mounting the immersion probe's sheath, screw the temperature probe and housing into the sheath.

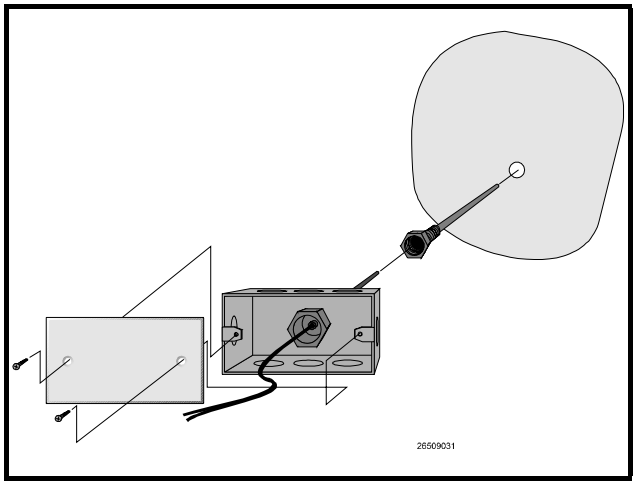


***Figure 32**-Immersion Probe with Sheath*

Pipe Mount Sensors

Bullet or pipe mount sensors mounted on refrigerant lines should be secured with low temperature cable tie, Panduit number PLT2S-M120, or equivalent. For pipe mount sensors, the curved surface should be placed against the pipe and the tie should be positioned in the groove on the top surface of the sensor. A second tie should be used to secure the lead to the pipe for additional support (leave some slack in the lead between the tie and the sensor block).

Sensors located on refrigerant lines should be insulated to eliminate the influence of the surrounding air. A self-adhering insulation that will not absorb moisture is recommended to prevent icing at the sensor location.

The sensor should be positioned on the side of a refrigeration line as shown in ***Figure 33***

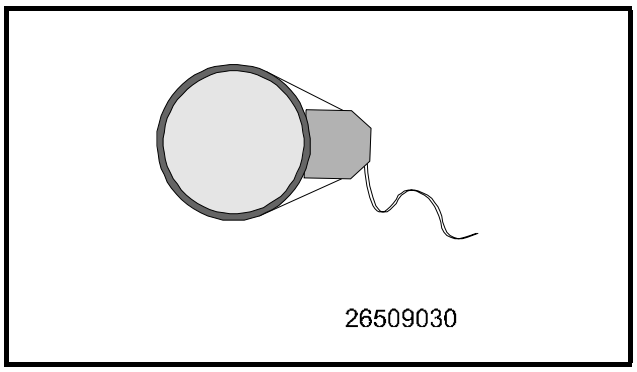


***Figure 33**-Sensor Orientation*

Other Sensors

Supply and Return Air Sensors

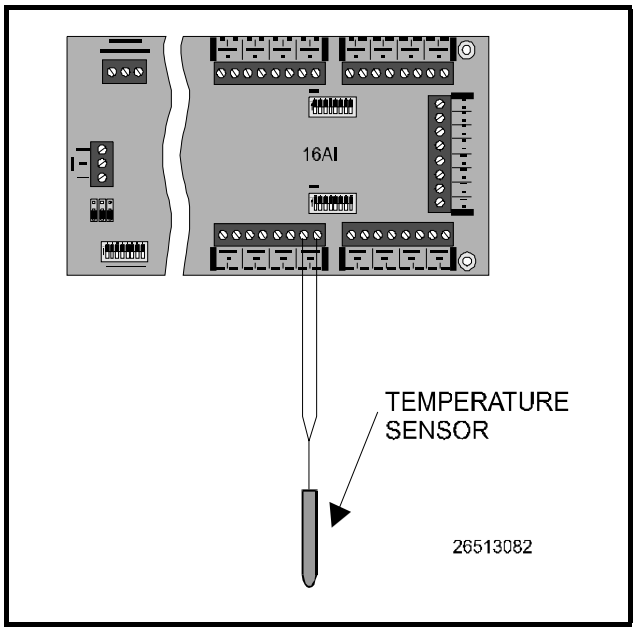
CPC uses the same temperature sensor used for outside and inside temperature to monitor supply and return air temperatures in HVAC applications. When used in this application, the sensors are supplied without enclosure covers. The sensors should be mounted directly in the air stream of the supply or return air duct. The sensors are not supplied with mounting hardware for this application.

Refrigeration System Temperature Probes and Sensors

CPC supplies several temperature monitoring devices including bullet sensors, pipe mount sensors, immersion probes, insertion probes, and sensors for high temperature applications. Each of these sensors is generally installed on the system by the equipment manufacturer.

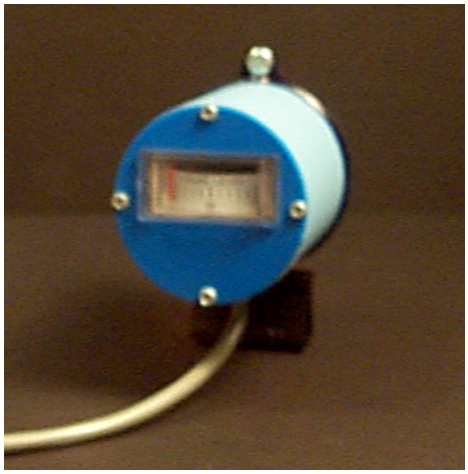
If a device must be added to the system, refer to the information supplied with the device and consult the refrigeration equipment manufacturer.

Wiring



Temperature sensors may be wired to any available point on the 16AI board. Temperature sensors are polarity insensitive. Wire one lead to an odd-numbered 16AI terminal, and wire the other lead to an even-numbered terminal. Once wired, the dip switch for the point to which the temperature sensor is wired must be put in the up position, since temperature sensors do not require power.

Refrigerant Liquid Level Sensor (P/N 207-0100)



Overview

The LA100SD-U Refrigerant Liquid Level Sensor is designed to be used as a tank-mounted sensor. This sensor can be connected to a 16AI board to monitor tank levels.

Installation

This installation procedure does not require the pump-down of the tank or refrigeration evacuation.

1. Remove existing float gauge LL-1 (two 6/32 screws. Do not loosen or remove the four corner screws.
2. Replace LL-1 with the LA100SD-U electronic sensor using the two 6/32 x 1/2" screws provided. The spacers and gasket supplied may be required if sensor readings are not within a reasonable range of the mechanical float gauge LL1.

   If you need to use the spacers and gaskets, do not overtighten screws. If spacers are not required, do not discard. Place the spacers in between the screw heads and the outside of the mounting bracket.
3. Wire the liquid level sensor as shown in ***Figure 34*** with the Black wire (common) connected to a odd terminal on an available point of a 16AI board, the Green wire (signal) connected to an even terminal on the same point, and the Red wire (power) connected to a 12 V terminal on the 16AI.

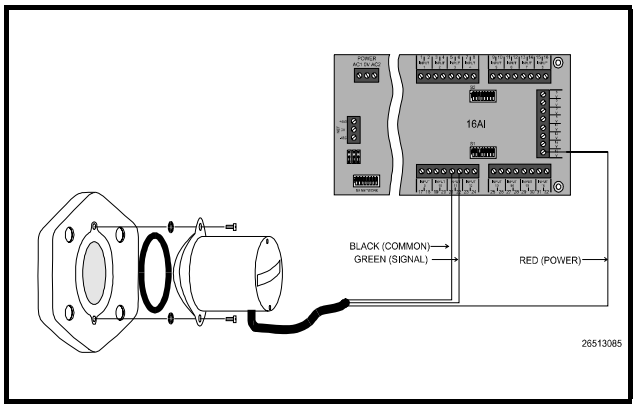
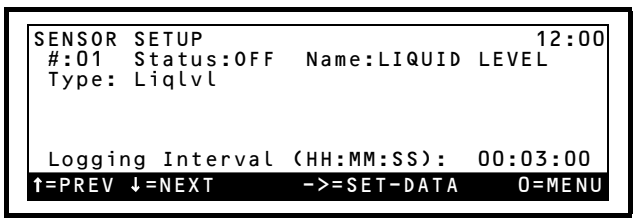


***Figure 34**-Wiring Diagram for Refrigerant Liquid Level Sensor*

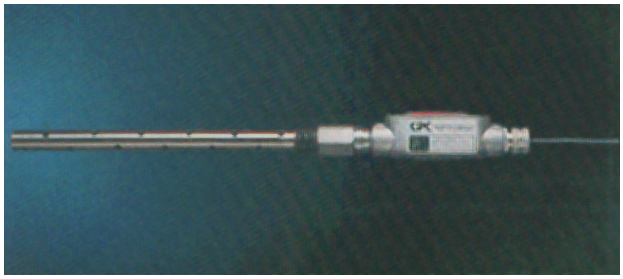
4. If extending the cable is required, use a shielded cable with three conductors such as Belden #8771 or Belden #9363. Ground the shield to the same odd 16AI terminal as the "common" connection. Do not connect the shield at the end of the cable near the sensor.
5. Set the corresponding dip switch in the down position.

Software Setup

1. After you assign the liquid level sensor to a board and point number, you will need to set the type of sensor you are using.
2. Select Setup from the sensor control menu and select the sensor you wish to setup. In the type field, scroll through the types until the RMCC displays LiqLvl in the type field.



Refrigerant Level Transducer Probe (P/N 207-1000)



Overview

Refrigerant level transducer (RLT) probes are used for the monitoring of refrigerant levels in vertical and horizontal tanks. RLT probes are designed to be inserted directly into a receiver tank and require no calibration.

RLT probes will fit a standard 3/4" MPT connection and are suitable for use with R22, R134A, and other approved refrigerants. The temperature of the refrigerant being monitored can range from 50° F to 150° F.

The RLT probe must be ordered with the correct immersion length for your receiver. Contact CPC for assistance.

Installation

1. Install RLT probe according to tank manufacturer's specifications.
2. Connect the Black (Common) to an available odd numbered terminal on the 16AI board.
3. Connect the Green (Signal) wire to an available even numbered terminal on the 16AI board. The odd and even numbered terminals must belong to the same point on the 16AI.
4. Connect the Red (Power) wire to an available 12 V power supply terminal on the 16AI board.
5. Set the dip switch that corresponds to the point where the RLT probe is connected to the "off" (down) position. ***Figure 35*** shows the RLT probe completely wired.

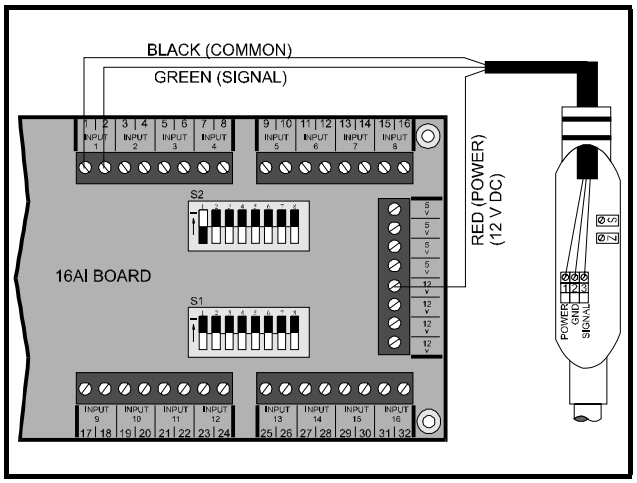
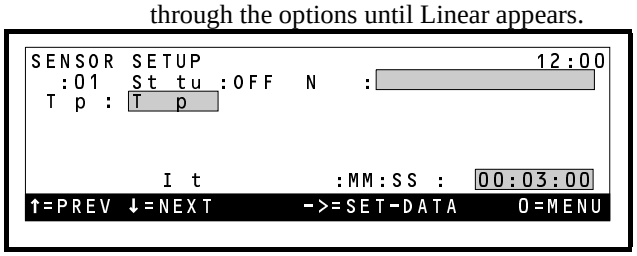


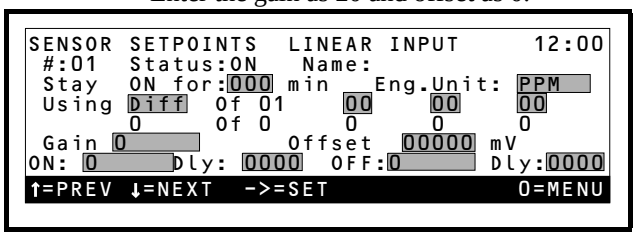
***Figure 35**-Wiring Diagram for RLT Probe*

Software Setup

1. After you have assigned the board and point number in the RMCC for the RLT probe, go to Sensor Setup and select the sensor number of the RLT probe. In the type field, scroll through the options until Linear appears.



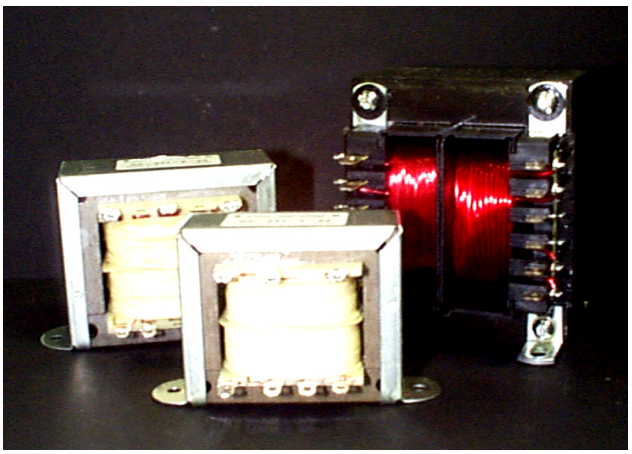
2. Select "Setpoints" from the Sensor Control menu. Select the appropriate sensor for setup. Enter the gain as 20 and offset as 0.



3. Set the alarms for the sensor. To do this, select "Alarms" from the Sensor Control menu. Select the sensor you want to set the alarms for. It is recommended that the RLT's Low Alarm set point be set to 10 (10%) and the delay be set to 30 minutes.

Transformers

3 Board–P/N 640-0043
6 Board–P/N 640-0045
10 Board–P/N 640-0048



Overview

CPC supplies three different types of transformers for use in powering CPC input and output boards: the three-board transformer (P/N 640-0043), the six-board transformer (P/N 640-0045), and the ten-board transformer (640-0048). As the names imply, each transformer is designed to power three, six, or ten I/O boards.

Three-board, six-board, and ten-board refer to the number of 8RO boards that may be powered by one transformer. When 16AI, 4AO, and 8IO boards are powered by a transformer, a three-board transformer may be able to power more or less than three boards. Total VAs must be matched for proper selection of a transformer.

Specifications

Transformer	3 Board (640-0043)	6 Board (640-0045)	10 Board (640-0048)
Series	Signal Transformer 241	Signal Transformer 241	Signal Transformer A41
Power	56 VA	100 VA	175 VA
Dielectric Strength	2500 VRMS Hipot	2500 VRMS Hipot	4000 VRMS Hipot
Primaries	Dual primaries (115/230 V - 50/60 Hz	Dual primaries (115/230 V -50/60 Hz)	Dual primaries (115/230 V - 50/60 Hz)
Secondary	Single center tapped secondary	Single center tapped secondary	Two secondaries must be connected in series
Secondary RMS Rating	24 VCT @ 2.4 A	24 VCT @ 4.0 A	24 VCT @ 7.3 A
Terminals	Solder lug / quick-connect type terminals (0.187”x0.020”)	Solder lug / quick-connect type terminals (0.187”x0.020”)	Solder lug / quick-connect type terminals (0.250”x0.031”)
Insulation	Class B insulation (130° C)	Class B insulation (130° C)	Class F insulation (155° C)
Agency Standards	-UL recognized to UL 506 -CSA certified to C22.2 #66	-UL recognized to UL 506 -CSA certified to C22.2 #66	-UL recognized to UL 506 -CSA certified to C22.2 #66 -VDE certified to VDE 0805 / EN 60950 -VDE certified to IEC 950 -Leakage current to meet UL 544

Matching Transformers to Boards

Power Requirements

Each board used has specific power requirements. These requirements determine how many boards may be wired to each transformer. Power requirements for each board on the RMCC network are listed in ***Table 13***.

	16AI	8RO	4AO	8DO	ARTC/8IO	485 Alarm
Amps	0.25	0.75	0.5	1.5	0.75	0.1 / 0.05
VA	5.0	15.0	10.0	18	18	12
V AC	24	24	24	24	24	120 / 208
Center Tap Used	YES	YES	YES	YES	NO	N/A

Table 13 *- Power Requirements*

Transformers for powering the input and output boards should be wired according to ***Figure 36*** and ***Figure 37*** depending on the number and type of boards being powered.

To select a power transformer for a board or a series of boards:

1. Determine what the total VA is for the boards that will be powered by the transformer.

   EX: Two 8IOs (18.0 VA each), and one 4AO (10.0 VA) boards are to be powered by one transformer

   $$(2 \times 18VA) + (1 \times 10VA) = 46VA$$

2. Use a transformer that has a power rating higher than the total calculated VA (See "Specifications" on page 47.).

   EX: Three board transformer (56 VA) is sufficient

   56 VA is greater than 46 VA

Fusing Specifications

Do not fuse transformer circuits using 32-volt automotive fuses.

Follow NEC guidelines regarding fusing of the transformers. The following overcurrent protection devices may be used to fuse the primary circuit:

Type	115 V AC Power	230 V AC Power
3 Board	1 A, 250 V, Slow Blow Bussmann AGC-1, or Littelfuse 312001	0.5 A,250 V, Slow Blow Bussmann AGC-1/2, or Littelfuse 312.500
6 Board	2 A, 250 V, Slow Blow Bussmann AGC-2, or Littelfuse 312002	1 A, 250 V, Slow Blow Bussmann AGC-1, or Littelfuse 312001
10 Board	4 A, 250 V, Slow Blow Bussmann AGC-4, or Littelfuse 312004	2 A, 250 V, Slow Blow Bussmann AGC-2, or Littelfuse 312002

Table 14 *- Transformer Fuse Types*

Transformer Wiring Diagrams

The following diagrams show how to wire transformers for various situations. Be sure that the diagram matches the situation before using it to wire a transformer.

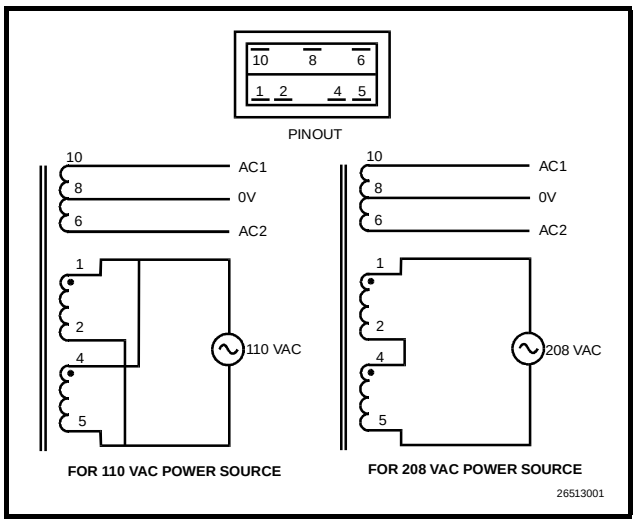


Figure 36 *- Wiring for 640-0043, Three Board, and 640-0045, Six Board Transformer*

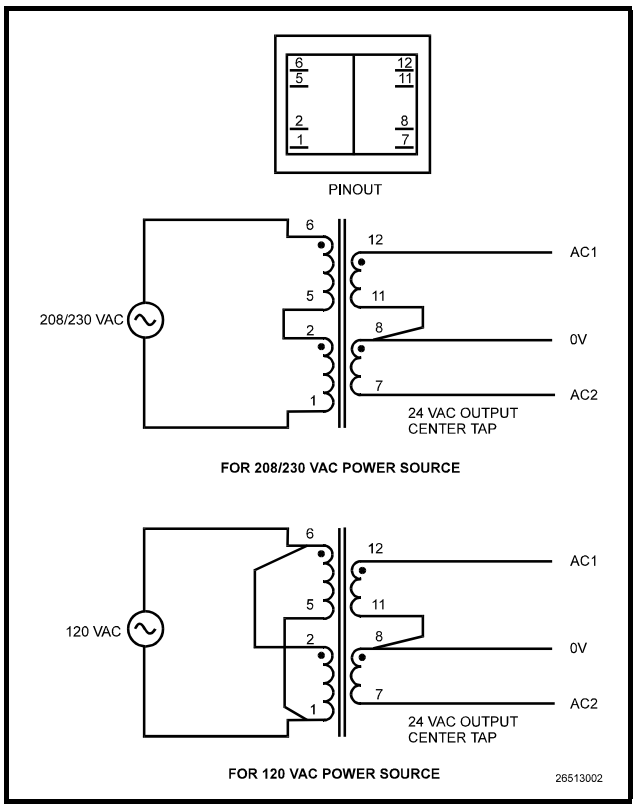


Figure 37 *- Wiring for 640-0048, Ten Board Transformer*

Wiring the 16AI, 8RO, 4AO, or 8DO

The 16AI, 8RO, 4AO, and 8DO all require the use of a center tap. ***Figure 38*** diagrams the wiring for three 16AIs, 8ROs, 4AOs, or 8DOs, or any combination of the four board types.

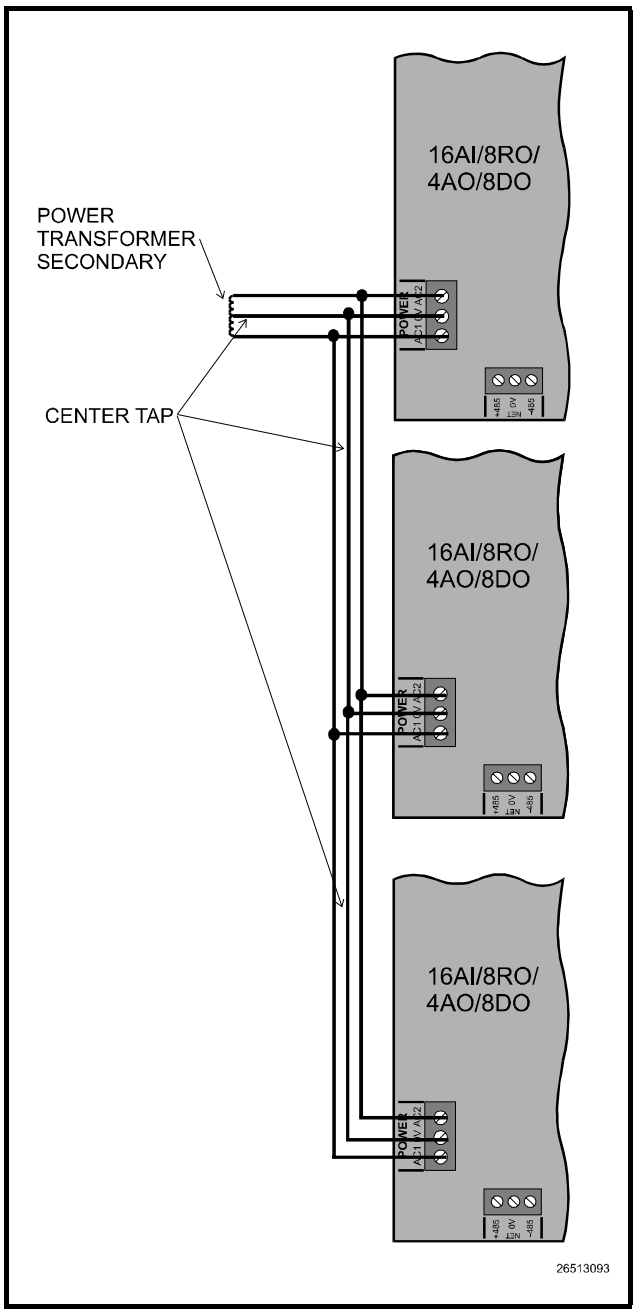


Figure 38*-Wiring for Three 16AIs, 8ROs, 4AOs, or 8DOs or Any Combination of*

Wiring the 8IO Board

The 8IO board can be wired for power in three different ways:

1. By itself with one transformer for power ***(Figure 39)***
2. In combination with a or multiple 16AI, 8RO, 4AO, or 8DO boards ***(Figure 40)***

3. On a 24 V AC line with the ground in the system on either side of the power line or with no ground in the system at all ***(Figure 41)***

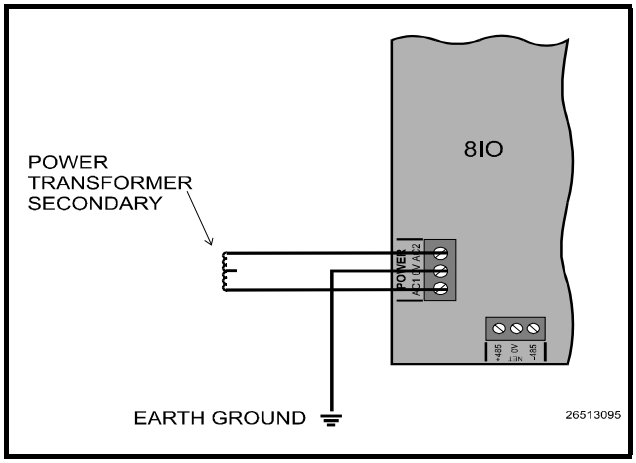


Figure 39*-Single 8IO Board Wired to One Transformer*

When the 8IO board is used by itself, it is satisfactory to wire the board with no grounding on either side of the 24 V AC power supply. Connect an Earth Ground to 0 V terminal of the 8IO's power connection.

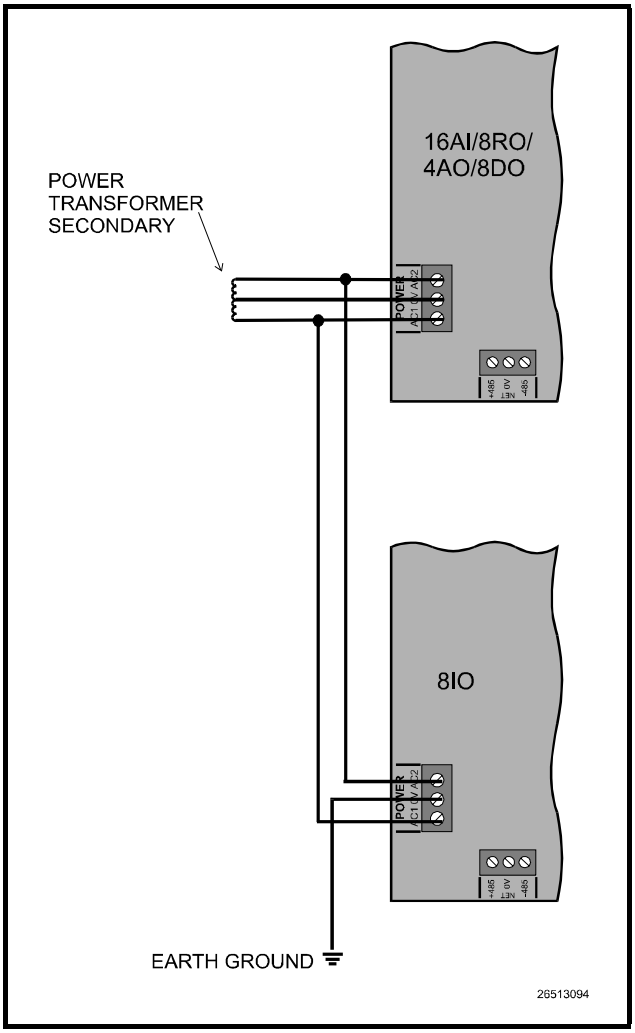


Figure 40*-8IO Board Wired in Combination with A or Multiple 16AI, 8RO, 4AO, 8DO*

When the 8IO board is wired in conjunction with other boards, the 8IO board is not grounded through the other board's center tap. A separate Earth ground should be run from the 0 V terminal of the 8IO's power connection.

When the 8IO is wired alone, either or neither side of the power supply may be grounded however, a separate Earth ground should be made off of the center terminal of the power connection.

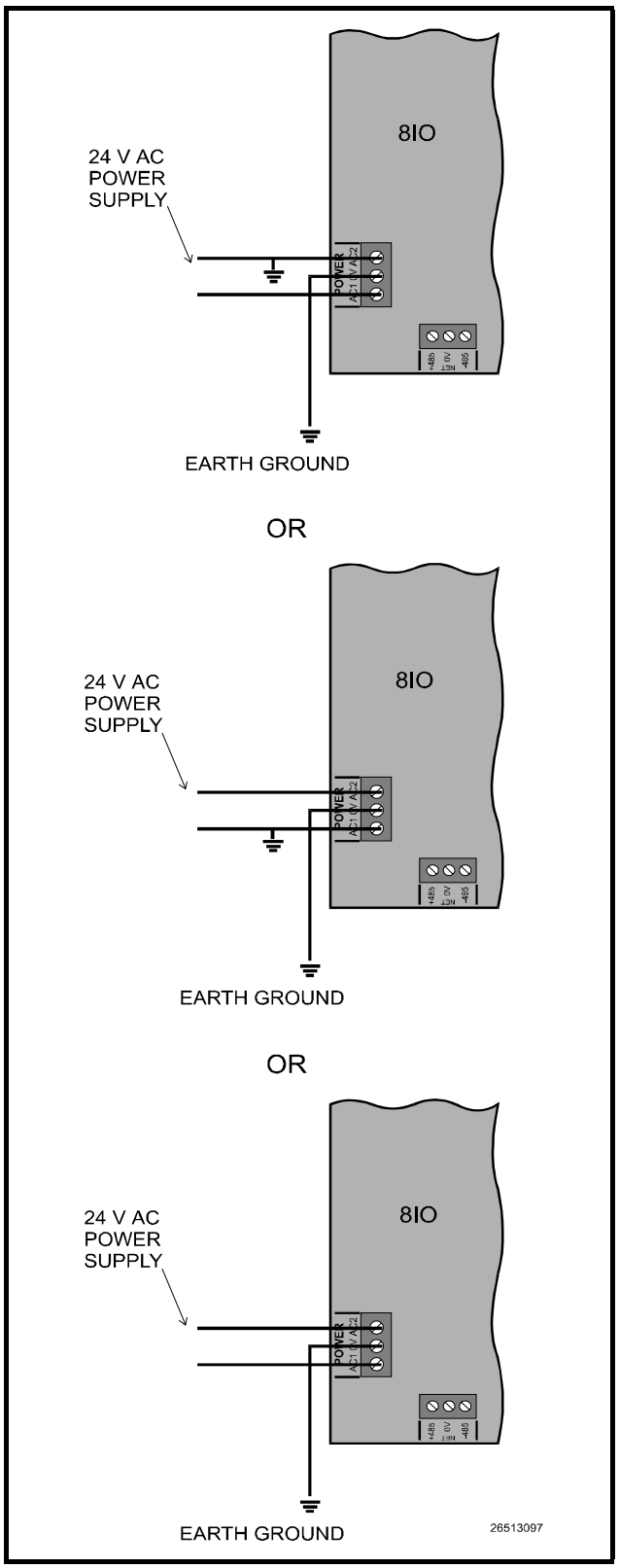
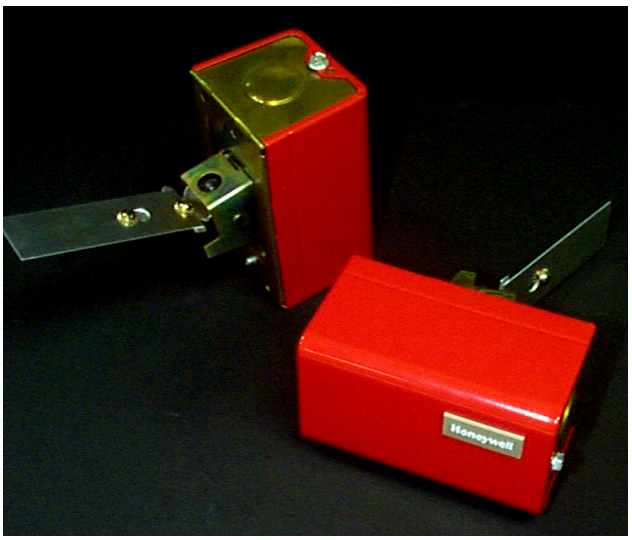


***Figure 41**-One 8IO with a Ground on Either Side of the Power Supply and One 8IO with no Ground in the System*

Sail Switches

S437A–P/N 205-0437
S637A–P/N 205-0637



Overview

The Honeywell S437A & S637A Sail Switches (CPC P/N 205-0437 & 205-0637) can be used to determine when there is airflow in a duct or when there is no airflow in a duct. The two different states are determined by the way in which the sail switch is wired (S637A) to an input board. The S437A can only relay one state.

Specifications

	S437A	S637A
Switch Type	Form A (SPNO)	Form C (SPDT)
Switching Action on Increasing Velocity	One set of contacts opens, one set closes at 1900-2250 fpm. Varies directly with differential setting.	
Switching Action on Decreasing Velocity	One set of contacts opens to de-energize blower, one set closes to energize warning circuit at 1350 fpm. Not adjustable.	
Switch Differential	Adjustable, 550-900 fpm	
Sail Size	Standard—1 x 3 inches Large—1 1/2 x 4 inches	
Insertion Length	Standard—3 1/2 inches Large—4 1/2 inches	
Maximum Ambient Temperature	150° F	

Table 15*-Technical Specifications for the S637A Sail Switch*

Mounting & Wiring the S437A & S637A

The Honeywell S637A Sail Switch (CPC P/N 205-0637) can be wired so that it will relay two different states to a 16AI or other CPC input board. Only one state can be sent to the input board at anytime. The S437A can only relay one state.

1. The sail switch should be mounted so that the sail (metal plate) will be in the direct path of an unrestricted airflow. Mount the switch so that the sail is perpendicular to the ground (short edge of sail is vertical, long edge is horizontal) so that the effect of gravity on the switch is negligible. It is satisfactory to mount the switch in an airflow that is moving upwards (sail moves from the down position to the up position). Do not mount the switch so that it will move from the up position to the

down position when there is airflow in the duct.

2. Cut a rectangular hole 1 1/2 x 2 inches in the location where the switch is to be mounted.
3. Remove the switch housing so that the chassis is exposed.
4. Use the chassis as a template to mark the two mounting hole locations at the top left and bottom right of the chassis.
5. Center punch and tap the holes where the chassis is to be mounted. Use sheet metal screw to attach the switch.

S437A

1. The S437A can only relay one state. Wire the switch so that one wire connects to both the A and B terminals (Figure 42). Run each wire to an available point on a CPC input board.

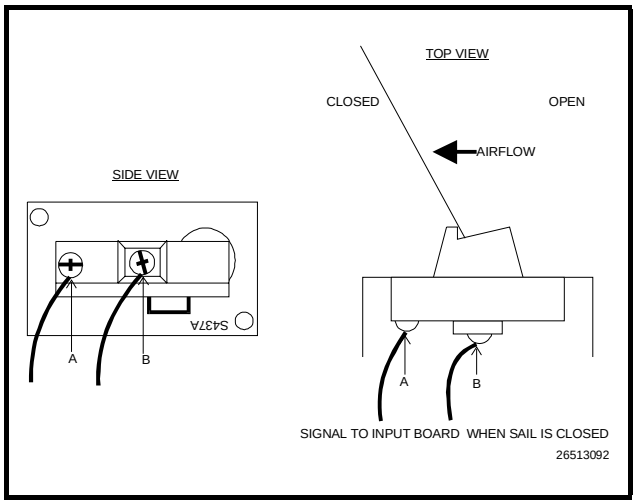


***Figure 42**-S437A Switch Connection for Signaling When Airflow is Present*

2. Replace the switch housing

S637A

1. To wire the sail switch so that it sends a signal to an input board when the sail is in the closed position, connect a wire to both the A and B terminals (Figure 43). Run each wire to an available point on a CPC input board.

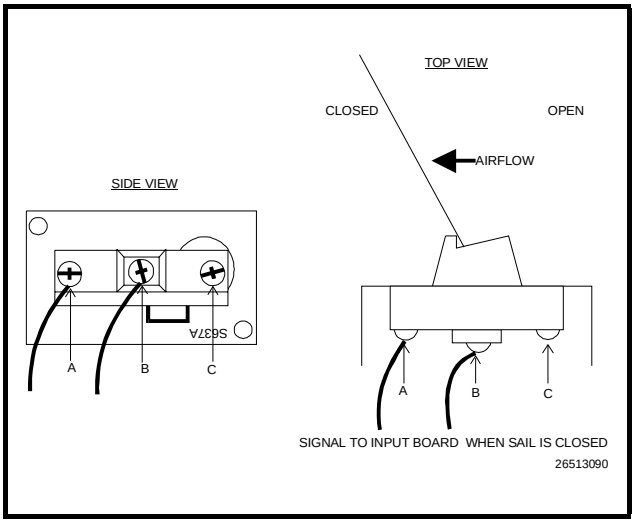


***Figure 43**-S637A Switch Connection for Signaling When Airflow is Present*

2. To wire the sail switch so that it sends a signal to an input board when the sail is in the open position, connect a wire to both the A and C terminals (Figure 44). Run each wire to an available point on a CPC input board.

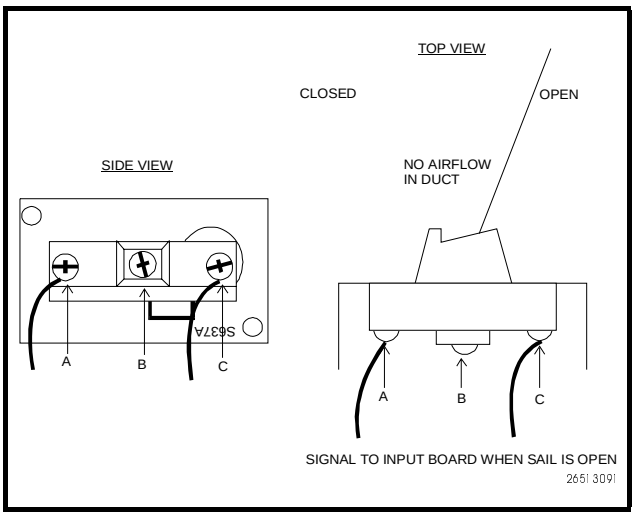


***Figure 44**-S637A Switch Connection for Signaling No Airflow*

3. Replace the switch housing.