Copeland PerformanceAlert™ Refrigeration Diagnostics Module

For use with Copeland Scroll® and reciprocating compressors

Field Guide

EMERSON™
Climate Technologies

Overview

Purpose of this guide

This field guide provides basic information on the operation of the Copeland PerformanceAlert™ refrigeration diagnostics module, its installation and its use for system troubleshooting. It also outlines optional accessories available to access historical operating information and to facilitate remote monitoring.

Technical support

There are several ways to find out more about Copeland PerformanceAlert and to get technical support: Contact your local Emerson Climate Technologies Authorized Wholesaler; call Emerson's Technical Support (888.EMR.9950); or go to **EmersonClimate.com/copelandperformancealert**.

Where to buy

Copeland PerformanceAlert is supported in the aftermarket by Emerson's network of Emerson Authorized Full-Line Wholesalers and Authorized Copeland Brand Wholesalers. This product can be purchased at any of the 950+ authorized-wholesaler branches nationwide.

Table of contents

Contents

Copeland PerformanceAlert product features and benefits

Introduction

The Copeland PerformanceAlert refrigeration diagnostics module is a new tool that represents proven Emerson® technology in refrigeration applications.

Contractor benefits

Provides a way for technicians to:

- Easily diagnose system issues
- Solve problem jobs
- Reduce callbacks
- Prevent compressor failures

End-user benefits

Provides a way for end-users to:

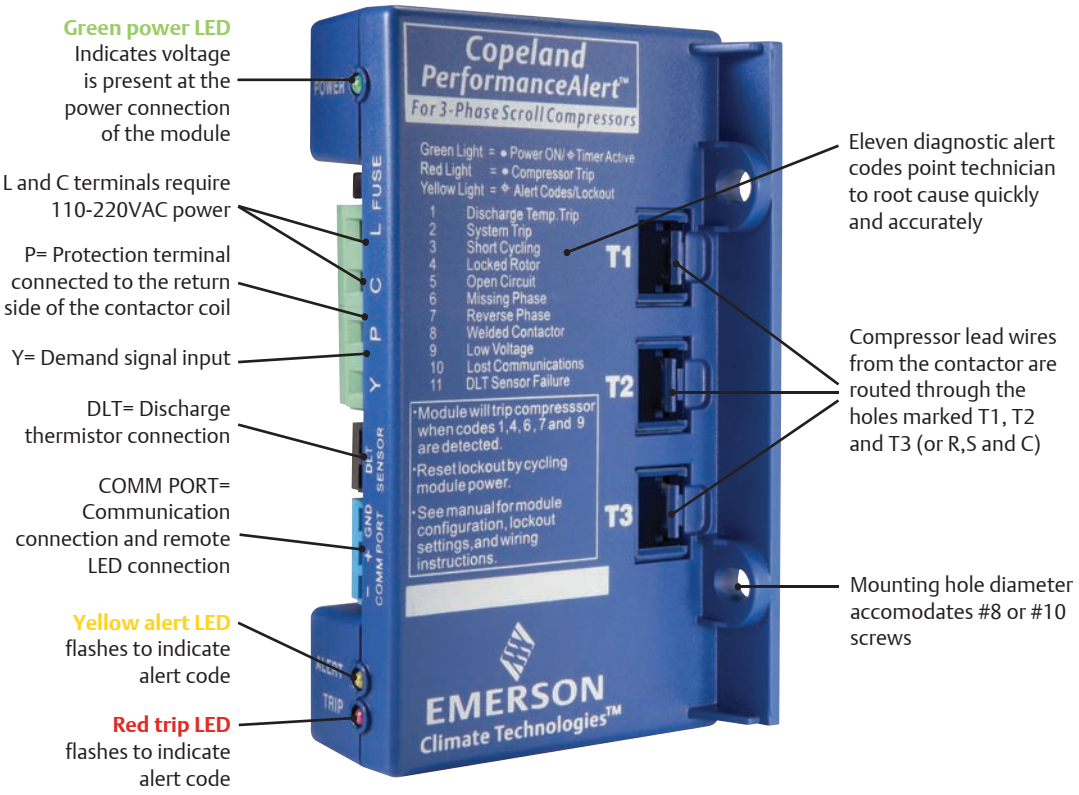
- Improve equipment uptime
- Reduce costs from spoilage
- Potential energy savings from a better-performing system

Continued on next page

Copeland PerformanceAlert product features and benefits (continued)

Diagram of features

This diagram shows the various features discussed in this field guide.



Installation
Overview

Compatible compressor brand

The Copeland PerformanceAlert™ refrigeration diagnostics module will only work in conjunction with Copeland® brand refrigeration compressors.

Non-compatible models

There are Copeland brand compressor models that are not compatible with Copeland PerformanceAlert because the rated load amps are less than three. Some models over three RLA could operate at less than three amps and require special installation procedures. Refer to page 7.

To find out whether a Copeland brand compressor is compatible with this module, refer to the RLA (rated load amps) on the compressor's nameplate, or go to Copeland's Online Product Information (OPI). OPI is accessible by logging on to the contractor portal (EmersonClimateContractor.com) or EmersonClimate.com.

Compatible compressor models

Copeland PerformanceAlert can be installed on single- and three-phase Copeland Scroll® and Copeland brand reciprocating compressors, including Copeland Discus™ models.

There is one Copeland PerformanceAlert module that works for single-phase Copeland brand compressors. There are two Copeland PerformanceAlert modules for three-phase Copeland brand compressors: one for scroll and one for reciprocating.

Kit part numbers for models

This table shows the part numbers for the three Copeland PerformanceAlert modules designed for single- and three-phase compressors.

Model	Part number
Single-phase compressors	943-0053-00
Three-phase reciprocating compressors	943-0055-00
Three-phase scroll compressors	943-0057-00

Field versus production line

Copeland PerformanceAlert is specifically designed to be installed on compressors that are currently operating in the field; however, many equipment manufacturers are choosing to install it, to provide extra value in the products that they offer.

Continued on next page

Installation
Overview

One-to-one ratio

A single module only provides compressor diagnostics and protection for one compressor.

Important section on address jumpers

If the technician intends to install the Copeland PerformanceAlert refrigeration diagnostics module in a multiple compressor system in which modules will be daisy-chained together, it is important to review the section on address jumpers prior to installing the module on the system.

Installation
Installation preparation

Introduction

Before installing the Copeland PerformanceAlert refrigeration diagnostics module, there are several factors that need to be considered, when deciding on an installation location.

Proximity to contactor

It is important for Copeland PerformanceAlert to be installed in close proximity to the contactor.

Orientation

Copeland PerformanceAlert can be mounted in any orientation and still function properly, but it should be securely mounted.

Visibility of LED lights

The light-emitting diode (LED) indicator lights on the side of Copeland PerformanceAlert should be easily visible. If this is not possible, included in the kit is an external LED indicator light that can be wired into the module and run to an easily visible location. (Depending on the installation location, it may be necessary to extend the LED indicator light wire leads.)

Note: The LED light is wired into the communication port. If you choose to install the communication package for system history retrieval and lockout configurations, the communication package also wires into the communication port. You will either need to install a toggle switch, so that both the communication package and the LED light can be wired into the same port, or you will need easy access to the communication port, to change the wiring.

Caution: Protect from elements

Copeland PerformanceAlert should be protected from the elements. Ideally it should be mounted inside the electrical panel.

Caution: This device is not National Electrical Manufacturers Association (NEMA) rated. It must be mounted in an enclosure if it is outdoors.

Installation
Basic installation procedure

How long it takes

The physical installation of the Copeland PerformanceAlert refrigeration diagnostics module takes 30-60 minutes. This does not include the time to ensure things like proper wiring, addition of the communication package and diagnostic checks.

What you need

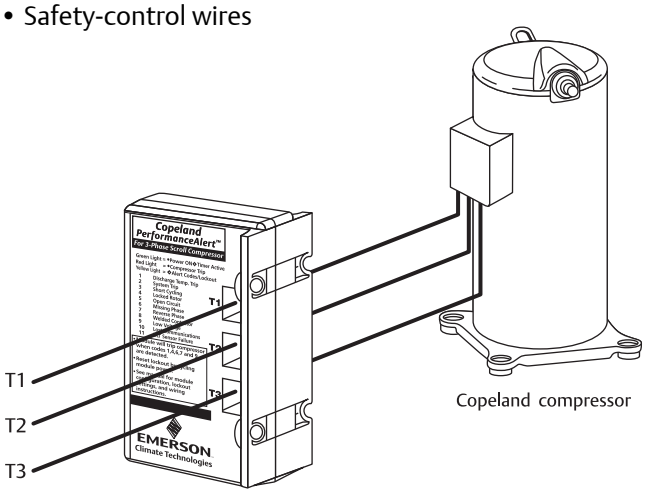
To install Copeland PerformanceAlert, you will need:

- Extra wire of appropriate gauge size (no more than 14 gauge) for control and power lines
- A drill
- A wire cutter/stripper
- #8 or #10 self-tapping screws (four)

Procedure

The technician should follow this procedure to install Copeland PerformanceAlert:

Step	Action
1	Locate the following wires: • T1, T2 and T3 compressor wires (or R, S and C compressor wires for single-phase compressors) • Safety-control wires



Note: The T1, T2 and T3 wires from the compressor will pass through Copeland PerformanceAlert and then connect into the contactor.

Continued on next page

Installation
Basic installation procedure (continued)

Procedure (continued)

Step	Action
2	Determine: Are the system running amps ever expected to fall below three (including pump down)?

If *no*, go on to Step 3.

If *yes*, then double-wrap the T1, T2 and T3 (or R, S and C) wires, as shown in the image below.

Caution: Failing to double-wrap these wires will result in repeated nuisance trips of Alert Code 6 (missing phase alert).

Connect wires

In steps 3 through 6, connect one end of the following wires to the appropriate connection on the Copeland PerformanceAlert refrigeration diagnostics module. Connect the other end of the wire to the correct location on the compressor contactor.

Note: Consult the wiring diagram on page 33 for this.

3	Connect the line (L) wire to the line side of the compressor contactor and to the L terminal on Copeland PerformanceAlert.
4	Connect the common (C) wire to the common side of the compressor contactor and to the C terminal on Copeland PerformanceAlert.
5	Connect the protection (P) wire to the contactor coil terminal and to the P terminal on Copeland PerformanceAlert.
6	Connect the demand (Y) wire to the Y terminal on Copeland PerformanceAlert.

Caution: Connect this wire last. This is the thermostat (or demand) wire and is the connection that signals the compressor to turn on or off.

Continued on next page

Installation
Basic installation procedure (continued)

Procedure (continued)

Step	Action
	Final steps
7	Strap the discharge line thermistor sensing bulb to the discharge line, six inches from the outlet of the compressor. A bulb strap is provided. Then connect the thermistor leads to the discharge-line temperature (DLT) sensor terminal on the Copeland PerformanceAlert refrigeration diagnostics module. **Note:** When connecting the discharge temperature probe to the module, the length of the wire may need to be extended. When doing this it is best practice to solder the extension wires to the leads of the probe. If a soldering iron is not available a barrel wire splice is acceptable. When extending the length of the discharge temperature probe, shielded wire must be used. The shield of the wire has to be connected to ground in the electrical panel as close to the module as practical. It is best not to make the wire any longer than what is required, and the wire must never be bundled with high voltage wire.
8	Securely mount the Copeland PerformanceAlert using the #8 or #10 self-tapping screws.
9	Perform a functional test, to ensure that Copeland PerformanceAlert is properly installed. To do this, disconnect power to the compressor and force a call for cooling. *Does the Trip LED (red) light turn on, indicating a compressor trip?* If *yes*, Copeland PerformanceAlert is properly installed. If no, it is probable that miswiring has occurred. Refer to the “Installation Troubleshooting” section on page 27 for miswiring help.

For more information

For more information on how to install Copeland PerformanceAlert, refer to the user manual. Additional installation information can be viewed on the Copeland PerformanceAlert video. Both of these reference tools are available on **EmersonClimate.com/copelandperformancealert**.

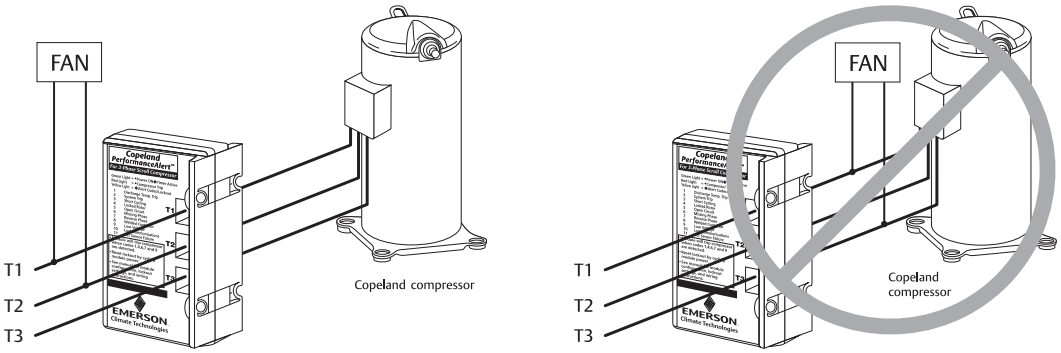
Installation
Installation with extra-load wiring

Introduction

When an extra load is present (for example, a fan), it is important to consider where it is wired in relation to the Copeland PerformanceAlert refrigeration diagnostics module.

Placement diagrams

The figure on the left is the preferred installation for any extra-load wiring.



Note: The figure on the right demonstrates a nondesirable loction for an extra load. The extra load should never be connected between T1 and T3. Such a connection can lead to nuisance Code 6 alerts.

Basics of operation
Indicator lights

Indicator Lights

The Copeland PerformanceAlert refrigeration diagnostics module uses the compressor as a sensor to communicate system issues. The indicator lights guide the technician in system diagnostics.

Location and function

There are three indicator lights on Copeland PerformanceAlert that technicians should be familiar with:

Light	Location	Function
Green “power” light	At the top module	Indicates that Copeland PerformanceAlert is receiving power
Red “trip” light	At the bottom of the module	Illuminates when demand is present, but the compressor is not running
Yellow “alert” light	Near the bottom of the module	Blinks a specific number of times, to indicate which one of 11 different conditions is occurring in the system

Note: See the “Alert codes” chart on page 11 for descriptions of these conditions.

Basics of Operation
Alert codes

Summary chart

This chart shows the 11 alert codes that the yellow alert light can indicate.

ALERT CODES			
Code	**Three-phase recip.**	**Three-phase scroll**	**Single-phase recip. and scroll**
* 1	Discharge-temp. trip	Discharge-temp. trip	Discharge-temp. trip
2	System trip	System trip	System trip
3	Short-cycling	Short-cycling	Short-cycling
* 4	Locked rotor	Locked rotor	Locked rotor
5	Open circuit	Open circuit	Open circuit
* 6	Missing phase	Missing phase	Open start circuit
* 7	Not used	Reverse phase	Open run circuit
8	Welded contactor	Welded contactor	Welded contactor
* 9	Low voltage	Low voltage	Low voltage
10	Lost communication	Lost communication	Lost communication
11	DLT sensor failure	DLT sensor failure	DLT sensor failure

*Refer to the section below on active protection for more information on these alerts.

Multiple alerts

When conditions occur that trip multiple alerts on the module, the Copeland PerformanceAlert refrigeration diagnostics module will display the alert code indicating the initial condition. This feature allows the technician to see the root cause of the system problem.

Example: Low line voltage (Alert 9) leads to locked rotor conditions on the compressor (Alert 4). In this case the yellow alert light on Copeland PerformanceAlert would flash nine times.

Display time

The module will continue to display an alert code until the system issue is resolved, or until the module's power is cycled off and on.

Note: When the module powers up, the alert code displayed prior to power loss will blink for one minute.

Active protection

Copeland PerformanceAlert comes standard in the active protection mode. To prevent serious system damage, some alert codes will automatically cause the compressor to shut down, or trip, for 20 minutes. These severe alert codes are 1, 4, 6, 7 and 9.

Continued on next page

Basics of Operation
Alert codes (continued)

Passive protection

It is possible to bypass the automatic trips associated with active protection by simply not connecting the protection (or P) wire. In cases in which the technician wants to use the Copeland PerformanceAlert refrigeration diagnostics module solely for diagnostics and does not want the module to interfere with system operations, the P wire can be left unconnected for passive protection.

Lockout protection

Copeland PerformanceAlert also offers a lockout feature, which prevents the compressor from restarting until the condition is resolved and the module is manually reset. Lockout must be enabled by the technician and requires using the communication package (part number 943-0143-00), which is sold separately.

To learn about enabling lockout and additional features of the communication package, refer to the "Communication package" section, starting on page 13.

Resetting code lights

Once a problem in the system has been resolved – either by technician intervention or because conditions in the system have returned to normal on their own – the flashing LED light indicating an alert code can be reset, either automatically or manually, as shown in the table.

Automatic reset conditions	Manual reset
Alert Code 1* will reset when DLT reaches a normal range (below 230°F or below set points 170° – 280°F).	When the lockout feature is enabled, there are four alert codes that will not automatically reset under any conditions 1, 4, 6 and 7. Manual reset is required to reset the controller in these cases.
Alert Codes 2, 3 and 4* will reset after four normal run cycles.	
Alert Codes 5, 6*, 7* and 8 will reset after one normal run cycle.	All alert codes can be manually reset by cycling power off and on to Copeland PerformanceAlert.
Alert Code 9 will reset when voltage rises above 85 volts for a 110-volt coil, or above 170-volts for a 220-volt coil.	

* When the lockout feature is enabled, this alert code will not automatically reset under any conditions.

Built-in protection features

Copeland PerformanceAlert comes with built-in phase protection, which protects the compressor from adverse power conditions, like phase reversal and single-phasing.

Additionally, an anti-short-cycling feature guarantees that the compressor will remain deactivated for a specified amount of time when it cycles off. The default setting for off-time is 0.1 minute. The table on page 17 outlines the minimum and maximum settings that can be defined by the user. (Installation of the communication package is required to change default settings.)

Communication package
Overview

Introduction

A communications package – which will allow for more advanced use of the Copeland PerformanceAlert refrigeration diagnostics module's features – can be purchased separately.

Parts

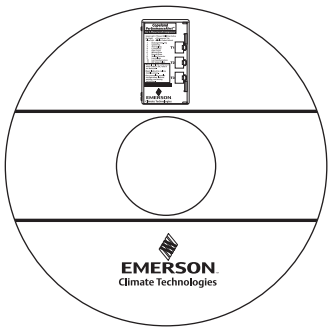
The communication package includes an RS-485 to USB adapter cable, a connector and software CD. (See pages 14 and 15 for more information.)

Description	Part number
Communication package kit	943-0143-00
Connector only	021-0341-00

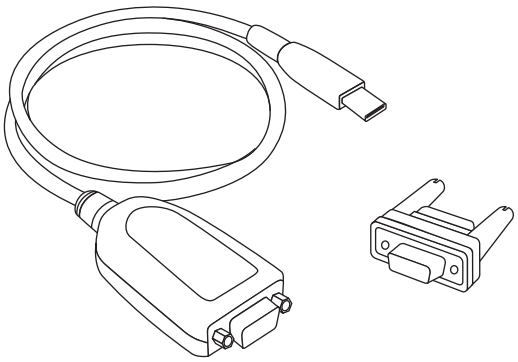
Added capabilities

The communication package gives Copeland PerformanceAlert these added capabilities:

1. Configurations and default settings can be changed for the application or per the user's specifications. (See page 17.)
2. Lockout times can be set, per the user's specifications. (See page 18.)
3. System history and logged data can be downloaded directly to a laptop computer. (See page 20.)



Software CD



Adapter cable

Connector

Communication package
Connecting the connector and adapter cable

Introduction

The communications package includes a connector and an "RS 485 to USB" adapter cable to connect the Copeland PerformanceAlert refrigeration diagnostics module to your laptop.

Instructions

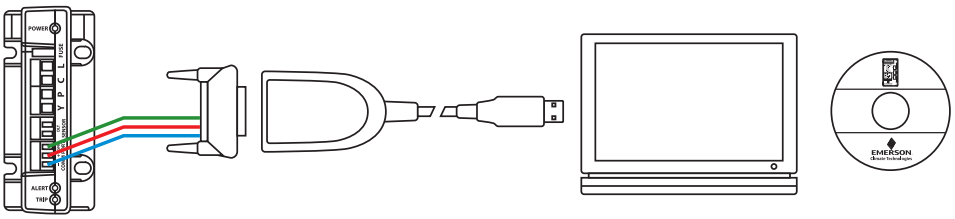
To connect the communication package, follow these instructions:

Step	Action
1	Has the LED light been installed on Copeland PerformanceAlert to facilitate easy viewing of the flashing light? If *no*, go to Step 2. If *yes*, either install a toggle switch so that both the RS 485 cable and the LED light can access the communications port at the same time, or temporarily remove the wiring for the LED light from the communications port while utilizing the communication package.
2	*Connect the positive (+) "D" terminal of the connector to the negative (-) "D" terminal of the communication port on the module. Then connect the negative (-) "D" terminal of the connector to the positive (+) "D" terminal of the communication port on the module.
3	Connect the "Gnd" terminal of the connector to the "Gnd" terminal of the communication port on Copeland PerformanceAlert.
4	Connect the connector to the RS-485 end of the adapter cable, and then connect the USB end of the cable into the USB port on the laptop.

*Some vendors use reverse polarity on the connector. If communications doesn't work (the power light will not illuminate on the adapter, or you will trigger an alert code 11), reverse the positive and negative terminals into the connector.

Diagrams

These diagrams show all of the components of the communication package and how they should be connected for successful use.



Module | Connector | Adapter cable | Laptop with USB port | Software CD

Communication package
Software CD

Introduction

The communication package also includes a software CD to load onto a laptop. The software is compatible with: Microsoft® Windows® 2000, Micosoft Windows Millennium Edition (Windows Me), Mirosoft Windows XP and Microsoft Windows Vista® operating systems. Downloading this software will require up to 70MB of hard drive space.

To activate

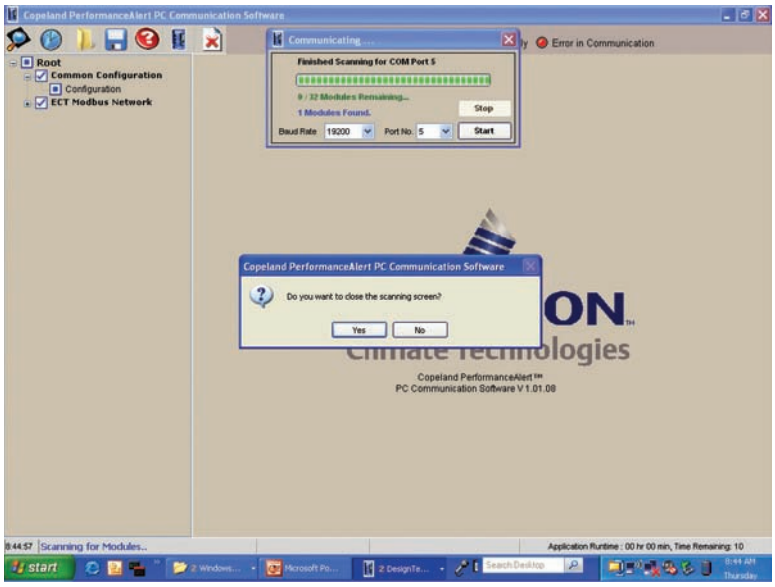
To activate the software:

Step	Action
1	Load the software onto the laptop. Refer to page 14 for complete installation details.
2	Properly connect the connector and adapter cable to the Copeland PerformanceAlert refrigeration diagnostics module and the laptop. (See “Connecting the connector and adapter cable” on page 14 for instructions.)
3	Double-click on the Copeland PerformanceAlert icon on the laptop.

Scanning process

The software will automatically scan to find all modules connected to the network. It can take up to 30 seconds for the software to locate all Copeland PerformanceAlert modules.

Search results screen



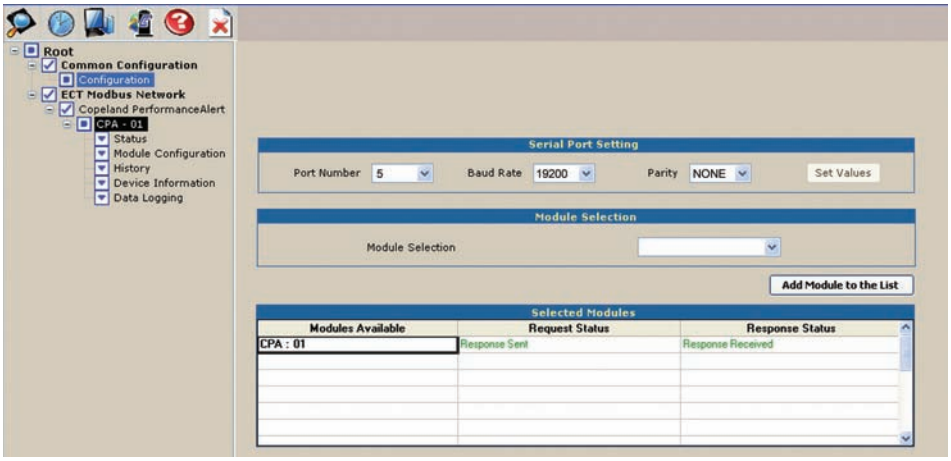
Communication package
Software CD (continued)

Module selection

Once the scan is complete, individual modules can be selected in the dropdown menu, to review system history or make setting changes. It is necessary to match up the compressor identification numbers for each Copeland PerformanceAlert module located by the software.

Module selection screen

After the user closes the scanning screen, the left toolbar will display a list of the modules found during the search. After selecting one of the modules, this screen will appear.



Communication package
Configuration

Defining parameters

The module configuration screen of the communication software allows the user to define specific parameters for things such as:

- Minimum on and off times
- Discharge-temperature trip points
- The number of short cycles that can occur in a specified amount of time

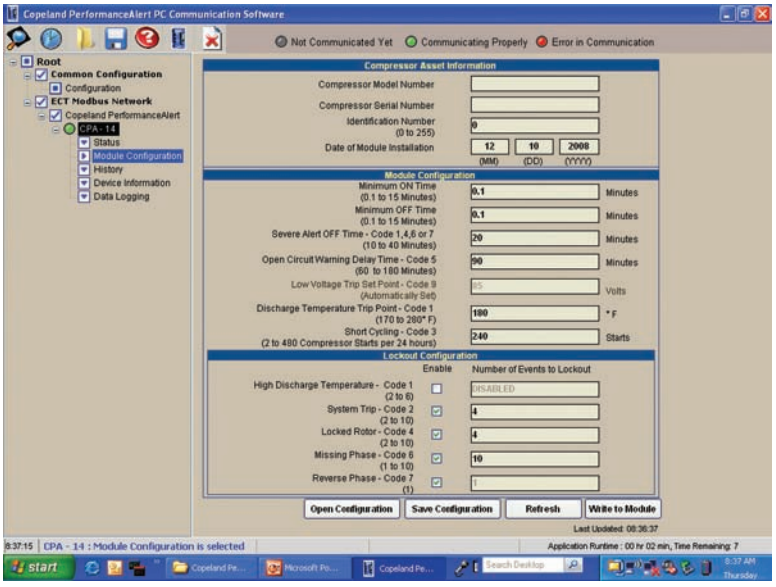
Changing settings

The table below shows the default settings, as well as the minimum and maximum settings that can be defined by the user.

Module Configuration	Minimum	Default	Maximum
Minimum on-time	0.1 Minutes	0.1 Minutes	15 Minutes
Minimum off-time	0.1 Minutes	0.1 Minutes	15 Minutes
Severe alert off-time	10 Minutes	20 Minutes	40 Minutes
Open circuit warning delay time	60 Minutes	90 Minutes	180 Minutes
Discharge temp. trip point	170˚F / 76.7˚C	230˚F / 110˚C	280˚F / 137.8˚C
Short cycling (even numbers only)	2 starts per day	240 starts per day	480 starts per day

Module configuration screen

This diagram shows the module configuration screen.



Communication package
Lockout feature

Purpose

The Copeland PerformanceAlert refrigeration diagnostics module offers a lockout feature, which prevents the compressor from restarting until the condition is resolved and the module is manually reset.

Enabling lockout

Lockout must be enabled by the technician and requires using the communication package. To enable lockout, check all four check boxes in the lockout configuration subsection of the module configuration screen in the software.

How it works

If lockout is enabled and a preset number of alarm events happens, then the module will not allow the compressor to start until the situation is corrected and the module is manually reset, by cycling power off and back on.

Indicator light

One long flash of the yellow LED (before an alert-code flash) indicates that the module is in lockout condition.

Adjustments

Users can go to the module configuration screen in the software, to adjust the number of alert event cycles required to trip lockout on a system.

Setting example

This table shows an example of lockout settings that can be adjusted in the module configuration screen.

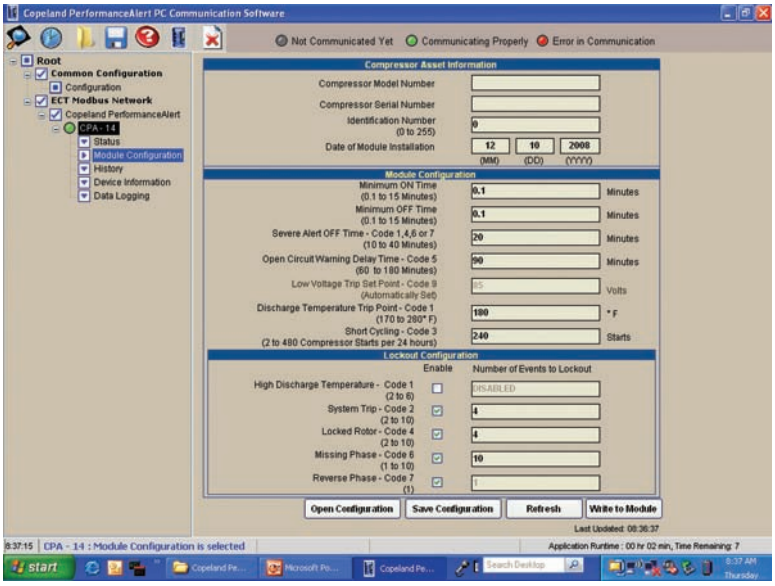
Code Number	Alert	Minimum # of alert events	Default # of alert events	Maximum # of alert events
1	High discharge-temp.	2	4	6
2	Protector, temperature or pressure trip	2	4	10
4	Locked rotor	2	4	10
6	Missing phase	1	10	10
7	Reverse phase	1	1	1

Continued on next page

Communication package
Lockout feature (continued)

Lockout screen

This figure shows the lockout screen shot.



Communication package
History retrieval

Types of displays

The history screen in the communication-package software displays the alarm history for the last seven days. It also displays the weekly total and the cumulative total for each of the following:

- Compressor starts
- Run time
- Each alert code

Saving and exporting

Users can save history information by using the “Save History” button in the software. History information can also be exported to a Microsoft Excel® spreadsheet.

Memory capability and date-stamping

The Copeland PerformanceAlert refrigeration diagnostics module is designed to store alert-code history in its memory. Copeland PerformanceAlert alert-code history will be date-stamped for the seven previous days. Alert-code history older than seven days will be stored as a cumulative total of alert codes, but will not be date stamped. The technician will simply see the number of times that each alert code has occurred over the life of the module.

In order to maintain an accurate date-stamped timeline of alert codes occurring in a system, Copeland PerformanceAlert history must be downloaded at least once every seven days.

Note: While it is not advised by Emerson, the module can be moved from compressor to compressor. It is important to note that the memory of alert codes cannot be wiped out, so a single module moved from compressor to compressor will store the entire fault history for all compressors for the life of the module.

One way to filter which alert codes belong to which compressor is to input each compressor’s identification information; then the user will be able to sort the exported alert-code history by compressor.

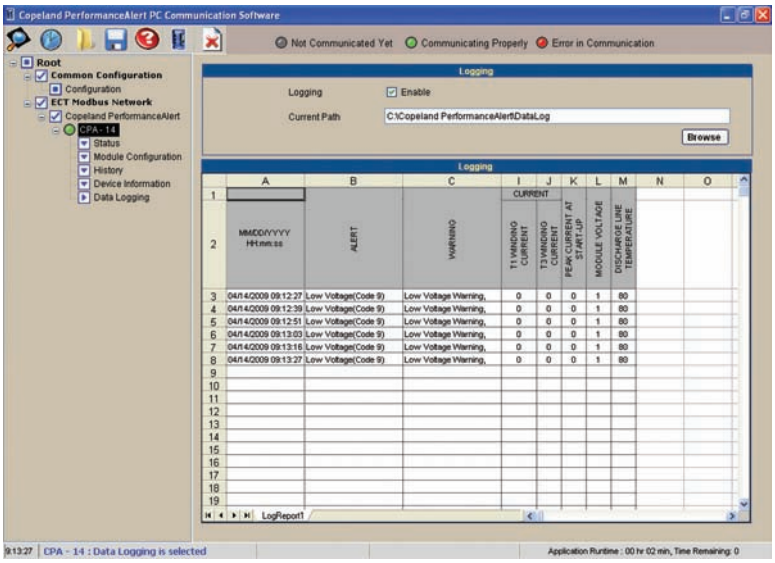
Communication package
History retrieval (continued)

Data logging

The data-logging screen provides real-time information that can be used to troubleshoot the system. It captures things like whether or not demand is present.

Data-logging screen

This figure shows the data logging screen shot.



Data-logging capabilities

When using the communication package, Copeland PerformanceAlert refrigeration diagnostics module has the capability to log the following: T1 Winding Current, T3 Winding Current, Peak Current at Start Up, Module Voltage and Discharge Line Temperature. The communication package will show date, time and type of code for each data log entry.

Continuous logging

In order to log the history of Copeland PerformanceAlert, it is necessary to leave a laptop connected to the module.

Communication package
Connecting multiple-compressor systems

Purpose

When more than one Copeland PerformanceAlert refrigeration diagnostics modules are installed in multiple compressor systems, it is possible to daisy-chain the communication ports of all the modules to establish communication between the modules and either a laptop or controller, like the E2 Facility Management System.

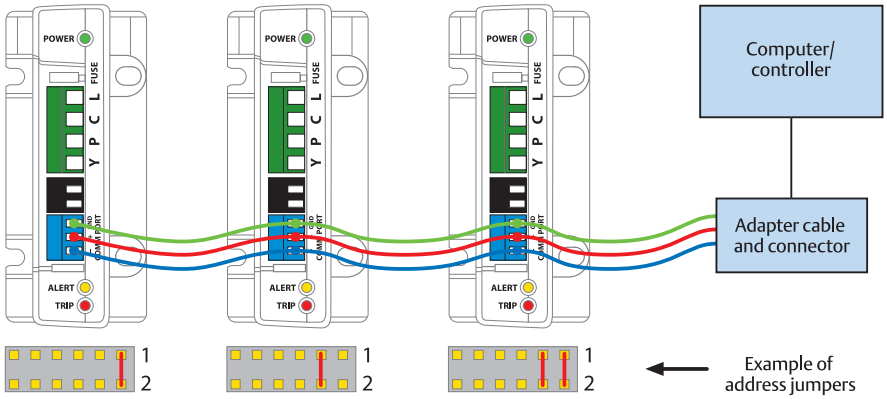
Note: For more information on communicating with the Copeland PerformanceAlert module via the E2 Facility Management System, see the "Gateway" section starting on page 25.

Benefit

Daisy-chaining modules together will eliminate the need to wire and unwire the connector and adapter cable from every Copeland PerformanceAlert module each time the technician wants to download alert-code history.

Daisy-chain setup

This diagram shows a typical daisy-chain setup for communications.



Setting the address jumpers

In a multiple-compressor system in which Copeland PerformanceAlert modules are daisy-chained together, it is necessary for the technician to properly set the address jumpers. The easiest time to do this is before the modules are permanently installed.

Continued on next page

Communication package
Connecting multiple-compressor systems (continued)

Table of jumper addresses

The table below shows which jumpers should be in place on each module, to designate each address.

Note: Refrain from removing all jumpers from the modules. This will result in an invalid address.

Module	AD5	AD4	AD3	AD2	AD1
01	–	–	–	–	Jumper
02	–	–	–	Jumper	–
03	–	–	–	Jumper	Jumper
04	–	–	Jumper	–	–
05	–	–	Jumper	–	Jumper
06	–	–	Jumper	Jumper	–
07	–	–	Jumper	Jumper	Jumper
08	–	Jumper	–	–	–
09	–	Jumper	–	–	Jumper
10	–	Jumper	–	Jumper	–
11	–	Jumper	–	Jumper	Jumper
12	–	Jumper	Jumper	–	–
13	–	Jumper	Jumper	–	Jumper
14	–	Jumper	Jumper	Jumper	–
15	–	Jumper	Jumper	Jumper	Jumper
16	Jumper	–	–	–	–
17	Jumper	–	–	–	Jumper
18	Jumper	–	–	Jumper	–
19	Jumper	–	–	Jumper	Jumper
20	Jumper	–	Jumper	–	–
21	Jumper	–	Jumper	–	Jumper
22	Jumper	–	Jumper	Jumper	–
23	Jumper	–	Jumper	Jumper	Jumper
24	Jumper	Jumper	–	–	–
25	Jumper	Jumper	–	–	Jumper
26	Jumper	Jumper	–	Jumper	–
27	Jumper	Jumper	–	Jumper	Jumper
28	Jumper	Jumper	Jumper	–	–
29	Jumper	Jumper	Jumper	–	Jumper
30	Jumper	Jumper	Jumper	Jumper	–
Remote/external LED blink	Jumper	Jumper	Jumper	Jumper	Jumper
Invalid address (31)	–	–	–	–	–

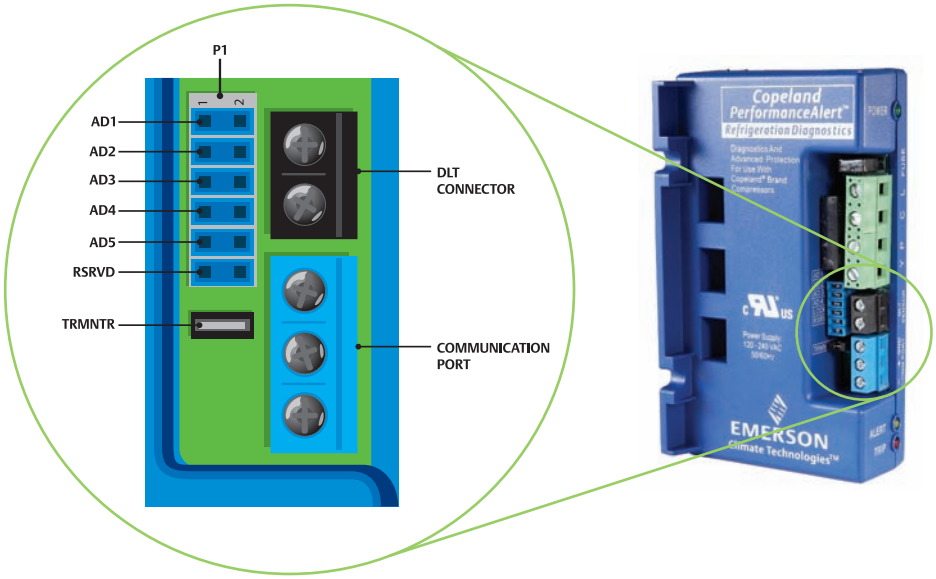
Continued on next page

Communication package
Connecting multiple-compressor systems (continued)

Terminating the chain

In a daisy-chain connection, the module that is the furthest away in the chain from the laptop or controller has to have the jumper TRMNTR placed to terminate the communication bus as shown in the figure below.

Magnified view



Note: In daisy-chain applications, the TRMNTR address jumper must be removed in all modules EXCEPT the one furthest away in the chain from the laptop or controller.

Gateway

Introduction

The gateway board for the Copeland PerformanceAlert refrigeration diagnostics module is part number 943-3730-00. It is shown in the figure below.

Gateway – part number 943-3730-00

Function

The gateway board allows the Emerson Climate Technologies family of site controllers to interface directly with multiple Copeland PerformanceAlert modules.

Note: See the daisy-chaining subsection on page 22 for more information.

Special Note: The gateway board is only necessary when interfacing with RMCC and E1 controllers. All other Emerson site controllers have the functions of the Gateway board built in.

Network ports used

The gateway board uses two network ports:

1. A Modbus® port is used to connect the gateway with the module.
2. An input/output (I/O) network port is used to connect the gateway to the I/O network of an E2 or Einstein control system.

   Note: When the REFLECS system is being used, the second connection will be made to the COM A/D.

How it works

The gateway board passes along information from Copeland PerformanceAlert about the compressor's behavior to the site controller, which is, in turn, monitored by a remote monitoring service, like Emerson Climate Technologies' Retail Solutions.

Note: Using the communications port, the module can communicate directly to E2 or to third party controllers that have modbus mapping.

Continued on next page

Gateway (continued)

Monitoring/communication options

Monitoring via the gateway board does not have to be remote. Using the communications port, Copeland PerformanceAlert can also communicate via a gateway board to an on-site rack controller, like the E2, Einstein or RMCC.

The gateway can be configured to pass only an “alarm on” signal to all three generations of controllers; or it can be configured to pass detailed alarm status and data to the Einstein and E2 controllers.

Note: Detailed alarm status and data cannot be passed to the RMCC controller; only an “alarm on” signal is passed.

Gateway support

For installation information and technical support on the gateway board, contact 888.EMR.9950.

Copeland PerformanceAlert troubleshooting
Installation troubleshooting

Results of miswiring

Miswiring the Copeland PerformanceAlert refrigeration diagnostics module will cause false alert codes.

Leaving Copeland PerformanceAlert miswired could cause damage to the module and to the system, and it will not provide the protection for which it is designed.

Recommended actions

The following chart describes what the indicator lights will do when Copeland PerformanceAlert is miswired and what should be done to correct the problem.

Miswired-module	Recommended troubleshooting action
Power LED (green) is not on, module does **not** power up.	1. Determine if both C and L module terminals are connected. 2. Verify that line voltage is present at module's C and L terminals. 3. Review wiring diagram.
Power LED (green) is on only when compressor is running.	1. Determine if L and Y terminals are wired in reverse. 2. Verify that module's C and L terminals have a constant source from line side of contactor.
Trip LED (red) is on, but system and compressor check OK.	1. Verify that the demand is connected to the Y terminal. 2. Review wiring diagram.
Trip LED (red) and alert LED are flashing together.	1. Verify that C and L module terminals are supplied with 85–265VAV. 2. Check if contactor coil terminal is connected to P.
Compressor does not run.	1. Check if P and Y cables are reversed. 2. Review wiring diagram.
Compressor runs when it should be off.	1. Review wiring diagram for P connection. 2. Check if P and C are shorted. 3. Review wiring diagram.
There is no communication with module.	1. Check if communication wiring is correct. 2. Check module address setting. It should **not** be 31.

Copeland PerformanceAlert troubleshooting
Refrigeration system troubleshooting

Trouble indicator lights

A quick look at the three indicator lights on the side of the Copeland PerformanceAlert refrigeration diagnostics module will tell the technician if the system requires attention.

Alert-light descriptions and causes

The following chart gives a description of what each light might be doing, a description of what the alert means, and some suggestions on what system issues could be causing the alert.

If the light is...	Then the...	And you should look for one of these causes for the alert light.
Green power	Module has power.	Supply voltage is present at module terminals.
Flashing green	Module has power; demand signal is present and minimum off time is active.	Once minimum off time is met, compressor will start normally.
Red trip	Thermostat demand signal Y is present, but the compressor is not running.	1. Compressor protector is open: - Check for high head pressure. - Check compressor-supply voltage. 2. Compressor circuit breaker or fuse(s) is open. 3. Broken wire or connector is not making contact. 4. Safety cutout switches are open (HPCO, LPCO, etc.). 5. Compressor contactor has failed open. 6. Module will trip compressor when Codes 1, 4, 6, 7 and 9 are present.
Flashing one long yellow (prior to short yellow flashes)	Module is in lockout condition.	Count the number of short yellow flashes and refer to the corresponding section of this table for causes.
Flashing yellow one time	High DLT trip is activated.	1. Check for possible loss of refrigerant charge. 2. Check for blocked condenser. 3. Verify that discharge valve is open. 4. On low-temperature scroll compressors, check liquid injection
Flashing yellow two times	System trip is activated (four consecutive compressor trips after run time of 1–15 minutes).	1. Check for excessive suction pressure or discharge press. 2. Check for improper wiring. 3. Check for defective run or start capacitor or relay.
Flashing yellow three times	Compressor is short cycling (2-480 runcycles in 24 hours ending with normal shut down default set at 240 run cycles).	1. Check pressure or temperature control. 2. Check for possible loss of refrigerant. 3. Check for blocked condenser. 4. Check for high suction pressure.

Continued on next page

Copeland PerformanceAlert troubleshooting
Refrigeration system troubleshooting (continued)

Alert-light descriptions and causes (continued)

If the light is...	Then the...	And you should look for one of these causes for the alert light.
Flashing yellow four times	Rotor is locked (compressor is drawing current without rotating or four consecutive compressor trips after run time of 1–15 seconds)	1. Run capacitor has failed (single-phase compressors). 2. Line voltage is low: - Check wiring connections. - Contact utility company if voltage is low at disconnect. 3. Excessive liquid refrigerant is present in compressor. 4. Compressor bearings are seized: - Check oil level in compressor. 5. Verify operating current. 6. Check safety switches (LPCO).
Flashing yellow five times	Circuit is open	1. Compressor circuit breaker or fuse(s) is open. 2. Compressor contactor has failed open: - Check compressor contactor wiring and connections. - Check for compressor contactor failure. - Check wiring and connectors between supply and compressor. - Check for low pilot voltage at compressor contactor coil. 3. High-pressure switch is open and requires manual reset. 4. Circuit is open in compressor-supply wiring or connections. 5. Compressor-protector reset time is usually long due to extreme ambient temperature. 6. Compressor windings are damaged: - Check compressor motor-winding resistance.
Flashing yellow six times	For single-phase compressors (recip. and scroll) demand signal is present but current is missing in start circuit.	1. Run capacitor has failed. 2. Open circuit in compressor start winding or connections: check wiring and connectors between supply and "S" terminal. 3. Compressor start windings are damaged: check compressor winding resistance. 4. Compressor current could be too low: refer to specifications. 5. Verify power on all legs.
	For three-phase compressors (recip. and scroll) demand signal is present, but current is missing in one phase.	1. Check for improper wiring. Correct order of phases in wires. 2. Check for failed contactor. Check contacts for pitting 3. Compressor current could be too low: check specs. 4. Verify presence of all legs of power line.

Continued on next page

Copeland PerformanceAlert troubleshooting
Refrigeration system troubleshooting (continued)

Alert-light descriptions and causes (continued)

If the light is...	Then the...	And you should look for one of these causes for the alert light.
Flashing yellow seven times	For single-phase compressors (recip. and scroll) demand signal is present but current is missing in run circuit.	1. Open circuit in compressor run winding or connections: check wiring and connectors between supply and "R" terminal. 2. Compressor run windings are damaged: check compressor winding resistance. 3. Compressor current could be too low: refer to specifications. 4. Verify power on all legs.
	For three-phase compressors (scroll only), reverse-phase signal is present but current is not detected in the correct sequence.	1. Improper wiring. Correct order of phases in wires. 2. Failed contactor. Check contacts for pitting. 3. Verify presence of all legs of power line.
Flashing yellow eight times	Contactor is welded (no demand signal, but current has been detected in one or both phases).	1. Control-circuit transformer is overloaded. 2. Thermostat demand signal is not connected to module. 3. Check wiring diagram.
Flashing yellow nine times	Low-voltage-detected control voltage dips below 85 volts for a 110-volt control circuit or below 170 or 220 volts for a 220-volt control circuit.	1. Check for low line voltage contact utility if voltage at disconnect is low. 2. Check wiring connections.
Flashing yellow 10 times	Communication is lost (between rack controller and module for 10 minutes).	1. Check communication wiring.
Flashing yellow 11 times	Discharge-temerature sensor has shorted or circuit is open.	1. Check discharge-temperature-sensor wiring and mounting.

Inactive yellow alert codes

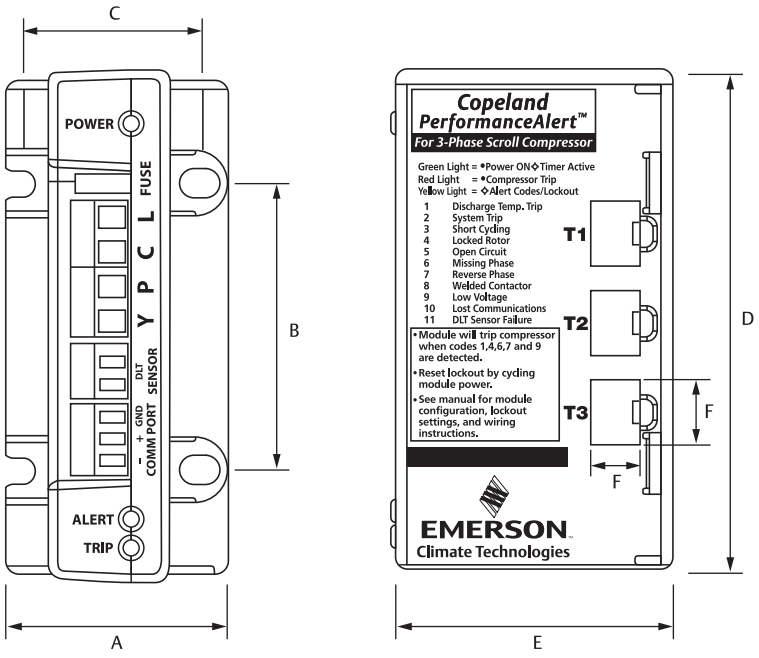
It is important to note that, depending on the system configuration, not all yellow alert codes will be active. The presence of safety switches will affect which alert codes are detected by the Copeland PerformanceAlert refrigeration diagnostics module.

Appendices
Product specifications

Operating conditions

Parameter	Measurement
Operating temperature	-40° to 150°F (-40° to 65°C)
Storage temperature	-40° to 175°F (-40° to 80°C)
Power-supply range	85–265 VAC, 48-62 Hz
Working amperage	3.0–200 amps
Maximum contactor-coil current	5 amps
Maximum wire size for wiring into the module terminals	14-gauge stranded

Model dimensions



Model dimensions	
A.	1.85 in. (47mm)
B.	2.44 in. (62mm)
C.	1.46 in. (37mm)
D.	4.40 in. (112mm)
E.	2.44 in. (62mm)
F.	0.33 in. (8mm) x 0.47 in. (12mm)

Continued on next page

Appendices
Computer software specifications (for communication package)

Requirements

The minimum hardware and software requirements for the Copeland PerformanceAlert refrigeration diagnostics module communication package are:

- Microsoft Windows 2000, Microsoft Windows, Microsoft Windows XP or Microsoft Windows Vista
- Pentium® III 300 MHz processor
- Internet Explorer® version 5.5 or higher browser

Software installation may require up to 70 MB of hard drive space.

CD installation

To install the software, follow these simple steps:

Step	Action
1	Close all applications running on your computer.
2	Insert the CD in the CD-ROM drive.
3	Installation will automatically begin. If installation does not begin, go to "My Computer" and click on the CD-ROM icon.

Note: In addition to installing Copeland PerformanceAlert software, the CD will also install any necessary drivers for the software to properly run.

Installation location

The software will install in the "C:\Program Files\Emerson Climate Technologies\Copeland PerformanceAlert" directory by default. You can specify another directory, if desired.

Software shortcut

Upon successful installation, an icon will be placed on your desktop, along with a shortcut in the start menu, for Copeland PerformanceAlert software.

Registration

It is recommended that users follow the prompts for registration, upon installation of the software. Registering the software ensures that Emerson is able to contact communication package users with new product information and updates.

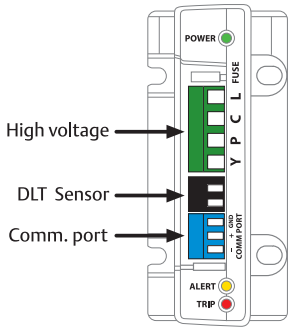
Software updates

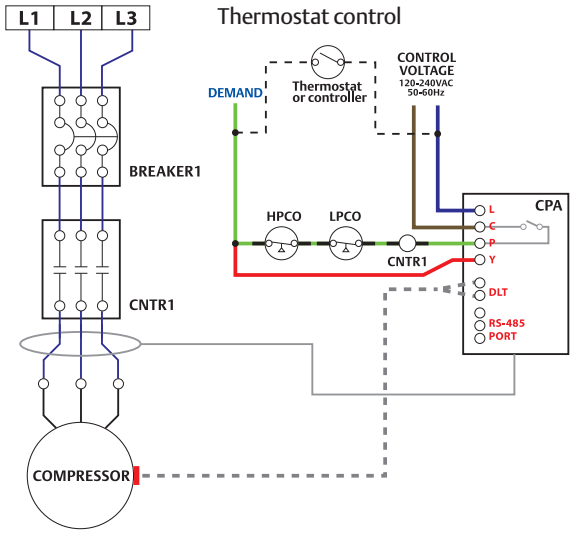
When updates to the software are available, the user will be prompted to accept the updates. Prompts will only occur when the user is connected to the Internet.

Appendices
Wiring diagrams

Thermostat control

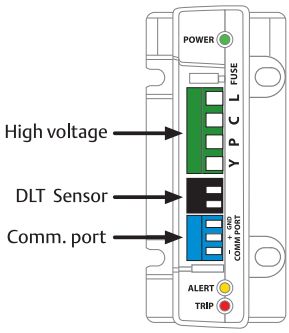
L Line
C Common
P Protection
Y Demand
HPCO High-pressure cutout switch
LPCO Low-pressure cutout switch
CNTR Compressor contactor coil
CPA Copeland Performance Module
DLT Discharge-line temperature

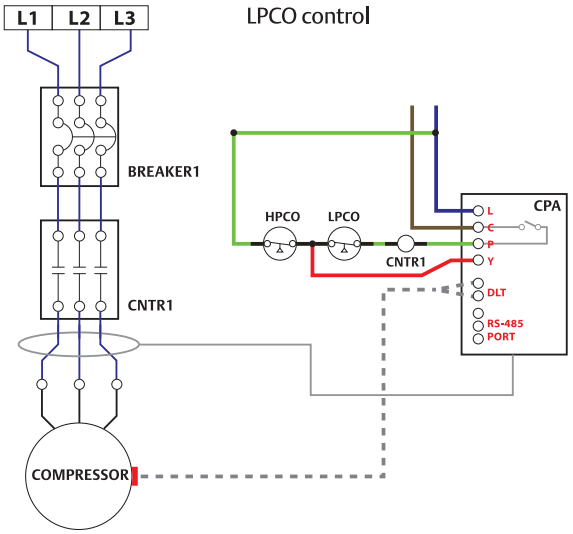




Low-pressure cutout control

L Line
C Common
P Protection
Y Demand
HPCO High-pressure cutout switch
LPCO Low-pressure cutout switch
CNTR Compressor contactor coil
CPA Copeland Performance Module
DLT Discharge-line temperature



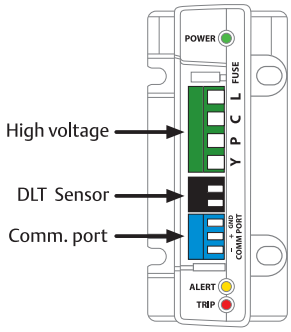


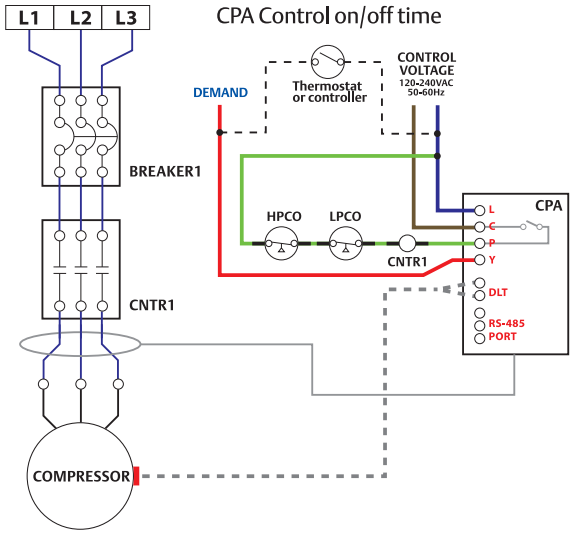
Continued on next page

Appendices
Wiring diagrams (continued)

On/off time control

L	Line
C	Common
P	Protection
Y	Demand
HPCO	High-pressure cutout switch
LPCO	Low-pressure cutout switch
CNTR	Compressor contactor coil
CPA	Copeland Performance Module
DLT	Discharge-line temperature





Q. What is the estimated installation time?

A. Depending on the application, the estimated time is up to 60 minutes.

Q. Is the voltage range adjustable?

A. No, the voltage range is 85-265. Refer to page 31 of this guide for additional product specification information.

Q. How many alert codes does the module store?

A. The module date-stamps all alert codes for the previous seven days. It also maintains a cumulative count for all alert codes created during the life of the module. It is necessary to utilize the communications package in order to retrieve alert code history.

Q. How many alert codes does the module display?

A. Just one alert code is actually displayed on the module itself; however, when used in conjunction with the communication package, all alert codes can be reviewed.

Q. Since the module displays only one alert code, how will I know if multiple alerts occur in the system?

A. To track complete alert code history, a communication package is required. Refer to page 20 to learn more about history retrieval.

Q. Is discharge line temperature (DLT) adjustable?

A. Yes. By using the communication package, the DLT range can be adjusted from 170°F to 280°F.

Q. What is the wire gauge limitation?

A. The T1, T2 and T3 (or R, C and S) dimensions are 0.33" x 0.47", which will accommodate up to a four gauge wire (depending on the manufacturer). However, there is a 14 gauge wire limitation for wiring into the module terminals.

Continued on next page

Q. Where are the address jumpers on the module and how do I access them?

A. The jumpers are located behind the DLT sensor input. Refer to the diagram on page 2 for a more detailed view. It is recommended that you set the jumpers prior to installing the module (if you are using them at all). Accessing them after installation could be difficult, especially if the space is tight.

Q. Is there a warranty on the module?

A. Yes, it is one year from the date of purchase. For warranty claims, contact your local authorized wholesaler. Warranty is subject to being voided if not properly installed.

Q. Can one module protect multiple compressors?

A. No, each compressor must have its own module to ensure proper protection.

Q. Can a Copeland PerformanceAlert refrigeration diagnostics module be used on any compressor brand?

A. No, Copeland PerformanceAlert modules will only work on Copeland refrigeration single and three phase, scroll and reciprocating refrigeration compressors. Refer to page 3 for non-compatible models.

Q. Is it necessary to mount the module inside the electrical panel?

A. While it is not necessary, it is certainly recommended. The module is not NEMA rated and should not be exposed to inclement weather, so if the installation occurs outside, it must be mounted in some sort of enclosure.

Q. I've resolved the problem, but the module is still blinking an alert code. How do I reset it?

A. The module will automatically reset once conditions return to a normal state; however, it can also be manually reset by cycling power off and on to the module. It is important to note that the last alert code prior to cycling power will display for one minute upon cycling power back on. For more information on the automatic reset conditions, refer to the table on page 12.

Continued on next page

Q. How many modules can be daisy-chained together?

A. Refer to page 23 for address jumper locations.

Q. What is the difference between a Copeland PerformanceAlert refrigeration diagnostics module and a phase monitor?

A. Both offer phase loss, missing phase, phase reversal and low voltage protection. Phase monitors use line and load voltage sensing for compressor protection. Copeland PerformanceAlert uses current sensors in T1 and T3 for phase loss/missing and phase reversal protection and terminals C and L for low voltage protection. PerformanceAlert also has additional compressor protection features like discharge line temperature (DLT) protection to let you know when the compressor reaches "red zone" temperature, and lock rotor protection when the compressor will not start. Copeland PerformanceAlert is also smaller in size than most phase monitors for easier installation in tight spaces.

Q. Is Copeland PerformanceAlert the equivalent of a data recorder (or data logger)?

A. Copeland PerformanceAlert performs the same functions, but also offers added compressor protection. In order to track data logging continuously, it is necessary to leave a laptop connected to the module.

Q. Can the module be mounted sideways?

A. Yes, as long as the module is mounted securely, it will function properly in any orientation.

Q. Is it possible to change the minimum on and off-times when the compressor trips?

A: Yes, the default settings for things like minimum on- and off-time, and discharge temperature trip point can be defined by the user; however, the communication package is required in order to change the settings.

Q: The yellow light is flashing just one time, but it is a long flash. What does that mean?

A: One long flash indicates the module has locked out the compressor.

Appendices

Emerson Climate Technologies is a proud supporter of NATE.

North American Technician Excellence, Inc. (NATE) is the leading certification program for technicians in the heating, ventilation, air conditioning and refrigeration (HVACR) industry and is the only test supported by the entire industry.

2009DS-73 (6/09)