

AE8-1367 R6

August 2018

CoreSense[™] Protection for Copeland Discus[™] Compressors

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Revision Tracking R6

References to "Emerson Retail Solutions" changed to Emerson.

References to 4M*LS models deleted.

Pg. 1 – Modbus Specification and E2 Setup added as Appendixes.

Pg. 6 – CoreSense Module part number added.

Pg. 8 – E2 Setup moved to end as an Appendix.

Pg. 10 – "General Guidelines and More Information" Section added.



Safety Instructions

Copeland Discus™ compressors with CoreSense™ technology are manufactured according to the latest U.S. and European Safety Standards. Particular emphasis has been placed on the user's safety. Safety icons are explained below and safety instructions applicable to the products in this bulletin are grouped on Page 3. These instructions should be retained throughout the lifetime of the compressor. You are strongly advised to follow these safety instructions.

Safety Icon Explanation



DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

CAUTION

CAUTION, without the safety alert symbol, is used to address practices not related to personal injury.



FLAMMABLE, Fire hazard! Sparking in a potentially explosive atmosphere! Explosion hazard!



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Instructions Pertaining to Risk of Electrical Shock, Fire, or Injury to Persons

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	ELECTRICAL SHOCK HAZARD
	 Disconnect and lock out power before servicing.
AS WARINING	Discharge all capacitors before servicing.
	Use compressor with grounded system only.
	 Molded electrical plug must be used when required.
	Refer to original equipment wiring diagrams.
	Electrical connections must be made by gualified electrical personnel.
	Failure to follow these warnings could result in serious personal injury.
	PRESSURIZED SYSTEM HAZARD
	 System contains refrigerant and oil under pressure.
	 Remove refrigerant from both the high and low compressor side before removing compressor.
	 Never install a system and leave it unattended when it has no charge, a holding charge, or with the service valves closed without electrically locking out the system.
	 Use only approved refrigerants and refrigeration oils.
	 Personal safety equipment must be used.
	Failure to follow these warnings could result in serious personal injury.
	BURN HAZARD
A WARNING	 Do not touch the compressor until it has cooled down.
	 Ensure that materials and wiring do not touch high temperature areas of the compressor.
	 Use caution when brazing system components.
	 Personal safety equipment must be used.
	 Failure to follow these warnings could result in serious personal injury or property damage.
	COMPRESSOR HANDLING
A CALITION	 Use the appropriate lifting devices to move compressors.
	 Personal safety equipment must be used.
	 Failure to follow these warnings could result in personal injury or property damage.

Safety Statements

- Refrigerant compressors must be employed only for their intended use.
- Only qualified and authorized HVAC or refrigeration personnel are permitted to install commission and maintain this equipment.
- Electrical connections must be made by qualified electrical personnel.
- All valid standards and codes for installing, servicing, and maintaining electrical and refrigeration equipment must be observed.

Application Engineering

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1. Overview

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The CoreSense™ Protection module (CPM) for Copeland Discus™ compressors combines oil and motor protection into one module, as well as offers optional protection against high discharge temperature and communication compatibility with Modbus communication devices. Display LEDs clearly indicate the operational status of the compressor and whether or not there are any active compressor warnings, trips or lockouts active.

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The CoreSense Protection product line is now available on Copeland[™] 2D, 3D, 4D and 6D Discus compressors and integrates a number of important sensing and compressor protection functions. Some key components for the CoreSense Protection module are labeled in **Figure 1 and Figure 2** at the end of this bulletin.

1.1. Nomenclature

Factory built Discus compressors with an S/E (the last 3 digits in the model number) beginning with "C" are CoreSense Protection compressors. For example, 3DS3F46KL-TFD-<u>C</u>00.

Kit Number	Description
943-0128-00	CoreSense Module Kit
998-0162-01	CoreSense Oil Sensor Kit

There are a select few 2D/3D Discus compressors that also use PTC Sensors. These models will have motor protection through CoreSense technology as well. Compressors with PTCs are indicated by an "S" in the second character of the electrical code, e.g. 4DH3R22ML-T<u>S</u>K-C00. See **Section 2.3** for more details about PTC sensors.

2. PROTECTION

2.1. Oil Protection

CoreSense Protection replaces mechanical oil pressure sensing devices, the current Sentronic+[™] as well as older versions of the Copeland Sentronic[™] oil pressure control. Furthermore, it provides the added value of communication of low oil pressure warnings, oil pressure trips and oil pressure lockouts via LED codes and/or a supervisory rack controller, such as Emerson E2. Insufficient oil pressure time for the compressor is stored and accumulated in the module memory. Once the total time accumulated for bad oil pressure (a reading less than 7-9 PSID) exceeds 120 seconds, the module will shut the compressor off and a "low oil pressure lockout" will be reported. The compressor will turn back on once the reset has been activated either manually or remotely through the communication network, or when power has been cycled to the CoreSense Protection module.

2.2. Reverse Jog Feature

The compressor will stop as long as the reset button on the bottom of the CoreSense Protection module is held in. This can be used for clearing liquid during a start-up. After the module re-boots (approximately 3 seconds) the compressor will run again. The reset button may be pushed as necessary to stop the compressor.

2.3. Motor Protection by Positive Temperature Coefficient (PTC) Sensor

CoreSense Protection replaces the Kriwan module INT369R and provides motor protection for Copeland Discus 4D/6D compressors, and Discus 2D/3D compressors with FS_ and ES_ motors. The CoreSense Protection module will communicate a motor protection trip when the resistance caused by an increasing motor temperature has risen above 13 K Ohms. The compressor will restart once the resistance drops below 3.2 K Ohms and a five minute off time has been achieved.

For Discus compressors with AWX/M/D motors , the motor resistance trip occurs when the resistance has risen above 4.5 K Ohms. The compressor will restart once the resistance drops below 2.75 K Ohms and a five minute off time has been achieved.

2.4. High Discharge Temperature Protection (Optional)

Compressor head temperatures can be very hot. are must be taken to ensure that wiring or other materials which could be damaged by these Application Engineering

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temperatures do not come into contact with these potentially hot areas.

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CoreSense[™] Protection for Copeland Discus[™] compressors can also provide valuable discharge temperature protection. By installing the temperature probe into the head of the Discus compressor and connecting to the CPM, CoreSense will protect the compressor from high discharge temperature conditions. If the temperature sensor detects a head temperature greater than 310°F, the CoreSense will trip the compressor off until the temperature cools down to an acceptable level (approximately 267°F). A high discharge temperature lockout can also be enabled through the E2. Navigating the E2 setup screens (including enabling a high discharge temperature lockout) are discussed later in this bulletin.

For more information on the protection features, LED status codes, event priority and troubleshooting of CoreSense Protection refer to the section titled Status Codes/LED Diagnostics.

Table 1 - Optional Core Sense Parts

Kit Number	Description
985-0109-50	High Discharge Temperature
905-0109-50	Protection Probe

2.5. Communication (Optional)

CoreSense Protection has an optional communication capability via a Modbus network connection. With communication enabled, CoreSense warnings, trips and lockouts can be displayed and recorded in a rack controller such as the E2.

2.6. Remote Reset

NOTICE

Service contractor and end user policies need to be considered when deciding whether or not to use the remote reset feature in the E2.

CoreSense Protection for Copeland Discus is equipped with a remote reset capability, such that if a compressor is off in a lockout condition, the user can remotely restart the compressor through their E2 rack controller or compatible remote access software (e.g. UltraSite[™]). To set up remote reset via the E2, refer to section titled **Performing a Remote Reset In the E2 Alarm Screen.**

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2.7. Fault History

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Compressor faults are recorded within the CPM and if communicating with an E2 can also be stored in the E2 and CoreSense Alarm Tables for the past seven days. An example of the E2 Alarm Table is shown in **Figure 3.**

2.8. Application Usage

2.8.1. Specifications

Operating Temperature: Between -25°F and 150°F Voltage Requirements: 110 VAC or 220 VAC

Inrush Current for Relay: 19A

Steady load current for Relay: 3A

Power rating for the module: 3VA

Storage temperature: Between -40°F and 185°F

2.9. Basic System Wiring Diagram

WARNING

Fusing and wire sizing must be done in accordance to all applicable electrical code standards.

Figure 4 shows the recommended basic system wiring for a Copeland Discus compressor with CoreSense Protection.

2.10. Variable Frequency Drives

CoreSense Protection may be used with variable frequency drives. Refer to <u>AE-1369</u>: "Use of Variable Frequency Drives (VFDs) With Copeland Scroll[™] and Copeland Discus[™] Fixed Capacity Compressors in Refrigeration Applications" for more information on Copeland Discus with variable frequency drives.

2.11.Digital/Conventional Unloaded Compressors

CoreSense Protection may be used with Copeland Discus DigitalTM as well as conventionally unloaded compressors. Refer to **Figure 5** for recommended wiring with the Copeland Digital Compressor Controller.

Note: When applying Discus Digital with CoreSense Technology, the discharge temperature protection can



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be done via the Digital Compressor Controller. Use the temperature probe provided with the Digital Compressor. Otherwise the optional temperature probe available for CoreSense can be used and one resistor can be placed across the T1-T2 on the DCC.

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2.12. Demand Cooling

CoreSenseTM Protection is compatible with Copeland Demand CoolingTM. However, the discharge temperature protection is provided by the Demand Cooling module. Discharge temperature information will not be communicated to the CoreSense Protection module. For more information on Copeland Demand Cooling, refer to <u>AE4-1287</u>: "Copeland DiscusTM Compressors with Demand CoolingTM System". Wiring of CoreSense Protection with Copeland Demand Cooling is shown in **Figure 6**.

3. INSTALLATION

3.1. Mounting

CoreSense Protection is designed and engineered for use in many refrigeration applications. Its environmental restrictions are not different than other Copeland Discus[™] compressors. As such, the compressor must be in an equipment room, rack house or roof enclosure to prevent direct precipitation on the compressor. The following clearance provisions must be considered when designing a system for use with a CoreSense Protection compressor:

- Removal of the cover of the module for access to dip-switches and the communication network connector
- Removal of the module for service reasons
- Removal of terminal box lids for service reasons

Dimensional reference drawings for the 2D, 3D, 4D and 6D Discus with CoreSense Protection are found at the end of this document.

3.1.1. Terminal Box and Current Sensing Toroid Connections

Terminal box and the current sensing toroid connections are installed at the factory. One of the motor power leads must be routed through the center opening in the toroid (refer to **Figure 7** and **Figure 8**). The current sensing toroid is used to determine if the compressor is running.

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If using CoreSense Protection with a part winding start motor, power leads L1 and L7 both should be passed through the center opening in the same direction (see **Figure 9**) to provide accurate compressor proofing.

3.1.2. Power Connections

The following power connections must be made by the original equipment manufacturer:

• Module power: 110/220 volts AC

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- Pilot circuit wiring: Pilot Circuit is wired through the L and M terminal. The L and M terminals are connected together when CoreSense Protection is not detecting any faults. L&M are an open circuit when the module is powered off or detecting a fault condition.
- Alarm circuit wiring: The L and A terminals are connected together when a fault is detected or when the module is powered off.
- Refer to Figure 4 for basic wiring of the CPM.

3.1.3. Stand Alone Mode

If running a Discus with CoreSense protection without communication to a rack controller, DIP switch 9 should be set to "Off." Otherwise, nuisance communication alarms will occur, **indicated by a flashing Code 5**. If using the discharge temperature probe for high discharge temp protection, DIP switch 10 should be set to "On". All other switches and jumpers can be left in their factory setting positions.

For more information on configuring the DIP switch refer to **DIP Switch Configuration** on page 8.

3.1.4. Communication Network (optional)

Rack Controller Requirements

The control network utilizes Modbus for CoreSense protocol. Rack controller manufacturers may develop equipment to interface with and control CoreSense Protection compressors. For non-Emerson controllers, consult with the controller manufacturer regarding controller compatibility with CoreSense Protection. **Application Engineering**

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For Modbus map refer to Appendix B.

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For the Emerson E2 controller, it should be equipped with an Emerson RS-485 communications network board. (Emerson part number 237-4890). The controller firmware must be revision level 3.0 or higher. Refer to Emerson E2 Installation and Operation Manual for RX Refrigeration, BX HVAC, and CX Convenience Store Controllers <u>026-1614 Rev. 7</u> for more detailed information.

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The E2 network interface board has two communication ports available. The E2 network interface board is shown on **Figure 14**.

3.2. Cable Routing / Daisy Chain Configuration

A shielded, twisted pair cable such as Belden #8761 (22AWG) should be used for the communication wiring. Passing the communications wire through the grommet in the plastic housing will help reduce abrasion to the wiring. Appropriate strain relief is recommended.

Note: The RS485 is polarity sensitive. "Pos" wires must connect to other "Pos" terminals, and "Neg" wires must connect to other "Neg" terminals. The shield wire is connected to the center terminal, or "0 volt" position. If the polarity is correct, red and green LEDs on circuit board will flash. If incorrect, the red LED will remain on. Refer to **Figure 10** and **Figure 11**.

CoreSense[™] Protection and the rack controller communicate with each other using Modbus protocol. The communication cable is wired from the rack controller to the first compressor. Additional compressors are wired in a daisy chained configuration. Refer to **Figure 12** and **Figure 13**.

3.3. Terminations

The last compressor in the daisy chain must be "terminated" by moving the jumper from the JP5 position to the(JP3) position. The last compressor in the daisy chain bust be terminated. For CoreSense modules built prior to 2015, this is done by moving the jumper from the JP5 position to the JP3 position. The inside cover of the module has instructions which show this configuration. For CoreSense Modules built after Dec. 2014, the termination is done by moving the position of the jumper on JP3 to 2 and 3. Again, refer to the inside cover

illustration on the module. For all of the other compressors, the jumper should remain in the default position.

For more information on setting the jumpers, refer to section titled **Jumper Settings** on page 9. More information on the CoreSense Protection module jumpers can be found in the section titled **Commissioning**.

The E2 jumpers on the Network Interface Board should be set for "terminated" (refer to **Figure 14**).

4. COMMISSIONING

Modules using a communications network must be commissioned as part of the E2 rack controller setup. The commissioning process uploads compressor asset information (model and serial number) into the rack controller for future reference. Once the commissioning process is completed, the controller will supervise and communicate with the module unless the node is deleted.

The CoreSense Protection module does not need to communicate to the rack controller in order to provide compressor oil and motor protection.

Using the communication process is optional and provides a means as an exchange of information from the controller to the CoreSense modules for proofing, remote reset, asset information, fault history and compressor status. Skip to section titled **Stand Alone Mode** if the communication feature will not be used.

The commissioning process begins by assigning a unique node address to each module. The address is established by the setting of a DIP switch in the module.

4.1. DIP Switch Configuration

DIP switch selection for the Modbus address, baud rate, parity, and other operating conditions simplify service and start-up procedures. **Table 2** at the end of this bulletin lists the purpose for each switch. See **Figure 15** for more information on DIP switch settings.

To access the DIP switch, remove the four CoreSense Protection module cover screws. Then remove the cover.

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Note: Press the reset button after changing any of the DIP settings for changes to take effect.

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The following steps cover the DIP switch settings throughout the commissioning process for a multiple compressor system with communications to the E2:

- Switches 1 through 6 are used for setting the address. Each CoreSense Protection device that is connected to a rack controller must have a unique node address (as determined by the DIP switch settings).
- Switch 7 defines the communications baud rate for the CoreSense[™] Protection module. If the switch is "off", the baud rate is 19200. If the switch is "on" the baud rate is 9600. The baud rate for each of the CoreSense Discus[™] devices should be set to match the rack controller. The default baud rate is 19200 ("off") for the CoreSense Protection module. To determine the baud rate in the E2, follow these steps:
 - From the main menu select 7 (System Configuration)
 - Press 3 (System Information)
 - Press 1 (General Controller Info)
 - Access the Serial Communications Tab by pressing CTRL + 3
 - Use the Page Down button or scroll down to view the settings for COM4
- 3. Switch 8 defines the communication parity. The default parity setting for the CoreSense Protection module is no parity. If the switch is set to "on" the module will communicate using even parity. The parity setting must match the parity setting of the rack controller.
- 4. Switch 9 is used to set the network mode (on) for the module. The default setting is standalone mode (off). Network mode will generate a communications error if the rack controller fails to communicate with device. For standalone the mode, no communications are expected so the communication error is blocked.

5. Switch 10 enables the optional discharge temperature probe. If the switch is set to "on" the CoreSense Protection module will expect a discharge temperature probe. If the switch is set to "off" the CoreSense Protection module will not respond to the discharge temperature probe. The default setting is discharge temperature probe disabled (off).

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- 6. Switch 11 is for oil protection circuit test. The test is preformed while the compressor is off. The test is started once the switch 11 is switched from the "OFF" to "ON" position within the first 5 seconds of module power up OR the first 5 seconds of pressing the RED reset button. This test tests for oil pressure. Since the compressor is off it will see no oil pressure and will result in an open contactor OR the L and M relay will be open on the CoreSense module.
- 7. Switch 12 is not used in CoreSense Protection applications and should be left in the "off" default setting.

4.2. Jumper Settings

4.2.1. 10 Position DIP Switch CoreSense:

The communications jumper(JP4) should be set for ECT Modbus if connected to an E2 rack controller (jumper pins 1-2). Use jumper pins 2-3 for other controllers. See **Figure 16**.

The last CoreSense Protection device in the daisy-chain should have a communication jumper in the "terminated" (JP3) position. All other modules should have a jumper in the JP5 position. In addition, the E2 should have the communication jumpers on the communication card (typically COM4) in the "terminated" position.

4.3. 12 Position DIP Switch CoreSense:

JP positions 1 and 2 are the terminated position and positions 2 and 3 are the unterminated positions. Please refer to **Figure 17**.

JP 4 is used when a CoreSense module is interfacing a Dixell[™] X-Web device. Positions 1 and 2 are 2 stop bits and positions 2 and 3 are 1 stop bit. Please contact Application Engineering for further information about this application.

Note: JP1 should not be removed.



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4.4. Network Setup in Emerson E2

For details about E2 setup procedures refer to Appendix A.

5. OPERATION

5.1. Status Codes / LED Diagnostics

The status codes are summarized in **Table 3**, **Table 4** and **Table 5** at the end of this bulletin.

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5.2. Event Priority

If the module sees more than one event at a time it will choose to display the highest priority event on the LEDs and on the E2. The alarm priorities are defined in **Table 6** where "1" is the highest priority.

5.3. Performing a Remote Reset in the E2 Alarm Screen

For details about procedures for resetting a CoreSenseTM alarm remotely from the E2 please refer to <u>Appendix A</u>.

5.4. Emergency Bypass of a Damaged Motor Temperature (PTC) Protection Sensor

CAUTION

At no time should more than one motor sensor be bypassed. In the unlikely event that one sensor may be damaged and have an open or shorted circuit, CoreSense Protection will prevent compressor operation (and display a motor protection alarm) even though the motor may be in perfect condition. If such a situation should be encountered in the field, an emergency means of operating the compressor can be used until such time as a replacement can be made. Connect a properly sized resistor between the CoreSense Protection motor leads and the common sensor terminal in the compressor terminal box. This indicates to the control module an acceptable resistance in the damaged sensor circuit, and compressor operation can be restored (see Figure 18). If an internal sensor is shorted, the wire from the sensor to the sensor terminal should be disconnected when installing the resistor. In effect, the compressor will continue operation with two leg protection rather than three leg protection. While this obviously does not provide the same high degree of protection, it does provide a means of continuing compressor operation with a degree of safety.

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The specifications for the emergency resistor are as follows:

One watt (or larger), 2200 ohm ±10%resistor

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6. OPERATION

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6.1. Status Codes / LED Diagnostics

The status codes are summarized in **Table 3**, **Table 4** and **Table 5** at the end of this bulletin.

6.2. Event Priority

If the module sees more than one event at a time it will choose to display the highest priority event on the LEDs and on the E2. The alarm priorities are defined in **Table 6** where "1" is the highest priority.

7. General Guidelines and More Information

For general Copeland Scroll compressor please log in to Online Product Information at <u>Emerson.com/OPI</u>, refer to the Application Engineering bulletins listed below, or contact your Application Engineer.

<u>AE-1328</u>	Copeland™ Digital Compressor Controller
<u>AE-1369</u>	Use of Variable Frequency Drives (VFDs) with Copeland Scroll [™] and Copeland Discus [™] Fixed Capacity Compressors in Refrigeration Applications



Figure 1 – CoreSense[™] Protection on Copeland Discus[™] Compressors



Figure 2 - Key Components on the CoreSense™ Protection Module



C1: Inputs	C2:	Outputs	C3: Dise	us Ou	ts	C.		A1.	1111	Out	65:	SensorHodul
C6: History	C7:	7 Day	C8: A1rr	Hist		CS	1:	Alr	'n	Table	CØ:	MORE
		D	iscus: DI	SCUS I	881							
					_	-		-				
Alen Ta	able	Type		1	2	3		5 6	1	8 1	Count	
	81	: Fault Dis	ch Tenp	Y	N		N	N N	N	N	2	
	#2	: Comm Loss	CT	Y	м	H	H		н	H		
	#3	: Low Dil P	rs Warnin	g v	н	H	H	H H	N	н	50	
	日 4	: Config Mi	snatch	Y	N	H	N	N N	N	N	2	
	115	: No Connun	ications	E2 N	н	2	N	H H	н	H	6	
	116	: Disch Ten	p Trip	v	н	H	H	нн	н	н	1	
	#7	: Comp Low	Voltage T	rip N	N	R.	N	NN	N	H	6	
	#8	: Notor Ten	p Trip	Y	н	H	H I	нн	N	н	8	
	#9	: Low Oil P	rs Lockou	t Y	н	H.	H.	H H	м	н	1	
	#10	: Disch Tem	p Lockout	N	м	H	N	NN	н	N I	HONE	
	811	: Comp Nodu	le failur	e N	N	2	N	N N	N	N 1	TONE	
	#12	: Unused		N	н	H	N	N H	N	N	6	8
	#13	: Unused		N	N	2	N	N N	N	N		8
	#14	: Unused		н	N	H	H I	H H	н	H	0	
	#15	: Unused		н	н	H.	H I	H H	N	H	40	E
	#16	: Unused		н	N	N	N	NN	ы	N		6 .
	#17	: Unused		N	N	N	N	NN	N	N		
							_					

Figure 3 -E2 Alarm Table For CoreSense™ Protection



Figure 4 - Basic Wiring Diagram



Figure 5 – CoreSense™ Protection with Copeland Digital Compressor Controller

* For applications with Discus Digital and Copeland Demand Cooling a 5kOhm, 1W resistor should be installed at T1 and T2 on the Digital Compressor Controller, and the Demand Cooling Temperature Probe should be used. For more information on the Copeland Digital Compressor Controller refer to <u>AE-1328</u>.



Figure 6 – CoreSense™ Protection with Copeland Demand Cooling

*Note: The CoreSense™ Module Is Dual Rated for 120v / 240v. The Demand Cooling Module Must Be Matched To The Line Voltage.



Figure 7 - One motor lead must be routed through the center opening of the current sensing toroid.





Figure 8 - Current Sensing Toroid



Figure 9 - Routing of motor leads through the current sensor for a part winding start motor.



Figure 10 - Polarity Indicator LED on CoreSense™ Protection Modules Prior to 2015



Figure 11 - Polarity Indicator LED on CoreSense™ Protection Modules 2015 and After



Figure 12 - RS485 Daisy Chain Connection

Figure 13 - Two Rack Daisy Chain Connection



Figure 14 - RS-485 Communication Network Board (Emerson P/N 237-4890



Figure 15 - Default CoreSense™ Protection DIP Switch Settings



Figure 16 - 10 Position Jumper Settings on CoreSense™ Protection Modules Prior to 2015

Figure 17 - Default Jumper Settings on CoreSense™ Protection Modules 2015 and After

Figure 18 - Emergency Bypass of Damaged Motor Temperature (PTC) Protection Sensor

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Table 2 - DIP Switches Functions

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DIP switch Number	On	Off
1 through 6	Modbus Module	Address
7	Baud Rate = 9600	Baud Rate = 19,200
8	Even Parity	No Parity
9	Network Mode	Stand Alone
10	Enable Discharge Temp Probe	No Probe

Table 3 - Green LED Flash Codes

# Flashes	Green LED – Warning Condition (The Compressor May Run With These Conditions)
1	Low oil pressure – Indicates that the device has detected low oil pressure for longer than 2 seconds. The compressor is able to run, because not enough time has elapsed without oil pressure to cause a shutdown. The warning will clear if 2 seconds of good oil pressure is detected.
2	Not used
3	Discharge Temperature Probe Open Or Disconnected – The system is not reading temperature data from the discharge temperature sensor input. The compressor is able to run when this condition is present. The condition will clear if the system reads valid temperature data from the probe for more than 2 seconds.
4	Current Sensor Disconnected – The current sensor is not connected to the system. The compressor continues to run. The condition will clear when the current sensor is connected to the module for more than two seconds.
5	Communication Error Between CoreSense [™] Protection Module And E2 – The rack controller is not communicating with the CoreSense [™] module. The compressor continues to run. The condition will clear when a valid message is received from the rack controller.

Table 4 - Yellow LED Flash Codes

#	Yellow LED – Trip Condition
Flashes	(Compressor Stops until Condition Clear and/or Time Delay has Expired)
1	Not used
2	Motor Protector Trip – The motor temperature sensors are too hot. The compressor is tripped off for at least 2 minutes and until the motor temperature sensors have cooled off.
3	Discharge Temperature – The head temperature probe has detected a temperature greater than 310°F. The compressor is off for at least 2 minutes and until the compressor has cooled off.
4	Not used
5	Not used

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Table 5 - Red LED Flash Codes

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# Flashes	Red LED - Lockout Condition (RESET Required)
1	Low Oil Pressure Lockout – The compressor has accumulated 2 minutes of run time with insufficient oil pressure.
2	Not used
3	Discharge Temperature - The head temperature probe has detected a temperature greater than 310°F and Discharge Temperature Lockout has been enabled in the rack controller.
4	Not used
5	Not used

Priority	Event	E2 Alarm Display	CPM LED		
1	CoreSense Protection Module Failure	"Module Failure Lockout" Steady RED	Steady RED		
2	Discharge Temperature Lockout	"Discharge Temp Lockout"	Flashing RED 3 Counts		
3	Low Oil Pressure lockout	"Low Oil Pressure Lockout"	Flashing RED 1 Count		
4	Motor Protector Trip	"Motor Temp Trip"	Flashing YELLOW 2 Counts		
5	Discharge Temperature Trip	"Discharge Temp Trip"	Flashing YELLOW 3 Counts		
6	Loss Of Communication Between CPM & E2	"No Communication"	Flashing GREEN 5 Counts		
7	E2 Config Mismatch	"E2 config mismatch"	Flashing GREEN 5 Counts		
8		RESERVED FOR FUTURE USE			
9	Low Oil Pressure Warning	"Low Oil Pressure"	Flashing Green 1 Count		
10	RESERVED FOR FUTURE USE				
11	Open Thermistor	"Fault Temp Probe"	Flashing GREEN 3 Counts		
12	Normal Run	"Normal Running"	Solid GREEN		
13	Normal Off	"Normal Off"	Solid GREEN		

Table 6 - Event Priority for CoreSense™ Protection Faults

8. REFERENCE DRAWINGS

Drawing # 1 - Dimensional Drawing for 2D Discus™ with CoreSense™ Protection

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Drawing # 2 - Dimensional Drawing for 3D Discus[™] with CoreSense[™] Protection

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Drawing # 3 - Dimensional Drawing for 4D Discus™ with CoreSense™ Protection

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Drawing # 4 - Dimensional Drawing for 6D Discus[™] with CoreSense[™] Protection

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Appendix A: E2 Setup

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2.	Enabling Discharge Temperature Lockout in the E2	32
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1. Network Setup in Emerson E2

B

The following section describes network set up with an E2 v3.0. Before beginning network setup, Emerson Climate Technologies recommends updating to the latest E2 firmware. For other controllers or newer versions of E2, contact your controller manufacturer representative.

Once the DIP switch and jumper settings have been verified for each CoreSense[™] module, you will need to establish communications with the new devices. Begin the network setup by following the steps below

Note! Before Making Any Changes in The E2 Setup, You Must Log In To The E2 By Pressing And Entering The Appropriate Username And Password

- 1. Press 💿 to Enter the Main Menu. Select 5. Configured Applications.
- 2. From the Configured Applications Menu Select 1. Suction Groups

3. Select the Suction Group The CoreSense[™] Devices Will Be Associated To. This Will Bring Up The Suction Group Status Screen.

4. Press F5 To Enter The Suction Group Setup Screen

12-88-18 🕈 🥱 🗐	RX-400 Unit 3 SUHMMRY	HANES	42+40+50
Sunnary For	Suction Groups and End	hanced Suction	
Name Suct Suction GRP01 ENHSUC GRP001 -8.9	Suct SP Ctl Tmp Temp: 22.0 NONE 5.0 NONE	5P Stages Of \$ 1 4 4 1 8 3	Cap Status DB <u>K</u> B <u>OK</u>
Press enter on desired ap	plication For status.		
F2: COME	NSER FRAT CIRCUITS	FA: SENSORS	ES: SETHP

- 5. From C1:General Tab, Input The Number Of Stages (Unloader Banks Are Counted As An Individual Stage)
- 6. Tab Over To C7: Stage Setup (Ctrl +7) To Modify The Stage Type Press F4: Look Up

General 02:	Circuit	s (C3:	Setpoints	Ch:	CS: Inputs
Outputs C7:	stage s	etup Issa	Stage Outs	C9 :	CO: HORI
	Enhar	iced Suc	tion: EMHSU	GRP001	
General	Value				
Hane	: ENHSUM	GRP001			
Long Nane					
Stratege	: Normal				
Hunber - Stage	52	5			
Ketrigerant	10,000	1.1.1			
Phase Protect	: Yes				
comp On Always	: No				
Comp On Defros	C: NO				
comp On Reclass	n: No				
Enable Float	: 190				
compenser					

General	C2: Circu	its C3: Sets	oints Ch:		C5: Inputs
Outputs	C7: Stage	Statute C8: Stag	e Outs C9:		CO: HORE
	Enl	sanced Suction:	EMNSUE GRPOOT		
Stage Setup	Type Ca	pacity Proof	0il Sensor	0i1 #19	0il Pres
#1	: Conp	5.0 Yes	Mone		
82	Conp	15.0 No	Mone		
83	: Conp	IS.0 Yes	Mone		
=+	: Unld 1	15.0			
#5	: Conp	15.0 Yes	None		

7. For Example, If A Stage Is An Unloader, Select Unid (Press U) From The Option List Selection Menu

12-08-10 • 👘 😁 💶 RX-400 Unit 3 💧 OPTION LOOKUP 🔤 MES	44+98+44	12-08-10 0 👘 🐨 🚾 RX-A00 Unit 3 🍈 Use Ctrl-X to Select CX Tabs SETUP MANES	44.+24+5
C1: General C2: Circuits C3: Setpeints C4:	CS: inputs	C1: General C2: Circuits C3: Setpoints C4:	CS: Inpets
C6: Outputs D24 Steppe Status C8: Stage Outs C9:	C0: HORE	C6: Outputs IPFENETCESIUM C8: Stage Outs C9:	CO: HORI
		Enhanced Suction: ENHSUG GRP001	
Stage Setup Ty #1 : Co #2 : Co	ly #il Pres	Stage Setup Type Capacity Proof Oil Sensor Oil Diy B1 : Comp 15.8 Yes None B2 : Comp1 15.8	0il Pres
M3 : Co hereviation Select:		#3 : Comp 15.0 Yes None	
HA : Un Pescription Selecc		#% : Unid 15.0	
IS : Co Conp C		MS : Comp 15.0 Yes None	
Unid US Ogt1 D CTdr T			
Use Op-Dawn Arraw keys or function keys to select entry. P	ress BACK.	Scroll using Next/Prev kees 1 Tupe of stage	
F1: SELECT F3: BEGINNING FA: END	F5: CANCEL	E4. BBER TAB _ E2. NEXT TAB _ E2. EAT _ EA: LONG ND	EF. DAMES

- 8. Tab Over To The C8: Stage Outs Tab (Press F2 or Ctrl+8)
- 9. Select the Stage To Be Setup And Define the Board Accordingly to Match The Relay Output Board Using F4: Look Up
- 10. Enter the Relay Point Under the Point Field. Repeat For Each Stage, Then Press Stage To Exit and Save Changes

13-10 • 🕥	🗊 Select CX Tat	RX-A00 Uni S SETUP	t 3 💿 HANES	11:1
: General	C2: Circui	ts C3: Setpoin	ts Ch:	C5: Inputs
: Outputs	C7: Stage	settup (CBH Stage (THES CP:	CO: HORE
	Er	nhanced Suction:	CHIL CRPOOT	
Stage Out	5	Board	Point	
STAGE OUT	1 :	8R0 881	.RD.03.01.01	L
STAGE OUT:	2 :	880_001	:.80.03.01.02	L.
STAGE OUT	з :	880_001	:.R0.03.01.03	L
STAGE OUT	A :	880_001	:.R0.03.01.04	L
STAGE OUT	5 ;	880 001	:.R0.03.01.05	L

12-1 Ise	13-18 9 () Ctrl-X t) 🕒 a Selec	t CX Tal	E RX-400	Unit 3 TUP	NRHE'S	11	:18:05
01:	General	62	: Circui	ts C3: Set	points	64:	CS: Input	5
06:	Outputs	C7	: Stage	Setup DE B SRE	ge Outs	C9:	C.0: 14088	
			E	nhanced Sucti	on: ENH G	RP 881		
	Stage O	uts		Board		Point		
	STAGE 0	111		880_001	8.	R0.03.01.01	τ.	
	STAGE 0	112		880_001	÷	R0.03.01.02	L	
	STAGE 0	uta .		880_881	÷!	R0.03.01.03	L.	
	STAGE 0	UT4		880_001	5.	R0.03.01.04	L	
	STAGE 0	UTS		880_001	Ξ.	R0.03.01.05	L	
Ent F1	er Point : PREV TO	/Proper	ty Co 2: NEXT	npressor outp TAB / F3:	edit	FA: LODK UP		NCEL

11. Press 💿 to Enter the Main Menu. Select 7. System Configuration.

12. From the System Configuration Menu Select 7. Network Setup.

This Unit DES	: 10 Network Dis LOT	Ca:	CS: Echelon	C1: This Hait	02	TO Network Dis Dit	04:	C5: Fchel
This Unit 042	Acontractoria C3: C6: Nain HENU Suction Groups Z. Condenser Control Circuits A. Sensor Controls S. Configured Applicati 6. Add/Delete Application 7. System Configuration	lenc	CS: Echelia C0: X 6 6 6 6 6 6 9 9 9 9 9 9 9 9 9 9 9 9 9	<u>c1:</u> This that c6: +		0.01910002 C3: UCT G8: SVSTEM COMPICEMENT 1. Input Definitions 2. Sutput Perinitions 3. System Information 4. Remote Communication 5. Alarn Setup 6. Logging Setup 7. Network Setup	CA: G9:	C5: Fchei C6: x 6 6 7 9 9 4 1 1 1 1 2 9 9 2 8 2 8 2 8
ss nens nunker	or scroll to selection			Prost none re	unbar.	P. Licensing or secoll to selection		

13. From the Network Setup Menu Select 2. Connected I/O Boards and Controllers .

14. From the Setup Screen Go To The C3: ECT Tab (Press Ctrl + 3)

15. In Option #5, Enter The Number Of Discus™ compressors being controlled by The E2. Press

🚳 to Save Changes and return to the previous Screen.

94-31-05 • 😚 (EX-480 Unit 1 SETUP	MANES FULL	19+60+
C1: This Unit C6:	C2: 10 Hetwork C7:	C3: ECT C8:	C4: C9:	C5: Echelon C0:
+	10 H 1. Hetwork 2. Convect 3. Router 3 A. Controll	NETWORK SETUP Summary nd I/O Boards & Setup Der Associations	Cantrollers	
Press menu mu	nber or scroll to	selection	1	

tt: This Unit	C2: 10 N	etwork DRE DRE	CA:		CS: Echelon
:6:	C7:	C8 :	C9:		C0:
		Nun Network Ctrls: Ne	tSetup		
	ECT	Board Type	Quantity	Hax	
	81	: CT Drive	0	16	
	82	: CtrlLink ACC	0	63	
	83	: CtrlLink CD	0	99	
	84	: CtrlLink RSC	0	99	
	85	: Discus	3	63	
	≡6	: Energy Heter	0	30	
	87	: ISD-1.0	0	64	
	#8	: ISD-2.0	0	10	
	#9	: Perf Alert	0	63	
	#1	0 : Status Display	0	7	
	81	1 : XEU12D	0	99	
	81	2 : XEU22D	0	99	
	81	3 : XJ Scroll Unit	0	16	
	81	4 : XR35CX	0	99	
	81	5 : XR75CX	.0	99	

- 16. From the Network Setup Menu Select 1. Network Summary
- 17. The Discus[™] Devices should be present on the network. Select the Discus to be commissioned. Press F4: Commission

Bit Cf: Cf: Cf: Cf: Nun Network Ctris: NotSetup ECT Network Sturwary 2. Connected 1/0 Boards & Controllers 3. Router Setup 4. Centroller Associations	1: INIS UNIT	67:10	NETWORK DEELEN	0.43	CS: Echelon
Nun Network Etris: NetSetup ECT NETMORK SETUP 1. Network Summary 2. Connected I/O Boards & Controllers 3. Router Setup 4. Controller Associations	Có:	C7:	CII:	C9:	C0:
ECT NETWORK SETUP 1. Hetwork Senary 2. Connected 1/0 Boards & Controllers 3. Reuter Sotup 4. Controller Associations 5			Nun Network Ctrls	: HetSetup	
		ECT 1. 2. 3. h.	HETMORK S Network Summary Connected 1/0 Boar Router Setup Controller Associa	ETUP ds & Controllers itions	6 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
	l				<u>-</u>

2-14-18 • 😚 🗐		Network	Unit 3 Sunnary	HER	ES	4-44-44
Nane	Type	He	tvork Addr	ress	Rev	Status
1815.03.1	RX400-Refrig		Ethernet:	: 1	2.85882	This Controller
1681_001	16AI		IONet:		0.00	Online
880_001	880		IONet:		0.00	Galine
015005_001	Discus		N00BUS-1:	-	0.08	Unknown
012082-002	Discus		N00BUS-1:		0.08	Vaknown
015CUS_003	Discus		NOOBUS-1:	-	0.02	Vaknowa
1: DELETE RCRD	F2: STATUS	1		4: D	000122100	N FS: SETUP

- 18. From the Modbus Device Menu Select an Unused Space That Matches The DIP Switch Address Of The CoreSense™ Device And Press Enter.
- 19. Verify The Address Matches The Address Assigned By The CoreSense™ Module's DIP Switch.

84-81-86 * ()		() 83 84+1	K-400 Unit 1 Luark Sunnary	HAME'S FULL	12:15:4
Nane			Matunita ad	deace_waut	
1913.07.1 1641.001 440.001 6672.00094 015603.001	H000US 1.23, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16,	-1 Devices CC72 C049-001 ((Inascd)) (Inascd) (Inascd) (Inascd) (Inascd) (Inascd) (Inascd) (Inascd) (Inascd) (Inascd) (Inascd) (Inascd) (Inascd) (Inascd) (Inascd) (Inascd)	150-2.4		atroller
	17.	(Unused) (Unused)			•
Press near n	iunber or	scroll to set	lection		FS: CANCEL

- 20. Press 🚳 to return to the Network Summary Screen. The Device Should Now Be "Online". Repeat Steps 8-10 To Address The Remaining CoreSense™ Devices.
- 21. Once All The Devices Are Addressed, Press 🔊 To Save Changes And Exit The Network Summary.

2-19-18 9	13 B	RX-400 Network	Unit 3 Sunnary	NAP	Ø(S	8+99+3
Nane	Type	H	ietwork Addro	ess	Rev	Status
THIS.00.1 1641_001 880_001 DISCUS_002 DISCUS_002 DISCUS_002	RXA00-Refri 1601 8R0 Discus Discus Discus	9	Ethernet: 10Net: 10Net: H0DDUS-1: H0DDUS-1: H0DDUS-1:	311567	2.85882 8.88 8.89 2.82F17 2.82F17 2.82F18 2.82F17	This Controller Online Online Online Online
	Once All C Are Addre Show The	CoreSe ssed T m All "	nse Dev he E2 S Online"	h	es ould	/
+						
1: DELETE	RCRD F2: STATU	s _	L FA	: 0	010122101	N FS: SETUP

22. Press (1) to Enter the Main Menu. Select 7. System Configuration.

23. From the System Configuration Menu Select 7. Network Setup.

24. From the Network Setup Menu, Select 4. Controller Associations. Then Select 4. Compressor (Press Enter)

84-81-85 0 😚 🙂	Compressor Assoc NAMES FUL	40.02.07	\$\$ C + \$\$ C + \$	23		12-13-18 • 😚 🗐
	Congresser(> Suct Group Association			1 Suction	or Suction Groups and Enhance	Sources
Conpressor	Suction Group	stage	205	\$ Cap Stat 4 100	Controller Associations	Nane SUCTION GREBT
915015_0 cc72_c0H_1 z	NETWORK SETUP Network Sommary Connected 1/0 Boards & Controllers Router Setup Controller Associations	0 YES 0 YES 0 NG	20	<u></u>	4. <u>Conversor</u>	EXH GRP001
+						
Press Rena Aunder or	screll to selection		Inter	1 F5: 6	roll to selection	Press nenu aunber or so

25. Highlight The Suction Group¹ Field Select F4: Look Up (Press F4) And Select The Appropriate Suction Group For The Device And Press Enter.

12-13-10 🔹	(†) C	Compres	Unit 3 sor Assoc	NAMES			4+98+98
	Cor	pressar<→ Su	ct Group A	ssociatie	a.		
	Compressor	Suction	Group				
					Stage	11-7-07	
	STCOUR AND			Conp	Unidi	Unidz	Proof
	015605 001				-		TES
	steens aas						TES
	miscos_003					-u	YES
Scroll an	olications with	NEXT/PREM Sen	s or use t	nok-up to	celect		
			1		-	10.0	4.00011
	*	7		PART FORM	- we	- F91 U	months in the

84-81-86 + 👘 💮	CELL LOOKUP HAMES FUL	49-20-4
Compressor DISCUS_BOIL CC72_COMPA	Application Selection Application Selection Appl/Point Type El SUG GRP01 Enhanced Suction SUCTION GRUP1 Enhanced Suction Suction Control	Unid2 Proof Ø VES Ø ND
Use Щр-Фрин Аггом кер	is ar function keys to select entry. P	ress MCK.

¹ For More Information on setting up Suction Groups in the E2, consult your Emerson representative

26. Scroll Over To The Comp Stage And Type In The Compressor Stage. CoreSense™ Protection Provides Proofing Only On The Compressor Not Its Unloaders Note! The Compressor Stage Number Should Correspond To The Stage Numbers in the

Suction Group Setup (Step 7)

12-13-18 + 👘 🕒	Compressor Assoc	HAHES			4+94+60
Cor	npressor(> Suct Group A	ssociatio	a		
Compressor	Suction Group				
D1SCUS_081 D1SCUS_082 D1SCUS_083	EHR GRP381	Comp 1 0 0	Unldi 0 0	Un142 0 0 0	Proof MS MS MS
*					
Enter Compressor Stage 1	1 to 16			F5: 0	ANCEL

2-13-1	a + 🔅 🕞			Cen	-400 Unit 3 pressor Asso	o NAMES			4.00.
		Ge	onpres	ssor(> Suct Group	Associatio	0		
	Conpres	501		Suc	tion Group				
						-	Stage	8-147	Berge
	DISCUS	001		ENH	GRP 681	1		0	VES
	DISCUS	0.02		ENH	GRP 001	3			VES
	DISCUS	003		ENH	GRP 001	5		0	YES
Enter	Conpressor	Stage	1 to	16					

27. Press 🚳 to Exit and Save your Changes.

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2. Enabling Discharge Temperature Lockout in the E2

The default setting for CoreSense[™] using Discharge Temperature protection is only a trip alarm. When the head temperature of the compressor rises above 310°F, the compressor will shut off until the temperature falls below 267°F. If it is preferred to have the compressor shut off and stay off in a high discharge temperature condition, a discharge temperature lockout can be enabled in the E2. The following steps discuss enabling a discharge temperature lockout in the CoreSense device.

Note! Before Making Any Changes in The E2 Setup, You Must Log In To The E2 By Pressing And Entering The Appropriate Username And Password

- 1. Press 💿 to Enter the Main Menu. Select 7. System Configuration.
- 2. From the System Configuration Menu Select 7. Network Setup

- 3. From the Network Setup Menu Select 1. Network Summary
- Select The Discus[™] Being Set Up For Discharge Temperature Lockout Capability And Press F5: Setup

2-14-18 • 💮		HX-400 Unit 3 Hetwork Sunnary	HINH	ES	
Hane	Туре	Network Addr	ess	Rev	Status
THIS.03.1	RX400-Refrig	Ethernet:	3	2.85682	This Controller
16A1_001	1001	10Het :		0.00	Unline
8R0_001	880	IONet:	1	0.00	Online
DISCUS_001	Discus	HODBUS-1:		2.02F17	Online
D15CUS 002	Discus	HODBUS-11	6	2.02F18	Online
01SCUS 003	Discus	H008US-1:	2	2.02F17	Online
					24

- 5. From The Setup Screen Go To C2: Setup (Ctrl +2).
- 6. In The "Dsch Temp Lock" Field Press 🔤 To Set Field To "Enabled ."

12-14-18 🔹 🎧		📑 RX-400 Unit 3	8	14:07:48
Use Ctrl-X to:	Select EX Tabs	SETUP	HalfE S	
C1: General	C2: Setup	C3: Inputs	C4: Outputs	C5: Discus Out
Co: Device	C7: 10 Config	C8: Alarms	C9: Alarn Out	CO: HORE
		Discus: DISCUS_0	Ø1	
Satan	Halus			
Brch Tom	Lack - Disables			
fisch Temp	Set - 318 c			
Book Tom	Becott : 047 0			
dati Shor	tforlet 8.18			
	ceyete: erre			
Scroll using	Hext/Prev keus	1 Discharge Temp	erature Lockout D	nabled
	CO. MENT TAD	FOR FAIT	Chi LONK HD	EE. DANKER
FIL PAGE IND	1 F21 PEAL 100	1 191 6911	F41 LOUR OF	1 PS: UNMEL

12-14-18 0 () Use Ctrl-X t	9 🕮 o Select CX Ta	65 SET	Jnit 3 JP E	i) NAME S	41
C1: General	C2: Setup	C3: Inpu	ts Ca:	Outputs CS:	Discus Outs
Có: Device	C7: 10 Ce	blig CB: Flar	ns C9:	Alarn Out C8:	HERE
		Discus: DI	CUS_001		
Setup	0.414				
Osch Te	no Lock : East	led			
Osch Te	mp Set : 3	10.0			
Osch Te	np Reset: 2	67.0			
Anti Sh	ortCucle:	0.10			
Screll usin	g Next/Prev ke	95 Pischarg	e Temperatur	re Lockout Engole	b's
EX- PRES TO	B F2+ NEXT	T08 E1+ E	DIT E	- LOOK UP D	C+ CAMPER

- 7. Go To C8: Alarms (Ctrl +8).
- 8. In The "DschTmpLockType" Field Press 🔤 To Set To "Alarm".
- 9. Press 🏵 To Exit and Save Changes. Repeat Steps 4-9 For Each CoreSense™ Device.

12-1 Use	Ctr1-X to	Select CX Tabs	RX-400 Unit 3 SETUP	NAMES	14:48:00
C1:	General	C2: Setup	C3: Inputs	Ch: Outputs	CS: Discus Out
C6:	Device	C7: 1D Config	[C8: Alarns	C9: Alarn Out	CO: HORE
			Discus: DISCUS_0	01	
	01arps	Ualue			
	FitTepPro	beTupe: Notice			
	Low0ilWar	nTupe : Notice			
	ConnLostC	TTupe : Notice			
	SensHodCn	fgTupe: Notice			
	DschTmpTr	pTupe : Notice			
	MotTepTri	pType : Alarm			
	LowDilLoc	kType : Alarm			
	DschTnpLo	ckType: Alarn			
	ModuleFai	lType : Alarn			
	011 Lock	Reset : Enabled			
Ser F1	oll using	Hext/Prev Reys	Discharge Temp	erature Lockout f	dvisory Type
	_				
	F1	F2 F3	1 4	15	
			0		
				P10 P11	Prev Next

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3. Performing a Remote Reset in the E2 Alarm Screen

Β

NOTICE

Service contractor and end user policies need to be considered when deciding whether or not to use the remote reset feature in the E2.

E

The following section discusses the procedures for resetting a CoreSense[™] alarm remotely from the E2. Any alarm in the E2 can be reset provided the condition that caused the alarm has been resolved and established time delays have been satisfied.

1. Press 🚥 to Enter the Alarm Screen of The E2.

2. Select The Alarm To Be Reset and Press F2:Alarm Rst. Press A To Reset The Advisory.

1 - Current 118 - Total			d ged	ovledge knovled	Ackn • - Unaci
HESSAGE	: Property	Area Ctrl: Application	STATE	TIME	DATE
15h dil Brarruna	-164 011 1077	THIS DO 4-DISCUS 484	AL ADM .	46+96	12-18-10
low dil Version	TON OIL LOCK	HIS 02 4 10 SOLS 001	M-NTC -	14124	2-14-10
Analication conf	:	THIS 03.1:DISCUS 001	NOTCE .	18:21	12-18-18
Contreller start		THIS,03,1:Susten	NOTCE .	18:56	12-10-10
Controller shutd		THIS, 83, 1:Sector	NOTCE .	18:51	12-10-10
Application conf		THIS,03.1:DISCUS 001	N-NTC .	10:10	12-14-18
Device absent Fr		THIS,03,1:DISCUS 002	H-FL +	16:56	12-13-10
Device absent fr		THIS,03.1:DISCUS 003	N-FL .	16:56	12-13-18
Device absent Fr		THIS.03.1:DISCUS_001	N-FL .	16:56	12-13-18
Device absent Fr-		THIS.03.1:880_001	N-FL =	16:56	12-13-18
Alarm(s) were re-		THIS.03.1:ADVISORY SERV	NOTCE .	16:49	12-13-10
Application conf		THIS, 03.1:DISCUS_001	N-NTC +	16:48	12-13-18
Low Oil Pressure	:LOW DIL LOCK	THIS.03.1:DISCUS_001	R-FL -	16:45	12-13-10
Alarm(s) were re-		THIS.03.1:ADVISORY SERV	N-NTC +	16:45	12-13-18
Low Oil Pressure	STOR OIL LOCK	THIS.03.1:DISCUS_001	R-FL -	16:45	12-13-18
Alarm(s) were cl		THIS.03.1:ADVISORY SERU	NOTCE .	16:45	12-13-10
Alarn(s) were re-		THIS.03.1:ADVISORV SERU	N-NTC .	16:44	12-13-18
Low Oil Pressure	:LOW OIL LOCK	THIS.03.1:DISCUS_001	R-FL -	16:44	12-13-10
Alarn(s) were re-		THIS.03.1:ADVISORY SERV	N-NTC .	16:44	12-13-18

2-14-18	● 代表	3		ADVISORY LOC	MARES		46.007.007
- = Ackn • = Unac	owledge knowled	ed dged					1 = Current 110 = Total
DATE	TIME	STATE		frea Ctrl: Application	: Proper	ty	MESSAGE
2-14-10	14:34	ALARH	٠	1HIS.03.1:DISCUS_041	LOW OIL	LOCK	ISD 011 Pressure
2-14-10	14:32	N-NTC	٠	THIS.03.1:015CUS_001	LOW OIL	MARY	Lov Oil Warming
2-14-18	14:31	NOTCE					Application confi
2-14-18	18:56	NOTCE		- (A) : Reset Advisory	#1		Controller starte
2-14-18	10:51	NOTCE		- (B) : Reset #11 #dvis	ories		Controller shutdo
2-14-18	10110	N-NTC		- (C) : Cancel Operatio	n		Application confi
2-13-18	16:56	N-FL					Device absent fro
2-13-10	16156	H-FL					Device absent fro
2-13-18	16:56	H-FL		Press desired selecti	on		Device absent fro
2-13-18	16:56	H-FL					Device absent fro
2-13-18	16:49	HOTCE		THIS.03.1: ADVISORY SERV	:	-	Alarn(s) were res
2-13-18	16:48	H-HTC		THIS.03.1:DISCUS_001			Application confi
2-13-18	16:45	用-FL		THIS.03.1:DISCUS_001	:LOW OIL	LOCK	Lou dil Pressure
2-13-18	16:45	N-NTC		THIS.03.1: ADVISORY SERV			Alarn(s) were res
2-13-18	16:45	R-FL		THIS.03.1:DISCUS_001	:LOW OIL	LOCK	Low Oil Pressure
2-13-18	16:45	NOTCE		THIS.00.1: ADVISORY SERV			Alarm(s) were cle
2-13-18	16:44	H-HTC		THIS.03.1:ADVISORY SERV			Alarn(s) were res
2-13-18	16:44	度-FL		THIS.03.1:DISCUS_001	LOW OIL	LOCK	Lou Oil Pressure
2-13-18	16:44	N-NTC		THIS.03.1:ADVISORY SERV			Alarn(s) were res
							TS: CANEEL

3. The Alarm Table Will Now Show That The Alarm Has Been Reset.

12-14-18	• 63 0	ù.		ADUISORY LOG	NAMES	48.52.8
- = Ackn • - Unac	ovledg knovle	ed dged				1 = Current 111 - Total
DATE	TINE	STATE		Area Ctrl: Application	: Property	HESSAGE
12-14-18	14:36	NOTCE	٠	THIS.03.1:ADVISORY SERV	:	Alarn(s) were res
12-14-18	14:34	R-ALM	-	THIS.03.1:DISCUS_001	:LOW OIL LOCK	ISD 0il Pressure
12-14-18	14:32	N-NTC		THES.03.1:DISCUS_001	LOW OIL WARK	Low Dil Warning
12-14-18	14:01	NOTCE		THIS.03.1:DISCUS_001		Application confi
12-14-18	10:56	NOTCE		THIS.03.1:System		Controller starts
12-14-18	10:51	NOTCE		THIS.03.1:System		Controller shutde
12-14-18	18:48	N-NTC		THIS.03.1:01SCUS_001		Application confi
12-13-18	16:56	N-FL		THIS.03.1:DISCUS_002		Device absent fro
12-13-18	16:56	N-FL		THIS.03.1:DISCUS_003		Device absent fro
12-13-18	16:56	N-FL		THIS.03.1:DISCUS_001		Device absent fro
12-13-18	16:56	N-FL		THIS.03.1:880 001		Device absent fro
12-13-18	16:49	N-NTC		THIS.03.1:ADUISORY SERU		Alarn(s) were res
12-13-18	16:48	N-NTC		THIS.03.1:DISCUS_001		Application confi
12-13-18	16:45	R-FL		THIS.03.1:DISCUS_001	:LOW OIL LOCK	Low Oil Pressure
12-13-18	16:45	N-NTC		THIS.03.1:ADUISORY SERV		Alarn(s) were res
12-13-18	16:45	R-FL		THIS.03.1:DISCUS 001	:LOW OIL LOCK	Low Oil Pressure
12-13-18	16:45	NOTCE		THIS.03.1:ADUISORY SERU		Alarn(s) were clo
12-13-10	16:44	N-NTC		THIS.03.1:ADUISORY SERV		Alarn(s) were ret
	46-16	0.01		100 201011 P.0 2101	:LOW OIL LOCK	Ina fil Pressure

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Appendix B CoreSense[™] Protection for Copeland Discus[™] Compressors Modbus® Specifications

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1. Introduction

The CoreSenseTM Protection module for Copeland DiscusTM compressors provides the protection and communication features to Copeland Discus compressors. By monitoring and analyzing data from CopelandTM compressors, the module can accurately detect the cause of electrical and system related issues. If an unsafe condition is detected, the module trips the compressor. A flashing LED indicator displays the ALERT code and guides the service technician more quickly and accurately to the root cause of a problem.

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The module also has an RS485 isolated communication port, by which the modules communicate with the system controller or the network master. The details of the communication are provided in this document.

1.1. Abbreviations

Table- 1 Abbreviations

Abbreviation	Meaning			
RTU	Remote Terminal Unit			
DLT	Discharge Line Temperature			
OAC	Overall Alarm Count (Total number of alarms since the module has been installed)			
CRC	Cyclic Redundancy Check			
CMD	Command			
VFD	Variable Frequency Drive			

1.2. Intent

This document defines standard usage of the Modbus protocol specification for CoreSense Protection modules for Copeland Discus compressors. This will allow third party controllers to easily communicate to our products using a standard Modbus interface.

1.3. Scope

This document only defines the Modbus options that are used in the CoreSense Protection module for Copeland Discus module; it is not intended to replace the Modbus protocol specification. Also, this specification defines the common usage of the physical layer and data link layers and some parts of the application layer interface.

1.4. References

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For the details of the Modbus specification, refer to the Modicon Modbus Protocol Reference Guide PI-MBUS-300 Rev. J.

2. General Description

Modbus uses a three layer protocol:

Physical Layer: The hardware interface.

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Data Link Layer: Defines the reliable exchange of messages.

Application Layer: Defines message structures for the exchange of application specific information.

Modbus has some required features, some recommended features, and some optional features. This specification starts with the physical layer and then works up to the application layer. The application layer defined in this specification defines the standard Modbus memory map and data interchange.

Modbus is a protocol with a single master and multiple slave devices. The master device initiates all messages. The master device is typically a system controller and the slave devices are the CoreSense modules.

3. Module Type Identification

Two modules are used with Copeland Discus compressors with CoreSense Protection. To identify which type is fitted in the CoreSense module, open the module lid and look at the circuit board. There is a 10 position DIP panel and a new module which has a 12 position DIP panel.

3.1. Modbus with 10 DIP Switches

Most of the features are the same, but the main differences are explained in this bulletin

The information given in the following selection is based on the operation of the Modbus new version (12 DIPswitch).

The input and holding register tables are valid for 12 DIP-switch, but most of the listed commands are also valid for the 10 DIP-switch model. See **Fig. 1** for identifying 10 DIP switch Modbus.

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Fig. 1 - View of the circuit board and label for 10 DIP switch Modbus

3.2. Modbus with 12 DIP Switches - New Version

Fig. 2 - View of the circuit board and label for 12 DIP

3.3. DIP Switch Functions

Table- 2 - CoreSense Protection Switch Settings

DIP Switch Fu	Factory	DIP Switch Position		
	Setting	10 DIP Switch	12 DIP Switch	
Node address for communication		On	1	1
Node address for communication		Off	2 to 5	2 to 6
Communications Baud rate Off: 19200 Baud	On: 9600 Baud	Off	7	7
Off: No parity	On: Even parity	Off	8	8
Off: Stand-alone mode	On: Network mode	Off	9	9
On: DLT enabled	Off: DLT disabled	On	10	10
Self-test function for oil functionality		Off		11
On: VFD application	Off: Non VFD Application	Off	6	12

NOTE: The following chapters are based on the operation of the present Modbus (12 DIP-switch).

4. Physical Layer

This layer defines the hardware interface to the network.

4.1. Topology

The CoreSense Protection module for Copeland Discus[™] compressors uses the 'two-wire' configuration (two signal wires plus a ground). When multiple CoreSense modules are used, the standard configuration will be to directly wire the cable forming a daisy-chain.

4.1.1. Wire Used

The recommended wire will be Belden 8761 that is a 22 AWG shielded twisted pair. The shield is also used as the circuit ground.

Fig. 3 - Recommended Communication Wire

4.1.2. Bus Bias

The master device must provide a means to bias the network. The recommended pull-down on the RS485 '+' output is a 511 ohm resistor, but up to a 1K ohm resistor is acceptable. The recommended pull-up resistor on the RS485 '-' output is a 511 ohm resistor, but up to 1K ohms is acceptable. These bias resistors can either be always enabled or they can be enabled through jumpers. The bias is applied at one point in the network.

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4.1.3. Termination

The last slave in the network must have a 150Ω resistor for termination. In this module, there is a jumper provision to enable this termination. The jumper is located between positions 1-2 at 'JP3' (see **Fig. 4** and **Fig. 5**). The last CoreSense module in the network shall be populated with a header on this jumper. For the other CoreSense modules in the network, this jumper needs not be populated.

Fig. 4 - 10 Position Jumper Settings

Fig. 5 - 12 Position Jumper Settings

4.2. Data Signaling Rate

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The default communications port default settings are 19200, no Parity, 8 data, 2 Stop bits. The baud rate (19200 or 9600), parity (even and no parity) and stops bits (1 bit or 2 bit) are user selectable through DIP switches and jumpers. The data length is not configurable.

4.2.1. Baud Rate Selection

CoreSense Diagnostics Modbus communication baud rate setting is configurable to either 19200 or 9600 through DIP switch number 7. See **Fig. 6**.

ON = 9600

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OFF = 19200 (Default setting)

Parity Selection

CoreSense Protection Modbus communication parity is user configurable (even or no parity) through DIP switch number 8.

ON = even parity

OFF = no parity (Default setting)

4.2.3 Stop Bits

The stop bits CoreSense Diagnostics with standard

Modbus and no parity is user configurable to either be

1 or 2 stop bit. Standard Modbus with even parity is always 1 stop bit. This can be changed by moving the jumper labeled JP4. See **Fig. 5**.

Fig. 6 - Baud rate and parity selection (12 position DIP switches)

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4.3. Labeling

The module has a 'COMM PORT' with the connector pins, labeled from left to right as:

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• ' + GND - '

For cables labeled with A and B, connect as follows:

- + = 'A' circuit connection
- GND = Common
- = 'B' circuit connection

4.4. Connector

A three position screw cable connector is used for Modbus communication.

4.5. Wiring and Connections

The Modbus wiring should be connected to module connector '+', 'GND', '-'.

Fig. 7 - Modbus 'Comm Port'

5. Data Link Layer

Modbus uses master/slave protocol where there is a single master device that initiates all messages. The Data Link Layer defines the reliable transfer of a message transferred from the master to one or more slave devices and the reliable transfer of the response message (when the command message is sent to a single device). The CoreSense module is a slave in the network and the rack controller is the master.

5.1. Node Address

The DIP switch setting combination gives the node address. The combination positions 1 through 6 will be used to define a node address from 1 to 63. Positions

7 to 12 will be used for baud rate, parity, network mode, discharge temperature protection, self-test mode, and VFD (Variable Frequency Drive).

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Note: This information is for the 12 position DIP switch module.

To enable a DIP switch change, power to the module must be cycled.

Fig. 8 - Switch 1 through 6 are used to assign module address

Node Address	1	2	3	4	5	6
#1	On	Off	Off	Off	Off	Off
#2	Off	On	Off	Off	Off	Off
#3	On	On	Off	Off	Off	Off
#4	Off	Off	On	Off	Off	Off
#5	On	Off	On	Off	Off	Off
#6	Off	On	On	Off	Off	Off
#7	On	On	On	Off	Off	Off
#8	Off	Off	Off	On	Off	Off
#9	On	Off	Off	On	Off	Off
#10	Off	On	Off	On	Off	Off
#11	On	On	Off	On	Off	Off
#12	Off	Off	On	On	Off	Off
#13	On	Off	On	On	Off	Off
#14	Off	On	On	On	Off	Off
#15	On	On	On	On	Off	Off
#16	Off	Off	Off	Off	On	Off
#17	On	Off	Off	Off	On	Off
#18	Off	On	Off	Off	On	Off
#19	On	On	Off	Off	On	Off
#20	Off	Off	On	Off	On	Off
#21	On	Off	On	Off	On	Off
#22	Off	On	On	Off	On	Off

DIP Switch Configurations for Addressing continued.

Node Address	1	2	3	4	5	6
#23	On	On	On	Off	On	Off
#24	Off	Off	Off	On	On	Off
#25	On	Off	Off	On	On	Off
#26	Off	On	Off	On	On	Off
#27	On	On	Off	On	On	Off
#28	Off	Off	On	On	On	Off
#29	On	Off	On	On	On	Off
#30	Off	On	On	On	On	Off
#31	On	On	On	On	On	Off
#32	Off	Off	Off	Off	Off	On
#33	On	Off	Off	Off	Off	On
#34	Off	On	Off	Off	Off	On
#35	On	On	Off	Off	Off	On
#36	Off	Off	On	Off	Off	On
#37	On	Off	On	Off	Off	On
#38	Off	On	On	Off	Off	On
#39	On	On	On	Off	Off	On
#40	Off	Off	Off	On	Off	On
#41	On	Off	Off	On	Off	On
#42	Off	On	Off	On	Off	On
#43	On	On	Off	On	Off	On
#44	Off	Off	On	On	Off	On
#45	On	Off	On	On	Off	On
#46	Off	On	On	On	Off	On
#47	On	On	On	On	Off	On
#48	Off	Off	Off	Off	On	On
#49	On	Off	Off	Off	On	On
#50	Off	On	Off	Off	On	On
#51	On	On	Off	Off	On	On
#52	Off	Off	On	Off	On	On
#53	On	Off	On	Off	On	On
#54	Off	On	On	Off	On	On
#55	On	On	On	Off	On	On
#56	Off	Off	Off	On	On	On
#57	On	Off	Off	On	On	On
#58	Off	On	Off	On	On	On
#59	On	On	Off	On	On	On

DIP Switch Configurations for Addressing continued.

Node Address	1	2	3	4	5	6
#60	Off	Off	On	On	On	On
#61	On	Off	On	On	On	On
#62	Off	On	On	On	On	On
#63	On	On	On	On	On	On

Table- 4 - Baud rate, Parity, control mode, discharge temp lockout, oil self-test DIP switch configurations

5.2. RTU Transmission Mode

The Modbus communication in the CoreSense module uses the RTU mode. The default character framing will be an 11 bit character as follows:

- 1 start bit
- 8 data bits
- 1 or 2 stop bit for no parity (or if 'even parity' is selected 1 stop bit and 1 parity bit)

A standard 2 byte CRC is used for frame verification.

5.3. Response Message Timeout

As per the Modbus specification each device can define its own maximum timeout for the response to be sent to a request, the maximum timeout for the module is 1 sec.

6. Application Layer

The Application Layer defines the type of messages that will be sent and the format of the messages.

6.1. Available Functions

Table- 5 - Standard Modbus Function Codes

Standard Modbus Function Codes Supported by CoreSense™ Protection for Copeland Discus™				
Switch Number	Function Code	Function Name	Register	Access
1	0x04	Read Input Registers	Input Register	Read Only
2	0x03	Read Holding Registers	Holding Register	Read/Write
3	0x06	Write Single Register	Holding Register	Read/Write
4	0x10	Write Multiple Registers	Holding Register	Read/Write

6.2. Data Types

Modbus requires that all multiple byte data be sent in Big Endian format. In Big Endian system, the most significant value in the sequence is stored at the lowest storage address (i.e. first).

6.3. Functions Supported

6.3.1. Input Register (Command 0x04)

Table- 6 -	Input	Register	(Command	0x04)
			(••)

Address (Hex)		Contents	Quantity	Data Description	
Start	Stop				
0000	001B	Division Name	28	'X'	
001C	0021	Product Name	6	Χ'	
0022	0029	Product Code	8	'X'	
002A	0030	Module Version Number	7	'X'	
0077	0077			Today compressor run time One counter means 6 minutes	
0078	0078			Today-1 compressor run time One counter means 6 minutes	
0079	0079			Today-2 compressor run time One counter means 6 minutes	
007A	007A	Seven Days of Compressor Run Time	7	Today-3 compressor run time One counter means 6 minutes	
007B	007B			Today-4 compressor run time One counter means 6 minutes	
007C	007C			Today-5 compressor run time One counter means 6 minutes	
007D	007D			Today-6 compressor run time One counter means 6 minutes	

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Address (Hex)		Contents	Quantit	Data Description	
Start	Stop		У		
007E	007E			Today compressor start times One counter means 1 time	
007F	007F			Today-1 compressor start times One counter means 1 time	
0080	0080			Today-2 compressor start times One counter means 1 time	
0081	0081	Seven Days Count of Compressor Starts	7	Today-3 compressor start times One counter means 1 time	
0082	0082			Today-4 compressor start times One counter means 1 time	
0083	0083			Today-5 compressor start times One counter means 1 time	
0084	0084			Today-6 compressor start times One counter means 1 time	
0085	0086	Total Compressor Run Time	2	One counter means 1 hours 0-4294967295	
0087	0088	Total Number of Compressor Start	2	One counter means 1 start 0-4294967295	
0089	008A	Total Low Oil Pressure Run Time	2	One counter means 1 hour 0-4294967295	
009B	009B		1	Alarm Id of tenth most recent alarm	
009C	009C		1	Alarm Id of ninth most recent alarm	
009D	009D		1	Alarm Id of eighth most recent alarm	
009E	009E		1	Alarm Id of seventh most recent alarm	
009F	009F	Top Most Passent Alarm	1	Alarm Id of sixth most recent alarm	
00A0	00A0		1	Alarm Id of fifth most recent alarm	
00A1	00A1		1	Alarm Id of most fourth recent alarm	
00A2	00A2		1	Alarm Id of third most recent alarm	
00A3	00A3			Alarm Id of second most recent alarm	
00A3	00A4		1	Alarm Id of most recent alarm	
00A5	00A5	Eight Days Alarm History of EEPROM Failure Warning	0	BIT0 - Today: (0 - Not present / 1 - Present) BIT1 - Today-1: (0 - Not present / 1 - Present) BIT7 - Today-7: (0 - Not present / 6 - Present)	
00AA	00AA	Eight Days Alarm History of DLT Fault	5	BIT0 - Today: (0 - Not present / 1 - Present) BIT1 - Today-1: (0 - Not present / 1 - Present) 	

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Input Register (Command 0x04) continued.

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Address (Hex)		Contents	Quantity	Data Description	
Start	Stop			·	
00AB	00AB	Eight Days Alarm History of CT Fault Warning	6	BIT0 - Today: (0 - Not present / 1 - Present) BIT1 - Today-1: (0 - Not present / 1 - Present) BIT7 - Today-7: (0 - Not present / 8 - Present)	
00AC	00AC	Eight Days Alarm History of Loss Comm From E2 Warning	7	BIT0 - Today: (0 - Not present / 1 - Present) BIT1 - Today-1: (0 - Not present / 1 - Present) BIT7 - Today-7: (0 - Not present / 9 - Present)	
00AE	00AE	Eight Days Alarm History of Low Oil Pressure Warning	9	BIT0 - Today: (0 - Not present / 1 - Present) BIT1 - Today-1: (0 - Not present / 1 - Present) BIT7 - Today-7: (0 - Not present / 11 - Present)	
00B4	00B4	Eight Days Alarm History of High Discharge Line Temperature Alarm	15	BIT0 - Today: (0 - Not present / 1 - Present) BIT1 - Today-1: (0 - Not present / 1 - Present) BIT7 - Today-7: (0 - Not present / 17 - Present)	
00C0	00C0	Eight Days Alarm History of High Motor Temp Alarm	27	BIT0 - Today: (0 - Not present / 1 - Present) BIT1 - Today-1: (0 - Not present / 1 - Present) BIT7 - Today-7: (0 - Not present / 29 - Present)	
00C6	00C6	Eight Days Alarm History of High Discharge Temperature Lockout	33	BIT0 - Today: (0 - Not present / 1 - Present) BIT1 - Today-1: (0 - Not present / 1 - Present) BIT7 - Today-7: (0 - Not present / 35 - Present)	
00CD	00CD	Eight Days Alarm History of Low Oil Pressure Lockout	40	BIT0 - Today: (0 - Not present / 1 - Present) BIT1 - Today-1: (0 - Not present / 1 - Present) BIT7 - Today-7: (0 - Not present / 42 - Present)	

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Input Register	(Command 0x04)	continued.
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Address (Hex)		Contents	Quantity	Data Description				
Start	Stop							
00D1	00D1	Eight Days Alarm History of Module Failure Lockout	44	BIT0 - Today: (0 - Not present / 1 - Present) BIT1 - Today-1: (0 - Not present / 1 - Present) BIT7 - Today-7: (0 - Not present / 46 - Present)				
00DE	00DE	OAC of EEPROM Failure Warning	0	One counter means one times 0 - 65535				
00E5	00E5	OAC of Loss Comm From E2 Warning	7	One counter means one times 0 - 65535				
00E7	00E7	OAC of Low Oil Pressure Warning	9	One counter means one times 0 - 65535				
00ED	00ED	OAC of High Discharge Line Temperature Alarm	15	One counter means one times 0 - 65535				
00FF	00FF	OAC of High Discharge Temperature Lockout	33	One counter means one times 0 - 65535				
0106	0106	OAC of Low Oil Pressure Lockout	40	One counter means one times 0 - 65535				
010A	010A	OAC of Module Failure	44	One counter means one times 0 - 65535				
0117	0117	Current Alert	1	1:Normal off 2: Normal Running 100:EEPROM Failure Warning 101:Temperature Probe Failure Warning 106:DLT Open Warning 107:DLT Short Warning 108:CT Fault Warning 109:Loss Comm From E2 Warning 111:Low Oil Pressure Warning 117:Module Failure 200:High Discharge Line Temperature Alarm 212:High Motor Temp Alarm 300:High Discharge Temperature Lockout 307:Low Oil Pressure Lockout 311:Module Failure Lockout				
011C	011C	DIP Switch_1	1	Comm Board DIP Switch: BIT15 - DS15 : (1 - ON / 0 - OFF) BIT14 - DS14 : (1 - ON / 0 - OFF) BIT13 - DS13 : (1 - ON / 0 - OFF) 				

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Input Register	(Command	0x04) continued.
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Address (Hex)		Contents	Quantity	Data Description					
Start	Stop								
0123	0123	Input Status 1		BIT0 - Demand Status (1 = Demand Present) BIT1 - Compressor Running (1 = TRUE/0=False) BIT2 - Injection Present (1=TRUE/0=FALSE) BIT3 - TRUE if Top Cap Thermistor is installed BIT4 - TRUE if 250 DTC valve thermistor is installed BIT5 - TRUE if solenoid is open BIT6 - Operating Voltage(1 = 230V, 0 - 110V) BIT7 - Line Frequency(1 - Frequency is 50H, 2 -Frequency is 60H) BIT8 - TRIP status: 1 - TRIP / 0 - Normal					
0126	0126	Output Status1	1	The output is high if corresponding bit is set. Bit masks follow: BIT3 - Crankcase Heater Status (Open-0 / Closed – 1)					
0127	0127	Output Status2		BIT15 – Protector Status(Only applicable for 2D & 3Ds) : (Normal-0/Trip-1) BIT14 – Previous Reset Status: (Hard reset - 0/Soft reset - 1) BIT13 -Oil Pressure Status: (Normal-1/Trip-0) BIT12 -HPCO Status: (Normal-1/Trip-0) BIT10 – PTC3 Status Suction pressure Status: (Normal-1/Trip-0) BIT10 – PTC3 Status: (Normal-0/Trip-1) BIT9 -PTC2 Status: (Normal-0/Trip-1) BIT7 - Spare Input -1 Status : (Not active-0 /Active-1) BIT6 - Spare Input -2 Status: (Not active-0 /Active-1) BIT5- Wake up pushbutton status: (Not active-0/Active-1) BIT4 - StandAlone_Unloader_2 Command Status: (Not active-0/Active-1) BIT3 - StandAlone_Unloader_1 Command Status: (Not active-0/Active-1) BIT2 - Standalone Demand Status: (Not active-0/Active-1) BIT1 - Unloader2 Triac Short Circuit Protection Input Status: (Normal-0 / short circuit condition has happened-1) BIT0 - Unloader1 Triac Short Circuit Protection Input Status: (Normal-0 / short circuit condition has happened-1)					

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Input Register (Command 0x04) continued.

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Address (Hex)		Contents	Quantit	Data Description					
Start	Stop		У						
0129	0129	Discharge Temperature Value	1	(Discharge temp sensor value/100)-70 Range = -70.0⁰F -585.35⁰F					
0173	0174	Total No. of Short Cycles	2	One counter means 1 cycle 0-4294967295					
017B	017C	Total Alarm Run Hours	2	One counter means 1 hours 0-4294967295					

6.3.2. Hold Register (Command 0x03, 0x06, 0x10)

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Address (Hex)		Contents	Quantity	Data Description					
Start	Stop								
0000	0010	Custumer Name	17	'X'					
0011	0014	Customer ID	4	'X'					
0015	0024	Customer Location	16	'X'					
0025	0036	Compressor Module Number	18	'X'					
0037	0042	Compressor Serial Number	12	'X'					
0051	005C	Module Part Number	12	'X'					
005D	0069	Module Serial Number	13	'X'					
0085	0085			DLT temp trip set point value, Unit : 0.01°F ; Range: -70 to 585.35 °F Set point = (Word - 7000)/ 100 (°F)					
0086	0086	Alert Trigger Parameters Configuration	20	Default: 297°F DLT temp trip reset point value, Unit : 0.01°F ; Range: -70 to 585.35 °F Reset point =(Word -7000)/100 (°F)					
00B4	00B4	Lockout Status Configuration1	1	BIT0 - High Discharge Temperature Lockout Status: 1 - Enable / 0 - Disable Others bit: Not used.					

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7. Troubleshooting

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If the module communication doesn't respond, here is a list with some general steps for troubleshooting:

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- 1. Check the wiring connection. Ensure the wiring is correctly connected and the connector is not loose.
- 2. Check the power to the CoreSense module. Check the power supply line and ensure the power is on and green LED is on.
- 3. Check the module network address. The address should match the address that the master has requested. Note: for the module, the address 0 is invalid.
- 4. Check your master data format setting. Ensure the master node data format setting is: RTU mode, 1 start bit, 8 data bit, no parity bit, 2 stop bit.
- 5. Check the master node baud rate setting. First, set your master node baud rate as 19200 and then try to communicate with the module. If the module does not respond, then set to 9600 baud rate and try again.

A third party PC debugging tool can also be used by

sending the query shown in Table-8 for getting the firmware version number.

The response indicates the Version Number as 1.01R00 (this version number is only for an example, may change for different models).

	Address	CMD	Bytes	1	1	-		0		1		R		0		0		CRC	
onse	0	0	1	0	3	0	2	0	3	0	3	0	5	0	3	0	3	8	1
Resp	8	4	0	0	1	8	Е	0	0	0	1	0	2	0	1	0	1	7	4