

CoreSense™ Protection for Copeland Discus® Compressors






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

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

 WARNING	<p>ELECTRICAL SHOCK HAZARD</p> <ul style="list-style-type: none"> • Disconnect and lock out power before servicing. • 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 qualified electrical personnel. • Failure to follow these warnings could result in serious personal injury.
 WARNING	<p>PRESSURIZED SYSTEM HAZARD</p> <ul style="list-style-type: none"> • System contains refrigerant and oil under pressure. • Remove refrigerant from both the high and low compressor side before removing compressor. • Use appropriate back up wrenches on rotalock fittings when servicing. • 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.
 WARNING	<p>BURN HAZARD</p> <ul style="list-style-type: none"> • 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.
 CAUTION	<p>COMPRESSOR HANDLING</p> <ul style="list-style-type: none"> • 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.

OVERVIEW

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.

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 **Figures 1 and 2.**

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-C00.

PROTECTION

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 Retail Solutions’ 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

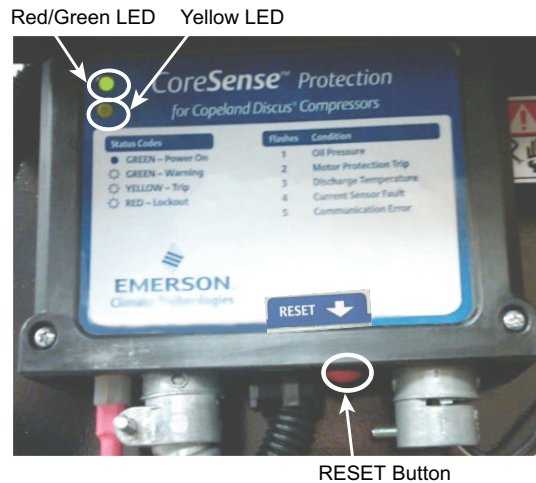


Figure 2 – Key Components on the CoreSense Protection Module

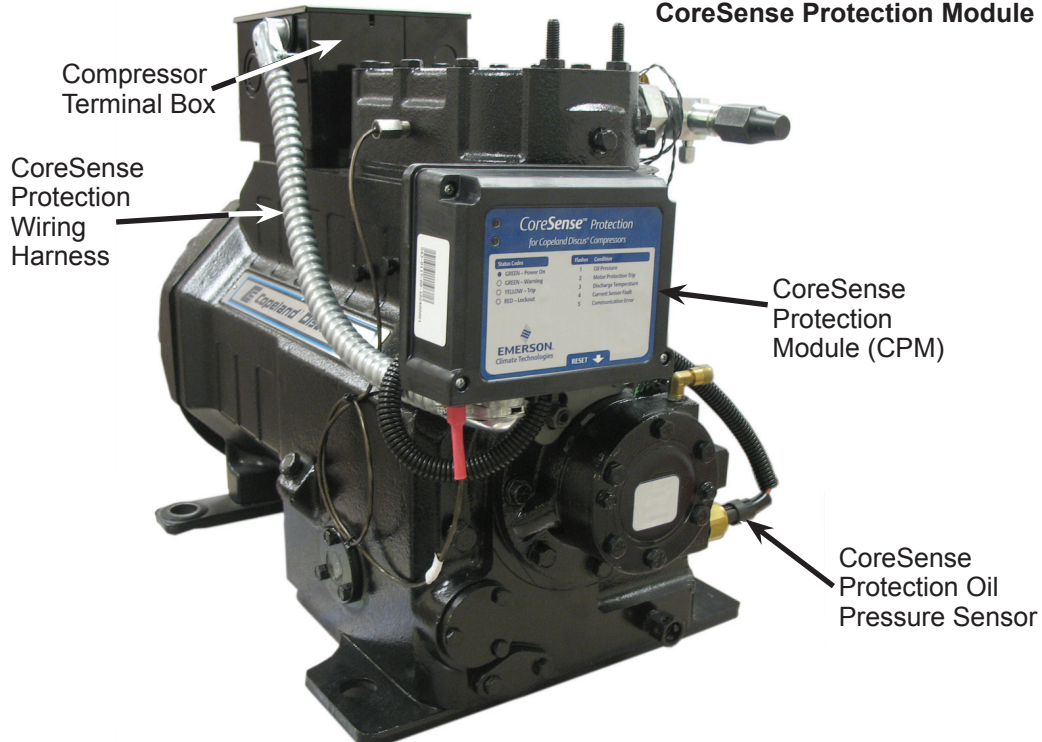


Figure 1 – CoreSense Protection on Copeland Discus Compressors

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.

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.

Motor Protection by Positive Temperature Coefficient (PTC) Sensors

On Copeland 4D and 6D Discus¹ compressors, CoreSense Protection also provides protection for the motor replacing the Kriwan module INT369R. The CoreSense Protection module will communicate a motor protection trip when the resistance caused by increasing motor temperature rises above 13 kOhms. The compressor will restart once the resistance drops below 3.2 kOhms.

High Discharge Temperature Protection (Optional)



Compressor head temperatures can be very hot. Care must be taken to ensure that wiring or other materials which could be damaged by these temperatures do not come into contact with these potentially hot areas.

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 (about 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**.

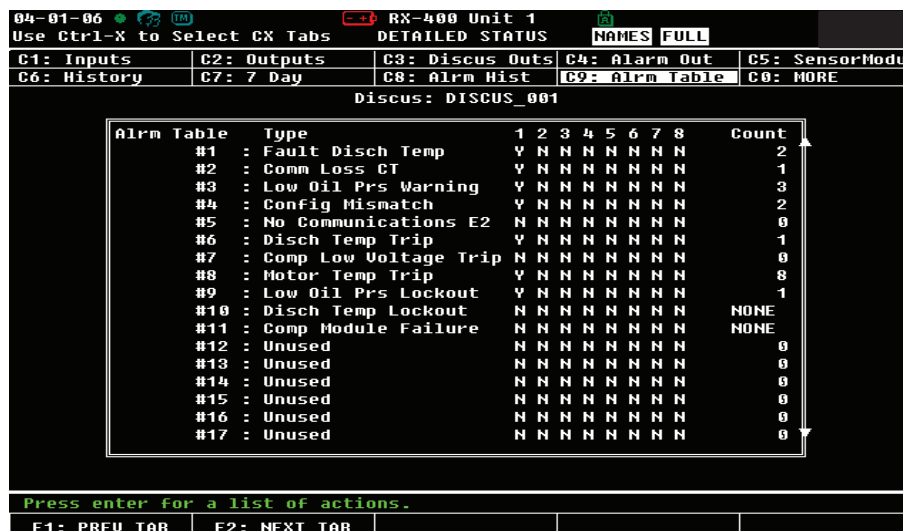
Communication (Optional)

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.

Remote Reset



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



04-01-06 RX-400 Unit 1
 Use Ctrl-X to Select CX Tabs DETAILED STATUS NAMES FULL
 C1: Inputs C2: Outputs C3: Discus Outs C4: Alarm Out C5: SensorModu
 C6: History C7: 7 Day C8: Alrm Hist C9: Alrm Table C0: MORE
 Discus: DISCUS_001

Alrm Table	Type	1	2	3	4	5	6	7	8	Count
#1	: Fault Disch Temp	Y	N	N	N	N	N	N	N	2
#2	: Comm Loss CT	Y	N	N	N	N	N	N	N	1
#3	: Low Oil Prs Warning	Y	N	N	N	N	N	N	N	3
#4	: Config Mismatch	Y	N	N	N	N	N	N	N	2
#5	: No Communications E2	N	N	N	N	N	N	N	N	0
#6	: Disch Temp Trip	Y	N	N	N	N	N	N	N	1
#7	: Comp Low Voltage Trip	N	N	N	N	N	N	N	N	0
#8	: Motor Temp Trip	Y	N	N	N	N	N	N	N	8
#9	: Low Oil Prs Lockout	Y	N	N	N	N	N	N	N	1
#10	: Disch Temp Lockout	N	N	N	N	N	N	N	N	NONE
#11	: Comp Module Failure	N	N	N	N	N	N	N	N	NONE
#12	: Unused	N	N	N	N	N	N	N	N	0
#13	: Unused	N	N	N	N	N	N	N	N	0
#14	: Unused	N	N	N	N	N	N	N	N	0
#15	: Unused	N	N	N	N	N	N	N	N	0
#16	: Unused	N	N	N	N	N	N	N	N	0
#17	: Unused	N	N	N	N	N	N	N	N	0

Press enter for a list of actions.
 F1: PREU TAB F2: NEXT TAB

Figure 3 – E2 Alarm Table For CoreSense Protection

¹There 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-TSK-C00.

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**.

Fault History

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**.

Application Usage

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

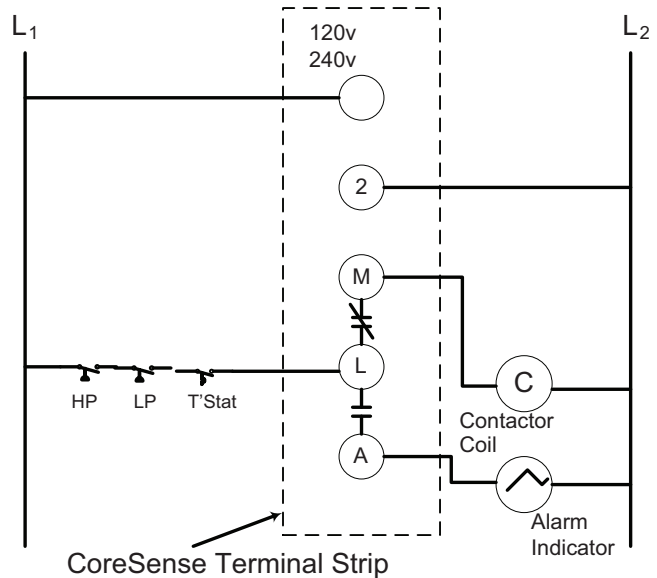
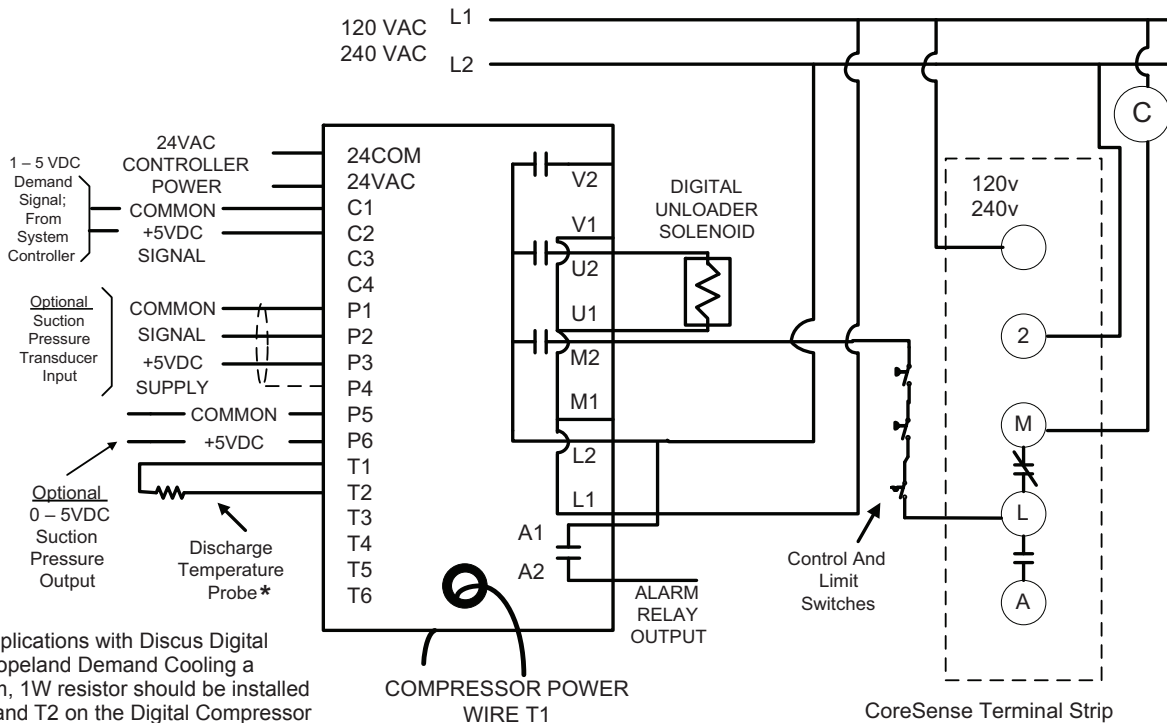


Figure 4 - Basic Wiring Diagram



* 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 **AE-1328**.

Figure 5 – CoreSense Protection with Copeland Digital Compressor Controller

Basic System Wiring Diagram



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.

Variable Frequency Drives

CoreSense Protection may be used with variable frequency drives. Refer to **AE-1369** for more information on Copeland Discus with variable frequency drives.

Digital / Conventional Unloaded Compressors

CoreSense Protection may be used with Copeland Discus Digital™ 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 is done via the Digital Compressor Controller. Use the temperature probe provided with the Digital Compressor, NOT the optional temperature probe available for CoreSense. Discharge temperature information **will not** be communicated to the CoreSense Protection.

Demand Cooling

CoreSense Protection is compatible with Copeland Demand Cooling®. However, the discharge temperature

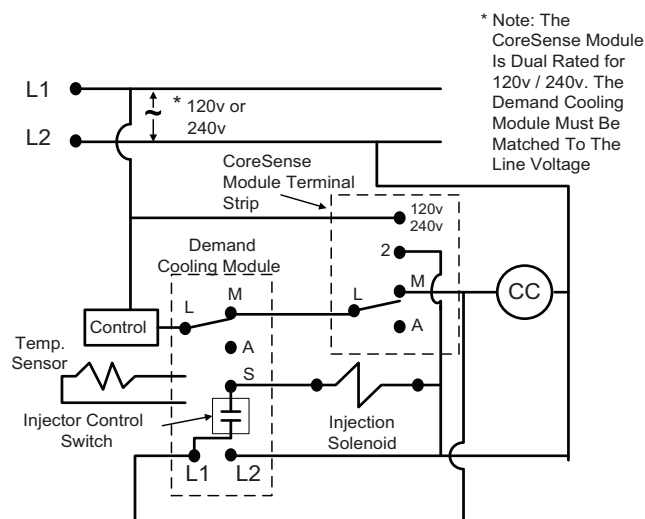


Figure 6 – CoreSense Protection with Copeland Demand Cooling

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 **AE4-1287**. Wiring of CoreSense Protection with Copeland Demand Cooling is shown in **Figure 6**.

INSTALLATION

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.

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 **Figures 7 and 8**). The current sensing toroid is used to determine if the compressor is running.

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.

Power Connections

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

- **Module power:** 110/220 volts AC
- **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.

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. 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.

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 Retail Solutions products, consult with the controller manufacturer regarding controller compatibility with CoreSense Protection.

For the Emerson Retail Solutions E2 controller, it should be equipped with an Emerson Retail Solutions RS-485 communications network board. (Emerson Retail Solutions part number 237-4890). The controller

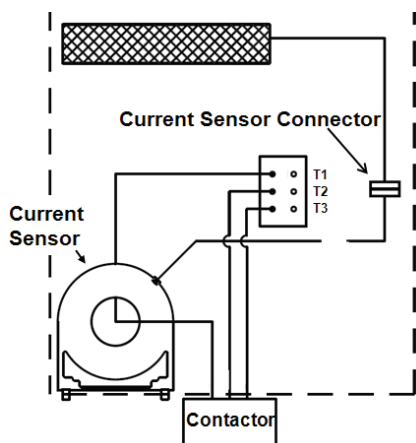


Figure 7 – One motor lead must be routed through the center opening of the current sensing toroid.

firmware must be revision level 3.0 or higher. Refer to Emerson Retail Solutions E2 RX Refrigeration Controller manual 026-1610 for more detailed information.

The E2 network interface board has two communication ports available. The E2 network interface board is shown on **Figure 13**.

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**.

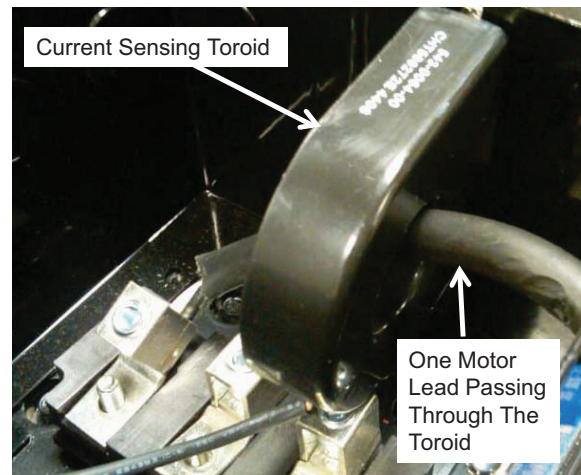


Figure 8 – Current Sensing Toroid

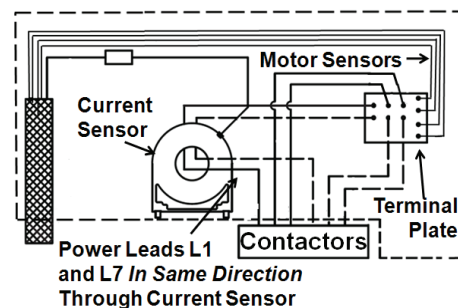


Figure 9 – Routing of motor leads through the current sensor for a part winding start motor.

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 **Figures 11 and 12**.

Terminations

The last compressor in the daisy chain must be “terminated” by moving the jumper from the JP5 position to the JP3 position. For all other compressors the jumper should remain in the default JP5 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 13**).

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.

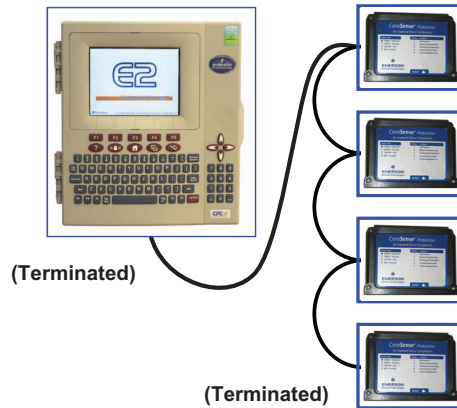


Figure 11 – RS485 Daisy Chain Connection

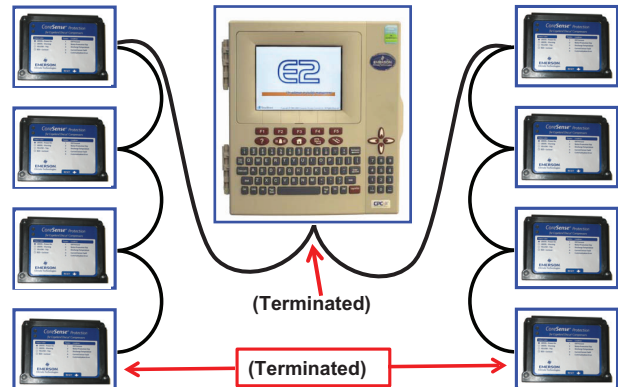


Figure 12 – Two Rack Daisy Chain Connection

Solid Red Light Stays On When RS-485 Polarity is Reversed RS-485 Connection

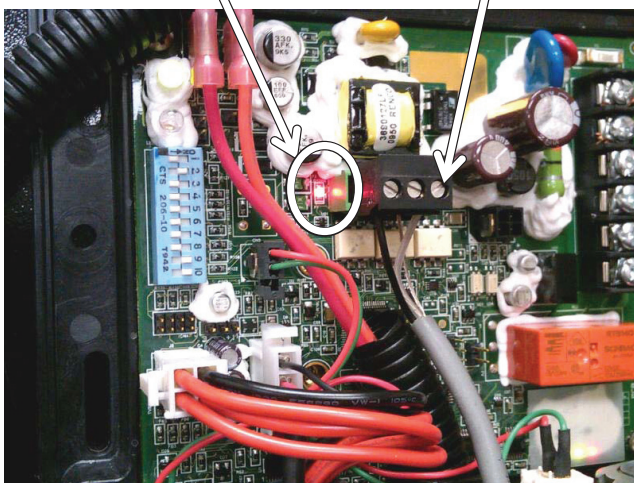


Figure 10 – Polarity Indicator LED on CoreSense Protection Module

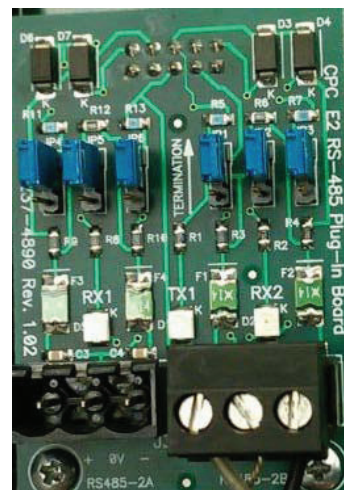


Figure 13 – RS-485 Communications Network Board (Emerson Retail Solutions P/N 237-4890)

Using the communication process is optional, but provides for information flow to the controller for proofing, remote reset, asset information, and 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.

DIP Switch Configuration

DIP switch selection for the Modbus address, baud rate, parity, and other operating conditions simplify service and start-up procedures. **Table 1** lists the purpose for each switch. See **Figure 14** for more information on DIP switch settings.

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

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

Table 1

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

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

1. 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).
2. 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 stand alone mode (off). Network mode will generate a communications error if the rack controller fails

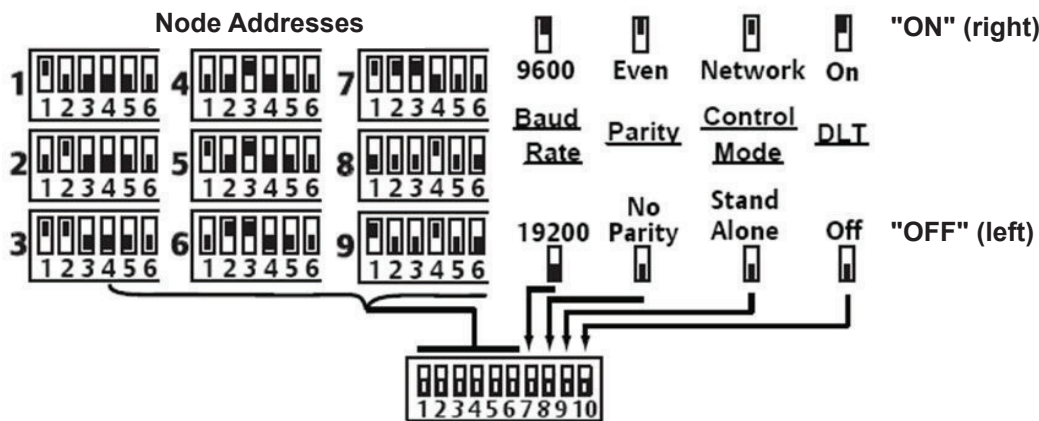


Figure 14 – Default CoreSense Protection DIP Switch Settings

to communicate with the device. For standalone mode, no communications are expected so the communication error is blocked.

- 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).

Jumper Settings

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 15**.

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.

Note! JP1 should not be removed.

Network Setup in Emerson Retail Solutions’ E2

NOTICE

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 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 on the next page.

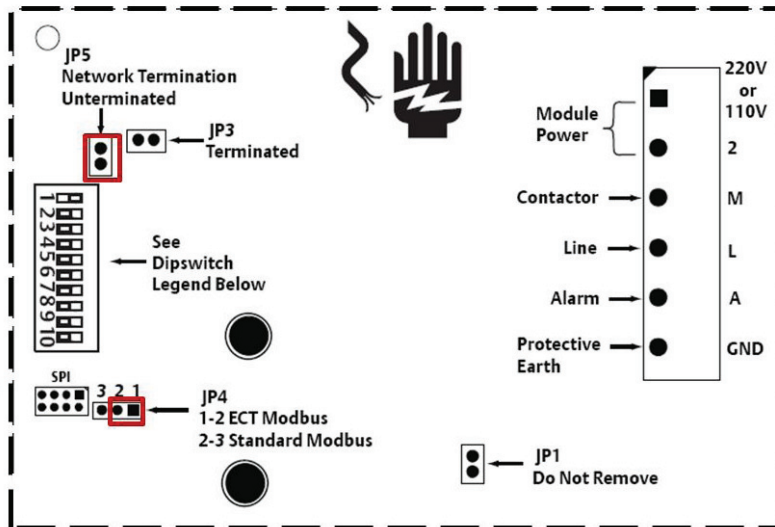
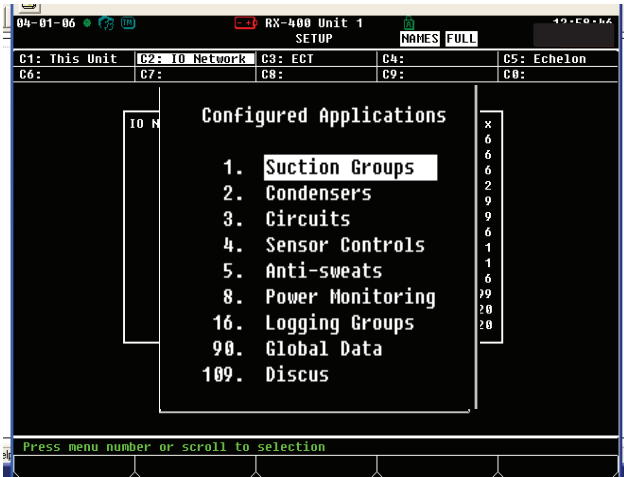


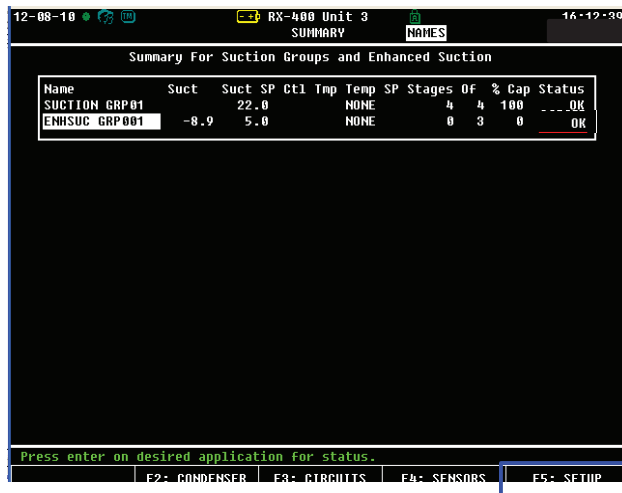
Figure 15
Default jumper settings on the Coresense Protection Module

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

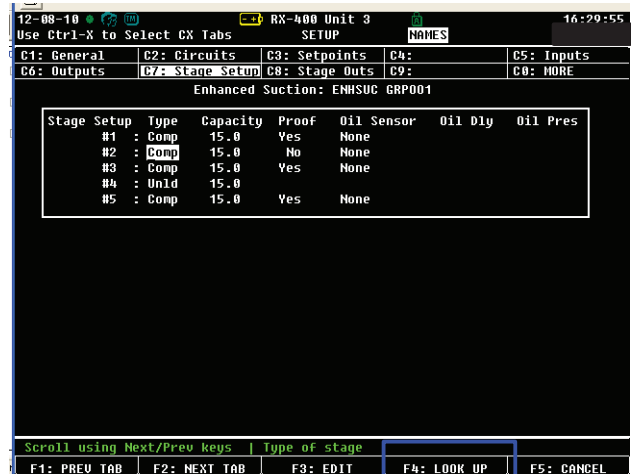
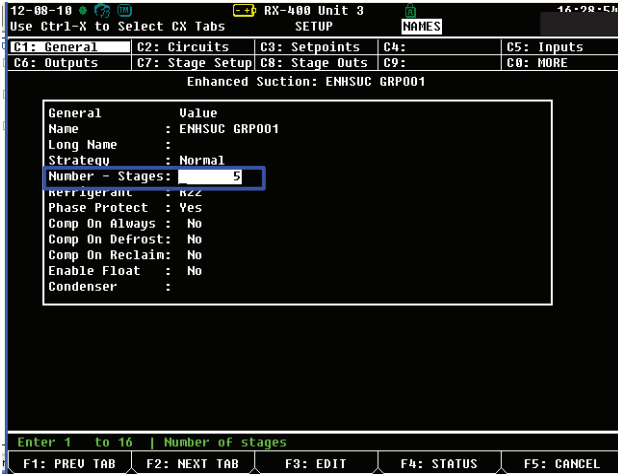


3. Select the Suction Group The CoreSense Devices Will Be Associated To. This Will Bring Up The Suction Group Status Screen.
4. Press F5 To Enter The Suction Group Setup Screen

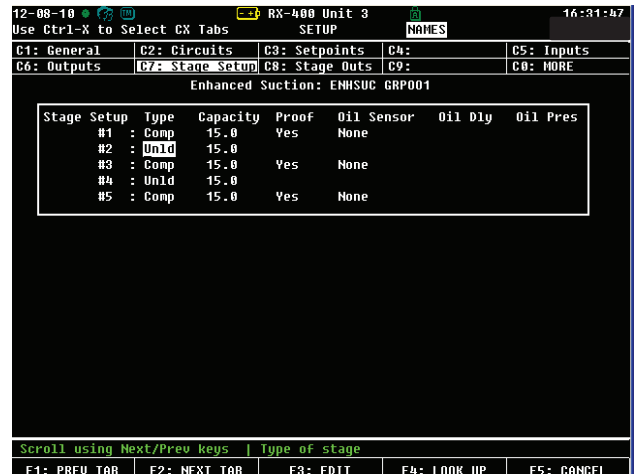
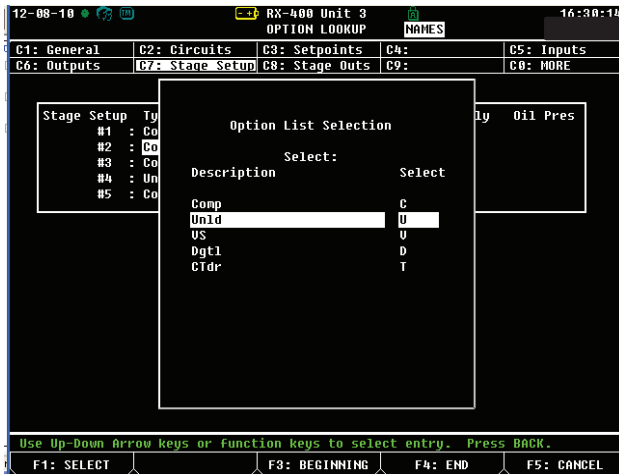



5. From C1:General Tab, Input The Number Of Stages (Unloader Banks Are Counted As An Individual Stage)

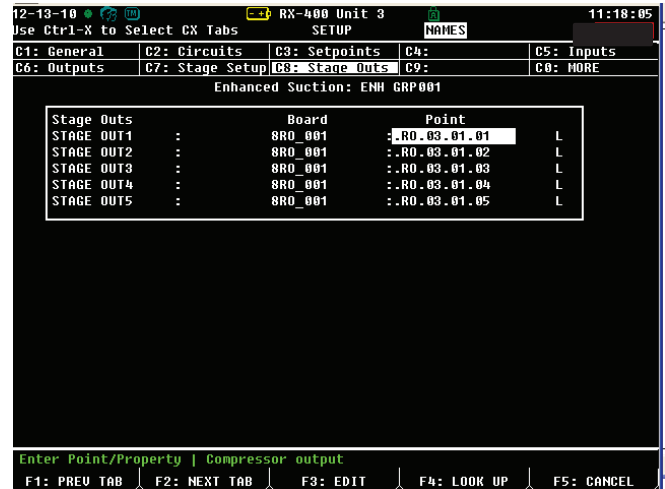
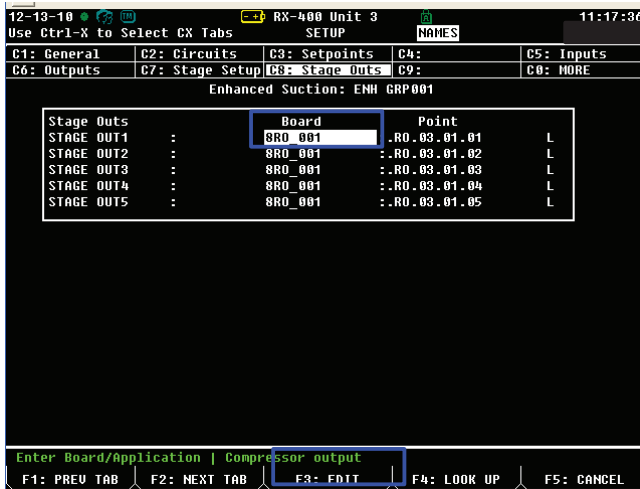
6. Tab Over To C7: Stage Setup (Ctrl +7) To Modify The Stage Type Press F4: Look Up



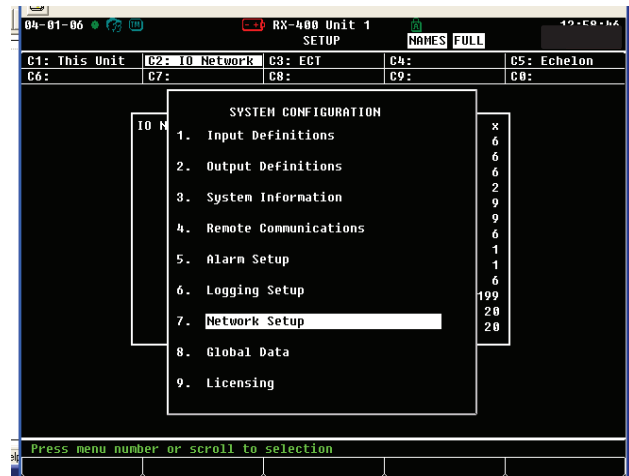
7. For Example, If A Stage Is An Unloader, Select Unld (Press U) From The Option List Selection Menu



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  To Exit and Save Changes



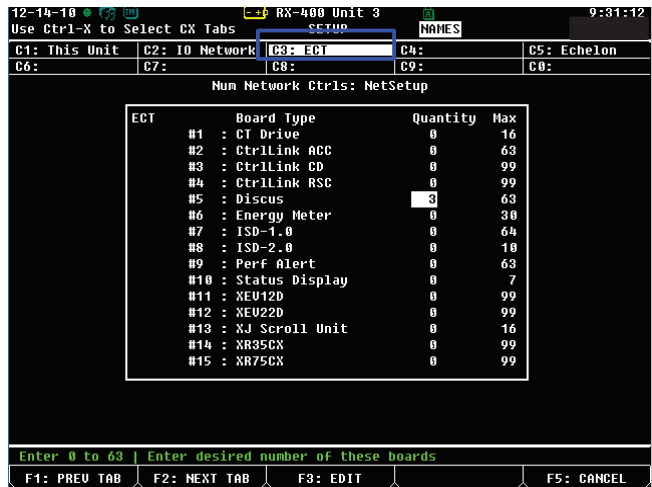
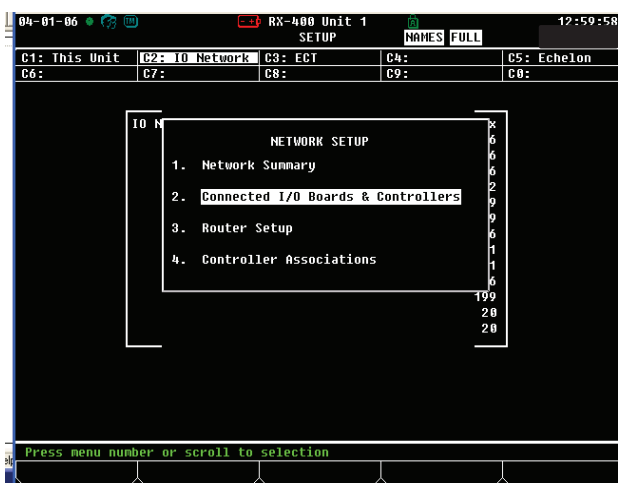
11. Press  to Enter the Main Menu. Select 7. System Configuration.
12. From the System Configuration Menu Select 7. Network Setup.



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

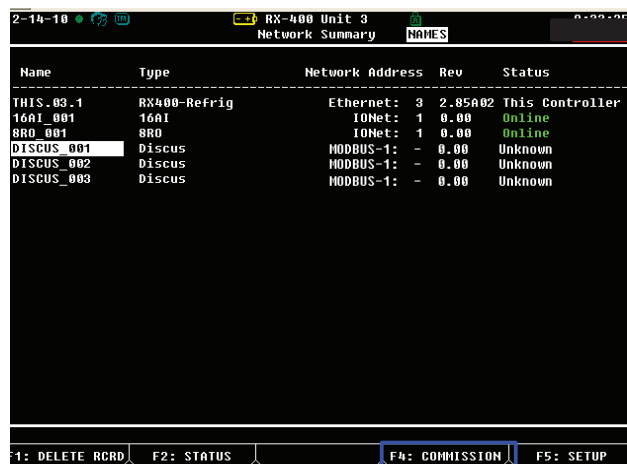
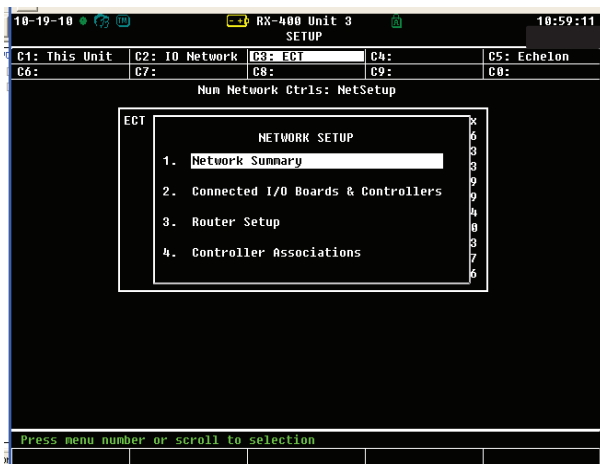
14. From the Setup Screen Go To The C3: ECT Tab (Press Ctrl + 3)

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.



16. From the Network Setup Menu Select 1. Network Summary

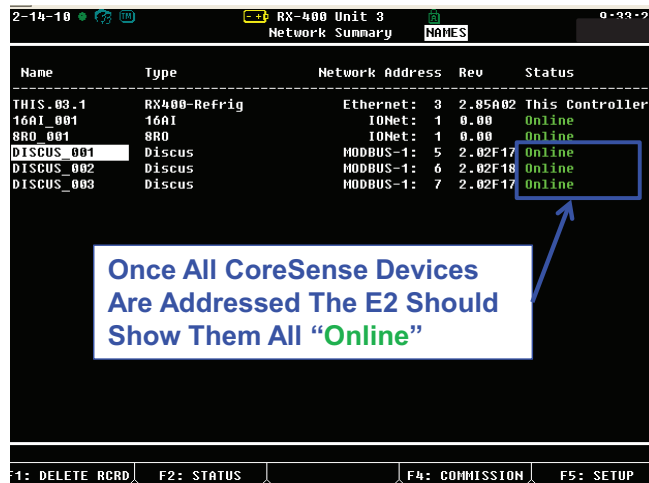
17. The Discus Devices Should Be Present On The Network. Select The Discus To Be Commissioned. Press F4: Commission



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.

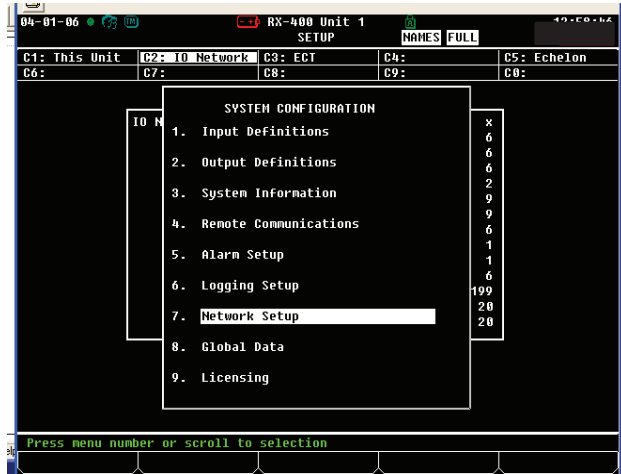
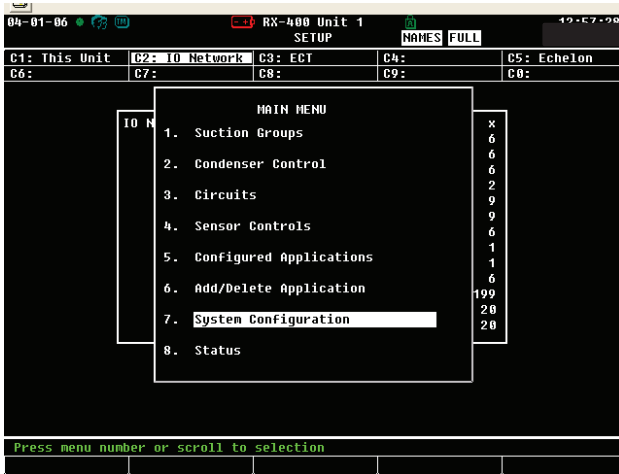


20. Press  To Return To The Network Summary Screen. The Device Should Now Be "Online". Repeat Steps 8-10 To Address The Remaining CoreSense Devices.
21. Once All The Devices Are Addressed, Press  To Save Changes And Exit The Network Summary.

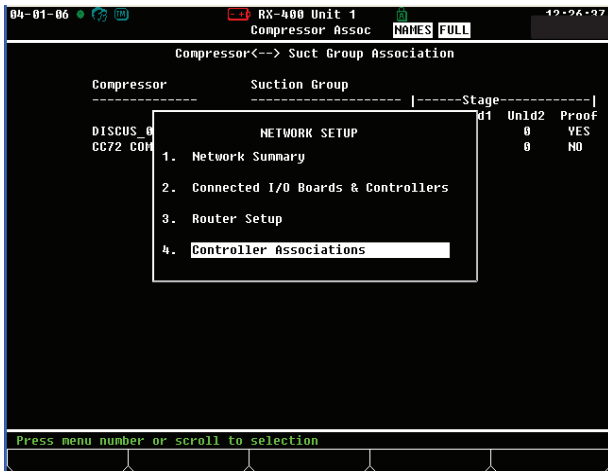


22. Press  to Enter the Main Menu. Select 7. System Configuration.

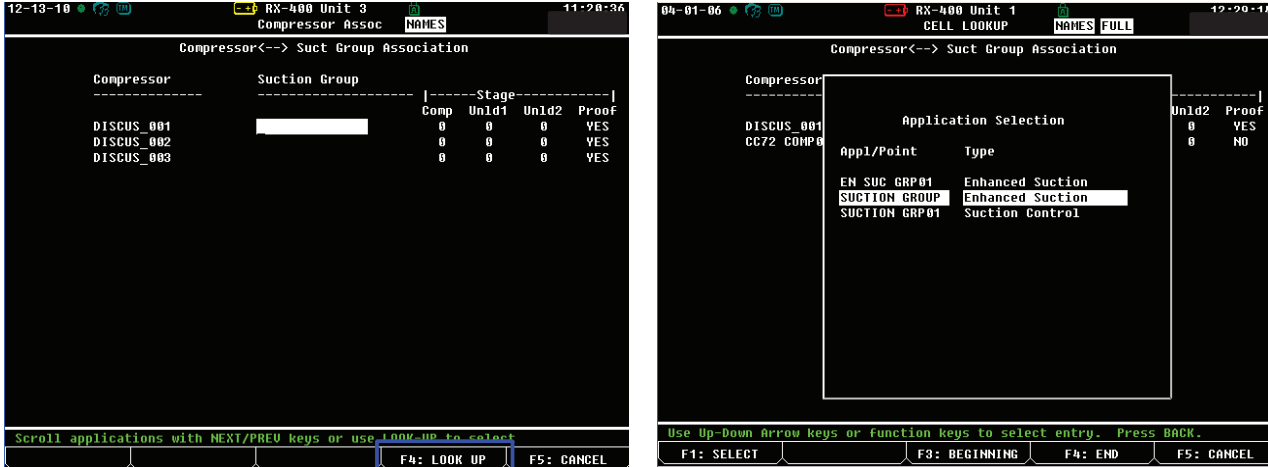
23. From the System Configuration Menu Select 7. Network Setup.



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

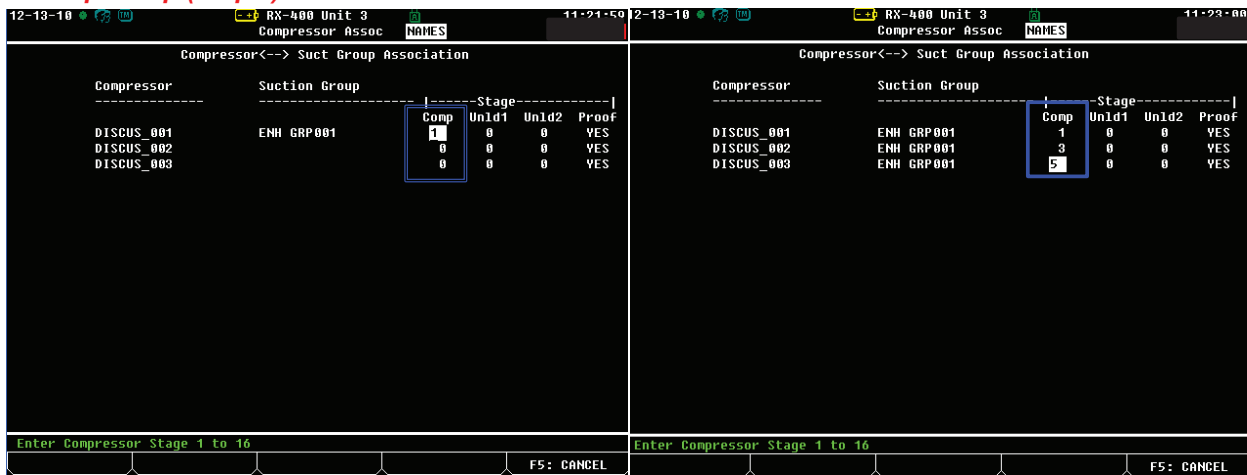


25. Highlight The Suction Group² Field Select F4: Look Up (Press F4) And Select The Appropriate Suction Group For The Device And Press Enter.



² For More Information On Setting Up Suction Groups In The E2 Consult Your Emerson Retail Solutions 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)




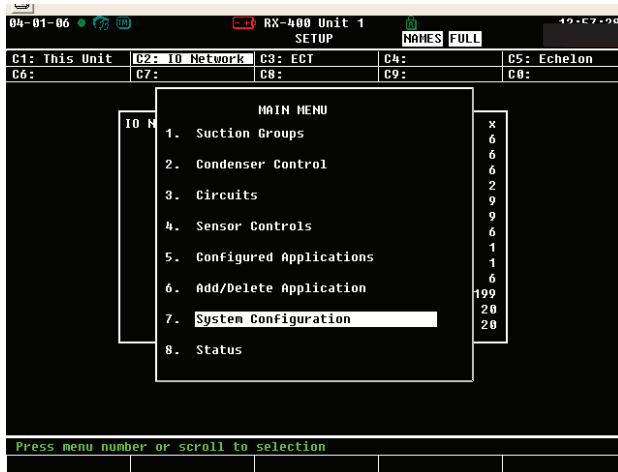
27. Press  To Exit And Save Your Changes.

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.

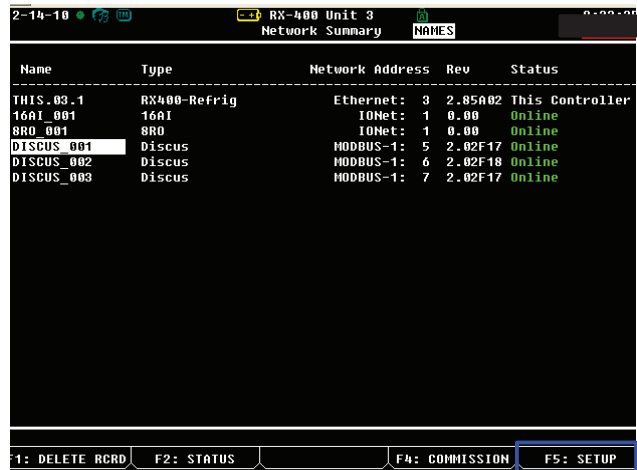
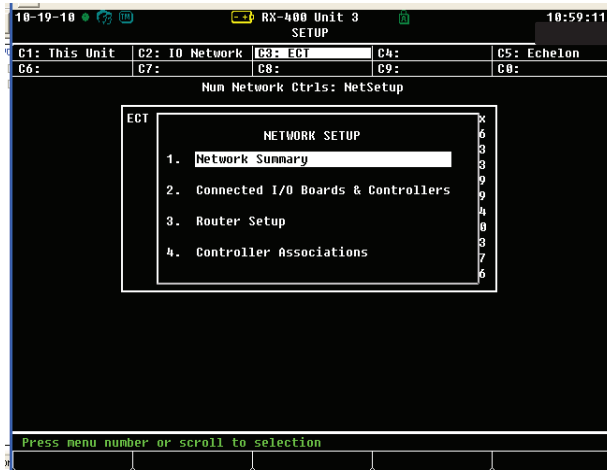
Note! Before Making Any Changes In The E2 Setup, You Must Log In To The E2 By Pressing  And Entering The Appropriate Username And Password

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



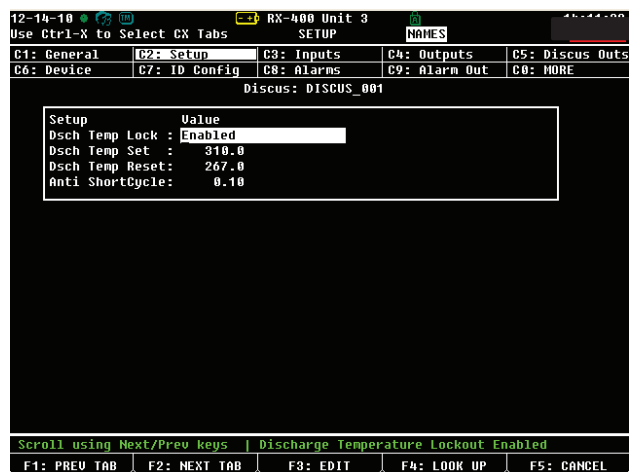
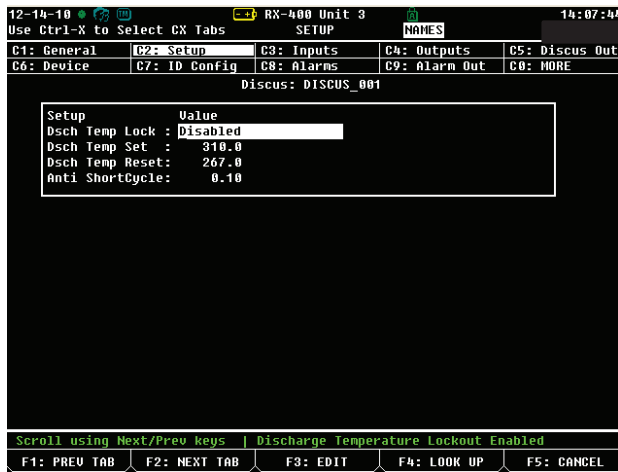
3. From the Network Setup Menu Select 1. Network Summary

4. Select The Discus Being Set Up For Discharge Temperature Lockout Capability And Press F5: Setup



5. From The Setup Screen Go To C2: Setup (Ctrl +2).

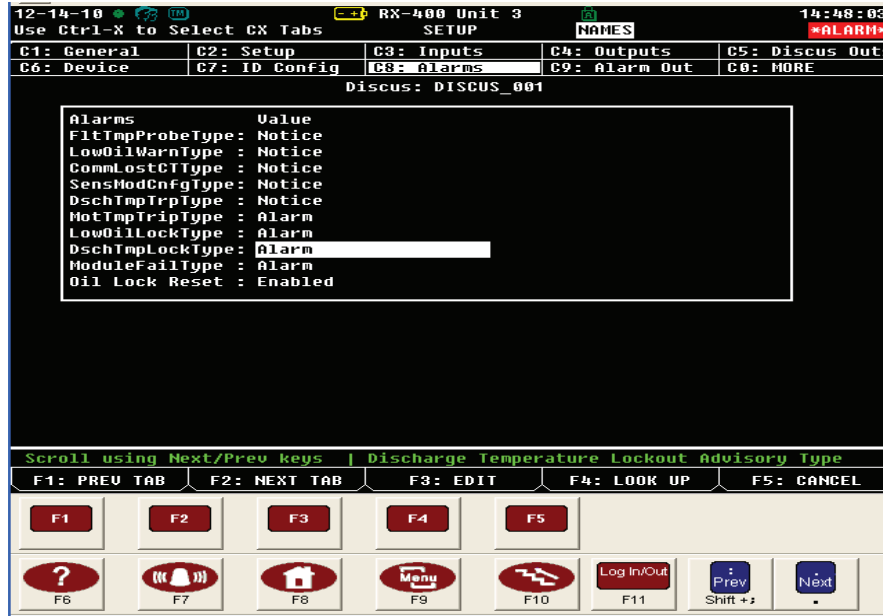
6. In The "Dschr Temp Lock" Field Press **Next** To Set Field To "Enabled."



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.



OPERATION

Status Codes / LED Diagnostics

The status codes are summarized in Tables 2-4.

Table 2 – 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 3 – Yellow LED Flash Codes

# Flashes	Yellow LED – Trip Condition (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

Table 4 – Red LED Flash Codes

# 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

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 5 where “1” is the highest priority.

Table 5 – Event Priority for CoreSense Protection Faults

Priority	Event	E2 Alarm Display	CPM LED
1	CoreSense Protection Module failure	"Module Failure Lockout"	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

Performing a Remote Reset in the E2 Alarm Screen

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.

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.

DATE	TIME	STATE	Area Ctrl:	Application	Property	MESSAGE
12-14-10	14:34	ALARM *	THIS.03.1:DISCUS_001	:LOW OIL LOCK		ISD Oil Pressure
12-14-10	14:32	N-NTC *	THIS.03.1:DISCUS_001	:LOW OIL WARN		Low Oil Warning
12-14-10	14:31	NOTICE *	THIS.03.1:DISCUS_001	:		Application confi
12-14-10	10:56	NOTICE *	THIS.03.1:System	:		Controller startu
12-14-10	10:51	NOTICE *	THIS.03.1:System	:		Controller shutdo
12-14-10	10:40	N-NTC *	THIS.03.1:DISCUS_001	:		Application confi
12-13-10	16:56	N-FL *	THIS.03.1:DISCUS_002	:		Device absent fro
12-13-10	16:56	N-FL *	THIS.03.1:DISCUS_003	:		Device absent fro
12-13-10	16:56	N-FL *	THIS.03.1:DISCUS_001	:		Device absent fro
12-13-10	16:56	N-FL *	THIS.03.1:8R0_001	:		Device absent fro
12-13-10	16:49	NOTICE *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were res
12-13-10	16:48	N-NTC *	THIS.03.1:DISCUS_001	:		Application confi
12-13-10	16:45	R-FL -	THIS.03.1:DISCUS_001	:LOW OIL LOCK		Low Oil Pressure
12-13-10	16:45	N-NTC *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were res
12-13-10	16:45	R-FL -	THIS.03.1:DISCUS_001	:LOW OIL LOCK		Low Oil Pressure
12-13-10	16:45	NOTICE *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were cle
12-13-10	16:44	N-NTC *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were res
12-13-10	16:44	R-FL -	THIS.03.1:DISCUS_001	:LOW OIL LOCK		Low Oil Pressure
12-13-10	16:44	N-NTC *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were res

STATE: N=Return-to-Normal R=Reset(Forced)-to-Normal.

F1: ALARM ACK F2: ALARM RST F3: ALARM CLR F4: EXPD INFO

DATE	TIME	STATE	Area Ctrl:	Application	Property	MESSAGE
12-14-10	14:34	ALARM *	THIS.03.1:DISCUS_001	:LOW OIL LOCK		ISD Oil Pressure
12-14-10	14:32	N-NTC *	THIS.03.1:DISCUS_001	:LOW OIL WARN		Low Oil Warning
12-14-10	14:31	NOTICE *	THIS.03.1:DISCUS_001	:		Application confi
12-14-10	10:56	NOTICE *	THIS.03.1:System	:		Controller startu
12-14-10	10:51	NOTICE *	THIS.03.1:System	:		Controller shutdo
12-14-10	10:40	N-NTC *	THIS.03.1:DISCUS_001	:		Application confi
12-13-10	16:56	N-FL *	THIS.03.1:DISCUS_002	:		Device absent fro
12-13-10	16:56	N-FL *	THIS.03.1:DISCUS_003	:		Device absent fro
12-13-10	16:56	N-FL *	THIS.03.1:DISCUS_001	:		Device absent fro
12-13-10	16:56	N-FL *	THIS.03.1:8R0_001	:		Device absent fro
12-13-10	16:49	NOTICE *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were res
12-13-10	16:48	N-NTC *	THIS.03.1:DISCUS_001	:		Application confi
12-13-10	16:45	R-FL -	THIS.03.1:DISCUS_001	:LOW OIL LOCK		Low Oil Pressure
12-13-10	16:45	N-NTC *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were res
12-13-10	16:45	R-FL -	THIS.03.1:DISCUS_001	:LOW OIL LOCK		Low Oil Pressure
12-13-10	16:45	NOTICE *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were cle
12-13-10	16:44	N-NTC *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were res
12-13-10	16:44	R-FL -	THIS.03.1:DISCUS_001	:LOW OIL LOCK		Low Oil Pressure
12-13-10	16:44	N-NTC *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were res

Press desired selection

(A) : Reset Advisory #1
(B) : Reset All Advisories
(C) : Cancel Operation

F5: CANCEL

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

DATE	TIME	STATE	Area Ctrl:	Application	Property	MESSAGE
12-14-10	14:36	NOTICE *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were res
12-14-10	14:34	R-ALM -	THIS.03.1:DISCUS_001	:LOW OIL LOCK		ISD Oil Pressure
12-14-10	14:32	N-NTC *	THIS.03.1:DISCUS_001	:LOW OIL WARN		Low Oil Warning
12-14-10	14:31	NOTICE *	THIS.03.1:DISCUS_001	:		Application confi
12-14-10	10:56	NOTICE *	THIS.03.1:System	:		Controller startu
12-14-10	10:51	NOTICE *	THIS.03.1:System	:		Controller shutdo
12-14-10	10:40	N-NTC *	THIS.03.1:DISCUS_001	:		Application confi
12-13-10	16:56	N-FL *	THIS.03.1:DISCUS_002	:		Device absent fro
12-13-10	16:56	N-FL *	THIS.03.1:DISCUS_003	:		Device absent fro
12-13-10	16:56	N-FL *	THIS.03.1:DISCUS_001	:		Device absent fro
12-13-10	16:56	N-FL *	THIS.03.1:8R0_001	:		Device absent fro
12-13-10	16:49	N-NTC *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were res
12-13-10	16:48	N-NTC *	THIS.03.1:DISCUS_001	:		Application confi
12-13-10	16:45	R-FL -	THIS.03.1:DISCUS_001	:LOW OIL LOCK		Low Oil Pressure
12-13-10	16:45	N-NTC *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were res
12-13-10	16:45	R-FL -	THIS.03.1:DISCUS_001	:LOW OIL LOCK		Low Oil Pressure
12-13-10	16:45	NOTICE *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were cle
12-13-10	16:44	N-NTC *	THIS.03.1:ADVISORY SERU	:		Alarm(s) were res
12-13-10	16:44	R-FL -	THIS.03.1:DISCUS_001	:LOW OIL LOCK		Low Oil Pressure

STATE: N=Return-to-Normal R=Reset(Forced)-to-Normal.

F1: ALARM ACK F2: ALARM RST F3: ALARM CLR F4: EXPD INFO

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 16). 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.

The specifications for the emergency resistor are as follows:

One watt (or larger), 2200 ohm $\pm 10\%$ resistor

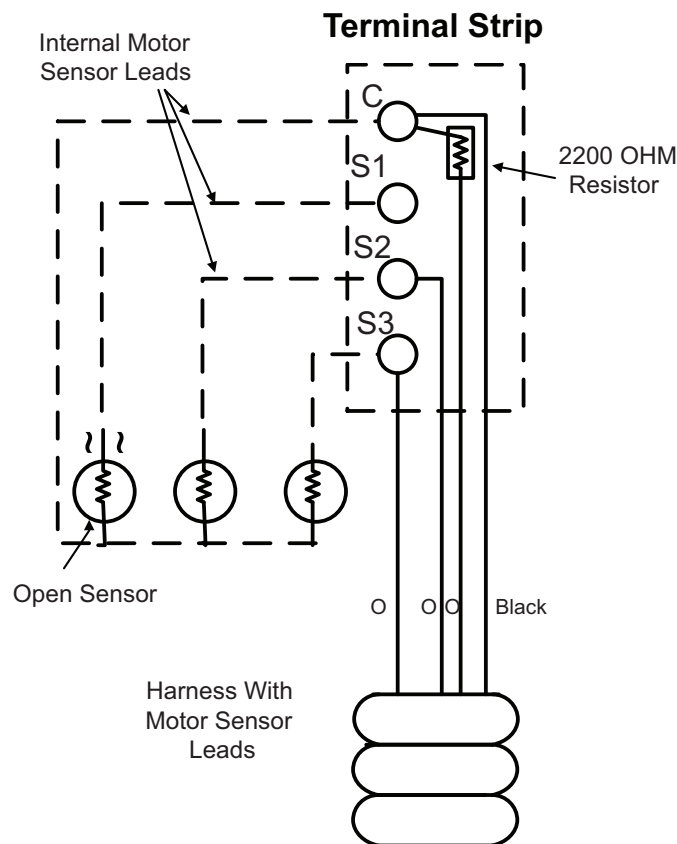


Figure 16
Emergency Bypass of damaged motor temperature (PTC) protection sensor

REFERENCE DRAWINGS

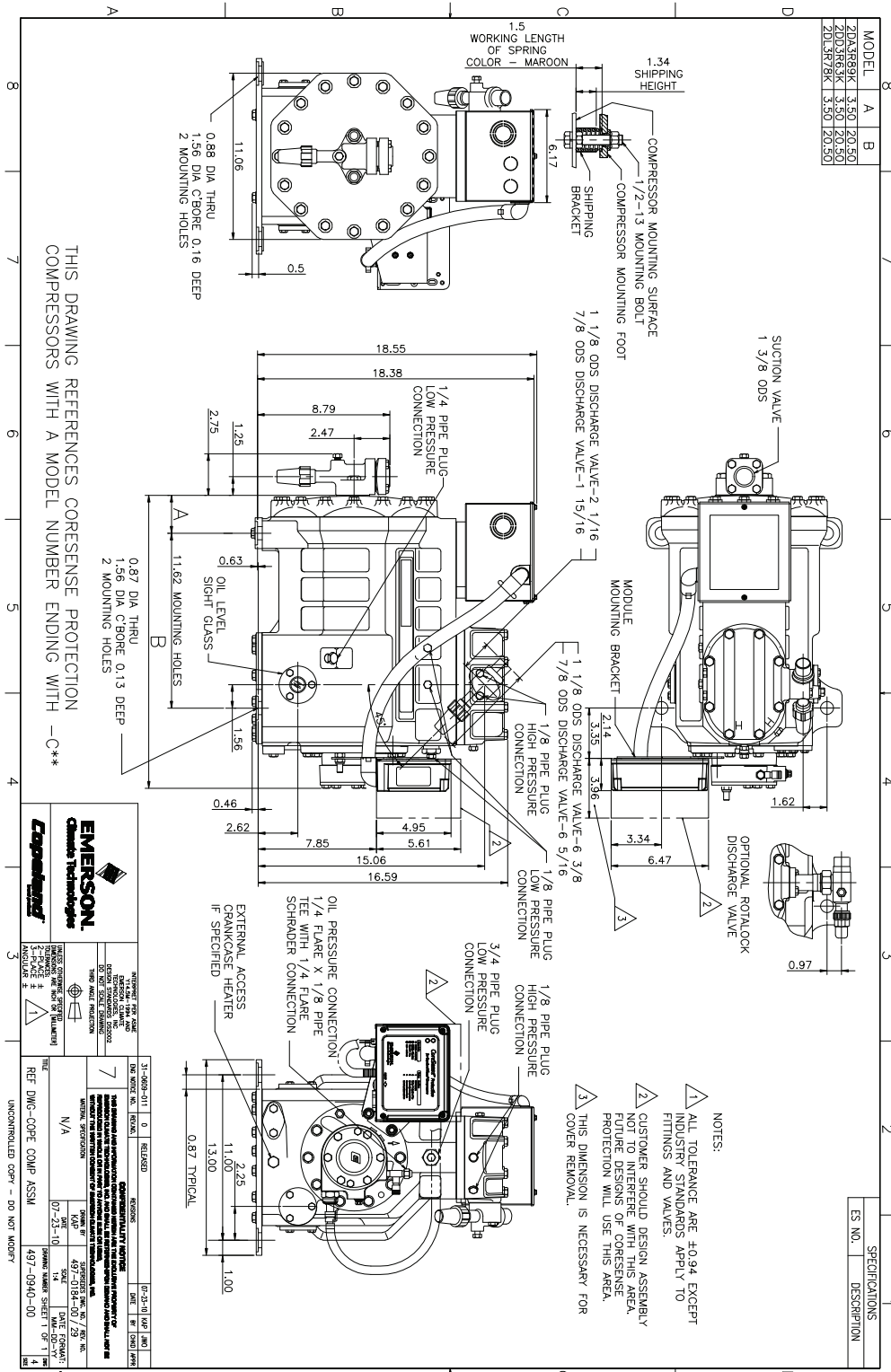


Figure 17 – Dimensional Drawing for 2D Discus With CoreSense Protection

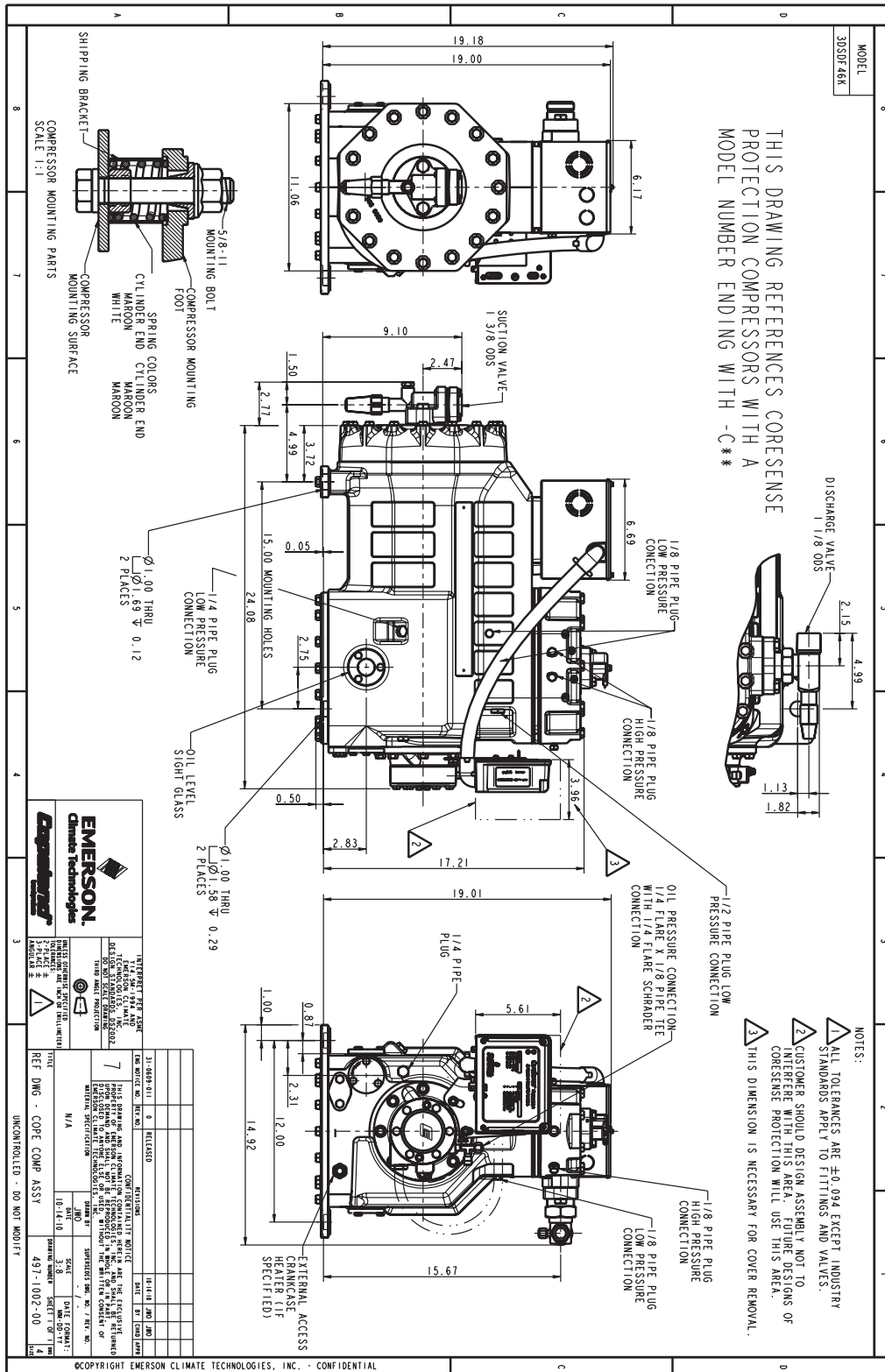


Figure 18 – Dimensional Drawing for 3D Discus With CoreSense Protection

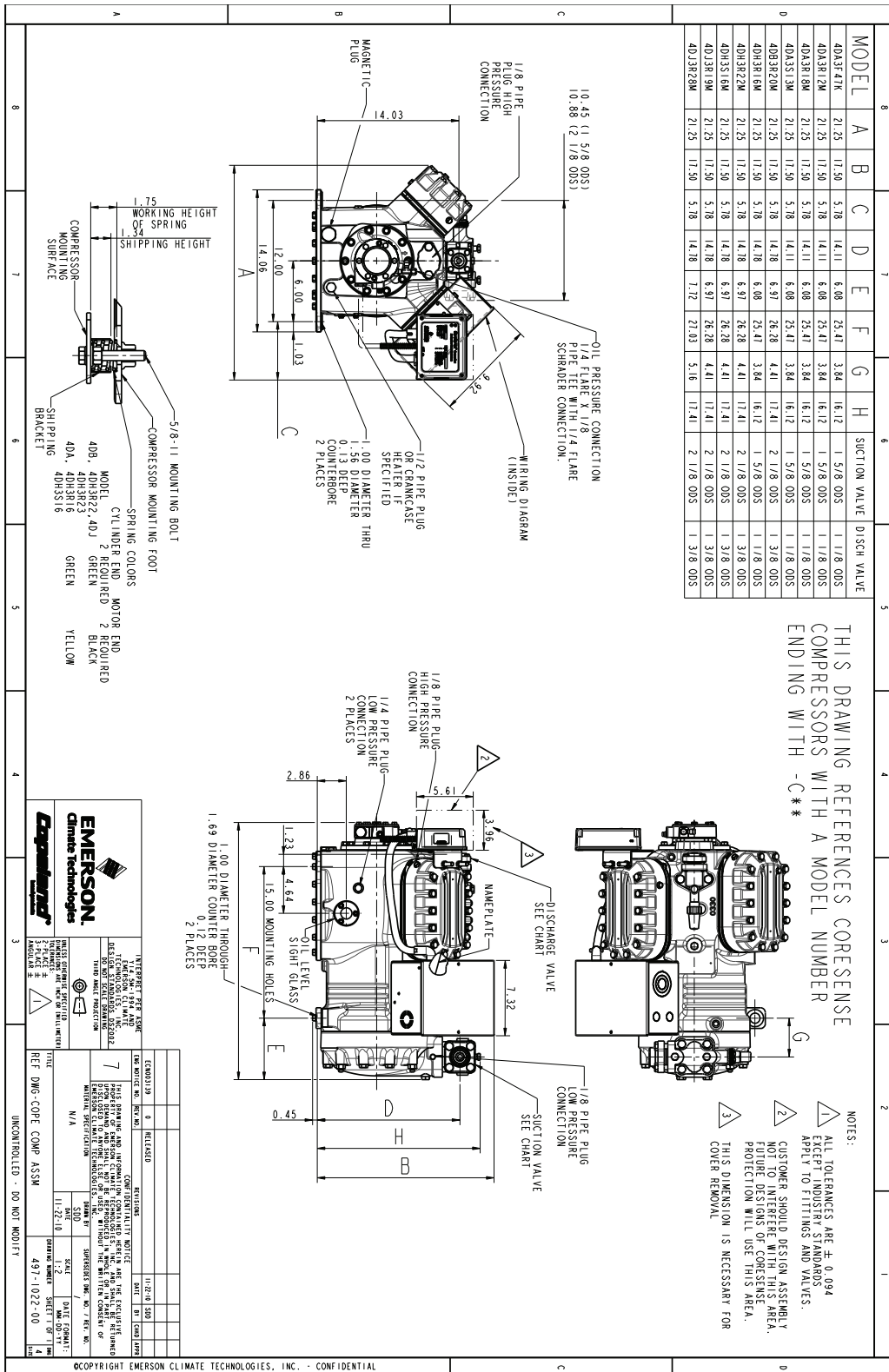


Figure 19 – Dimensional Drawing for 4D Discus With CoreSense Protection

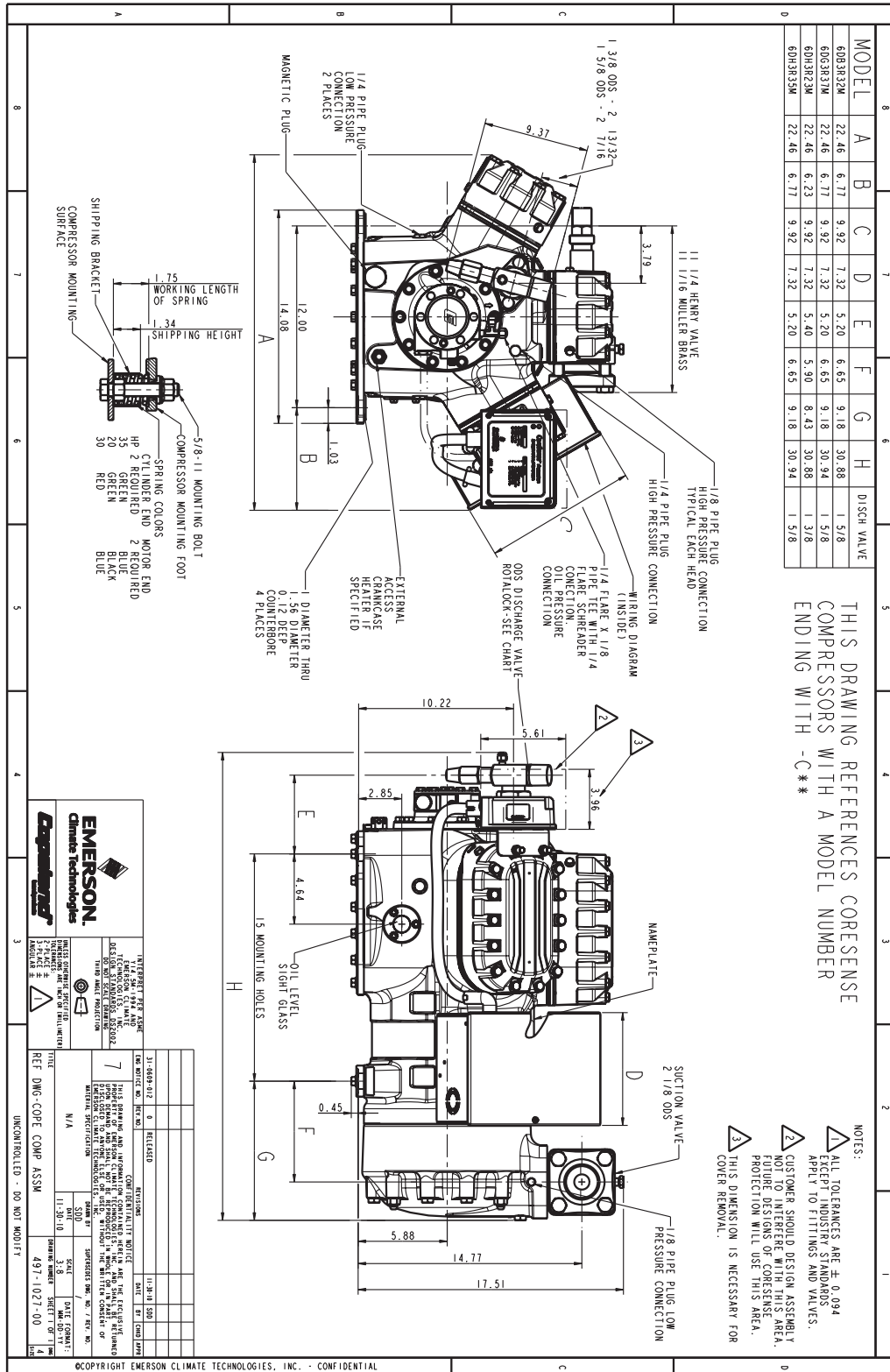


Figure 20 – Dimensional Drawing for 6D Discus With CoreSense Protection