EMERSON Climate Technologies

Application Engineering

Copeland brand products

BULLETIN

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CoreSense™ Communications for 13 to 15 Ton Copeland Scroll™ Air Conditioning Compressors

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Safety Instructions

Copeland Scroll™ compressors with CoreSense™ Communications are manufactured according to the latest U.S. and European Safety Standards. Particular emphasis has been placed on the user's safety. Safey 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	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	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.

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

⚠WARNING	ELECTRICAL SHOCK HAZARD • 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	PRESSURIZED SYSTEM HAZARD • 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	BURN HAZARD • 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	COMPRESSOR HANDLING • 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.

INTRODUCTION

Overview

CoreSense™ Communications is a breakthrough innovation for 13 to 15 ton Copeland Scroll™ air conditioning compressors. The CoreSense Communications module, installed in the compressor electrical box, provides advanced diagnostics, protection, and communications that enhance compressor performance and reliability.

Features

CoreSense Communications has the following key features:

1. Motor temperature protection
2. Missing phase protection
3. Reverse phase protection
4. Low control circuit voltage protection
5. Short cycling detection and alert
6. Communication to system controller through RS485/Modbus
7. Storage of operational history, runtime information, fault counters, etc.
8. Display of status, warning, and alert information via LEDs

CoreSense Communications provides compressor and system protection through its proprietary lockout feature. Depending on the severity and frequency of the fault that caused the trip condition, the CoreSense Communications module can lockout the compressor contactor to prevent damage to the compressor and system components. Less severe fault conditions resulting in an occasional trip will not result in a lockout condition.

Flashing red and green LEDs communicate Status, Warning, and Alert codes to the service technician and the master controller.

Application Usage

⚠WARNING

CoreSense Communications modules may only be used to retrofit Kriwan INT69 SU2 modules. They are not interchangeable with any other brand of motor protection module that may have been previously used with Copeland Scroll compressors.

CoreSense Communications modules are only intended to be used as field retrofits for Kriwan INT69 SU2 motor protection modules that have been previously used with 13 to 15 ton Copeland Scroll compressors.

Copeland Scroll compressors equipped with CoreSense Communications will have an “E” in the electrical code. An example is the 15-ton scroll, ZP182KCE-TED.

Module Part Numbers

OEM and service compressors will have the CoreSense Communications module installed in the compressor electrical box. Individually packaged modules are available to the aftermarket for component replacement. Part numbers for OEM and service applications are listed in Table 1 at the end of this bulletin.

Agency Recognition

CoreSense Communications carries the following agency recognitions:

U.L. file E253322, Volume 7, Software Class B

CB Test Certificate

Product Specifications

CoreSense specifications are shown in Table 2. Many of the electrical specifcations are the same as previously used electronic motor protection modules.

INSTALLATION

Mounting

As mentioned above, CoreSense Communications will be shipped already installed in the compressor electrical box. Two holding tabs secure the module in the box. To remove the module depress the holding tabs and remove the module.

⚠WARNING

Always disconnect and lockout the power supply before removing the compressor electrical box cover for servicing.

Terminal Description and Basic Field Wiring

Figure 2 at the end of this bulletin shows the CoreSense Communications module. Figures 1a and 1b are the terminal box wiring diagrams. An explanation of the terminal designations follows:

T2-T1: Module power supply, 24 or 120/240 VAC.

L1-L2-L3: Phase inputs corresponding to compressor input power L1-L2-L3.
M2-M1: Normally open control circuit contacts; M2-M1 should be wired in series with the compressor contactor.

A (-), GND, B (+): RS485 communications.

Temperature Plug: See Figure 3 for identification of the PTC and common connections.

When multiple CoreSense Communications modules are networked, a shielded, twisted pair cable such as Beldon #8761 (22 AWG) should be used for the communication wiring.

NOTICE

The RS485 is polarity sensitive. When “daisy chaining” modules the A (-) must connect to other A (-) terminals and B (+) must connect to other B (+) terminals.

Dielectric (Hipot) Testing

⚠ CAUTION

Use caution with high voltage and never hipot when compressor is in a vacuum.

U.L. sets the requirement for dielectric strength testing and should be consulted for the appropriate voltage and leakage values. Emerson Climate Technologies does not recommend hipot testing at voltages higher than 1,000 VAC.

OPERATION

⚠ WARNING

The CoreSense Communications module is a recognized safety device and must be used with all compressors that have TE* electrical codes.

A solid green LED indicates the module is powered and operation is normal. A solid red LED indicates an internal problem with the module. See the Troubleshooting section of this bulletin for more information on what to do if the red LED is solid.

CoreSense Communications communicates Warning codes via a green flashing LED. Warning codes do not result in a trip or lockout condition. Alert codes are communicated via a red flashing LED. Alert codes will result in a trip condition and possibly a lockout condition.

Warning Codes (Green LED Flash Code)

Code 1 - Loss of Communication

The module will flash the green Warning LED one time indicating the module has not communicated with the master controller for longer than 5 minutes. Once communication is reinitiated, the Warning will be cleared.

Code 2 - Reserved For Future Use

Code 3 - Short Cycling

The module will flash the green Warning LED three times indicating the compressor has short cycled more than 48 times in 24 hours. A short cycle is defined as compressor runtime of less than 3 minutes. The Warning will be activated when the “Short Cycling” dipswitch (#10) is "off" or in the "down" position. When fewer than 48 short cycles are accumulated in 24 hours the Warning code will be cleared.

Code 4 - Not used with this compressor family

Alert/Lockout Codes (Red LED Flash Code)

Code 1 - Motor High Temperature

The module will flash the red Alert LED one time indicating the motor PTC circuit has exceeded 4.5K Ohms ± 25%. A code 1 Alert will open the M2-M1 contacts. The Alert will reset after 30 minutes and the M2-M1 contacts will close if the resistance of the motor PTC circuit is below 2.75K Ohms. Five consecutive Code 1 Alerts will lockout the compressor. Once the module has locked out the compressor, a power cycle or Modbus reset command will be required for the lockout to be cleared.

Code 2 - Open/Shorted Motor Thermistor

The module will flash the red Alert LED two times indicating the motor PTC thermistor circuit has a resistance value that indicates an open/shorted thermistor chain (see Table 2). A Code 2 Alert will open the M2-M1 contacts. The Alert will reset after 30 minutes and the M2-M1 contacts will close if the resistance of the motor PTC circuit is back in the normal range. The module will lockout the compressor if the trip condition exists for longer than 6 hours. Once the module has locked out the compressor, a power cycle or Modbus reset command will be required to clear the lockout.

Code 3 - Short Cycling

The module will flash the red Alert LED three times indicating the compressor is locked out due to short cycling. A Code 3 Alert will open the M2-M1 contacts. Code 3 will be enabled when the "Short Cycling" dipswitch (#10) is "on" or in the "up" position and the compressor has exceeded the number of short cycles configured by the user in a 24 hour period. Once the module has locked out the compressor, a power cycle or Modbus reset command will be required to clear the lockout.

Code 4 - Not used with this compressor family

Code 5 - Reserved for Future Use

Code 6 - Missing Phase

The module will flash the red Alert LED six times indicating a missing phase in one of the three leads to the compressor. A Code 6 Alert will open the M2-M1 contacts. The Alert will reset after 5 minutes and the M2-M1 contacts will close if the missing phase condition is not present. The module will lockout the compressor after 10 consecutive Code 6 Alerts. Once the module has locked out the compressor, a power cycle or Modbus reset command will be required to clear the lockout.

Code 7 - Reverse Phase

The module will flash the red Alert LED seven times indicating a reverse phase in two of the three leads to the compressor. A Code 7 Alert will open the M2-M1 contacts. The module will lockout the compressor after one Code 7 Alert. A power cycle or Modbus reset command will be required to clear the lockout.

Code 8 - Reserved For Future Use

Code 9 - Module Low Voltage

The module will flash the red Alert LED nine times indicating low module voltage (see Table 2) on the T2-T1 terminals for more than 5 seconds. A Code 9 Alert will open the M2-M1 contacts. The Alert will reset after 5 minutes and the M2-M1 contacts will close if the T2-T1 voltage is above the reset value in Table 2.

Please see Table 6 for a summary of Warning and Alert codes and troubleshooting information.

Resetting Alert Codes

Resetting Alert codes can be accomplished in two different ways. First, Alert codes can be reset manually by cycling power to the module (disconnect T2 or T1 for 5 seconds). The second way to reset Alert codes is to send a Modbus reset command from the master controller.

Power Up Delay

When CoreSense Communications is cycled off, there is a thirteen to fifteen second delay before the module is active.

If the fault that initiated the Alert code is absent after one of the above resets is performed, the Alert code will be cleared and CoreSense will allow normal operation. If the fault is still present after the reset is performed the fault code will continue to be displayed via the green or red flashing LED.

COMMISSIONING

Communications

Programming knowledge and a familiarity with Modbus will be required by the system designer to use the communications features of CoreSense Communications. CoreSense Communications has opto-isolated RS485 for the physical layer. The communication protocol is Standard Modbus and Emerson Climate Technologies Modbus. CoreSense Communications will act as the Modbus slave, while the master will be implemented in a system controller, PC software, or any other equivalent external device. Use of the communications feature of CoreSense Communications allows the master access to much of the data that resides in the CoreSense Communications module. Emerson Climate Technologies Modbus has six message categories:

1. Device ID Messages
2. CoreSense Status Messages
3. CoreSense History Status Messages
4. Configuration Messages
5. Command Messages
6. Firmware Update Messages

CoreSense status, configuration, history, and device information messages available to the master include those listed in Table 4.

The history status messages give the order in which the Warning/Alert has happened, with the total compressor run time. Information about the Warning/Alert occurrence during the last 7 days and the cumulative Warning/Alert counter are also available.

For more information on CoreSense™ Communications features and to request Modbus maps please contact your Application Engineer.

DIP Switch Configuration

DIP switch selection for the Modbus address, baud rate, parity, and other operating conditions simplify service and start-up procedures. Table 5 lists the purpose of each switch.

NOTICE

The module must be reset after changing any of the DIP switch settings for changes to take effect.

CoreSense Communications modules are shipped from the factory with the DIP switches set to default settings for standalone operation. Default settings are shown in Table 5. Switch 1 is turned “on” as part of a quality

control check to verify communications capability of the module before it leaves the compressor manufacturing plant. All other DIP switch default settings are in the "off" position.

NOTICE

If DIP switch settings are inadvertently changed, the compressor will operate, but could have some loss of protection. Scroll temperature protection and short cycle protection could be disabled.

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

1. Switches 1 through 5 are used for setting the device address. DIP switch 1 is the least significant bit (LSB) and switch 5 is the most significant bit (MSB). DIP switch addresses 0 through 31 are shown in Figure 4. Each CoreSense Communications module that is daisy chained and connected to a master controller must have a unique node address (as determined by the DIP switch settings).
2. Switch 6 defines the communication baud rate for the CoreSense Communications module. If the switch is "off", the baud rate is 19200. If the switch is "on" the baud rate is 9600. The baud rate of each CoreSense Communications module should be set to match the master controller baud rate.
3. Switch 7 defines the communications parity. The default parity setting for the CoreSense Communications 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 master controller.
4. Switch 8 defines the control mode. The default setting is standalone mode (off). If communications with a master controller is desired, switch 8 should be turned "on" to network.
5. Switch 9 defines the thermistor configuration. The default setting is "off" for PTC thermistor types.
6. Switch 10 enables short cycling protection if turned "on". The default setting is "off".

Jumper Setting

CoreSense Communications modules are shipped with the jumper installed. For standalone operation the jumper should remain installed. For daisy chained applications the jumper should remain installed for the modules on the ends of the daisy chain. All other jumpers in the sequence of daisy chained modules should be removed. The jumper can be removed using miniature electronics needle nose pliers

PC Interface Software

PC interface software is available from Emerson Climate Technologies, Inc. The PC interface software allows the design engineer access to status, configuration, history, and data logging via a computer. This method of connecting and communicating with CoreSense is very helpful during the unit development stage if CoreSense is in stand-alone mode and not communicating with a master controller.

The RS-485/USB adapter used to connect the laptop to the CoreSense is B & B Electronics model number USOPTL4. Figure 5 illustrates the wiring and DIP switch settings necessary to enable communications.

For more information on the PC interface software, how to obtain it, and a tutorial on its use, please contact your Application Engineer.

SERVICE

Field Service

Service compressors will be shipped with the CoreSense Communications module installed in the compressor terminal box. Special attention should be given to the module DIP switch settings of the compressor being replaced so the DIP switch settings can be transferred to the module of the replacement compressor. As mentioned earlier, the CoreSense Communications module is a recognized safety device and shall be used only with approved compressors.

NOTICE

If a compressor with CoreSense Communications fails in the field, the CoreSense module should remain with the failed compressor so Emerson technicians can download the CoreSense data to assist with determining the root cause of compressor failure.

Troubleshooting

WARNING

Always disconnect and lockout the power supply before removing the compressor electrical box cover for servicing.

For troubleshooting purposes the motor thermistor circuits are similar to those of other Copeland Scrolls. The motor has positive temperature coefficient (PTC)

type thermistors; as the motor temperature increases, so does the resistance of the thermistor chain. To measure the resistance of the PTC circuit simply remove the temperature plug from the CoreSense module and measure the resistance in the appropriate pins shown in Figure 3. The measured values should be in the ranges listed in Table 2. For information on troubleshooting causes of high motor temperatures please refer to the Application Engineering Bulletin for the compressor.

A loss of communications with the master controller for more than five minutes is communicated via a green flash code 1 if DIP switch #8 is enabled. CoreSense Communications has no provisions to detect incorrect wiring neither between daisy chained modules nor to the master controller. Ideally, the master controller will contain advanced troubleshooting menus for help in diagnosing communications issues between the master controller and the CoreSense module.

NOTICE

In some rare cases communication between the master controller and the CoreSense module is problematic. Reversing the polarity will re-initiate communication.

To reverse polarity:

1. Adjust CoreSense to negative
2. Adjust master controller to positive

Table 1
CoreSense Communications Module Part Numbers

Voltage	OEM Part Number	Service Part Number
24	571-0065-05	971-0065-04
120/240	571-0064-06	971-0064-05

Table 2
CoreSense Communications Module Specifications

Module Part Number	571-0065-05	571-0064-06
Module Voltage & Frequency	24 VAC, 50/60 HZ	120/240 VAC, 60HZ
		115/230 VAC, 50 HZ
Allowable Voltage Range	18 - 30 VAC	85 - 265 VAC
T2/T1 Low Voltage Trip	18 VAC	85/170 VAC
T2/T1 Low Voltage Reset	19 VAC	95/185 VAC
Power Consumption	5 VA	5 VA
M1/M2 Contact Rating	2.5A Max	2.5A Max
Motor Temperature Trip Resistance	> 4.5KΩ ± 25%	> 4.5KΩ ± 25%
Open Motor Thermistor Trip Resistance	>220KΩ	>220KΩ
Shorted Motor Thermistor Trip Resistance	<40Ω	<40Ω
Motor Temperature Reset Resistance	< 2.75KΩ	< 2.75KΩ
Reset Time After Trip	30 minutes	30 minutes
Operating Temperature	-40° to 150°F (-40° to 65°C)	-40° to 150°F (-40° to 65°C)
Storage Temperature	-60° to 175°F (-51° to 80°C)	-60° to 175°F (-51° to 80°C)

Table 3
CoreSense Communications Accessory Parts

Part Description	Part Number
Motor Thermistor Harness	529-0211-00

Table 4 - CoreSense Modbus Map

Note: Number of registers value to be send in the query = Number in the column "Message Length With Zero Stuffing" / 2 (e.g. number of reg required to read "Seven day Warning history with cumulative count" is 36 (72/2)

Read Only Data
Read Write Data
Write Only Data

Parameters can be read using Function code 4 (Read Input Register)				
Location in Hex	Parameter	Message Length in Bytes	Message Length With Zero Stuffing	Description
300	CoreSense Module Firmware Version	8	16	
308	CoreSense Module Model Number	12	24	
314	ASSET Serial Number	12	24	
320	ASSET Model Number	18	36	
332	CoreSense Module Serial Number	11	22	
33D	Division Name	29	58	
35A	Product Code	9	18	
363	Product Name	7	14	
36A	Product type	1	2	
36B	Endian Convention	1	2	
36C	Dip switch Setting	2	2	
Unused (18 bytes)				
380	Alarm Code	1	2	0 - Normal Operation 1 - Loss of Communication to E2 2 - Open OR Short Spare Thermister Warning 3 - Open OR Shrt Scroll Thermister Warning 4 - Short Cycle Warning 5 - Module Low Voltage Trip 6 - Spare High Temperature Trip 7 - Missing Phase Trip 8 - Scroll High Temperature Trip 9 - Motor Thermister Open OR Short Trip 10 - Motor High Temperature Trip 11 -Short Cycle Lockout 12 - Spare High Temperature Lockout 13 - Motor High Temperature Open OR Short Lockout 14 - Reverse Phase Lockout 15 - Missing Phase Lockout 16 - Scroll High Temperature Lockout 17 - Motor High Temperature Trip Lockout 18 - P47 Module Failure

Table 4 - CoreSense Modbus Map Continued

Unused (18 bytes) - continued				
381	Input and Output status	4	4	0x0001 - PTC Status (OK-1/Not OK-0) 0x0002 - Scroll High Temp NTC Status (OK-1/Not OK-0) 0x0004 - Spare Temp NTC Status (OK-1/Not OK-0) 0x0008 - L1 Voltage Status (Present-1/Absent-0) 0x0010 - L2 Voltage Status (Present-1/Absent-0) 0x0020 - L3 Voltage Status (Present-1/Absent-0) 0x0040 - Line Phase Voltage Status (OK-1/Not OK-0) 0x0080 - Line Reverse Voltage Status (OK-1/Not OK-0) 0x0100 - Pilot Voltage Status (OK-1/Not OK-0)
385	N/A	2	2	
387	N/A	2	2	
389	Pilot Voltage Value	2	2	Pilot Voltage Value - Range 0 to 655.36 V
Unused (117 bytes)				
400	Ten most recent alarms with time stamp	40	60	
428	Compressor run history with cumulative count	11	20	
433	Compressor start history with cumulative count	19	20	
446	Short Cycle history with cumulative count	11	20	
Unused (30 bytes)				
46F	Seven day Warning history with cumulative count	40	72	
497	Seven day Trip history with cumulative count	60	108	
4D3	Seven day Lockout history with cumulative count	70	126	

Table 4 - CoreSense Modbus Map Continued

Parameters can be read using Function code 3 (Read Holding Register)			
Location in Hex	Parameter	Message Length in Bytes	Message Length With Zero Stuffing
100	Customer Id Code	4	8
104	Customer Location	17	34
115	Customer Name	17	34
126	Compressor Model Number Modified	18	36
138	Compressor serial number	12	24
144	Application code	3	6
147	Temperature code	4	8
14B	Refrigerant code	7	14
152	Functional Configuration	2	2
154	Compressor run time to count as short cycle	1	2
155	N/A	2	2
157	N/A	2	2
159	No. of Events to Phase Loss Lockout	1	2
15A	Future Use		
15B	Future Use		
15D	Future Use		
15F	N/A	1	2
160	No.of Events to Short Cycling Warning	1	2

Table 4 - CoreSense Modbus Map Continued

Parameters can be write using Function code 16 (Preset Multiple Registers)				
Location in Hex	Parameter	Message Length in Bytes	Message Length With Zero Stuffing	
100	Customer Id Code	4	8	
104	Customer Location	17	34	
115	Customer Name	17	34	
126	Compressor Model Number Modified	18	36	
138	Compressor serial number	12	24	
144	Application code	3	6	
147	Temperature code	4	8	
14B	Refrigerant code	7	14	
152	Functional Configuration	2	2	
154	Compressor run time to count as short cycle	1	2	Range: 1 min to 6 min
155	N/A	2	2	
157	N/A	2	2	
159	No. of Events to Phase Loss Lockout	1	2	Range: 4 to 24
15A	Future Use			
15B	Future Use			
15D	Future Use			
15F	N/A	1	2	
160	No. of Events to Short Cycling Warning	1	2	Range: 20 to 200
16A	Write Command	2	2	Options: 0x0800(Alarm Reset) & 0x8000(Module Reset)

Table 5 - DIP Switch Purpose

DIP Switch Number	On	Off
1 through 5	Modbus Module Address	
6	Baud Rate = 9600	Baud Rate = 19200
7	Even Parity	No Parity
8	Network Mode	Stand Alone
9[1]		PTC
10	Enable Short Cycle Protection	Disable Short Cycle Protection

[1] Thermistor configuration: = PTC only (2 wire connectors)

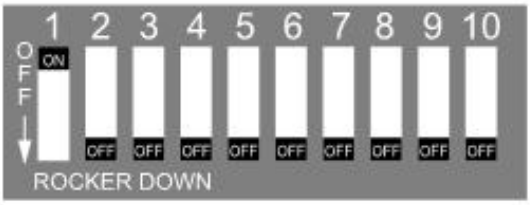


Table 6 - CoreSense™ Communications LED Flash Code Information

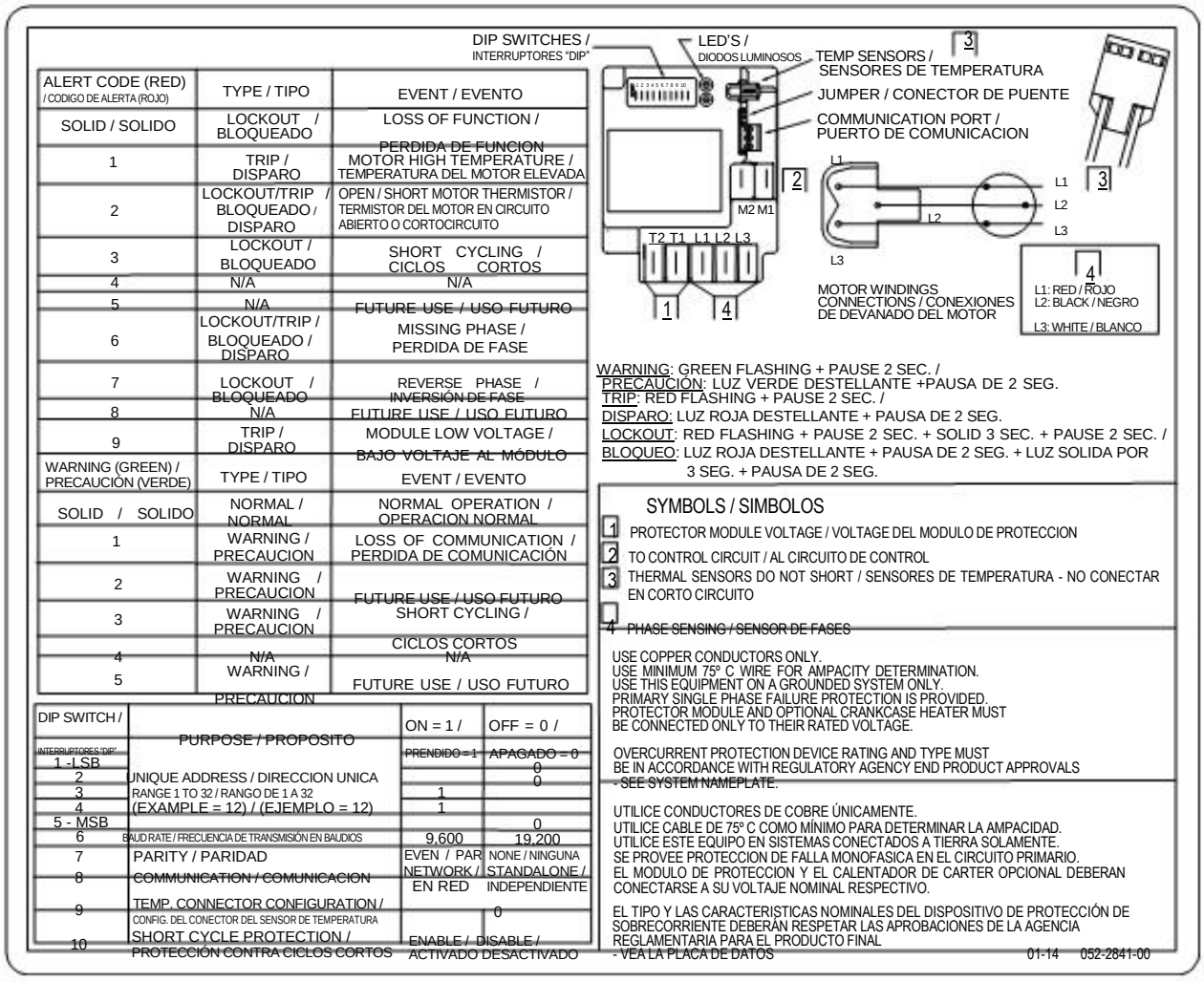
The flash code number corresponds to the number of LED flashes, followed by a pause, and then the flash code is repeated. A lockout condition produces a red flash, followed by a pause, a solid red, a second pause, and then repeated.

Status	Fault Condition	Code Fault Description	Code Reset Description	Trouble Shooting Information
Solid Green	Normal Operation	Module is powered and operation is normal	N/A	N/A
Solid Red	Module Malfunction	Module has internal fault	N/A	1) Reset module by removing power from T2-T1 2)Replace module
Warning LED Flash				
Green Flash Code 1	Loss of Communication	Module and master controller have lost communications with each other for more than 5 minutes	When communications are confirmed	1)Check the control wiring 2)Verify dipswitch 8 is "on"
Green Flash Code 2	Future Use	N/A	N/A	N/A
Green Flash Code 3	Short Cycling	Run time of less than 3 minutes; number of short cycles exceeds 48 in 24 hours	< 48 short cycles in 24 hours	1) Check system charge and pressure control setting 2) Adjust set-point of temperature controller 3) Install anti-short cycling control
Green Flash Code 4	Improper Dip Switch 9 Setting	N/A	N/A	Verify dipswitch 9 is "off"
Green Flash Code 5	Future Use	N/A	N/A	N/A

Table 6 Continued

Alert/Lockout LED Flash				
Red Flash Code 1	Motor High Temperature	Ω > 4.5K ± 25%; Lockout after 5 Alerts	Ω < 2.75K and 30 minutes	1) Check supply voltage 2) Check system charge & superheat 3) Check contactor
Red Flash Code 2	Open/Shorted Motor Thermistor	Ω > 220K or Ω < 40; Lockout after 6 hours	40 < Ω < 2.75K and 30 minutes	1) Check for poor connections at module and thermistor fusite 2) Check continuity of thermistor wiring harness
Red Flash Code 3	Short Cycling	Run time of less than 3 minutes; Lockout if the number of Alerts exceeds the number configured by the user in 24 hours	Interrupt power to T2-T1 or perform Modbus reset command	1) Check system charge and pressure control setting 2) Adjust set-point of temperature controller 3) Install anti-short cycling control
Red Flash Code 4	Not Used	N/A	N/A	N/A
Red Flash Code 5	Future Use	N/A	N/A	N/A
Red Flash Code 6	Missing Phase	Missing phase; Lockout after 10 consecutive Alerts	After 5 minutes and missing phase condition is not present	1) Check incoming power 2) Check fuses/breakers 3) Check contactor
Red Flash Code 7	Reverse Phase	Reverse phase; Lockout after 1 Alert	Interrupt power to T2-T1 or perform Modbus reset command	1) Check incoming phase sequence 2) Check contactor 3) Check module phasing wires A-B-C
Red Flash Code 8	Future Use	N/A	N/A	N/A
Red Flash Code 9	Module Low Voltage	Low voltage on T2-T1 terminals[1]	After 5 minutes and the voltage is back in the normal range	1) Verify correct module p/n 2) Check VA rating of transformer 3) Check for blown fuse in transformer secondary

[1] This Alert does not result in a Lockout



ALERT CODE (RED) / CODIGO DE ALERTA (ROJO)	TYPE / TIPO	EVENT / EVENTO
SOLID / SOLIDO	LOCKOUT / BLOQUEADO	LOSS OF FUNCTION / PERDIDA DE FUNCION
1	TRIP / DISPARO	MOTOR HIGH TEMPERATURE / TEMPERATURA DEL MOTOR ELEVADA
2	LOCKOUT/TRIP / BLOQUEADO / DISPARO	OPEN / SHORT MOTOR THERMISTOR / TERMISTOR DEL MOTOR EN CIRCUITO ABIERTO O CORTOCIRCUITO
3	LOCKOUT / BLOQUEADO	SHORT CYCLING / CICLOS CORTOS
4	N/A	N/A
5	N/A	FUTURE USE / USO FUTURO
6	LOCKOUT/TRIP / BLOQUEADO / DISPARO	MISSING PHASE / PERDIDA DE FASE
7	LOCKOUT / BLOQUEADO	REVERSE PHASE / INVERSIÓN DE FASE
8	N/A	FUTURE USE / USO FUTURO
9	TRIP / DISPARO	MODULE LOW VOLTAGE / BAJO VOLTAJE AL MÓDULO
WARNING (GREEN) / PRECAUCIÓN (VERDE)	TYPE / TIPO	EVENT / EVENTO
SOLID / SOLIDO	NORMAL / NORMAL	NORMAL OPERATION / OPERACION NORMAL
1	WARNING / PRECAUCION	LOSS OF COMMUNICATION / PERDIDA DE COMUNICACIÓN
2	WARNING / PRECAUCION	FUTURE USE / USO FUTURO
3	WARNING / PRECAUCION	SHORT CYCLING / CICLOS CORTOS
4	N/A	N/A
5	WARNING / PRECAUCION	FUTURE USE / USO FUTURO

DIP SWITCH / INTERRUPTORES "DIP"	PURPOSE / PROPOSITO	ON = 1 / PRENDIDO = 1	OFF = 0 / APAGADO = 0
1 - LSB	UNIQUE ADDRESS / DIRECCION UNICA RANGE 1 TO 32 / RANGO DE 1 A 32 (EXAMPLE = 12) / (EJEMPLO = 12)		0
2			0
3		1	
4		1	
5 - MSB			0
6	BAUD RATE / FRECUENCIA DE TRANSMISIÓN EN BAUDIOS	9,600	19,200
7	PARITY / PARIDAD	EVEN / PAR	NONE / NINGUNA
8	COMMUNICATION / COMUNICACION	NETWORK / EN RED	STANDALONE / INDEPENDIENTE
9	TEMP. CONNECTOR CONFIGURATION / CONFIG. DEL CONECTOR DEL SENSOR DE TEMPERATURA		0
10	SHORT CYCLE PROTECTION / PROTECCIÓN CONTRA CICLOS CORTOS	ENABLE / ACTIVADO	DISABLE / DESACTIVADO

WARNING: GREEN FLASHING + PAUSE 2 SEC. /
PRECAUCIÓN: LUZ VERDE DESTELLANTE +PAUSA DE 2 SEG.
TRIP: RED FLASHING + PAUSE 2 SEC. /
DISPARO: LUZ ROJA DESTELLANTE + PAUSA DE 2 SEG.
LOCKOUT: RED FLASHING + PAUSE 2 SEC. + SOLID 3 SEC. + PAUSE 2 SEC. /
BLOQUEO: LUZ ROJA DESTELLANTE + PAUSA DE 2 SEG. + LUZ SOLIDA POR 3 SEG. + PAUSA DE 2 SEG.

SYMBOLS / SIMBOLOS

1 PROTECTOR MODULE VOLTAGE / VOLTAGE DEL MODULO DE PROTECCION
2 TO CONTROL CIRCUIT / AL CIRCUITO DE CONTROL
3 THERMAL SENSORS DO NOT SHORT / SENSORES DE TEMPERATURA - NO CONECTAR EN CORTO CIRCUITO
4 PHASE SENSING / SENSOR DE FASES

USE COPPER CONDUCTORS ONLY.
USE MINIMUM 75° C WIRE FOR AMPACITY DETERMINATION.
USE THIS EQUIPMENT ON A GROUNDED SYSTEM ONLY.
PRIMARY SINGLE PHASE FAILURE PROTECTION IS PROVIDED.
PROTECTOR MODULE AND OPTIONAL CRANKCASE HEATER MUST BE CONNECTED ONLY TO THEIR RATED VOLTAGE.

OVERCURRENT PROTECTION DEVICE RATING AND TYPE MUST BE IN ACCORDANCE WITH REGULATORY AGENCY END PRODUCT APPROVALS - SEE SYSTEM NAMEPLATE.

UTILICE CONDUCTORES DE COBRE ÚNICAMENTE.
UTILICE CABLE DE 75° C COMO MÍNIMO PARA DETERMINAR LA AMPACIDAD.
UTILICE ESTE EQUIPO EN SISTEMAS CONECTADOS A TIERRA SOLAMENTE.
SE PROVEE PROTECCION DE FALLA MONOFASICA EN EL CIRCUITO PRIMARIO.
EL MODULO DE PROTECCION Y EL CALENTADOR DE CARTER OPCIONAL DEBERAN CONECTARSE A SU VOLTAJE NOMINAL RESPECTIVO.

EL TIPO Y LAS CARACTERISTICAS NOMINALES DEL DISPOSITIVO DE PROTECCIÓN DE SOBRECORRIENTE DEBERÁN RESPETAR LAS APROBACIONES DE LA AGENCIA REGLAMENTARIA PARA EL PRODUCTO FINAL - VEA LA PLACA DE DATOS

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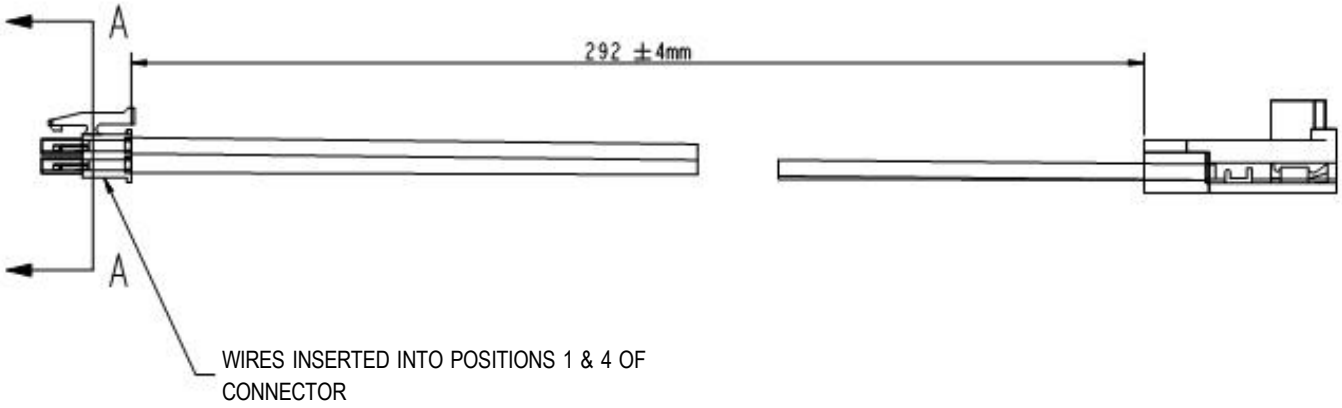
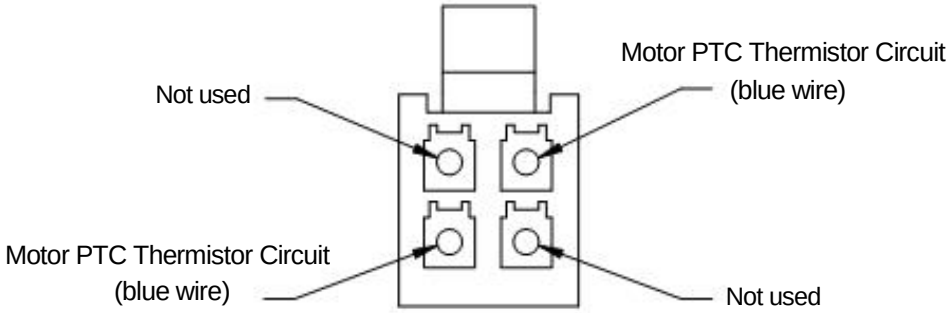
Figure 1 - Wiring Diagram

Figure 2 - CoreSense Communications Module





Terminal identification is from the end of the plug (View A)

Figure 3
Thermistor Circuit Cable

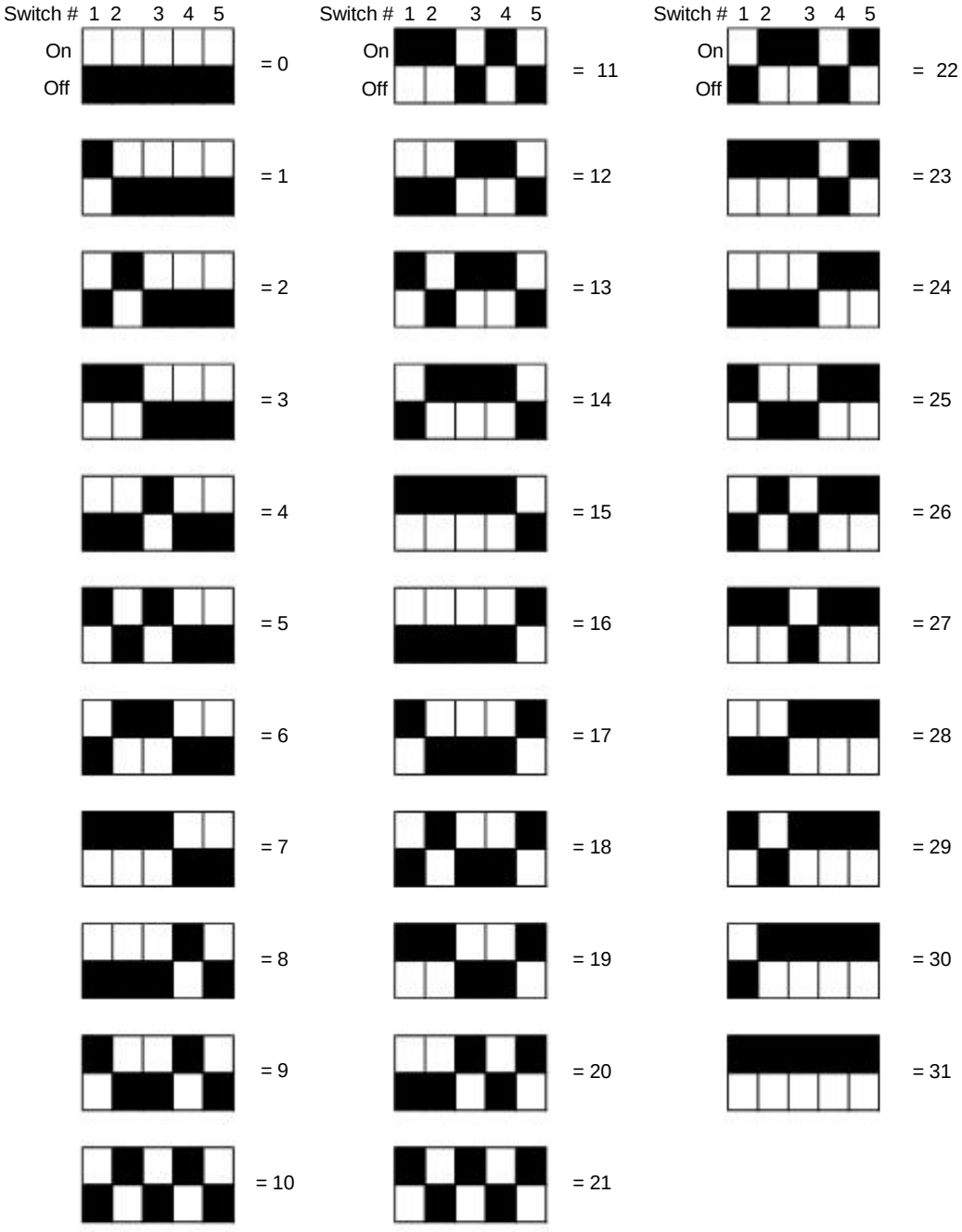


Figure 4
Modbus Addressing

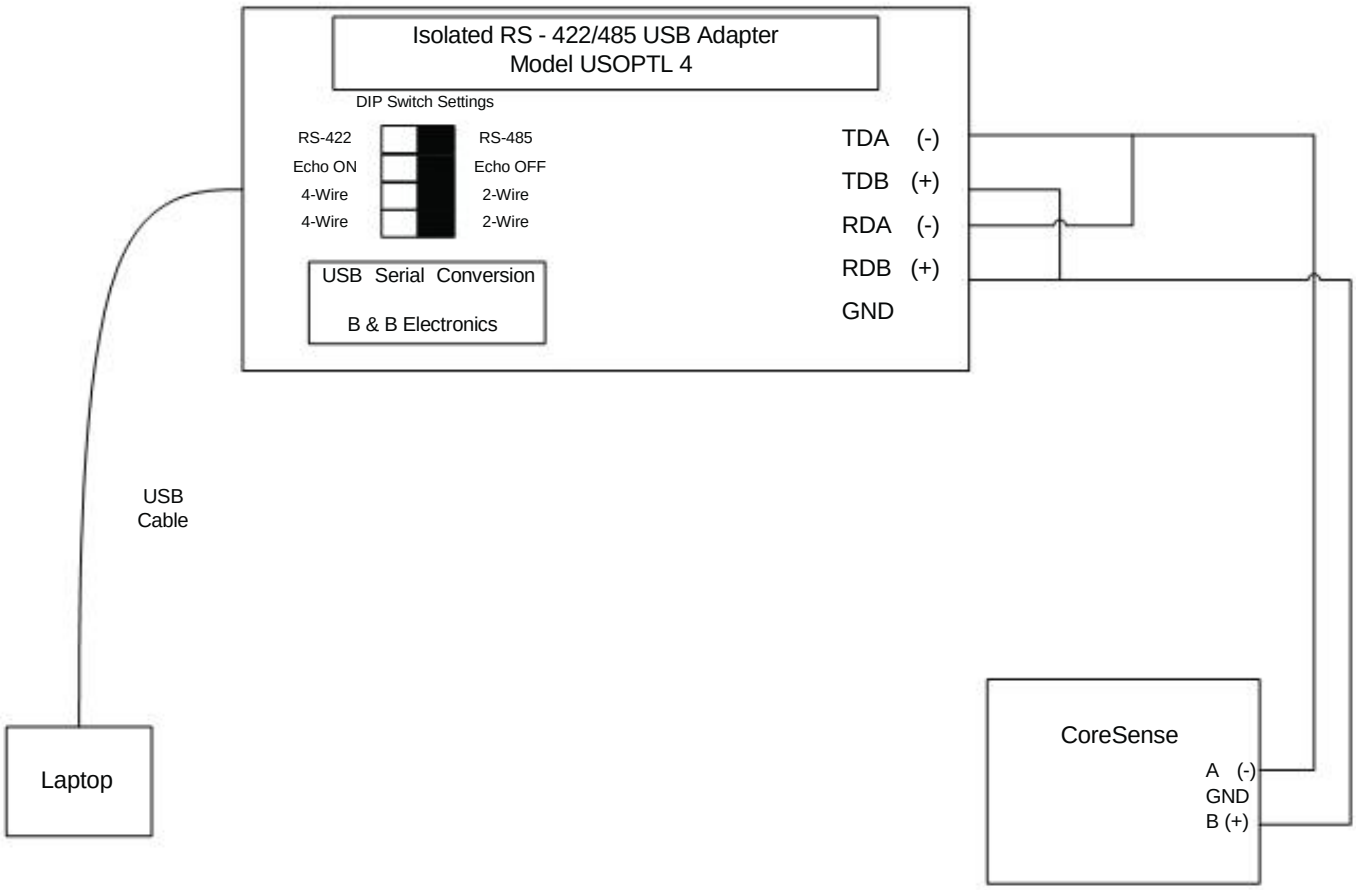


Figure 5
PC Interface Wiring