

Copeland Scroll™ Outdoor Condensing Unit

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Introduction

Copeland Scroll™ outdoor condensing units provide the many benefits of scroll compressor technology, coupled with advanced diagnostic controls, to ensure reliable performance and operation in foodservice applications. Electronics are used extensively in its protection and diagnostic features. These features are controlled by an electronic integrated control board. The control board provides base control functions related to temperature controller, defrost, evaporator fan control, compressor protection e.g. current overload, phase reversal, liquid/vapor injection control, self diagnostics and warnings. These error codes can be seen by an LED display for easy and rapid troubleshooting and maintenance.

A complete product offering for medium and low temperature units is being offered in single and three phase 208/230 volts. The -002 and -012 BOM product is approved for operation in ambients from 120°F to -10°F.

XJAM/XJAL -022 models come factory equipped with a heated and insulated receiver (thermostat controlled), a check valve installed between the condenser outlet and receiver inlet, and a 6 second low pressure control time delay function.

XJAM/XJAL -022 models are approved to operate in ambient temperatures below -10°F (-24°C). Laboratory testing has confirmed successful operation at -30°F (-34°C) with the factory supplied low ambient components. At low ambient conditions, a unit may recycle on low pressure several times during a restart. This is normal behavior.

Nomenclature/Features

See **Figure 1** at the end of this bulletin.

Understanding Actual vs. Standard Airflow

To choose the proper coil for your application, the density of the incoming air needs to be known to calculate the actual capacity and performance of the system.

A coil's required capacity can be calculated using the thermodynamic equation

$$Q = M \times \Delta h$$

Q = Heat transfer to or from the air (Btuh)

M = Mass flow rate of air (lb/hr)

Delta h = Difference between the entering and leaving air enthalpy or total heat (Btu/lb)

The mass flow rate is equal to the density of air times the face area of the coil times the velocity of the air at the coil or face velocity.

$$M = P \times A \times V$$

P = Density (lb/ cubic ft.)

A = Face area of coil (square ft.) ~ Fin height x fin length

V = Air Velocity (ft./min.)

For temperature conversions (**A1**) = $\frac{530}{T+460}$

Temperature Conversion Factors

Temp (degrees F)	Factor A1	Temp (degrees F)	Factor A1
0	1.15	60	1.02
10	1.13	70	1.00
20	1.10	80	.98
30	1.08	90	.96
40	1.06	100	.95
50	1.04	110	.93

Altitude Conversion Factors (A2)

Alt.- Ft.	Factor- A2	Alt.- Ft	Factor- A2
0	1.00	3000	.895
500	.982	4000	.864
1000	.965	5000	.832
1500	.947	6000	.802
2000	.930	7000	.771
2500	.912	8000	.743

$$SCFM = CFM \times A1 \times A2$$

Note: all calculations and ratings are based on standard air at 70°F dry bulb temp and 29.92 Hg atmospheric pressure (sea level). These tables convert non standard cfm to standard cfm.

Performance Data

See **Tables 1** and **2** at the end of this bulletin.

Electrical / Physical Data

See **Table 3**.

Generator Requirements

In situations or locations where an electrical power generator could be applied in the event of a power outage, the Copeland Scroll™ outdoor condensing unit will operate providing the generator will provide a supply voltage range of 180-260 VAC along with a frequency of 47-63 Hz. The electronics control along with the power board will function properly providing the range of operating limits is in compliance!

Physical Dimensions

See **Figure 2**.

Installation / Piping Instructions

See **Figure 2** for overall dimensions of the units. It is recommended that a clearance of 8 inches from the wall (or the next unit) be maintained from the unit's left and rear panel whereas a clearance of 20 inches is to be maintained from the unit's right, top and front panels. Both service access and airflow have been considered in making these recommendations. Where multiple units are to be installed in the same location, careful consideration for proper clearance needs to be given to each individual unit.

Ideally, the unit should be mounted level on a solid concrete slab with rubber strips between unit feet and concrete. However, these units have been designed for mounting on suitable brackets for wall mounting. In this case it is equally important that the spatial guidelines given above are followed, and additional consideration needs to be given for possible air recycling if units are stacked above and below each other. In general terms, air by-pass around each condenser and between each unit should be avoided at all times.

Pipe sizing should not only be of sufficient size to ensure optimum performance and good oil return, but it also needs to take into account the full capacity range through which this particular unit will need to operate. Follow the ASHRAE guidelines for proper piping practices.

Condensing Unit Operational Control

The Digital Control electronic control board controls the operation of the condensing unit. Whenever there is a control input asking to start or stop the condensing unit, the control board will execute a set of pre-programmed procedures to do so. It also monitors the compressor operating parameters, so as to protect the system from unsafe operating parameters. See **Figure 3**.

For example, when the low temperature unit experiences an extreme temperature day, the control board decides to switch from vapor-injection-optimization to discharge gas temperature control to allow the compressor to run safely and pass the extreme weather hours.

Control Features

The base control function is for the following standard features. See **Figure 3** for additional input options and output options of the control board.

Fresh Start Program

This Fresh Start Program is a bump start procedure that

will energize and start the compressor for 3 seconds and then will be followed by a 20 second off cycle time. This will occur for 3 cycles, and then continuous power will be supplied to the compressor for normal operation.

The Fresh Start Program will be executed on initial start up or any time power is reapplied when the ambient temperature is lower than 95°F. In addition, the Fresh Start Program will be executed for any start when the unit has been cycled off for more than an hour when the ambient temperature is lower than 95°F.

Stop Program

When the unit is satisfied, or there is any error which requires the unit to be shut down, the controller will execute a Stop Program. The compressor and the condenser fans will cycle off and the injection valves will close.

For low temperature units only, when the unit is satisfied the EXV will start closing immediately, but the compressor will delay 5 seconds before shut down to prevent reverse rotation of the compressor.

Automatic Liquid Injection (Medium temperature units only)

Automatic Liquid Injection ensures that the scroll compressor operates within a safe temperature limit. This unit employs a patented liquid injection system which injects a saturated refrigerant into the suction line at the compressor. Activation of the liquid injection valve is in response to a thermistor which is attached to the compressor discharge line. A signal is sent to the stepper motor of the injection valve, opening the valve in response to increasing discharge temperatures and injecting saturated refrigerant to reduce the discharge temperature.

Compressor Phase Reversal

Compressor Phase Reversal senses for the correct phase sequence on three phase applications. Reset is automatic once the correct phase sequence is sensed. An error message will be shown on the diagnostic LED.

Loss of Phase Protection

If three phase supply is incorrectly connected to the contactor terminals, or if a missing phase is sensed, an error message will be shown on the diagnostic LED. Reset is automatic once the correct phasing is sensed.

Motor Current Overload

- All scroll compressors used in these condensing units have an internal inherit motor protector.

- The Copeland Scroll Outdoor Condensing Unit is also equipped with two current sensors (CT1, CT2) to monitor the electrical current of the condensing unit. If the condensing unit current exceeds a pre-defined current limit, the controller will take the following actions:
 - Stop the compressor for 3 minutes
 - LED signal will display an Over Current Error for 3 minutes
 - After a 3 minute delay the compressor will go through a normal start
 - The system will lock out after 6 over current trips within an hour

For this function to operate, two of the power leads are routed through the current sensing coils (CT1, CT2), prior to the contactor, from the factory. See **Figure 3**.

Non-Adjustable High Pressure Control

This pressure sensing device is a nonadjustable, low voltage pressure switch that will open at 435psig and reset at 348psig in the event of high discharge pressure. Its signal is monitored by the control board.

- In the event of a high pressure trip, the unit will stop and then restart after a 3-minute delay.
- After 6 successive HP cut-outs within 1 hour, the unit will lock-out.
- The lockout feature can be reset by disconnecting the power source and then cycling power to the unit.

Adjustable Low Pressure Switch

An adjustable low pressure switch is provided as standard equipment on both the medium and low temperature condensing units. This control can be used for a pump-down cycle if so desired. See **Table 8, Low Pressure Control Settings**.

Units introduced in mid-2013 include an electronic low pressure control. The electronic low pressure control provides more accurate cut-in and cut-out pressure settings and maintains these settings without drifting over time. See **Figure 7** for setup procedure.

Liquid Floodback Protection

- Liquid refrigerant entering the compressor during the run cycle, in excessive quantities, can damage the compressor by diluting the lubricant, as well as excessive stress on several components in the compressor. Proper control of liquid refrigerant within the system is an application issue and is beyond control of this controller. However, the controller can perform checks and alert the user that liquid refrigerant floodback may be occurring and

immediate field service is required. This is only a warning signal and will not terminate the operation of the unit. See **Tables 6** and **6a**.

- Liquid Floodback Protection is acquired by monitoring the compressor discharge temperature. When the discharge line temperature falls below a specified point, low suction line superheat may be the cause.

Crankcase Heater

The crankcase heater is wired through a normally closed contact of the compressor contactor which is energized whenever the compressor cycles off.

Condenser Fan Speed Control

The Condenser Fan Speed Control will vary the speed of the condenser fan motor for head pressure control under low ambient conditions. There are two thermistor type sensors that are connected to the control board. These sensors monitor the condenser mid coil temperatures and ambient air temperatures to control the fan speed.

Enhanced Vapor Injection (EVI) Control (Low temperature units only)

The EVI system improves low temperature operational efficiency and provides a reliable low temperature envelope. It is used to optimize performance and to prevent the scroll set from overheating. This is done by controlling the discharge line temperature (DLT) and vapor injection superheat (VISH).

Enhanced vapor injection is accomplished by utilizing a subcooling circuit. A heat exchanger is used to subcool the liquid refrigerant before it enters the evaporator. As a result of the subcooling done by the heat exchanger, refrigerant will also be evaporated. This evaporated refrigerant is then injected into the mid compression cycle of the scroll compressor for overheat temperature control.

There are two thermistors sensing the discharge line temperature, one is located at the discharge line of the compressor and the second one is placed at the inlet of the condenser coil. In order to have a higher temperature resolution, the discharge line thermistor and condenser coil inlet sensor cooperate to sense a temperature range from 50°F to 329°F. The discharge line thermistor has a sensing range from 163°F to 329°F and the condenser coil will sense temperature from 50°F to 176°F. The EVI system will keep the discharge line temperature below 230°F to ensure the safety of the compressor.

It is important to insulate the system liquid line from the condensing unit to the evaporator. The recommended insulation thickness is a minimum of ½ inch. Also the

lower liquid temperature can increase the evaporator expansion valve capacities. Please follow the valve manufactures recommended liquid temperature correction factors for proper selection of the evaporator expansion valve.

Electronic Expansion Value (EXV)

The Electronic Expansion Value (EXV) is a key part of the EVI system. It will regulate vapor injection flow to optimize the performance of system and cool the scroll set. Every second, the control chip will collect the thermistors reading and do a four second averaging. The EXV opening will be changed every 20 seconds and the variation is calculated by different ways based on different purposes.

TXV selection

For EVI, Emerson recommends a balanced port TXV because it offers a wider operating range for floating liquid temperatures.

See **Table 7** for specifics regarding balanced port sizing recommendations. Applied with the low temp units it is recommended that a balanced port expansion valve be used along with a complete review of the the distributor & nozzle (orifice) that is supplied with the Evaporator coil being matched with the applicable condensing unit. Typically nozzles are selected for standard TXV sizing using 100°F liquid, with the XJAL those typical selections could be grossly oversized. See **Table 7** for the liquid correction safety factors when selecting those components.

Other Inputs to the Control Board

Customer Supplied Control (Thermostat)

The control board will accept a normal 220 volt AC input ON/OFF signal such as the switching action of a normal commercial thermostat and relay. If the system is controlled by low pressure control for a multiple evaporator system and/or pump down system, the control board will accept the signal directly from the control. See **Wiring Diagrams**, for proper installation.

Other Outputs from the Control Board

Defrost Control Board for Units Produced Prior to Mid- 2013

(using the control module shown in **Figure 4.**)

The defrost control board is a basic time initiated module which is standard on both low and medium temperature units. The defrost control board can control either off-cycle or electric defrost.

The defrost control board will control the liquid line

solenoid valve. When defrost is initiated the liquid line solenoid valve will close and the unit will go into a pumpdown cycle. When the suction pressure equals the setting of the low pressure control, the compressor will cycle off. After the defrost time has expired, the liquid line solenoid valve opens and then the low pressure control will allow the compressor to restart.

On -002 and -012 models only, due to heater amperage loads, electric defrost requires an additional relay or contactor to energize the defrost heater. Relays capable of 30 amp loads are supplied on the -022 models

The defrost cycle can be executed either automatically or manually. There are two rotary dip switches by which the user can set up the defrost cycle, see **Figure 4**. One rotary dipswitch sets the defrost duration (SW1) and the second rotary dipswitch sets the time interval between defrost cycles (SW2). For automatic defrost set SW1 and SW2 as desired. See **Table 4** for time settings. The defrost control board also incorporates a manual defrost button that enables a manual defrost as an override to the rotary switch setting the defrost interval. Upon the completion of a manual defrost, the system will reset to the refrigeration cycle with the same procedures as automatic defrost and then the automatic defrost timer will reset.

For setting manual defrost only set SW1 as desired and set SW2 to "0". Whenever the manual defrost button is pressed, one defrost cycle will be executed and the duration of defrost will be determined by the setting of the rotary dipswitch SW1.

Note: There is no method to terminate a defrost cycle without resetting the control board.

Table 4 lists rotary dip switch settings for the Defrost Control Board.

An ON/OFF output connection is provided on the control board (JP10) for direct connection of a customer supplied contactor coil/relay when the defrost option is used. Terminals are male spade type. Coil voltage rating should be 220VAC and current ratings, 30VA (hold) and 330VA (inrush). See **Figure 6**.

For customers using their existing defrost timer, remove the defrost cable connecting the defrost control board to the unit control board. Also on the unit control board change the mode setting dip-switch bit 2 to ON and proceed to standard defrost wiring. See **Table 5**.

Updated Defrost Control Module

Models produced after mid 2013 include an updated electronic control module that allows for both interval based defrost or real time based defrost. See **Figure 7** for quick setup guide. See **Appendix 2, Defrost Quickstart**, for detailed information.

Evaporator Fan Control

An ON/OFF output connection is also provided on the control board (JP9) for direct connection of a customer supplied contactor coil controlling the evaporator fans. Terminals are the male spade type. Coil voltage rating is to be 220VAC and a maximum power rating of 30VA (hold) and 330VA (inrush). See **Figure 6**.

Diagnostic Display Board

Each condensing unit is supplied with a one-way communications and diagnostic display board, see **Figure 5**. A two character display will make up the diagnostic/error code. The first character will display the unit status as shown in **Table 6**. The second character will display the error/warning code as shown in **Table 6a**. See **Figure 5** for a detailed view of the diagnostics board assembly.

The Main Board Connector terminal will accept the cable connecting the display board to the main control board. The Reset Button will reset the diagnostic display board only. The Message Recall Button will display the last error signal received by the display board. See **Figure 5**.

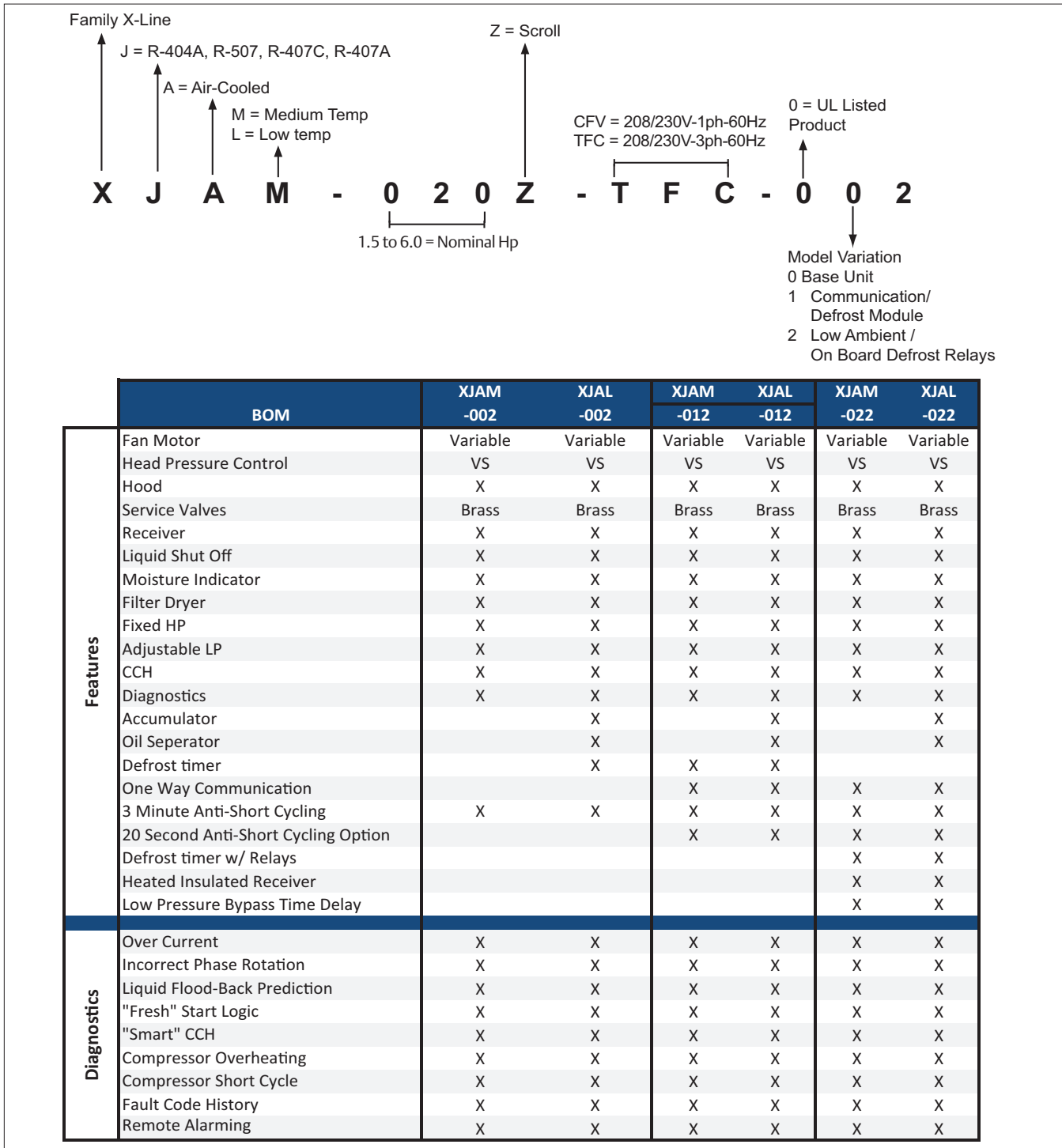
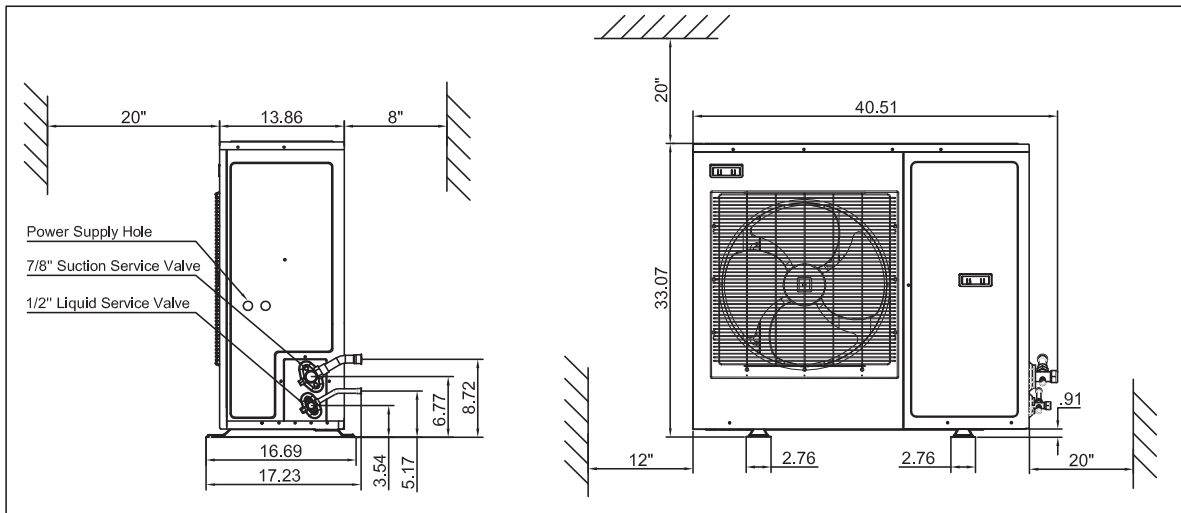
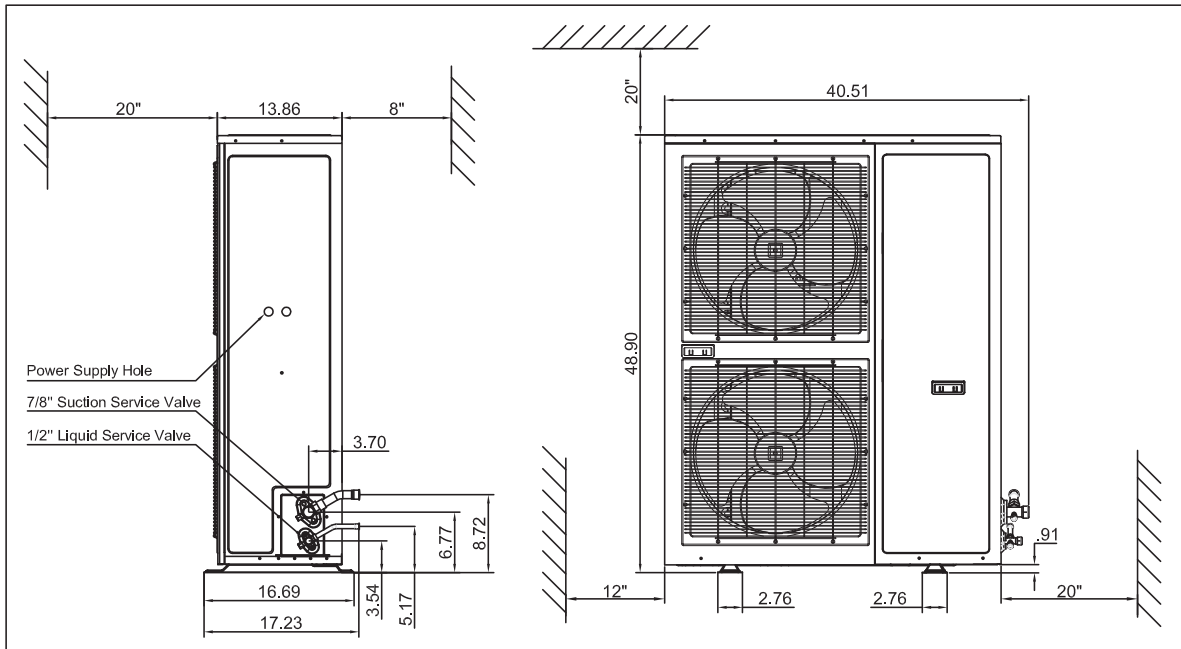


Figure 1 – Nomenclature and Features

END ELEVATION & ELEVATION VIEWS - SINGLE FAN UNIT



END ELEVATION & ELEVATION VIEWS - DUAL FAN UNIT



BOTTOM VIEW - ALL MODELS

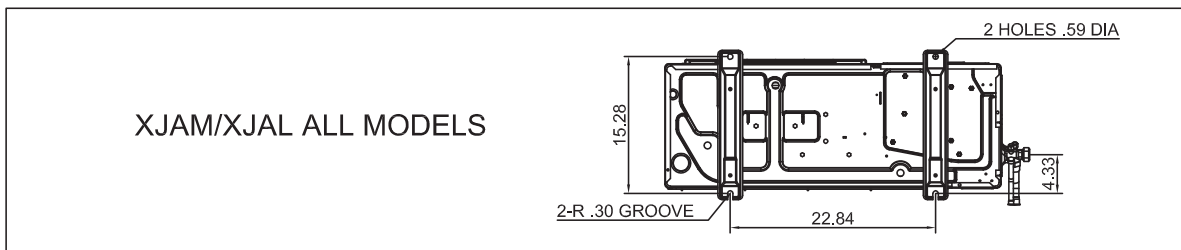


Figure 2 – Physical and Installation Requirements

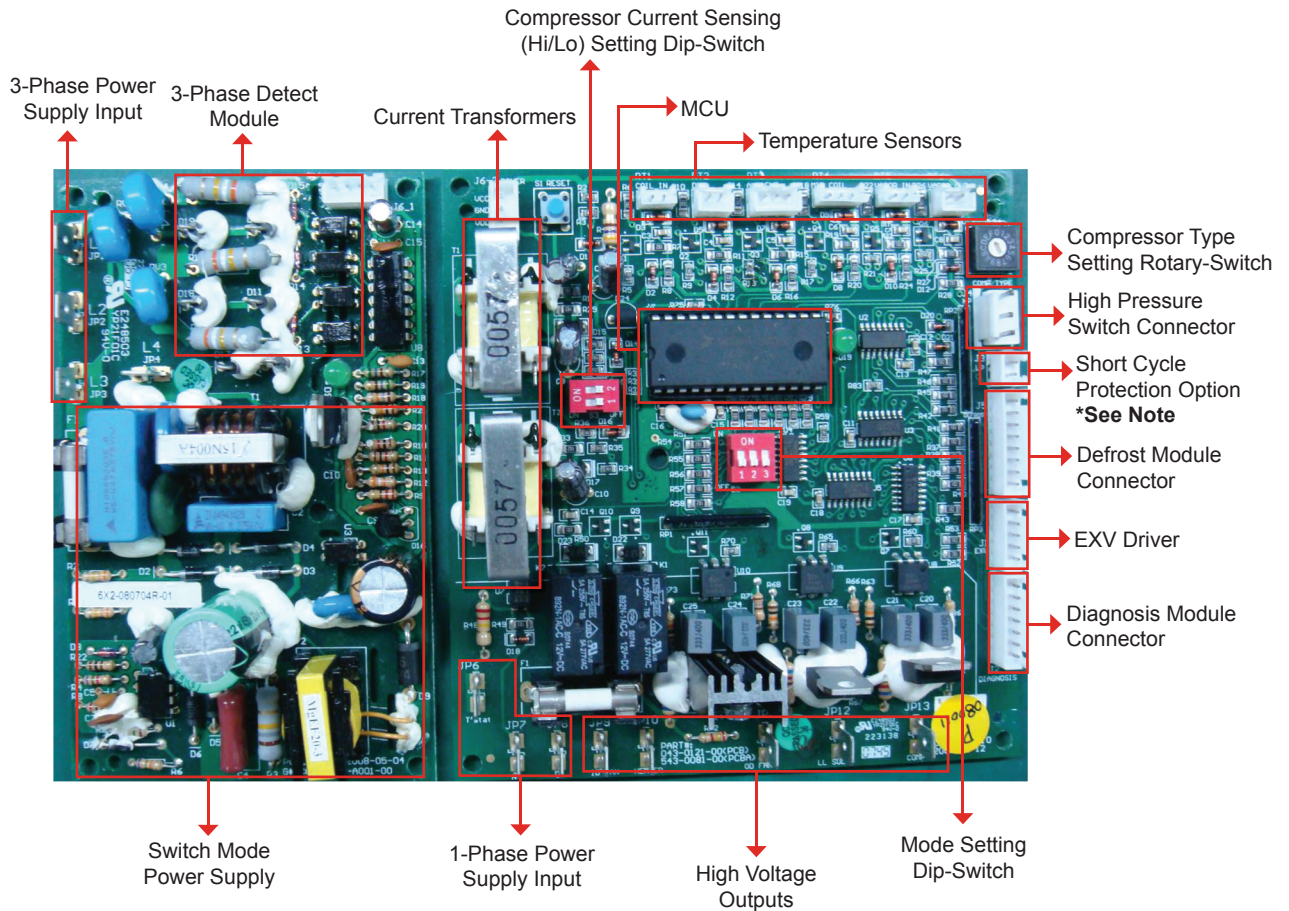


Figure 3 – Power Board / Control Board

*** Note:** Short Cycle Protection Option

- a) Factory Jumper Installed Three Minute Time Delay
- b) Remove Jumper Twenty Second Time Delay

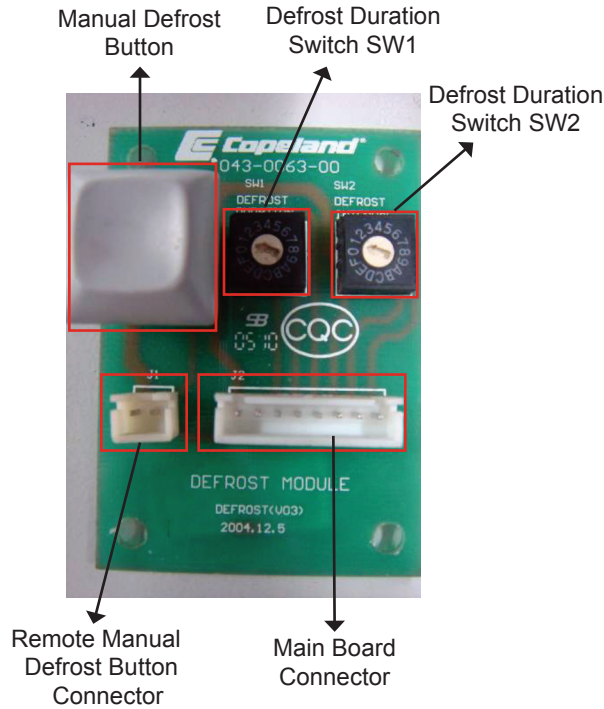


Figure 4
Defrost Control Module

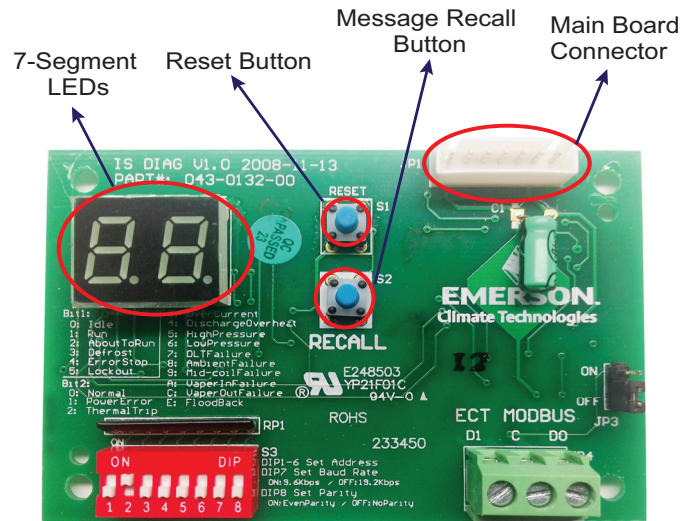
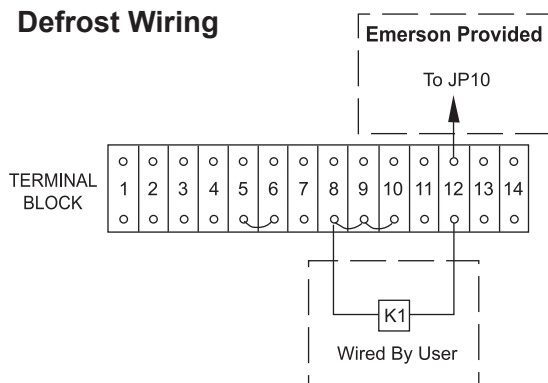


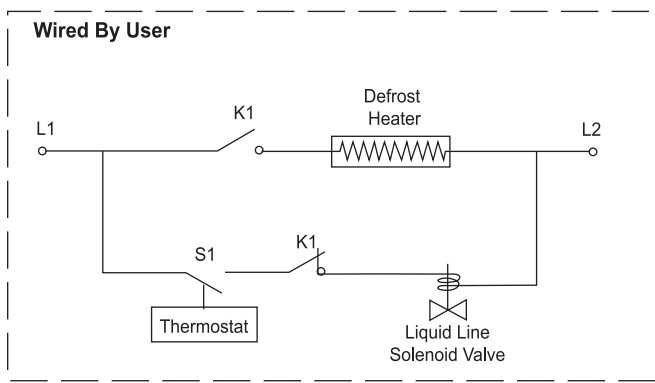
Figure 5
Communication Board

Emerson-Supplied Defrost Module Requirements Utilized on Bom's -002/-012

Defrost Wiring



Wired By User













K1: Double Pole Relay/Contactor

Note: Emerson defrost module (PN#043-0063-00) is used as the defrost timer.

Figure 6
Emerson Supplied Defrost (-002/-012 Models Only)

Quick Setup Guide

Adjusting Low Pressure Settings

Hold DOWN and SET simultaneously for 3 seconds to enter menu (PSI light will flash)	 + 
Cycle through menu options – UP/DOWN	 
Select function – SET	
Adjust value – UP/DOWN	 
Store function - SET	
Exit menu - UP and SET	 + 



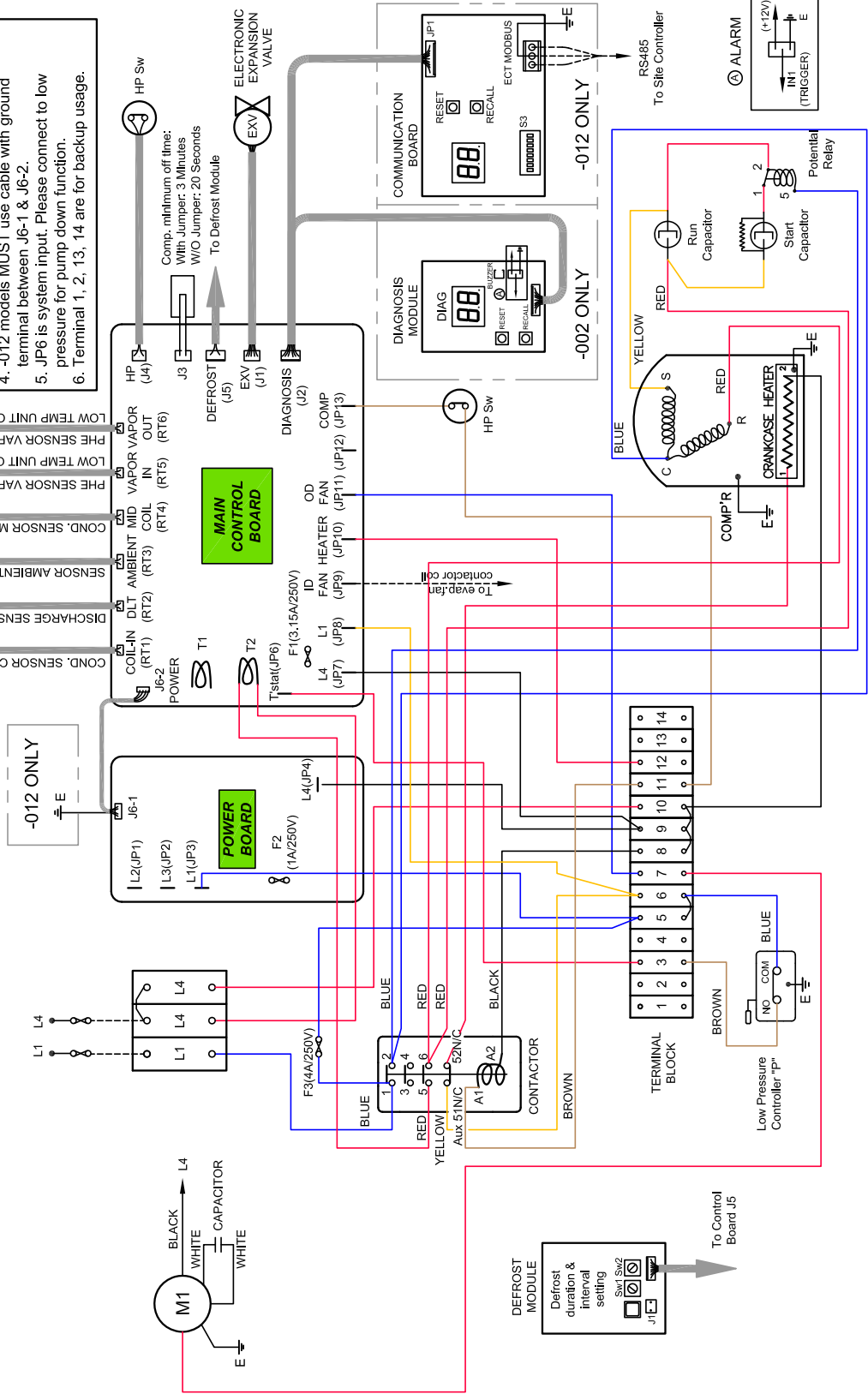
	
Low Pressure Cut-In	Low Pressure Cut-Out

Figure 7
Quick Setup Guide for Electronic Low Pressure Control

XJAM/XJAL Single Fan CFV-002 and -012 Models

ATTENTION: Unit MUST be grounded!

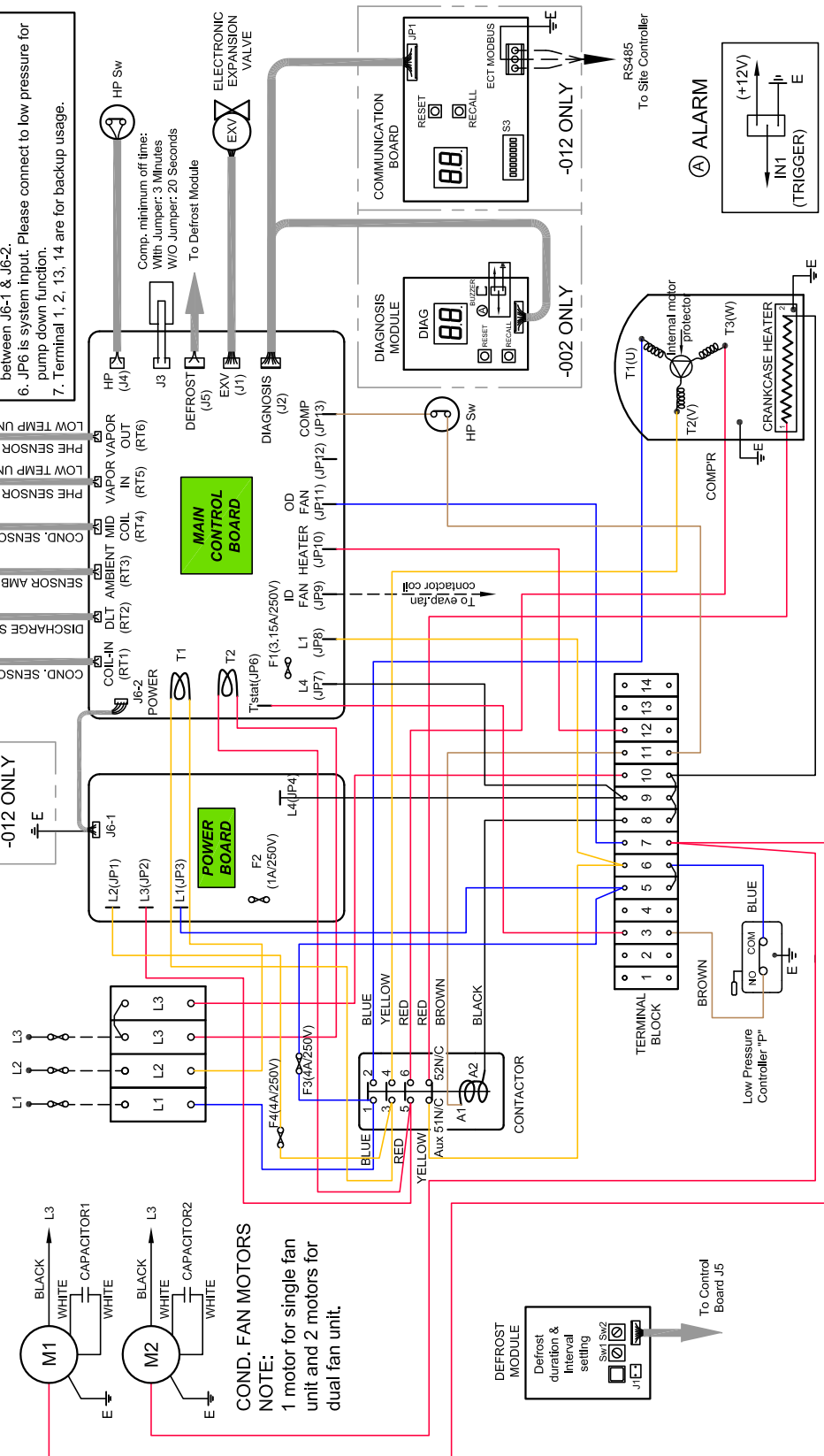
Notes:
 1. Dashed line "----" is wired by installer.
 2. "L4" and Earth "E" wirings are not shown in harnesses for clarity.
 3. Diagnosis module only exists in -002 models, Communication board only exists in -012 models.
 4. -012 models MUST use cable with ground terminal between J6-1 & J6-2.
 5. JP6 is system input. Please connect to low pressure for pump down function.
 6. Terminal 1, 2, 13, 14 are for backup usage.



XJAM/XJAL Single and Dual Fan TFC-002 and -012 Models

ATTENTION: Unit MUST be grounded!

- NOTES:**
1. Dashed line "----" is wired by installer.
 2. Earth "E" wirings are not shown in harnesses for clarity.
 3. "L4" shown on Power Supply Board & Main Control Board connect to Hotline "L3".
 4. Diagnosis module only exists in -002 models.
 5. -012 models MUST use cable with ground terminal between J6-1 & J6-2.
 6. JP6 is system input. Please connect to low pressure for pump down function.
 7. Terminal 1, 2, 13, 14 are for backup usage.

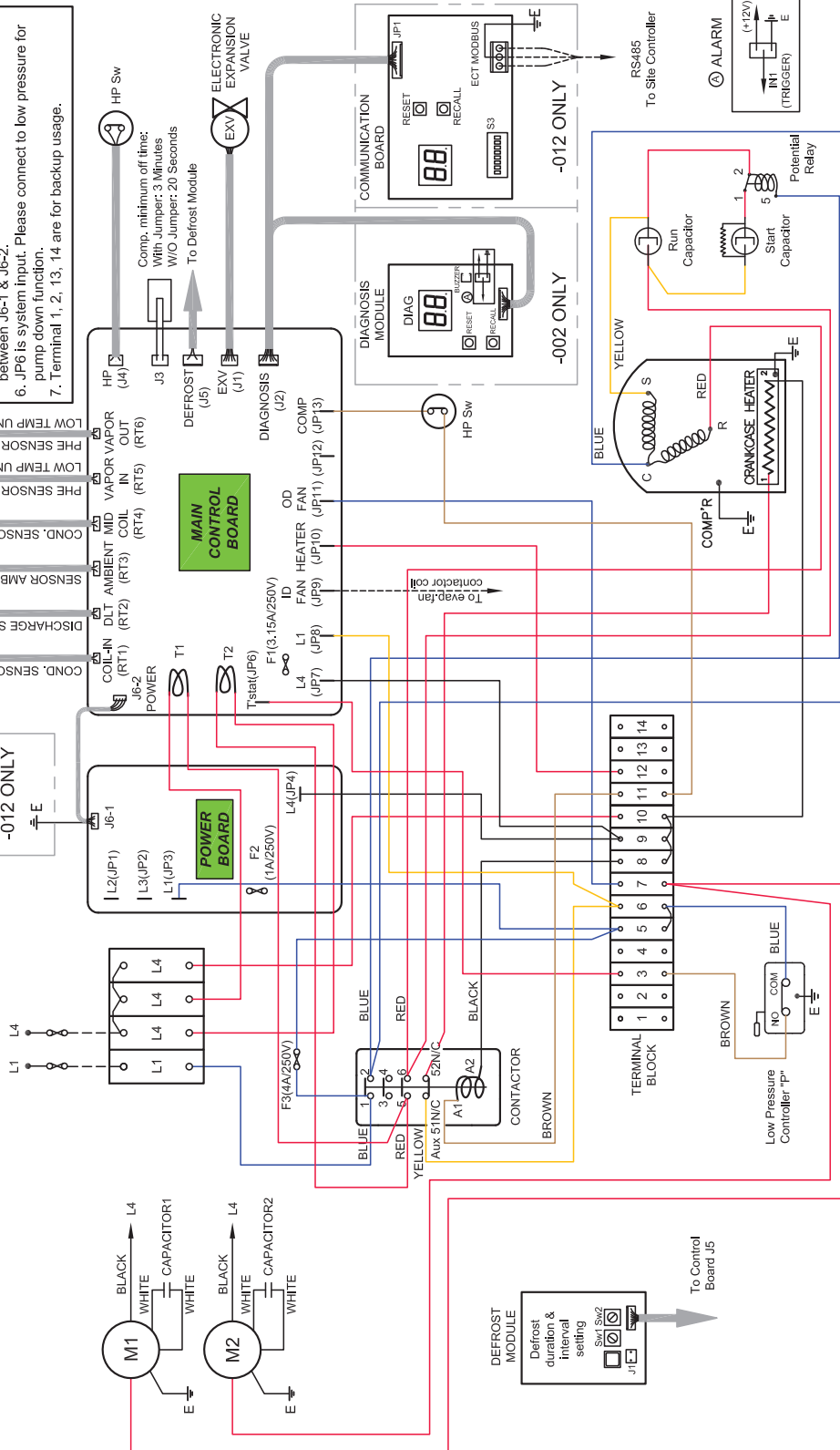


COND. FAN MOTORS
NOTE:
1 motor for single fan
unit and 2 motors for
dual fan unit.

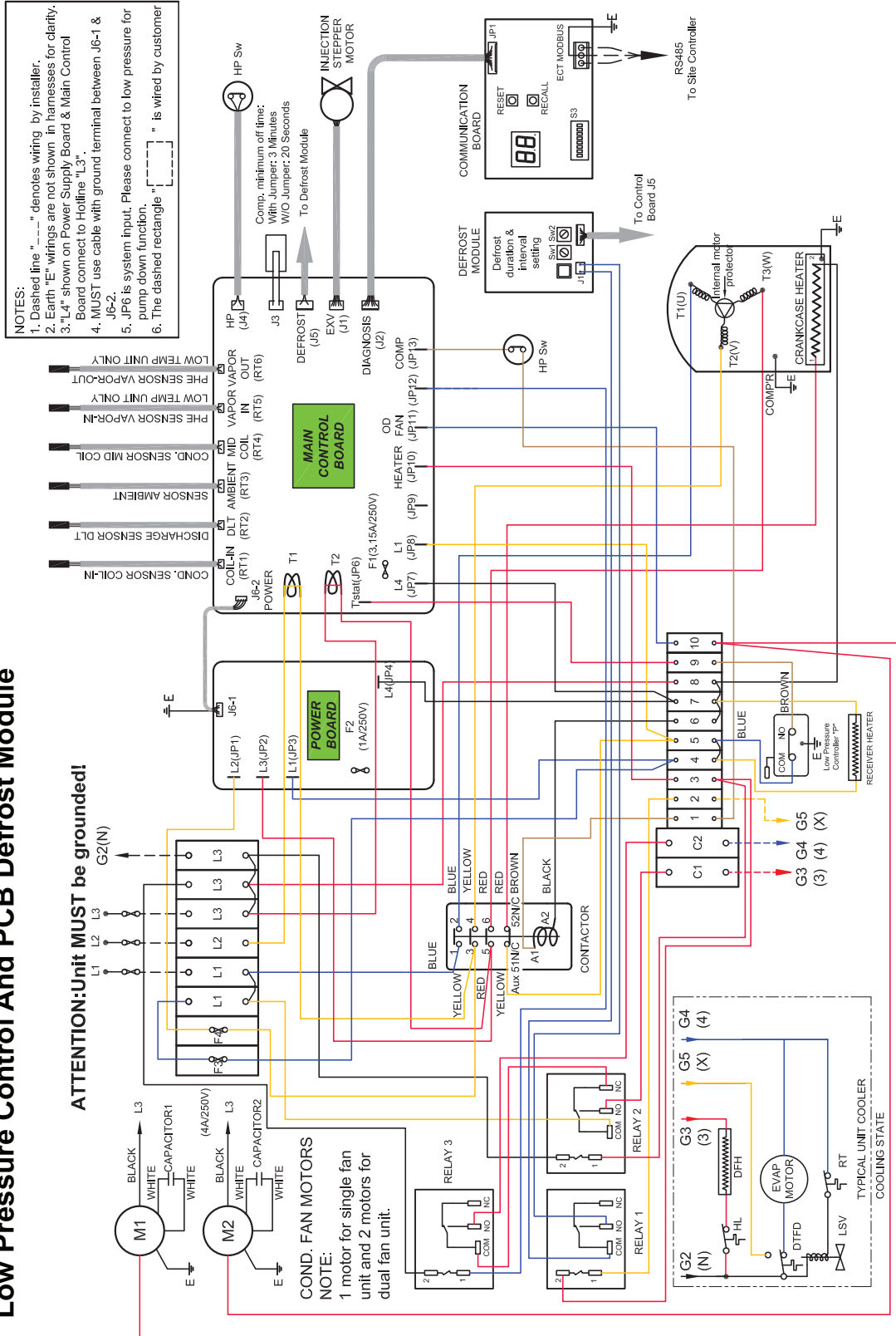
XJAM/XJAL Dual Fan CFV-002 and -012 Models

ATTENTION: Unit MUST be grounded!

- Notes:
1. Dashed line "-----" is wired by Installer, for clarity.
 2. "L4" and Earth "E" wirings are not shown in harnesses.
 3. Wires pass thru T1 & T2 MUST have same length & size.
 4. Diagnosis module only exists in -002 models.
 5. -012 models MUST use cable with ground terminal between J6-1 & J6-2.
 6. JP6 is system input. Please connect to low pressure for pump down function.
 7. Terminal 1, 2, 13, 14 are for backup usage.

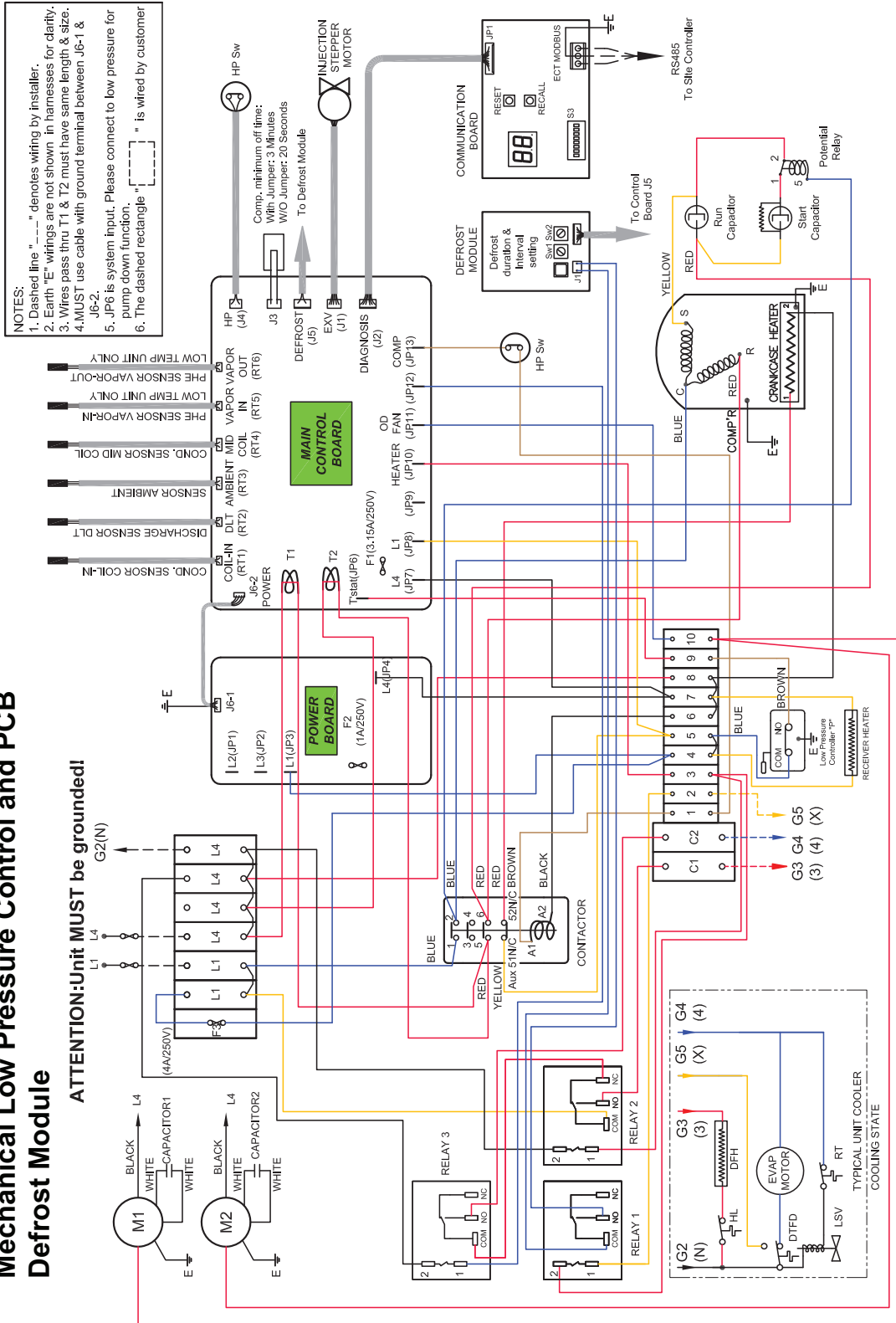


XXJAM/XJAL TFC-022 Models With Mechanical Low Pressure Control And PCB Defrost Module



XJAM/XJAL Dual Fan CFV-022 Models with Mechanical Low Pressure Control and PCB Defrost Module

ATTENTION: Unit MUST be grounded!

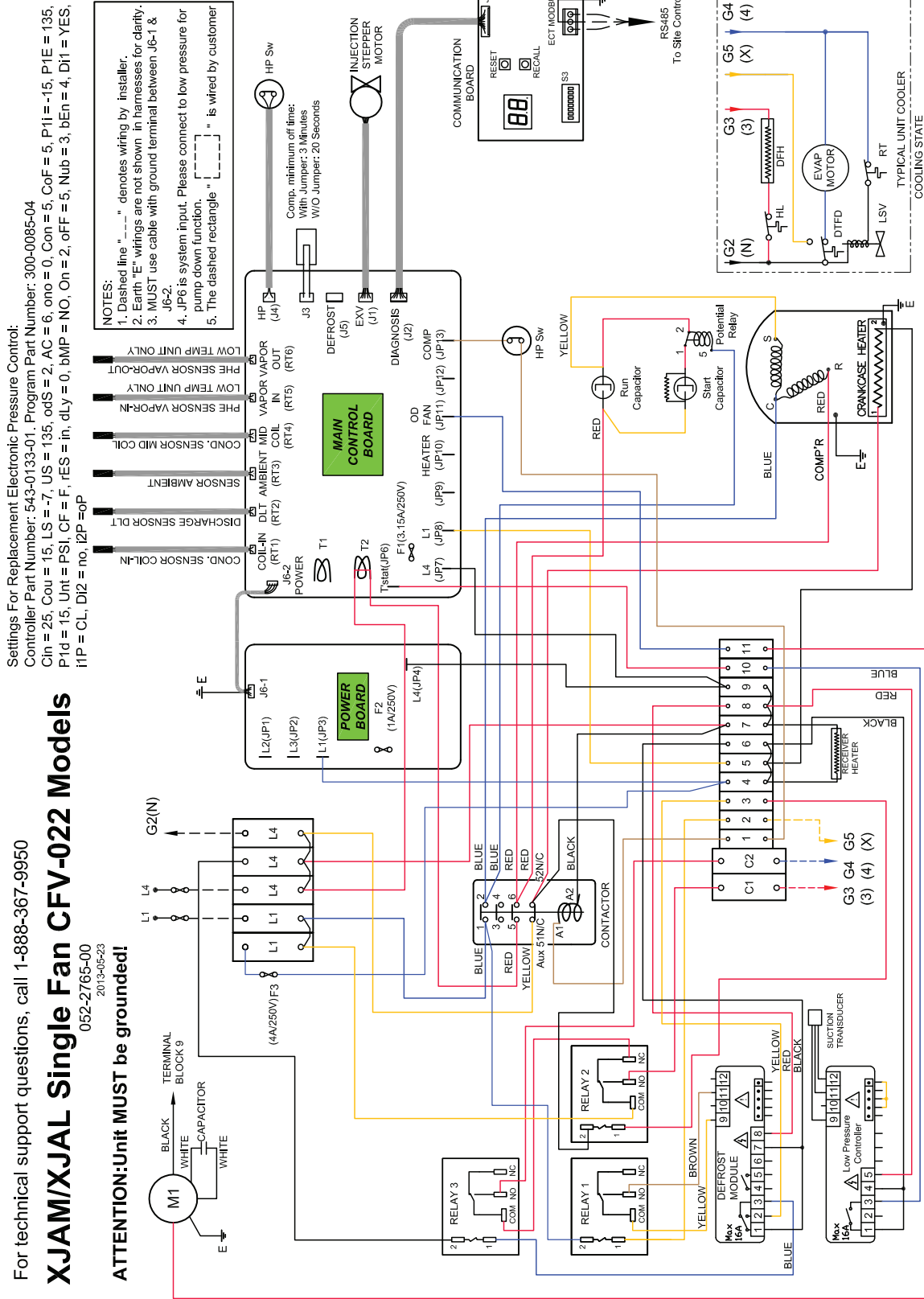


For technical support questions, call 1-888-367-9950

XJAM/XJAL Single Fan CFV-022 Models

052-2765-00
2013-05-23

ATTENTION: Unit MUST be grounded!



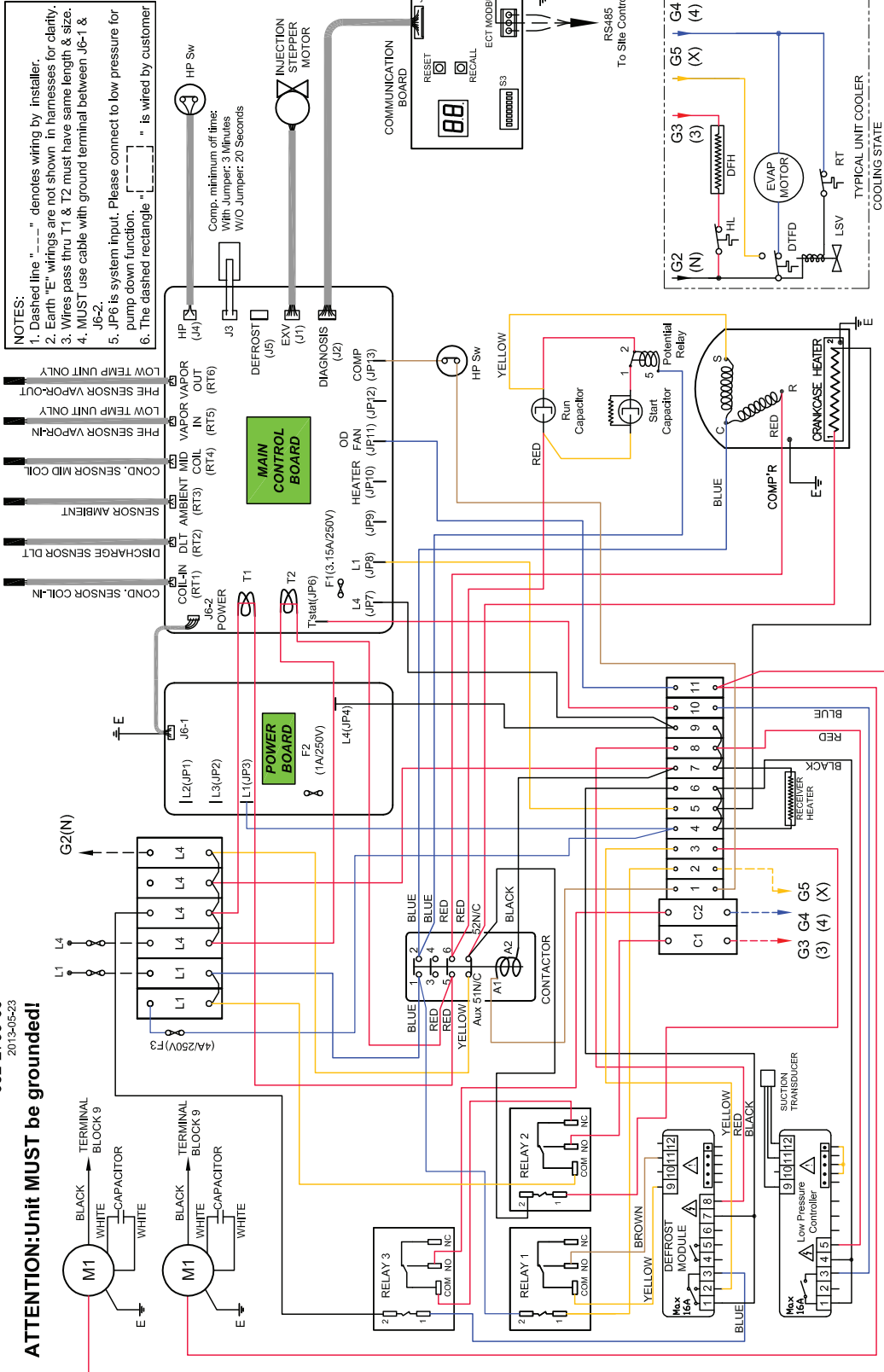
For technical support questions, call 1-888-367-9950

XJAM/XJAL Dual Fan CFV-022 Models

052-2766-00
2013-05-23

ATTENTION: Unit MUST be grounded!

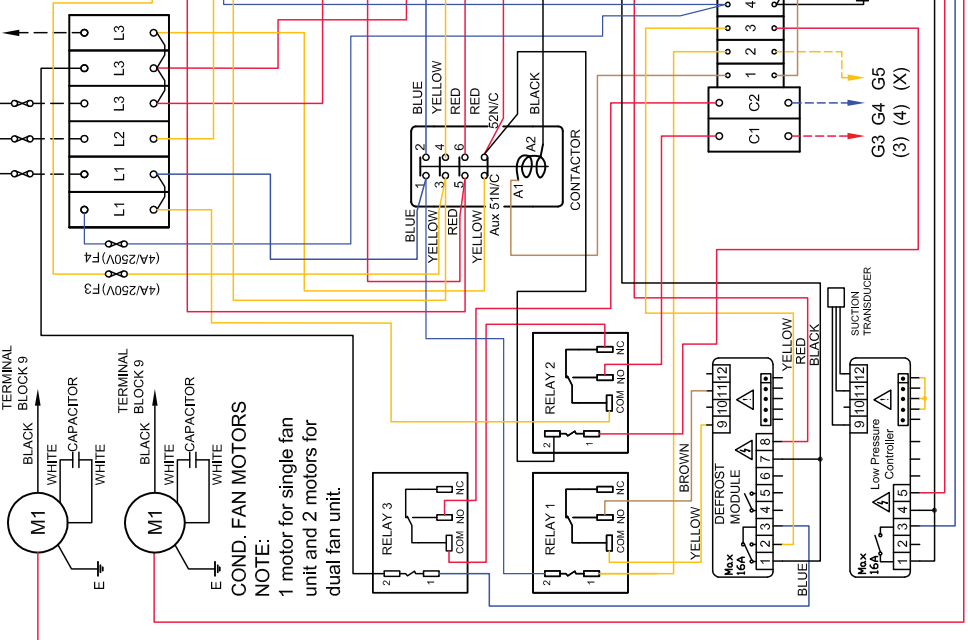
Settings For Replacement Electronic Pressure Control:
Controller Part Number: 543-0133-01, Program Part Number: 300-0085-04
Cin = 25, Cou = 15, LS = -7, US = 135, oDS = 2, AC = 6, ono = 0, Con = 5, CoF = 5, P1I = -15, P1E = 135,
P1d = 15, Unt = PSI, CF = F, rES = in, dLy = 0, bMP = NO, On = 2, oFF = 5, Nub = 3, bEn = 4, DI1 = YES,
i1P = CL, DI2 = no, i2P = oP



For technical support questions, call 1-888-367-9950
XJAM/XJAL Single And Dual Fan
TFC-022 Models

052-2767-00
2013-05-23

ATTENTION: Unit MUST be grounded!

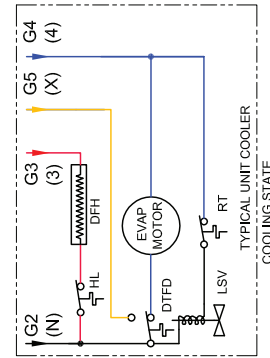
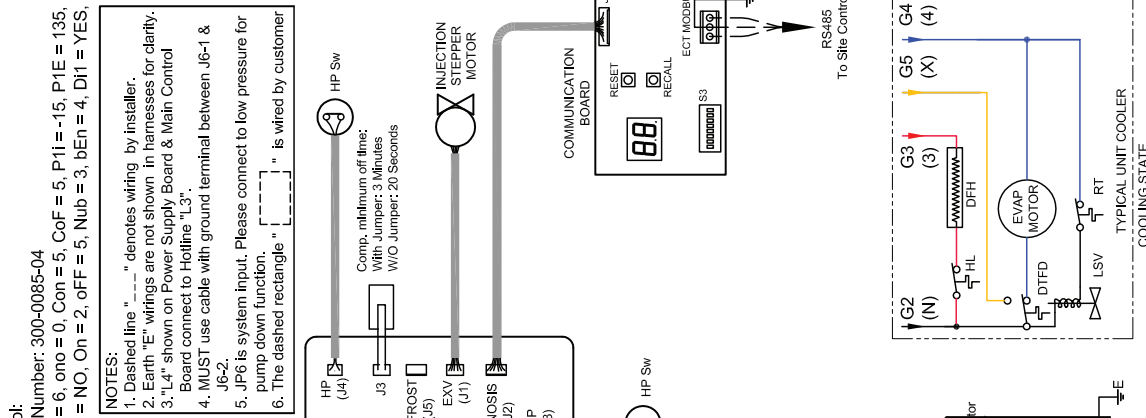


Settings For Replacement Electronic Pressure Control:

Controller Part Number: 543-0133-01, Program Part Number: 300-0085-04

Cin = 25, Cou = 15, LS = -7, US = 135, odS = 2, AC = 6, ono = 0, Con = 5, CoF = 5, P1I = -15, P1E = 135, P1d = 15, Unt = PSI, CF = F, rES = in, dLy = 0, bMP = NO, On = 2, oFF = 5, Nub = 3, bEn = 4, D1I = YES, H1P = CL, D12 = no, I2P = 0P

- NOTES:
1. Dashed line "----" denotes wiring by installer.
 2. Earth "E" wirings are not shown in harnesses for clarity.
 3. "L4" shown on Power Supply Board & Main Control Board connect to Hotline "L3".
 4. MUST use cable with ground terminal between J6-1 & J6-2.
 5. JP6 is system input. Please connect to low pressure for pump down function.
 6. The dashed rectangle " [] " is wired by customer.



Defrost Wiring

052-2596-00
2012-07-03
SIZE:A5

DEFROST WIRING
ALL WIRES SHOWN ARE FIELD INSTALLED

LEGEND:

- DFH.....DEFROST HEATER
- DTFD.....DEFROST TERMINATION/FAN DELAY
- HL.....HEATER LIMIT
- LSV.....LIQUID SOLENOID VALVE
- RT.....ROOM THERMOSTAT

TERMINAL BLOCK CONNECTIONS:

- 2.....DEFROST TERMINATION (L2) INPUT
- C1.....HEATER LINE VOLTAGE (L1) OUTPUT
- C2.....FAN LINE VOLTAGE (L1) OUTPUT
- L4.....LINE VOLTAGE (L2) OUTPUT

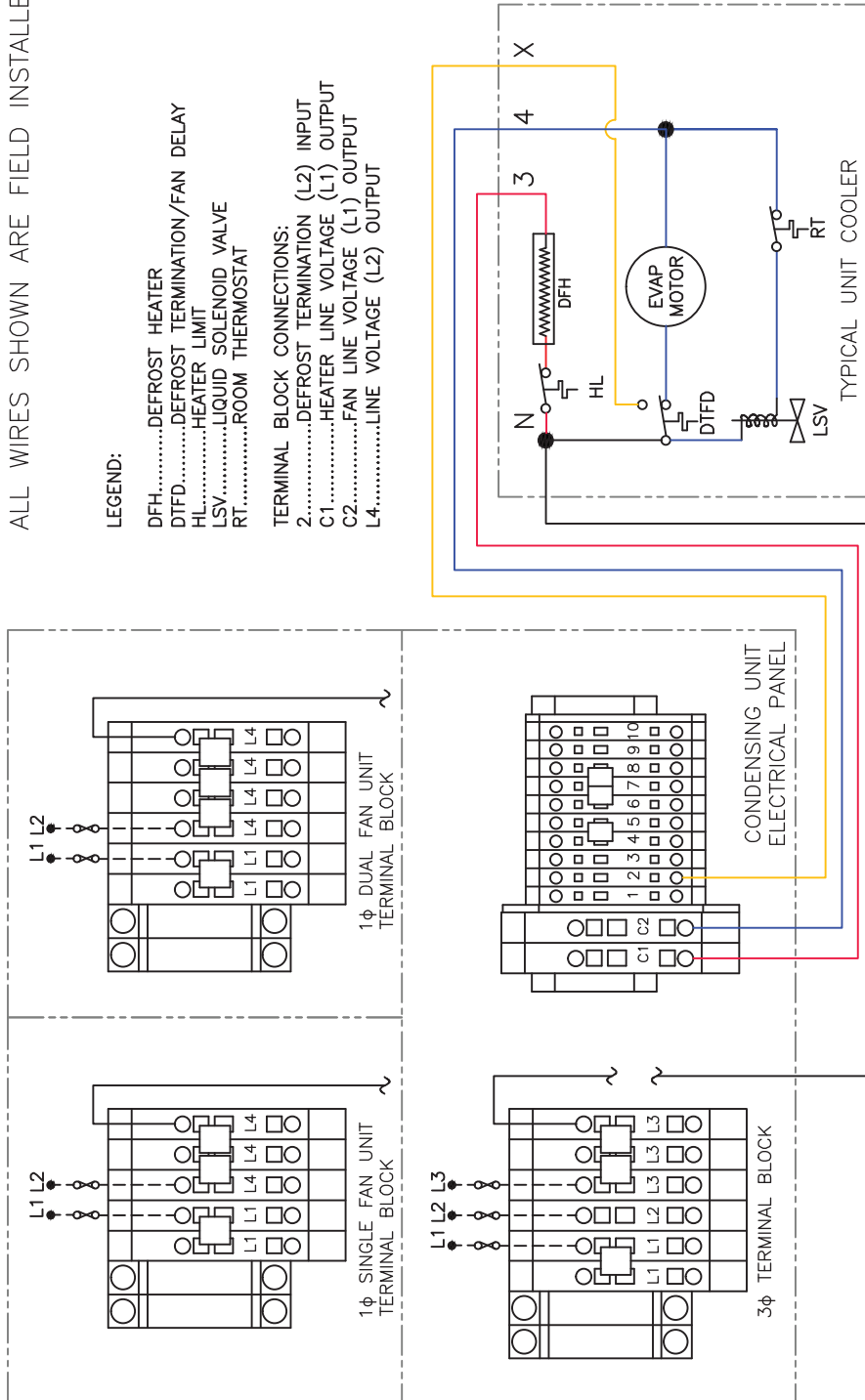


Table 1
Medium Temp Performance Criteria for R-404A

For other approved refrigerant performance data, visit Online Product Information at www.emersonclimate.com

H.P.	Medium Temperature Model Number	Btu/hr @ +25°F Sat. Suction Temp / 90°F Ambient	Btu/hr @ +25°F Sat. Suction Temp / 100°F Ambient	Refrigerant/Oil Type
1.5	XJAM-015Z-CFV	14600	13600	R404A / POE
2	XJAM-020Z-CFV	19600	17900	R404A / POE
2	XJAM-020Z-TFC	19600	17900	R404A / POE
3	XJAM-030Z-CFV	28500	25900	R404A / POE
3	XJAM-030Z-TFC	28500	25900	R404A / POE
4	XJAM-040Z-CFV	38600	35300	R404A / POE
4	XJAM-040Z-TFC	38600	35300	R404A / POE
5	XJAM-050Z-CFV	47100	43800	R404A / POE
5	XJAM-050Z-TFC	47100	43800	R404A / POE
6	XJAM-060Z-TFC	54600	50200	R404A / POE

Table 2
Low Temp Performance Criteria for R-404A

For other approved refrigerant performance data, visit Online Product Information at www.emersonclimate.com

H.P.	Low Temperature Model Number	Btu/hr @ -10°F Sat. Suction Temp / 90°F Ambient	Btu/hr @ -10°F Sat. Suction Temp / 100°F Ambient	Refrigerant/Oil Type
2	XJAL-020Z-CFV	13100	12700	R404A / POE
2	XJAL-020Z-TFC	13100	12700	R404A / POE
3	XJAL-030Z- TFC	17200	16400	R404A / POE
3	XJAL-035Z- CFV	19700	18100	R404A / POE
4	XJAL-040Z-CFV	24700	23700	R404A / POE
4	XJAL-040Z-TFC	24700	23700	R404A / POE
5	XJAL-050Z-CFV	27600	25700	R404A / POE
5	XJAL-050Z-TFC	27600	25700	R404A / POE
6	XJAL-060Z-TFC	34700	32700	R404A / POE

Table 3
Mechanical /Electrical Specifications

Unit Model	Compressor	H.P.	Dimensions (in)			Connection Lines		# of Fans	Min Circuit Ampacity/ Max Fuse (Amps)		Pump Down Capacity (lbs)	Unit Weight (lbs)	dba *
			L	W	H	Suction	Liquid		208/230V 1ph-60hz	208/230V 3ph-60hz			
XJAM-015Z	ZS11KAE	1.5	16.7	40.5	33	3/4" Pre mid-2013 7/8" Post mid-2013	1/2 "	1	15.2 / 20	N/A	7.5	180	55
XJAM-020Z	ZX15KCE	2	16.7	40.5	33	3/4" Pre mid-2013 7/8" Post mid-2013	1/2 "	1	18.7 / 30	11.1 / 15	7.5	182	55
XJAM-030Z	ZX21KCE	3	16.7	40.5	33	3/4" Pre mid-2013 7/8" Post mid-2013	1/2 "	1	24.3 / 40	14.7 / 25	7.5	194	55
XJAM-040Z	ZX30KCE	4	16.7	40.5	49	7/8 "	1/2 "	2	32.1 / 50	19.7 / 30	11	250	56
XJAM-050Z	ZX38KCE	5	16.7	40.5	49	7/8 "	1/2 "	2	36.6 / 60	29.0 / 50	11	258	56
XJAM-060Z	ZX45KCE	6	16.7	40.5	49	7/8 "	1/2 "	2	N/A	28.1 / 45	11	270	56
XJAL-020Z	ZXI06KCE	2	16.7	40.5	33	3/4" Pre mid-2013 7/8" Post mid-2013	1/2 "	1	19.4 / 30	14.7 / 25	7.5	188	50
XJAL-030Z	ZXI09KCE	3	16.7	40.5	33	3/4" Pre mid-2013 7/8" Post mid-2013	1/2 "	1	N/A	15.4 / 25	7.5	192	50
XJAL-035Z	ZXI11KCE	3.5	16.7	40.5	33	7/8 "	1/2 "	1	30.7 / 50	N/A	7.5	213	50
XJAL-040Z	ZXI14KCE	4	16.7	40.5	49	7/8 "	1/2 "	2	36.1 / 60	24.5 / 40	11	251	58
XJAL-050Z	ZXI15KCE	5	16.7	40.5	49	7/8 "	1/2 "	2	N/A	26.1 / 45	11	267	58
XJAL-050Z	ZXI16KCE	5	16.7	40.5	49	7/8 "	1/2 "	2	40.4 / 70	N/A	11	287	58
XJAL-060Z	ZXI18KCE	6	16.7	40.5	49	7/8 "	1/2 "	2	N/A	30.7 / 50	11	291	58

Assume Each Fan @ .75 Amps

*Estimated sound pressure values are 10 feet from the unit at 25F evap for MT and -10 evap for LT at 90 ambient. A sound reduction of up to 3 dBA will occur in ambient temperatures below 70F. This data is typical of "free field" conditions for horizontal air cooled condensing units and may vary depending on the condensing unit installation. There are many factors that affect the sound reading of a condensing unit such as unit mounting, reflecting walls, background noise and operating condition.

Table 4
Emerson Supplied Defrost Set Points
for Models with Mechanical Low Pressure Control and PCB Defrost Module

Switch 1	Defrost duration (minutes)
0	No defrost (manual defrost only)
1	5 minutes
2	10 minutes
3	15 minutes
4	20 minutes
5	25 minutes
6	30 minutes
7	35 minutes

Switch 2	Time interval between defrost
0	No defrost (manual defrost only)
1	1 hour
2	2 hours
3	3 hours
4	4 hours
5	5 hours
6	6 hours
7	7 hours

**Table 5
Main Control Board Settings**

XJAM				
Unit Model	Compressor Name**	Rotary Switch	2bit Dip-Switch	3bit Dip Switch
Control Board Default Setting		0	ON/ON	Bit1: To set evaporator fan control mode <ul style="list-style-type: none"> "OFF": Evaporator Fan On/Off Logic Same As Compressor "ON": Evaporator fan will be ON all the time no matter whether compressor is ON/OFF or defrosting Bit2: To set defrost mode <ul style="list-style-type: none"> "OFF": default setting, using Emerson defrost module "ON": Using Customer defrost module Bit3: Not Used Yet
XJAM-015Z-CFV	ZS11KAE-PFV	A	ON/ON	
XJAM-020Z-TFC	ZX15KCE-TF5	1	ON/ON	
XJAM-020Z-CFV	ZX15KCE-PFV	2	ON/ON	
XJAM-030Z-TFC	ZX21KCE-TF5	3	ON/ON	
XJAM-030Z-CFV	ZX21KCE-PFV	4	OFF/OFF	
XJAM-040Z-TFC	ZX30KCE-TF5	5	ON/ON	
XJAM-040Z-CFV	ZX30KCE-PFV	6	OFF/OFF	
XJAM-050Z-TFC	ZX38KCE-TF5	7	OFF/OFF	
XJAM-050Z-CFV	ZX38KCE-PFV	8	OFF/OFF	
XJAM-060Z-TFC	ZX45KCE-TF5	9	OFF/OFF	

XJAL				
Unit Model	Compressor Name**	Rotary Switch	2bit Dip-Switch	3bit Dip Switch
Control Board Default Setting		0	ON/ON	Bit1: To set evaporator fan control mode <ul style="list-style-type: none"> "OFF": Evaporator Fan On/Off Logic Same As Compressor "ON": Evaporator fan will be ON all the time no matter whether compressor is ON/OFF or defrosting Bit2: To set defrost mode <ul style="list-style-type: none"> "OFF": default setting, using Emerson defrost module "ON": Using Customer defrost module Bit3: Not Used Yet
XJXL-020Z-TFC	ZXI06KCE-TF5	1	ON/ON	
XJXL-020Z-CFV	ZXI06KCE-PFV	2	ON/ON	
XJXL-030Z-TFC	ZXI09KCE-TF5	3	ON/ON	
XJXL-035Z-CFV	ZXI11KCE-PFV	4	OFF/OFF	
XJXL-040Z-TFC	ZXI14KCE-TF5	5	OFF/OFF	
XJXL-040Z-CFV	ZXI14KCE-PFV	6	ON/ON	
XJXL-050Z-TFC	ZXI15KCE-TF5	7	OFF/OFF	
XJAM-050Z-TFC	ZX38KCE-TF5	7	OFF/OFF	
XJAM-050Z-CFV	ZX38KCE-PFV	8	OFF/OFF	
XJAM-060Z-TFC	ZX45KCE-TF5	9	OFF/OFF	

** Please set the switches to the correct position according to compressor model.

Table 6 – Diagnostics Module Display

LED1 - Unit Status	
Display	Status
0	Idle (Set Point or Low Pressure Cut-Out Reached)
1	Run
2	About To Start ¹
3	Defrost
4	Unit Trip
5	Unit Lockout

Table 6a – Diagnostics Module Display

LED2 - Error/Warning Code	
Display	Error/Warning
0	No error/warnings
1	Compressor Phase Error (Wrong Phase Sequence/Loss Of Phase)
2	Compressor Inside Internal Motor Protector Trip
3	Compressor Over Current
4	Discharge Gas Overheat (High Discharge Temperature)
5	Compressor High Pressure Cut Out
6	Not Used
7	DLT Thermistors Failure
8	Ambient Temperature Sensor Failure
9	Mid-coil Temperature Sensor Failure
A	PHE Vapor In Temperature Sensor Failure or over range ²
C	PHE Vapor Out Temperature Sensor Failure or over range ²
E	System Liquid Flood Back Warning

Note: ¹ This signal is for Fresh Start, Normal Start Program and any start request delay.
² PHE Vapor In/Out Temperature Sensor is not applicable in XJAM condensing unit (MT units).
 All error/warning messages are priority-ranked from highest to lowest.
 If unit is initially powered on, the diagnosis module will show signal similar to the below example:

Diagnostics Module Start Up Information

Delay	Firmware	Unit Revision	Stator
88 (1second) ->	02 (3 seconds) ->	-F (3 seconds) ->	00
02	= Software Version No.		
-F	= Unit Identification Code		
└─┬─>	"F"- With OD Fan Speed Control; "-" = W/O OD Fan Speed Control		
└─┬─>	"L"- LT; "-" = MT		
00	= Power On		

*Lockout feature can be reset by disconnecting the unit power source and then reconnection of the unit power source.

Table 7
Refrigerant Liquid Temperature Valve Capacity Multiplier Correction Factors

	Refrigerant Liquid Temperature °F														
	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140
R-12 Correction Factor	1.60	1.54	1.48	1.42	1.36	1.30	1.24	1.18	1.12	1.06	1.00	0.94	0.88	0.82	0.75
R-134a Correction Factor	1.70	1.63	1.56	1.49	1.42	1.36	1.29	1.21	1.14	1.07	1.00	0.93	0.85	0.78	0.71
R-22 Correction Factor	1.56	1.51	1.45	1.40	1.34	1.29	1.23	1.17	1.12	1.06	1.00	0.94	0.88	0.82	0.76
R-404A/R-507 Correction Factor	2.00	1.90	1.80	1.70	1.60	1.50	1.40	1.30	1.20	1.10	1.00	0.90	0.80	0.70	0.50

These factors include corrections for liquid refrigerant density and net refrigerating effect and are based on an average evaporator temperature of 0°F. However, they may be used for any evaporator temperature from - 40°F to + 40°F since the variation in the actual Factors across this range is insignificant.

Table 8
Pressure Control Settings for XJAL/M Units

Application	Control	R-404A/R-507	R-407A	R-407C
XJAL(Low Temp)	Low Pressure	0 PSIG min.	N/A	N/A
XJAM(Medium Temp)	Low Pressure	17 PSIG min.	26.9 PSIG min.	9.4 PSIG min.

Table 9 – System Diagnostic Information

Code Character 1	Code Character 2	Fault Type	Trip to Set Point	Control Board Actions	Auto Resets	Possible Error and Solution
0	0	Low Pressure Cutout	Loss of Low Pressure Control Signal	- Stop the Unit	Auto Start	Suction Pressure below Cutout Set Point, normal operation for pump down system control. Unit in standby mode of operation
1	0	No Fault	No Fault	No Action	Run	No Fault, Unit Running
1	2	Electrical Failure	Compressor intends to start but current transducers on main control board sense no current	-Display compressor protector trip on diagnostic -Auto Start When protector resets	Auto Start	-Verify proper system voltage at the compressor -Verify start component operation (if single phase) -Verify all phases are present, (three phase) verify operation of the unit contactor.
1	7	Discharge Line And Coil in Temp Sensors Failure (See Table 10)	-Actual DLT>320°F ~DLT Sensor Fails and actual DLT> 176°F -Both coil-in and DLT sensors fail (short circuit) -Coil Sensor fails (open) and actual DLT is <163°F	-Display DLT sensor failure on diagnostic -Continue to run the unit on default mode	Run	-Verify proper connection at the main control board -Verify the resistance of the two sensors See Table 10
1	8	Ambient Temperature Sensor Failure (See Table 10)	Ambient sensor reads < -22°F or >145°F	-Display ambient temp sensors failure on diagnostic -Continue to run the unit on default mode.	Run	-Verify proper connection at the main control board -Verify the resistance of the sensor See Table 10
1	9	Condensor Mid-Coil Sensor Failure (See Table 10)	Mid-coil sensor reads < -22°F or >145°F	-Display mid-coil temp sensors failure on diagnostic -Continue to run the unit on default mode.	Run	-Verify proper connection at the main control board -Verify the resistance of the sensor See Table 10
1	A	PHE vapor in sensor failure (Only in XJAL CDU) (See Table 10)	-Vapor in sensor reads <3.2°F or >163°F -Ambient temp reads >50°F	-Display sensor error on diagnostics -Continue to run unit on default mode	Run	-Check whether actual temperature is out of range -Check whether the sensor is connected to the control board -Check whether the sensor is mounted at the right position -Check whether the sensor is in the heat isolation material -Check whether the sensor has failed
1	C	PHE vapor out sensor failure (Only in XJAL CDU) (See Table 10)	-Vapor out sensor reads <3.2°F or >163°F -Ambient temp reads >50°F	-Display sensor error on diagnostics -Continue to run unit on default mode	Run	-Check whether actual temperature is out of range -Check whether the sensor is connected to the control board -Check whether the sensor is mounted at the right position -Check whether the sensor is in the heat isolation material -Check whether the sensor has failed

Table 9 Continued

2	0	Compressor Rapid Cycling	See Page 8. Minimum off time can be selected via jumper setting	-Delay compressor start, if minimum off time is less than 3 min -Display about to turn on diagnostic	Auto Start	-Compressor start signal is active when unit stops; the only thing needed to do is wait until the unit starts
		Fresh Start	Occurs on: -initial unit start, -When power is reset <95°F ambient Compressor is cycled off > than 1 hour < than 95° F ambient	-Compressor runs 3 sec and stops 20 sec -After 3 cycles, compressor runs continuously -Display fresh start on diagnostic	Auto Start	No faults detected, unit about to start.
2	1	Reverse Phase/Loss of phase (3 phase only)	Incorrect phase sequence	-Stop the unit -Display the incorrect phase -Display waiting to restart on diagnostic -Check the phase sequence after 3 minutes	Auto Start	Compressor Phase Reversal senses for the correct phase sequence on three phase applications. Reset is automatic once the correct phase sequence is sensed. An error message will be shown on the diagnostic LED.
2	3	Over Current	Set based on Compressor	-Stop the Unit -Display over current trip on diagnostic -Display waiting to restart on diagnostic -Auto start the unit after 3 minutes -Lockout unit if 6 trips in less than 12 hour	5 Auto Starts in 1 Hour	* Check rotary switch, make sure it is on the right position according to the unit model, Reference table 5 * Check system operating pressures * Check voltage supply at the compressor terminals, must be within the +/- 10% voltage tolerance of the compressor nameplate.
2	4	Discharge Gas Overheat	Discharge Temperatures over 270°F	-Stop the Unit -Display DLT trip on diagnostic -Display waiting to restart on diagnostic -Auto start the unit after 3 minutes -Lockout unit if 6 trips within 1 hour	5 Auto Starts in 1 hour	-Verify system operations to be within unit pressure / temperature envelope of the unit -Review return gas temperatures at the compressor.
2	5	High Pressure Trip	-Contact open at 435 psig ±22psig -Contact Close at 348 psig ±22psig	-Stop the Unit -Display HP trip on diagnostic -Display waiting to restart on diagnostic -Auto start the unit after 3 minutes -Lockout unit if 6 trips within 1 hour	5 Auto Starts in 1 Hour	-Check fan motor / blade operations, verify wiring of the system. -Blocked condenser, air re-circulation , Non Condensables -Check liquid line solenoid valve, liquid service valve, make sure they are open
2	7	Discharge Line And Coil in Temp Sensors Failure (See Table 10)	-Actual DLT>320°F ~DLT Sensor Fails and actual DLT> 176°F -Both coil-in and DLT sensors fail (short circuit)	(Only in XJAL) -Stop the unit -Display DLT sensor failure on the diagnostic -Display waiting to restart on diagnostic -Auto start the unit after 3 minutes	Auto Start	-Verify proper connection at the main control board -Verify the resistance of the two sensors See Table 10

Table 9 Continued

4	1	Reverse Phase/Loss of phase (3 phase only)	Incorrect Voltage sequence	-Stop the unit -Display the incorrect phase -Display waiting to restart on diagnostic -Check the phase sequence after 3 minutes	Auto Start	-Check Voltage sequence of the Power board, see wiring diagram for applicable sequence. Verify voltage sequence at line side of unit terminal block. See wiring diagram
4	3	Over Current	Set based on Compressor	-Stop the Unit -Display over current trip on diagnostic -Auto start the unit after 3 minutes -Lockout unit if 6 trips in less than 12 hour	5 Auto Starts in 1 Hour	* Check rotary switch, make sure it is on the right position according to the unit model, Reference table 5 * Check system operating pressures * Check voltage supply at the compressor terminals, must be with in the +/- 10% voltage tolerance of the compressor nameplate.
4	4	Discharge Gas Overheat	Discharge Temperatures over 270°F	-Stop the Unit -Display DLT trip on diagnostic -Auto start the unit after 3 minutes -Lockout unit if 6 trips within 1 hour	5 Auto Starts in 1 hour	-Check system operations, for example condensing pressures, return gas temperatures, envelope operations etc. Verify operations and correct the situation
4	5	High Pressure Trip	-Contact open at 435 psig ±22psig -Contact Close at 348 psig ±22psig	-Stop the Unit -Display HP trip on diagnostic -Auto start the unit after 3 minutes -Lockout unit if 6 trips within 1 hour -Display HP lockout on diagnostic	5 Auto Starts in 1 Hour	-Verify condenser fan operation, excessive air recirculation, excessive ambient temperatures, incorrect envelope operations -Verify system component operations
5	3	Over Current	Set based on Compressor	-Stop the Unit -Display over current trip on diagnostic -Lockout unit if 6 trips in less than 12 hour -Display over current lockout on diagnostic	Lockout	* Check rotary switch, make sure it is on the right position according to the unit model, Reference table 5 * Check system operating pressures * Check voltage supply at the compressor terminals, must be with in the +/- 10% voltage tolerance of the compressor nameplate.
5	4	Discharge Gas Overheat (XJAM Models)	Discharge Temperatures over 270°F	-Stop the Unit -Display DLT trip on diagnostic -Lockout unit if 6 trips within 1 hour -Display DLT overheat lockout on diagnostic	Lockout	-Check system operations, for example condensing pressures, return gas temperatures, envelope operations etc. Verify operations and correct the situation
5	5	High Pressure Trip	-Contact open at 435 psig ±22psig -Contact Close at 348 psig ±22psig	-Stop the Unit -Display HP trip on diagnostic -Lockout unit if 6 trips within 1 hour -Display HP lockout on diagnostic	Lockout	-Verify condenser fan operation, excessive air recirculation, excessive ambient temperatures, incorrect envelope operation -Verify system component operations

Sensor information

In the event there is fault code referencing a possible issue with any one of the four unit control temperature sensors, see **Table 10** to assess the fault code condition. If the resistance of the sensor in question does not compare to the information provide in the table for the applicable sensor, then that sensor will need replaced.

Table 10 – Sensor Information

DLT			Coil-in			Amb/Mid-Coil			VIT/VOT		
Temp (F)	Temp (C)	R (kohm)	Temp (F)	Temp (C)	R (kohm)	Temp (F)	Temp (C)	R (kohm)	Temp (F)	Temp (C)	R (kohm)
140	60	22.99	50	10	207.6	-22	-30	121.9	5	-15	56.48
142	61	22.13	52	11	197.2	-20	-29	115.5	7	-14	53.78
144	62	21.31	54	12	187.5	-18	-28	109.5	9	-13	51.24
145	63	20.51	55	13	178.4	-17	-27	103.9	10	-12	48.84
147	64	19.78	57	14	169.7	-15	-26	98.54	12	-11	46.56
149	65	19.06	59	15	161.5	-13	-25	93.52	14	-10	44.4
151	66	18.36	61	16	153.7	-11	-24	88.78	16	-9	42.36
153	67	17.7	63	17	146.4	-9	-23	84.32	18	-8	40.42
154	68	17.06	64	18	139.4	-8	-22	80.1	19	-7	38.58
156	69	16.45	66	19	132.8	-6	-21	76.12	21	-6	36.84
158	70	15.87	68	20	126.6	-4	-20	72.38	23	-5	35.08
160	71	15.31	70	21	120.6	-2	-19	68.82	25	-4	33.62
162	72	14.78	72	22	115.1	0	-18	65.48	27	-3	32.12
163	73	14.26	73	23	109.8	1	-17	62.3	28	-2	30.7
165	74	13.77	75	24	104.7	3	-16	59.3	30	-1	29.36
167	75	13.29	77	25	100	5	-15	56.48	32	0	28.08
169	76	12.83	79	26	95.47	7	-14	53.78	34	1	26.86
171	77	12.39	81	27	91.19	9	-13	51.24	36	2	25.7
172	78	11.97	82	28	87.1	10	-12	48.84	37	3	24.6
174	79	11.57	84	29	83.24	12	-11	46.56	39	4	23.56
176	80	11.18	86	30	79.55	14	-10	44.4	41	5	22.46
178	81	10.8	88	31	76.05	16	-9	42.36	43	6	21.6
180	82	10.44	90	32	72.73	18	-8	40.42	45	7	20.7
181	83	10.1	91	33	35.12	19	-7	38.58	46	8	19.84
183	84	9.761	93	34	66.56	21	-6	36.84	48	9	19.02
185	85	9.443	95	35	63.7	23	-5	35.08	50	10	18.24
187	86	9.135	97	36	60.98	25	-4	33.62	52	11	17.49
189	87	8.836	99	37	58.4	27	-3	32.12	54	12	16.78
190	88	8.55	100	38	55.92	28	-2	30.7	55	13	16.11
192	89	8.275	102	39	53.59	30	-1	29.36	57	14	15.46
194	90	8.01	104	40	51.34	32	0	28.08	59	15	14.84
196	91	7.754	106	41	49.21	34	1	26.86	61	16	14.25
198	92	7.508	108	42	47.18	36	2	25.7	63	17	13.69
199	93	7.272	109	43	45.25	37	3	24.6	64	18	13.15
201	94	7.044	111	44	43.39	39	4	23.56	66	19	12.64

Table 10 Continued

DLT		
Temp (F)	Temp (C)	R (kohm)
203	95	6.823
205	96	6.612
207	97	6.406
208	98	6.209
210	99	6.019
212	100	5.834
214	101	5.658
216	102	5.487
217	103	5.321
219	104	5.164
221	105	5.01
223	106	4.862
225	107	4.717
226	108	4.578
228	109	4.445
230	110	4.316
232	111	4.192
234	112	4.07
235	113	3.954
237	114	3.841
239	115	3.733
241	116	3.626
243	117	3.524
244	118	3.427
246	119	3.331
248	120	3.239
250	121	3.149
252	122	3.062
253	123	2.978
255	124	2.897
257	125	2.819
259	126	2.742
261	127	2.668
262	128	2.598
264	129	2.529
266	130	2.462
268	131	2.396
270	132	2.333
271	133	2.272

Coil-in		
Temp (F)	Temp (C)	R (kohm)
113	45	41.64
115	46	39.95
117	47	38.36
118	48	36.82
120	49	35.36
122	50	33.96
124	51	32.62
126	52	31.35
127	53	30.14
129	54	28.97
131	55	27.86
133	56	26.8
135	57	25.78
136	58	24.81
138	59	23.87
140	60	22.99
142	61	22.13
144	62	21.31
145	63	20.51
147	64	19.78
149	65	19.06
151	66	18.36
153	67	17.7
154	68	17.06
156	69	16.45
158	70	15.87
160	71	15.31
162	72	14.78
163	73	14.26
165	74	13.77
167	75	13.29
169	76	12.83
171	77	12.39
172	78	11.97
174	79	11.57
176	80	11.18

Amb/Mid-Coil		
Temp (F)	Temp (C)	R (kohm)
41	5	22.46
43	6	21.6
45	7	20.7
46	8	19.84
48	9	19.02
50	10	18.24
52	11	17.49
54	12	16.78
55	13	16.11
57	14	15.46
59	15	14.84
61	16	14.25
63	17	13.69
64	18	13.15
66	19	12.64
68	20	12.15
70	21	11.68
72	22	11.23
73	23	10.8
75	24	10.39
77	25	10
79	26	9.624
81	27	9.266
82	28	8.922
84	29	8.592
86	30	8.276
88	31	7.974
90	32	7.686
91	33	7.408
93	34	7.142
95	35	6.886
97	36	6.642
99	37	6.408
100	38	6.182
102	39	5.966
104	40	5.76
106	41	5.56
108	42	5.368
109	43	5.186

VIT/VOT		
Temp (F)	Temp (C)	R (kohm)
68	20	12.15
70	21	11.68
72	22	11.23
73	23	10.8
75	24	10.39
77	25	10
79	26	9.624
81	27	9.266
82	28	8.922
84	29	8.592
86	30	8.276
88	31	7.974
90	32	7.686
91	33	7.408
93	34	7.142
95	35	6.886
97	36	6.642
99	37	6.408
100	38	6.182
102	39	5.966
104	40	5.76
106	41	5.56
108	42	5.368
109	43	5.186
111	44	5.008
113	45	4.84
115	46	4.676
117	47	4.52
118	48	4.37
120	49	4.224
122	50	4.086
124	51	3.952
126	52	3.822
127	53	3.698
129	54	3.58
131	55	3.464
133	56	3.354
135	57	3.246
136	58	3.144

Table 10 Continued

DLT		
Temp (F)	Temp (C)	R (kohm)
273	134	2.213
275	135	2.156
277	136	2.101
279	137	2.047
280	138	1.994
282	139	1.944
284	140	1.894
286	141	1.847
288	142	1.801
289	143	1.756
291	144	1.712
293	145	1.669
295	146	1.628
297	147	1.588
298	148	1.549
300	149	1.512
302	150	1.474

Amb/Mid-Coil		
Temp (F)	Temp (C)	R (kohm)
111	44	5.008
113	45	4.84
115	46	4.676
117	47	4.52
118	48	4.37
120	49	4.224
122	50	4.086
124	51	3.952
126	52	3.822
127	53	3.698
129	54	3.58
131	55	3.464
133	56	3.354
135	57	3.246
136	58	3.144
138	59	3.046
140	60	2.95

VIT/VOT		
Temp (F)	Temp (C)	R (kohm)
138	59	3.046
140	60	2.95
142	61	2.858
144	62	2.77
145	63	2.684
147	64	2.602
149	65	2.522
151	66	2.446
153	67	2.372
154	68	2.302
156	69	2.232
158	70	2.166
160	71	2.102
162	72	2.04
163	73	1.98

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Digital controller with off cycle defrost XR30CX

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1. GENERAL WARNING

1.1 PLEASE READ BEFORE USING THIS MANUAL

- This manual is part of the product and should be kept near the instrument for easy and quick reference.
- The instrument shall not be used for purposes different from those described hereunder. It cannot be used as a safety device.
- Check the application limits before proceeding.
- Dixell Srl reserves the right to change the composition of its products, even without notice, ensuring the same and unchanged functionality.

1.2 SAFETY PRECAUTIONS

- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- Warning: disconnect all electrical connections before any kind of maintenance.
- Fit the probe where it is not accessible by the End User. The instrument must not be opened.
- In case of failure or faulty operation send the instrument back to the distributor or to "Dixell S.s.l." (see address) with a detailed description of the fault.
- Consider the maximum current which can be applied to each relay (see Technical Data).
- Ensure that the wires for probes, loads and the power supply are separated and far enough from each other, without crossing or intertwining.
- In case of applications in industrial environments, the use of mains filters (our mod. FT1) in parallel with inductive loads could be useful.

2. GENERAL DESCRIPTION

Model **XR30CX**, format 32 x 74 mm, is a digital thermostat with off cycle defrost designed for refrigeration applications at normal temperature. It provides two relay outputs, one for the compressor, the other one can be used for defrost heater. The digital input operates to stop defrost.

The HOT KEY output allows to connect the unit, by means of the external module XJ485-CX, to a network line ModBUS-RTU compatible such as the **dixell** monitoring units of X-WEB family. It allows to program the controller by means the HOT KEY programming keyboard.

The instrument is fully configurable through special parameters that can be easily programmed through the keyboard.

3. CONTROLLING LOADS

3.1 COMPRESSOR

The compressor relay is always closed when the controller is powered except during defrost and dripping time.

3.2 DEFROST

The defrost interval is controlled by means of parameter "EdF":


- with EdF=in the defrost is made every "ldF" time,
- with EdF = "rtc", the defrost is made in real time depending on the hours set in the parameters Ld1...Ld6 on workdays and in Sd1...Sd6 in holidays;


Other parameters are used to control defrost cycles: its maximum length (MdF)

4. FRONT PANEL COMMANDS



 (DEF) To start a manual defrost

 (UP): To see the max. stored temperature; in programming mode it browses the parameter codes or increases the displayed value.

 (DOWN) To see the min stored temperature; in programming mode it browses the parameter codes or decreases the displayed value.




To switch the instrument off, if onF = oFF.



Not used

KEY COMBINATIONS:





 To lock & unlock the keyboard.

SET +  To enter in programming mode.

SET +  To return to the room temperature display.

4.1 USE OF LEDS

Each LED function is described in the following table.

LED	MODE	FUNCTION
	ON	Compressor enabled
	Flashing	Anti-short cycle delay enabled
	ON	Defrost enabled
	ON	An alarm is occurring
°C/°F	ON	Measurement unit
°C/°F	Flashing	Programming phase

5. MAIN FUNCTIONS

5.1 CONTROLLER DISPLAY

The controller displays:

- "on" when is powered.
- "dEF" during a defrost
- "oFF" when it is in stand by.


5.2 HOW TO START A MANUAL DEFROST



Push the DEF key for more than 2 seconds and a manual defrost will start.

5.3 HOW TO CHANGE A PARAMETER VALUE

To change the parameter's value operate as follows:

1. Enter the Programming mode by pressing the **Set** +  keys for 3s (the "°C" or "°F" LED starts blinking).
2. Select the required parameter. Press the "SET" key to display its value
3. Use "UP" or "DOWN" to change its value.
4. Press "SET" to store the new value and move to the following parameter.



To exit: Press **SET** + **UP** or wait 15s without pressing a key.

NOTE: the set value is stored even when the procedure is exited by waiting the time-out to expire.



5.4 THE HIDDEN MENU


The hidden menu Includes all the parameters of the instrument.

5.4.1 HOW TO ENTER THE HIDDEN MENU

1. Enter the Programming mode by pressing the **Set** +  keys for 3s (the "°C" or "°F" LED starts blinking).
2. Released the keys, then push again the **Set** +  keys for more than 7s. The Pr2 label will be displayed immediately followed from the HY parameter.

NOW YOU ARE IN THE HIDDEN MENU.


3. Select the required parameter.
4. Press the "SET" key to display its value
5. Use  or  to change its value.
6. Press "SET" to store the new value and move to the following parameter.

To exit: Press **SET** +  or wait 15s without pressing a key.

NOTE1: if none parameter is present in Pr1, after 3s the "noP" message is displayed. Keep the keys pushed till the Pr2 message is displayed.

NOTE2: the set value is stored even when the procedure is exited by waiting the time-out to expire.

5.4.2 HOW TO MOVE A PARAMETER FROM THE HIDDEN MENU TO THE FIRST LEVEL AND VICEVERSA.



Each parameter present in the HIDDEN MENU can be removed or put into "THE FIRST LEVEL" (user level) by pressing "**SET** + .

In HIDDEN MENU when a parameter is present in First Level the decimal point is on.

5.5 HOW TO LOCK THE KEYBOARD

1. Keep pressed for more than 3 s the **UP** + **DOWN** keys.
2. The "POF" message will be displayed and the keyboard will be locked. At this point it will be possible only to see the set point or the MAX o Min temperature stored
3. If a key is pressed more than 3s the "POF" message will be displayed.

5.6 TO UNLOCK THE KEYBOARD

Keep pressed together for more than 3s the  and  keys, till the "Pon" message will be displayed.

5.7 THE ON/OFF FUNCTION

With "onF = oFF", pushing the ON/OFF key, the instrument is switched off. The "oFF" message is displayed. In this configuration, the regulation is disabled. To switch the instrument on, push again the ON/OFF key.

WARNING: Loads connected to the normally closed contacts of the relays are always supplied and under voltage, even if the instrument is in stand by mode.

6. PARAMETERS

rtc Real time clock menu: to set the time and date and defrost start time.

DISPLAY

CF Temperature measurement unit: °C=Celsius; °F=Fahrenheit. **WARNING:** When the measurement unit is changed the SET point and the values of the parameters Hy, LS, US, Ot, ALU and ALL have to be checked and modified if necessary).

rES Resolution (for °C): (in = 1°C; dE = 0.1 °C) allows decimal point display.

DEFROST

EdF Defrost mode:

rtc = Real Time Clock mode. Defrost time follows Ld1+Ld6 parameters on workdays and Sd1+Sd6 on holidays.

in = interval mode. The defrost starts when the time "ldf" is expired.

ldF Interval between defrost cycles: (0÷120h) Determines the time interval between the beginning of two defrost cycles.

mdF (Maximum) length for defrost: (0÷255min) When P2P = n, (not evaporator probe: timed defrost) it sets the defrost duration, when P2P = y (defrost end based on temperature) it sets the maximum length for defrost.

dFd Temperature displayed during defrost: (rt = real temperature; it = temperature at defrost start; SET = set point; dEF = "dEF" label)

dAd MAX display delay after defrost: (0÷255min). Sets the maximum time between the end of defrost and the restarting of the real room temperature display.

Fdt Drip time: (0÷120 min) time interval between reaching defrost termination temperature and the restoring of the control's normal operation. This time allows the evaporator to eliminate water drops that might have formed due to defrost.

TO SET CURRENT TIME AND WEEKLY HOLIDAYS

Hur Current hour (0 ÷ 23 h)

Min Current minute (0 ÷ 59min)

dAY Current day (Sun ÷ SAT)

Hd1 First weekly holiday (Sun ÷ nu) Set the first day of the week which follows the holiday times.

Hd2 Second weekly holiday (Sun ÷ nu) Set the second day of the week which follows the holiday times.

N.B. Hd1,Hd2 can be set also as "nu" value (Not Used).

TO SET DEFROST TIMES

Ld1÷Ld6 Workday defrost start (0 ÷ 23h 50 min.) These parameters set the beginning of the 6 programmable defrost cycles during workdays. Ex. When Ld2 = 12.4 the second defrost starts at 12.40 during workdays.

Sd1÷Sd6 Holiday defrost start (0 ÷ 23h 50 min.) These parameters set the beginning of the 6 programmable defrost cycles on holidays. Ex. When Sd2 = 3.4 the second defrost starts at 3.40 on holidays.

N.B. :To disable a defrost cycle set it to "nu"(not used). Ex. If Ld6=nu ; the sixth defrost cycle is disabled

OTHER

Adr Serial address (1÷244): Identifies the instrument address when connected to a ModBUS compatible monitoring system.

onF on/off key enabling: nu = disabled; oFF = enabled; ES = not set it.

rEL Software release for internal use.

Ptb Parameter table code: readable only.

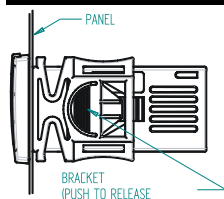
7. DIGITAL INPUT

The free voltage digital input is used to stop defrost.

8. TTL SERIAL LINE – FOR MONITORING SYSTEMS

The TTL serial line, available through the HOT KEY connector, allows by means of the external TTL/RS485 converter, XJ485-CX, to connect the instrument to a monitoring system ModBUS-RTU compatible such as the X-WEB500/3000/300.

9. INSTALLATION AND MOUNTING



Instrument XR30CX shall be mounted on vertical panel, in a 29x71 mm hole, and fixed using the special bracket supplied. The temperature range allowed for correct operation is 0÷60 °C. Avoid places subject to strong vibrations, corrosive gases, excessive dirt or humidity. The same recommendations apply to probes. Let air circulate by the cooling holes.

10. ELECTRICAL CONNECTIONS

The Control has push-on connectors to accept a factory wire harness.

11. HOW TO USE THE HOT KEY

11.1 HOW TO PROGRAM A HOT KEY FROM THE INSTRUMENT (UPLOAD)

1. Program one controller with the front keypad.

- When the controller is ON, insert the "Hot key" and push ▲ key; the "uPL" message appears followed a by flashing "End"
- Push "SET" key and the End will stop flashing.
- Turn OFF the instrument remove the "Hot Key", then turn it ON again.

NOTE: the "Err" message is displayed for failed programming. In this case push again ▲ key if you want to restart the upload again or remove the "Hot key" to abort the operation.

11.2 HOW TO PROGRAM AN INSTRUMENT USING A HOT KEY (DOWNLOAD)

- Turn OFF the instrument.
- Insert a programmed "Hot Key" into the 5 PIN receptacle and then turn the Controller ON.
- Automatically the parameter list of the "Hot Key" is downloaded into the Controller memory, the "doL" message is blinking followed a by flashing "End".
- After 10 seconds the instrument will restart working with the new parameters.
- Remove the "Hot Key"..

NOTE the message "Err" is displayed for failed programming. In this case turn the unit off and then on if you want to restart the download again or remove the "Hot key" to abort the operation.

11.3 OTHER MESSAGES

Pon	Keyboard unlocked.
PoF	Keyboard locked
noP	In programming mode: none parameter is present in Pr1 On the display or in dP2, dP3, dP4: the selected probe is nor enabled
On	Controller is working, compressor relay is closed
dEF	Defrost is running

12. TECHNICAL DATA

Housing: self extinguishing ABS.

Case: XR30CX frontal 32x74 mm; depth 60mm;

Mounting: XR30CX panel mounting in a 71x29mm panel cut-out

Protection: IP20; **Frontal protection:** XR30CX IP65

Connections: Screw terminal block ≤ 2,5 mm² wiring.

Power supply: according to the model: 12Vac/dc, ±10%; 24Vac/dc, ±10%; 230Vac ±10%, 50/60Hz, 110Vac ±10%, 50/60Hz

Power absorption: 3VA max

Display: 3 digits, red LED, 14,2 mm high; **Inputs:** Up to 4 NTC or PTC probes.

Digital input: free voltage contact

Relay outputs: compressor SPST 8(3) A, 250Vac; or 20(8)A 250Vac defrost: SPDT 8(3) A, 250Vac

Data storing: on the non-volatile memory (EEPROM).

Kind of action: 1B; **Pollution grade:** 2;**Software class:** A.;

Rated impulsive voltage: 2500V; **Overvoltage Category:** II

Operating temperature: 0÷60 °C; **Storage temperature:** -30÷85 °C.

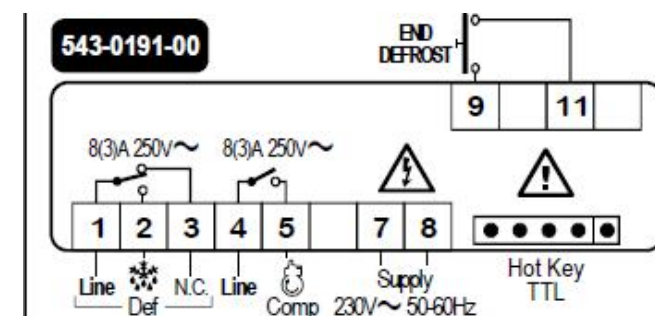
Relative humidity: 20÷85% (no condensing)

Resolution: 0,1 °C or 1°C or 1 °F (selectable);

Accuracy (ambient temp. 25°C): ±0,7 °C ±1 digit.

13. CONNECTIONS

13.1 XR30CX – 8A COMPRESSOR



14. DEFAULT SETTING VALUES

Label	Name	Range	Default	Menu
rtc	Real time clock menu	-	-	Pr1
CF	Temperature measurement unit	°C ÷ °F	°F	Pr2
rES	Resolution	in=integer; dE= dec.point	in	Pr2
EdF	Defrost mode	rtc - in	in	Pr1
IdF	Interval between defrost cycles	1 ÷ 120 ore	8	Pr1
MdF	(Maximum) length for defrost	0 ÷ 255 min	45	Pr1
dFd	Displaying during defrost	rt, it, SEt, DEF	dEF	Pr2
dAd	MAX display delay after defrost	0 ÷ 255 min	0	Pr2
Fdt	Draining time	0÷120 min	0	Pr2
Hur	Current hour	0÷23	-	rtc
Min	Current minute	0 ÷ 59	-	rtc
dAY	Current day	Sun ÷ SAt	-	rtc
Hd1	First weekly holiday	Sun+ SAt - nu	nu	Pr2
Hd2	Second weekly holiday	Sun+ SAt - nu	nu	Pr2
Ld1	1 st workdays defrost start	0 ÷ 23h 50 min. - nu	6.0	rtc
Ld2	2 nd workdays defrost start	0 ÷ 23h 50 min. - nu	13.0	rtc
Ld3	3 rd workdays defrost start	0 ÷ 23h 50 min. - nu	21.0	rtc
Ld4	4 th workdays defrost start	0 ÷ 23h 50 min. - nu	nu	rtc
Ld5	5 th workdays defrost start	0 ÷ 23h 50 min. - nu	nu	rtc
Ld6	6 th workdays defrost start	0 ÷ 23h 50 min. - nu	nu	rtc
Sd1	1 st holiday defrost start	0 ÷ 23h 50 min. - nu	6.0	Pr2
Sd2	2 nd holiday defrost start	0 ÷ 23h 50 min. - nu	13.0	Pr2
Sd3	3 rd holiday defrost start	0 ÷ 23h 50 min. - nu	21.0	Pr2
Sd4	4 th holiday defrost start	0 ÷ 23h 50 min. - nu	nu	Pr2
Sd5	5 th holiday defrost start	0 ÷ 23h 50 min. - nu	nu	Pr2
Sd6	6 th holiday defrost start	0 ÷ 23h 50 min. - nu	nu	Pr2
Adr	Serial address	0÷247	1	Pr2
onF	on/off key enabling	nu, oFF; ES	oFF	Pr2
rEL	Software release	--	9.1	Pr2
Ptb	Map code	--	--	Pr2

*****Important before Programming - determine desired defrost mode*****

Interval Mode - Interval between defrost cycles

RTC Mode - Real Time Clock based defrost schedule

*Note - on start up, r_{tc} will appear flashing. If using interval based defrost, disregard flashing r_{tc}. **IF** Real time clock defrost schedule is selected time/day will be set in step 9-15. Expected screen displays shown inside()

1. Turn controller on using Power Button (**pn**)
2. Press and hold **SET+DOWN** for 3 seconds (r_{tc}).
3. Press **UP** (**udf**)
4. Press **SET**, select Interval (**in**) or press **DOWN** to select Real Time defrost mode (r_{tc})
5. Press **SET** (**udf**), if **in** selected proceed to step 6, if r_{tc} selected proceed to step 9

If using Interval defrost mode:

6. Press **SET** and use up or down arrow to select desired interval between defrost (1-120 hours)
7. Press **SET** (**ndf**)
8. Press **SET** and use up or down arrow to select desired maximum duration of defrost (0-255 minutes)

If using Time of Day defrost mode :

9. Press **UP** two times (r_{tc})
10. Press **SET** (**hur**)
11. Press **SET** and use up or down arrow to select current hour (0-24)
12. Press **SET** (**rin**)
13. Press **SET** and use up or down arrow to select current minute (0-59)
14. Press **SET** (**drdy**)
15. Press **SET** and use up or down arrow to select current day (Sun-Sat)
16. Press **SET** (**ld1**)
17. Press **SET** and use up or down arrow to select time of first daily defrost (0-23:50- **ndj**)
18. Press **SET** (**ld2**)
19. Press **SET** and use up or down arrow to select time of second daily defrost (0-23:50- **ndj**)

Parameter	Name	Range
r _{tc}	Real time clock menu	-
E _{df}	Defrost mode	in-rtc
i _{df}	Interval between defrost cycles	1 -120 hour
n _{df}	(Maximum) length for defrost	0 -255 min
H _{ur}	Current Hour	0-23
n _{in}	Current minute	0-59
d _{rdy}	Current day	Sun - Sat
L _{d1}	1 st daily defrost time	0 - 23h 50 min. - ndj (ndj =not used)
L _{d2}	2 nd daily defrost time	0 - 23h 50 min. - ndj (ndj =not used)
L _{d3}	3 rd daily defrost time	0 - 23h 50 min. - ndj (ndj =not used)
L _{d4}	4 th daily defrost time	0 - 23h 50 min. - ndj (ndj =not used)
L _{d5}	5 th daily defrost time	0 - 23h 50 min. - ndj (ndj =not used)
L _{d6}	6 th daily defrost time	0 - 23h 50 min. - ndj (ndj =not used)



20. Repeat process for maximum of 6 daily defrosts; **ndj** setting stands for not used
21. Press **SET+UP** to exit menu (**pn**)
22. Hold **SET+DOWN** for 3 seconds (r_{tc})
23. Press **DOWN** (**ndf**)
24. Press **SET** and use up or down arrow to select maximum duration of defrost (0-255 minutes)
25. Press **SET+UP** or allow controller to time out

***Controller will time out after 15 seconds of inactivity. In this case, hold **SET+DOWN** for 3 seconds to open menu and continue. Previously entered values will be stored.



Installation Instructions: XJ Scroll Condenser to XWEB300D/500D/500

Copeland XJ Scroll Condenser Units are used for walk-in cooler and freezer applications. All units integrate the many benefits of scroll compressor technology, fan speed control, and Copeland PerformanceAlert™ diagnostic controls.

XWEB communicates with the Copeland XJ Scroll Condenser One-way Communication Board via the RS485 MODBUS network. The XWEB is used to receive alarm and notice status from the XJ Scroll condensers via the One-way Communication board. If the XJ Scroll condenser does not have a One-way Communication Board, one must be installed for XWEB alarm and notice receiving. The XWEB then provides the ability to assign delays and priorities to alarms or notices, but the alarms and notices can be logged in the XWEB.

Product notice

Network Wiring and Configuration

XJ Scroll Condensers connect to the XWEB with the One-Way Communication Board using RS485 MODBUS.

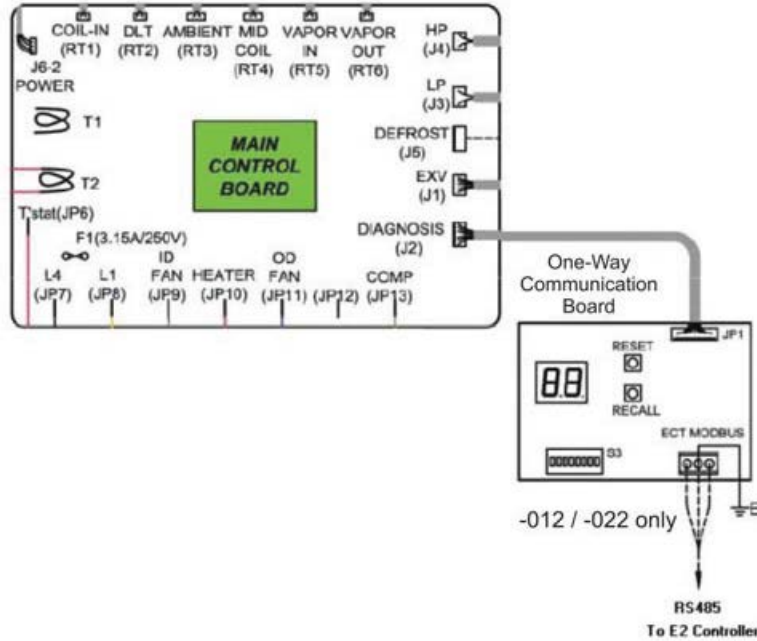


Figure 1 - XJ Scroll Connected to a One-Way Communication Board

Connect the XJ Scroll to the MODBUS network as shown in figure below. Connect the network cable to the RS-485 connector on the XWEB. Please refer to the XWEB User manual for its wiring instructions.

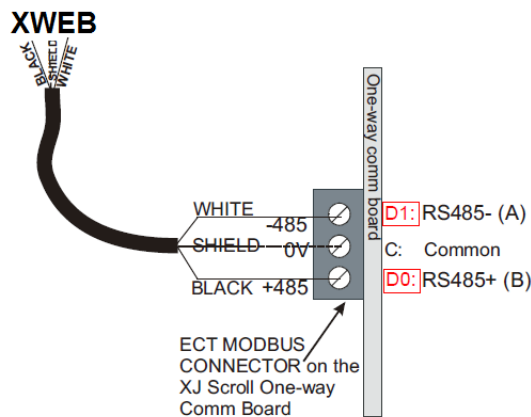
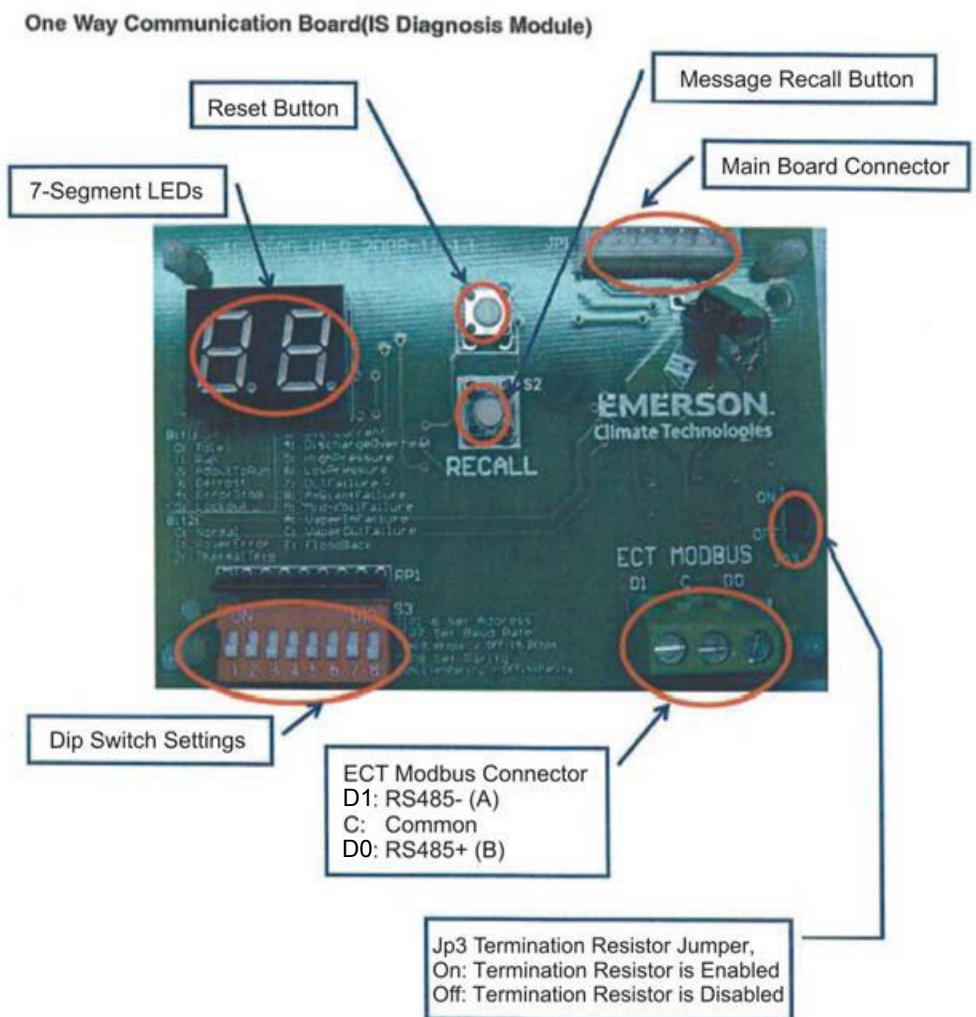


Figure 2 - XWEB Modbus Connected to the One-Way Communication Board

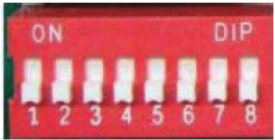
XJ Scroll One-Way Communication Board Configuration

XJ Scroll address is determined using dip switches on the One-Way Communication Board. Switch numbers 1 to 6 set the slave address. Switch number 7 will set the Baud rate and switch number 8 will set the parity. The range of allowable addresses is 1 through 63. Refer to Table below for settings.

Make sure that you are setting parity to “No Parity” and baud rate to “9.6Kbps”.



Dip Switch Address Settings

					<ul style="list-style-type: none"> •No.1~6: Set Slave Address •No.7: Set Baud Rate •No.8: Set Parity 			
1	2	3	4	5	6	7	8	
Set Address								Address
OFF	OFF	OFF	OFF	OFF	ON	-	-	Address=1
OFF	OFF	OFF	OFF	ON	OFF	-	-	Address=2
OFF	OFF	OFF	OFF	ON	ON	-	-	Address=3
OFF	OFF	OFF	ON	OFF	OFF	-	-	Address=4
OFF	OFF	OFF	ON	OFF	ON	-	-	Address=5
OFF	OFF	OFF	ON	ON	OFF	-	-	Address=6
OFF	OFF	OFF	ON	ON	ON	-	-	Address=7
OFF	OFF	ON	OFF	OFF	OFF	-	-	Address=8
OFF	OFF	ON	OFF	OFF	ON	-	-	Address=9
OFF	OFF	ON	OFF	ON	OFF	-	-	Address=10
OFF	OFF	ON	OFF	ON	ON	-	-	Address=11
OFF	OFF	ON	ON	OFF	OFF	-	-	Address=12
OFF	OFF	ON	ON	OFF	ON	-	-	Address=13
OFF	OFF	ON	ON	ON	OFF	-	-	Address=14

Set Baud Rate Baud Rate

----- ON - 9.6Kbps

Set Parity Parity

----- OFF No Parity

IN THIS ISSUE

XWEB WITH COPELAND XJ
SCROLL CONDENSER UNITS

 Product **notice**

XWEB and XJ Compatibility rules

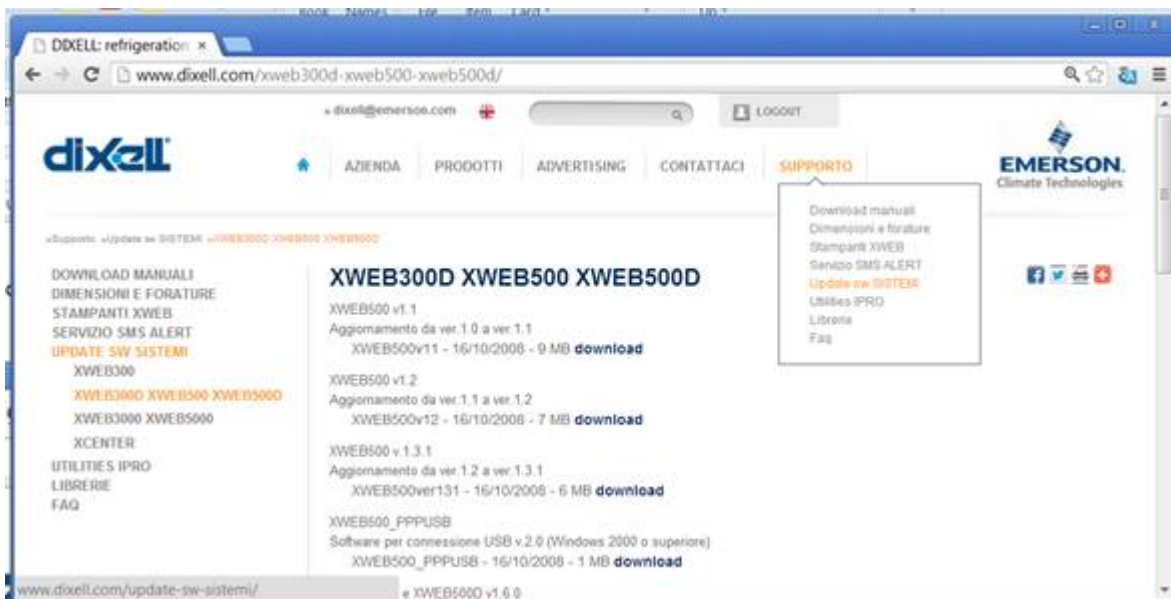
The XJ units that will work with the XWeb are all XJAM and XJAL units with -012 and -022 BOMs. Here it follows the complete list

XJAL-020Z-CFV-012	XJAL-050Z-CFV-022	XJAM-030Z-TFC-012
XJAL-020Z-CFV-022	XJAL-050Z-TFC-012	XJAM-030Z-TFC-022
XJAL-020Z-TFC-012	XJAL-050Z-TFC-022	XJAM-040Z-CFV-012
XJAL-020Z-TFC-022	XJAL-060Z-TFC-012	XJAM-040Z-CFV-022
XJAL-030Z-TFC-012	XJAL-060Z-TFC-022	XJAM-040Z-TFC-012
XJAL-030Z-TFC-022	XJAM-015Z-CFV-012	XJAM-040Z-TFC-022
XJAL-035Z-CFV-012	XJAM-015Z-CFV-022	XJAM-050Z-CFV-012
XJAL-035Z-CFV-022	XJAM-020Z-CFV-012	XJAM-050Z-CFV-022
XJAL-040Z-CFV-012	XJAM-020Z-CFV-022	XJAM-050Z-TFC-012
XJAL-040Z-CFV-022	XJAM-020Z-TFC-012	XJAM-050Z-TFC-022
XJAL-040Z-TFC-012	XJAM-020Z-TFC-022	XJAM-060Z-TFC-012
XJAL-040Z-TFC-022	XJAM-030Z-CFV-012	XJAM-060Z-TFC-022
XJAL-050Z-CFV-012	XJAM-030Z-CFV-022	

All firmware versions that were used on the attached list of units will be compatible with the XWEB. Older versions of the XJ that have an -002 BOM do not have a communication board, and will not work with the XWeb.

XWEB Configuration

XWEB is compatible with XJ Units with firmware version 2.1.1 plus patch "Update_CDU-UNITS_(20121203)". You can freely download it from the Dixell's website (requires login).



- Login into your xweb with an administrative account and go to menu Information→System updates.
- Provide the XW5 patch file you have just downloaded to the XWEB.
- Once file has been selected wait until the execution of the upgrade procedure ends.
- Restart XWEB.
- Setup the XJ Unit in XWEB from the Configuration→Devices menu.

APPENDIX 4

Installation Instructions: XJ Scroll Condenser to E2

Overview

Copeland XJ Scroll Condenser Units are used for walk-in cooler and freezer applications. All units integrate the many benefits of scroll compressor technology, fan speed control, and Copeland PerformanceAlert™ diagnostic controls.

E2 communicates with the Copeland XJ Scroll Condenser One-way Communication Board via the RS485 MODBUS network. The E2 is used to receive alarm and notice status from the XJ Scroll condensers via the One-way Communication board. If the XJ Scroll condenser does not have a One-way Communication Board, one must be installed for E2 alarm and notice receiving. The E2 then provides the ability to assign delays and priorities to alarms or notices, but the alarms and notices can be logged in the E2.

Maximum Number of XJ Scroll units per E2:

E2 Model/Series	100	300	400
RX	4	8	16
CX	4	8	16

Table 1 - E2 Models

Installation Instructions: XJ Scroll Condenser to E2

Network Wiring and Configuration

XJ Scroll Condensers connect to the E2 with the One-Way Communication Board using RS485 MODBUS.

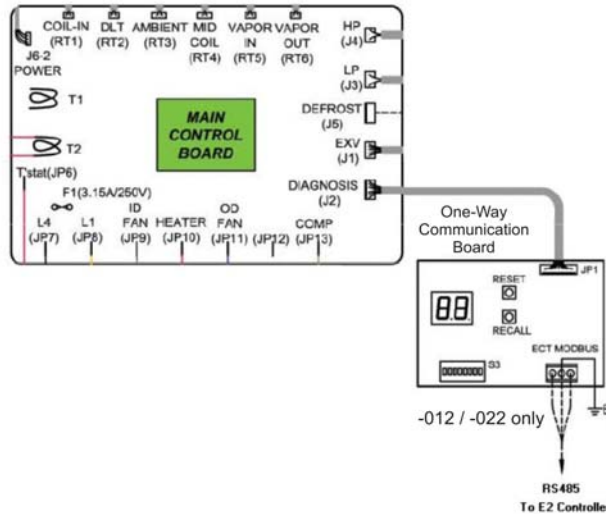


Figure 1 - XJ Scroll Connected to a One-Way Communication Board

Connect the XJ Scroll to the MODBUS network as shown in *Figure 2*. Connect the network cable to the three-terminal connector on the E2 COM port that has been configured as MODBUS port (COM 2, 4, or 6).

Installation Instructions: XJ Scroll Condenser to E2

When the E2 is at one end of the daisy chain, terminate the E2 with all three jumpers in the terminated (UP) position.

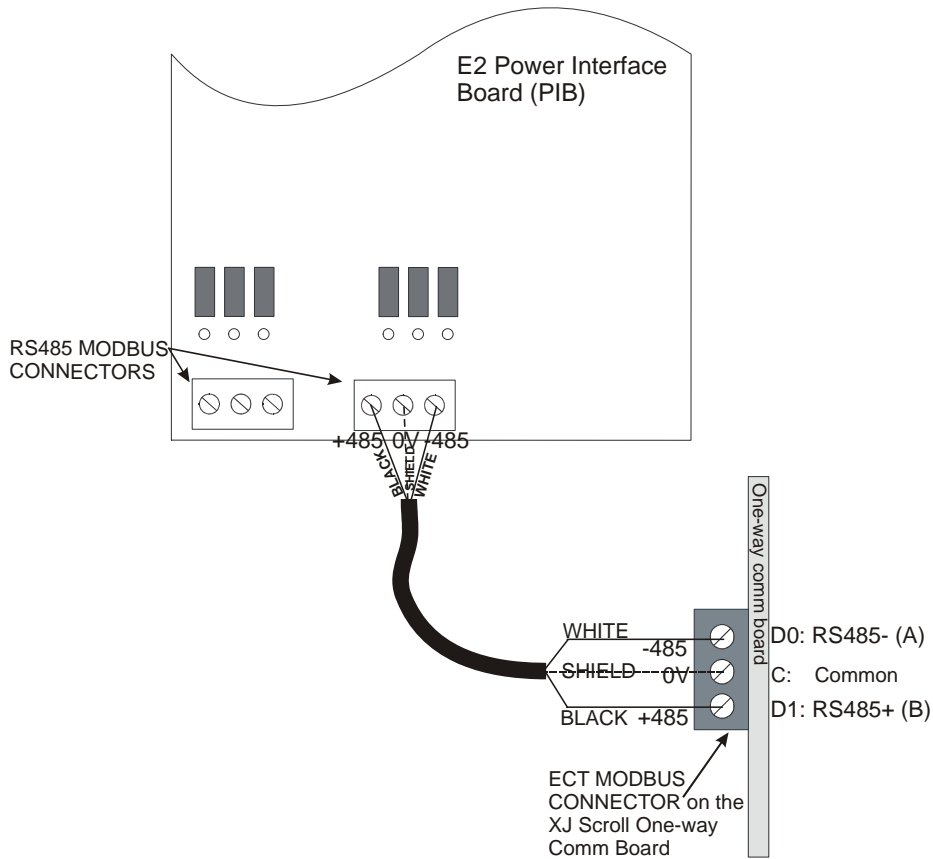


Figure 2 - E2 Modbus Connected to the One-Way Communication Board

Installation Instructions: XJ Scroll Condenser to E2

XJ Scroll One-Way Communication Board Configuration

XJ Scroll address is determined using dip switches on the One-Way Communication Board. Switch numbers 1 to 6 set the slave address. Switch number 7 will set the Baud rate and switch number 8 will set the parity. The range of allowable addresses is 1 through 63. Refer to *Table 2* for settings.

Make sure that you are setting the same parity and baud rate as that in E2.

Please note the Termination JP3 Jumper is just used for the devices **at beginning or end of the chain** – any devices in the middle of the chain do not need it.

JP3 Termination Jumper ON = Add 150 Ohm resistor between A and B

JP3 Termination Jumper Off = Remove 150 Ohm resistor between A and B

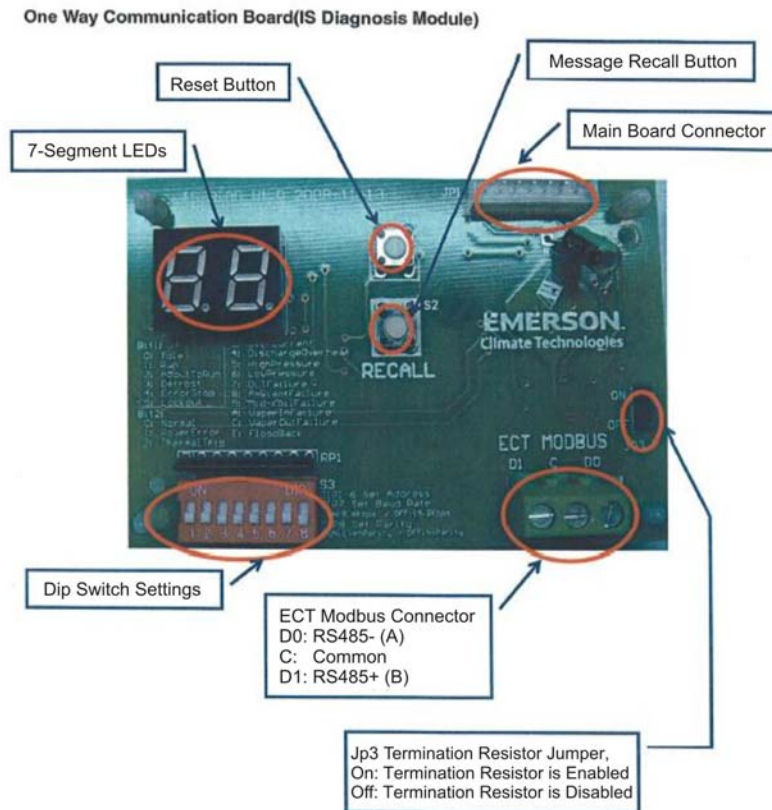


Figure 3 - XJ Scroll One-Way Communication Board

Installation Instructions: XJ Scroll Condenser to E2

Dip Switch Address Settings

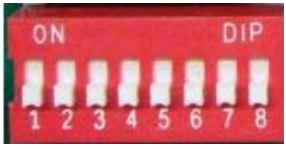
					<ul style="list-style-type: none"> •No.1~6: Set Slave Address •No.7: Set Baud Rate •No.8: Set Parity 			
1	2	3	4	5	6	7	8	
Set Address								Address
OFF	OFF	OFF	OFF	OFF	ON	-	-	Address=1
OFF	OFF	OFF	OFF	ON	OFF	-	-	Address=2
OFF	OFF	OFF	OFF	ON	ON	-	-	Address=3
OFF	OFF	OFF	ON	OFF	OFF	-	-	Address=4
OFF	OFF	OFF	ON	OFF	ON	-	-	Address=5
OFF	OFF	OFF	ON	ON	OFF	-	-	Address=6
OFF	OFF	OFF	ON	ON	ON	-	-	Address=7
OFF	OFF	ON	OFF	OFF	OFF	-	-	Address=8
OFF	OFF	ON	OFF	OFF	ON	-	-	Address=9
OFF	OFF	ON	OFF	ON	OFF	-	-	Address=10
OFF	OFF	ON	OFF	ON	ON	-	-	Address=11
OFF	OFF	ON	ON	OFF	OFF	-	-	Address=12
OFF	OFF	ON	ON	OFF	ON	-	-	Address=13
OFF	OFF	ON	ON	ON	OFF	-	-	Address=14
OFF	OFF	ON	ON	ON	ON	-	-	Address=15
OFF	ON	OFF	OFF	OFF	OFF	-	-	Address=16
OFF	ON	OFF	OFF	OFF	ON	-	-	Address=17
ON	ON	OFF	OFF	OFF	ON	-	-	Address=18
OFF	ON	OFF	OFF	ON	ON	-	-	Address=19
OFF	ON	OFF	ON	OFF	OFF	-	-	Address=20
OFF	ON	OFF	ON	OFF	ON	-	-	Address=21
OFF	ON	OFF	ON	ON	OFF	-	-	Address=22
OFF	ON	OFF	ON	ON	ON	-	-	Address=23
OFF	ON	ON	OFF	OFF	OFF	-	-	Address=24
OFF	ON	ON	OFF	OFF	ON	-	-	Address=25

Table 2 - Address Settings

Installation Instructions: XJ Scroll Condenser to E2

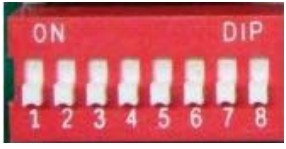
								<ul style="list-style-type: none"> •No.1~6: Set Slave Address •No.7: Set Baud Rate •No.8: Set Parity
1	2	3	4	5	6	7	8	
OFF	ON	ON	OFF	ON	OFF	-	-	Address=26
OFF	ON	ON	OFF	ON	ON	-	-	Address=27
OFF	ON	ON	ON	OFF	OFF	-	-	Address=28
OFF	ON	ON	ON	OFF	ON	-	-	Address=29
OFF	ON	ON	ON	ON	OFF	-	-	Address=30
OFF	ON	ON	ON	ON	ON	-	-	Address=31
ON	OFF	OFF	OFF	OFF	OFF	-	-	Address=32
ON	OFF	OFF	OFF	OFF	ON	-	-	Address=33
ON	OFF	OFF	OFF	ON	OFF	-	-	Address=34
ON	OFF	OFF	OFF	ON	ON	-	-	Address=35
ON	OFF	OFF	ON	OFF	OFF	-	-	Address=36
ON	OFF	OFF	ON	OFF	ON	-	-	Address=37
ON	OFF	OFF	ON	ON	OFF	-	-	Address=38
ON	OFF	OFF	ON	ON	ON	-	-	Address=39
ON	OFF	ON	OFF	OFF	OFF	-	-	Address=40
ON	OFF	ON	OFF	OFF	ON	-	-	Address=41
ON	OFF	ON	OFF	ON	OFF	-	-	Address=42
ON	OFF	ON	OFF	ON	ON	-	-	Address=43
ON	OFF	ON	ON	OFF	OFF	-	-	Address=44
ON	OFF	ON	ON	OFF	ON	-	-	Address=45
ON	OFF	ON	ON	ON	OFF	-	-	Address=46
ON	OFF	ON	ON	ON	ON	-	-	Address=47
ON	ON	OFF	OFF	OFF	OFF	-	-	Address=48
ON	ON	OFF	OFF	OFF	ON	-	-	Address=49
ON	ON	OFF	OFF	ON	OFF	-	-	Address=50
ON	ON	OFF	OFF	ON	ON	-	-	Address=51
ON	ON	OFF	ON	OFF	OFF	-	-	Address=52
ON	ON	OFF	ON	OFF	ON	-	-	Address=53

Table 2 - Address Settings

Installation Instructions: XJ Scroll Condenser to E2

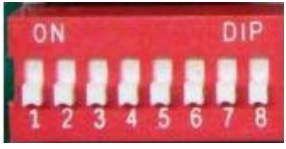
					<ul style="list-style-type: none"> •No.1~6: Set Slave Address •No.7: Set Baud Rate •No.8: Set Parity 			
1	2	3	4	5	6	7	8	
ON	ON	OFF	ON	ON	OFF	-	-	Address=54
ON	ON	OFF	ON	ON	ON	-	-	Address=55
ON	ON	ON	OFF	OFF	OFF	-	-	Address=56
ON	ON	ON	OFF	OFF	ON	-	-	Address=57
ON	ON	ON	OFF	ON	OFF	-	-	Address=58
ON	ON	ON	OFF	ON	ON	-	-	Address=59
ON	ON	ON	ON	OFF	OFF	-	-	Address=60
ON	ON	ON	ON	ON	OFF	-	-	Address=61
ON	ON	ON	ON	ON	ON	-	-	Address=62
ON	ON	ON	ON	ON	ON	-	-	Address=63
Set Baud Rate								Baud Rate
-	-	-	-	-	-	ON	-	9.6Kbps
-	-	-	-	-	-	OFF	-	19.2Kbps
Set Parity								Parity
-	-	-	-	-	-	-	ON	Even Parity
-	-	-	-	-	-	-	OFF	No Parity

Table 2 - Address Settings

Installation Instructions: XJ Scroll Condenser to E2

Network Connection to E2

Connecting an XJ Scroll Condenser to an E2 unit requires the E2 to be version 2.84 or above. Contact Retail Solutions for upgrade information if the controller is a version before 2.84.

An E2 has up to three COM ports that can be assigned for XJ Scroll board communication (COM2, an RS485 port on the E2 power interface board, and COM4 and COM6, which are external RS485 cards). COM ports can only be used for one function; in other words, if COM2 is set up as the I/O network, you cannot connect XJ Scroll boards to COM2. If COM2 is not used for XJ Scroll boards, ensure your E2 is equipped with an RS485 COM Card (P/N 637-4890) and configured in E2 General Services (Menu **7 3 1** or press **Alt + M**, **Serial** tab) to enable COM4.

Connect the network cable to the three-terminal connector on the COM port that has been configured as XJ Scroll.

When the E2 is at one end of the daisy chain, terminate the E2 with all three jumpers in the terminated (UP) position.

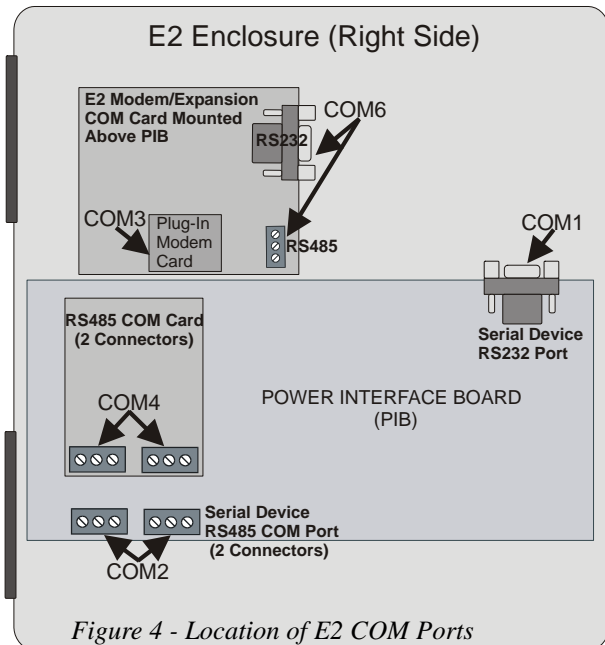
E2 Setup of XJ Scroll Condensers

Set Up Network Ports

Before communicating to an XJ Scroll, the port on the E2 that has the cable connected to the XJ Scroll Condenser must be configured to use the XJ Scroll Condenser.

1. Log in to the E2 with Level 4 access.
2. Press **Menu** followed by **7 3 1** - **General Controller Info**.
3. Press **Ctrl + 3** to open the **Serial** tab of the General Controller Info setup screens:

E2 PIB COM PORT ASSOCIATIONS



Installation Instructions: XJ Scroll Condenser to E2

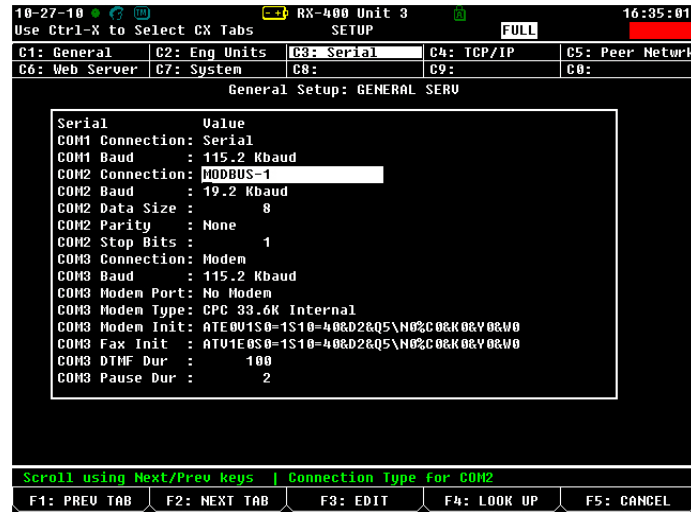




Figure 5 - Serial Communications Manager Screen

4. This screen will have a “Connection” field for all COM ports on the E2. Highlight the COM port connection field that will be used for MODBUS, and press **F4** - **LOOK UP**. From the list of network types, select **MODBUS (1-3)**.
5. Four fields will become visible underneath the COM port connection field, which pertain to the way the device communicates:
 - Baud** - Default setting is **19.2k**. The baud rate setting should be set to match the baud rate dip switch settings of all XJ Scroll devices. Refer to *Table 2*. (All devices connected to the same COM port should be set to the same baud rate.)
 - Data Size** - Leave this field at the default value (**8**).
 - Parity** - Leave this field at the default value (**None**). The parity settings should be set to match the parity dip switch settings of all XJ Scroll devices. Refer to *Table 2*.
 - Stop Bits** - Leave this field at the default value (**1**).
6. Press  to save changes and exit.

Add and Connect XJ Scroll

To enable communications between E2 and the XJ Scroll, the devices must be added and addressed in E2.

1. Log in to the E2 with Level 4 access.
2. Press  **&7 &7 @** - **Connected I/O Boards and Controllers**.

Installation Instructions: XJ Scroll Condenser to E2

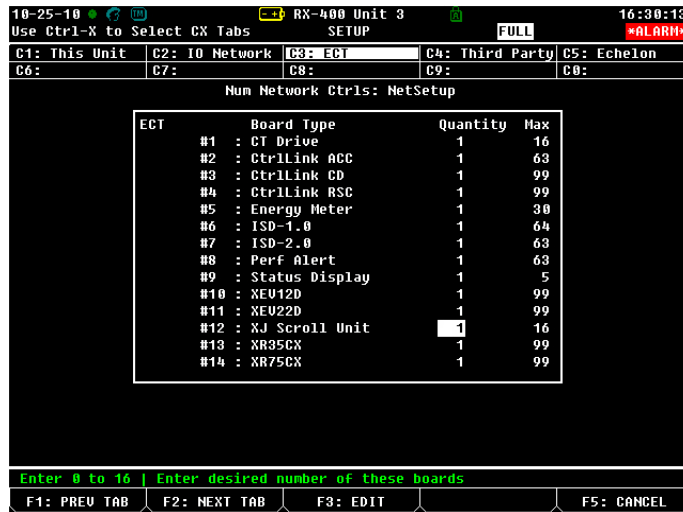


Figure 6 - Connected I/O Screen

- In the Connected I/O screen, under the **ECT** tab, Enter the number of XJ Scroll devices in the **XJ Scroll Unit** number field.
- Press to return to the Network Setup menu, then select - **Network Summary**.
- Locate the XJ Scroll units you added to the network list (press and to scroll through the list). The default name for an XJ Scroll begins with a two-letter designator of the model type (**XJ** for XJ Scroll).

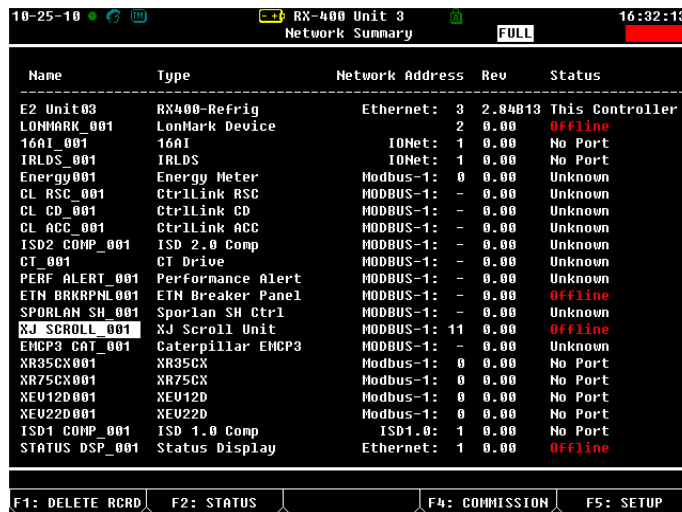


Figure 7 - Network Summary Screen

- By default, each XJ Scroll’s board number in the network list is indicated by a - (dash). To set the address and begin communication, press to Commission. (If you have more than one

Installation Instructions: XJ Scroll Condenser to E2

MODBUS network, specify to which network you want the device to belong.) A screen will open that will allow you set the address:

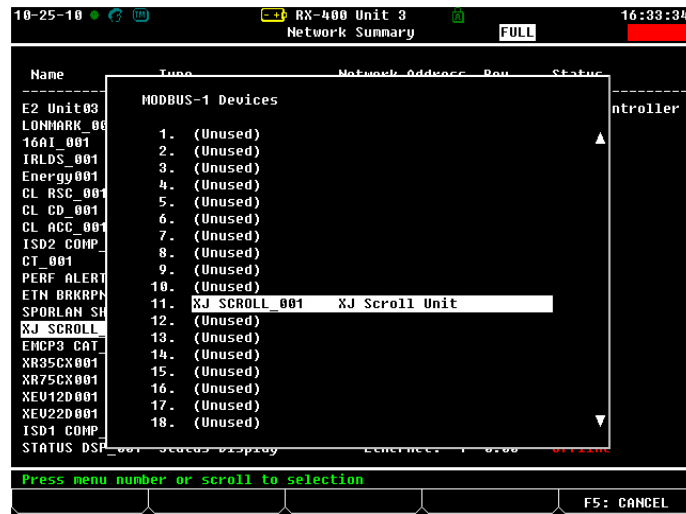


Figure 8 - Set Address of the XJ Scroll

7. In the list of MODBUS devices, choose the address number corresponding to the XJ Scroll One-way Communication Board address dip switch setting, and press to select it. If a network ID has already been selected, its name will be shown next to the network ID in this list. If the network ID you are trying to assign has already been used, you must set the network ID dip switch on this device to a different number that is not being used.
8. Repeat **Steps 5** and **6** until each XJ Scroll device has been commissioned.
9. When finished, press to return to the Network Setup menu, then press **1** - **Network Summary**. Locate the XJ Scrolls you set up, and look at each device's status in the **Status** field. You will see one of the following messages:
 - Online** - The XJ Scroll is communicating normally.
 - Offline** - The XJ Scroll is not communicating, has not been commissioned, is not functional, or is not powered up. Verify the XJ Scroll is powered up, wired correctly, and has the proper network address, baud rate, and parity.
 - Unknown** - The XJ Scroll is not communicating or has not been commissioned. Verify the XJ Scroll is powered up, wired correctly, and has the proper network address, baud rate, and parity.
 - No Port** - No port is set up in the E2 Serial Configuration Manager to be a MODBUS port.
 - Wrong FW Rev** - This message is likely caused by the XJ Scroll having a firmware version older than the minimum revision required by E2 for communication. Replace the XJ Scroll One-way Communication Board with one that has the latest version of firmware on it.

Wiring Types

Retail Solutions specifies Belden #8641 shielded twisted pair cables for use as RS485 Bus wiring (or Belden #82761 and Belden #88761 for plenum installations).

If the recommended cable is not available in your area, be sure the wiring meets or exceeds the following specs:

Shielded?	Yes
Conductor Type	Twisted Pair
Gauge	18 - 24 AWG
Capacitance between signal wires	31 pF/ft or less (9.45 m) or less
Capacitance between signal and shield	59 pF/ft or less (17.98 m) or less
Maximum Length	4000 ft/18 to 22 AWG (1219.2 m) 2500 ft/24 AWG (762 m)
Nominal Impedance	120Ω±50Ω

Table 3 - Cable Specs

Installation Instructions: XJ Scroll Condenser to E2

Appendix

Main Control Board Setting For XJAM CDU (Software Version 300-0043-06 V1.0)

Model Name	Rotary Switch	2bit Dip-Switch	3bit Dip-Switch
Control Board Default Setting	0	ON/ON	Bit 1: To set evaporator fan control mode - "OFF": Evaporator Fan On/Off Logic Same As Compressor - "ON": Evaporator fan will be ON all the time no mater whether compressor is ON/OFF or defrosting Bit 2: To set defrost mode - "OFF": Using Emerson defrost module - "ON": Using customer defrost module Bit 3: Not used yet.
ZX15KCE-TF5	1	ON/ON	
ZX15KCE-PFV	2	ON/ON	
ZX21KCE-TF5	3	ON/ON	
ZX21KCE-PFV	4	OFF/OFF	
ZX30KCE-TF5	5	ON/ON	
ZX30KCE-PFV	6	OFF/OFF	
ZX38KCE-TF5	7	OFF/OFF	
ZX38KCE-PFV	8	OFF/OFF	
ZX45KCE-TF5	9	OFF/OFF	

Table 4 - Settings for XJAM CDU

Main Control Board Setting For XJAL CDU (Software Version 300-0043-05 V1.0)

Model Name	Rotary Switch	2bit Dip-Switch	3bit Dip-Switch
Control Board Default Setting	0	ON/ON	Bit 1: To set evaporator fan control mode - "OFF": Evaporator Fan On/Off Logic Same As Compressor - "ON": Evaporator fan will be ON all the time no mater whether compressor is ON/OFF or defrosting Bit 2: To set defrost mode - "OFF": Using Emerson defrost module - "ON": Using customer defrost module Bit 3: Not used yet.
ZXI06KCE-TF5	1	ON/ON	
ZXI06KCE-PFV	2	ON/ON	
ZXI09KCE-TF5	3	ON/ON	
ZXI11KCE-PFV	4	OFF/OFF	
ZXI14KCE-TF5	5	OFF/OFF	
ZXI14KCE-PFV	6	ON/ON	
ZXI15KCE-TF5	7	OFF/OFF	
ZXI16KCE-PFV	8	OFF/OFF	
ZXI18KCE-TF5	9	OFF/OFF	

Table 5 - Settings for XJAL CDU