

Natural Refrigerant Training Summit

Building a Sustainable Workforce

Presentation Title

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Copeland



NORTH AMERICAN
Sustainable
Refrigeration
Council

Natural Refrigerant Training Summit

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Who We Are

A 501c3 nonprofit working to create a sustainable future for supermarket refrigeration by removing barriers to natural refrigerant adoption.




160+
member
companies



55K+
food retail
locations



Goals

-  Build a sustainable technician workforce
-  Increase funding for natural refrigerant equipment
-  Improve technology options, education, and awareness

What are Natural Refrigerants?

CO₂

R744
Carbon Dioxide

C₃H₈

R290
Propane

NH₃

R717
Ammonia



NORTH AMERICAN
Sustainable Refrigeration Council

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Control Overview



Agenda

Copeland Supervisory Controllers

E3 Controller

Co2 High Pressure Controller

Case Controllers

Copeland VFD's and Leak Detection

CO2 Startup

Copeland Applications and Tools

What do Copelands Supervisory Controllers Do?

E3



Built In Display
Communicates to Modbus, BACnet
Devices
Multiple Ethernet Ports
Drop-In Replacement for E2
Same Grounding, Power
Communication Connections

Site Supervisor



Cost flexibility
Ideal for space constrained areas
Flexible display options (10-21")
Onboard I/O
Communicates to Modbus, BACnet and
Canbus Devices
Multiple Ethernet Ports
Flexible mounting

HVAC Control 


Refrigeration Control 

Lighting Control 

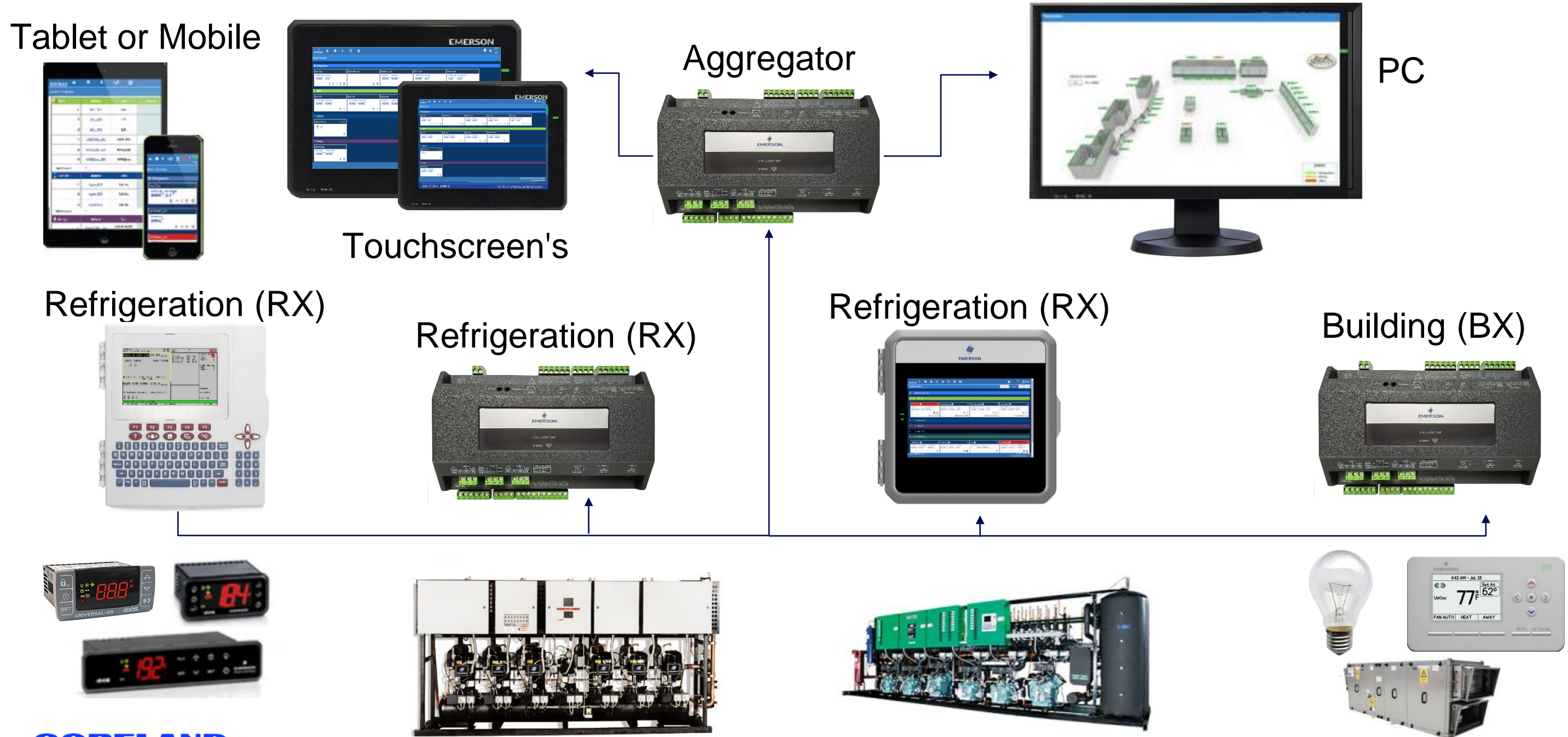
Energy Metering 

Remote Monitoring 

Operational Optimization 

Energy Savings 

Network Layout with Existing and New Controllers



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E3 Controller



E3 vs E2 Differences

E3 front view

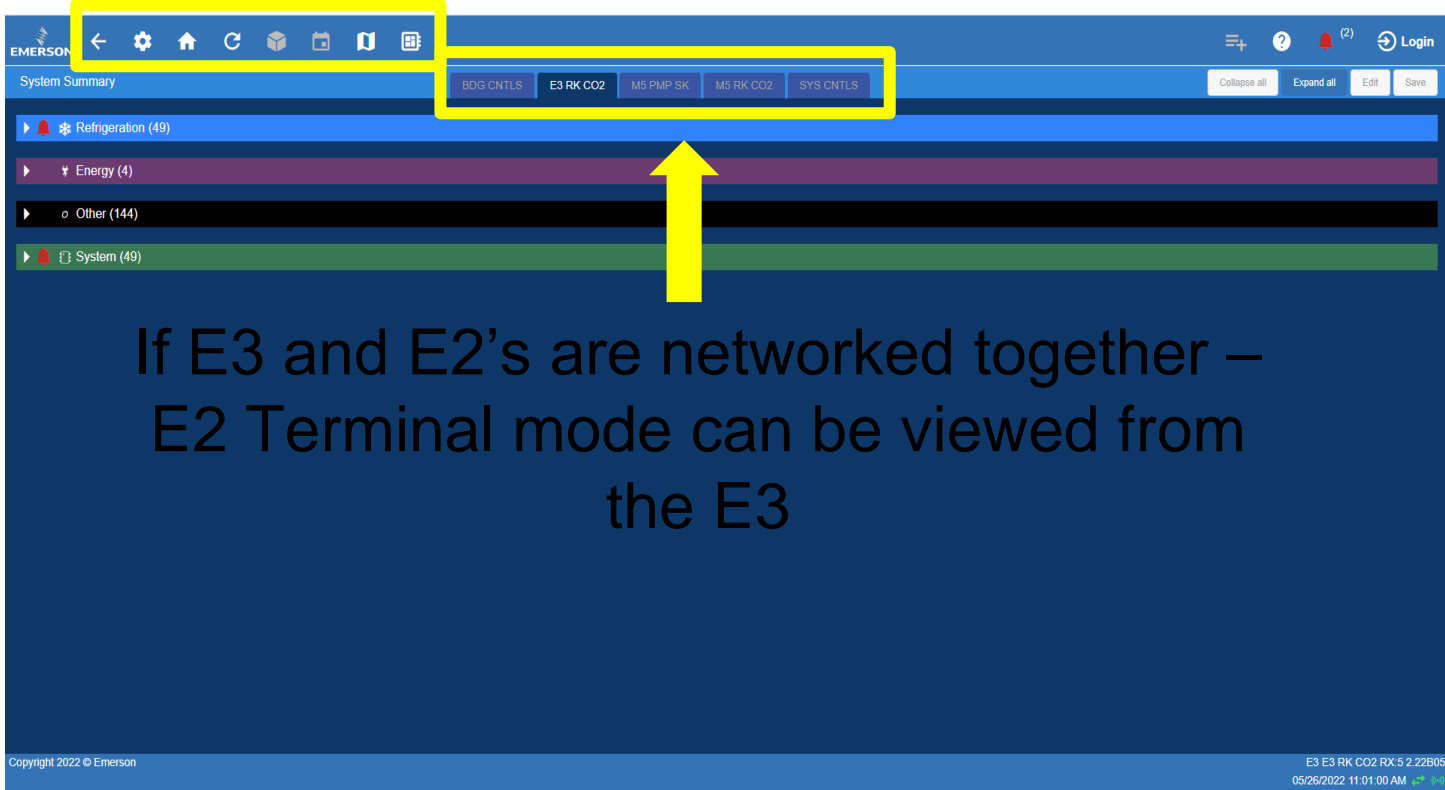


E2e front view



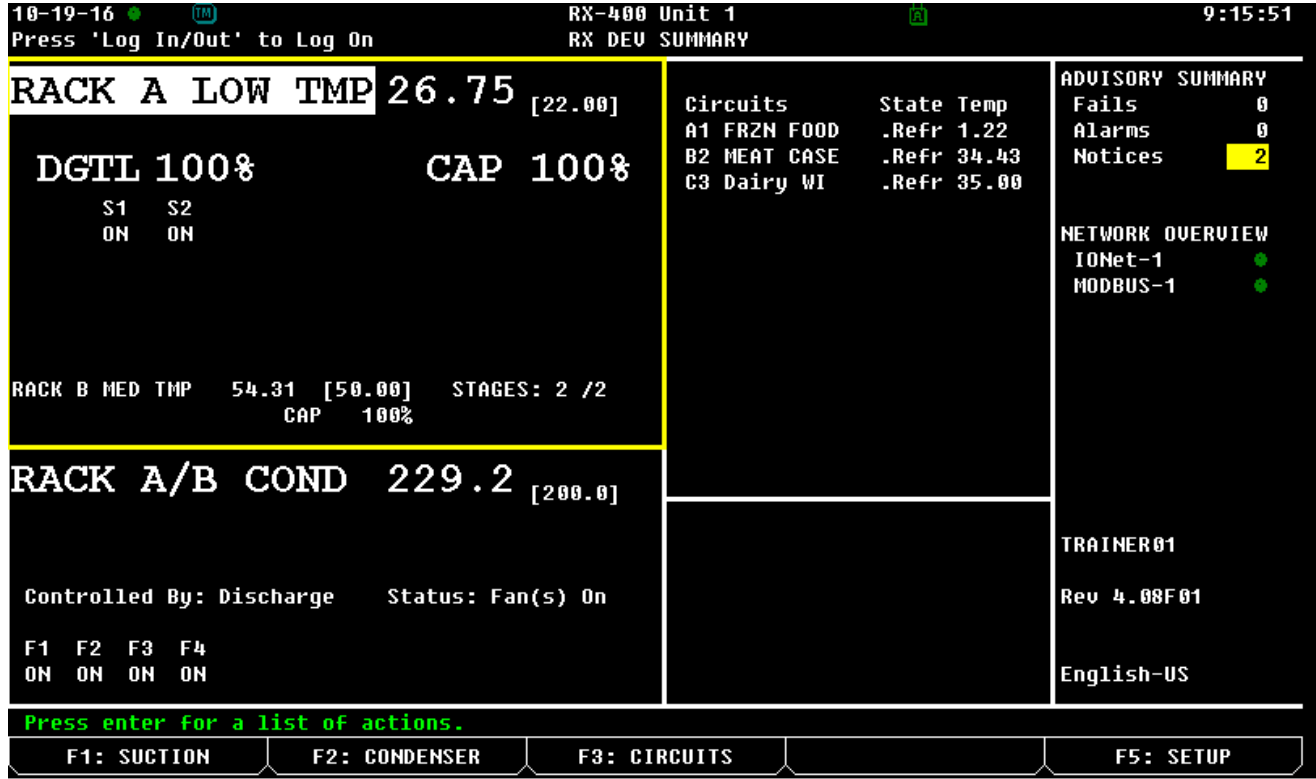
E3 vs E2 Display

E3 Display – Colored 10” Touch Screen



If E3 and E2's are networked together – E2 Terminal mode can be viewed from the E3

E2 Display



The E3 operates on a shared software platform with Site Supervisor. This new format offers intuitive navigation that technicians will find familiar and easy to use.

E3 Controller is a Drop-in Replacement for the E2 Product



- **True E2 Drop-in Replacement**
 - Identical wiring holes, mounting points and vents
 - Enclosure fits into existing panel cut-out
- **Updated Integrated Display**
 - Larger 10" capacitive color touch-screen
 - User-friendly interface with on-screen keyboard
- **Equivalent COM Port Configuration and Power Connections**
 - Total of four COM ports for connected devices with two isolated COM ports
 - Easily swap out an E2 with no need for rewiring
- **Fully Backward Compatible With MultiFlex and all other IONet Boards**

E3 Technical Specifications

Operating Temperature	-40°F to 149°F (-40°C to 65°C)
Operating Humidity	5% - 95% RH non-condensing at 90°F
Storage Humidity	5% - 100% RH
24 VAC	24 VAC ±20%, 50/60 Hz, Class 2, 80VA
Dimensions	12" L x 12.5" W x 3.75 H"
4 RS485 ports	COMM 1 = RS485 Com 2 A and B COMM 2 = RS485 Com 6 (isolated) COMM 3 = RS485 (isolated) COMM 4 = RS485 Com 4 A and B
2 Ethernet ports	Ports 0,1
2 USB ports	J2, J3

Hardware Enhancements and Modified Applications

Hardware Enhancements

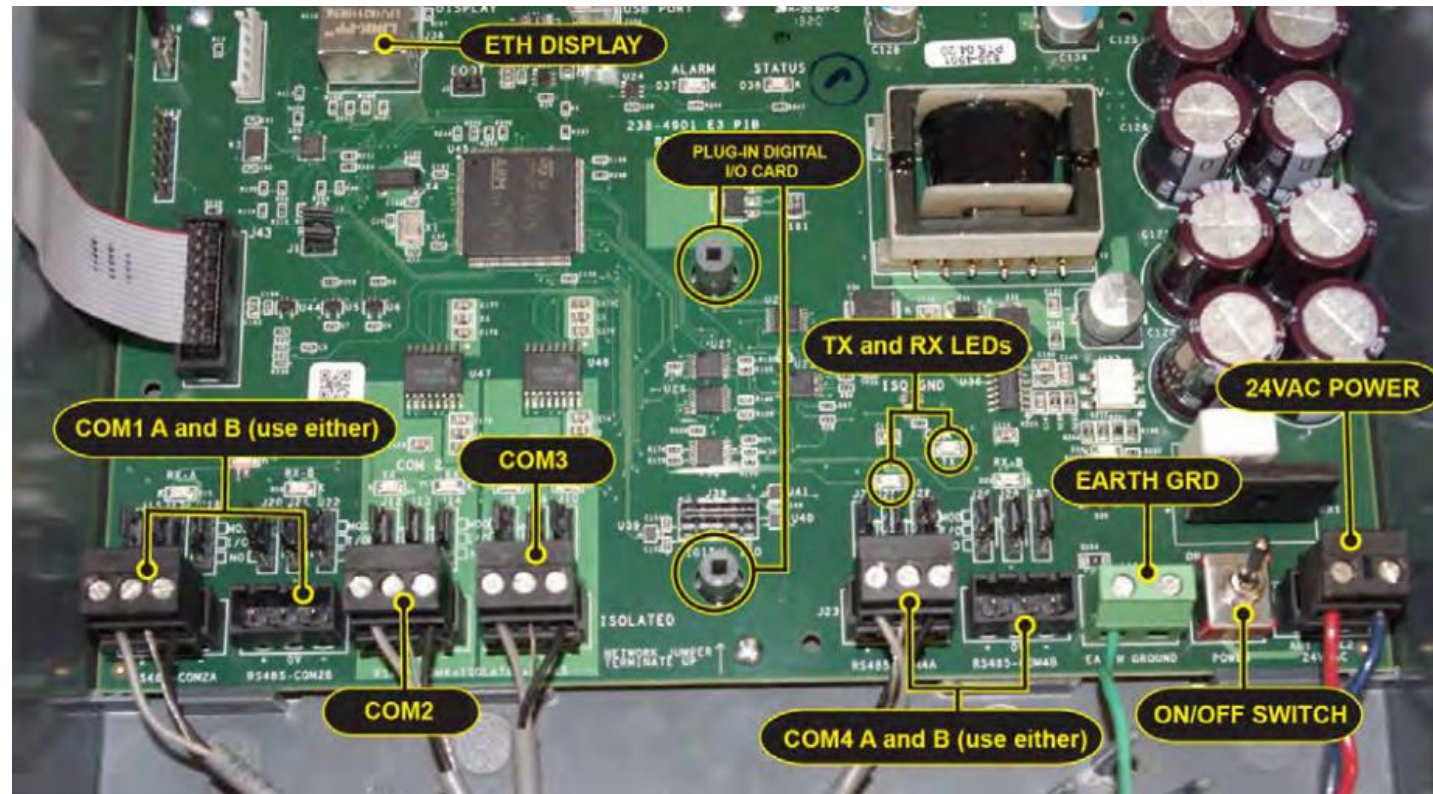
E2 Hardware	E3 Hardware
500 MHz Single Core	1.6 GHz Quad Core
128 MB RAM	2 GB RAM
1 Ethernet Port (1 MAC/PHY)	2 Ethernet Ports (2 MAC/PHY)
3 RS-485 COM Ports	4 RS-485 COM Ports (2 Isolated)
Plug for Optional I/O Daughter Card	Plug for Optional I/O Daughter Card

Modified Applications in E3

E2 Application Name	New E3 Application Name
Eng. Unit Converter	Localization
Heat/Cool Control	Thermostat or Sensor Control
Power Monitoring	Utility Monitoring
Pulse Accumulator	Utility Monitoring
Time Schedule	Scheduler

Twelve times faster processing power and 16X additional memory built into E3 for faster response time and increased storage.

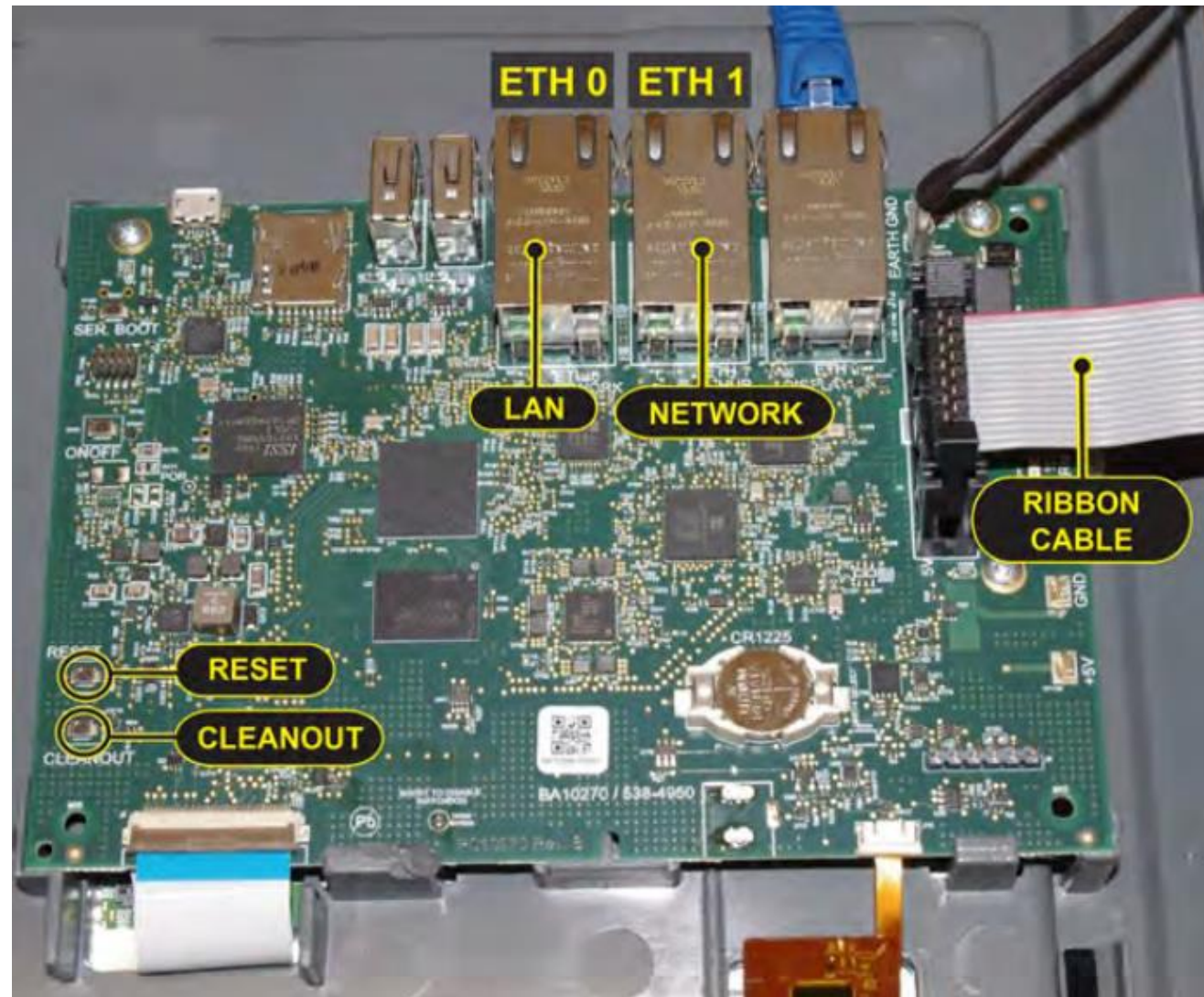
E3 Power Interface Board (PIB)



- 24VAC Transformer Class II
- (4) Universal Communication Ports
 - IO Net, ModBus, BACnet
- Optional Plug-In IO Card (same part used for e2)

Operating Temperature	-40°F to 113°F (-40°C to 45°C) <i>*Tested to UL60730-1 standard</i>
Operating Humidity Storage Humidity	5% - 95% RH non-condensing at 90°F 5% - 100% RH
24VAC	24 VAC ±20%, 50/60 Hz, Class 2
Dimensions	12" L x 12.5" W x 3.75" H
4 RS485 ports	COM 1 = RS485-COM2A and RS485-COM2B COM 2 = RS485-COM6<ISOLATED> COM 3 = <ISOLATED>RS485 COM 4 = RS485-COM4A and RS485-COM4B
2 Ethernet ports	ETH 0, ETH 1
2 USB ports	J2, J3
External Pollution Rating	All Models: Pollution Degree 3
Rated Impulse Voltage	2500/4000V
Lithium Battery Marking	Caution: The cell used in this device may present a fire or chemical burn hazard if mistreated. Do not disassemble, heat above 212°F (100°C), or incinerate.


E3 Motherboard




- Customer LAN Network (ETH0)
 - 192.168.0.250 default IP (can be changed)
- Service LAN Connection (ETH1)
 - 192.168.1.250 default IP (do not change)
- Reset and Cleanout buttons

Communication Protocols For CO2 Devices

Device Type	Purpose	Communication Protocol
E3	System Manager (Compressor, Gas Cooler Fans, Circuit Management, Alarms)	Ethernet (Remote) IO Net, Modbus, BACnet (Devices)
MultiFlex Boards	Input/Outputs	IO Net
iPro HPV/BGV	HPV & BGV Controller	Modbus
XM678D/XM679K	Case Controller	Modbus
CC200	Case Controller	Modbus or BACnet
MRLDS-450	Leak Detection	Modbus
EVM/EVH	Variable Frequency Drive	Modbus or BACnet





Product: [8761](#)

Electronic, 2 C #22 Str TC, PE Ins, OS, PVC Jkt, CM

Request Sample

Product Description
Electronic, 2 Conductor 22AWG (7x30) Tinned Copper, PE Insulation, Overall Beldfoil® Shield, PVC Outer Jacket, CM

Model Cross Reference for Supervisory Control Platform (SS/E3) vs E2

E3 or Site Supervisor to E2 Cross-Reference Guide									
E2 Models	E3 / Site Supervisor Models								
	Small Format Controller SF	Refrigeration Controller RXS	Refrigeration Controller RXSe	Building Controller BXS	Building Controller BXSe	Combination Controller CXS	Combination Controller CXSe	Service Replacement SR	Site Aggregator SA
RX300		✓						✓	
RX400			✓					✓	
BX300				✓				✓	
BX400					✓			✓	
CX100	✓							✓	
CX300						✓		✓	
CX400						✓	✓	✓	
Overlay E2									✓

New Service Replacement (SR) Model

- **Max** number of all applications RX, BX, CX, 400 level
- **Save time** when emergency replacement needed
- **Reduce complexity** of carrying/stocking multiple types for service calls
- **Simplify** your enterprise with one controller that does the max of everything

Site Aggregator (SA)

- True System Supervisor. Dedicated processing power and memory for logging and analytics
- Single view of controllers, compatible with E2's and Supervisors
- Overlay Existing E2 network



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Software Differences and Additions



Control Software Features

Software Features

Supervisory Control Software provides the Same Control Function as E2, and includes new:

- Faster Response and Navigation
- Text and Email Alerting
- Prioritized Alarms
- Floor Plan Views
- Consistent Application Views
- Aggregate Devices
- Intuitive Navigation with Graphical Interface
- Increased User Security
- Increased Network Functionality and Security
- Built in Web Server - No Additional Software Needed
- CO2 Suction Groups
- Intuitive Programming (Flex Combiners)



Internal Webpage

EMERSON

System Summary

- ▶ Refrigeration (7)
- ▶ HVAC (2)
- ▶ Lighting (2)
- ▶ Energy (7)
- ▶ System (6)

- System Settings
- Home Screen – can be any screen
- Site Inventory
- Schedules
- Graphics/Floorplans
- Inputs an Outputs

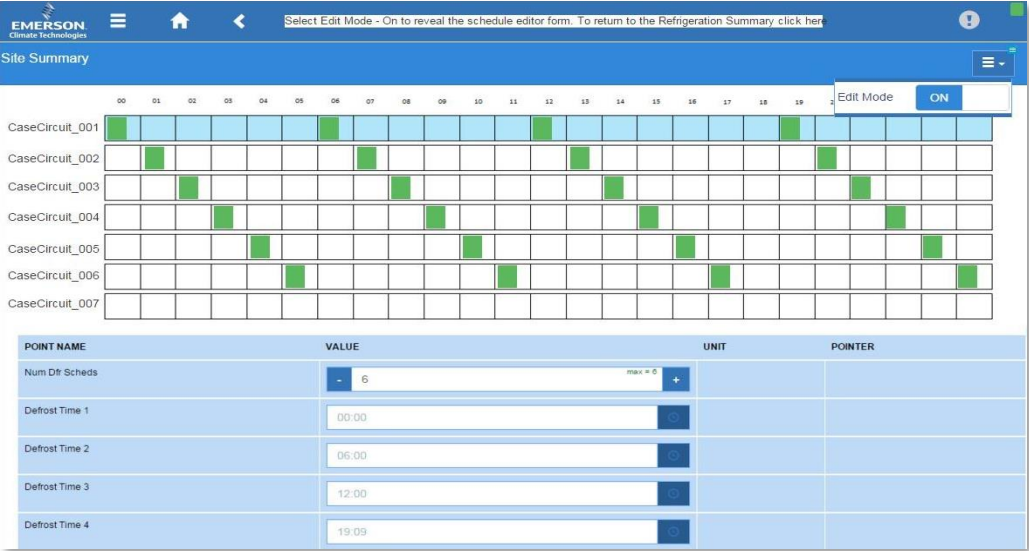
Copyright 2022 © Emerson

user 1

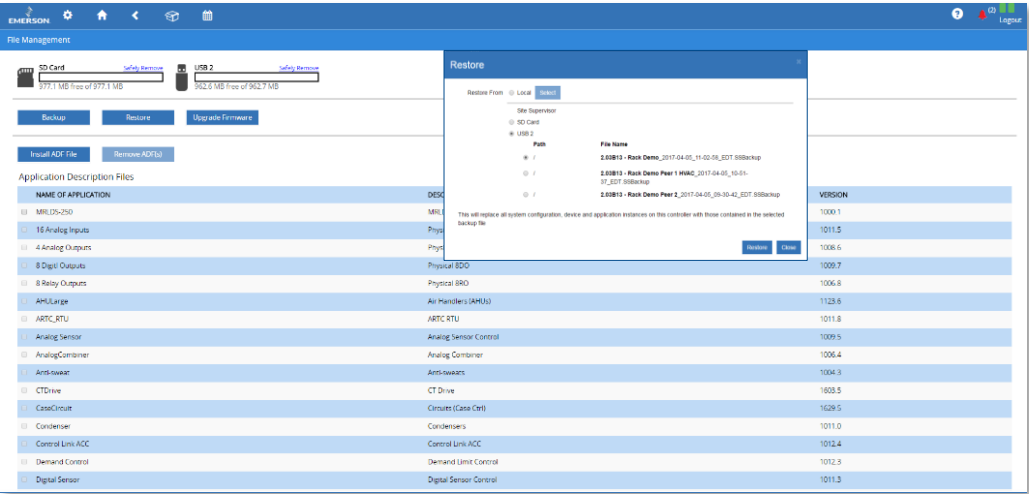
Site Supervisor Demo SR:1 2.21F01
08/03/2023 09:27:21

Supervisory Control Differentiators vs. E2

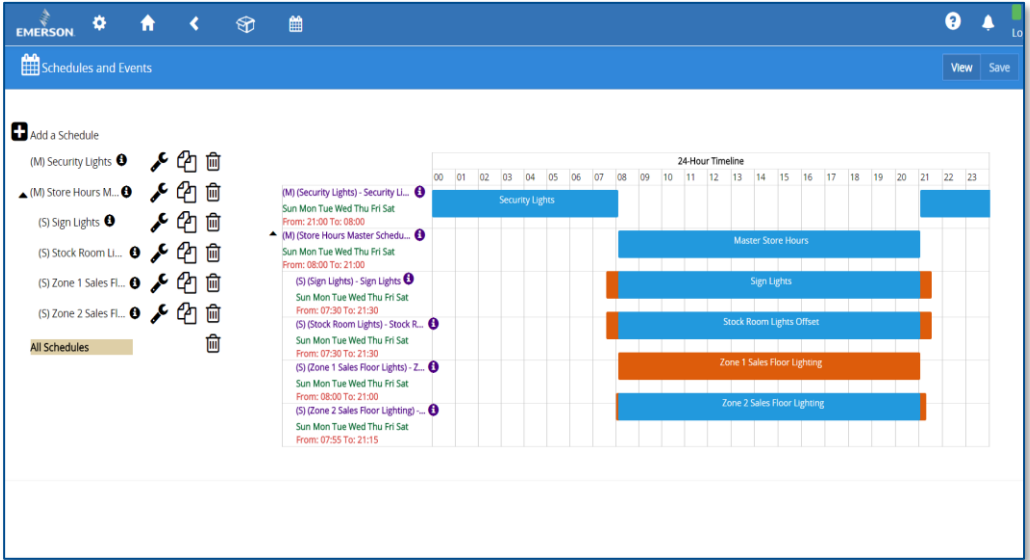
Graphical Defrost Summary



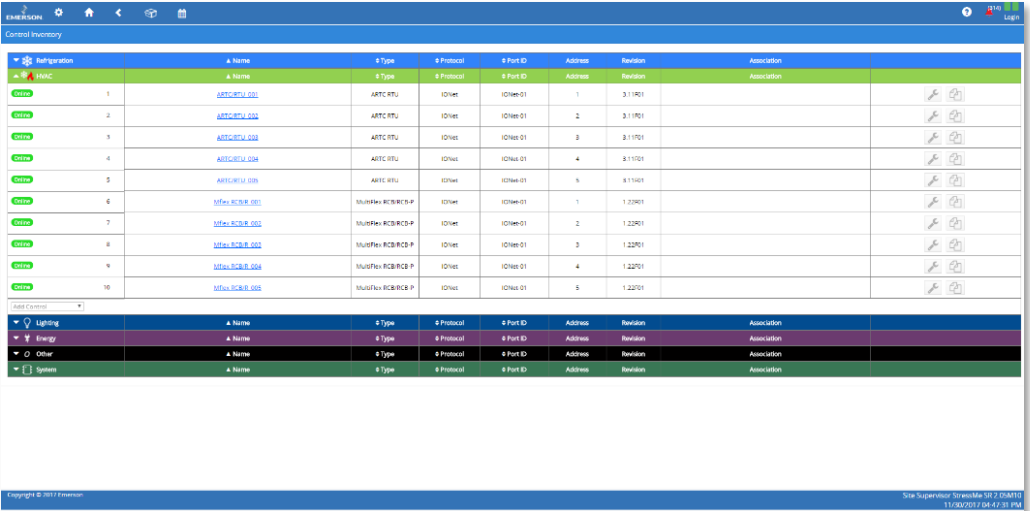
File Management



Graphical Schedule



Site Inventory



Fast Troubleshooting via Smart Alarms and Custom Graphing

Smart Alarms

- Provides high level explanation, possible causes, and suggested actions to take. Can enter custom user defined messages.

The screenshot shows the 'Non-Critical Alarm 1 of 1' details window. The main window displays a list of alarms with columns for Description, Type, Time Occurred, and Age. The details window for 'Non-Critical Alarm 1 of 1' provides the following information:

- Explanation:** You are receiving this alarm because your condenser fan has cycled more than the recommended times per time period.
- Possible Causes:**
 1. Failed temperature sensor.
 2. Improper temperature sensor location.
 3. Improper pressure transducer connection.
 4. Extreme ambient conditions.
 5. High pressure discharge valve malfunction.
 6. PID not properly tuned.
 7. Capacity cannot meet load.
- Suggested Actions:**
 1. Check temperature sensor for proper operation and placement.
 2. Check pressure probe for proper operation.
 3. Check valve setpoint for appropriate ambient conditions.
 4. Check high pressure valve for proper operation.
 5. Check PID related parameters for proper configuration.
 6. Check unit sizing for proper load capacity.
- User Defined Message:**
 - Type: Non-Critical
 - Time Occurred: 01/01/2021 10:12:12 PM
 - Age: 6d 17h 44m
 - Unit Number: 1
 - Unit Name: Market
 - Device Type: SS
 - Originator: Condenser A: PRES CTRL IN
Condenser A: TEMP CTRL IN
Ex. Fan. 001:Cvclce number

Graphical System Status Pages

- Monitor system status and performance visually with graph-based reports that identify historical patterns, trends and issues.

The screenshot shows the 'Graphical System Status Pages' interface. The dashboard includes a navigation menu with options like Status, General, Setpoints, Float Setup, Inputs, Outputs, Comp Setup, Comp Outs, Alarms, Proof, Comp Oil, Advanced, Power, Hot Gas, CheckIt, ISD, Associations, and Input/Output Status. The main content area displays a table of system parameters and several time-series graphs.

Parameter	Value
SUCTION PRESS	54.15 PSI
CUR PRESS SETPT	58.00 PSI
STAGES ACTIVE	2
TOTAL STAGES	6
PERCENT USED	37.31 %
RACK FAIL	OFF
COMP 1	OFF
COMP 2	OFF
COMP 3	ON
COMP 4	OFF
COMP 5	ON
COMP 6	OFF

The graphs show historical trends for various parameters over time (06:00:00 to 12:00:00 on 01/08/2021):

- PERCENT USED [%] (Base Log):** Shows a fluctuating trend around 44.78%.
- PRESS [PSI] (Base Log):** Shows a fluctuating trend around 61.90 PSI.
- COMP 1 (Base Log):** Shows a binary state (ON/OFF) fluctuating between 06:00:00 and 12:00:00.
- COMP 2 (Base Log):** Shows a binary state (ON/OFF) fluctuating between 06:00:00 and 12:00:00.
- COMP 3 (Base Log):** Shows a binary state (ON/OFF) fluctuating between 06:00:00 and 12:00:00.
- COMP 4 (Base Log):** Shows a binary state (ON/OFF) fluctuating between 06:00:00 and 12:00:00.

Benefit: Faster Trouble Shooting, Saving Time

Performance Meter, A Simple Way to Recognize Site Performance

- Case performance rolls-up into circuit performance. Graph or download performance data for detailed analysis. Up to 13 months of performance history for seasonal performance comparison is available.

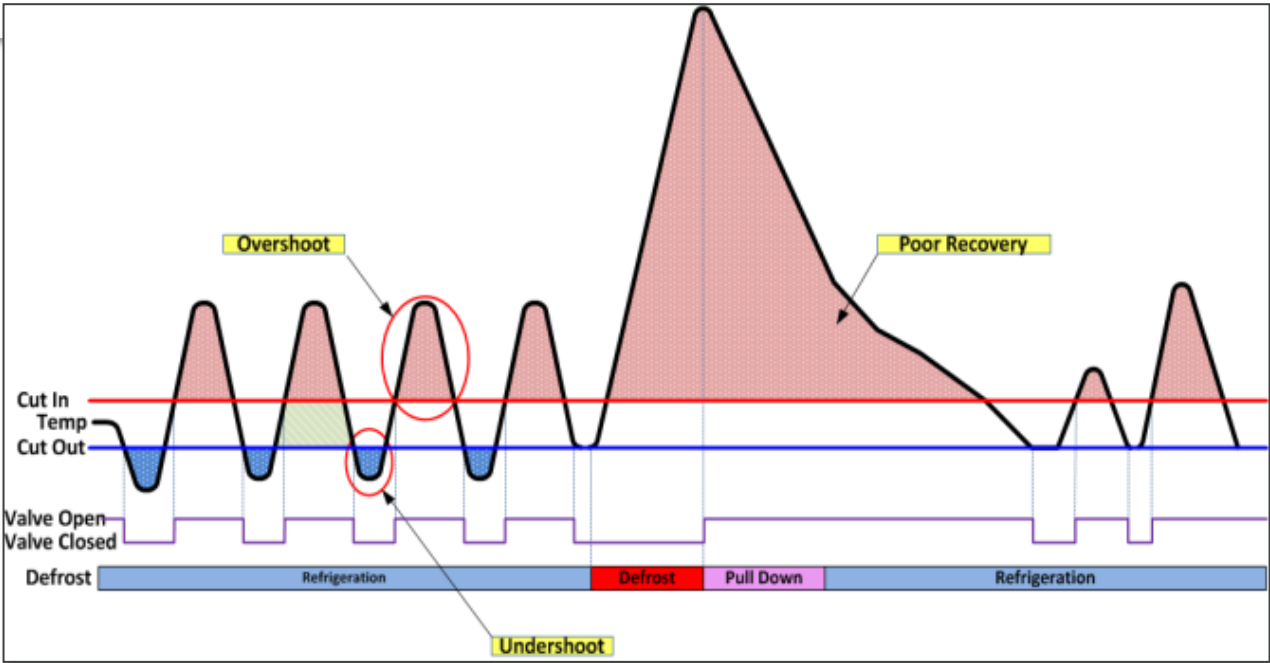


System Summary | HVAC/LTS | Rack A | Rack B

Refrigeration (23)

Circuit ID	Control Temp	Active Setpt
+23 R507 SUC	59.60 PSI	58.00 PSI
RACK A COND	150.62 PSI	170.00 PSI
A01 DELI CLR	33.67 °F	34.00 °F
A02 PROD PREP	58.69 °F	58.00 °F
A03 PROD CLR	36.79 °F	38.00 °F
A04 1F PROD	42.03 °F	32.00 °F
A05 3E MD PRD	30.31 °F	34.00 °F
A06 16SS DELI	29.44 °F	30.00 °F
A07 COLD DELI	32.86 °F	36.00 °F
A08 12SS CAKE	35.13 °F	36.00 °F
A09 20 MD MT	29.62 °F	29.00 °F
A10 2DK FR MT	25.36 °F	24.00 °F
A11 20 MD MT	27.95 °F	29.00 °F
A12 MEAT CLR	33.22 °F	34.00 °F
A13 MEAT PREP	46.53 °F	48.00 °F
A14 36 LNCH MI	29.50 °F	30.00 °F
A15 DAIRY CLR	38.91 °F	36.00 °F
A16 2E DAIRY	39.83 °F	32.00 °F
A17 44 DAIRY	29.53 °F	32.00 °F
A18 24 REER	NONE °F	36.00 °F
A19 2E BEER		
C33 6 FLORAL		
SPARE		

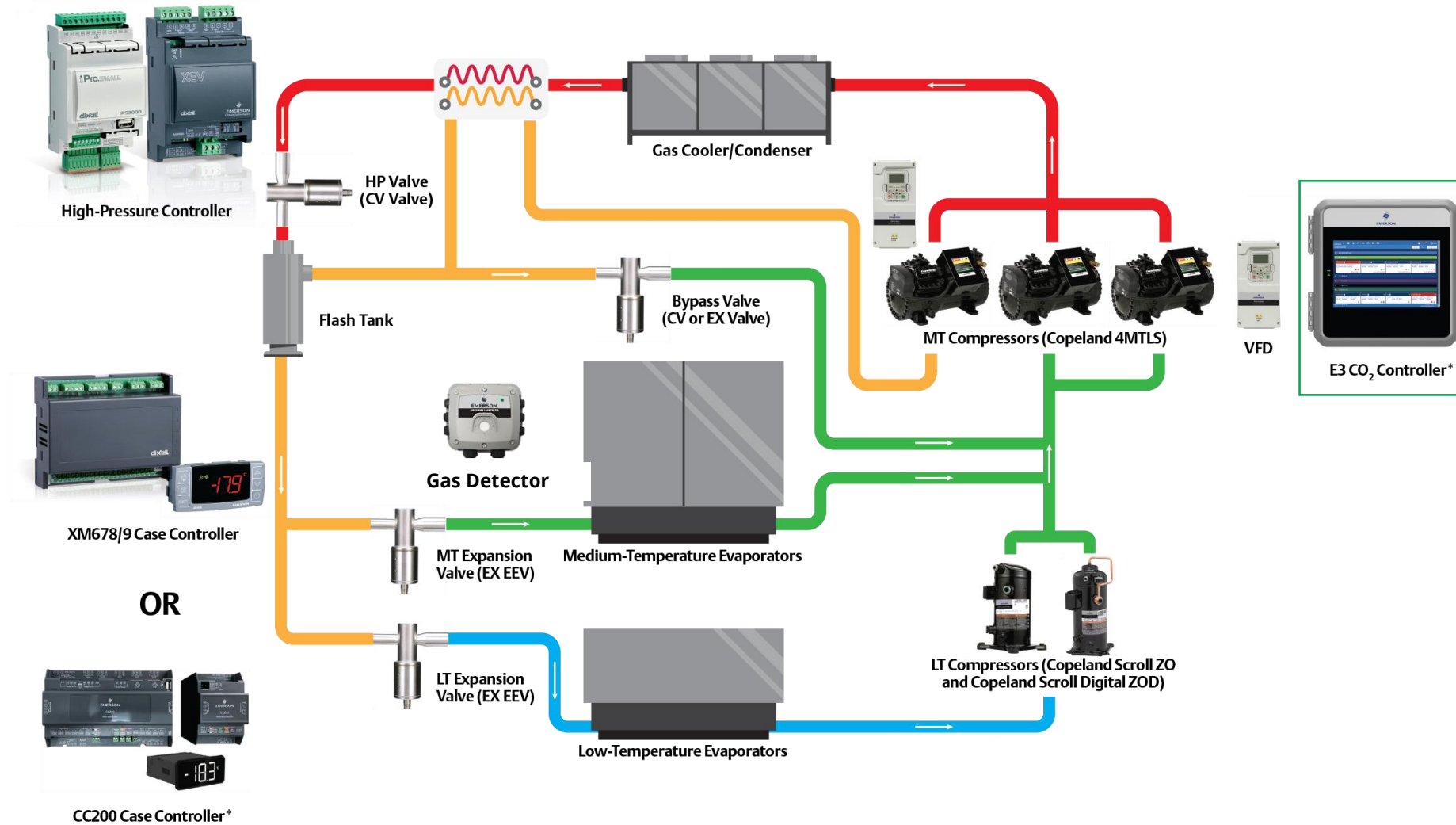
POINT NAME	VALUE	POINTER
FOM	99 %	
% Time Above	3.91 %	
% Time Below	0.00 %	
% Time At Target	96.09 %	
% Time In Defrost	13.06 %	
% Time In Recovery	0.00 %	
PB Hi Offset	5.40 Δ°F	
PB Low Offset	5.40 Δ°F	
Sensitivity	1.00	



Supervisory Control CO₂ Application



Transcritical CO₂ Booster System



System Diagram

R-744 (CO₂) system that uses only CO₂ for medium-temperature and low-temperature refrigeration loads.

Integrated Solutions

Deliver seamless system integration that enables maximum system reliability, efficiency and simplicity.

Enhanced visibility of overall system through E3 CO₂ controller.



OMC Oil Control



High Pressure Transducers



High Pressure Controls



Liquid / Oil Level Sensor



Ball / Check Valves



Filter Driers / Sight Glass

One CO2 System Application

E2e Control

Enhanced Suction Groups
+ or -
20 Flex Combiners
For
liquid Injection
HG Injection
Oil Management
Circuit Shutdown
Heat Reclaim

The screenshot displays a complex control interface with multiple panels. The top panel shows 'LOW TEMP' and 'GAS COOLER' settings. Below it, there are sections for 'LQ INJ MT SCT' and 'NEW OIL PULSE'. The interface is dense with text and small icons, making it difficult to read and navigate.

Enhanced Suction Groups
+
Native Algorithms for CO2 Booster Control
+
Custom System Layout Feature

Hard To Read
Hard to Write

```

Output Eq      Value
A01 Eq        : IF(A11<(A12-10psi),3,IF(A11<(A12+4psi),a
A01 Eq 2      : i3,if(A11<(a12+10psi),a13+a14,a15)))
    
```

New E3 CO2 Suction Group Control

The screenshot shows a modern, clean interface with a blue color scheme. It features a top navigation bar, a main content area with multiple panels, and a bottom status bar. A green callout box highlights the text: 'Customize Layout By User with tables, graphs & tiles!'. The interface includes a graph showing data trends and several data tables.

Simplified Control Configuration

Dedicated CO₂ Application Reduces Programming Efforts and Complexity

CO₂ Suction Group

- Control of CO₂ Transcritical booster systems and parallel compression – centralized control provides ease of use
-

Advanced Compressor Superheat Management

- Liquid and/or Hot gas injection
-

Load Management

- Enable & Disable Evaporator Loads Via Time Delays & Specific CO₂ Alarms
-

Enhanced CO₂ System Monitoring

- Additional advisories for out-of-range pressures/temperatures
 - Works with load management to provide better recovery
-

Oil Management

- Valve Control Between Oil Separator & Reservoir
 - To provide long compressor service life
-

Software User Interface Can Be Customized To User Preference

The screenshot displays the Emerson software interface for CO2 systems, featuring several data tables and a graph. The interface is titled ".CO2" and includes navigation icons at the top. The main content area is divided into several sections:

- CO2 Suction Groups:** A table with columns for Name, Filtered Pres, Cur Pres Setpt, Sat Suct Temp, Cur Superheat, Percent Used, Control Status, Rack Fail, and Stage Out 1. It lists three suction groups: CO2 Group LT, CO2 Group MT, and CO2 Group HT.
- Condenser:** A table with columns for Name, T Ctrl Val Out, Discharge Out, VS Fan Out, Control Method, and Condenser State. It lists two condenser units: GAS COOLER and TIL CO.
- Circuits:** A table with columns for Name, Circuit State, and Control Temp. It lists various circuit types such as 01 WALK-IN FREEZ, 02 WALK-IN COOL, 03H4 MD COOL, etc.
- HPV Controller:** A table with columns for Name, HPV Mode, P1 Pres-Outlet, Valve 1 Output, P2 Pres-Receive, and Valve 2 Output. It lists one HPV controller: HPV COOL_001.
- XM Case Controllers:** A table with columns for Name, Control Value, and Command Out. It lists various XM case controllers such as AC EXCH 37 FHR, CO2 MILKSCHE, CO2 BCVR LG TP, etc.
- View Graphs:** A line graph titled "Control Ambient Air Temperature" showing temperature fluctuations over time. The y-axis is labeled "°F" and ranges from 60.00 to 110.00. The x-axis represents time. A callout box labeled "View Graphs" points to the graph.

Additional callouts include "CO2 Suction Groups" pointing to the top table, "Condenser" pointing to the second table, "Circuits" pointing to the third table, "HPV Controller" pointing to the fourth table, and "XM Case Controllers" pointing to the fifth table. The bottom of the screen shows a copyright notice for Emerson and a timestamp: "F3 F3 RK CO2 RK 2 18085 09/14/2021 10:43:57 AM".












Match Traditional "RX" View for Facility Or Refrigeration Specific for Service Technician

New CO2 Suction Group Features



New CO2 Application

New CO2 Feature (Liqui Injection, Hat Gas Injection, Oil Management)

POINT NAME	VALUE	UNIT	STATUS
SUCT PRES SETPT	375.0	PSI	 
Ext Pres Shift	0.0	PSI	
Pres Deadband	10.0	PSI	
Liquid Injection Setpoint	50.00	Δ°F	
Liquid Injection Deadband	5.00	Δ°F	
Hot Gas Injection Setpoint	10.00	Δ°F	
Hot Gas Injection Deadband	5.00	Δ°F	
Enable Oil Separator Pulse	<input checked="" type="radio"/> ENABLED <input type="radio"/> DISABLED		
Oil Dump Interval	00:03:00		
Oil Dump Pulse Duration	00:00:05		

New CO2 Application

New CO2 Feature (Load Enables)

POINT NAME	VALUE	POINTER
▶ Load Management State	Startup	?
▶ Next Load Enable	00h:01m:19s ⓘ	?
▶ DISREGARD ALARMS	OFF ▾	?
Persist Active Advisories	<input checked="" type="radio"/> YES <input type="radio"/> NO	?
Hide inactive Alarms outputs	<input checked="" type="radio"/> YES <input type="radio"/> NO	?
Num Load Enables	<input type="text" value="4"/> - +	?
▶ MT Load Enable 1	ENABLED	?
▶ LT Load Enable 1	DISABLED	?
▶ MT Load Enable 2	DISABLED	?
▶ LT Load Enable 2	DISABLED	?

New CO2 Feature (Load Enables)

< Status General Setpoints Inputs Outputs Stage Setup Stage Outs **Load Enables** Var Cap CO2 Alarms Alarm IO Alarms Proof Comp Oil Normal Power H

POINT NAME	VALUE	PROPERTY	POINTER
POINTER <input type="checkbox"/> Show non-visible points			
TARGET	<input type="text" value="5G +34 Cooler Coil 1"/>	LOAD ENABLE	<input type="button" value="+"/>
Override			
In Override <input type="text"/> OFF			
Expanded Information			
Enabled <input type="text"/> OFF			
MT Delay Load Enable 1	<input type="text" value="00:02:00"/>	<input type="button" value="ⓘ"/>	<input type="button" value="ⓘ"/>
MT Load Enable 1 Alarms	<input type="text" value="MT-Hi Discharge Pressure 2 × Hi Flash Tank Pressure 2 ×"/>	<input type="button" value="ⓘ"/>	<input type="button" value="ⓘ"/>

New CO2 Feature (Dedicated CO2 Alarms)

< Status General Setpoints Inputs Outputs Stage Setup Stage Outs Load Enables Var Cap **CO2 Alarms** Alarm IO Alarms Proof Comp Oil Normal Power

POINT NAME	VALUE	POINTER
▶ High Superheat Alert	Non-Critical	?
▶ Low Superheat Alert	Non-Critical	?
▼ Low Superheat Alarm 1	Non-Critical	?
Category	Refrigeration	
Display Message		
Repeat Rate	00:00	
Monitor Alarm	<input type="radio"/> ON <input checked="" type="radio"/> OFF	
Low Superheat Alarm 1	10.00 Δ°F	?
Low Superheat Alarm 1 Delay	00:10:00	?
Low Superheat Alarm 1 Deadband	10.00 Δ°F	

New CO2 Application

New CO2 Feature (Parallel/IT Compression Group)

POINT NAME	VALUE	POINTER
▶ PARALLEL STATE	<input type="text" value="Input Error"/>	<input data-bbox="2057 517 2140 581" type="button" value="?"/>
▶ Inputs in Error	<input type="text" value="BYPASS VALVE POSITION, SUCTION PRES"/>	
▶ RACK IN STANDBY	<input type="text" value="ON"/>	<input data-bbox="2057 720 2140 784" type="button" value="?"/>
▶ BGV CONTROL SETPOINT	<input type="text" value="460.0"/> <input type="button" value="-"/> <input type="button" value="+"/> PSI	<input data-bbox="2057 819 2140 883" type="button" value="?"/>
▶ BYPASS VALVE POSITION	<input type="text" value="NONE"/> <input type="button" value="-"/> <input type="button" value="+"/> %	<input data-bbox="2057 918 2140 982" type="button" value="?"/>
▶ ENABLE IT	<input type="text" value="ENABLED"/> <input type="button" value="v"/>	<input data-bbox="2057 1017 2140 1081" type="button" value="?"/>
Enable GC Temp	<input type="radio"/> YES <input checked="" type="radio"/> NO	<input data-bbox="2057 1116 2140 1180" type="button" value="?"/>
▶ BGV Setpoint in Standby	<input type="text" value="460.0"/> <input type="button" value="-"/> <input type="button" value="+"/> PSI	<input data-bbox="2057 1215 2140 1279" type="button" value="?"/>
▶ BGV Setpoint Running	<input type="text" value="500.0"/> <input type="button" value="-"/> <input type="button" value="+"/> PSI	<input data-bbox="2057 1314 2140 1378" type="button" value="?"/>

New CO2 Feature (Heat Reclaim)

❄️ 🔥 📄 Heat Reclaim ⓘ
View Basic Delete Save Send To ▾

- Status
- General
- Settings
- Conversions
- Reclaim
- Inputs
- Outputs
- Alarms
- Input/Output Status
- Generic Alarms

POINT NAME	VALUE	POINTER
Reclaim Type	Single with Water Tank Temperatures	
Minimum Vessel Level	10.0 %	
Restore Vessel Level	15.0 %	

- Status
- General
- Settings
- Conversions
- Reclaim
- Inputs
- Outputs
- Alarms
- Input/Output Status
- Generic Alarms

POINT NAME	VALUE	POINTER
Reclaim Use	Water Heater	
External Signal EU	Temperature ▾	
Water Tank Setpoint	113.00 °F	
Water Tank Hysteresis	7.20 Δ°F	
Water Pump Off Delay	00h:00m:30s ⓘ	
Water Pump	Digital ▾	
Control Pump By	Temperature ▾	

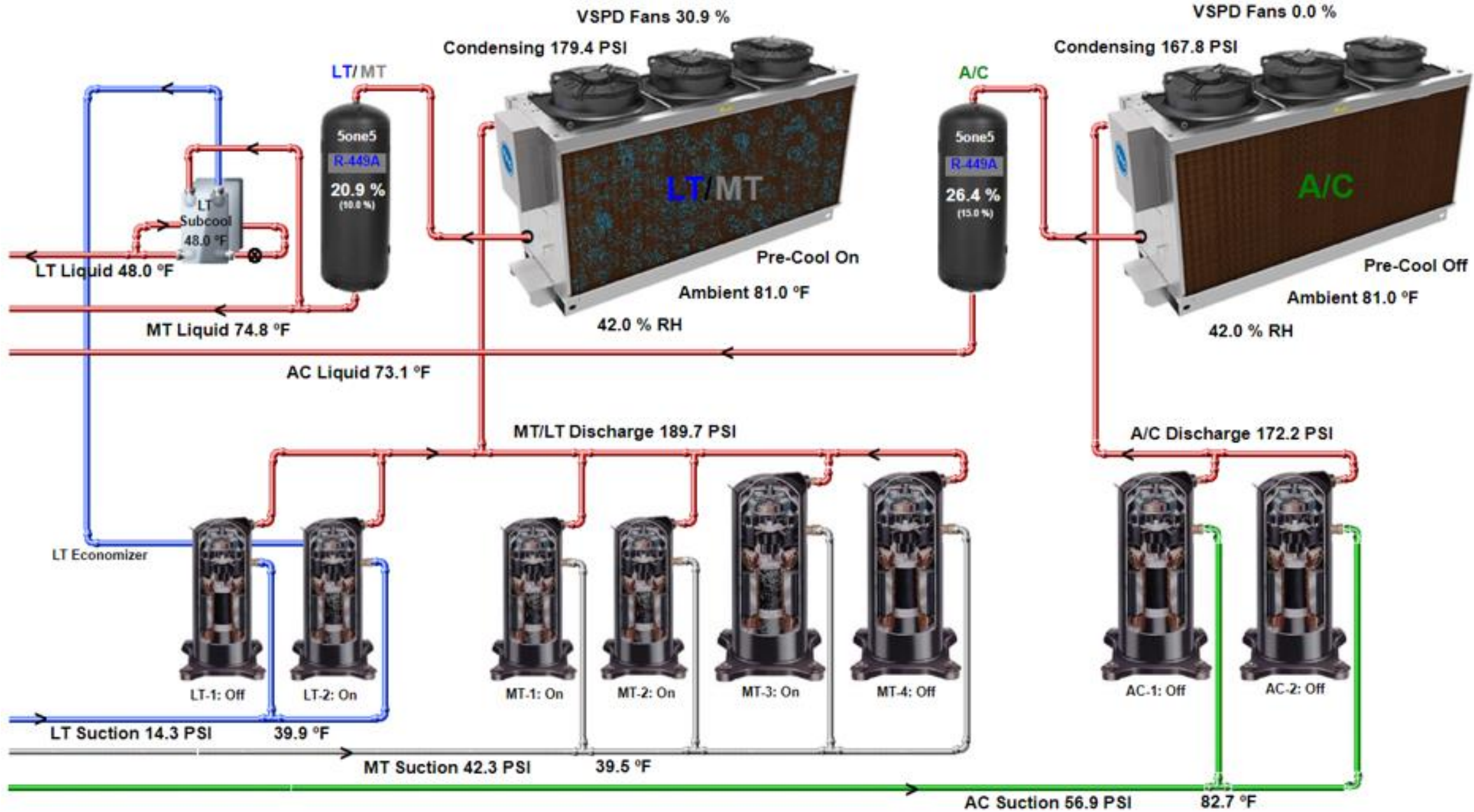
New CO2 Feature (Condenser Control)

Gas Cooler fan control logic

- **For the major controllers used currently on CO2 system today, the fan speed is controlled on the gas cooler outlet temperature**
- The set point of the fan is based on the inlet air temperature plus a configurable TD and is limited by the minimum and maximum values which are also configurable.
 - ❑ **A TD of 3-10°F** is recommended to allow the fan speed to slow down in mild ambient to prevent wasting unnecessary fan power
 - ❑ **Max Fan Setpoint:** Fan is expected to run at the max. speed when the weather gets warmer. It is achieved through the max. setpoint setting. Once the ambient temperature is warm enough to keep the gas cooler outlet temperature above its max. fan setpoint, the fan remain at 100% speed to ensure the best efficiency
 - ❑ **Min. Fan Setpoint:** Limitation is needed to keep the flash tank pressure at the setpoint under colder weather. The min. fan setpoint should NOT be set lower than the flash tank saturation temperature, otherwise, CO₂ will leave the gas cooler and enter the flash tank via the HPV valves at a temperature lower than the flash tank vapor temperature and causing the FT pressure to drop below its setpoint, throwing the system out of balance.
- **Therefore:**
 - The gas cooler fan should be running at the max. speed under hot weather for the best efficiency
 - The gas cooler fan should regulate its speed to keep the required TD under mild weather to save fan power
 - The gas cooler fan should stay close to the min. speed under cold weather to maintain the min. gas cooler outlet temperature

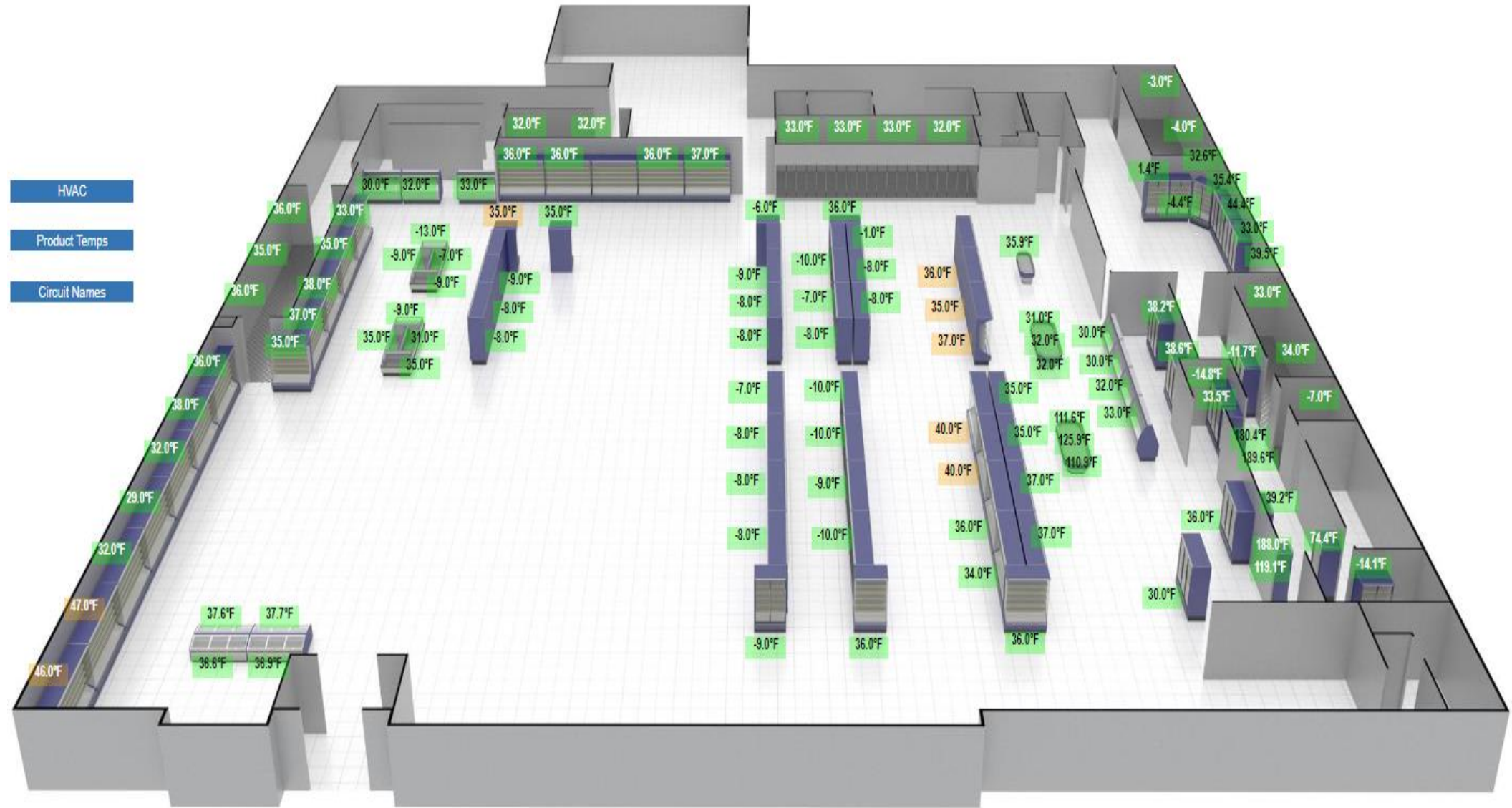
Custom System Graphics (System)

Added real time data on a system circuit drawing for ease of quick overview of system performance



Custom System Graphics (Floorplans)

Added real time data on a system circuit drawing for ease of quick overview of system performance



COPELAND

CO₂ High Pressure Controller

CO₂ High Pressure Controller

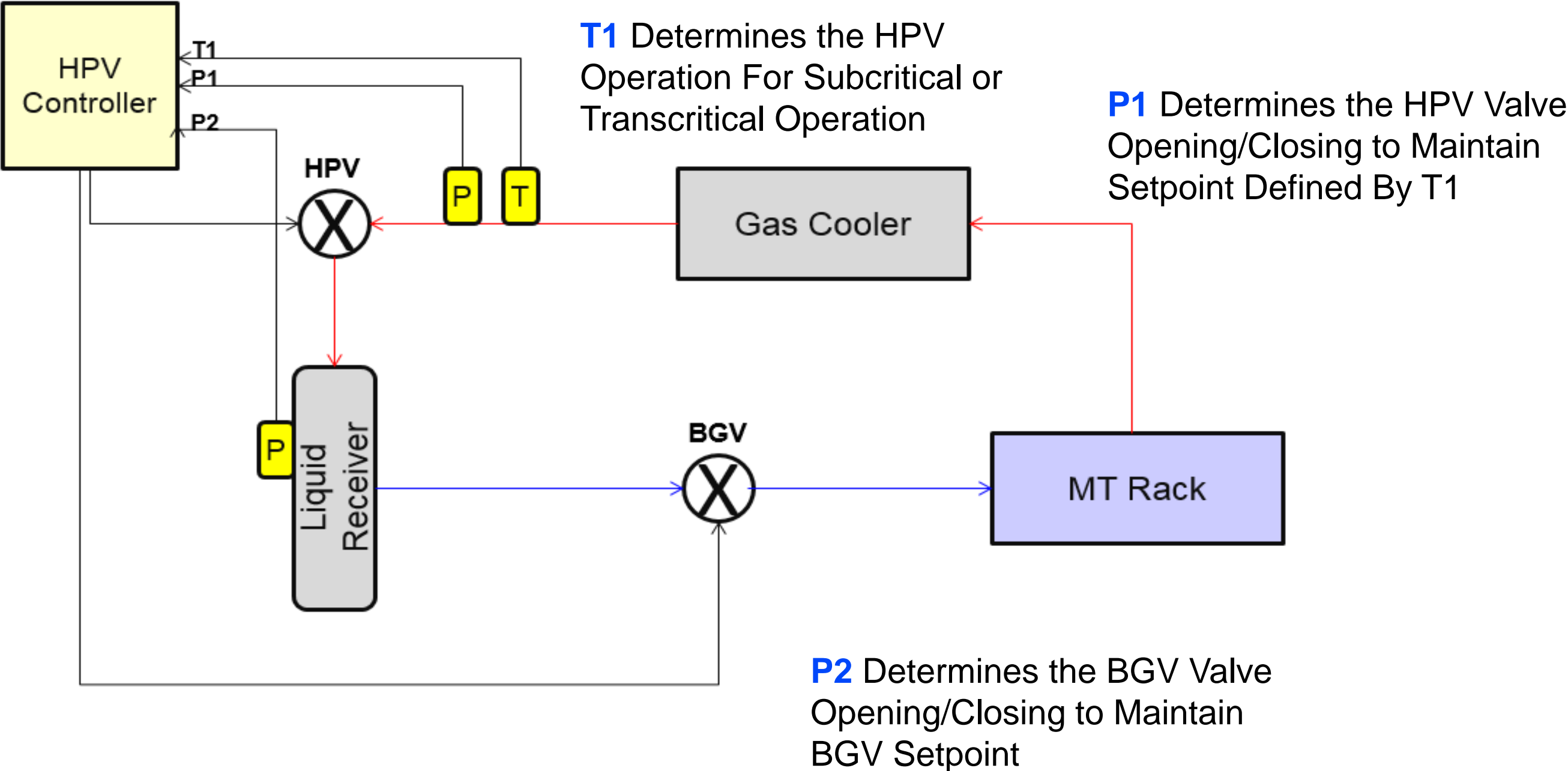


CO₂ High Pressure Controller

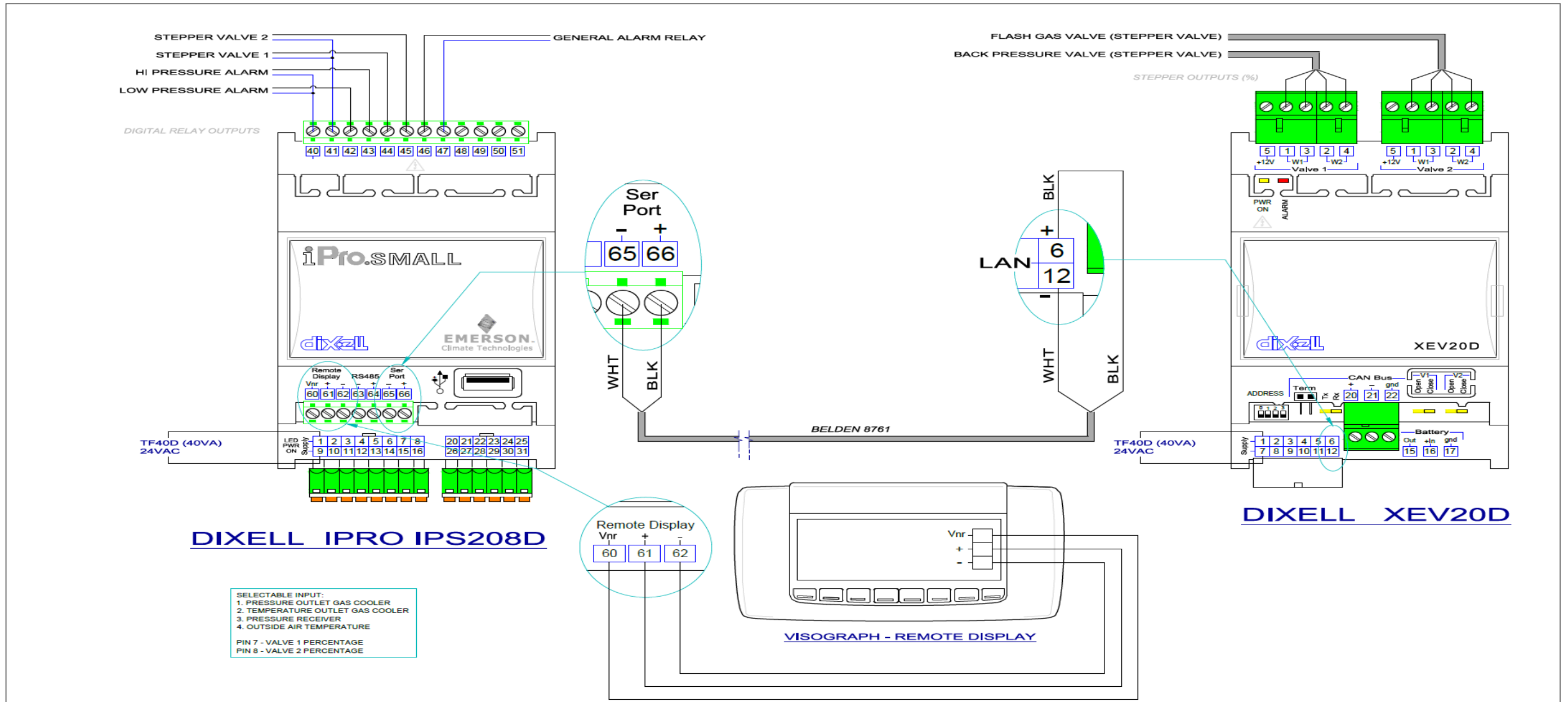


- Gas Cooler Pressure & Temp, Flash Tank Pressure
- High Pressure Valve & Bypass Gas Valve
- Subcritical & Transcritical Modes
- Optimizes COP In Transcritical Mode
- Heat Reclaim Mode
- Integrated to E3 for visibility and setpoint configuration

CO₂ High Pressure Controller



iPro CO2 Controller



CO₂ High Pressure Controller

- Using the Gas Cooler Outlet Temperature (T1) and Gas Cooler Outlet Pressure (P1). The HPV control will switch **control modes** depending on the temperature or pressure leaving the Gas Cooler 87.8
 - **Hold Back** - if the pressure is below the minimum gas cooler pressure setpoint, the HPV will abandon the Subcritical algorithm and maintain the minimum pressure setpoint.
 - **Subcritical** - if the pressure and temperature indicate the system is subcritical, the HPV will maintain a subcooled liquid in the Gas Cooler. The HPV will typically maintain a value of 5°F of subcooling.
 - **Transcritical** - If the pressure and temperature indicate the system is in Transcritical, the HPV will maintain a pressure setpoint for optimal performance.
- Flash tank pressure is monitored using the Flash Tank Pressure (P2). The Bypass Gas Valve (BGV) has a static liquid receiver pressure setpoint. The valve operates to maintain the setpoint and will open to relieve pressure from the flash tank back to medium temperature suction. It is common for BGV to be closed under low load and low ambient conditions, opening periodically to relieve any pressure once above the flash tank pressure setpoint.
 - It is recommended that the flash tank pressure maintain at least 75psi above the MT Suction Pressure to ensure pressure differential between both liquid and suction pressure and allow positive oil pressure difference.
- **Features to protect the rack from a pressure relief event.**
 - High flash tank pressure – if the flash tank pressure is above the high-pressure limit, the HPV will start to close to decrease the pressure in the flash tank. If the flash tank pressure continues to rise, the HPV may close completely to prevent a pressure relief.
 - Low flash tank pressure – if the flash tank pressure is below the low-pressure limit, the HPV will start to open to raise the flash tank pressure. If the flash tank pressure continues to fall, the HPV may open completely to try to re-pressurize the flash tank.
 - If the gas cooler outlet pressure is lost, failsafe to the remote discharge pressure sensor where installed.
 - If the gas cooler outlet temperature is lost, failsafe to remote temperature sensor where installed.
 - If both fixed sensors and remote sensors are lost, failsafe to fixed valve setting.

HPV and BPV Operation Parameters

- **Subcritical Mode:**

- When the Control Temp is below the Mode Setpoint minus Hysteresis
- When the Control temp is above the Mode Setpoint, In Transcritical
- PID Loop control using a Calculated Subcool Value, from the Pressure-1 (P1) And Temperature-1 (T1) to maintain the Subcool Setpoint.

Subcritical Parameter	Description	Default Value
HPV Mode <u>Setpoint</u>	Setpoint for Subcritical and Transcritical mode	87 DF
HPV Mode Hysteresis	Control Temperature Hysteresis	5 DDF
HPV <u>Subcool Setpoint</u>	<u>Subcool Setpoint</u> in Subcritical Mode	5 DDF
HPV RS-Temp	Subcritical proportional band offset	0 DDF
HPV PB-Temp (P)	Subcritical proportional band	30 DF
HPV INC (I)	Integral sampling time	180 Sec
HPV DDER (D)	Derivative time	0 Sec

HPV and BPV Operation Parameters

- **Transcritical Mode:**

- When the Control temp is above the Mode Setpoint, System in Transcritical
- Stop maintaining a Subcool Setpoint and switch to Pressure Setpoint from Transcritical Table. PID loop start controlling using The Pressure (P1)
- Transition from subcritical to Transcritical:
 - Locks last known PID valve percentage and allows a linear-ratio transition between the two PIDs by the TransMaxtime

Transcritical Parameter	Description	Default Value
HPV Mode <u>Setpoint</u>	Setpoint for Subcritical to Transcritical mode	87 DF
Transcritical Setpoint	<u>Setpoint from Transcritical table</u>	From Table
HPV RS-Press	Subcritical proportional band offset	0 PSI
HPV PB-Press (P)	Subcritical proportional band	170 PSI
HPV INC (I)	Integral sampling time	180 Sec
HPV DDER (D)	Derivative time	0 Sec
<u>TransMaxTime</u>	Transition Time of the Two Sub and Trans PID	120 Sec

HPV and BPV Operation

- **Transcritical Setpoint:**
 - Control Temperature Value determines setpoint
 - T1 (gas cooler outlet temp) or T2 (gas cooler temp bypass) calculation setpoint

Reference Table

Gas Cooler T1 or T2 Transcritical Setpoint			
C	Bar	F	PSI
21	65	69.8	942.5
22	65	71.6	942.5
23	65	73.4	942.5
24	65	75.2	942.5
25	65	77	942.5
26	65	78.8	942.5
27	66.1	80.6	958.7
28	69.2	82.4	1002.7
29	72.2	84.2	1047.0
30	75.3	86	1091.5
31	78.3	87.8	1135.9
32	81.4	89.6	1180.2
33	84.4	91.4	1224.2
34	87.4	93.2	1267.7
35	90.4	95	1310.7
36	93.3	96.8	1352.8
37	96.1	98.6	1394.1
38	98.9	100.4	1434.4
39	101.6	102.2	1473.5
40	104.2	104	1511.2
41	106.7	105.8	1547.4
42	109.1	107.6	1582.0

HPV and BPV Safety Fallback Operation Parameters

- Low Receiver Pressure – HPV Opens & BGV Close
- High Receiver Pressure – HPV Closes & BGV Opens
- Pressure Sensor Fail – Use Network value if available, else fix opening %
- Temp Sensor Fail - Use network temp if available, else use Alternate sensor (T1/T2) or predetermined failsafe %

Safety Parameter	Description	Default Value
Hi PSI Set	High receiver pressure setpoint (depends on system design)	620 PSI
Hi Hy	High receiver pressure hysteresis	15 PSI
Lo PSI Set	Low receiver pressure <u>setpoint</u>	450 PSI
Lo Hy	Low receiver pressure hysteresis	15 PSI
HPV% Open Fail-SC	Valve % open during Subcritical with sensor fail	0 %
HPV% Open Fail-TC	Valve% open during Transcritical with sensor fail	0 %
HPV% Open Fail Lo	Valve% open during low pressure safety mode	15 %
BGV% Open Fail	Valve% open during high pressure safety mode	100 %

iPro CO2 Controller

- XEV20D Driver
 - Stepper valve driver intended for bipolar or unipolar stepper valve
 - HPV and/or BGV when not using iPro Analog outputs
 - High Pressure Valve (HPV) connected to Valve 1
 - Bypass Gas Valve (BGV) connected to Valve 2
 - Communicates via LAN network
 - Drives all types of Valves
- Technical Data
 - Power Supply 24VAC 40VA
 - Voltage Chopper constant current
 - max 0.9mA per valve output



HPV and BPV Controller Display

- **Menu Driven Local Display With Ability To Change:**
 - The Modbus Address, Baud Rate, Screens Update, Time And Date, I/O, And Valve Setup
- **Status Screen Shows Both HPV And BGV With Their Corresponding Control Values And Parameters.**
 - HPV Dual And Failure/Alarm Operation Modes
 - Online/Offline Status On The XEV20
- **The I/O Configuration Screen Shows Type Of Sensors & Polarities**
- **Setup Screens Protected**

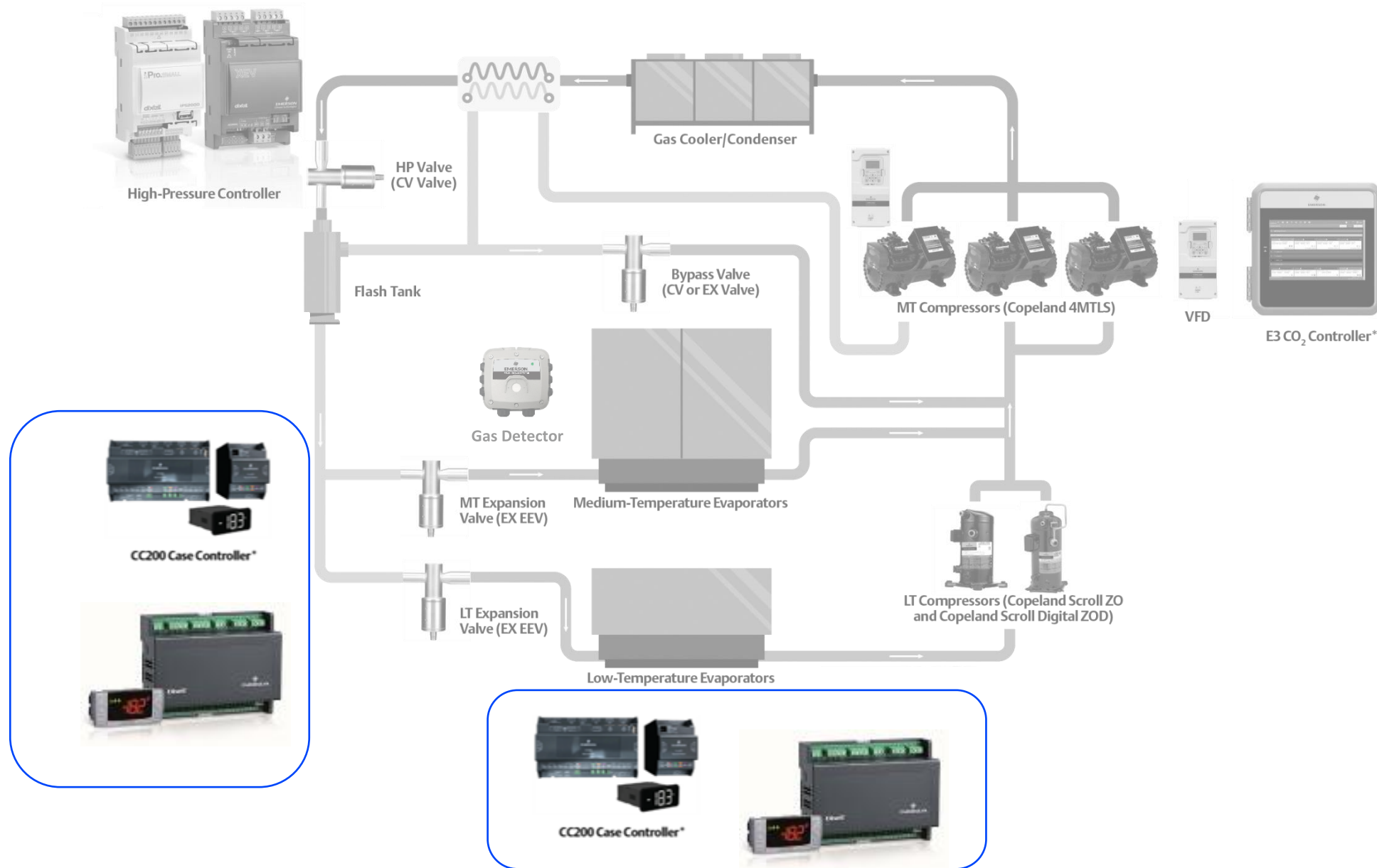


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Case Controllers



Transcritical CO₂ Booster System



System Diagram

R-744 (CO₂) system that uses only CO₂ for medium-temperature and low-temperature refrigeration loads.

Integrated Solutions

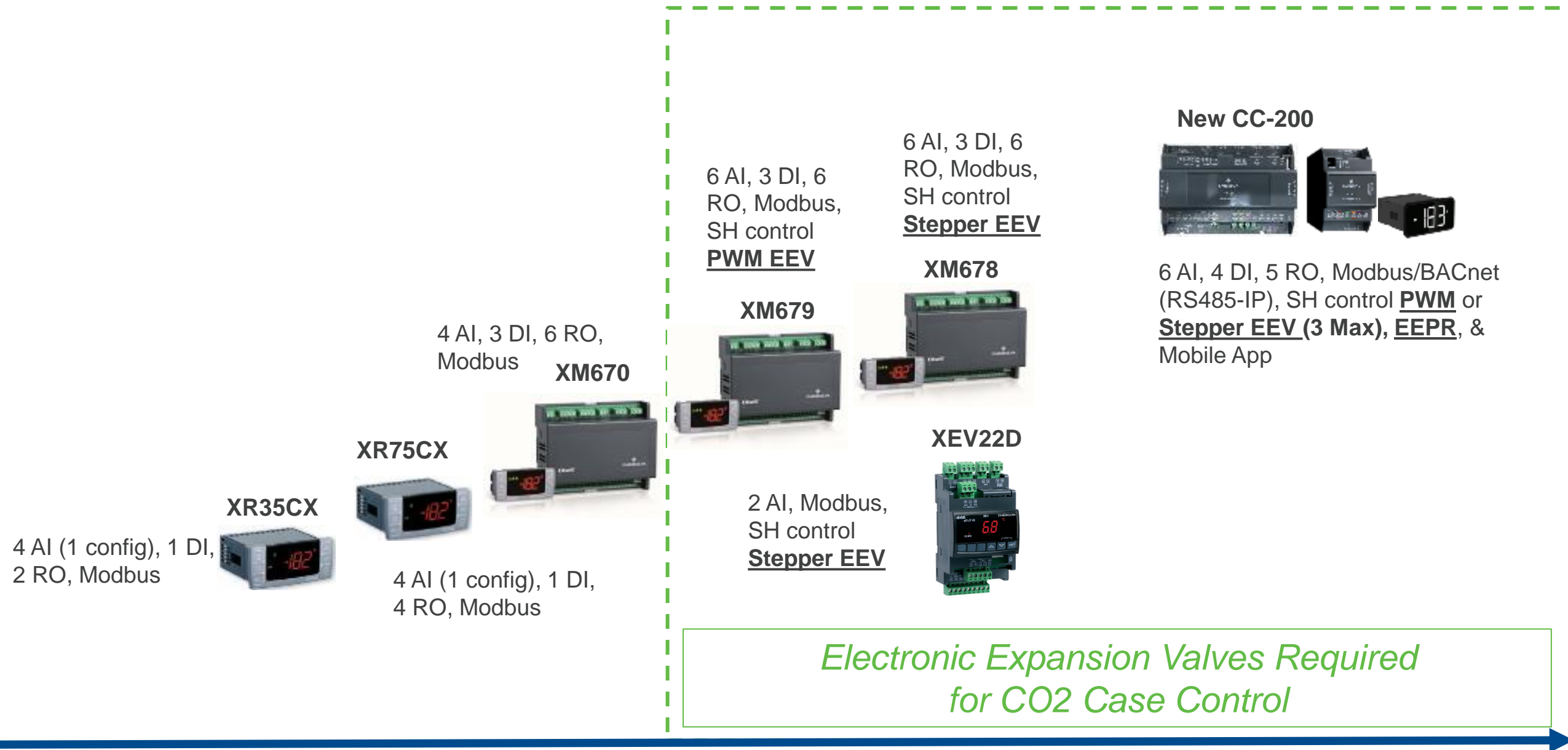
Deliver seamless system integration that enables maximum system reliability, efficiency and simplicity.

Enhanced visibility of overall system through E3 CO₂ controller.

AI→ Analog input
 DI→ Digital input
 RO→ Relay output
 SH→ Superheat
 EEPR→ Electronic
 Evaporator Pressure
 Regulator

Case Control Portfolio Overview

Value



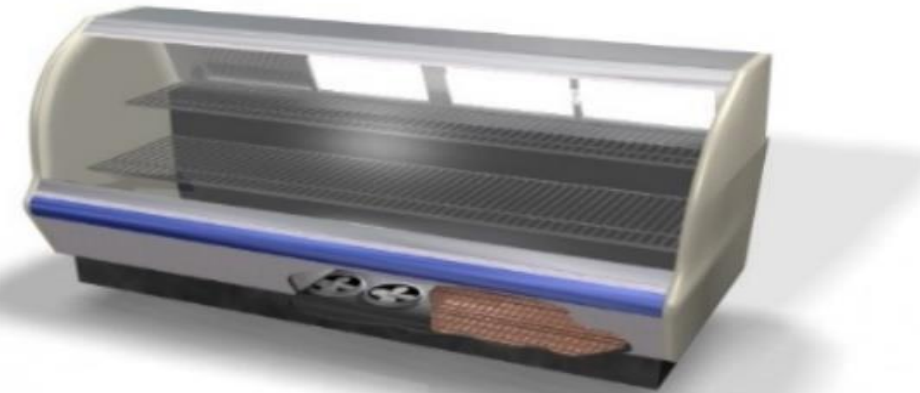
Functionality

Training & Development Device Within the Application

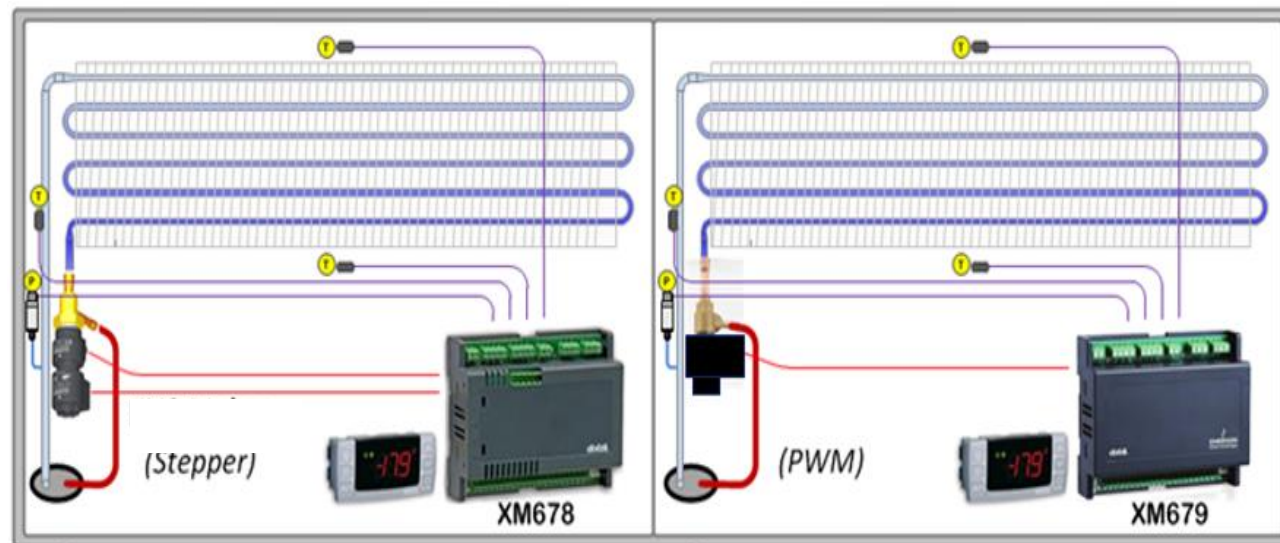
Application



MT & LT Cases



MT & LT Walk-Ins



XM-678 and 679 Overview

Device Image



Introduction

The XM67x is a case controller suitable for medium and low temperature applications with built in superheat management of one (1) electronic expansion valve.

It also had the ability to control many loads such as the assets fans, lights, defrost, LLSV and night blinds.

Key Features & Regulation

- Electronic Expansion valve driver and regulator based on SH reading
- NTC, PTC, Pt1000 temperature inputs
- (0-5V DC, 4-20mA) Pressure analog inputs
- Pressure value broadcast via LAN
- Alarm management (Visual and relay)
- Hot Key connector, RTC option
- RS485 Modbus communications (E2 & E3)
- Defrost, Fan, Light Control
- Antisweat Control

Parts Required

- CX660 keyboard for remote display
- Air temperature probes (air in and/or air out)
- Defrost termination probe
- Coil outlet superheat probe
- Pressure transducer
- 24V 40VA Transformer (XM678/668)

CC-200 Technical Overview

Devices Image



Introduction

The Case Controller 200 (CC200) is a microprocessor-based controller for use in controlling temperature and Superheat in refrigerated fixtures and walk-in boxes. The controller is suitable for medium and low temperature applications and can control all loads in a refrigerated box or fixture for up to three evaporator coils.

Key Features and Control

- Seamless coordination of refrigeration case lineups with support for up to 8 cases in a lineup.
- Manages all loads in a refrigerated case: lighting, fans, defrost heaters, LLSV, expansion valves, EEPR.
- EEPR control based on air temperature or suction pressure.
- Precise control of evaporator superheat using Stepper EEV or PWM EEV.
- Patent pending floating evaporator SST setpoint management automatically adjusts evaporator SST to the optimum setpoint for discharge air.
- Modular design allows up to three (3) evaporator coils per case.
- Low, medium, and dual temperature case types.
- Built-in sensor redundancy algorithms keep the system running.
- Single power supply for CC200, expansion modules and display simplify wiring and reduce labor cost.
- Form C relays allow direct control of case loads and allow simplified wiring.
- Bluetooth® connectivity for easy controller status and service.
- Communicates with a Supervisory controller via BACnet or Modbus.

CC200 Solution

Features

24VDC Power Supply

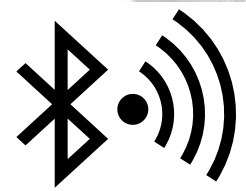


Main Controller



Expansion Module

- A completely new case controller re-designed at every level, hardware to software.
- Single 24VDC power supply
- EEV Control
- EEP R Control
- Refrigeration, Defrost, Fans, Lights
- Adaptive Defrost
- R744 CO2 Ready
- Multiple Evaporator Control
- Dual Temperature Cases
- BACnet and Modbus protocol
- Bluetooth connectivity w/mobile app
- Pluggable Phoenix Style Connectors
- Plug In Expansion Modules
- Defrost Heater and Fan Motor Amperage Monitoring



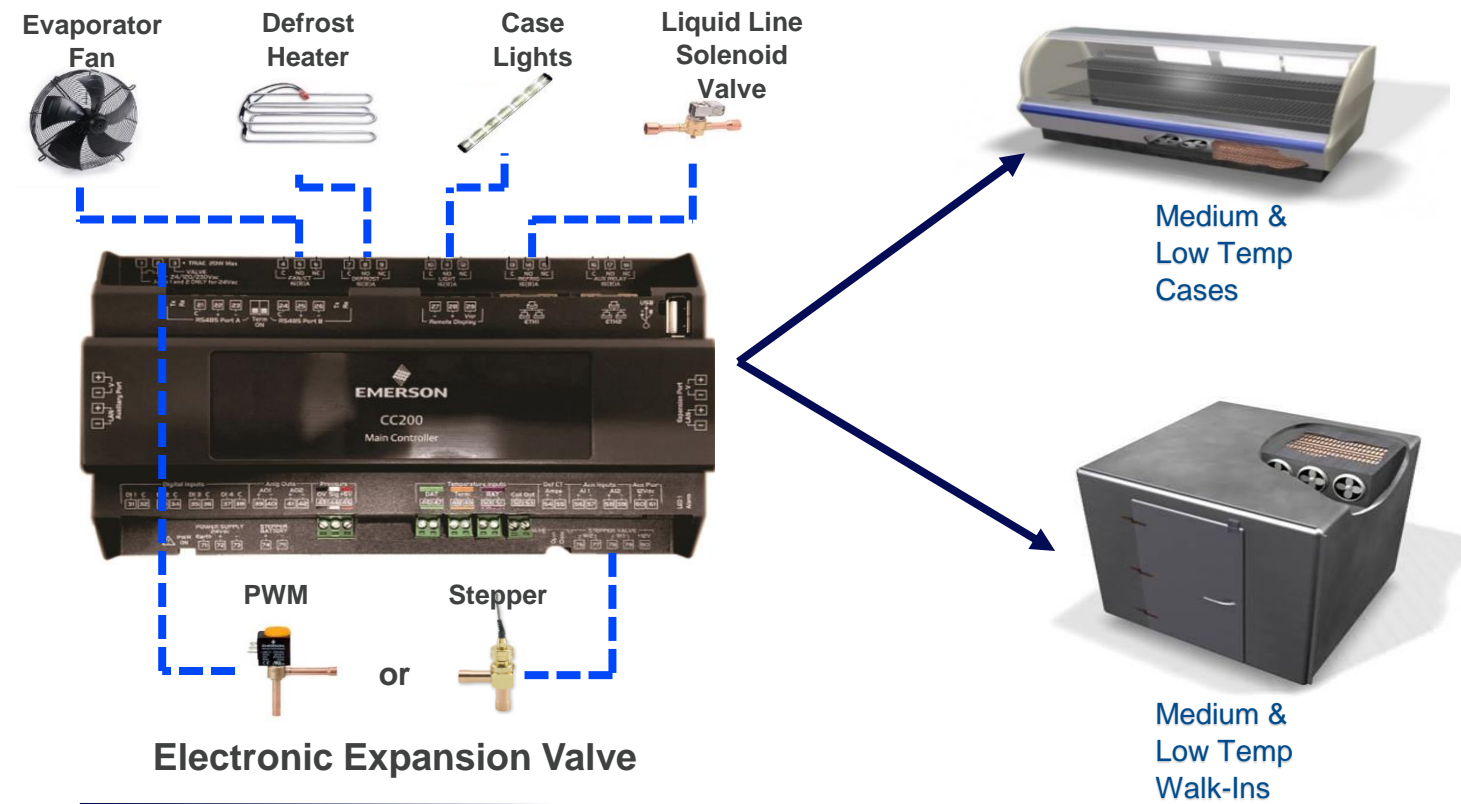
Cold Chain Connect App



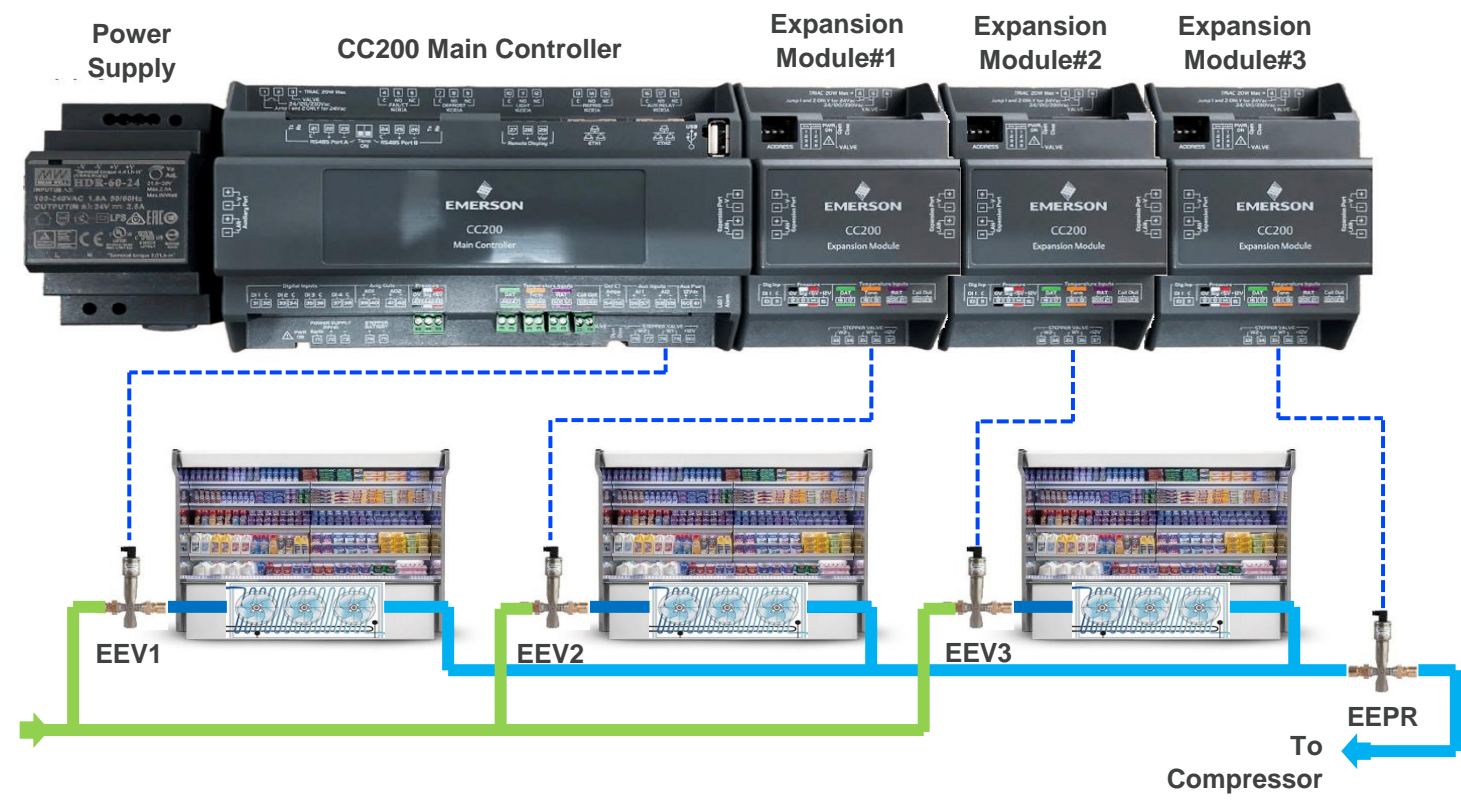
Case Display

CC200 Technical Overview

Single Evaporator



Multiple Evaporators



Relay Outputs (Main Controller)

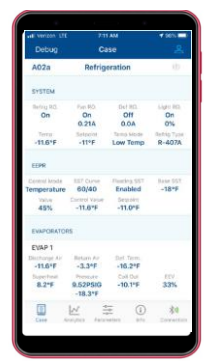
- Relay Outputs
 - Defrost
 - Refrigeration (LLSV)
 - Evaporator Fans
 - Lights
 - Auxiliary

Digital Inputs (Main Controller)

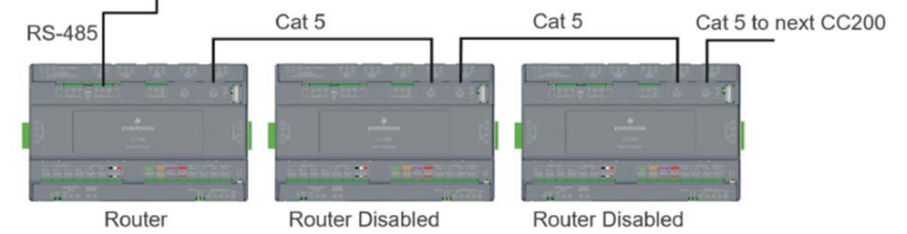
- Configurable DI1-DI4 (Free voltage)
 - Door Switch
 - Service Switch
 - Dual Temp Switch
 - Defrost Term Switch
 - Leak Shutdown
 - Satellite 1 or 2 for E2e

Analog Inputs (Main Controller & Expansion Module)

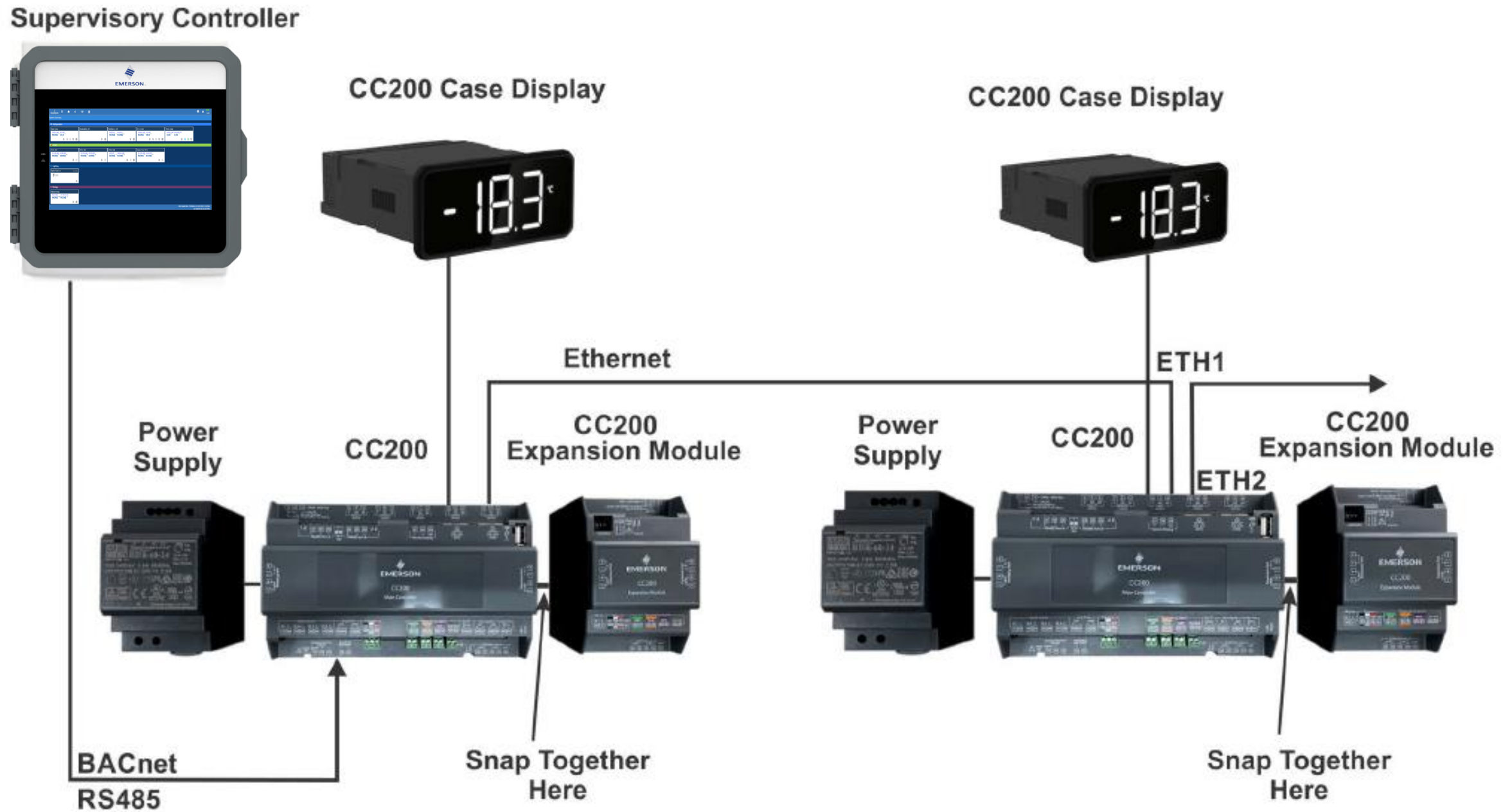
- Probe Inputs (non configurable)
 - Discharge Air Temperature (1 to 3)
 - Return Air Temperature (1 to 3)
 - Suction Pressure (1 to 3)
 - Defrost Termination (1 to 3)
 - Suction Temperature (1 to 3)
 - Fan and Defrost Amps
- Configurable Inputs (AI1 and AI2)
 - External fan CT
 - Coil Inlet Temp
 - Product Temp
 - Circuit Suction Temp



BACnet or ModBus



CC200 Network Layout Overview



Customer Value: Simplification & Visibility

Cold Chain Connect Bluetooth App

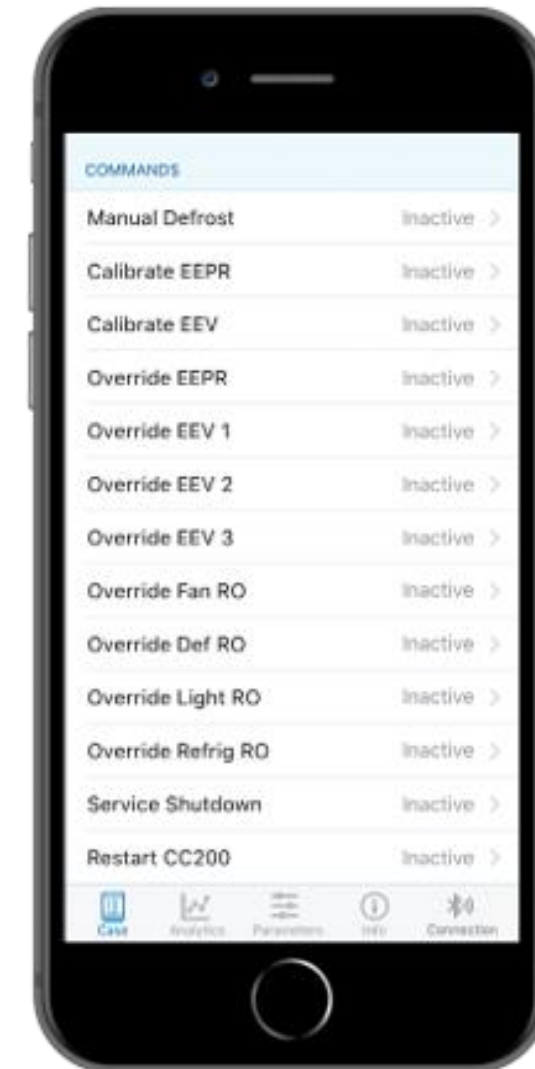
Feature:

- CC200 Bluetooth with Cold Chain Connect application

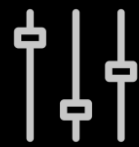
OEM Sales Value:

- Reduce time/cost on installation and commissioning
- Simplified installation, commissioning, and service
- 40 data points and 12 service commands allow faster troubleshooting
- Easy service actions enable easy valve and relay verification
- Graphing to visualize temperature, superheat, and pressure trends
- View parameters to easily verify controller configuration

CCC Dashboard and Commands



Precision



Autotuning



Flexibility &
Compatibility



Simplification &
Visibility

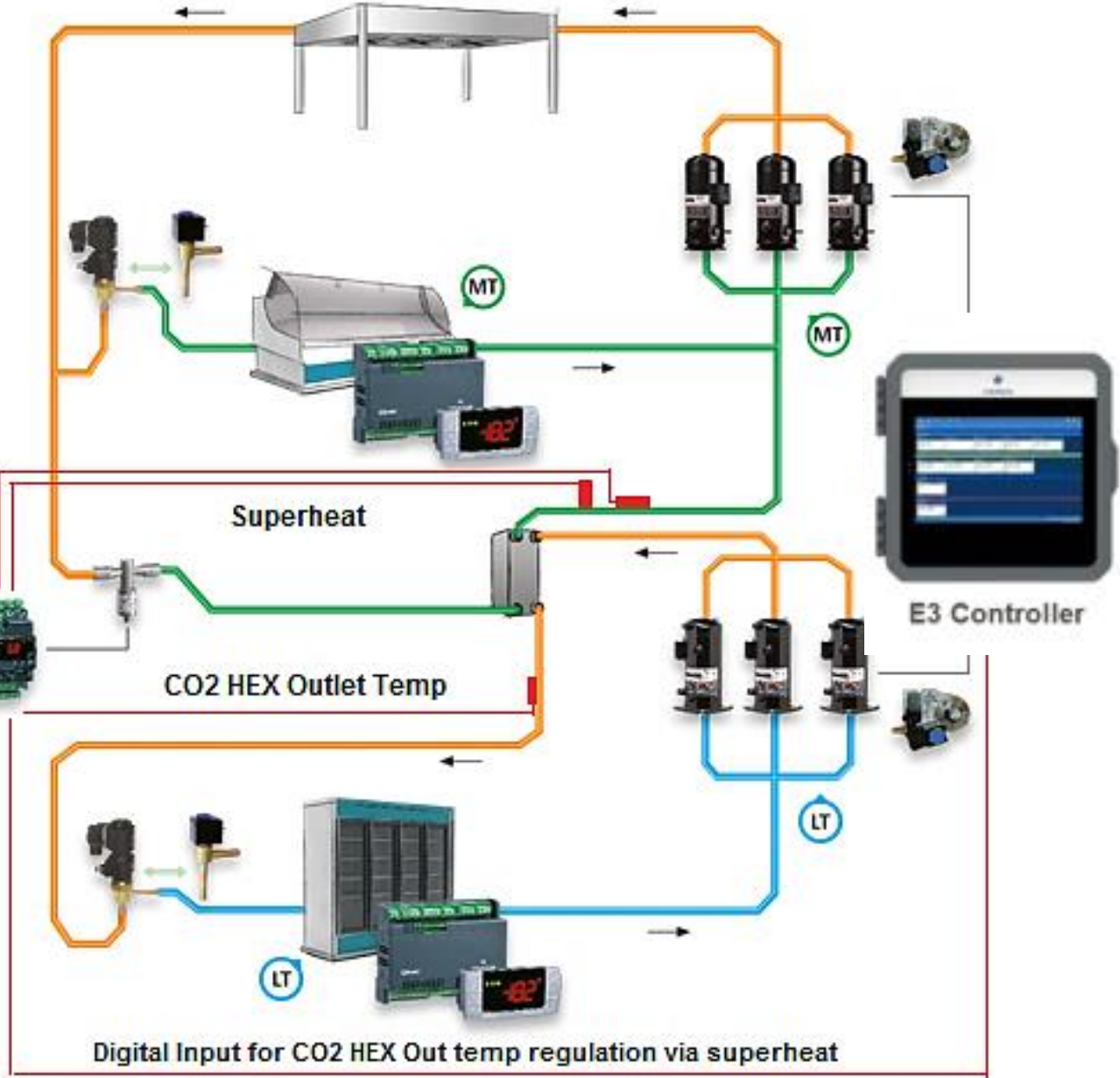


Sustainability &
Energy

XEV and EXD Superheat Controls



Are used as a stepper electronic expansion valve driver in systems with CO2 as the low temperature refrigerant.



XEV/EXD Super Heat Controllers Overview

Device Image



Introduction

The XEV/EXD series of driver modules are used to control a large variety of stepper electronic expansion valves for superheat regulation applications. The XEV's regulation of refrigerant superheat allows for optimized and safe system operation over a wide variety of climatic and load conditions.

Key Features & Regulation

- Electronic expansion valve driver and regulator based on superheat reading
- Battery backup with XEC Supercap (optional)
- Pressure value broadcast via LAN to XEV devices
- Alarm management (Visual and relay)
- Hot Key connector or programming keyboard for easy programming
- RS485 Modbus communications

Parts Required

- 24Vac/dc transformer
- Coil outlet superheat probe
- Suction pressure transducer

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Leak Detection and VFDs

Leak Detection



	MRLDS-450	MRLDS-550	CRLDS-1000	CRLDS-CO2	MRLDS-250	RLDS
	Good	Good	Good	Good	Better	Best
Application	Safety Compliance	Safety Compliance	Safety Compliance	Safety Compliance	Safety Compliance	Safety & Emission Reductions
Sampling type	Passive / Diffusion	Passive / Diffusion	Passive / Diffusion	Passive / Diffusion	Passive / Diffusion	Aspiration / Active Sampling
Sensor Technology	Semiconductor & IR	Semiconductor & IR	Semiconductor	IR	IR	IR
Minimum Detection Level	75 PPM	75 PPM	150 PPM	1000 PPM	50 PPM	1 PPM
Cold Room (-40oC)	Y	N	Y	Y	N	Y
Combustible gases	Y	Y	N	Y	N	N
Stability & Accuracy	Standard	Standard	Standard	Standard	High	High
Sensor Channels	1	2	1	1	1	Up to 16
User Interface	Mobile App	Local Display	Mobile App	Mobile App	Local Display	Local Display
Calibration / Sensor Life	Annual / 3-5 years	Annual / 3-5 years	Annual / 3-5 years	Annual / 3-5 years	Annual / 6-8 years	Never / 6-8 years
General selection guideline	Lowest cost to meet ASHRAE 15 safety compliance (<9 sensors / site)	Measures 1-2 gases, on board display, remote sensors	Lowest cost to meet ASHRAE 15 safety compliance (<9 sensors / site)	Lowest cost to meet ASHRAE 15 safety compliance (<9 sensors / site)	Flexible broadband detection, long life, onboard display	Low level leak detection, reduce emissions, lowest cost (>8 sensors / site)

Copeland™ VFD Platforms

- **The Copeland EVM** VFD series is ideal for chillers, medical refrigeration, display cases, walk-ins, reach-ins and other applications where less control functionality is needed.
 - Covers ½ to 30 HP range
 - Available in single- and three-phase input options, including 575-volt options
 - Equipped with onboard Bluetooth® capabilities for ease of use
 - IP20, can be made IP21 equivalent with NEMA1 Kit

- **The Copeland EVH** VFD series is designed for large centralized racks including CO2, advanced chillers and industrial refrigeration applications that require more demanding motor control functionality.
 - Covers 1 to 250 HP
 - Available in three-phase, including 575-volt options
 - Delivers advanced motor control
 - IP21 and IP54



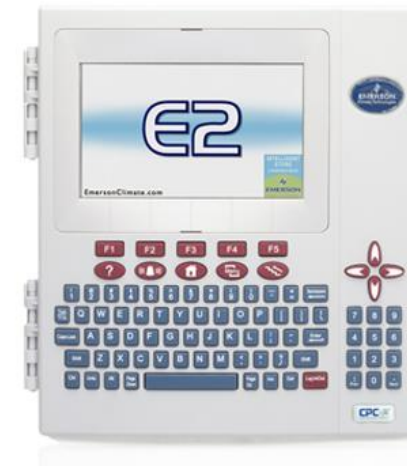
Copeland VFD System Integration

Copeland Controls Are Already Mapped For The EVM and EVH

- E2
- E3/Site Supervisor
- Full Programming Configuration thru Supervisory Controller

Copeland VFDs Can Integrate W/ Any Controller

- Published communication details
- Analog input speed control
- Onboard I/O & PID Control
- Expandability



The Ground-Work Has Already Been Done To Make Integration Seamless On Copeland Devices

Key Feature Differences: EVH vs. EVM

Feature	EVH	EVM Pro	EVM Basic
Copeland Compressor Optimized	YES	YES	YES
HP Range	1HP - 250HP	0.5HP - 30HP	0.5HP - 30HP
Frame Sizes	1 - 6	1 - 4	1 - 4
IP Ratings	IP21 & 54	IP20	IP20
DC Link Choke	YES	NO	NO
Real Time Clock	YES	NO	NO
BACnet MS/TP & IP	YES	YES	NO
Modbus RTU	YES	YES	YES
Modbus TCP	YES	YES	NO
Bluetooth	NO	YES	YES
Analog Inputs	2	1	1
Digital Inputs	8	4	4
Analog Outputs	2	1	1
Digital Outputs	1	0	0
Relay Outputs	3	2	1
EMI Upgrade Available	YES	YES	YES
Safe Torque Off	YES	YES	NO
Brake Chopper	YES	YES	YES
Keypad	YES	YES	NO - EXT
Removable Keypad	YES	NO	NO
Expansion Slots	2	1	1

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Applications and Tools

E3 Offline Manager

<https://offlinemanager.emerson.com/>

Offline Manager

E-mail

Password

Remember me (for 30 days)

[Log In](#)

[Forgot your password?](#)

[Create an Account](#)

Copyright © 2023 Copeland Offline Manager 1.11.04

- Offline Manager is a programming tool in a cloud environment that provides a virtual E3 or Site Supervisor for you to build programs, upload existing programs and self-train

E3 Offline Manager

My Sessions (10)

[+ Create Session](#)

Session Name  | Version  | Model  | Feature Set  | Status  | Created  | Last Access Time  | Actions

Create New Session ✕

Name

Model

Version

Feature Set

Licenses & ADFs ✕

Available

- 531-0016 - Hitachi VRF
- 531-0017 - ShengNeng Water Heater
- 531-0018 - ABB ACS 510
- 531-0019 - Schneider ATV61F VFD
- 531-0020 - DAIKIN Gateway ModBus RTU DIII Interface
- 531-0021 - XCM2SD 1.3 ZXME
- 531-0022 - XCM2SD 1.3 ZXLE
- 531-0023 - XCM2SD 1.3 ZXDE
- 531-0024 - Aparator FAUN Heat

Selected

Licenses & ADFs ✕

Available

- 531-0271 - ALTIVAR 212 VFD
- 531-0272 - ECB-D10_9.01 AHT Version
- 531-0273 - CoreSense
- 531-0275 - Schneider PM-5500
- 531-0276 - Simply VAV
- 531-0277 - Seasons-4 D808
- 531-0278 - BCI-R_RTU
- 531-0279 - Munters_TI
- 531-0280 - Mitsui FCU
- 531-0281 - XC450CX 34















































Selected

531-0274 - iPro CO2 - HPV/BGV 1

- Create New Programs
- Import Existing Programs
- Edit Programs
- Manage Program Inventory
- Use For Training

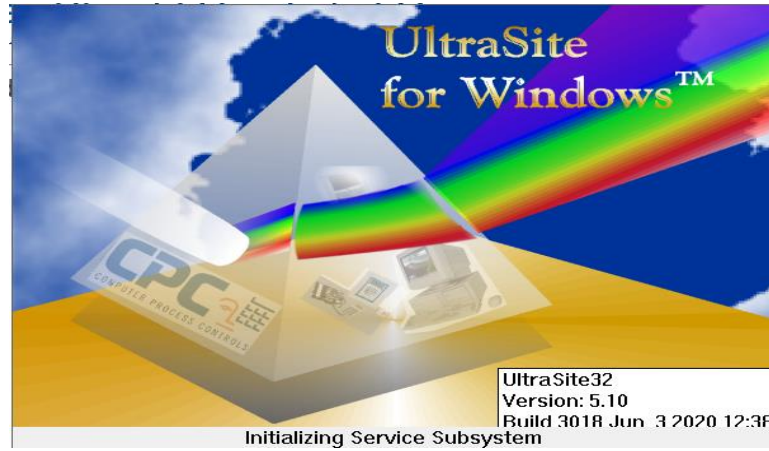
My Sessions (10)

[+ Create Session](#)

Session Name 	Version 	Model 	Feature Set 	Status 	Created 	Last Access Time 	Actions
	2.24F01	SS	SR	Exited	3/7/2023, 4:54:56 PM	3/15/2023, 4:50:55 PM	  
	2.21F01	E3	RXe	Exited	6/7/2022, 3:30:37 PM	6/7/2022, 11:18:33 PM	  
Heatcraft Training	2.26F01	E3	RXe	Running	9/8/2023, 9:35:31 AM	Never	  
	2.23F01	E3	RXe	Exited	1/13/2023, 2:06:59 PM	1/19/2023, 2:40:10 PM	  
	2.25F01	E3	RXe	Exited	7/6/2023, 12:27:25 PM	7/6/2023, 10:23:01 PM	  
	2.21F01	E3	CXe	Exited	6/17/2022, 11:44:19 AM	6/28/2022, 5:13:13 PM	  
	2.25F01	SS	RXe	Exited	6/6/2023, 2:52:17 PM	7/18/2023, 5:09:05 PM	  
	2.23F01	E3	SR	Exited	1/17/2023, 8:30:41 PM	1/18/2023, 9:07:02 AM	  
	2.25F01	E3	RXe	Exited	7/1/2023, 11:29:39 AM	7/1/2023, 12:00:20 AM	  
	2.21F01	SS	SR	Exited	6/8/2022, 2:55:51 PM	6/8/2022, 4:05:34 PM	  

E2 to E3 Program Conversion

Required Ultra-Site 5.10



UltraSite: Revision 5.10 - [Tree View]

File Tree Logs System View Window Help

UltraSite

- E2e Trainer
 - Amazon UFF
 - Dustin's E2e
 - E2e trainer
 - sprouts
 - test
- Site Supervisor/E3
 - Dustin's Supervisor
 - SS 1: SS Unit01
- United States :: Open Sites
- United States :: Pre-Open Sites
- United States :: Dark Stores
- ZZZ - Test Labs

Site Supervisor Restore Error List

Summary Error List:

```

Application CHLLER WI CU2 adding error>
Application FREEZER MRLDS adding error>
Application FREEZER WI CU5 adding error>
Application FREEZER WI CU3 adding error>
Application FREEZER WI CU4 adding error>
Application BaslerGen001 adding error>
Application CHLLER WI CU1 adding error>
Application CHLDSTOR MRLDS adding error>
CHLD STOR 01, CaseTemp1: E2 sent CHLDSTOR EVP1A:Regul.Probe, SS reported NONE
CHLD STOR 01, CaseTemp2: E2 sent CHLDSTOR EVP1B:Regul.Probe, SS reported NONE
CHLD STOR 01, CaseTemp3: E2 sent CHLDSTOR EVP1C:Regul.Probe, SS reported NONE
CHLD STOR 01, CaseTemp4: E2 sent CHLDSTOR EVP1d:Regul.Probe, SS reported NONE
CHLD STOR 01, DefrAvTerm1: E2 sent CHLDSTOR EVP1A:1defProbe, SS reported NONE
CHLD STOR 01, DefrAvTerm2: E2 sent CHLDSTOR EVP1B:1defProbe, SS reported NONE
CHLD STOR 01, DefrAvTerm3: E2 sent CHLDSTOR EVP1C:1defProbe, SS reported NONE
CHLD STOR 01, DefrAvTerm4: E2 sent CHLDSTOR EVP1d:1defProbe, SS reported NONE
CHLD STOR 02, CaseTemp1: E2 sent CHLDSTOR EVP2A:Regul.Probe, SS reported NONE
CHLD STOR 02, CaseTemp2: E2 sent CHLDSTOR EVP2B:Regul.Probe, SS reported NONE
CHLD STOR 02, CaseTemp3: E2 sent CHLDSTOR EVP2C:Regul.Probe, SS reported NONE
CHLD STOR 02, CaseTemp4: E2 sent CHLDSTOR EVP2d:Regul.Probe, SS reported NONE
CHLD STOR 02, DefrAvTerm1: E2 sent CHLDSTOR EVP2A:1defProbe, SS reported NONE
CHLD STOR 02, DefrAvTerm2: E2 sent CHLDSTOR EVP2B:1defProbe, SS reported NONE
CHLD STOR 02, DefrAvTerm3: E2 sent CHLDSTOR EVP2C:1defProbe, SS reported NONE
CHLD STOR 02, DefrAvTerm4: E2 sent CHLDSTOR EVP2d:1defProbe, SS reported NONE
CHLDSTOR EVP1A, Regul.Set: E2 sent CHLD STOR 01:ActiveSetpt, SS reported 0.00000
CHLDSTOR EVP1A, Defrost: E2 sent CHLDSTOR LK HI:CommandOut, SS reported 1
CHLDSTOR EVP1A, DefrostStop: E2 sent CHLD STOR 01:Defrost, SS reported 0
CHLDSTOR EVP1A, AuxOn: E2 sent CHLD STOR 01:RefrigSolenoid, SS reported 0
CHLDSTOR EVP1B, Regul.Set: E2 sent CHLD STOR 01:ActiveSetpt, SS reported 0.00000
CHLDSTOR EVP1B, Enable: E2 sent CLDSTG LK HI:CommandOut, SS reported 1
CHLDSTOR EVP1B, DefrostStart: E2 sent CHLD STOR 01:Defrost, SS reported 0
CHLDSTOR EVP1B, DefrostStop: E2 sent CHLD STOR 01:RefrigSolenoid, SS reported 0
CHLDSTOR EVP1C, Regul.Set: E2 sent CHLD STOR 01:ActiveSetpt, SS reported 0.00000
CHLDSTOR EVP1C, Enable: E2 sent CLDSTG LK HI:CommandOut, SS reported 1
CHLDSTOR EVP1C, DefrostStart: E2 sent CHLD STOR 01:Defrost, SS reported 0
CHLDSTOR EVP1C, DefrostStop: E2 sent CHLD STOR 01:RefrigSolenoid, SS reported 0
CHLDSTOR EVP1d, Regul.Set: E2 sent CHLD STOR 01:ActiveSetpt, SS reported 0.00000
CHLDSTOR EVP1d, Enable: E2 sent CLDSTG LK HI:CommandOut, SS reported 1
CHLDSTOR EVP1d, DefrostStart: E2 sent CHLD STOR 01:Defrost, SS reported 0
CHLDSTOR EVP1d, DefrostStop: E2 sent CHLD STOR 01:RefrigSolenoid, SS reported 0
    
```

Save Error List Show Value Differences Show Restore Comparison Close

Error's (If There Are Any)

UltraSite: Revision 5.10 - [Tree View]

File Tree Logs System View Window Help

UltraSite

- E2e Trainer
 - Amazon UFF
 - Dustin's E2e
 - E2e trainer
 - sprouts
 - test
- Site Supervisor/E3
 - Dustin's Supervisor
 - SS 1: SS Unit01
- United States :: Open Sites
- United States :: Pre-Open Sites
- United States :: Dark Stores
- ZZZ - Test Labs

Conversion In Progress

Restore E2 Setpoints to Site Supervisor

Progress bar showing approximately 25% completion.

http://192.168.1.250/#/systemsummary

SS1 Site Supervisor

EMERSON

System Summary

- Refrigeration (19)
- HVAC (0)
- Lighting (0)
- Energy (0)
- Other (10)
- System (5)

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Site Supervisor SS1 SR 2.14F01
01/07/2021 05:04:07 PM

Wiz-Mate



Map Network Wizard Custom Descriptions Map Compare

Open Map Save Map Upload from Device Download to Device Program Hotkey Upload from Hotkey Run Wizard Save Excel Print Map Selection Filter Multi-Languages Description Selection XLS WEL Compile Lib XLS->LIB XLS XDB Compile Maps XLS->XDB Multidevice

Model XCS103D FW 1.1

Notes

Group	Parameter	Description	Value		Vis. Level	Limit		Unit	Comment	Active
			Edit	Original		Minimum	Maximum			
HPV	SptO	HPV Setpoint for Subcritical and Transcritic	87	87	Pr1	27	87	°F		<input checked="" type="checkbox"/>
HPV	HyO	HPV Hysteresis for Subcritical and Transcri	4	4	Pr1	0	36	°F		<input checked="" type="checkbox"/>

Map Network Wizard Custom Descriptions Map Compare

Load/Compare Map File Load/Compare Device Map Close All Print Comparison

■ Different value ■ Different Visibility/Modifiability

Group	Parameter	Description	lpro HP on Trainert.bin	lpro in trainer 12-23.bin
HPV	SptO	HPV Setpoint for Subcritical and Transcritic	87	87
HPV	HyO	HPV Hysteresis for Subcritical and Transcrit	4	4
HPV	SptS	HPV Setpoint in Subcritical mode	3	3
HPV	RSBT	HPV Subcritical band offset	0	0
HPV	PBBT	HPV Subcritical proportional band	22	38
HPV	DERT	HPV Subcritical derivative sampling time	0	0
HPV	DDERT	HPV Subcritical derivative time	0	0
HPV	RSBP	HPV Transcritical band offset	0.0	0.0
HPV	PBBP	HPV Transcritical proportional band	329.9	329.9
HPV	INCS	HPV Integral sampling time used for subcritic	140	140
HPV	INCT	HPV Integral sampling time used for transcrit	0	0
HPV	DERP	HPV Transcritical derivative sampling time	0	0
HPV	PIDSmIn	HPV Minimum PID step	1	1
HPV	PIDSband	HPV PID step band	1.0	1.0
HPV	HMax%	HPV maximum valve % open	100	100
HPV	PGmax	HPV Maximal allowable pressure in gas coo	1249.6	1249.6
HPV	PGmaxHy	HPV Hysteresis for the PGMax alarm	50.0	1.0
HPV	SFSpt	HPV HP safety setpoint	1500.6	1500.6
HPV	SFDly	HPV HP safety delay before standard regula	10	10
HPV	TStc_X1	HPV Transcritical setpoint calculation param	0	0
HPV	TStc_Y1	HPV Transcritical setpoint calculation param	0.0	0.0
HPV	TStc_X2	HPV Transcritical setpoint calculation param	104	104

- Upload Parameters
- Download Parameters
- Build and Save Controller Parameters
- Compare Parameters
- Troubleshoot Comm Loops

Site Commissioning

Transcritical CO2 Start Up

Start Up Date:	
Completion Date:	
Store Number:	
Address:	
City:	
State:	
Zip Code:	
Rack OEM:	
OEM Representative:	
OEM Representative:	
Phone:	
Fax:	
EMS Phone Number:	
Emerson Representative:	
Emerson Representative:	

Controller Information	Information	Notes
Controller 1		
Rack #	1	
Model of E2		
Version of E2 Firmware		
Version of E2 Firmware if modify		
Mac Address		
Mother Board		
Serial Number		

Refrigeration		Information	Notes
Controller 2	Rack Information		
Rack #	Low Temp Rack		
Model of E2-E3	Compressor Manufacturer		
Version of E2-E3 Firmware	Compressor Quantity		
Version of EE3 Firmware if modify	VFD Lead Compressor		
Mac Address	Digital Lead Compressor		
Mother Board			
Serial Number			
	Medium Temp Rack		
	Compressor Manufacturer		
	Compressor Quantity		
	VFD Lead Compressor		
	Digital Lead Compressor		

Remote communication	Refrigeration	Checked Yes/No	Notes
Check operation of modem	GENERAL CONTROLER		
Backup setpoint file	Verify E2-E3 programming		
Atlanta base point backup	SUCTION GROUP		
	Control Strategy		
	Standard		
	Enhanced		
	Floating suction setpoint enabled		
	Compressor cycling under 100 cycles per day per compressor		
	Turn all compressors on and off through the control system		
	Turn all unloaders on and off through the control system		
	Verify Pressure Transducers, Voltage and Range		
	Verify & Calibrate Pressure Transducers		
	Verify operation of all compressor oil failure inputs		
	Verify operation of all compressor proof inputs (If equipped)		

Refrigeration	Checked Yes/No	Notes
EEPR VALVES		
EEPR valves manufacturer		
Check EEPR operation and setup		
Check and Record Failsafe percentages for Medium Temperature circuits that are piped into the low temperature header. (Fail all Medium temperature circuits that have the Max or Failsafe valve percentage set at 100%)		

- Create a Start-up report
- Check all Inputs/Outputs
- Drive all Valves
- Verify Programming
- Recommission after 90 days

Emerson Retail Solutions Apps and Popular Sites



Training

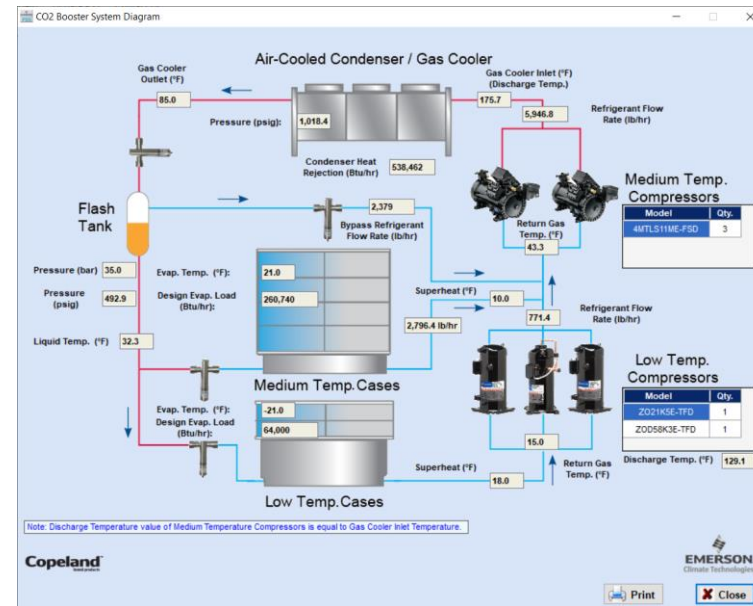
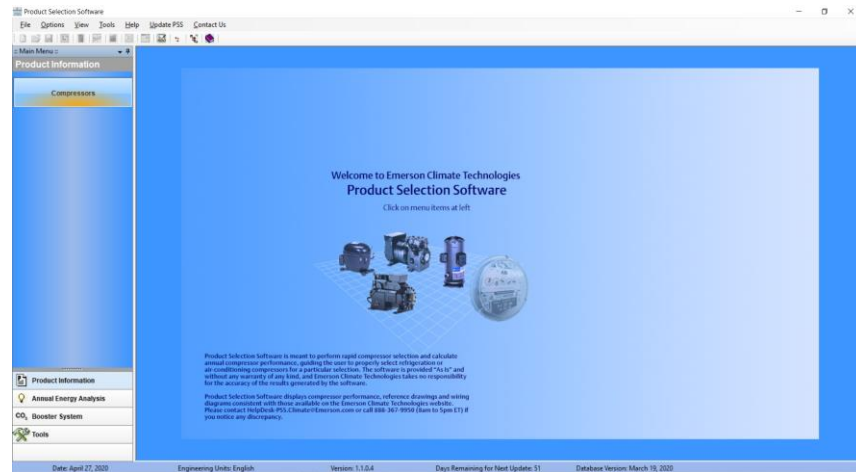
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Software Updates

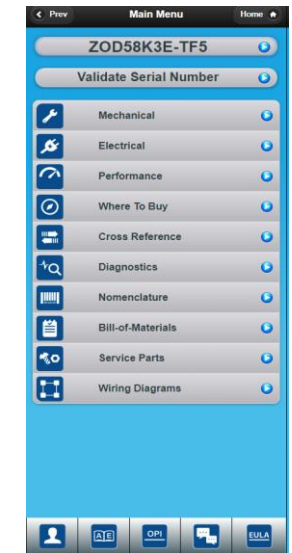
<https://climate.emerson.com/en-us/products/controls-monitoring-systems/facility-controls-electronics/facility-and-system-controls/>

CO2 Product Information Library

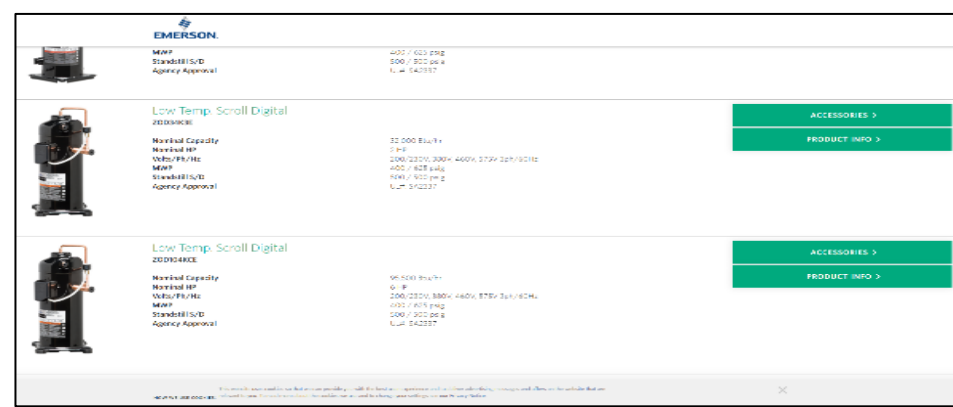
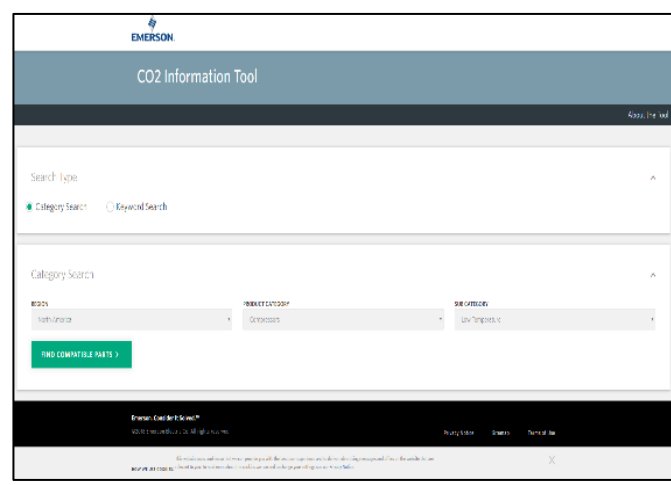
Product Selection Software with Booster Design



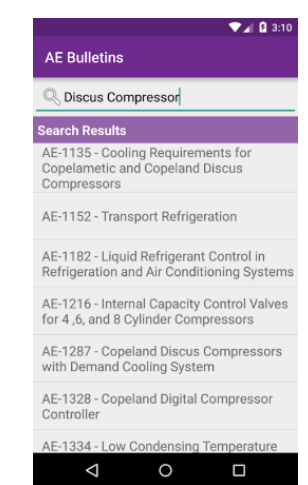
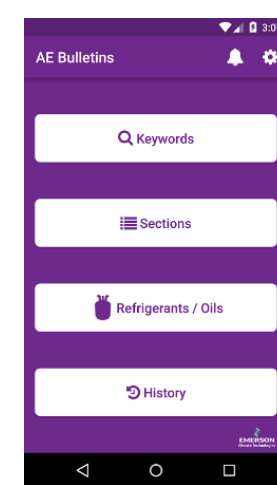
Copeland Mobile



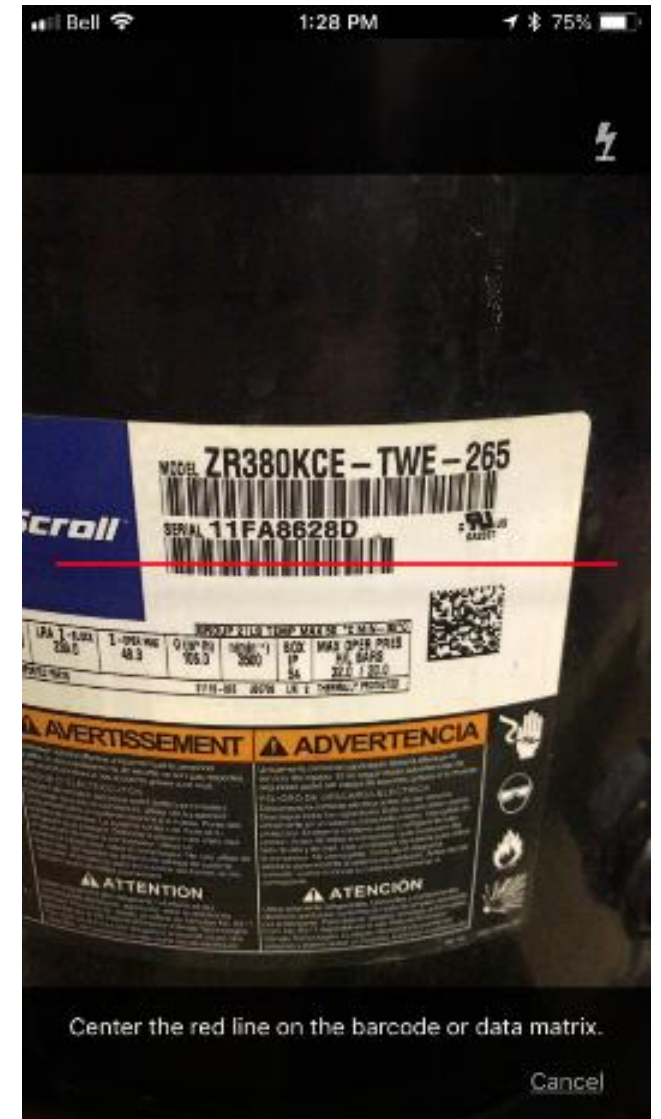
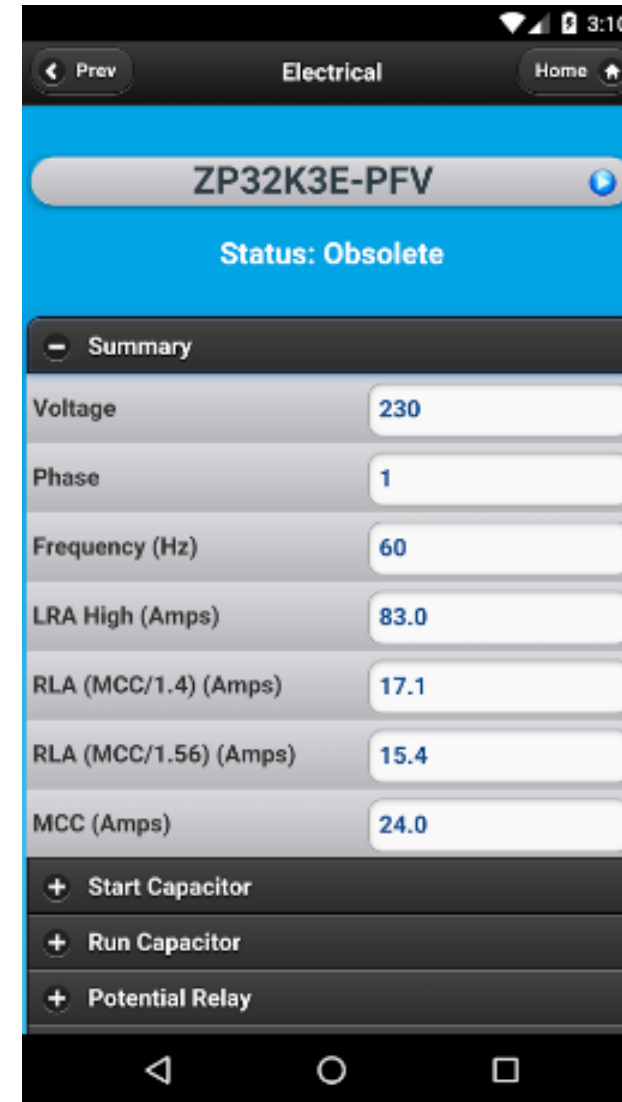
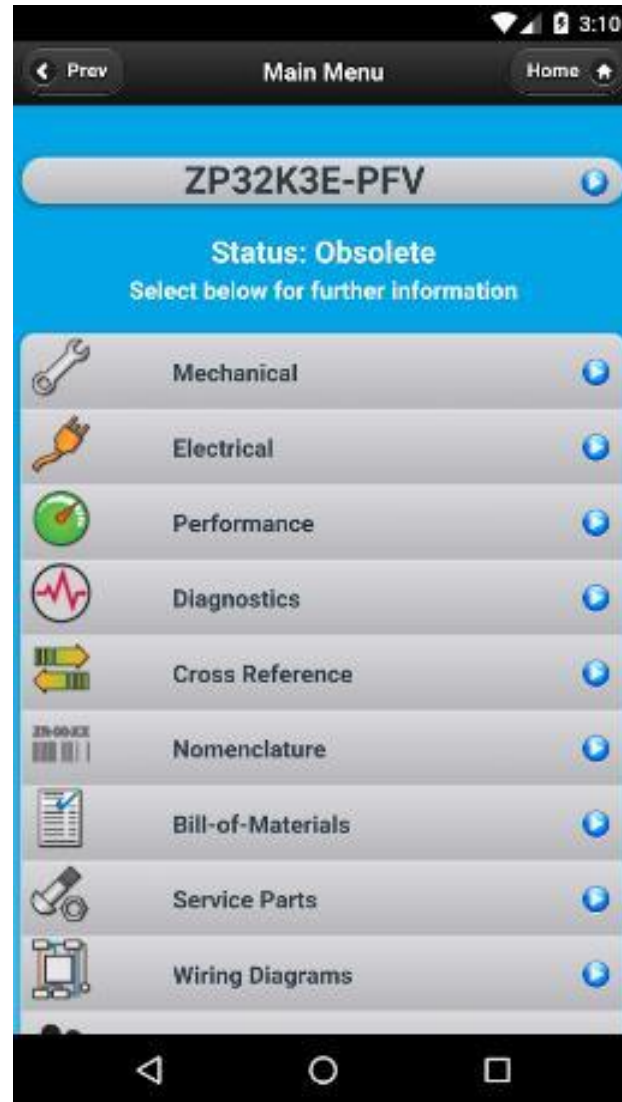
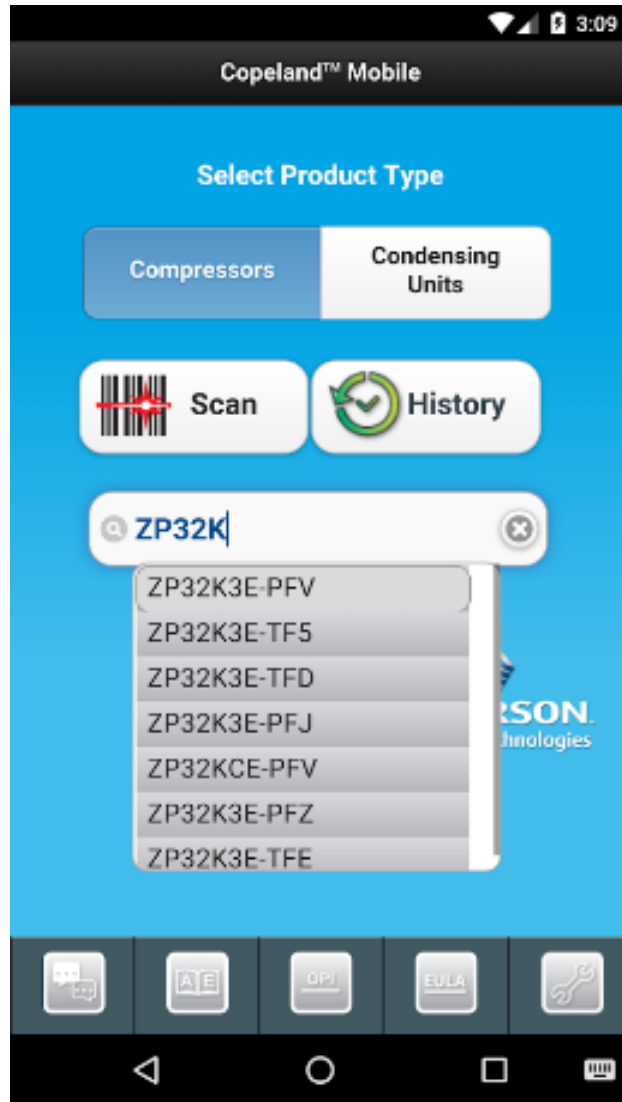
CO2 Information Tool



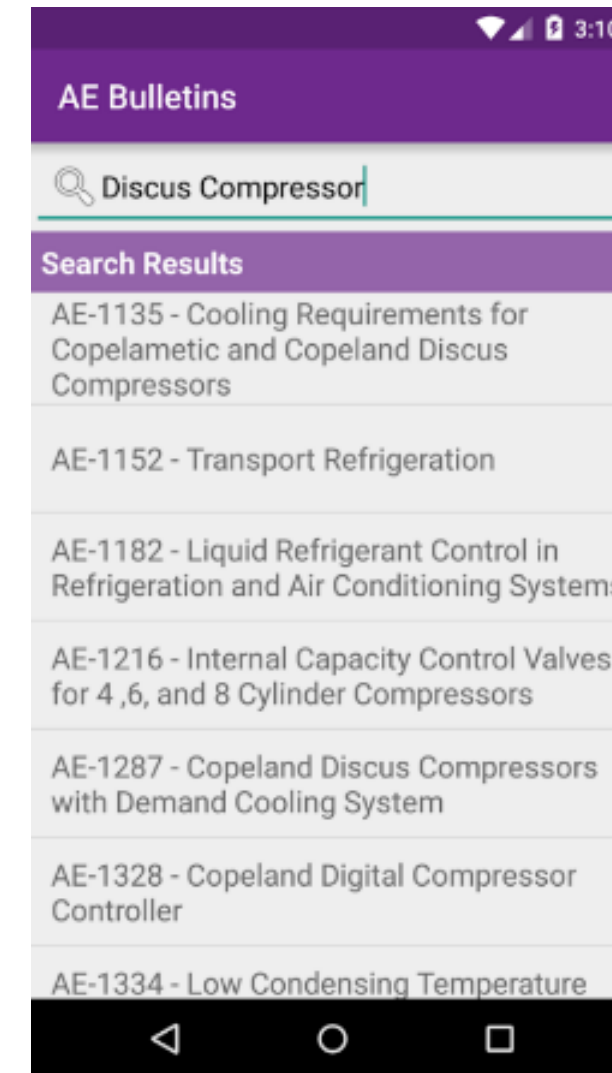
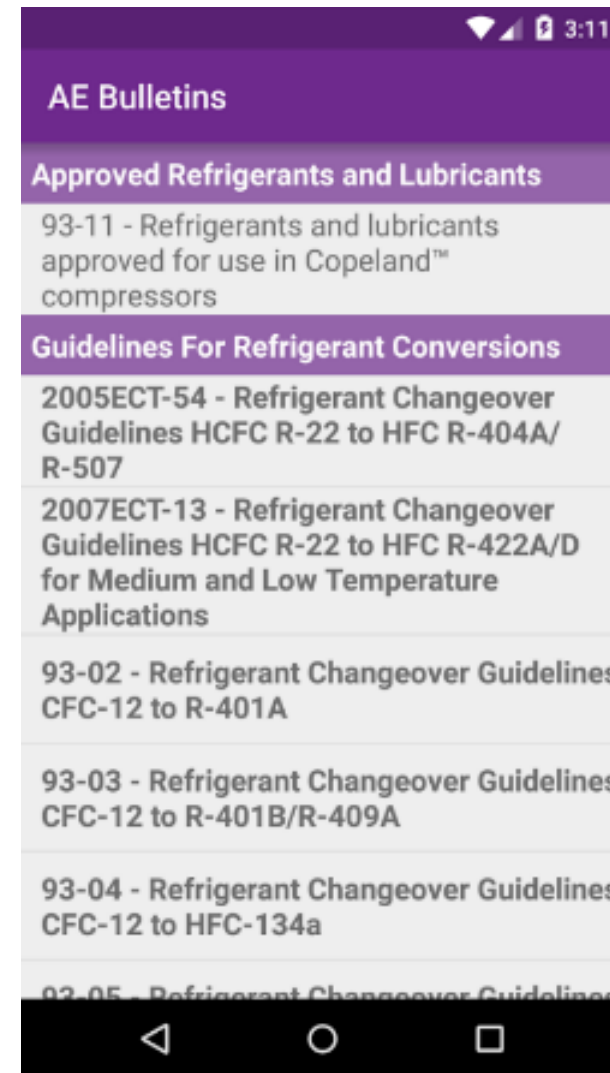
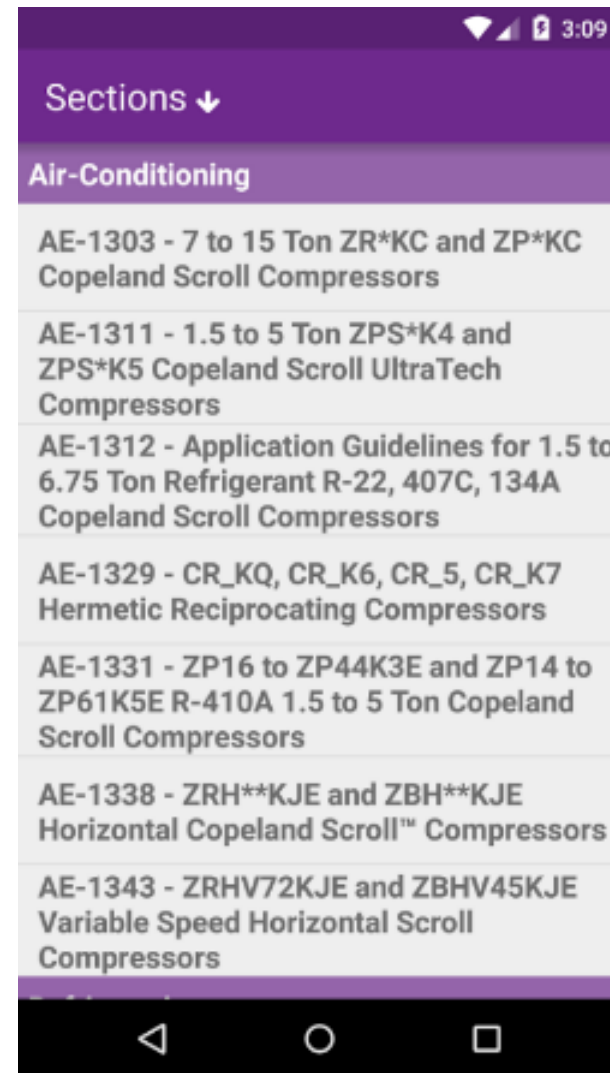
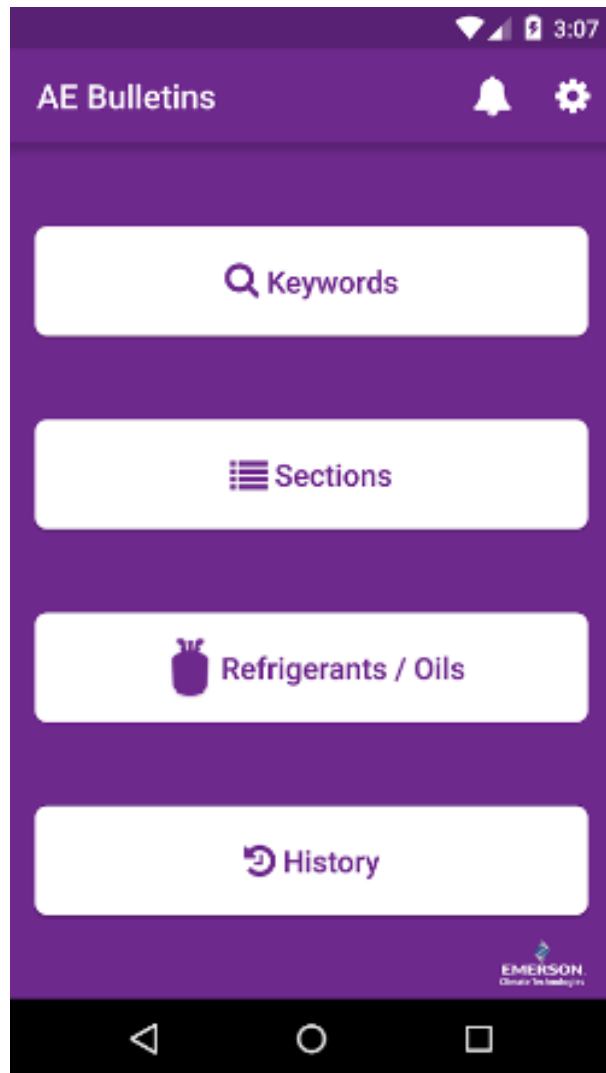
AE Bulletins



Copeland Mobile



AE Bulletins



Technical Support Material

Using the E2 setpoint conversion tool when retrofitting E2 with supervisory or E3 controllers: Using UltraSite32™ version 5.10 and above

Technical Bulletin

When retrofitting E2 with supervisory controllers, a backup/restore process should be performed on the E2 controller. The supervisory controller will run the same devices and applications as the E2, but instead of manually entering the information, the setpoints and configurations can be automatically converted from the E2 to the supervisory controller using UltraSite.

The conversion tool can be expected to convert 80% or more of your E2 backup file. The conversion process will take between 10 to 20 minutes depending on the complexity of the backup file. You must do a side-by-side comparison of the E2 backup file and the newly converted Supervisor file to verify there are no errors. It will be necessary to review all setpoints and alarms for consistency in addition to the error log report and restore comparison log (see Figure 13) that is generated at the end of the conversion process to ensure your new system will run properly.

Licensed features and 3rd-party integrations will not convert if your new controller does not have the licenses or features installed.

Note that some complex schedules and Flex Combiners may not be converted.

If you feel there is something that should have been converted but did not, or if there is an error that shows a setpoint or parameter did not convert correctly, please contact Emerson Technical Support.

Step 1: Set up Supervisor in UltraSite

1. Log into UltraSite as user/pass.
2. Add Supervisor as a Site (right-click Directory and click Add Site).

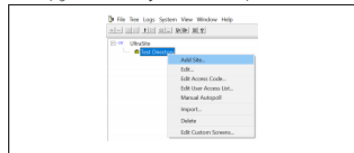


Figure 1 - Click Add Site

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Visit our website at <http://www.climate.emerson.com> for the latest technical documentation and updates.



[Conversion Tool](#)

Supervisory Controller Installation and Operation Manual



Site Supervisor Version 2.13
026-1800 Rev 17



[Supervisor Controller Manual](#)

Site Supervisor Controller

Quick Setup Guide

The Site Supervisor is a system that combines energy management with the ability to monitor various facility systems and provide alerts when there are issues that need attention. This system provides HVAC control, Refrigeration System Monitoring and Control, as well as Lighting Control. In addition, the Site Supervisor can monitor and report energy consumption and take action to reduce the energy demand during peak periods. This can have a direct impact on utility bills by reducing total energy costs. Site Supervisor ensures that the HVAC and lighting systems are on and off at the appropriate times. This ability to monitor store conditions can potentially minimize energy consumption.

For a copy of the full Site Supervisor Guide (PN 026-1800), visit the Site Supervisor page on the Emerson website: <http://climate.emerson.com/en-us/products/controls-monitoring-systems/facility-controls-electronics/facility-and-system-controls/site-supervisor/facility-control> to download or contact Emerson Electronics and Solutions Customer Service at 770-425-2724.



Figure 1 - Site Supervisor

Ethernet Connection

1. ETH1 is designed to be used for directly connecting to laptop, PC, or optional touchscreen with a CAT5 network cable.
2. The default IP for ETH1 is 192.168.1.250.
3. The optional Site Supervisor Display touchscreen default IP is 192.168.1.200 and will connect automatically to the Site Supervisor when plugged into ETH1. *It is recommended that you do not change these defaults.*
4. ETH0 should be reserved for the secure network connections: store or corporate networks. Ask your network administrator for the correct network IP address for ETH0.
5. ETH0 and ETH1 are physically separated for added security. Directly connecting to ETH1 will not access the secure network connection on ETH0.



Figure 2 - Site Supervisor ETH 1 Ports



Figure 3 - Site Supervisor ETH 0 Port

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Visit our website at <http://www.emerson.com> for the latest technical documentation and updates.



[Supervisor Quick Setup Guide](#)



24/7 Technical Support

Email - coldchain.technicalservices@emerson.com

Phone Number – [833-409-7505 \(opt 2\)](tel:833-409-7505)

[Offline Manager](#) - offlinemanager.emerson.com

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