

RTU Open Control Class Itinerary

- Tech Tools Overview
- RTU Open Operation
- RTU Open Factory-Installed
- RTU Open Field-Installed
- Communicating Sensors
- Universal Protocol Converter (UPC)
- Integration into competitor front ends

Tech Tools Kit (USB-TKIT)

Hardware +



(USB-L)

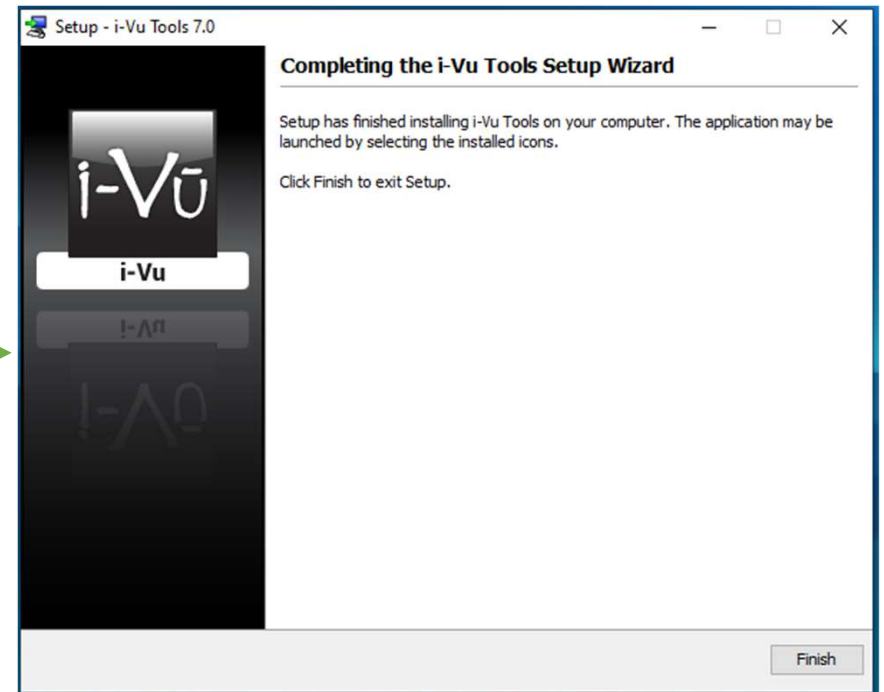
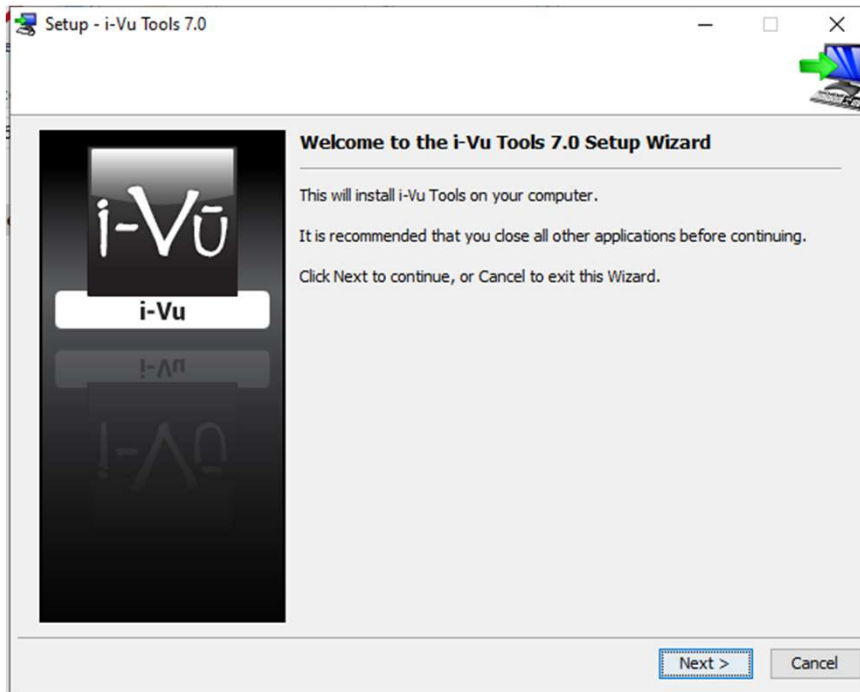
Software

- fa** Field Assistant.exe
- eb** EquipmentBuilder.exe
- sn** Snap.exe
- vb** ViewBuilder.exe
- bv** Virtual BACView.exe

Plus more...

(CIV-OPNTOOLS)

i-Vu Tools Set Up



i-Vu Tools Set Up (Cont'd)

Automatically Installed:

-  Field Assistant.exe
-  EquipmentBuilder.exe
-  Snap.exe
-  ViewBuilder.exe
-  Virtual BACView.exe

Other Programs on Disc:

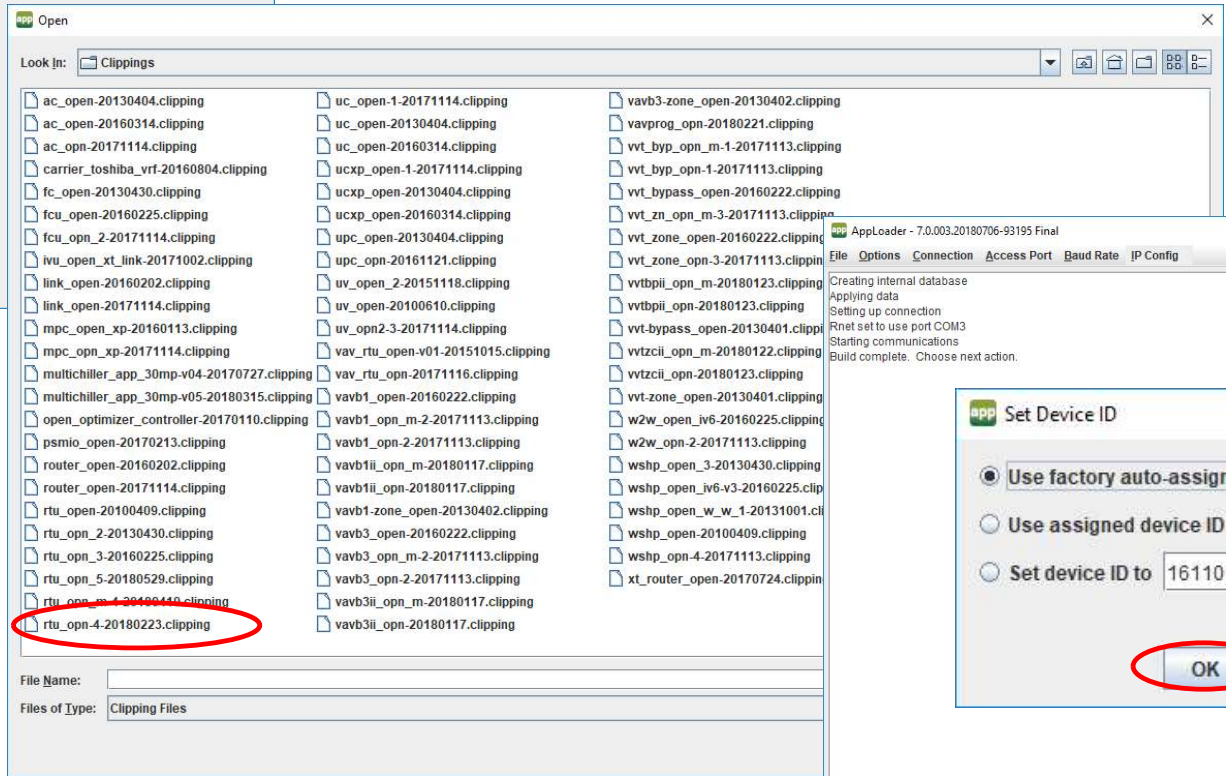
- Alarm Pop-up
- BBMD Config
- MS/TP Capture Tool
- AppLoader
- Test & Balance
- LonWorks Integration Tool

AppLoader

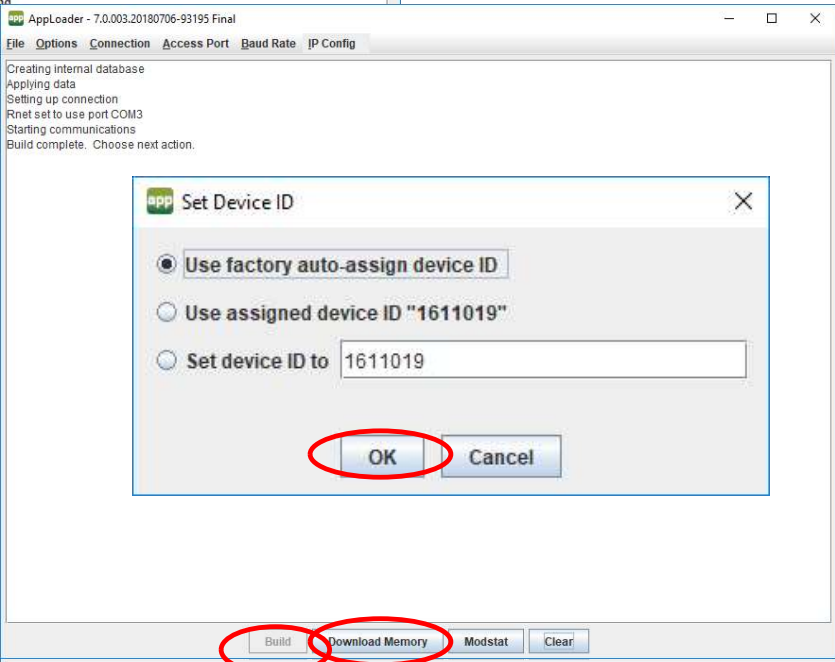
1. Select Appropriate file.



2. Build File

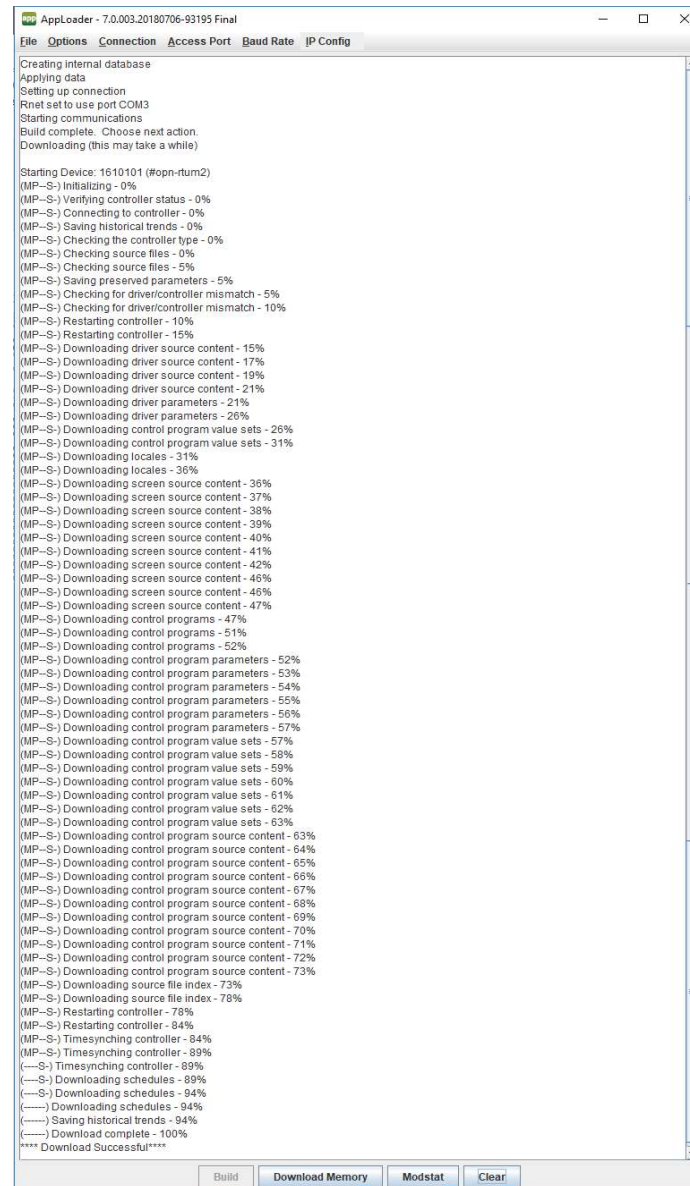


3. Download



AppLoader Download

- Gets controller back to factory condition of version of program loaded.
- Checks first if hardware can handle software
- Downloads drivers, control programs, graphics...

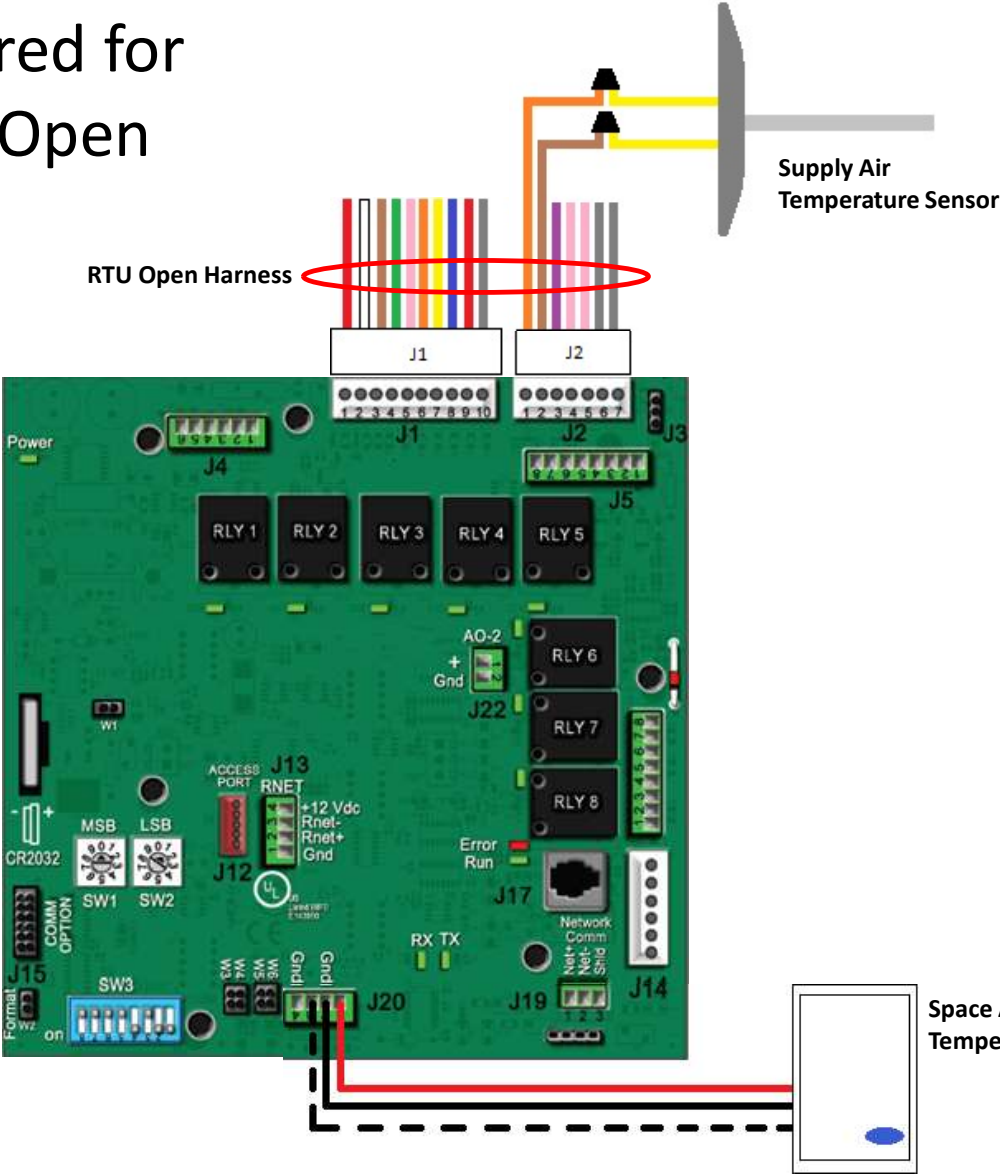


What is RTU Open?



- Product-Integrated Control (PIC)
- Constant Volume Equipment Controller
- 8 Digital Outputs
- 2 Analog Outputs
- 6 Analog Inputs
- 5 Digital Inputs
- Native BACnet Protocol
- Can be Factory-Installed on most Small to Medium RTU's
- Can be Field-Installed on Electro-Mechanical Package Units and Splits

Required for RTU Open



RTU Open Harness
OPN-RTUHRN



Supply Air Temperature Sensor
NSB-10K-4-D-

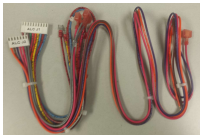


Space Temperature Sensors

What do you get when Factory-Installed?



- RTU Open Controller



- RTU Open Harness



- Supply Air Temperature Sensor



- Space Temperature Sensor
(Not Included)

- Humidimizer

- Economizer

Minimum
Requirement

Factory-Installed Economizer



Unit w/ RTU-Open Option

- Comes with RTU-Open Installed
- Comes with SAT installed
- Comes with Economizer II and OAT sensor installed



Unit w/ Electro-Mechanical Controls Option

- RTU-Open must be field installed
- SAT must be field installed
- Comes with Economizer X or IV



Economizer X (W7220) uses proprietary enthalpy sensors and damper actuator which are communicating. Cannot be used with other control systems.

Case Study #1 Verizon Shockoe Richmond, VA

- Customer needed BACnet compliant 10- and 5-Ton units with Economizers for a job to be integrated into existing front-end System. **Wanted them fast!!**
- Decided to get units with Electro-Mechanical Controls because lead time was shorter and add Carrier RTU-Open control in field.



Unit w/ RTU-Open Option

- Comes with RTU-Open Installed
- Comes with SAT installed
- Comes with Economizer II and OAT sensor installed



Unit w/ Electro-Mechanical Controls Option

- RTU-Open must be field installed
- SAT must be field installed
- Comes with Economizer X



Economizer X (W7220) uses proprietary enthalpy sensors and damper actuator which are communicating. Useless for other control systems.

Customer added RTU-Open and Supply Air Temperature Sensor, opted to leave Economizer X in place. Lost control and ability to configure economizer through BACnet front end.

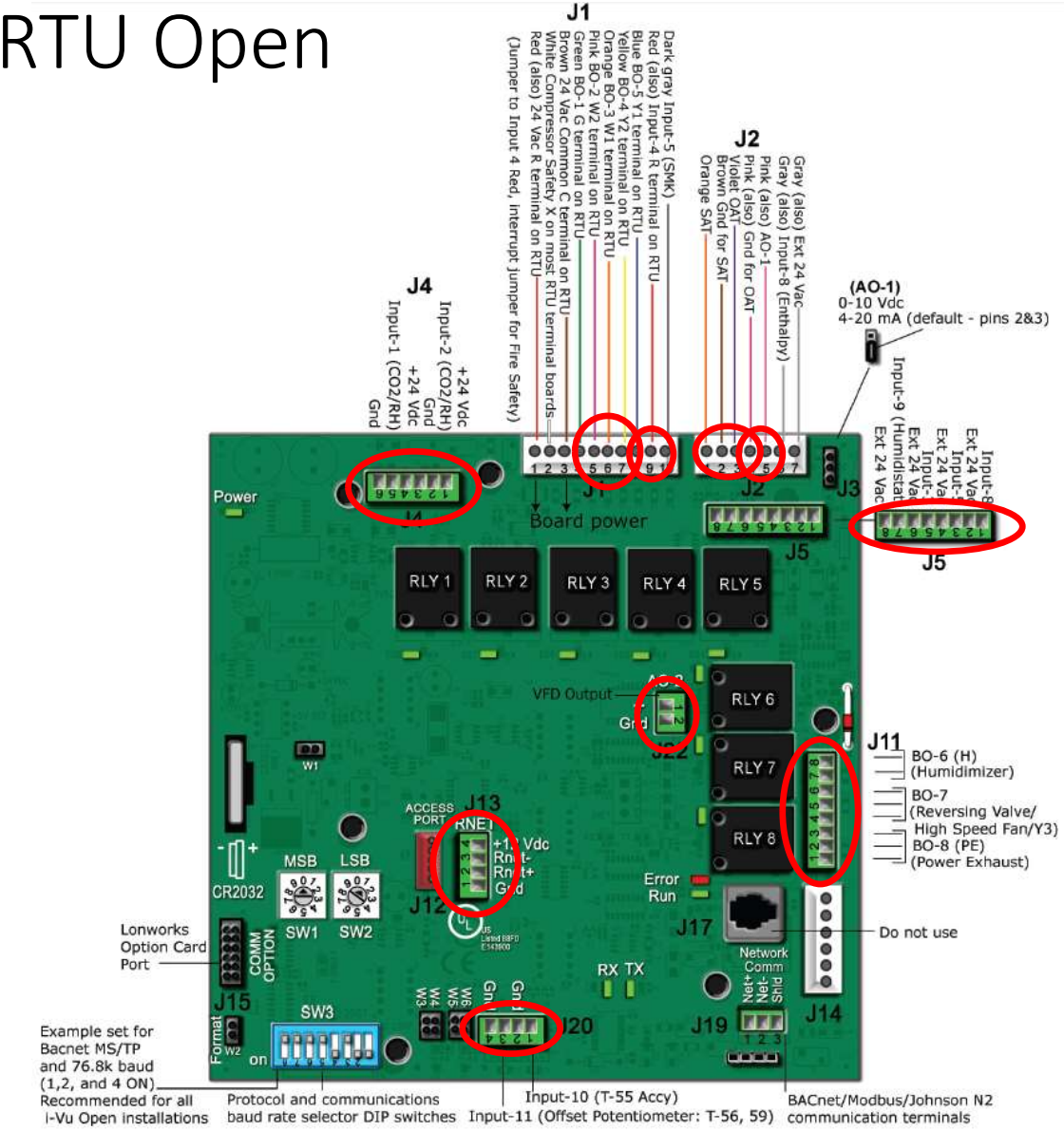
Factory-Installed RTU Open

ComfortLink Units do not
use RTU Open. Use UPC.

* 48/50HC with Energy
Recovery Ventilator comes
with ComfortLink Controller.
UPC not a Factory Option.

Weather Series		Gas & Electric (Tons)	Heat Pump (Tons)	Target Descriptor
	 48/50N	75 - 150	-	Ultra High Performance/ Feature Life Cycle Cost   
	 48/50LC	3 - 23	-	
	 48/50P	30 - 100	-	High Performance Payback / High    
	 48/50HC-Q	3 - 25 *	3 - 10	
	 48/50GC	3 - 5	-	
	 48/50A	20 - 60	-	Value Base Performance Base Features 
	 48/50TC-Q	3 - 27.5	3 - 20	
	 48/50FC	3 - 5	-	
	 48/50KC	3 - 5	3 - 5	

RTU Open



Binary Outputs

- BO-1 Fan (G) (Dedicated)
- BO-2 Heat 2 (W2) (Dedicated)
- BO-3 Heat 1 (W1) (Dedicated)
- BO-4 Cool 2 (Y2) (Dedicated)
- BO-5 Cool 1 (Y1) (Dedicated)
- BO-6 Humidi-MiZer (Dedicated)
- BO-7 RV / High Speed Fan / Y3
- BO-8 Powered Exhaust (Dedicated)

Analog Outputs

- AO-1 Economizer (Dedicated)
- AO-2 VFD (48/50LC*B) (Dedicated)

Inputs

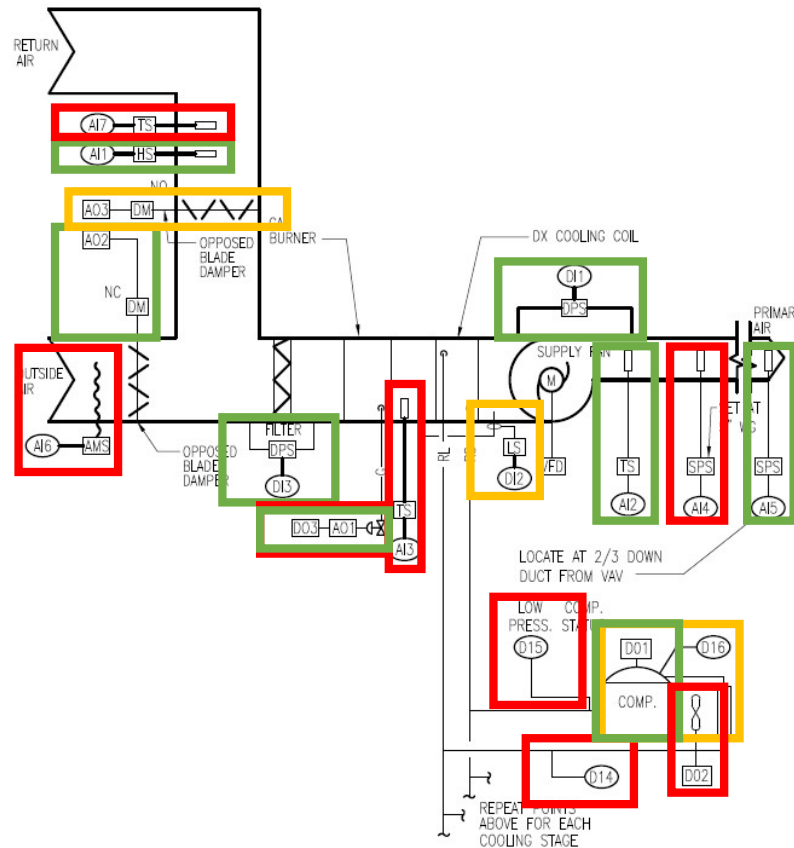
- Input 1 AI } Indoor CO2 / Outdoor CO2 / Relative Humidity
- Input 2 AI } Duct Static Pressure (48/50LC*B)
- Input 4 BI Safety Chain (Dedicated)
- Input 6 AI Supply Air Temperature (Dedicated)
- Input 7 AI Outside Air Temperature (Dedicated)
- Input 10 AI T55 (10K Thermistor) (Dedicated)
- Input 11 AI T56 (100K Potentiometer Adjust) (Dedicated)
- Input 3 BI Compressor Safety
- Input 5 BI Fire Shutdown
- Input 8 BI Enthalpy Switch
- Input 9 BI IGC Input
- Inputs 3, 5, 8, & 9 } Fan Status
Filter Status
Remote Occupancy
Door Contact

Rnet

Space Sensors

Case Study #2: Earthcore Industries Buildout Plan

- Aaon Spec – Chesapeake Virginia
- Single Zone YAC and 6-Ton VAV YAC with (4) VAV Terminal units with Electric Heat
- Aaon Unit is Loaded Up
- Can we meet points list requested?
- Call to Engineer



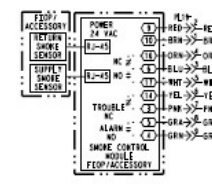
RTU	
LOCAL DDC CONTROLLER	
INPUTS	
AI1	RA HUMIDITY
AI2	SUPPLY AIR TEMPERATURE
AI3	GAS BURNER DISCHARGE AVERAGE
AI4	UNIT DISCHARGE STATIC PRESSURE
AI5	SA DOWN DUCT PRESSURE TRANSMITTER
AI6	OA AIRFLOW MEASURE STATION
AI7	RA TEMPERATURE
DI1	SUPPLY FAN STATUS
DI2	CONDENSATE HI-LEVEL
DI3	FILTER STATUS
DI4	REFRIG. HIGH PRESSURE ALARM
DI5	REFRIG. LOW PRESSURE ALARM
DI6	COMPRESSOR ALARM
OUTPUTS	
AO1	MODULATING GAS CONTROL
AO2	OUTSIDE AIR DAMPER CONTROL
AO3	RETURN AIR DAMPER CONTROL
DO1	1ST STAGE COOLING ON/OFF
DO2	CONDENSER FAN ON/OFF
DO3	GAS HEAT ON/OFF

PACKAGED VAV RTU WITH GAS HEAT CONTROL DIAGRAM (DDC)

NO SCALE



- NOTES:
1. TERMINAL BOARD SCHEMATIC LAYOUT DOES NOT MATCH ACTUAL TERMINAL BOARD TO SIMPLIFY CIRCUIT TRACES
 2. ENSURE DESIGNATED JUMPERS ON TERMINAL BOARD ARE CUT WHEN ADDING SMOKE DETECTORS, PHASE LOSS RELAY, OCCUPANCY AND REMOTE SHUTDOWN.
 3. FOR GAS LEAK (YAC), DO NOT CUT JUMPER 2.
 4. LOW VOLTAGE CONNECTIONS MUST BE CLASS 2.
 5. FOR ENTHALPHY SENSOR CONNECTION, DISCONNECT GREY WIRE(S) FROM PLUG HARNESS AND CONNECT AS SHOWN.



6 TON YAC TIER 3
RTU CONTROL,VAV
208/230,460,575V

48LC000203	-
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Case Study #3: Andrews Joint Base

- Spec Called for Small VAV units to be used with VAV terminal boxes in a military PX

Problems

- LC*B are the only Packaged units that Carrier offers below 20 Tons
- LC*B will not work stand alone. Must establish Airside Linkage with Carrier Open Zoning controls (VAV or VVT) to work at all.
- Salesman quoted LC*B units without packaging them with VAV Zoning Controls
- Contractor supplied VAV boxes with Siemens VAV Controllers.

Solution:

NONE

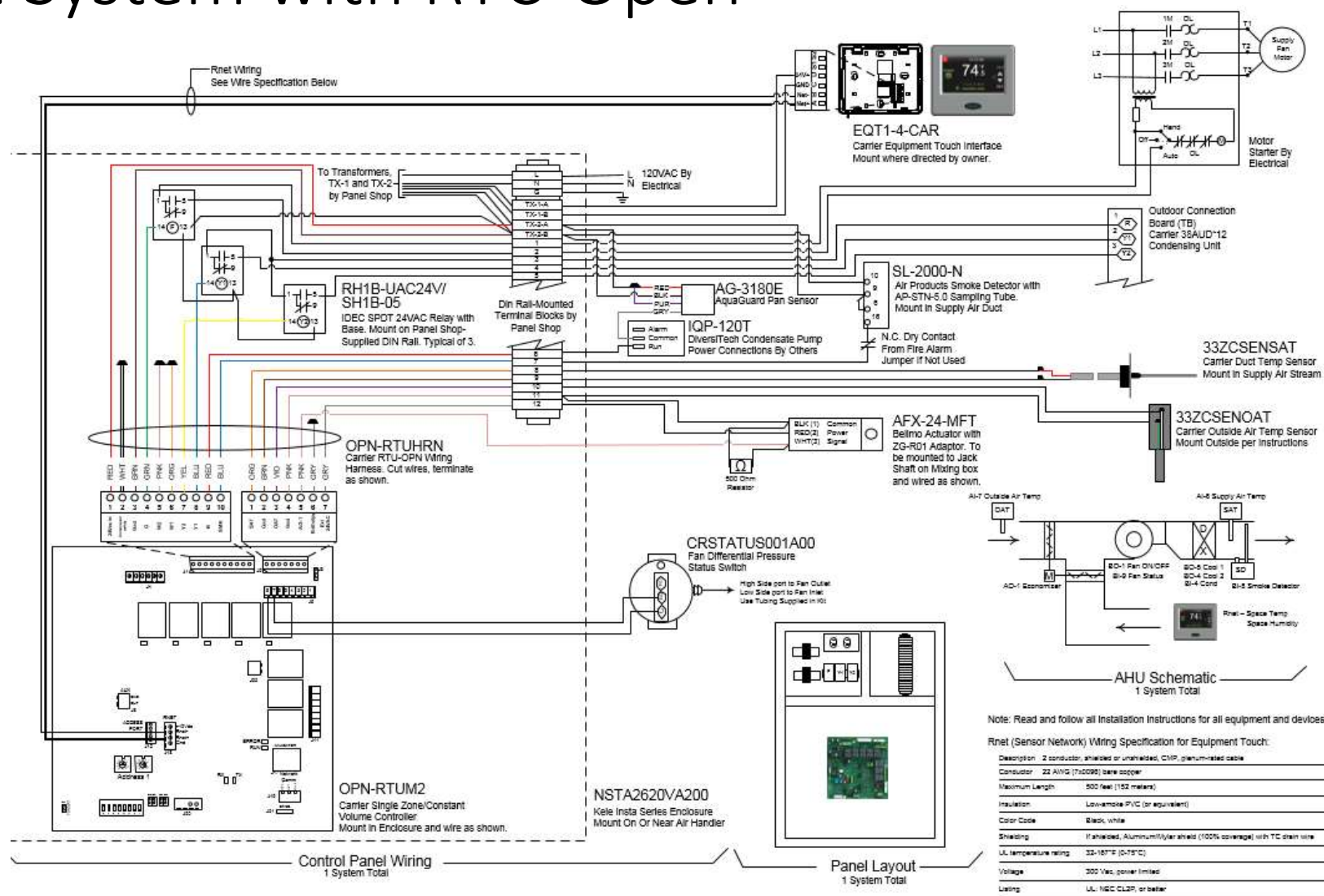
Note: LC*B Package units have been updated to work with third party VAV boxes and stand-alone.

Update

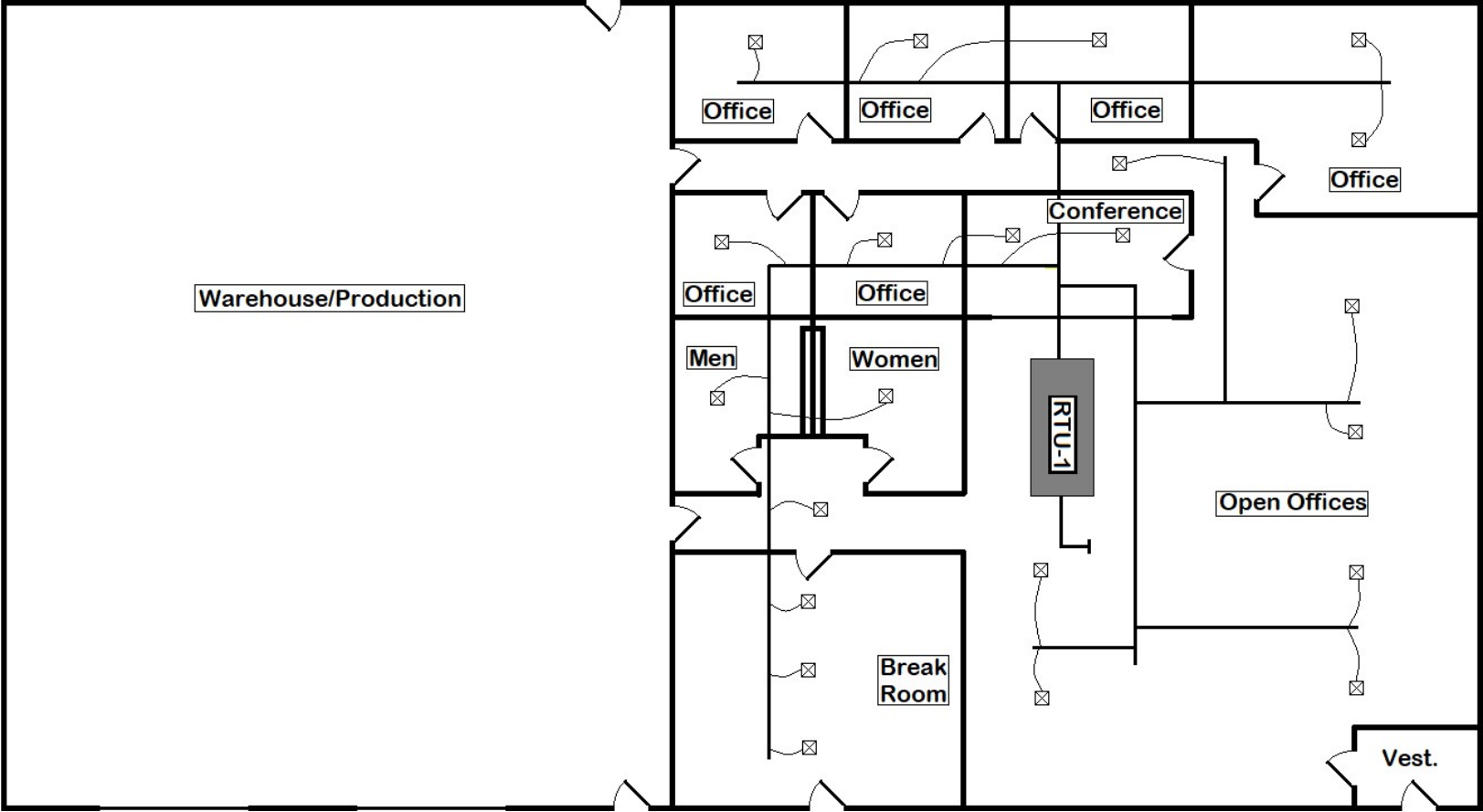
Now using AppLoader, we can download newest programming and drivers to allow unit to work with these third-party controllers.



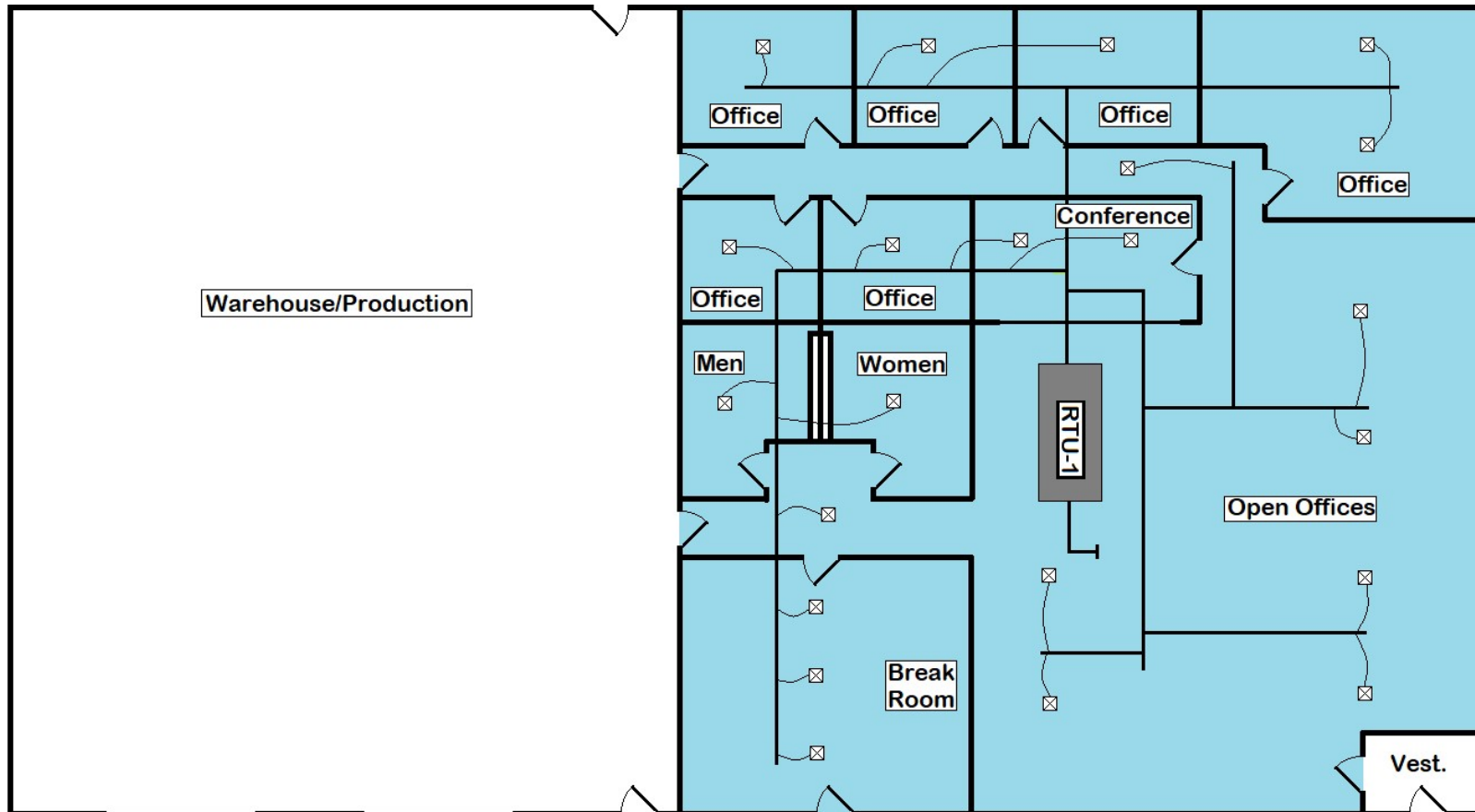
Split System with RTU Open



Training Building Shell

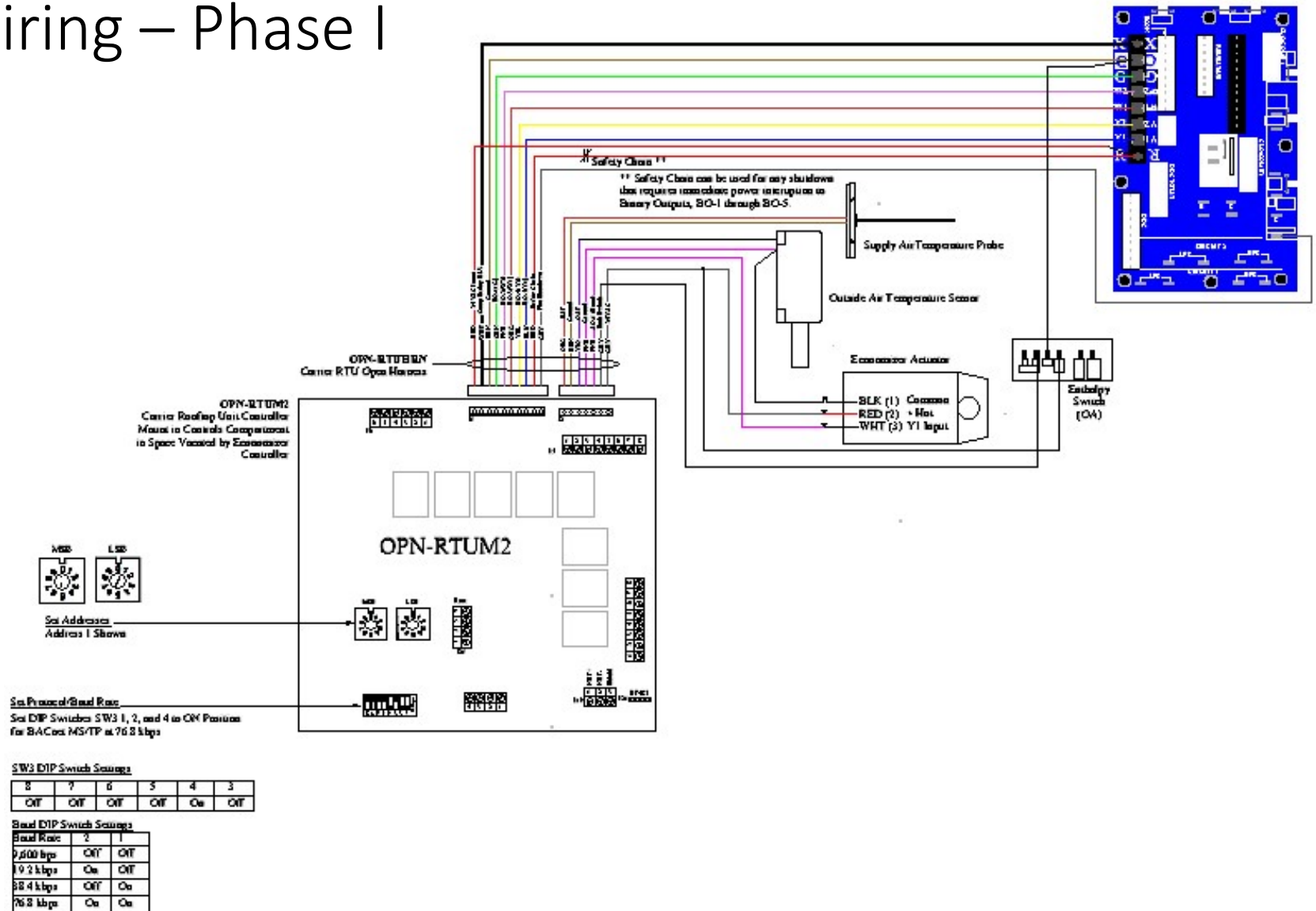


Training Building Phase I



- SAV Unit with Humidifier
- Differential Enthalpy Economizer
- Powered Exhaust
- Smoke Detector
- Fan Status Switch
- Filter Status Switch
- BACnet Capable

Factory Wiring – Phase I



Create Database/ Download Controller

Field Assistant Launcher

System Name 

Source Files

System Time Zone

Communications

☐ BACnet/IP Service Port Use Service Port

☐ BACnet/IP

☐ BACnet/IPv6

Multicast Address

Multicast Port BACnet Port

☒ Local Access: If your port is not listed, relaunch this application with USB-L connected.



System Status: **Not Started**

License expires on 12/31/2022

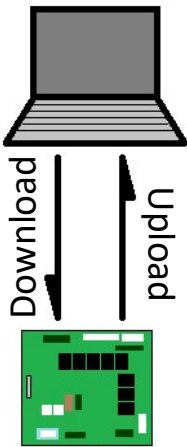
Create a new system

System Name

Create a new system

System Name

Create Database/ Download Controller



Field Assistant Launcher

System Name + -

Source Files

System Time Zone USA (GMT -05:00) Eastern

Communications

☐ BACnet/IP Service Port Use Service Port

☐ BACnet/IP 10.212.134.102 - Fortinet SSL VPN Virtual Ethernet Adapter

☐ BACnet/IPv6 2600:4040:11f7:9b00:41a0:6001:c3f0:a7b - Realtek PCIe GBE Family Controller

Multicast Address ff02::bac0

Multicast Port 47810 BACnet Port 47810

☒ Local Access COM3 If your port is with USB-L **Not Started** in this application

System Status: **Start...**

License expires on 12/31/2022

Create a new system

System Name

Create a new system

System Name

i-Vu Field Assistant - /Commerce

localhost/_common/lv5/main.jsp?wbs=-1873345292&oper...

Local Access: Connected
Controller 1

Properties Reports

Commercial Class

Controller 1

The controller has not been uploaded. Please upload to access controller content in the system.

Controller 1

Controller Information

Reference Name: **device1610101** Display Name: **Controller 1**

Device Definition Name: **Controller** Access Type: **bacnet**

Database Driver: **drv_autodiscovered_5-01-000** Model Name: **RTU Open**

Device Instance: **1610101** Address: **1**

Out of Service: ☐ Stop the connection to edit the address

Module Status

BACnet Device Management

Show Bindings

BACnet Password:

Create Object

Message from webpage

Properties Page (unconfigured)

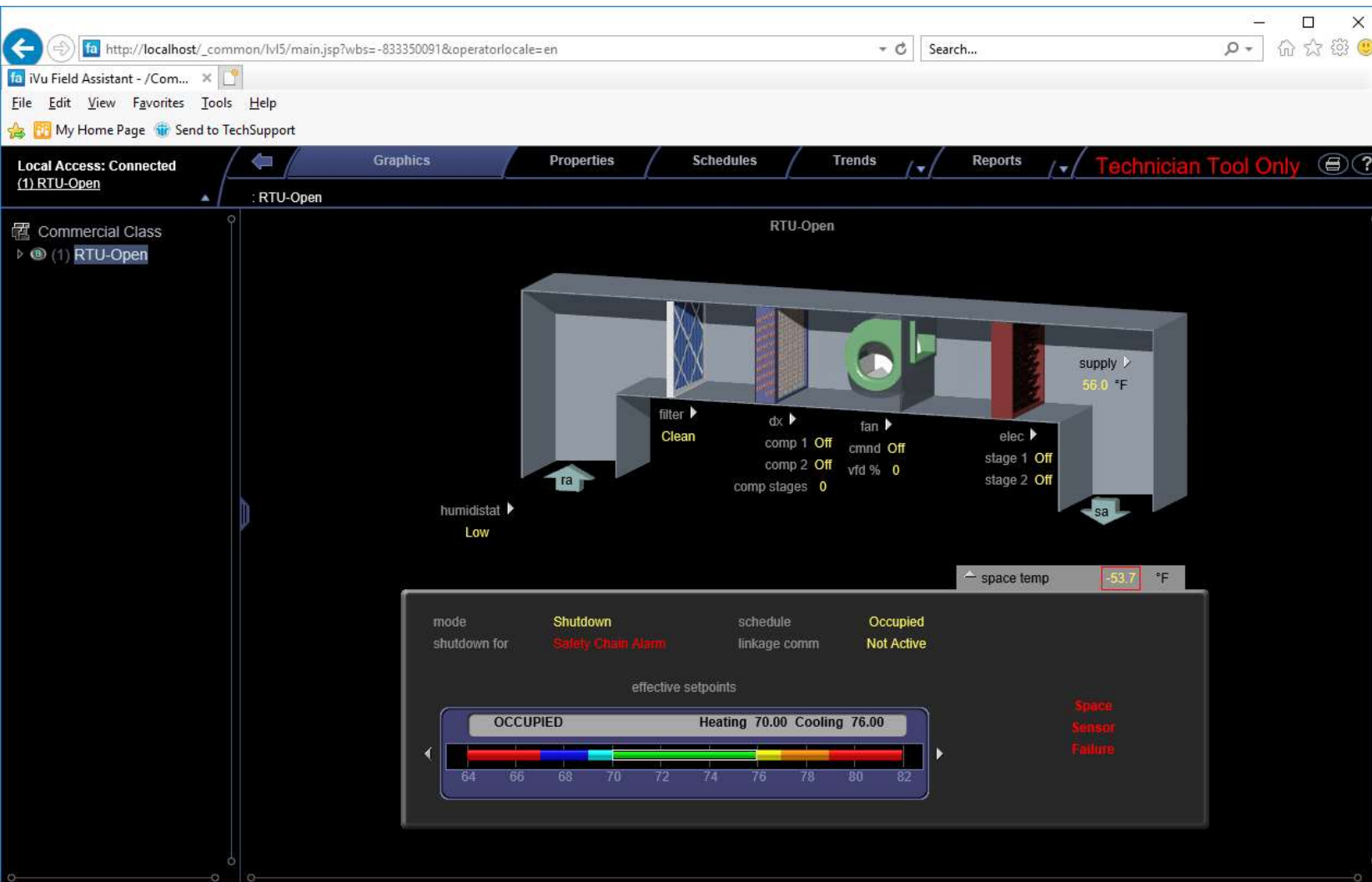
The screenshot shows the iVu Field Assistant web interface. The browser address bar displays the URL: `http://localhost/_common/lv15/main.jsp?wbs=-833350091&operatorlocale=en`. The page title is "iVu Field Assistant - /Com...". The main navigation bar includes tabs for "Graphics", "Properties" (selected), "Schedules", "Trends", and "Reports". A "Technician Tool Only" button is visible on the right. Below the navigation bar, a sub-menu shows "Control Program", "I/O Points", "Alarm Sources", "Trend Sources", "Network Points", "BACnet Object", "Rnet Points", and "Protocol Mapping", with "RTU-Open" selected. The left sidebar shows "Local Access: Connected (1) RTU-Open" and "Commercial Class" with a sub-item "(1) RTU-Open". The main content area displays the following information:

- Name: **RTU-Open** (#eq_1610101_1) Control Program: **rtum2_iv6_ws-4_06_20180223** Object Instance: **1**
- Controller: **Controller 1** (device1610101) Address: **16101 : 1** on the **Network 16101** network
- Last Parameter Change: Tue Oct 15 09:56:52 EDT 2019
- Equipment status: Red
- Notes:

Below the main information, there is a list of expandable sections:

- ▶ Status
- ▶ Configuration
- ▶ Maintenance
- ▶ Performance
- ▶ Alarms
- ▶ Linkage

Graphics Page (unconfigured)



Things to Note:

- No Economizer
- Humidistat
- Filter Status
- 2 Stages Compressor
- Fan: VFD
- Heat: Electric 2 Stage
- Mode: Shutdown
- Shutdown for: Safety Chain Alarm
- Schedule: Occupied
- Occupied Setpoints
- Linkage Comm: Not Active
- Space Temperature Failure

Properties Page / Status (unconfigured)

The screenshot shows the iVu Field Assistant web interface. The browser address bar displays the URL: `http://localhost/_common/iv5/main.jsp?wbs=-512152330&operatorlocale=en`. The application title is "iVu Field Assistant - /Com...". The menu bar includes "File", "Edit", "View", "Favorites", "Tools", and "Help". Below the menu bar, there are links for "My Home Page" and "Send to TechSupport".

The main interface has a dark sidebar on the left with the text "Local Access: Connected (1) RTU-Open" and "Commercial Class" with a sub-item "(1) RTU-Open". The top navigation bar includes tabs for "Graphics", "Properties" (selected), "Schedules", "Trends", and "Reports". On the far right of this bar is a red label "Technician Tool Only" and a help icon.

The "Properties" tab is active, showing details for the "RTU-Open" device. The sub-tabs include "Control Program", "I/O Points", "Alarm Sources", "Trend Sources", "Network Points", "BACnet Objects", "Rnet Points", and "Protocol Mapping". The main content area displays the following information:

- Name: RTU-Open (#eq_1610101_1) Control Program: rtum2_iv6_ws-4_06_20180223 Object Instance: 1
- Controller: Controller 1 (device1610101) Address: 16101 : 1 on the Network 16101 network
- Last Parameter Change: Tue Oct 15 12:22:00 EDT 2019
- Notes: (empty text box)
- Equipment status: Red

Below this information is a "Status" section with a list of parameters and their values:

Parameter	Value
Equipment Status	(BMSV) Disabled
System Mode	(BMSV) Shutdown
Supply Fan VFD	(BAV) 0 %
Space Temperature - Prime Variable	(BAV) -53.7 °F
Supply Air Temperature	(BAV) 81.3 °F
Outdoor Air Temperature	(BAV) 88.9 °F
Shutdown	(BBV) Inactive Default Value: Inactive Lock at value: Inactive

At the bottom of the status section, there are expandable sections for "Configuration", "Maintenance", "Performance", "Alarms", and "Linkage".

Service Configuration

Properties/Configuration/Service Configuration

Unit Type

- Heat/Cool
- LC WeatherExpert (Default)
- HP O/B Ctrl
- HP Y1/W1 Ctrl

Economizer Exists

- No (Default)
- Yes

Fan Control

- Single Speed
- Two Speed
- Variable Speed (Default)

Heat Type

- Electric (Default)
- Gas

The screenshot displays the 'Service Configuration' window with a tree view on the left containing 'Status', 'Configuration', 'Unit Configuration', 'Setpoints', 'Alarm Configuration', and 'Service Configuration'. The 'Service Configuration' section is expanded, showing a list of parameters with their current values, default values, and lock status. The parameters are organized into two main sections: 'Unit Type' and 'Service Test'.

Unit Type	(BMSV)	LC WeatherExpert	Default Value:	LC WeatherExpert	Look at value:
Economizer Exists	(BBV)	No	Default Value: No	No	Look at value: No
VFD Input	(BBV)	2-10 vdc	Default Value: 2-10 vdc	2-10 vdc	Look at value: 0-10 vdc
Max VFD Output	(BAV)	100 %	Default Value: 100.00	100.00	Look at value: 0
Min VFD Output	(BAV)	40 %	Default Value: 40.00	40.00	Look at value: 0
Dehum Min VFD Output	(BAV)	100 %	Default Value: 100.00	100.00	Look at value: 0
Stage 1 SAT Stpt	(BAV)	57 °F	Default Value: 57.00	57.00	Look at value: 0
Stage 2 SAT Stpt	(BAV)	57 °F	Default Value: 57.00	57.00	Look at value: 0
Stage 3 SAT Stpt	(BAV)	56 °F	Default Value: 56.00	56.00	Look at value: 0
Heat Type	(BBV)	Electric	Default Value: Electric	Electric	Look at value: Electric
Number Of Heat Stages	(BMSV)	2	Default Value: 2	2	Look at value: 1
Continuous Occupied Exhaust	(BBV)	No	Default Value: No	No	Look at value: No
RH Control	(BBV)	Disable	Default Value: Disable	Disable	Look at value: Disable
DCV Control	(BBV)	Disable	Default Value: Disable	Disable	Look at value: Disable
System Space Temperature	(ANI2)	-999.00	Lock at value: 0	Enabled?: ☒	
System Space RH	(ANI2)	-999	Lock at value: 0	Enabled?: ☒	
System Space AQ	(ANI2)	-999	Lock at value: 0	Enabled?: ☒	
System Cool Demand Level	(ANI2)	0.00	Lock at value: 0	Enabled?: ☒	
System Heat Demand Level	(ANI2)	0.00	Lock at value: 0	Enabled?: ☒	
System Outdoor Air Temperature	(ANI2)	-999.00	Lock at value: 0	Enabled?: ☒	
System Outdoor AQ	(ANI2)	-999	Lock at value: 0	Enabled?: ☒	
System Fire / Smoke	(BNI2)	Off	Lock at value: Off	Enabled?: ☒	

Service Test

Service Test (BBV)	Disable	Disable
Fan Test (BBV)	Disable	Disable
Compressor 1 Test (BBV)	Disable	Disable
Compressor 2 Test (BBV)	Disable	Disable
Heat 1Test (BBV)	Disable	Disable
Heat 2Test (BBV)	Disable	Disable
Dehumidification Test (BBV)	Disable	Disable
Power Exhaust Test (BBV)	Disable	Disable
Economizer Test (BAV)	0	0
VFD Speed Test (BAV)	0	0

Service Configuration

Properties/Configuration/Service Configuration

Continuous Occupied Exhaust

- No (Default)
- Yes

RH Control

- Disable (Default)
- Enable

DCV Control

- Disable (Default)
- Enable

Heat Type

- Electric (Default)
- Gas

System Inputs

Allows information to be accessed from other controllers

Service Test

The screenshot displays the 'Service Configuration' section of a control system interface. It is organized into a tree view on the left with expandable sections: Status, Configuration, Unit Configuration, Setpoints, Alarm Configuration, and Service Configuration. The 'Service Configuration' section is currently expanded, showing a list of parameters with their units, default values, and configuration options.

Parameter	Unit	Default Value	Configuration Options
Unit Type	(BMSV)	LC WeatherExpert	LC WeatherExpert (dropdown), Look at value: Heat / Cool (dropdown)
Economizer Exists	(BBV)	No	No (dropdown), Look at value: No (dropdown)
VFD Input	(BBV)	2-10 vdc	2-10 vdc (dropdown), Look at value: 0-10 vdc (dropdown)
Max VFD Output	(BAV)	100 %	100.00 (text), Look at value: 0 (text)
Min VFD Output	(BAV)	40 %	40.00 (text), Look at value: 0 (text)
Dehum Min VFD Output	(BAV)	100 %	100.00 (text), Look at value: 0 (text)
Stage 1 SAT Stpt	(BAV)	57 °F	57.00 (text), Look at value: 0 (text)
Stage 2 SAT Stpt	(BAV)	57 °F	57.00 (text), Look at value: 0 (text)
Stage 3 SAT Stpt	(BAV)	56 °F	56.00 (text), Look at value: 0 (text)
Heat Type	(BBV)	Electric	Electric (dropdown), Look at value: Electric (dropdown)
Number Of Heat Stages	(BMSV)	2	2 (dropdown), Look at value: 1 (dropdown)
Continuous Occupied Exhaust	(BBV)	No	No (dropdown), Look at value: No (dropdown)
RH Control	(BBV)	Disable	Disable (dropdown), Look at value: Disable (dropdown)
DCV Control	(BBV)	Disable	Disable (dropdown), Look at value: Disable (dropdown)
System Space Temperature	(ANI2)	-999.00	Lock at value: 0 (text), Enabled?: ☒
System Space RH	(ANI2)	-999	Lock at value: 0 (text), Enabled?: ☒
System Space AQ	(ANI2)	-999	Lock at value: 0 (text), Enabled?: ☒
System Cool Demand Level	(ANI2)	0.00	Lock at value: 0 (text), Enabled?: ☒
System Heat Demand Level	(ANI2)	0.00	Lock at value: 0 (text), Enabled?: ☒
System Outdoor Air Temperature	(ANI2)	-999.00	Lock at value: 0 (text), Enabled?: ☒
System Outdoor AQ	(ANI2)	-999	Lock at value: 0 (text), Enabled?: ☒
System Fire / Smoke	(BNI2)	Off	Lock at value: Off (dropdown), Enabled?: ☒

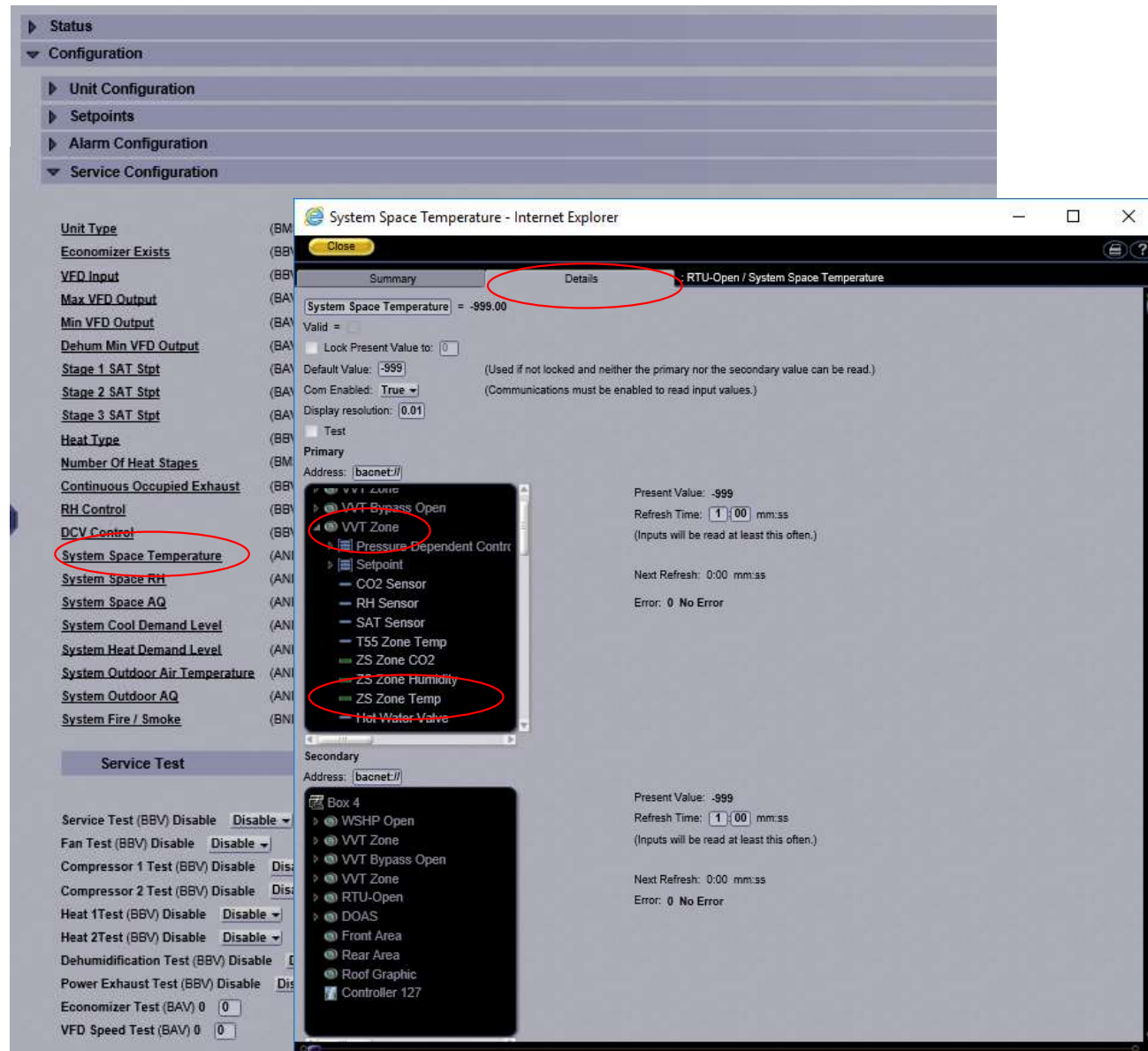
Below the configuration table is a 'Service Test' section with a list of tests and their status (Disable/Enable):

- Service Test (BBV) Disable
- Fan Test (BBV) Disable
- Compressor 1 Test (BBV) Disable
- Compressor 2 Test (BBV) Disable
- Heat 1 Test (BBV) Disable
- Heat 2 Test (BBV) Disable
- Dehumidification Test (BBV) Disable
- Power Exhaust Test (BBV) Disable
- Economizer Test (BAV) 0
- VFD Speed Test (BAV) 0

System Inputs

Properties/Configuration/Service Configuration

- Allows information to be accessed from other controllers
- Have to have other controllers on MS/TP Communications Bus
- Can share sensors through system
- Can get System Fire/Smoke Signal



Service Test

Properties/Configuration/Service Configuration

- Allows you to test outputs from controller
- Minimum On and Off Timers will be ignored
- Outputs that can be tested will be dependent on your configuration
- Always start by enabling Service Test

The screenshot displays a software interface for configuring a unit. The left sidebar shows a tree view with 'Service Configuration' selected. The main area is divided into two columns of settings. The bottom section, titled 'Service Test' (circled in red), contains a list of tests with 'Disable' buttons next to them.

Unit Type	(BMSV)	LC WeatherExpert	Default Value:	LC WeatherExpert	Look at value:
Economizer Exists	(BBV)	No	Default Value:	No	Look at value: Heat / Cool
VFD Input	(BBV)	2-10 vdc	Default Value:	2-10 vdc	Look at value: 0-10 vdc
Max VFD Output	(BAV)	100 %	Default Value:	100.00	Look at value: 0
Min VFD Output	(BAV)	40 %	Default Value:	40.00	Look at value: 0
Dehum Min VFD Output	(BAV)	100 %	Default Value:	100.00	Look at value: 0
Stage 1 SAT Stpt	(BAV)	57 °F	Default Value:	57.00	Look at value: 0
Stage 2 SAT Stpt	(BAV)	57 °F	Default Value:	57.00	Look at value: 0
Stage 3 SAT Stpt	(BAV)	56 °F	Default Value:	56.00	Look at value: 0
Heat Type	(BBV)	Electric	Default Value:	Electric	Look at value: Electric
Number Of Heat Stages	(BMSV)	2	Default Value:	2	Look at value: 1
Continuous Occupied Exhaust	(BBV)	No	Default Value:	No	Look at value: No
RH Control	(BBV)	Disable	Default Value:	Disable	Look at value: Disable
DCV Control	(BBV)	Disable	Default Value:	Disable	Look at value: Disable
System Space Temperature	(ANI2)	-999.00	Look at value: 0	Enabled?:	✓
System Space RH	(ANI2)	-999	Look at value: 0	Enabled?:	✓
System Space AQ	(ANI2)	-999	Look at value: 0	Enabled?:	✓
System Cool Demand Level	(ANI2)	0.00	Look at value: 0	Enabled?:	✓
System Heat Demand Level	(ANI2)	0.00	Look at value: 0	Enabled?:	✓
System Outdoor Air Temperature	(ANI2)	-999.00	Look at value: 0	Enabled?:	✓
System Outdoor AQ	(ANI2)	-999	Look at value: 0	Enabled?:	✓
System Fire / Smoke	(BNI2)	Off	Look at value: Off	Enabled?:	✓

Service Test

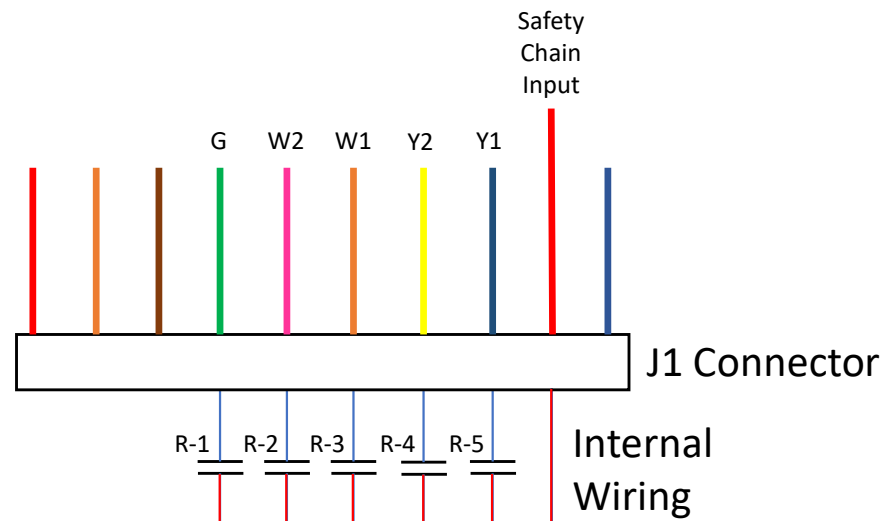
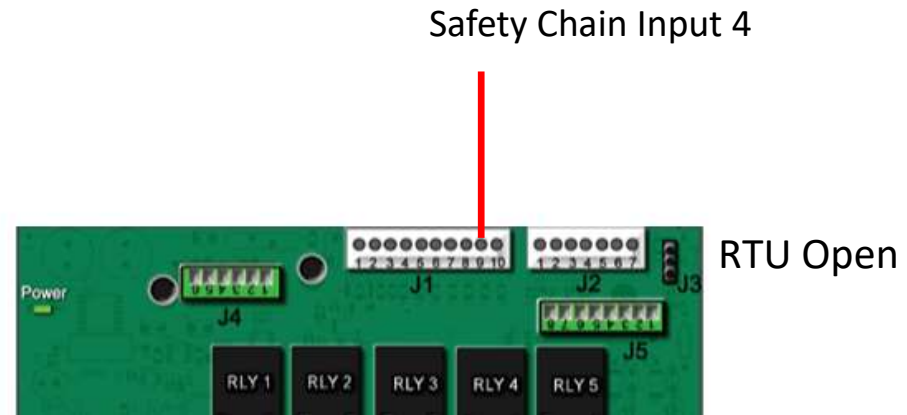
- Service Test (BBV) Disable Disable
- Fan Test (BBV) Disable Disable
- Compressor 1 Test (BBV) Disable Disable
- Compressor 2 Test (BBV) Disable Disable
- Heat 1Test (BBV) Disable Disable
- Heat 2Test (BBV) Disable Disable
- Dehumidification Test (BBV) Disable Disable
- Power Exhaust Test (BBV) Disable Disable
- Economizer Test (BAV) 0 0
- VFD Speed Test (BAV) 0 0

Graphic after Service Configuration



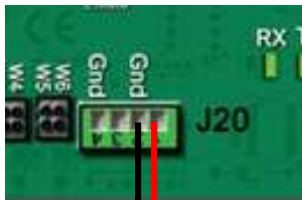
Safety Chain

- Must Have 24V on Safety Chain Input to get voltage out of the relays
- Can be broken for any condition for which you want the unit outputs to shut down immediately



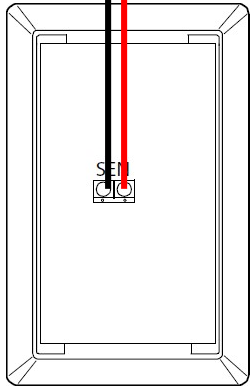
Space Temperature Sensor

Simplest Option – 10K Type III (CP/MCI)

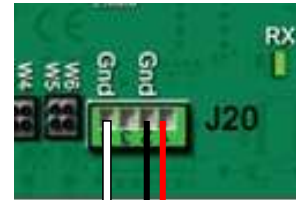


RTU Open

T55 (33ZCT55SPT)
Sensor and Override

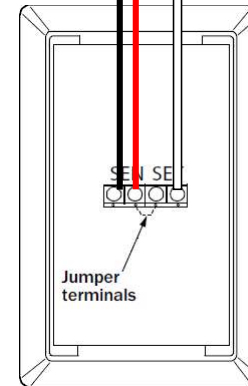


or

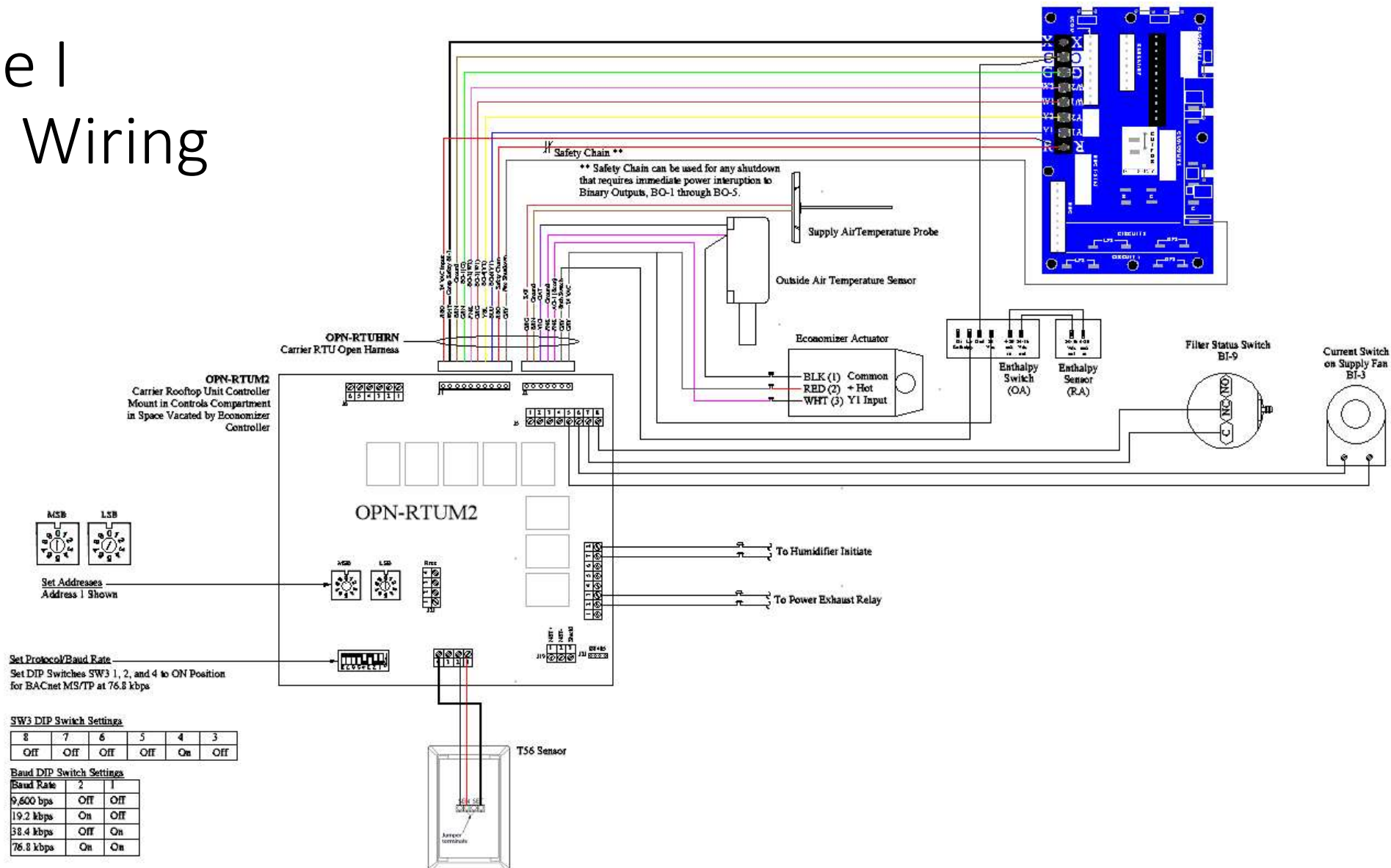


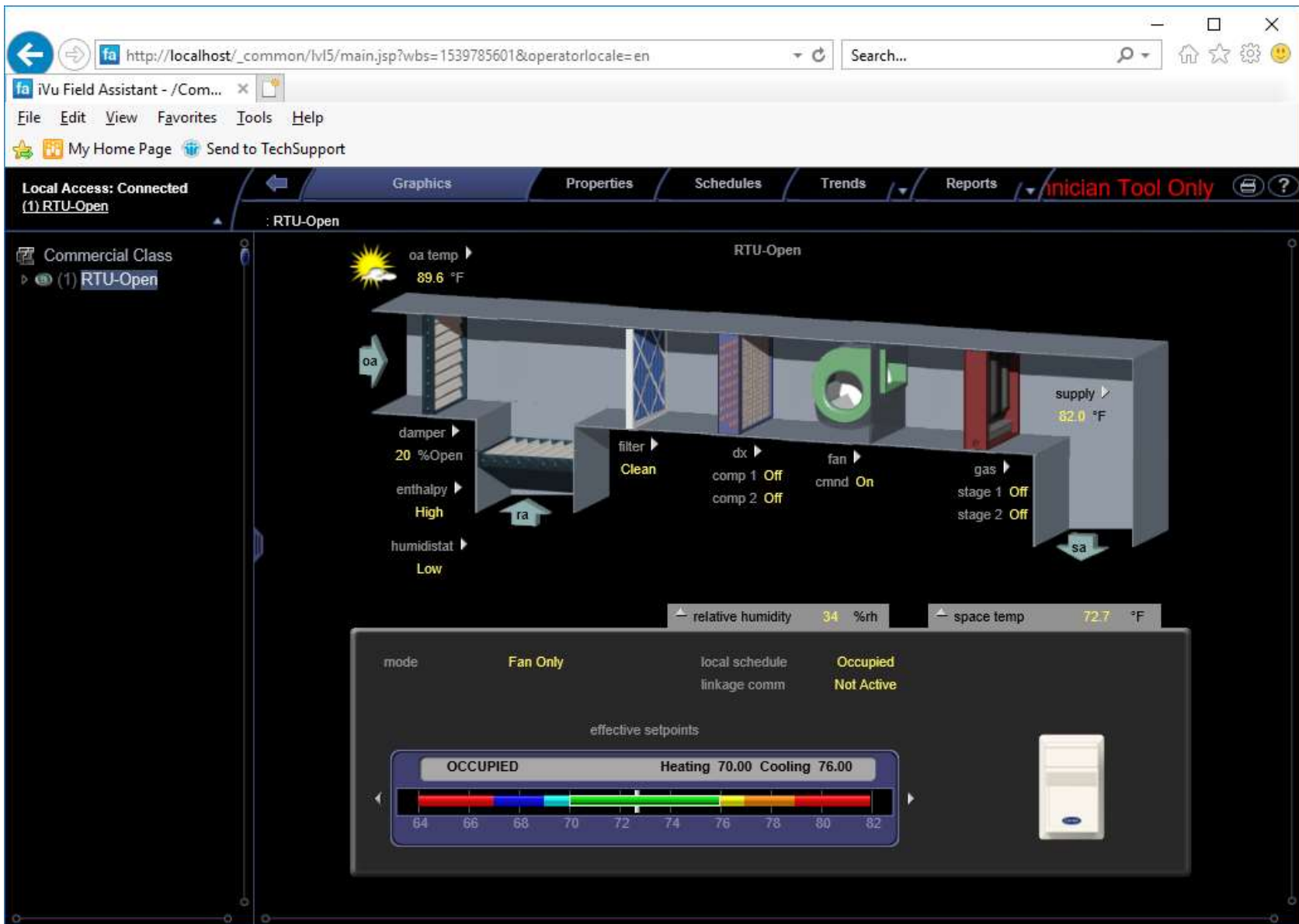
RTU Open

T56 (33ZCT56SPT)
Sensor, Override and Adjust



Phase I Field Wiring





Unit Configuration

Properties/Configuration/Unit Configuration

Fan Mode

- Auto
- Continuous (Default)
- Always On

Power Fail Restart Delay

Fan Off Delay

Minimum/Maximum Cooling/Heating SAT

Vent Dmpr Pos / DCV Min Pos

Service Alarm Timers

- Supply Fan
- Compressor 1
- Compressor 2
- Filter

Door Alarm Delay

Space Temperature Sensor Configuration

- Pushbutton Override
- Setpoint Adjustment
- Setpoint Adjustment Range

▼ Configuration

▼ Unit Configuration

<u>Fan Mode</u>	(BMSV) Continuous	Default Value: Continuous ▼	☐ Lock at value: Auto ▼
<u>Power Fail Restart Delay</u>	(BAV) 5 sec	Default Value: 5.00	☐ Lock at value: 0
<u>Fan Off Delay</u>	(BAV) 90 sec	Default Value: 90.00	☐ Lock at value: 0
<u>Minimum Cooling SAT</u>	(BAV) 50 °F	Default Value: 50.00	☐ Lock at value: 0
<u>Maximum Heating SAT</u>	(BAV) 120 °F	Default Value: 120.00	☐ Lock at value: 0
<u>Vent Dmpr Pos / DCV Min Pos</u>	(BAV) 20 %Open	Default Value: 20.00	☐ Lock at value: 0
<u>Economizer Purge Min Pos</u>	(BAV) 40 %Open	Default Value: 40.00	☐ Lock at value: 0
<u>Supply Fan Service Alarm Timer</u>	(BAV) 0 hr	Default Value: 0.00	☐ Lock at value: 0
<u>Compressor 1 Service Alarm Timer</u>	(BAV) 0 hr	Default Value: 0.00	☐ Lock at value: 0
<u>Compressor 2 Service Alarm Timer</u>	(BAV) 0 hr	Default Value: 0.00	☐ Lock at value: 0
<u>Filter Service Alarm Timer</u>	(BAV) 600 hr	Default Value: 600.00	☐ Lock at value: 0
<u>Door Alarm Delay</u>	(BAV) 60 sec	Default Value: 60.00	☐ Lock at value: 0
<u>Pushbutton Override</u>	(BBV) Enable	Default Value: Enable ▼	☐ Lock at value: Disable ▼
<u>Setpoint Adjustment</u>	(BBV) Enable	Default Value: Enable ▼	☐ Lock at value: Disable ▼
<u>Setpoint Adjustment Range</u>	(BAV) 5 °°F	Default Value: 5.00	☐ Lock at value: 0
<u>Cooling Lockout Temperature</u>	(BAV) 45 °F	Default Value: 45.00	☐ Lock at value: 0
<u>Economizer High OAT Lockout Temp</u>	(BAV) 75 °F	Default Value: 75.00	☐ Lock at value: 0
<u>Heating Lockout Temperature</u>	(BAV) 65 °F	Default Value: 65.00	☐ Lock at value: 0
<u>Pre Occupancy Purge</u>	(BBV) Enable	Default Value: Enable ▼	☐ Lock at value: Disable ▼
<u>Purge Time</u>	(BAV) 60 min	Default Value: 60.00	☐ Lock at value: 0
<u>Unocc Free Cool</u>	(BBV) Disable	Default Value: Disable ▼	☐ Lock at value: Disable ▼
<u>Minimum Setpoint Separation</u>	(BAV) 5 °F	Default Value: 5.00	☐ Lock at value: 0
<u>Occupancy Source</u>	(BMSV) Always Occupied	Default Value: Always Occupied ▼	☐ Lock at value: Always Occupied ▼
<u>Occ Override Delay</u>	(BAV) 15 min	Default Value: 15.00	☐ Lock at value: 0

Input Configuration

Unit Configuration

Properties/Configuration/Unit Configuration

Lockout Temperatures

- Cooling
- Economizer
- Heating

Pre Occupancy Purge

Purge Time

Unocc Free Cool

Minimum Setpoint Separation

Occupancy Source

- Always Occupied
- BACnet Schedule
- BAS On/Off
- Remote Occ Input

Occ Override Delay

When motion sensor used, this is the amount of time the equipment will remain occupied after motion is no longer sensed.

The screenshot displays the 'Unit Configuration' window, which is organized into a table-like structure. The table has four columns: the parameter name, its units, the default value, and a 'Lock at value' dropdown menu. The parameters are listed in the first column, and their corresponding values are in the other columns. The 'Lock at value' column contains dropdown menus that can be set to 'Auto', '0', 'Disable', or 'Always Occupied'.

Parameter	Units	Default Value	Lock at value
Fan Mode	(BMSV)	Continuous	Auto
Power Fail Restart Delay	(BAV)	5 sec	0
Fan Off Delay	(BAV)	90 sec	0
Minimum Cooling SAT	(BAV)	50 °F	0
Maximum Heating SAT	(BAV)	120 °F	0
Vent Dmpr Pos / DCV Min Pos	(BAV)	20 %Open	0
Economizer Purge Min Pos	(BAV)	40 %Open	0
Supply Fan Service Alarm Timer	(BAV)	0 hr	0
Compressor 1 Service Alarm Timer	(BAV)	0 hr	0
Compressor 2 Service Alarm Timer	(BAV)	0 hr	0
Filter Service Alarm Timer	(BAV)	600 hr	0
Door Alarm Delay	(BAV)	60 sec	0
Pushbutton Override	(BBV)	Enable	Disable
Setpoint Adjustment	(BBV)	Enable	Disable
Setpoint Adjustment Range	(BAV)	5 °F	0
Cooling Lockout Temperature	(BAV)	45 °F	0
Economizer High OAT Lockout Temp	(BAV)	75 °F	0
Heating Lockout Temperature	(BAV)	65 °F	0
Pre Occupancy Purge	(BBV)	Enable	Disable
Purge Time	(BAV)	60 min	0
Unocc Free Cool	(BBV)	Disable	Disable
Minimum Setpoint Separation	(BAV)	5 °F	0
Occupancy Source	(BMSV)	Always Occupied	Always Occupied
Occ Override Delay	(BAV)	15 min	0

Input Configuration

Input Configuration

Properties/Configuration/Input Configuration

Inputs 1 & 2

- No Sensor (Default)
- IAQ Sensor
- OAQ Sensor
- Space RH Sensor

Input 3 Function

- Compressor Safety (Default)

Input 5 Function

- Fire Shutdown (Default)

Input 8 Function

- Enthalpy Switch (Default)

Input 9 Function

- HumidiStat (Default)

Input 3, 5, 8 & 9 Function

- No Sensor
- Default
- Fan Status
- Filter Status
- Remote Occupancy
- Door Switch

Input Configuration				
<u>Input 1 Function</u>	(BMSV) No Sensor	Default Value:	No Sensor ▾	☐ Lock at value: No Sensor ▾
<u>Input 2 Function</u>	(BMSV) No Sensor	Default Value:	No Sensor ▾	☐ Lock at value: No Sensor ▾
<u>Input 3 Function</u>	(BMSV) Compressor Safety	Default Value:	Compressor Safety ▾	☐ Lock at value: No Function ▾
<u>Input 3 Switch Configuration</u>	(BMSV) NO	Default Value:	NO ▾	☐ Lock at value: NO ▾
<u>Input 5 Function</u>	(BMSV) Fire Shutdown	Default Value:	Fire Shutdown ▾	☐ Lock at value: No Function ▾
<u>Input 5 Switch Configuration</u>	(BMSV) NO	Default Value:	NO ▾	☐ Lock at value: NO ▾
<u>Input 8 Function</u>	(BMSV) Enthalpy Switch	Default Value:	Enthalpy Switch ▾	☐ Lock at value: No Function ▾
<u>Input 8 Switch Configuration</u>	(BMSV) NO	Default Value:	NO ▾	☐ Lock at value: NO ▾
<u>Input 9 Function</u>	(BMSV) HumidiStat	Default Value:	HumidiStat ▾	☐ Lock at value: No Function ▾
<u>Input 9 Switch Configuration</u>	(BMSV) NO	Default Value:	NO ▾	☐ Lock at value: NO ▾
<u>Space sensor type</u>	(BMSV) T55	Default Value:	T55 ▾	☐ Lock at value: T55 ▾
<u>T5x Override Duration</u>	(BAV) 1 hr	Default Value:	1.00	☐ Lock at value: 0
Sensor Binder	(SNB)	(CTRL + click to configure)		
Zone Temp	(ASVI) 69.2 °F	(CTRL + click to edit)		
Zone Humidity	(ASVI) -999 %rh	(CTRL + click to edit)		
ZS Zone CO2	(ASVI) -999 ppm	(CTRL + click to edit)		
WS Signal Strength %	(ASVI) -999 %	(CTRL + click to edit)		
WS Battery Strength %	(ASVI) -999 %	(CTRL + click to edit)		
RNet Sensed Occupancy	(BSVI) OFF	(CTRL + click to edit)		
WS Contact	(BSVI) OFF	(CTRL + click to edit)		
<u>ZS model to show on graphic</u>	(BMSV) ZS Pro model	Default Value:	ZS Pro model ▾	☐ Lock at value: ZS Base model ▾
<u>WS model to show on graphic</u>	(BMSV) WS Plus model	Default Value:	WS Plus model ▾	☐ Lock at value: WS Base model ▾
<u>Net Space Temp to show on graphic</u>	(BMSV) Equipment Touch	Default Value:	Equipment Touch ▾	☐ Lock at value: Network Temp ▾
Sensor Calibration				

Input Configuration

Properties/Configuration/Input Configuration

Space Sensor Type

- T55
- T56
- SPT
- None
- ZS Sensor
- WS Sensor

T5x Override Duration

ZS Sensor Binder

Next Slide

ZS model to show on graphic

WS model to show on graphic

Net Space Temp to show on graphic

Input Configuration				
<u>Input 1 Function</u>	(BMSV) No Sensor	Default Value:	No Sensor ▾	☐ Lock at value: No Sensor ▾
<u>Input 2 Function</u>	(BMSV) No Sensor	Default Value:	No Sensor ▾	☐ Lock at value: No Sensor ▾
<u>Input 3 Function</u>	(BMSV) Compressor Safety	Default Value:	Compressor Safety ▾	☐ Lock at value: No Function ▾
<u>Input 3 Switch Configuration</u>	(BMSV) NO	Default Value:	NO ▾	☐ Lock at value: NO ▾
<u>Input 5 Function</u>	(BMSV) Fire Shutdown	Default Value:	Fire Shutdown ▾	☐ Lock at value: No Function ▾
<u>Input 5 Switch Configuration</u>	(BMSV) NO	Default Value:	NO ▾	☐ Lock at value: NO ▾
<u>Input 8 Function</u>	(BMSV) Enthalpy Switch	Default Value:	Enthalpy Switch ▾	☐ Lock at value: No Function ▾
<u>Input 8 Switch Configuration</u>	(BMSV) NO	Default Value:	NO ▾	☐ Lock at value: NO ▾
<u>Input 9 Function</u>	(BMSV) HumidiStat	Default Value:	HumidiStat ▾	☐ Lock at value: No Function ▾
<u>Input 9 Switch Configuration</u>	(BMSV) NO	Default Value:	NO ▾	☐ Lock at value: NO ▾
<u>Space sensor type</u>	(BMSV) T55	Default Value:	T55 ▾	☐ Lock at value: T55 ▾
<u>T5x Override Duration</u>	(BAV) 1 hr	Default Value:	1.00	☐ Lock at value: 0
Sensor Binder	(SNB)	(CTRL + click to configure)		
Zone Temp	(ASVI) 69.2 °F	(CTRL + click to edit)		
Zone Humidity	(ASVI) -999 %rh	(CTRL + click to edit)		
ZS Zone CO2	(ASVI) -999 ppm	(CTRL + click to edit)		
WS Signal Strength %	(ASVI) -999 %	(CTRL + click to edit)		
WS Battery Strength %	(ASVI) -999 %	(CTRL + click to edit)		
RNet Sensed Occupancy	(BSVI) OFF	(CTRL + click to edit)		
WS Contact	(BSVI) OFF	(CTRL + click to edit)		
<u>ZS model to show on graphic</u>	(BMSV) ZS Pro model	Default Value:	ZS Pro model ▾	☐ Lock at value: ZS Base model ▾
<u>WS model to show on graphic</u>	(BMSV) WS Plus model	Default Value:	WS Plus model ▾	☐ Lock at value: WS Base model ▾
<u>Net Space Temp to show on graphic</u>	(BMSV) Equipment Touch	Default Value:	Equipment Touch ▾	☐ Lock at value: Network Temp ▾

Sensor Calibration	
--------------------	--

ZS2 – Zone Sensors (Rnet)

ZS Standard



ZS2-CAR
ZS2-C-CAR
ZS2-H-CAR
ZS2-HC-CAR
ZS2-V-BNK
ZS2-HV-BNK

ZS Plus



ZS2PL-CAR
ZS2PL-C-CAR
ZS2PL-H-CAR
ZS2PL-HC-CAR
ZS2PL-V-BNK
ZS2-HV-BNK

ZS Pro



ZS2P-CAR
ZS2P-C-CAR
ZS2P-H-CAR
ZS2P-HC-CAR

ZS Pro-M



ZS2P-M-CAR
ZS2P-CM-CAR
ZS2P-HM-CAR
ZS2P-HCM-CAR

ZS Pro-F



ZS2PF-CAR
ZS2PF-C-CAR
ZS2PF-H-CAR
ZS2PF-HC-CAR

Wireless Sensors



RG-902 Wireless Adaptor



WS-ML-902 Wireless Motion/Lux Sensor



WS-THMDOF-C-902 Wireless Pro-F Sensor



WS2-T-C-902 Wireless Standard Sensor



WS2-TO-C-902 Wireless Plus Sensor



WS-S-902 Wireless Door Window Sensor

Sensor Network (Rnet)

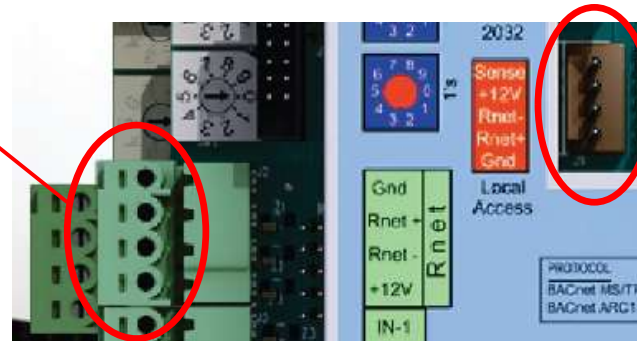
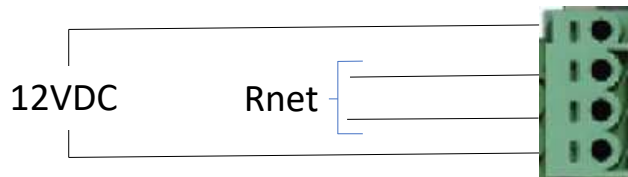
Rnet wiring specifications

The Rnet communicates at a rate of 115 kbps and should be wired in a daisy-chain, star, or hybrid configuration.

NOTE Use the specified type of wire and cable for maximum signal integrity.

Description	4 conductor, shielded or unshielded, CMP, plenum rated cable
Conductor	22 AWG (7x0096) bare copper
Maximum length	500 feet (152 meters)
Insulation	Low-smoke PVC (or equivalent)
Color Code	Black, white, green, red
Shielding	If shielded, Aluminum/Mylar shield (100% coverage) with TC drain wire
UL temperature rating	32–167 °F (0–75 °C)
Voltage	300 Vac, power limited
Listing	UL: NEC CL2P, or better

Rnet Connection
Connection for ZS and WS
Wireless Sensors and for
Equipment Touches



Brown Plug – Connection for
USB-L Allows Access to Clip
Files, Install Programs and to
use Field Assistant

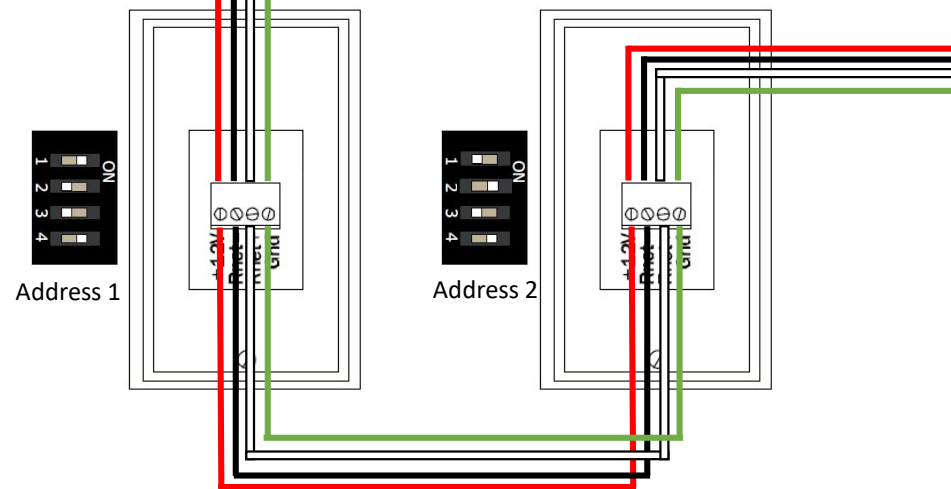
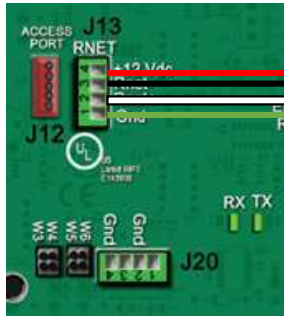
Can have as many as 5 sensors per program on Rnet.

PIC's have only one program. Can only have 5 sensors on its Rnet.

Programmable controllers can use three separate programs (if capable) for a total of 15 sensors on Rnet.

Wiring ZS Sensors

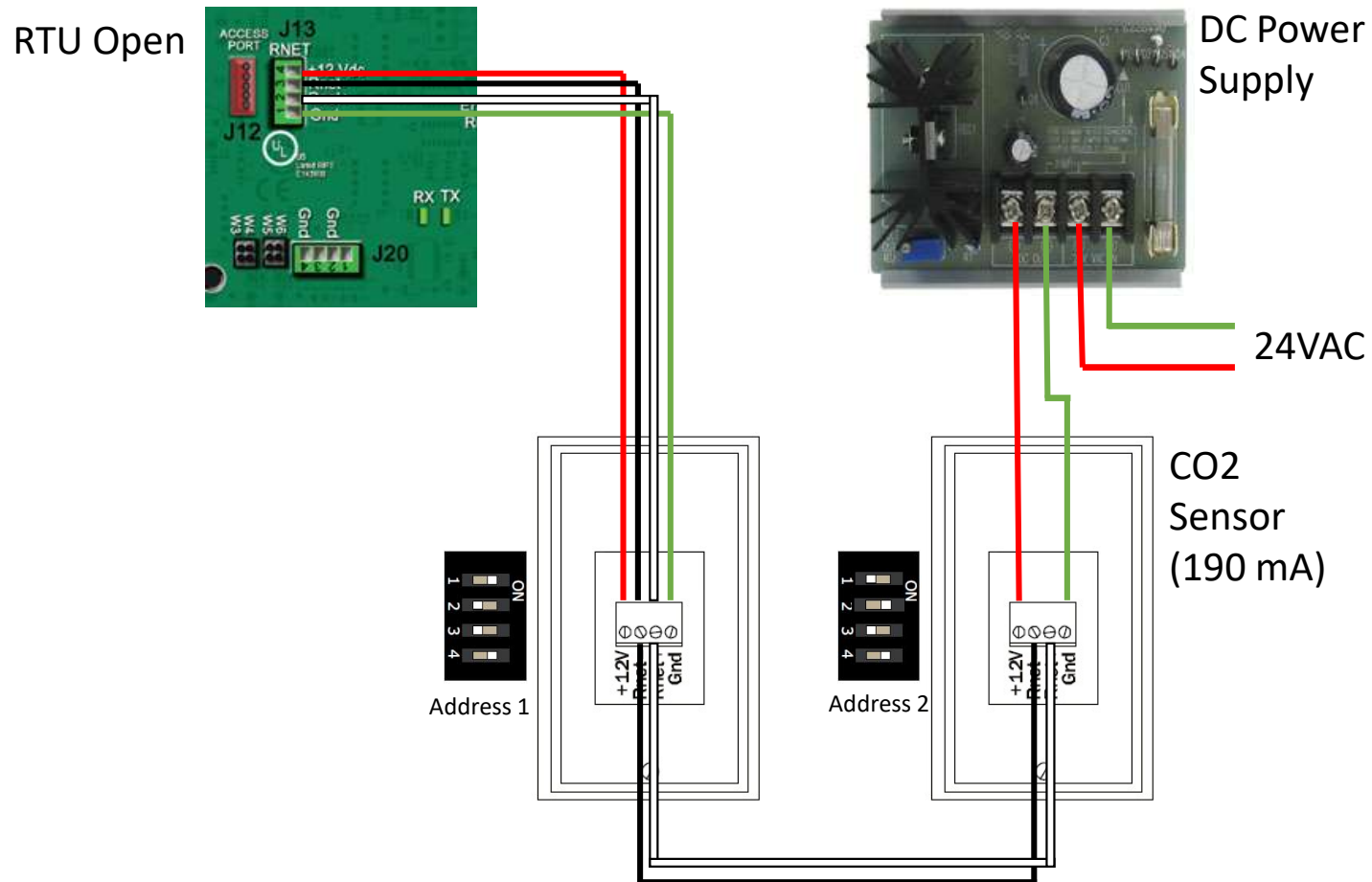
RTU Open



Up to 5 Total ZS Sensors
Must be addressed

Wiring ZS Sensors Special Case

When using multiple sensors and any one of the sensors has a CO2 sensor



Input Configuration – ZS Sensor

Properties/Configuration/Input Configuration

Sensor Binder	(SNB)	(CTRL + click to configure)
Zone Temp	(ASVI) 74.2 °F	(CTRL + click to edit)
Zone Humidity	(ASVI) -999 %rh	(CTRL + click to edit)
ZS Zone CO2	(ASVI) -999 ppm	(CTRL + click to edit)
WS Signal Strength %	(ASVI) -999 %	(CTRL + click to edit)
WS Battery Strength %	(ASVI) -999 %	(CTRL + click to edit)
RNet Sensed Occupancy	(BSVI) OFF	(CTRL + click to edit)
WS Contact	(BSVI) OFF	(CTRL + click to edit)

Sensor Binder - Internet Explorer

Close

: RTU-Open / Sensor Binder

Sensor Binder RefName: zs_binder

Sensor Binder ALARM Alarm = Off

Display Name: Sensor Binder

Associated Sensors

Index	Area	Network Type	Address	Lock Display	Version	Status	Error
1	Main Sensor	Rnet	1	☐	ZS2P-C 2SP8800XTPv03.10.03	Sensor Configured	None
2	Sensor 2	Unused	2	☐		Sensor Offline	None
3	Sensor 3	Unused	3	☐		Sensor Offline	None
4	Sensor 4	Unused	4	☐		Sensor Offline	None
5	Sensor 5	Unused	5	☐		Sensor Offline	None

Sensor Binder - Internet Explorer

Close

: RTU-Open / Sensor Binder

Sensor Binder RefName: zs_binder

Sensor Binder ALARM Alarm = Off

Display Name: Sensor Binder

Associated Sensors

Index	Area	Network Type	Address	Lock Display	Version	Status	Error
1	Main Sensor	Rnet	1	☐	ZS2P-C 2SP8800XTPv03.10.03	Sensor Configured	None
2	Sensor 2	Rnet	2	☐	ZS ZSB7800D8Pv03.08.02	Sensor Configured	None
3	Sensor 3	Unused	3	☐		Sensor Offline	None
4	Sensor 4	Unused	4	☐		Sensor Offline	None
5	Sensor 5	Unused	5	☐		Sensor Offline	None

Input Configuration – ZS Sensor

Properties/Configuration/Input Configuration

Sensor Binder	(SNB)	(CTRL + click to configure)
Zone Temp	(ASVI) 74.2 °F	(CTRL + click to edit)
Zone Humidity	(ASVI) -999 %rh	(CTRL + click to edit)
ZS Zone CO2	(ASVI) -999 ppm	(CTRL + click to edit)
WS Signal Strength %	(ASVI) -999 %	(CTRL + click to edit)
WS Battery Strength %	(ASVI) -999 %	(CTRL + click to edit)
RNet Sensed Occupancy	(BSVI) OFF	(CTRL + click to edit)
WS Contact	(BSVI) OFF	(CTRL + click to edit)

Zone Temp - Internet Explorer

Close Properties Alarms Trends

Summary Details : RTU-Open / Zone Temp

BACnet Analog Sensed Value Input RefName: zs_zone_temp

ASVI point name Output = 73.7
Valid? Valid? Valid? = ☒

Rnet Tag: Zone Temp (1)
Display Name: Zone Temp
Description: zone temp
☐ Lock Present Value to: 0.0



Zone Temp - Internet Explorer

Close Properties Alarms Trends

Summary Details : RTU-Open / Zone Temp

Zone Temp 73.9 °F
Valid = ☒
☐ Lock Present Value to: 0.0
Default Value: -999 (Used if not locked and the actual value cannot be read.)

Sensor Configuration

Rnet Tag: Zone Temp (1)

(Index)	Area	Use	Raw Value	Calibration	Corrected Value	Status
(1) Main Sensor		☒	73.899994	0	73.899	None
(2) Sensor 2		☐	73.66999	0	73.669	None
(3)		☐	0	0	-999.000	No Comm
(4)		☐	0	0	-999.000	No Comm
(5)		☐	0	0	-999.000	No Comm

Combination Algorithm: Average Input Smoothing: None

Show on sensors: Calculated Value Display Resolution: 1 COV Increment: 0.1

ZS Sensor Display Configuration

☒ Home Screen (1)
☐ Information Screen (2)
☐ Diagnostics Screen (3)

BACnet Configuration

☐ Network Visible: (Must be enabled for other BACnet objects to read or write to this point, and for this point to generate alarms.)
Object Name: zs_zone_temp Reliability: No Fault Detected
Object Id: Analog Input 0, #5
Device Type: ☐
Input Resolution: 0.1

Sensor Calibration

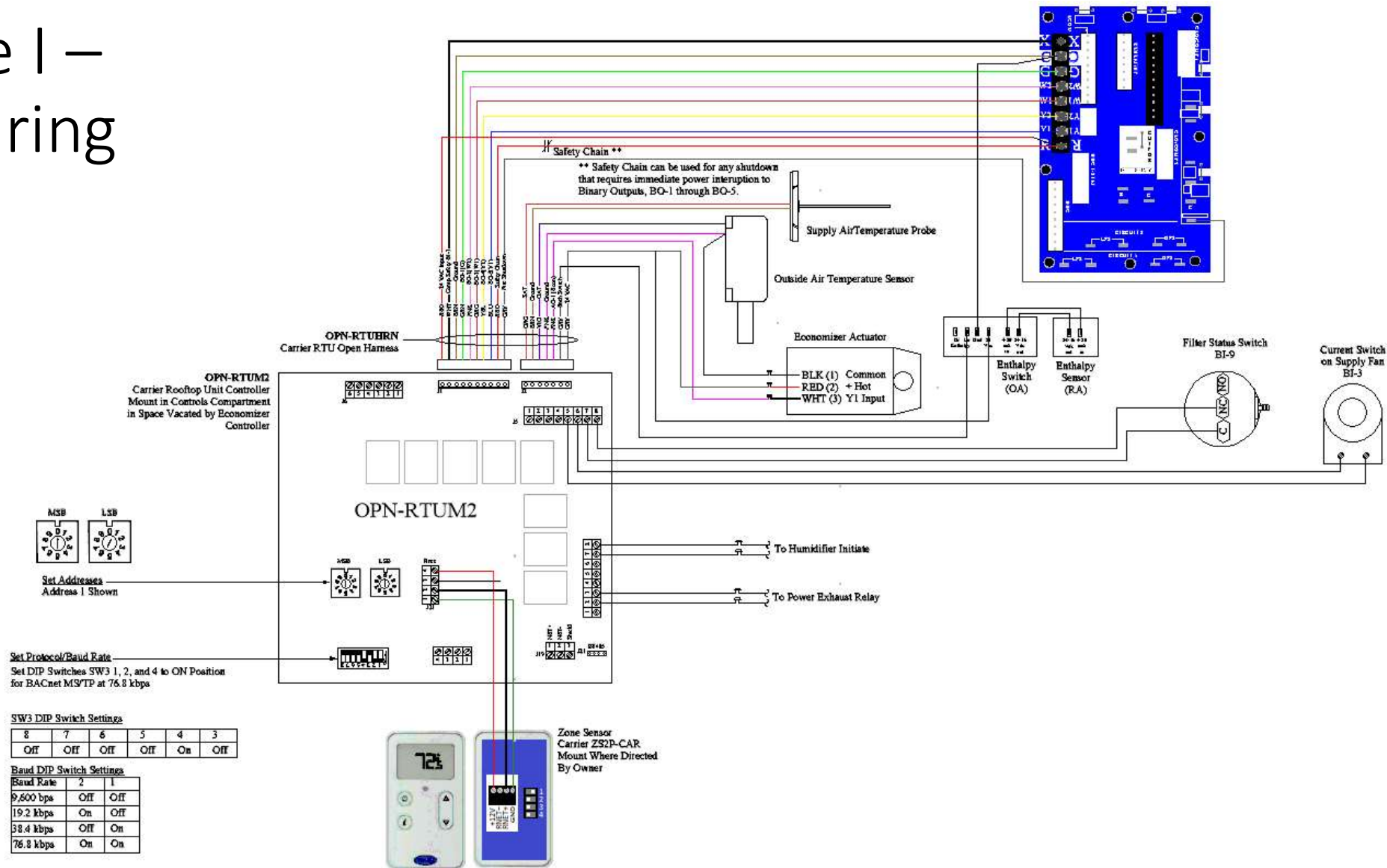
Properties/Configuration/Unit Configuration/Sensor Calibration

Sensor Calibration

<u>Space Temperature</u>	(BAV) 74.2 °F	
<u>Space Temp Calibration</u>	(BAV) 0 °F	Default Value: 0.00 ☐ Lock at value: 0
<u>Supply Air Temperature</u>	(BAV) 80.8 °F	
<u>Supply Air Temp Calibration</u>	(BAV) 0 °F	Default Value: 0.00 ☐ Lock at value: 0
<u>Outdoor Air Temperature</u>	(BAV) 89.6 °F	
<u>Outdoor Air Temp Calibration</u>	(BAV) 0 °F	Default Value: 0.00 ☐ Lock at value: 0

Allows you to calibrate temperature sensors

Phase I – ZS Wiring



Setpoints

Properties/Configuration/Setpoints

Values

Occupied Setpoints

Unoccupied Setpoints

Click on bar you want to look at / change

Optimal Start

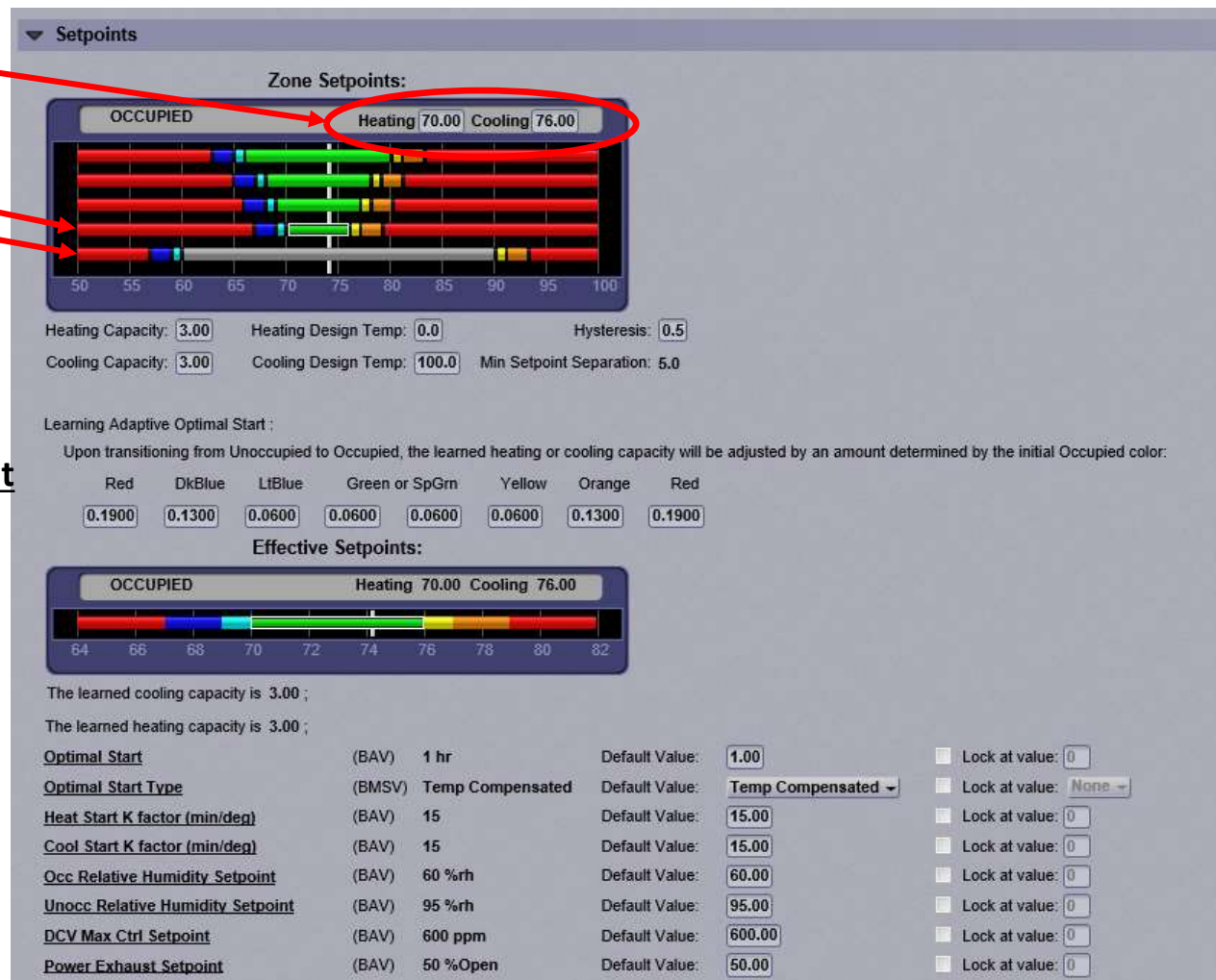
Next Slide

Occupied/Unoccupied Relative Humidity Setpoint

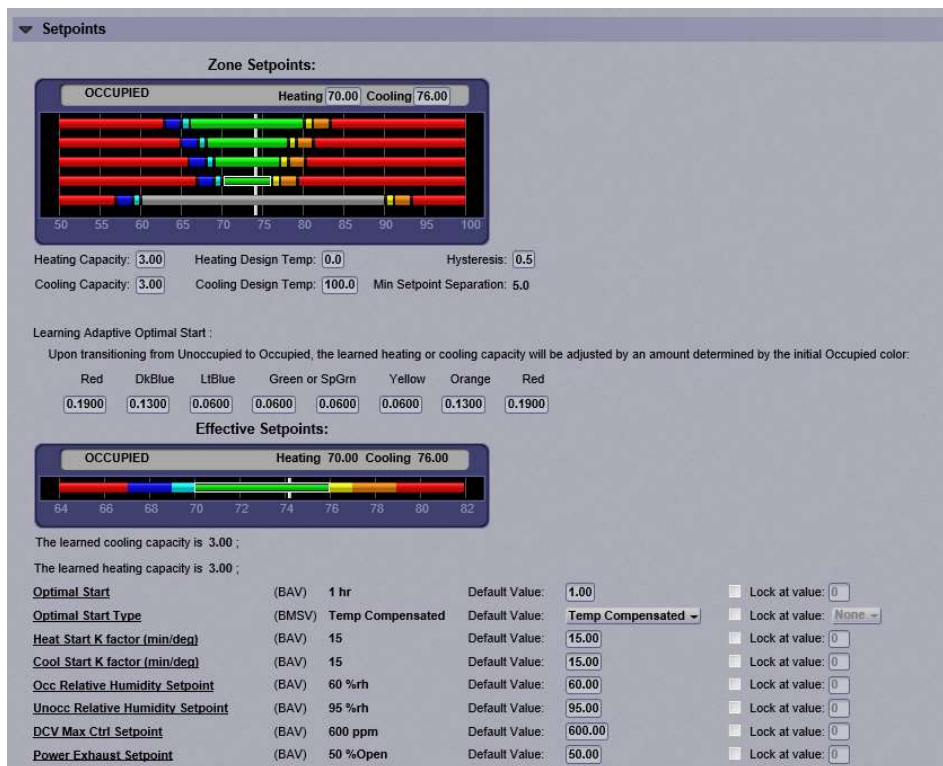
DCV Max Ctrl Setpoint

- Value is difference between Space/RA CO2 and OA CO2
- If no OA CO2 Sensor present will use default of 400 ppm
- On this screen setpoint would be 1000 ppm

Power Exhaust Setpoint



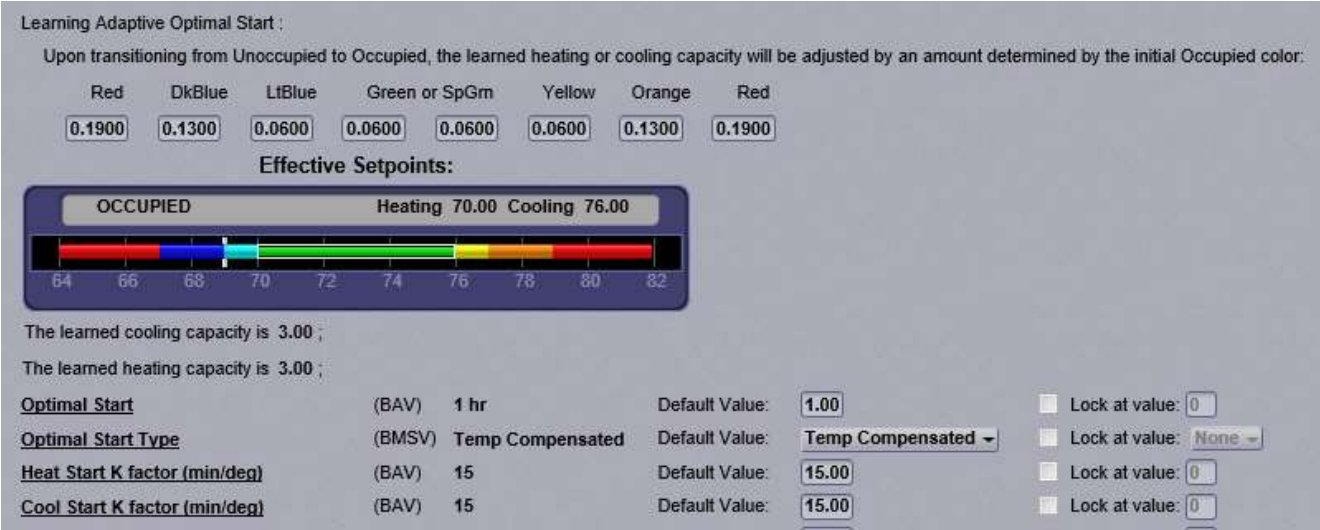
Color Codes



Color	Condition
	Green Temperature is within the Occupied Low and High Setpoint
	Grey Temperature is within the Unoccupied Low and High Setpoint
	Light Blue Temperature is less than 2°F below the Occupied Low Setpoint
	Dark Blue Temperature is more than 2°F below the effective Low Setpoint but less than 4°F below the effective Low Setpoint
	Yellow Temperature is less than 2°F above the effective High Setpoint
	Orange Temperature is more than 2°F above the effective High Setpoint but less than 4°F above the effective High Setpoint
	Red Temperature is more than 4°F above or below the effective setpoints

Optimal Start

Properties/Configuration/Setpoints



Optimal Start

Number of hours before occupancy that Optimal Start may begin

Optimal Start Type

- None
- Temp Compensated (Default)
- Learning Adaptive

Heat Start K factor (min/deg) } TC Only
Cool Start K factor (min/deg) }

None

Unit will not change to occupied setpoints until the scheduled time. Setpoints do not ramp but change immediately

Temp Compensated

Unit changes to occupied setpoints at a variable time prior to the occupied time, which is calculated by the current difference between space temperature and the appropriate heating or cooling setpoint. At that time, the setpoints do not ramp, but change immediately from unoccupied to occupied values.

Learning Adaptive Start

Unit gradually changes to occupied setpoints by adjusting the unoccupied setpoints over a specified period of time to achieve the occupied setpoint by the time scheduled occupancy begins.

Alarm Configuration

Properties/Control Program/Configuration/Alarm Configuration

- Can set up Space and Supply Air Temperature, Space Humidity and CO2 Alarms.
- Importance really depends on where alarm will be sent.
- Can set up what Alarms and Maintenance reminders can be seen on ZS Sensors.

Alarm Configuration

Space Temperature Alarm

Occupied Alarm Hysteresis

(BAV) 5 °F

Default Value: 5.00

☐

Lock at value: 0

Alarm Delay (min / deg)

(BAV) 10

Default Value: 10.00

☐

Lock at value: 0

Unoccupied Low SPT Alarm Limit

(BAV) 45 °F

Default Value: 45.00

☐

Lock at value: 0

Unoccupied High SPT Alarm Limit

(BAV) 95 °F

Default Value: 95.00

☐

Lock at value: 0

Supply Air Temperature Alarm

Low SAT Alarm Limit

(BAV) 38 °F

Default Value: 38.00

☐

Lock at value: 0

High SAT Alarm Limit

(BAV) 160 °F

Default Value: 160.00

☐

Lock at value: 0

Space Humidity Alarm

Occupied High RH Alarm Limit

(BAV) 70 %rh

Default Value: 70.00

☐

Lock at value: 0

Alarm Delay (min / %RH)

(BAV) 5

Default Value: 5.00

☐

Lock at value: 0

Unoccupied High RH Alarm Limit

(BAV) 100 %rh

Default Value: 100.00

☐

Lock at value: 0

Low RH Alarm Limit

(BAV) 30 %rh

Default Value: 30.00

☐

Lock at value: 0

IAQ / Ventilation Alarm

Occupied High CO2 Alarm Limit

(BAV) 1200 ppm

Default Value: 1200.00

☐

Lock at value: 0

Alarms Displayed on ZS or SPT Sensor

Fire / Smoke Shutdown Alarm

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Stuck Gas Valve Alarm

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Compressor Safety/Chain Alarm

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Space Temperature High/Low Alarm

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Space Indoor Air CO2 High Alarm

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Space Relative Humidity High Alarm

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Supply Fan Failure Alarm

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Supply Air Temperature Low OR High Alarm

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Maintenance Displayed on ZS Sensor

Sensor Faults

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Filter Dirty Alarm/Main

(BBV) Display

Default Value: Display

☐

Lock at value: Ignore

Alraide Linkage Status Alarm

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Misconfiguration - Switch/Analog Inputs

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Compressor 1 Runtime Alarm

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Compressor 2 Runtime Alarm

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Supply Fan Hand Fault

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Supply Fan Runtime Alarm

(BBV) Ignore

Default Value: Ignore

☐

Lock at value: Ignore

Maintenance

Properties/Control Program/Maintenance

Allows you to look at system information.

Maintenance

Unit

<u>Occupancy Status</u>	(BBV)	Occupied
<u>Temp Compensated Start</u>	(BBV)	Inactive
<u>Pre-Occ Purge</u>	(BBV)	Inactive
<u>Space Temp Source</u>	(BMSV)	ZS Sensor
<u>Setpoint Adjustment</u>	(BAV)	0.0 °F
<u>Effective Heat Setpoint</u>	(BAV)	70.0 °F
<u>Effective Cool Setpoint</u>	(BAV)	76.0 °F
<u>Relative Humidity Source</u>	(BMSV)	Network
<u>IAQ Source</u>	(BMSV)	ZS Sensor
<u>QAQ Source</u>	(BMSV)	N/A
<u>Outdoor Air Temperature Source</u>	(BMSV)	Local
<u>System Status</u>	(BMSV)	OA Econ unsuitable
<u>Safety Chain Feedback</u>	(BBV)	Run Enabled
<u>Fire Shutdown Status</u>	(BBV)	Run Enabled
<u>Compressor Safety Status</u>	(BBV)	Normal
<u>Calculated Min Econ Pos</u>	(BAV)	49 %
<u>Calculated PE Setpoint</u>	(BAV)	50 %
<u>Active Compressor Stages</u>	(BAV)	0
<u>Active Heat Stages</u>	(BAV)	0
<u>Fan Control</u>	(BMSV)	Single Speed
<u>Enthalpy Status</u>	(BBV)	High
<u>Humidistat Input Status</u>	(BBV)	Low
Reset Supply Fan Runtime	(BV)	Run
Reset Comp 1 Runtime Alarm	(BV)	Run
Reset Comp 2 Runtime Alarm	(BV)	Run
Reset Filter Runtime Alarm	(BV)	Run

Occupancy

<u>BAS On / Off</u>	(BMSV)	Inactive	Default Value:	Inactive	Look at value:	Inactive
<u>Pushbutton Override</u>	(BBV)	Off				
<u>Override Time Remaining</u>	(BAV)	0.00 min				
<u>Schedule</u>	(BBV)	Occupied				

Runtime

<u>Supply Fan Runtime</u>	(BAV)	14.7 hr
<u>Compressor 1 Runtime</u>	(BAV)	0.6 hr
<u>Compressor 2 Runtime</u>	(BAV)	0.4 hr
<u>Filter Runtime</u>	(BAV)	14.7 hr

Performance

Properties/Control Program/Performance

Gives current and historical performance information about the controller

▼ Performance

Current Performance Data

<u>Equipment Runtime</u>	(BAV) 14.9 hr
<u>Economizer Utilization</u>	(BAV) 0.0 %
<u>DCV Utilization</u>	(BAV) 0.0 %
<u>Unocc Free Cool Utilization</u>	(BAV) 0.0 %
<u>Part Load Cooling Utilization</u>	(BAV) 0.9 %
<u>Full Load Cooling Utilization</u>	(BAV) 3.1 %
<u>Heating Utilization</u>	(BAV) 0.0 %
<u>Recorded High OAT</u>	(BAV) 106.8 °F
<u>Recorded Low OAT</u>	(BAV) 74.7 °F
Performance Data	(BV) <u>Collect</u> ▼

Historical Performance Data

Save Performance Data Daily (BBV) Enable Default Value: Enable ▼ ☐ Lock at value: Disable ▼

<u>Equipment Runtime</u>	(BAV) 0.0 hr
<u>Economizer Utilization</u>	(BAV) 0.0 %
<u>DCV Utilization</u>	(BAV) 0.0 %
<u>Unocc Free Cool Utilization</u>	(BAV) 0.0 %
<u>Part Load Cooling Utilization</u>	(BAV) 0.0 %
<u>Full Load Cooling Utilization</u>	(BAV) 0.0 %
<u>Heating Utilization</u>	(BAV) 0.0 %
<u>Previous High OAT</u>	(BAV) 107.1 °F
<u>Previous Low OAT</u>	(BAV) 106.8 °F

Alarms

Properties/Control Program/Alarms

At a glance, you can see status of controller alarms

▼ Alarms		
<u>Safety Chain</u>	(BALM)	Normal
<u>Fire / Smoke Shutdown</u>	(BALM)	Normal
<u>Compressor Status</u>	(BALM)	Normal
<u>Space Temperature Alarm Status</u>	(BBV)	Normal
<u>ZS/WS Temp Sensor</u>	(BALM)	Normal
<u>ZS/WS Sensor Configuration</u>	(BALM)	Normal
<u>Space Temp Sensor</u>	(BALM)	Normal
<u>Wireless Battery Strength Alarm</u>	(BALM)	Normal
<u>Wireless Signal Strength Alarm</u>	(BALM)	Normal
<u>Supply Air Temperature</u>	(BALM)	Normal
<u>Supply Air Temp Sensor</u>	(BALM)	Normal
<u>Indoor Air Quality</u>	(BALM)	Normal
<u>Indoor Air Quality Sensor</u>	(BALM)	Normal
<u>Space Relative Humidity</u>	(BALM)	Normal
<u>Space Relative Humidity Sensor</u>	(BALM)	Normal
<u>Filter</u>	(BALM)	Clean
<u>Local OAT Sensor</u>	(BALM)	Normal
<u>Outdoor Air Temp Sensor</u>	(BALM)	Normal
<u>Economizer Operation</u>	(BALM)	Normal
<u>Switch Configuration</u>	(BALM)	Normal
<u>Analog Input Configuration</u>	(BALM)	Normal
<u>Supply Fan Runtime</u>	(BALM)	Normal
<u>Compressor 1 Runtime</u>	(BALM)	Normal
<u>Compressor 2 Runtime</u>	(BALM)	Normal
<u>Airside Linkage</u>	(BALM)	Normal

Linkage

Properties/Control Program/Linkage

- Linkage involves zoning systems.
- Open VAV and VVT controllers can link with RTU Open to control RTU Open Equipment
- Linkage is set up at zone controller.

▼ Linkage		
Airside Linkage		
<u>Linkage Collector</u>	(COLLECTOR)	
<u>Airside Linkage Status</u>	(BBV)	Not Active
<u>Air Source Mode</u>	(BMSV)	VENT
<u>Air Source Supply Air Temp</u>	(BAV)	80.8 °F
<u>Air Source Outdoor Air Temp</u>	(BAV)	89.60 °F

Other Tabs under Properties Tab



I/O Points Allows I/O to be configured if necessary

Name	Type	Value	Offset/Polarity	Locked	Exp:Num	I/O Type	Sensor/Actuator Type	Min / Max	Resolution	Checked Out	Checkout Notes
SPT Sensor / Zone Temp	(BAI)	45.0 °F	0	☐ 0.0	00:00	Thermistor	Thermistor, Precon Type II, 10k@77 deg F		0.1	☐	
input 1	(BAI)	0.0	0	☐ 0.0	00:01	0-20 mA	Linear Full Range	0 / 20	0.1	☐	
input 2	(BAI)	0.0	0	☐ 0.0	00:02	0-20 mA	Linear Full Range	0 / 20	0.1	☐	
input 6	(BAI)	80.9 °F	0	☐ 0.0	00:06	Thermistor	Thermistor, Precon Type II, 10k@77 deg F		0.1	☐	
input 7	(BAI)	89.8 °F	0	☐ 0.0	00:07	Thermistor	Thermistor, Precon Type II, 10k@77 deg F		0.1	☐	

Alarm Sources Allows you to set up alarm priority, where it's sent, if it needs acknowledgement

Trend Sources Allows you to set up configure points for trending; how often data sampled, COV

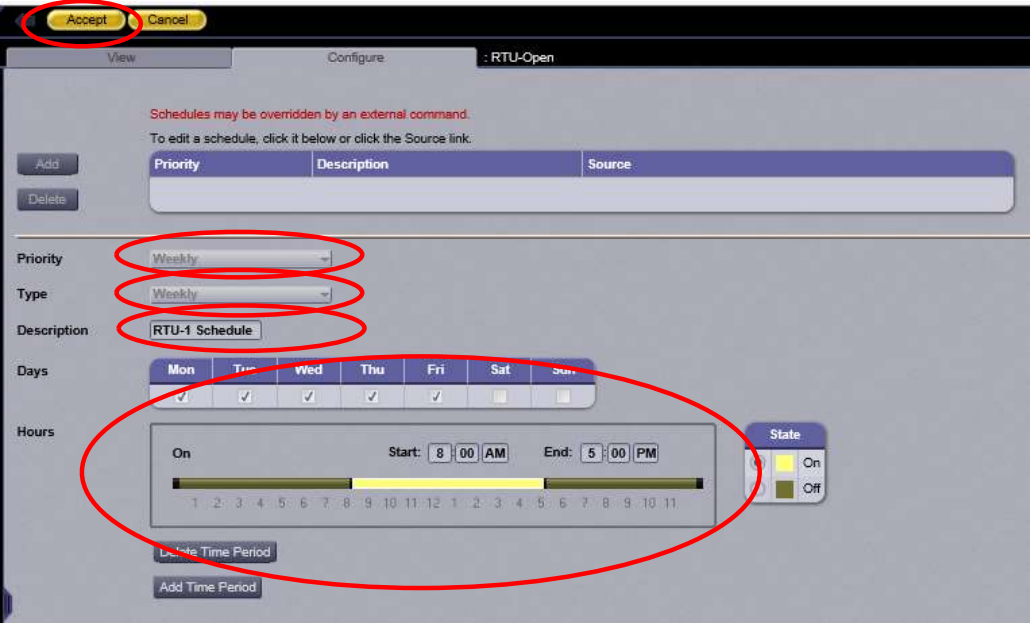
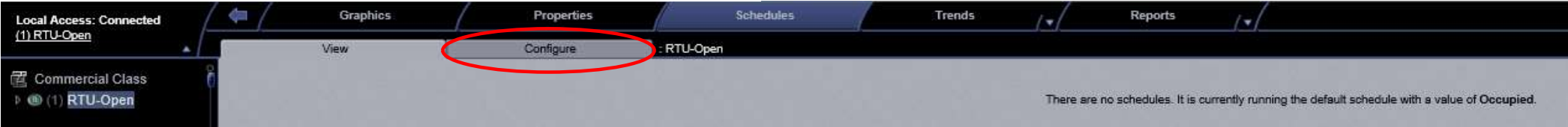
Network Points Allows you to configure System Network points

BACnet Objects Lists all points with BACnet addresses / visibility

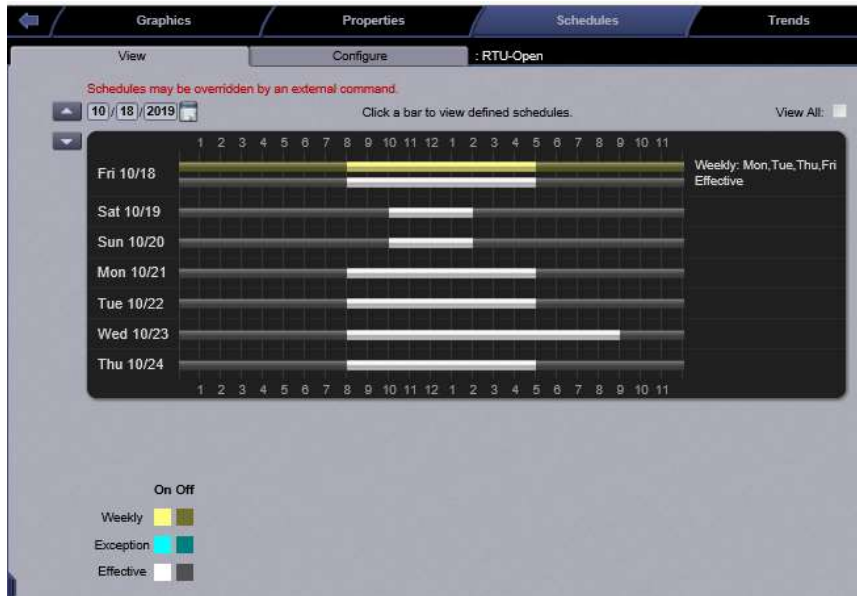
Rnet Points Allows you to see all Rnet points

Protocol Mapping Same as BACnet Objects for N2, Modbus and LON

Schedules



Schedules



Weekly Schedules can be add on top of one another.

This Schedule is the same except we added separate weekly schedules to allow system to remain occupied until 9 PM on Wednesday and a separate schedule to occupy equipment from 10 AM until 2 PM on Saturday and Sunday

Schedules can be added as exceptions to weekly schedule based on a Date, a range of Dates, or Wildcards

Trends



Reports

Graphics

Properties

Schedules

Trends

Reports

Technician Tool Only

View

Options

: RTU-Open : Equipment / Locked Values

Run

Save report as:

PDF

XLS

CSV

Location: Box 4 / New / RTU-Open

Run Date: 10/18/2019 1:16:36 PM

Location	Control Program	Name	Locked Value
/Box 4/New	RTU-Open		
		input_8	75.0 °F
		Zone Temp	72 °F

Documentation

 Commissioning Sheet 								
Project Information				Unitary Information				
Name:				Brand:		TRANE		
Address:				Model#:				
City/State/Zip:				Serial#:				
Project #:		IP Address:		Unit Tag#:		Volts/Phase:		
Technician		Date	Total Hrs	Baud Rate	Dip Switch Address	Protocol		
Unitary Type		Device Type		Device Number				
Cooling Type	None	RTU-Open						
Heating Type	None	Version		Set points				
Supplemental Heat Type	None	20100409		Occupied Heating		Occupied Relative Humidity		
Room Sensor	Temp Sensors	Safeties		Occupied Cooling		UnOccupied Relative Humidity		
Type	Outdoor Air Sensor	Fan Status		UnOccupied Heating		DCV Max Control Setpoint		
Verified	Reading	Verified		UnOccupied Cooling		Power Exhaust Setpoint		
Calibrated	Supply Air Sensor	Fire Shutdown		Setpoint Adjust		Optimal Start Time		
Override	Reading	Verified		Time Schedules				
Display	Return Air Sensor	Safety Chain Input		From	To	DOW		
Sen Offset	Reading	Verified				M T W Th F S Su H		
Indoor RH	Space Sensor					M T W Th F S Su H		
Reading	Reading	Verified						
Setpoint	Other	Other Sensors						
Indoor CO2	Filter Status	Enthalpy		Equipment Verification				
Reading	Verified	Reading		Fan	Locked	Verified	Locked	
Setpoint	Remote Occupancy	Duct Pressure					Verified	
Outdoor CO2	Verified	Reading		Cooling	Setpoint:	SAT Temp:		
Reading	Door Contact	Enthalpy				Verified?		
Setpoint	Verified	Reading		Heating	Setpoint:	SAT Temp:		
General Notes / Punch List:						Verified?		
				Economizer	Locked	Verified	Locked	Verified
					100%		20%	
				Power Exhaust	Selected	Working		

Touch Interfaces

Allow for Configuration, Scheduling, Setting Setpoints, Viewing Alarms and Some Trending



Equipment Touch



System Touch

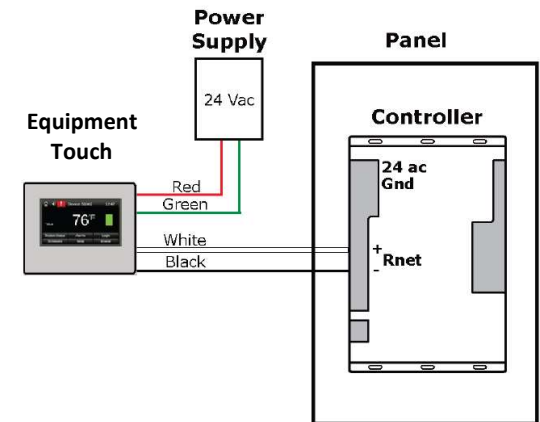
Touch Interfaces

Allow for Configuration, Scheduling, Setting Setpoints, Viewing Alarms and Some Trending



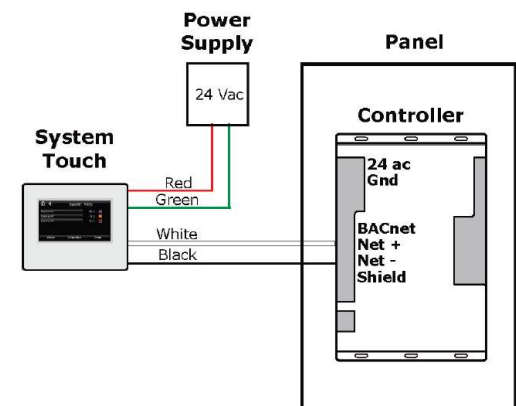
Equipment Touch

- Interfaces with one controller
- Has on-board Temperature and Humidity Sensors
- Sits on Rnet Sensor Bus



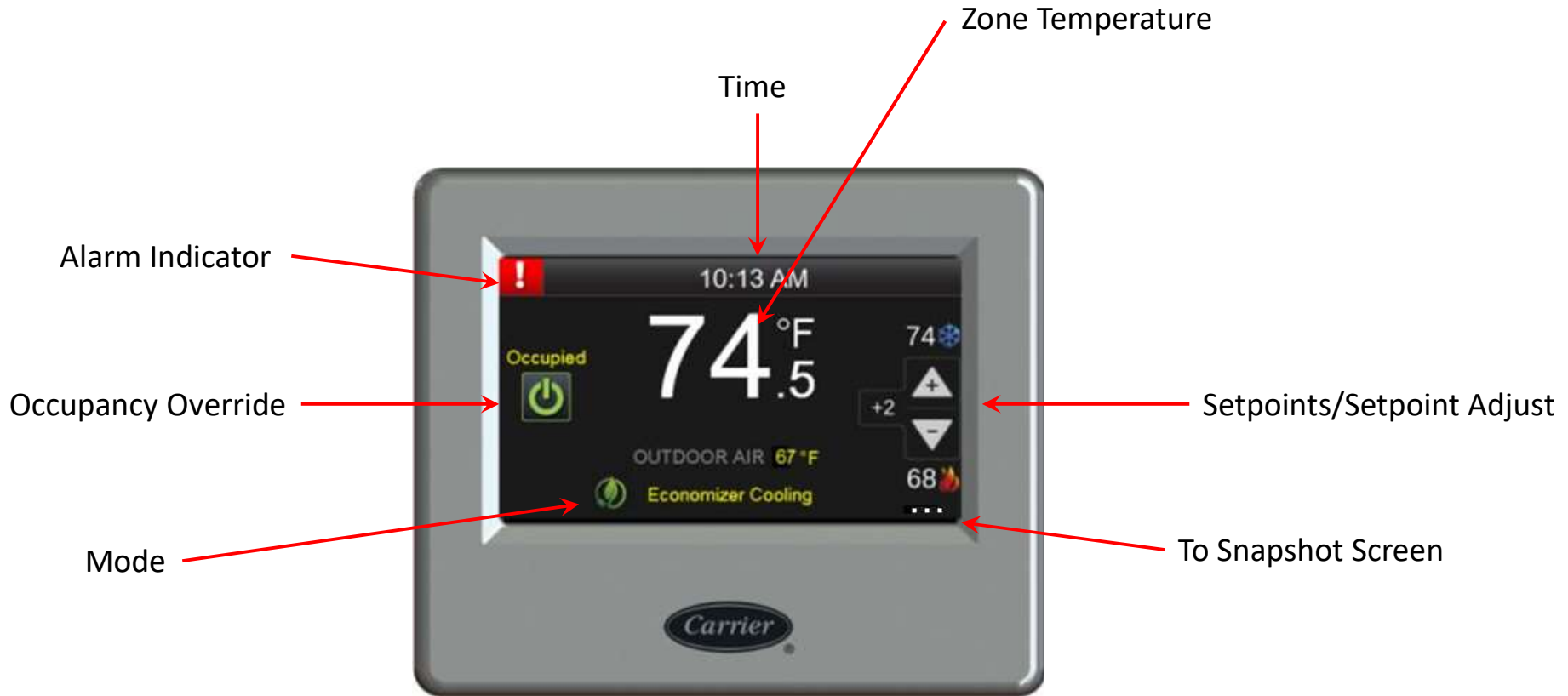
System Touch

- Interfaces with all controllers on Network (actually works best with ~ 10 controllers)
- Has on-board Temperature and Humidity Sensors
- Sits on MS/TP Communications Bus



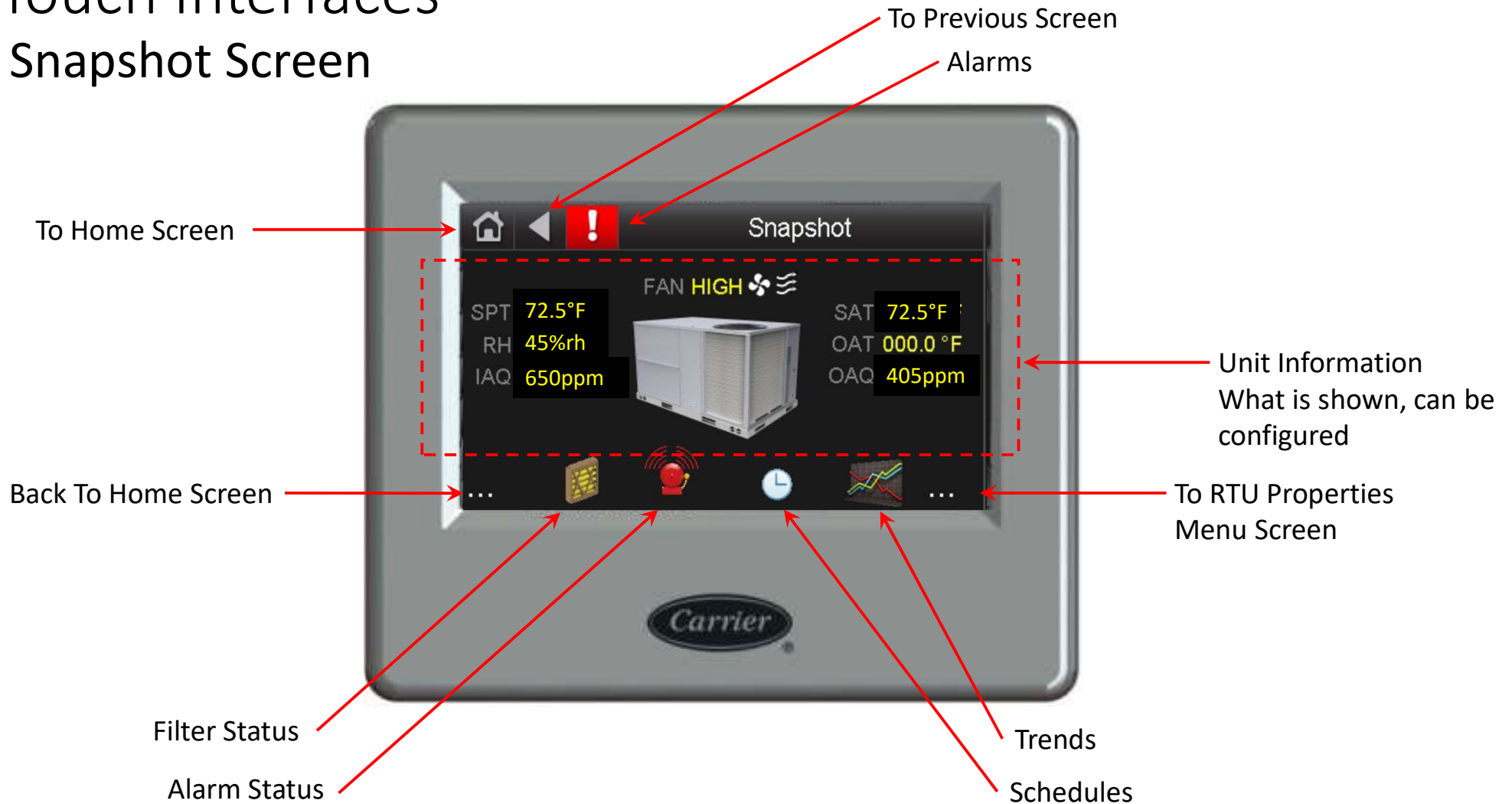
Equipment Touch

Home Screen



Touch Interfaces

Snapshot Screen



Touch Interfaces

RTU Properties Menu



Login with the password:

admin

Touch Interfaces

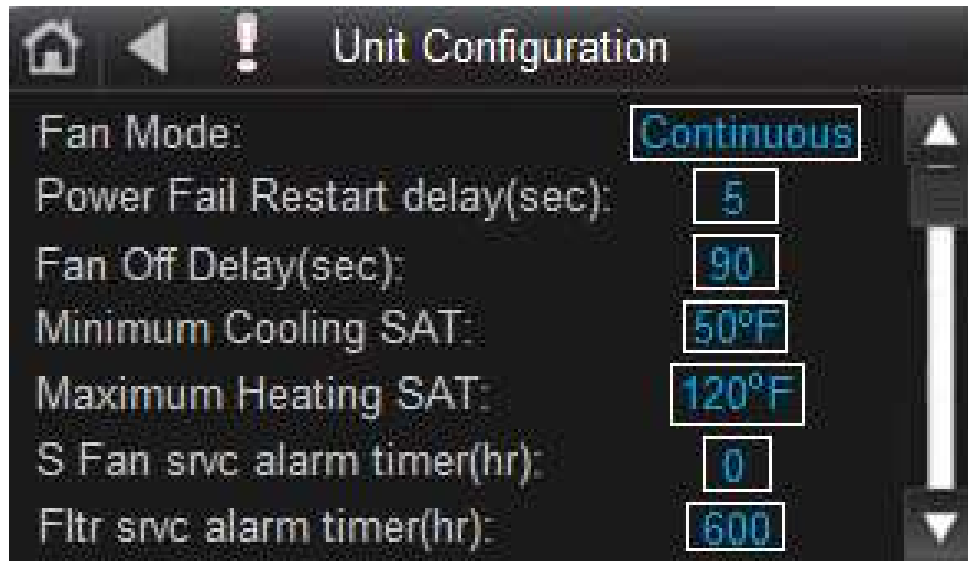
RTU Properties Menu



- Status
- Unit Configuration
- Setpoints
- Alarm Configuration
- Maintenance
- Performance
- Alarms
- Startup Wizard
- ET Show/Hide Config
- ET System
- Touchscreen Setup

Touch Interfaces

Unit Configuration Menu



A screenshot of the 'Unit Configuration' menu. The title bar shows a home icon, a back arrow, and a warning icon. The menu items and their values are: Fan Mode: Continuous; Power Fail Restart delay(sec): 5; Fan Off Delay(sec): 90; Minimum Cooling SAT: 50°F; Maximum Heating SAT: 120°F; S Fan srvc alarm timer(hr): 0; Fltr srvc alarm timer(hr): 600. A vertical scrollbar is on the right.

Parameter	Value
Fan Mode	Continuous
Power Fail Restart delay(sec)	5
Fan Off Delay(sec)	90
Minimum Cooling SAT	50°F
Maximum Heating SAT	120°F
S Fan srvc alarm timer(hr)	0
Fltr srvc alarm timer(hr)	600



A screenshot of the 'Startup Wizard(admin only)' menu. The title bar shows a home icon and a back arrow. The menu items and their values are: Unit Type: Heat / Cool; Heat Type: Electric; Heat Stages: 2; Compressor Stages: Two Stages; Fan Control: Single Speed; Economizer Exists: Yes. Each item has an information icon (i) to its right. A vertical scrollbar is on the right.

Parameter	Value
Unit Type	Heat / Cool
Heat Type	Electric
Heat Stages	2
Compressor Stages	Two Stages
Fan Control	Single Speed
Economizer Exists	Yes

- Fan Mode
- Power Fail Restart Delay
- Fan Off Delay
- Minimum Cooling SAT
- Maximum Cooling SAT
- S Fan srvc alarm timer
- Fltr srvc alarm timer
- Pushbutton Override:
- Setpoint Adjustment
- Setpt Adj Range
- Cooling Lockout Temp
- Preoccupancy Purge
- Purge Time
- Unocc Free Cool

Touch Interfaces

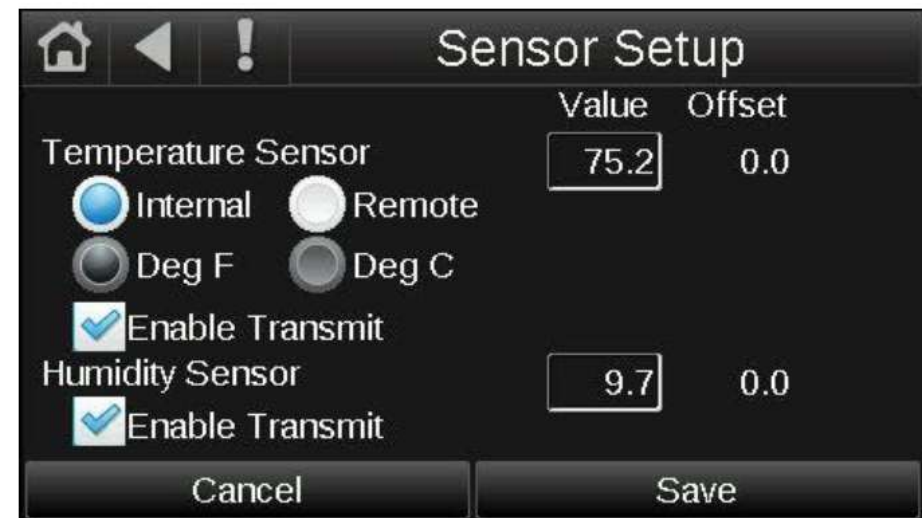
Start Up Wizard Menu



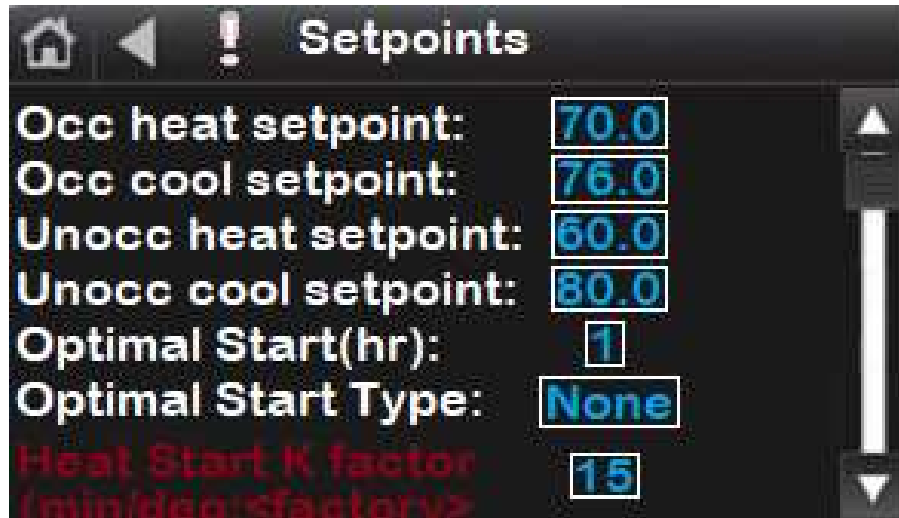
Indication that more info is available

- Unit Type
- Heat Type
- Heat Stages
- Compressor Stages
- Fan Control
- Economizer Exists
- Economizer High OAT Lockout Temp
- Vent Dmpr Pos / DCV Min Pos
- Economizer Purge Min Pos
- Low Fan Econ Min Pos
- Space Sensor Type
- RH Control
- DCV Control
- DCV Max Damper Pos
- Reversing Valve Output
- HP Rev Cycle Lockout Temp
- Occupancy Source
- Input 1 Function
- Input 2 Function
- Input 3 Function
- Input 5 Function
- Input 5 Switch Config
- Input 8 Function
- Input 9 Function

Using Onboard Sensors

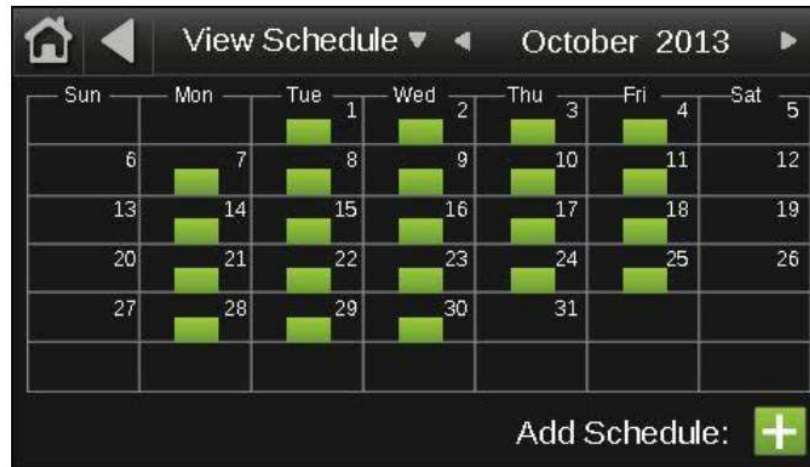


Setpoints



- Occ heat setpoint
- Occ cool setpoint
- Unocc heat setpoint
- Unocc cool setpoint
- Optimal Start(hr)
- Heat Start K factor
(min/deg)<factory>
- Cool Start K factor
(min/deg)<factory>
- Occ Relative Humidity Setpoint
- Unocc Relative Humidity Setpoint
- DCV Max Ctrl Setpoint

Schedules



- Week View
- Month View

The screenshot shows a form for creating or editing a schedule. It includes a 'Schedule Name' field with the value 'Schedule1'. Below this are two checkboxes: 'On Schedule (Occupied)' (checked) and 'Off Schedule (Unoccupied)'. The 'Type' field is set to 'Dated'. The 'Priority' field has two radio buttons: 'Normal' (selected) and 'Override'.

Schedule Name

☒ **On Schedule (Occupied)** ☐ **Off Schedule (Unoccupied)**

Type:

Priority: ☒ **Normal** ☐ **Override**

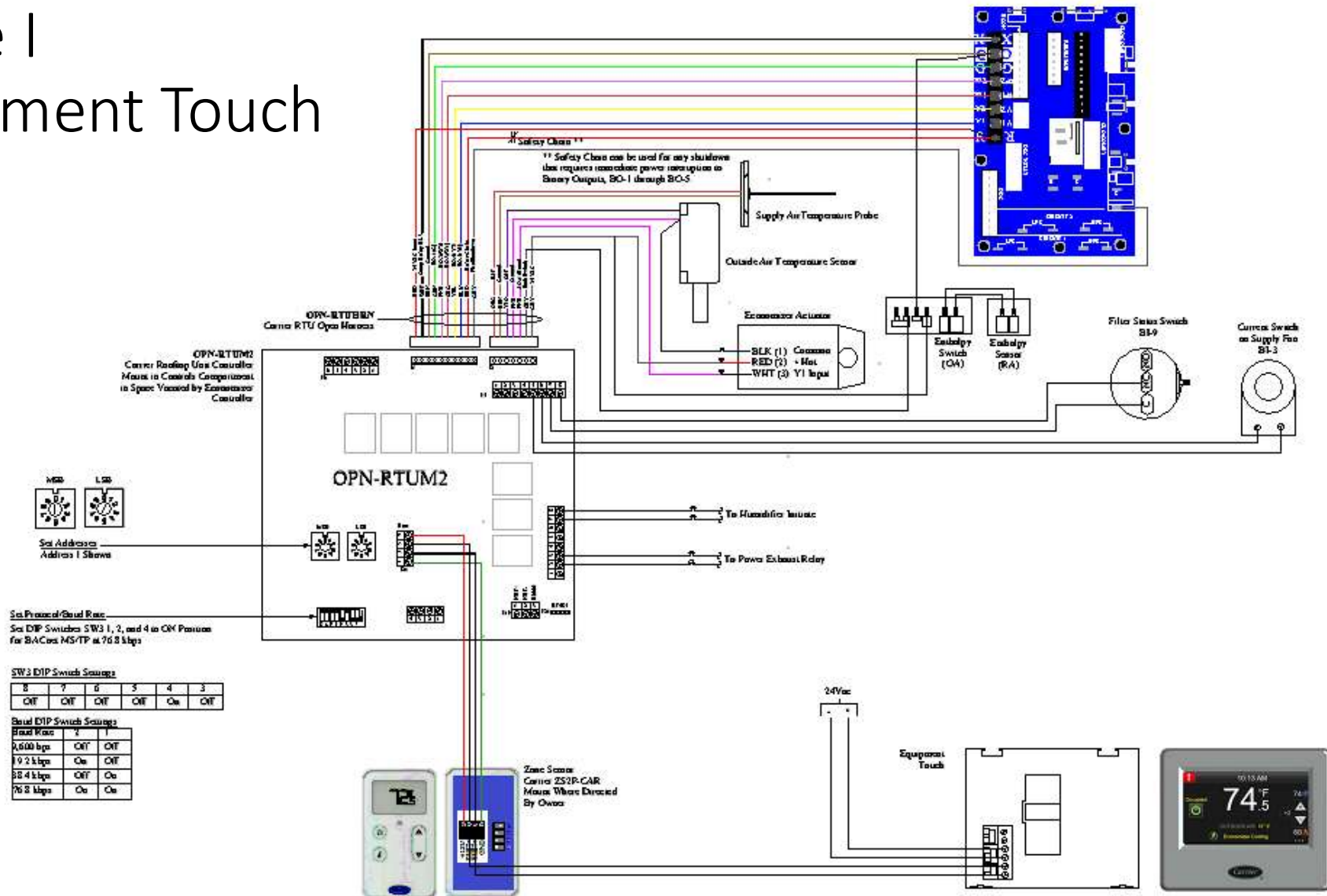
- Dated
- Weekly
- Continuous

Updating Equipment Touch Firmware

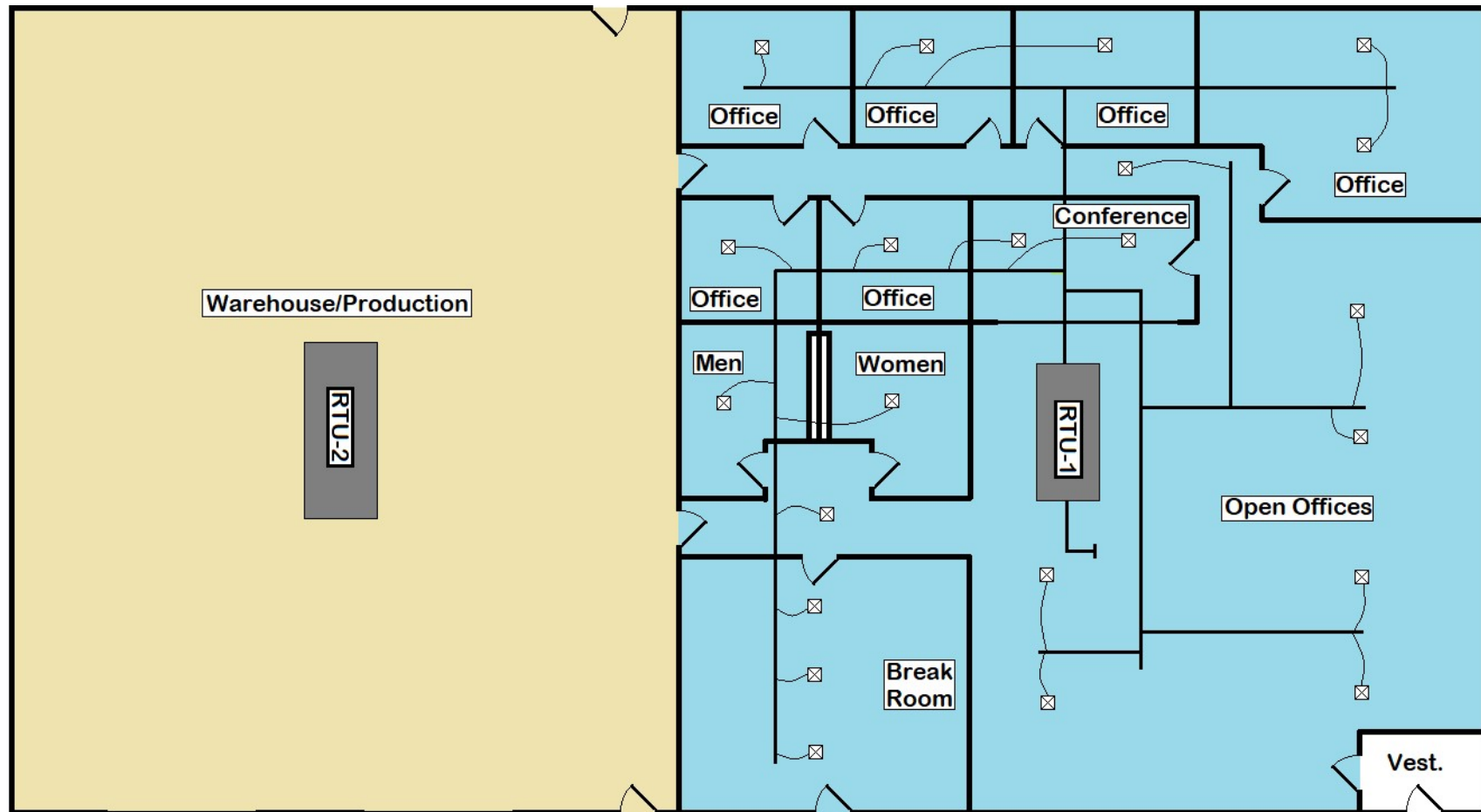
- Create Folder on USB Drive (FATXX) called Touch:
- Download Latest Update from HVAC Partners and copy to “Touch” Folder
- Plug USB Drive into bottom of Touch Device
- Go To Touchscreen Setup and click “Reload Firmware”
- After process, Home Screen will come back. Remove USB Drive.



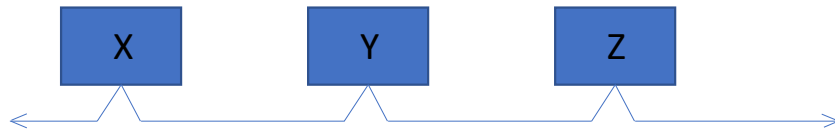
Phase I Equipment Touch



Training Building Phase II



BACnet & MS/TP



- Must Speak the Same Language
- Must Speak at the Same Speed
- Must Have a Unique Address

- Carrier CCN
- Johnson N2
- ModBus
- LON

BACnet – Building Automation Control Network

Protocol rules apply to:

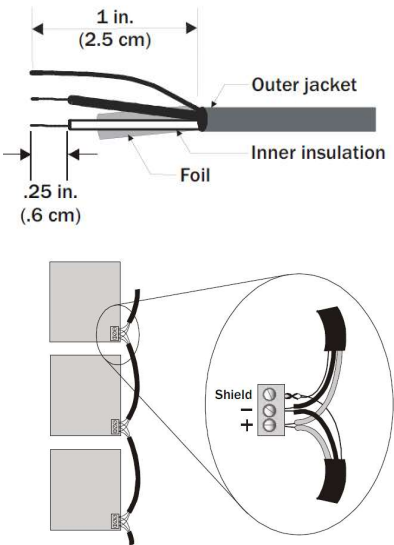
- Electrical Signaling
- Addressing
- Network Access (Master/Slave, Peer-to-Peer)
- Error Checking
- Flow Control
- Message Sequencing, Segmentation, Checkpointing
- Presentation Format (Compression, Encryption)
- Message Format

BACnet Applications

- HVAC control
- Fire detection and alarm
- Lighting control
- Security
- "Smart" elevators
- Utility company interface

MS/TP Wire Specifications

Description	Single twisted pair, low capacitance, CL2P, 22 AWG (7x30), TC foam FEP, plenum rated cable
Conductor	22 or 24 AWG stranded copper (tin plated)
Insulation	Foamed FEP 0.015 in. (0.381 mm) wall 0.060 in. (1.524 mm) O.D.
Color code	Black/White
Twist lay	2 in. (50.8 mm) lay on pair 6 twists/foot (20 twists/meter) nominal
Shielding	Aluminum/Mylar shield with 24 AWG TC drain wire
Jacket	SmokeGard (SmokeGard PVC) 0.021 in. (0.5334 mm) wall 0.175 in. (4.445 mm) O.D. Halar (E-CTFE) 0.010 in. (0.254 mm) wall 0.144 in. (3.6576 mm) O.D.
DC resistance	15.2 Ohms/1000 feet (50 Ohms/km) nominal
Capacitance	12.5 pF/ft (41 pF/meter) nominal conductor to conductor
Characteristic impedance	100 Ohms nominal
Weight	12 lb/1000 feet (17.9 kg/km)
UL temperature rating	SmokeGard 167 °F (75 °C) Halar -40 to 302 °F (-40 to 150 °C)
Voltage	300 Vac, power limited
Listing	UL: NEC CL2P, or better



Wiring specifications		Recommended vendors & part numbers			
Wire type	Description	Connect Air International	Belden	Ramcorp	Contractors Wire & Cable
MS/TP or ARCNET network (RS-485)	22 AWG, single twisted shielded pair, low capacitance, CL2P, TC foam FEP, plenum rated.	W221P-2227	-	25160PV	CLP0520LC
MS/TP or ARCNET network (RS-485)	24 AWG, single twisted shielded pair, low capacitance, CL2P, TC foam FEP, plenum rated.	W241P-2000FB	82841	25120-OR	-
Rnet	4 conductor, unshielded, CMP, 18 AWG, plenum rated.	W184C-2099BLB	6302UE	21450	CLP0442
Power - 24 Vac	2 conductor, CM, 18 AWG, unshielded.	W181P-2051	5300UE	21251	CLP0440
Analog & discrete sensor wiring < 100 ft	Single twisted pair, unshielded, CM, 22AWG, plenum rated.	W221P-2005	6500UE	21281	CLP0410
Analog & discrete sensor wiring 100-500 ft	Single twisted shielded pair, CM, 22AWG, plenum rated.	W221P-2044	6500FE	21280	CLP0520

Bus Limitations

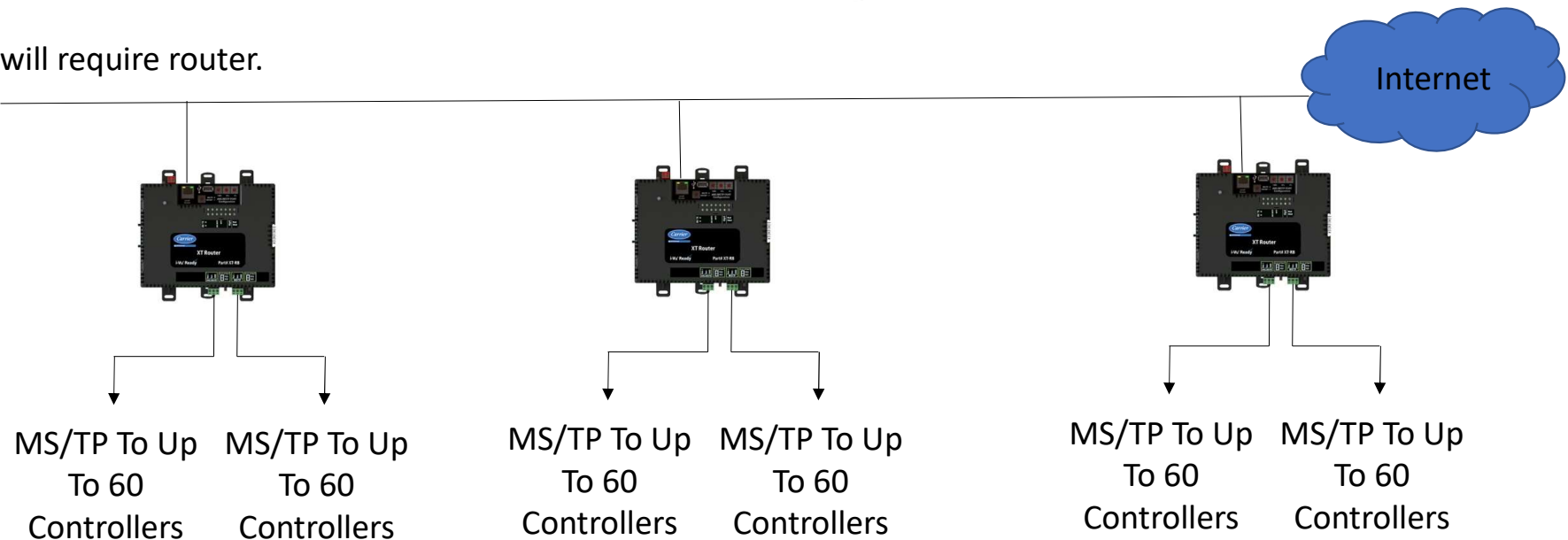
MS/TP Networks

Each MS/TP can handle up to 60 controllers at speed of 76.8 kbps.

Baud Rate	Recommended maximum number of controllers per network
76.8 kbps	60
38.4 kbps	30
19.2 kbps/9600 bps	15

Beyond 60 will require router.

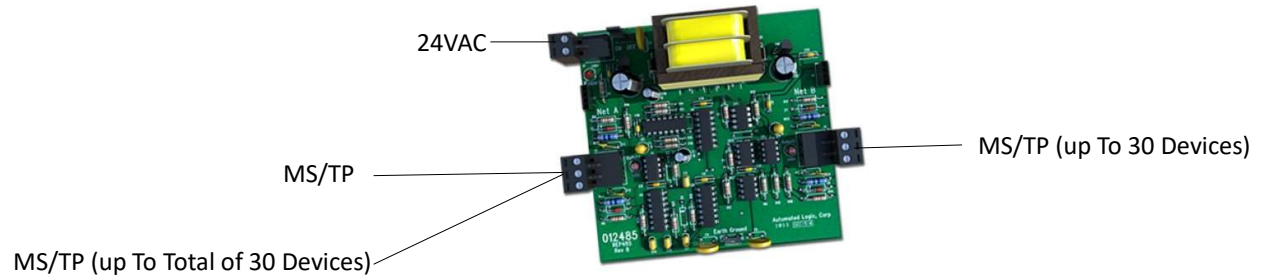
Ethernet



Network Accessories

- Repeaters (REP485)

- Required after every 31 controllers
- Required after 2000 feet
- Information cannot pass through more than 4 repeaters



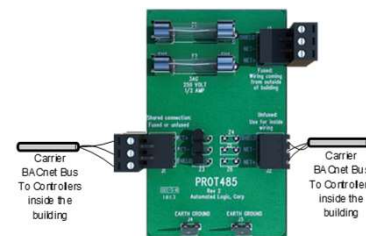
- Biasing Terminators (BT485)

- Required at ends of MS/TP segments
- Required at each side of Repeaters
- Resistor (TERM485) can be used where no receptacle

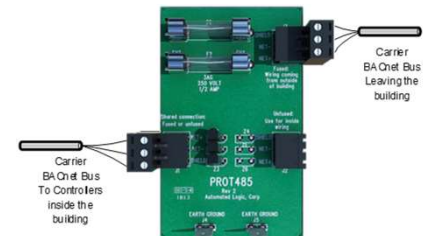


- Protection Module (PROT485)

- Recommended whenever MS/TP enters/leaves building
- Recommended within 500 feet of every controller.

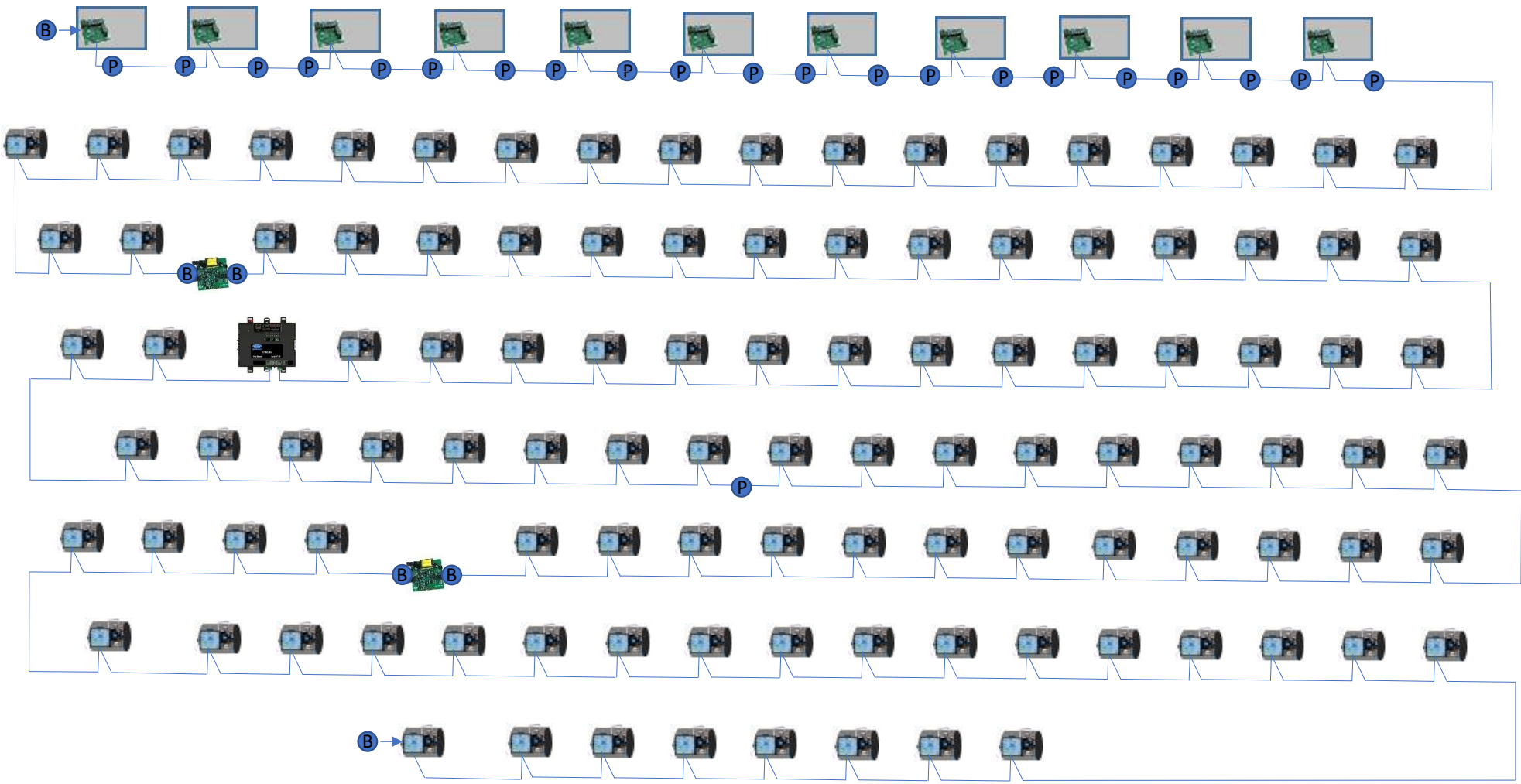


PROT 485 – Inside a Building

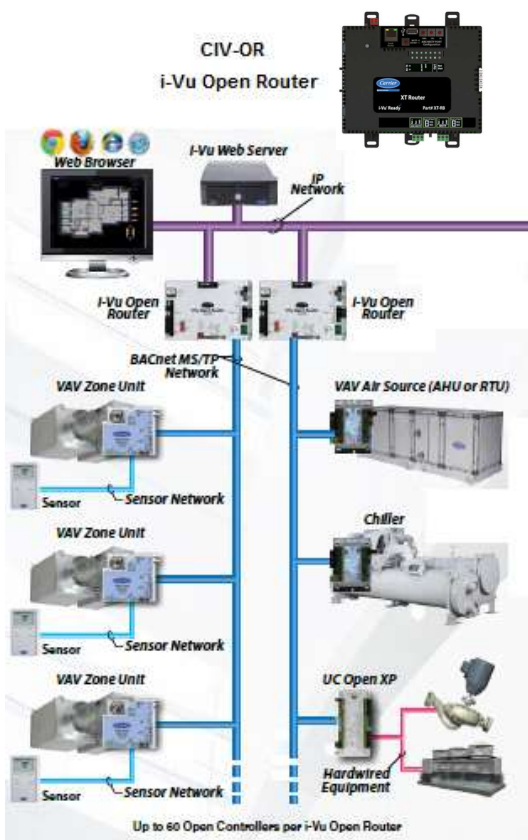


485 PROT Between Buildings

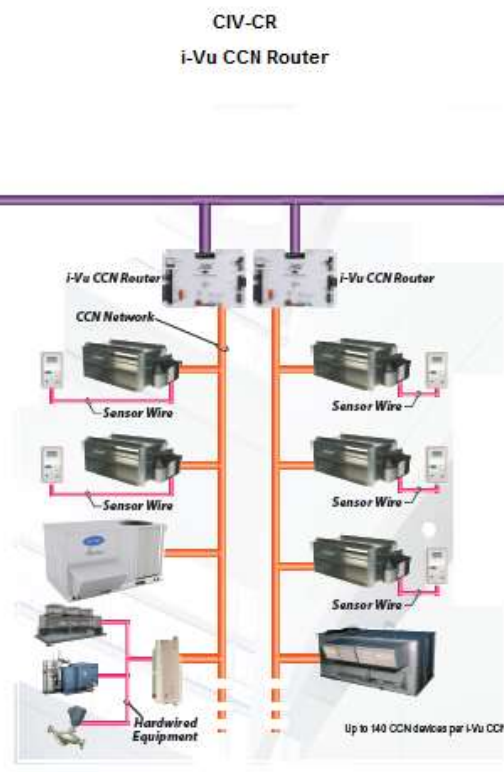
Sample Network



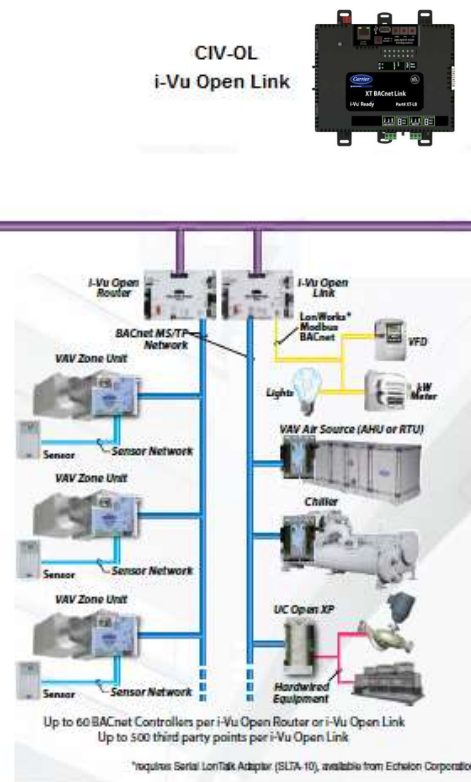
i-Vu - Networks



Open Controls only
Up to 60 Controllers



CCN Only
Up to 140 Devices
Trending
Time Schedules



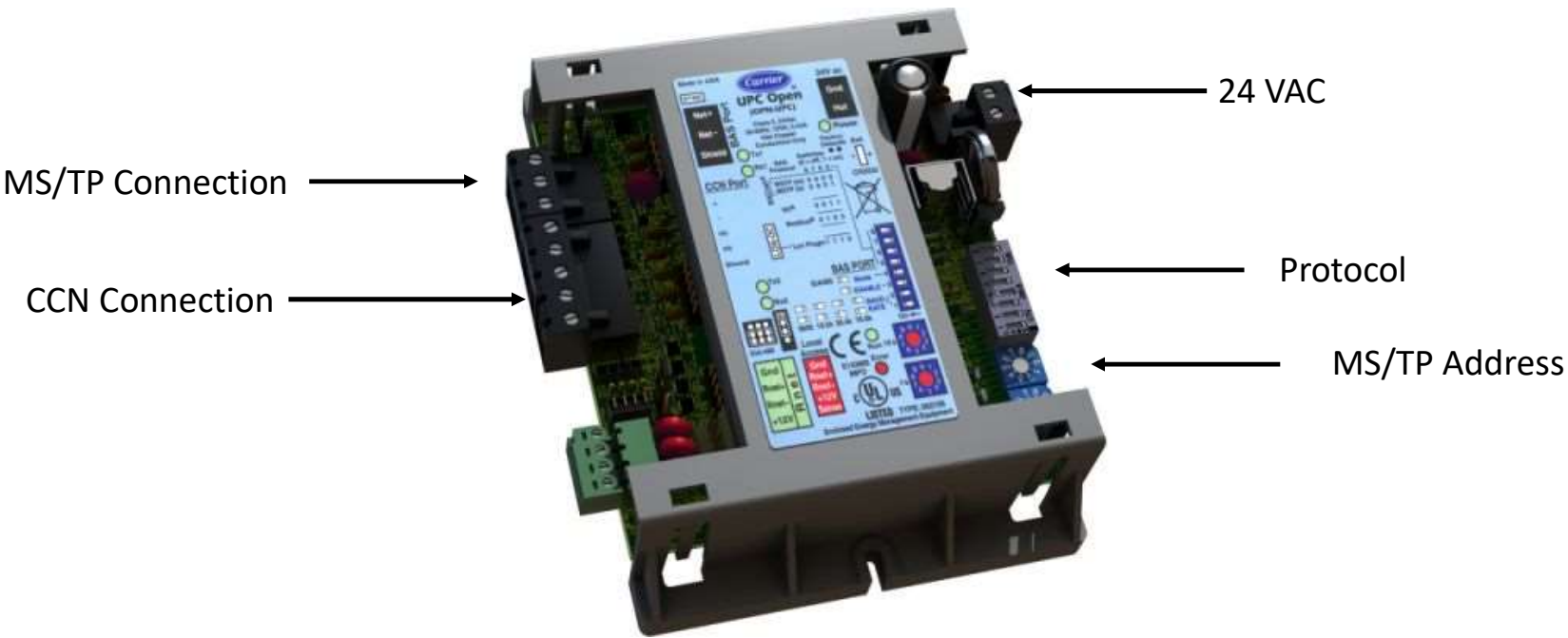
i-Vu Open Controls
Up to 60 Open Controller
and 3rd Party Devices on
* BACnet
* Modbus
* LonWorks
Up to 500 Points



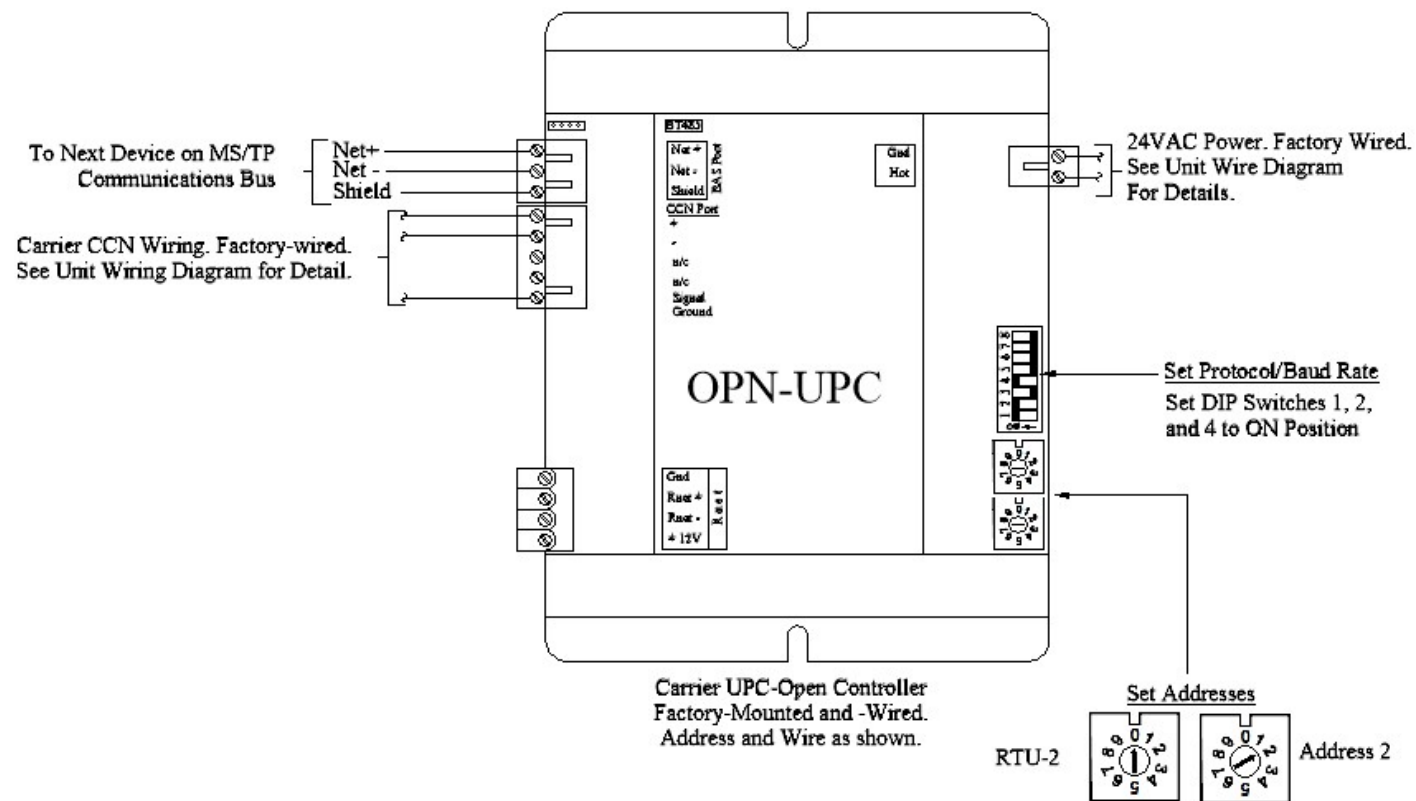
CCN Devices
Up to 140 CCN Controllers
and 3rd Party Devices on
* BACnet
* Modbus
* LonWorks
140 Devices
Up to 500 Points

Universal Protocol Converter (UPC)

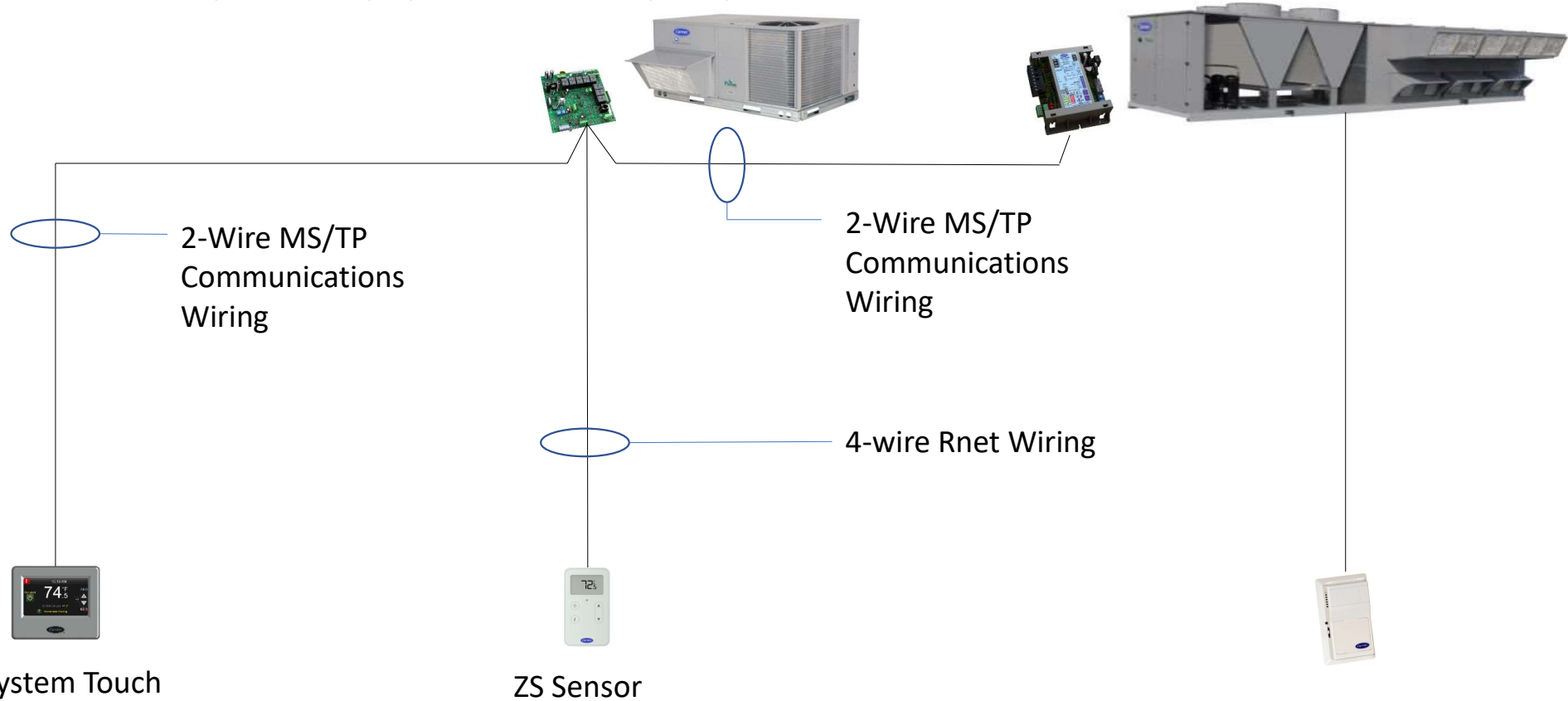
Allows us to bring Carrier Proprietary DDC (CCN) into the BACnet World



Phase II – Unit UPC Factory Wiring



Unitary + Applied Equipment



Local Access: Connected
(1) RTU-Open

Open Controls Phase 1
▶ (1) RTU-Open

Manage Advanced : Open Controls Phase 1

Find Devices Checking controller status

☒ Show Control Programs 1 Uploaded Controllers
☐ Select all

Add Control Program

All Content Download All Content Upload

	Name	Status	Address	IP Address	Number of controllers	Model
	RTU-Open	✓	1	1	0	RTU Open

To find a router's controllers, select the router in the tree.

Local Access: Connected
(1) RTU-Open

Open Controls Phase 1
▶ (1) RTU-Open
▶ (2) Controller 2
▶ (127) Controller 127

Manage Advanced : Open Controls Phase 1

Find Devices

☒ Show Control Programs 1 Up
☐ Select all +2 Up

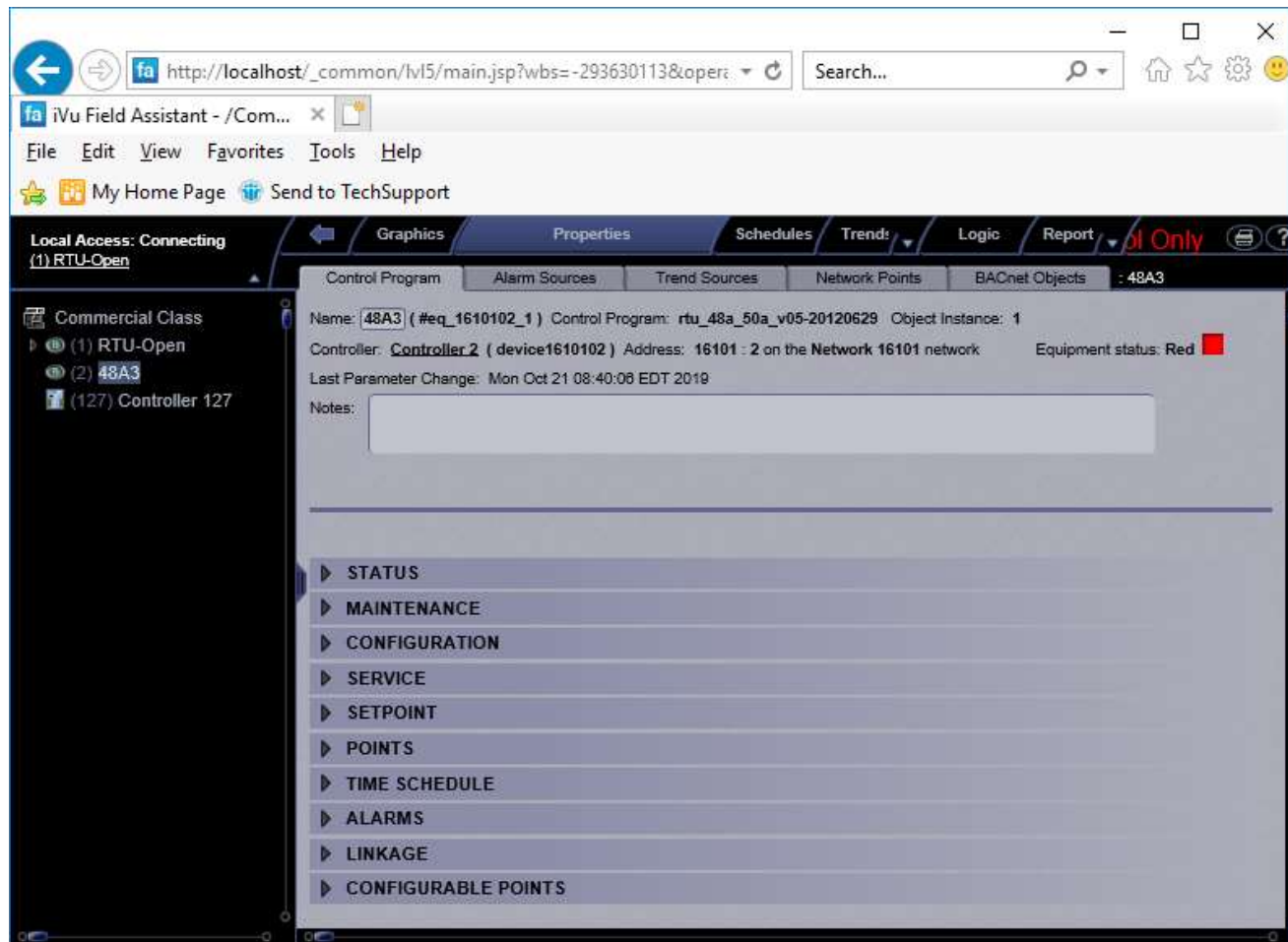
Add

All Content Download All Content Upload

	Name	Status	Address	IP Address	Number of controllers
	Controller 2	Upload All Content	2	2	0
	Controller 127	Upload All Content	127	127	0
	RTU-Open	Download Parameters	1	1	0

To find a router's controllers, select the router in the tree.

Adding Another Controller to System



Configuring UPC Open

Navigation:

i-Vu® / Field Assistant:
BACview®:

**Properties > Control Program > Status
CCN**

Point Name/Description	Default/Range
Element Comm Stat - The UPC Open's current status of communication to the CCN equipment. Click the Element Comm Stat microblock link to change the CCN equipment target address - bus and element number. NOTE If more than one UPC Open is connected to a CCN bus for a Multiple Chiller Application, you must change the CCN controller's address in this object's Summary tab.	D: 0, 1 R: Bus: 0.1 - 239 Element: 1 - 239

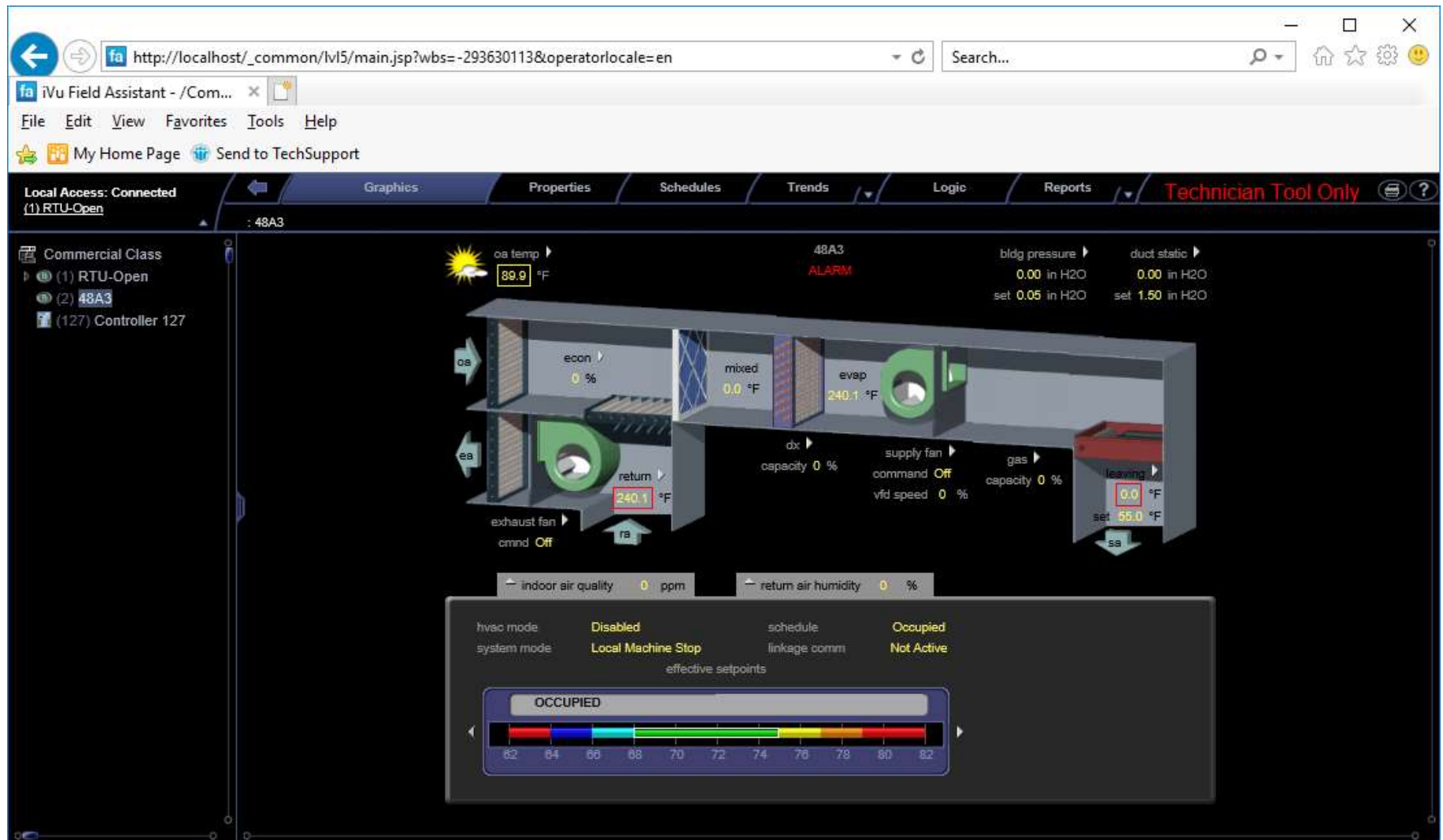
Navigation:

i-Vu® / Field Assistant:

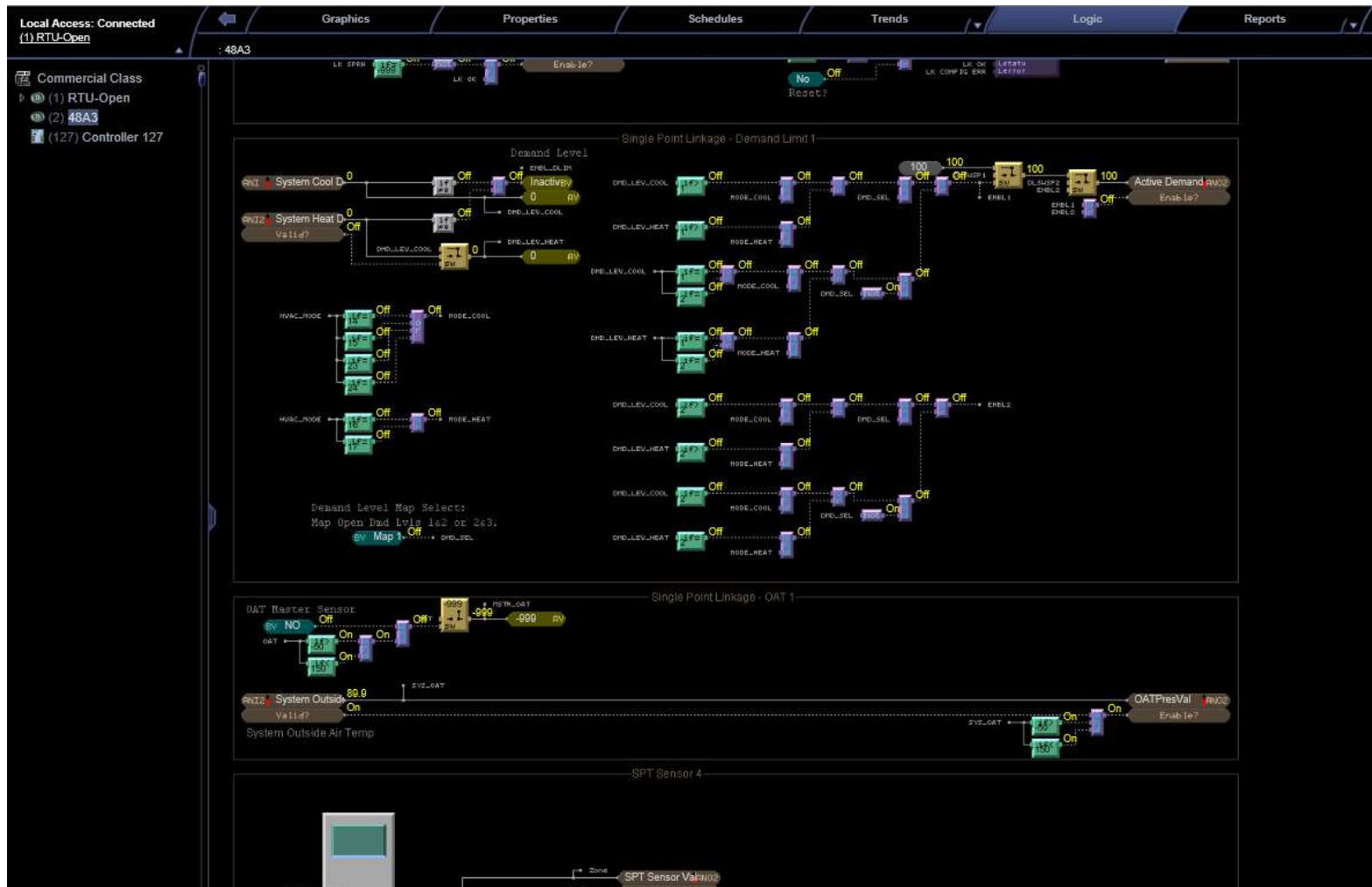
Driver Properties > Communications > CCN

Point Name/Description	Default/Range
CCN Address - Configuration of the UPC Open's CCN element number.	D: 0, 200 R: 1 - 239

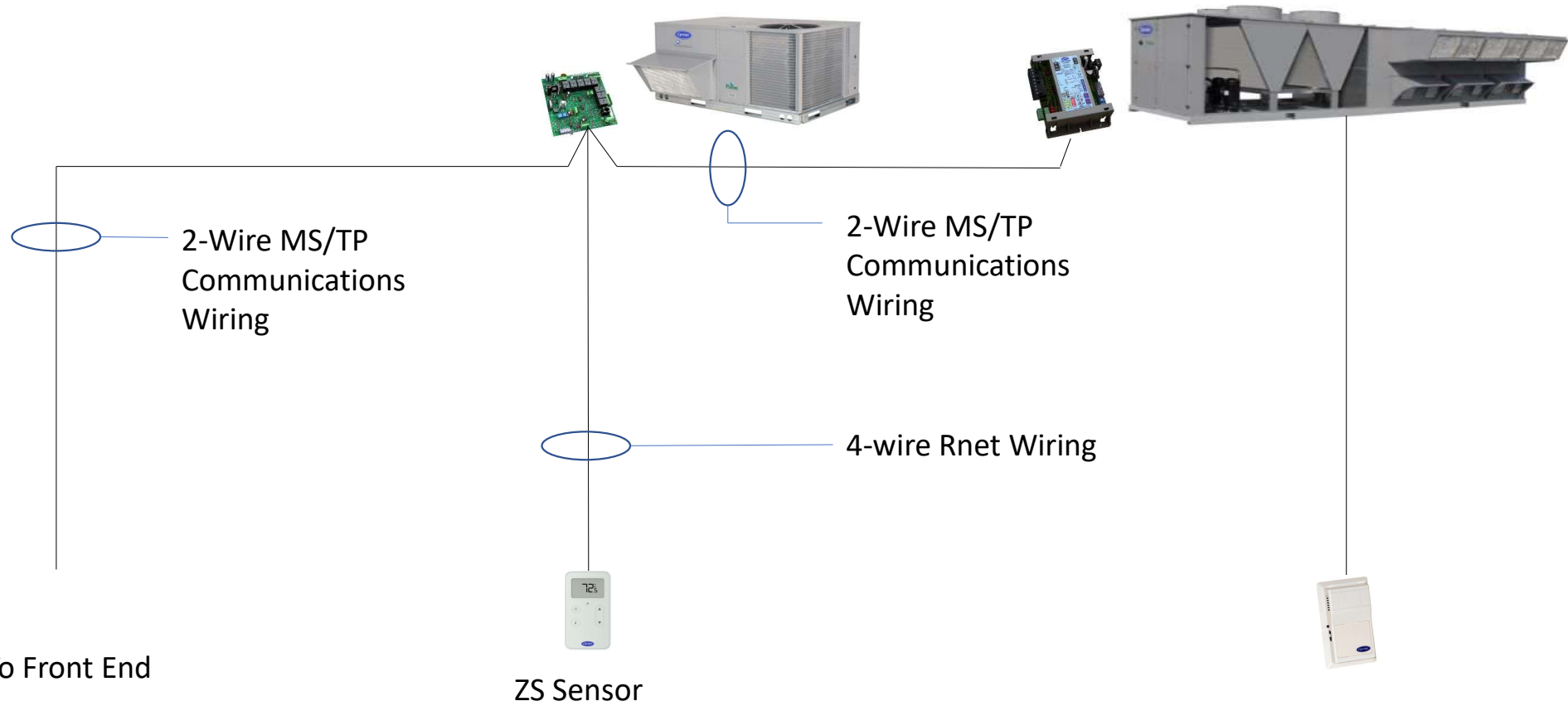
UPC Graphic



Logic



Third Party Integration



RTU Open BACnet Integration

48---50LHTCQ---01T

48/50TC04-30, 50TCQ04-24
48/50HC04-28, 50HCQ04-12
48/50LC04-26
Factory Installed Option
RTU Open
Multi-Protocol Controller


turn to the experts

Controls, Start-Up, Operation and Troubleshooting

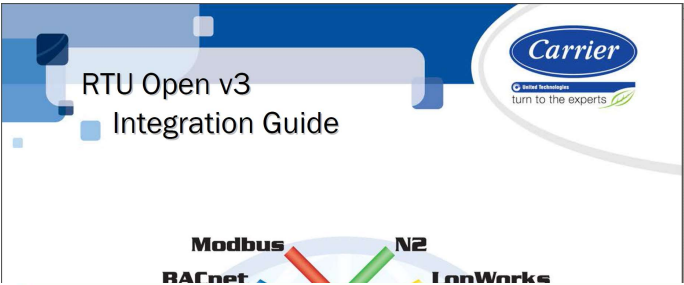
TABLE OF CONTENTS

Dehumidification Test 16

SAFETY CONSIDERATIONS 2

Power Exhaust Test 17

Point Name	Point Access	Units	Default Value	BACnet Info		Modbus Info	
				BACnet Point Name	BACnet Object ID	Modbus Register Type	Modbus Register #
Occupancy Source	R/W	1=Always Occupied 2=BACnet Schedule 3=BAS On/Off 4=Remote Occ Input	1	occ_source	MSV:1002		
Space sensor type	R/W	1=T55 2=T56 3=SPT Sensor 4=None	1	spt_type	MSV:9001		
Space Temp Source	R	1=Sensor Failure 2=SPT Sensor 3=T55 / T56 4=Network 5=Airside Linkage 6=Locked Value		spt_status	MSV:2003		
Unit Type	R/W	1=Heat / Cool 2=LC WeatherExpert 3=HP O/B Ctrl 4=HP Y1/W1 Ctrl	2	unit_type	MSV:9018		
ZS Temp Sensor	R	0=Normal 1=Alarm		zst_sensor_fail	BV:7051		
Economizer Operation	R	0=Normal 1=Fault Detected		econ_opr	BV:7054		
Space Temperature Alarm Status	R	0=Normal 1=Alarm		spt_alarm_status	BV:7056		
SPT Sensor	R	°F		zone_temp_zone_temp	AI:1		
SPT Sensor	R	min		zone_temp_override_time_remaining	AV:1		
Input_10	R	°F		ai_10	AI:1010		
Factory Test Analog 1 Control	R/W	%	0	ao1_fac_test	AV:91001		
Economizer High OAT Lockout							



Appendix A: Network Points List for RTU Open

Network points list for BACnet and Modbus

Point Name	Point Access	Units	Default Value	BACnet		Modbus	
				BACnet Point Name	BACnet Object ID	Modbus Register Type	Modbus Register #
Active Heat Stages	R			heat_run	AV:2003	Input Register (Float)	33
Effective Cool Setpoint	R	°F		eff_cl_stpt	AV:3005	Input Register (Float)	55
High Space Temperature	R	0=Normal 1=Alarm		spt_hi_alarm	BV:7011	Discrete Input	35
Low Space Temperature	R	0=Normal 1=Alarm		spt_lo_alarm	BV:7012	Discrete Input	39
Input_6	R	°F		ai_6	AI:1006		
Supply Fan Relay State	R	0=Off 1=On		sfan	BV:2001	Discrete Input	23
Supply Fan Status	R	0=Off 1=On		sfan_status	BV:1003	Discrete Input	24
Economizer Output	R	%Open		econ_output	AV:2022	Input Register (Float)	51
Outdoor Air Quality Sensor	R	0=Normal 1=Alarm		oaa_fail	BV:7006	Discrete Input	41
DCV Max Vent Damper Pos	R/W	%Open	50	iaq_dpr_max	AV:9011	Holding Register (Float)	47
Space Temperature - Prime Variable	R	°F		space_temp	AV:2007	Input Register (Float)	107
HP Rev Cycle Lockout Temp	R/W	°F	-3	hp_rev_cycle_lockout	AV:9004	Holding Register (Float)	71
System Outdoor Air Temperature	R/W	°F	-999	system_oat	AV:1901	Holding Register (Float)	119
Economizer Purge Min Pos	R/W	%Open	40	econ_purge_min	AV:9029	Holding Register (Float)	75
Active Compressor Stages	R			comp_run	AV:2020	Input Register (Float)	31
System Mode	R	1=Off 2=Fan Only 3=Economizer Cooling 4=Cooling 5=Heating 6=Dehumidification 7=Test		run_status	MSV:2002	Input Register (Signed)	1

UPC BACnet Integration



Weathermaker®
48/50A2,A3,A4,A5020-060
Single Package Large Rooftop Units
with *ComfortLink* Version 8.x Controls

Controls, Start-Up, Operation, Service and Troubleshooting

CONTENTS

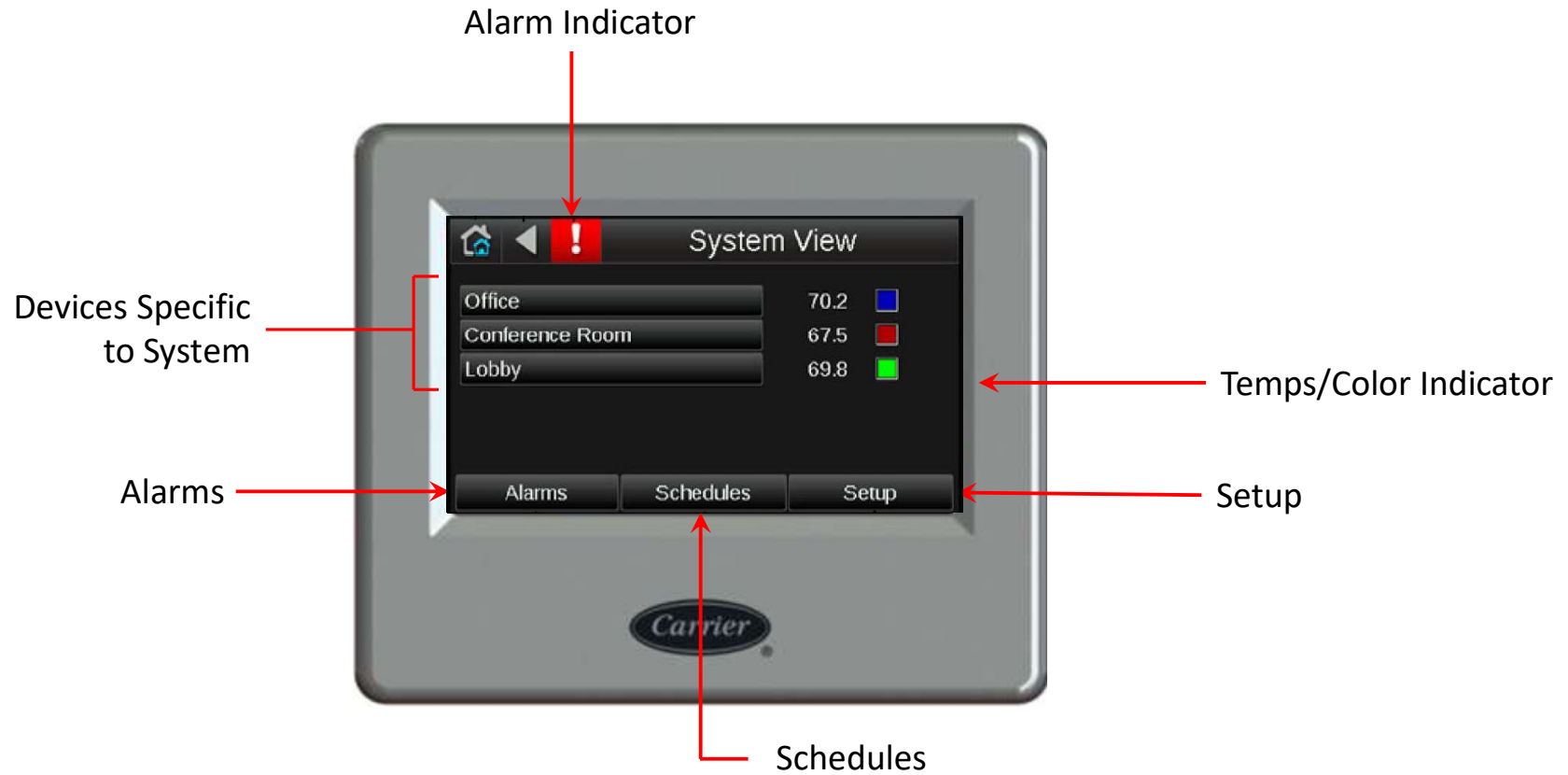
	Page		Page
SAFETY CONSIDERATIONS	2	• COMPRESSOR SAFETIES	
GENERAL	3	• COMPRESSOR TIME GUARDS	
Conventions Used in this Manual	3	• COOL MODE SELECTION PROCESS	
BASIC CONTROL USAGE	4	• COOLING MODE DIAGNOSTIC HELP	

NETWORK POINTS LIST

POINT DESCRIPTION	CCN POINT NAME	READ/ WRITE	UNITS	DEFAULT VALUE	RANGE	BACNET OBJECT ID	BACNET OBJECT NAME
Active Demand Limit	DEM_LIM	W	%	n/a	0-100	AV:9	dem_lim_1
Air Temp Lvg Supply Fan	SAT	R	°F	n/a	n/a	AV:10	sat_1
Alarm State	ALM	R	n/a	n/a	n/a	BV:9	alm_1
BP PID Evaluation Time Level	BPPERIOD	W	min	1	0-10	AV:16	bpperiod_1
BP Setpoint Offset	BPSO	W	in H2O	0.05	0-0.5	AV:17	bps_1
BP Threshold Adjustment	BPZ_GAIN	W	n/a	1	0.1-10	AV:18	bpz_gain_1
Building Pressure	BP	R	in H2O	n/a	n/a	AV:1070	bldg_static_press_1
Building Pressure Setp.	BPSP	W	in H2O	0.05	-0.5	AV:3070	bldg_press_stpt_1
Capacity Clamp Mode	CAPMODE	R	n/a	n/a	n/a	BV:10	capmode_1
Capacity Load Factor	SMZ	R	%	n/a	n/a	AV:22	smz_1
Capacity Threshold Adj	Z_GAIN	W	n/a	1	0-10	AV:23	z_gain_1
CEM AN1 10K temp J5,1-2	CEM10K1	W	°F	n/a	-280	AV:12	cem10k1_1
CEM AN1 4-20 ma J5,1-2	CEM4201	W	mA	n/a	0-20	AV:11	cem4201_1
CEM AN2 10K temp J5,3-4	CEM10K2	W	°F	n/a	-280	AV:14	cem10k2_1
CEM AN2 4-20 ma J5,3-4	CEM4202	W	mA	n/a	0-20	AV:13	cem4202_1
Cir A Discharge Pressure	DP_A	R	psig	n/a	n/a	AV:1601	discharge_press_a_1
Cir A Sat. Condensing Temperature	SCTA	R	°F	n/a	n/a	AV:1602	sat_cond_temp_a_1
Cir A Sat. Suction Temperature	SSTA	R	°F	n/a	n/a	AV:1603	sat_suction_temp_a_1
Cir A Suction Pressure	SP_A	R	psig	n/a	n/a	AV:1600	suction_press_a_1
Cir B Discharge Pressure	DP_B	R	psig	n/a	n/a	AV:1605	discharge_press_b_1
Cir B Sat. Condensing Temperature	SCTB	R	°F	n/a	n/a	AV:1606	sat_cond_temp_b_1
Cir B Sat. Suction Temperature	SSTB	R	°F	n/a	n/a	AV:1607	sat_suction_temp_b_1
Cir B Suction Pressure	SP_B	R	psig	n/a	n/a	AV:1604	suction_press_b_1

System Touch

System Screen



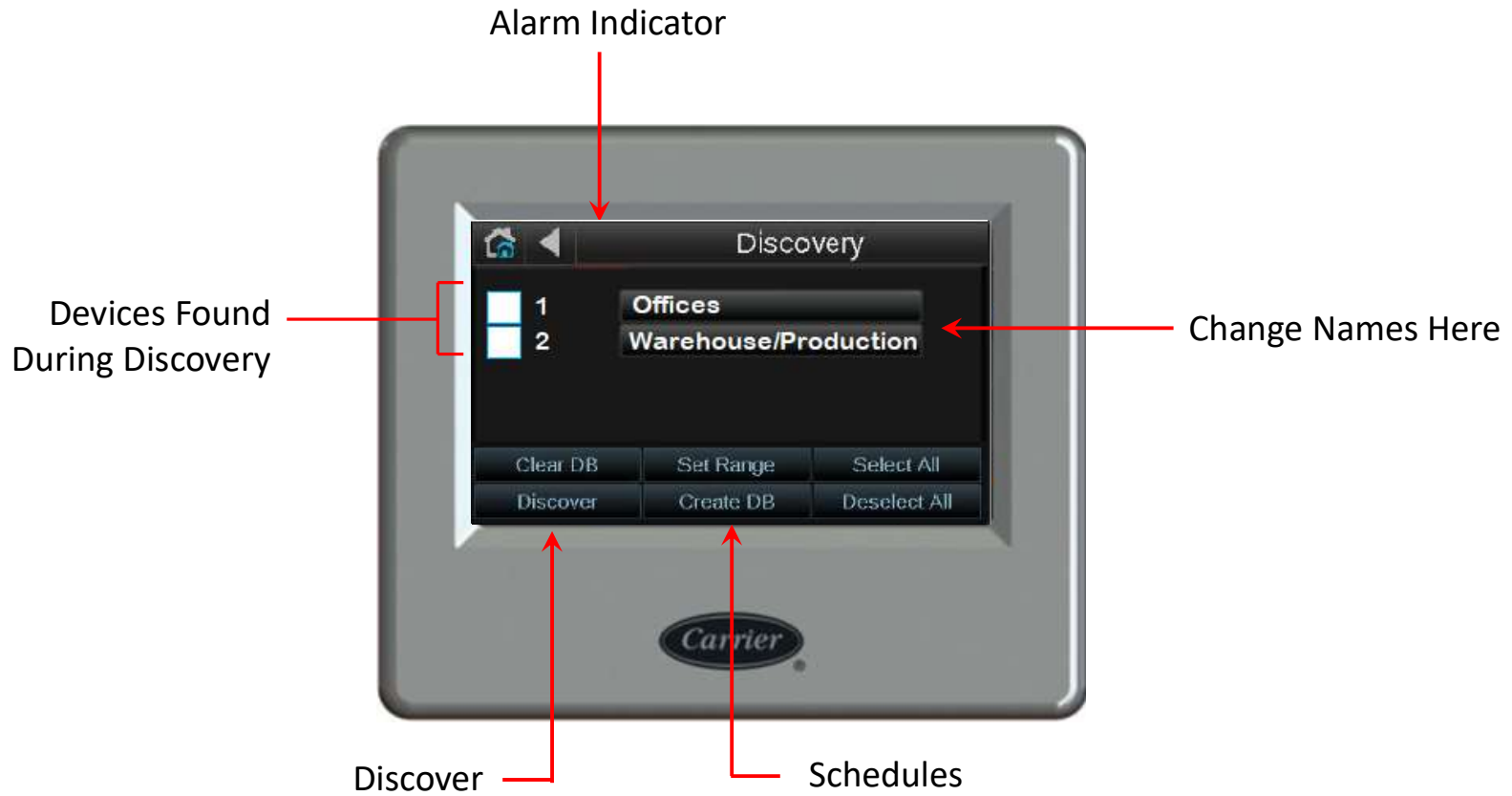
System Touch

Discovery



System Touch

Discovery



System Touch

Schedules

  Create Schedule Group

Group Name

Lobby

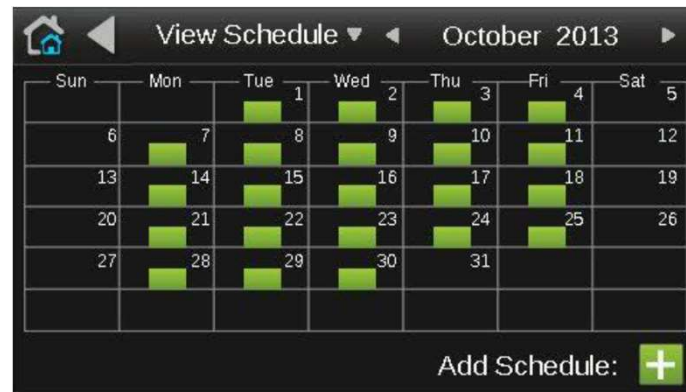
☐ schedule

Office

☐ schedule

Save

Cancel



Thank You