CARRIER AND BRYANT VRF:

Controls Training

Heating & Cooling Systems

5/20/21

AGENDA

Section 1
CONTROLS PRODUCT

Section 2
NETWORK & CENTRAL CONTROLLERS

Section 3
24V INTERFACE

Section 4
ERV INTERFACE

Section 5
ACB INTERFACE

1

CONTROLS PRODUCTS

CONTROLS PRODUCTS

Available Controllers

24V Control interface
(40VM900008)

Touch screen Wired
controller (40VM900005)

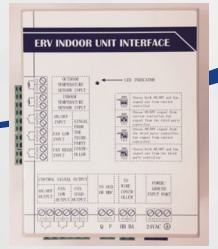
Touch screen central
controller (40VM900006)

Wired Controller
(40VM900003)

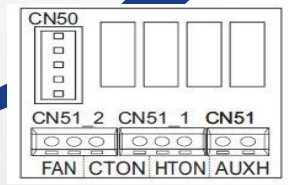
BACnet / IP
(40VM900052)

Wired controller
(40VM900002)

Wireless controller
(40VM900001)



DODI Interface
(40VM900007)



Auxiliary control board (ACB)

CONTROLS PRODUCTS

Remote Controller Overview

REMOTE CONTROLLERS

- Wireless remote controller (40VM900001)
- Wired remote controller – Non-Programmable (40VM900002)
- Wired remote controller – Programmable (40VM900003)
- Touchscreen wired remote controller (40VM900005)

CONTROLS PRODUCTS

Remote Controller Overview - Compatibility

Indoor unit series		40VM900001	40VM900002	40VM900003	40VM900005
4-Way Cassette	40VMF	√	Either but only one in use		
Compact 4-Way Cassette	40VMC	√	Either but only one in use		
High Wall	40VMW	√	Either but only one in use		
Medium Static Duct	40VMM	√	Either but only one in use		
Ceiling/Floor	40VMU	√	Either but only one in use		
High Static Duct	40VMH	√	Either but only one in use		
Vertical AHU	40VMV	√	Either but only one in use		
Low Static Duct	40VML	√	Either but only one in use		
Floor Console Recessed	40VMR	√	Either but only one in use		
Outside Air	40VMA	√	×	Either but only one in use	
I/O Board-(ERV)		×	×	Either but only one in use	

× means unavailable in this unit

CONTROLS PRODUCTS

Remote Controller Overview

CONTROLLERS

- Allows for individual or group control of indoor unit
- Takes user desired space set point, fan speed, mode selection

CONTROLS PRODUCTS

Remote Controller Overview

WIRED REMOTE CONTROLLER

Non-Programmable (40VM900002)

- Simple, Easy to Use
- ON/OFF
- Group Control (Max 16 IDU)
- Mode Setting
- Fan Speed Setting
- Set-point Display
- Swing Setting
- Addressing Capability
- Back light
- Dual set-point control
- Set temperature range limiting
- Room Temperature Display
- Error Display
- Touch Button
- 1F temperature indication

CONTROLS PRODUCTS

Remote Controller Overview

WIRED REMOTE CONTROLLER

Programmable (40VM900003)

- Simple, Easy to Use
- ON/OFF
- Group Control (Max 16 IDU)
- Mode Setting
- Fan Speed Setting
- Set-point Display
- Swing Setting
- Addressing Capability
- Back light
- Dual set-point control
- Set temperature range limiting
- Room Temperature Display
- Error Display
- Clock & Weekly Scheduling
- Touch Button
- 1F temperature indication

CONTROLS PRODUCTS

Remote Controller Overview

TOUCHSCREEN WIRED REMOTE CONTROLLER

(40VM900005)

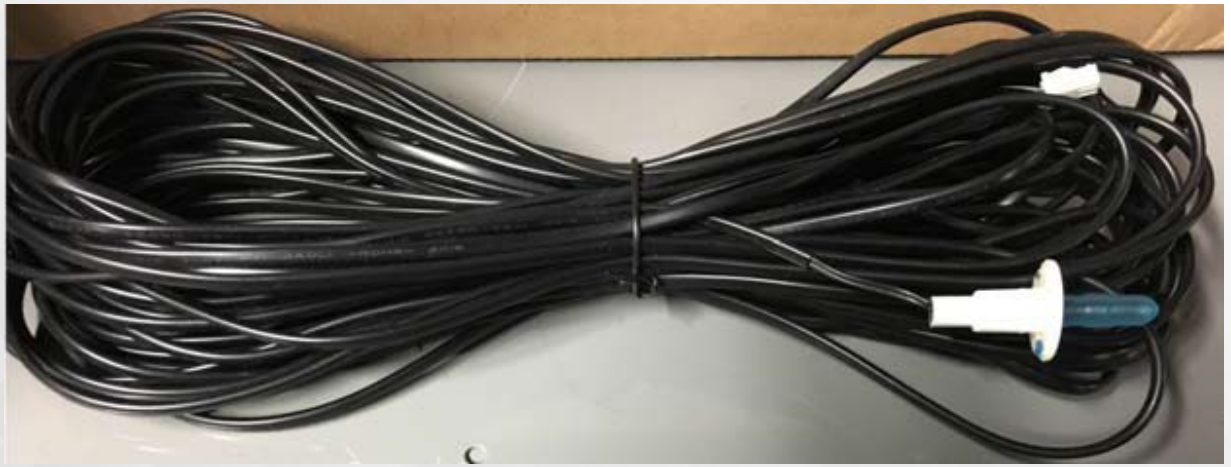
- Display is 800*480 resolution
- ON/OFF
- Group Control (Max 16 IDU)
- Mode Setting
- Fan Speed Setting
- Set-point Display
- Swing Setting
- Addressing Capability
- Back light
- Dual set-point control
- Set temperature range limiting
- Room Temperature Display
- Error Display
- Clock & Weekly Scheduling
- Touch Screen
- 1F temperature indication

CONTROLS PRODUCTS

Accessory

Button Sensor Remote Thermistor

(40VM900009)

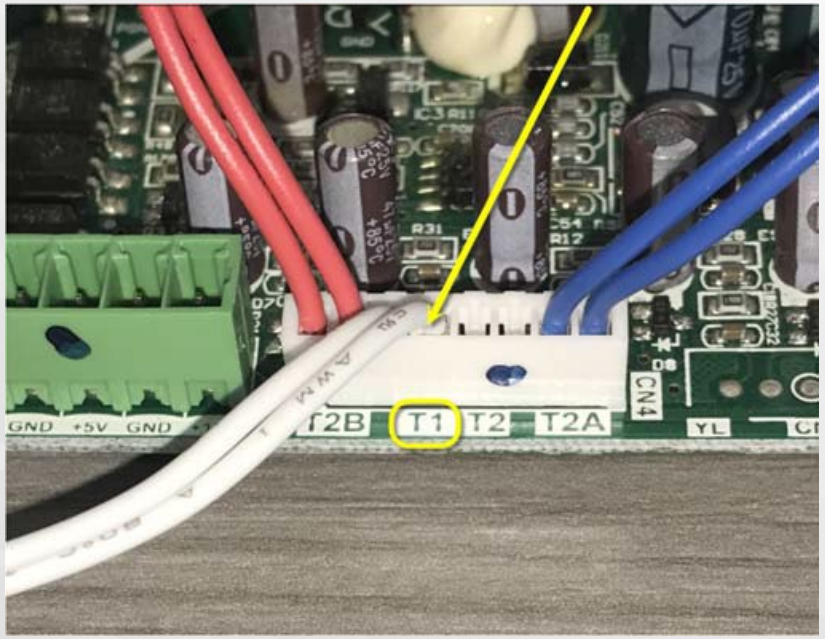


Button Sensor Features

- Thermistor Type: 10k-2
- Length 65 feet
- Paintable with Latex or Oil-Based Paint
- Compatible with all 40VM series Indoor Units *except* 40V MA Outside Air Unit
- For applications requiring low-profile space temperature sensor

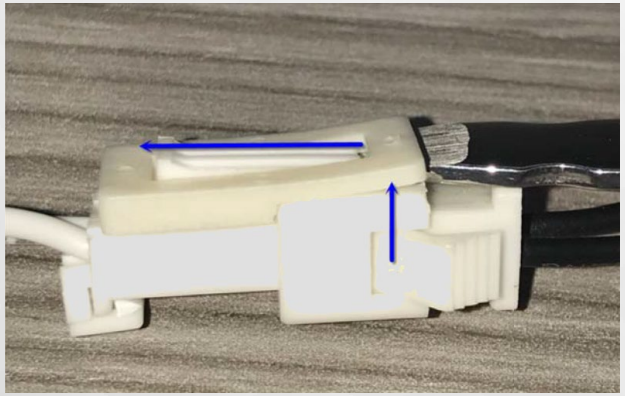
Button Sensor Remote Installation Tips

1. Select installation location for Button Sensor that receives adequate airflow and circulation, so as to sample "average" zone temperature.
2. Do not locate button sensor near sources of heat - such as direct sunlight or electronics.
3. Drill 3/8" diameter hole in installation location and insert button sensor.
4. Locate T1 Sensor Wire (white) on IDU Control Board.

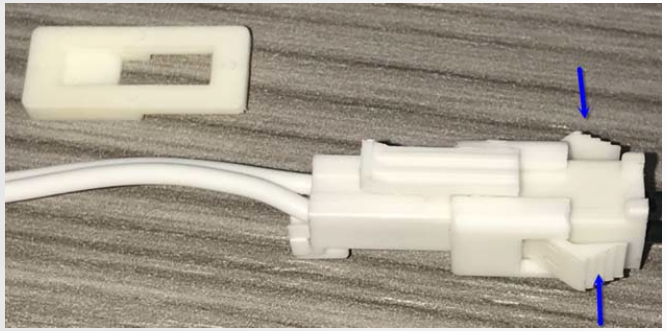


Button Sensor Remote Installation Tips

5. Carefully disconnect factory T1 Sensor by carefully lifting locking clip, sliding locking clip off, and then squeezing release tabs to disconnect sensor.



6. Connect button sensor to T1 Sensor Wire and re-install locking clip.
7. Remove blue dust cover after mounting the sensor.



CONTROLS PRODUCTS

Button Sensor Remote Thermistor

VRF Controls and Accessories
40VM900009 - Button Sensor

Carrier
United Technologies

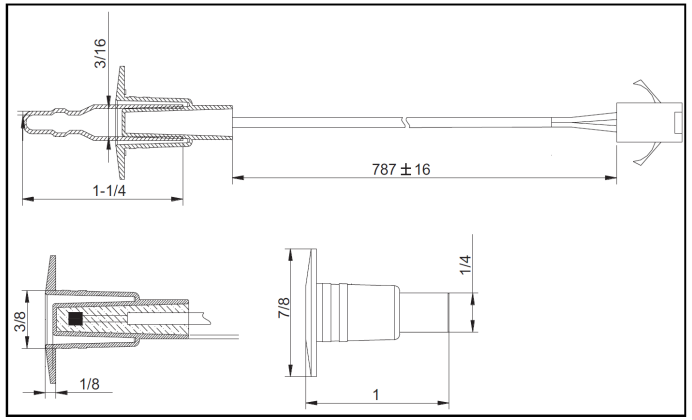
Submittal Data

Job Data _____ Location _____
Buyer _____ Buyer PO # _____ Carrier # _____
Unit Number _____ Model Number _____
Performance Data Certified By _____ Date _____

40VM900009 - Button Sensor Features

- Thermistor Type: 10k-2
- Length 65 feet
- Paintable with Latex or Oil-Based Paint
- Compatible with all 40VM series Indoor Units *except* 40VMA Outside Air Unit
- For applications requiring low-profile space temperature sensor

DIMENSIONAL DRAWING



NOTE: All dimensions shown in inches

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

Printed in U.S.A. Form 40VM900009-C-1SD Pg 1 12-18 Replaces: New

Submittal Drawings
(HVAC Partners)

2

NETWORK & CENTRAL CONTROLLERS

NETWORK & CENTRAL CONTROLLERS

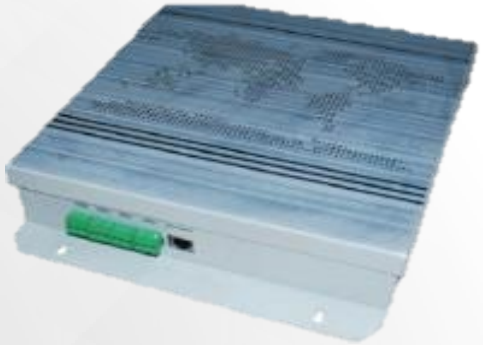
Overview

Energy Management Module (EMM)（40VM900051）

Touchscreen Centralized Controller (40VM900006)

BACnet/IP (40VM900052)

LONWORKS (40VM900053)



NETWORK & CENTRAL CONTROLLERS

Central Control Overview

TOUCHSCREEN CENTRALIZED CONTROLLER

(40VM900006)

- 10.1 inch screen, 1200*800 resolution
- 3 level of account management ,can set up 20 users
  - 2 administrators and 18 normal users are included
- Remote access
- Alarm notification via email
- Fire alarm and interacting information, 4 path DI and DO
- Recognize units automatically
- Controls up to 384 IDU
- Mode Setting, Fan Speed Setting, Set-point Display
- Swing Setting
- Dual set-point control
- Set temperature range limiting
- Error Display
- Clock & Weekly Scheduling

NETWORK & CENTRAL CONTROLLERS

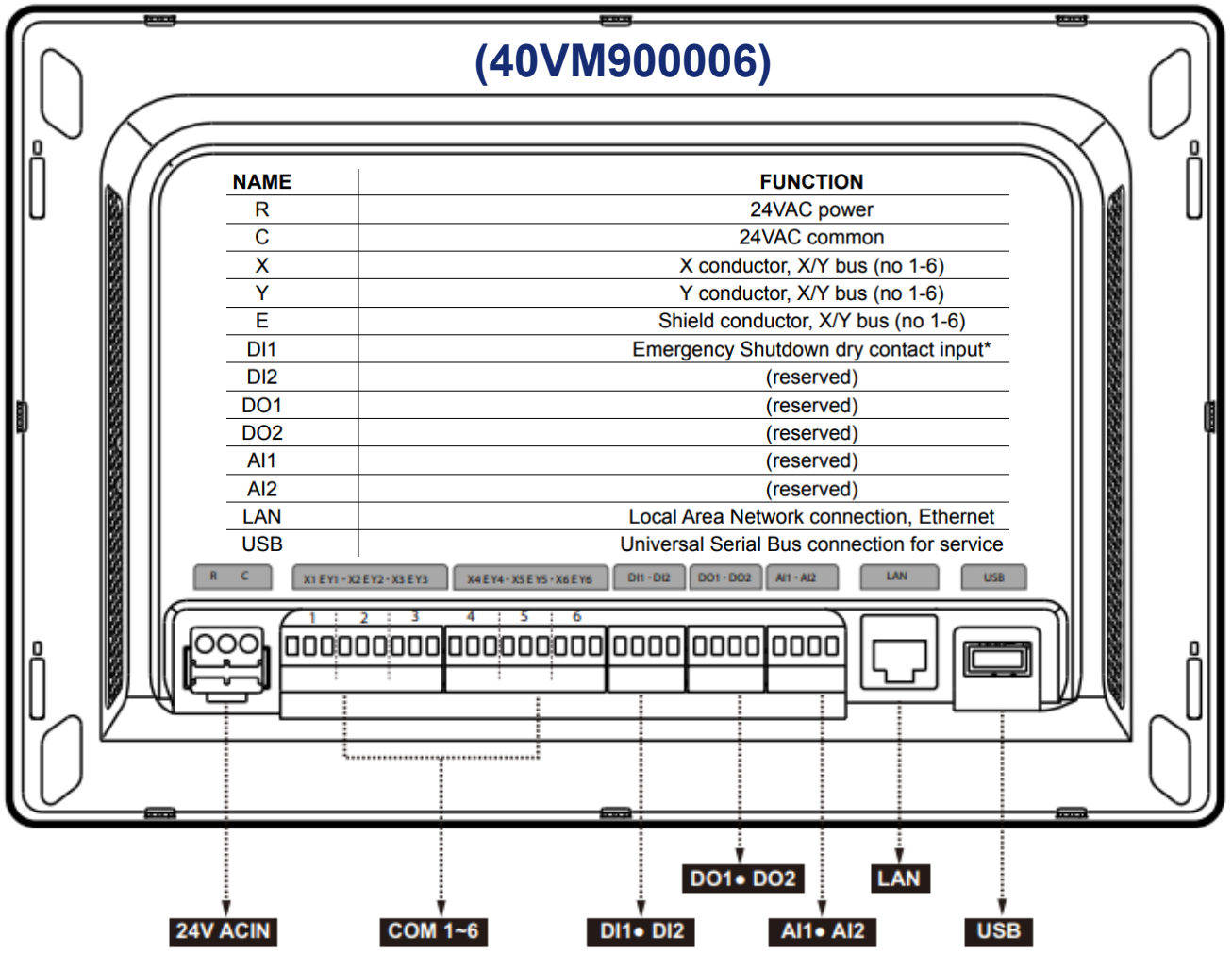
Central Control Overview

TOUCHSCREEN CENTRALIZED CONTROLLER (40VM900006)

Each channel can support up to 64 indoor units and/or 8 systems.

NETWORK & CENTRAL CONTROLLERS

Connection Description

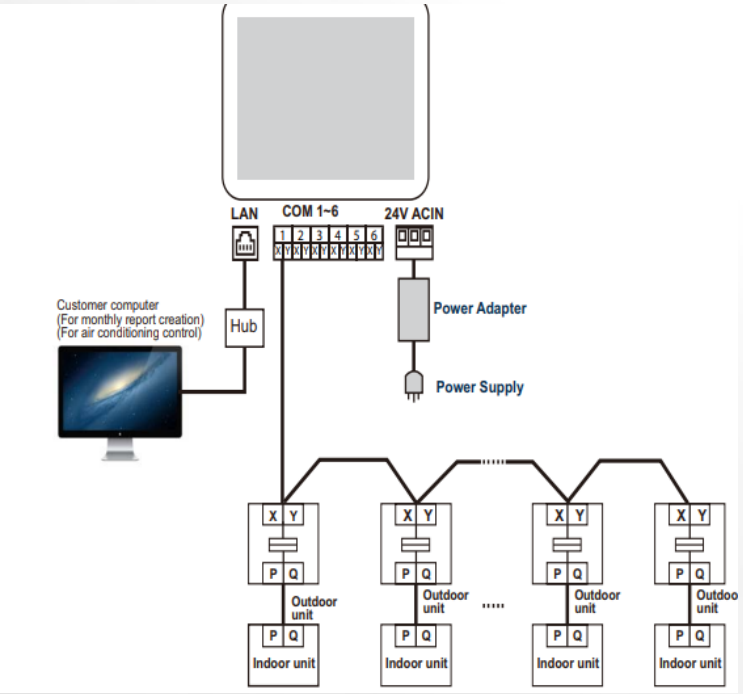


NETWORK & CENTRAL CONTROLLERS

Wire the Controller

Control Wire: Use 16 to 20 AWG (American Wire Gage), stranded twisted pair shielded 2-core wiring (copper wire). The controller has 6 central control bus (X/Y) lines. Each line can support up to 8 refrigerant systems and 64 indoor units, maximum. a. Using control wire, connect outdoor units' X/Y central control bus terminals in a "daisy chain" configuration b. Connect the terminating end to the Central Controller's designated X/Y line (#1 through 6). c. For larger Heat Pump systems with dual or triple modules on a refrigerant system, wire X/Y daisy chain only to the Header outdoor unit of each refrigerant system.

Connect field-supplied 24VAC power (copper wire) to R and C terminals.
Connect Ethernet to LAN where applicable.

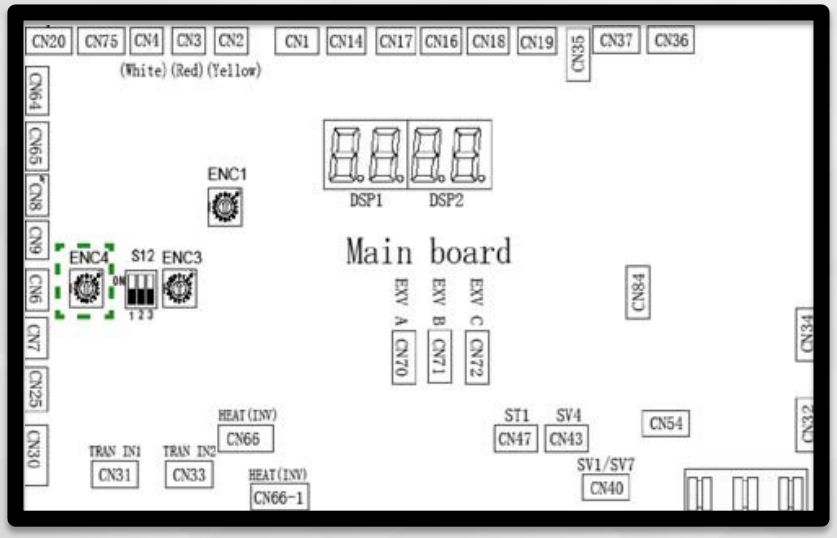


NETWORK & CENTRAL CONTROLLERS

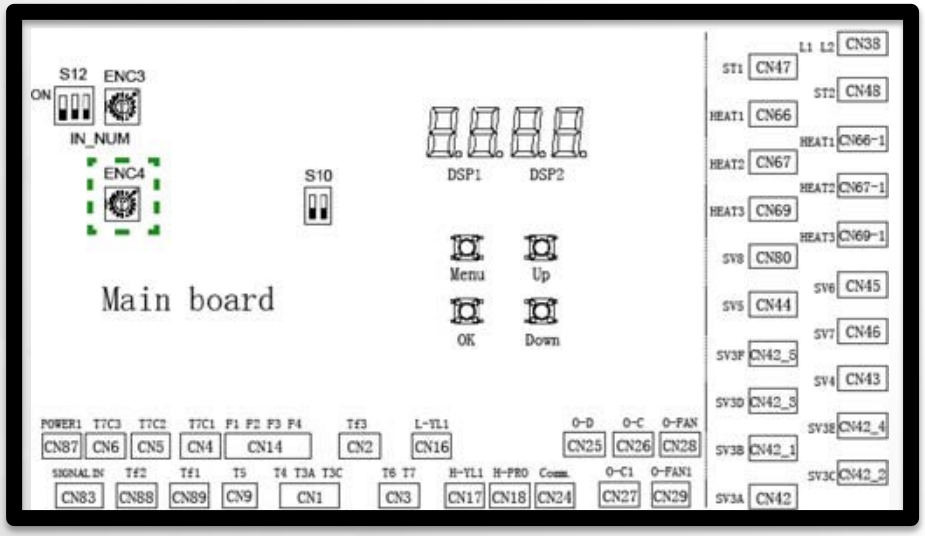
Setting the Network Address

Make sure each outdoor unit / refrigerant system has its own unique network address: 0-7. Set by turning rotary encoders shown below (ENC4 for 3-Phase Heat Pump and Heat Recovery; ENC2 for single Phase Heat Pump). For larger Heat Pump systems with dual or triple modules, set all addresses the same for each module within the refrigerant system.

Heat Pump ENC4



Heat Recovery ENC4



NETWORK & CENTRAL CONTROLLERS

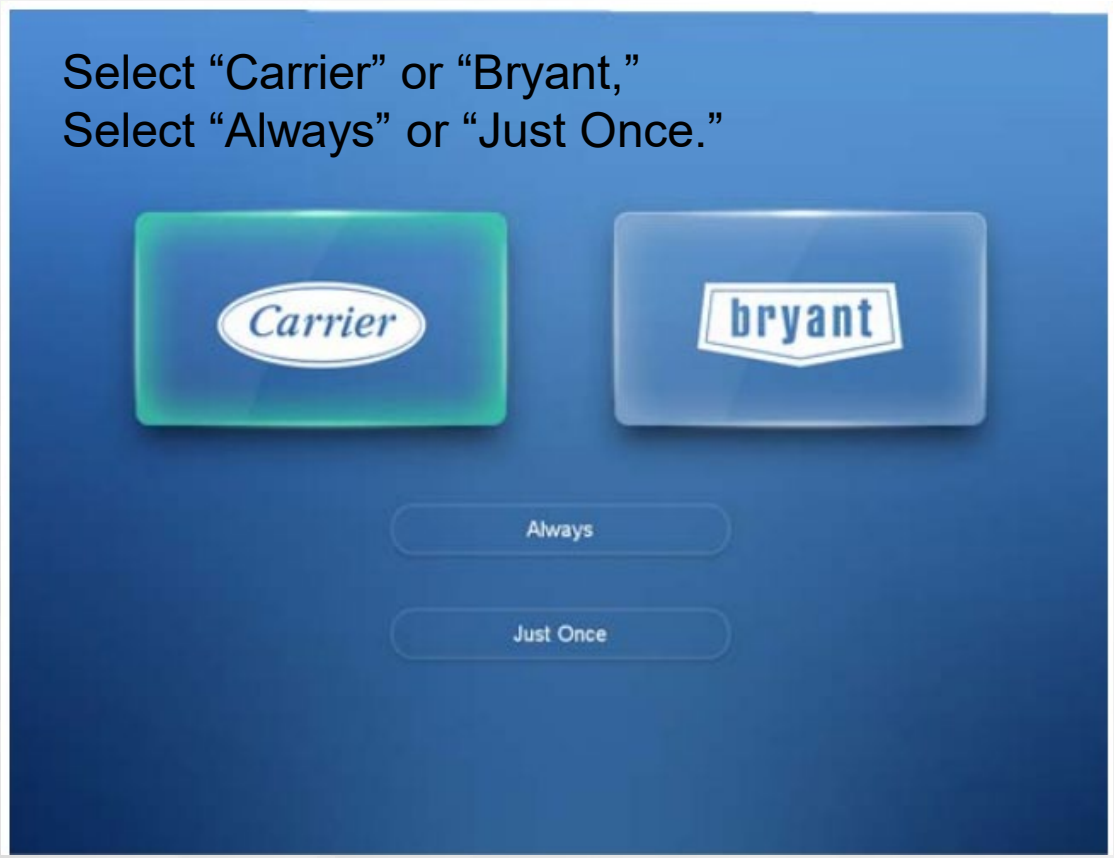
Start-up

Power on the controller. The following splash screen will be briefly displayed:

NETWORK & CENTRAL CONTROLLERS

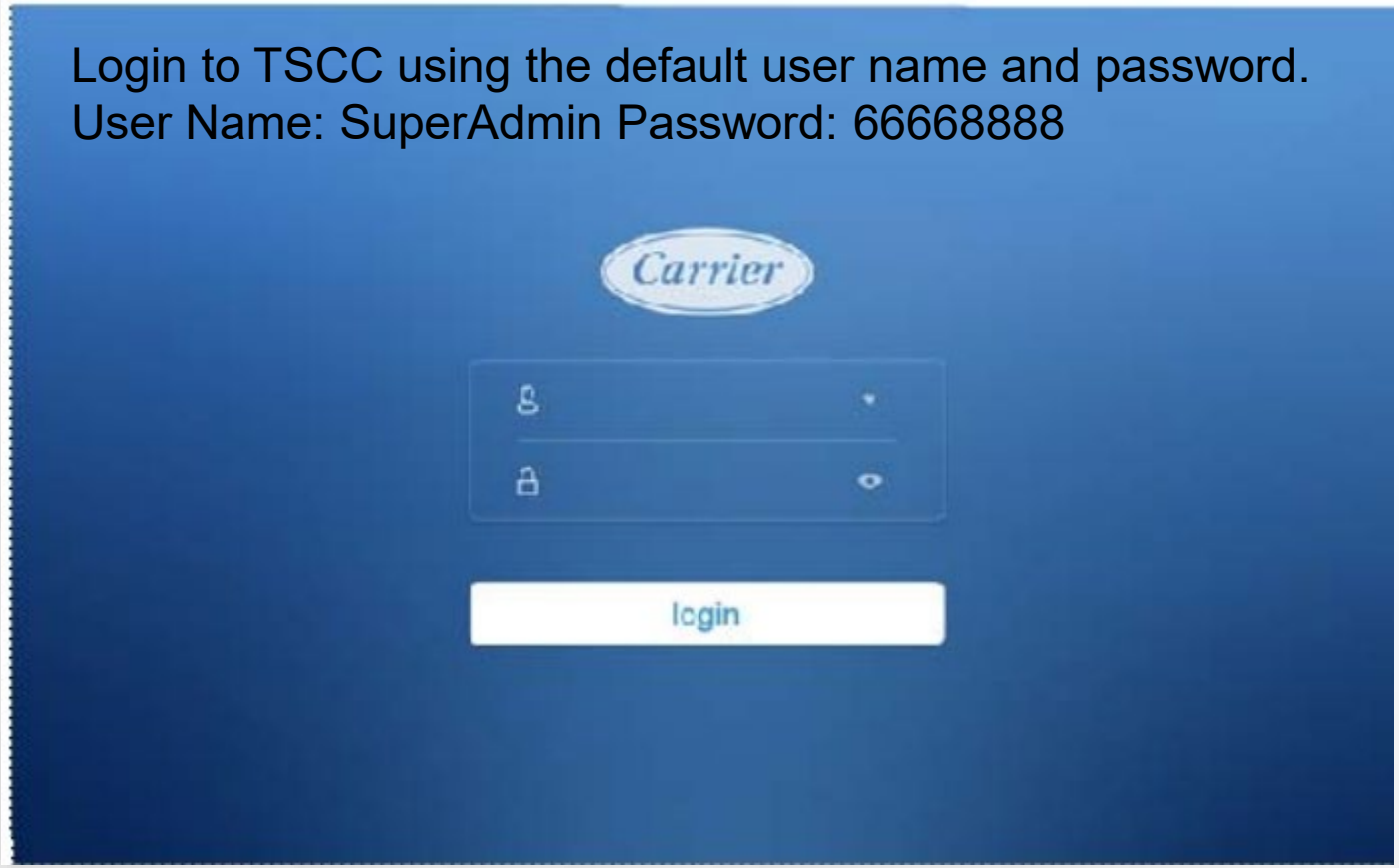
Login / Brand Selection (Carrier or Bryant)

The following screen will be displayed:



NETWORK & CENTRAL CONTROLLERS

Carrier Login Screen



NETWORK & CENTRAL CONTROLLERS

Carrier Home Screen

NETWORK & CENTRAL CONTROLLERS

Auto Search

The Touch Screen Central Controller can automatically search and connect to the system's connected units. Devices connected to the controller are automatically searched for and registered. You can register a device automatically as follows.

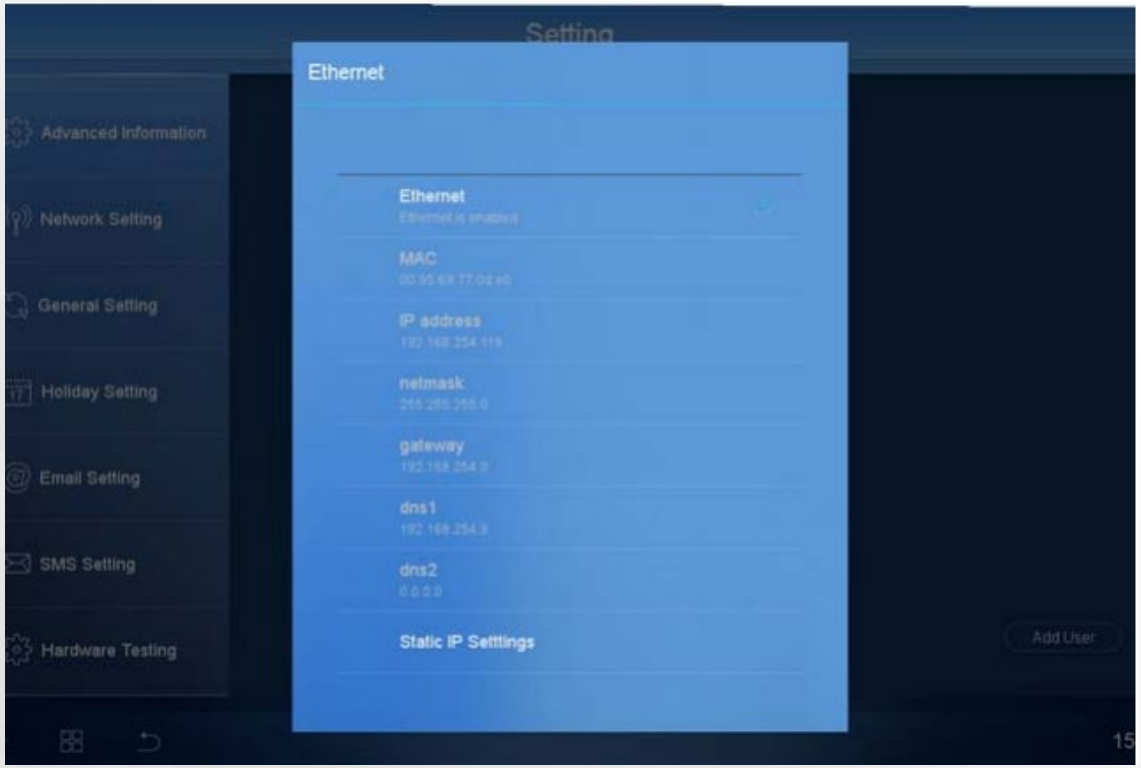
1. In the main menu, click the [Install] menu icon.
2. 2. Click the [Auto Search] button.

NETWORK & CENTRAL CONTROLLERS

Web Interface Instructions

Set Up — Make sure the touch screen central controller and the computer are on the same local area network.

1. Under Setting/Network Setting, set the controller's IP address, subnet mask, and default gateway. Typically, Ethernet with Static IP is selected. Make note of the IP address for Web login.

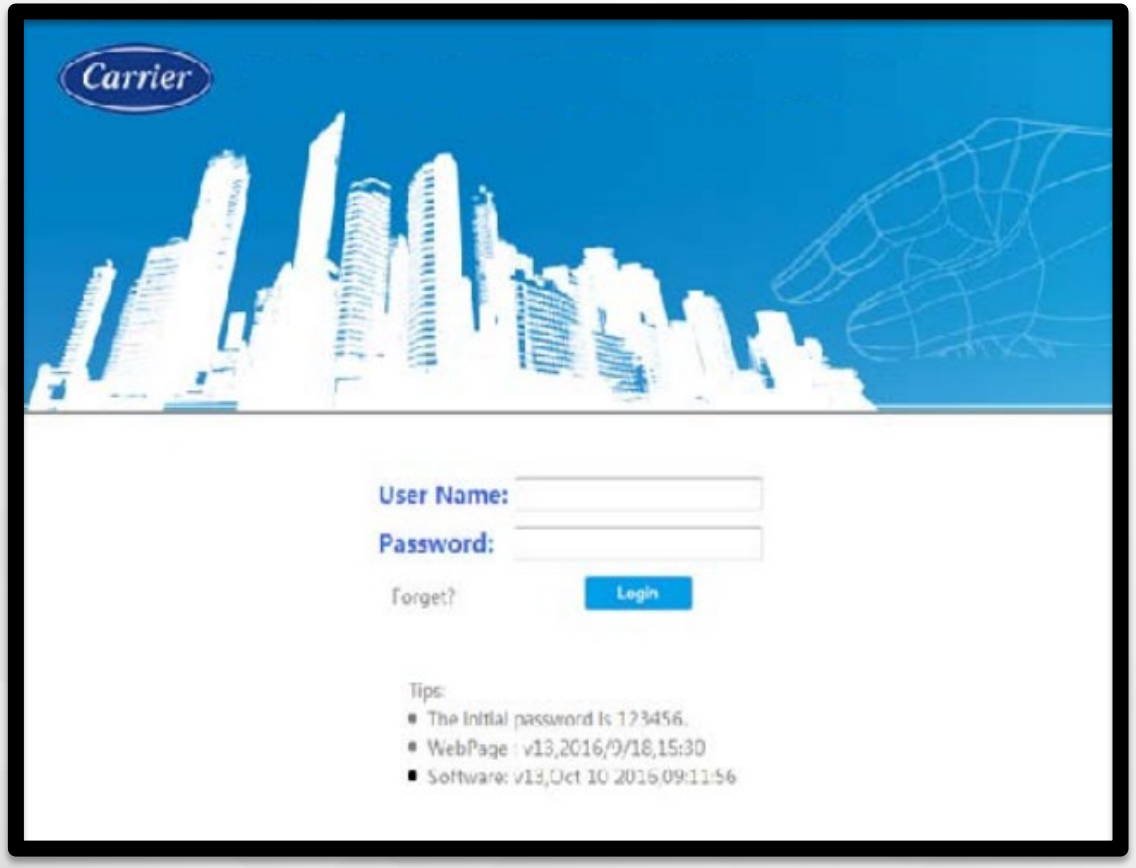


NETWORK & CENTRAL CONTROLLERS

Web Interface Instructions

Input the Controller's IP address in the computer's web browser.
Log in with the User Name and Password.

Login Screen



NETWORK & CENTRAL CONTROLLERS

Logging into the Touch Screen Central Controller

The touch screen central controller provides one Administrator and 384 users accounts.
The administrators user name is Admin.
The administrator's original password is 123123.
The user's original password is 123456.

1. Administrators and users log into the system using the original password. The following message displays:

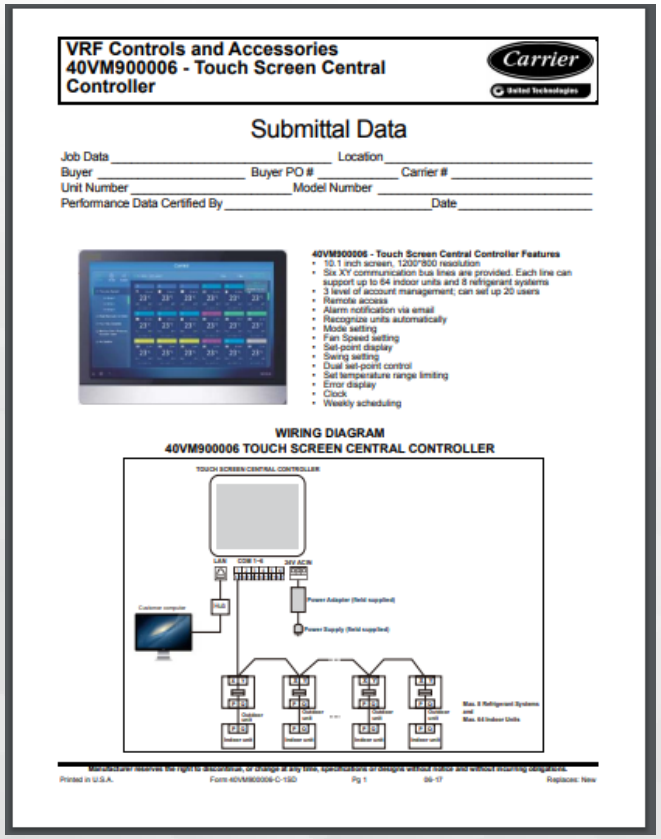
NETWORK & CENTRAL CONTROLLERS

Change Password Prompt

2. Click [OK], and the following screen displays:

NETWORK & CENTRAL CONTROLLERS

Interface Information on HVACPartners



VRF Controls and Accessories
40VM900006 - Touch Screen Central Controller

Carrier

Submittal Data

Job Data _____ Location _____
Buyer _____ Buyer PO # _____ Carrier # _____
Unit Number _____ Model Number _____
Performance Data Certified By _____ Date _____

40VM900006 - Touch Screen Central Controller Features
- 10.1 inch screen, 1200*800 resolution
- Six XY communication bus lines are provided. Each line can support up to 64 indoor units and 8 refrigerant systems
- 3 level of account management; can set up 20 users
- Remote access
- Alarm notification via email
- Recognize units automatically
- Mode setting
- Fan Speed setting
- Set-point display
- Swing setting
- Dual set-point control
- Set temperature range limiting
- Error display
- Clock
- Weekly scheduling

WIRING DIAGRAM
40VM900006 TOUCH SCREEN CENTRAL CONTROLLER

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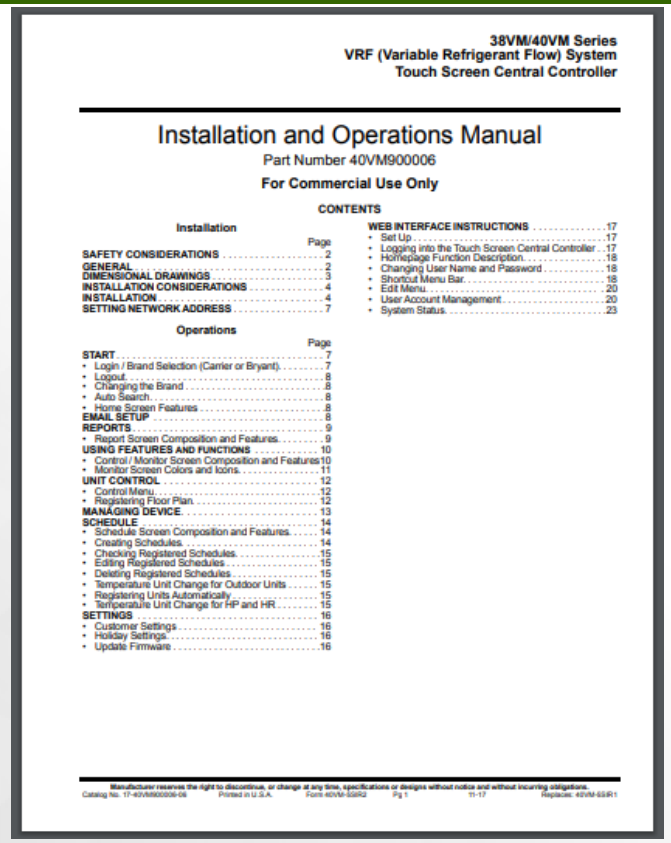
Printed in U.S.A. Form 40VM900006-C-15D Pg 1 06-17 Replaces: New

Submittal Drawings



38VM/40VM Series
VRF (Variable Refrigerant Flow) System
Touch Screen Central Controller

Installation and Operations Manual

Part Number 40VM900006

For Commercial Use Only

CONTENTS

Installation

Operations

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.
Catalog No. 17-40VM900006-06 Printed in U.S.A. Form 40VM-SSR2 Pg 1 11-17 Replaces: 40VM-SSR1

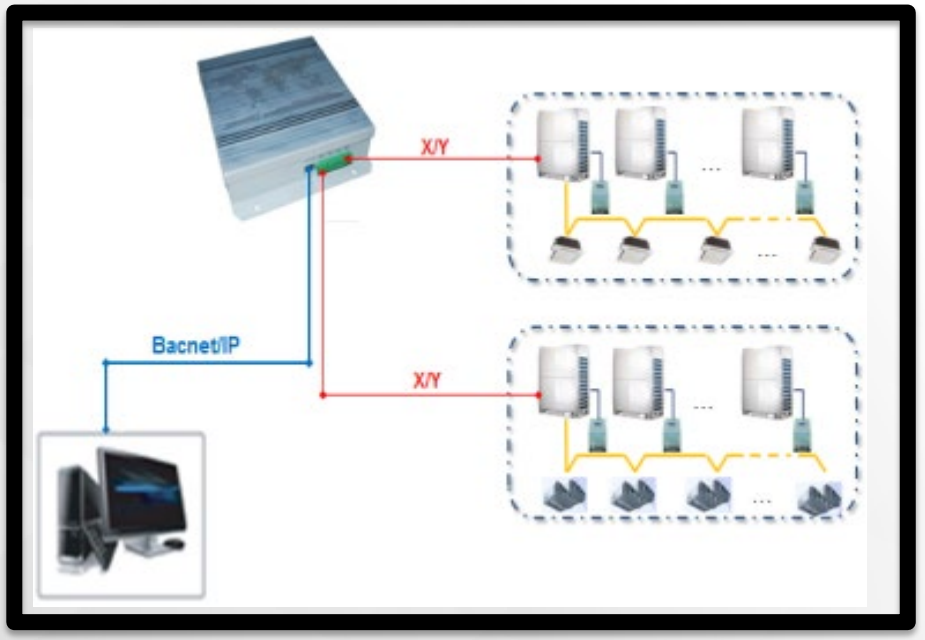
Installation & Start Up

NETWORK & CENTRAL CONTROLLERS

BACnet Interface

BACnet/IP (40VM900052)

- Four ports, each port can access 64 indoor units or 8 refrigeration systems
- WEB service allows log in through web
- Indoor unit
  - Temperature set
  - Indoor temperature
  - Operate mode
  - Error code
  - Set mode
- Outdoor unit
  - Mode
  - Outdoor temperature
  - Error code

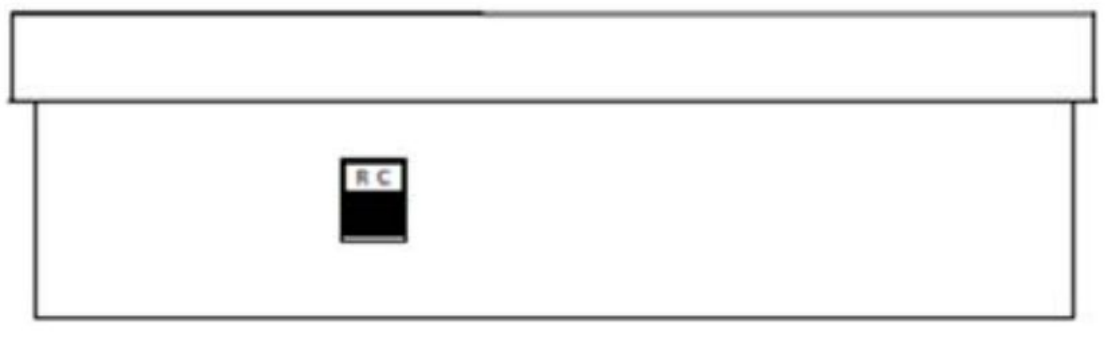


NETWORK & CENTRAL CONTROLLERS

BACnet Interface

The VRF (variable refrigerant flow) BACnet Interface is a wall-mounted, low-voltage controller that provides site level control of multiple VRF systems. The BACnet Interface provides BACnet IP communications with VRF system(s). In addition, it provides central management of mode, setpoint, and scheduling of indoor units (IDUs) through its web browser interface.

Field-provided 24VAC Power Wire: Use copper wire rated for at least 1A. Follow the applicable electrical codes.



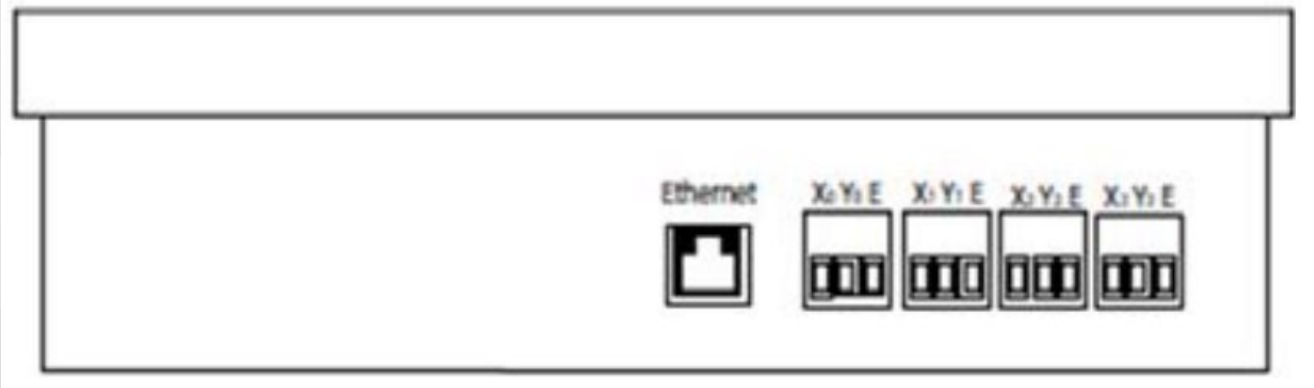
NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Control Wiring

1. Control Wire: Use 16 to 20 AWG (American Wire Gage), stranded twisted pair shielded 2-core wiring (copper wire). Note: The controller has 4 central control bus (X/Y) lines. Each line can support up to 8 refrigerant systems and 64 indoor units, maximum.

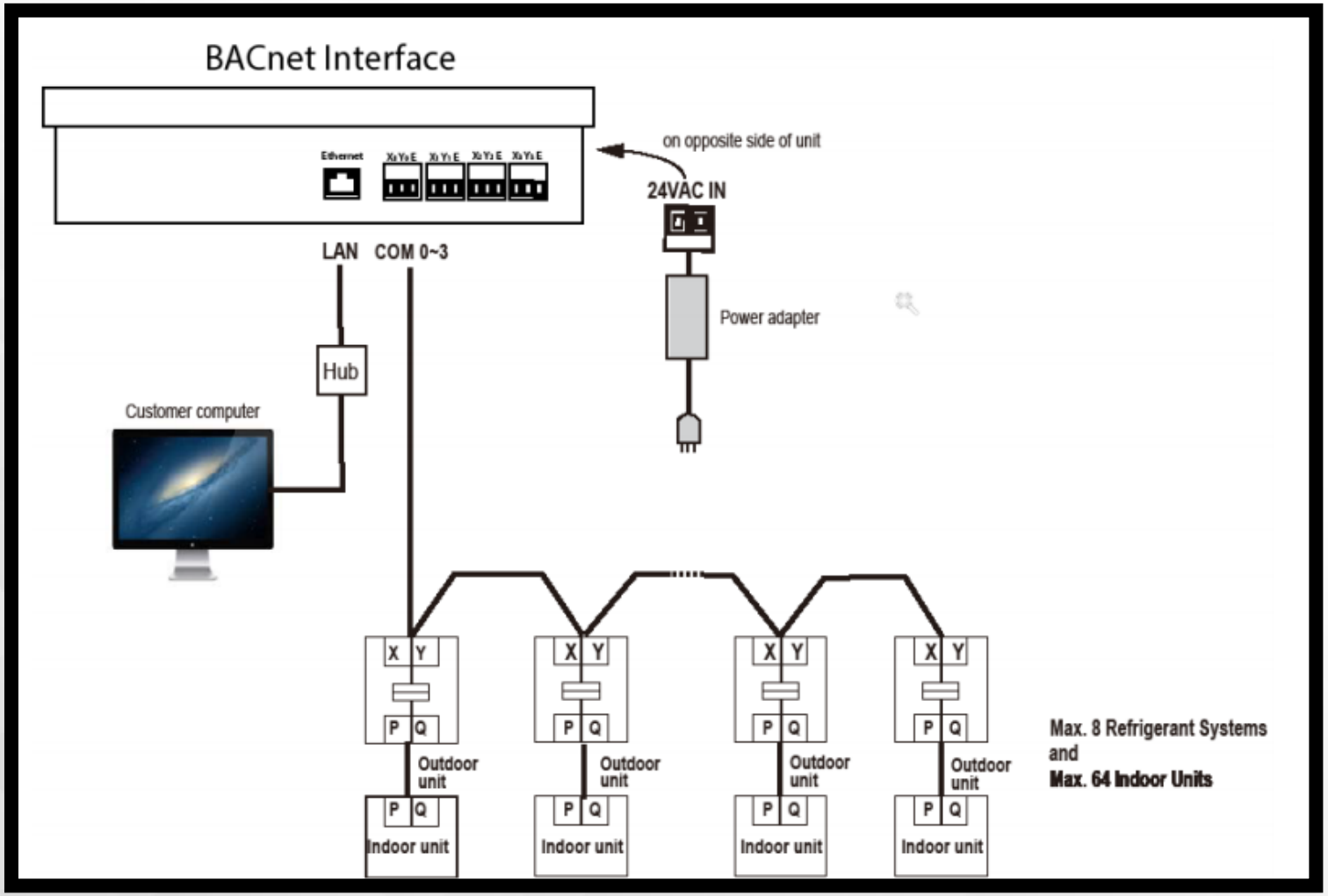
2. Using control wire, connect outdoor units (X/Y central control bus terminals) in a daisy chain configuration. Connect terminating end to the Central Controller's designated X/Y lines (0-3).

3. For larger heat pump systems with dual or triple modules on a refrigerant system, wire X/Y daisy chain only to the Header outdoor unit of each refrigerant system. See Figure 4.



NETWORK & CENTRAL CONTROLLERS

BACnet Interface – System Wiring Diagram

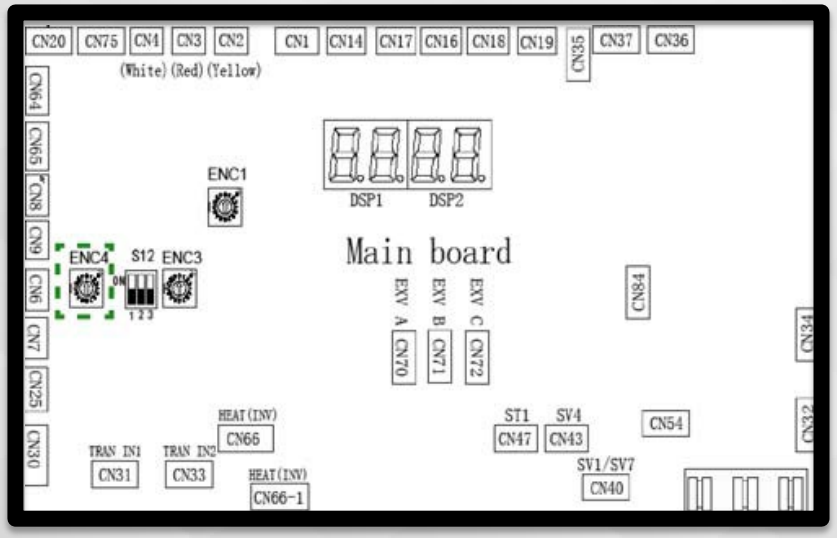


NETWORK & CENTRAL CONTROLLERS

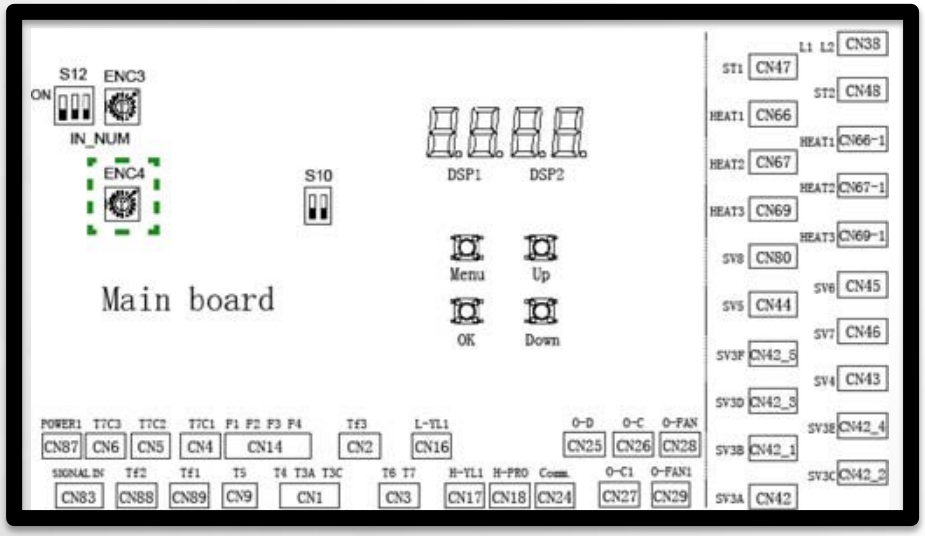
BACnet Interface – Setting Network Address

Make sure each outdoor unit / refrigerant system has its own unique network address: 0-7. Set by turning rotary encoders shown below (ENC4 for 3-Phase Heat Pump and Heat Recovery; ENC2 for single Phase Heat Pump). For larger Heat Pump systems with dual or triple modules, set all addresses the same for each module within the refrigerant system.

Heat Pump ENC4



Heat Recovery ENC4



NETWORK & CENTRAL CONTROLLERS

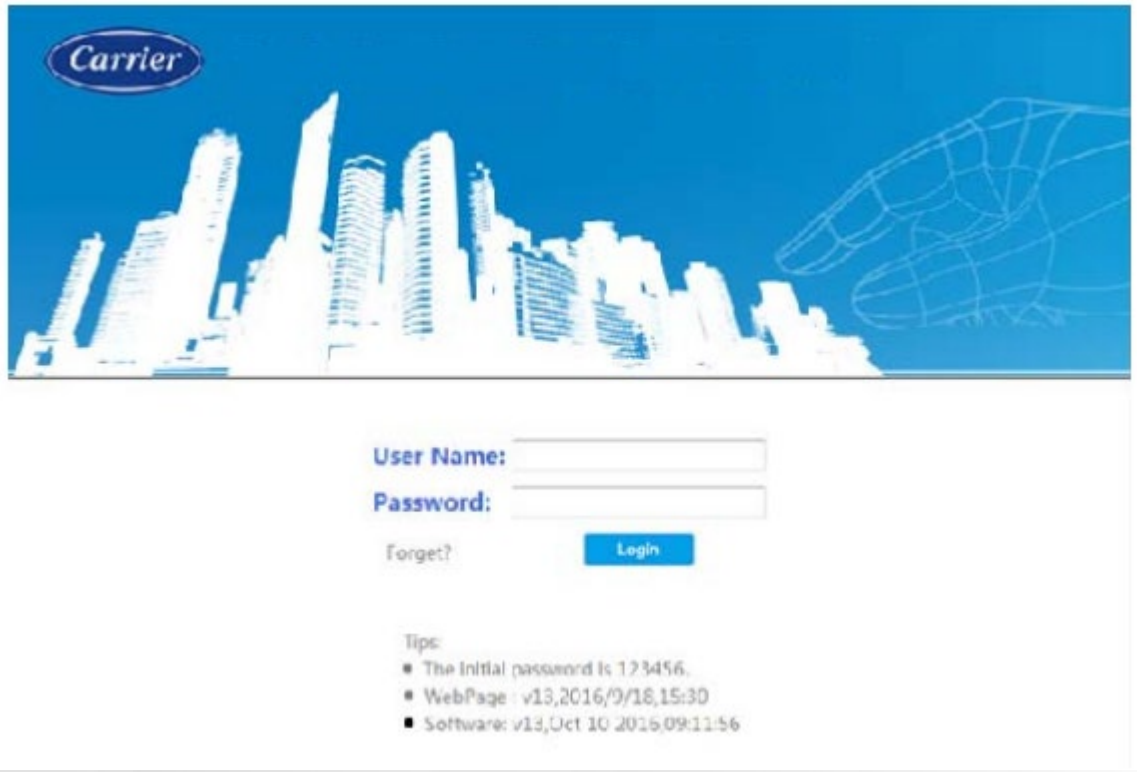
BACnet Interface – Initial Start-up

The BACnet Interface and the computer are connected to the same LAN.

The default IP address of BACnet is 192.168.1.8.

1. Change the IP address of the computer to the same network segment as BACnet: i.e. 192.168.1.x (x cannot be 8)

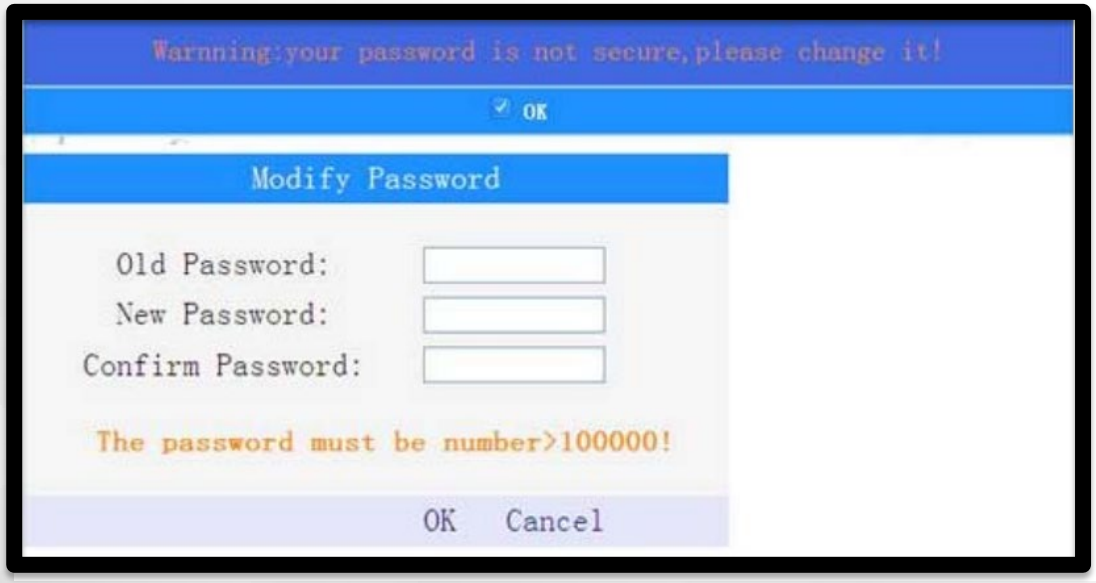
2. Enter 192.168.1.8 in browser.



NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Login Screen

The BACnet interface provides one administrator and 384 user privileges. The administrator's login is "Admin" and the initial password is 123456. When using the initial password to login, the system will remind: "your password is not secure, please change it!"



NOTES:

1. The computer operating system currently supports Windows 7 (32-bit, 64-bit) and later.
2. The web browser currently supports IE9 and later, Google Chrome18.0 and later, and Firefox1.5 and later. 3. The computer screen resolution requirement is no less than 1280 * 800.

NETWORK & CENTRAL CONTROLLERS

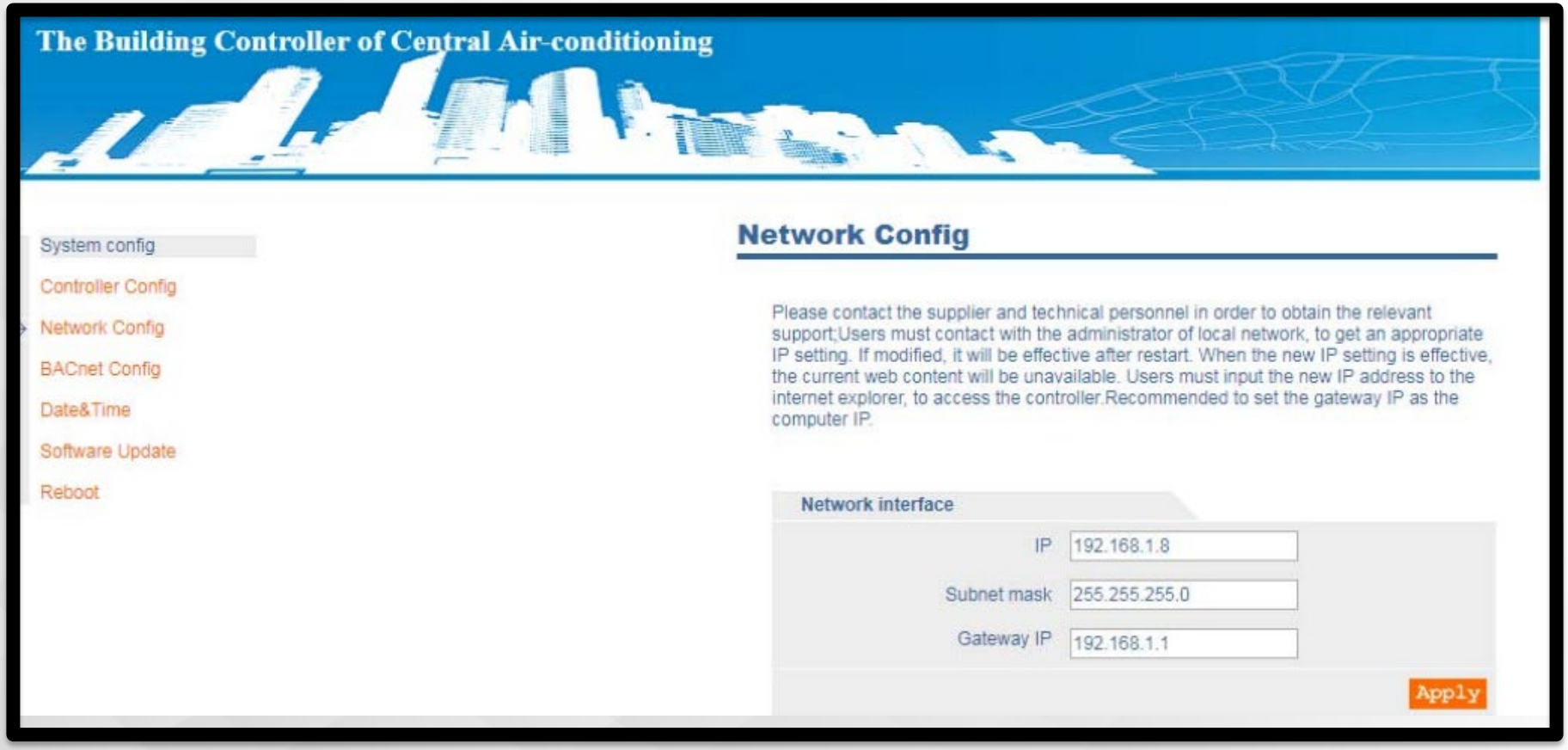
BACnet Interface – Controller Configuration

In the drop-down menus, you can select the mode of each of the Interface's four X/Y/E buses. Buses can be set to Polling Mode, Listening Mode, or Idle. Click "Apply" after making desired changes.

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Controller Configuration

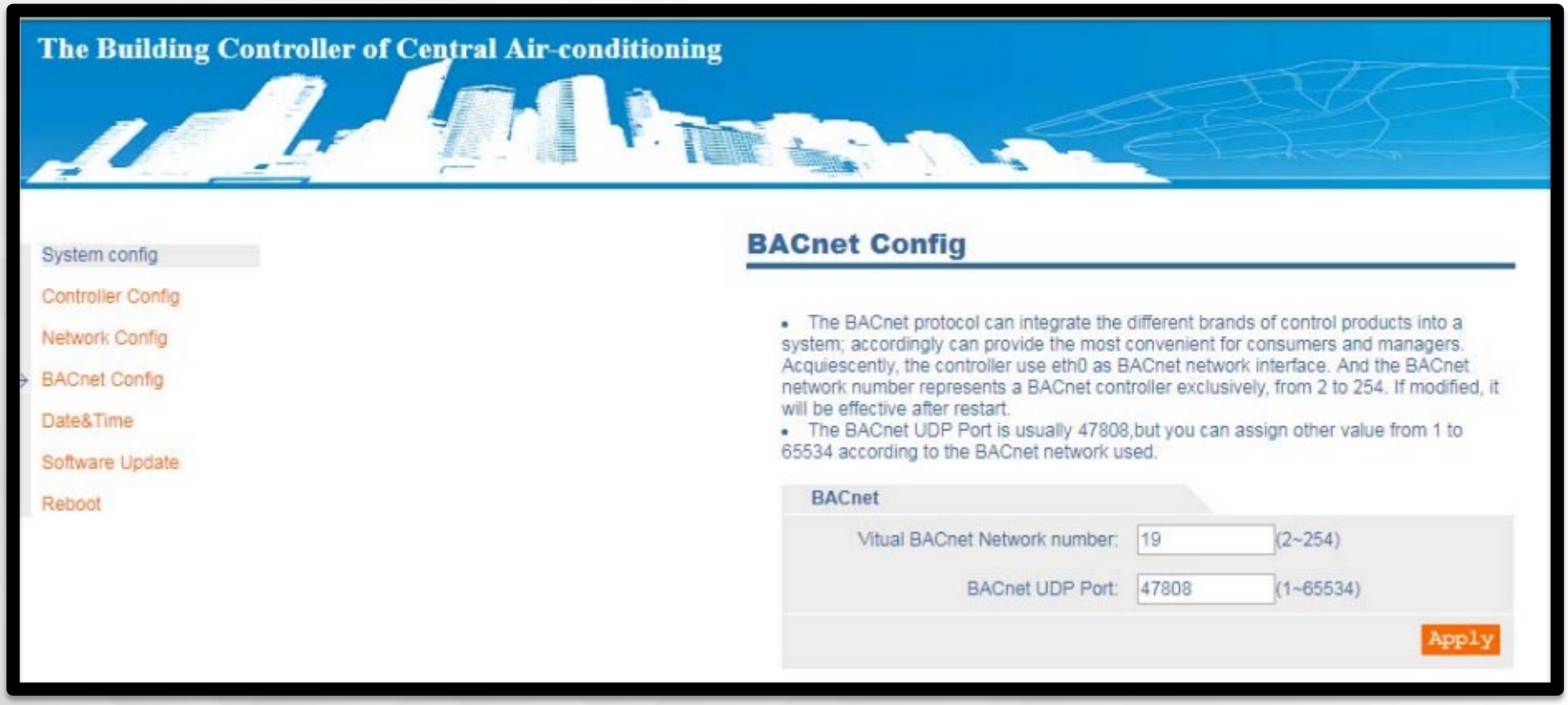
This page is used to set the static IP address, subnet mask, and default gateway of the interface.



NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Configuration

This menu is used to select the virtual BACnet network number and UDP port.



NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Software Update

This feature is for updating the system firmware.

1. As necessary, obtain firmware update file from factory representative.
2. Store on PC connecting to BACnet Interface. This file will be a ".tar" extension.
3. Select "Choose File" to browse to the ".tar" file directory in the PC.
4. Select "Upload"; and the system will install the update and prompt to restart.

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – IP Address Hard Reset

After powering on the device, connect XYE port 0 and port 1 as shown in the figure below. After restarting, the IP address will be reset to 192.168.1.8, and the remaining user settings will be retained.

Connect XYE Port 0 and Port 1

AI - Indoor Unit Objects

Name	Instance Number	Description
IDU_AI_RoomTemp	AI 1	Room temperature status
IDU_AI_SetTemp	AI 2	Setting temperature status
IDU_AI_DualPointCoolingStatus	AI 3	Dual point cooling status
IDU_AI_DualPointHeatingStatus	AI 4	Dual point heating status
IDU_AI_CoolTempLimitStatus	AI 5	Cooling temperature limit status
IDU_AI_HeatTempLimitStatus	AI 6	Heating temperature limit status
IDU_AI_MalfunctionCode	AI 7	Malfunction code
IDU_AI_OutletAirTemp (IDU_AI_T2Temp)	AI 8	Outlet air temperature or T2 temperatur

AO - Indoor Unit Objects

IDU_A0_TempSetting	A0 1	Setting temperature
IDU_A0_DualPointCoolingSetting	A0 2	Dual point cooling setting
IDU_A0_DualPointHeatingSetting	A0 3	Dual point heating setting
IDU_A0_CoolTempLimitSetting	A0 4	Cooling temperature limit
IDU_A0_HeatTempLimitSetting	A0 5	Heating temperature limit

BI - Indoor Unit Objects

IDU_BI_OnOffStatus	BI 1	On/Off status
IDU_BI_Alarm	BI 2	Alarm identification
IDU_BI_VaneHorizontalStatus	BI 3	Vane horizontal status
IDU_BI_VaneVerticalStatus	BI 4	Vane vertical status
IDU_BI_RCLockStatus	BI 5	RC lock status
IDU_BI_ControllerLockStatus	BI 6	Controller lock status
IDU_BI_SwingLockStatus	BI 7	Swing lock status

BO - Indoor Unit Objects

IDU_B0_OnOffSetting	B0 1	On/Off setting
IDU_B0_VaneHorizontalSetting	B0 2	Vane horizontal setting
IDU_B0_VaneVerticalSetting	B0 3	Vane vertical setting
IDU_B0_RCLockSetting	B0 4	RC lock setting
IDU_B0_ControllerLockSetting	B0 5	Controller lock setting
IDU_B0_SwingLockSetting	B0 6	Swing lock setting

MI - Indoor Unit Objects

IDU_MI_ModeStatus	MI 1	Mode status
IDU_MI_FanSpeedStatus	MI 2	Fan speed status
IDU_MI_ModeLimitStatus	MI 3	Mode lock status
IDU_MI_OnOffLimitStatus	MI 4	On/Off lock status
IDU_MI_FanLockStatus	MI 5	Fan lock status

MO - Indoor Unit Objects

IDU_M0_ModeSetting	M0 1	Mode setting
IDU_M0_FanSpeedSetting	M0 2	Fan speed setting
IDU_M0_ModeLimitSetting	M0 3	Mode lock setting
IDU_M0_OnOffLimitSetting	M0 4	On/Off lock setting
IDU_M0_FanLockSetting	M0 5	Fan lock setting

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Supported Indoor Units

If the model connected is not supported by the 40VM900053 BACnet interface, the ‘Unknown IDU Type’ is displayed.

IDU Type Number	IDU Type
0	CASS
1	HWALL
2	MDUCT
3	LDUCT
4	VERT
5	HDUCT
6	SCASS
7	UCF
8	FLRCR
10	OA
11	ERV I/O

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – IDU On/Off Setting

• Object-identifier:Binary-Output 1 • Object-name : IDU_BO_OnOffSetting

Name	Value
object-identifier	(B0, 1)
object-name	“IDU_BO_OnOffSetting”
object-type	binary-output
description	“On/Off Setting”
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
device-type	“”
present-value	inactive
inactive-text	“off”
active-text	“on”
polarity	normal
reliability	no-fault-detected
priority-array	{NULL, NULL, NULL, NULL...}
relinquish-default	inactive

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Running Mode Setting : Multistate-Output 1

If the Indoor Unit supports automatic mode, the Interface automatically detects the type of system and Indoor Unit it is connected to.

IDUs that Support Automatic Mode

Property Name	Property Value
object-identifier	(multistate-output, 1)
object-name	“IDU_MO_ModeSetting”
object-type	multistate-output
present-value	1
description	“Mode Setting”
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
number-of-states	6
state-text	{OFF, FAN, COOL, HEAT, AUTO, DRY}
priority-array	{NULL, NULL, NULL, NULL...}
relinquish-default	1
reliability	no-fault-detected

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Running Mode Setting : Multistate-Output 1

- Object-identifier : Multistate-Output 1
- Object-name : IDU_MO_ModeSetting Present-Value: a readable a

Property Name	Property Value
object-identifier	(multistate-output, 1)
object-name	“IDU_MO_ModeSetting”
object-type	multistate-output
present-value	3
description	“Mode Setting”
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
number-of-states	6
state-text	{OFF, FAN, COOL, HEAT, Reserved, DRY}
priority-array	{NULL, NULL, NULL, NULL...}
relinquish-default	1
reliability	no-fault-detected

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Running Mode Setting : Multistate-Output 1

Present Value

Models that support automatic mode	Models that do not support automatic mode	Number
Power off	Power off	1
Fan	Fan	2
Cooling	Cooling	3
Heating	Heating	4
Auto	N/A	5
Dry	Dry	6
ERV	**New Indoor Units**	

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Fan Speed Setting Multistate Output 2

• Object-identifier : Multistate-Output 2 • Object-name : IDU_MO_FanSpeedSetting
Present-Value: a readable and writable value stands for the air speed of this indoor unit.

Speed Setting	Number
off	1
low	2
med	3
high	4
auto	5

Property Name	Property Value
object-identifier	(multistate-output, 2)
object-name	"IDU_MO_FanSpeedSetting"
object-type	multistate-output
present-value	4
description	"Fan Speed Setting"
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
number-of-states	5
state-text	{OFF, LOW, MEDIUM, HIGH, AUTO}
priority-array	{NULL, NULL, NULL, NULL...}
relinquish-default	1
reliability	no-fault-detected

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Temperature Setting

• Object-identifier : Analog-Output 1 • Object-name : IDU_AO_TempSetting
Present-Value : 62~86° : 54~86°

Name	Value
object-identifier	(A0, 1)
object-name	“IDU_AO_TempSetting”
object-type	analog-output
description	“Temperature Setting”
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
device-type	“”
present-value	22
units	degrees-Celsius
reliability	no-fault-detected
min-press-value	12
max-press-value	30
resolution	1
priority-array	{NULL, NULL, NULL, NULL...}
relinquish-default	25
cov-increment	1

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Horizontal Swing Setting

• Object-identifier : Binary-Output 2 • Object-name : IDU_BO_VaneHorizontalSetting Present-Value: a readable and writable value stands for the settings of Horizontal Swing of this indoor unit.

Present Value

Status	Number
Horizontal Swing off	0
Horizontal Swing on	1

Name	Value
object-identifier	(B0, 2)
object-name	"IDU_BO_VaneHorizontalSetting"
object-type	binary-output
description	"Vane Horizontal Setting"
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
device-type	""
present-value	inactive
inactive-text	"off"
active-text	"on"
polarity	normal
reliability	no-fault-detected
polarity-array	{NULL, NULL, NULL, NULL...}
relinquish-default	inactive

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Vertical Swing Setting

• Object-identifier : Binary-Output 3 • Object-name : IDU_BO_VaneVerticalSetting Present-Value: a readable and writable value stands for the settings of Vertical Swing of this indoor unit.

Name	Value
object-identifier	(B0, 3)
object-name	“IDU_BO_VaneVerticalSetting”
object-type	binary-output
description	“Vane Vertical Setting”
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
device-type	“”
present-value	inactive
inactive-text	“off”
active-text	“on”
polarity	normal
reliability	no-fault-detected
polarity-array	{NULL, NULL, NULL, NULL...}
relinquish-default	inactive

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Auto Mode Dual Set Point Heating Temperature Setting

Object-identifier : Analog-Output 3
Object-name : IDU_AO_DualPointHeatingSetting

Name	Value
object-identifier	(A0, 3)
object-name	"IDU_AO_DualPointHeatingSetting"
object-type	analog-output
description	"Dual Point (Heating) Setting"
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
device-type	""
present-value	65
units	degrees-Fahrenheit
reliability	no-fault-detected
min-press-value	54
max-press-value	86
resolution	1
priority-array	{NULL, NULL, NULL, NULL...}
relinquish-default	70
cov-increment	1

Auto Mode Dual Set Point Heating Temperature Setting

Present-Value: a readable and writable value, stands for present heating temperature setting value of this indoor unit.
Centigrade: 12~30; Fahrenheit 54~86. This variable is valid only when the indoor unit operation mode is set to the automatic mode.

- Analog-Output 1 IDU_O_TempSetting
- Analog-Output 2 IDU_AO_DualPointCoolingSetting
- Analog-Output 3 IDU_AO_DualPointHeatingSetting
- Analog-Output 2 IDU_AO_DualPointCoolingSetting
- Analog-Output 3 IDU_AO_DualPointHeatingSetting

Auto Mode Dual Set Point Heating Temperature Setting

When the mode is auto, the set temperature is no longer executed according to Analog-Output 1 IDU_O_TempSetting, and both the Analog-Output 2 IDU_AO_DualPointCoolingSetting and the Analog-Output 3 IDU_AO_DualPointHeatingSetting must be set.

When the room temperature reaches the set value of Analog-Output 2 IDU_AO_DualPointCoolingSetting, the indoor unit operates in the cooling mode. When the indoor temperature reaches the set value of Analog-Output 3 IDU_AO_DualPointHeatingSetting, the unit operates in heating mode.

(Only effective on the model has auto mode function)

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Room Temperature

• Object-identifier : Analog-Input 1 • Object-name : IDU_AI_RoomTemp Present-Value: a read-only variable that stands for the present room temperature of this indoor unit.

Name	Value
object-identifier	(AI, 1)
object-name	“IDU_AI_RoomTemp”
object-type	analog-output
description	“Room Temperature”
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
device-type	“”
present-value	25
units	degrees-Celsius
reliability	no-fault-detected
resolution	1
cov-increment	1

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Set Temperature

• Object-identifier : Analog-Input 2 • Object-name : IDU_AI_SetTemp Present-Value: a read-only variable value that stands for the present set temperature of this indoor unit. Range: Fahrenheit 54~86.

Name	Value
object-identifier	(AI, 2)
object-name	"IDU_AI_SetTemp"
object-type	analog-output
description	"Setting Temperature Status"
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
device-type	""
present-value	22
units	degrees-Celsius
reliability	no-fault-detected
resolution	1
cov-increment	1

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Indoor Unit Operation Mode

• Object-identifier : Multistate-Input 1 • Object-name : IDU_MI_ModeStatus Present-Value: a read-only variable value that stands for the present operation mode of this indoor unit.

Property Name	Property Value
object-identifier	(multistate-input, 1)
object-name	“IDU_MI_ModeStatus”
object-type	multistate-input
present-value	1
description	“Mode Status”
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
number-of-states	6
state-text	{OFF, FAN, COOL, HEAT, AUTO, DRY}
reliability	no-fault-detected

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Indoor Unit On/Off State

• Object-identifier : Binary-Input 1 • Object-name : IDU_BI_OnOffStatus Present-Value: a read-only variable value that stands for the present on/off state of this indoor unit.

Present Value

State	Value
on	0
off	1

Property Name	Property Value
object-identifier	(BI, 1)
object-name	“IDU_BI_OnOffStatus”
object-type	binary-input
description	“On/Off Status”
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
device-type	“”
present-value	active
inactive-text	“off”
active-text	“on”
polarity	normal
reliability	no-fault-detected

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Indoor Unit Fan Speed State

• Object-identifier : Multistate-Input 2 • Object-name : IDU_MI_FanSpeedStatus Present-Value: a read-only variable value that stands for the present fan speed state of this indoor unit.

Indoor Fan Speed	Value
fan closed	1
low	2
medium	3
high	4
auto	5

Property Name	Property Value
object-identifier	(multistate-input, 2)
object-name	"IDU_MI_FanSpeedStatus"
object-type	multistate-input
present-value	4
description	"Fan Speed Status"
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
number-of-states	5
state-text	{OFF, LOW, MEDIUM, HIGH, AUTO}
reliability	no-fault-detected

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Auto Mode Dual Set Point Cooling Temperature Setting

• Object-identifier : Analog-Input 3 • Object-name : IDU_AI_DualPointCoolingStatus Present-Value: a read-only variable value that stands for the present cooling temperature setting value of this indoor unit. Fahrenheit 62~86. (Units: temperature unit, automatic identification)

(Only effective on models that have auto mode)

Name	Value
object-identifier	(AI, 3)
object-name	"IDU_AI_DualPointCoolingStatus"
object-type	analog-output
description	"Dual Point (Cooling)"
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
device-type	""
units	degrees-Fahrenheit
reliability	no-fault-detected
resolution	1
cov-increment	1

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Auto Mode Dual Set Point Cooling Temperature Setting

• Object-identifier : Analog-Input 4 • Object-name : IDU_AI_DualPointHeatingStatus
Present-Value: a read-only variable value that stands for the present heating temperature setting value of this indoor unit. Fahrenheit 54~86.

(Only effective on models that have auto mode)

Name	Value
object-identifier	(AI, 4)
object-name	"IDU_AI_DualPointHeatingStatus"
object-type	analog-output
description	"Dual Point (Heating)"
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
device-type	""
units	degrees-Fahrenheit
reliability	no-fault-detected
resolution	1
cov-increment	1

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Fault Codes

• Object-identifier：Analog-Input 7 • Object-name : IDU_AI_MalfunctionCode Present-Value: a read-only variable value that stands for the present fault code of this indoor unit. The malfunction codes are as follows:

Name	Value
object-identifier	(AI, 7)
object-name	“IDU_AI_MalfunctionCode”
object-type	analog-output
description	“Malfunction Code”
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
device-type	“”
present-value	0
units	no-units
reliability	no-fault-detected
resolution	1
cov-increment	1

Fault codes are only used for debugging functions. The meaning of the specific fault code is subject to the explanation of the service manual.

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Alarm

- Object-identifier : Multistate-Output 1
- Object-name : IDU_MO_ModeSetting Present-Value: inactive/active

Present Value

Status	Value
No fault	0
Fault	1

Name	Value
object-identifier	(BI, 2)
object-name	“IDU_BI_Alarm”
object-type	binary-output
description	“Alarm Identification”
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
device-type	“”
present-value	inactive
inactive-text	“off”
active-text	“on”
polarity	normal
reliability	no-fault-detected

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Evaporator Temperature

• Object-identifier : Analog-Input 8
• Object-name : IDU_AI_T2Temp Present-Value: a read-only variable value that stands for the present evaporator temperature of this indoor unit.

Name	Value
object-identifier	(AI, 8)
object-name	“IDU_AI_T2Temp”
object-type	analog-output
description	“T2 Temperature”
status-flags	(F,F,F,F)
event-state	normal
out-of-service	F
device-type	“”
present-value	24
units	degrees-Celsius
reliability	no-fault-detected
resolution	1
cov-increment	1

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Outdoor Units

There are 20 BACnet objects in the outdoor Header unit and 13 BACnet objects in the outdoor Follower unit for the BACnet building Management system to monitor. Follower units only have input variables The input variables for the Header and Follower are the same.

BACnet Object List of Outdoor Header Unit

Name		Instance Number	Description
ODU_AI_AmbientTemp	1	AI 1	ambient temperature
ODU_AI_CompressorSpeed	2	AI 2	compressor speed
ODU_AI_DischargeTemp1	3	AI 3	discharge temperature 1
ODU_AI_DischargeTemp2	4	AI 4	discharge temperature 2
ODU_AI_DischargeTemp3	5	AI 5	discharge temperature 3
ODU_AI_HighPressure	6	AI 6	high pressure
ODU_AI_LowPressure	7	AI 7	low pressure
ODU_AI_MalfunctionCode	8	AI 8	malfunction code
ODU_AI_Fan1_Speed	9	AI 9	fan 1 speed
ODU_AI_Fan2_Speed	10	AI 10	fan 2 speed

NETWORK & CENTRAL CONTROLLERS

BACnet Interface – Outdoor Units

BACnet Object List of Outdoor Header Unit

ODU_BI_OnOffStatus	1	BI 1	on/off status
ODU_BI_Alarm	2	BI 2	alarm indication

ODU_MI_ModeStatus	1	MI 1	mode status

SYS_MO_AllEnergyLimit	10	MO 10	
SYS_MO_AllTurnOff	11	MO 11	
SYS_MO_AllCoolStopFan	12	MO 12	
SYS_MO_AllHeatStopFan	13	MO 13	
SYS_MO_AllDryContact4On	14	MO 14	
SYS_MO_AllDryContact4Off	15	MO 15	
SYS_MO_AllDryContact4Delay	16	MO 16	

NETWORK & CENTRAL CONTROLLERS

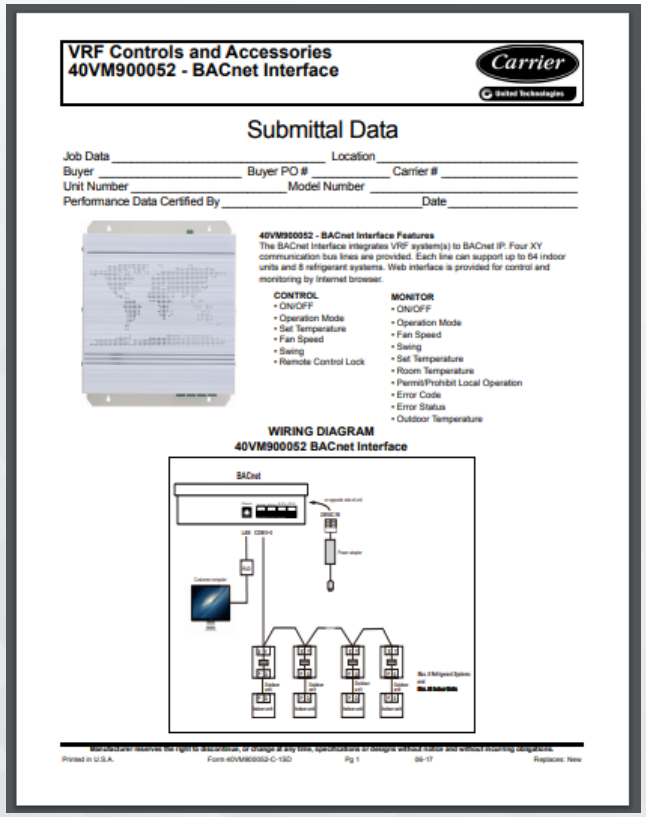
BACnet Interface – Outdoor Units

BACnet Object List of Outdoor Follower Unit

Name		Instance Number	Description
ODU_AI_AmbientTemp	1	AI 1	ambient temperature
ODU_AI_CompressorSpeed	2	AI 2	compressor speed
ODU_AI_DischargeTemp1	3	AI 3	discharge temperature 1
ODU_AI_DischargeTemp2	4	AI 4	discharge temperature 2
ODU_AI_DischargeTemp3	5	AI 5	discharge temperature 3
ODU_AI_HighPressure	6	AI 6	high pressure
ODU_AI_LowPressure	7	AI 7	low pressure
ODU_AI_MalfunctionCode	8	AI 8	malfunction code
ODU_AI_Fan1_Speed	9	AI 9	fan 1 speed
ODU_AI_Fan2_Speed	10	AI 10	fan 2 speed
ODU_BI_OnOffStatus	1	BI 1	on/off status
ODU_BI_Alarm	2	BI 2	alarm indication
ODU_MI_ModeStatus	1	MI 1	mode status

NETWORK & CENTRAL CONTROLLERS

BACnet Interface on HVACPartners



VRF Controls and Accessories
40VM900052 - BACnet Interface

Carrier

Submittal Data

Job Data _____ Location _____
Buyer _____ Buyer PO # _____ Carrier # _____
Unit Number _____ Model Number _____
Performance Data Certified By _____ Date _____

40VM900052 - BACnet Interface Features

The BACnet Interface integrates VRF system(s) to BACnet IP. Four XY communication bus lines are provided. Each line can support up to 64 indoor units and 8 refrigerant systems. Web interface is provided for control and monitoring by Internet browser.

CONTROL
- ON/OFF
- Operation Mode
- Set Temperature
- Fan Speed
- Swing
- Remote Control Lock

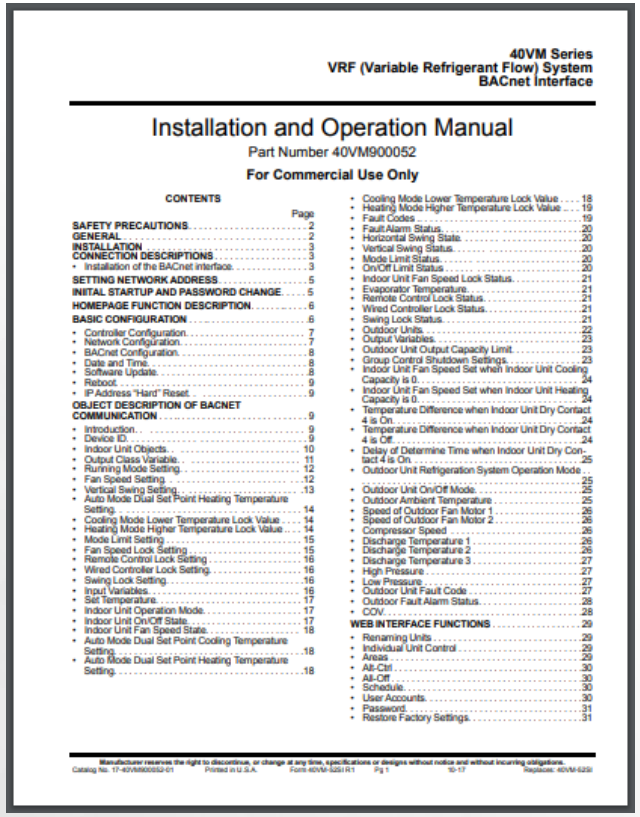
MONITOR
- ON/OFF
- Operation Mode
- Fan Speed
- Swing
- Set Temperature
- Room Temperature
- Permit/Prohibit Local Operation
- Error Code
- Error Status
- Outdoor Temperature

WIRING DIAGRAM
40VM900052 BACnet Interface

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

Printed in U.S.A. Form 40VM900052-C-1SD Pg 1 06-17 Replaces: New

Submittal Drawings



40VM Series
VRF (Variable Refrigerant Flow) System
BACnet Interface

Installation and Operation Manual

Part Number 40VM900052

For Commercial Use Only

CONTENTS

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

Catalog No. 17-40VM900052-01 Printed in U.S.A. Form 40VM-52SI R1 Pg 1 10-17 Replaces: 40VM-52SI

Installation & Start Up

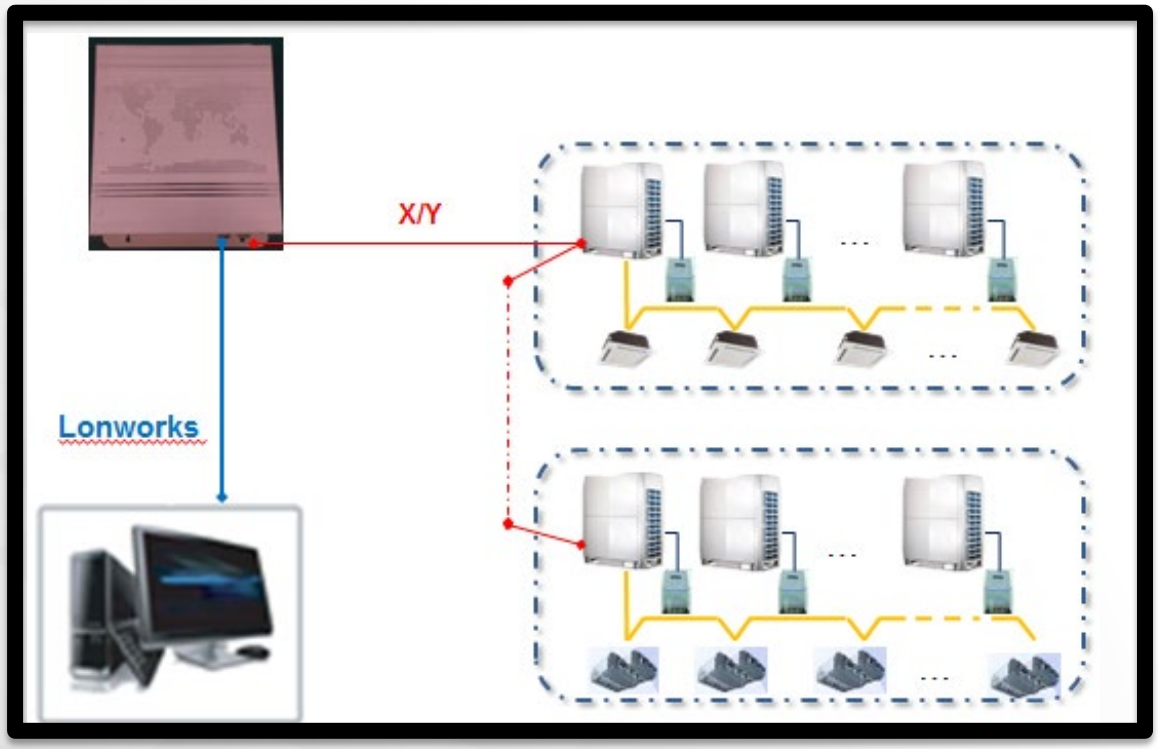
NETWORK & CENTRAL CONTROLLERS

BMS Interface

LONWORKS

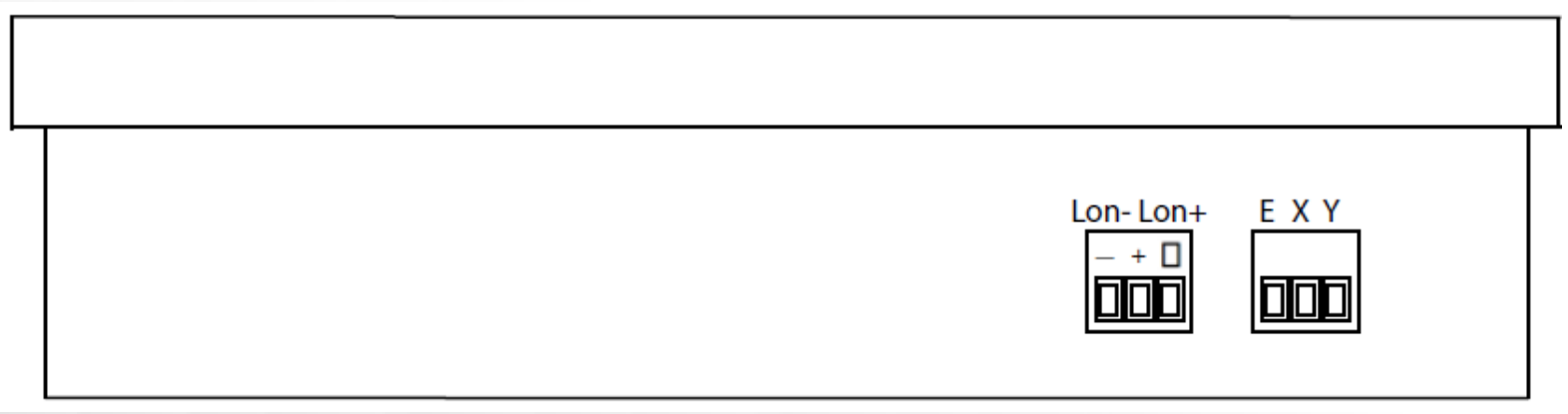
(40VM900053)

- Supports 64 indoor units
  - Indoor unit
    - Temperature set
    - Indoor temperature
    - Operate mode
    - Fault code
  - Outdoor unit
    - Mode
    - Outdoor temperature
    - Fault code

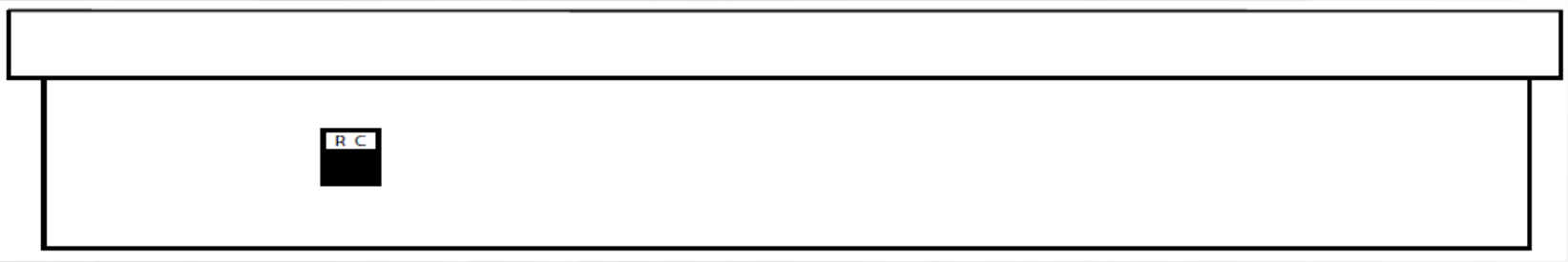


NETWORK & CENTRAL CONTROLLERS

LonWorks – Connection Descriptions



Name	Function
R	24VAC power
C	24VAC common
E	Shield conductor, X/Y bus
X	X conductor, X/Y bus
Y	Y conductor, X/Y bus
Lon +	Lon + conductor, Lonworks bus
Lon-	Lon- conductor, Lonworks bus



NETWORK & CENTRAL CONTROLLERS

LonWorks – Wiring Interface

NOTE: Follow all applicable electrical codes.

Field-Provided 24VAC Power Wire: Use copper wire rated for at least 1A.

Control Wire: Use 16 to 20 AWG (American Wire Gage),stranded twisted pair shielded 2-core wiring (copper wire).
Be sure the distance between the controller and the furthest outdoor units is not more than 3937 ft.

The controller has 1 central control bus (X/Y) lines. This line can support up to 8 refrigerant systems and 64 indoor units.

1. Using control wire, connect outdoor units' E/X/Y central control bus terminals in a "daisy chain" configuration.

2. Connect terminating end to the Central Controller's designated E/X/Y line. For larger Heat Pump systems with dual or triple modules on a refrigerant system, wire E/X/Y
daisy chain only to the Header outdoor unit of each refrigerant system.

3. Connect the customer-provided LonWorks system to the Lon Bus port.

NETWORK & CENTRAL CONTROLLERS

LonWorks – Wiring Interface

The LonWorks Gateway has one group of X-NET communication ports that can connect to one X-NET bus. Through this X-NET bus, LonWorks Gateway can connect to up to 64 indoor units (addresses ranging from 0 to 63) and 24 outdoor units (eight refrigerant systems, with addresses ranging from 96 to 127).

LonWorks Gateway provides one Lon bus port, with the channel type TP/FT-10. The Lon bus port connects to the LonWorks system of buildings through a twisted pair with free topology.

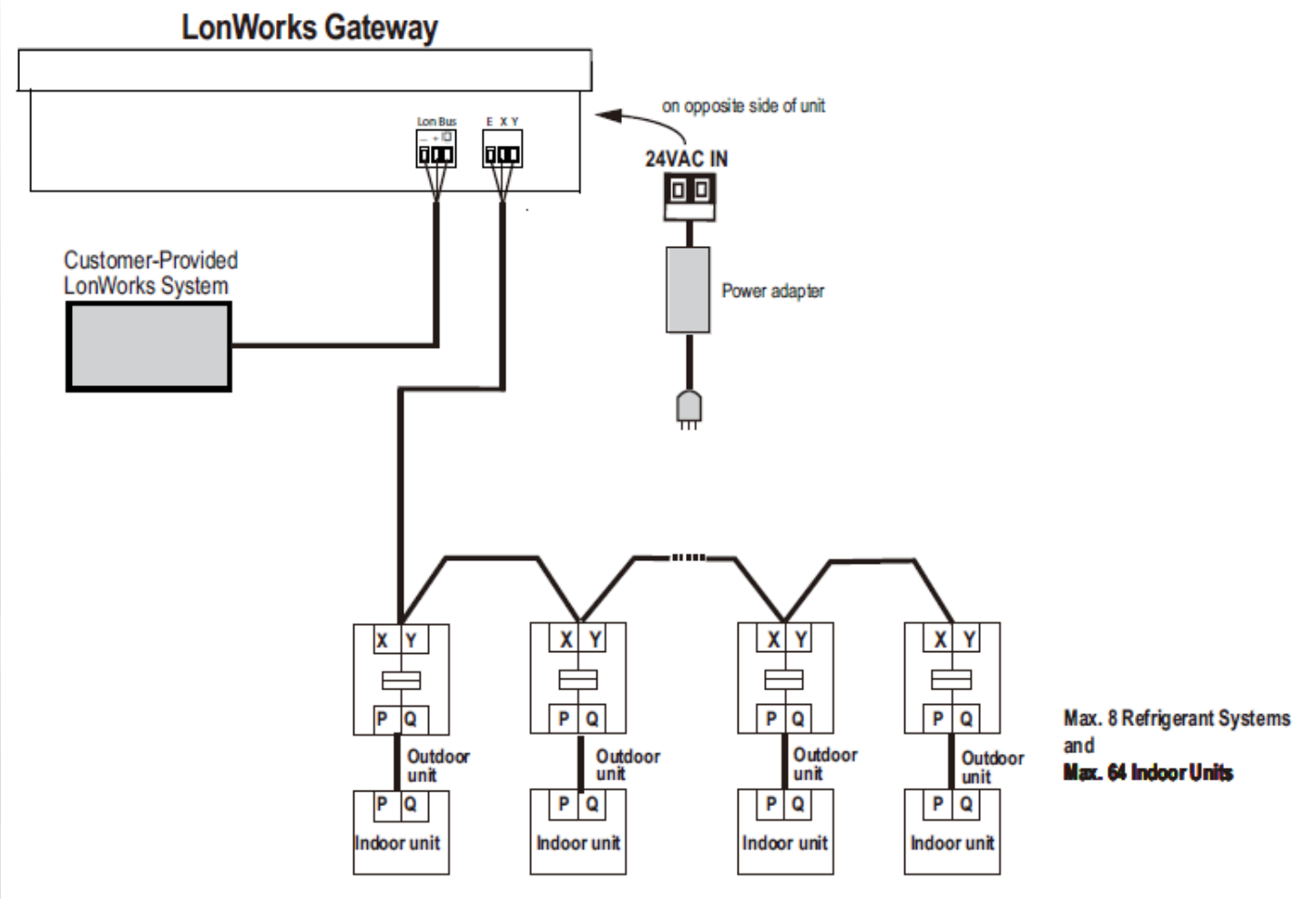
Both the theoretical communication distances of the Lon bus and X-NET bus are 1,000 m, but the actual communication distances are subject to the installation environment.

LonWorks Gateway can determine whether the indoor unit is an outside air unit or a non-outside air unit.

In the following cases, the LonWorks Gateway must be restarted:
1. The temperature unit of the air conditioner connected to the gateway switches to another <<Another what?>>.
2. The indoor unit type at the same network address changes.

NETWORK & CENTRAL CONTROLLERS

LonWorks – Wiring Interface

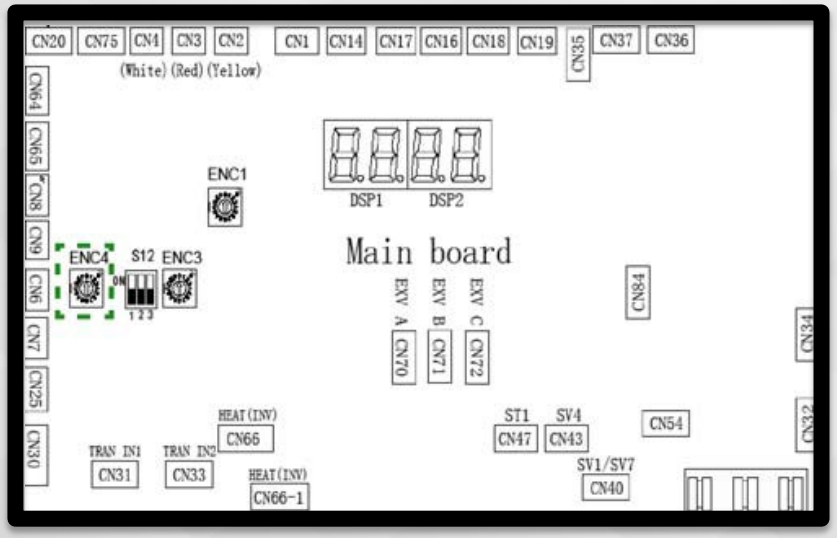


NETWORK & CENTRAL CONTROLLERS

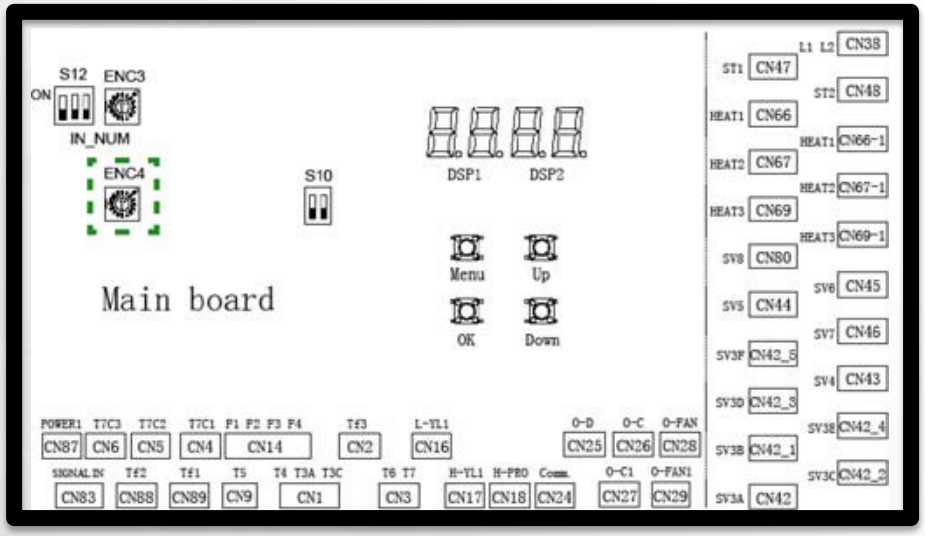
LonWorks – Setting Network Address

Make sure each outdoor unit / refrigerant system has its own unique network address: 0-7. Set by turning rotary encoders shown below (ENC4 for 3-Phase Heat Pump and Heat Recovery; ENC2 for single Phase Heat Pump). For larger Heat Pump systems with dual or triple modules, set all addresses the same for each module within the refrigerant system.

Heat Pump ENC4



Heat Recovery ENC4



NETWORK & CENTRAL CONTROLLERS

LonWorks – Communication Object Description

The LonWorks Gateway has two main boards. Each board can connect to up to 32 indoor units and 12 outdoor units.

The addresses of the indoor units connected to the main board range from 0 to 31, and the addresses of the outdoor units range from 96 to 111.

The addresses of the indoor units connected to the sub main board range from 32 to 63, and the addresses of the outdoor units range from 112 to 127.

LonWorks Gateway description of the indoor unit

An indoor unit has 10 LonWorks objects to be used by the main unit of the LonWorks system in a building.

NETWORK & CENTRAL CONTROLLERS

LonWorks – Setting Mode

Variable name: nviSetMode_M

Setting Mode - Parameter Definition

Status	Value-LonMaker	Value-NLutil
Heating	1	1
Cooling	3	3
Power-off	6	6
Air supply	9	9
Dehumidifying	14	E

NOTES:

1. M indicates the indoor unit address
2. nviSetMode_1 indicates No.0 indoor unit mode
3. nviSetMode_1 to nviSetMode_32 of the main board indicate modes of No.0 to No.31 indoor units
4. nviSetMode_1 to nviSetMode_32 of the sub main board indicate modes of No.32 to No.63 indoor units By default, when this variable is specified, the indoor unit is powered on and the mode is set. If the upper computer sends a value outside the definition, the indoor unit powers off by default.

NETWORK & CENTRAL CONTROLLERS

LonWorks – Modes Supported By Carrier

Each indoor unit type of Carrier supports the following modes:

Outside air unit	Cooling, heating, air supply, power-off
ERV	Cooling/heating/air supply/ dehumidifying (When the variable specifies cooling/heating/air supply/ dehumidifying mode, the indoor unit is powered on), power-off
Other indoor units	Cooling, heating, air supply, dehumidifying, power-off

NETWORK & CENTRAL CONTROLLERS

LonWorks – Setting Fan Speed

Variable name: nviSetWind_M

Status	Value-LonMaker	Value-NLutil
Weak	1.01	02 01
Moderate	3.01	06 01
Strong	5.01	0A 01
Auto	7.01	0E 01

NOTES:
1. M indicates the indoor unit address
2. nviSetWind_1 indicates the fan speed of No.0 indoor unit
3. nviSetWind_1 to nviSetWind_32 of the main board indicate fan speeds of No.0 to No.31 indoor units
4. nviSetWind_1 to nviSetWind_32 of the sub main board indicate fan speeds of No.32 to No.63 indoor units If the upper computer sends a value outside the definition, the fan speed is regarded as weak by default. If nviSetMode_M specifies power-off or dehumidifying mode, the value of nviSetWind_M is invalid. If nviSetMode_M specifies heating mode, the indoor unit may not respond to nviSetWind_M that specifies moderate or strong wind.

NETWORK & CENTRAL CONTROLLERS

LonWorks – Fan Speed when nviSetMode_M is Set

The fan speed of each Carrier's indoor unit type when nviSetMode_M is set:

nviSetMode_M	ERV	Other indoor units
Weak	Weak	Weak
Moderate	Weak	Moderate
nviSetMode_M	ERV	Other indoor units
Strong	Strong	Strong
Auto	Strong	Auto

When the outside air unit sends a command to specify auto wind, the indoor unit automatically converts the command into the one for specifying weak wind.

NETWORK & CENTRAL CONTROLLERS

LonWorks – Indoor Unit Error Code

Variable name: nvoIDUErrCode_M

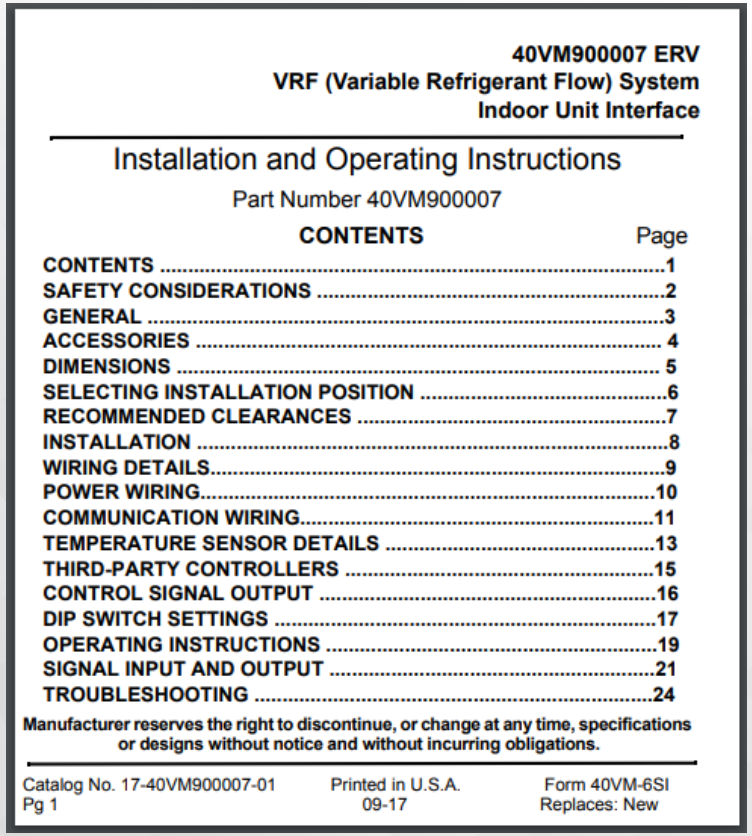
Indoor Unit Error Code – Parameter Definition

1	2	3	4	5	6	7	8	9	10
dd	E1	E2	E3	E4	E5	E6	E7	E8	E9
11	12	13	14	15	16	17	18	19	20
EA	EB	EC	ED	EE	EF	EH	EL	EP	EU
21	22	23	24	25	26	27	28	29	30
C0	C1	C2	C3	C4	C5	C6	C7	C8	C9
31	32	33	34	35	36	37	38	39	40
CA	CB	CC	CD	CE	CF	CH	CL	CP	CU
41	42	42	44	45	46	47	48	49	50
F0	F1	F2	F3	F4	F5	F6	F7	F8	F9
51	52	53	54	55	56	57	58	59	60
FA	FB	FC	FD	FE	FF	FH	FL	FP	FU
61	62	63	64	65	66	67	68	69	70
H0	H1	H2	H3	H4	H5	H6	H7	H8	H9
71	72	73	74	75	76	77	78	79	80
HA	HB	HC	HD	HE	HF	HH	HL	HP	HU
81	82	83	84	85	86	87	88	89	90
P0	P1	P2	P3	P4	P5	P6	P7	P8	P9
91	92	93	94	95	96	97	98	99	100
PA	PB	PC	PD	PE	PF	PH	PL	PP	PU
101	102	103	104	105	106	107	108	109	110
L0	L1	L2	L3	L4	L5	L6	L7	L8	L9
111	112	113	114	115	116	117	118	119	120
LA	LB	LC	LD	LE	LF	LH	LL	LP	LU
121	122	123	124	125	126	127	128	129	130
U0	U1	U2	U3	U4	U5	U6	U7	U8	U9
131	132	133	134	135	136	137	138	139	140
UA	UB	UC	UD	UE	UF	UH	UL	UP	UU

- See the service manual for the meanings of the error codes
- Error codes for some models may not be consistent with the faults

NETWORK & CENTRAL CONTROLLERS

LonWorks Additional Information on HVACPartners



40VM900007 ERV
VRF (Variable Refrigerant Flow) System
Indoor Unit Interface

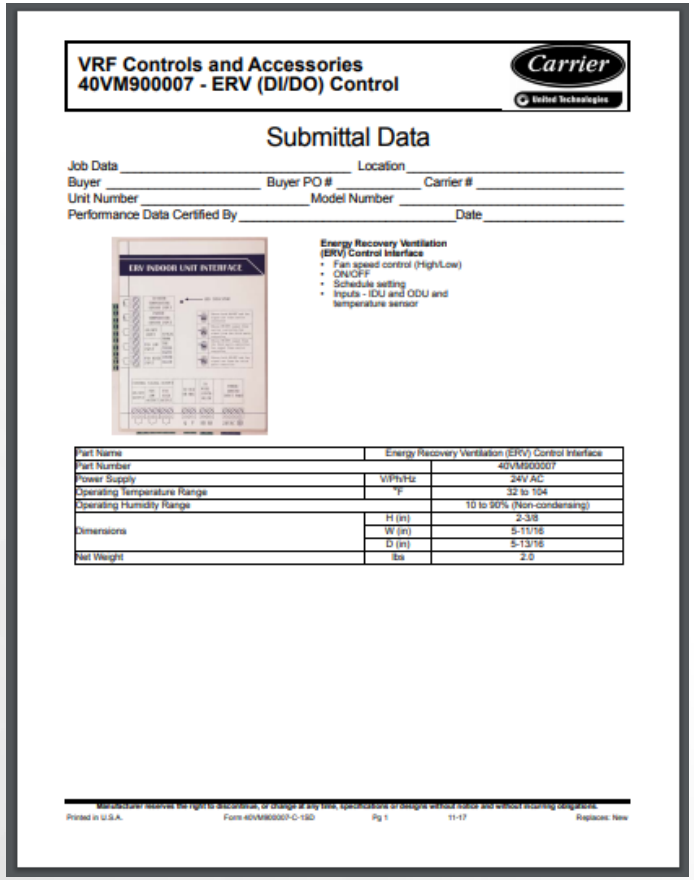
Installation and Operating Instructions

Part Number 40VM900007

CONTENTS Page

Catalog No. 17-40VM900007-01 Printed in U.S.A. Form 40VM-6SI
Pg 1 09-17 Replaces: New

Submittal Drawings



VRF Controls and Accessories
40VM900007 - ERV (DI/DO) Control

Carrier
United Technologies

Submittal Data

Job Data _____ Location _____
Buyer _____ Buyer PO # _____ Carrier # _____
Unit Number _____ Model Number _____
Performance Data Certified By _____ Date _____

Energy Recovery Ventilation (ERV) Control Interface
- Fan speed control (High/Low)
- ON/OFF
- Schedule setting
- Inputs - IDU and ODU and temperature sensor

Part Name		Energy Recovery Ventilation (ERV) Control Interface
Part Number		40VM900007
Power Supply	V/Ph/Hz	24V AC
Operating Temperature Range	°F	32 to 104
Operating Humidity Range		10 to 90% (Non-condensing)
Dimensions	H (in)	2-3/8
	W (in)	5-11/16
	D (in)	5-13/16
Net Weight	lbs	2.0

Installation & Start Up

24V INTERFACE

24V INTERFACE

Model # 40VM900008 24V Interface

The 40VM900008 24V Interface for Carrier VRF systems is a device that enables the use of a conventional 24VAC thermostat with indoor units.

The Interface receives 24VAC signals for Cool, Heat, and Fan. This translates these commands to the system's communication protocol and sends the commands to indoor unit over the HA / HB communication bus.

The 40VM900008 24V interface can be used with 3 phase and single phase Carrier VRF systems.

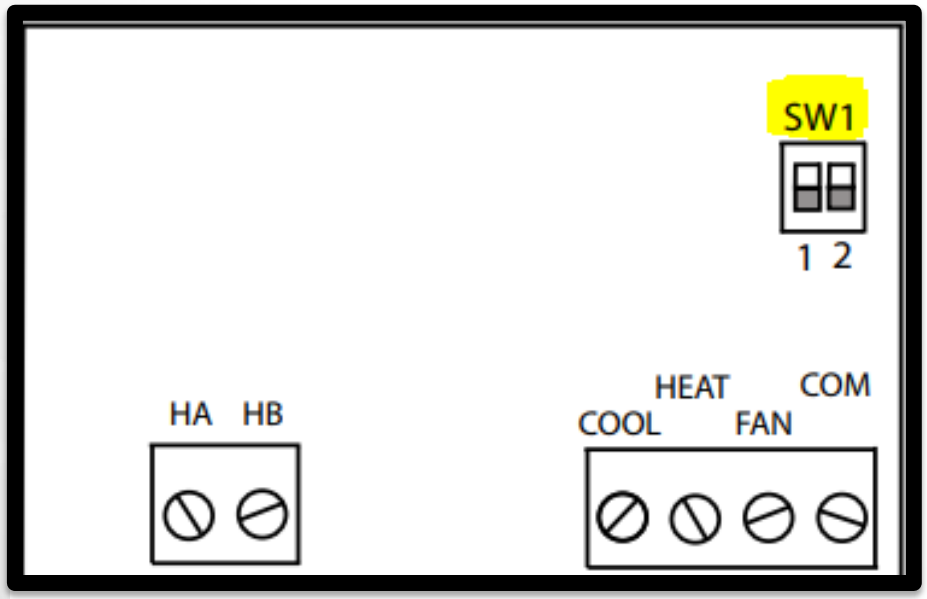
24V INTERFACE

Configuring the 24V Interface

Using SW1 dip switches on 24V Interface, select IDU fan speed operation when thermostat calls for fan:

Configuring Settings

	00 selects low fan speed
	01 selects medium fan speed
	10 selects high fan speed
	11 selects auto fan speed



1. Disconnect any power source before servicing or changing the DIP switches.
2. Using SW1 dip switches on 24V Interface, select IDU fan speed operation when Thermostat calls for fan.

24V INTERFACE

Configuration

3rd Party Thermostat

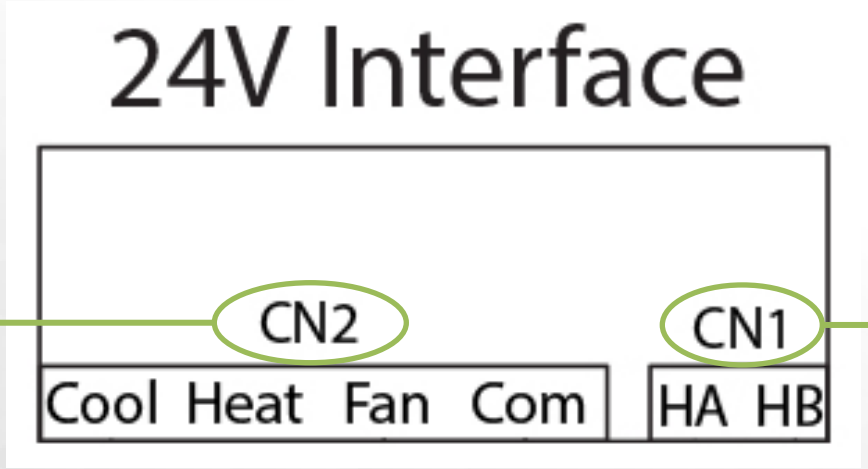
Configure the third-party thermostat per manufacturer's instructions. If third-party thermostat has adjustable time delays among Fan, Heat, or Cool; disable them (i.e. fan delays for gas furnace warm-up). Fan signal shall start/stop simultaneously with any call for Heat or Cool.

Considerations

1. 24V Interface shall be configured for use with a conventional 24VAC thermostat with outputs for Fan, Heat, and Cool.
2. The 24V Interface can only connect one thermostat and an indoor unit
3. COOL/HEAT/FAN inputs can only receive 24VAC signal with common ("C"/"COM") wire.
4. 4. While using 24V Interface, fan speed can only be set by the 24V Interface dip switches.
5. It is not recommended to connect any other front end controls to a system that is using the 24V Interface 40VM900008.
6. The 24V Interface is for indoor use only.

24V INTERFACE

Terminal Definitions



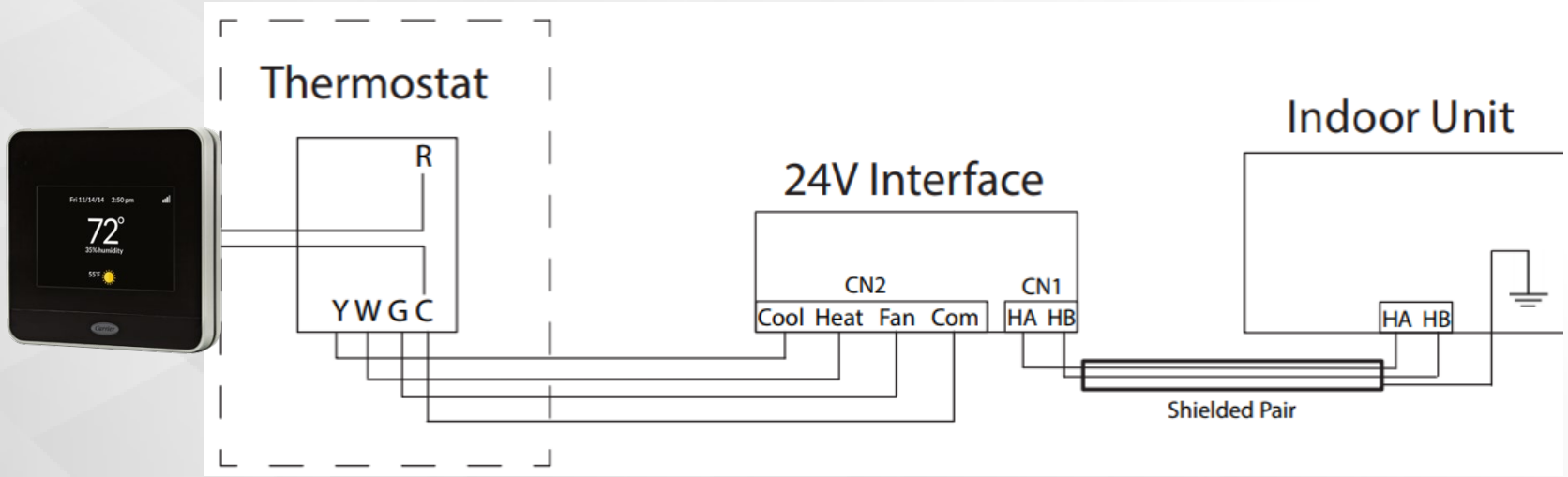
Terminal	Function
G	Fan
W	Heating
Y	Cooling
C	Comm

Terminal	Function
HA	Comm to Indoor Unit
HB	Comm to Indoor Unit

24V INTERFACE

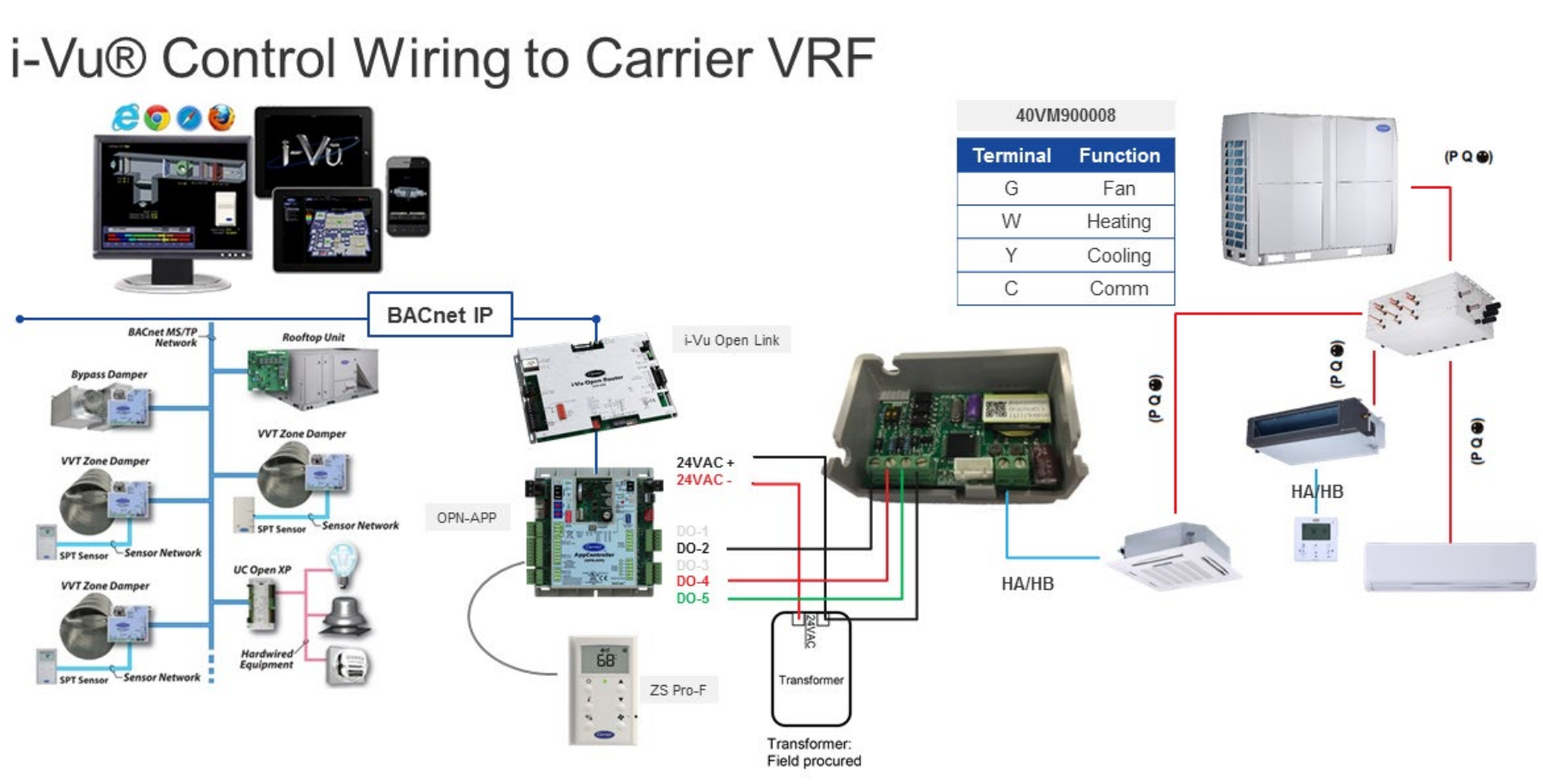
Wiring Specifications

1. All wiring used must satisfy all local and national regulations and is field procured.
2. Wiring for Fan, Heat, and Cool signals from Thermostat to interface should be performed with 18 AWG thermostat wire.
3. Communication wiring from 24V Interface to Indoor Unit (HA/HB) should be 20-16 AWG, stranded, shielded control wire.



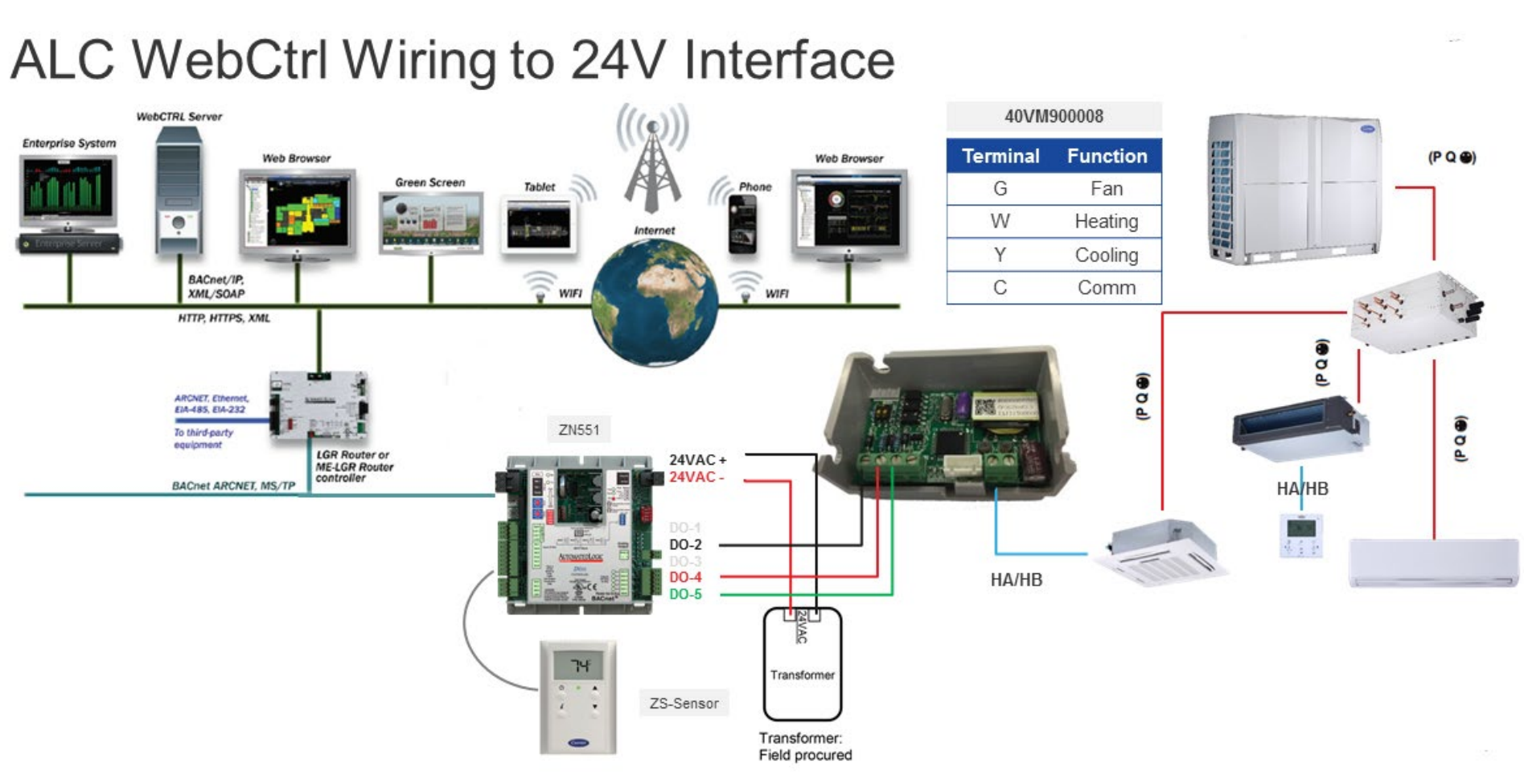
24V INTERFACE

i-Vu® Control Wiring to Carrier VRF



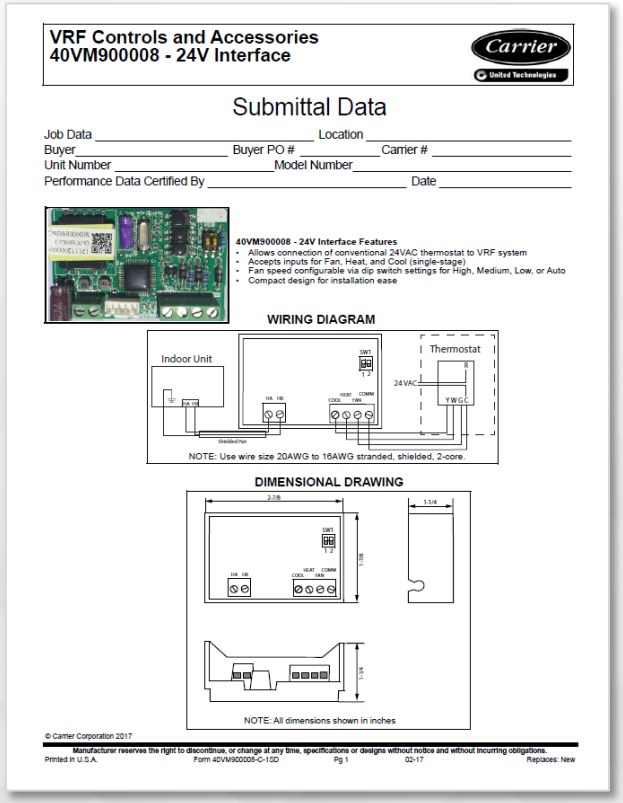
24V INTERFACE

ALC WebCtrl Wiring to 24V Interface



24V INTERFACE

24V Thermostat Interface Information on HVACPartners



VRF Controls and Accessories
40VM900008 - 24V Interface

Carrier
United Technologies

Submittal Data

Job Data _____ Location _____
Buyer_____ Buyer PO # _____ Carrier # _____
Unit Number _____ Model Number_____
Performance Data Certified By _____ Date _____

40VM900008 - 24V Interface Features
- Allows connection of conventional 24VAC thermostat to VRF system
- Accepts inputs for Fan, Heat, and Cool (single-stage)
- Fan speed configurable via dip switch settings for High, Medium, Low, or Auto
- Compact design for installation ease

WIRING DIAGRAM

Indoor Unit
Thermostat
24 VAC
R
Y W G C
HA HB
HEAT COOL
COMM FAN
SW1
1 2
Shielded Pair

NOTE: Use wire size 20AWG to 16AWG stranded, shielded, 2-core.

DIMENSIONAL DRAWING

2-7/8
1-1/4
SW1
1 2
HA HB
HEAT COOL
COMM FAN
3-1/8
1-1/4

NOTE: All dimensions shown in inches

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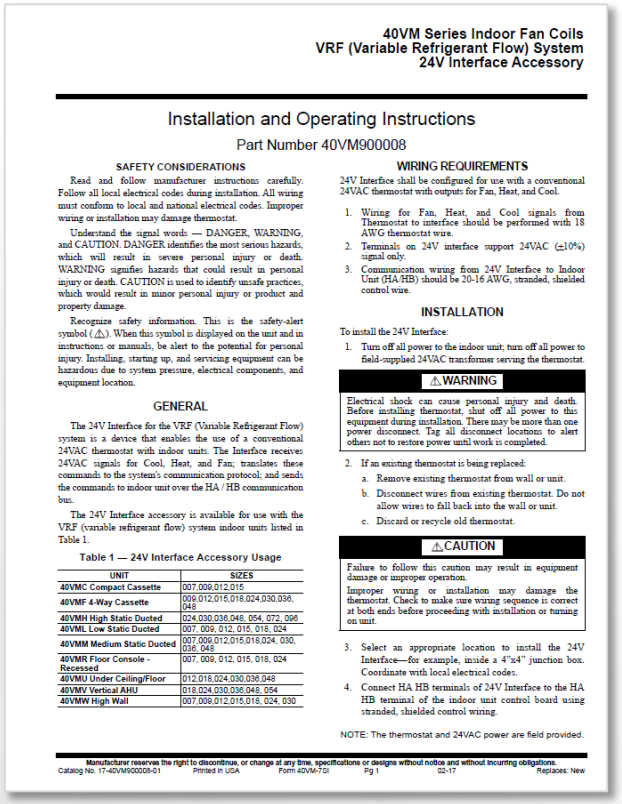
Submittal Drawings



40VM Series Indoor Fan Coils
VRF (Variable Refrigerant Flow) System
24V Interface Accessory

Installation and Operating Instructions

Part Number 40VM900008

SAFETY CONSIDERATIONS

Read and follow manufacturer instructions carefully. Follow all local electrical codes during installation. All wiring must conform to local and national electrical codes. Improper wiring or installation may damage thermostat.

Understand the signal words — DANGER, WARNING, and CAUTION. DANGER identifies the most serious hazards, which will result in severe personal injury or death. WARNING signifies hazards that could result in personal injury or death. CAUTION is used to identify unsafe practices, which would result in minor personal injury or product and property damage.

Recognize safety information. This is the safety-alert symbol (⚠). When this symbol is displayed on the unit and in instructions or manuals, be alert to the potential for personal injury. Installing, starting up, and servicing equipment can be hazardous due to system pressure, electrical components, and equipment location.

GENERAL

The 24V Interface for the VRF (Variable Refrigerant Flow) system is a device that enables the use of a conventional 24VAC thermostat with indoor units. The Interface receives 24VAC signals for Cool, Heat, and Fan; translates these commands to the system's communication protocol; and sends the commands to indoor unit over the HA / HB communication bus.

The 24V Interface accessory is available for use with the VRF (variable refrigerant flow) system indoor units listed in Table 1.

Table 1 — 24V Interface Accessory Usage

UNIT	SIZES
40VMC Compact Cassette	007,009,012,015
40VMF 4-Way Cassette	009,012,015,018,024,030,036, 048
40VMH High Static Ducted	024,030,036,048, 054, 072, 096
40VML Low Static Ducted	007, 009, 012, 015, 018, 024
40VMM Medium Static Ducted	007,009,012,015,018,024, 030, 036, 048
40VMR Floor Console - Recessed	007, 009, 012, 015, 018, 024
40VMU Under Ceiling/Floor	012,018,024,030,036,048
40VMV Vertical AHU	018,024,030,036,048, 054
40VMW High Wall	007,009,012,015,018, 024, 030

WIRING REQUIREMENTS

24V Interface shall be configured for use with a conventional 24VAC thermostat with outputs for Fan, Heat, and Cool.

1. Wiring for Fan, Heat, and Cool signals from Thermostat to interface should be performed with 18 AWG thermostat wire.
2. Terminals on 24V interface support 24VAC (±10%) signal only.
3. Communication wiring from 24V Interface to Indoor Unit (HA/HB) should be 20-16 AWG, stranded, shielded control wire.

INSTALLATION

To install the 24V Interface:

1. Turn off all power to the indoor unit; turn off all power to field-supplied 24VAC transformer serving the thermostat.

⚠WARNING

Electrical shock can cause personal injury and death. Before installing thermostat, shut off all power to this equipment during installation. There may be more than one power disconnect. Tag all disconnect locations to alert others not to restore power until work is completed.

2. If an existing thermostat is being replaced:
   a. Remove existing thermostat from wall or unit.
   b. Disconnect wires from existing thermostat. Do not allow wires to fall back into the wall or unit.
   c. Discard or recycle old thermostat.

⚠CAUTION

Failure to follow this caution may result in equipment damage or improper operation.

Improper wiring or installation may damage the thermostat. Check to make sure wiring sequence is correct at both ends before proceeding with installation or turning on unit.

3. Select an appropriate location to install the 24V Interface—for example, inside a 4"x4" junction box. Coordinate with local electrical codes.
4. Connect HA HB terminals of 24V Interface to the HA HB terminal of the indoor unit control board using stranded, shielded control wiring.

NOTE: The thermostat and 24VAC power are field provided.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.
Catalog No. 17-40VM900008-01 Printed in USA Form 40VM-7SI Pg 1 02-17 Replaces: New

Installation & Start Up

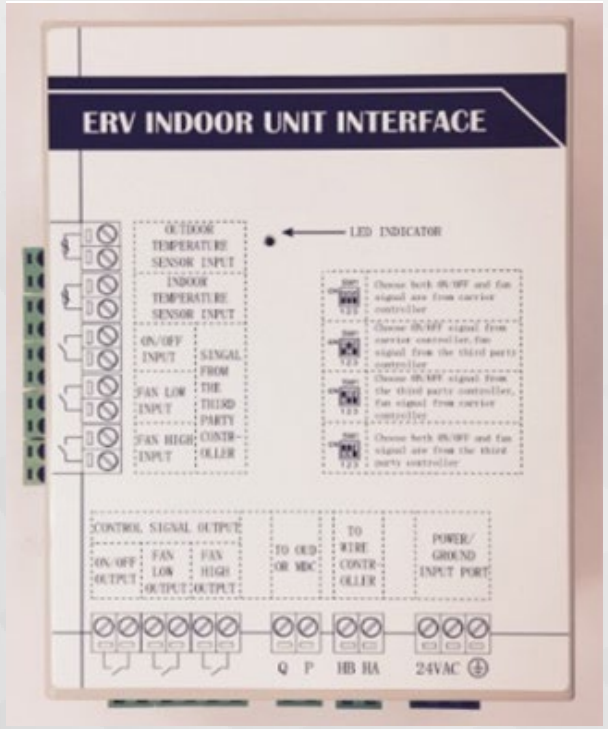
4

ERV Interface

ERV INTERFACE

DIDO Interface (40VM900007)

The DI DO interface is a control board that allows a field-supplied ERV / DOAS unit to tie into the Carrier 2 Pipe VRF system.



The DI DO interface should be installed in the electrical box of the ERV / DOAS indoor unit.

COMMUNICATION WIRING

Type: Shielding 2-core twisted pair cable, copper wire

Diameter: AWG 20 to 16 (0.51 to 1.31mm2)

Power for the DI DO interface is 24VAC and is field supplied.

ERV INTERFACE

Selecting Installation Position

- Avoid installing ERV interface near high voltage components and heat generating devices.
- If there is not enough space inside the ERV unit to mount ERV interface, it can be mounted outside the unit.
- Follow the local code for wiring between ERV unit and ERV interface.
- Make sure the cover of ERV interface is installed after wiring to avoid any moisture or dust accumulation.
- Do not install the controller in a place exposed to water or in a condensing environment.
- Do not install the device in a location where there is direct sunlight or where the temperature may become greater than 104°F(40°C) or less than 32°F(0°C). This product is neither waterproof nor dustproof, so it can only be installed indoors.

ERV INTERFACE

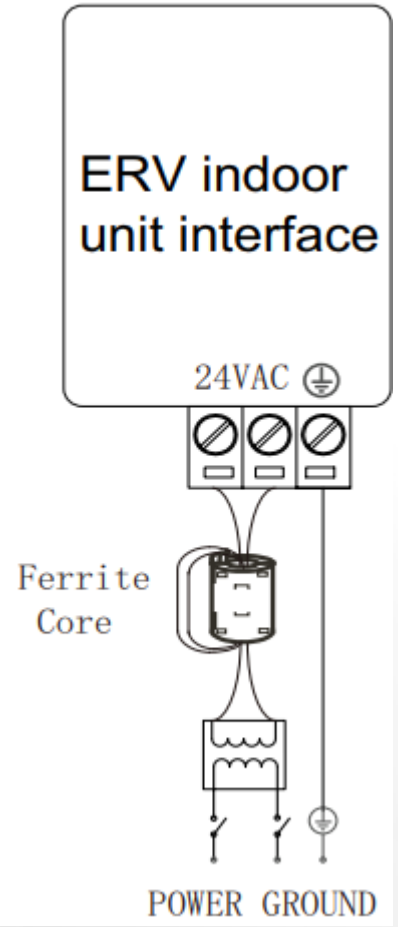
Power Wiring

Voltage: 24VAC Current: 300mA Wire: 3*AWG18-16#, copper wire

The ERV indoor unit interface requires 24 VAC power. Verify that the power voltage is within±10% of the rated voltage, and capacity of current must be at least 300 mA.

NOTE: The distance between ferrite core and ERV board should not be more than 6 inches and the wire needs to be wrapped twice around the core.

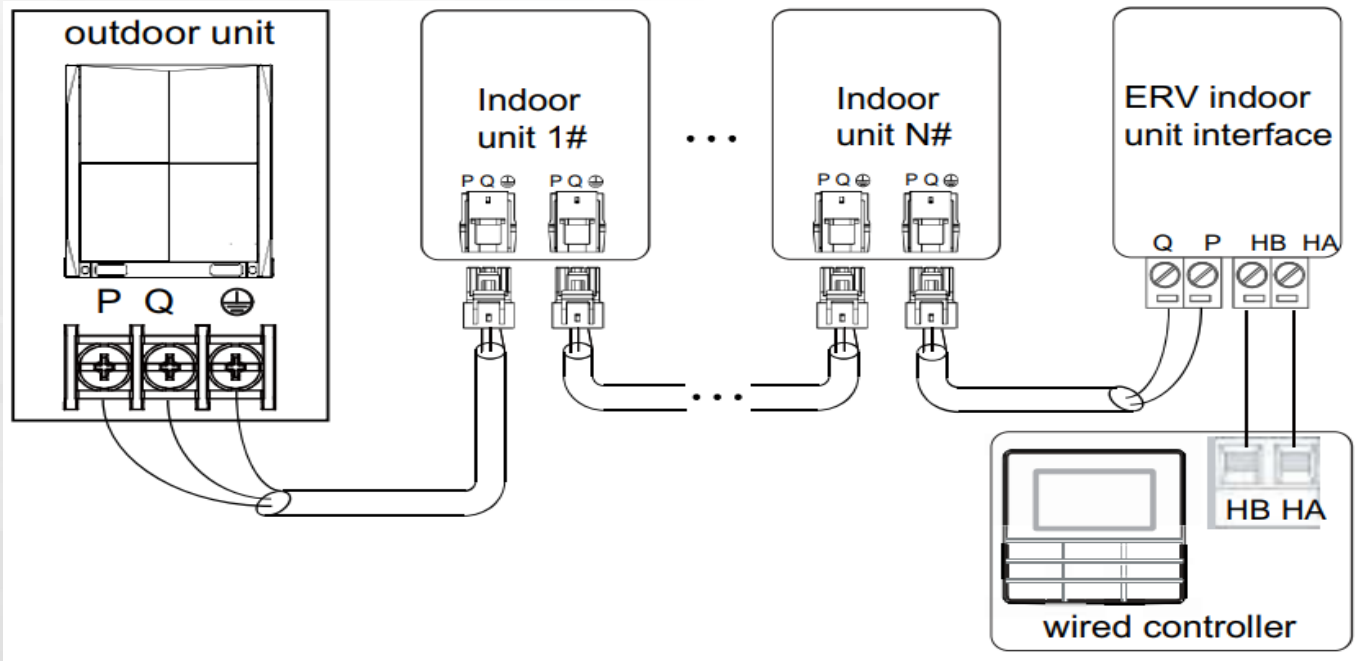
NOTE: 24VAC is field supplied.



ERV INTERFACE

Communication Wiring for Heat Pump System

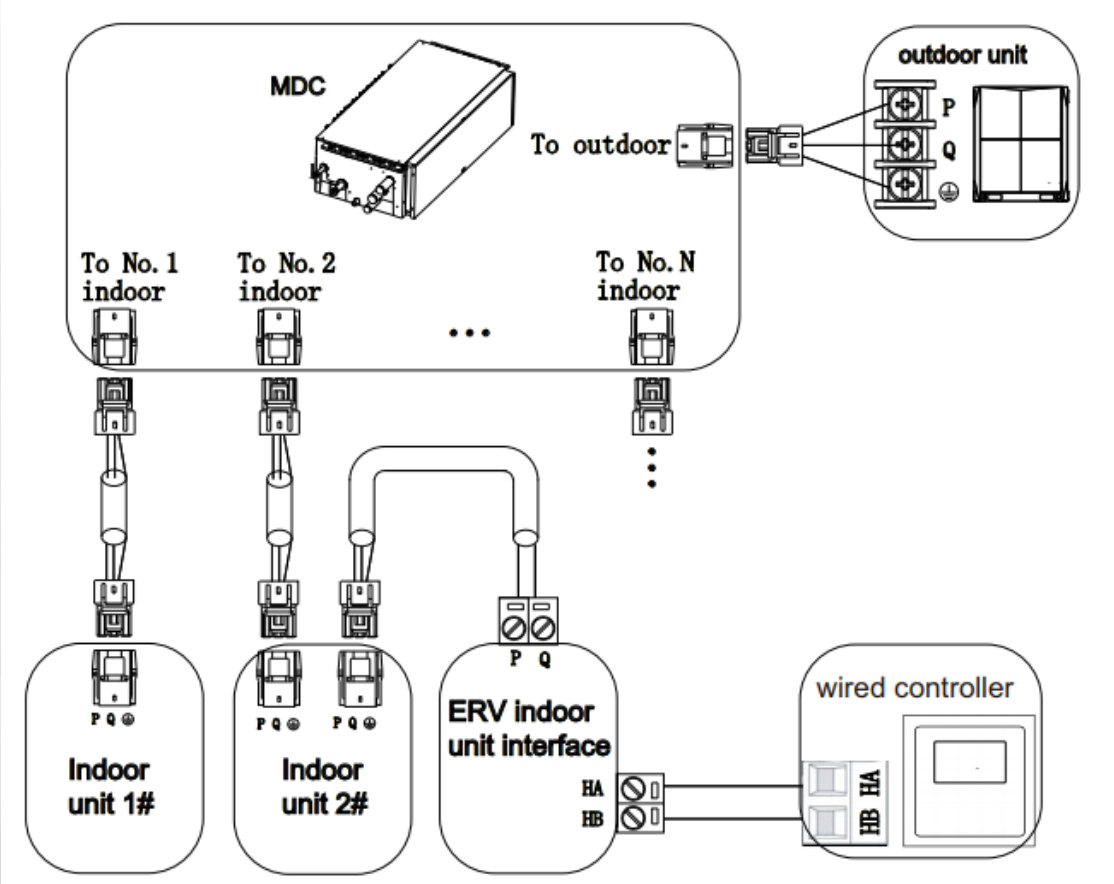
Type: Shielding 2-core twisted pair cable, copper wire Diameter: AWG 20 to 16 (0.51 to 1.31mm2)



Maximum wiring length: • Within 3937 ft. between the outdoor and the ERV interface • Within 3937 ft. between the MDC and the ERV interface • Within 820 ft. between the wire controller and ERV interface.

ERV INTERFACE

Communication Wiring for Heat Recovery System



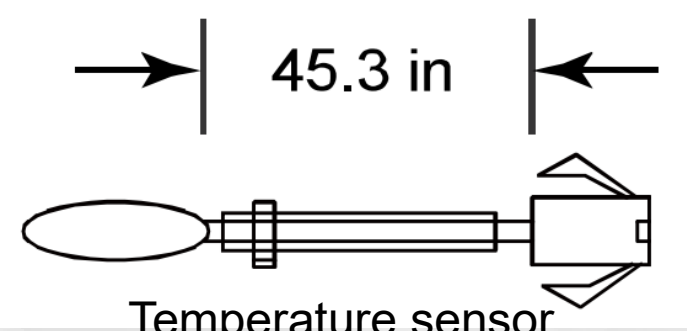
NOTE: Do not connect the main power source to terminal blocks of the communication line.

ERV INTERFACE

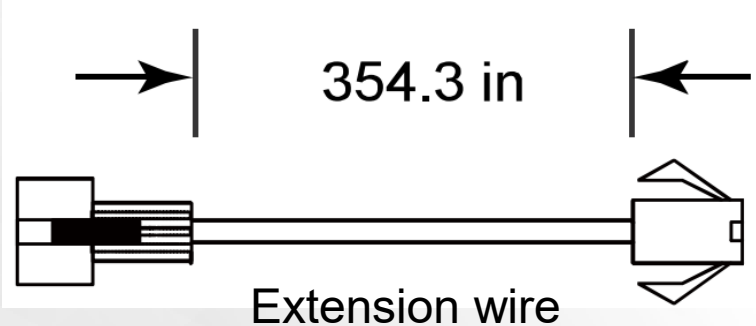
Temperature Sensor Details

Temp sensors and extension wires

ERV interface is provided with temperature sensor and extension wire as standard accessories. Sensors are used to sense indoor and outdoor temperatures. Extension wires can be used for sensor location beyond 45 inches from the unit. See Figure 8 for additional details.



Temperature sensor



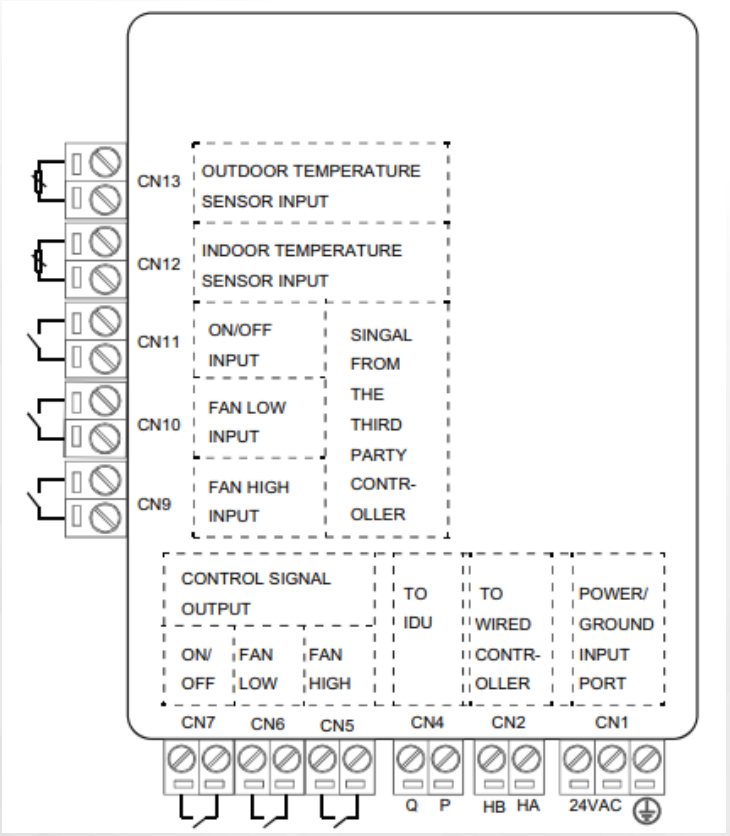
Extension wire

The temperature sensors should be installed where they can show the actual indoor and outdoor temperatures separately. Secure the sensor ensuring it is protected from water, dust, mechanical stress, and other conditions that can influence the temperature reading or sensor lifespan.

ERV INTERFACE

Wiring Details

Function of each port

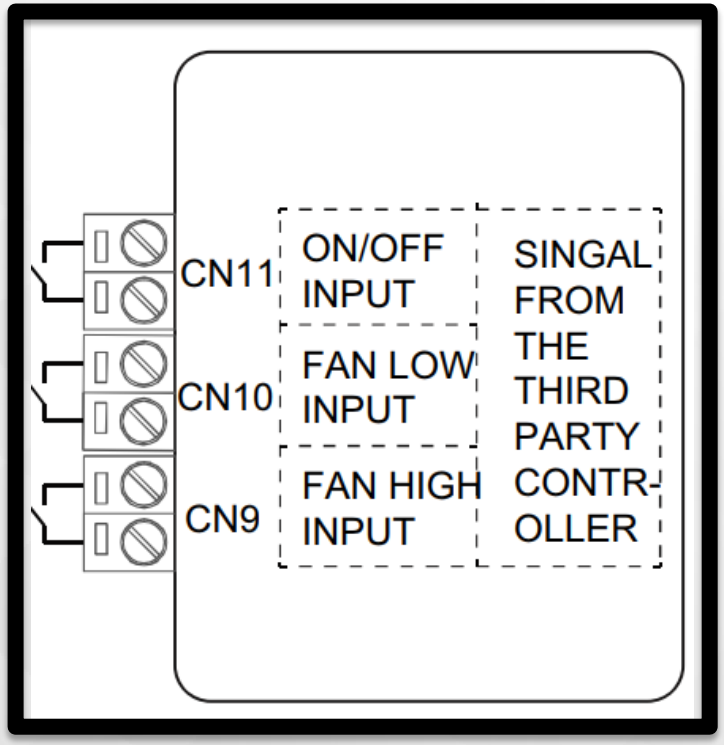


ERV INTERFACE

Signal from Third Party Controller

Using THIRD-PARTY CONTROLLERS

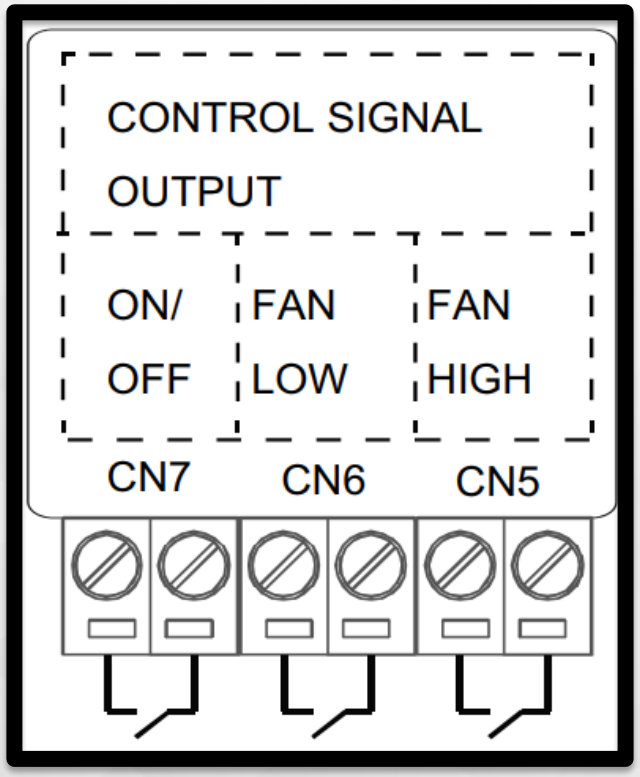
CN9, CN10, and CN11 are used to connect a third-party controller to the DI DO interface. The ON/OFF and fan speed control signal from the third-party controller must be a dry contact signal.



ERV INTERFACE

Control Signal Output

CN5, CN6, AND CN7 are the terminals for ON/OFF and the fan speed signal output of ERV indoor unit interface. The signal type is dry contact.



ERV INTERFACE

Control Signal Output

The voltage and current must be meet the requirements of the below Tables.

Max. AC Voltage

Port	Max. Voltage (VAC)	Max Current (A)
CN5, CN6, CN7	250	1

Max. DC Voltage

Port	Max. Voltage (VDC)	Max Current (A)
CN5, CN6, CN7	30	1

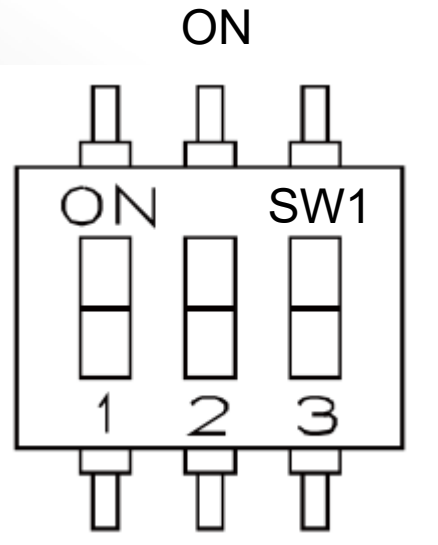
ERV INTERFACE

Dip Switch Settings

SW1-1/2: The ON/OFF and fan speed control signal can be from the 40VM series wire controller or a third-party controller. The signal source is set by adjusting SW1-1 and SW1-2 according to Table

DIP Switch 1-1 (1-2)

SW1-1	SW1-2	Result
OFF	OFF	Choose both ON/OFF and fan speed signal from the 40VM series controller
OFF	ON	Choose ON/OFF signal from the 40VM series controller and the fan speed signal from the third-party controller
ON	OFF	Choose ON/OFF signal from the third-party controller and fan the speed signal from the 40VM series controller
ON	ON	Choose both ON/OFF and fan speed signal from the third-party controller



Dip Switch

ERV INTERFACE

Dip Switch Settings

SW1-3: When power is off and then turned on, the ERV indoor unit interface can be set to automatic restart or non-automatic restart by adjusting SW1-3 according to Table

DIP Switch 1-3

SW1-3	Result
OFF	Automatic restart function
ON	Non-automatic restart function

Only ON/OFF and fan speed signal are chosen from the 40VM9 series controller. The automatic restart function can be effective.

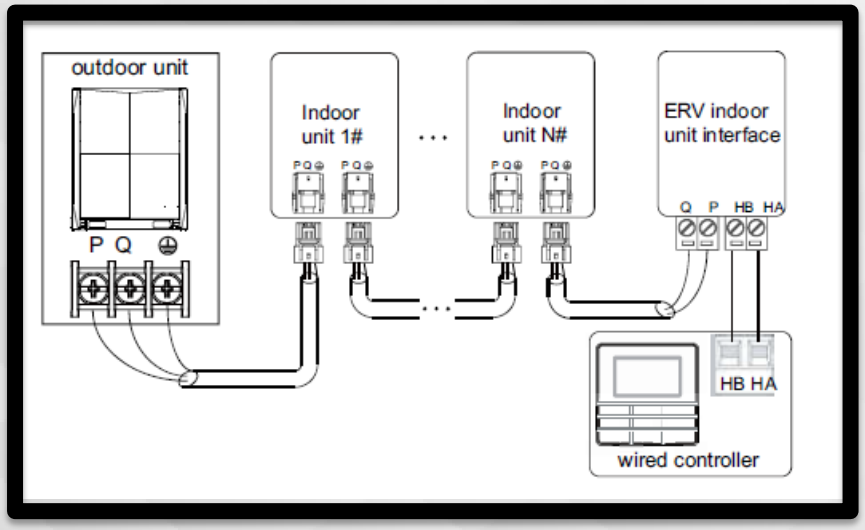
NOTE: After changing the status of any DIP switch on the circuit board, be sure to power cycle the unit so that it can take effect.

ERV INTERFACE

Operating Instructions

When a wired controller, 40VM900003 or 40VM900005, is connected to the DIDO indoor unit interface. The wired controller automatically converts to the ERV / DOAS user Interface display.

Other indoor units and ERV indoor unit interfaces cannot share one wired controller.



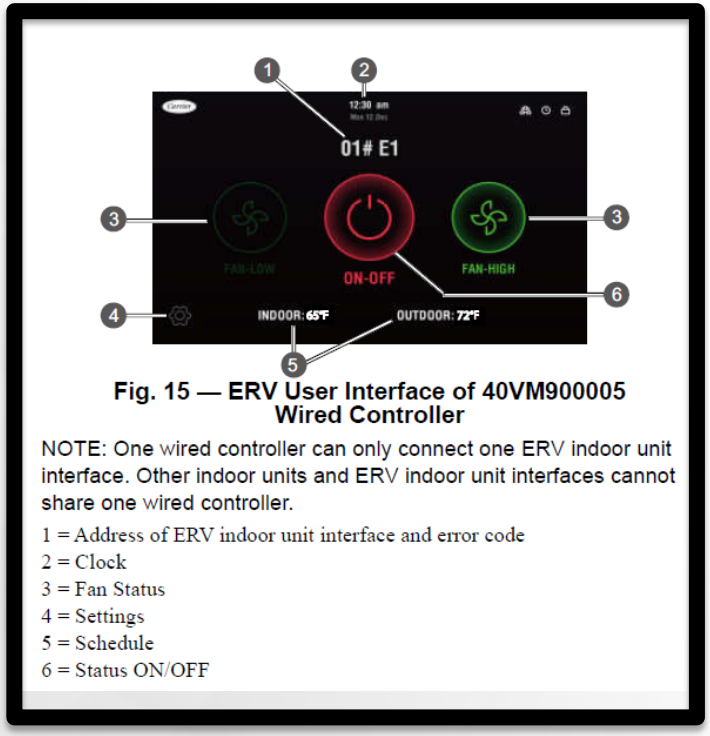


Fig. 15 — ERV User Interface of 40VM900005 Wired Controller

NOTE: One wired controller can only connect one ERV indoor unit interface. Other indoor units and ERV indoor unit interfaces cannot share one wired controller.

1 = Address of ERV indoor unit interface and error code
2 = Clock
3 = Fan Status
4 = Settings
5 = Schedule
6 = Status ON/OFF

ERV INTERFACE

Signal Input and Output

When the source of control signal is selected, the ERV indoor unit will only respond to the signal from the selected controller. The details between input and output are show in BELOW Table.

Signal Input/Output

Signal Input			Signal Output		
ON/OFF	Fan Low	Fan High	ON/OFF	Fan Low	Fan High
ON	OFF	OFF	ON	OFF	OFF
ON	ON	OFF	ON	ON	OFF
ON	OFF	ON	ON	OFF	ON
ON	ON	ON	ON	ON	ON
OFF	OFF	OFF	OFF	OFF	OFF
OFF	ON	OFF	OFF	OFF	OFF
OFF	OFF	ON	OFF	OFF	OFF
OFF	ON	ON	OFF	OFF	OFF

ERV Interface

SIGNAL INPUT AND OUTPUT

Most of the time, the control signal output of the ERV indoor unit interface will vary. Follow the signal input as shown in Table 7. There is one exception: if both ON/OFF and fan speed signal source are selected from the 40VM series controller. In this situation, the ON/OFF signal is ON, fan low signal is OFF, and fan high speed is OFF. The output of the ERV indoor unit will be different from Table 6. The actual output is shown Table

Actual control signal output of ERV indoor unit

Schedule signal input from wired controller			Signal output of ERV indoor unit interface		
ON/ OFF	Fan low	Fan high	ON/ OFF	Fan low	Fan high
ON	OFF	OFF	ON	Keep the wired controller current fan speed status when wired controller is ON	Keep the wired controller current fan speed status when wired controller is ON

NOTE: If both fan low speed and fan high speed are ON, the wired controller will only display that the fan high speed is ON.

ERV INTERFACE

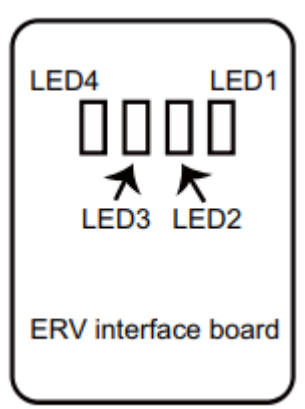
Troubleshooting

If ERV indoor unit interface is connected to a wired controller, the error code will be displayed on the wired controller. The error definition of ERV indoor unit interface are shown in Table 8. Refer to the outdoor unit, indoor unit, or wired controller for the rest of error code.

Error codes

Error Code	Definition
E1	Communication error between ERV indoor unit interface and indoor unit
E2	Indoor ambient temperature sensor error
E4	Outdoor ambient temperature sensor error
E7	EEPROM error of ERV indoor unit interface
E9	Communication error between ERV indoor unit interface and wired controller

Layout of LED



The LED1-4 on the circuit board can also show the fault information of the ERV indoor unit interface as shown in Figure 16 and in Table 9. NOTE: The cover of the ERV must be removed to see all 4 LEDs.

ERV INTERFACE

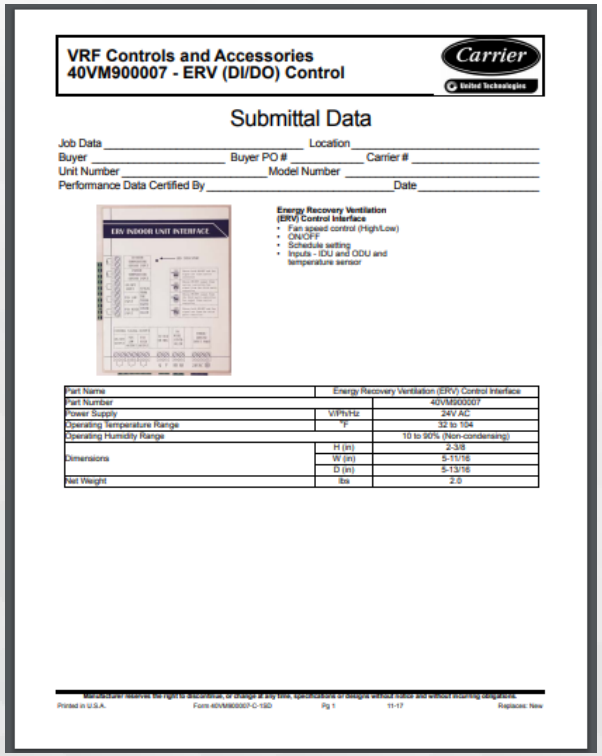
Troubleshooting

Fault information from LEDs

LED	Definition	Normal Status	Abnormal Status
LED1	Power Indicator	Light	Flash or Extinguish
LED2	Indicates communication between ERV indoor unit interface and wired controller	Extinguish	Flash
LED3	Indicates communication between ERV indoor unit interface and MDC or outdoor unit	Extinguish	Flash
LED4	Status indicator of indoor temperature sensor and outdoor sensor	Extinguish	Flash

ERV INTERFACE

ERV Interface Information on HVACPartners



VRF Controls and Accessories
40VM900007 - ERV (DI/DO) Control

Carrier

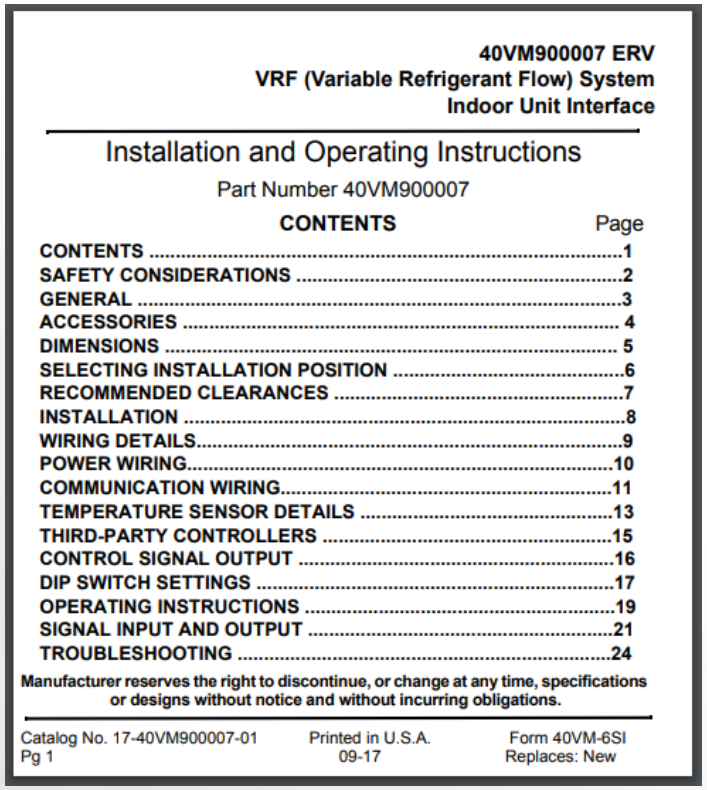
Submittal Data

Job Data _____ Location _____
Buyer _____ Buyer PO # _____ Carrier # _____
Unit Number _____ Model Number _____
Performance Data Certified By _____ Date _____

Energy Recovery Ventilation (ERV) Control Interface
- Fan speed control (High/Low)
- ON/OFF
- Schedule setting
- Inputs - IDU and ODU and temperature sensor

Part Name	Energy Recovery Ventilation (ERV) Control Interface	
Part Number		40VM900007
Power Supply	V/Ph/Hz	24V AC
Operating Temperature Range	°F	32 to 104
Operating Humidity Range		10 to 90% (Non-condensing)
Dimensions	H (in)	2-3/8
	W (in)	5-11/16
	D (in)	5-13/16
Net Weight	lbs	2.0

Submittal Drawings



40VM900007 ERV
VRF (Variable Refrigerant Flow) System
Indoor Unit Interface

Installation and Operating Instructions

Part Number 40VM900007

CONTENTS Page

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

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Installation & Start Up

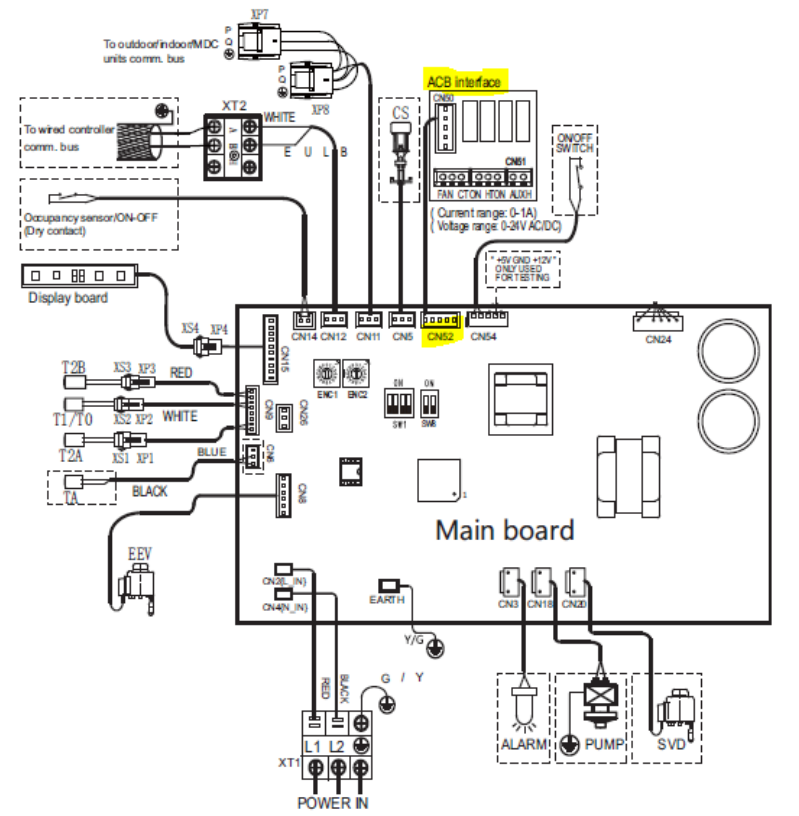
5

ACB INTERFACE

ACB INTERFACE

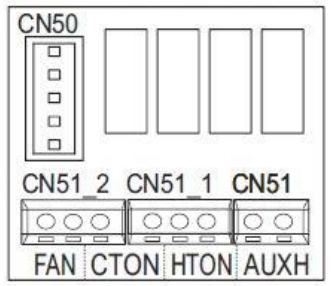
Overview

ACB Interface — Is factory installed on all Indoor Units. The ACB interface is a dry contact board that can output up to four signals to control devices..



Occupancy Sensor Connection

Remove factory installed jumper on CN14
OCCUPANCY SENSOR CONNECTION
(OPTIONAL AND FIELD SUPPLIED)



Auxiliary Control Board (ACB)

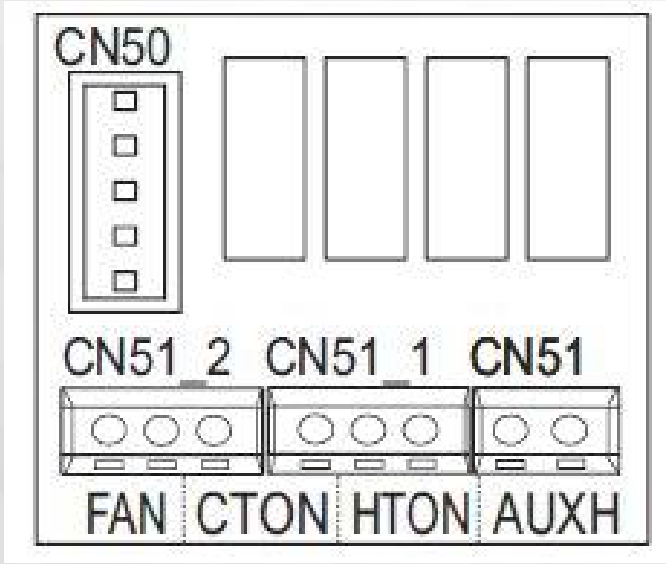
FAN - Output for Fan Operation
CTON - Output for Cooling Operation
HTON - Output for Heating Operation
AUXH - Output for Auxiliary Heat

ACB INTERFACE

Supplemental Heat Control in Indoor Unit

DRY CONTACT BOARD

24V DC Voltage Signal

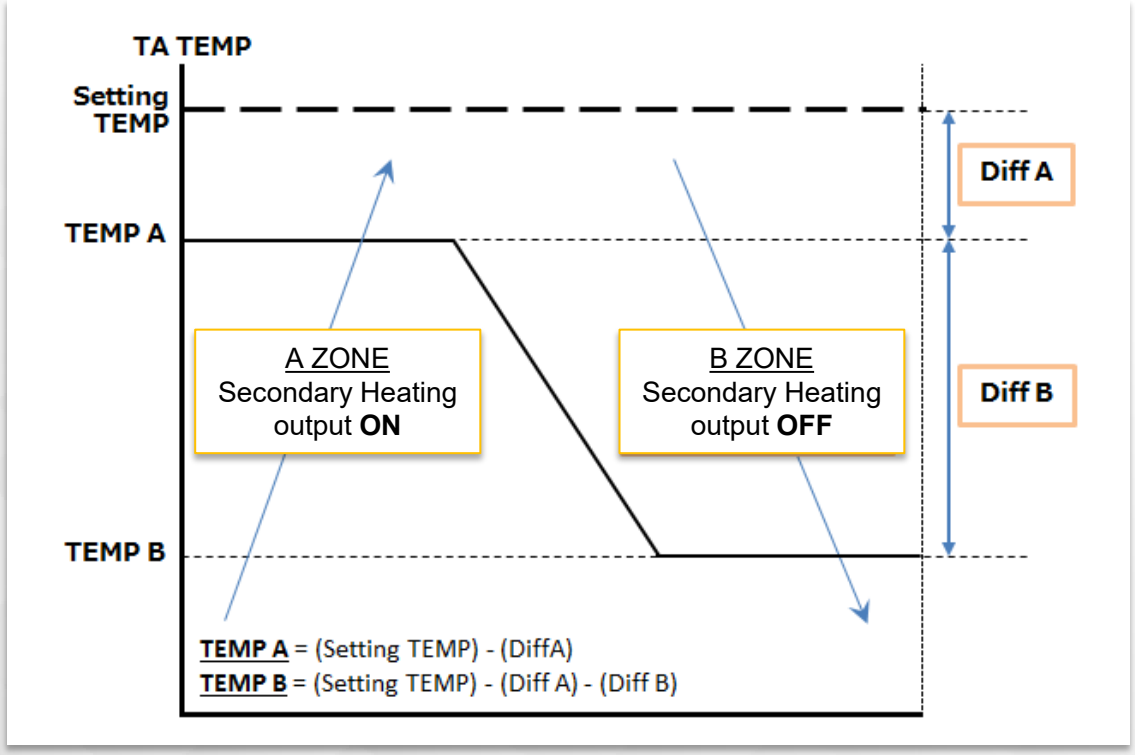


40VMM as example

FAN	control port of exhaust fan device etc.
CTON	control port of humidifier etc.
HTON	control port of economizer etc.
AUTH	control port of auxiliary heater etc.

ACB INTERFACE

Supplemental Heat Control in Indoor Unit



Service Menu:

Thermal Sensitivity ADJ = DIF A (1F~2F)
Dry Contact Config = DIF B (1F~5F)
Dry Contact Config = 15, 30, 45 min

ACB INTERFACE

Supplemental Heat Control in Indoor Unit

Wired Remote Controller Service Menu:

10	Supplemental heat or Aux Heat status Dry Contact 4 / Supplemental Aux Heat status can be enabled and Disabled with the wired controller.	Supplemental Heat or Aux Heat status.	OFF (default), ON
		Supplemental Heat or Aux Heat status configuration.	1ºF (default), 2ºF, 3ºF, 4ºF, 5ºF
		Time delay.	15 minutes (Default), 30 minutes, 45 minutes
		Indoor fan status.	ON (Default), OFF

1. The dry contact 4 closes while all the following requirements are met:
• The indoor unit conducts heating mode or heating operation in auto mode.
• The return air temperature T1 is lower than the setting temperature,
Ts (Ts - T1 = 1°F/2°F/3°F/4°F/5°F). This can be set by the remote controller. The default setting is 3°F.
• The indoor unit is in operation.
• The ambient temperature T4 transferred from the outdoor unit is 1.8°F lower than the auxiliary heat source turning on the temperature set at the outdoor unit.
• The dry contact function is enabled on the wired controller.

2. The dry contact 4 disconnects when any of the following requirements are met:
• The operation mode of the indoor unit is not heating.
• The indoor unit is not in operation.
• T4 transferred from the outdoor unit is higher than the auxiliary heat source turning on the temperature.
• The dry contact function is prohibited from the wired controller.
• Heating thermo-OFF.

3. The dry contact 4 conducts time-delayed close while any of the following requirements are met:
• The thermostat conducts the heating operation for the first time.
• The setting temperature for the room rises and the ΔTs is larger than 3°F.
• Delay time can be adjusted by wired controller (15 minutes, 30 minutes, and 45 minutes). Factory setting is 15 minutes. 4.

QUESTIONS?

THANK YOU!