



UNIT CONTROLLER SCHEMATIC

LEGEND:
CB - CONNECTION BOARD
H - HUMIDISTAT OUTPUT
IAQ - IND OR AIR
QUALITY
OAO - OUTDOOR AIR
QUALITY
S - SPARE OUTPUT



Verify that you have the most current version of this document from **www.hvacpartners.com** or **www.accounts.lvusystems.com** or your local Carrier office.

Important changes are listed in **Document revision history** at the end of this document.

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Introduction

What is the i-Vu® CCN Router?

The i-Vu® CCN Router is an integral part of the i-Vu® system. It connects an Ethernet-based Local Area Network (LAN) to the Carrier Comfort Network (CCN). The i-Vu® CCN Router can be used in two different configurations. It serves as a Gateway, where it gives the i-Vu® server residing on the Ethernet LAN access to the entire CCN, or it can function as a Bridge, where it creates secondary CCN communication buses in order to add additional CCN elements to the system. Because the i-Vu® CCN Router allows for the use of existing LAN wiring, it is an ideal solution for integrating CCN into any building or facility.

The i-Vu® CCN Router has one EIA-485 port for connecting to the CCN bus, and one 10/100Base-T Ethernet port for connecting to the building LAN. Each i-Vu® CCN Router can connect to up to 140 CCN devices. The i-Vu® CCN Router also stores trend data and time schedules for the CCN devices that are connected to it.

The i-Vu® CCN Router functions in one of the following modes, depending on configuration:

- **Gateway** - Provides access to the CCN bus from an i-Vu® web server that resides on the Ethernet. The i-Vu® CCN Router is the access node from the Ethernet to the CCN, responsible for maintaining a routing table of CCN system elements.


In this application, the i-Vu® CCN Router is connected directly to the CCN's primary bus (Bus 0), and, like other CCN system elements, occupies a unique address on the CCN (Bus 0, Element 1-239).

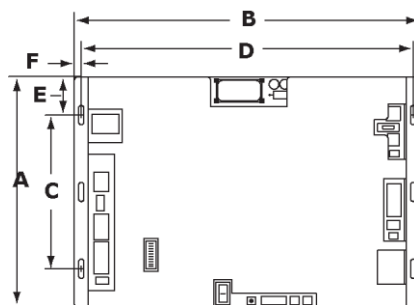
- **Bridge** - Acts as a CCN/Ethernet interface device in applications where the Ethernet is being used to connect separate CCN buses. This application requires an additional i-Vu® CCN Router functioning as a Gateway.

In this application, each i-Vu® CCN Router occupies a unique bus and element address on the CCN. When configured as a Bridge, it is addressed similarly to other CCN Bridges where the system element number on the primary bus identifies the secondary bus number.

NOTE The rotary switches are not used on the i-Vu® CCN Router for addressing the router's BACnet Device Instance or IP.

Specifications

Module drivers	drv_ivuccnrouter
Maximum number of CCN controllers	140
Power	24 Vac $\pm 10\%$, 50–60 Hz, 24 VA 26 Vdc $\pm 10\%$, 10 W
Communication ports	10/100 BaseT Ethernet Port E1 : LAN communication Port S1 : 5-pin EIA-485 for CCN Network and/or CCN Service Tool connection (9600 and 38400 baud)
Microprocessor	32-bit Motorola Power PC microprocessor with cache memory, Fast Ethernet controller, high performance 32-bit communication co-processor
Memory	16 MB non-volatile battery-backed RAM (with 12 MB available for use), 8 MB Flash memory, 32-bit memory bus
Real-time clock	Battery-backed real-time clock keeps track of time in event of power failure
Battery	<p>10-year Lithium CR123A battery ensures the following data is retained for a maximum of 720 hours during power outages:</p> <ul style="list-style-type: none"> • Time • Graphics • Control programs • Editable properties • Schedules • Trends <p>To conserve battery life, you can set the driver to turn off battery backup after a specified number of days and depend on the archive function to restore data when the power returns. A low battery is indicated by the Battery Low LED or a low battery alarm in the i-Vu® application, a touchscreen device, and Field Assistant.</p>
Protection	<p>Built-in surge and transient protection for power and communications in compliance with EN61000-6-1.</p> <p>Incoming power and network connections are protected by non-replaceable internal solid-state polyswitches that reset themselves when the condition that causes a fault returns to normal.</p> <p>The power and network connections are also protected against transient excess voltage/surge events lasting no more than 10 msec.</p> <p> CAUTION To protect against large electrical surges on serial EIA-485 networks, place a PROT485 at each place wire enters or exits the building.</p>
Status indicators	LED status indicators for EIA-485 CCN communication, Ethernet port communication, and low battery status. Seven segment status display for running, error, and power status.
Environmental operating range	-20 to 140°F (-29 to 60°C), 10–90% relative humidity, non-condensing
Storage temperature range	-24 to 140°F (-30 to 60°C), 0 to 90% relative humidity, non-condensing
Physical	Rugged aluminum cover, removable screw-type terminal blocks



Overall dimensions	A:	7-1/2 in. (19.1 cm)
	B:	11-5/16 in. (28.7 cm)
Mounting dimensions	C:	5 in. (12.7 cm)
	D:	10-7/8 in. (27.6 cm)
	E:	1-1/4 in. (3.2 cm)
	F:	1/4 in. (.6 cm)
Mount with 6-32 by 1/2 in. mounting screws		
Recommended panel depth	2 3/4 in. (7cm)	
Weight	1.4 lbs (0.64 kg)	
Listed by	UL916 (Canadian Std C22.2 No. 205-M1983, CE, FCC Part 15 - Subpart B - Class A)	

Safety considerations

⚠ WARNING Disconnect electrical power to the i-Vu® CCN Router before wiring it. Failure to follow this warning could cause electrical shock, personal injury, or damage to the controller.

Mounting and wiring

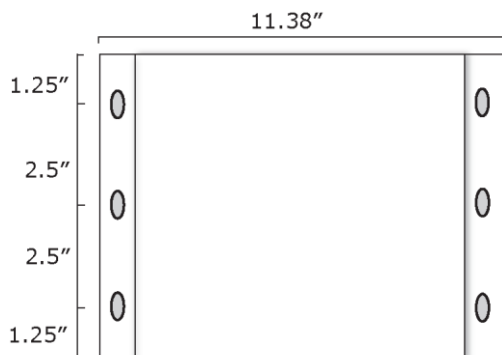
To mount the i-Vu® CCN Router

WARNING

When you handle the i-Vu® CCN Router:

- Do not contaminate the printed circuit board with fingerprints, moisture, or any foreign material.
- Do not touch components or leads.
- Handle the board by its edges.
- Isolate from high voltage or electrostatic discharge.
- Ensure that you are properly grounded.

Screw the i-Vu® CCN Router into an enclosed panel using the mounting slots on the cover plate. Leave about 2 in. (5 cm) on each side of the controller for wiring.



To wire for power

- 1 Make sure the i-Vu® CCN Router's power switch is in the **OFF** position to prevent it from powering up before you can verify the correct voltage.
- 2 Remove power from the power supply.
- 3 Pull the screw terminal connector from the router's power terminals labeled **24 Vac/Vdc** and **Ground**.
- 4 Connect the transformer wires to the screw terminal connector.
- 5 Apply power to the power supply.
- 6 Measure the voltage at the i-Vu® CCN Router's power input terminals to verify that the voltage is within the operating range of 21.6 – 26.4 Vac or 23.4 - 28.6 Vdc.
- 7 Insert the screw terminal connector into the i-Vu® CCN Router's power terminals.
- 8 Turn **on** the i-Vu® CCN Router's power.
- 9 Verify that the Run LED (a dot in the lower right corner of the **Module Status** LED) begins blinking. The **Module Status** LED will display **8** for about 5 seconds and then reverts to **0**, until controllers have been found and downloaded. There is a chase pattern when the router is running with no errors.

To wire CCN devices on Port S1

- 1 Turn off the i-Vu® CCN Router's power.
- 2 Check the communications wiring for shorts and grounds.
- 3 Verify that the **Port S1** 485/232 jumper is set to **EIA-485** (left side) and the 2/4 jumper to **485-2w** (right side).
- 4 Connect the i-Vu® CCN Router's **Port S1** to the CCN bus. Use the same polarity throughout the network segment.

Wire this Port S1 terminal...	To this CCN device terminal...
Signal Ground (Pin 5)	G
Net- (Pin 2)	-
Net+ (Pin 1)	+

NOTE The CCN Shield should be tied/taped back or daisy chained if the i-Vu® CCN Router is not at one end of the bus.

Configuring IP for the i-Vu® CCN Router

The i-Vu® CCN Router must be commissioned using Network Service Tool on **Port S1**.

- 1 Use **Network Service Tool V** (NST V) to connect the i-Vu® CCN Router directly into Port S1, which is designated for CCN communications.
- 2 Upload the i-Vu® CCN Router (Default CCN Address 0, 1).

NOTE After uploading the controller the CCN address should be changed to something other than 0,1. This avoids addressing conflicts when uploading Carrier equipment into the i-Vu application. When using NSTV the CCN address can be changed by highlighting the i-Vu® CCN Router and then clicking on the Display/set properties icon.

- 3 Access the **Service Configuration Table** IP_CONF to enter the following configuration options:

NOTE A static IP address is required, as DHCP is not supported.

- **Host IP Address** - enter the device manager's IP address, provided by the LAN administrator (allowable entries for xxx.xxx.xxx.xxx: xxx is a decimal number between 0 - 255)
- **Subnet Mask** - enter the device manager's IP address, provided by the LAN administrator (allowable entries for xxx.xxx.xxx.xxx: xxx is a decimal number between 0 - 255)
- **Default Gateway** - enter the IP Gateway's IP address, provided by the LAN administrator (typically a router on the Ethernet LAN).

CCN ENET Configuration

Device Type -

- Select **0** for **Gateway** if the converter connects the primary CCN Bus (Bus 0) to the Ethernet. Toggle the spacebar to select **0**.
- Select **1** for **Bridge** if the converter connects a secondary CCN Bus to the Ethernet. Toggle the spacebar to select **1**. The CCN Element number of the CCN Bridge becomes the CCN secondary bus number assigned to controllers residing on the network.

NOTE You can only have one Gateway per system.

If configured as a Bridge:

- **CCN/Ethernet Gateway Address** - enter the IP address of the i-Vu® device manager that is configured as the CCN Ethernet Gateway. This is the same address that was entered in the Host IP address for the CCN Gateway. (Entries are allowed for xxx.xxx.xxx.xxx:xxx are decimal numbers between 0 - 255.)

NOTE When the device manager is configured as the Gateway, it ignores the CCN/Ethernet Gateway IP address. In this case, leave the CCN/Ethernet gateway address at its default setting (0.0.0.0.).

- 4 Repeat the above steps for each i-Vu® device manager used in the CCN system.

Troubleshooting

If you have problems mounting, wiring, or addressing the i-Vu® CCN Router, contact Carrier Control Systems Support.

NOTE To help you troubleshoot, obtain a Module Status (Modstat) from the controller and review the System Error and Warning details.

Formatting the i-Vu® CCN Router



CAUTION This erases all archived information and user-configuration settings. You will have to reconfigure all custom settings. It is recommended to restore the factory defaults only under the guidance of Carrier Control Systems Support.

To erase volatile memory data and restore factory default configuration settings:

- 1 Turn **off** the i-Vu® CCN Router's power.
- 2 Hold down the i-Vu® CCN Router's **Format** button while you turn its power on.
- 3 Continue to hold down the **Format** button until the module status LED displays **8** and then **0**, then release the button.
- 4 Sets the Bus and Element number to 0, 1, which must be reverted using the Network Service Tool.
- 5 In the i-Vu® interface, select the i-Vu® CCN Router in the navigation tree, go to the **Downloads** page and **Download All Content** to download the control programs, drivers, and parameters.

LED's

The LED's indicate if the i-Vu® CCN Router is speaking to other devices on the network. The LED's should reflect communication traffic based on the baud rate set. The higher the baud rate, the more solid the LED's will look.

The **Module Status** LED can display the following error codes.

Error Code...	Indicates...	Possible solutions
0	The controller is not downloaded.	1 In the i-Vu® interface, select the router in the navigation tree, go to the Downloads page and click Download All Content .
1	A custom equipment error	Obtain a Module Status Report (Modstat) and look for error conditions.* If you cannot determine the error from the Modstat, send a screenshot of the Modstat to Technical Support. * NOTE To obtain a Module Status Report in i-Vu®, click the menu button, then select Manual Command and type in "modstat".
2	The i-Vu® CCN Router's memory is full	In the i-Vu® application, reduce the amount of trend data being stored in the module.
3	A setup error	Verify that the IP address has been set through Network Service Tool. See <i>Configuring IP for the i-Vu® CCN Router</i> (page 6).
4	A system error	Obtain a Module Status Report (Modstat) and look for error messages. If you cannot determine the error from the Modstat, send a screenshot of the Modstat to Carrier Control Systems Support. NOTE To obtain a Module Status Report in the i-Vu® interface, click the Main Menu button, then select Manual Command and type in <code>modstat</code> .
8	The i-Vu® CCN Router is formatting	The number 8 should display only during the short formatting period. If this number displays continuously or flashes intermittently with another number, try the following options: <ul style="list-style-type: none"> • Turn the i-Vu® CCN Router's power off, then on. • Format the i-Vu® CCN Router. See <i>Formatting the i-Vu® CCN Router</i> (page 7). • Download memory to the i-Vu® CCN Router. • Replace the i-Vu® CCN Router.

Other LED's show the status of certain functions.

If this LED is on...	Status is...
Power	The i-Vu® CCN Router has power.
Link	The controller is connected to the Ethernet
LAN	The Ethernet port is transmitting or receiving data
100	The connection speed is 100 Mbps. If LED is not lit, the connection speed is 10 Mbps.
CMnet transmit	The i-Vu® CCN Router is transmitting data over the CMnet
CMnet receive	The i-Vu® CCN Router is receiving data from the CMnet
Archive Valid	The i-Vu® CCN Router's memory backup is valid
Port S1 transmit	The i-Vu® CCN Router is transmitting data from Port S1
Port S1 receive	The i-Vu® CCN Router is receiving data on Port S1
Battery low	The battery is low

To replace the i-Vu® CCN Router's battery

The i-Vu® CCN Router's 10-year Lithium CR123A battery retains the following data for a maximum of 720 hours during power outages: time, control programs, editable properties, schedules, and trends.

To conserve battery life, you can set the driver to turn off battery backup after a specified number of days and depend on the archive function to restore data when the power returns.

A low battery is indicated by the **Battery low** LED or a low battery alarm in the i-Vu® application. You can purchase replacement batteries from any retailer that sells a CR-123A battery.

- 1 Verify that the i-Vu® CCN Router's power is on.
- 2 Using a small flathead screwdriver, pry up each side of the black battery clip until it is free and you can remove it.
- 3 Remove the battery from the controller, making note of the battery's polarity.
- 4 Insert the new battery into the controller, matching the polarity of the battery you removed.
- 5 Push the black clip back onto the battery until you hear both sides click in place.
- 6 Download the i-Vu® CCN Router.

Compliance

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



CAUTION Changes or modifications not expressly approved by the responsible party for compliance could void the user's authority to operate the equipment.

CE Compliance



WARNING This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

BACnet Compliance

Compliance of listed products to requirements of ASHRAE Standard 135 is the responsibility of BACnet International. BTL® is a registered trademark of BACnet International.

Document revision history

Important changes to this document are listed below. Minor changes such as typographical or formatting errors are not listed.

Date	Topic	Change description	Code*
1/20/21	Configuring the IP for the i-Vu® CCN Router	Added note to step 2 of NSTV about changing the CCN address to avoid conflicts Specified CCN ENET Configuration Device Type numbers to use.	C-TS-JN-E
1/20/21	What is the i-Vu® CCN Router?	Added note about rotary switches.	C-TS-JN-E
1/24/19	Specifications	Added surge CAUTION to Protection specification.	X-TS-AK-E-CC
10/26/18	Specifications	Reworded Protection specification and added first paragraph.	X-H-JS-O
1/8/16		General formatting changes - no content changes.	C-D
8/6/14	Configuring the IP for the i-Vu® CCN Router	Corrected the Network Service Tool procedure by adding CCN ENET Configuration.	C-TS-RD-E

* For internal use only

