Crestron **CNX-BF12 & CNX-BN12**

Designer Function & Numeric Keypads

Operations & Installation Guide

CRESTRON

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Contents

Function & Numeric Keypads: CNX-BF12 & CNX-BN12

Introduction

Features and Functions

- Compatible with standard electrical gang boxes
- Ergonomic buttons are easy to read from any angle
- Backlit buttons are easy to locate
- Programmable LED indicators provide visual feedback
- Speaker provides audio feedback
- Temperature sensor reports to Cresnet® for HVAC monitoring[1]
- Available in almond (A), black (B) and white (W)[2]
- Additional source buttons for CNX-BF12 are provided, enabling custom source selection (refer to illustration on page 5)
- Seamless Cresnet integration

1. The temperature sensor is not accurate when the backlight is on.
2. For example, a CNX-BN12B is a numeric keypad in black.

NOTE: Keypads can also be mounted in multi-gang electrical boxes.

Specifications

Specifications for the CNX-BF12 & CNX-BN12 are listed in the following table.

CNX-BF12 & CNX-BN12 Specifications

SPECIFICATION	DETAILS
Audio	Built-in speaker, adjustable volume
Audio Capacity	101 WAV files maximum, ~56 seconds total time, 512 kB total memory
WAV File	8-bit PCM, mono, 8 kHz sampling rate
Temperature Sensor	
Type	Linear, digital
Precision	0.18°F (0.1°C)
Accuracy	1.8°F (1.0°C) with all LEDs and backlight off
Range	32° to 113°F (0° to 45°C)
Power Requirements	
Cresnet Power Usage	3 Watts (0.125 Amps @ 24 Volts DC)
Default NET ID	60
Minimum 2-Series Control System Update File[1, 2, 3]	Version C2-2.004.CUZ or later
Environmental	
Temperature	32° to 113°F (0° to 45°C)
Humidity	10% to 90% RH (non-condensing)
Enclosure	1-gang mountable in a standard electrical box

(Continued on following page)

CNX-BF12 & CNX-BN12 Specifications (Continued)

SPECIFICATION	DETAILS
Dimensions (including faceplate)	
Height	4.77 in (12.10 cm)
Width	2.92 in (7.40 cm)
Depth	1.54 in (3.91 cm) – without connector
Weight	2.60 oz (74 g)
Available Models	
C2N-DBF/N12A	Almond
C2N-DBF/N12B	Black
C2N-DBF/N12W	White
Available Accessories	
B-G1-FP	1-Gang Designer Series and Standard Faceplates
B-G2-FP	2-Gang Designer Series and Standard Faceplates
B-G3-FP	3-Gang Designer Series and Standard Faceplates
B-G1-FPAR	1-Gang Architectural Series Faceplates
B-G1-WPK	Water Resistant Cover Kit

1. The latest software versions can be obtained from the Crestron® website. Refer to the NOTE following these footnotes.

2. Crestron 2-Series control systems include the AV2 and PRO2. Consult the latest Crestron Product Catalog for a complete list of 2-Series control systems.

3. Minimum Non 2-Series Control System Update Files:
    CEN/CN/TVAV   Version 5.10.13V.UPZ or later
    CNMSX-AV/PRO   Version 5.10.11X.UPZ or later
    CNRACKX/-DP   Version 5.10.11W.UPZ or later
    ST-CP   Version 4.01.04S.UPZ or later

    CNX update files are required for either CNMSX-AV/PRO or CNRACKX/-DP. Filenames for CNX update files have a UPZ extension, and ST-CP files are in one EXE or zipped UPZ file. To avoid program problems, make sure you are using the update file with the correct suffix letter (e.g., S, V, W, X).

> **NOTE:** Crestron software and any files on the website are for authorized Crestron dealers and Crestron Authorized Independent Programmers (CAIP) only. New users may be required to register to obtain access to certain areas of the site (including the FTP site).

Physical Description

This section provides information on the connections, controls and indicators available on your CNX-BF12 & CNX-BN12.
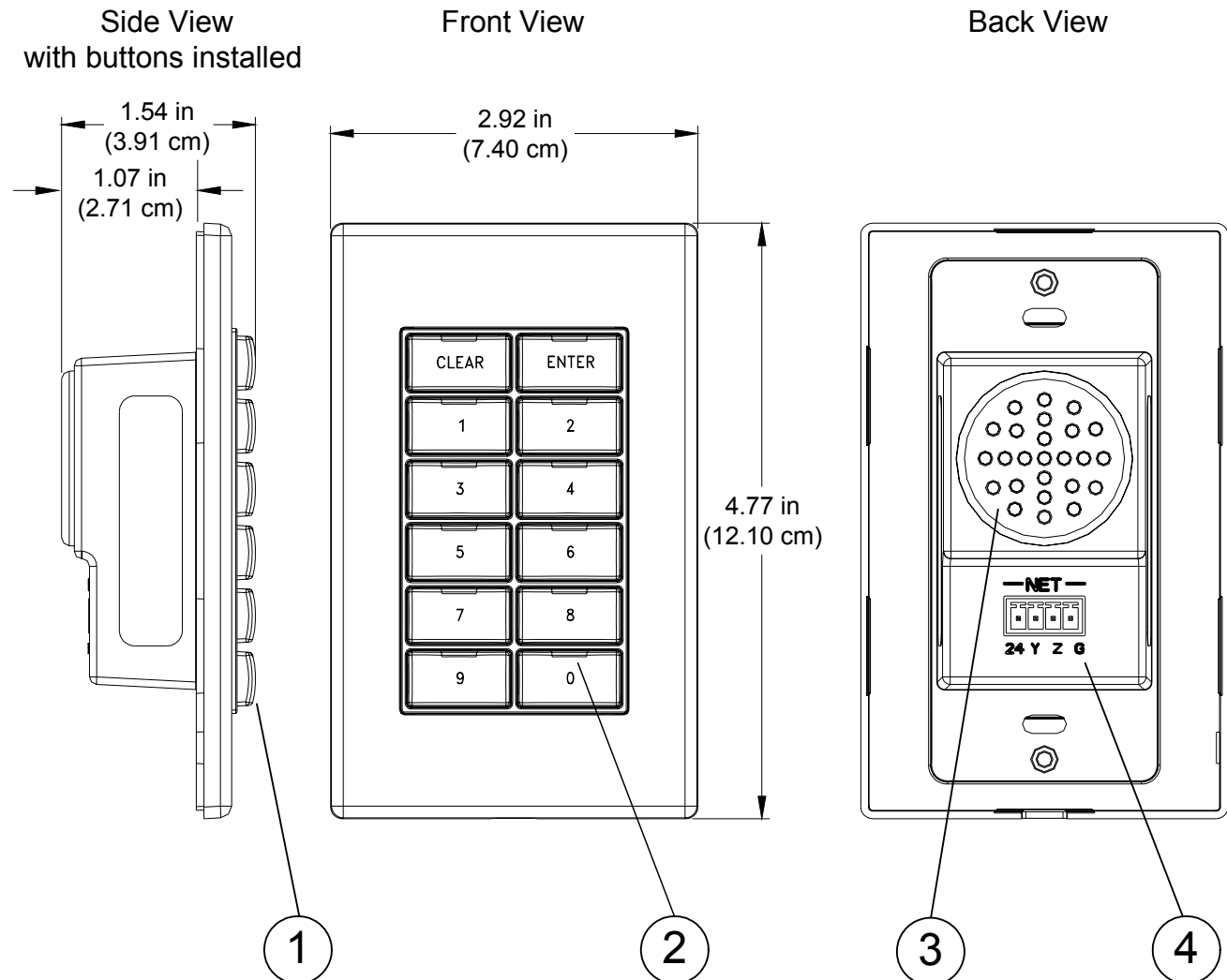
CNX-BF12 & CNX-BN12 Physical View

CNX-BF12
(White Color)

CNX-BN12
(Black Color)

CNX-BF12 & CNX-BN12 Overall Dimensions

Side View
with buttons installed

Front View

Back View

1.54 in
(3.91 cm)

1.07 in
(2.71 cm)

2.92 in
(7.40 cm)

CLEAR   ENTER

1	2
3	4
5	6
7	8
9	0

4.77 in
(12.10 cm)

— NET —

24 Y Z G

① ② ③ ④
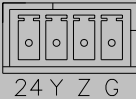
Connectors, Controls & Indicators

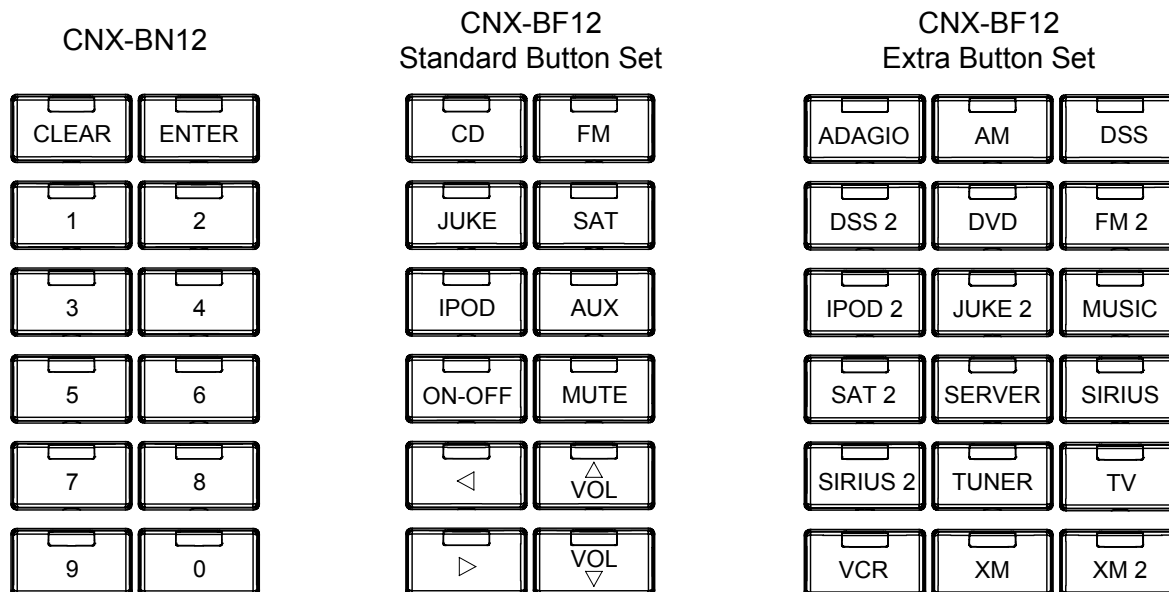| #	CONNECTORS[1], CONTROLS & INDICATORS	DESCRIPTION
1	Buttons	(12) Replaceable pre-labeled buttons, programmable; (18) Extra button caps supplied[2]
2	LED Indicators	(1 per button, providing feedback, red) programmable and dimmable

(Continued on following page)

Connectors, Controls & Indicators (Continued)

#	CONNECTORS[1], CONTROLS & INDICATORS	DESCRIPTION
3	Speaker	Provides audio feedback, adjustable volume
4	NET[1] 24 Y Z G	Four-position terminal block connector for data and power. Connects to Cresnet control network. An interface connector provided. Pin 1 (24) Power Pin 2 (Y) Data Pin 3 (Z) Data Pin 4 (G) Ground

1. Interface connector for **NET** port is provided with the unit.
2. CNX-BF12 only.

Button Arrangements

CNX-BN12	CNX-BF12 Standard Button Set	CNX-BF12 Extra Button Set

CNX-BN12:

CLEAR	ENTER
1	2
3	4
5	6
7	8
9	0

CNX-BF12 Standard Button Set:

CD	FM
JUKE	SAT
IPOD	AUX
ON-OFF	MUTE
◁	△ VOL
▷	VOL ▽

CNX-BF12 Extra Button Set:

ADAGIO	AM	DSS
DSS 2	DVD	FM 2
IPOD 2	JUKE 2	MUSIC
SAT 2	SERVER	SIRIUS
SIRIUS 2	TUNER	TV
VCR	XM	XM 2

The keypads come fully assembled and each has 12 buttons with LED windows (refer to illustration on page 4). The CNX-BN12 has a CLEAR button, an ENTER button and numeric digit buttons 0 through 9. The CNX-BF12 has six source selector buttons, an ON-OFF button, a MUTE

button, and device transport control and volume control buttons. A kit with additional source buttons for the CNX-BF12 is also provided (refer to illustration on page 6).

Industry Compliance

As of the date of manufacture the CNX-BF12 & CNX-BN12 have been tested and found to comply with specifications for CE marking and standards per EMC and Radiocommunications Compliance Labelling.

$$C \in \mathcal{C}$$

NOTE: This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

Setup

Network Wiring

When wiring the network, consider the following:

- Use Crestron Certified Wire.

- Use Crestron power supplies for Crestron equipment.

- Provide sufficient power to the system.

> **CAUTION:** Insufficient power can lead to unpredictable results or damage to the equipment. Please use the Crestron Power Calculator to help calculate how much power is needed for the system (http://www.crestron.com/calculators).

- For larger networks, use a Cresnet Hub/Repeater (CNXHUB) to maintain signal quality.

For more details, refer to "Check Network Wiring" on page 22.

Identity Code

The Net ID of the CNX-BF12 & CNX-BN12 has been factory set to **60**. The Net IDs of multiple CNX-BF12 & CNX-BN12 devices in the same system must be unique. Net IDs are changed from a personal computer (PC) via the Crestron Toolbox™ (refer to "Establishing Communication" on page 18).

When setting the Net ID, consider the following:

- The Net ID of each unit must match an ID code specified in the SIMPL Windows program.

- Each network device must have a unique Net ID.

For more details, refer to the Crestron Toolbox help file.

Installation

The following tools/hardware are required for installation.

- Cresnet network cable (sold separately)
- Phillips screwdriver (not supplied)
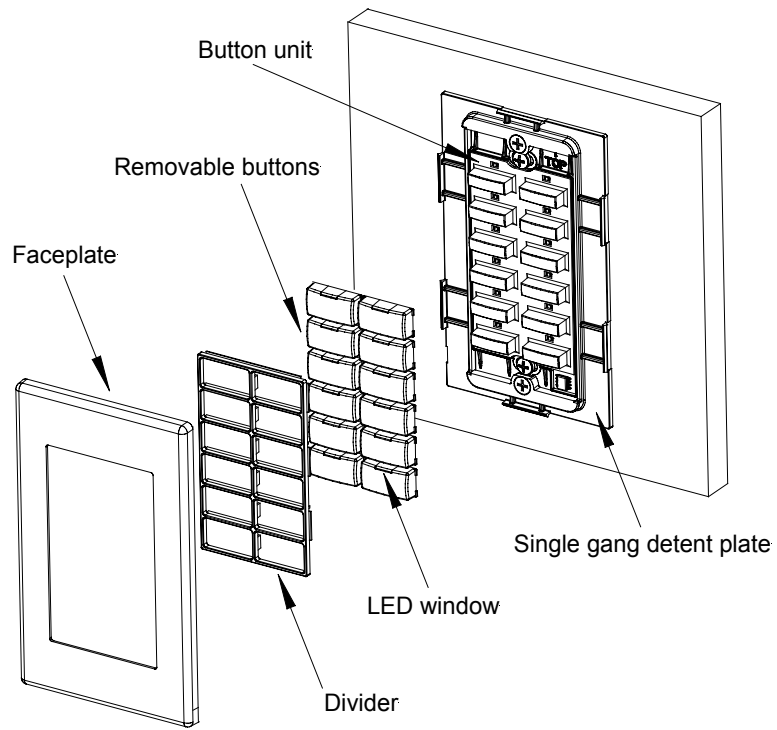
- Two 1-in. pan head Phillips screws (supplied)

After the Cresnet network wiring has been installed and verified, use the following procedure to install the keypad in a standard, single-gang electrical box (refer to illustrations on page 10):

1. Turn Cresnet system power **OFF**.

2. Connect the Cresnet cable with supplied connector plug to the keypad's Cresnet port and the other end to the control system.

3. Remove faceplate and divider from keypad.

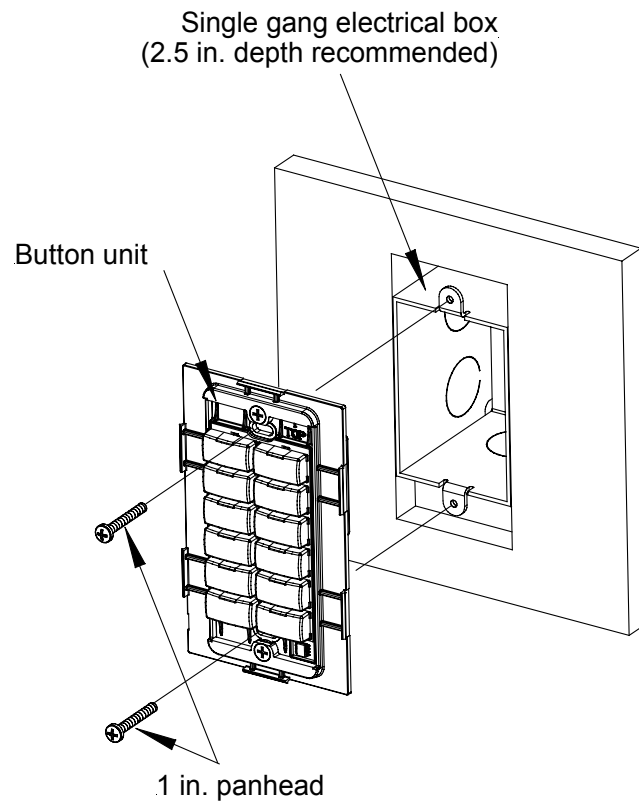4. Make sure button unit is oriented as marked with arrow at top and place it in the electrical box.

CAUTION: Excess wire that is pinched between the keypad and electrical box could short out. Make sure that all excess wire is completely inside the electrical box and not between the box and the keypad.

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5. Attach the keypad to the electrical box using the supplied two 1-in. pan head screws.

6. Attach faceplate and divider.

7. Turn Cresnet system power **ON**.

Disassembly View

Button unit

Removable buttons

Faceplate

Single gang detent plate

LED window

Divider

Installation View

Single gang electrical box
(2.5 in. depth recommended)

Button unit

1 in. panhead

Hardware Hookup

Make the necessary connections as called out in the illustration that follows this paragraph. Refer to "Network Wiring" on page 8 before attaching the 4-position terminal block connector. Apply power after all connections have been made.

When making connections to the CNX-BF12 & CNX-BN12, use Crestron power supplies.

Hardware Connections for the CNX-BF12 & CNX-BN12
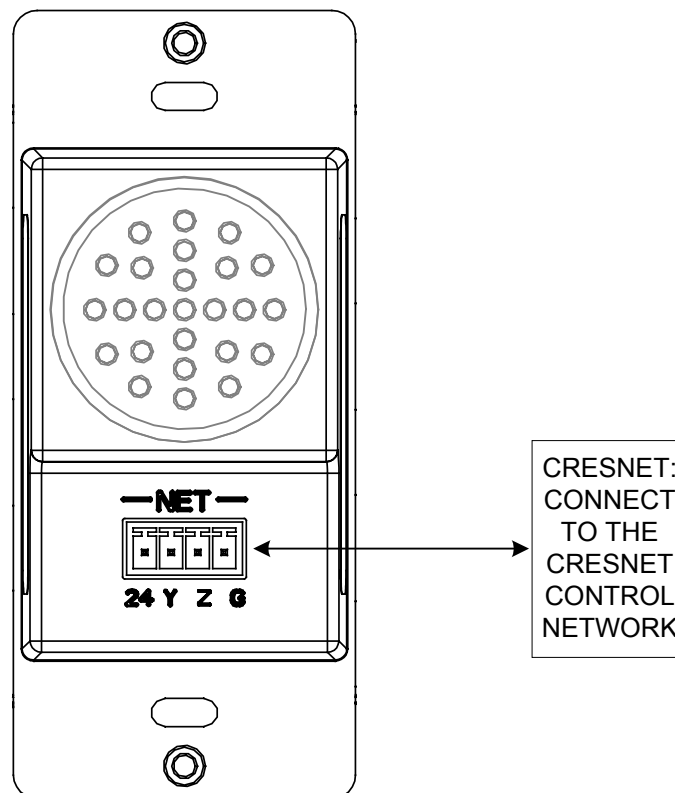
Button Replacement

Replacing/changing the removable buttons in a keypad is a simple process. Refer to the illustrations on page 10 and the following procedures.

1. Remove faceplate from front of keypad.

2. If the keypad is installed in an electrical box, remove the two 1-inch securing screws, carefully pull the keypad from the electrical box, and disconnect the Cresnet cable.

3. Remove the divider.

CAUTION: The removable buttons fit snugly on the rubber membrane and must be removed carefully to avoid pulling the membrane from the unit. Once the membrane is detached, you may be unable to reattach it.

4. While holding adjacent buttons in place, carefully pull the button(s) to be replaced from the rubber membrane.

5. Carefully press the replacement button(s) in place, make sure LED window(s) orientation is correct, and attach the divider using the four screws removed in step 2.

6. If applicable, reinstall the keypad in the electrical box.

Programming Software

Have a question or comment about Crestron software?

Answers to frequently asked questions (FAQs) can be viewed in the Online Help section of the Crestron website. To post a question or view questions you have submitted to Crestron's True Blue Support, log in at http://support.crestron.com. First-time users will need to establish a user account.

Earliest Version Software Requirements for the PC

NOTE: Crestron recommends that you use the latest software to take advantage of the most recently released features. The latest software is available from the Crestron website.

Crestron has developed an assortment of Windows®-based software tools to develop a Cresnet system. The following are the minimum recommended software versions for the PC:

Software

TASK	REQUIRED SOFTWARE VERSION
Program control system to operate CNX-BF12 & CNX-BN12.	SIMPL Windows version 2.04.11 or later with SIMPL+® Cross Compiler version 1.1 or later and Library update 227 or later; Also requires Crestron Database version 15.9.8 or later.
Upload program and firmware.	Crestron Toolbox 1.01.06 or later.

(Continued on following page)

Software (Continued)

TASK	REQUIRED SOFTWARE VERSION
Program with simple wizards for systems using a CNX-BF12 and/or CNX-BN12 (optional but recommended).	Crestron SystemBuilder™ version 2.0 or later with SystemBuilder Templates version 2.0 or later. Refer to software release notes or Crestron website for other required Crestron software packages.

Programming with Crestron SystemBuilder

Crestron SystemBuilder is the easiest method of programming but does not offer as much flexibility as SIMPL Windows. For additional details, download SystemBuilder from the Crestron website and examine the extensive help file.

Programming with SIMPL Windows

NOTE: While SIMPL Windows can be used to program the CNX-BF12 & CNX-BN12, it is recommended to use SystemBuilder for configuring a system.
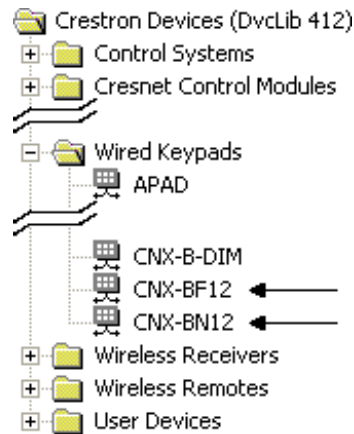
SIMPL Windows is Crestron's premier software for programming Crestron control systems. It is organized into two separate but equally important "Managers".

Configuration Manager

Configuration Manager is the view where programmers "build" a Crestron control system by selecting hardware from the *Device Library*.
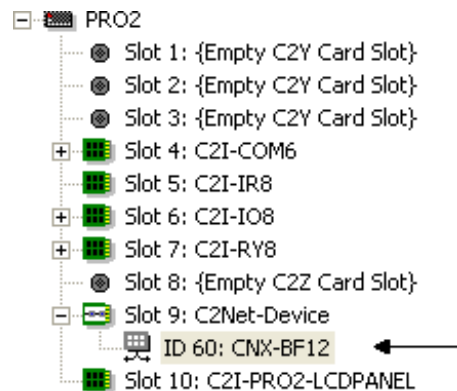
- To incorporate the CNX-BF12 & CNX-BN12 into the system, drag the CNX-BF12 & CNX-BN12 from the Wired Keypad folder of the *Device Library* and drop it in the *System Views*.

Locating the CNX-BF12 & CNX-BN12 in the Device Library

```
📁 Crestron Devices (DvcLib 412)
   ⊞ 📁 Control Systems
   ⊞ 📁 Cresnet Control Modules
   ⌇
   ⊟ 📁 Wired Keypads
          🖳 APAD
   ⌇
             🖳 CNX-B-DIM
             🖳 CNX-BF12  ◄──────────
             🖳 CNX-BN12  ◄──────────
   ⊞ 📁 Wireless Receivers
   ⊞ 📁 Wireless Remotes
   ⊞ 📁 User Devices
```

- The system tree of the control system displays the device in the appropriate slot with a default Net ID as shown in the following illustration.

C2Net Device, Slot 9

```
⊟ ▥ PRO2
     ⦿ Slot 1: {Empty C2Y Card Slot}
     ⦿ Slot 2: {Empty C2Y Card Slot}
     ⦿ Slot 3: {Empty C2Y Card Slot}
   ⊞ ▦ Slot 4: C2I-COM6
     ▦ Slot 5: C2I-IR8
   ⊞ ▦ Slot 6: C2I-IO8
   ⊞ ▦ Slot 7: C2I-RY8
     ⦿ Slot 8: {Empty C2Z Card Slot}
   ⊟ ▨ Slot 9: C2Net-Device
        🖳 ID 60: CNX-BF12  ◄──────────
     ▦ Slot 10: C2I-PRO2-LCDPANEL
```

- Additional CNX-BF12 & CNX-BN12 devices are assigned different Net ID numbers as they are added.

- If necessary, double click a device to open the "Device Settings" window and change the Net ID, as shown in the following figure.

"CNX-BF12 & CNX-BN12 Device Settings" Window
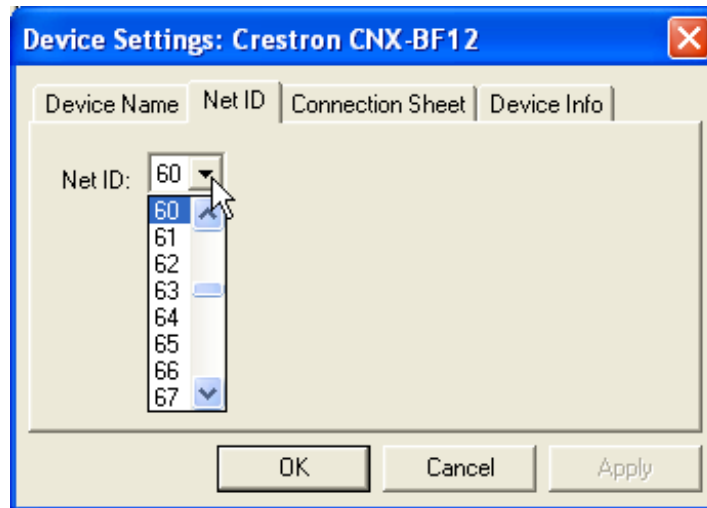
- The ID code specified in the SIMPL Windows program must match the Net ID of each unit.

Program Manager

Program Manager is the view where programmers "program" a Crestron control system by assigning signals to symbols. The symbol can be viewed by double clicking on the icon or dragging it into *Detail View*. Each signal in the symbol is described in the SIMPL Windows help file (**F1**).

Programming with VisionTools® Pro-e

To play WAV files, a CNX-BF12 or CNX-BN12 project must be created in VisionTools Pro-e, with WAV files and correct join numbers added to the project using **Tools | Sound Mana**ger. For more information, refer to the VisionTools Pro-e help file.

NOTE: If you need to create WAV files, refer to Windows Help (Using Sound Recorder).

NOTE: The keypad project allows you to add WAV files only. You cannot add pages or keypad buttons to the project. Join numbers assigned to a WAV file in VisionTools Pro-e begin at 20 because join numbers below 20 are already assigned to other keypad buttons or functions.

Once the project is created, use **File | Upload Project** from the VisionTools Pro-e main menu to load it in the CNX-BF12 or CNX-BN12. For more information, refer to the VisionTools Pro-e help file.

> **NOTE:** This can be done after an identity code (NET ID) is assigned to the keypad or after installation (refer to "Identity Code" or "Installation" on page 8 for details).

Example Program

An example program for the CNX-BF12 & CNX-BN12 is available from the Crestron website (http://www.crestron.com/exampleprograms).
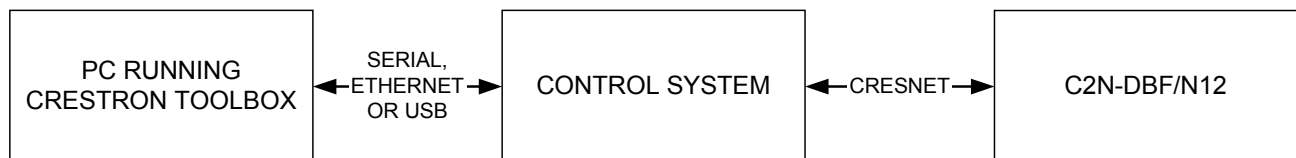
Uploading and Upgrading

Crestron recommends using the latest programming software and that each device contains the latest firmware to take advantage of the most recently released features. However, before attempting to upload or upgrade it is necessary to establish communication. Once communication has been established, files (for example, programs, projects or firmware) can be transferred to the control system (and/or device). Finally, program checks can be performed (such as changing the device ID) to ensure proper functioning.

Establishing Communication

Use Crestron Toolbox for communicating with the CNX-BF12 & CNX-BN12; refer to the Crestron Toolbox help file for details. There is a single method of communication: indirect serial communication.

Indirect Serial Communication

```
┌─────────────────────┐   SERIAL,    ┌─────────────────────┐              ┌─────────────────────┐
│   PC RUNNING        │◄─ETHERNET─►  │  CONTROL SYSTEM     │◄─CRESNET─►   │   C2N-DBF/N12       │
│  CRESTRON TOOLBOX   │   OR USB     │                     │              │                     │
└─────────────────────┘              └─────────────────────┘              └─────────────────────┘
```

- CNX-BF12 & CNX-BN12 connects to control system via Cresnet.

- Establish communications between the PC and the control system as described in the latest version of the 2-Series Control Systems Reference Guide (Doc. 6256).

Programs, Projects and Firmware

Program, project or firmware files may be distributed from programmers to installers or from Crestron to dealers. Firmware upgrades are available from the Crestron website as new features are developed after product releases. One has the option to upload programs and projects via the programming software or to upload and upgrade via the Crestron Toolbox. For details on uploading and upgrading, refer to the SIMPL Windows help file, VisionTools Pro-e help file or the Crestron Toolbox help file.

SIMPL Windows

If a SIMPL Windows program is provided, it can be uploaded to the control system using SIMPL Windows or Crestron Toolbox.

VisionTools Pro-e

Upload the VisionTools Pro-e file to the keypad using VisionTools Pro-e or Crestron Toolbox.

Firmware

Check the Crestron website to find the latest firmware. (New users may be required to register to obtain access to certain areas of the site, including the FTP site.)

- Upgrade CNX-BF12 & CNX-BN12 firmware via Crestron Toolbox.

- Establish communications with the CNX-BF12 & CNX-BN12 and display the "System Info" window.

- Select **Functions | Firmware…** to upgrade the CNX-BF12 & CNX-BN12 firmware.

Program Checks

For Cresnet connections, display the network device tree (**Tools | Network Device Tree**) to show all network devices connected to the control system. Right-click on the CNX-BF12 & CNX-BN12 to display actions that can be performed on the CNX-BF12 & CNX-BN12.

Operation

The CNX-BF12 serves as a source keypad.

The CNX-BN12 can be used to expand the capabilities of the source keypad and is ideal for audio device functions such as selecting a particular CD track number or a certain CD from a CD changer.

All buttons on the keypad are functionally identical and have light emitting diodes (LEDs) that serve as user feedback indicators. Each LED's illumination (on/off) is independently addressable and is programmable using SIMPL Windows.

In the program, the intensity level for all of the button LEDs can be set from 0 to 100%.

Problem Solving

Troubleshooting

The following table provides corrective action for possible trouble situations. If further assistance is required, please contact a Crestron customer service representative.

CNX-BF12 & CNX-BN12 Troubleshooting

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Keypad does not function.	Keypad is not communicating with the network.	Use Crestron Toolbox to poll the network. Verify network connection to the device.
	Keypad is not receiving power from a Crestron power source.	Use Crestron power source. Verify connections.
	Keypad is not receiving sufficient power.	Use the Crestron Power Calculator to help calculate how much power is needed for the system.
	Keypad Net ID is not correct.	In Toolbox, poll the network (F4) to verify Net ID.
	Keypad Net ID is not set to match the net ID set in the SIMPL Windows program.	Verify Net ID setting in SIMPL Windows program.

(Continued on following page)

CNX-BF12 & CNX-BN12 Troubleshooting (Continued)

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Keypad does not function (continued).	Keypad Net ID is the same as another device's Net ID.	Assign a different Net ID in SIMPL Windows and reset unit using Toolbox.
Button LED does not illuminate.	Feedback signal names incorrect in SIMPL Windows program.	Verify SIMPL Windows program for feedback signal names.
	LED intensity set to 0 (zero).	Set intensity to desired level.
Pressing button yields wrong result.	Keypad is mounted upside down.	Check keypad orientation.
	Keypad programmed incorrectly.	Check programming in SIMPL Windows.
No sound from speaker	Feedback audio signal is not present.	Verify VisionTools Pro-e program for feedback audio signals.

Check Network Wiring

Use the Right Wire

In order to ensure optimum performance over the full range of your installation topology, Crestron Certified Wire and only Crestron Certified Wire may be used. Failure to do so may incur additional charges if support is required to identify performance deficiencies because of using improper wire.

Calculate Power

CAUTION: Use only Crestron power supplies for Crestron equipment. Failure to do so could cause equipment damage or void the Crestron warranty.

CAUTION: Provide sufficient power to the system. Insufficient power can lead to unpredictable results or damage to the equipment. Please use

the Crestron Power Calculator to help calculate how much power is needed for the system (http://www.crestron.com/calculators).

When calculating the length of wire for a particular Cresnet run, the wire gauge and the Cresnet power usage of each network unit to be connected must be taken into consideration. Use Crestron Certified Wire only. If Cresnet units are to be daisy-chained on the run, the Cresnet power usage of each network unit to be daisy-chained must be added together to determine the Cresnet power usage of the entire chain. If the unit is home-run from a Crestron system power supply network port, the Cresnet power usage of that unit is the Cresnet power usage of the entire run. The wire gauge and the Cresnet power usage of the run should be used in the following equation to calculate the cable length value on the equation's left side.

Cable Length Equation

$$L < \frac{40,000}{R \times P}$$

Where: L = Length of run (or chain) in feet
R = 6 Ohms (Crestron Certified Wire: 18 AWG (0.75 MM^2))
or 1.6 Ohms (Cresnet HP: 12 AWG (4 MM^2))
P = Cresnet power usage of entire run (or chain)

Make sure the cable length value is less than the value calculated on the right side of the equation. For example, a Cresnet run using 18 AWG Crestron Certified Wire and drawing 20 watts should not have a length of run more than 333 feet. If Cresnet HP is used for the same run, its length could extend to 1250 feet.

NOTE: All Crestron certified Cresnet wiring must consist of two twisted pairs. One twisted pair is the +24V conductor and the GND conductor and the other twisted pair is the Y conductor and the Z conductor.

Strip and Tin Wire

When daisy-chaining Cresnet units, strip the ends of the wires carefully to avoid nicking the conductors. Twist together the ends of the wires that share a pin on the network connector and tin the twisted connection. Apply solder only to the ends of the twisted wires. Avoid tinning too far up the wires or the end becomes brittle. Insert the tinned connection into the Cresnet connector and tighten the retaining screw. Repeat the procedure for the other three conductors.

Add Hubs

For larger networks (i.e., greater than 28 network devices), it may become necessary to add a Cresnet Hub/Repeater (CNXHUB) to

maintain signal quality throughout the network. Also, for networks with lengthy cable runs it may be necessary to add a Hub/Repeater after only 20 devices.

Reference Documents

The latest version of all documents mentioned within the guide can be obtained from the Crestron website (http://www.crestron.com/manuals). This link will provide a list of product manuals arranged in alphabetical order by model number.

List of Related Reference Documents

DOCUMENT TITLE
2-Series Control Systems Reference Guide

Further Inquiries

If you cannot locate specific information or have questions after reviewing this guide, please take advantage of Crestron's award winning customer service team by calling the Crestron corporate headquarters at 1-888-CRESTRON [1-888-273-7876]. For assistance in your local time zone, refer to the Crestron website (http://www.crestron.com/) for a listing of Crestron worldwide offices.

You can also log onto the online help section of the Crestron website to ask questions about Crestron products. First-time users will need to establish a user account to fully benefit from all available features.

Future Updates

As Crestron improves functions, adds new features and extends the capabilities of the CNX-BF12 & CNX-BN12, additional information may be made available as manual updates. These updates are solely electronic and serve as intermediary supplements prior to the release of a complete technical documentation revision.

Check the Crestron website periodically for manual update availability and its relevance. Updates are identified as an "Addendum" in the Download column.

Software License Agreement

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