



DeviceNet Starter Kit

INTRODUCTION

The DeviceNet Starter Kit is a complete set of Cutler-Hammer products designed to give you a thorough introduction to DeviceNet technology and PC-based control.

The kit includes the following:

Automation Software. Demonstration versions of Cutler-Hammer's software enable you to design and simulate your own control application. NetView is used to configure your devices, while NetSolver allows you to design and control your system. PanelMate PC provides operator interface capabilities for your PC, and NetPoiNT is a human machine interface software package.

Scanner Card. This card, available in both ISA and PCMCIA versions, fits into a standard or industrial personal computer, permitting communication and control from the computer's CPU to the DeviceNet network. It functions as a DeviceNet scanner and acts as the interface between the network and our Automation Software.

Advantage Motor Starter. Coupled with a WPONIDNA interface module to allow communication over the DeviceNet network, this starter features solid-state overload protection, phase loss trip, phase unbalance trip, ground fault trip and an adjustable trip class.

DN50 I/O Block. Our DN50 I/O Block acts as a slave device in an open automation system, providing 8 inputs and 6 outputs. Up to 4 modules can be linked together for a total of 56 discrete I/O points on one node. An analog expander (not included) can also be added, providing up to four analog inputs or two analog outputs.

Prism Photoelectric Sensor. This polarized-reflex photoelectric sensor is part of a powerful line of miniature sensors with an industry-standard 18mm tubular body, and implanted with DeviceNet intelligence. Its threaded body with flat sides mounts quickly in a 3/4" hole or against any flat surface. All mounting hardware is included.

Physical Media. All components to build a DeviceNet network are included. A cable with a Phoenix connector is used to link the PC to the network. A terminator is included to ensure reliable network communications. Assorted tee connectors and drop cables allow individual devices (i.e. the motor starter, DN50, and the photoelectric sensor) to be attached to the network. The plug-and-play capability of the DeviceNet media means that connections can be made error-free and without tools. Devices can even be added while the system is hot.

Power Supply. A 120Vac to 24Vdc power supply required for DeviceNet systems is also included.

GETTING STARTED

The Starter Kit has been designed to enable you to be up-and-running with a minimal amount of effort. Simply follow the steps outlined below:

1. Select a PC that meets the system requirements – or use a Cutler-Hammer D700 Series Automation PC.
2. Insert the DeviceNet Scanner Card.
3. Build the DeviceNet network by connecting the cables, connectors, and components.
4. Install the software.
5. Configure and design your system.

Each of these steps is described on the following pages. Detailed information on each hardware component can be found in the I.L. (Instruction Leaflet) included with each device.

A Troubleshooting Guide is included at the end of this publication.

STEP 1: SYSTEM REQUIREMENTS

- A personal computer with an Intel Pentium microprocessor and at least 24 MB of RAM (32 is recommended)
- A 3.5 inch floppy disk drive and a CD-ROM drive
- A hard drive with 50 MB free space available (300MB if you choose to install all the demo software)
- Windows NT 4.0 and Service Pack 3
- A video card and monitor with VGA or higher resolution that is supported by Windows
- A mouse supported by Windows

STEP 2: SCANNER CARD INSTALLATION

INSTALLING AN ISA SCANNER CARD

1. Ground yourself to avoid static discharge. Use an ESD strap to avoid permanent damage to integrated circuits.
2. Remove all power from the unit.
3. Remove the back cover of the computer.
4. On the ISA card, set the dip switches to port location 258. The dip switch positions are listed below.

I/O	SW1 Setting					
	1	2	3	4	5	6
Address						
0 x 250	0	1	0	1	0	0
0 x 258	1	1	0	1	0	0

5. Ensure the Phoenix connector is removed prior to installing and set aside to be used in Step 3 below. Insert the ISA card into the slot and ensure the gold edge-connector seats firmly into the expansion slot connector.
6. Reattach the back cover of the computer. Tighten down all screws and restart the computer.

INSTALLING A PCMCIA SCANNER CARD

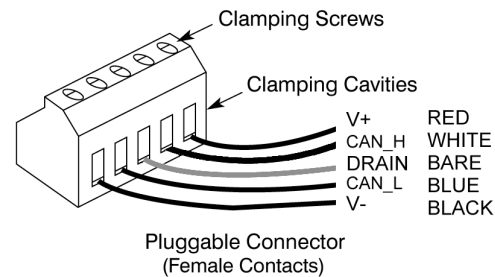
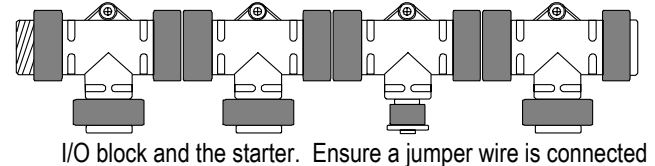
1. Remove all power from the computer.
2. Remove Phoenix connector from the D930PCMDNA interface module and set it aside to be used in step 3 below. Insert PCMCIA scanner card into slot on the computer and connect the D930PCMDNA interface module to the card.
3. Restart the computer.

NOTE: Do not install the software that comes with the scanner card. It is not required for this demo.

STEP 3: BUILD THE NETWORK

1. Connect all tees together as shown in Figure 1.
2. Connect the micro connector of the Prism photoelectric sensor to the micro connector tee identified as D970DNTMR. A D970DNDRR03 drop cable is included if more distance between the tee and the sensor is desired.
3. Attach the stripped and pre-tinned ends of one of the D970DNDMP03 drop cable assemblies to the Phoenix connector provided with the scanner card as shown in Figure 2. Then attach this assembly to the mating receptacle on the scanner card (or D930PCMDNA module). Attach the other end of this cable to one of the D970DNTMM tees.
4. Attach the stripped and pre-tinned ends of one of the D970DNDMP03 drop cable assemblies to the Phoenix connector provided with the WPONIDNA and Advantage Motor Starter as defined by the color code on the connector. Then attach this assembly to the mating receptacle on the WPONIDNA. Attach the other end of this cable to one of the D970DNTMM tees.
5. See the installation leaflet for the WPONIDNA for instructions on attaching this interface module to the Advantage Motor Starter.

6. Attach the stripped and pre-tinned ends of one of the D970DNDMP03 drop cable assemblies to the Phoenix connector provided with the DN50 as defined by the color code on the connector. Then attach this assembly to the mating receptacle on the DN50. Attach the other end of this cable to one of the D970DNTMM tees.
7. See the installation leaflet of the DN50 I/O Block for specific instruction on connecting devices.
8. Connect AC power to the appropriate terminals on the DN50



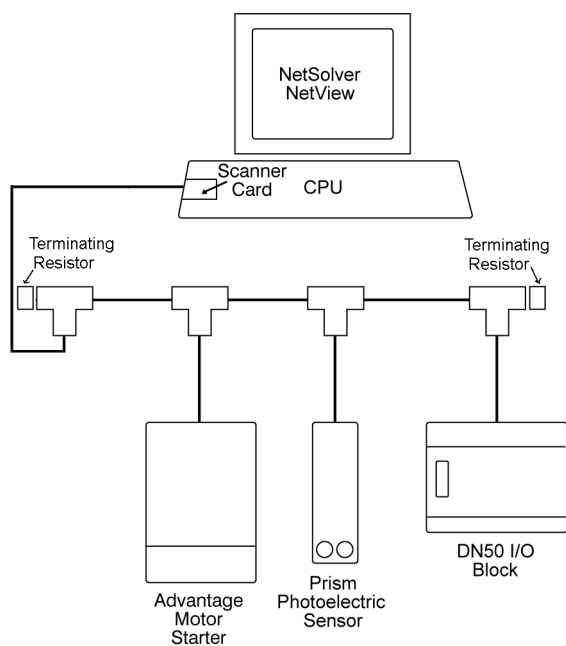
between E and P on the starter.

9. Connect 24Vdc power to the appropriate terminals on any one of the Phoenix connectors.
10. Add terminating resistors (D970DNNA and D970DNNB) to both ends of the network.

Network should now look like that shown in Figure 3.

Figure 1

Figure 2

*Figure 3*

STEP 4: SOFTWARE INSTALLATION

INSTALLING SERVICE PACK #3 FOR WINDOWS NT

The Service Packs are patches made by Microsoft to repair or fix problems existing in their operating systems. For Windows NT, there are three Service Packs in existence. For NetSolver, it is recommended that Service Pack #3 be installed on your computer prior to the installation of Cutler-Hammer Automation Software.



WARNING

YOU CANNOT HAVE NETSOLVER INSTALLED BEFORE LOADING ONE OF THE SERVICE PACKS. IF NETSOLVER IS ALREADY INSTALLED, YOU MUST FIRST UNINSTALL IT. FAILURE TO DO THIS CAN CORRUPT FILES AND REQUIRE THE REFORMATTING OF YOUR HARD DRIVE.

Demonstration versions of PanelMate PC and NetPoiNT have been included in your DeviceNet Starter Kit. Installation of these products is not required to achieve the intended functionality of the Starter Kit, but please install them to learn more about the superior interface solutions that Cutler-Hammer offers for your DeviceNet systems.

NETPOINT

NetPoiNT is a real-time, full-featured, Human Machine Interface (HMI) software package. With its integration to Cutler-Hammer's NetSolver PC-based control software, it is a total C-H solution. Utilizing the latest software technologies, it has the performance and connectivity that today's PLC and PC-based machine control applications demand and the analysis tools needed for supervisory monitoring and control of multiple machines and processes.

In addition to its high-performance architecture, NetPoiNT also offers a unique CAD-like interface that has numerous benefits for both the developer and the operator. The vector graphics at the core of the system provide for pan and zoom operations and allow applications to be run in any display resolution without losing clarity or requiring rework of the graphics. The Elaborating Zoom feature allows layers of graphics to become visible based upon the current zoom level and/or user privileges. This feature can be readily applied to provide a straightforward scheme for security and a natural "drill down" approach to debugging.

PANELMATE PC

PanelMate PC is a runtime version of the PanelMate Power Series executive software and communication drivers, designed to run on an industry standard Intel-based PC and the Windows NT 4.0 operating system. It is a full 32-bit Windows NT-compliant software package with native 32-bit NT PLC drivers.

PanelMate PC was created to take advantage of industry standard, open architecture hardware and software developed by other vendors, while maintaining the PanelMate's legendary simplicity and ease of use.

INSTALLING NETVIEW SOFTWARE FROM A FLOPPY

1. Insert Disk 1 of 2 into your floppy drive.
2. Click Start/Run.
3. Type in A:\setup.exe.
4. Follow instructions during the install. Choose to install the card driver when asked.
5. Select the card type that came with your kit.

INSTALLING NETSOLVER OR NETPOINT SOFTWARE FROM A CD-ROM

1. Insert the CD into your computer. If your PC supports Auto-Run, the CD will automatically launch a setup wizard. Skip to step 4.
2. Click Start/Run.
3. Type in D:\setup.exe (if your CD-ROM drive is a different drive letter than D, type the proper driver letter in place of D).
4. Follow instructions during the install.

NOTE: NetSolver will disable AGP video. You may use a standard VGA driver. Do not install NetSolver if you want to maintain the AGP setting.

INSTALLING PANELMATE PC SOFTWARE

For installation instructions, see the install.txt on the CD-ROM.

A printed user manual for the NetView software has been included. Manuals for NetSolver and NetPoiNT are included on the Automation Software Suite CD-ROM in the Manuals directory for each product. These manuals are also available from the Cutler-Hammer Automation web site, <http://www.cutlerhammer.eaton.com/automation/>. Choose Online Literature, then Software. You will see a literature matrix. Select the Product Manual that you want and download it.

The manuals are in PDF format and will require Adobe Acrobat reader in order to read or print them.

Install files for Acrobat Reader are included in the NetSolver/Manuals directory on the Automation Software Suite CD-ROM and are also available for download from the web site.

STEP 5: CONFIGURATION

Now that you've built your network and installed your software, you will need to configure your devices using NetView. Below is a chart of each device, the associated MAC-ID, configuration, and special notes.



IMPORTANT

TO USE THE SAMPLE PROJECT THAT IS PROVIDED, YOU MUST USE THE SETUP BELOW.

Device	MAC-ID	Configuration	Notes
Scanner card	62	Port Location = 0x258h Memory = 0xD000h	None
Starter	25	Advantage Starter.nvm	Ensure <i>Net Control</i> is set for True(found in <i>Attribute</i> screen under <i>Control Supervisor [1]</i>)
Photo	40	Light Operate	None
DN50	50	None	

The following steps list how to configure devices using NetView. These steps take you through the process of setting up your network for use with the programs provided.

1. Verify that 24Vdc power is being supplied to the network and the cable with the Phoenix connector is properly attached to the ISA scanner card (or PCMCIA card).
2. Open the NetView program. (maximize the screen for ease of viewing).
3. At top of screen select Settings/Configuration.
4. Select ...
Card I/O Port Address: 258
TOOL BAUD RATE: 125 K
Tool MAC ID: 62
5. On the tool bar, select the On/Off Line button. This should give you a screen showing you what is on the network. If you go online without getting an error message, proceed to Step 8.
6. If you get a "Unable to initialize the card. Status=26." error message, possible causes could be one of the following:
 - A. Scanner card I/O port address is not set correctly in NetView. Check that the address you set in Step 4 is the same as you set in the dip switches on the scanner card.

- B. Scanner card is not seated correctly in the computer. Re-verify that the card is seated correctly.
 - C. Scanner card dip switches are not set to same address as the scanner card driver uses. Start the sscfg32 program, which can be found on the Start menu with NetView, highlight the driver for the address that you are using, click on Properties, and verify that the I/O address is the same as what is set on the card dip switches. The scanner card, the driver, and NetView all must use the same I/O port address.
 - D. Scanner card I/O port address or memory address conflicts with other hardware in Windows NT. Again, use sscfg32 to find out the I/O port address and memory that the driver uses. Start the Windows NT Diagnostics, select the Resources tab, and see if any other device is using the same I/O port address or memory as the scanner.
7. If you get a "Failed to go on line, DeviceNet not responding" error message, possible causes could be one of the following:
 - A. Your network is not getting 24Vdc power. You need to re-verify that 24Vdc is being supplied to the network.
 - B. DeviceNet cable not connected to scanner card. Check that the Phoenix connector is firmly connected to the scanner card and cable.
 - C. No termination resistors present at the ends of the trunk line on the network. Check that the resistors are correctly connected.
 - D. Severed or damaged DeviceNet cable. Replace the damaged cable.
 8. If all but the scanner card and one of the devices come up as faulted, that is OK. You will need to configure the devices in a slightly different order.
 9. As each device comes up as MAC ID 63, choose that one and go to the appropriate step.

Starter	Step 10
Prism (PRM10)	Step 20
DN50	Step 22
 10. Single click on the Starter device. Then click on the MAC tool button at the top of your screen.
 11. Select MAC ID 25 and click OK.
 12. Click on the Starter, then choose the *Attributes* screen. Click on the *Control Supervisor* (click on the (+) sign) to get a drop down list. Double click on the number one.
 13. Highlight the word *False* in the value column for the attribute *Net Control*. Type the word *True*, then hit return.

14. Starter again, then choose the *Message* tool at the top. This will take you to the message screen.
15. Next, click on the file cabinet in the lower left and choose *Open Messages*. Then double click on the file *Library*.
16. On the next screen, double click on the file *Starters*, then double click on the *Advantage* file. When a list of objects comes up, double click on:
Advantage Starter.nvm
17. You will find yourself back at the Message screen at this time and there should be four messages there. Press and hold the shift key. While doing this; single click on each of the four messages under the column *Service*. All four messages should turn blue. Once this is done, click on *Send*.
18. You should get a message back in the Response column from the first two saying "Success" and the last two should send back: 62 30 33 and 62 33 35.
19. Now click on OK, this will take you back to the original NetView screen.
20. To configure the Photo eye, click once on the PRM10, and then select the MAC tool button.
21. Select MAC-ID 40 and click OK.
22. To configure the DN50, click once on the DN50, and then select the MAC tool button.
23. Select MAC-ID 50 and click OK.
24. Take NetView offline.

NOTE: The NetView and NetSolver programs cannot be online at the same time.

DEMONSTRATION PROGRAMS

You are now ready to begin exercising your DeviceNet network using NetSolver.

One sample project is provided to allow for immediate use of the DeviceNet system. Please feel free to create your own programs as well.

The project name is demo.vlc and it is installed with NetSolver.

PROGRAM DESCRIPTIONS

Example 1: This program turns on the DN50 outputs when the photoelectric is flagged.

Example 2: This program turns on the starter when the photoelectric is flagged seven (7) times.

Example 3: This program performs the same function as Example 2 except that it is written in ladder logic.

RUNNING THE PROJECT AND PROGRAMS

1. Start NetSolver.
2. Open the demo project (Project/Open, C:\solver\projects\demo\demo.vlc)
3. To load a program from the project screen, just double click on that program and it will take you to the Development screen for that program. It is in this mode that you can do additional programming or make modifications to the existing program.
4. To run a program, we first need to compile it. Click on Execution and then click on Compile. You could also click on the Compile button on the tool bar. This will take all programs in Runtime and compile them into code the computer can run.
5. Next, click on Execution again and then click on Load and Go. This will load the programs into memory and run them. You could also click on the Load and Go button on the tool bar (looks like two arrows—yellow and green).

VIEWING PROGRAMS IN RUNTIME

1. To show the programs solving their logic, shift to Control Viewer Mode. To do this, click on Execution and then click on Viewer Mode. A short cut button is on the right side of the tool bar next to the help button.
2. To view multiple programs at the same time, you must first open the programs you wish to see. You do this from the project screen where it listed all programs in the project. To get there from the development screen, click on the reduce window for that program.
3. You will then be able to call up all of the programs you would like to see. Once all programs you wish to see in viewer mode are open, minimize the project window screen.
4. You will probably wish to size each program for the window available. To do this click once in the program you wish to size. Then click on the View and select the option Zoom to Fit. There is a short cut button on the tool bar you can also use. It is the magnifying glass with a sheet of paper in it.
5. Repeat this with each program until all are easily seen.
6. Operate the inputs on your network and watch the blue highlight in the programs indicate where it is. In RLL, the blue highlight indicates active contacts/coils.

WATCH WINDOWS AND FORCING

Once you are in Control Viewer Mode, you will be able to go into watch windows and watch individual inputs and outputs change and watch internal values as they are changed within the program.

You can also force individual tags on and off from this screen.

1. Click on Window and then click on Watch Window. You can also go to the Watch Window screen by clicking on the shortcut button that says **I/O** on it.
2. Next, click on the Watch button. This will give you a list of all tags and you can highlight which tags you want. You can also click on the option to look at all of them. To watch a timer accumulate, you must double click on the desired timer to display the associated xxx.accum integer.
3. Once all the devices you want to look at are highlighted, click on the Done option and this will take you back to the Watch Window.
4. To force an output on, simple click once on the device and then click on the option to turn the force on. After this, you can toggle the value, as you need. Note that forces stay on and must be turned off prior to running the program. Also, while forces are active a message appears in the upper right corner of the Watch Window caption block.

TROUBLESHOOTING

This section is designed to address some of the most common problems that you may encounter.

If you still experience problems, please call 1-800-809-2772 and select option 6.

NETWORK WIDE PROBLEMS

When you apply power to the network, watch the LEDs on the devices. Each should go through a self-test. The light pattern should look like this:

MS Green for ~ .25 seconds, Red for ~ .25 seconds, then Green

NS Green for ~ .25 seconds, Red for ~ .25 seconds,
OFF until the system completes self check (~ 7
seconds), then flash

NA Green for ~ .25 seconds, Red for ~ .25 seconds, then OFF

All devices dark indicates a bad power supply, no power available, or loose wires between the power supply and network.

When trying to go on line, watch the LEDs on the scanner. If they stay red, it indicates the problem is not with your network but is with your scanner card/computer.

Other things to check if the network is not responding are:

1. Ensure tees and drop line connections are screwed tight.
2. Verify that the terminating resistors are connected to both ends of the network.

INDIVIDUAL DEVICE PROBLEMS

Several indications from the system indicate there is a problem with a device and not with the entire system.

1. Look at each device's LEDs. If you are off line (not running NetSolver or NetView) the Module Status (MS) LED should be solid green, the Network Status (NS) LED should be

flashing green, and the Node Address (NA) LED should flash the correct MAC-ID to you. If this is not the case with a device, it is an indication that it is the failed device.

2. Next, look in NetView to verify that all devices are being read when you go on line.
3. If a device does not show up at this time, that is an indication of a communications failure. A device may show up as faulted. This could indicate a duplicate MAC-ID problem or it could mean a device has failed.
4. If you are unable to go online with the network, remove all nodes from the network. Then try to go back on line. If the system goes on line, reconnect the devices one by one and ensure they go online. The device that crashes the network is your faulted node.

Disconnect and reconnect power to the faulted device. The cycling of power will cause the device to go through a self-check and may clear the problem. For the starter, it may require removing both AC and DC. In this case, reapply the 24Vdc power first – wait a few seconds – then reapply AC.

STARTER

1. Verify all wires going to the Phoenix connector are tight.
2. Verify the wires supplying AC are tight, and verify Control Voltage is applied to the starter. This comes from a jumper connected to the DN50. On the overload section of the starter, there should be a white wire coming into the Common (C) and a black wire coming into E.
3. Verify that the small jumper connection on the WPONIDNA module is installed. This connection should jumper CE and ES together.

4. If the LED indications are OK but the device will not connect with NetSolver, check the following:
 - a. Verify the configuration selected in DeviceNet Configuration screen is the same as the configuration used in NetView. It is usually easier to change the NetView configuration to match your project.
 - b. Verify that the MAC-IDs used in the project match the ones being displayed by the NA LED. If they do not match, you can quickly change them in NetView.
5. If the device is not responding to commands, do this:
 - a. Call up the device in NetView.
 - b. At the *Attribute* screen choose *Control Supervisor [1]*.
 - c. Ensure *Net Control* and *Control From Net* are both true.
If false, first check the overload section of the starter to ensure that the E and P terminals have a jumper between them. Then type *true* in the *Net Control* value column. Refresh the screen and verify that *Control From Net* goes true.
 - d. Check that the *Ready* attribute is true.
If false, check that it is connected properly and that power is supplied.
6. Check the *Faulted* attribute, it should be false.
If true, look at *Fault Code* for the cause.
Fault Codes are located in the back of the device's I.L.

DN50 I/O BLOCK

1. Verify that all wires going into the Phoenix connector are tight.
2. Check that the wires supplying control voltage are securely fastened (bottom left of DN50 module).
3. To test the outputs, open up NetView and go to the *Messages* screen for the DN50.
 - a. Create an I/O Poll message.
 - b. In the Data field of the message, enter a value of 63 (decimal).
 - c. Send the message. All outputs on the DN50 should turn on.

PRISM PHOTO

1. Check that the combined NS/MS light is active. If this is not flashing or solid, it probably indicates that you have no power applied to the device.
2. If the device is on the network, LEDs are working fine, but you are not getting any on/off indication, check that when you pass your hand close to the lens, that the red LED on the bottom of the Prism lights up. If this is not working, you may have a faulty device.

COMPUTER/SCANNER CARD PROBLEMS

You will not be able to have a running NetSolver Program and look at the network through NetView at the same time. This is because the scanner card can only have one master at a time. You can have NetView running in the background or NetSolver in development mode running in the background when you use the other software package, but they CANNOT use the scanner card at the same time.

1. The first thing to try is to shut down your computer and restart. This will clear several errors that may have occurred.
2. With NetView, the Comm light will flash each time it sends or receives a message from the network. With NetSolver, it will go into a continuous scan mode and the light should turn a solid green. If these are your indications, the scanner and computer are fine.
3. When transporting a computer (or shipping), the cards may come loose inside the computer. The first thing to do if the computer does not boot up or if the computer can not communicate with the scanner card is to reseat all of the cards in the computer. Open up the machine, pull the cards out and reseat them.

Support Services

It is Cutler-Hammer's goal to ensure your greatest possible satisfaction with the operation of our products. We are dedicated to providing fast, friendly and accurate assistance. By phone, fax, modem or mail, you can access Cutler-Hammer support information 24 hours a day, seven days a week.

Technical Support

1-800-809-2772

If you are in the U.S. or Canada, you can take advantage of our toll-free line for technical assistance with hardware and software product selection, system design and installation, and system debugging and diagnostics. Technical support engineers are available for calls during regular business hours (8 am - 5:30 pm EST) by calling 1-800-809-2772. International calls can be made to either the Tech Line at 1-800-809-2772 (toll call) or the Cutler-Hammer main business line at 614-882-3282.

Technical Support Fax

614-882-0417

You can also contact our technical support engineers by faxing your support requests directly to the Advanced Product Support Center (APSC) located in Westerville, Ohio at 614-882-0417.

Information Fax-Back Service

614-899-5323

The latest Cutler-Hammer product information, specifications, technical notes and company news is available to you via fax through our direct document request service at 614-899-5323. Using a touch-tone phone, you can select any of the info faxes from our automated product literature and technical document library, punch in a fax number and receive the information immediately.

Bulletin Board Service

614-899-5209

Parameters: 8 data bits, 1 stop bit, parity none, 9600-28.8K baud

If you have modem access, you can dial in directly to our electronic bulletin board service for the latest product and company information. File sharing, product software downloads and our user message service are just a few of the things you will find online at 614-899-5209.

Website

<http://www.cutlerhammer.eaton.com/automation>**E-mail chatechsupport@ch.etn.com**

If you have Internet capabilities, you also have access to technical information via our website at <http://www.cutlerhammer.eaton.com/automation>. The website includes technical notes, frequently asked questions, release notes, and other technical documentation. Technical support messages and files can be sent to chatechsupport@ch.etn.com

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