Instructions for the
Ethernet - Product Operated Network Interface
used with Ethernet Networks

THE EPONI

The Ethernet Product Operated Network Interface (EPONI) enables communication between an Ethernet network master station and an IQ Device in a Master/Slave format over an Ethernet network. The EPONI is compatible with the IQ Analyzer, the IQ DP-4000, and the IQ Data Plus II. The EPONI is powered either by the IQ product to which it is attached or, optionally, by an external isolated 24VDC supply.

The EPONI is offered in two styles. One style supports 10Base-T only. The other style supports both 10Base-T and 10Base-FL. Both styles communicate at 10Mbps. Both styles have a group of LEDs that indicate EPONI status.

Catalog Number	Description
EPONI	10Base-T only
EPONIF	10Base-T and 10Base-FL

References to 10Base-FL in this document apply only to the EPONIF style. Otherwise, the styles are the same.
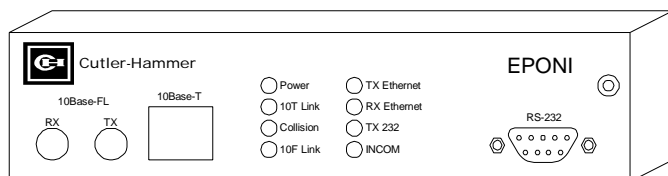

Figure 1: The Cutler-Hammer EPONI

INSTALLATION

The EPONI is designed to be installed, operated, and maintained by adequately trained personnel. These instructions do not cover all details, variations, or combinations of the equipment, its storage, delivery, installation, check-out, safe operation, or maintenance.

NOTE: De-energize the device to which the EPONI will be attached or wired -- otherwise miss-operation or damage to equipment could occur.

The installer must comply with the National Electric and local codes or regulations, as well as safety practices, for this class of equipment.

1. Make sure mounting screws for the EPONI have been included.

Item	Qty
#8-32 X 1.88" Mounting Screw	2

2. Be sure to check the instruction leaflet mounting instructions for each EPONI compatible IQ host device. The following illustrates common examples of mounting instructions.

3a. **Mounting to IQ Analyzer or IQ DP-4000 or IQ Data Plus II**

Disconnect power to the IQ Device. Many applications will have a separately mounted power module. In this case, mount the EPONI to the IQ Device using the stacking screws provided. For other applications, remove the power module from the IQ Device, and then mount the EPONI using the stacking screws provided. Then mount the power module to the EPONI using its stacking screws. Note that, in this case, the EPONI is to be sandwiched between the device and the power supply. Mount the EPONI with the label facing up, the LEDs on the left, and the ribbon cable on the right. Connect the ribbon cable from the EPONI to the receptacle of the IQ Device, shown in Figure 2, and firmly tighten the screws on the plug lock assembly.
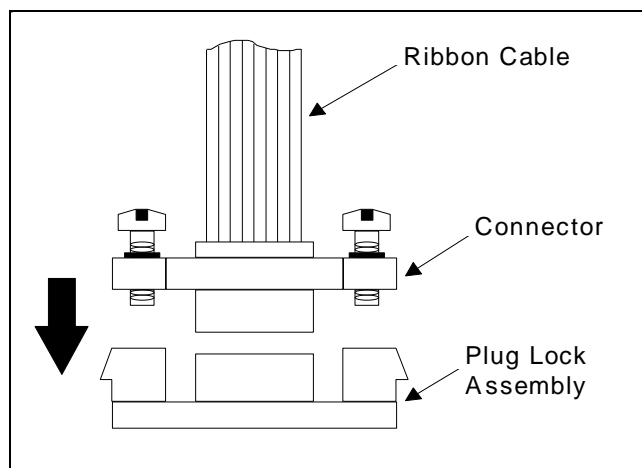

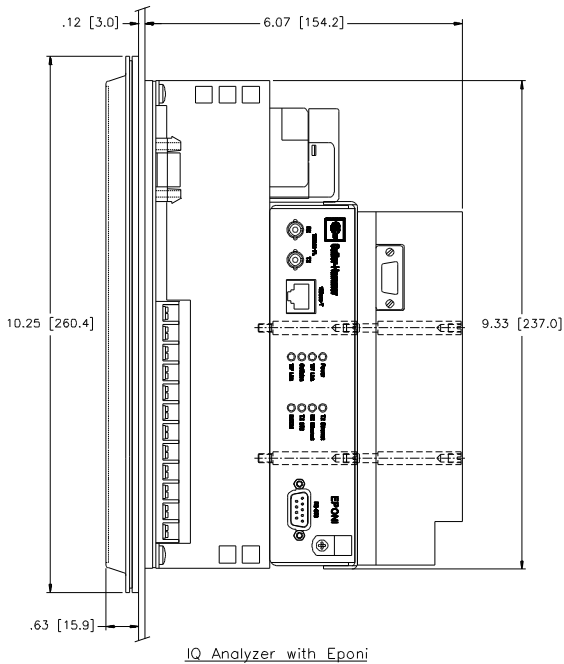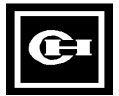*Figure 2: Attaching the Cable to the Plug Lock Assembly*

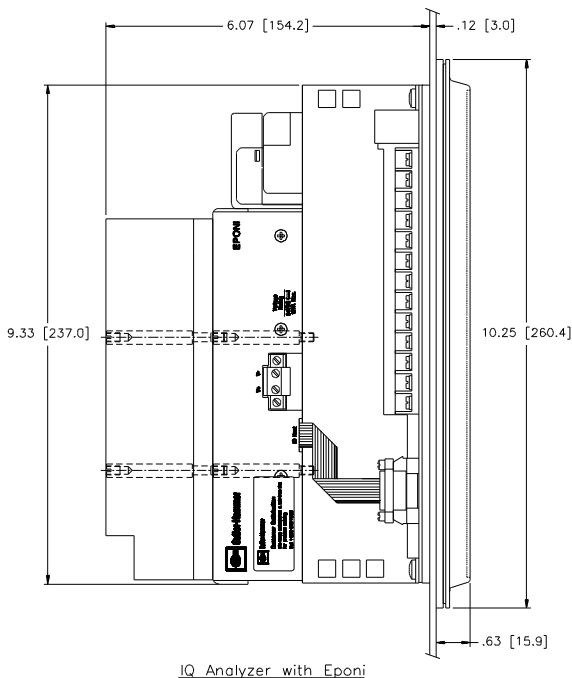*Figure 3: EPONI mounted on an IQ Analyzer – Left Side*

Figure 4: EPONI mounted on an IQ Analyzer – Right Side

Plug the Ethernet cable into the EPONI using the RJ-45 connector for 10Base-T or the fiber optic connectors for 10Base-FL.

For applications with the IQ Analyzer or IQ DP-4000, while the power to the IQ device is disconnected, replace the ¼ Amp fuse with the ½ Amp fuse provided.

Restore power to the IQ device.

3b. **Mounting to other IQ Devices**

As of the effective date of this I.L., the EPONI only supports the IQ Analyzer, the IQ DP-4000, and the IQ Data Plus II. However, the EPONI is designed to support other IQ devices in the future with a firmware upgrade. The external power supply is not needed for the IQ Analyzer, the IQ DP-4000, or the IQ Data Plus II, but is included in order to provide future support for other IQ Devices that may not be able to supply enough power for the EPONI. At such time as these future upgrades become available, additional mounting instructions for other products will be provided.

CAUTION:
1. **Do not install in locations where the temperature at the unit will fall outside the range of -20°C to 70°C. Cooling equipment such as a fan should be used to lower the temperature if the 70°C limit is exceeded. Heating equipment should be provided if the -20°C limit is exceeded.**
2. **Do not install where the relative humidity will exceed 90%, or where condensation will form due to rapid temperature changes. A heater should be provided to prevent the formation of condensation.**
3. **Do not install where dust, salt, or iron particle densities are high.**
4. **Do not install where the unit may be subjected to direct impact or vibration.**

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4. **External Power Supply**

The EPONI supports an optional external 24 VDC power supply. This optional power supply is not required for the IQ Analyzer, the IQ DP-4000, or the IQ DP II. If used, the external supply would be connected to the 2-pin header labeled V+ and V-. This power port is provided only for IQ products that may be supported by the EPONI in the future. Note that V- is internally connected to the IQ host device's common, which
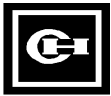
means that for some applications, the external power supply must be isolated.

> **WARNING:** **Ensure that the optional external power supply is isolated, or that the application allows the external supply ground to be connected to the IQ host device ground -- otherwise miss-operation or damage to equipment could occur.**

NETWORKING

MASTER DEVICE

The control station for the Ethernet network must be a unit such as a PC running the Cutler-Hammer PowerNet software.

SLAVE DEVICE

An EPONI may be used as a slave device on an Ethernet network to provide communication with the host IQ Device.

SIMPLIFIED WIRING RULES

For complete wiring rules, please refer to the Ethernet Specification IEEE 802.3. The Ethernet configuration must comply with the rules for hub and drop cable configuration and length. The following are the basic wiring rules of thumb for connecting the EPONI:

10Base-T Unshielded Twisted Pair (UTP):
- Limit the length of 10Base-T drop lines to 90m (295ft).
- Use data grade 4-pair stranded riser cable, Cat. 3, 4, or 5. Shielded (STP) Cat. 5 is recommended.
- Unshielded (UTP) cable is rated at 300V isolation, which means that it should not be run in the same cable tray as power cables. For best noise immunity, use shielded (STP) Cat. 5 cable, maintain a minimum separation of six inches between 10Base-T cable and power cables, or separate with a metal barrier.

> **NOTE:** **Maintain a minimum separation of six inches between the 10Base-T cable and power cables, or separate with a metal barrier. Use of an industrial grade (or CE-marked) hub or switch is recommended for adequate noise immunity.**

10Base-FL fiber optic (F/O):

- Limit the length of 10Base-FL drop lines to 2000m (6560 ft).
- Use duplex riser multimode 62.5um/125um ST-ST connectorized fiber optic cable.

Other rules of thumb:
- A commonly accepted rule of thumb is to limit the number of hubs in any communication path in a network to more than four. Bridges and/or routers would be required to extend a network beyond about four hubs in a path.
- If the cable is being run through an air return (e.g., between floors), consider plenum cable instead of riser cable. Plenum cable has a special coating that doesn't give off toxic fumes when it burns.
- Solid conductor cables will have lower attenuation than stranded cables, but they shouldn't be bent, flexed, or twisted repeatedly. Solid conductor cables are intended to be used as a backbone or between a hub and wall plate. Stranded cables are better for shorter runs where the cable may be flexed repeatedly.

OPERATION CHECK

After the Ethernet system has been installed, check the operation of the EPONI by applying power to the IQ Device. When under power, all the LEDs should flash on, then begin performing their designated functions. The power LED will remain on to indicate that the device is under power.

Check the operation of the Ethernet interface by connecting the appropriate Ethernet cable. If connected correctly, the appropriate Link LED should turn on (10T Link for 10Base-T, or 10F Link for 10Base-FL). The EPONI will automatically sense the 10Base-T or 10Base-FL connection. If both 10Base-T and 10Base-FL cables are connected, the EPONI will use the 10Base-T connection. Also, if there is already communication on the Ethernet segment, then the RX Ethernet LED should flash as data packets are received.

EPONI CONFIGURATION

Configuration of an EPONI as part of a PowerNet system is a three step process. The unit must be attached to a host product and powered. Once power is established to the EPONI, its configuration parameters must be assigned before it can communicate on a PowerNet network. The configuration is done through a desktop or laptop computer. Once the EPONI is configured, including assigning its IP address, NetPower Configurator is used to establish communications through the EPONI to the host product. An EPONI requires a C-H NetLink or a DeviceServer to establish communications.

Configuration of the EPONI's internal parameters is performed via its RS-232 interface. Since only one Ethernet device can have a given IP address, an RS-232 dumb terminal or a terminal program running on a PC will typically be used to configure each EPONI device. Connect a dumb terminal or a PC running a terminal program to the EPONI using a standard RS-232 patch cord. This patch cable can be obtained at any PC supply store. At the EPONI end, the cable must have a standard DB-9 male connector. Note that the EPONI provides hex nuts for secure connection, so hex nuts on the connector are not required (and would have to be removed for the cable to be of use). The EPONI uses the following signals in the cable:

Pin	Function
2	Transmit
3	Receive
4	Data Terminal Ready
5	Signal Ground
8	Clear To Send

The EPONI will detect carriage returns as its cue to start the configuration procedure. If connected correctly, the EPONI will print a welcome banner and the EPONI settings as presently configured.

Windows 95 Terminal Program Example:

1. In Windows 95, begin setting up the terminal session by clicking on the **Start** button. Point to **Programs**, then **Accessories**, then the **HyperTerminal** folder, and click on it. In the window that pops up, double click on the **HyperTrm.exe** program.
2. At the prompt, enter a session name (e.g., EPONI) and then select an icon from the list. Click on OK to close this window.
3. In the window that pops up, find the **Connect using** drop down menu box, and click on the down-arrow button to the right. Select the serial port used to connect to the EPONI (e.g., **Direct to Com 1**), and click on OK to close the window.

4. In the window that pops up, click on the down-arrows for each of the following drop down menus, and set the following parameters:

Menu Selection	Proper Value
Bits per second:	9600
Data Bits:	8
Parity:	None
Stop bits:	1
Flow Control:	Xon/Xoff

5. Click OK to close this window. A blank terminal window will appear.
6. Type a carriage return (i.e., Enter) to get the EPONI's attention. The EPONI will print the present configuration settings to the blank window. If these parameter settings do not appear in response to carriage returns, double check the physical RS-232 connection.

The following EPONI parameters may be changed:
*   **EPONI LAN IP address**. Each EPONI requires a unique static IP address. An IP address is represented as a string of four 8-bit values separated by dots. The IP address should be assigned by the local network administrator. The default IP address is 192.168.1.2.
*   **Socket port ID**. The TCP/IP protocol used by the EPONI requires a socket port ID to communicate with the Ethernet master. The default is 5150, and should not be changed, as it would affect the configuration of the Ethernet master.
*   **Subnet mask**. The subnet mask allows a single network to be divided into subnets. The subnet mask should be assigned by the local network administrator.
*   **Default gateway IP address**. The default gateway address specifies a destination to which all packets are forwarded when a direct route cannot be found. The default gateway address should be assigned by the local network administrator.
*   **Ethernet master #1 IP address**. The EPONI requires a unique static IP address for its Ethernet master. This IP address should be assigned by the local network administrator. The Ethernet master will be, for example, a C-H DeviceServer or a NetLink.
*   **Ethernet master #2 IP address**: The EPONI supports an optional second Ethernet master, for example, as a back-up to the first master. This IP address also should be assigned by the local network administrator.
*   **Read-only access**. The EPONI supports a read-only mode in which other Ethernet clients may request non-protected data from the EPONI. For example, control actions are examples of

commands that are "protected," and therefore not available in read-only mode. Fast status is an example of a "non-protected" command that is available in read-only mode. Type a zero (0) for the default non-read-only mode, and a one (1) for read-only mode.

- **RS-232 port communication rate**. The EPONI supports both 9600 and 19.2K bps modes. The default is 9600.

LED DEFINITIONS AND DIAGNOSTICS

During the power-up initialization sequence, all LEDs should turn on, then off. This indicates that all LEDs are functioning correctly. After initialization, these LEDs function as follows.

Power LED: The Power LED, when on, indicates that power is applied to the EPONI unit.

10T Link LED: The 10T Link LED, when on, indicates that the 10Base-T cable is plugged into the RJ-45 connector, and that a valid 10Base-T link has been established.

Collision LED: The collision LED will flash each time the EPONI detects a collision on the Ethernet. While collisions are a normal occurrence on an Ethernet segment, if network traffic is high, a high frequency of collisions will result. This is an indication that the bandwidth of the Ethernet segment has been consumed, which means that network performance is substantially degraded. Strategies for increasing performance in such cases include partitioning segments with bridges and/or routers such that high volumes of traffic are isolated on local LAN segments, if possible.

10F Link LED: The 10F Link LED, when on, indicates that a 10Base-FL cable has been plugged into the two fiber optic ST connectors, and that a valid 10Base-FL link has been established.

TX Ethernet LED: The TX Ethernet LED will turn on each time the EPONI transmits a packet on the 10Base-T Ethernet.

RX Ethernet LED: The RX Ethernet LED will turn on each time the EPONI receives a packet on the 10Base-T Ethernet.

TX 232 LED: The TX 232 LED will turn on each time the EPONI transmits data on its RS-232 port.

INCOM LED: The INCOM LED will turn on each time the EPONI receives a message from the attached IQ host device.

TROUBLE SHOOTING

In the unlikely event the LEDs do not function as above, check the following:

1) If all LEDs remain off, check to make sure that the host cable is connected to the IQ host device, and that the IQ host device is under power. If the LEDs still remain off, check to make sure the fuse is good on the IQ Analyzer or IQ DP-4000.
2) If the appropriate link integrity LED does not turn on, check to make sure that the Ethernet cable is correctly plugged into the EPONI on one end, and into a functioning hub at the other end. Note that if the EPONI is directly connected to a PC's Network Interface Card (NIC), a non-standard patch cable that crosses TX and RX is required.
3) If the appropriate link integrity LED turns on, but no Ethernet activity is indicated by the TX and RX Ethernet LEDs, check to make sure that there is an Ethernet master (e.g., the DeviceServer) on the Ethernet network, and that appropriate application software has been installed and is functioning correctly on that master node. Then, check to ensure that this EPONI node has a unique IP address programmed into it (using an RS-232 terminal and the EPONI's RS-232 port). Note that general Ethernet activity will be indicated by the RX LED periodically flashing.
4) If the TX 232 LED remains off when sending carriage returns to the EPONI's RS-232 port, check to make sure the cable is a standard RS-232 patch cable.
5) Check the EPONI's configuration parameters using the RS-232 terminal. Note that the EPONI's configuration parameters will revert to their out-of-box settings if non-volatile memory fails (for example, due to an unusual noise event).
6) If the INCOM LED remains off, check the function of the IQ device on which the EPONI is mounted. Is it connected, powered, and showing correct readings on the faceplate? Remove power to the IQ device, detach the EPONI's ribbon cable from the product, reattach, and reapply power to the IQ device.
7) Check the Ethernet network wiring for loose connections, shorted wires, etc.
8) If suggestions 1-7 do not remedy the problem, the EPONI may need to be replaced.

The user should not attempt to service this equipment. The following components are the only replacement parts available for the EPONI.

Component description	Cutler-Hammer Part #
Phoenix Contact 2 pin plug # 1858769	73479JCA01
Cable tie-down clip	70801GGA03
Mounting screws	66B2037H01

Please contact your local Cutler-Hammer representative or the Cutler-Hammer Advanced Product Support Center for service information, additional questions regarding the EPONI, or any other IQ/IMPACC product.

SPECIFICATIONS

External Power Connector Ratings

V+	20VDC to 27VDC; inrush = 500mA; steady state = 200mA; maximum 12VA
V-	IQ host device common

System Ratings

Operating Temperature	-20°C to 70°C
Storage Temperature	-20°C to 75°C
Altitude	3048 m (10,000 ft.)
Operating Humidity	5 to 90% max. noncondensing
Environment	Indoor use only
Transient Overvoltage	Category 1
Pollution Degree	2
Communication Rate	10 Mbps

Ethernet Cable Specifications

For complete specifications, refer to the IEEE 802.3 Ethernet specification.

10Base-T: Data grade Cat. 3, 4, or 5 STP cable. Recommend shielded Cat. 5 4-pair stranded STP riser cable (Standard: EIA/TIA TSB40-A Category 5) for applications with short runs that may undergo repeated bending. For runs through air return, use plenum cable. For longer runs that won't undergo repeated bending, use solid wire.

Characteristics	Specification at 10MHz
Impedance	100 Ohm
Conductor gauge	24 AWG
Mutual capacitance	15pf/ft
Frequency	Up to 100MHz

Wiring type	TSB 568B
Connector	RJ-45

10Base-FL: Recommend terminated duplex multimode 62.5um/125um fiber optic riser cable with ST-ST connectors.

Characteristics	Specification at 10MHz
Core diameter	62 um
Cladding diameter	125 um
Fiber type	Multimode
Min. bandwidth (3dB)	160MHz/km
Min. bend radius	5 cm
Connector	ST

MAINTENANCE AND CARE

The EPONI is designed to be a self-contained and maintenance-free unit. The printed circuit board is calibrated and conformally coated at the factory. The EPONI is intended to be serviced by factory trained personnel only. *Never* clean the EPONI with IQ host power on. Clean the EPONI using only a clean, dry cloth. Do not use water or solvents of any kind.

CONTACT INFORMATION

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