

EINC Node Controller



Description

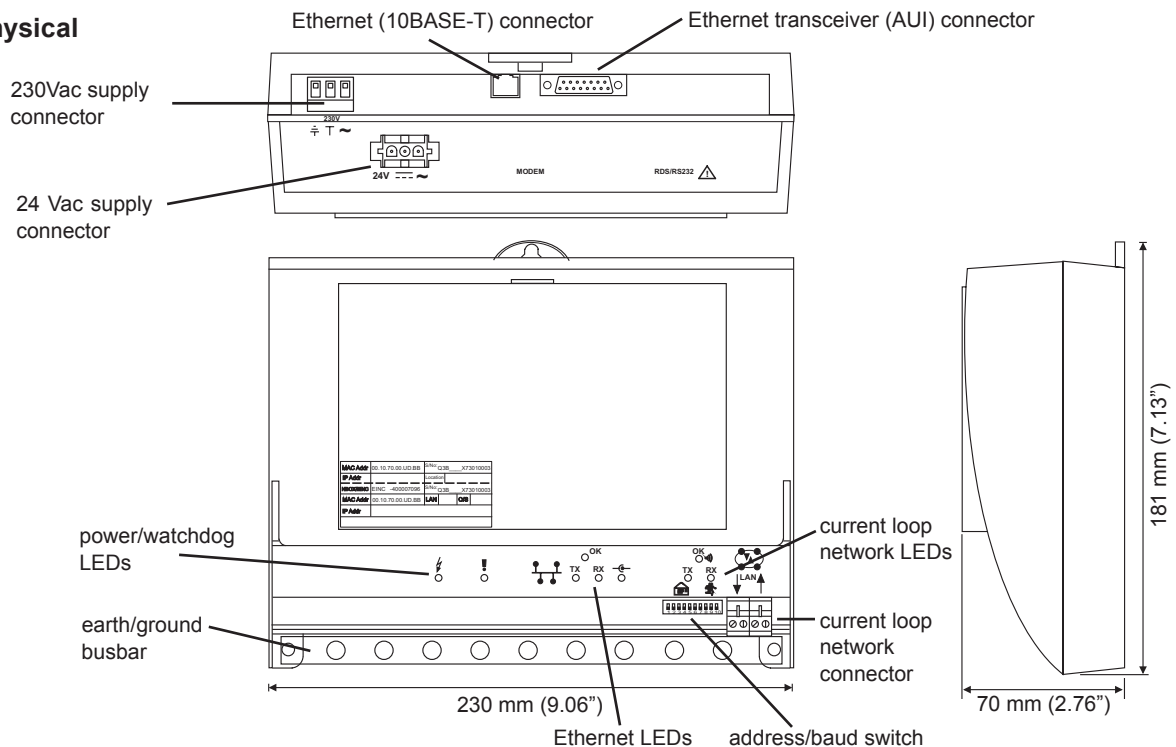
The EINC, Ethernet Internetwork Node Controller, provides the means by which the Building Management System network can incorporate an Ethernet network. The EINC operates at the internetwork level, including the necessary support for WAN's (e.g. TMN support). It also provides virtual CNCs which allow supervisory or tool software running in PCs connected to the Ethernet network to connect to the BMS system.

It is provided with a 10 BASE-T interface, and an AUI connector which allows an alternative network transceiver to be used

Features

- Facilitates use of Ethernet network in BMS system.
- 10 BASE-T interface and AUI connector for alternative transceivers.
- Four virtual CNCs for PC connection using Ethernet.
- EINC's can build internetworks across routers.
- Ethernet provides faster signalling rate.
- Integration of BMS network into existing Ethernet system.
- Automatic reporting of network population.
- Network alarms available in 10 languages.
- EEPROM retains configured data during power fail (no battery required).

Physical



FUNCTIONALITY

The functionality of the EINC can be split into system, hardware, and firmware sections:

SYSTEM

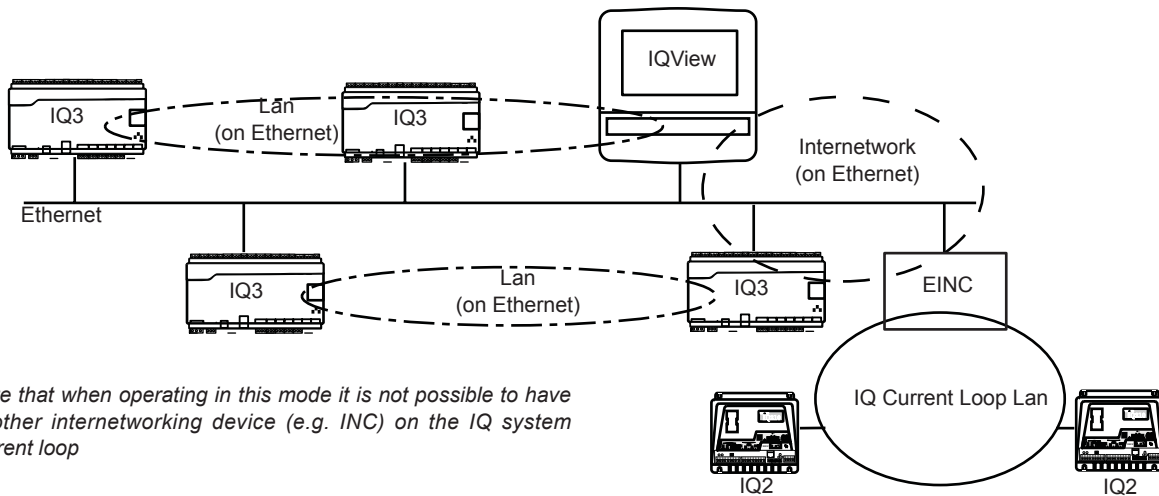
The EINC acts as an interface between parts of an IQ network running over IQ system current loop, and Ethernet. It acts like an INC, but it enables an Ethernet network to be used to carry the internetwork. It also enables a current loop internetwork to be extended onto an Ethernet network. To enable this an EINC can operate in one of two modes:

- INC mode
- Internetwork Extension mode.

The mode of operation is determined by the address set on its address switch. When set to a value less than 100 it will operate in INC mode when set to a value greater than or equal to 100 it will operate in Internetwork Extension mode.

INC Mode

When operating in INC mode it enables an internetwork running on an Ethernet network and a Lan running on a current loop network to be joined together to form a single IQ network as shown below.

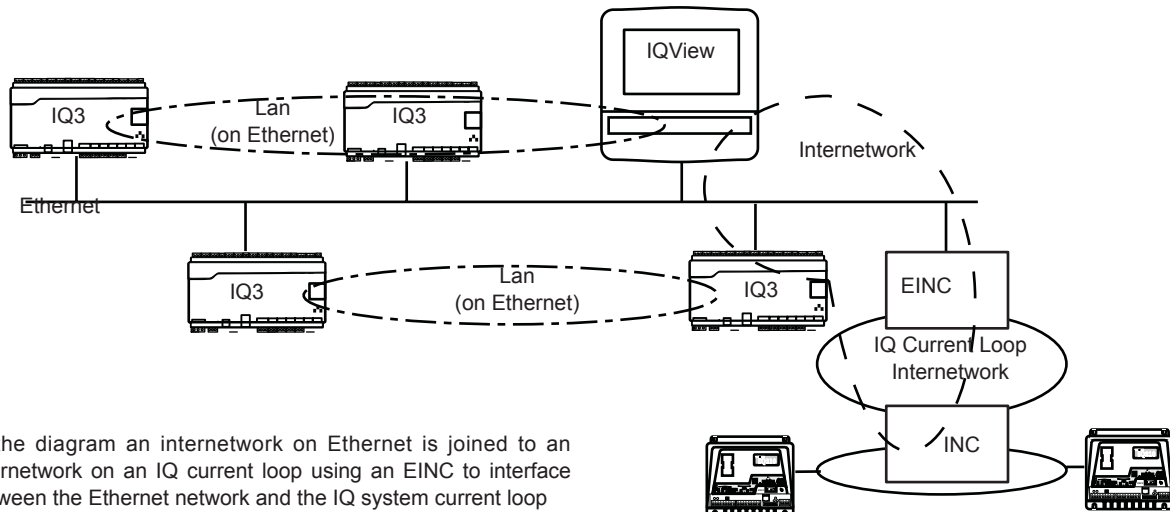


Note that when operating in this mode it is not possible to have another internetworking device (e.g. INC) on the IQ system current loop

The EINC will build an internetwork with other EINC's, 3xtend/ EINC's, LINC's, IQ3's, NXIP's or IQView's connected to the same Ethernet network. The LAN number of the Lan connected to the EINC's IQ system current loop is defined by the EINC's address switch. This Lan will consist of the devices connected to the IQ system current loop to which the EINC is connected; it will also contain the EINC's virtual CNC's, plus the EINC itself, which always has address 126.

Internetwork Extension Mode

When operating in internetwork extension mode the EINC enables an internetwork running on an Ethernet network and a internetwork running on an IQ system current loop network to be joined together to form a single IQ internetwork as shown below.



In the diagram an internetwork on Ethernet is joined to an internetwork on an IQ current loop using an EINC to interface between the Ethernet network and the IQ system current loop

Virtual CNCs

The EINC's firmware incorporates four virtual CNCs that enable the connection between a PC running supervisor/tool software and the IQ network to be made over Ethernet to the virtual CNC. They also enable alarms generated from IQs or other devices to be transmitted to a PC running 963. In order to do this each of the virtual CNCs can act in one of two modes:

- Supervisor mode
- Alarm mode

For a virtual CNC to operate, its cnc Address must be set up using IPTool or in configuration mode. The virtual CNC is switched from a supervisor mode to alarm mode by setting up an alarm IP address or host name in the virtual CNC module. Once enabled the virtual CNCs appear to be located on the EINC's local Lan, and will respond to Lan mapping in this way.

Supervisor Mode

This enables the Ethernet network to be used as a connection between a PC running supervisory or tool software and the virtual CNC (rather than normal RS232, device to CNC, interface). The supervisor connects to the CNC by using the EINC's IP address and the port address set up in the virtual CNC module making a permanent connection to the virtual CNC. This enables the supervisor/tool to communicate with devices on the IQ network, and for those devices to communicate with it.

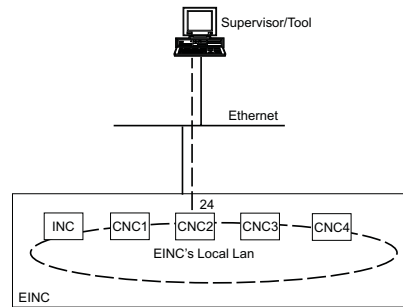
The 963 can make a connection to the virtual CNC when information is required, treating each connection as a separate site. However, the connection will only allow the virtual CNC to send alarms back to the supervisor when the supervisor is connected. If alarms need to be sent independently of the supervisor being connected then a virtual CNC in alarm mode must be used.

Alarm Mode

The Alarm mode of a virtual CNC enables alarms generated from IQs or other devices to be transmitted to a PC running 963 connected to the Ethernet where the connection to the virtual CNC is of a temporary nature. An IQ can send its alarms to the virtual CNC using normal Lan/device addressing, and the virtual CNC will forward the alarms to the PC using the Port Address and the Alarm IP address, specified in the virtual CNC. The 963 listens for alarms on the specified port, and retrieves the site identities, Lan numbers, and device addresses of any alarms it receives so that it can process them further.

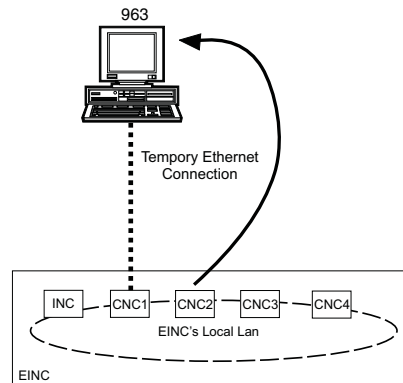
In the diagram right the 963 is able to connect to the site on which the EINC is situated, using a temporary connection to virtual CNC 1 which is in supervisor mode. Virtual CNC 2 is operating in alarm mode and set to forward alarms it receives to the IP address of the 963.

Connection to virtual CNC



In the diagram above the supervisor/tool connects to the EINC's virtual CNC2 over Ethernet, and will have a Lan address of 20 and a network address of 24 on the IQ network.

Connection to virtual CNC with alarms sent by virtual CNC in alarm mode.

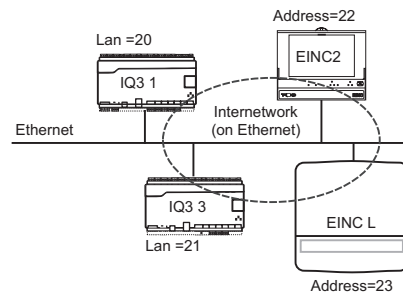


Building Internetworks On Ethernet

The EINC will build an internetwork with 3xtend/EINC Ls, IQ3 controllers, IQViews, NXIPs, and other EINC's that are connected to the Ethernet network.

If there is more than one IQ system Ethernet device on the same segment of the Ethernet network (no routers between them) and they use the same UDP port they will automatically form a single internetwork as shown right. If IQ system Ethernet devices have formed Lans the device with the lowest IP address will assume INC functionality and will be included in the internetwork. In the diagram right the EINC, IQ3 controllers and the 3xtend/EINC L are on the same network segment and the IQ3 controllers have different Lan numbers. Therefore they form an internetwork consisting of Lan 20, Lan 21, Lan 22, and Lan 23.

When there are routers on the Ethernet network and it is required for the internetwork to be built across routers an IQ system Ethernet device must be installed on either side of the router and be configured to span the routers. In the diagram right there is a router with EINC's and IQ3 controllers on the Ethernet network.

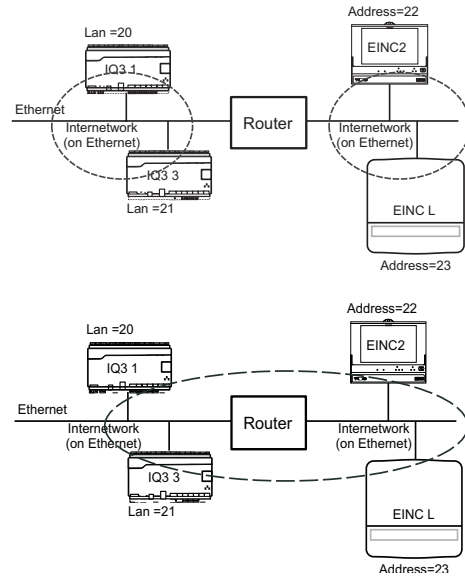


Building Internetworks On Ethernet (continued)

If none of the devices have their remote devices table setup they will be unable to build an internetwork across the routers, and will construct two separate internetworks as shown right. This is effectively two separate sites. For the sites to combine, the remote devices table must be set up in

each device on the system. The remote devices table must contain the details of two devices from each other subnet in the system, and this should be set up in every device on the local subnet. For increased reliability, details of additional devices should also be set up. In the example all the devices have had their remote devices table setup. This allows the two sites to combine to form one single site as shown right.

Note that EINC's with firmware earlier than v4.1 cannot build internetworks across routers.



The setting up of the table in more than one device across routers is facilitated by the 'uPdatelist' configuration module. This enables the remote devices table from the EINC to be copied to all the EINC's and 3xtend/EINC L's in the system.

UDP Port

The UDP (User Datagram Protocol) port number defines the Ethernet port used by the EINC to send messages to other IQ system Ethernet device. To construct an internetwork, the devices must be on the same subnet (unless set up to span routers), and must use the same UDP port. If the user is restricted to using one subnet, but wishes to have separate sites on that subnet (i.e. more than one internetwork), then he can set different UDP port numbers for the groups of IQ system Ethernet in the different internetworks. The UDP port should not normally be changed from its default value in order to simplify system maintenance.

Ethernet Addressing

The EINC can operate on an Ethernet system where the IP addressing information (IP address, subnet mask, default router, and WINS Server) are specified manually (i.e. the IP address is fixed). This is done using IPTool or configuration mode.

EINC's do NOT support automatic addressing, and MUST NOT be installed on an Ethernet network that is using automatic addressing.

Crossing Routers: If the internetwork is to be built across a router(s), the devices in the remote devices table must be set up as described above.

Connecting to an EINC: Connection to an EINC over Ethernet, e.g. to a virtual CNC, must be made using the EINC's IP address

Note that EINC's with firmware earlier than v4.1 cannot build internetworks across routers.

HARDWARE

Box: The EINC is housed in an IP30 network box , which provides a plastic 230 mm (9.06”) x 181 mm (7.13”) x 70 mm (2.76”) IP30 enclosure. The unit must be mounted inside an enclosure conforming to EN61010-1.

Power: The EINC is available in two different power versions 24V and 230V. The 24V version requires 24 Vac and is only available in the USA. The 230V version (/230) (not available in USA) requires 230 Vac input power at 50 or 60 Hz. The maximum consumption is 18 VA.

Note that the unit must be earthed, grounded using its power earth, ground terminal.

Fusing: The 230 Vac version (not available in USA) is protected by 125 mA (T), 250 V, 20 mm supply fuse, the 24 Vac version (only available in the USA) is protected by 1.6 A, 20 mm supply fuse.

IQ Current Loop Network: The network connection is a 4 wide set of 2 part terminals, suitable for 2 wire cables. The standard current loop node features are included (Lan OK, TX, and RX indicators, bypass relays, network alarm generation).

Network bypass relay: In order the current loop Lan continues to operate if the EINC fails, a set of node bypass relays is fitted to maintain network integrity in the event failure of the node's power supply, or failure of the node itself. The bypassing of a node will be recognised by the downstream node, and reported as a Lan Changed alarm.

Connectors: Two part connectors are used throughout to facilitate wiring. A busbar is provided for screen termination.

Transceivers: The EINC has two Ethernet connector, the 10 BASE-T connector and the AUI connector, but only one connector may be used at a time. The unit will automatically detect which connector is in use.

The 10 BASE-T network uses twisted pair cable (to IEEE 802.3) and the EINC can run up to 10 Mbps. The maximum distance between the node and the hub is 100 m (109 yds). The EINC should be connected to the hub using Cat 5e unshielded or shielded (UTP or FTP) cable and RJ45 plugs (shielded or unshielded appropriate to the cable).

Indicators:

The EINC has nine LED indicators; Power, Watchdog, Current Loop Network, (TX, RX, OK) Ethernet (TX, RX, OK, Link Integrity)

General

Power : (green) On when power supply is connected.
Watchdog : (red) Flashes when EINC has internal fault.

Current Loop network

TX : (yellow) Indicates current flowing from the EINC current loop network transmitter (normally ON). If OFF indicates open circuit.
RX : (yellow) Indicates current flowing into the EINC current loop network receiver (normally ON). If OFF indicates open circuit or short circuit.
OK : (green) This indicates that the EINC is able to send and receive messages on the current loop network (normally ON). Flashes when prohibited address switch setting (0, 2, 3, >119). When OFF it indicates a LANBROKEN condition exists on the network (e.g. baud rate fault).

Data Backup: The EINC uses EEPROM to hold configuration data. This is non-volatile to power failure without need for a battery.

Address Switch: The EINC device address on the local Lan is set to 126. The Lan number (1, 4 to 9, 11 to 99) is selected by the address switch poles 1 to 7. It must be set to a Lan number unique on the internetwork. An address setting <100 sets the EINC's mode of operation as INC mode and =>100 set the mode of operation internetwork extension mode.

Baud Rate Switch: The baud rate on the current loop network is set by address/baud rate switch poles 8 to 10. It must be set to match other nodes on the Lan. It may be set to 1k2, 9k6, or 19k2 baud. It may also be set to 38k4 baud by selecting both 1k2 and 19k2, although this rate can only be used with other node 2 devices (e.g. INC2).

Reset: Setting both the address and baud rate switches to zero for more than 3 seconds with power applied will reset the configuration parameters to default values. Defaults are:

- Address module (see list in firmware section)
- User module (clear)
- Router (clear)
- Virtual CNCs (clear)
- Remote EINC's (clear)

The Attachment Unit Interface (AUI) connector is a 15-way D type. It is a standard connector for connection either directly, or indirectly by a drop cable, to a transceiver module. This enables use of other Ethernet media such as 10 BASE-2 (co-axial thin net) or FOR/RL (fibre-optic cable). The interface can supply 12 Vdc at a maximum of 400 mA to the transceiver module.

Ethernet

TX : (yellow) Packet of data is being transmitted across Ethernet (normally flashes ~6s). If continuously OFF indicates fault.
RX : (yellow) Packet of data is being received across Ethernet (normally flashes ~6s). If continuously OFF indicates fault.
OK : (green) The EINC has successfully communicated with at least one other EINC on the Ethernet. ON if internetwork on Ethernet has been constructed. OFF if EINC alone (e.g. using virtual CNCs only).
Link Integrity : (yellow) On when connection to Ethernet system detected (voltage present on network). Normally ON; if OFF indicates faulty Ethernet connection). Only applies to 10BASE-T use; OFF for AUI use

FIRMWARE

The EINC's firmware consists of a number of configuration modules (see table below) similar to the ones used in IQ controllers that enable EINC's operation to be specified. These modules need to be set up as required before the EINC will operate correctly.

Module Type	Module Identifier	Number of Modules
Address	R	1
Remote EINC's	E	20
Router	T	1
Updatelist	P	1
User	U	1
Virtual CNC	C	4

The initial configuration is best done using IPTool over Ethernet. This allows the configuration of the IP address, subnet mask, UDP port, Lan and network address, default router, virtual CNCs, and the remote devices table. The configuration of other module parameters must be done using the EINC's configuration mode which provides access to all of the EINC's parameters. Configuration mode is a built-in feature enabling the modules to be setup using the network (including across the internetwork), using any IQ system configuration utility.

When accessing the EINC with IPTool it can be identified from the list of devices by its MAC address. The EINC can be accessed in configuration mode using any IQ system configuration utility connected to the IQ network. This connection can be made using Ethernet, or the current loop. A local PC may be connected using the Ethernet either by using an adjacent hub, or by direct connection using a standard Ethernet cable in conjunction with a crossover adapter (XCITE/XA) and then by using one of the EINC's virtual CNCs. Once the configuration utility has connected to the IQ network the EINC will be located from its local Lan at address 126 on Lan 0, and from the internetwork by device address 126 on its Lan number.

Configuration Mode

When an EINC is accessed in configuration mode the top-level configuration mode menu is as follows:

```

Connecting to OS 126 Lan 0
EINC
User addRes rouTer virtualCncs remoteEincs uPdatelist
=?

```

Note that if Ethernet is not connected, the following warning is given:

```
*** WARNING - NO ETHERNET SIGNAL DETECTED ***
```

The required options are selected by entering the relevant upper case letter and pressing **ENTER**. If a value has been changed **X+ENTER** will confirm it and return to the top menu, whereas **Q+ENTER** will quit and return with the value unchanged. Configuration mode may be protected by a password that will stop any changes being made until a valid password is entered.

Address Module

The address module stores the EINC's addressing information. It has the following parameters:

Parameter	Description	Text Comms Parameter
Lan Number	read only) The lan number is set by the address switches and so is read-only in the address module. It defines the Lan number of the Lan connected to the internetwork via the EINC. If used in Ethernet extension mode the Lan number is used by the virtual CNCs and to address the EINC for configuration purposes (i.e. address 126 on Lan x)	-
Identifier	read/write) A 15-character label used to identify the Lan. 15 alphanumeric characters - not \(\{\};?* characters.	D
Trend Alarm address	(read/write) The alarm target device address for alarms generated by the current loop network. It can be set to any valid address (1 to 119 excluding addresses 2, 3, and 10). 0 stops the alarms being transmitted. Default = 0	A
Trend Alarm Lan	(read/write) The target Lan number for alarms generated by the current loop network. It can be any valid address (1 to 119 excluding 2, 3, and 10). 0 stops the alarms being transmitted Default = 0.	R
Ethernet Alarm Address	(read/write) The alarm target device address for internetwork alarms (alarms on Ethernet). It can be set to any valid address (1 to 119 excluding addresses 2, 3, and 10). 0 stops the alarms being transmitted. Default = 0	E
Ethernet Alarm Lan	(read/write) The alarm target Lan number for internetwork alarms (alarms on Ethernet). It can be set to any valid address (1 to 119 excluding addresses 2, 3, and 10). 0 stops the alarms being transmitted. Default = 0	T

Address Module (continued)

Parameter	Description	Text Comms Parameter
Alarm Language	(read/write) The language used for the network alarms. 0=English, 1=Spanish, 2=Finnish, 3=Swedish, 4=Norwegian, 5=Danish, 6=German, 7=Italian, 8=Portuguese, 9=French. Default=0 (English)	P
Ethernet MAC Address	(read only) A unique number that identifies Ethernet chip; also used in default PIN generation process.	s
IP Address	(read/write) The IP address of the EINC. The IP address for each device on the Ethernet network must be unique to avoid address clashes. Defaults to 128.1.1.<address switch setting>, i.e. the last section is set the same as the address switch setting. Range = 0.0.0.0 to 255.255.255.255	I
Subnet Mask	(read/write) The subnet mask of the EINC. The subnet mask must be the same for all devices not separated by routers that are to build Lans or an internetwork. This ensures that they are on the same subnet. Defaults to 255.255.255.0. Range = 0.0.0.0 to 255.255.255.255	S
UDP Port	(read/write)The UDP (User Datagram Protocol) port used by the EINC to communicate with other IQ system devices over the Ethernet network. All devices used to create an internetwork must use same port. It should not normally be changed from the default value. Defaults to 57612. Range = 0 to 32767	U
Version	(read only) A 25-character string containing device type, prom issue, and date	C

Remote EINC Modules

The remote EINC modules store details of other devices that are to form part of the internetwork on Ethernet, allowing the internetwork to be built across routers. They form the remote devices table; each module is one entry in the table. There are 20 modules enabling up to 20 remote devices to be specified.

The remote devices table must contain the details of two devices on the internetwork from each other subnet and be set up in every device on the local subnet. The devices must be specified using their IP address and subnet mask and the devices should be those with the lowest IP address. For increased reliability, details of additional devices should also be set up.

Parameter	Description	Text Comms Parameter
IP Address	(read/write) The IP address of the remote device on Ethernet Range = 0.0.0.0 to 255.255.255.255. Default=0.0.0.0	I
Send Remote Broadcast	Specifies whether remote broadcast messages or directed messages are used to build the internetwork across routers. If set to use broadcast messages (Yes) the messages used to build the internetwork across routers will be sent to the default router requesting a broadcast message to all devices on the remote device's subnet as well as the remote device specified in the module. This has the advantage that if the remote device specified in the module has failed the messages will reach other devices on the that subnet and the internetwork can still be built. The broadcast message is sent to the subnet containing the remote device, it is therefore necessary to calculate what that is. This is done by applying the subnet mask to the IP address to give the subnet address of the remote device. E.g. subnet mask 255.255.255.0 with an IP address 171.171.10.2 gives the subnet address 171.171.10.0 which is used as the destination address for the broadcast messages. Note that the router may not allow broadcast messages. If set not to use broadcast messages (No) the messages used to build the internetwork across routers will only be sent (by direct messaging) to the device specified in the module. This option should only be turned off if the routers have remote broadcast messaging disabled. If broadcasting is turned off, details of as many device's as possible from each subnet should be entered in the remote devices table to enable the internetwork to be built in the event of a failure.	B
Subnet mask	(read/write) The subnet mask for the remote device. Range = 0.0.0.0 to 255.255.255.255 Default=0.0.0.0	S

Router Module

The router modules specifies the IP address of the router to which messages are sent if the destination address is not on the local subnet. It should be set to the IP address of a router on the same subnet as the EINC. It must be specified if the EINC is to build an internetwork across routers, or if one of the virtual CNCs is to be used by a PC connected to an Ethernet subnet the other side of a router.

Virtual CNC Modules

The EINC has four virtual CNC modules (module identifier C). Which when enabled allow a supervisor to connect to the IQ network, or alarms to be sent to an IP address. Each module has the following parameters:

Parameter	Description	Text Comms Parameter
Alarm IP Address	(read/write) The host name or IP address of the alarm target supervisor that is connected to the Ethernet network if operating in alarm mode. This should be set up if the virtual CNC is being used as the destination address for alarm. Setting this up switches the virtual CNC into alarm mode, and prevents the virtual CNC being used as a CNC by a supervisor. 0 will switch the virtual CNC back into supervisor mode. Default=Unused.	I
CNC Address	(read/write) The device address of the virtual CNC on EINC's Lan. It is set to unused by default, and the virtual CNC will not operate until its address is set up. It can be set to any valid address (1 to 119 excluding addresses 2, 3, and 10). 0 will disable the virtual CNC.	A
Port Address	(read/write) The TCP port used by the virtual CNC. It is set unused by default and then defaults to 10000 plus the cnc address when the cnc address is set up, but can subsequently be changed. Range = 1 to 32767.	P

Update List Module

The updatelist module (module identifier P) enables the remote devices table in one EINC to be copied to all the EINC's and 3xtend/ EINC Ls in the table. Selecting P from the top-level configuration menu displays the following prompts.

Overwrite remote EINC list in all EINC(s) (Y/N)

If **Y** is entered, the list (including Broadcast/Directed flag status) will be copied to all the other devices on subnets that have at least one of their INC type node's details in the list. The devices will then be able to create the internetwork across the routers. The list should contain the EINC's own details as well as details of at least two INC type nodes from every subnet to be linked by the internetwork. If broadcasting is not enabled, details of as many devices as possible from each subnet should be entered.

During the process the screen will show the progress of the operation. Any INC type node with a security enabled will require that PIN to be entered for its update to proceed.

Note that IPTool is recommended to keep the remote Trend devices list updated, so the update list function should not be used.

User Module

The user module (module identifier U) provides password protection against changes made to EINC parameters. There is only one password (PIN), and if set, this PIN must be entered before changes can be made. If the PIN is not correct the changes will be discarded.

Parameter	Description	Text Comms Parameter
Generator	(read only) A 4-digit number that is used to generate a PIN should the existing PIN be forgotten. Will only be correct for that session of configuration mode.	g
PINt	(read/write) The 4-digit number that must be entered by the user to log on from a display, or must be sent by a tool/supervisor to authorise a change.	P

If the PIN is forgotten, a default password can be obtained from Trend by quoting the generator number and the Ethernet MAC address. The default password may then be entered and the protection turned off, or the password changed to one that can be remembered. It has the following parameters.

Text Communications

The EINC has full text comms capability. Text communications uses the module identifier, and the text comms parameter. E.g. U(P) Pin number, and R(D) iDentifier.

Identification

The EINC replies to 'w' comms with Internetwork Node Controller (INC) v4.00 or greater. The virtual CNCs reply with Communications Node Controller (CNC) v4.xx when they are not in use; when in use they will pass the 'w' comms request on to the connected device.

Alarms

The EINC helps to maintain a high level of network integrity by performing continuous checking of network messages. The following text alarms are generated when faults are found and sent to the specified address. It can deliver the alarms to two destinations set up in the address module: one for alarms from the Ethernet network, and another for alarms from the IQ system current loop network.

The following alarms are generated when faults or state changes are found on the IQ system current loop port when it is operating as a local Lan. They are sent to the address defined in the trend alarm addr section of the address module.

Alarms (continued)

Alarm	Description	Alarm Code
LAN Broken	Indicates a break in the Lan communications.	NKBK
LAN Changed	A node has gone from or been added to the Lan.	NKCH
LAN OK	Lan communications are restored.	NKOK
Duplicate address	The EINC's address is duplicated on the Lan (i.e. another address 126: another INC type node). Only generated after the Lan has been mapped.	NKDA

The alarms are in the format shown below:

Remote LAN From EINC on Lan <xxx> - <Alarm> <Alarm Code>

Where <xxx> is the Lan number of the EINC. <Alarm> is the alarm text as in the Alarm column of the table above. <Alarm Code> is the alarm code as in the Alarm Code column of table.

The following alarms are generated when faults are found on the IQ system current loop port when it is operating as an internetwork segment. They are sent to the address defined in the trend alarm addr section of the address module.

Alarm	Description	Alarm Code
Internetwork Broken	Indicates a break in the current loop internetwork communications.	NKBK
Internetwork Changed	A node has gone from or been added to the current loop internetwork.	NKCH
Internetwork OK	Current loop internetwork communications are restored.	NKOK
Caused Re-Map	EINC has started mapping its internetwork after a network change has occurred. This is only generated by devices whose address is > 100.	NKCH
All Maps Built	Internetwork mapping finished. This is only generated by devices whose address is > 100.	NKCH

The following alarms are generated when faults are found on the Ethernet port. They are sent to the address defined in the Ethernet alarm addr section of the address module.

Alarm	Description	Alarm Code
IP lwrk Broken	Indicates a break in the Ethernet internetwork communications.	NKBK
IP lwrk Changed	A node has gone from or been added to the current loop internetwork.	NKCH
IP lwrk OK	Current loop internetwork communications are restored.	NKOK
IP Caused Re-Map	EINC has started mapping its internetwork after a network change has occurred. This is only generated by devices whose address is > 100.	NKCH
IP All Maps Built	Internetwork mapping finished. This is only generated by devices whose address is > 100.	NKCH

The following alarm is generated when the EINC's Lan number is duplicated on the internetwork. It is sent to the address defined in the internetwork alarm addr section of the address module.

Alarm	Description	Alarm Code
Duplicate Address	The EINC's Lan number address switch setting is duplicated on the internetwork. Only generated after the internetwork has been mapped.	NKDA

The alarms are in the format shown below:

Internetwork From EINC on Lan <xxx> - <Alarm> <Alarm Code>

Where <xxx> is the Lan number of the EINC. <Alarm> is the alarm text as in the Alarm column of the table above. <Alarm Code> is the alarm code as in the Alarm Code column of table.

The following alarm is generated when the EINC detects a node that thinks it is the only one on the network. It is sent to both alarm addresses defined in the address module.

Alarm	Description	Alarm Code
This ode is deaf	This is generated when the EINC hears another node that thinks it is the only node on the network. This will only occur if there is a hardware fault that enables a node to transmit but not receive, or thne device's sub net is different to other on the same UDP port.	

The alarm is in the format shown below:

Internetwork IP<xxx.xxx> - <Alarm>

Where <xxx.xxx> is the last two numbers of the IP address of the device that thinks it is the only device on the network. <Alarm> is the alarm text as in the Alarm column of the table above.

INSTALLATION

The NBOX/EINC must be mounted inside an enclosure conforming to EN61010-1. For NBOX/EINC/24 only, the unit is rated as 'UL916, accessory to enclosed energy management equipment'. The EINC installation involves the following procedure:

- Mount the unit in position
- Route cables
- Connect current loop network
- Set current loop network address
- Set current loop network baud rate
- Connect power supply
- Connect earth/ground (if not part of supply)
- Connect Ethernet network

- Set Address/Baud rate switch
- Power up unit
- Commission current loop network
- Configure EINC
- Set up Local Device
- Configure remote end of Ethernet
- Test system

This is covered in detail in NBOX/EINC Installation Instructions TG200152. Details for mounting the metal box are included in the ENCLS/MBOX installation instructions TG200203.

CONNECTIONS

230 Vac Power Supply
2 part connector for use with supplied shrouded plug kit

Note that the unit must be earthed, grounded using its power earth, ground terminal.

24 Vac Power Supply
Mat-N-Loc to terminal adaptor (supplied)

/USA only
2 part Mat-N-Loc connector (supplied)

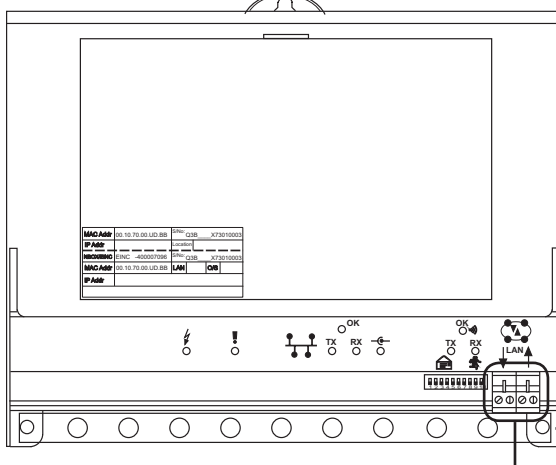
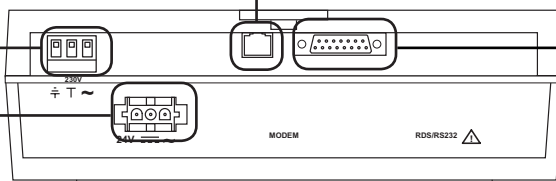
24 Vac: 24_{vac} 0V

Note that the unit must be earthed, grounded using its power earth, ground terminal.

10BASE-T Ethernet Port

A standard Ethernet cable and an XCITE/XA adaptor may be used to connect directly to the EINC

AUI Ethernet Port
15 Way D socket
For connection of transceiver or drop cable.



Earth/ground Bus

Connect bus to earth separately

Current Loop Network

2 wire

4 wire

polarity independent

COMPATIBILITY

Supervisors/Displays:	963 v2.1, 915MDS >v3, 916, IQView
Utility software:	SET v6 (including IPTool software)
Controllers:	IQ3 controllers and IQ1, IQ2. Any IQ251 on the system must be firmware version 1.2 or later and an IQ241 must be firmware version 1.2M or later.
Ethernet Nodes:	Compatible with NXIP and 3xtend/EINC L providing it is not used in an automatic IP addressing environment. An ANC+, AND, or XN28 on the internetwork must be firmware version 2.5 or later and an MNC on the internetwork must be firmware version 2.54 or later (any TMN is OK). The 38k4 baud rate is only compatible with other node 2 devices (e.g. INC2).
Routers:	EINC version 4.2 is required to build internetworks across routers.
Automatic Addressing:	Must not be used in an automatic IP addressing environment.

MAINTENANCE


Replacement of the fuse is described in the NBOX/EINC Installation Instructions TG200152 sheet 3.

DISPOSAL

Control of Substances Hazardous to Health UK Government Regulations 2002 (COSHH) ASSESSMENT FOR DISPOSAL OF NODE CONTROLLER. No parts affected.

RECYCLING

All plastic and metal parts are recyclable. The printed circuit board may be sent to any PCB recovery contractor to recover some of the components for any metals such as gold and silver.



WEEE Directive:

At the end of their useful life the packaging, product, and battery (if fitted) should be disposed of by a suitable recycling centre. Do not dispose of with normal household waste. Do not burn.

ORDER CODES

Non USA Order Code
NBOX/EINC/230

:EINC for 230 VAC supply in NBOX plastic enclosure, including busbar and screws. (not available in USA)

NBOX/EINC/USA/UL/24VAC

:EINC for 24 Vac supply in NBOX plastic enclosure, including busbar and screws. (USA only)

Accessories

ENCLS/MBOX

:Metal box with hinged front panel for NBOX device including busbar, screws, and cable glanding knockouts. (not available in USA)

CAT5 UTP LSZH 305M

:305 m of Cat 5e UTP (unshielded) cable for wiring Ethernet connections. (not available in USA)

CAT5 FTP LSZH 305M

:305 m of Cat 5e FTP (shielded) cable for wiring Ethernet connections. (not available in USA)

RJ45 PLUG UTP/10

:Pack of 10 unshielded RJ45 connectors for wiring Ethernet connections.

RJ45 PLUG FTP/10

:Pack of 10 shielded RJ45 connectors for wiring Ethernet connections.

XCITE/XA/5

:Pack of 5 Ethernet connector adapters for direct connection of PC to EINC L using standard Ethernet cable.

SPECIFICATION

Electrical

Supply /230 :230 Vac -15%, +10%, 50 or 60 Hz, 18 VA. (not available in USA).
 /24 :24 Vac, ±10%, 50 or 60 Hz, 24 VA (USA only)

Fusing /230 :125 mA (T), 250 V, 20 mm input powers fuse. (not available in USA).
 /24 :1.6 A (T), 20 mm input powers fuse (USA only)

Data Backup :No battery needed, configuration data stored in non-volatile memory

Current Loop Network :20 mA two wire current loop, opto-isolated polarity independent, receiver, balanced transmitter

Current loop network distance :Between units dependent on cable type (see table).

Cable	1k2 baud	4k8 baud	19k6 baud	19k2 baud	38k4 baud	No of wires
Belden 9182	1000 m (1090 yds)	1000 m (1090 yds)	1000 m (1090 yds)	700 m (765 yds)	500 m (545 yds)	2
Belden 9207	1000 m (1090 yds)	1000 m (1090 yds)	1000 m (1090 yds)	500 m (545 yds)	350 m (380 yds)	2
Trend TP/1/1/22/HF/500 (Belden 8761)	1000 m (1090 yds)	1000 m (1090 yds)	700 m (765 yds)	350 m (380 yds)	250 m (270 yds)	2
Trend TP/2/2/22/HF/500 (Belden 8723)	1000 m (1090 yds)	1000 m (1090 yds)	500 m (545 yds)	250 m (270 yds)	125 m (135 yds)	4

Current loop baud rate:Selectable by board switches 1k2, 9k6, 19k2, 38k4 baud - set to be same as other nodes on Lan.

Lan number :Selectable by board switches - Lan number set to be unique on internetwork; 116 nodes addressable (1 to 119, excluded addresses 2,3, and 10).

Device address :The address of the EINC on the Lan is preset at 126. The four virtual CNC addresses set in configuration mode, to be unique on Lan; 116 nodes addressable (1 to 119, excluded addresses 2,3, and 10) per Lan.

Ethernet
 10 BASE-T :IEEE 802.3
 AUI :Attachment Unit Interface for attachment to alternative Ethernet media (e.g. 10 BASE-2).

Connectors
 10 BASE-T :RJ45 connector, unshielded twisted pair (UTP) cable, 10 Mbps, 100 m.
 AUI :15 way D type connector for attachment of AUI transceiver to convert to other Ethernet media (e.g. fibre optic, co-axial). Either direct connection or using drop cable. The interface supplies 12 Vdc at 400 mA maximum to transceiver.

Lan/internetwork:2 part connector screw terminals 0.5 to 2.5 mm² cross section area (20 to 14 AWG) cables.

Power :2 part connector screw terminals 0.5 to 2.5 mm² cross section area (20 to 14 AWG) cables.

Mechanical

Dimensions :230 mm (9.06") x 181 mm (7.13") x 70 mm (2.76").

Material
 Box :ABS
 Terminal Cover :Clear Styrolux

Protection :IP30

Weight :1.4 kg (3.08 lbs)

Environmental

EMC :EN61326-1: 2006.
 Immunity :(Table 2) for equipment intended for use in industrial locations

Emissions :EN55011: 2007 Class B
 :EN61000-3-2: 2006
 :EN61000-3-3+A2: 2005

Safety :EN61010-1: 2001.
 UL :(/USA/UL/24VAC only) The unit is rated as 'UL916, accessory to enclosed energy management equipment.'

Ambient limits
 Storage :-10 °C (14 °F) to 50 °C (122 °F)
 Operating :0 °C (32 °F) to 45 °C (113 °F)
 Humidity :0 to 95 %RH non-condensing
 Altitude :<2000m (6561')

Indicators

Current Loop
 TX :(yellow) ON if current is flowing from the current loop network transmitter
 RX :(yellow) ON if current is entering the current loop network receiver
 OK :(green) ON if EINC successfully communicating over current loop network.

Ethernet
 OK :(green) ON if EINC successfully communicating over Ethernet with another EINC.
 TX :(yellow) EINC transmitting Ethernet data packets.
 RX :(yellow) EINC receiving Ethernet data packets.
 Link integrity:(yellow) On when Ethernet 10BASE-T connected properly.
 Power :(green) On when supply is on.
 Watchdog :(red) Flashes when internal fault detected.

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Trend Control Systems Limited

Albery House, Springfield Road, Horsham, West Sussex, RH12 2PQ, UK. Tel:+44 (0)1403 211888 Fax:+44 (0)1403 241608 www.trendcontrols.com

Trend Control System USA

6670 185th Avenue NE, Redmond, Washington 98052, USA. Tel:(425) 869-3900 Fax:(425) 869-8445 www.trend-americas.com