

### Lon Internetwork Node Controller



LONMARK™  
PARTNER



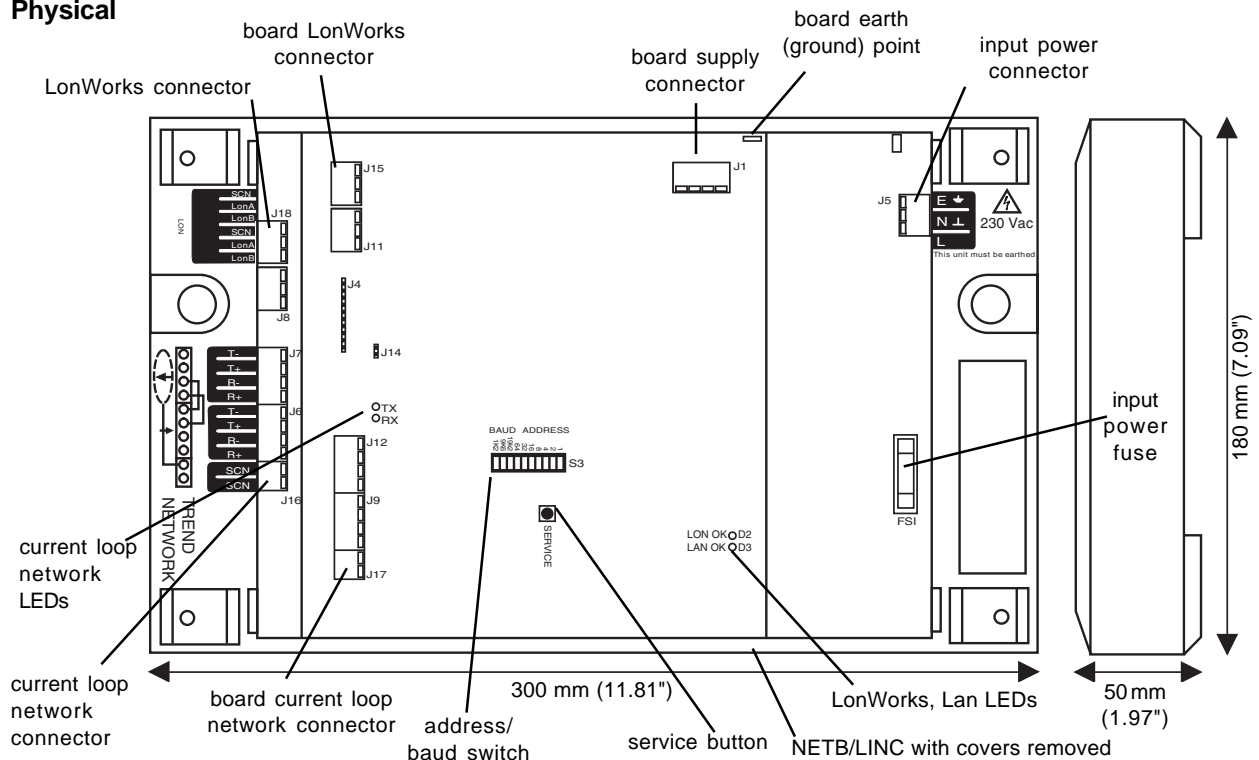
### Description

The LINC, LonWorks Internetwork Node Controller, provides the means by which IQLs (IQ System's LonWorks controllers) and LONCs (LonMark Object Node Controllers) integrate with the IQ System proprietary current loop network. The LINC operates at the IQ System's internetwork level, including the necessary support for WAN's (e.g. TMN support). IQ system operation is achieved without the need for any LonWorks network management. LINC can however be managed, and integrated with LonMark products.

### Features

- Facilitates use of LonWorks network in BMS system
- Automatic configuration from one DIP switch
- Automatic reporting of network population
- LonMark compatible, gateway using LONC
- LonWorks provides flexibility of two wire free topology.
- LonWorks provides faster signalling rate.
- Integration of IQ System's network into existing Lon system.
- EEPROM retains configured data during power fail (no battery required).
- Integration of IQL controllers into IQ system

### Physical



## FUNCTIONALITY

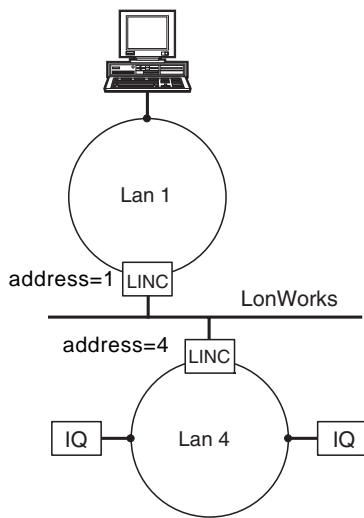
The LINC acts as an interface between the IQ system current loop network and the LonWorks bus (LonWorks). This enables it to be used in a number of applications including the integration of IQLs and LONCs into the IQ system.

## SYSTEM

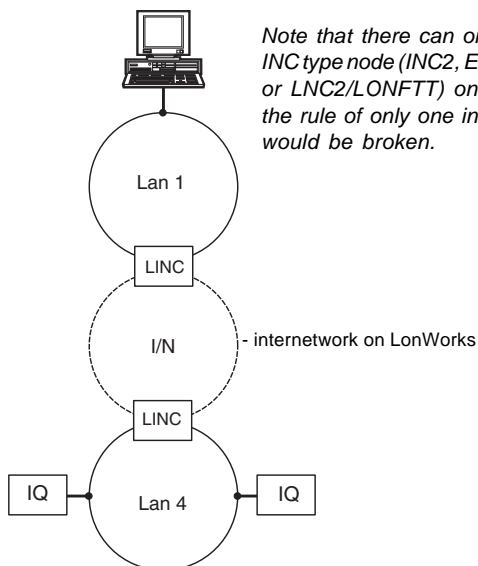
Full system details of IQ system products on LonWorks are given in the IQ system LonWorks Products Engineering Manual TE200292.

### Lon Internetwork

The LINC may be used to provide a LonWorks internetwork. When used in this way it has similar functionality to an INC i.e. it enables a IQ network system to be expanded by connecting Lans together using an internetwork. However instead of connecting to a IQ system current loop internetwork it connects to a LonWorks internetwork. The LINC identifies this mode of operation by an address switch setting <100. In this mode (LonWorks INC) it automatically takes address 126 on the Lan and its address switch is used to set the Lan's address on the internetwork, known as the Lan number. As normal, the address switch allows settings in the range 0 to 128, but in this case Lan numbers 0, 2, 3, 10, and >99 are not allowed. This gives a maximum of 96 Lans on the LonWorks internetwork. In this mode, with two LINC's or more, a LonWorks internetwork is constructed.



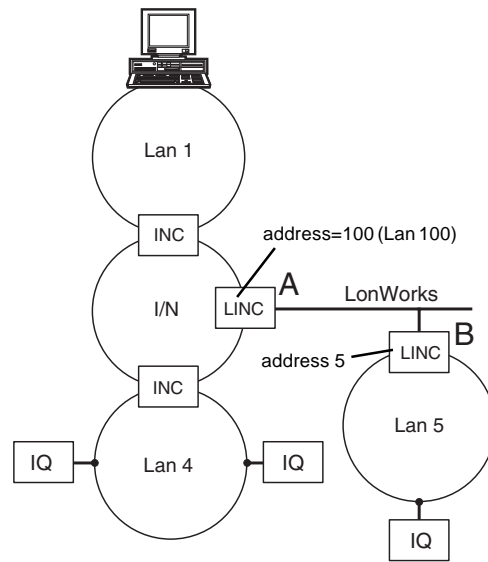
The LINC's together create an internetwork as indicated in the equivalent diagram below:



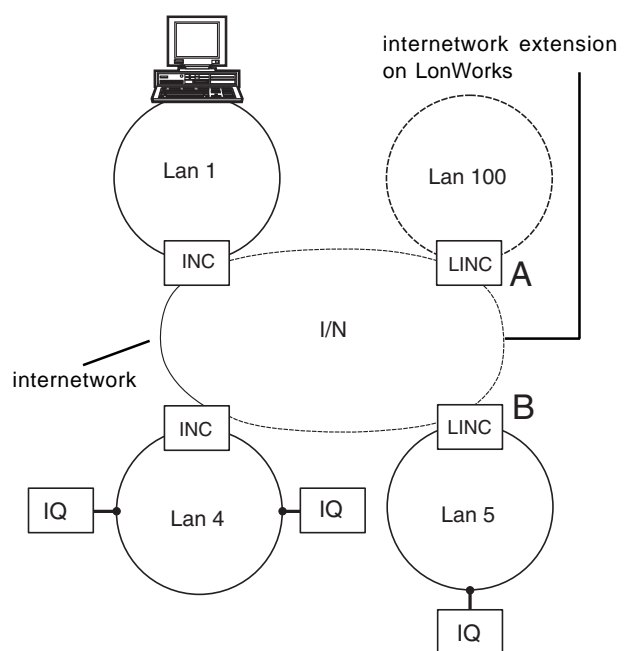
*Note that there can only be one INC type node (INC2, EINC, LINC, or LNC2/LONFTT) on a Lan, or the rule of only one internetwork would be broken.*

### Internetwork extension on LonWorks

The LINC may also be used to extend a IQ system current loop internetwork into a LonWorks internetwork. In this mode it acts as a router between the IQ system internetwork and the LonWorks bus (e.g. LINC A in diagram below); it takes a Lan number on the internetwork which is used to identify the LINC for configuration purposes. The LINC identifies this mode of operation by an address switch =>100. The Lan number defined by the address switch setting is only used for configuring the LINC (i.e. address 126 on this Lan number), it should not be used by any other device. The diagram below shows a LINC (LINC A) being used in internetwork LonWorks extension mode with a second LINC (LINC B) acting in LonWorks INC mode.



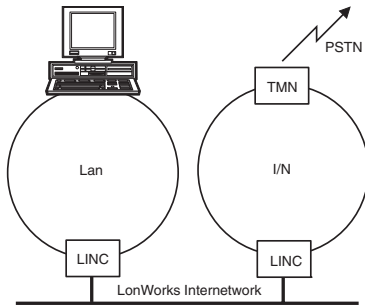
This is equivalent to an internetwork on LonWorks with a separate Lan for the LonWorks extension LINC (LINC A).



**SYSTEM** (Continued)

**Wans**

This diagram emphasises the fact that a TMN (on the IQ system current loop internetwork) may be connected to the LonWorks internetwork using the LINC. The LINC can thus give WAN operation (e.g. PSTN, PSDN) using the appropriate node controller (e.g. TMN).



**LINC's with IQLs and LONCs**

**IQLs:** The IQL range of controllers (LonMark terminal unit controllers) use the LonWorks as their communication network. They are small, fixed strategy controllers with limited configurability using terse text comms.

IQ system networked devices can communicate with the IQL module values and parameters either by text communications (in the case of supervisors) or by inter-controller communications (for controllers). IQLs can communicate with each other using inter-controller communications (IC Comms), and with other LonMark devices (e.g. LonWorks sensor) using LonWorks network variables (nvs).

The IQL's address and Lan number is set up in the factory during its production process on a rolling basis and is printed on the unit's label; the addresses and Lan numbers are generated only in the range 11 to 119. An IQL will normally install satisfactorily without the need to change the IQL's Lan number and address, but if needed they may be changed by terse text communications. IQLs with the same Lan number form a Lan on LonWorks.

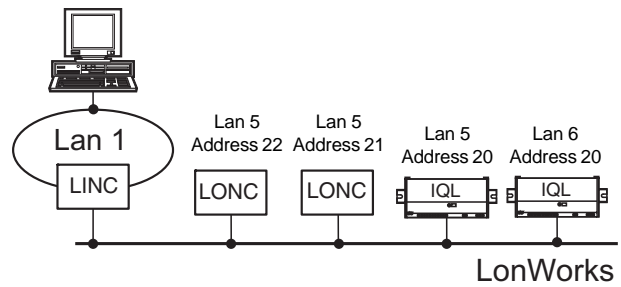
**LONCs:** A LONC (LonMark Object Node Controller) is able to communicate with other LonMark devices (e.g. LonWorks sensor) in a similar way to that used by IQLs to communicate with other LonMark devices, i.e. using LonWorks network variables (nvs). The LONC transfers the communicated values to and from its analogue array. IQ system networked devices can then communicate with the analogue array either by text communications (in the case of supervisors) or by inter-controller communications (for controllers).

The LONC device address is set by its address switch. Its Lan number (default 1) is set up in its configuration mode in a similar fashion to IQ controllers. The address and Lan number can only be set in range 1,4 to 9, 11 to 119 as per normal. Like IQLs, LONCs with the same Lan number form a virtual Lan on LonWorks (the virtual Lan may be a mix of LONCs and IQLs).

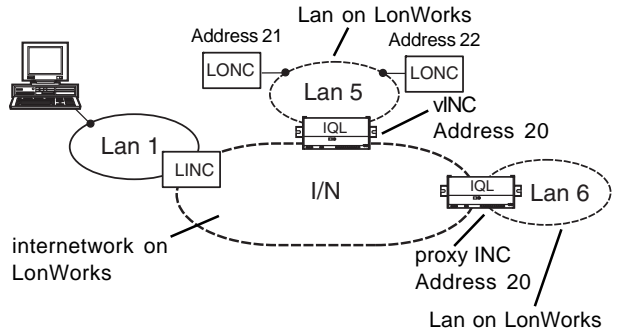
*Note that LINC's, LONCs, and IQLs may only be on the same Lan if they are on the same side of a router, but LINC's may be used to construct an internetwork over routers.*

**vINC:** The lowest addressed LINC (or IQL) will act as a vINC and perform the INC functions necessary to communicate between the Lan and the internetwork, but **it is recommended that as far as possible an IQL is always used as the vINC so the lowest addressed device on a Lan should be an IQL.**

The diagram shows a LonWorks with one LINC, two LONCs, and 2 IQLs.



The LONCs and IQLs form two Lans connected to the internetwork on LonWorks.



**IQ system Network on LonWorks - Rules**

**The maximum number of nodes allowed on an FTT LonWorks segment (i.e. between routers) is 64 (including any router nodes)**

**The recommended maximum number of nodes on a Lan is 40**

**The recommended maximum number of values that can be displayed on a 963 schematics page is 30 points from 15 IQLs (or LONCs).**

**LonWorks Integration**

In a Trend only LonWorks system no LonWorks installation is required as the Trend LonWorks products self-install. Installation onto a LonWorks network Management Tool is only necessary:

- if it is required to bind LonMark devices to the IQL strategy modules,
- if LINC's pre-version 3.23. straddle a router,
- if other devices on LonWorks have address conflicts with IQ system LonWorks devices
- if LONROUTERS are used on a system already installed on a LonWorks Management Tool.

*Note that if one Trend LonWorks device is installed on a LonWorks management Tool, all Trend LonWorks devices must be installed.*

**TARP**

TARP is a parameter in the address module. The LINC factory default is TARP set to Yes which enables it to work in all situations.

Since TARP slows down communications, it should be set to No unless there is more than one LINC connected together by LonWorks.

In addition, TARP is automatically set to Yes if the LINC is installed on a LonWorks Management Tool. After the LINC it has been installed on a LonWorks Management Tool, TARP is read only (cannot be changed in configuration mode).

With TARP set to No, the LINC will address IQLs by using the fixed relationship between IQ system addressing and LonWorks addressing (i.e. IQ system outstation address = LonWorks node address, IQ system Lan number = 255 - LonWorks subnet address).

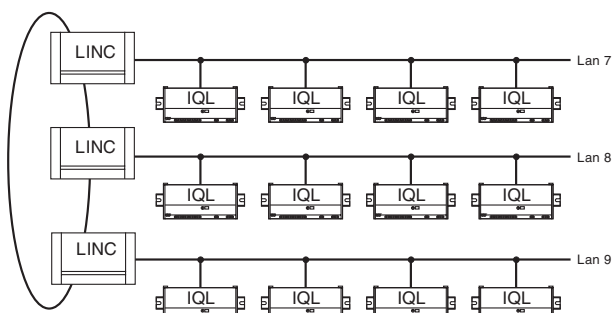
**SYSTEM** (Continued)

If the IQ system has been installed on a LonWorks Management Tool, the fixed relationship no longer applies and the TARP (Trend Address Resolution Protocol) has to be used. A global message is sent requesting the LonWorks address for the IQL with a particular IQ address, and the IQL replies with its LonWorks address.

If there is more than one LINC on the LonWorks segment, there could be IQs on a LINC's attached Lan(s). Their addresses can only be found by using TARP.

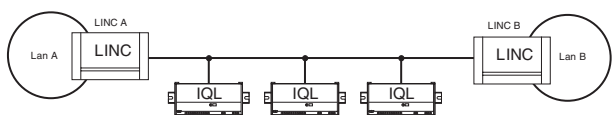
*Note that a LINC2/LONFTT acts like a LINC, so 2 LINC2s or a LINC and an LINC2 also require TARP.*

Multiple LINC's which do not share the same LonWorks section do not need TARP, so TARP should be set to No.



Change TARP to No for multiple LonWorks segments to speed up communications,

*Note that the TARP parameter setting can only be changed by accessing a LINC from its current loop side (not from across LonWorks).*



TARP must be left set to Yes for two LINC's on same LonWorks section

In the above diagram LINC A can only have its TARP parameter setting changed from Lan A side, not from Lan B (vice versa for LINC B)

**Internetwork Advantages**

The internetwork provides:

**Increased addressing** - 116 Lans may be connected using an internetwork each Lan having 116 devices networked.

**Each Lan may have different baud rates** - this is relevant to older IQ systems where an area may be limited to low baud rates (1k2).

**Immunity to Lan failure** - if one Lan fails the others will still operate.

**LonWorks (FTT) Advantages**

**Free bus topology** enables star, bus, or loop wiring, simplifies installation, and facilitates network expansion.

**Simple wiring** using two wires (twisted pair) which are polarity insensitive with no need for screen.

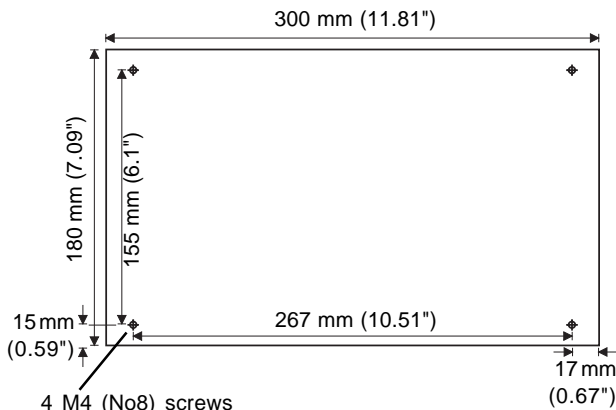
**Increase baud rate** of 78 k baud which is approximately four times faster than IQ system current loop.

**Use existing installation** and reduce cost as the FTT LonWorks may already be present in a building.

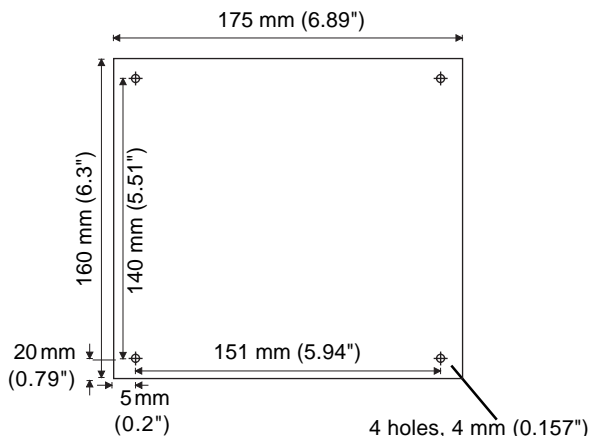
**HARDWARE**

**Packaging:** The LINC can be provided boxed, or as a board version

**The Boxed Version:** provides an IP40 plastic enclosure with 6 cable entry grommets (2 in the rear, 2 in the top edge, 2 in the bottom edge), and two terminal covers which can be removed using a screwdriver. The box is 4 point mounting using M4 (No 8) screws.



The board version will fit inside certain IQ controllers. The controllers can be ordered pre-fitted with the node (e.g. IQ251/LINC/..) or the node can be retrofitted by using the appropriate node fitting kit (KIT/NODE/IQ23x, for IQ231/233, KIT/NODE/IQ241 for IQ241/242, KIT/NODE/IQ25x for IQ251). The board is 4 point mounting using 4 mm (0.157") holes.



**Input Power:** The boxed version can be provided in 230 Vac or 24 Vac versions.

The board version requires 24 Vdc or 18 Vac (transformer isolated, or 18-0-18 Vac (transformer centre tapped).

**Fusing:** The boxed versions are protected by 20 mm time delay fuses. The 230 Vac version uses a 50 mA (T) fuse, and the 24 Vac version uses a 630 mA (T) fuse.

**Network:** There is a set of 2 part network terminals suitable for 4 wire cables. Two screen terminals are provided to ground the network screens. The standard IQ system node features are included (Lan OK and RX indicators, bypass relays, network alarm generation). The network connection is either a local Lan for LonWorks INC mode (address switch <100), or IQ system internetwork for LonWorks internetwork extension mode (address switch =<100).

*Note that there is no RS232 connection duplication of the network connection fitted to the LINC, and the connector in the cover of the boxed version is disconnected.*

**HARDWARE** (Continued)

**Address/Baud Rate Switch:** The LINC device address on the local Lan is set to 126 (hard coded); the Lan number (1, 4 to 9, 11 to 119) is selected by the address/baud rate switch poles 1 to 7. An address setting <100 identifies the LonWorks INC mode of operation (IQ system current loop Lan/LonWorks internetwork) whereas =>100 identifies the internetwork LonWorks extension mode of operation (IQ system current loop internetwork/LonWorks internetwork).

The baud rate on the IQ system 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.

Setting all the switch poles to zero for more than 6 seconds (or until both Lan and LonWorks OK LEDs flash) with power applied will reset the unit in a similar way to a brand new ex-factory LINC. It will reset its parameters as follows:

**Address module**

own local Lan: address switch setting, device address: 126  
 identifier: "LINC"  
 local alarms address: 0, Remote Lan: 0  
 Lon iwrk alm address: 0, remote: Lan 0  
 lonworks managed: No, lonworks node: 126  
 lonworks subnet: 255-address switch setting  
 lonworks transceiver: FTT-10, lonworks domain: 1  
 lonworks message code: 64  
 lonworks domain wide: Yes, router buffer size: 146  
 tarp: Yes  
**User module**  
 PIN number: retained

**Network Bypass Relays:** In order that the Lan continues to operate if the LINC fails, node bypass relays are fitted to maintain network integrity in the event of failure of the node's input power, or failure of the node itself. The bypassing of a node will be recognised by a downstream node and be reported as a Lan Changed alarm.

**RS232 Interface:** There is no RS232 interface fitted to the LINC

**Service Button:** This is used during the installation of the LINC into a LonWorks network Management Tool (LMT). This is only necessary under conditions described in the LonWorks section below. During the installation process, the tool will request to be informed of the presence of the LINC; this is done by pressing the 'service' button.

Pressing the button also generates an alarm message which would be forwarded by another LINC to its target alarm address (if set up) which identifies the originating LINC by means of its neuron ID.

**Indicators:** The LINC has four LED indicators.

**TX:** Indicates current flowing from the LINC current loop network transmitter. If Off indicates open circuit.

**RX:** Indicates current flowing into the LINC current loop network receiver. If Off indicates open circuit or short circuit.

**Lon OK:** Flashes every 24 s while the internetwork on LonWorks is being built after which it stays on indicating that the LINC has successfully communicated with at least one other IQ system device on the LonWorks. Although the Lans of IQLs will build in about 30s, it takes up to about 2½ minutes until the internetwork on LonWorks is completed after a LonWorks network change.

**Lan OK:** This indicates that the LINC is able to send and receive messages on the IQ system current loop network and indicates that the baud rate is correctly set. When extinguished it indicates a LAN BROKEN condition exists on the network.

**Connectors:** Two part connectors are used throughout to facilitate wiring.

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

**FIRMWARE****Network Alarms**

The LINC generates text alarms when there are changes to the network structure of either its IQ system current loop port, or its LonWorks port. The IQ system current loop port can either be on a local Lan, or on a segment of internetwork depending on the LINC's address (see above in System section), whereas the LonWorks port is always internetwork.

The following own Lan alarms are sent if LINC address <100, and both **local alarms Addr**, and **Remote lan** (both in address module) are set up and are sent to the address defined by these parameters:

"LINC -\*Rem LAN From LINC on Lan xxx-

**LAN Broken NKBK"** - a break in Lan communications.

**LAN Changed NKCH"** - a node has gone from or been added to the Lan.

**LAN OK NKOK"** - Lan communications are restored.

**DUPLICATE ADDRESS NKDA"** - The LINC's address is duplicated on the local Lan (i.e. another address 126); only generated when the local Lan is mapped.

\*Rem LAN means remote Lan.

The following alarms about the segment of current loop internetwork are sent if LINC address =>100, and both **trend iwrk alarm Addr**, and **Remote lan** (both in address module) are set up and are sent to the address defined by these parameters:

"LINC - Int'wrk From LINC on Lan xxx-

**CNC Iwrk Broken NKBK"** - a break in internetwork segment communications.

**CNC Iwrk Changed NKCH"** - a node has gone from or been added to the internetwork segment.

**CNC Iwrk OK NKOK"** - internetwork segment communications are restored.

**DUPLICATE LAN NKDA"** - The LINC's Lan number is duplicated on the internetwork segment; only generated when the internetwork is mapped.

The following LonWorks internetwork alarms are sent (regardless of LINC address) if both **lon iwrk alm** (or **int/net alarms**) **node** and **remoTe lan** (both in address module) are set up and are sent to the address defined by these parameters:

"LINC - Int'wrk From LINC on Lan xxx-

**LON Iwrk Broken NKBK"** - a break in internetwork communications.

**LON Iwrk Changed NKCH"** - a node has gone from or been added to the internetwork.

**LON Iwrk OK NKOK"** - internetwork communications are restored.

**DUPLICATE LAN NKDA"** - The LINC's Lan number is duplicated on the internetwork; only generated when the internetwork is mapped.

**NID=00112233445566 NKSVM"** - Neuron ID alarm generated when the LINC receives a service pin message from any LonWorks device (i.e. not just IQ system devices). The neuron ID can be used as an attribute on an IQL to get its Lan number and device address.

*Note that the deaf IQL condition can be reported by a LINC for a short period after it comes on line on a network which previously had such a node.*

"LINC - Int'wrk Node xxx Subnet yyy This Node is deaf NKDF" - The LINC detects that the identity message received from an IQL identifies it as being 'deaf' and generates a "deaf IQL" alarm. The IQL detects its "deaf IQL" status while building the virtual Lan. It generally means a broken network, or having only one LonWorks wire connected. The changed identity message will be sent every 25 seconds by the deaf IQL, so the LINC will also generate the "deaf IQL" alarm every 25 seconds until the deaf IQL condition is corrected.

**FIRMWARE** (Continued)

The node and subnet numbers given in the alarm are LonWorks addresses, but if self-installed (i.e. not installed on a LonWorks management Tool) they are related to the IQ system addresses as follows:

IQ system device address = node

IQ system Lan number = 255 - subnet

**Configuration Mode**

**LINC Configuration:** The LINC has a configuration mode similar to that used by IQ controllers (see IQ Configuration Manual); this is a built-in feature enabling configuration by any IQ system configuration tool. It has no local supervisor port, so can only be configured using the current loop network (including across the internetwork).

*Note that a LINC can only be configured across LonWorks (i.e. using another LINC) if it has TARP set to Yes (default is Yes); if previously changed to No, TARP can only be set to Yes by configuring a LINC from its current loop side (not from across LonWorks).*

A LINC is addressed from its local Lan as device 126 on Lan 0, and from the internetwork as device 126 on its own Lan number (as defined by the address switch setting).

The top configuration menu is shown below:

**User**

The LINC has a single programmable **PIN** number which will protect the LINC from unauthorised configuration mode changes. If a PIN is not set up the user can enter a PIN in range 0000 to 9999.

Once a PIN is set up, until the valid PIN is entered the User module display will show a blank PIN and random **generator** number. If the PIN is forgotten, the user should contact Technical Support quoting the generator number, and the neuron chip id (see below); Technical Support will supply a default PIN.

**Address**

```
ADDRESSES
addr switch on local lan 122
iDentifier LINC
trend iwrk alm: Addr 0 Remote lan 0
lon iwrk alm : nodE 0 remoTe lan 0
lonworks managed No
lonworks node 126
lonworks subnet 133
lonworks transceiVer FTT-10
lonworks domain 1
lonworks Message code 64
lonworks domain wide Yes
router Buffer size 146
tarP Yes
neuron id 00:01:17:47:05:00:
LINC v3.30 07-Mar-03
```

The address is 122 so the LINC is providing an internetwork extension on Lon.

**addr switch own local lan** (read only): This is the LINC address switch setting which defines the own Lan number. If the address is <100, the LINC sits on the local Lan and acts like an INC using the LonWorks as an internetwork (LonWorks INC mode), if the address setting is =>100, the LINC sits on the internetwork and uses the LonWorks as an internetwork extension (internetwork LonWorks extension mode).

**D - iDentifier** (read/write): This is the first attribute and acts as an identifier for the LINC. It is up to 15 characters long. It can be read by text comms **R(D)**.

**trend iwrk alarm:**

**A - Addr** (read/write): The destination device address for internetwork alarms.

**R - Remote lan** (read/write): The destination Lan number for internetwork alarms.

**lon iwrk alm:**

**E - nodE** (read/write): The destination device address for alarms from the LonWorks internetwork.

**T - remoTe lan** (read/write): The destination Lan number for alarms from the LonWorks internetwork.

[If the address was <100, the labels for these parameters would change to the following:

**local alarms:**

**A - Addr** (read/write): The destination device address for IQ system local Lan alarms.

**R - Remote lan** (read/write): The destination Lan number for IQ system local Lan alarms.

**int/net alarms:**

**E - nodE** (read/write): The destination device address for alarms from the LonWorks internetwork.

**T - remoTe lan** (read/write): The destination Lan number for alarms from the LonWorks internetwork].

*Note that alarm destination node addresses and Lan numbers must be in th valid range (1 to 119 excluding 2, 3, and 10). If either is set to zero, the alarms will not be sent.*

**lonworks managed** (read only). The Lonworks managed flag displays **No** if the node is not installed in a LonWorks Management Tool. This means that the read only parameters (node, subnet, domain, domain wide) will be left at their last setting (e.g. defaults), and the read/write parameter (message code) will be left as last set up. When installed in the LonWorks Management Tool, the Lonworks managed flag changes to **Yes**, and the tool takes charge of all these parameters. Other than the message code, the other read/write parameters listed below can still be changed by configuration mode.

**lonworks node** (read only). The node address on LonWorks. The LonWorks logical addressing structure of domain, subnet, and node is superimposed on the physical neuron address. The third level of addressing is the node. Each subnet can have up to 127 nodes but the IQ system recommendation is for a maximum of 40 nodes on a Lan and hence subnet. The LonWorks node address defaults to the IQ system network device address for LINC, IQLs and LONCs, which for LINC is always 126. During installation into a Lonworks Management Tool, the node address may be changed.

**lonworks subnet** (read only). The subnet to which the node belongs. The second level of addressing on LonWorks is the subnet. Each domain can have up to 255 subnets. The IQ system Lan maps directly onto the subnet; by default there is only one Lan per subnet, only one subnet per Lan. The LINC, IQL, and LONCs self-install with a subnet number equal to 255 minus the Lan number (for LINC this is 255 minus the switch setting). During installation into a LonWorks Management Tool, the subnet numbers may be changed.

*Note that all members of a Lan must be on the same subnet. The LonWorks Management Tool may put several Lans within a subnet and change their node addresses appropriately.*

*[Note that the IQ system internetwork may consists of a number LINC and IQLs acting as proxy INCs so it connects together a number of nodes on different subnets, and so does not map onto a subnet. This allows it to span routers (LINC version >=3.23).] Although there can be up to 255 subnets, there can only be up to 116 Lans on an internetwork, so the IQ system will only use up to 116 subnets. Each LINC will use one of these Lans which cannot contain any other device.*

**FIRMWARE** (Continued)

**V - lonworks transceiver** (read/write): Change of transceiver type not supported. It should be left unchanged as 0=FTT-10. **lonworks domain** (read only). The domain table being used (0 or 1). The domain number is the top level of LonWorks addressing. On one LonWorks system there can be several domains, which could be different systems communicating completely independently of each other. The neuron chip can be a member of two domains and could have a different subnet and node address in each domain. The neuron thus has two domain tables, zero and one. The domain table defines the domain specification, subnet and node address. Domain table zero is normally used by LonWorks Management Tools, so by default the IQ system uses domain table one. When LonWorks managed, the domain table may be changed by the LonWorks Management Tool. The default setting of lonworks domain is 1, for domain table 1. Each domain has a domain specification; this defines the number of bytes used to specify the domain in the address structure, and the actual value of those bytes. The IQ system specifies its domain as one byte long with a value of 255.

*Note that all IQ system devices on LonWorks must be members of the same domain (even if they have been installed in a LonWorks Management Tool).*

**M - lonworks Message code** (read/write). The message code for all IQ system messages on LonWorks. *Note that it must be the same code for every IQ system device on LonWorks and must be different to the message code used by any other node on the LonWorks network.*

If there is a clash with an existing code the message code must be changed. The default is 64. When lonworks managed, the message code may be changed by the LonWorks Management Tool and cannot be changed by configuration mode.

**lonworks domain wide** (read only). When set to 1, IQ system LonWorks messages can be sent to anywhere in the domain, when set to 0, they are restricted to their local subnet. Default is 1. When lonworks managed, the domain wide flag may be changed by the LonWorks Management Tool.

**B - router Buffer size** (read/write). The size of message frames sent on LonWorks. The default is 146 bytes. If routers separate LINC's and have a buffer size smaller than 146 bytes, the router buffer size should be set to the smallest buffer size (minimum = 66 bytes).

**tarP** (read/write, if not installed on LMT): By default TARP is set to Yes. Set TARP to No to speed up LonWorks communications if there isn't more than one LINC physically connected together by LonWorks (see SYSTEM/TARP above). If the LINC is installed on a LonWorks Management Tool, TARP will be set to Yes and will become read only (cannot be changed in configuration mode).

**neuron id** (read only): Unique number identifies neuron chip; also used in default PIN generation process.

**LINC v3.30 07-Mar-03** (read only): This is the identification string returned with the text comms request **R(C)**. It gives identification as a LINC and firmware version and date.

**z - reset node flag** (read/write): Parameter used by IQ system engineers.

**Inter-Controller Communications (intcoN)**

IC Comms are not available in LINC. If selected returns to top menu displaying 'Use LONC for IC Comms'.

**Identification**

Replies to w comms with INC v3.xx

**Text Communications**

The LINC has very restricted text communications, it will only respond to directed to comms (i.e. not global or visitor comms). It will reply to the following:

**R(C) - Version string** (read only). Firmware version and date.  
**R(D) - Identifier** (read only). The identifier for the node.

**COMPATIBILITY**

An ANC+ or XN28 on the internetwork must be firmware version 2.5 or later and an MNC on the internetwork must be firmware version 2.53 or later.

*Note: Always repower LINC after changing autodialling node number table entries so that LINC may learn about the node changes.*

Any IQ251 on the system must be firmware version 1.2U or later and an IQ241 must be firmware version 1.2M or later.

LONC v5.1 or later must be used with LINC v3.2 or later.

**INSTALLATION**

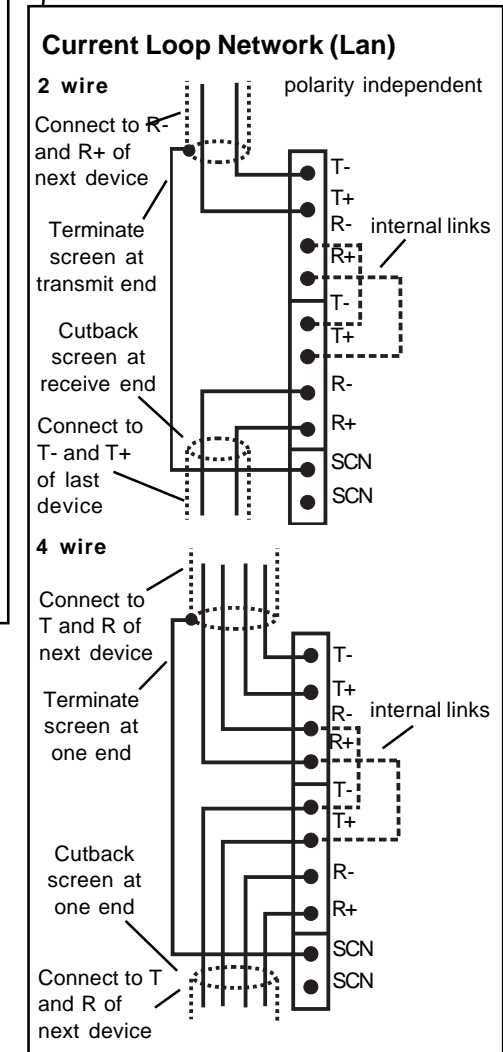
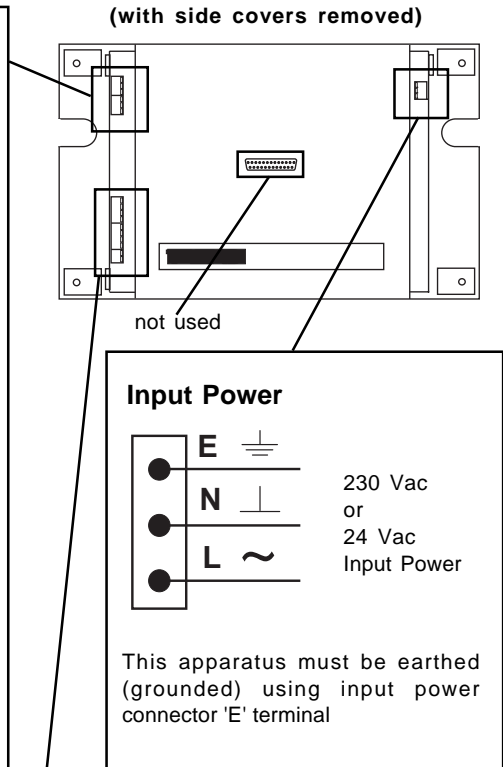
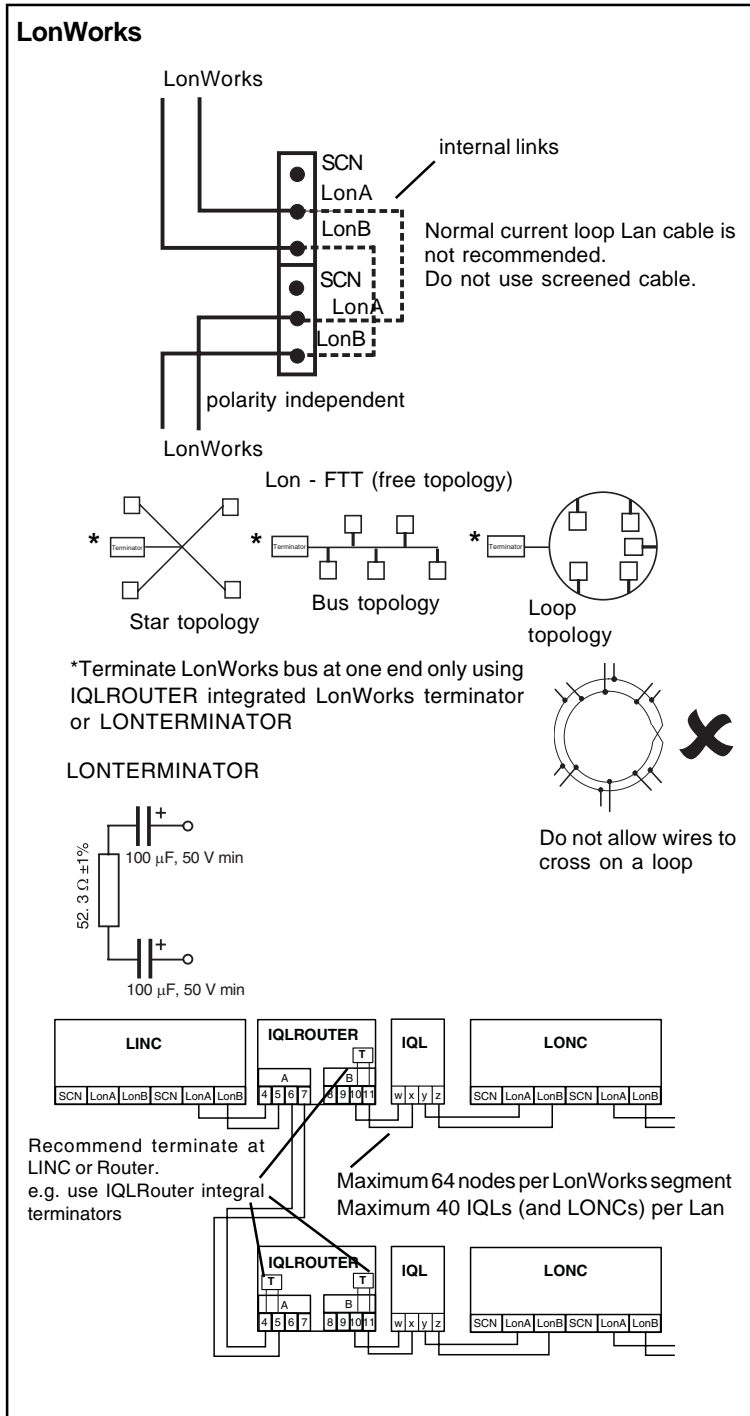
If the LINC is supplied as a board, it must first be mounted in a suitable enclosure (e.g. certain IQ controllers, NETB). It is normally mounted on 4 pillars. The NETB/LINC must be mounted on a flat surface using 4 off M4 (No 8) screws and rawl plugs. For LINC/FTT and NETB/LINC/FTT/24, the unit is UL rated as 'UL916, accessory to open energy management equipment'. The LINC installation involves the following procedure:

Mount the unit in position	Replace main cover
Route cables	Switch on unit
Connect input power (do not switch on)	Commission IQ system current loop network
Connect earth (ground) if not part of input power	Check LINC on LonWorks
Connect LonWorks network	Configure LINC
Connect current loop network	Install on LonWorks management Tool (if required)
Remove main cover	Install remaining IQ system LonWorks devices
Set IQ system current loop network address (by switch)	Test system
Set IQ system current loop network baud rate (by switch)	

A full description of installing the NETB/LINC is provided in the NETB/LINC Installation Instructions TG200632. Instructions for installing a LINC board only are provided in the LINC Installation Instructions TG103062.

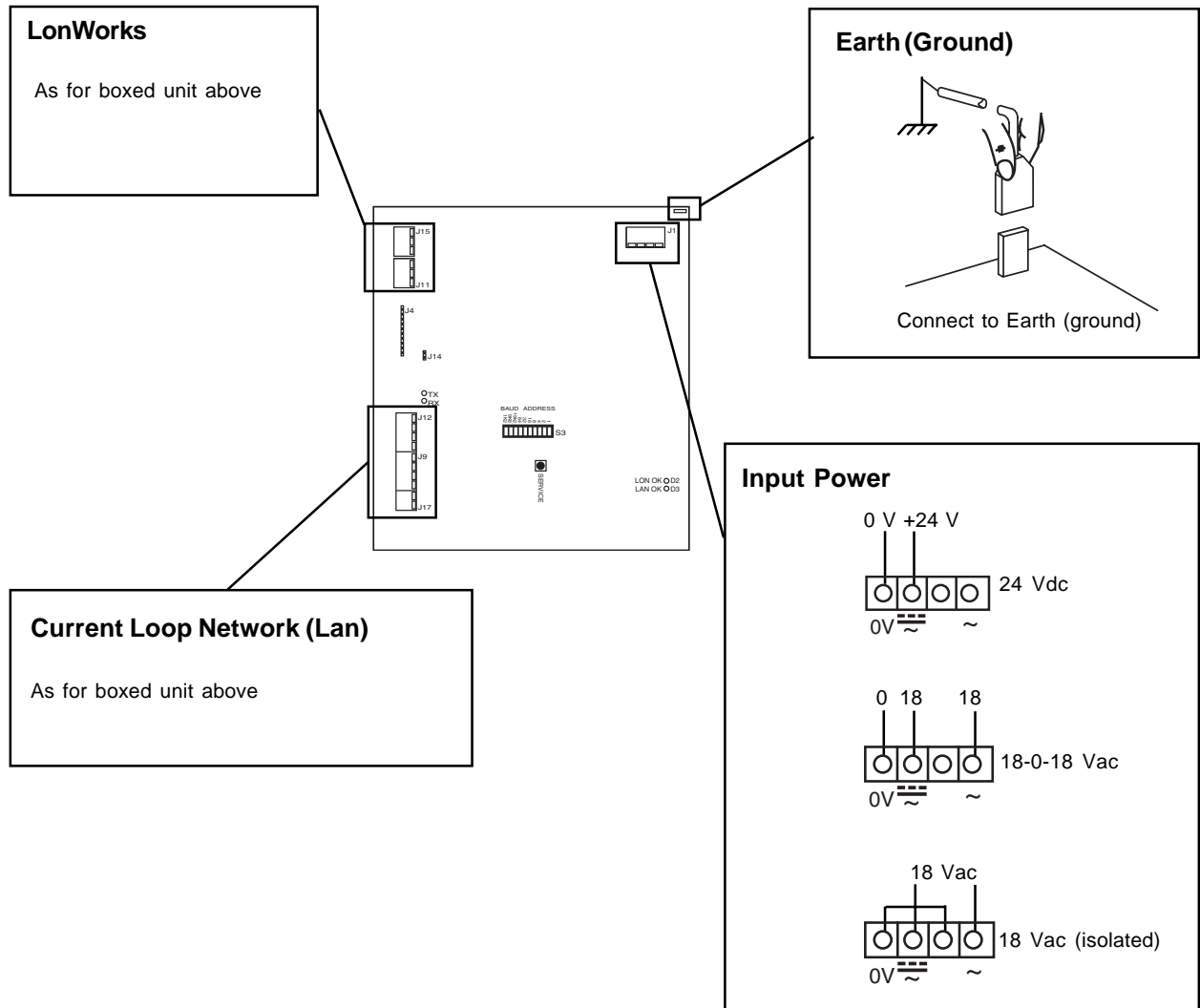
CONNECTIONS

Boxed - NETB/LINC



**CONNECTIONS** (Continued)

**Board - LINC**



## ORDER CODE

<b>Non USA Order Code</b>	<b>USA Order Code</b>	
LINC/FTT	not available in USA	Board version of LINC
NETB/LINC/FTT/230	not available in USA	Boxed version of LINC requiring 230 Vac input power
NETB/LINC/FTT/24	not available in USA	Boxed version of LINC requiring 24 Vac input power
NETB/LINC/FTT/USA/UL/24VAC	<b>882000280</b>	UL rated boxed version of LINC requiring 24 Vac input power
KIT/node/IQ25x	not available in USA	Mountings required to retrofit a node inside a IQ250/251 controller
KIT/node/24x	not available in USA	Mountings required to retrofit a node inside a IQ241/242 controller
KIT/node/IQ23x	not available in USA	Mountings required to retrofit a node inside a IQ231/233 controller
IQxx/LINC/FTT	not available in USA	LINC fitted inside an IQ241/242, IQ231/233, IQ251 controller (e.g. IQ241/LINC/.. for LINC inside IQ241).

## Accessories

<b>LONTERMINATOR</b>	<b>882000350</b>	Universal LonWorks terminator FTT, LPT-10, or TPT/ XF1250 (see LONTERMINATOR data sheet TA200229)
IQLROUTER/24VAC	not available in USA	IQL Router with 24Vac power option.
IQLROUTER/230	not available in USA	IQL Router with 230 Vac power option.
IQLROUTER/USA/UL/24V	<b>88200130</b>	IQL Router with 24Vac power option.

## DISPOSAL

COSHH (Control Of Substances Hazardous to Health - UK Government Regulations 2002) 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 and product should be disposed of by a suitable recycling centre.

Do not dispose of with normal household waste.  
Do not burn.

**SPECIFICATION**

**Electrical**

Input Power Board :24 Vdc ±15 % at 250 mA  
 18-0-18 Vac ±15 % (transformer centre tapped) 50 or 60 Hz 20 VA  
 18 Vac ±15 % (transformer isolated) 50 or 60 Hz 20 VA.  
 (board must be earthed/grounded using ¼" Fast-on).  
 NETB :230 Vac -15%, +10%, 50 or 60 Hz, 6 VA.  
 :24 Vac -15%, +10%, 50 or 60 Hz, 6 VA.  
 (unit must be earthed/grounded using earth/ground terminal)  
 Fusing NETB/230 :50 mA(T) 20 mm fuse  
 NETB/24 :630 mA(T) 20 mm fuse  
 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 below).

Cable	1k2 baud	9k6 baud	19k2 baud	No. of Wires
Belden 9182	1000 m (1090 yds)	1000 m (1090 yds)	700 m (765 yds)	2
Belden 9207	1000 m (1090 yds)	1000 m (1090 yds)	500 m (545 yds)	2
Trend TP/1/1/22/HF/200 (Belden 8761)	1000 m (1090 yds)	700 m (765 yds)	350 m (380 yds)	2
Trend TP/2/2/22/HF/200 (Belden 8723)	1000 m (1090 yds)	500 m (545 yds)	250 m (270 yds)	4

Current Loop baud rate :Selectable by board switches 1k2, 9k6, 19k2 baud - set to be same as other nodes on the current loop network.  
 Current Loop Lan address:Fixed at 126  
 Internetwork Address :Lan number selectable by board switches - set to be unique on internetwork. 116 nodes addressable (1 to 119, excluding addresses 2,3, and 10). Addresses 100 to 119 cause LINC to assume internetwork LonWorks extension mode.  
 LonWorks :FTT (Free Topology), 78 k baud, transformer isolated. Single termination (RC network). Can also use LPT10 (Loop Powered free Topology).  
 LonWorks FTT distance :Maximum bus length and node to node distance depend on cable type (see table below).

Cable	Max bus length	Max node to node
Belden 85102	500 m (545 yds)	500 m (545 yds)
Trend TP/1/0/16/HF/200 (Belden 8471)	500 m (545 yds)	400 m (430 yds)
UL Level IV, 22 AWG	500 m (545 yds)	400 m (430 yds)
JY(St) Y2 x 2 x 0.8	500 m (545 yds)	320 m (350 yds)
TIA568A Cat. 5, 24 AWG	450 m (490 yds)	250 m (270 yds)

Note that this does not include cable recommended for the current loop Lan

If used with LPT10 (powered bus), cable lengths differ - see "Link Power Transceiver User's Guide (078-0105-01C)".

Manufactured for and on behalf of the Environmental and Combustion Controls Division of Honeywell Technologies Sàrl, Ecublens, Route du Bois 37,Switzerland by its Authorized Representative, Trend Control Systems Limited.

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**Mechanical**

Dimensions board :175 mm (6.89") x 160 mm (6.3") x 35 mm (1.38") typical  
 NETB :300 mm (11.81") x 180 mm (7.09") x 50 mm (1.97")  
 Material NETB :Borg Warner Cyclac KGBE or equivalent  
 Wiring :2 part connector screw terminals 0.5 to 2.5 mm<sup>2</sup> cross section area (14 to 20 AWG) cables.  
 Weight board :0.4 kg (0.88 lbs)  
 NETB :1.5 kg (3.3 lbs)

**Environmental**

EMC Emissions :EN50081-1  
 EMC immunity :EN50082  
 Electrical Safety :IEC 730-1  
 UL :(LINC/FTT or NETB/LINC/FTT/24 only)  
 The unit is UL rated as 'UL916, accessory to open energy management equipment.'

Ambient limits Storage operating humidity ::-10 °C (14 °F) to 50 °C (122 °F)  
 :0 °C (32 °F) to 45 °C (113 °F)  
 :0 to 95 %RH non-condensing  
 Protection NETB :IP40

**Indicators**

TX :ON if current is flowing from the current loop network transmitter  
 RX :ON if current is entering the current loop network receiver  
 Lan OK :ON if LINC successfully communicating over current loop network.  
 LonWorks OK :ON if LINC successfully communicating over Lon.

**Version**

Firmware :V 3.3  
 Board :AM102370 Issue 1

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