**XTEND/24V Data Sheet**

**XTEND Node Controller**

**Description**

The XTEND Node Controller enables Trend networks running on Ethernet, LonWorks® and Trend current loop to be integrated into a single network. It operates at the internetwork level, including the necessary support for WANs. It also provides virtual CNCs that allow supervisory or tool software, running on PCs connected to the Ethernet network, to connect to the Trend system.

Operation on a LonWorks network is achieved without the need for any LonWorks network management.

**Features**

- Integration of Trend network on Ethernet, LonWorks and Trend current loop.
- Ethernet 10/100 BASE-T with DHCP and DNS lookup enabled.
- Eight virtual CNCs for PC/supervisor connection via Ethernet.
- Can span routers.
- Network alarms available in 10 languages.
- Flash memory retains configuration during power fail.
- Integration of IQL controllers into Trend system.
- Connection to LonWorks network with IqlTool 2 using vCNC.
- TS35 DIN rail mounting.

**Physical**

**Dimensions**

- 206 mm (8.11")
- 139 mm (5.47")
- 58 mm (2.28")
- 145 mm (5.70")

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**XTEND/24V Data Sheet TA201301 Issue 3, 18-Sep-2014**
PHYSICAL (continued)

Features
FUNCTIONALITY

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

SYSTEM

The XTEND enables Trend devices operating on separate Ethernet, LonWorks and/or current loop networks to form a single Trend network.

The XTEND can operate in one of two modes:

- INC mode
- Internetwork Extension mode

The mode of operation is determined by the XTEND’s LAN number (see “Networking” on page 4).

INC Mode

Using the XTEND in INC mode enables a LAN running on a current loop network to be joined with an internetwork running on an Ethernet network and an internetwork running on a LonWorks network, as shown in the following example:

![Diagram of INC mode]

Devices A and B form a LAN on Ethernet, devices C and D form a LAN on LonWorks, and devices E and F form a LAN on the current loop. Devices B and D act as internetwork nodes (INCs) allowing the XTEND to build an internetwork across the Ethernet and LonWorks networks. The XTEND provides the INC functionality on the current loop and joins this LAN to the internetwork.

Note: In this mode no other INC type devices must exist on the current loop network.

Internetwork Extension Mode

Using the XTEND in internetwork extension mode enables an internetwork running on a current loop to be joined with an internetwork running on an Ethernet network and an internetwork running on a LonWorks network, as shown in the following example:

![Diagram of internetwork extension mode]

Devices A and B form a LAN on Ethernet, devices C and D form a LAN on LonWorks, and devices E and F form an internetwork on the current loop. Devices B and D act as internetwork nodes (INCs) allowing the XTEND to build an internetwork across all connected network media.

Note: The XTEND builds its own internal LAN which forms part of the internetwork (see “Networking” on page 4).

Ethernet

The XTEND supports either static or dynamic (DHCP) IP addressing. DHCP is enabled by default.

Each XTEND has a unique MAC (Media Access Control) address allocated to its Ethernet node. This can be used to help identify the XTEND during configuration.

UDP Port

The UDP (User Datagram Protocol) port number defines the Ethernet port used by the XTEND to send messages to other Trend Ethernet devices. 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 Trend Ethernet devices in the different internetworks.
LonWorks

The XTEND supports the use of free bus topology enabling star, bus, or loop wiring. An onboard termination switch is provided to allow correct termination on the LonWorks network.

*Note: It is not recommended that the LonWorks network is used where a high level of communication traffic is expected, e.g. joining internetworks or where there are many Trend devices on many Trend LANs being accessed across an internetwork routed through the LonWorks network. An alternative topology should be used, such as an Ethernet internetwork.*

**LON Service Button:** Pressing the button generates an alarm message which would be forwarded to a target alarm address (if set up) which identifies the originating XTEND/24V by means of its Lon Neuron ID (NID).

Current Loop

The current loop may be wired in either a 2-wire or 4-wire configuration.

If the current loop is not to be connected (i.e. the unit is to only interface between Ethernet and LonWorks) a loop back connector must be fitted.

**Network Bypass Relay:** If the XTEND loses power a set of bypass relays will close to maintain integrity of the current loop network. If the relays close it will be recognised by the downstream device, and reported as a LAN Changed or Internetwork changed alarm.

**Baud Rate Switch:** The baud rate used by the XTEND on the Trend current loop network is set by onboard switches and can be set to 9k6, 19k2 or 38k4 baud. All devices connected to the current loop LAN/internetwork must use the same baud rate.

Networking

In **INC mode** the current loop operates as a LAN. This LAN will comprise:

- the XTEND's INC,
- the XTEND's eight virtual CNCs (vCNC1 to vCNC8),
- any devices physically connected to the XTEND's current loop.

XTEND will join the current loop LAN to the internetwork on Ethernet and LonWorks.

In **internetwork extension mode** the current loop operates as an internetwork. The XTEND builds an internal LAN which will comprise:

- the XTEND's INC,
- the XTEND's eight virtual CNCs (vCNC1 to vCNC8).

XTEND will link the internetwork across the Ethernet, LonWorks and current loop, and include any other INC type devices connected to the XTEND's current loop.

**INC Functionality:** The INC has a fixed address of 126 on its associated LAN. Its LAN number is set by on-board switches and can be in the range 1 to 119 (excluding 2, 3 and 10) and also defines the XTEND's operating mode. A value less than 100 sets the XTEND to INC mode, while a value greater than or equal to 100 sets the XTEND to internetwork extension mode.

**vCNC Functionality:** For further details see “Virtual CNCs” on page 5.
Virtual CNCs

The XTEND incorporates eight virtual CNCs (vCNCs) that enable a connection to be made over Ethernet between a PC running supervisor/tool software and the Trend network.

By default all eight vCNCs are disabled. For a vCNC to operate it must be given an address on the local LAN using the Virtual CNC module (see “Firmware” on page 9).

Each vCNC can act in one of two modes:

- Supervisor mode
- Alarm mode

Supervisor Mode

In this mode the supervisor/tool connects to the vCNC by using the XTEND’s host name or IP address and the vCNC’s port address. This enables the supervisor/tool to communicate with devices on the Trend network, and for those devices to communicate with it.

The 963 can make either a permanent or temporary connection to the vCNC. Temporary connections will not allow the vCNC to send alarms back to the supervisor since it may not always be connected; in this case a separate vCNC in alarm mode must be used.

In the example below vCNC4 is enabled with address 24 on LAN 20 and is in supervisor mode. The supervisor/tool makes a permanent connection to vCNC4 over Ethernet, and will have a LAN number of 20 and a device address of 24 on the Trend network.

Alarm Mode

In this mode the vCNC can be used to forward alarms from the Trend network to a supervisor PC over Ethernet. This is used when the supervisor makes a temporary connection to XTEND (using a different vCNC).

An IQ controller can be configured to send its alarms to the vCNC using normal LAN/device addressing, and the vCNC will forward these alarms to the PC using the Port Address and the Alarm host name/IP address specified in the Virtual CNC module. The supervisor 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 example below vCNC4 is enabled with address 24 on LAN 20 and is in supervisor mode. The supervisor makes a temporary connection to vCNC4 over Ethernet. In addition vCNC3 is enabled with address 23 and is operating in alarm mode. It will forward any alarms it receives to the IP address of the supervisor PC.

Note: When IqTool 2 connects to a vCNC in supervisor mode, IqTool 2 detects that the vCNC is capable of communications with devices on a LonWorks network, enabling IqTool 2 to connect to the LonWorks network over an Ethernet network.
**Ethernet Addressing**

The XTEND supports either static or dynamic (DHCP) IP addressing. DHCP is enabled by default.

*Note: When setting up the Ethernet addressing ensure that there is only one subnet on a network segment.*

**Dynamic Addressing (DHCP)**

The XTEND is able to operate on an Ethernet system where the IP addressing information (IP address, subnet mask, default router, and WINS Server) are automatically allocated by a Dynamic Host Configuration Protocol (DHCP) server or IP address is automatically negotiated with other devices. This means that the IP address is not fixed.

When in auto addressing mode the XTEND obtains IP addressing information from a DHCP server. If there is no DHCP server or the DHCP server fails the XTEND enters link/local mode where it auto-negotiates its IP address with other devices on its Ethernet segment. There may be some delay between DHCP server failure and the XTEND entering link/local mode as it will only prompt the DHCP server after its lease has expired, which may be a long time.

When in link/local mode IP addresses start at 169.254.0.0 with subnet mask of 255.255.0.0; ensuring all devices in link/local mode are on the same subnet, the default router, and WINS server address remain at their last settings. Any devices wanting to communicate with them using IP addressing must be on this subnet.

**Fixing the XTEND’s address on a DHCP network:** It is possible for the XTEND to operate in a DHCP regime with a fixed IP address by setting up the DHCP server so that it always gives the XTEND the same IP address. An alternative is to set the XTEND to use manual addressing and set its IP address outside the range of the DHCP server.

**Connecting to an automatically addressed XTEND:** Because the XTEND’s IP address may not remain the same, any connection to it over Ethernet, e.g., to a virtual CNC, must use a host name. For more details see ‘Host names’ below.

*Note that if any communication using a host name crosses a router(s) then a WINS server address must be set up.*

**Crossing Routers if DHCP is operating:** In the DHCP regime, if the internetwork is to be built across a router(s), the devices in the remote devices table must be specified using their host names and subnet mask. This will enable the IP addresses to be obtained from the WINS servers. The remote devices table must contain the details of two devices in the network from each other subnet and be set up in every device on the local subnet. For increased reliability, details of additional devices should also be set up.

**Static/Fixed Addressing**

The XTEND 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.

**Connecting to a manually addressed XTEND:** Connection to a XTEND over Ethernet, e.g., to a vCNC, can be made using either the host name or IP address. For more details see ‘Host names’ below.

*Note: If any communication using a host name crosses a router(s) then a WINS server address must be set up.*

**Crossing Routers:** If the internetwork is to be built across a router(s), the devices in the remote devices table can be specified using their host names and subnet mask, or IP address and subnet mask. The remote devices table must contain the details of the two devices with the lowest IP address in the network from each other subnet and be set up in every device on the local subnet. For increased reliability, details of additional devices should also be set up.

**Link/local Default Operation**

XTEND, IQ3/IQ4 controllers and IQView are set to automatic IP addressing by default. If a group of these devices are connected together on an Ethernet segment (without DHCP, WINS servers) they will power up in link/local and auto-negotiate their IP addresses. If they have been set up with device addresses and LAN numbers they will construct a Trend network. A supervisor or system tool running on a PC on the same segment will be able to communicate with them using host names (if the PC is set up for auto-addressing). Such a system cannot form a network across a router; this would require the setting up of DHCP and WINS servers and the remote devices table.

**Host names**

The XTEND has an additional addressing parameter, Host name, which provides a user-friendly method of accessing the XTEND, e.g., when connecting to a vCNC, or building an internetwork across routers in a DHCP regime.

The host name defaults to TREND_xx_yy_zz where xx, yy and zz are the last 3 groups of the number in the XTEND’s MAC address.

**Using across routers:** If the connection is to be across routers a Windows Internet Naming Service (WINS) server must be used to enable the device connecting to the XTEND to obtain the its IP address. Each device must be set up with the IP address of the WINS server. The XTEND sends its host name to the WINS server on power up. Devices wishing to communicate with XTEND send the host name to the WINS server which returns the associated IP address.

If a WINS server is not present the host name can only be used over the local segment (i.e. not across routers).

**Using in a DHCP regime:** Because the XTEND’s IP address may not remain the same the host name must be used to connect to the XTEND when automatic addressing is being used.

**Communication across the Internet:** If connection to XTEND is to be made using the Internet then the firewall either has to be able to use the host name, or the XTEND’s IP address must be fixed.

**Remote Devices Table:** The XTEND allows the address of remote devices to be specified using host names.
Building Internetworks On Ethernet

The XTEND will build an internetwork with other Trend devices that are connected to the Ethernet network. If there is more than one Trend device on the same segment of the Ethernet network (i.e. no routers between them) and they use the same UDP port they will automatically form a single internetwork as shown in the example below.

If any 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 above the XTEND, IQ3 controllers and the EINC are on the same network segment and the IQ3 controllers have different LAN numbers. Therefore they form an internetwork consisting of LANs 20, 21, 22 and 23.

When there are routers on the Ethernet network, and it is required for the internetwork to be built across routers, a Trend Ethernet device must be installed on either side of the router and be configured to span the routers. This is achieved by creating a remote devices table on each device using the Remote Device modules (see “Firmware” on page 9).

In the example below, if none of the devices have their remote devices table setup they will be unable to build an internetwork across the router and will construct two separate internetworks as shown. 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 at least two devices in the network from each other subnet and 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 below all the devices have had their remote devices table set up. This allows the two sites to combine to form one single site:

Building Internetworks on LonWorks

The XTEND will build an internetwork with other Trend devices that are connected to the LonWorks network. If there is more than one of these devices on the LonWorks network they will automatically form a single internetwork as shown below:

If IQ3s have formed LANs the device with the lowest address will assume INC functionality and will be included in the internetwork. In the diagram above the XTEND, the IQ3 controllers and the LINC are on the same network segment. IQ3 1 and 2 have the same LAN number and form a LAN. IQ3 3 and IQ1 have the lowest address on their LANs and assume INC functionality and will build an internetwork with the XTEND and LINC consisting of LAN 1, 5, 6 and 7.

Note: XTEND is not compatible with LONCs. The LONC must be bound on a LonWorks network, and XTEND cannot be bound. An EINC and LINC must be used instead.

Rules for a Trend Network on a LonWorks Network

The maximum number of nodes allowed on an FTT LonWorks network segment (i.e. between routers) is 64 (including any router nodes). The recommended maximum number of nodes on a LAN is 40.

Connection to Network on a LonWorks Network using a Virtual CNC

When IqTool 2 connects to a vCNC in supervisor mode IqTool 2 detects that the vCNC is capable of communications with devices on a LonWorks network. This enables IqTool 2 to connect to the network on the LonWorks network over an Ethernet network without the need for an LCI. If any of the XTEND’s vCNCs are connected to by IqTool 2 the ‘vLCI in Use’ parameter (in the Lontalk module) is set to Yes. Only one vCNC can be connected in this way at a time.
**HARDWARE**

**Enclosure**

The XTEND is housed in a polycarbonate case. Integral spring clips on the back of the case enable the unit to be clipped on to (and quickly released from) a standard TS35 DIN rail.

The XTEND must be installed in a secondary/protective enclosure rated to at least IP20 or equivalent (e.g. Trend ENCLS/MBOX/XTEND) or mounted outside normal reach (e.g. in a plenum).

The ENCLS/MBOX/XTEND is a metal box (available separately) featuring an integral DIN rail and mounting lugs for a mains transformer. There are various knockouts for M20 (or ¾”) conduit fittings in the back, sides, top and bottom of the box.

**Power Supply**

The XTEND requires either a 24 Vac (50/60 Hz) or 24 Vdc power supply. The maximum power consumption is 6 VA (or 100mA, 2.4W). Note that this power level cannot be provided from an IQ controller's auxiliary power output, so a separate power supply unit is required.

**CAUTION:** Do not connect mains voltage directly to this unit.

A suitable 230 Vac/24 Vac, 36 VA, transformer is available (ACC/24VAC). This is a sealed unit with four mounting lugs; it has an isolated 24 Vac output and an additional earth (ground) lead connected through from the input for earthing (grounding) the XTEND.

A general purpose 24 Vac transformer may also be used provided that it is rated at 6 VA or greater.

A suitably rated switch or circuit breaker must be included in the input power to the unit and in close proximity to it, and it must be clearly marked as the disconnecting device for the unit.

**Fusing:** The PCB is protected by a 3.15 A fast-blow fuse. This protects the XTEND board from drawing excessive current. If it blows the unit should be returned to the supplier for repair.

**LON Service Button:** Pressing the button generates an alarm message which would be forwarded a target alarm address (if set up) which identifies the originating XTEND by means of its Lon Neuron ID (NID).

**Indicators**

The XTEND has various LED indicators as detailed below:

**Power:** :green: Normally ON to indicate that the unit is powered and operating correctly. A slow double flash indicates that an IP address has not yet been established.

**Status:** :red: Normally OFF. ON indicates a device fault.

**Current Loop network**

**TX:** :yellow: ON indicates current flowing from the XTEND current loop network transmitter. OFF indicates open circuit between XTEND and the next device node.

**RX:** :yellow: ON indicates current flowing into the XTEND current loop network receiver. OFF indicates open circuit or short circuit between XTEND and the previous device node.

**OK:** :green: ON indicates that XTEND has successfully communicated with at least one other Trend system device on the current loop network. Flashes once every 15 seconds (approx.), for up to 60 seconds, while the current loop network is being built. If the LED continues to flash this indicates a LAN BROKEN condition (e.g. invalid address, incorrect baud rate, no connection or wiring fault).

**Ethernet network**

**OK:** :green: ON indicates that XTEND has successfully communicated with at least one other Trend system device on the Ethernet and that an internetwork on Ethernet has been constructed. OFF indicates that XTEND is alone (e.g. using virtual CNCs only).

**LINK:** :green: ON if the XTEND has a good Ethernet connection. OFF indicates a faulty Ethernet connection.

**DATA:** :yellow: Flashes when a package of data is being received from the Ethernet network.

**LonWorks network**

**OK:** :green: ON indicates that XTEND has successfully communicated with at least one other Trend system device on the LonWorks bus. Flashes once every 24 seconds (approx.) while the internetwork on the LonWorks bus is being built. Although the virtual Lans of IQLs will build in about 30s, it can take up to about 2½ minutes until the virtual internetwork on the LonWorks network is completed after a LonWorks network change.

**Labels**

A small two-part label is attached to the front of the XTEND which displays the unit's serial number and MAC address (in both text and barcode format). Space is provided on the label for recording the unit's device (outstation) address, LAN number and IP address (if DHCP is not being used). It has a tear-off self-adhesive strip that also contains the serial number and MAC address (text and barcode) which can be adhered to a paper record, e.g. a building plan or log book.

The barcodes on both labels conform to the 'code 128 auto' format.
**FIRMWARE**

**Modules**

The XTEND’s firmware consists of a number of configuration modules (see table below) that enable XTEND’s operation to be specified. These modules need to be set up as required before the XTEND will operate correctly.

<table>
<thead>
<tr>
<th>Module Type</th>
<th>Number of Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>1</td>
</tr>
<tr>
<td>Ethernet-ip</td>
<td>1</td>
</tr>
<tr>
<td>Iq-lan</td>
<td>1</td>
</tr>
<tr>
<td>Lontalk</td>
<td>1</td>
</tr>
<tr>
<td>Remote Device</td>
<td>20</td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
</tr>
<tr>
<td>Update Remote Devices</td>
<td>1</td>
</tr>
<tr>
<td>User</td>
<td>1</td>
</tr>
<tr>
<td>Virtual CNC</td>
<td>8</td>
</tr>
</tbody>
</table>

For full details of modules and configuration parameters, refer to the XTEND/24V Installation Instructions - Configuration (TG201314).

**Configuration Tools**

The initial configuration is best done using IPTool over Ethernet. This allows the configuration of the IP address, subnet mask, UDP port, LAN and device address, default router, vCNCs, and the remote devices table.

The XTEND also supports text communications (Text Comms).

**Alarms**

The XTEND helps to maintain a high level of network integrity by performing continuous checking of LAN and internetwork communications and generating alarms for various changes in status or fault conditions.

Alarms are generated for the following events:

- Break in network communications
- Network communications restored
- Node removed or added to the network
- Duplicate device address found
- LAN/internetwork mapping started or completed
- Lone device detected

Network alarms can be sent to two destinations set up in the Address module: one for alarms from the internetwork, and another for alarms from the LAN.

**Identification**

The XTEND 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.

**Data Backup**

Configuration data is stored in flash memory which is non-volatile in the case of power failure.

**Firmware Upgrades**

New versions of firmware may be made available from time to time to change or add functionality or to provide support for new products.

The XTEND has an SD card socket that will take an SD/MMC card (Secure Digital/Multimedia Card). This can be used for upgrades. Firmware upgrades will be supplied as a file that can be copied onto an SD card from a PC.

**Device Reset**

Setting all of the onboard address and baud rate switches to the off position for more than 3 seconds with power applied will reset the XTEND to the following default configuration:

- All module parameters set to default values.
- All vCNCs set to unused.
- Remote Devices List cleared

See XTEND/24V Installation Instructions - Configuration (TG201314) for further details of default values.
FIELD MAINTENANCE

The XTEND requires no routine maintenance.

| WARNING: Contains no serviceable parts. Do not attempt to open the unit. Failure to comply may cause damage to the unit. |

DISPOSAL

COSH (Control of Substances Hazardous to Health - UK Government Regulations 2002) ASSESSMENT FOR DISPOSAL OF XTEND. The only part affected is the lithium battery (on the battery option board) which must be disposed of in a controlled way.

| 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. |

COMPATIBILITY

Supervisors/Displays: 963 v2.1 or greater, 915MDS v3 or greater, 916, IQView8

Utility software: SET v6 (including IP Tool software)

Controllers: IQ4x, IQ3x, also IQ1, IQ2, and IQL.

Ethernet Nodes: NXIP, EINC, IQ4NC.

Note: NXIP or EINC must not be used in an automatic IP addressing (DHCP) environment.

LonWorks network: Not compatible with a LonWorks network that has been installed on a LonWorks Management Tool. A trend system can communicate with an installed LonWorks network using a TONN.

SECURITY

XTEND is a networked product and as such, must have its security correctly configured to reduce the risk of unauthorised access. For guidance on securing XTEND, refer to the XTEND/24V Installation Instructions - Configuring (TG201303).

For general information about securing Trend products see the General Security Best Practice for Trend IP Based Products Information Sheet (TP201331).

INSTALLATION

The XTEND must be mounted on a DIN rail and be installed in a secondary/protective enclosure rated to at least IP20 or equivalent (e.g. Trend ENCLS/MBOX/XTEND) or mounted outside normal reach (e.g. in a plenum). The installation procedure involves:

- Mounting the unit
- Connecting power
- Connecting Ethernet (if required)
- Connecting Trend current loop (if required)
- Connecting LonWorks network (if required)
- Reading End User Licence Agreement
- Powering up
- Configuring the unit
- Checking LEDs
- Testing the unit

A full description of installation is given in the XTEND/24V Installation Instructions - Mounting (TG201302) and XTEND/24V Installation Instructions - Configuring (TG201303).
**ORDER CODES**

**XTEND/24V**  
XTEND for 24 Vac (or 24 Vdc) supply.

**ACCESSORIES**

**ENCLS/MBOX/XTEND**  
Metal enclosure (with integral DIN rail and transformer mounting).

**ACC/24VAC**  
24 Vac, 36 VA transformer for 230 Vac installation.

**SPECIFICATION**

**ELECTRICAL**

**Power Input**  
:24 Vac ±10% 50/60 Hz at up to 6 VA;  
:24 Vdc ±15% at up to 100 mA, 2.4 W.

**Fusing**  
:3.15 A, internal fast blow fuse (not user replaceable).

**Power Failure Protection**

**Configuration data**  
:internal 32 MB flash memory.

**Memory Card**  
:SD/MMC format. (used for firmware upgrades only)

**Ethernet Network**

**Transmission**  
:10/100 BASE-T (IEEE 802.3).

**Connection**  
:RJ45, auto MDI-X.

**Cable Type:**  
:Cat 5e, UTP (unshielded twisted pair).

**Distance (to hub):**  
:100 m (109 yds) maximum

**Virtual CNCs:**  
:8.

**Addresses**  
:Not set by default – set to desired value in range 1 to 119 (excluding 2, 3, & 10) using configuration mode. Address must be unique on LAN.

**Current Loop Network**

**Transmission**  
:20 mA, two wire current loop, opto-isolated, polarity independent receiver, balanced transmitter.

**Baud Rate**  
:9k6, 19k2 or 38k4, selectable by onboard switches. Must match other nodes on LAN/Internetwork.

**Device Address**  
:126 (fixed on the local LAN).

**LAN Number**  
:1 to 119, (2, 3, and 10 not permitted) selectable by onboard switches. Must be unique for each node on internetwork;

**Distance (node to node):**  
:dependent on cable type and baud rate (see table below):

<table>
<thead>
<tr>
<th>Cable</th>
<th>Type</th>
<th>9k6</th>
<th>19k2</th>
<th>38k4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trend</td>
<td>Shielded twisted pair</td>
<td>1000</td>
<td>700</td>
<td>350</td>
</tr>
<tr>
<td>TP/2/2/22/HF/200</td>
<td>Belden 8723 (4 conductors)</td>
<td>(1090 yds)</td>
<td>(765 yds)</td>
<td>(380 yds)</td>
</tr>
<tr>
<td>Trend</td>
<td>Shielded twisted pair</td>
<td>1000</td>
<td>700</td>
<td>350</td>
</tr>
<tr>
<td>TP/1/1/22/HF/200</td>
<td>Belden 8761 (2 conductors)</td>
<td>(1090 yds)</td>
<td>(765 yds)</td>
<td>(380 yds)</td>
</tr>
<tr>
<td>Belden 9182</td>
<td>Twinaxial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belden 9207</td>
<td>Twinaxial</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LonWorks Network**

**Transmission**  
:FTT (Free Topology), 78 k baud, transformer isolated. Single termination (RC network). Can also use LPT10 (Loop Powered free Topology).

**Transceiver**  
:FT5000

**Signal Transformer**  
:FT-X3

**FTT Distance**  
:Maximum cable length and node to node distance depends on cable type.

<table>
<thead>
<tr>
<th>Recommended Cables</th>
<th>Max cable length</th>
<th>Max node to node</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belden 85102</td>
<td>500 m (545 yds)</td>
<td>500 m (545 yds)</td>
</tr>
<tr>
<td>Trend</td>
<td>500 m (545 yds)</td>
<td>400 m (430 yds)</td>
</tr>
<tr>
<td>TP/1/0/16/HF/200</td>
<td>500 m (545 yds)</td>
<td>400 m (430 yds)</td>
</tr>
<tr>
<td>Trend</td>
<td>500 m (545 yds)</td>
<td>400 m (430 yds)</td>
</tr>
<tr>
<td>Belden 8471</td>
<td>500 m (545 yds)</td>
<td>400 m (430 yds)</td>
</tr>
<tr>
<td>UL Level IV, 22 AWG</td>
<td>500 m (545 yds)</td>
<td>400 m (430 yds)</td>
</tr>
<tr>
<td>JY(SI) Y2 x 2 x 0.8</td>
<td>500 m (545 yds)</td>
<td>320 m (350 yds)</td>
</tr>
<tr>
<td>TIA568A Cat. 5, 24 AWG</td>
<td>450 m (490 yds)</td>
<td>250 m (270 yds)</td>
</tr>
</tbody>
</table>

**Note:** Cables recommended for the current loop network are not suitable for use with the LonWorks network.

**INDICATORS**

**Power**  
:Green LED

**Status**  
:Red LED

**Current Loop**

**TX**  
:Yellow LED

**RX**  
:Yellow LED

**OK**  
:Green LED

**Ethernet**

**OK**  
:Green LED

**LINK**  
:Green LED

**DATA**  
:Yellow LED

**LonWorks**

**OK**  
:Green LED

**Note:** Other devices may specify different maximum cable lengths. The shortest length applies when connecting to the XTEND current loop.
### MECHANICAL

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (WxHxD)</td>
<td>206 mm (8.11&quot;) x 145 mm (5.70&quot;) x 58 mm (2.28&quot;).</td>
</tr>
<tr>
<td>Weight</td>
<td>569 g (1.25 lb)</td>
</tr>
<tr>
<td>Material Box</td>
<td>Flame retardant PCABS</td>
</tr>
<tr>
<td>Terminal Covers</td>
<td>Polycarbonate</td>
</tr>
<tr>
<td>DIN Rail Clip</td>
<td>Glass-filled nylon</td>
</tr>
<tr>
<td>Mounting</td>
<td>TS35 DIN Rail (EN500022).</td>
</tr>
</tbody>
</table>

### Connectors

### Power Input

- Type: 2 part connector (0.2” pitch) with rising cage clamp screw terminals.
- Cable Size: 0.5 to 2.5 mm² (20 to 14 AWG).

### Current Loop Network

- Type: 2 part connector (0.2” pitch) with rising cage clamp screw terminals.
- Cable Size: 0.5 to 2.5 mm² (20 to 14 AWG).

### LonWorks Network

- Type: 2 part connector (0.2” pitch) with rising cage clamp screw terminals.
- Cable Size: 0.5 to 2.5 mm² (20 to 14 AWG).

### Ethernet Network

- Type: RJ45.

### ENVIRONMENTAL

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMC</td>
<td>EN61326-1:2006</td>
</tr>
<tr>
<td>Immunity</td>
<td>Table 2 for equipment used in industrial locations</td>
</tr>
<tr>
<td>Emissions</td>
<td>Class B</td>
</tr>
<tr>
<td>Safety EU</td>
<td>EN60950-1: 2006</td>
</tr>
<tr>
<td>CB Scheme USA/Canada</td>
<td>Certificate number NO76403</td>
</tr>
<tr>
<td>Canada</td>
<td>UL rated as ‘UL916 listed open energy management equipment’ (E219709).</td>
</tr>
<tr>
<td>Ambient Limits Storage</td>
<td>-30 °C (-22 °F) to 60 °C (140 °F)</td>
</tr>
<tr>
<td>Operating</td>
<td>-25 °C (-13 °F) to 55 °C (131 °F)</td>
</tr>
<tr>
<td>Humidity</td>
<td>0 to 90 %RH, non-condensing</td>
</tr>
<tr>
<td>Altitude</td>
<td>&lt;2000m (6562 ft)</td>
</tr>
<tr>
<td>Pollution Degree</td>
<td>2 (only non-conducting pollution occurs)</td>
</tr>
<tr>
<td>Protection</td>
<td>IP20, NEMA1</td>
</tr>
</tbody>
</table>

This data sheet is based on firmware v1.50.

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