Easylon®

For Automation with LonWorks®

Interfaces
Connecting to LonWorks

Software
LonWorks Data Access

Network Components
From Repeater to Terminator

Gesytec

Contents

Easylon® Products for LonWorks®

Easylon ...

... these are devices, tools and connectivity solutions for easy configuration and intelligent operation of LonWorks or CEA-709 compatible networks.

As European LonWorks pioneer Gesytec develops since 1992 LonWorks components for distributed, intelligent automation, also using them with success in own projects. With Easylon products we provide the user with the network-oriented components and tools to realize the most efficient use of LonWorks technology.

As specialist for electronics and automation we introduced our ample know-how in development and use of components for automation networks into the Easylon products.

Large Range of Products

The product spectrum ranges from state-of-the-art interfaces and gateways via control nodes to infrastructure components for network operation. Many customers use Easylon software for control network access – from Remote Network Interface to OPC server.

Connectivity products for cross-system data communication complete the Easylon range of products for LonWorks. The Delta Embedded PCs provide the complementary devices for efficient integration of LonWorks network into a manifold world of communication.

Individual Solutions

In addition, we also provide both application specific adaptation of the Easylon products and customer specific development of special components.

We are specialized in intelligent design solutions for your specific application. Either upon direct customer order or for the realization of automation projects Gesytec developed more than 100 LonWorks components. The basis of a multitude of existing solutions turns your requirement faster into a finished product.

The know-how combined of more than 30 years development services, application experience in automation and being LonWorks provider right from the beginning makes Gesytec your ideal partner for development and series production of specific LonWorks components.

Easylon® Interfaces

Connecting to LonWorks® and CEA-709.1 Networks

Interfaces+
High performance network access

Remote Access Solutions
IP network access

PC/104 and Socket Interfaces
The OEM solutions

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Easylon® Interfaces

Connecting to LONWORKS® and CEA-709.1 Networks

A multitude of Easylon products is designated to access the data of LONWORKS or CEA-709.1 compatible networks for distributed, intelligent automation; especially the Easylon interfaces and Easylon software, such as the OPC server or the RNI capability of the Easylon interfaces.

Design and scope of performance of the Easylon interfaces are designated to the highest demands. We attach great importance to

- ability of use, especially in industrial applications,
- support of current operating systems,
- support of current bus systems and latest technical developments,
- usability in LONWORKS networks either with or without LNS,
- the needs of users that have to access these interfaces with their own applications,
- the customers desire for products with most simple usability.

These are the reasons why each and any Easylon interface offers a variety of variants though they have a lot in common, as compiled in the following.

However, shouldn't you be able to trace the solution you are looking for – just ask us. Maybe we already realized the solution for your problem for another customer in the past or it is already under development.

LONWORKS and CEA-709.1

The ANSI/CEA-709.1 standard "Control Network Protocol Specification" describes the LonTalk® protocol underlying the LONWORKS technology. Based on this specification and licensed by Echelon Corp. network nodes can be developed independent of the NEURON Chip® otherwise mandatory. Gesytec is offering CEA-709.1 based products: the Interfaces+. The plus is indicating that there is to be expected more than from a stand LONWORKS node. The technology is as well described by the European standard EN 14908.

Interfaces+

Technically the "plus" products realize the control network functionality on chip different from the NEURON Chip. For the interfaces this means a separation into a physical and a logical part, also referred to as virtual network interface (VNI). With respect to a typical Easylon Interface+ card for a PC this means that the card implements protocol layers 1 and 2 of the interface while the PC realizes layers 3 to 7.

Several advantages arise from this:

- The performance of modern PCs and servers can be used.
- On the interface card a powerful processor and sufficient buffer can be used.
- The PC receives all messages.
- Time stamps can be set.
- The PC sends messages with any source address.
- The PC emulates several (currently up to 8) logical interfaces, each having a node-ID of its own.
- Ordinary drivers are used to access the interface.
- Several programs can access the interface hardware in parallel.
- 16 bit programs as well as 32 bit or 64 bit programs can be used.

In practice this means:

- All PC applications previously used can be used further on without modifications.
- Compatibility with Echelon interfaces.
- Parallel transactions in MIP mode.
- Up to eight applications can access the network in parallel. In addition to the normal applications network analysis and network management can be run.
- A larger number of address table entries can be used.
- There is an efficient hardware interface.
- Any Easylon Interfaces+ is the hardware basis for the Easylon Analyzer.

Easylon® Interfaces

General Properties

Drivers

Windows operating systems from Windows XP to the current ones are supported, for 32 bit and 64 bit systems. This refers as well to Windows CE. For some cards even older drivers for Windows 95 and 98, NT, ME or DOS are available. These, however, are no longer supported and are provided without warranty.

Using the drivers the user can assign driver names at will. This is as well advantageous with older systems and applications requiring a systematical naming when using several interfaces (LON1, LON2, ...) as with distributed applications, which are accessed by the driver name, e.g. accessing remote systems via RNI. Then descriptive names can be used.

Linux drivers are provided too for most of the interfaces. They come in source code for different kernel versions.

Driver updates and versions for the latest operating systems can be downloaded any time from the support pages of the Gesytec web site. If you want others than the standard, feel free to ask.

MIP or NSI Firmware

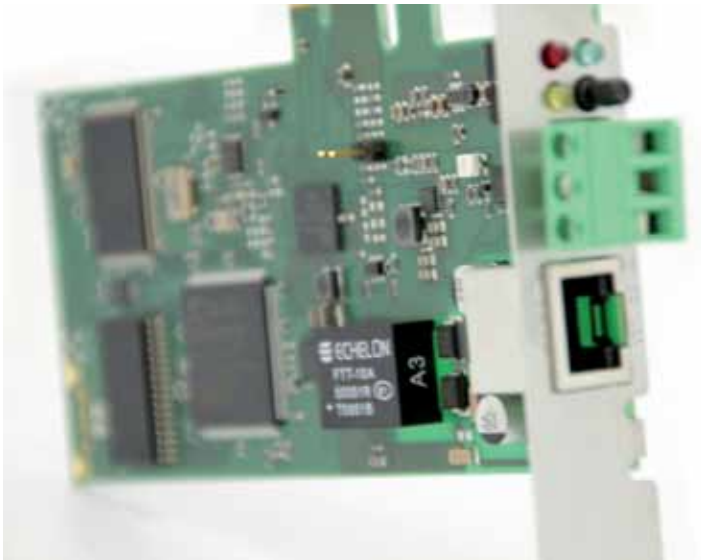
To be able to operate as a network interface the Neuron Chip requires a special firmware. Two types are available: MIP and NSI. The NSI firmware is required if the interface is to be used by LNS based applications, e. g. a network management tool. This especially applies for older LNS versions up to 2.x. LNS 3.x version programs should use an Interface+, as these offer a better performance.

Interfaces running MIP firmware can be used for all other applications, e.g. the Easylon Analyzer.

Transceiver

In their standard version Easylon Interfaces come with a free topology TP/FT (FTT-10A) or FTX smart transceiver. Some interfaces are additionally available in standard variants with transformer coupled twisted pair transceiver (TP/XF-78 or TP/XF-1250). Depending on the interface type OEM variants with EIA-485 or Direct Connect (DC) transceiver can be realized. Most of the EIA-485 interfaces provide galvanic isolation.

For details concerning available transceivers and drivers, please refer to the technical specifications of the different interface devices.



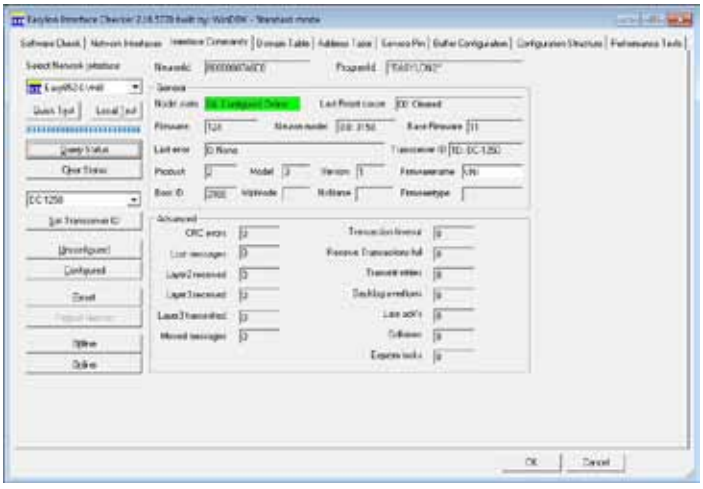
Tools for Development and Commissioning

Several tools are provided to support setting up the interfaces for operation. Problems eventually arising can thus easily be tracked down. Developers appreciate that Easylon Interfaces support a debug mode, helpful with testing new applications.

EasyCheck, for instance, is a small, versatile utility for setup and diagnosis of Easylon interfaces. Basic tests and configurations, such as setting LonWorks address, mode and buffers, can easily be performed with EasyCheck. Communication tests can be performed by sending and receiving service pin messages. A higher level feature is scanning a domain for attached nodes. “Performance tests” will compare the speed of two interfaces. EasyCheck also shows the versions of all Easylon software installed on the PC.

Easylon IMaC, the Interface Management Center, offers everything you need for the configuration of LonWorks interfaces. Not only PC cards and external LonTalk adapters can be handled but as well the Easylon Remote Network Interface (Easylon RNI) and the Easylon IP Interface, the software interface to the LON IP channel.

Both programs are included in the Easylon Interface delivery.



Remote Network Interface (RNI)

This software for remote access from a networked PC (LAN, Internet) via TCP/IP to the interface devices at a LonWorks or CEA-709.1 compatible network is part of the scope of delivery of the Easylon interfaces. This is the smartest solution to realize network management tasks in a distant network from your office PC. You will find more details in the product description on page 11.

WLDV32.DLL

The WLDV32.DLL, being part of the Easylon interface scope of delivery, offers a 32 bit driver interface for Windows operating systems including CE. Nowadays the program package also covers 64 bit applications. The WLDV32.DLL is as well available separately for use with interfaces from other manufacturers.

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Easylon® Interfaces at a Glance

LonTalk® and CEA-709.1 Adapters

		EASYLON INTERFACES+							
									
		PCIe PCI Express	PCI-Bus PCI, PCI-X	USB USB 2.0	IP Interface CEA-852	PC/104 ISA Bus	mini PCIe USB 2.0	USB Socket USB 2.0	Serial Socket RS 232 TTL
Transceiver	TP/XF-78	–	+	–	–	+	–	–	–
	TP/XF-1250	–	+	–	–	+	–	–	–
	EIA-485	+	+	–	–	+	–	+	–
	FTT-10A	–	+	+	–	+	–	–	–
	DC-1250	–	+	–	–	+	–	–	–
	FTX	+	–	–	–	+	+	+	+
	CEA-852, LON/IP	–	–	–	+	–	–	–	–
Firmware	MIP (MIP compatible)	–	–	–	–	+	+	+	+
	NSI (LNS compatible)	–	–	–	–	+	–	–	–
	VNI (LNS/MIP compatible)	+	+	+	+	–	–	–	–
Driver	DOS[4]	–	–	–	–	+	–	–	+
	Windows 32 Bit: XP, Vista, 7, 8, Server 2003, 2008, 2008 R2, 2012	+	+	+	+	+	+	+	+
	Windows 64 Bit: XP, Vista, 7, 8, Server 2003, 2008, 2008 R2, 2012	+	+	+	+	+[3]	+	+	+
	Windows CE 4.2, 5.0, 6.0	–	–	–	+	+	+	+	+
	Linux 2.6.32, 3.2, 3.4, 3.10	+	+	+	+[3]	+	+	+	+
Options	Extended temperature range	–	–	–	–	+	+	+	+
	Coating[3]	–	–	–	–	+	+	+	+
	Form factor modification	–	–	–	–	–	–	+	+
	Cap for FTT-10A	–	+	+	–	+	–	–	–
Connector	Screw-plug terminal								
	Weidmüller, 5.08 mm	+	+[1]	+	–	–	–	–	–
	Phoenix, 3.81 mm	–	+[1]	–	–	–	–	–	–
	D-type	–	+	–	–	–	–	–	–
	RJ45	+	+[2]	+	–	–	–	–	–
	Pin connector	–	–	–	–	+	+	+	+

1 not with EIA-485 variants

2 optional, on request instead of D-type

3 on request

4 unsupported

Easylon® PCIe Interface+

CEA-709.1 Control Network Interface for PCI-Express

- Real multi-client usage for up to 8 applications
- Full compatible VNI
- Parallel transactions in MIP mode
- Increased performance
- Supports usage in virtual machines
- RJ45 and plug-screw connector

The Easylon PCIe Interface+ is a plug-in card according to CEA -709.1 to connect PC with PCI Express slots to CEA -709.1 compatible control networks.

As an Easylon Interface+ product it features several advantages. Simultaneous network access by up to eight PC applications is a major benefit. Both LNS and MIP based programs can be used. The Easylon PCIe Interface+ is compatible with other VNIs of other manufacturers and replaces traditional control network interfaces without modification of the applications. Furthermore this Easylon Interface is best suited for usage in virtual machines, e.g. VMware.

Easylon interfaces+ are the preferred network adapters for the Easylon Analyzer in order to run a thorough network analysis.

The interface board is fitted with alternatively usable RJ45 and plug-screw connectors to connect to the network.

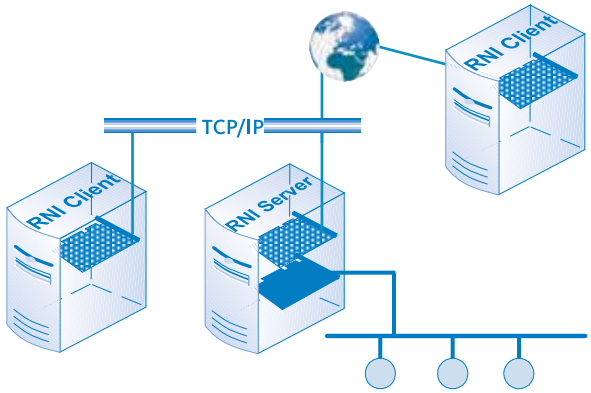
In addition to the usual TP/FT transceiver, a variant with EIA-485 transceiver is available.

Bus Interface	according to PCI Express Base Specification, r1.1; 1 lane (x1)	
Network Interface	according to ANSI/CEA-709.1	
Transceiver	TP/FT with FT-X2 or EIA-485, galvanic. isolated from system ground	
Connectors	RJ-45 and 3 pin plug-screw (0.5–2.5 mm²)	
Node-ID	in EEPROM	
Display & Operation		
LEDs	traffic, status, error, power	
Push button	service	
Dimensions & Environmental Characteristics		
Dimensions	low profile PCI Express add-in card 70 x 95 [mm], w/o connectors	
slot bracket	low profile	80 mm
	standard height	121 mm
Temperature	operating	0 – +60 °C
	storage	0 – +60 °C
Humidity	according DIN 40 040, class F, no condens.	
EMC	emission	EN 55 022 A/B
	immunity	EN 61 000-6-2
Software		
Drivers for Windows	XP, Vista, 7, 8, Server 2003, 2008, 2008 R2, 2012, all for 32 and 64 bit systems	
Linux	Kernels with long term support 2.6.32, 3.2, 3.4, 3.10 under GPL	

Easylon PCIe Interface+

with standard height and low profile slot bracket

TP/FT	P.V10806
EIA-485	P.V10803



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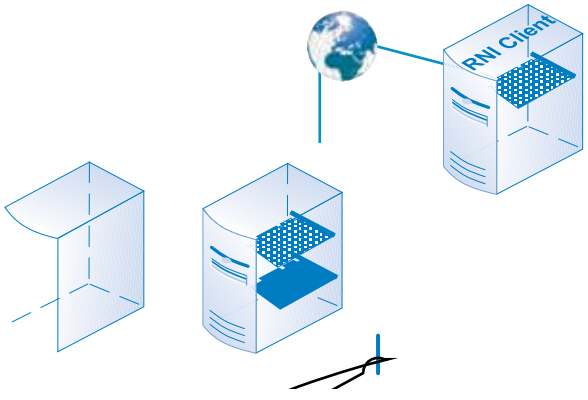


Easylon® USB Interface+

USB Interface to ISO/IEC 14908 Networks

- Real multi-client capability on 8 channels
- Full compatible VNI
- Parallel transactions in MIP mode
- Supports usage in virtual machines
- TP/FT-10 and EIA-485 variants
- RJ45 and plug-screw connector

The Easylon USB Interface+ is a handy sized USB module compliant to ISO/IEC 14908-2, which connects a PC via USB to LonWorks control networks.

The Easylon USB Interface+ is available in variats for TP/FT-10 and for EIA-485 LON networks.

As an Easylon Interface+ product it features several advantages. Simultaneous network access by up to eight PC applications is a major benefit. Both LNS and MIP based programs can be used. The Easylon USB Interface+ is compatible with other VNIs of other manufacturers and replaces traditional control network interfaces without modification of the applications. Furthermore this Easylon Interface is best suited for usage in virtual machines, e.g. VMware workstation.

Easylon interfaces+ are the preferred network adapters for the Easylon Analyzer in order to run a thorough network analysis.

As flexible solution this adapter is suitable for both desktop PC and laptop. Being small, handy sized and without additional power pack it represents a flexible network access solution.

If the Easylon USB Interface is used in permanet installations, a special bracket is available. It can be used for DIN-rail mounting as well as for wall mounting.

USB Interface

	according to high speed USB standard 2.0, compatible to full speed USB standard 1.1
Connector	USB type B

Network Interface

	according to ISO/IEC 14908-2
Transceiver variants	TP/FT-10 or EIA-485, galv. isolated from system mass
Connectors	RJ45 and 3 pin plug-screw (0.5–2.5 mm²)
Node-ID	in EEPROM

Power Supply

Voltage	5 V, from USB port
Input current	100 mA typically

Display & Operation

LEDs	service, status, error
Push button	service

Dimensions & Environmental Characteristics

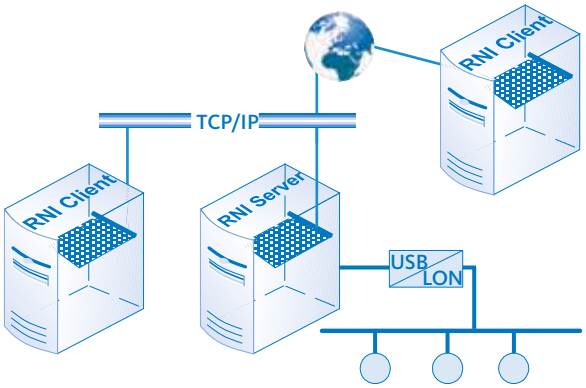
Dimensions	128 x 71 x 23 [mm]	
Temperature	operating	0 – +50 °C
	storage	0 – +50 °C
Humidity	class F, accord. DIN 40040, no condensation	
EMC	emission	EN 55022 A/B
	immunity	EN 61000-6-2 EN 55024

Software

Drivers for	Windows	XP, Vista, 7, 8, 10, Server 2003, 2008, 2008 R2, 2012, all for 32 and 64 bit systems
	Linux	Kernels with long term support 2.6.32, 3.2, 3.4, 3.10 under GPL
	others	on request

Easylon USB Interface+

for TP/FT-10	P.V10306
for EIA-485	P.V10303



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Easylon® IP Interface+

CEA-852 Compatible Network Interface

- LON over IP
- VNI and MIP interface
- Compatible with existing interfaces
- Parallel transactions in MIP mode
- Standard applications now with LON/IP
- Up to 8 clients

The Easylon IP Interface+ operates according to the EIA/CEA-852 standard. As software running on Windows PCs it provides a standard network interface to CEA-709.1 compatible networks.

Drivers for this interface provide the same functionality as other Easylon interfaces, thus enabling all applications operating with standard interfaces for LON over IP.

The Easylon IP Interface+ operates as a VNI interface. The drivers can also provide MIP interfaces. In an extended MIP mode 16 parallel transactions are possible for sending. Thereby performance is considerably increased. Up to eight client applications can use the interface simultaneously. Even old 16 bit applications can use this interface. Furthermore it can be used with the Easylon Analyzer software.

With the Easylon IP Interface+ applications become LON/IP enabled. This "LON over IP" solution allows task processing on different computers integrated into local and global IP structures. Backbones of larger facilities can thus be realized via Ethernet.

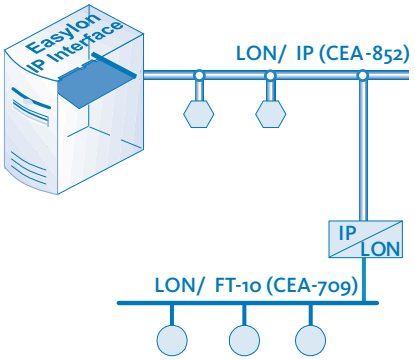
Connecting to TP/FT LONWORKS networks requires a suitable LON/IP router, such as the Easylon Router+. The interface is, of course, compatible with all LON/IP routers.

Technical Features

Node-ID		in USB Dongle
Drivers for	Windows	XP, Vista, 7, 8, Server 2003, 2008, 2008 R2, all for 32 and 64 bit systems, CE 4.2, CE 5.0, CE 6.0
	Linux	Kernels with long term support 2.6.32, 3.2, 3.4, 3.10 under GPL
	others	on request

EASYLON IP INTERFACE+

CEA-852 compatible driver software	P.S20401



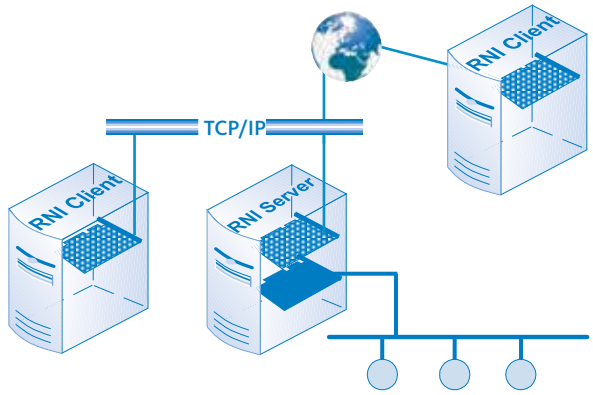
Info

STANDARDS AND NAMES

CEA-709	Communication protocol standard (ANSI/EIA), LONWORKS compatible; corresponding European standard: EN 14908
CEA-852	Standard for an Ethernet based communication protocol equivalent to LONWORKS (ANSI/EIA/CEA), corresponding European standard: EN14908 part 4
DIN EN 14908	"Open data communication in building automation, controls and building management"; European standard for LONWORKS equivalent communication protocol;
LON over IP	Usage of Ethernet / IP channel for LONWORKS protocol transfer.

EASYLON REMOTE NETWORK INTERFACE
Driver software P.S20101

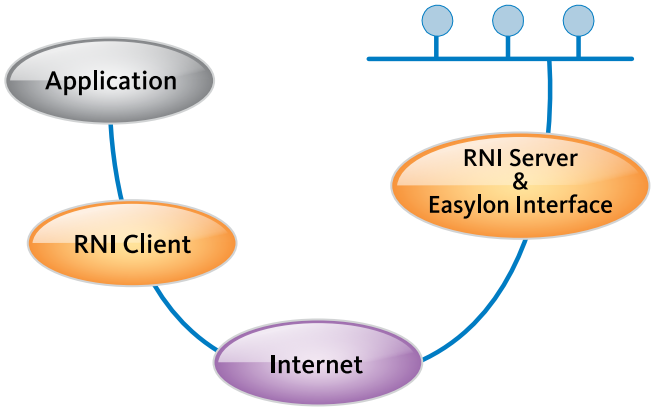
Software is included in the scope of delivery of Easylon interfaces. Separate orders are necessary only for interfaces of other manufacturers.

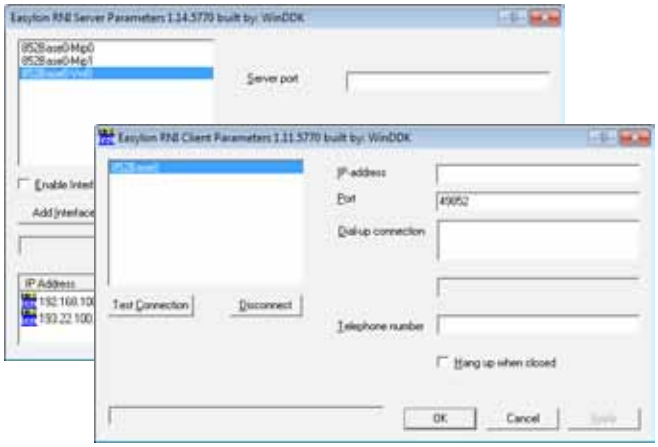


Easylon® Remote Network Interface

TCP/IP Access to Distant LONWORKS® Networks

- Software for remote access to LONWORKS networks
- Standard with all Easylon interfaces and Easylon Interfaces+
- Network management, status monitoring via standard PC communication





Similar to a server Easylon Remote Network Interface (RNI) enables access via a TCP/IP or dial-up connection to a PC–LONWORKS interface device from a remote PC. Target hardware on the network side can be a usual LonTalk® adapter in a PC as well as a standalone device such as the Easylon Router+. Thus remote access to LONWORKS data either via LAN or the internet is easily achieved.

Status monitoring, maintenance, download of modified programs – all this can be done from a remote PC with Internet connection using the RNI software. Requirements: a PC with Internet access, Easylon Interface and the RNI software at the LONWORKS network

Handling

The RNI driver can logically represent several LONWORKS interfaces. For each the IP address of the RNI server is entered and, if required, an additional phone number for the connection via the Windows dial-up network. Thus logical LONWORKS interfaces can be assigned to different remote servers. By selecting the desired LONWORKS interface in a LONWORKS tool the connection to a specific remote server can be established.

Existing systems can be upgraded easily and free of charge by installing the latest drivers and the RNI software. The RNI driver software required for the remote PC can also be installed quickly and subsequently you can handle network management or use data in visualization programs from your networked desktop. The RNI access method is standard with the Easylon Interfaces+ as well.

Easylon RNI is especially of interest for LONWORKS networks without LNS usage, which otherwise can hardly be accessed via TCP/IP.

Easylon RNI is available free of charge for all Easylon interfaces and at a minor license fee for PC-LONWORKS interfaces from other manufacturers.

Easylon® PC/104 Interface

LONWORKS® Interface Board for PC/104 Systems

- FTT-10A. FTX, TP/XF-78, TP/XF-1250, EIA-485 or other transceivers
- For networks with or without LNS
- Drivers for DOS, Windows and Linux
- Versions for extended temperature range
- EN 50155 and IEEE 1473-L compliant

The Easylon PC/104 Interface connects PC/104 systems to LONWORKS and other CEA-709.1 compatible control networks.

A variant with optically isolated EIA-485 transceiver is available further to the usual FTT-10A and TP/XF transceiver versions. The board can also be fitted with direct connect or FTX smart transceiver.

Interesting for use in embedded systems are OEM versions of this board, which can be adapted to the target system in moderate extent, e.g. adaptations concerning plug position and type can be realized.

This board, proven in industrial environment, is also available in versions with extended temperature range and customer specific coating. These versions are compliant to EN 50155, a standard used in railway technology.

PC/104 INTERFACE

	8 bit data (I/O) according to personal computer bus standard IEEE P996 and PC/104 specification
I/O-addresses	4, setting by DIP switches
Interrupts	3, 5, 7, 9, 10, 11, 12, 15 software selectable
Coupling	parallel, slave_A mode

NETWORK INTERFACE

Transceiver variants	TPT/XF-78, TPT/XF-1250, FTT-10A, FTX, DC-1250 or EIA-485 (39 Kbps)
Connector	pin connector
Compatibility	LonTalk, CEA-709.1

POWER SUPPLY

Voltage	5 V, from PC
Power consumption	1.5 W, typically

DISPLAY & OPERATION

LED	service LED
option:	LON traffic LED, signal externally usable
Push button	service

DIMENSIONS & ENVIRONMENTAL CHARACTERISTICS

Dimensions	90.2 x 95.9 [mm], incl. connectors	
Temperature	operating	0 – +50 °C
	storage	-20 – +60 °C
extended range	operating	-40 – +85 °C
	storage	-40 – +85 °C
Humidity	class F, accord. DIN 40 040, no condensation	
EMC	emission	EN 55 022 A/B
	immunity	EN 61 000-6-2
Compatibility	EN 50155, IEEE 1473-L (version with ext. temp. range)	

SOFTWARE

Drivers for	Windows	XP, Vista, 7, 8, Server 2003, 2008, 2008 R2, all for 32 and 64 bit systems, CE 4.2, CE 5.0, CE 6.0
	Linux	Kernels with long term support 2.6.32, 3.2, 3.4, 3.10 under GPL
	others	DOS , RT kernel, more on request
Firmware	NSI	for LNS based applications
	MIP/P50	for networks without LNS applications

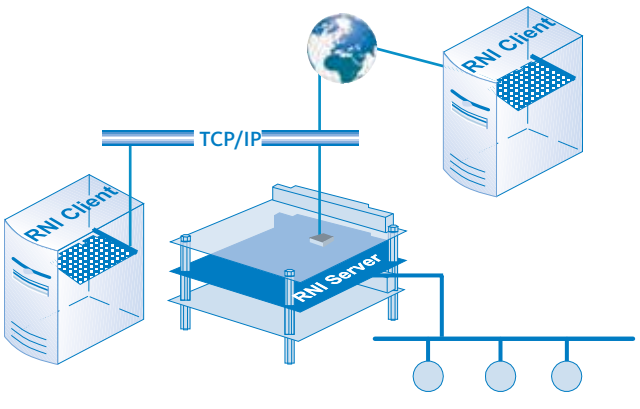
EASYLON PC/104 INTERFACE

with transceiver type t and

- MIP/P50 firmware	P.P1010t
- NSI firmware	P.P1011t

Transceiver types: t =

1 = TP/XF-78	4 = FTT-10a
2 = TP/XF-1250	5 = DC-1250
3 = EIA-485	6 = FTX



Easylon® Mini PCIe Socket Interface

LonWorks® Interface as Plug-In Module

- Integrable LonWorks interface
- FT-X2 transceiver
- Drivers for Windows and Linux
- Suited for extended temperature range
- Economic OEM solution

The Easylon Mini PCIe Socket Interface realizes a LonWorks-USB interface in the design of a PCIe „Full-Mini Card with bottom side keep outs (F2)". It can be used in devices offering a Mini PCIe socket.

An FT-X2 transceiver running MIP firmware connects to the LonWorks network. Service and traffic LED signals are available via the socket connector; a service button has to be connected externally. Status, error and service LEDs are on board. In the FTX version the LonWorks interface is galvanically separated from the Mini PCI Express ground.

Using the Easylon Mini PCIe Socket Interface small embedded devices with Mini PCI Express socket gain access to the LonWorks network.

LonWorks Interface

CPU	Neuron FT 5000, 80 MHz
Transceiver	FT-X2 transceiver
Connector	3 pin edge connector, Molex 1.25mm PanelMate
Compatibility	LonTalk, CEA-709.1

Mini PCIe Interface

Full Mini Card, according to PCI Express, Mini Card Electromechanical Specification, Rev 1.2

Connector	Mini PCIe socket connector
usable in	- Full-Mini-Only Socket (connector A) - Dual-Use Socket (connector A) - Dual Head-to-Head-Socket (connector A
Monitoring	PowerON

Power Supply

Power Supply	3.3V +/- 9%, extern
Power consumption	typially <100 mA

Display & Operation

LEDs on Board	status, error, Neuron service
external signals via Mini PCIe connector	traffic TX, RX, Neuron service
Push button	Neuron service, ext. via Mini PCIe connector

Dimensions & Environmental Characteristics

Dimension	30.0 x 50.95 [mm]	
Height above board	8.18 mm	
Mounting	screw mounting	
Temperature	operating	-40 – +85 °C
	storage	-40 – +85 °C
Humidity	according DIN 40 040, class F, no condens.	

Software

Drivers for	Windows	XP, Vista, 7, 8, Server 2003, 2008, 2008 R2, 2012, all for 32 and 64 bit systems, CE 4.2, CE 5.0, CE 6.0
	Linux	Kernels with long term support 2.6.32, 3.2, 3.4, 3.10 under GPL
	others	on request
Firmware		MIP, this module is not suited for usage with an LNS server.

Easylon Mini PCIe Socket Interface

with FT-X2 transceiver and MIP firmware P.P20A06

Gesytec

Easylon® USB Socket Interface

LONWORKS® Interface as Plug-In Module

- Integrable LONWORKS interface
- FT-X2 or EIA-485 transceiver
- Drivers for Windows and Linux
- Version with extended temperature range
- Economic OEM solution

The Easylon USB Socket Interface meets the requirements of device manufacturers for an integrated LONWORKS interface. Connected to the motherboard by USB the plug-in module with FTX transceiver realizes the connection to the LONWORKS network. Additionally OEM variants can be realized with EIA-485 transceiver.

Further to the opportunity to integrate a completed solution the details of the integration are crucial criteria. Location and design of the board connection, outlet of the LONWORKS interface from the housing, driver availability – these are design questions we are happy to resolve for this OEM module.

USB INTERFACE

USB Interface	according to high speed USB standard 2.0
Connector	10 pin, accord. to ASUS board standard, OEM variants on request

NETWORK INTERFACE

Variants	FT-X2 transceiver, NEURON FT 5000, 80 MHz
or	EIA-485, 1250 MBit/s, NEURON 5000, 80 MHz
Connector	3 pin, OEM variants on request
Compatibility	LonTalk, CEA-709.1

POWER SUPPLY

Power Supply	from USB interface

DISPLAY & OPERATION

LEDs	- service
	- status
	- error
Push button	- service

DIMENSIONS & ENVIRONMENTAL CHARACTERISTICS

Dimension	37 x 69.3 [mm]	
Temperature	operating	0 – +70 °C
extended range	operating	-40 – +85 °C
	storage	-40 – +85 °C
Humidity	according DIN 40 040, class F, no condens.	
Mounting	screw mounting	

SOFTWARE

Drivers for	Windows	XP, Vista, 7, 8, Server 2003, 2008, 2008 R2, all for 32 and 64 bit systems, CE 4.2, CE 5.0, CE 6.0
	Linux	Kernel 2.4, 2.6
	others	on request
Firmware		MIP, this module is not suited for LNS based applications.

EASYLON USB SOCKET INTERFACE

with transceiver type t and MIP firmware	P.P1050t-3

Transceiver types: t = 3 = EIA-485 6 = FTX

Subject to technical modifications

Easylon® Serial Socket Interface

Serial LonWorks® Interface as Plug-In Module

- Integrable LonWorks interface
- Reduced development effort
- LonTalk adapter or serial gateway
- Conexant compatible pin-out
- Suited for extended temperature range
- Economic OEM solution

The Easylon Serial Socket Interface realizes a LonWorks-serial connection as a socket module, to be integrated into OEM devices. The serial connection to the CPU board is designed according to the Conexant socket modem standard. Thus every board providing this connector becomes potentially LonWorks enabled. Power supply uses this connector as well.

A FT-X2 transceiver connects to the LonWorks network. Service button and service LED can be implemented on the main board, though the service LED is on board as well. LonWorks traffic signals are also available.

Firmware can be downloaded via the serial connection. MIP is used as firmware for the FT 5000 Neuron Chip. Thus, the module cannot be used as interface for LNS applications, such as e.g. LonMaker for Windows.

The Easylon Serial Socket Interface can be used as a **serial LonTalk adapter**. For Windows or Windows CE operating systems the WLDV32.DLL is used to access the interface. A driver is available for Linux systems.

In a second application variant the interface module operates as a **serial gateway**. A host application running on the module allows implementation of network variables – even more than the usual 62. Thus more data points than in simply Neuron based solutions can be used. The module's processor with large integrated memory enables implementation even of complex protocols.

As the serial interface offers the RTS and CTS signals, serial protocols with handshake can be implemented.

As an OEM module a certain flexibility with respect to customer specific requirements has to be observed, e.g. with respect to connector, form factor, protective coating, or different transmission rates. Even for the realization of more thorough requirements we will be pleased to send you a specific offer.

Network Interface

CPU	Neuron FT 5000, 80 MHz
Transceiver	FT-X2
Connector	pin connector
Service LED	on board or via Conexant connector
Service push button	via Conexant connector
TX/RX LED	via Conexant connector
Isolation	1 kV_{eff} 60 s
Compatibility	LonTalk, CEA-709.1

CPU

Processor	80C52 compatible
Clock	18.432 MHz
Memory	flash 64 kbytes, RAM 8 kbytes

Serial Interface

Type	TTL, Conexant standard, RxD, TxD, RTS, CTS
Connector	pin connector
Transmission	115.2 kBd, others on request, max. 230,4 kBd

Power Supply

Voltage	3.3 V DC +- 5%, externally via Conexant socket
Power consumption	typ. 70 mA, max. 95 mA

Dimensions & Environmental Characteristics

Dimension	64.5 x 26.5 x 8.5 [mm]	
Temperature	operating	-40 – +85 °C
	storage	-40 – +85 °C
Humidity	class F accord. DIN 40040, no condensation	

Software

Drivers for	Windows	XP, Vista, 7, 8, Server 2003, 2008, 2008 R2, all for 32 and 64 bit systems, CE 4.2, CE 5.0, CE 6.0
	Linux	Kernel 2.4, 2.6
	others	on request
WLDV32		for Windows and Windows CE
Firmware		MIP, this module is not suited for LNS based applications.

Easylon Serial Socket Interface

with

- MIP firmware as serial LonTalk adapter	P.P10906
- firmware as serial gateway	P.P10926

Evaluation Kit to Serial Socket Interface

Connection board with connectors , LEDs, push buttons P.P20906

- USB and serial cabels
- schematics, Gerber and Step files of the board

Easylon® Software

Accessing Messages and Data

Analyzer
Network diagnosis

OPC Server
Access to LonWorks network data

Gesytec

Easylon® Analyzer

Diagnosis and Management of LONWORKS® Networks

- Operates on unknown networks
- Detailed message information
- Consistency reports and transaction analysis
- Detailed node information and manipulation
- For Windows operating systems

Requirements and Recommendations

- Windows PC with XP, Vista, 7, or Server 2003, 2008. operating system
- Easylon Interface+ or Echelon VNI interface for network access. Easylon Interfaces+ allow simultaneous operation with other programs. The 1-ms-time-stamps require these interfaces, too.

EASYLON ANALYZER

Software for use with Easylon Interface+	P.S10501
Software for use with third party interface	P.S10502

The Easylon Analyzer is the pro's software tool to thoroughly investigate LONWORKS network communication and nodes properties. In combination with Interfaces+ or VNI interfaces from other vendors this Windows PC based program gives insight into network behavior. The advantage of Easylon Interfaces+ is their capability to run network analysis in parallel with other programs.

The Analyzer software offers comprehensive and flexible methods for data analysis. Specialists intimate with LONWORKS technology appreciate the Easylon Analyzer for its in-depth operations even allowing manipulation of the NEURON's® memory.

This diagnosis tool supports installation and maintenance of LONWORKS networks by lots of useful features.

- All messages on the screen
  The Easylon Analyzer records all network traffic and displays the messages with all relevant information. Network variable (NV) updates are displayed with correctly formatted values facilitating the immediate understanding of messages.
- Detailed information
  1-ms time stamps, sequence and transaction numbers, service type, source and destination addresses, text display with NV names and values formatted according to SNVT type, hex dump and CRC errors.
- Trigger and filter to find relevant events
  In order to sift out essential information from the mass of data, the Easylon Analyzer allows filtering according to address- and NV-parameters, triggering dependent on filters and logical combinations of filters and triggers.
- LNS database is not required
  The Easylon Analyzer operates on unknown networks. All relevant information is collected either by monitoring network traffic or via a "scan and upload".
- Consistency report and transaction analysis
  Are there quirks in your network? The Easylon Analyzer's consistency report tracks down nodes which have not been installed, addresses which have been assigned twice, incomplete bindings and similar problems, which other-wise would remain hidden. The transaction analysis displays erroneous transfers.
- In-depth network node information
  - The nodes list contains all detected nodes, with address information, location and self-documentation
  - The node information contains all structures of the NEURON Chip
  - Node commands comprise wink, reset, on-line, off-line, EEBlank, set location and even allow writing to the NEURON's memory.

Easylon® Network Components

From Repeater to Terminator

Repeater
Compact or multi-port

Router
Structuring networks, combining FT and IP

Link Power Supply
Supply and fieldbus on the same line

Host Controller
Embedded PC for LonWorks

Terminator
Bus terminator for LonWorks

Easylon®

Gesytec

Easylon® Repeater

Compact LONWORKS® Repeater

- Increase of the communication distance
- Regeneration of network signals
- AC and DC power supply
- Separation of Link Power segments
- Communication of data packets of any length
- No configuration required

Compact repeater for TP/FT and TP/LP LONWORKS networks, increasing the allowable communication distances by regeneration of the signals. A greater number of nodes within a physical network segment are also possible. The rules for repeater usage have to be observed.

In Link Power networks the Easylon Repeater realizes the connection between two segments.

By its compact size of just 45 mm width it perfectly suits into cabinets or in cable ducts. The power supply of the DIN rail module can either be AC or DC.

NETWORK INTERFACE

Transceiver	FTT-10A
Connectors	2 pairs of screw terminals on each side

POWER SUPPLY

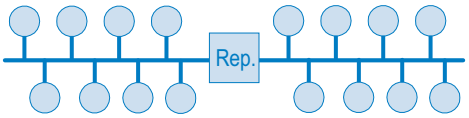
Voltage	24 V AC ± 20%, 1 W or 12 – 28 V DC, 1 W
Connector	screw terminals

DIMENSIONS & ENVIRONMENTAL CHARACTERISTICS

Housing	type F, cf. p. 26	
Dimensions	95 x 45 x 38 [mm], 2.5 units accord. to DIN 43880	
Mounting	DIN rail (EN 60715: 35x15, 35x7.5)	
Temperature	operating	0 – +60 °C
	storage	-20 – +85 °C
Humidity	class F, accord. DIN 40040, 5 – 93 %, no condensation	
Protection class	IP 20	
EMC	emission	EN 55022 A/B
	immunity	EN 61000-6-2
Flammability	UL94-V0, self-extinguishing	

EASYLON REPEATER

with transceiver FTT-10A	P.R10003



Easylon® Multiport Repeater

LonWorks® Repeater with 4 Channels

- Integrated bus termination
- Variants for 24 V, 120 V, 230 V or Link Power
- Version for extended temperature range

LonWorks Repeater with 4 channels in variants for free topology and Link Power. By regenerating the signals it increases the allowable communication distance. Even a greater number of nodes within a physical network segment are also possible within the limits of a tolerable network load.

With up to 4 network connections the Easylon Multiport Repeater allows for a flexible network structure. Of course this repeater is also compatible to Link Power networks. For each channel a termination can be set by switches to bus or free topology network structure. The device status is displayed by a power and a traffic LED.

There are variants for power supply with 24 V AC/DC, 120 V AC or 230 V AC available. A fourth variant of the repeater is supplied by Link Power. This device with a width of only 70 mm does not require external power supply.

Network Interface

Transceiver	4 x FTT-10A or 3 x FTT-10A and 1x LPT-10
Connectors	3 pin screw-plug terminals, Phoenix 3.81 mm
Termination	bus / free topology selectable per channel

Power Supply

Voltage1	Type A	24 V AC +- 20%, or 12 – 28 V DC
	Type B	230 V AC, 50 Hz
	Type C	120 V AC, 60 Hz
	Type D	Link Power over LonWorks network
Power consumption:		< 2.5 W

Display & Operation

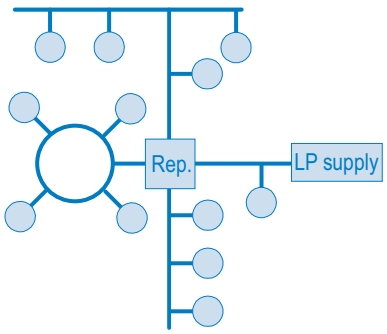
LEDs	power (green) traffic (yellow)
DIL switches	2 per channel: bus termination on/off and topology

Dimensions & Environmental Characteristics

Housing	type A or B, cf. p. 26	
Dimensions		
Repeater type A, B, C	105 x5 8 x 68 [mm], 6 units accord. DIN 43880	
type D	70 x 58 x 86 [mm], 4 units accord. DIN 43880	
Mounting	DIN rail (EN 60715: 35x15, 35x7.5)	
Temperature	operation	0 – +55 °C
	storage	-20 – +85 °C
ext. temp. range	operation	-40 – +85 °C
	storage	-40 – +85 °C
Humidity	class F accord. DIN 40040 F, 5 – 93 %, no condensation	
Protection class	IP20	
EMC	emission	EN 55 022 A/B
	immunity	EN 61000-6-2
Flammability	UL94-V0, self-extinguishing	

Easylon Multiport Repeater

24 V supply (Type A)	P.R10103
230 V supply (Type B)	P.R10113
120 V supply (Type C)	P.R10123
Link power supply (Type D)	P.R10133



Gesytec

Easylon® Router+

LON/IP Router for ISO/IEC 14908 Compatible Networks

- Router in TP/FT-10 and to LON/IP-852 networks
- Channel routing, subnet-/node routing
- Integrated configuration server
- Remote network interface for VNI and MIP applications
- Usable as NTP server
- Multi-language browser interface for setup and diagnosis

The Easylon Router+ connects ISO/IEC 14908-2 compatible network segments, as well as TP/FT-10 and LON/IP-852 networks, according to the ISO/IEC 14908-4 standard. Furthermore the device operates as configuration server in LON/IP networks.

Fitted with Ethernet interface and 2 LON TP/FT-10 interfaces the 3-port version of the device can be used in versatile manner: As router between two segments of a TP/FT network or to a LON/IP network. The latter allows implementation of fast backbone structures. The device is also available as a 2-port variant with only one TP/FT interface.

Parameterization of the Easylon Router+ is easily achieved via its multi-lingual web interface, by which extensive diagnosis information can as well be called from the device.

PC based applications, such as a network management tool, accessing the TCP/IP channel will additionally need the Easylon IP Interface software.

Configuration Server

The Easylon Router+ provides an integrated Configuration Server. Using the web interface all settings are easily handled including access to the settings of other LON/IP devices.

Network Interface for Remote Access

Installed at the LONWORKS network and connected to it and via Ethernet into the Internet, the device can as well serve as a TCP/IP network interface. Using the Easylon RNI software this is a cost effective and reliable solution for remote network access for VNI or MIP based PC applications, compared to a special PC at the network.

INTERFACES

Network Interfaces	
Transceiver	1 or 2 x TP/FT-10, depending on variant
Connector	3 pin screw-plug terminals (0.5–2.5 mm²)
Ethernet Interface	LON/IP-852 according to ISO/IEC 14908-4
Transmission rate	10/100 Mbps
Connector	RJ45

POWER SUPPLY

Voltage	24 V DC (10–30 V)
Consumption	typically: <2,5 W, max = 3,6 W
Connector	3 pin screw-plug terminals (0.5–2.5 mm²)

DISPLAY & OPERATION

LEDs	- Status
	- Ethernet
	- Channel / Reset
	- LON IP
	- LON 1
	- LON 2
Taster	- Service Pin
	- Factory Reset

FEATURES

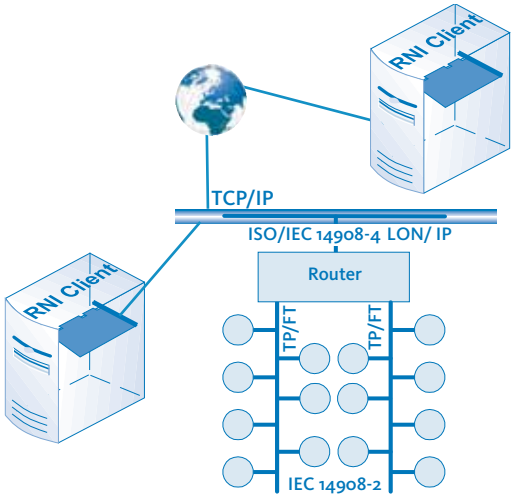
Real-time clock	Gold Cap buffered, >6 d
Watchdog	
Voltage Monitoring	
Temperature Sensor	displayed in Web Interface

DIMENSIONS & ENVIRONMENTAL CHARACTERISTICS

Dimensions	107 x 90 x 58 [mm], 6 units acc. to DIN 43880	
Mounting	DIN rail (EN 60715: 35 x 15, 35 x 7.5)	
Temperature	operating	0 – +55 °C
	storage	0 – +55 °C
Humidity	class F, accord. DIN 40040, 5 – 93 %, no condensation	
Protection class	IP 20	
EMC	emission	EN 55 022 B
	immunity	EN 61000-6-2/3/4/5
Flammability	UL94-V0, self-extinguishing	

EASYLON ROUTER+

2 x TP/FT-10, 1 x LON/IP-852	P.I30106
1 x TP/FT-10, 1 x LON/IP-852	P.I30116



Easylon® Link Power Supply

Supply and Fieldbus on the Same Line

- Low residual ripple of the output voltage
- Short circuit and over current monitoring
- Type of bus termination externally selectable
- Output current limitation
- Thermal monitoring
- Variants for 120 V and 230 V supply

Power supply for LonWorks networks in Link Power technology. The Easylon Link Power Supply is designed for the use in networks with free and bus topology. It satisfies with both, its compact design and its excellent technical features: Overload protection at 2.3 A, residual ripple of the output voltage below 80 mV, galvanic isolation of input and output voltage, internal no load, overload and short-circuit protection.

The high efficiency of the power pack of more than 75% reduces heating of switching cabinets. The EMC classification makes the module the perfect choice for industrial as well as building and home automation networks.

Automatic restart of the Easylon Link Power Supply at failures increases the usability of the device. The possibility to set the type of bus termination by a switch is comfortable.

Power Supply

Rated input voltage	230 V AC (195 – 264 V) or 120 V AC (96 – 144 V)
Rated frequency	50 Hz (47 – 63 Hz) or 60 Hz (57 – 63 Hz)
Mains failure buffering	> 20 ms at nominal input voltage
Rated input current	0.7 A / 1,4 A
Inrush current	< 20 A
Efficiency	> 75%, at nominal input voltage

Output to Bus

Output voltage	41.5 V +/-2.2%
Residual ripple	< 80 mV at 10 kHz (200 mV at f>200 kHz)
Output current	2 A at nominal input voltage
Overload protection	typical at 2.3 A; permanent short-circuit proof with pulsing try of restart

Dimensions & Environmental Characteristics

Housing	type D, cf. p. 26	
Dimensions	126 x 58 x 90 [mm], 7 units accord. DIN 43880	
Mounting	DIN rail (EN 60715: 35x15, 35x7.5)	
Connectors	screw terminal 0.5 – 2.5 mm²	
Temperature	operating	0 – +40 °C convection
	storage	-40 – +70 °C
Relative humidity	5 – 95 %, no condensation	
Protection class	IP 20 (EN 60529)	
VDE0106 T1	I (with PE) (EN61140)	
EMC emission	EN 61000-6-3, class B, EN 50090-2-2	
immunity	EN 61000-4-2/3/4/5/6, class A	
Bus termination	bus or free topology, settable by switch	

Easylon Link Power Supply

230 V input voltage	P.I10002
120 V input voltage	P.I10012

Info

Link Power Networks

In Link Power Networks the twisted pair line not only transmits messages but also supplies the devices. One link power supply can energize a bus length of up to 320 m. For the network nodes a supply of 100 mA at 5 V is available. Several link power segments can be connected. Concerning their structure link power networks have to follow the rules for free topology networks. Mixed networks with link power (TP/LP) and free topology (TP/FT) transceivers can be realized.

Gesytec

DELTA 1000

Host Controller with Remote Access

- Remote Network Interface for VNI and MIP Applications
- Host Controller at LONWORKS Control network
- Data server for remote capturing and monitoring
- Web server for parameterization and diagnosis

DELTA 1000 is an embedded device providing many features for data communication. In addition to an Ethernet connection a modem can be plugged in optionally. Furthermore it provides two interfaces to CEA-709.1 compatible networks (LONWORKS TP/FT), making the device suitable as host controller.

Depending on project requirements socket modems (analog, ISDN or GSM) can also be used for a remote connection. Thus the DELTA 1000 is perfectly suitable for the use in data capturing and monitoring systems with remote access, running user provided software. The device software includes an SQL data base, a web server and an CEA-852 compliant LON/IP interface.

With the DELTA 1000 the following solutions can be realized in a LONWORKS environment:

- Data capturing and communication with remote systems
- Ethernet interface to the control network
- Analyzer node (using the optionally available Analyzer software from a networked PC)

A browser interface is available for parameterization which can also be used for diagnosis purposes.

INTERFACES

LONWORKS		
	Transceiver	2 x FTT-10A
	Connector	3 pin screw-plug terminals, Phoenix 5.08 mm
Serial Interface		EIA-232, not optically isolated
	Connector	9 pin D-type
Ethernet Interface		according to CEA-852
	Transmission rate	100 Mbps
	Connector	RJ45
USB Host		acc. full speed USB standard 2.0
	Connector	USB type B
Modem	optional	PSTN, ISDN or GSM modem

POWER SUPPLY

Voltage	24 V DC (± 20%),
Consumption	< 2.5 W w/o external USB devices
	< 8 W under GSM operation

DISPLAY & OPERATION

LEDs	- Status
	- LON 1
	- LON 2
	- LON IP
	- USB active
Push button	- service pin
	- stop USB
DIL switches	- bus termination, free or bus topology
	- watchdog
	- boot mode

DIMENSIONS & ENVIRONMENTAL CHARACTERISTICS

Housing	type C, cf. p. 26	
Dimensions	157 x 86 x 58 [mm], 9 units accord. to DIN 43880	
Mounting	DIN rail (EN 60715: 35 x 15, 35 x 7.5)	
Temperature	operating	0 – +55 °C
	storage	-20 – +70 °C
Humidity	class F, accord. DIN 40040, 5 – 93 %, no condensation	
Protection class	IP 20	
EMC	emission	EN 55 022 A/B
	immunity	EN 61000-6-2
Flammability	UL94-V0, self-extinguishing	

DELTA 1000

Hardware configurations:
2x FTT-10, CEA-852
2x FTT-10, CEA-852, PSTN Modem
2x FTT-10, CEA-852, ISDN Modem
2x FTT-10, CEA-852, GSM Modem

Please contact us for available software.

Easylon® Bus-Terminator

Bus Terminator for LonWorks®

- For FTT-10, LPT-10 and TP/XF networks
- Variants for free and bus topology
- Top hat rail installation

A bus terminator is required for correct operation of a LonWorks network. The type of the bus terminator depends on the used transmission technology and the network topology. Easylon Terminators for TP/FT-networks are available for bus or free topology. These are as well suited for LPT-10 (link power) networks. A separate variant is available for TP/XF networks.

Network Interface

Connector	screw terminal 0.5 – 2.5 mm²

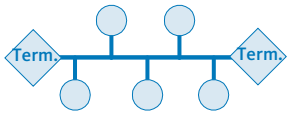
Dimensions & Environmental Characteristics

Housing	type F, cf. p. 26	
Dimensions	75 x 55 x 10 [mm]	
Mounting	DIN rail (EN 50 022, 35x15)	
Temperature	operating	- 0 – +60 °C
	storage	-20 – +70 °C
Humidity	class F, accord. DIN 40 040, 5 – 93 %, no condensation	
Protection class	IP 20	
Flammability	UL94-V0, self-extinguishing	

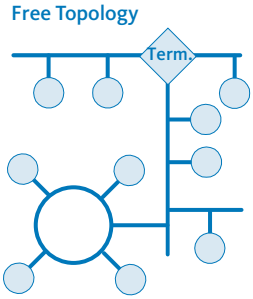
Easylon Bus-Terminator

FTT-10/LPT-10 for	- free topology	P.Z10013
	- bus topology	P.Z10023
TP/XF-1250, -78	- bus topology	P.Z10001

Bus (line)



Free Topology



Info

Using Terminators

TP/FT and TP/LP networks

Free topology:	One terminator per segment is required, which can be connected at any place.
Bus topology:	Two terminators are required, which must be placed at both ends.

TP/XF networks

Bus topology:	Two terminators are required, which must be placed at both ends.

The Easylon Link Power Supply, Multiport Repeater and Router+ have integrated bus terminators.

Gesytec

Housings

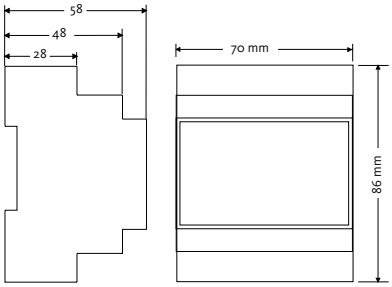
HOUSING TYPE A

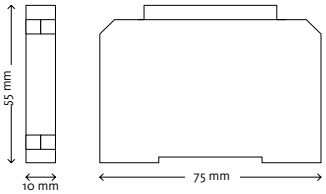
Multiport Repeater

Material
- Top: Lexan 940
- Base: Noryl VO 1550

Flammability: UL94-Vo

Color
- Top: RAL 7035 (grey)
- Base: RAL 7021 (black)





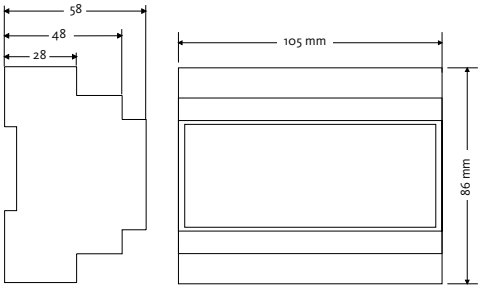
HOUSING TYPE B

Multiport Repeater

Material
- Top: Lexan 940
- Base: Noryl VO 1550

Flammability: UL94-Vo

Color
- Top: RAL 7035 (grey)
- Base: RAL 7021 (black)



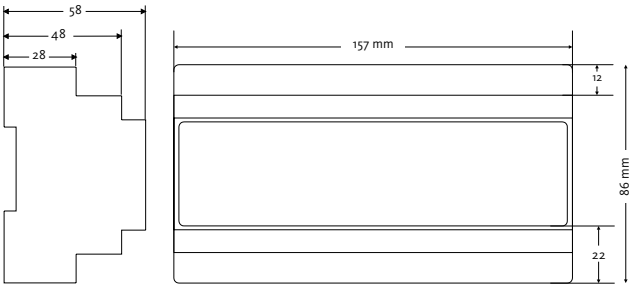
HOUSING TYPE C

Router+, DELTA 1000

Material
- Top: Lexan 940
- Base: Noryl VO 1550

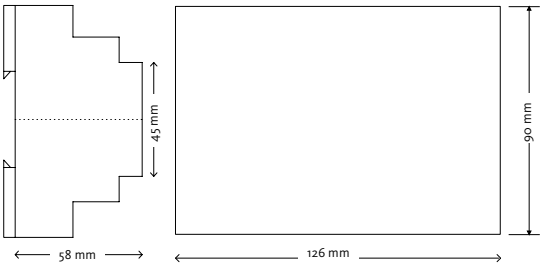
Flammability: UL94-Vo

Color
- Top: RAL 7035 (grey)
- Base: RAL 7021 (black)



HOUSING TYPE D

Link Power Supply



HOUSING TYPE E

Terminator

Material: Polycarbonate

Flammability: UL94-Vo

Color: green

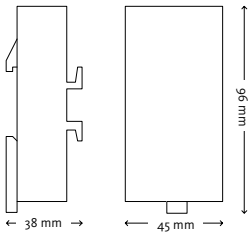
HOUSING TYPE F

Repeater

Material: Makrolon 9425

Flammability: UL94-Vo

Color: grey



Some Information About LonWorks®

LonWorks is a control network for universal use developed by Echelon Corporation, USA. It is a distributed automation system where free programmable intelligent nodes communicate using the standardized LonTalk® protocol (CEA-709.1). The nodes exchange status and control messages in any topology and via various media realizing the desired control applications by interacting. Thereby the entire system remains modular and flexible. Furthermore the software of a node remains slight and manageable.

Interoperability, meaning the seamless integration of products from several manufacturers, is a major subject of LonWorks technology. This was reached by using a single microprocessor –the Neuron Chip®– not only providing a standardized communication interface but also realizing the basic communication. Disclosure of the communication protocol in the ANSI/CEA-709.1 standard and continuative standards defined an open standardized system, for which components are available from manufacturers all over the world.

What Makes the Difference?

The difference in comparison with other field bus systems becomes obvious in the technological approach: Distributing the control task by using rules partly realized in hardware is a general approach not emerging from the solution for a single area of application. This results in a universal usability for a general and very broad range of requirements. For extreme requirements and special challenges LonWorks often is inappropriate. There specific solutions are unbeatable, however rarely transposable.

In building automation this becomes apparent. LonWorks crosses the traditional barriers between different building sections (heating, lighting, ...) to the advantage of a cross-functional building automation. LonWorks devices complete the control tasks in their application section but, at the same time, make available information to devices dedicated to other application sections, thus increasing the effectiveness of the whole automation system. The important thing in this is not being open for information transfer but the integrated operation of the networked system. Without any change in technology all tasks can be solved using products from different manufacturers. The message from the access control at the gate is just a data point, which next to granting access can as well be used by the room heating resulting in a comfortable office temperature as soon as the staff member reaches the office. Separate presence detection is not required. Initial costs of such integrated solutions may be higher than those for traditional ones, total cost of ownership will soon make up for it.

LonWorks Characteristics

- Standardized and already implemented communication
- Manageable software by distribution of the control task
- Easy modification and scalability
- Free choice of topology
- Safe local operation by independence from a central instance
- Variety of transmission media
- Communication distance
- Flexible addressing
- Interoperability

The Elements of LonWorks

Network Nodes

The Neuron Chip is the core of the node intelligence, where arbitrary applications can be loaded. If required, external memory can be added. Each Neuron and herewith each network node can be identified by its unique, 48 bit Neuron-ID. In addition the Neuron ensures communication handling by the implemented LonTalk protocol.

Following the disclosure of the LonTalk protocol in the CEA-709.1 standard it is possible to develop devices for this network technology using different processors. Normally an FPGA or ASIC is used on the device to access the network; the higher protocol layers are then realized in PC software. This allows, further to higher performance, to overcome other resource restrictions. PC–network interfaces, routers and nodes with special performance requirements are typical fields of application. The Easylon + products, for instance, make use of these possibilities.

Transceiver

A transceiver couples the node to the network. As large as the variety of the media is which LonWorks can use (the technology is by definition not restricted to certain media) as large is the number of different transceivers. Very common is the FTT-10A transceiver, as twisted pair lines in free topology are frequently used (TP/FT networks).

LonTalk Protocol

This is the LonWorks “language”. It is used with all nodes and is already implemented in the Neuron Chip.

Info

Standards and Names

CEA-709	Communication protocol standard (ANSI/EIA), LonWorks compatible; corresponding European standard: EN 14908
CEA-852	Standard for an Ethernet based communication protocol equivalent to LonWorks (EIA/CEA) corresponding European standard: EN14908 part 4
DIN EN 14908	"Open data communication in building automation, controls and building management"; European standard for LonWorks equivalent communication protocol;

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Tools for Operation and Development

A network management tool is required to design and maintain a LonWorks network. Almost all current tools are based on the LNS (LonWorks Network Services) platform by Echelon. A network management tool serves for planning the network and establishing the logical connections between the nodes – the binding. Furthermore it allows network diagnosis and provides information visualization systems can use.

For the development of the nodes themselves Echelon provides the "NodeBuilder" software. This program allows application writing using the Neuron-C programming language. Similar to C this language contains special extensions with respect to the LonWorks communication protocol and enables a quick implementation of control applications.

Interoperability

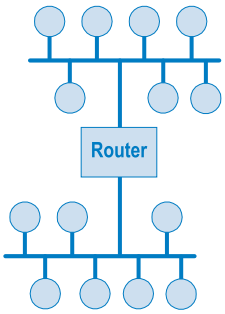
The standardized protocol in itself is not sufficient. Standard network variable type tables (SNVT) are part of the LonWorks technology. With respect to applications, LonMark International coordinates the definition of functional profiles existing for many areas of application.

The Network Structure

The LonWorks network can be structured in domain, subnet and node. A domain can comprise up to 255 subnets, a subnet a maximum of 127 nodes. In total this makes up to 32 385 nodes in one domain. Several domains can be connected. However, in principle only nodes within the same domain can directly communicate. Each node in the network has a distinct logical address consisting of the three hierarchical levels domain-id, subnet-id and node-id.

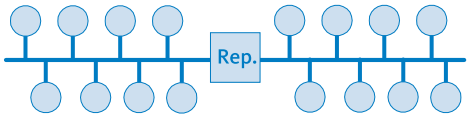
A LonWorks network uses infrastructure components such as routers, bridges and repeaters.

Routers are devices offering two or more network connections. They are used to connect different subnets. Messages received from the network on one side will usually be transmitted to the other side and vice versa. Additionally the router can filter messages, distribute messages or find and route into the correct subnet.



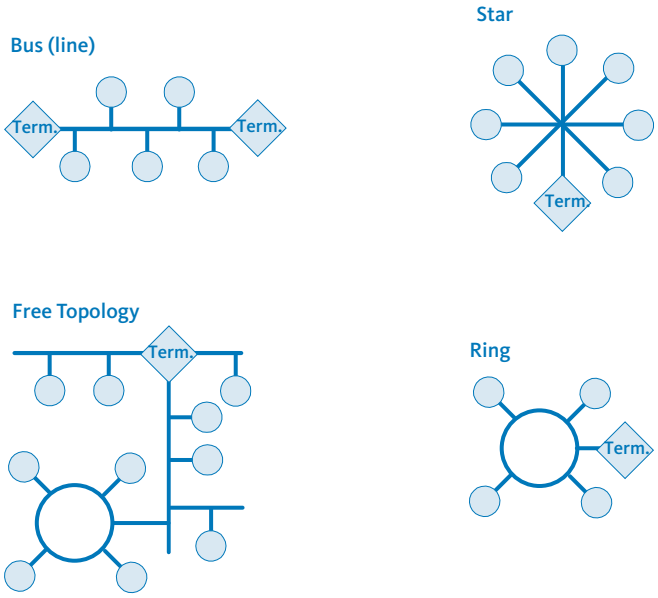
Bridges connect different domains. They transmit data from one domain to another and vice versa.

Repeaters just are physical signal amplifiers regardless of the message contents. They are used to realize long communication distances or if the maximum permissible number of 64 nodes per 2-wire-segment (FTT-10 transceiver) is exceeded.



Network Topology and Media

LonWorks allows for various network topologies and free selection between bus, star, ring or tree structure. In practice free topologies often are realized, oriented to the existing structures in buildings or installations. For segmentation of such free topologies routers can be used to control the data transfer.



LonWorks is specially flexible with respect to the transmission media:

- Twisted pair
- Radio
- Infra-red
- Fiber optic cable
- COAX cable
- Power supply system
- IP-networks

Even larger distances can be connected. Networks (in bus topology) can be extended up to more than 2000 m using twisted pair lines. By using physical star couplers for instance, the length of the individual branch lines is 1.3 km maximum. By using repeaters, routers or gateways the structures of the network can be extended to an almost unlimited length.

Further to those transmission media the LonTalk protocol can also use the IP-protocol for transmission. Thus the LonTalk protocol becomes Intranet and Internet enabled.

Transceiver	TP/XF 78	TP/XF-1250	TP/FTT-10		TP/LP-10	
Medium	Twisted Pair	Twisted Pair	Twisted Pair		Twisted Pair	
Number nodes	64	64	64		127	
Topology	line	line	line	free	line	free
Network length	1 400 m	130 m	2 700 m	500 m	2 200 m	500 m

Who is Addressing Whom?

Further to the mere physical connection the control task requires a logical connection. Data exchange in LonWorks networks takes place between network variables (NV). A special group among these is the SNTVs (Standard Network Variable Type). Defined by LonMark International every developer can use them to maintain interoperability. Network variables are of special importance:

- Information from one node to another is exclusively "transmitted" by NVs.
- NVs are the logical interface from one node to every other node.
- Binding the NVs of the network nodes is the main task of the system integrator while commissioning the network.
- NVs are, along with configuration parameters, the essential information, which can be seen of a node.

A network management tool is used to define the control logic of the network. The following definitions are made:

- Who communicates with whom?
- Which information is exchanged?
- In which way is the information exchanged?

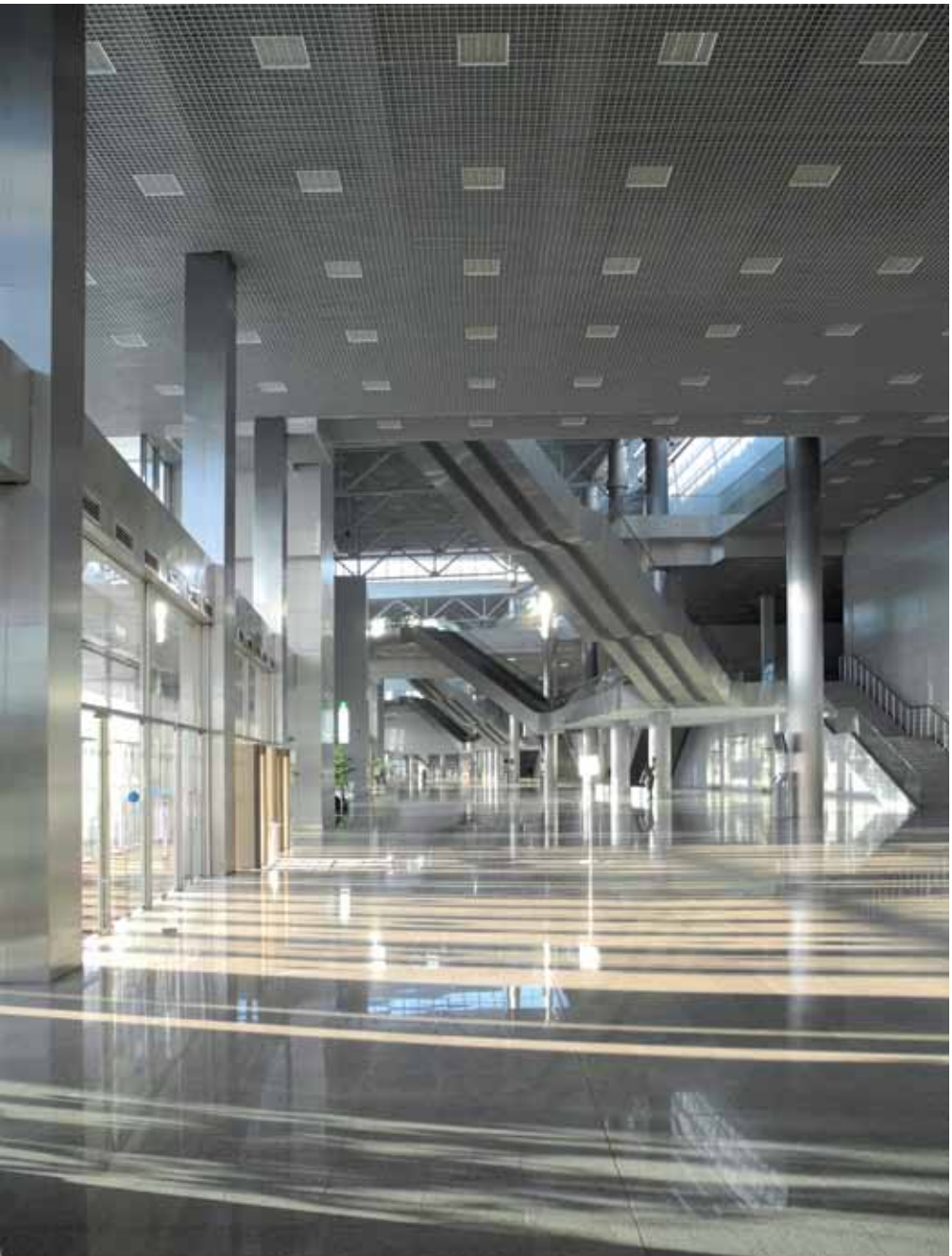
The Network is the Control

A LonWorks network consists of up to 32 385 intelligent network nodes communicating via LonTalk. Time-critical messages can be prioritized; a safe transmission is granted, amongst others, by end-to-end control and acknowledgements.

Wherever input and output signals (I/O) are required, distributed and intelligent sensor or actor devices can be placed. Those application specific nodes control and manage themselves and mutually. They only need status or modification messages from other network nodes to take action, which they receive via the LonWorks network. Transmission speeds up to 1.25 Mbps can be reached.

Standardized data types, so-called SNVTs and functional profiles are the basis for the interoperability of the network nodes. The interoperability between modules from different vendors provides the user with freedom of choice and considerably facilitates a cross-functional building automation.

By distributing the intelligence or, respectively, the application LonWorks networks can be operated at low cost without host computer or PLC (for central capturing and processing). No host computer is required for control and monitoring tasks. For visualization purposes and further processing of LonWorks data in other systems usually PCs are used.



LonWorks offers a flexible field bus system provided with distributed intelligence that can cover large distances using most different media on a high level of reliability and safety. The modular structure allows for modification and extension of the network; at any time and without large effort.

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