

# Powerlink FACTS

Volume 1, Issue 1/May, 2006

## Power-packed Combination

ETHERNET Powerlink  
is Lenze's Choice  
for L-force

## System on Chip

Hilscher: The Future  
of Communication

## Hardware Manufacturer Independent

Infoteam's  
PowerMAP



## Interview with Hans Wimmer

Our Goal for  
2009: 3.5 mn.  
Installed Nodes.



# WE ARE CONNECTED



While others are still working on their real-time Ethernet concepts, ETHERNET Powerlink users are already connected. More than 100,000 installed nodes and 5 years in serial production, with product support from leading automation vendors, make ETHERNET Powerlink the most mature and most reliable real-time Ethernet solution on the market.

Why are you waiting any longer? Join the future of industrial networking today.

[www.ether-net-powerlink.org](http://www.ether-net-powerlink.org)

**ETHERNET  
POWERLINK**  
STANDARDIZATION GROUP

## Cover Illustration

Integrated automation components from B&R.

## Interview

- 5 Hans Wimmer,**  
B&R's Managing Director, answers our questions



## Hardware

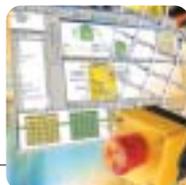


- 4 FRABA POSITAL**  
OPTOCODE Series of Absolute Encoders with Automatic Protocol Switching for ETHERNET Powerlink
- 4 SHF Communication Technologies AG**  
EPL Key Components for Full-Scale Solutions
- 6 Lenze**  
Power-packed Combination: ETHERNET Powerlink is Lenze's Choice for L-force
- 7 B&R**  
Integrated Safety – with EPLsafety from B&R
- 7 WAGO**  
WAGO Powerlink: Real-time Ethernet throughout an Installation
- 8 Hilscher**  
ETHERNET Powerlink V2.0 onboard the netX
- 8 Pepperl+Fuchs**  
One Rotary Encoder for all Automation Levels – Absolute Rotary Encoder with ETHERNET Powerlink and TCP/IP Interface
- 9 Deuschmann**  
Gateways – Bridges between EPL and Standard Ethernet
- 10 Hirschmann**  
The Key to the Powerlink Segment



## Software

- 4 Janz**  
ETHERNET Powerlink Interface for PCI Systems
- 5 Port**  
EPL Protocol Library
- 7 KW-Software**  
Software for IEC 61508 compliant Safety Equipment up to SIL3
- 9 IXKAT**  
Hard- and Software Components for Development and Series Production
- 10 Infoteam**  
PowerMAP: CANopen and ETHERNET Powerlink
- 10 Port**  
ETHERNET Powerlink Tools



## Even Openness has its Price

*Experience tells us there's a price to pay for everything. And that's an experience we make time and again. Remember the first "fieldbus battle" of the mid-1990s? The major players took on the competition boasting features such as hamming distances, multi master capability and many others. And who seized the market? Out of a multitude of bus systems, Profibus-DP and CANopen now dominate factory automation. The former's sponsor was the market leader, the latter's many small and medium sized companies. Now the debate is on again. About Industrial Ethernet. Everyone wants it. But many want it a little different. The old protagonists are once more trying to make their in-house bus the industry standard. Engineers, control systems and component manufacturers face the question: Who do I decide for? And what do I base my decision on? Let me provide an answer, not as a Member of the Board of the EPSG, but as Head of Innovation at Lenze: openness gives you independence, which in turn is the best protection for your investments. At Lenze, we hope to liberate ourselves and end users from proprietary hardware solutions. So we've put our faith in an open system, one which all of us – including ourselves – can help develop to its full potential. That, too, has its price: time. Many EPSG members feel ETHERNET Powerlink's introduction to the market should proceed more quickly, both in terms of technology and of the marketing effort. As far as technology is concerned, the second great milestone is there. Automation tasks are now accomplished with solutions based on the open ETHERNET Powerlink specification V2.0, with automation systems and components from different manufacturers. This new publication gives you a glimpse of what's available. And with that, we're talking marketing. This is another case in point for the EPSG's openness: you don't see one company advertise its in-house bus here, but the EPSG's members jointly flying their flag by introducing some of what they have to offer in these PowerlinkFACTS.*



**Dr.-Ing. Edwin Kiel**  
Authorized Officer  
Lenze AG

Enjoy your read!

Regards,

Dr.-Ing. Edwin Kiel

## FRABA POSITAL: Absolute encoders with Automatic Protocol Switching for EPL

FRABA POSITAL's absolute encoders with an integrated ETHERNET Powerlink interface feature automatic adjustment to the protocol used in an EPL network. They support both the V1 protocol as well as the current open protocol version V2, and can thus be very easily integrated into a given application. These models are part of the tried and tested OPTOCODE series. They are especially suited to highly dynamic applications such as synchronized shafts, for which minimal jitter on the microsecond level is essential, and for high bandwidth requirements. All types are equipped with standard M12 plugs. Their rugged design ensures reliable operation even under harsh environmental conditions. While the devices support the cost-effective line structure preferred for many networks, alternative wiring topologies are also an option thanks to an



integrated dual port hub. Diagnostic LEDs indicate Powerlink device status information and Ethernet network diagnostics (link, collision, receive). A network address is assigned to an encoder by setting its device IP address using two turn switches on its interface unit. The encoders also accept control commands for configuration, either as TCP/IP frames or via an integrated web server.

[www.posital.de](http://www.posital.de)

## Janz Automationsysteme: ETHERNET Powerlink Interface for PCI Systems

The EPL PCI Interface available from Janz Automationsysteme AG serves to connect host systems to ETHERNET Powerlink automation environments. The interface card can be used in

any system with a free 32-bit PCI extension slot. Interfaces for other system architectures such as PC/104+ or PMC are designated for development. The ETHERNET Powerlink communication profile is fully processed by the integrated CPU on the



PCB. The interface is suited for communication with one or two EPL networks, depending on the required level of performance. It is designed for Windows 2000/XP (embedded) and Linux;

support for other operating systems – VxWorks, QNX etc. – is optionally available. The EPL protocol stack is compatible to Janz's CANopen protocol stack.

[www.janz.de](http://www.janz.de)

## SHF Communication Technologies: EPL Key Components for Full-Scale Solutions

The powerful Ethercontrol product family provides everything for a quick set-up of Ethernet-based real-time control systems. A PCI Manager, an EPL Gateway and a variety of I/O modules can be combined to create a very convenient plug-and-play solution.

The EPL Gateway enables easy access to module parameters and ensures safe monitoring of the EPL network. The PCI Manager (MN) is equipped with a dual port RAM interface and comes with drivers supplied in source code and with sample software. Thus, it can be comfortably used with any operating system. Thanks to its dual port hub and an optional gateway port, the PCI Manager is suited for small-scale as well as more extensive EPL networks. Ethernet wiring is greatly simplified due to its auto crossover function. It is operated as a Controlled Node (CN) to enable simple data transfer between the PC and control system. The high performance processor can even take on control tasks – in this case, the PCI Manager becomes a real-time control system within the PC. Integrated diagnostic functions serve to monitor and



analyze the EPL network. The Ethercontrol I/O modules feature different combinations of binary digital, analog or encoder inputs or outputs, which make them ideal complementary components e.g. for existing drive controllers.



The integrated web server allows for controlled operation and simulations of I/O functions from a web browser, which helps to speed up the start-up of an installation. A wide input voltage range and optional power supply via

Power Over Ethernet give these I/O modules great application flexibility.

[www.shf.de](http://www.shf.de)



# Our Goal for 2009: 3.5 mn. Installed Nodes.

Editor in Chief Rüdiger Eikmeier talked to Hans Wimmer,  
Managing Director of B&R in Eggelsberg



## R. Eikmeier:

Mr Wimmer, in 2001, B&R was the first company to introduce a real-time Ethernet variant, which it called ETHERNET Powerlink. However, some say there's no longer a lot of buzz over ETHERNET Powerlink. What's your take on that?

## H. Wimmer:

Unlike other systems, ETHERNET Powerlink is already widely in use in series production. So we haven't been as vocal in the public debate as we used to be during the concept phase, and have instead focused more on the ongoing development of the system now that it is established on the market. If your frame of reference is the marketing moves and tactics of competitors who are pursuing their market introduction strategies, then you're right to say there's not so much buzz over ETHERNET Powerlink in the trade media.

## R. Eikmeier:

So you are saying that ETHERNET Powerlink is a considerable step ahead of other systems?

## H. Wimmer:

It's a fact that ETHERNET Powerlink is the only real-time Ethernet system at this time with an extensive track record in the field. Which other system can lay a claim to around 10,000 series machines in use at 150 OEMs worldwide today?

## R. Eikmeier:

B&R's decision at the time was to make ETHERNET Powerlink openly available. What role does the EPSG (Ethernet Powerlink Standardization Group) play in that respect?

## H. Wimmer:

As a strong user organization with roughly 300 members now, of which 150 are manufacturers and 150 are machine engineering companies, the EPSG is a major force driving the spread of ETHERNET Powerlink. That's what gives the system its strong base and opens it up in all directions.

## R. Eikmeier:

There are currently about 13 different Ethernet systems. Which ones are going to make it on the market, and where do you see ETHERNET Powerlink in a few years?

## H. Wimmer:

Unlike other systems, ETHERNET Powerlink does not have to be established on the market first. ETHERNET Powerlink is already widely in use in series production. As for the future, I don't want to consult the crystal ball. Rather, my expectations are based on very positive market feedback. Careful estimates project about 500 machine

builders will have equipped over 250,000 series machines with ETHERNET Powerlink by 2009. That corresponds to around 3.5 million installed nodes. I am convinced we will find out in the near future which two or three systems other than ETHERNET Powerlink will actually make inroads in the market, too.

## port: EPL Protocol Library

The main challenge in device development today is the accurate and quick implementation of a design – a goal which can no longer be achieved with in-house developments alone. port has created a comprehensive chain of tools for EPL device development around the protocol software at its core. It is based on decades of experience with CANopen.

The software package is supplied in source code. Major portions of the code are hardware independent to enable its use on different platforms. Hardware access functions for the Ethernet Media Access Controller are encapsulated in a separate module.

The library features comprehensive databases for the implementation of key device profiles,



such as the CiA 402 drive profile or 401 standard I/O routines. As these are already used in a range of CANopen projects, this is a proven technology which can quickly be applied in EPL environments as well. Since device developers can fully rely on the flawless interoperability of the protocol stack and object directory, more of their time can be dedicated to the integration of the application at hand.

 [www.epl-tools.com](http://www.epl-tools.com)

# Power-packed Combination:

ETHERNET Powerlink is  
Lenze's Choice for L-force

Lenze integrates ETHERNET Powerlink (EPL) as the high performance motion bus of the future into the new servo controllers of the L-force Servo Drives 9400 series. EPL complements the also integrated CANopen system bus to support demanding applications that have hard real-time requirements.

Two qualities are called for in machine and plant engineering and construction. One requirement is higher speeds and higher precision to increase productivity and product quality. The other need is easy access to field devices from control and remote maintenance systems – using familiar IT standards. In more and more cases, conventional field bus systems fail to perform at a level that would meet these requirements. Ethernet, on the other hand, fulfills both conditions. Already long established in the office world, that communication standard is now also suited for use as a hard real-time motion bus based on TCP/IP. Besides pure performance, the decisive factors for its market acceptance are simple handling, sufficient means for diagnostics and proper consideration of safety aspects.

Combining L-force Servo Drives 9400 with ETHERNET Powerlink yields excellent support for modular machine construction concepts. Such concepts revolve around separate machine modules with autonomous communication structures that are logically independent from each other and are able to directly communicate with other autonomous modules.

## Fit for today and tomorrow

Two additional communication modules can be integrated into the controllers to complement the onboard CANopen system bus in order to meet current and future requirements for field bus technology. For Ethernet applications, there is standard Ethernet for non-real-time, and ETHERNET Powerlink for hard real-time applications.

If an EPL module is used, the bus master and bus slave functions (Managing Node or Controlled Node) are already integrated into the drive, allowing for direct, highly dynamic coupling of axes. The bus module is equipped with a dual port hub for quick wiring in a line structure. Its network address is set via DIP switches or software. A plug-in memory module stores all configuration data. In case a device must be replaced, only the memory module needs to be swapped to transfer all parameterization data to a new controller.

EPL is based on the ISO/OSI layer model and supports client/server and producer/consumer communications. A procedure called Slot Communication

Network Management (SCNM) is utilized to transfer cyclic real-time data and asynchronous data over a network connection. All network traffic is handled in isochronous slices of time (i. e. cycles), with one device on the network acting as the central controller, or Managing Node. In each cycle, all stations are assigned individual slots for transferring their real-time data. Only after this phase is concluded, asynchronous data packages such as TCP, UDP, IP, HTTP or FTP are sent. The procedure is strictly deterministic and designed for hard real-time requirements with cycle times as low as 200  $\mu$ s. Jitter is kept below 1  $\mu$ s. EPL technology allows for implementing versatile systems including highly dynamic motion systems, and at the same time fully ensures the benefit of open communication via standard internet protocols.

EPL provides an excellent means to implement modular machine concepts, since the producer/consumer or client/server concept enables the set-up of centralized master/slave as well as multi master networks. Thus, centralized and decentralized control structures are equally viable options. Simple handling,

simple engineering and easy maintenance were key goals for the development of L-force and its associated Ethernet solutions, which is why Lenze also made major contributions to the specification of ETHERNET Powerlink V2.0. The benefits of conventional field bus technology are thus married to those of open IT technology.

## Summary

Industrial Ethernet is the standard of the future: one communication system for information access, recipe changes, remote maintenance and hard real-time data transfer in motion applications. Combining it with conventional field bus technology is simple due to its good interoperability with CANopen and the Lenze system bus. The integration of Ethernet technology into Lenze's new engineering tool L-force Engineer makes setting up full-scale networks much quicker and more comfortable.

 [www.Lenze.de](http://www.Lenze.de)



## KW-Software: Software for IEC 61508 Compliant Safety Equipment up to SIL3

KW-Software is the leading supplier of safe software components for simple parameterization of safety-oriented devices as well as programming of safety control systems.

SAFEPROG, the safe IEC 61131 programming system with a graphical user interface, is used in conjunction with SafeOS, the redundant, safe IEC 61131 SPS runtime system, to program safety control systems. SAFEGRID is the tool for simple parameterization of safe automation devices (drives, sensors, relays).

Due to their open interfaces both products can be adapted to customer-specific hardware and a variety of bus systems. Their features also include error detection functions, protocol routines and a capability to validate the user program.



KW-Software is the first company whose development process for software components in compliance with IEC 61508 SIL 1 to SIL 3 has been certified by TÜV Rheinland. In addition, KW-Software is also the first enterprise to provide support for PLCopen Safety Function Blocks.

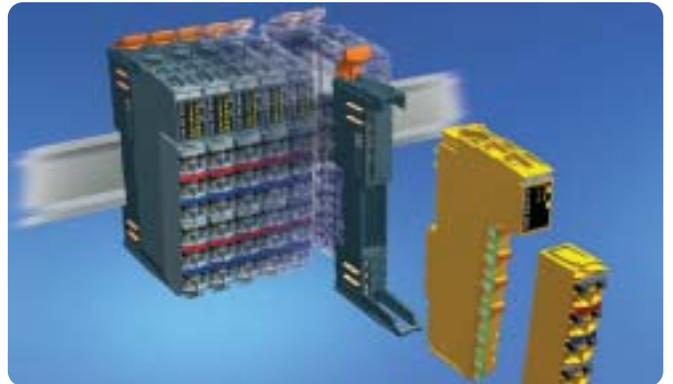
 [www.kw-software.com](http://www.kw-software.com)

## B&R: Integrated Safety – With EPLsafety from B&R

B&R's choice is EPLsafety, the first safety bus based on a real-time Ethernet implementation. Extremely low cycle times of 200  $\mu$ s for SIL 3 and reaction times that have been reduced by a factor of 10 herald a new era in safe communication. The open standard thus combines the benefits of hard-wired solutions with those of the latest integrated

and intelligent safety equipment. A decentralized distribution of I/Os provides more flexibility and cuts costs for standard as well as safe I/Os. Migration to this new technology is exceptionally simple, since it requires no more than adding I/O nodes to the safety modules.

 [www.br-automation.com](http://www.br-automation.com)



## WAGO Kontakttechnik: POWERLINK – Real-time Ethernet throughout an Installation

Tried and tested in the industry, the highly modular fieldbus system WAGO-I/O-SYSTEM 750 now also features ETHERNET Powerlink capability: it is equipped with a field bus coupler which complies with ETHERNET Powerlink specification V2.0. The coupler supports up to 64 I/O terminals, or even 250 via a bus extension. Its application interface is based on the CANopen communication profile DS 301 (i. e. EN 50325-4).

The major benefit of ETHERNET Powerlink is that it is both based on standard Ethernet and meets extreme demands on deterministic performance and cycle times. The protocol is therefore ideally suited for use in applications with hard real-time requirements, but also for reliably transferring large amounts of data within a given span of time.

In addition, EPL features a flexible, well-engineered application interface enabling access to a broad base of existing device and application profiles.

The WAGO-I/O-SYSTEM 750 provides a comprehensive range of I/O terminals to give this high performance protocol a hardware base suitable for industrial environments.

 [www.wago.com](http://www.wago.com)



*Ethernet making inroads: The new ETHERNET Powerlink coupler from WAGO*

### Highlights WAGO POWERLINK

- Extremely compact connection to ETHERNET Powerlink V2.0
- Hardware base for industrial environments
- Extensive range of I/O terminals
- Suited for applications with hard real-time requirements
- Transfer of large amounts of data within a given span of time

## Hilscher: ETHERNET Powerlink V2.0 onboard the netX

Most EPL hardware platforms available today bundle an application controller with a standard Ethernet MAC. While such combinations do provide a basic entry into the ETHERNET Powerlink world, they do not tap the full potential of the available bandwidth. Hilscher has therefore introduced its System-on-Chip solution netX, which features special hardware extensions as a means to fully unleash the benefits of ETHERNET Powerlink, and, in addition, provide users with more processing power for their own applications.

The netX has two Ethernet channels which come with the analog component, the so-called PHYs, already integrated. An optimized Medium Access Controller (xMAC) is connected to the PHY via MII. The xMAC serves to control the sending and receiving

of Ethernet packages, verify their checksums and detect collisions on the network. A repeating hub is integrated between the two channels, enabling hook-up of an additional EPL node with no need for a separate external hub device.

The xMAC is subordinate to a purpose-developed Protocol Execution Controller (xPEC). This unit analyzes the Ethernet header and passes only those Ethernet frames relevant to the node on to the EPL protocol stack within the application layer. The xPEC also fully integrates the EPL Data Link Layer functionality, and thus does away with conventional

interrupt latency times between the Ethernet MAC and application controller. This implementation ensures that a Controlled Node can respond to a Poll

Request from the Managing Node with a Poll Response immediately after the Inter Package Gap is concluded, which puts the available Ethernet bandwidth to full use. Data is transferred via 32-bit DMA between the xPEC and the application controller, i. e. it causes no load on the ARM CPU.

Higher-level CANopen protocol layers are handled on the ARM 926. The CPU's 200 MIPS provide enough processing power

to keep small applications running on the netX besides the EPL protocol stack.

### Features:

ETHERNET Powerlink V2.0, based on netX technology

- Managing Node (MN) and Controlled Node (CN)
- 2 PHYs/MACs integrated
- Integrated class II repeater enables implementation of daisy chain topologies to minimize the need for stand-alone hubs
- Response time for Poll Requests  $\leq 1 \mu\text{s}$  (Inter Frame Gap)
- Integrated high performance application controller



[www.hilscher.com](http://www.hilscher.com)

## Pepperl+Fuchs: Absolute Rotary Encoders with Powerlink and TCP/IP Interface: One Rotary Encoder for all Automation Levels

Ethernet is becoming increasingly important as a cost-effective alternative network option even in the bottommost field level. Drive applications at this level e.g. call for rotary encoders with appropriate interfaces. Besides easy connection to a company network, key features for encoders include real-time capability, intelligent extra functions

and worldwide service and maintenance availability.

**Total resolution up to 30 bit**  
Pepperl+Fuchs Drehgeber GmbH supplies different models of absolute rotary encoders for connection to Ethernet TCP/IP and ETHERNET Powerlink networks. They come with solid shafts or hollow shafts and as single turn or multi turn models. While the single turn type provides a resolution of up to 16 bit, it can be supplemented by a multi turn model with up to 14 bit to deliver a total 30 bit resolution. As with field bus encoder models, additional device

functions are optionally available for Ethernet encoders as well, including a position signal output that can be parameterized, cam controller functions,

current speed outputs and diagnostic capabilities.

### Parameterization and operation from a PC

An HTTP capable web server is integrated into the encoders. The consistent use of open communication standards enables comfortable operation and parameterization via standard browsers, from any PC, and from anywhere in the world. Status messages can be polled as well.

### Ethernet for standard and real-time applications

For applications with no particular real-time requirements, Ethernet rotary encoders with a TCP/IP interface are the ideal choice. They can be connected to any PC for configuration and start-up. However, due to the CSMA/CD access procedure,

standard Ethernet cannot ensure definite transfer times. Collisions, whose frequency increases with the load on the network, slow down the performance. Then again, they can be reduced or avoided altogether by setting up an appropriate network structure and using switches. Ideally such implementations attain cycle times as low as 1 ms. Cycle times below that are provided by devices with Powerlink interfaces: ETHERNET Powerlink utilizes a hardware-based, top priority time slice procedure and operates in fixed cycles. EPL achieves cycle times of 200  $\mu\text{s}$ , which is sufficient even for very demanding drive solutions.



[www.pepperl-fuchs.com](http://www.pepperl-fuchs.com)

## IXXAT: Hard- and Software Components for Development and Series Production

IXXAT Automation is one of the leading providers of communication solutions in industrial automation. Besides the CAN-based protocols CANopen and DeviceNet, IXXAT's technological focus is on Ethernet-based communication protocols, and namely on ETHERNET Powerlink.

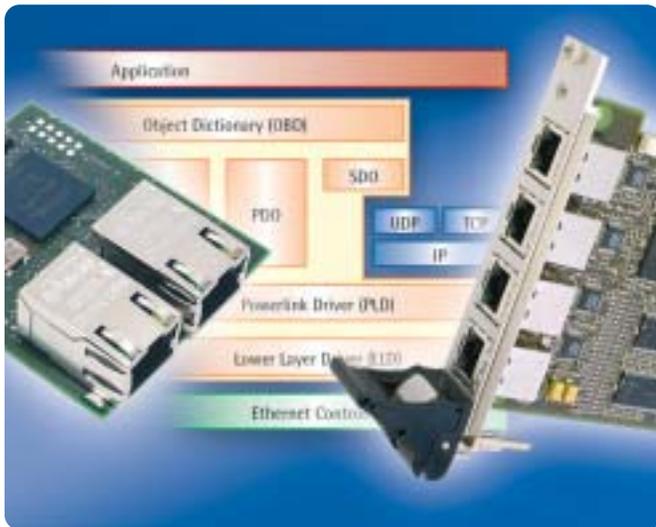
### ETHERNET Powerlink protocol software

IXXAT's Ethernet protocol stack includes all features of the current ETHERNET Powerlink

Powerlink's functionality. User data from a PC application (such as Windows with a real-time extension) are rendered in a process image. A card can be connected to any operating system (including non real-time OS) via the EPL-API available on the PC.

### Embedded module

IXXAT's EPL module provides all ETHERNET Powerlink functions for a Controlled Node, which makes this PCB a very flexible



specification and allows for the implementation of Managing and Controlled Nodes. The Powerlink software is available in a generic version enabling easy porting to different target systems and platforms. It also leaves the choice of implementing ETHERNET Powerlink in environments with or without an operating system.

### PC cards for PCI and cPCI systems

IXXAT's ETHERNET Powerlink PC cards can be operated as Managing Nodes as well as Controlled Nodes. They enable e. g. a simple set-up of real-time capable PC-based PLC applications. The cards also serve as platforms for PC-based analysis and test systems. They provide the full scope of ETHERNET

solution to EPL-enable various devices such as drives, I/O modules or encoders. The embedded module contains an Altera FPGA with a CPU (NIOS II), an Ethernet controller and a dual port hub. The IXXAT EPLCN Stack is running on the NIOS II. The stack communicates with the application CPU via a shared memory interface, i.e. a quasi dual ported memory.

### Development services

As a complement to the protocol software, IXXAT also offers training and consulting services as well as customer-specific development of hard- and software.

 [www.ixxat.de](http://www.ixxat.de)

## Deutschmann: Gateways – Bridges between EPL and Standard Ethernet

With the advent of EPL standardization, many users do not only need to integrate the EPL communication profile into their own products, but also provide for data transfer to standard Ethernet networks.

Deutschmann's universal ETHERNET Powerlink router is equipped with two Ethernet ports. The real-time port is connected to an ETHERNET Powerlink network. The other port is the router's interface to an IP network. The device features the EPL protocol stack V2.0 and can be deployed as a CN-based gateway/router. The gateway allows for seamless integration of an EPL network into an intranet, which enables access to Powerlink devices from any office PC. In effect, connections can be established between any PC and any EPL node via TCP/IP without compromising the real-time cycle. Special-purpose software interfaces for PC-based configuration tools are optionally available, including the EPL Device Monitor and an interface for the EPL-Report analysis tool.

Each of the router's Ethernet ports has two LEDs which signal a live Ethernet connection (Link) and network activity (LAN). The port on the EPL side has an additional status (BS) and error LED (BE). An address switch (ID) serves to set the node ID of the device.

An integrated HTML form allows for NAT routing configuration from any web browser.

The router is available as a C profile rail module measuring 23 x 100 x 155 mm (W x H x D). It is suited for 24 V DC power supply.

Trial versions of both the EPL Device Monitor and EPL-

Report software are included in supply. A powerful EPL network analyzer and monitor, EPL-Report can be relied on to help determine key performance characteristics of the network in everyday operation, in order to identify potential error sources or even failing devices or configurations.

The EPL Device Monitor is a tool for configuring EPL nodes in an EPL network.

Both tools can be tested in demo mode. An activation license to unlock them for full functionality is optionally available.

 [www.deutschmann.de](http://www.deutschmann.de)



## infoteam Software: CANopen and ETHERNET Powerlink

Readily available, powerful software tools from independent developers are more and more crucial to the spread and eventual success of fieldbus systems on the market.

### Universal Solution

infoteam's PowerMap is a software tool for manufacturer-independent, efficient parameterization and start-up of hardware. It supports ETHERNET Powerlink as well as CANopen. Components can be configured with PowerMap using either standardized device description files or the devices themselves. PowerMap accepts both current ASCII formats (EDS, DCF) and XML files (XDD, XDC). The set-up of new projects is a matter of only a few mouse clicks; for existing hardware, a bus scan will do as well.

### Template-based configuration

PowerMAP is designed to interoperate with infoteam's OpenPCS Automation Suite. OpenPCS's template concept allows for storing typical constellations as preconfigured templates, which provides users with a range of solutions for major parts of their applications. Individual nodes are configured from the software's clearly laid out tree view, which gives experienced users convenient access to all parameters of the devices on the network.

### PowerMAP

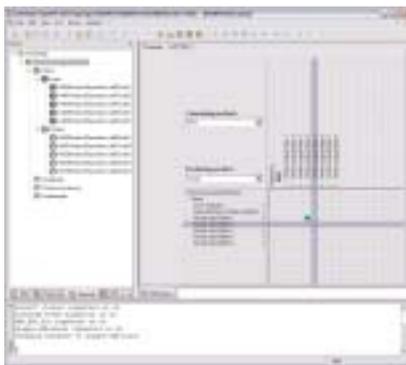
- Fieldbus configuration for distributed EPL-I/Os
- CANopen compliant
- manufacturer independent
- integrated HTTP server functionality

PowerMAP is initially supplied as part of the OpenPCS Automation Suite. This package delivers a combination of IEC 61131-3 compliant programming for different platforms and solutions for fieldbus communication.

Communication stacks for CANopen and ETHERNET Powerlink are optionally available. However, PowerMAP does not work exclusively with protocol stacks from hardware manufacturers, but also with all other implementations that adhere to the standards. The software's function blocks for ETHERNET Powerlink, which are the same as the familiar, tried and tested CANopen functions in OpenPCS, far surpass the features of the DS405 standard. Like all components of the OpenPCS Automation Suite, PowerMAP can be easily detached from the Suite and embedded in other OEM specific applications, given the sole condition that the target environment supports one of the well-established component technologies (COM/ActiveX, .Net/C#-Controls, Eclipse).

### Interoperation with IEC 61131-3

Using PowerMAP in conjunction with IEC 61131-3 allows for linking network data to existing IEC variables or using it for new

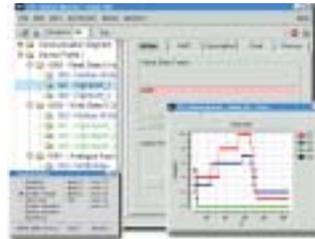


IEC variable declarations. Thus, applications can be adapted to different fieldbuses very simply by swapping a declaration file – without any changes to the program code itself.

[www.infoteam.de](http://www.infoteam.de)

## port: ETHERNET Powerlink Tools

Both speedy development of EPL devices and a successful operation of EPL networks depend on powerful tools. One of these is port's EPL-Report, a graphic network analyzer which records, processes and evaluates telegrams. Its functions include capabilities to recognize faulty frames and



supply statistical analysis of data, which enable a targeted application of the tool. port's ETHERNET Powerlink Device Monitor (EDM) simplifies device development and provides func-

tions for the configuration, start-up and integration of devices and networks. Its integrated scripting language makes auto-



minating functions very simple and allows for easy adaptation of the interface to varying application cases, such as development tests and production tests.

Plug-ins with special functions for different device profiles are additionally available.

[www.epl-tools.com](http://www.epl-tools.com)

## Hirschmann Automation and Control: The Key to the Powerlink Segment

The RR-EPL Powerlink router connects an open Ethernet segment to a Powerlink segment by inserting data into the asynchronous timeslot of the Powerlink cycle.

Users thus gain controlled access to the real-time segments of a network, e. g. transparent access to real-time controllers from remote stations.

Another option is access over a standard phone line via a modem. The RR-EPL has a password-protected serial interface for this purpose. It is also equipped with two Ethernet ports, i. e. one twisted-pair socket for the real-time segment and one TX or fibre multimode port for its connection to the open network. The router features firewall, IP routing and NAT functions, and operates as a Powerlink Slave.



[www.hirschmann.de](http://www.hirschmann.de)

**ABB Automation Technology/Robotics**  
www.abb.com

**Alstom Power Centrales**  
www.power.alstom.com

**Altera**  
www.altera.com

**AMC Europe Ltd.**  
www.amce.hu

**AMK Arnold Müller GmbH & Co. KG**  
www.amk-antriebe.de

**ARBURG GmbH + Co KG**  
www.arburg.com

**Atmel**  
www.atmel.com

**Baldor Motors and Drives**  
www.baldor.com

**Baumüller Nürnberg Electronic GmbH & Co. KG**  
www.baumueller.de

**Berger Lahr GmbH & Co. KG**  
www.berger-lahr.com

**Bernecker + Rainer Industrie-Elektronik Ges.m.b.H.**  
www.br-automation.com

**Bystronic Maschinen AG**  
www.bystronic.com

**Cincinnati Extrusion GmbH**  
www.cet-austria.com

**Control Techniques**  
www.controltechniques.com

**Danaher Motion GmbH**  
www.DanaherMotion.net

**Deutschmann Automation GmbH & Co. KG**  
www.deutschmann.de

**Eckelmann AG**  
www.eckelmann.de

**Fachhochschule Salzburg GmbH**  
www.fh-salzburg.ac.at/its

**Fachhochschule Wiener Neustadt  
für Wirtschaft und Technik Ges.m.b.H.**  
www.fhwn.ac.at

**Ferromatik Milacron Maschinenbau GmbH**  
www.ferromatik.com

**FH Oldenburg / Ostfriesland / Wilhelmshaven**  
www.i2ar.de

**Fraba Posital GmbH**  
www.posital.de

**Fritz Kühler GmbH**  
www.kuebler.com

**Harting Electric GmbH & Co. KG**  
www.harting.com

**Hilscher Gesellschaft für Systemautomation mbH**  
www.hilscher.com

**Hirschmann Automation and Control GmbH**  
www.hirschmann.de

**HMS Industrial Networks AB**  
www.anybus.com

**Hyperstone AG**  
www.hyperstone.com

**Infoteam Software GmbH**  
www.infoteam.de

**innotec GmbH**  
www.innotecsafety.de

**Iskra Sistemi d.d.**  
www.iskrasistemi.si

**IXXAT Automation GmbH**  
www.ixxat.de

**Janz Automationsysteme AG**  
www.janz.de

**KEBA AG**  
www.keba.com

**KNAPP Logistik Automation GmbH**  
www.knapp.com

**KUKA Roboter GmbH**  
www.kuka-roboter.de

**KW-Software GmbH**  
www.kw-software.com

**LARsys-Automation GmbH**  
www.LARsys.com

**Leine & Linde AB**  
www.leinelinde.se

**Lenze Drive Systems GmbH**  
www.Lenze.com

**Lindauer Dornier GmbH**  
www.lindauer-dornier.com

**LPKF Motion & Control GmbH**  
www.lpkf-mc.de

**Micrel Inc.**  
www.micrel.com

**Müller Martini AG**  
www.mullermartini.com

**NHP Electrical Engineering Products P/L**  
www.nhp.com.au

**PackSys Global (Switzerland) Ltd.**  
www.packsysglobal.com

**Parker Hannifin**  
www.parker.com

**PEAK System Technik GmbH**  
www.peak-system.com

**Pepperl + Fuchs Drehgeber GmbH**  
www.pepperl-fuchs.com

**port GmbH**  
www.port.de

**PSG Plastic Service GmbH**  
www.psg-online.de

**Saia-Burgess Controls Ltd.**  
www.saia-burgess.com

**SEW-EURODRIVE GmbH & Co. KG**  
www.sew-eurodrive.de

**SHF Communication Technologies AG**  
www.shf.de

**SIEI**  
www.sieigroup.com

**Smart Network Devices GmbH**  
www.smartnd.com

**Steinbeis GmbH & Co. KG für Technologietransfer**  
www.stw.de

**STMICROELECTRONICS Design und Application GmbH**  
www.st.com

**SYS TEC electronic GmbH**  
www.systec-electronic.com

**Tetra Pak R&D**  
www.tetrapak.com

**TR-Electronic GmbH**  
www.tr-electronic.de

**Universidade de Aveiro**  
www.ieeta.pt/lse

**Vinten Broadcast Ltd.**  
www.vinten.com

**VIPA GmbH**  
www.vipa.de

**WAGO Kontakttechnik GmbH**  
www.wago.com

**Weidmüller Interface GmbH & Co. KG**  
www.weidmueller.com

**Woodhead Software & Electronics**  
www.woodhead.com

**WTCM - CRIF**  
www.wtcm.be

**Zürcher Hochschule Winterthur ZHW (InES)**  
www.zhwin.ch

## Masthead

»PowerlinkFACTS« is an information service of the EPSG – ETHERNET POWERLINK STANDARDIZATION GROUP, c/o TEMA Technologie Marketing AG, Theaterstraße 74, 52062 Aachen, Germany.

Conception, Layout, Project Marketing and Coordination: FR&P Werbeagentur Reisenacker & Broddack GmbH, Kurfürstenstraße 112, 10787 Berlin, Germany, Phone: +49 30-85 08 85-0, Fax: +49 30-85 08 85-87.

Publication Management:  
A.-Christian Broddack, Erich Reisenacker.

Coordination Editorial Office/Production Team: Heide Rennemann-Ihlenburg.

Editorial Office: gj Die Presse-Agentur GmbH, Dietrich-Bonhoeffer-Straße 4, 10407 Berlin, Germany, Phone: +49 30-53 89 65-0, Fax: +49 30-53 89 65-29.

Editor in Chief: Rüdiger Eikmeier.  
Editorial Assistant: Asja Kootz.

© Copyright Notice  
The name and layout of »PowerlinkFACTS« are protected by copyright laws.

Republication in full or in excerpts requires advance permission from the editorial office.

 **ETHERNET  
POWERLINK**

**Powerlink** **FACTS**