Automation Systems

Controller-based Automation

Visualisation

System Manual EN

13473828

Lenze

Contents

Contents

1 About this documentation

This system manual contains some information relating to the system structure ...

- of the controller-based visualisation technology (control technology release 3.x), and
- of the PC-based visualisation technology (control technology release 2.x).

As a higher-level system manual, the document provides an overview of the visualisation technology's system components and their interaction.

Detailed information on the components, target systems and the Engineering software to be used can be found in the manuals for the related components and devices as well as in the communication manuals of the supported bus systems.

This manual is part of the "Controller-based Automation" manual collection. It consists of the following sets of documentation:

Documentation type	Subject
System manuals	System overview/sample topologies • Controller-based Automation • Visualisation
Communication manuals **Online helps**	Bus systems • Controller-based Automation EtherCAT® • Controller-based Automation CANopen® • Controller-based Automation PROFIBUS® • Controller-based Automation PROFINET®
Reference manuals **Online helps**	Lenze Controllers: • Controller 3200 C • Controller c300 • Controller p300 • Controller p500
Software manuals **Online helps**	Lenze Engineering Tools: • »PLC Designer« (programming) • »Engineer« (parameter setting, configuration, diagnostics) • »VisiWinNET® Smart« (visualisation) • »Backup & Restore« (backup, restore, update)

"PC-based automation" system manual

Here you'll find more information relating to the designs and configuration options of the Lenze Industrial PCs.

More technical documentation for Lenze components

Further information on Lenze products which can be used in conjunction with Controller-based Automation can be found in the following sets of documentation:

Mounting & wiring
🕮 **Mounting instructions** • Controllers • Communication cards (MC-xxx) • I/O system 1000 (EPM-Sxxx) • Inverters, Servo Drives • Communication modules
☐ **Hardware manuals** • Inverters, Servo Drives
☐ **Operating instructions** • Controllers • Servo system ECS (ECSxE, ECSxM)
Sample applications/Using application templates
☐ **Online help/reference manuals** • Application Sample i700 • Application Samples • Application Template • FAST technology modules
Parameterisation, configuration, commissioning
☐ **Online help/reference manuals** • Controllers • Inverters, Servo Drives • I/O system 1000 (EPM-Sxxx)
☐ **Online help/communication manuals** • Bus systems • Communication modules
☐ **Operating instructions** • Servo system ECS (ECSxE, ECSxM)

Symbols:

- 🕮 Printed documentation
- ☐ PDF file / online help in the Lenze Engineering tool

Tip!

Current documentation and software updates with regard to Lenze products can be found in the download area at:

www.lenze.com

1 About this documentation

Target group

This documentation addresses to all persons who want to be provided with an overview of PC-based visualisation with a Lenze Industrial PC (IPC)/controller.

Information regarding the validity

The information in this documentation applies to the Lenze automation system.

"Controller-based Automation" (from software release 3.x):

- Panel Controller p300/p500
- Cabinet Controller 3231 C/3241 C (with an external monitor panel/display)

"PC-based automation" (from software release 2.x):

- HMI series EL 100
- Industrial PCs: EL 1800-9800, CS 5800-9800 and CPC 2800

1.1 Document history

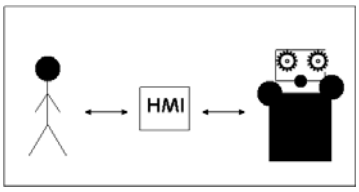
Version			Description
1.0	10/2009	TD11	First edition
1.1	08/2010	TD11	Update for the "Controller-based Automation" 3.x Lenze automation system • Lenze Controller 3200 C supplemented.
1.2	02/2011	TD11	Update for the "PC-based automation" 2.5 Lenze automation system • Industrial PC x800 supplemented.
1.3	07/2011	TD11	Update for the Lenze automation system "Controller-based Automation" 3.1 • Updated for new software version.
1.4	06/2012	TD11	Revision on the Lenze automation system "Controller-based Automation" 3.3 • Supplemented by Controllers p500 (panel controllers).
1.5	04/2014	TD17	Revision on the Lenze automation system "Controller-based Automation" 3.8 • Controller p300 (panel controller) supplemented.
1.6	01/2015	TD17	• Note added regarding the DHCP configuration for Controllers 3231/3241 C and p500. ▸ Commissioning (📖 51) • Note added regarding CODESYS® OPC server V3 user manual (📖 34).

1.2 Conventions used

This documentation uses the following conventions for highlighting different types of information:

Type of information	Highlighting	Examples/notes
Spelling of numbers		
Decimal	Normal spelling	Example: 1234
Decimal separator	Point	The decimal point is always used. For example: 1234.56
Hexadecimal	0x[0 ... 9, A ... F]	Example: 0x60F4
Binary • Nibble	0b[0, 1]	Example: '0b0110' Example: '0b0110.0100'
Text		
Version information	Blue text colour	All information that only applies to or from a certain software version of the inverter is marked correspondingly in this documentation. Example: This function extension is available from software version V3.0!
Program name	» «	»PLC Designer«...
Window	*italics*	The *message window*... / The *Options* dialog box ...
Variable names		Setting *bEnable* to TRUE...
Control element	**bold**	The **OK** button ... / The **Copy** command ... / The Properties tab ... / The **Name** input field ...
Sequence of menu commands		If several commands must be used in sequence to carry out a function, the individual commands are separated by an arrow. Select **File→Open** to...
Shortcut	**<bold>**	Use **<F1>** to open the online help.
		If a key combination is required for a command, a "+" is placed between the key identifiers: With **<Shift>+<ESC>**...
Hyperlink	Underlined	Optically highlighted reference to another topic. It is activated with a mouse-click in this online documentation.
Icons		
Page reference	(📖 11)	Optically highlighted reference to another page. In this online documentation activated via mouse-click.
Step-by-step instructions		Step-by-step instructions are indicated by a pictograph.

1.3 Terminology used

Term	Meaning
Controllers	The industrial PC (IPC) or Controller is the central component of the Lenze automation system which control the motion sequences by means of the operating system. The Controller communicates with the field devices via the fieldbus (inverter).
IPC	
Engineering PC	The Engineering PC and the Engineering tools installed serve to configure and parameterise the system "Controller-based Automation". The Engineering PC communicates with the controller via Ethernet.
Fieldbus node	Devices integrated in the bus system as, for instance, Controller and inverter
Field device	
HMI	Human Machine Interface (HMI) is a synonym for MMI (Man - Machine - Interface). The term stands for the user interface of a machine. Via the HMI, the operator can operate the machine, monitor system states, and, if necessary, intervene in the process. Information is either provided by means of hardware via operator panels with signal lamps, display fields, and buttons, or, by means of software, via a visualisation system running on a terminal. The HMI communicates with the machine PLC via different communication paths. Simplified description of the exchange of information: **operator <-> HMI <-> machine**  In this context, the term **S**upervisory **C**ontrol **A**nd **D**ata **A**cquisition (SCADA) is often used.
Inverter	Generic term for Lenze frequency inverters, servo inverters
MPI	The multi-point interface is used for connecting programming units, operator panels, and other SIMATIC-S7 devices. The MPI is based on the EIA-485 standard (formerly RS-485) and operates at a baud rate of 187.5 kbps - 12 Mbps. The voltage supply gets the interface from the control system via the MPI line. The interface is hardware-compatible with the Profibus interface on Siemens control systems. Different manufacturers offer PCI plug-in cards, PCMCIA plug-in cards, USB adapters, or Ethernet adapters for communication via MPI. All S7 stations can be interconnected via the MPI bus. The MPI bus is not standardised, but a Siemens-specific bus. The multi-point interface is a communication interface integrated in every SIMATIC®-S7 automation device (SIMATIC® S7/M7, and C7). It can be easily used for simple networks.
OPC tunnel	▸ OPC tunnel (📖 62)
PLC	Programmable Logic Controller
SCADA	**S**upervisory **C**ontrol **A**nd **D**ata **A**cquisition (SCADA) • A SCADA system is a process visualisation or host system on which several machines or lines are interconnected. • Central alarm management, archiving of data, the creation of time control software programs, and a messaging service (SMS, e-mail, text-to-speech) are typical of a SCADA system. ▸ HMI (📖 9)
PLC	Programmable Logic Controller (PLC)
Bus systems	
CAN	CAN (Controller Area Network) is an asynchronous, serial fieldbus system.

Term	Meaning
CANopen	CANopen® is a communication protocol based on CAN. The Lenze system bus (CAN on board) operates with a subset of this communication protocol. CANopen® is a registered community trademark of the CAN user organisation CiA® (CAN in Automation e. V.).
EtherCAT	EtherCAT® (**Ether**net for **C**ontroller and **A**utomation **T**echnology) is an Ethernet-based fieldbus system which fulfils the application profile for industrial real-time systems. EtherCAT® is a registered trademark and patented technology licensed by Beckhoff Automation GmbH, Germany.
ETHERNET	Ethernet specifies the software (protocols) and hardware (cables, plugs, etc.) for wired data networks. In the form of "Industrial Ethernet", the Ethernet standard is used in industrial production systems. On the basis of IEEE 802.3, standard Ethernet is specified by the Institute of Electrical and Electronics Engineers (IEEE), USA.
PROFIBUS	PROFIBUS® (Process Field Bus) is a widely used fieldbus system for the automation of machines and production lines. PROFIBUS® is a registered trademark and patented technology licensed by the PROFIBUS & PROFINET International (PI) user organisation.
PROFINET	PROFINET® (Process Field Network) is a real-time capable fieldbus system based on Ethernet. PROFINET® is a registered trademark and patented technology licensed by the PROFIBUS & PROFINET International user organisation (PI).

1.4 Definition of the notes used

The following signal words and symbols are used in this documentation to indicate dangers and important information:

Safety instructions

Layout of the safety instructions:

Pictograph and signal word!

(characterise the type and severity of danger)

Note

(describes the danger and gives information about how to prevent dangerous situations)

Pictograph	Signal word	Meaning
	**Danger!**	**Danger of personal injury through dangerous electrical voltage** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
	**Danger!**	**Danger of personal injury through a general source of danger** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
	**Stop!**	**Danger of property damage** Reference to a possible danger that may result in property damage if the corresponding measures are not taken.

Application notes

Pictograph	Signal word	Meaning
	**Note!**	Important note to ensure trouble-free operation
	**Tip!**	Useful tip for easy handling
		Reference to another document

2 Safety instructions

Please observe the following safety instructions when you want to commission an inverter or system using the Industrial PC.

Read the documentation supplied with the system components thoroughly before starting to commission the devices and the Industrial PC!

The system manual includes safety instructions which must be observed!

Danger!

According to today's scientific knowledge it is not possible to ensure absolute freedom from defects of a software product.

If necessary, systems with built-in inverters must be provided with additional monitoring and protective equipment complying with the relevant safety regulations (e.g. law on technical equipment, regulations for the prevention of accidents) in each case, so that an impermissible operating status does not endanger persons or facilities.

During commissioning persons must keep a safe distance from the motor or the machine parts driven by the motor. Otherwise there is a risk of injury by the moving machine parts.

Stop!

If you change parameters in the engineering software while a device is connected online, the changes will be directly accepted by the device.

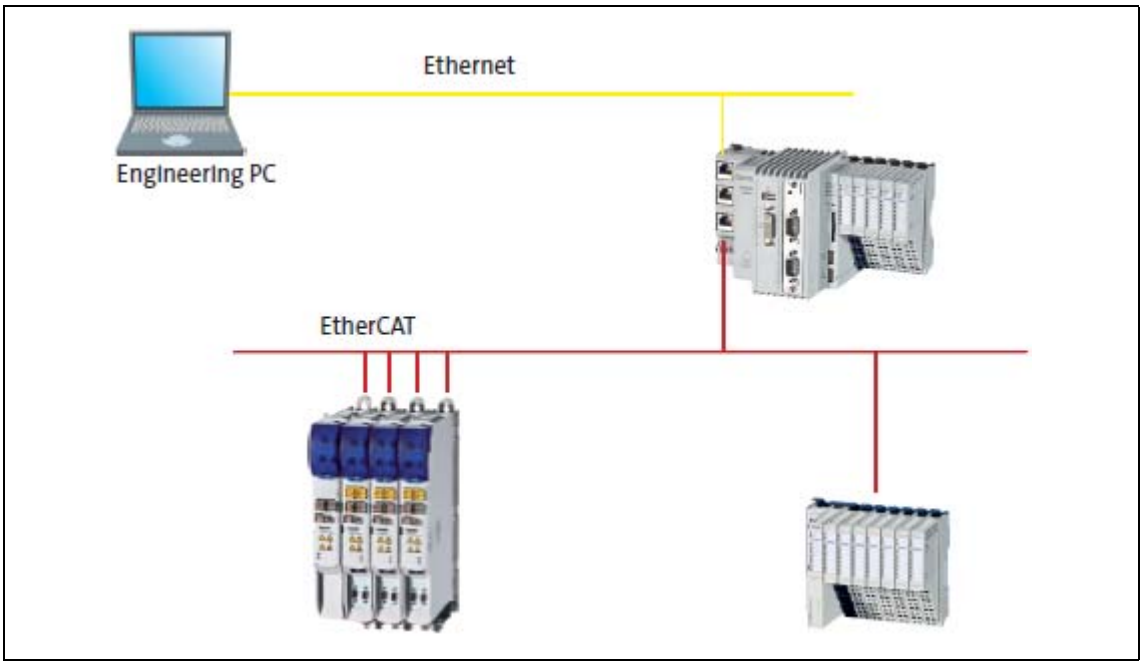
A wrong parameter setting can cause unpredictable motor movements.

By an unintended direction of rotation, too high speed, or jerky operation, the driven machine parts may be damaged.

3 Controller-based Automation: Central motion control

The Lenze "Controller-based Automation" system serves to create complex automation solutions with central motion control. Here, the Controller is the control centre of the system.

System structure of the Controller-based Automation



[3-1] **Example:** EtherCAT bus system with Controller 3231 C, I/O system 1000 and Servo-Inverter i700

Lenze provides especially coordinated system components:

- Engineering software
  The Lenze Engineering Tools on your Engineering PC (Windows® operating system) serve to parameterise, configure and diagnose the system. The Engineering PC communicates with the Controller via Ethernet.
- Controllers
  The Lenze Controller is available as Panel Controller with integrated touch display and as Cabinet Controller in control cabinet design.
  Cabinet Controllers provide a direct coupling of the I/O system 1000 via the integrated backplane bus.
- Bus systems
  EtherCAT is the standard "on-board" bus system of the Controller-based Automation. EtherCAT enables the control of all nodes on one common fieldbus.
  Optionally, CANopen, PROFIBUS and PROFINET can be used as extended topologies.
  The controllers c300/p300 are also provided with an "on board" CANopen interface (in addition to EtherCAT).
- Inverter (e.g. Servo-Inverter i700)

Operating system/Firmware of the Lenze Controllers

The operating system of the Lenze Controllers enables the control and/or visualisation of motion sequences.

These operating system versions are available:

- "Runtime":
  The sequence control takes place (by logically combined control signals) in the Controller.
  The motion control takes place in the inverter.
- "Motion":
  The sequence control and the motion control take place in the controller.
  The inverter merely serves as actuating drive.
  - Motion applications make special demands on the cycle time and real-time capability of the bus system between the Controller and the subordinate fieldbus nodes.
  - This, for instance, is the case if the field devices are to move in a synchronised way or if position setpoints are to be transmitted.
- "Visualisation":
  The optional visualisation of the automation system can be used separately or additionally to "Runtime" or "Motion".
- For this purpose, an external monitor panel/display can be connected to the Cabinet Controller 3231 C/3241 C.

Fieldbus communication

The Lenze controllers have different interfaces for fieldbus communication:

Range	Cabinet Controller				Panel Controller	
	c300	3221 C	3231 C	3241 C	p300	p500
Interfaces (on board)						
Ethernet	1	2			1	2
EtherCAT	1 [1)]	1			1 [1)]	1
CANopen	1 [2)]	-			1 [2)]	-
Optional interfaces (communication cards)						
CANopen MC-CAN2	-	●			-	●
PROFIBUS master MC-PBM	-	●			-	●
PROFIBUS slave MC-PBS	-	●			-	●
PROFINET device MC-PND	-	●			-	●

1) In preparation

2) Only the CAN master functionality is supported.

The Ethernet interface serves to connect the Engineering PC or to create line topologies (no integrated switch for Controller c300/p300).

More information on the bus systems and configuration can be found in the **communication manuals**:

- Controller-based Automation EtherCAT®
- Controller-based Automation CANopen®
- Controller-based Automation PROFIBUS®
- Controller-based Automation PROFINET®

4 System description

This chapter describes the use of an Industrial PC or Controller as a visualisation device and the required components.

4.1 Visualisation system structure

The system structure describes where to find the control system, the visualisation application, and the operator device in the system.

The field of visualisation technology distinguishes between three system architectures:

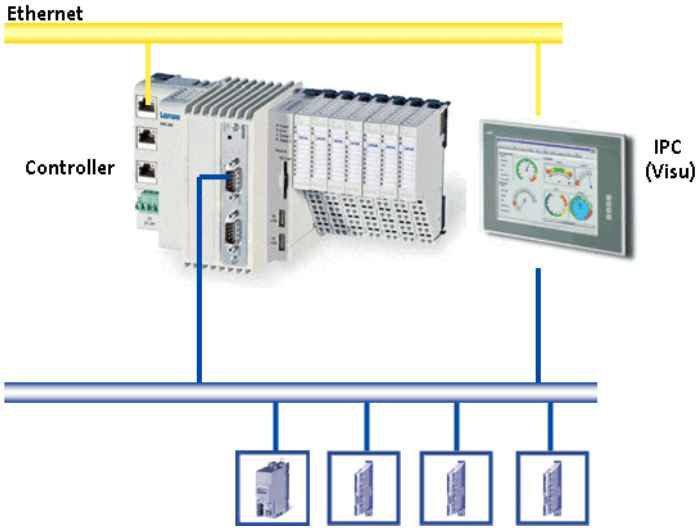
- Integrated control system (📖 18)
  The control, visualisation, and operation can be carried out from one common controller.
- Stand-alone application (📖 17)
  The system structure can be composed of different devices (optionally from different manufacturers in each case).
- Client/server system
  A central server, Industrial PC or Controller is used for the data management (alarm, recipe, trend management). The machine/system is operated and observed via any number of client devices.

Since the system architectures are independent of the communication between the »VisiWinNET®« visualisation system and the field devices, they can be freely combined.

More information regarding the communication with field devices can be found here:

▸ Field devices (📖 27)

4.1.1 Stand-alone application



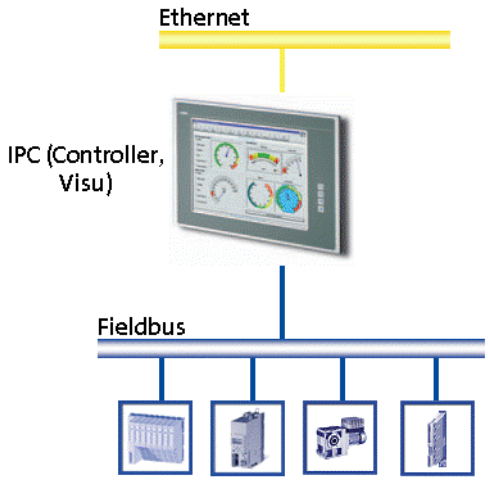
The control system and the visualisation (Visu) run on separate Controllers, respectively.

- The visualisation IPC (Visu) directly communicates with an external control system and the lower-level field devices. A fieldbus or a higher-level Ethernet network are used for communication.
- The visualisation can access variables of the Controller and (depending on the bus system) in addition can directly access parameters of the field devices (inverters).
- For the visualisation, a Panel PC/Industrial PC Embedded Line or a control cabinet PC/Controller with an external monitor panel can be used.

4.1.2 Integrated control system

Note!

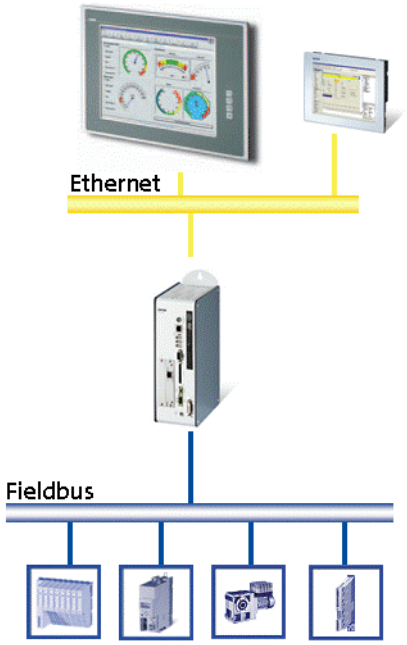
The integrated control system is only available for industrial PCs/Controllers with ...
- integrated monitor panel;
- DVI interface for an external monitor panel/display.



The control system and the visualisation run on the same industrial PC (Controller, Visu).

The visualisation (Visu) ...
- is directly coupled to the control system;
- can access variables of the control system and (depending on the bus system) in addition can directly access the parameters of the field devices (inverters.

4.1.3 Client/server system



The client/server system is a classical SCADA application (Supervisory Control and Data Acquisition).

A central server, industrial PC or Controller for data management (alarm, recipe, trend management) is typical of this application.

Operation and monitoring of the machine/system can be carried out via an optional number of client devices.

4.2 System components

4.2.1 Controller: "Controller-based Automation" (control technology release 3.x)

Lenze offers a range of different Controllers in cabinet and panel design. Depending on the application, the Controllers are available with different processors, panel sizes and operating systems (runtime, motion, visualisation).

More information about Lenze controllers in the "Controller-based Automation" system can be found in the following sets of documentation:

- **"Controller-based Automation" system manual**
- **Controller reference manual**

4.2.2 Industrial PCs (IPC): "PC-based automation" (control technology release 2.x)

The platform strategy of the Lenze Industrial PCs provides for individual system concepts with regard to the power, panel size, and function, producing various designs from which you can select the platform for your automation solution customised for each case.

This universal and scalable IPC platform is complemented by HMIs which are provided in fixed configurations and can also fulfil automation functions in a restricted way.

More information about Lenze Industrial PCs in the "PC-based automation" system can be found in the following sets of documentation:

- **"PC-based automation" system manual**
- **Industrial PC (IPC) software manual**

4.2.3 Operating system of the Lenze industrial PCs and Controllers

By default, the operating system is installed in the Lenze industrial PC/Controller as **"Runtime"** mode for the central control of PLC applications.

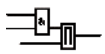
Optionally, the **"Motion"** mode is available, additionally enabling extensive motion control of Motion functions. The inverter then only acts as an actuating drive.

In addition, the **"Visualisation"** mode is available enabling a central visualisation with the industrial PC/Controller.

The operating system consists of:

- Windows® CE operating system
- "Runtime" or "Motion" operating system for controlling motion sequences
- Optional visualisation software (»VisiWinNET®« Compact CE).

Differences between "Runtime" and "Motion"

Runtime	Motion
	
The industrial PC/Controller controls simple motion sequences by logically combined control signals.	The industrial PC/Controller controls extensive motion sequences. the "Motion" operating system ... • contains the PLCopen library; • contains the "Runtime" operating system; • supports "SoftMotion" applications.
Logic applications are suitable for the control of inverters without a Motion functionality which ... • execute simple motion sequences; • can only be controlled via PLC functionality.	Motion applications are suitable... • for the control of inverters executing complex motion sequences of multi-axes in several dimensions; • ...for the control of devices that are to traverse synchronously; • for the transfer of setpoints.

Note!

Depending on the operating system used (Runtime/Motion), a fieldbus can only be used in a limited way for a Lenze device series.

Details can be found in the **communication manuals**:

- Controller-based Automation EtherCAT®
- Controller-based Automation CANopen®
- Controller-based Automation PROFIBUS®
- Controller-based Automation PROFINET®

4.2.3.1 "Visualisation" / runtime software "Visu" operating system

The "Visualisation" / runtime software "Visu" operating system ...

- extends the Lenze industrial PC/Controller to a visualisation device;
- can be used separately or in addition to the "Runtime" or "Motion" operating systems.

Engineering tool required: »VisiWinNET®«

All visualisation applications are executed within a runtime environment (runtime). The licence required for this purpose depends on the hardware operating system.

The "visualisation" / runtime software "Visu" operating system is not preinstalled on Lenze industrial PCs/Controllers but is loaded together with the visualisation application. By means of the »VisiWinNET®«, the required program parts are automatically compiled.

If you use the »VisiWinNET®« compact runtime software, the download is carried out directly from »VisiWinNET®«. In the case of the other runtime variants, »VisiWinNET®« creates a **setup file** which, apart from the actual runtime software, also contains the complete visualisation application, which must be installed on the respective target system.

Depending on the target system/operating system which is to be used for the visualisation process, various versions of the runtime software with different functional ranges are provided.

»VisiWinNET®« Compact CE

This runtime system for Windows® CE systems only requires a small amount of memory space and is specially designed for systems with a lower processor power. Typical scopes of application are the machine-oriented operation and monitoring with low demands with regard to the visualisation. They are used in stand-alone applications and integrated control systems.

The following Lenze devices can be used:

- Controller:
  - Panel Controller p300/p500
  - Cabinet Controller 3231 C/3241 C (with an external monitor panel/display)
- Industrial PCs:
  - Embedded Line EL 1800 - 9800
  - Command Station CS 5800 - 9800
  - Control cabinet PC CPC 2800
- HMIs:
  - EL 100
  - EL 100 PLC

»VisiWinNET®« Compact XP

This runtime system for Windows® XP Embedded systems only requires a small amount of memory space and is specially designed for systems with a lower processor power. Typical scopes of application are the machine-oriented operation and monitoring on Industrial PCs, where customised applications run alongside with the visualisation software. They are used in stand-alone applications.

The following Lenze devices can be used:

- Cabinet Controller 3241 C (with an external monitor panel/display)
- Industrial PCs:
  - Embedded Line EL 1800 - 9800
  - Command Station CS 5800 - 9800
  - Control cabinet PC CPC 2800

»VisiWinNET®« Standard XP

This runtime system for Windows® XP or Windows® XP Embedded is designed for a medium to high performance class. It is used in stand-alone applications.

The following Lenze devices can be used:

- Cabinet Controller 3241 C (with an external monitor panel/display)
- Industrial PCs:
  - Embedded Line EL 1800 - 9800
  - Command Station CS 5800 - 9800
  - Control cabinet PC CPC 2800

»VisiWinNET®« Standard Client/Server (C/S)

This runtime system for Windows® XP as client/server system offers the whole functional range of the »VisiWinNET®« standard. However, all information used commonly is managed centrally on one server.

So-called "Terminal Clients" serve as clients. They are simple Industrial PCs and HMIs under Windows® CE or Windows® XP without a special runtime software, to which only the visualisation application must be imported.

As an alternative, "Thin Clients" can also be used, which do not require any further installation, since the application completely runs in the server in this case.

The following Lenze devices are suitable for the use as server:

- Industrial PCs:
  - Embedded Line EL 1800 - 9800
  - Command Station CS 5800 - 9800
  - Cabinet Controller 3231 C/3241 C (with an external monitor panel/display)

The following Lenze devices are suitable for the use as client:

- Controller:
  - Panel Controller p300/p500
  - Cabinet Controller 3231 C/3241 C (with an external monitor panel/display)
- Industrial PCs:
  - Embedded Line EL 1800 - 9800
  - Command Station CS 5800 - 9800
  - Control cabinet PC CPC 2800
- HMIs:
  - EL 100
  - EL 100 PLC
- Thin clients:
  - Embedded Line EL 1800 - 9800 TC
  - Command Station CS 5800 - 9800 TC

Functional range of the runtime software variants

Application	Easy operation & monitoring under Windows® CE	Operation & monitoring under Windows® XP	Visualisation under Windows® XP for complex machine operation	Client/server applications for control room solutions
Target system	Windows® CE	Windows® XP Embedded	Windows® XP	Windows® XP or Windows® Server 2003
Runtime version	Compact CE	Compact XP	Standard XP	Standard XP / CS
Client / server	Only client	-	-	●
Development system(s)	»VisiWinNET®« Smart / Professional			»VisiWinNET®« Professional
Microsoft® Visual Studio .NET Required	Only for »VisiWinNET®« Professional			
Use of Word, Excel, and Outlook	-	●	●	●
Print	Only PCL printers	●	●	●
History / archive / trend	Online history (depending on the memory capacity)	Online history (depending on the memory capacity)	Online history	Online history
Alarm history	●	●	●	●
Logging	Restricted	Restricted	●	●
Number of pages	Depending on the memory capacity	Depending on the memory capacity	Unlimited	Unlimited
Object per image	Depending on the memory capacity	Depending on the memory capacity	Unlimited	Unlimited
System is OPC server	-	-	●	●
Connection via OPC	●	●	●	●
Connection via driver	Yes (only »VisiWinNET®« drivers)	Yes (only »VisiWinNET®« drivers)	●	●
Number of process variables	Max. 2000	Max. 2000	Unlimited	Unlimited
Logic	Under »VisiWinNET®« Smart restricted With »VisiWinNET®« Professional, individual system extensions can be integrated.			●
Recipes	XML	XML	XML / MDB	XML / MDB
Colour gradients	-	Option	Option	Option
Transparent objects	-	Option	Option	Option
FDA	Restricted	Restricted	●	●
Database handling	Only if application has been developed with »VisiWinNET®« Professional.			●

●: Function available
-: Function not available

4.2.3.2 Licence information for the visualisation

For executing the visualisation, a licence is required. The licence information indicates which »VisiWinNET®« runtime software version (compact, standard etc.) may be used, how many clients are allowed to log on to a client/server system, and how many variables (power tags) can be displayed via the visualisation.

Depending on the device type, the licence information is stored in different ways.

- Controller:
  - Panel Controller p300/p500
  - Cabinet Controller 3231 C/3241 C (with an external monitor panel/display)
- Industrial PCs:
  - Embedded Line EL 1800 - 9800
  - Command Station CS 5800 - 9800
  - Control cabinet PC CPC 2800

Under Windows® XP, the licence information can optionally be provided via a "Dongle" for the USB interface or via a licence file that is connected to the MAC address of the network interface card. The licence file is used by default.

Under Windows® CE, solely the use of the licence file is possible. The licence desired is specified with the order, so that the device can be delivered in a fully configured state.

The **EL 100** and **EL 100 PLC** HMIs are provided with a Visu licence by default (»VisiWinNET®« compact CE with a fixed number of power tags). This makes a separate dongle/separate licence file dispensable.

4.2.4 Field devices

The following field devices are supported:

- Inverter:
  - i700 servo inverter
  - Inverter Drives 8400 / 8400 motec / 8400 protec
  - Servo Drives 9400 Highline
  - ECS servo system
  - 8200 vector frequency inverter
  - 9300 servo inverters
- Further field devices:
  - I/O system 1000
  - I/O system IP20 compact/modular
  - Other devices for which an applicable device description file is available.
- Control systems:
  - Logic & Motion
  - Siemens Simatic® S7 300/400
  - VIPA
  - SAIA
  - Other control systems for which an OPC server or a »VisiWinNET®« direct driver is available.

Basically, two different scenarios with external control systems must be distinguished for the data to be visualised. This may lead to restricted access possibilities.

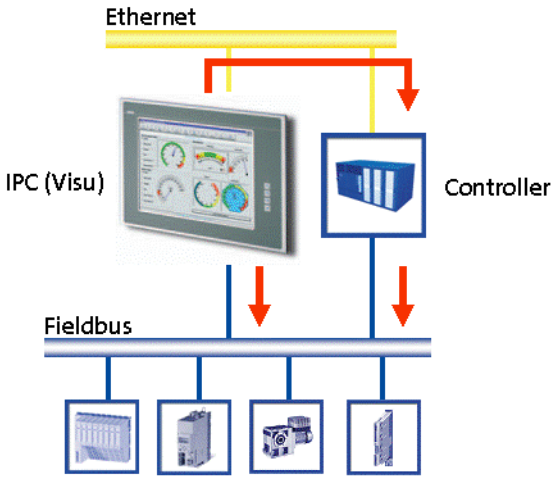
Further information on the system structure and the control system can be found in the following documentation:

- **"PC-based automation"** system manual (control technology release 2.x)
- **"Controller-based Automation"** system manual (control technology release 3.x)

4.2.4.1 Direct access to the field devices

Note!

- Direct access to the field devices connected to the fieldbus ensures a maximum independence of the two systems, but is rarely reasonable in practical operation.
- The configuration with independent control and visualisation systems is only recommended for systems without a Lenze control system!



The Controller and industrial PC (Visu) access the fieldbus (inverter) independently of each other.

The visualisation (Visu) can access the parameters of the field devices and the parameters of the controller.

Depending on the bus system used, several bus masters that are independent of each other can be used.

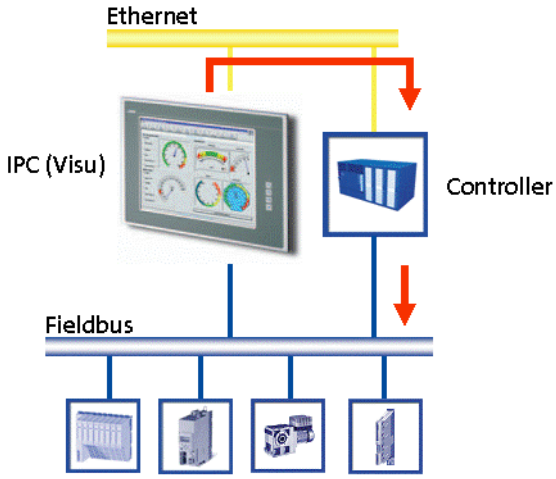
The visualisation may impact the real-time capability of the bus depending on the bus system used. Therefore this configuration is only suitable for Motion systems to a limited extent.

Field devices can be directly accessed via CANopen, for instance.

Details regarding the suitability of the respective field devices can be found here:

▸ Network topologies (📖 33)

4.2.4.2 Access to the control system and the field devices (inverters)



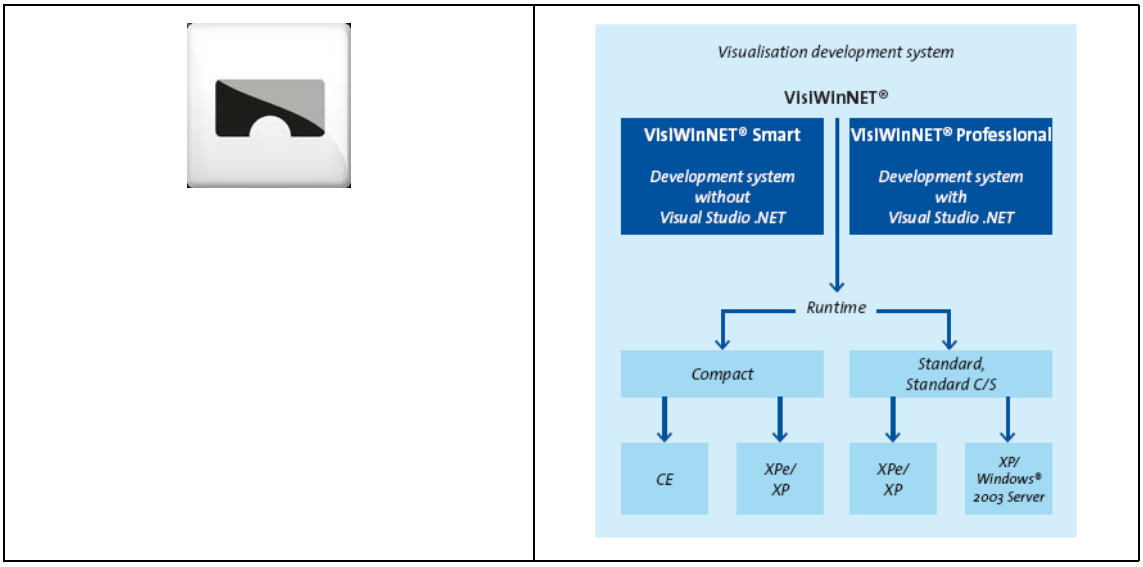
When using the Lenze control technology, the visualisation can directly access the field devices without any further impact, using the Industrial PC as gateway. When different control systems are used, this is usually not possible. Therefore it is recommended to only use data of the controller.

To display the data of the field devices (inverters) in the visualisation, the controller must import these data cyclically and transfer them to a transfer section (e.g. a data block) which is only accessed by the visualisation. This ensures field device data access without any further effects.

4.2.5 Engineering tool»VisiWinNET®«

With »VisiWinNET®«, Lenze provides a scalable Engineering tool to create visualisation applications according to individual requirements and load them on the Industrial PCs.

»VisiWinNET®« is provided in the versions »VisiWinNET®« Smart and »VisiWinNET®« Professional.



4.2.5.1 »VisiWinNET®« Smart

For easy interface creation, »VisiWinNET®« Smart provides a user-friendly visualisation system. It can be used as a flexible tool for the creation of simple applications or for service purposes.

»VisiWinNET®« Smart is provided with an individual full-graphics integrated development environment and supports the user by ready-made templates. One of the system's strong points is the possibility of combining it with »VisiWinNET®« Professional.

»VisiWinNET®« Smart is suitable for machine-oriented applications.

4.2.5.2 »VisiWinNET®« Professional

»VisiWinNET®« Professional is completely integrated into the Microsoft® Visual Studio .NET integrated development environment and provides the basis for the creation of visualisation and SCADA applications with a high functionality.

The ready-made templates and modules can be used to smoothly create applications via "drag and drop". If required, the system permits individual program-related changes on the basis of Visual Basic .NET and C#. This serves to solve company-specific and complex tasks when the standard visualisation functions are not sufficient.

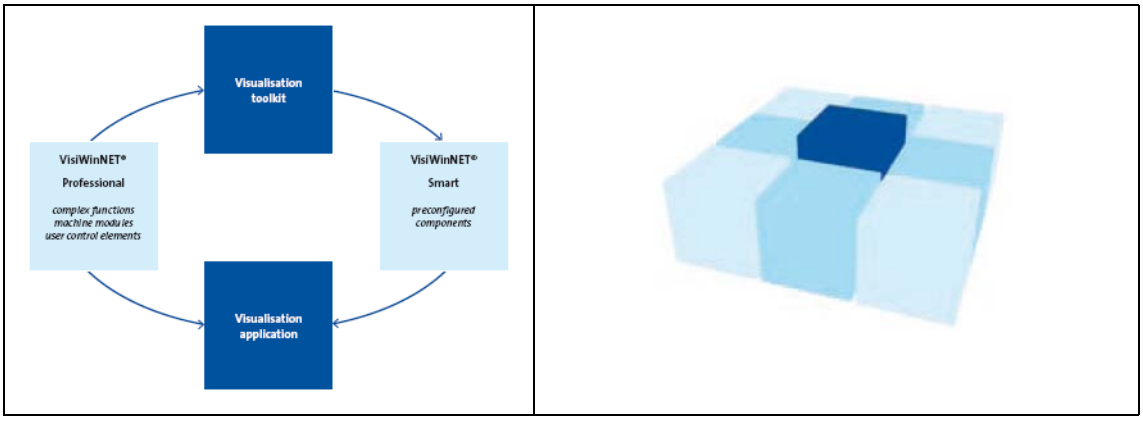
»VisiWinNET®« Professional is suitable for ...

- complex applications;
- client/server systems with SCADA applications;
- individual and company-related programming;
- the connection to databases or other Microsoft® Office programs;
- the use of complex report functions;
- establishing an individual visualisation kit.

4.2.5.3 Visualisation kit

The .NET functions and object-oriented programming enable the creation of individual control elements and machine modules. Using ready-made modules, individual visualisation kits can be implemented according to your personal requirements. In both systems, applications, except for scripts, can be edited reciprocally.

The easy handling of »VisiWinNET®« Smart and the openness of the more complex »VisiWinNET®« Professional provide substantial advantages when projects are edited reciprocally.



Note!

»VisiWinNET®« Professional is an expert system that requires special programming knowledge and goes far beyond the creation of a drag-and-drop system.

Hence, »VisiWinNET®« Professional is not available as a catalog product!

4.2.6 Backup of visualisation data (UPS functionality)

The **Controllers 3221 C/3231 C** back up the visualisation data cyclically every 60 seconds. The visualisation data backed up are therefore not exactly up-to-date after a voltage failure. Depending on the time at which the voltage failure occurs, the data status backed up may be out-of-date for up to 59 seconds (the interval between two backup processes is 60 seconds).

When a voltage failure occurs, the **Controllers 3241 C** back up the visualisation data on the SD card in an exactly isochronous fashion if a capacitor pack (CAPS-PACK) is connected.

The **Controllers p300/p500** are equipped with implemented UPS for the buffering of visualisation data.

The **EL 100** and **EL 100 PLC** HMIs are provided with an internal capacitor for buffering the current supply. Like this, remanent PLC variables can be saved with mains failure protection.

Industrial PC/HMI and Controller reference manual

Here, further information can be found.

4.2.6.1 Capacitor pack (CAPS-PACK)

The capacitor pack serves to buffer the current supply of the controller/IPC for some seconds. Like this, current fluctuations can be compensated.

In the case of a power failure, the capacitors ensure the current supply. Within this protected time, specially marked variable contents (remanent PLC variables) can be saved.

The following controllers and Industrial PCs can be equipped with a capacitor pack (CAPS-PACK) for backup:

- Controller 3241 C
- EL 1800 - 9800
- CS 5800 - 9800
- CPC 2800

4.2.6.2 Battery pack (ACCU-PACK)

The battery pack serves to bridge longer power failures. Within this protected time, further data from the visualisation can be saved (in addition to the remanent PLC variables).

Alarms, batch protocols, trends, or recipe data can be saved. If this data has been defined as remanent memory data it will be written to the memory card via a cache of a variable size.

If a power failure occurs, the battery pack activates an alarm and all data in the cache will be saved. When the system is restarted, the data saved with mains failure protection will still be available.

The following controllers and Industrial PCs can be equipped with a battery pack (ACCU-PACK) for backup:

- EL 1800 - 9800
- CS 5800 - 9800
- CPC 2800

4.3 Network topologies

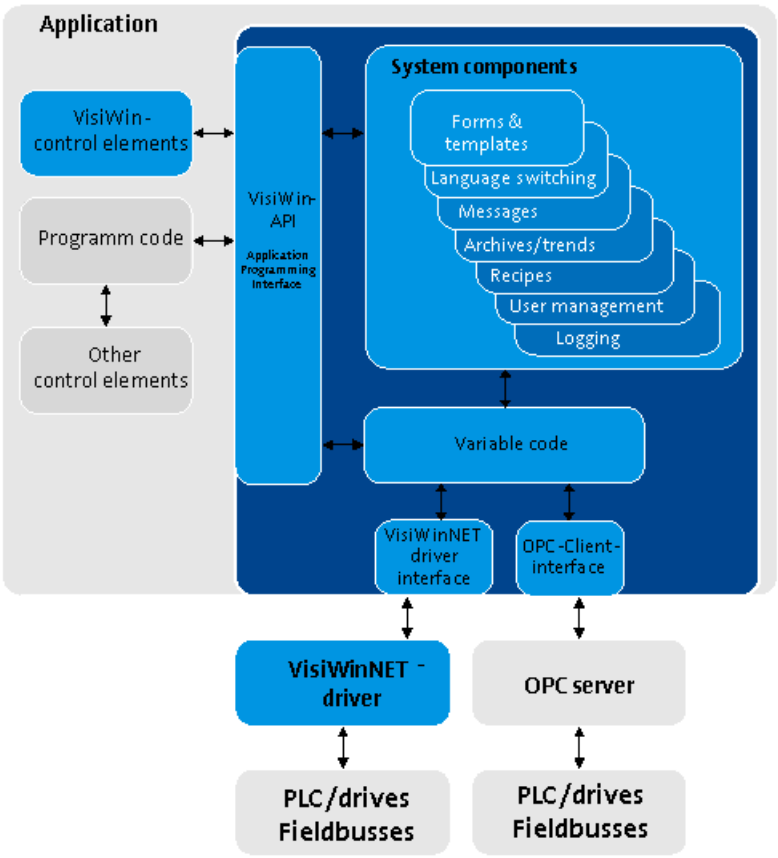
The Lenze visualisation system supports different control and bus systems connected via »VisiWinNET®« channels. Depending on the control or bus system used, the communication and network options are different.

Communication has an impact on the usability of the operating systems and device lines.

4.3.1 Channels

The following »VisiWinNET®« communication channel types are distinguished:

- »VisiWinNET®« driver (direct driver)
- OPC server



Note!

There is no OPC server available for **PROFIBUS** and **PROFINET**.

Controller p300:

- The OPC communication for »VisiWinNET« is exclusively available for Controller p300 without PLC.
- Otherwise, only the Lenze "Logic&Motion" direct driver can be used for the data exchange between »VisiWinNET« and PLC.

Depending on the bus system, either a »VisiWinNET®« driver (direct driver) or an OPC server is provided.

Direct drivers...	OPC servers...
• are contained in the scope of supply of the »VisiWinNET®« development packages. • are transferred from the Engineering PC to the Industrial PC when the visualisation application is downloaded. • are specially tailored to »VisiWinNET®« and can only be used for this software program.	• can be universally used and offer an open interface. Like this, it is basically possible to integrate other control or bus systems into »VisiWinNET®« if a suitable OPC server is available. • usually must be installed separately.

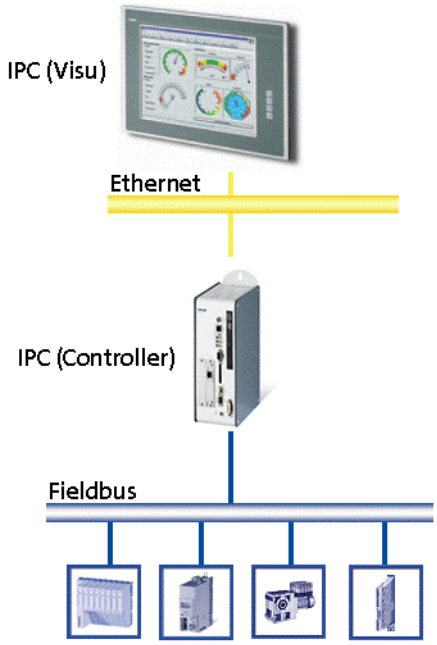
▸ Stand-alone application (📖 17)
▸ Integrated control system (📖 18)

CODESYS® OPC server V3 user manual

Here you will find detailed information on the installation and use of the CODESYS® OPC server V3.

The »PLC Designer« online help provides a link to the user manual (PDF).

Remote access



Remote access allows you to separate the control system and visualisation on physically separated industrial PCs. The system structure is basically similar to a Client/server system (📖 19).

- Remote access may be reasonable if a control system runs on a control cabinet PC, but no monitor panel is available. In contrast to the client/server system, it is not possible to implement several operator terminals.
- Depending on the fieldbus, direct drivers (optimised for remote access) or remote-capable OPC servers can be used.
  ▸ Channels (📖 33)

4.3.2 Browsing variables

For defining the variables to be displayed, »VisiWinNET®« allows you to "browse" variables.

Depending on the bus system and the control system type, there are different file formats from which »VisiWinNET®« can take the variable information and offer it for selection.

- In the case of CANopen, this is for instance an EDS file containing the parameters of the corresponding device.
- This can also be the project file of a control program (e.g. Logic & Motion, CODESYS®, STEP7® program), containing the variables of the control.

Tip!

The »VisiWinNET®« project wizard helps you to select the right browser.

Browsing online/offline

With an automation system that is already completely available, some browsers allow you to browse the system from »VisiWinNET®« (online browsing).

In practical operation, online browsing is rarely used because the system is often not yet complete and still has to be commissioned.

As an alternative, offline browsing is possible, which requires special device description files that contain the parameter information of a specific device type. Depending on the control and bus system, these files differ from each other.

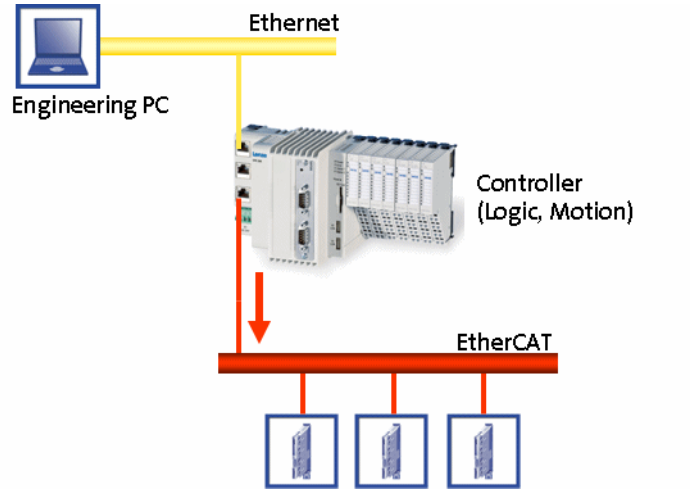
4.3.3 EtherCAT®

Note!

For Industrial PCs of the **EL 1xx**, **EL x8xx**, **CS x8xx**, and **CPC x8xx** series in control technology release 2.5, the EtherCAT bus system is not provided.

The EtherCAT bus system only allows one single master. Since the master functionality is typically assigned to the control system, it is not possible that another controller accesses field devices independently of the control system.

The Lenze controllers **3231 C/3241 C** and **p300/p500** are equipped with an "on board" EtherCAT interface.



[4-1] **Sample configuration:** Controller 3200 C with EtherCAT

For more information on the use of EtherCAT®, please see the following sets of documentation:

- **"Controller-based Automation" system manual**
- **"Controller-based Automation - EtherCAT®" communication manual**

Tip!

Lenze offers complete solutions for EtherCAT as part of the "Logic & Motion" control technology.

Furthermore, »VisiWinNET®« can be used together with other EtherCAT control systems via Ethernet if appropriate OPC servers or »VisiWinNET®« direct drivers are available.

Available runtime software for Lenze controllers

Controllers	Runtime Software	Access	Driver type	Driver name	Communication type	Browser
3231 C **3241 C** **p300** **p500**	**Windows® Compact CE** Logic Motion Visu	Field devices	OPC	Lenze.Digitec.OPCTunnel.DA)	EtherCAT OPC Tunnel	Offline (EDS/DCF/GDC [1])
				Lenze.OPC_EtherCAT_CE	EtherCAT OPC Server	Offline (EDS/DCF/GDC [1])
		PLC variables (Logic & Motion)	OPC	Lenze.Digitec.OPCTunnel.DA)	SoftPLC OPC Tunnel	Offline (SYM)
				CODESYS.OPC.DA)	SoftPLC OPC Server	Online/offline (SYM)
		IPC parameters	OPC	Lenze.Digitec.OPCTunnel.DA)	Data manager OPC tunnel	Offline (EDS/DCF)

1) Available from »VisiWinNET®« version 6.4.

4.3.4 CANopen®

Note!

- Due to the access mechanisms of the CAN bus, the real-time capability of the bus may be influenced by the visualisation if visualisation and control system communicate independently of each other with the field devices via CAN. Therefore, this constellation is only with restrictions suitable for the use in Motion systems.
  This restriction does not apply to the Lenze Logic & Motion control system!
- As an alternative, it is recommended to access the variables of the field devices via Ethernet and control system IPC.

▸ Access to the control system and the field devices (inverters) (📖 29)

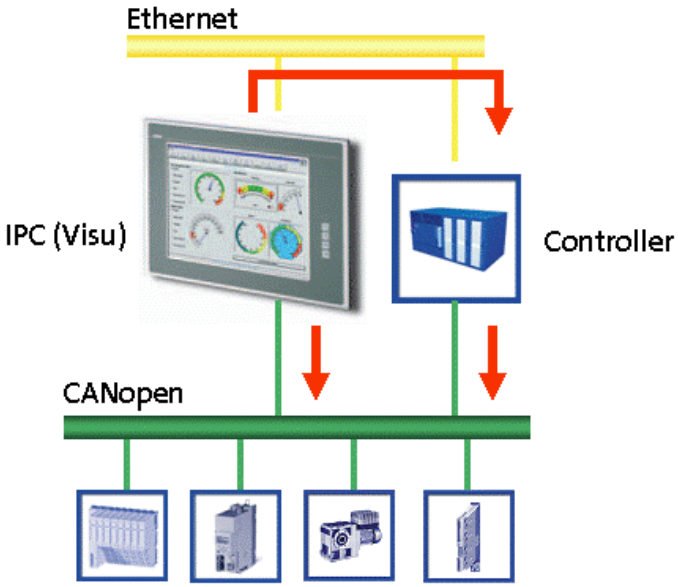
Controller p300 ...

- are equipped with an integrated CAN communication interface (on board);
- only support the CAN master functionality.

The optional **MC-CAN2** communication card is not supported by controllers p300.

Visualisation applications with CANopen are available for the following Lenze devices:

- HMI series EL 100
- Industrial PCs: EL 1800-9800, CS 5800-9800 and CPC 2800
  The Industrial PCs use an OPC server for communication.
- Cabinet Controller 3231 C/3241 C (with an external monitor panel/display)
- Panel Controller p300/p500



Under Windows® CE, a direct driver is provided for communication.

Functional range

- Direct access to field devices via CANopen.
  ▸ Access to the control system and the field devices (inverters) (📖 29)
- Control system access via CAN if the control systems have an SDO object directory.
- Control system access via Ethernet if an OPC server is available.
- SDO and PDO access (only with direct drivers).
- Visualisation variables can be imported from EDS/DCF/GDC files.

For more information regarding the use of CANopen®, please see the following sets of documentation:
- **"Controller-based Automation" system manual**
- **"Controller-based Automation - CANopen®" communication manual**

Runtime software available for the corresponding device series

Hardware	HMI	Industrial PCs			Controllers			
		Embedded Line	Command Station	Control cabinet PC	Cabinet Controller		Panel Controller	
Device type	EL 100 EL 100 PLC	EL 1800 - 9800	CS 5800 - 9800	CPC 2800	3231 C	3241 C	p300	p500
Example illustration								
"Visu" runtime software								
»VisiWinNET®« Compact CE	●	●	●	●	● 1)	● 1)	●	●
»VisiWinNET®« Compact XP	-	●	●	●	-	● 1)	-	-
»VisiWinNET®« Standard XP	-	●	●	●	-	● 1)	-	-
»VisiWinNET®« Standard Client/server XP	-	●	●	●	-	● 1)	-	-
Communication								
CAN interface (on board)	●	-	-	-	-	-	● 2)	-
MC-CAN2 (optional)	-	●	●	●	●	●	-	●

●: Function available
-: Function not available
1) For 3231 C/3241 C, only with external monitor panel/display at DVI interface.
2) Controllers p300 only support the CAN master functionality.

Available communication drivers and browsers

Device type	Runtime Software	Access	Driver type	Driver name	Communication type	Browser
Controllers **3231 C** **3241 C** **p300** **p500**	**Windows® CE** Logic Motion Visu	Field devices	OPC	Lenze.Digitec.OPCTunnel.DA [1)]	CAN OPC tunnel	Offline (EDS/DCF/GDC [1)])
				Lenze.OPC_CANbus_CE [1)]	CAN OPC server	Offline (EDS/DCF/GDC [1)])
		PLC variables (Logic & Motion)	OPC	Lenze.Digitec.OPCTunnel.DA [1)]	SoftPLC OPC Tunnel	Offline (SYM)
				CODESYS.OPC.DA [1)]	SoftPLC OPC Server	Online/offline (SYM)
		Parameter of the controller/IPC	OPC	Lenze.Digitec.OPCTunnel.DA)	Data manager OPC tunnel	Offline (EDS/DCF)
EL 1800-9800 **CS 5800-9800** **CPC 2800**	**Windows® XP** Visu	Field devices	OPC	Lenze OPC system bus server	Lenze system bus OPC server	Offline (EDS/DCF/GDC[1)])
	Windows® CE Logic Motion Visu	Field devices	OPC	Lenze.Digitec.OPCTunnel.DA [1)]	CAN OPC tunnel	Offline (EDS/DCF/GDC [1)])
				Lenze.OPC_CANbus_CE [1)]	CAN OPC server	Offline (EDS/DCF/GDC [1)])
		PLC variables (Logic & Motion)	OPC	Lenze.Digitec.OPCTunnel.DA [1)]	SoftPLC OPC Tunnel	Offline (SYM)
				CODESYS.OPC.DA [1)]	SoftPLC OPC Server	Online/offline (SYM)
		Parameter of the controller/IPC	OPC	Lenze.Digitec.OPCTunnel.DA)	Data manager OPC tunnel	Offline (EDS/DCF)
EL 100		Field devices	Direct driver	Lenze CAN CE driver	»VisiWinNET®« LenzeCAN Driver	Offline (EDS/DCF[1)]/GDC)
EL 100 PLC		Field devices	Direct driver	Lenze CAN CE driver	»VisiWinNET®« Lenze CAN Driver	Offline (EDS/DCF[1)]/GDC)
		PLC variables (Logic & Motion)	Direct driver	Driver for CODESYS® runtimes	»VisiWinNET®« CODESYS® driver	Offline (SYM)

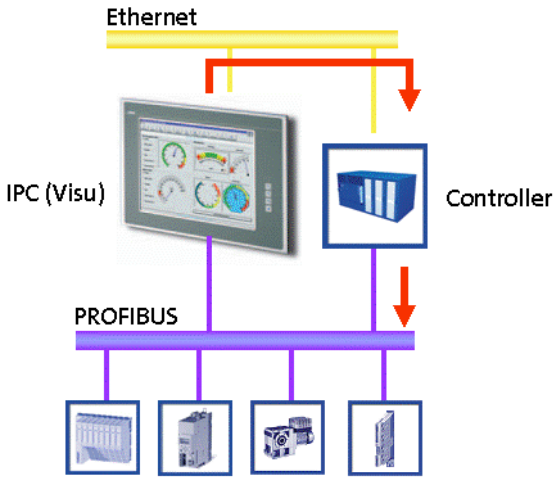
1) Function is available from »VisiWinNET®« version 6.4!

4.3.5 PROFIBUS®

Visualisation applications with PROFIBUS are available for the following Lenze devices:

- HMI series EL 100
- Industrial PCs: EL 1800-9800, CS 5800-9800 and CPC 2800
  The Industrial PCs use an OPC server for communication.
- Cabinet Controller 3231 C/3241 C (with an external monitor panel/display)
- Panel Controller p300/p500

Under Windows® CE, a direct driver is provided for communication.



The connection of the visualisation to PROFIBUS makes use of the properties that the MPI protocol is "tunnelled" on PROFIBUS and the connection of an MPI node to PROFIBUS is identical as regards the hardware. Thus a direct connection to a Siemens S7 control is possible without logging on a separate PROFIBUS node in the control configuration.

For this purpose, the Industrial PCs are equipped with a communication card (MC-MPI), whereas the interface is already available on-board for the EL 100 with the MPI variant.

To facilitate the creation of an application in »VisiWinNET®«, the variables can be imported from an S7-PLC program. Communication drivers are available for all runtime systems.

Functional range

- Access to Siemens S7-300/400 control systems via PROFIBUS (MPI)
- Access to other controls via Ethernet if an OPC server or »VisiWinNET®« direct driver is available.
- Visualisation variables can be imported from STEP7®.

Note!

The data of the connected PROFIBUS slaves **cannot** be directly accessed!

As an alternative, the control system can access variables of the field devices. The control system automatically reads in the variables and provides them to the visualisation in a transfer area.

▸ Access to the control system and the field devices (inverters) (📖 29)

For more information regarding the use of PROFIBUS®, please see the following sets of documentation:

- **"Controller-based Automation" system manual**
- **"Controller-based Automation - PROFIBUS®" communication manual**

Runtime software available for the corresponding device series

Hardware	HMI	Industrial PCs			Controllers			
		Embedded Line	Command Station	Control cabinet PC	Cabinet Controller		Panel Controller	
Device type	EL 100 EL 100 PLC	EL 1800 - 9800	CS 5800 - 9800	CPC 2800	3231 C	3241 C	p300	p500
Example illustration								
"Visu" runtime software								
»VisiWinNET®« Compact CE	●	●	●	●	● 1)	● 1)	●	●
»VisiWinNET®« Compact XP	-	●	●	●	-	● 1)	-	-
»VisiWinNET®« Standard XP	-	●	●	●	-	● 1)	-	-
»VisiWinNET®« Standard Client/server XP	-	●	●	●	-	● 1)	-	-
Communication								
MPI (on board)	●	-	-	-	-	-	●	-
MC-MPI (optional)	-	●	●	●	●	●	-	●
MC-PBM, master (optional)	-	●	●	●	●	●	-	●
MC-PBS, slave (optional)	-	●	●	●	●	●	-	●

●: Function available
-: Function not available
1) For 3231 C/3241 C, only with external monitor panel/display at DVI interface.

Overview of the communication drivers and browsers available

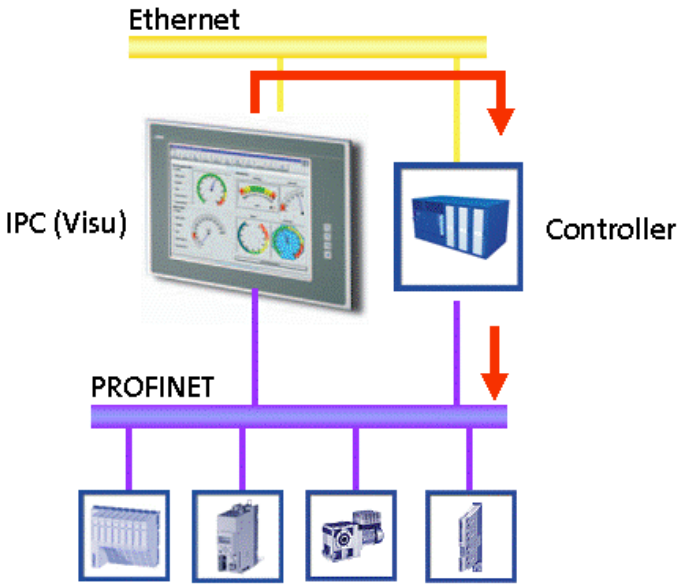
Device type	Runtime Software	Access	Driver type	Driver name	Communication type	Browser
Controllers **3231 C** **3241 C** **p300** **p500**	**Windows® CE** Visu	PLC variables (external control)	Direct driver	Lenze MPI CE driver	»VisiWinNET®« LenzeMPI Driver (Basic datatypes syntax / Instruction list AWL syntax)	Offline (SDF, IL)
EL 100 **EL 100 PLC**						
EL 1800-9800 **CS 5800-9800** **CPC 2800**	**Windows® XP** Visu	PLC variables (external control)	Direct driver	»VisiWinNET®« driver S7 for Lenze MC MPI	»VisiWinNET®« LenzeMPI Driver (Basic datatypes syntax / Instruction list AWL syntax)	Offline (SDF, IL)
	Windows® CE Visu	PLC variables (external control)	Direct driver	»VisiWinNET®« driver S7 for Lenze MC MPI	»VisiWinNET®« LenzeMPI Driver (Basic datatypes syntax / Instruction list AWL syntax))	Offline (SDF, IL)
	Windows® CE Logic Motion	PLC variables (Logic & Motion)	OPC	Lenze.Digitec.OPCTunnel.DA [1)]	SoftPLC OPC Tunnel	Offline (SYM)
				CODESYS.OPC.DA [1)]	SoftPLC OPC Server	Online/offline (SYM)
		IPC parameters	OPC	Lenze.Digitec.OPCTunnel.DA)	Data manager OPC tunnel	Offline (EDS/DCF)

1) Function is available from »VisiWinNET®« version 6.4!

4.3.6 PROFINET®

Visualisation applications with PROFINET are available for the following Lenze devices:

- HMI series EL 100
- Industrial PCs: EL 1800-9800, CS 5800-9800 and CPC 2800
  The Industrial PCs use an OPC server for communication.
- Cabinet Controller 3231 C/3241 C (with an external monitor panel/display)
- Panel Controller p300/p500



[4-2] Basic structure of a visualisation system with PROFINET

Here, the PROFINET property is used, that each PROFINET switch allows for the connection of standard Ethernet devices to PROFINET and real time on the bus is nevertheless ensured. This provides the possibility of using the RFC1006 protocol (MPI via TCP/IP). The advantages of this solution are that no special PROFINET interface is required and the visualisation does not need to be logged on explicitly as PROFINET node in the control configuration.

The Lenze Industrial PCs, the controllers, and the EL100 HMI series are provided with an "on board" Ethernet interface suitable for connection to a PROFINET switch.

To facilitate the creation of applications in »VisiWinNET®«, all variables can be imported from an STEP7® PLC program. Communication drivers are available for all runtime systems.

Functional range

- Access to Siemens S7-300/400 control systems via PROFIBUS (MPI)
- Access to VIPA control systems via PROFINET (RFC1006)
- Visualisation variables can be imported from STEP7®

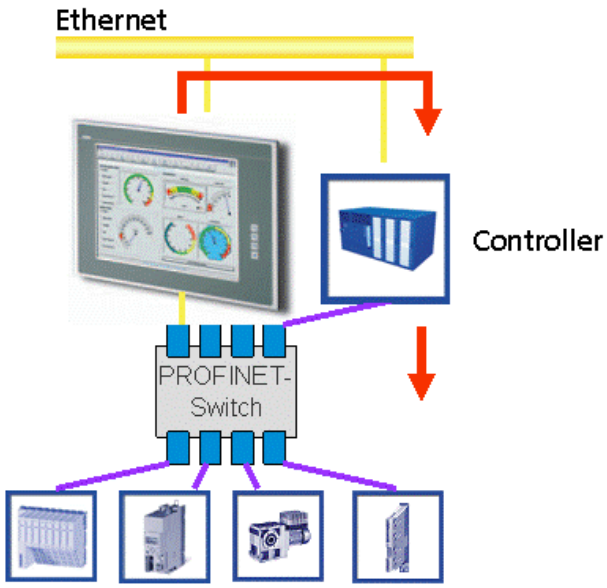
Note!

The data of the PROFINET field devices connected cannot be accessed directly! As an alternative, the variables of the field devices should be accessed via the control system.

▸ Access to the control system and the field devices (inverters) (📖 29)

From the view of wiring, a PROFINET network is not a bus in the true sense, but a "switched" Ethernet with point-to-point connections.

- This structure is described below. The real time data transfer runs via the connections printed in violet.
- The connections printed in yellow are purely used for Ethernet data transfer. Data are also transferred via PROFINET without real time interferences.



For more information regarding the use of PROFINET®, please see the following sets of documentation:

- **"Controller-based Automation" system manual**
- **"Controller-based Automation - PROFINET®" communication manual**

Runtime software available for the corresponding device series

Hardware	HMI	Industrial PCs			Controllers			
		Embedded Line	Command Station	Control cabinet PC	Cabinet Controller		Panel Controller	
Device type	EL 100 EL 100 PLC	EL 1800 - 9800	CS 5800 - 9800	CPC 2800	3231 C	3241 C	p300	p500
Example illustration								
"Visu" runtime software								
»VisiWinNET®« Compact CE	●	●	●	●	● 1)	● 1)	●	●
»VisiWinNET®« Compact XP	-	●	●	●	-	● 1)	-	-
»VisiWinNET®« Standard XP	-	●	●	●	-	● 1)	-	-
»VisiWinNET®« Standard Client/server XP	-	●	●	●	-	● 1)	-	-
Communication								
Ethernet interface (on board)	●	●	●	●	●	●	●	●
MC-PND, I/O device (optional)	-	●	●	●	●	●	-	●

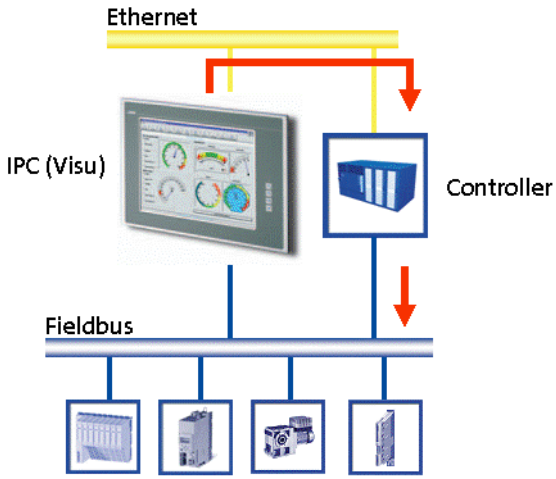
●: Function available
-: Function not available
1) For 3231 C/3241 C, only with external monitor panel/display at DVI interface.

Available communication drivers and browsers

Device type	Runtime Software	Access	Driver type	Driver name	Communication type	Browser
Controllers 3231 C 3241 C p300 p500	**Windows® CE** Visu	PLC variables (external control)	Direct driver	»VisiWinNET®« driver for Siemens S7 TCP/IP	»VisiWinNET®« LenzeMPI Driver (Basic datatypes syntax / Instruction list AWL syntax)	Offline (SDF, IL)
EL 100 EL 100 PLC						
EL 1800-9800 CS 5800-9800 CPC 2800	**Windows® XP** Visu	PLC variables (external control)	Direct driver	»VisiWinNET®« driver for Siemens S7 TCP/IP	»VisiWinNET®« LenzeMPI Driver (Basic datatypes syntax / Instruction list AWL syntax)	Offline (SDF, IL)
	Windows® CE Visu	PLC variables (external control)	Direct driver	»VisiWinNET®« driver for Siemens S7 TCP/IP	»VisiWinNET®« LenzeMPI Driver (Basic datatypes syntax / Instruction list AWL syntax))	Offline (SDF, IL)

4.3.7 Ethernet

Most control systems are equipped with an integrated Ethernet connection. Since Ethernet is much more powerful than most fieldbuses, it is recommended to access the control system via Ethernet (and not via the lower-level fieldbus system).



This option has been described in the previous bus-specific chapters. There is no general possibility of accessing optional field devices via Ethernet because Ethernet only describes the physical bus features, but not the transmission protocol. Depending on the field device to be addressed, different Ethernet protocols are required.

Lenze supports the RFC1006 Ethernet protocol which is based on TCP/IP and is supported by many control system manufacturers. Control systems by the following manufacturers can be accessed via RFC1006:

- Siemens S7-300/400
- VIPA
- SAIA

In addition, drivers for access to the following control systems are available:

- Industrial PCs (PC-based Automation): 3S Smart Software Solutions (CODESYS® V2.x)
- Controller (Controller-based Automation): 3S Smart Software Solutions (CODESYS® V3.x)

Runtime software available for the corresponding device series

Hardware	HMI	Industrial PCs			Controllers			
		Embedded Line	Command Station	Control cabinet PC	Cabinet Controller		Panel Controller	
Device type	EL 100 EL 100 PLC	EL 1800 - 9800	CS 5800 - 9800	CPC 2800	3231 C	3241 C	p300	p500
Example illustration								
"Visu" runtime software								
»VisiWinNET®« Compact CE	●	●	●	●	● 1)	● 1)	●	●
»VisiWinNET®« Compact XP	-	●	●	●	-	● 1)	-	-
»VisiWinNET®« Standard XP	-	●	●	●	-	● 1)	-	-
»VisiWinNET®« Standard Client/server XP	-	●	●	●	-	● 1)	-	-
Communication								
Ethernet interface (on board)	●	●	●	●	●	●	●	●

●: Function available
-: Function not available
1) For 3231 C/3241 C, only with external monitor panel/display at DVI interface.

Available communication drivers and browsers

Device type	Runtime Software	Access	Driver type	Driver name	Communication type	Browser
Controllers **3231 C** **3241 C** **p300** **p500**	**Windows® CE** Visu	PLC variables (external control)	Direct driver	»VisiWinNET®« driver for Siemens S7 TCP/IP	»VisiWinNET®« LenzeMPI Driver (Basic datatypes syntax / Instruction list AWL syntax)	Offline (SDF, IL)
EL 100 **EL 100 PLC**						
EL 1800-9800 **CS 5800-9800** **CPC 2800**	**Windows® XP** Visu	PLC variables (external control)	Direct driver	»VisiWinNET®« driver for Siemens S7 TCP/IP	»VisiWinNET®« LenzeMPI Driver (Basic datatypes syntax / Instruction list AWL syntax)	Offline (SDF, IL)
	Windows® CE Visu	PLC variables (external control)	Direct driver	»VisiWinNET®« driver for Siemens S7 TCP/IP	»VisiWinNET®« LenzeMPI Driver (Basic datatypes syntax / Instruction list AWL syntax))	Offline (SDF, IL)
		PLC variables (CODESYS®)	OPC	CODESYS.OPC.DA)	SoftPLC OPC Server	Offline (SDF, IL)
		PLC variables (Logic & Motion)	OPC	Lenze.Digitec.OPCTunnel.DA [1)]	SoftPLC OPC Tunnel	Online/offline (SYM)
			OPC	CODESYS.OPC.DA [1)]	SoftPLC OPC Server	Online/offline (SYM)

1) Function is available from »VisiWinNET®« version 6.4!

4.3.8 Further bus systems

In addition to access via individual direct drivers, »VisiWinNET®« also allows you to access field devices via standardised OPC servers. If a standardised OPC server is available, any devices can be integrated in »VisiWinNET®«.

Note!

Lenze only ensures the correct system function for communication systems for which Lenze offers corresponding drivers and OPC servers in »VisiWinNET®«.

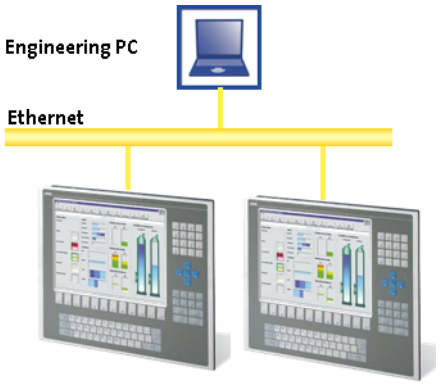
Lenze accepts no system responsibility for drivers and OPC servers not originating from Lenze!

5 Commissioning

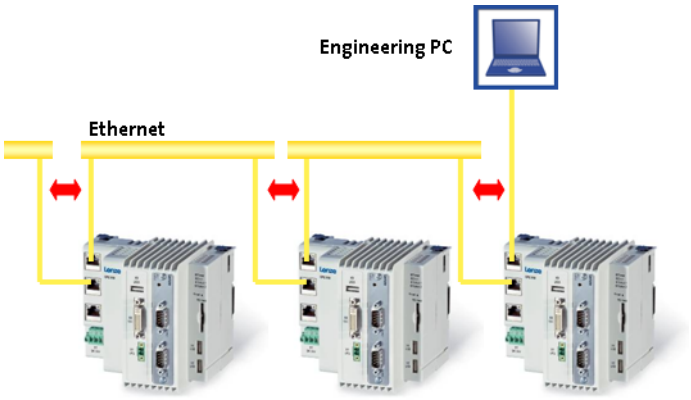
For commissioning the visualisation system you need an Engineering PC. This can be a standard laptop.

The programs required for configuring, parameterising, and commissioning the visualisation system are installed on the Engineering PC.

- Engineering tool»VisiWinNET®« (📖 30)



[5-1] Sample configuration with industrial PCs of the EL series



[5-2] Example configuration with 3200 C controllers (connected to each other via an internal switch)

The Engineering PC...

- is connected with the Industrial PC/Controller via Ethernet.
- is used to transfer the runtime software to the Industrial PC/Controller.

For operating the visualisation system, the Engineering PC is not required anymore.

An Engineering PC can be used to configure any number of industrial PCs.

Note!

Controller 3231/3241 C and p500

During the DHCP configuration with an unplugged Ethernet cable, the local visualisation cannot be operated for approx. 20 s.

Software manual/online help »VisiWinNET®« - Getting started

Here you'll find more information relating to the commissioning of an Industrial PC/ controller as visualisation device.

6 Remote maintenance and diagnostics

For a remote maintenance of a Controller, the standard mechanisms for remote maintenance of a PC can be used.

The standard mechanisms ...

- are based on Ethernet protocol and the protocols used for Ethernet;
- can be used between the Engineering/remote maintenance PC (Remote PC) and the corresponding Lenze controller, industrial PC or HMI.

The Engineering PC and remote PC are either connected directly to each other, or via remote connection.

The access mechanisms to a Lenze Controller, Industrial PC, or HMI can be used ...

- with direct connection between the PCs within a local network;
- with a remote connection.

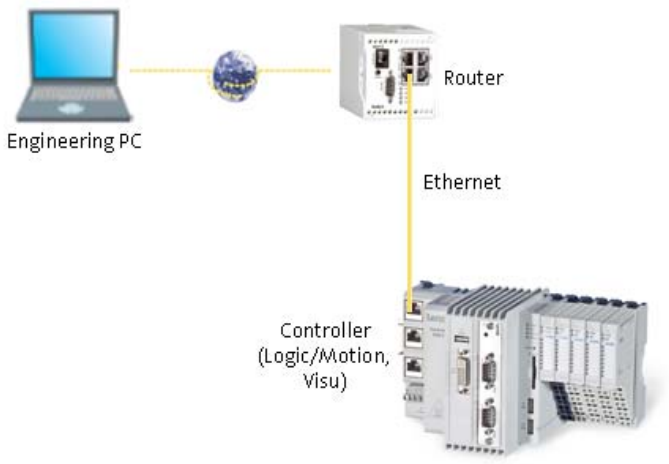
6.1 Remote maintenance with an external router

Establishing a remote connection requires an external router which establishes the remote connection between two network segments.

The router has to be configured separately and has to be connected to the Lenze controller, industrial PC or HMI by one of the following types of connection:

- DSL
- ISDN
- Analog (modem)

Remote maintenance via an external router is advisable if remote maintenance is required for several Controllers, industrial PCs or HMIs.

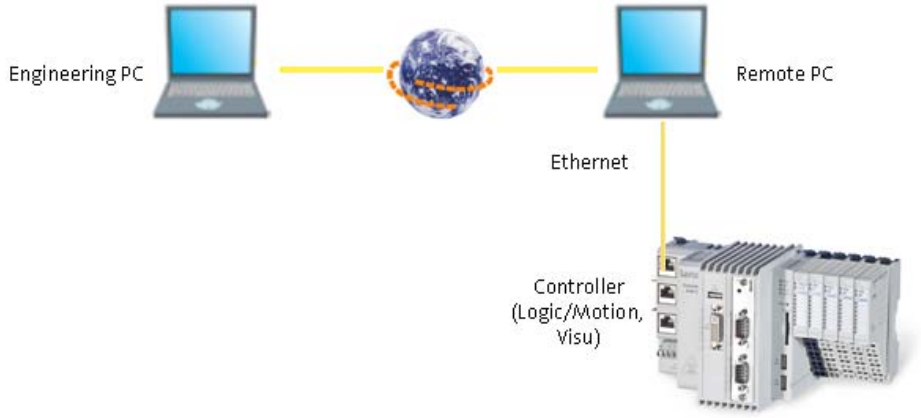


6.2 Remote maintenance with a separate remote PC

Note!

Setting a remote maintenance may endanger the IT safety!

- This is particularly relevant if the remote PC is connected to an Ethernet network.
- Contact your IT administrator to take the necessary safety measures.



[6-1] **Sample configuration:** Remote maintenance of a Controller 3200 C

- The Engineering PC accesses the separate remote PC via an internet connection.
- The remote PC is connected to the Lenze controller, industrial PC, or HMI via Ethernet.
- On the remote PC, the Lenze engineering tools (such as »EASY Starter«, »PLC Designer«) are installed.
- The remote PC can be controlled from the Engineering PC via screen redirection.
  ▸ »Virtual Network Computing (VNC)«: Redirecting screen contents/entries (📖 58)

The screen contents of the controller, industrial PC, or HMI are redirected to the remote PC. This makes it possible to actuate the functions of the device, for instance the same programs as for the local connection via Ethernet can be used.

A basic overview of the different dial-in programs can be found in the following section.

6.3 Log-in on an IPC of the x800 device series (PC-based automation)

An RAS server runs on the IPCs. A user can log-in via modem/ISDN card on this RAS server. If someone dials-in from a remote maintenance PC via this medium, the IPC executes a password check and then activates the connection.

Further information about the function and configuration of RAS servers can be found in the following documentations:

"HMI EL 1xx" device series:

- **HMI EL 100 with Windows® CE**

Controller 3200 C / p300 / p500:

- **Controller reference manual**

6.4 Computer access via Telnet

Telnet is a standard mechanism for experts to change system settings.

Telnet ...

- enables the access to the Controller data (example: Contents of the SD card);
- requires an existing local connection or remote connection.

Note!

Controller p300:

- These devices come with a deactivated Telnet in the Lenze standard setting.
- The function can be activated via the »WebConfig«. The activation of the function can influence the real-time behaviour.
- After a restart of the Controller, the function is deactivated again.

6.5 File transfer via FTP

The File Transfer Protocol (FTP) is a network protocol for the transfer of data within networks.

- FTP makes it possible to exchange files between the Lenze controller, IPC, or HMI and other PCs.
- The controller, IPC, or HMI data can be accessed via FTP connection.
- FTP requires an existing connection or a remote connection.
- In order to be able to transfer files with Windows® via FTP, the Windows® Explorer can be used which comes with an integrated FTP support.

Note!

FTP must be used for system-diagnostic purposes only. Deleting or changing system files causes malfunctions of the controller!

Controller p300:

- These devices come with a deactivated FTP in the Lenze standard setting.
- The function can be activated via the »WebConfig«. The activation of the function can influence the real-time behaviour.
- After a restart of the Controller, the function is deactivated again.

Controller reference manual

Here you will find further information on the function and configuration of FTP and web server/»WebConfig«.

6.6 Web server/»WebConfig«

The Lenze controllers, IPCs, and HMIs are provided with an integrated web server. The web server makes it possible to parameterise the devices via »WebConfig«.

- The controller, IPC, and HMI parameters can be displayed/altered via web browser.
- In order to parameterise a controller, IPC, or HMI in a web-based fashion, a remote connection (via Ethernet by specifying the IP address) to the desired device has to be established.

Further information on how to redirect screen contents can be found in the following documentation:

"HMI EL 1xx" device series:

- **HMI EL 100 with Windows® CE**

Controller 3200 C / p300 / p500 :

- **Controller reference manual**

6.7 »Virtual Network Computing (VNC)«: Redirecting screen contents/entries

For remote maintenance of a Lenze controller, IPC, and HMI, the screen contents can be redirected to the Engineering PC. This makes it possible to view all keyboard entries/mouse movements of the local PC on the remote PC.

The remote PC can be operated as if you were directly in front of it. However, the quality of the remote connection is very important, since the display speed of the screen content strongly depends on it. A bad connection may render program operation using the mouse impossible since you can no longer track the movements of the mouse pointer. In such cases, use the command line based protocols like FTP and telnet, depending on the function to be executed.

- Screen content can be redirected via a local connection or a remote connection.
- The »Virtual Network Computing (VNC)« software is installed on the controllers, IPCs, and HMIs by default.

Further information on how to redirect screen contents can be found in the following documentation:

"HMI EL 1xx" device series:

- **HMI EL 100 with Windows® CE**

Controller 3200 C / p300 / p500 :

- **Controller reference manual**

»Virtual Network Computing (VNC)«

»Virtual Network Computing (VNC)« is a software developed by Olivetti & Oracle Research Laboratory (from 1999 AT&T), which shows the screen content of a remote computer (with the VNC server software running) on a local computer (with the VNC viewer software running). The keyboard/mouse movements of the local computer can be viewed on the remote computer. Alternatively, a "read only" mode can be set, where local entries have no impact on the remote computer.

VNC can be found under "Open source licence"; the source code is provided free of charge for purposes of advancement. The VNC server is already installed by default on controllers 3231 C/ 3241 C, p300/p500, the devices of the EL 100 HMI series, and Industrial PCs EL x800.

The Engineering PC requires the corresponding **VNC viewer software**. The VNC viewer software is provided on the CD that is part of the scope of supply of the devices.

As an alternative, the VNC viewer software is available in the download area at www.lenze.com.

7 Appendix

7.1 Information regarding the FDA conformance

»VisiWinNET®« can provide a visualisation that complies with FDA regulations 21 CFR part 11 of the Food and Drug Administration. These regulations are applicable to machines exported into the U.S.. Industry therefore demands that the operating system and, in some cases, also the production machines must contain data backup functions and functions protecting against the manipulation of data.

A basic demand of the FDA is that electronic data shall be equivalent to paper data and that electronic signatures shall have the same significance and unambiguousness as handwritten signatures. The system should provide an easy but yet effective protection against manipulation, although it is commonly known that electronic data and even paper data can almost always be subsequently changed or deleted in the event of a criminal intent.

Using »VisiWinNET®«, completely FDA-compliant visualisation applications can be created by means of the following functions:

- User management
- Recording of all parameter changes
- Start / stop recording
- Managing/changing passwords
- Saving encoded data in a database.

8 Glossary

A

Application Samples
Predefined application samples/sample projects for commissioning Lenze inverters.

Application templates
Lenze application template for creating standardised modular applications in the »PLC Designer«.

Application
Implementation of a precise function (e.g. speed control) on an individual device.

B

Bus server
Fieldbus-specific OPC server according to DRIVECOM specification.
- OPC
- DRIVECOM

C

CAL
Abbreviation for "**C**AN **A**pplication **L**ayer". Communication standard (CiA DS 201-207) which provides the objects, protocols and services for the event or polling-controlled transfer of CAN messages and the transfer of greater data areas between CAN nodes. Furthermore, CAL offers powerful processes for an automatic assignment of message identifiers, the initialisation of network nodes and the assignment of an individual identification to network nodes.

CAN
Abbreviation for "**C**ontroller **A**rea **N**etwork". Serial, message-oriented (not node-oriented) bus system for max. 127 nodes.

CANopen
Communication profile (CiA DS-301, version 4.01), developed under the CiA umbrella association ("CAN in Automation") in conformity with CAL ("CAN Application Layer").

CiA
Abbreviation for "**C**AN **i**n **A**utomation (e. V.)": International manufacturer and user organisation with the target to worldwide distribute the knowledge of the internationally standardised CAN bus system (ISO 11898) and promote its technical further development.
- Internet: http://www.can-cia.org/

COM
Abbreviation for "**C**omponent **O**bject **M**odel": Architecture developed by Microsoft ® for the co-operation of individual executable software components (objects) which communicate with each other in a similar manner and are not connected until the program is running.

Control
Element with optional graphical user interface providing prefabricated functions for the user.

D

DCOM
Abbreviation for "**D**istributed **C**omponent **O**bject **M**odel": COM where the executable objects are distributed to different computers within one local area network.
▸ COM

DRIVECOM
"DRIVECOM User Group e.V.": International association of manufacturers for drive technology, universities and institutes with the objective of developing a simple integration of drives into open automation structures.
▸ www.drivecom.org

DriveServer
Lenze software which provides an easy integration of drives into open automation structures based on OPC ("OLE for Process Control").
▸ OPC

E

Property
Parameter of a control/control element, e.g. colour or size

I

Item
Communication object (variable) from the control system/fieldbus.
Can be available in different formats (e.g. integer, bit, array, char).

K

Communication module
Device extension which for instance extends an inverter by a communication interface and which can neither fulfil a function nor is able to communicate without a device.

S

Machine application
Implementation of a function which is generated by the interaction of several communication-capable devices. A machine application is defined by the (device) applications involved and the exchange of application variables between them.

N

NMT
Abbreviation for "**N**etwork **M**anagement **T**elegram": Services and protocols for initialisation, configuration, management and network monitoring within a CAN network according to the master/slave principle.
▸ CAN

O

Object-oriented programming (OOP)

Object-oriented programming (OOP) is a procedure for structuring computer programs where data belonging together and the corresponding program logic are combined to objects (separate units).

Conceptually, a program then no longer (as with procedural programming) sequentially processes individual functional areas of an algorithm which changes a certain number of data, but the program logic is developed in the communication and the internal status changes of the objects of which the program is composed.

Advantages of object-oriented programming:

- Modularisation of codes
- Easier maintainability and reusability of individual modules

Higher flexibility of the entire program, in particular, in the field of user guidance because programs of this kind are less obliged to force certain operating sequences upon the user.

OLE

Abbreviation for "**O**bject **L**inking and **E**mbedding": Insertion of functional objects into other applications, e.g. a Microsoft® Excel table into a Microsoft® Word document.

OPC

Abbreviation for "**O**LE for **P**rocess **C**ontrol": Defines an interface based on the Microsoft® Windows® technologies OLE, COM and DCOM which enables data exchange between different automation devices and PC programs without driver and interface problems.

The OPC server provides the data and the OPC client receives the data.

OPC tunnel

OPC server and OPC client can be on different PCs networked via Ethernet. Communication between the PCs requires a special DCOM configuration. For OPC communication from several computers, Lenze uses an OPC tunnel that does not require any configuration.

P

PLC Designer

Lenze Engineering tool for programming the PLC according to IEC 61131.

Power tag

In the »VisiWinNET®« visualisation, a "Power tag" describes the variables available.

A "Power tag" can represent different variable types. It is possible to combine up to 32 bit variables in a long word in the PLC and to transfer them as one variable.

Within »VisiWinNET®«, the user can then use the long word for BIT operations such as in a checkbox or for activation of alarm messages.

With 2000 power tags, thus theoretically a maximum of 64kBit variables are available to the user.

The number of power tags limits the number of internal »VisiWinNET®« variables in the same way as the variables communicated via the bus (external variables).

S

PLC

Abbreviation for "**P**rogrammable **L**ogic **C**ontroller".

Control element

Element with optional graphical user interface providing prefabricated functions for the user.

Index

FEEDBACK

Your opinion is important to us

These instructions were created to the best of our knowledge and belief to give you the best possible support for handling our product.

Perhaps we have not succeeded in achieving this objective in every respect. If you have suggestions for improvement, please e-mail us to:

feedback-docu@lenze.com

Thank you very much for your support.

Your Lenze documentation team

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