L-force catalogue

Automation systems
Drive solutions

Controls
Inverters
Motors
Gearboxes
Engineering tools

Automation systems: Controller-based Automation, **Inverters:**
Servo-Inverters i700

Lenze
As easy as that.

Contents of the L-force catalogue

■ Selected portfolio

▨ Additional portfolio

Lenze makes many things easy for you.

With our motivated and committed approach, we work together with you to create the best possible solution and set your ideas in motion - whether you are looking to optimise an existing machine or develop a new one. We always strive to make things easy and seek perfection therein. This is anchored in our thinking, in our services and in every detail of our products. It's as easy as that!

1

Developing ideas

Are you looking to build the best machine possible and already have some initial ideas? Then get these down on paper together with us, starting with small innovative details and stretching all the way to completely new machines. Working together, we will develop an intelligent and sustainable concept that is perfectly aligned with your specific requirements.

2

Drafting concepts

We see welcome challenges in your machine tasks, supporting you with our comprehensive expertise and providing valuable impetus for your innovations. We take a holistic view of the individual motion and control functions here and draw up consistent, end-to-end drive and automation solutions for you - keeping everything as easy as possible and as extensive as necessary.

3

Implementing solutions

Our easy formula for satisfied customers is to establish an active partnership with fast decision making processes and an individually tailored offer. We have been using this easy principle to meet the ever more specialised customer requirements in the field of machine building for many years.

4

Manufacturing machines

Functional diversity in perfect harmony: as one of the few full-range providers in the market, we can provide you with precisely those products that you actually need for any machine task – no more and no less. Our L-force product portfolio, a consistent platform for implementing drive and automation tasks, is invaluable in this regard.

5

Ensuring productivity

Productivity, reliability and new performance peaks on a daily basis – these are our key success factors for your machine. After delivery, we offer you cleverly devised service concepts to ensure continued safe operation. The primary focus here is on technical support, based on the excellent application expertise of our highly-skilled and knowledgeable after-sales team.

A matter of principle:
the right products for every application.

Lenze's extensive L-force product portfolio follows a very simple principle. The functions of our finely scaled products are assigned to the three lines Base-Line, State-Line or High-Line.

But what does this mean for you? It allows you to quickly recognise which products represent the best solution for your own specific requirements.

Powerful products with a major impact:
• Easy handling
• High quality and durability
• Reliable technologies in tune with the latest developments

Lenze products undergo the most stringent testing in our own laboratory. This allows us to ensure that you will receive consistently high quality and a long service life. In addition to this, five logistics centres ensure that the Lenze products you select are available for quick delivery anywhere across the globe. It's as easy as that!

Product range for your machine task

Controller
I/O System
Communication
Inverters
Motors
Gearboxes
Base-Line
State-Line
High-Line
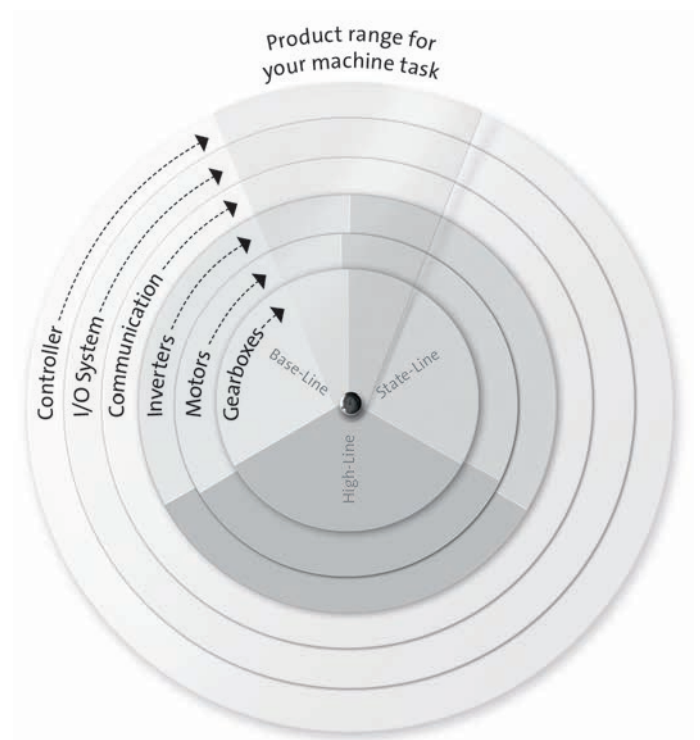
L-force product portfolio

Controls

Cabinet Controller

I/O System 1000

Controller 3200 C

Panel Controller

Human Machine Interface
EL 100
with visualisation software
VisiWinNet®

Controller p500
with visualisation software
VisiWinNet®

Engineering tools

Navigator
All Lenze engineering tools at a glance

Solution

Development

Operation

DSD

Drive Solution Designer

Engineer

EASY Starter

Drive Solution Catalogue

PLC

PLC Designer

VisiWinNET®

L-force product portfolio

Inverters

High-Line

Servo-Inverter i700

Servo Drives ECS

Inverter Drives 8400 TopLine

Servo Drives 9400 HighLine

Inverter Drives 8400 HighLine

State-Line

Inverter Drives 8400 StateLine

decentralised
Inverter Drives 8400 protec

decentralised
Inverter Drives 8400 motec

decentralised
Inverter Drives SMV IP65

Inverter Drives SMV IP31

Inverter Drives smd

Inverter Drives 8400 BaseLine

Base-Line

L-force product portfolio

Motors

MQA asynchronous
servo motors

SDSGS synchronous servo
motors

MDXKS synchronous servo
motors

Synchronous servo motors MCS

Asynchronous servo motors
MCA

Asynchronous servo motors
SDSGA

MF three-phase AC motors

MH three-phase AC motors

MD three-phase
AC motors

Basic MD/MH three-phase
AC motors
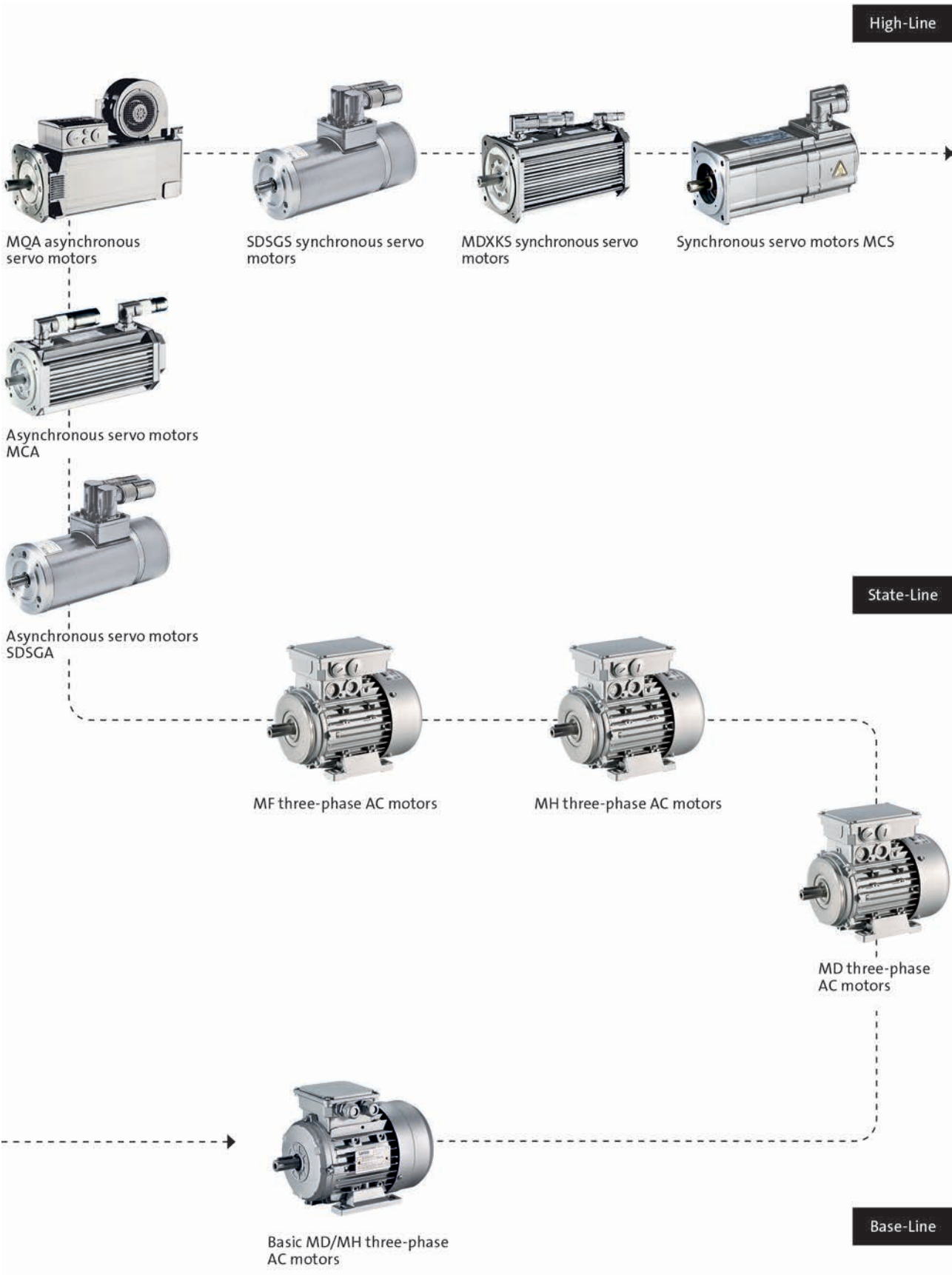
L-force product portfolio

Gearboxes

Planetary gearboxes

Shaft-mounted helical gearboxes

Helical-bevel gearboxes

Helical gearboxes

Bevel gearboxes

Helical-worm gearboxes

Worm gearboxes
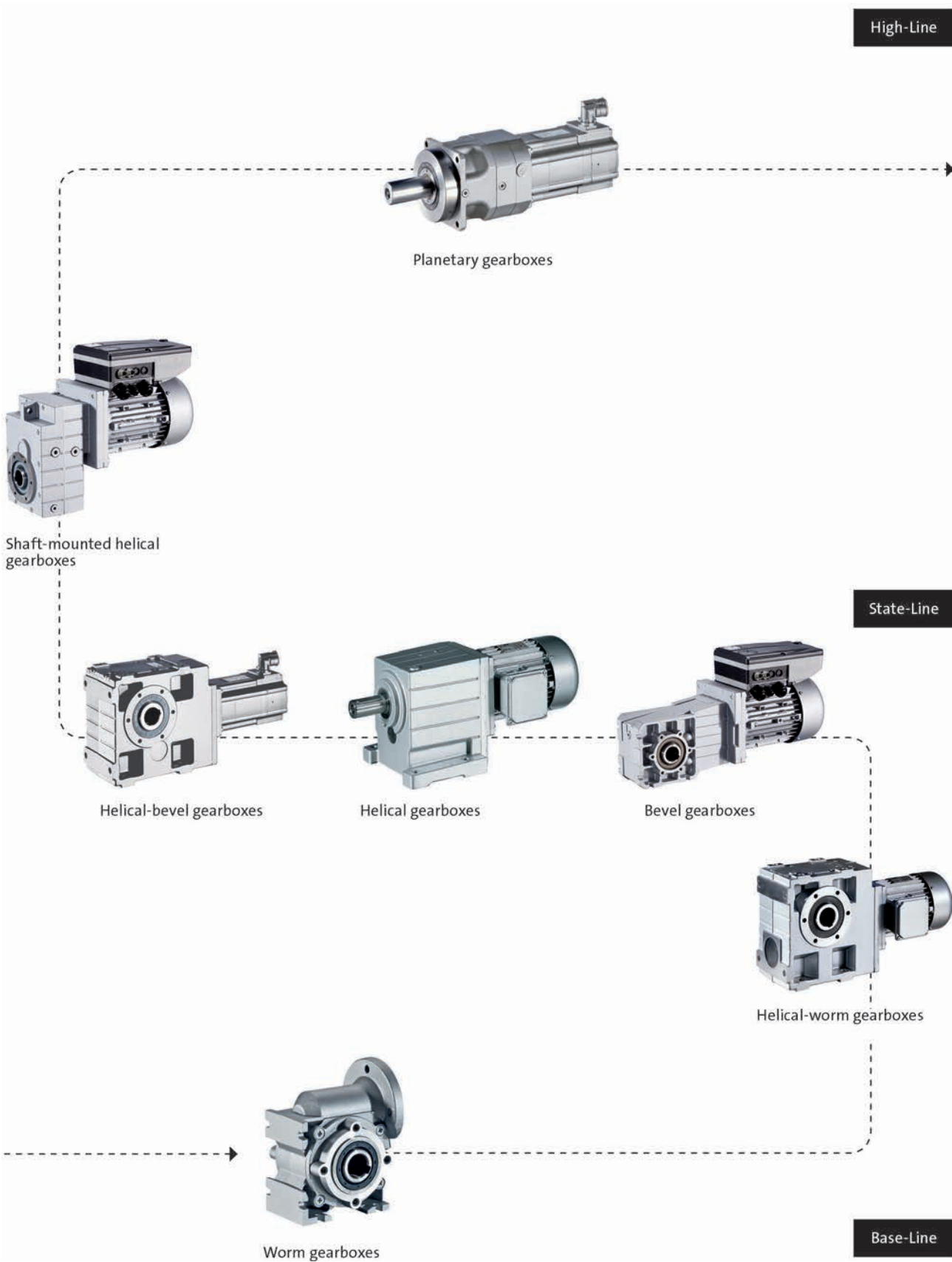
Controller-based Automation

Controller-based Automation

Contents

1.1

Controller-based Automation

General information

Automation with central motion control

Complex machines such as robots, packaging machines and handling systems require a powerfu, uniform and end-to-end automation system with a central control system. This allows coordinated movement of many axes and is also capable of performing control functions for a linear process. For project engineers, the central architecture offers the additional advantage that only one control program has to be developed and managed. We call this Controller-based Automation for central motion control.
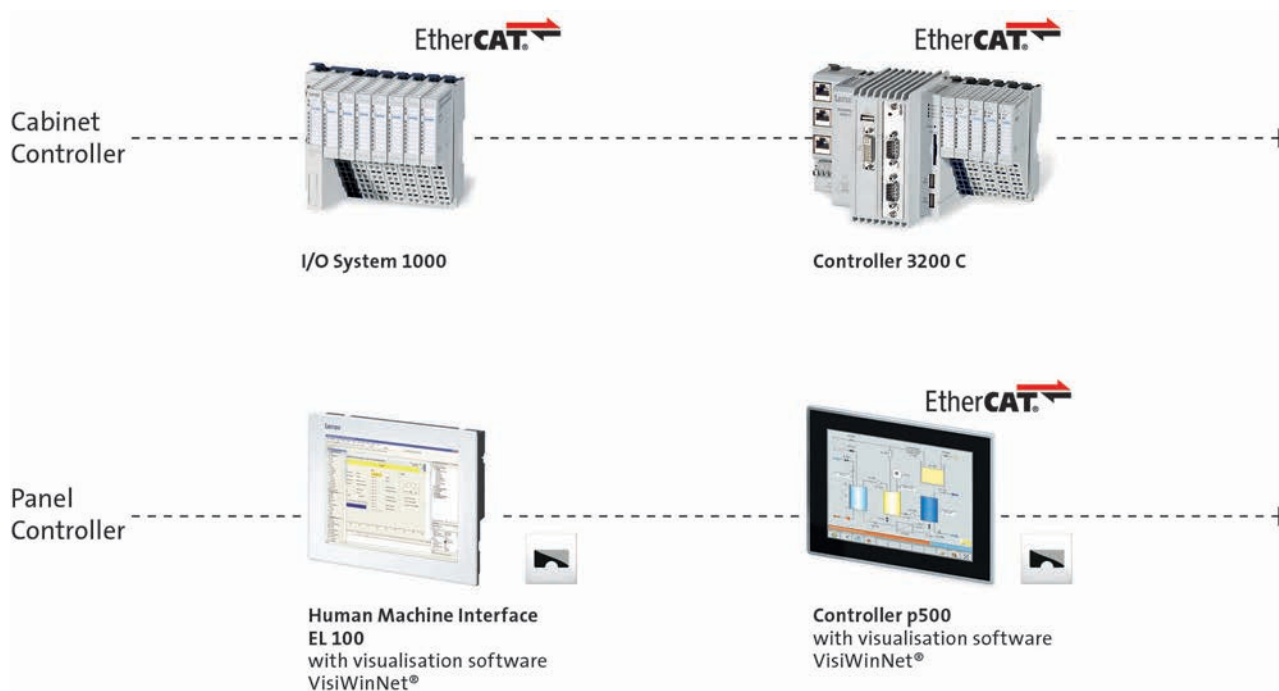
To address the increasing complexity of your automation tasks efficiently and cost-effectively, alongside a uniform, end-to-end automation system you also expect your automation supplier to provide you with advanced engineering tools and, if necessary, qualified support. Lenze offers you experienced experts in sales and support that can help you, whatever issues you are experiencing. No matter whether you are seeking support for project planning, dimensioning, selecting the right components or programming a mechatronic solution, we are here to help.

In Europe alone, customers have access to a network of over 100 highly-qualified application engineers with extensive expert knowledge and sector expertise. All-around service, training sessions and a helpline that can be accessed from anywhere in the world round off our portfolio of services.

Components in Lenze's Controller-based Automation system include the controllers, a wide range of inverters with matching standard three-phase AC motors, as well as synchronous servo motors and asynchronous servo motor, each of which can be combined with various types of gearboxes all the way up to decentralised I/O systems.

Cabinet Controller

I/O System 1000

Controller 3200 C

Panel Controller

Human Machine Interface EL 100 with visualisation software VisiWinNet®

Controller p500 with visualisation software VisiWinNet®

Controller-based Automation

General information

Automation with central motion control

Management level

Control level

Logic   Motion   Visu

Logic   Motion

Field level

EtherCAT

Actuator/sensor level,
electromechanics
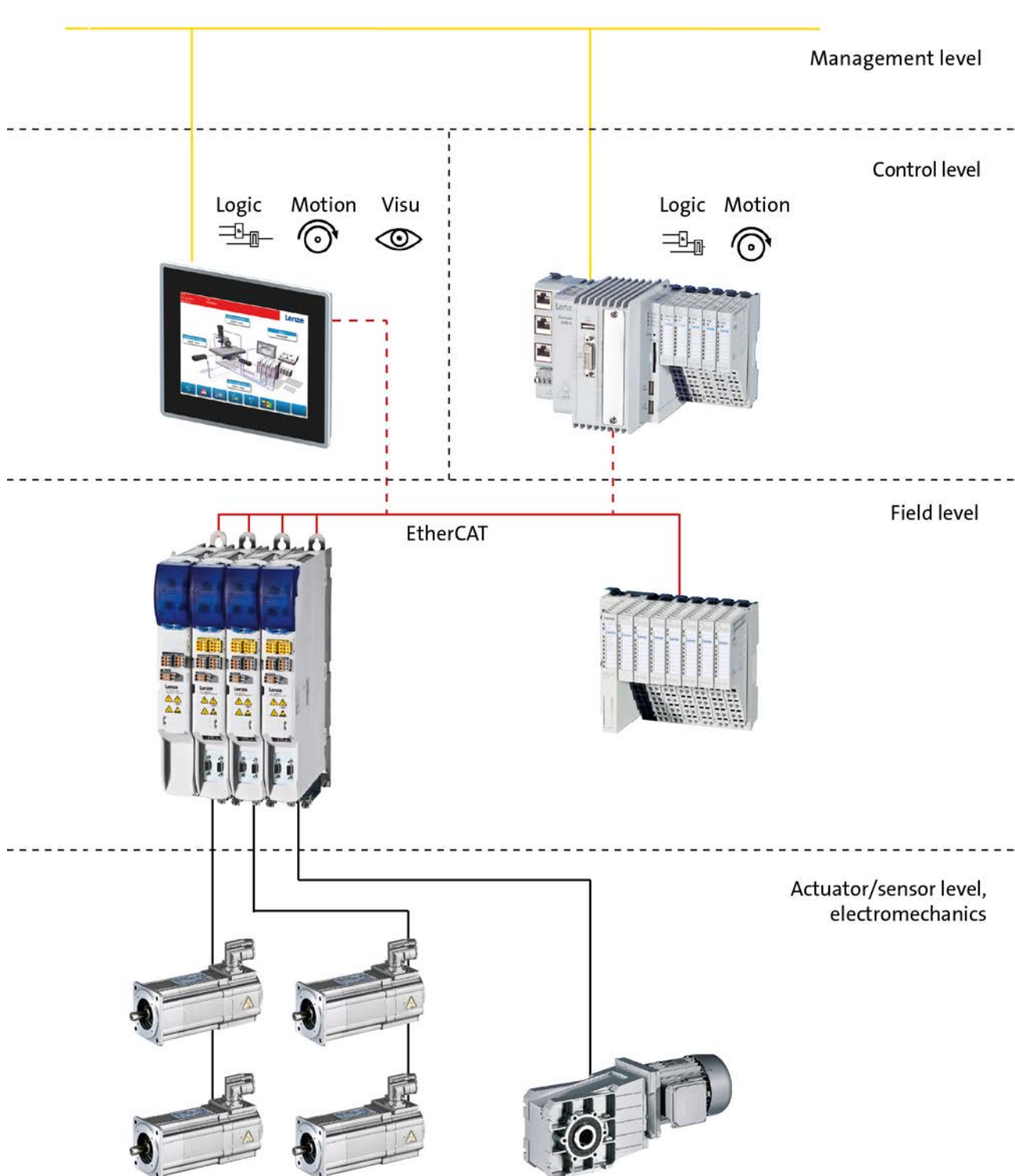
Standard topology with EtherCAT®

1.1

The Ethernet-based bus system EtherCAT® is the standard topology for Controller-based Automation applications and offers a large range of potential applications:
- Everything on a single bus (Logic, Motion)
- Virtually unlimited number of nodes
- 1 ms cycle time
- Combination with other bus systems possible (via optional boards)
- Baud rate 100 Mbps

Functional principle
Data is removed from or added to the EtherNet telegram as it passes through. This process was used for the first time with INTERBUS under the heading of "one-total-frame protocol". Although the basic idea is the same, there are significant differences between INTERBUS and EtherCAT® in terms of details. No EtherNet telegrams are used.

Topology
Although the topology of an EtherCAT® system can generally be freely defined, a line topology is generally assumed as standard. However, this actually implies a ring. It is not possible to use standard switches to create a star arrangement.

Integrating products

Runtime software	L-force Logic	L-force Motion
Product	LPC 1000	MPC 1200
Task	Sequence control; motion control is provided by the Inverter	Sequence control and motion control are provided by the controller
Controller	3221 C, 3231 C, 3241 C, p500	3221 C, 3231 C, 3241 C, p500
I/O system	I/O 1000	

Inverter	Intelligent Inverters:
	• 8400 StateLine
	• 8400 HighLine
	• 8400 TopLine
	• 8400 motec
	• 9400 HighLine
		Inverter as an actuating drive:
		• i700
		• ECS
		  Application "Motion"
		• 9400 HighLine
		  Application "CiA 402"

Integration of additional field devices	XML file	

Controller-based Automation

Topologies

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Standard topology with EtherCAT®

Topology with EtherCAT®

Engineering PC — Ethernet — Controller 3200C

EtherCAT

I/O System 1000 — Inverter Drives 8400 motec — Inverter Drives 8400 — Servo-Inverter i700
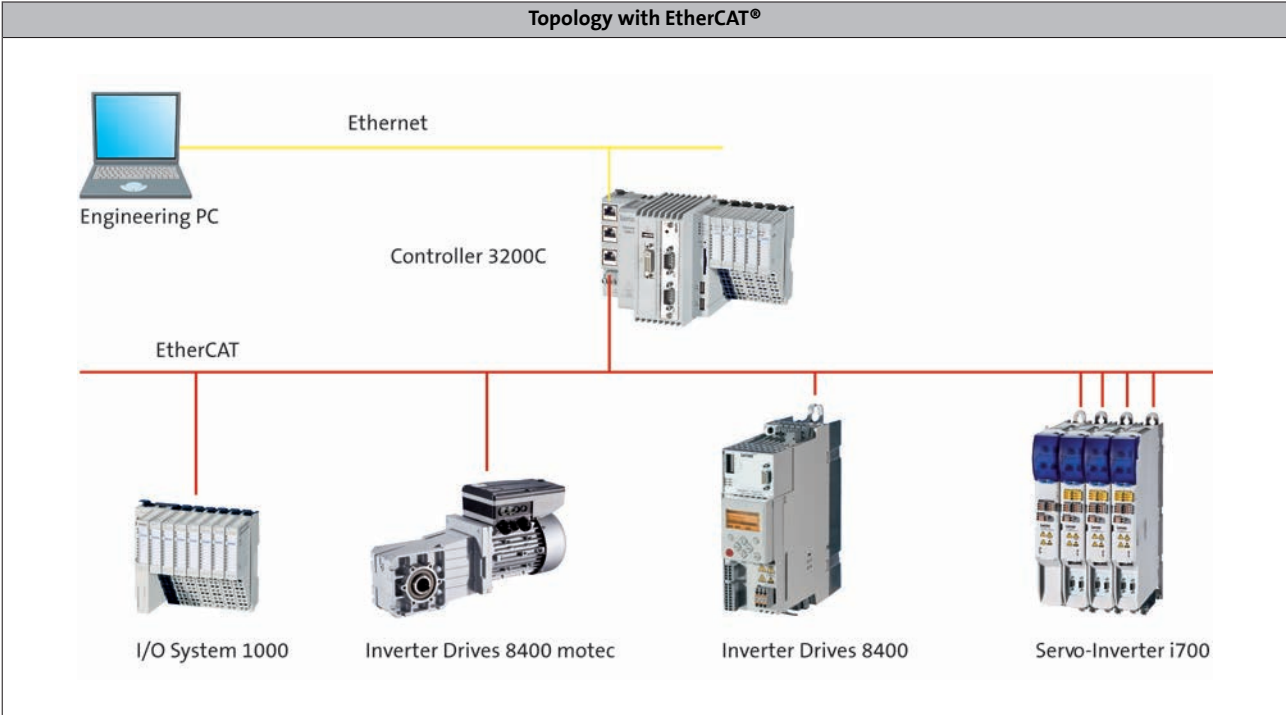
Advanced topology with CANopen

The tried-and-tested CAN bus comes as standard on many field devices. The controller therefore allows CANopen to be used as an option in addition to EtherCAT®.

- Separation of motion and logic bus recommended
- Up to 2 synchronised motion buses are possible
- Cost-effective for medium power outputs and a small number of axes
- 1 ms cycle time

Up to 2 CAN buses
When using the baud rate of 1 Mbit/s, a maximum of 3-4 inverters with a cycle time of 1 ms can be operated on one CAN bus. Multiple CAN buses which are suitable for motion are therefore available, and these are synchronised among one another.

As such, the number of inverters that can be addressed is multiplied by the number of bus lines.

Using a separate CAN bus purely to perform logic control always makes sense in this regard, as this allows any inverter faults to be avoided by other CANopen nodes (e.g. an HMI).

CANopen vs. system bus (CAN)
Lenze's ECS range of devices include an on-board system bus (CAN) connection. The protocol used here represents a subset of CANopen and can also be operated on a CANopen-compatible L-force Controller in connection with other CANopen-compatible nodes.

Integrating products

Runtime software	L-force Logic	L-force Motion
Product	LPC 1000	MPC 1200
Task	Sequence control; motion control is provided by the Inverter	Sequence control and motion control are provided by the controller
Controller	3221 C, 3231 C, 3241 C, p500	3221 C, 3231 C, 3241 C, p500
I/O system	I/O 1000	

Inverter	Intelligent Inverters:
	• 8400 StateLine
	• 8400 HighLine
	• 8400 TopLine
	• 8400 motec
	• 9400 HighLine
		Inverter as an actuating drive:
		• ECS
		  Application "Motion"
		• 9400 HighLine
		  Application "CiA 402"

Integration of additional field devices	EDS file	

Controller-based Automation

Topologies

Advanced topology with CANopen

Topology with EtherCAT® and CANopen

Engineering PC — Ethernet — Controller 3200C

CANopen (Motion)

CANopen (Logic or Motion)

EtherCAT

I/O System 1000

Inverter Drives 8400 motec

Inverter Drives 8400

Servo-Inverter i700
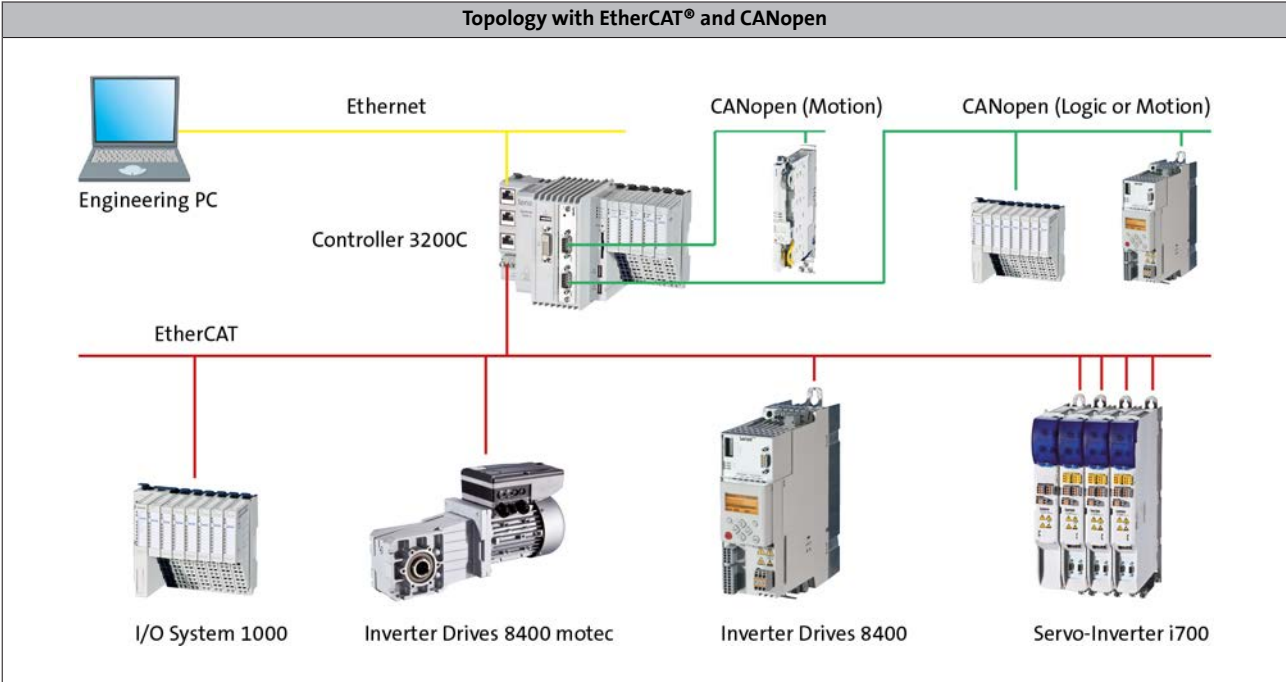
Advanced topology with PROFIBUS

PROFIBUS in the most widespread fieldbus used in modern automation technology. The ranges of available field devices are immense. With extension of control technology to incorporates PROFIBUS, this diversity is now also available within L-force Logic.

- PLC with L-force Logic functional range (LPC 1000)
- Can be combined with motion buses
- Integration of devices via the GSE device description file
- 1 ms cycle time

Combined solutions
Lenze offers combined solutions that allow customers to integrate tried-and-tested system components automated with PROFIBUS into the Lenze control environment, while also exploiting the advantages of the L-force control technology. For example, the logic field devices can be addressed via PROFIBUS, while EtherCAT® is operated in parallel with this as a motion bus. This approach also allows flying transitions when switching over from PROFIBUS to other bus systems.

Integrating products

Runtime software	L-force Logic
Product	LPC 1000
Task	Sequence control
Controller	3221 C, 3231 C, 3241 C
I/O system	I/O 1000
Inverter	Intelligent Inverters: • 8400 StateLine • 8400 HighLine • 8400 TopLine • 8400 motec • 9400 HighLine
Integration of additional field devices	GSE file

Controller-based Automation

Topologies

Advanced topology with PROFIBUS

Topology with EtherCAT® and PROFIBUS

Engineering PC — Ethernet — Controller 3200C — PROFIBUS — EtherCAT — I/O System 1000 — Inverter Drives 8400 motec — Inverter Drives 8400 — Servo-Inverter i700
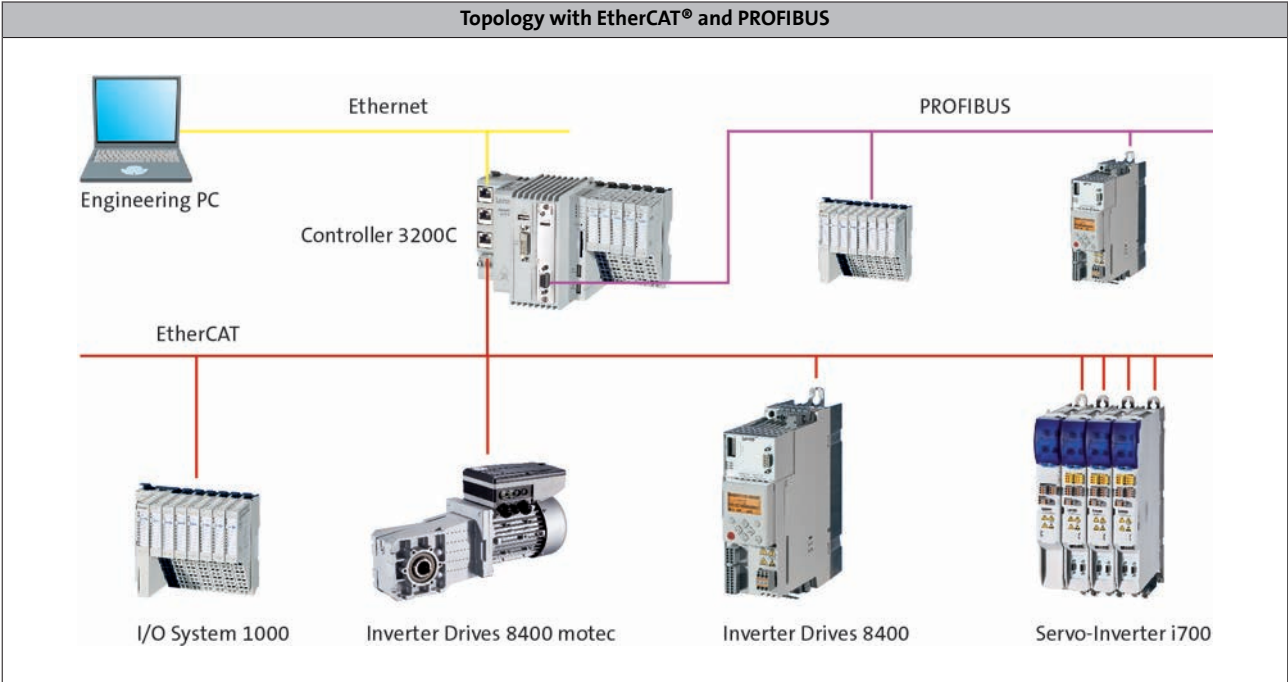
Runtime software

The runtime software in a controller determines what kind of functions it can perform.

We differentiate between the following 3 types of runtime software:
- L-force Logic
  allows the controller to execute sequence control.
- L-force Motion
  allows the controller to execute motion functions.
- L-force Visu
  allows the controller to execute visualisation projects.

Alongside the various classes, the runtime software is also scales, meaning that you only have to pay for the functions you actually need. The performance data of the respective software is not specified until the hardware platform has been selected.

L-force Logic

Mode		Features
Product		

LPC 1000		• Engineering software required: PLC Designer
		• PLC functionality in line with IEC 61131-3
		• 6 languages:
		  - Instruction list (IL)
		  - Ladder diagram (LD)
		  - Function plan (FP)
		  - Structured text (ST)
		  - Sequential function chart (SFC)
		  - Free graphical function plan editor (CFC)
		• Multitasking
		• Based on the tried-and-tested CoDeSys
		• Object-oriented programming

L-force Motion

Mode		Features
Product		
MPC 1200		• Engineering software required: PLC Designer • Motion in line with PLCopen Part 1 + 2 • OS-dependent runtime software which is installed on the target hardware • NC transformations: gantry, tripod and scara via libraries • NC functionality with 3 interpolated axes (3 D) • G-Code Interpreter module (DIN 66025) • Electronic cam • Electronic cam group • Always supplied together with L-force Logic

1.1

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Runtime software

L-force Visu

Mode		Features
Product		
VisiWinNET® compact CE	👁	• Engineering software required: VisiWinNET® • OS-dependent runtime software which is installed on the target hardware • Scaling via the number of power tags • Visualisation functions: - Control variables - Status message system - Archiving - User management - Recipe system

VisiWinNET® engineering tool in all designs
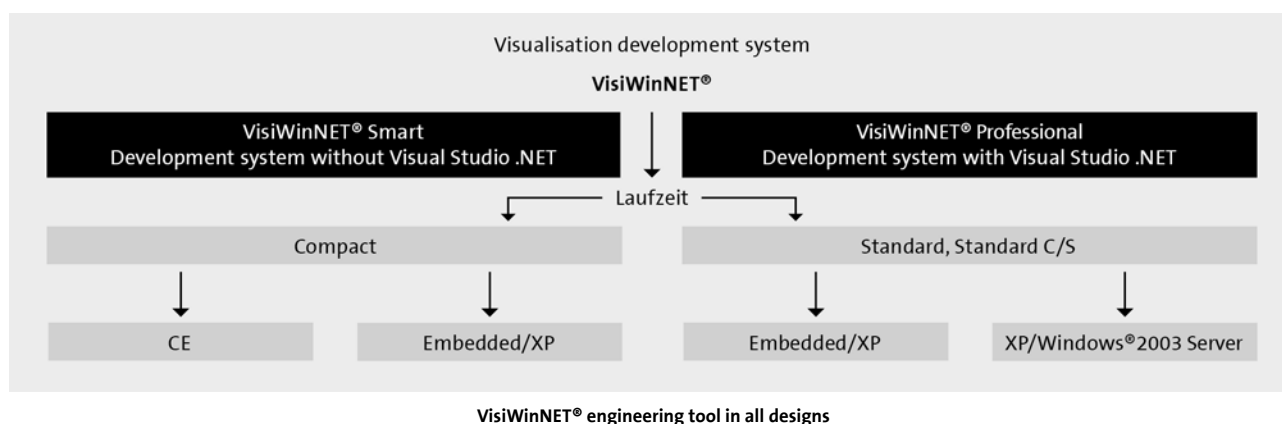
Controller-based Automation

Application areas

FAST Application Software

The topic of software is becoming increasingly important in developing machines as mechanical engineers are focusing more attention on efficient processes for creating the applications they need. Lenze's standard software modules make it easy to develop modular mechanical control by simply adding the individual modules using the application template. Without application template the modules also can be used in standard IEC61131 programming.

Highlights

- Up to 80 % of the software engineering can be covered by standards. The ApplicationTemplate of Lenze's FAST (Feasibly Applicable Software Toolbox) acts in a supportive way as software structure and technology modules.
- Considerable reduction of the development times for the basic functions
- Saved time can be invested in the further development of the special features of the machine
- Predefined and tested software modules
- Structured programming
- Easier reuse of programming segments
- Error reduction by tested software

FAST modules

Mode		Features
Product		
Motion Control		• Positioning and synchronising of axes as the basis of any machine
Winder		• Winding and unwinding, with and without sensor or dancer
Tension control		• Tension control, with adaptive PI controller
Touch probe		• Touch probe function for positioning and synchronising
Register control		• Register control for pressure-mark detection
CAM profile		• CAM function for online and offline cams
Temperature control		• Temperature monitoring for the production process

Controller-based Automation

Application areas

FAST Application Software

FAST modules

Mode		Features
Product		
Cross Sealing		• Cross-sealing with one or multiple sealing jaws
SmartTrack		• Single-step conveyors for establishing correct product-spacing
MagicTrack		• Multi-chain control for grouping and further packaging of products
2D portal		• Standard portal for pick-&-place applications
Delta 3-Axes		• Pick-&-place applications with parallel kinematics
Parallelogram 3-Axes		• The standard robot for final packaging and palletising

FAST Application Software

Controller-based Automation

Application areas

Functions and features

Servo-Inverters i700

The Servo-Inverter i700 is implemented into the Controller-based Automation solution via the Ethernet-based EtherCAT® bus system. Thus, a large variety of technology applications can be adopted via the implemented Controller.
The PLC Designer engineering software serves to program the L-force Motion functions.

Controller 3200 C with Servo-Inverter i700

Controller p500 with Servo-Inverter i700
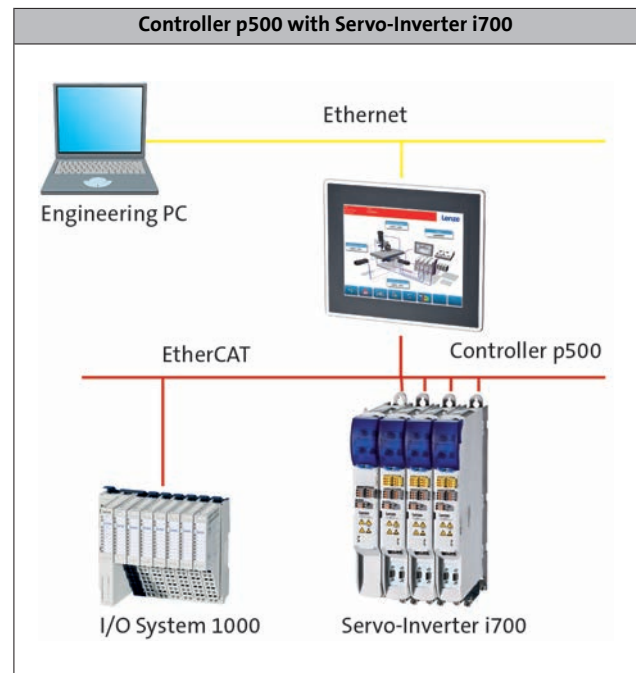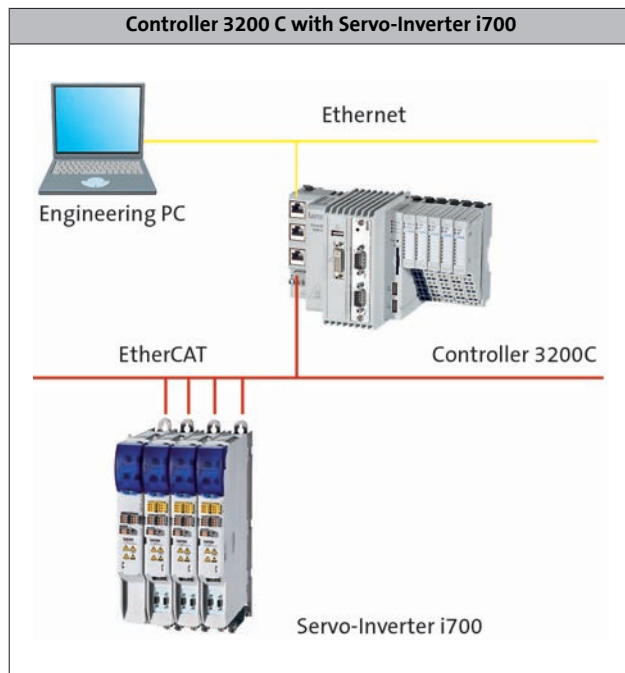
With Lenze Motion Controllers and depending on the functionality, certain cycle times of the setpoint selection can be achieved depending on the number of axes. The table shows typical values for PLCopen 1/2 and CNC functionalities.

Mode						
Controller			3221 C	3231 C	3241 C	p500
Min. cycle time PLCopen 1/2						
2 axes	t	[ms]			1	
4 axes	t	[ms]			1	
8 axes	t	[ms]			1	
12 axes	t	[ms]	2		1	
16 axes	t	[ms]			2	
32 axes	t	[ms]			3	
64 axes	t	[ms]	6		5	
Min. cycle time CNC						
2 axes	t	[ms]	2		1	
4 axes	t	[ms]	2		1	
8 axes	t	[ms]	3		2	

Controller-based Automation

Engineering

Handling, commissioning and diagnostics

The Controller-based Automation solution can be easily commissioned and optimised with the PLC Designer and EASY Starter engineering tools.
The entire plant is commissioned via the Ethernet terminal of the Controller. By this means, the entire plant will be made available.
When the plant is used for the first time, it can be subsequently optimised using the EASY Starter.

Drafting concepts

Defining automation solutions

Finding the right solution together
- Individual consulting service by the Lenze field service.
- Joint analysis and definition of the machine topology.
- Basic functions of the FAST modules as basis.
- Consistent automation and drive solution.

Implementing solutions

Machine development

PLC

Consistent engineering using the PLC Designer
- Control and drive application with only one tool.
- Creating an application easily using the FAST modules.
- All Lenze motor data is available.
- The oscilloscope function within the inverter supports the assessment and optimisation of the settings.

Manufacturing machines

Standard set-up

Commissioning via USB stick
- The prepared USB stick provides for the transfer of
  - software for control.
  - parameter setting and firmware for connected field devices.
- All the machines can be prepared, configured and parameterised in an automated way.
- Plug in USB stick, start machine, wait, finished.

Ensuring productivity

Servicing, diagnostics

Easy diagnostics - EASY Starter
- Support by the service technicians in commissioning and maintenance.
- Easy parameter setting and commissioning.
- Online diagnostics without the risk of an accidental application change.

Device exchange without tools
- Thanks to automated firmware and parameter download.
- The SD card of the Controller provides for an easier device exchange.
- Possible without any specific know how and software.
- No data of the machine gets lost.

Inverters

Servo-Inverters i700

5 ... 64 A

Servo-Inverters i700

Contents

4.6

Product key

| E70A | C | M | S | E | 005 | 4 | S | A | 1 | ET | R |

Design
C – Control cabinet inverter

Type
M – Single axis or double axis
P – Supply module

Version
S – Standard

Mounting type
E – Installation
D – Push–trough technique
C – Cold plate technique

Max. short-time output current
005 – 5.0 A   032 – 32.0 A
010 – 10.0 A   048 – 48.0 A
020 – 20.0 A   064 – 64.0 A

Voltage class
4 – 400/480 V, 3/PE AC

Ambient conditions
S – Standard
R – Rough

Drive-based safety
A – With drive-based safety (STO)

Motor outputs
1 – Single axis
2 – Double axis

Communication
ET – EtherCAT

Encoder input
R – Resolver
E – Encoder/Absolute value encoder

4.6

Servo-Inverters i700

General information

Equipment

	Supply module	Double axis	Single axis

Mains connection
Supply module

DC supply
Supply module - Axes

Digital inputs and digital outputs
for diagnosis and brake chopper control

Drive-based safety (STO)

2 Digital inputs

External 24 V supply
electronic

External 24 V supply
electronic

EtherCAT
Input/Output

Feedback
Resolver connection or
Encoder connection

Integrated shield mounting
for motor cable

Pluggable connection for brake resistor

Integrated shield mounting
for brake resistor cable

Pluggable connections
for motor and brake

List of abbreviations

b	[mm]	Dimensions
C_{th}	[KWs]	Thermal capacity
f_{ch}	[kHz]	Rated switching frequency
h	[mm]	Dimensions
$I_{N, out}$	[A]	Rated output current
$I_{N, AC}$	[A]	Rated mains current
m	[kg]	Mass
n_{max}	[r/min]	Max. speed
P	[kW]	Typical motor power
P_V	[kW]	Power loss
P_N	[kW]	Rated power
R_N	[Ω]	Rated resistance
t	[mm]	Dimensions
U_{AC}	[V]	Mains voltage
U_{DC}	[V]	DC supply
$U_{N, AC}$	[V]	Rated voltage
U_{out}	[V]	Max. output voltage

ASM	Asynchronous motor
DIAG	Slot for diagnostic adapter
DIN	Deutsches Institut für Normung e.V.
EN	European standard
EN 60529	Degrees of protection provided by enclosures (IP code)
EN 60721-3	Classification of environmental conditions; Part 3: Classes of environmental parameters and their limit values
EN 61800-3	Electrical variable speed drives Part 3: EMC requirements including special test methods
IEC	International Electrotechnical Commission
IEC 61508	Functional safety of electrical/electronic/programmable electronic safety-related systems
IM	International Mounting Code
IP	International Protection Code
MCI	Slot for communication module (module communication interface)
NEMA	National Electrical Manufacturers Association
UL	Underwriters Laboratory Listed Product
UR	Underwriters Laboratory Recognized Product
VDE	Verband deutscher Elektrotechniker (Association of German Electrical Engineers)

4.6

Servo-Inverters i700

General information

Generation Easy for multi-axis applications

The innovative Servo-Inverter i700 for central motion control is characterised by its compact and highly flexible design. Dual axes keep the drive size to a minimum, dynamic motor control makes it suitable for use in a wide range of applications. Drive integration, commissioning and maintenance have been substantially simplified thanks to its installation concept and easy engineering.

Highlights:
- Easy to use: from installation to service
- Compact: both in size and connection system
- Flexible: motor control for synchronous and asynchronous motors
- High performance, e. g. with real-time EtherCAT® bus system

i700 – in use

Powerful central motion control of demanding machine tasks is best achieved with our Controller-based Automation. The Servo-Inverter i700 for multiaxis application can drive all centrally controlled motors in your machine module – from three-phase AC motor to servo motor.

i700 features:
- Multi-axis system
- Single and double axes
- Power supply modules
- DC-bus connection via busbar system
- Pluggable connection system
- Automatic parameter/firmware download via the control system
- Motor control:
  -Servo with field weakening and torque pre-control
  -V/f control for standard asynchronous motors without encoder
- Scalable safety functions
- 3 cooling methods: standard panel-mount, cold plate technique, push-through technique

4.6

Servo-Inverters i700

General information

Functions and features

The Servo-Inverter i700 can be directly implemented into the Controller-based Automation applications via the integrated EtherCAT® interface. The interaction of the different Lenze controllers provide for a high number of sophisticated L-force Motion applications.

The speed and position control modes are directly executed in the servo inverter which ensures very short cycle times (0.25 ms). The selection of the right control mode for the application is determined via the application in the Controller. The "Controller-based Automation" chapter summarises which controller optimally solves the individual applications together with the i700.

Mode	
	Servo-Inverters i700
Conrol types, motor control	
Field-oriented servo control (SC)	For synchronous servo motors, asynchronous servo motors and three-phase asynchronous motors
V/f control (VFCplus)	For three-phase AC motors and asynchronous servo motor (linear or square-law)
Basic functions	
	Brake management for brake control with low rate of wear PID controller
Operating modes to CiA 402	Velocity mode (VL) - non-cyclic velocity setpoint Cyclic synchronous position (csp) - cyclic position setpoint Cyclic synchronous velocity (csv) - cyclic velocity setpoint Cyclic synchronous torque (cst) - cyclic torque setpoint
Overload behaviour	
	200% maximum current (with regard to 4kHz rated current)
Functions with FAST Application Software	
	Comprehensive library of function and technology modules e.g. for positioning, cam functions, electrical shaft etc.
Monitoring and protective measures	
	Overload Motor stalling, motor overload Short circuit Short to earth (protected against short to earth during operation, limited protection against short to earth on mains power-up) Overvoltage Undervoltage DC-bus voltage Motor phase failure Overcurrent I² x t-Motor monitoring Overtemperature Motor overtemperature (input for PTC or thermal contact, KTY evaluation) Brake chopper, brake resistance
Diagnostics	
	Axis modules: Error codes to CiA 402 Power supply modules: Status message via 2 digital outputs
Status display	2 LEDs
Braking operation	
Brake chopper	Integrated in power supply module
Brake resistor	External
Mounting conditions	
Mounting type	Installation Cold plate technique Push-through technique
Mounting place	In the control cabinet
Mounting position	Vertical
Free spaces	At the top: minimum 90 mm Side–by–side mounting without any clearance At the bottom: minimum 70 mm

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Operating modes

Overcurrent operation

Axis modules and power supply modules

Power supply modules and axis modules can be operated with higher currents beyond the rated current if this overcurrent is only active for a limited operating time. Within the efficiency cycles, the overcurrent can flow for a certain period of time if afterwards an accordingly long recovery phase takes place afterwards. Two efficiency cycles of 15 s [1] in red and 180 s [2] in blue are defined.

- 15-s cycle
  - 3 s (T_1) load period with peak current [A] (200 %)
  - 12 s (T_2) recovery time with limited current [B] (75 %)
- 180-s cycle
  - 60 s (T_3) load period with peak current [C] (150 %)
  - 120 s (T_4) recovery time with limited current [D] (75 %)

A load period with peak current must be followed by a recovery time. In the recovery time, the current must not exceed the given value.

Overcurrent operation
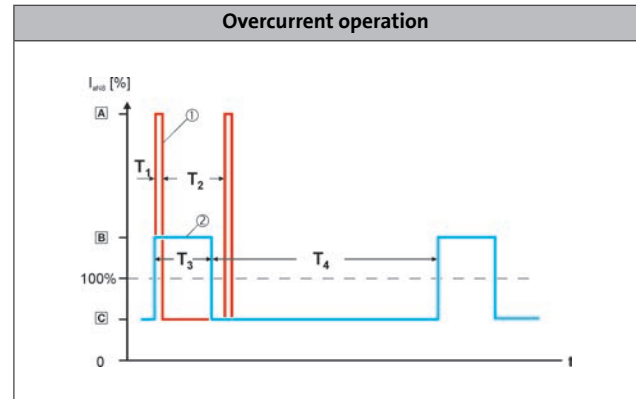
► From a maximum device current of 32 A, the following restriction applies:
With field frequencies lower than 5 Hz, the cycle time of the short time behaviour is reduced from 15 s to 3 s.

Dimensioning of a multi-axis system

Drive dimensioning of multi-axis systems with Servo-Inverters i700 can be easily carried out using the DSD (Drive Solution Designer) engineering tool. This tool can be downloaded from the Lenze homepage (http://www.lenze.com/download/software-downloads). It considers various, frequently recurring applications, the ambient conditions and the entire mechatronic system and their operating mode as for instance coordinated or uncoordinated multi-axis operation with energy exchange in the DC-bus system. It provides comprehensible dimensioning protocols and an Energy Performance Certificate for the axes and for the multi-axis system. The Energy Performance Certificate clearly displays the energy efficiency of all drive components under the given operation modes and provides potential for energy optimisations for entire plants.

Functions and features

Mode	
	Engineering Tool DSD
Applications	
	Comprehensive applications as for instance linear and rotating drives, positioning-, wheel, hoist and synchronous drives, winders, pumps, fans, ...
Components	
	Inverter Motors (brake, feedback) Geared motors Power supply modules
Check of components and drive system	
	Monitoring functions of the inverters Maximum limits of the components Product data in the applications Consideration and check of the entire drive system Limit loads (electrical/mechanical) M-n characteristic fields and system checks Possible combinations of the drive components Losses and energy efficiency
Optimisation and evaluation	
	Energy consumption of the components and of the application Energy exchange in multi-axis applications Representation of working points, e.g. as characteristic
Presentation of the result	
	Evaluation of the dimensioning Representation of energy consumption Logging of dimensioning Creating CAD data
Basic functions	
	Metric and imperial unit systems Intuitive interfaces with simple dialogs Comprehensive online help with physical basics and overviews Fast and easy drive dimensioning and product configuration Editor for the motion sequence Creating alternative solutions with comparison operations

4.6

Dimensioning of a multi-axis system

Consideration of energy in the DC link

Adjustment of interconnected DC system

Operating behaviour of the individual axes

4.6
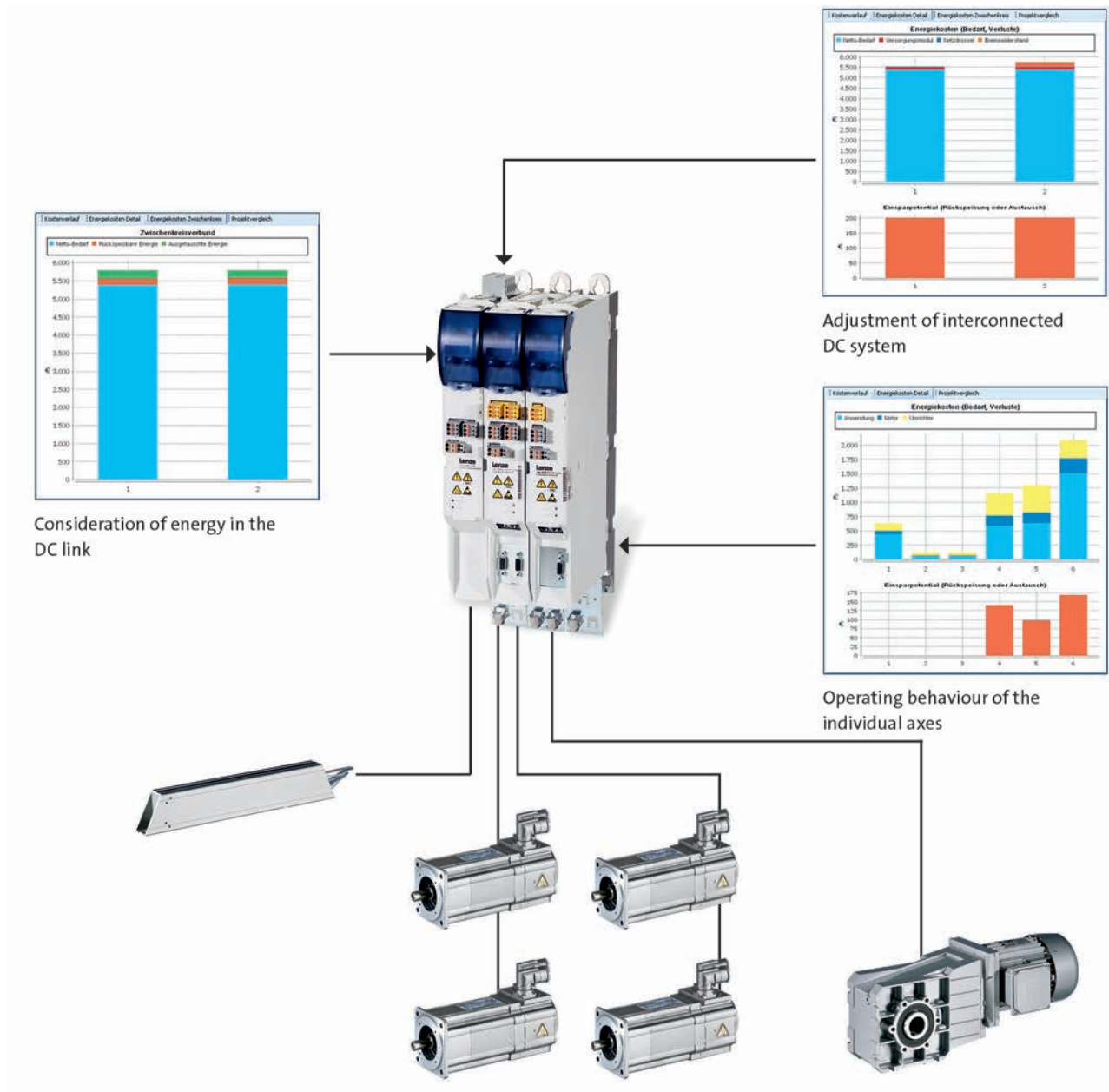
Servo-Inverters i700

Technical data

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Standards and operating conditions

Mode			
Product			Servo-Inverters i700
Conformity			
CE			Low-Voltage Directive
			2006/95/EG
Approval			
UL 508C			Power Conversion Equipment (File-No.) [1]
CSA			
Certification			
			RoHs
Enclosure			
EN 60529			IP20
NEMA 250			Type 1
Climatic conditions			
Storage (EN 60721-3-1)			1K3 (temperature: -25 °C ... +60 °C)
Storage (EN 60721-3-1) > 6 months			1K3 (temperature: -25 °C ... +40 °C)
Transport (EN 60721-3-2)			2K3 (temperature: -25 °C ... +70 °C)
Operation (EN 60721-3-3)			3K3 (temperature: -10°C ... +55°C)
Current derating at over 40°C			2.5 % / K
Site altitude			
Amsl	H_{max}	[m]	4000
Current derating at over 1000 m		[%/1000 m]	5
Vibration resistance			
Transport (EN 60721-3-2)			2M2
Operation (EN 61800-5-1)			10 Hz $\leq$ f $\leq$ 57 Hz: ±0.075 mm amplitude, 57 Hz $\leq$ f $\leq$ 150 Hz: 1.0 g
Operation (Germanischer Lloyd)			5 Hz $\leq$ f $\leq$ 13.2 Hz: ± 1 mm amplitude 13.2 Hz $\leq$ f $\leq$ 100 Hz: 0.7 g

Mode	
Product	Servo-Inverters i700
Supply form	
	Systems with earthed star point (TN and TT systems) Systems with high-resistance or isolated star point (IT systems)
Mains switching	
	Cyclic mains switching of 5 times in 5 minutes is permissible without restrictions.
Noise emission	
EN 61800-3	Cable-guided disturbance: According to category C1 with special measures According to category C2 with standard accessories According to category C3 without additional measures
Insulation resistance	
EN 61800-5-1	Overvoltage category III über 2000 m über NN Überspannungskategorie II
Degree of pollution	
EN 61800-5-1	2
Shock current	
EN 61800-5-1	> 3.5 mA AC, > 10 mA DC
Protective insulation of control circuits	
EN 61800-5-1	Safe mains isolation: double/reinforced insulation

[1] In preparation.

Servo-Inverters i700

Technical data

Rated data for single axes

Max. short-time output current					
	$I_{max, out}$	[A]	5.0	10.0	20.0
Product key					
			E70ACMS□0054SA1ET□	E70ACMS□0104SA1ET□	E70ACMS□0204SA1ET□
DC supply					
	U_{DC}	[V]	DC 260 V -0 % ... 775 V +0 %		
Typical motor power					
4-pole asynchronous motor	P	[kW]	1.10	2.20	5.00
Rated output current					
	$I_{N, out}$	[A]	2.5	5.0	10.0
Rated switching frequency					
	f_{ch}	[kHz]	4		
Output current					
4 kHz	I_{out}	[A]	2.5	5.0	10.0
8 kHz	I_{out}	[A]	2.0	4.0	8.0
16 kHz	I_{out}	[A]	1.5	3.0	6.0
Power loss					
	P_V	[W]	50.0	80.0	130.0

Dimensions and weights

Standard installation design

Dimensions			
Height	h	[mm]	350
Height, including fastening	h	[mm]	410
Width	b	[mm]	50
Depth	t	[mm]	261
Mass			
	m	[kg]	2.7

Servo-Inverters i700

Technical data

Rated data for single axes

Max. short-time output current					
	$I_{max, out}$	[A]	32.0	48.0	64.0
Product key					
			E70ACMS□0324SA1ET□	E70ACMS□0484SA1ET□	E70ACMS□0644SA1ET□
DC supply					
	U_{DC}	[V]	DC 260 V -0 % ... 775 V +0 %		
Typical motor power					
4-pole asynchronous motor	P	[kW]	7.50	11.0	15.0
Rated output current					
	$I_{N, out}$	[A]	16.0	24.0	32.0
Rated switching frequency					
	f_{ch}	[kHz]	4		
Output current					
4 kHz	I_{out}	[A]	16.0	24.0	32.0
8 kHz	I_{out}	[A]	12.8	19.2	25.6
16 kHz	I_{out}	[A]	9.6	14.4	19.2
Power loss					
	P_V	[W]	210.0	290.0	390.0

Dimensions and weights

Standard installation design

Dimensions			
Height	h	[mm]	350
Height, including fastening	h	[mm]	410
Width	b	[mm]	100
Depth	t	[mm]	261
Mass			
	m	[kg]	5.2

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Rated data for double axes

Max. short-time output current				
	I_max, out	[A]	5.0	10.0
Product key				
			E70ACMS☐0054SA2ET☐	E70ACMS☐0104SA2ET☐
DC supply				
	U_{DC}	[V]	DC 260 V -0 % ... 775 V +0 %	
Typical motor power				
4-pole asynchronous motor	P	[kW]	1.10	2.20
Rated output current				
	$I_{N, out}$	[A]	2.5	5.0
Rated switching frequency				
	f_{ch}	[kHz]	4	
Output current				
4 kHz	I_{out}	[A]	2.5	5.0
8 kHz	I_{out}	[A]	2.0	4.0
16 kHz	I_{out}	[A]	1.5	3.0
Power loss				
	P_V	[W]	90.0	140.0

Dimensions and weights

Standard installation design

Dimensions			
Height	h	[mm]	350
Height, including fastening	h	[mm]	410
Width	b	[mm]	50
Depth	t	[mm]	261
Mass			
	m	[kg]	2.9

Servo-Inverters i700

Technical data

Rated data for double axes

Max. short-time output current				
	$I_{max, out}$	[A]	20.0	32.0
Product key				
			E70ACMS□0204SA2ET□	E70ACMS□0324SA2ET□
DC supply				
	U_{DC}	[V]	DC 260 V -0 % ... 775 V +0 %	
Typical motor power				
4-pole asynchronous motor	P	[kW]	5.00	7.50
Rated output current				
	$I_{N, out}$	[A]	10.0	16.0
Rated switching frequency				
	f_{ch}	[kHz]	4	8
Output current				
4 kHz	I_{out}	[A]	10.0	16.0
8 kHz	I_{out}	[A]	8.0	12.8
16 kHz	I_{out}	[A]	6.0	9.6
Power loss				
	P_V	[W]	260.0	370.0

Dimensions and weights

Standard installation design

Dimensions				
Height	h	[mm]	350	350
Width	b	[mm]	100	100
Depth	t	[mm]	261	261
Mass				
	m	[kg]	5.2	5.2

Rated data for power supply modules

► The data is valid for operation at 3/PE AC 400 V.

Product key				
Power supply module			E70ACPS□0304S	E70ACPS□0604S
Rated power				
With mains filter/mains choke	P_N	[kW]	15.4	30.9
Without mains filter/mains choke	P_N	[kW]	10.3	20.6
Mains voltage range				
	U_{AC}	[V]	3/PE AC 320 V-0% ... 528 V+0 % 45 Hz-0 % ... 65 Hz+0 %	
Rated mains current				
	$I_{N, AC}$	[A]	24.5	49.0
Rated DC-bus current				
	$I_{N, DC}$	[A]	30.0	60.0
Power loss				
	P_V	[W]	60.0	110.0

Brake chopper rated data

Rated power, Brake chopper				
	P_N	[kW]	4.1	10.1
Max. output power, Brake chopper				
	$P_{max, 1}$	[kW]	26.8	65.5
Running time				
	t_{on}	[s]	15.0	
Recovery time				
	t_{re}	[s]	82.0	
Min. brake resistance				
	R_{min}	[Ω]	22.0	9.0

Dimensions and weights

Standard installation design

Dimensions				
Height	h	[mm]	350	
Height, including fastening	h	[mm]	410	
Width	b	[mm]	50	100
Depth	t	[mm]	261	
Mass				
	m	[kg]	2.8	5.8

"Cold plate" design

Inverters in cold-plate design dissipate some of their waste heat (heat loss) via a cooler adapted to the application. For this purpose, the inverters are provided with a planed cooling plate which is connected to a separate cooler in a thermally conductive way. Using the cold plate technology, the main part of the heat energy can be transferred directly to the external cooling units.

The use of cold-plate technology is advantageous for the following application cases:

- Minimising the expense of cooling the control cabinet. Here, the main part of the power loss is directly transferred to a cooling unit outside of the control cabinet, e.g. convection cooler or water cooler.
- Heavily polluted ambient air or control cabinets with a high degree of protection which do not allow for a use of a forced air cooling of the control cabinets.
- Low mounting depth in the control cabinet.

Requirements for the cooler

When cold-plate technology is used, the following basic conditions must be considered:

- Good thermal connection to the external cooling unit, i.e. the implementation of the heat transfer resistance (Rth) according to the power loss.
- The contact surface must at least be as big as the cooling plate of the inverter.
- The planarity of the contact surface must not exceed 0.05 mm.
- The contact surface of the external coolers and cooling plate must be connected by means of the intended screwed connection.
- The maximum temperature of the cooling plate of the inverter ((75 °C) must not be exceeded.

Product key	Power to be dissipated	Thermal resistance
Inverter		
	P_V	R_{th}
	[W]	[K/W]
E70ACMS□0054SA1ET□	25.0	≤ 1.6
E70ACMS□0104SA1ET□	50.0	≤ 0.8
E70ACMS□0204SA1ET□	95.0	≤ 0.45
E70ACMS□0324SA1ET□	140	≤ 0.25
E70ACMS□0484SA1ET□	215	≤ 0.2
E70ACMS□0644SA1ET□	290	≤ 0.15
E70ACMS□0054SA2ET□	50.0	≤ 0.8
E70ACMS□0104SA2ET□	95.0	≤ 0.45
E70ACMS□0204SA2ET□	185	≤ 0.2
E70ACMS□0324SA2ET□	275	≤ 0.15

Product key	Power to be dissipated	Thermal resistance
Power supply module		
	P_V	R_{th}
	[W]	[K/W]
E70ACPS□0304S	45.0	≤ 0.95
E70ACPS□0604S	85.0	≤ 0.45

Servo-Inverters i700

Technical data

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"Cold plate" design

Dimensions and weights

Single axes

Product key			E70ACMS□0054SA1ET□	E70ACMS□0104SA1ET□	E70ACMS□0204SA1ET□
Dimensions					
Height, including fastening	h	[mm]		410	
Width	b	[mm]		50	
Depth	t	[mm]		221	
Mass					
	m	[kg]		2.3	

Product key			E70ACMS□0324SA1ET□	E70ACMS□0484SA1ET□	E70ACMS□0644SA1ET□
Dimensions					
Height, including fastening	h	[mm]		410	
Width	b	[mm]		100	
Depth	t	[mm]		221	
Mass					
	m	[kg]		5.3	

Double axes

Product key			E70ACMS□0054SA2ET□	E70ACMS□0104SA2ET□	E70ACMS□0204SA2ET□	E70ACMS□0324SA2ET□
Dimensions						
Height, including fastening	h	[mm]		410		
Width	b	[mm]		50	100	
Depth	t	[mm]		221		
Mass						
	m	[kg]		2.5	5.3	

Power supply modules

Product key			E70ACPS□0304S	E70ACPS□0604S
Dimensions				
Height, including fastening	h	[mm]		410
Width	b	[mm]	50	100
Depth	t	[mm]		221
Mass				
	m	[kg]	2.6	5.6

- -

Push-through technique design

The inverters in push-through design reduce the waste heat in the control cabinet.
The inverter is mounted in the control cabinet so that the heatsink on the inverter is outside the control cabinet. Thus, the entire waste heat can be dissipated outside the control cabinet via convection or forced air cooling for almost all device performances.

Using the push-through technology is advantageous in the following application cases:

- Minimising the expense for control cabinet cooling. For this purpose, the main part of the power loss is directly transferred to the ambience outside the control cabinet, e.g. convection cooling.
- In case of control cabinets with a high degree of protection > IP54 by using separate mounting and cooling areas.
- Low mounting depth in the control cabinet.

Product key	Power to be dissipated
Inverter	
	P_V
	[W]
E70ACMS□0054SA1ET□	25.0
E70ACMS□0104SA1ET□	50.0
E70ACMS□0204SA1ET□	95.0
E70ACMS□0324SA1ET□	140
E70ACMS□0484SA1ET□	215
E70ACMS□0644SA1ET□	290
E70ACMS□0054SA2ET□	50.0
E70ACMS□0104SA2ET□	95.0
E70ACMS□0204SA2ET□	185
E70ACMS□0324SA2ET□	275

Product key	Power to be dissipated
Power supply module	
	P_V
	[W]
E70ACPS□0304S	45.0
E70ACPS□0604S	85.0

Push-through technique design

Dimensions and weights

Single axes

Product key			E70ACMS☐0054SA1ET☐	E70ACMS☐0104SA1ET☐	E70ACMS☐0204SA1ET☐
Dimensions					
Height, including fastening	h	[mm]	410		
Width	b	[mm]	50		
Depth (in control cabinet)	t	[mm]	221		
Mass					
	m	[kg]	3.0		

Product key			E70ACMS☐0324SA1ET☐	E70ACMS☐0484SA1ET☐	E70ACMS☐0644SA1ET☐
Dimensions					
Height, including fastening	h	[mm]	410		
Width	b	[mm]	100		
Depth (in control cabinet)	t	[mm]	221		
Mass					
	m	[kg]	7.1		

Double axes

Product key			E70ACMS☐0054SA2ET☐	E70ACMS☐0104SA2ET☐	E70ACMS☐0204SA2ET☐	E70ACMS☐0324SA2ET☐
Dimensions						
Height, including fastening	h	[mm]	410			
Width	b	[mm]	50		100	
Depth	t	[mm]	261			
Mass						
	m	[kg]	3.2		7.1	

Power supply modules

Product key			E70ACPS☐0304S	E70ACPS☐0604S
Dimensions				
Height, including fastening	h	[mm]	410	
Width	b	[mm]	50	100
Depth (in control cabinet)	t	[mm]	221	
Mass				
	m	[kg]	2.8	5.8

4.6

4.6

Servo-Inverters i700

Interfaces

Mains connection

Interference voltage categories according to the European standard EN 61800-3 are divided into category C1, C2 and the category C3.

Category C1
• Describes the use in public networks.

Category C2
• Describes the use of devices intended for industrial purposes in areas also comprising residential areas.

Category C3
• Describes the use of devices intended for industrial purposes only.

▶ ▤ 26 - The interference voltage categories achievable due to the filter measures are shown in conjunction with the motor cables.

With an upstream mains choke or mains filter, the maximum continuous power of the power supply modules can be used since the effective current will be reduced.
If no filter or an RFI filter is used, the permissible continuous power (rated power) of the power supply module is reduced.
The mains choke and the RFI filter can also be combined without any restrictions.

▶ ▤ 33 - Mains chokes, RFI filters, mains chokes

Mains fuses and cable cross-sections

▶ The mains fuse and cable cross-section specifications are for a mains connection of 3AC 400 V or 3AC 480 V.
▶ Class gG/gl fuses or class gRL semiconductor fuses.
▶ The cable cross-sections apply to PVC-insulated copper cables.
▶ Use for installation with UL-approved cables, fuses and brackets.

Rated power	Mains voltage	Product key	Circuit breaker	Fuse		Mains connection
		Power supply module		EN 60204-1	UL [1]	Cross-section (with mains choke)
P_N	U_{AC}		I	I	I	q
[kW]	[V]		[A]	[A]	[A]	[mm2]
15.4	3 AC 320 ... 528	E70ACPS□0304S	C40	40		10.0
30.9		E70ACPS□0604S	C63	63		16.0

[1] In preparation.

Motor connection

► Electric strength of the motor cable: 1 kV as per VDE 250-1.
► Keep motor cables as short as possible, as this has a positive effect on the drive behaviour.
► Maximum motor cable length 50 m per axis.
► In group drives (multiple motors on one controller), the resulting cable length is the crucial factor. Please consult Lenze for detailed information.

Motor cable lengths and interference voltage categories

When using the i700 system, use external filters to comply with the EMC Directives.

Category C1
• With special measures; please contact your Lenze subsidiary

Category C2
• With RFI filters, 6 axes with 25 m motor cable
• With mains filters , 10 axes with 50 m motor cables

Category C3
• Without external measures, 6 axes with 25 m motor cable
• With mains choke, 6 axes with 25 m motor cable

▶ 📄   33 - Mains chokes, RFI filters, mains chokes

Connection plans

Servo-Inverter i700 wiring example, axis modules
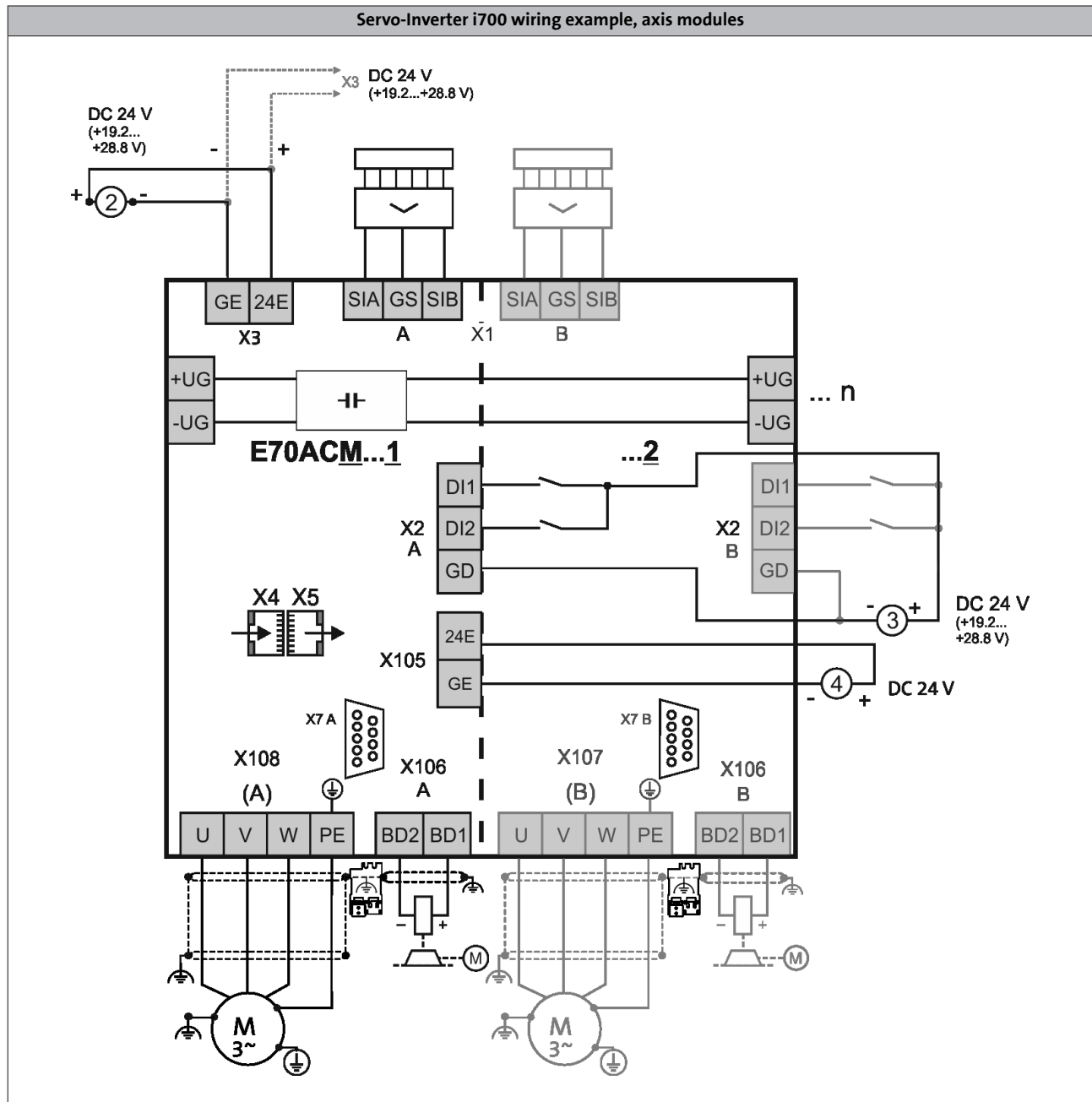
[2] 24 supply for control electronics
[3] 24 V supply for digital inputs
[4] 24 V supply for motor holding brake(s)

Connection plans

Servo-Inverter i700 wiring example, power supply modules

[1] 24 V supply for digital inputs
[2] 24 V supply for control electronics

Control connections

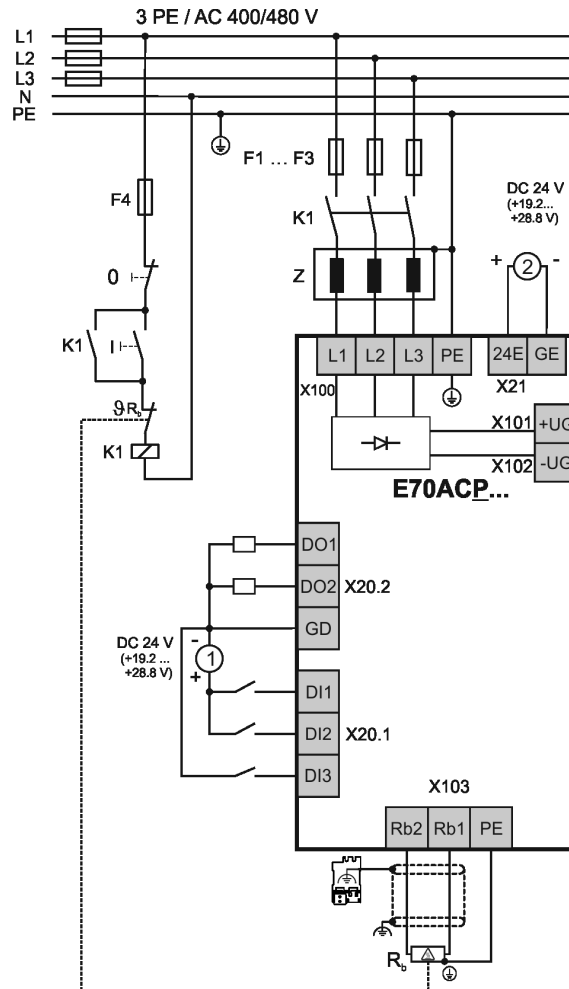| Mode	
	Servo-Inverters i700
Digital inputs	
Number	2
Touch-probe-capable	2 with time and position stamp
Switching level	PLC (IEC 61131-2)
Max. input current	8 mA
External DC supply	
Rated voltage	24 V in accordance with IEC 61131-2
Voltage range	19.2 ... 28.8 V, max. residual ripple ± 5%
Interfaces	
EtherCAT	2 (in/out)
Safety engineering	Safe torque off (STO) 2 channel design
Drive interface	
Resolver input	Sub-D, 9-pin
Encoder input	Sub-D, 15-pin SinCos absolute value encoder single-turn (with zero pulse) or multi-turn (Hiperface®)

4.6

Connection of digital inputs
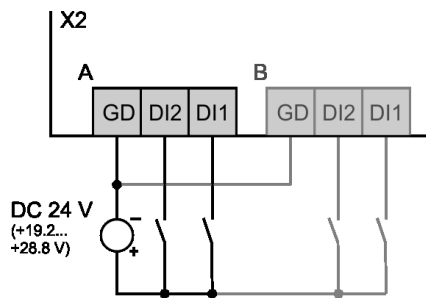
Safety engineering connection
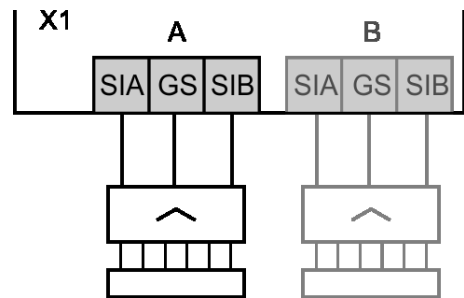
Motor brake connection
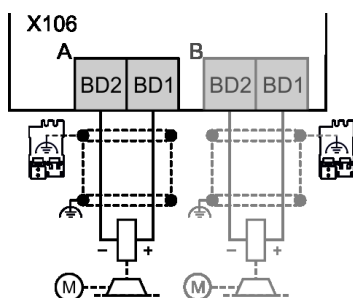
Control connections

External 24 V supply

The control electronics of the Servo-Inverter i700 has to be supplied with an external 24-V supply. For this purpose, Lenze provides power supply units. The following table shows the corresponding current consumptions of the devices.

▶ 🗎 36 - 24 V power supply unit

Single axes

Max. short-time output current	Product key	External DC supply
		Current
$I_{max, out}$		
[A]		
5.0	E70ACMS☐0054SA1ET☐	
10.0	E70ACMS☐0104SA1ET☐	1.0 A
20.0	E70ACMS☐0204SA1ET☐	
32.0	E70ACMS☐0324SA1ET☐	
48.0	E70ACMS☐0484SA1ET☐	2.0 A
64.0	E70ACMS☐0644SA1ET☐	

Double axes

Max. short-time output current	Product key	External DC supply
		Current
$I_{max, out}$		
[A]		
5.0	E70ACMS☐0054SA2ET☐	1.0 A
10.0	E70ACMS☐0104SA2ET☐	
20.0	E70ACMS☐0204SA2ET☐	2.0 A
32.0	E70ACMS☐0324SA2ET☐	

Safety system (STO)

By default, the Servo-Inverter i700 are available with the "safe torque off, STO" safety function. This helps reduce the control system costs, save space in the control cabinet and keep wiring to a minimum. The safety engineering is certified according to EN ISO 13849-1 (Cat. 4, PL e), EN 61508/EN 62061 (SIL 3). A "safe stop 1, SS1" can be implemented easily using a safety switching device.

The product key of the inverter has an "**A**".
as the 14th character. For example, a servo inverter 5A, built-in unit with safety engineering would be: E70ACMSE0054S**A**ETR

Double axis with connections for safety engineering

4.6

Servo-Inverters i700

Interfaces

EtherCAT® communication

EtherCAT enables the Servo-Inverter i700 to be controlled with digital control signals via the EtherCAT® bus system. It is integrated in the Servo-Inverter i700. It can be seen in the product key at the positions 16 and 17: E70ACM□□□□4SA□**ET**□.

The advantages of the system are:
- quick and very powerful bus system
- ideally suited for Controller-based Automation solutions
- easy system integration since a wide range of sensors and actuator is available on the market.
- the basic features of a servo drive are available in the axes according to the device profile and can be easily used via the EtherCAT®.

Mode	Features
Communication	
EtherCAT [1]	• CANopen over EtherCAT (CoE) • Distributed clock • 2 RJ45 connections with LEDs for link and activity

[1] EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Technical data

Product key			
			E70ACM□□□□4SAxET□
Communication			
Medium			CAT5e S/FTP according to ISO/ICE11801 (2002)
Communication profile			CoE (CANopen over EtherCAT)
Baud rate			
	b	[MBit/s]	100
Node			
			Slave
Network topology			
			Line (internal ring)
Number of logical process data channels			
			1
Process data words (PZD)			
16 Bit			1 ... 32
Number of bus nodes			
			max. 65535
Max. cable length			
between two nodes	I_{max}	[m]	100
Rated voltage			
	$U_{N, DC}$	[V]	24.0

Servo-Inverters i700

Accessories

Brake resistors for power supply modules

The assignment of brake resistors to the power supply modules is shown in the following tables.

Brake resistor 27 ohms

Product key		Rated resistance	Rated power	Thermal capacity	Dimensions	Mass
Power supply module	Brake resistor					
		R_N	P_N	C_{th}	h x b x t	m
		[Ω]	[W]	[KWs]	[mm]	[kg]
E70ACPS□0304S	ERBP027R200W	27.0	200.0	30	320 x 41 x 122	1.0
	ERBS027R600W		600.0	90	550 x 110 x 105	3.1
	ERBS027R01K2		1200.0	180	1020 x 110 x 105	5.6
E70ACPS□0604S	ERBG012R01K9	12.0	1900.0	285	486 x 236 x 302	13.0
	ERBG012R05K2		5200.0	750	486 x 426 x 302	28.0

4.6

Mains chokes for power supply modules

A mains choke is an inductive resistor which is connected in the mains cable of the power supply module. The use of a mains choke provides the following advantages:
- **Fewer effects on the mains:**
  The wave form of the mains current is a close approximation to a sine wave.
- **Reduction in the effective mains current:**
  Reduction of mains, cable and fuse loads
- **Current balancing of power supply modules connected in parallel**

Mains chokes can be used without restrictions in conjunction with RFI filters.

Please note:
The use of a mains choke slightly reduces the mains voltage at the input of the power supply module – the typical voltage drop across the mains choke at the rated values is around 5%.
The selection of the correct mains chokes for the power supply modules depends on the number of connected axes. For this purpose, different mains chokes are available. For the following efficiencies of the power supply modules, we have dimensioned model mains chokes:
- Power supply modules for 30 A operation with rated data
- Power supply modules for 60 A operation with rated data

Mains choke

Product key		Output power	Rated current	Dimensions	Mass
Power supply module	Mains choke	at 400 V			
		P_{out}	I_N	h x b x t	m
		[kW]	[A]	[mm]	[kg]
E70ACPS□0304S	EZAELN3025B122	15.4	25.0	177 x 155 x 110	5.8
E70ACPS□0604S	EZAELN3050B591	30.9	50.0	210 x 185 x 112	8.4

Interference suppression of power supply modules

RFI filter

RFI filters are primarily capacitive accessory components which can be connected directly upstream from the power supply modules. This measure enables compliance with the corresponding conducted noise emission requirements according to EN 61800-3.

RFI filter, can be mounted beside the power supply module

Product key		Output power	Rated current	Power loss	Max. cable length	Dimensions	Mass
Power supply module	RFI filter	at 400 V			Reference group C2		
		P_{out}	I_N	P_V	I_{max}	h x b x t	m
		[kW]	[A]	[W]	[m]	[mm]	[kg]
E70ACPS☐0304S	E94AZRP0084	3.60	8.00	20.0	6 axes of 10 m each	485 x 60 x 261	4.2
	E94AZRP0294	10.3	29.0	50.0			4.5
E70ACPS☐0604S	E94AZRP0824	20.6	82.0	80.0		490 x 209 x 272	18.5

Interference suppression of power supply modules

Mains filter

A mains filter is a combination of mains choke and RFI filter in one housing. It reduces the conducted interference emission into the mains in order that the conducted interference voltage is reduced to the area permissible according EN61800-3.
This results in the following advantages:
- Fewer effects on the mains:
  The wave form of the mains current is a close approximation to a sine wave.
- Reduction in the effective mains current:
  Reduction of mains, cable and fuse loads
- Current balancing when power supply modules are connected in parallel

Product key		Output power	Rated current	Voltage drop	Max. cable length	Dimensions	Mass
Power supply module	Mains filter	at 400 V			Reference group C2		
		P_{out}	I_N	U	I_{max}	h x b x t	m
		[kW]	[A]	[V]	[m]	[mm]	[kg]
E70ACPS□0304S	E94AZMP0084	4.90	8.00	10.0	10 axes of 50 m each	485 x 90 x 261	8.6
	E94AZMP0294	15.4	29.0	7.3		485 x 120 x 261	16.5
E70ACPS□0604S	E94AZMP0824	30.6	82.0	6.4		490 x 270 x 272	29.0

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24 V power supply unit

The control electronics of the axis and power supply modules must be supplied by external 24-V power supply units. For this purpose, various power supply units are available. The power supply units can be supplied with AC voltage and DC voltage from the DC bus of the drive system. This ensures a continuous supply of the electronics in case of mains failure to ensure a controlled braking process.

Electrical isolation
The i700 components have a "save separation" between mains and electronic potential according to IEC 61131–2. For maintaining this feature, the successive power supply units can be used with SELV (Safety Extra Low Voltage) or PELF (Protective Extra Low Voltage).

24 V power supply unit

Product key			EZV1200-000	EZV2400-000	EZV4800-000	EZV1200-001	EZV2400-001	EZV4800-001
Rated voltage								
AC	$U_{N, AC}$	[V]	230			400		
Input voltage								
	U_{in}	[V]	AC 85 ... 264 DC 90 ...350			AC 320 ... 575 DC 450 ...800		
Rated mains current								
	$I_{N, AC}$	[A]	0.8	1.2	2.3	0.3	0.6	1.0
Output voltage								
	U_{out}	[V]	DC 22.5 ...28.5					
Rated output current								
	$I_{N, out}$	[A]	5.0	10.0	20.0	5.0	10.0	20.0
Dimensions								
Height	h	[mm]	130					
Width	b	[mm]	55	85	157	73	85	160
Depth	t	[mm]	125					
Mass								
	m	[kg]	0.8	1.2	2.5	1.0	1.1	1.9

Installation sets for Servo-Inverter i700

The installation sets include:
• All plug-in terminals
• Shield sheets plus shield terminals
• EtherCAT® cable (100 mm) for connecting the next axis

Mode	Features	Product key
Installation set for single axes	• For axes 5 ... 20 A	E70AZEVK001
	• For axes 32 ... 64 A	E70AZEVK003
Installation set for double axes	• For axes 5 ... 10 A	E70AZEVK002
	• For axes 20 ... 32 A	E70AZEVK004
Installation set for power supply modules	• For power supply module 30 A	E70AZEVK005
	• For power supply module 60 A	E70AZEVK006
	• For parallel connection	E70AZEVK007

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