

PacDrive™

PS-4 and PD-8



Imprint

© All rights reserved to ELAU AG, also in case of patent right applications.

No part of this documentation and the related software and firm-ware may be reproduced, rewritten, stored on a retrieval system, transmitted or translated into any other language or computer language without the express written consent of ELAU AG.

All possible measures were taken to ensure the that this product documentation is complete and correct. However, since hardware and software are continuously improved, ELAU makes no representations or warranties with respect to the contents of this product documentation.

Trademarks

PacDrive is a registered trademark of ELAU AG.

All other trademarks mentioned are the exclusive property of their manufacturers.

ELAU AG
Dillberg 12
D-97828 Marktheidenfeld
Phone: 09391/606-0
Fax: 09391/606-300
eMail: info@elau.de
Internet: www.elau.de

ELAU Inc.
165 E. Commerce Drive
Schaumburg, IL 60173 - USA
Phone: +1 847 490 4270
Fax: +1 847 490 4206
e-mail: info@elau.com
Internet: www.elau.com

Contents

1	On this manual	5
1.1	Introduction	5
1.2	Symbols, Signs and Forms of Depiction	6
2	General Safety Notes	7
2.1	Basics	7
2.2	Depiction of Safety Notes	8
2.3	Use as Directed	9
2.4	Selection and Qualification of Staff	10
2.5	Residual Risks	10
2.5.1	Installation and Handling	11
2.5.2	Protection against Touching Electrical Parts	12
2.5.3	"Safely Separated Low Voltages"	13
2.5.4	Potentially Dangerous Movements	14
3	System Overview	15
3.1	Drive Concepts for Packaging Machines	15
3.2	Structure of the PacDrive™ Automation System	17
3.3	Structure	18
3.4	Components	19
4	Transportation, Storage, Unpacking	21
4.1	Transportation	21
4.2	Storage	21
4.3	Unpacking	21
5	Maintenance	25
5.1	Spare Parts, Components	25
5.2	Repair	26
5.3	Service Addresses	26
5.4	Exchanging units	27
5.5	Cleaning	29
5.6	EMC Rules	30
5.7	Commissioning	31
5.7.1	Slaves in the SERCOS ring	35
5.8	Configuration / Programming / Diagnosis	35
5.8.1	Diagnosis LEDs	36
5.8.2	Combination of PacDrive SCL and PacDrive PS-4	37

5.9	Order numbers	38
5.9.1	PacDrive PS-4	38
5.9.2	Cables	39
6	Project definition	41
6.1	Creation of a PacDrive PS-4/PD-8, SCL055 application	41
6.2	PacDrive PS-4	41
6.2.1	Mains Connection of PacDrive PS-4	41
6.2.2	Transformer dimensioning	44
6.3	Electricity Supply via Slip Ring	46
7	Technical Data	47
7.1	PacDrive PS-4	47
7.1.1	General	47
7.1.2	Electrical connections	48
7.1.3	Dimensions	51
7.2	PacDrive PD-8	52
7.2.1	General	52
7.2.2	Electrical connections	53
7.2.3	Dimensions	54
7.3	Declaration by the manufacturer	57
7.4	Modifications	58
8	APPENDIX	59
8.1	Contact	59
8.2	Further Literature	60
8.3	Product Training	62
8.4	Index	63
8.5	Form for Error Report	65

1 On this manual

1.1 Introduction

Before using ELAU components for the first time, you should familiarize yourself with this operating manual.

In particular, observe the safety notes described in chapter 2.

Only persons who meet the criteria for "Selection and Qualification of Staff" (see chapter 2.4) are allowed to work on ELAU components.

One copy of this manual has to be available for staff working on the components with access at any time.

This manual is to help you use the component safely and expertly and to use it as directed.

Observe this manual. This will help to avoid risks, reduce repair costs and down times and increase the lifetime and reliability of the products.

You also need to observe the valid rules for the prevention of accidents and for environmental protection in the country and place where the device is used.

1.2 Symbols, Signs and Forms of Depiction

The following symbols and signs are used in this document:




Depiction	Meaning
■	First level enumeration sign.
–	Second level enumeration sign.
▶	Action symbol: The text following this symbol includes an instruction for action. Execute the instruction actions in the given order, from top to bottom.
✓	Result symbol: The text following this symbol contains the result of an action.
<i>Italics</i>	If the describing text contains special terms (e.g. parameters) these are written in italics.
Serif font	If the manual contains program code, this is marked by Serif font.
	Information symbol: This symbol marks notes and useful tips for using the product.
	Warning sign: Safety notes can be found in the relevant places. They are marked by this symbol.
	After this symbol, information about contents of the chapter follows as guideline assistance.

Table 1-1: Symbols, signs and forms of depiction

2 General Safety Notes



This chapter contains general requirements for working safely. Every person using ELAU components or working on ELAU components has to read and observe these general safety notes. If activities involve a residual risk, you will find a clear note in the respective places. The note describes the risk that may occur and preventive measures to avoid that risk.

2.1 Basics

The ELAU components are built according to the state of technology and generally accepted safety rules. Nevertheless, their use may cause a risk to life and limb or material damage if:

- you do not use the components as directed
- work on the components is not done by experts or instructed staff
- you inexpertly alter or modify a component
- you fail to test the protective measures in place after installation, commissioning or servicing
- you do not observe the safety notes and regulations.

Only operate the components in perfect technical condition, as directed, with regard to safety and risks and observe this manual.

The flawless and safe operation of the components requires appropriate transport, storage, mounting and installation as well as careful maintenance.

In case of any circumstances that impair the safety and cause changes in the operating behavior, immediately put the component(s) to a stop and inform the service staff in charge.

In addition to this manual, observe

- the prohibiting, warning and mandatory signs on the component, the connected components and in the switching cabinet
- the relevant laws and regulations
- the operating manuals of the other components
- the universally valid local and national rules for safety and the prevention of accidents.

2.2 Depiction of Safety Notes

Risk categories

The safety notes in this manual are grouped into different risk categories. The table below shows which risk and possible consequences the symbol (pictograph) and the signal words indicate.


Pictograph	Signal word	Definition
	DANGER!	Indicates an immediately dangerous situation that will result in death or very serious injuries if the safety rules are not observed.
	WARNING!	Indicates a possibly dangerous situation that can result in serious injuries or major material damage if the safety rules are not observed.
	CAUTION!	Indicates a possibly dangerous situation that might result in material damage if the safety rules are not observed.

Table 2-1: Risk categories

2.3 Use as Directed

The ELAU components are designed for installation in a machine/plant or for combination with other components to form a machine/plant. The components may only be used under the installation and operating conditions described in this documentation. You must use the accessories and ancillary parts (components, cables, etc.) mentioned in the documentation. You must not use any foreign objects or components that are not explicitly approved by ELAU.

"Use as directed" also means that you

- observe the Operating Manuals and other documentations (see appendix),
- observe the instructions for inspection and maintenance.

Use other than directed

The operating conditions at the place where the device is used must be checked on the basis of the given technical data (performance information and ambient conditions) and observed.

The device must not be put into operation until it is guaranteed that the useable machine or the plant in which the motor is installed meets in its entirety EC directive 98/37/EC (machine directive).

In addition, observe the following norms, directives and regulations:

- DIN EN 60204 Safety of machines:
Electrical equipment of machines.
- DIN EN 292 part 1 and part 2 Safety of machines:
Basics, general design guidelines.
- DIN EN 50178 Equipment of high-voltage plants with electronic operating means.
- EMC directive 89/336/EEC

2.4 Selection and Qualification of Staff

This manual is aimed exclusively at technically qualified staff with detailed knowledge in the field of automation technology.

Only qualified staff can recognize the significance of safety notes and implement them accordingly.

This manual is aimed in particular at design and application engineers in the fields of mechanical and electrical engineering, at programmers, service and commissioning engineers.

Working on electrical equipment

Work on electrical equipment must only be done by qualified electricians or by instructed staff supervised by an electrician according to the electrotechnical rules.

An electrician is a person who, due to his vocational training, know-how and experience as well as knowledge of the valid regulations, is able to:

- evaluate the work he is supposed to do
- identify potential risks
- implement suitable safety measures.

2.5 Residual Risks

We minimized the health risk for people by means of appropriate construction and safety technology. Nevertheless, there is a residual risk, since the components work with electrical current and voltage.

2.5.1 Installation and Handling



WARNING!

Risk of injury while handling the unit!

Risk of injury due to squeezing, cutting or hitting!

- Observe the universally valid construction and safety rules for handling and installation.
 - Use suitable installation and transport facilities and use them professionally. If necessary, use special tools.
 - Take precautions against squeezing.
 - If necessary, use suitable protective clothing (e.g. safety glasses, safety shoes, protective gloves).
 - Do not stay under pending loads.
 - Remove any leaking liquids from the floor immediately to avoid skidding.
-

2.5.2 Protection against Touching Electrical Parts

Touching parts carrying a voltage of 50 Volts or higher can be dangerous. When electric appliances are operated, certain parts of these appliances inevitably carry a dangerous voltage.



DANGER!

High voltage!

Life hazard!

- Observe the universally valid construction and safety rules for working on high-voltage units.
 - After installation, check the fixed connection of the earth conductor on all electric appliances according to the connection plan.
 - Operation, even for short-term measuring and test purposes, is only permitted with an earth conductor firmly connected to all electric components.
 - Before accessing electrical parts with voltages exceeding 50 Volts, disconnect the unit from mains or power supply and lock it out. After switching off, wait for at least 5 minutes before touching any components.
 - Do not touch electrical connections of the components while the unit is on.
 - Before switching on the unit, cover all voltage carrying parts to prevent accidental contact.
 - Provide for protection against indirect touching (EN 50178 / 1998 section 5.3.2).
-



DANGER!

High leak current!

Life hazard!

- The leak current is greater than 3.5 mA. Therefore the units must have a firm connection to the power grid (according to DIN EN 50178 / 1998 - equipment of high-voltage systems).
-

2.5.3 "Safely Separated Low Voltages"

PELV Signal voltage and control voltage of the PacDrive units are <33 V.
Protective-Extra-Low-Voltage In this range the specification as PELV system according to IEC 364-4-41 includes a protective measure against directly and directly touching dangerous voltages by means of a "safe separation" from the primary to the secondary side in the plant/machine. ELAU urgently recommends to execute the plant/machine with safe separation.



DANGER!

High voltage due to wrong connection!

Life hazard or risk of serious injury!

- Only units, electric components or cables with a sufficient safe separation of the connected power supplies according to EN 50178 / 1998 (equipment of high-voltage systems with electronic operating means) may be connected to the signal voltage connections of these components.
- Make sure that the existing safe separation is retained throughout the entire current circuit.

FELV When using ELAU components in systems that do not include a
Functional-Extra-Low-Voltage safe separation as a means of protection against directly or indirectly touching dangerous voltages, all connections and contacts (e.g. MAX-4, Sub-D connector, serial interface) that do not comply with protection class IP2X must be permanently covered. The cover or device connection must be such that it can only be removed with the help of a tool. The protective measure must be observed on all connected devices.

2.5.4 Potentially Dangerous Movements

There can be different causes for potentially dangerous movements:

- mistakes in wiring or cable connection
- software errors
- faulty components
- errors in measuring value and signal encoders
- operating mistakes

The protection of people must be insured by superior means or monitoring on the plant side. You must not rely on the internal monitoring in the drive components alone. Monitoring or measures are to be provided according to a risk and error analysis by the plant builder according to the specific conditions of the plant. The valid safety rules for the plant are to be included in this process.



DANGER!

Potentially dangerous movements!

Life hazard, serious injury or material damage!

- No persons are allowed within the motion range of the machine. This is to be ensured by means of devices like protective fences, grids, covers or photoelectric barriers.
 - The fences and covers must be sufficiently strong to withstand the maximum possible motion energy.
 - The emergency stop switch must be located very close to the operator. Check the operation of the emergency stop before starting up the plant.
 - Secure against unintentional start by enabling the mains contactor of the drives via an emergency off circuit or by means of the function 'safe stop'.
 - Before accessing the danger zone, bring the drives to a safe stop.
 - To work on the plant, power must be turned off and locked out.
 - Avoid operating high-frequency, remote-control and radio devices in the vicinity of the plant's electronics and connecting wires. If the use of those devices is inevitable, check system and plant for possible malfunctions before first operation. In some cases a special EMT check may be necessary.
-

3 System Overview

3.1 Drive Concepts for Packaging Machines

Modern machine concepts in the packaging industry are characterized by the need for high dynamism, flexibility, modularity and efficiency. Packaging machines were traditionally equipped with a main drive and a mechanical main shaft, which coupled all other motion organs in the machine usually with mechanical components with complicated motion functions. Designing such packaging machines flexibly for different products is a highly complex task. Even minor changes in the packaging process, particularly in case of a product change, require major modifications and down time.

Packaging machines with electronic vertical shafts, by contrast, permit full flexibility. Electronic servo drive systems replace cam and coupling gears, and a virtual electronic main shaft ensures that the motion axes are synchronous. Any pulse and angle synchronous movements are determined by a central controller.

Unplanned machine states, such as stop or emergency off situations and initialization movements, can be realized angle-synchronously. Dynamic changes of the goods to be packed or the packaging material in the plant (like slippage of the products to be packed or expansion of the packaging material) can be detected by sensors while the machine is running and eliminated by modifying the corresponding drive movements. This development substantially changes and highly simplifies the classical mechanical machine concept. The structure of the packaging machine can be broken down into modules that are easy apply and standardize.

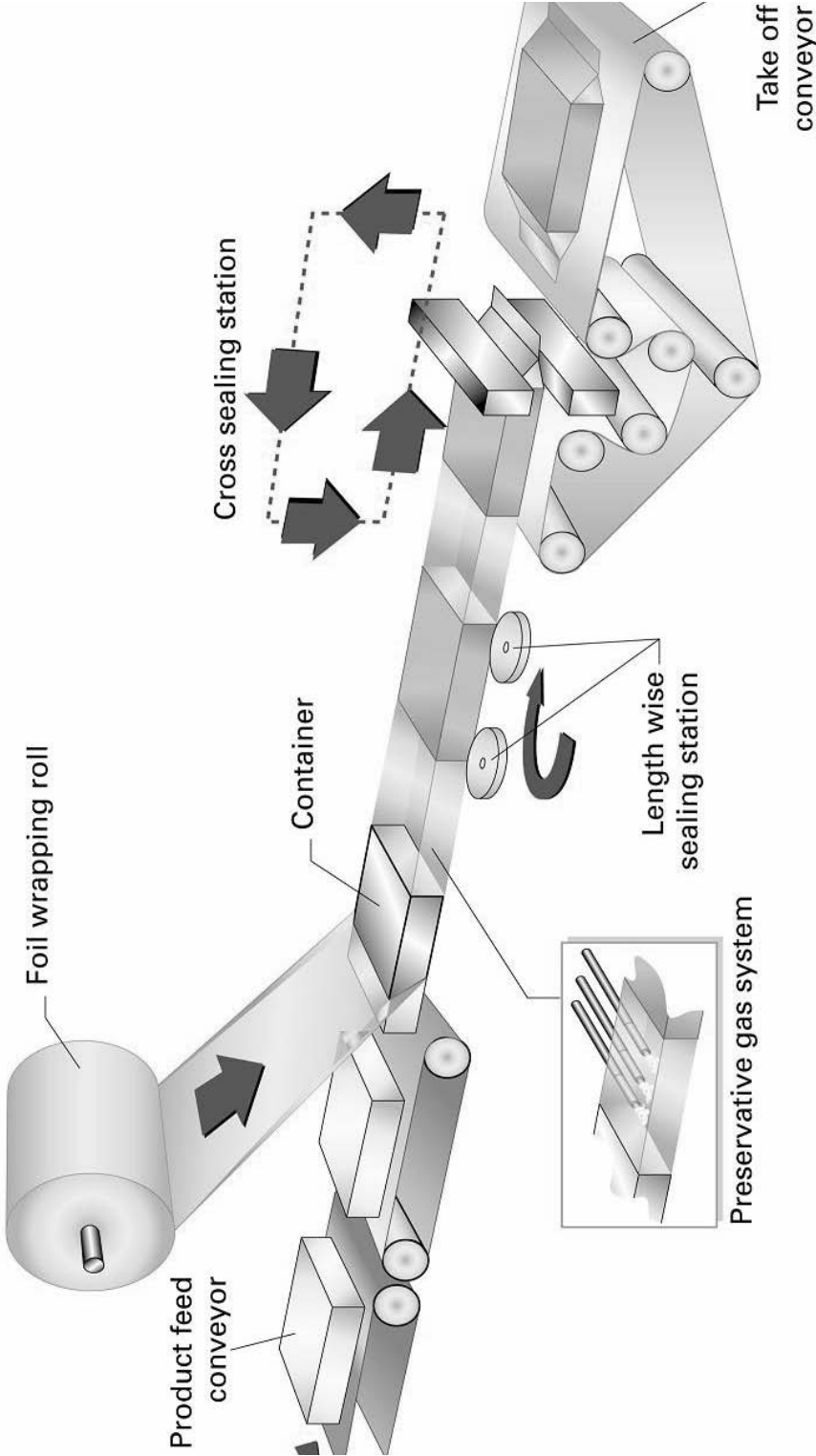


Fig. 3-1: Sketch of a packaging machine

3.2 Structure of the PacDrive™ Automation System

The PacDrive™ automation system offers a technically and economically ideal solution for electronic packaging machines. PacDrive™ consists of an efficient PC-based control, the PacDrive Controller and the digital motor controllers, which include the mains connection unit, the end-stage power and the servo regulator of the individual axes (Fig. 3-2).

The PacDrive controller is the intelligent head of the system, and is based on an industrial PC. The PacDrive controller synchronizes and coordinates the motion functions of the packaging machine. Using an IEC 61131-3 soft-PLC, the PacDrive Controller ventures into applications previously reserved to classical PLCs. The individual PLC or positioning tasks can be broken down into several parallel tasks, which are implemented with the EPAS-4 programming environment according to IEC 61131-3 standard.

The ring-shaped digital real-time bus SERCOS ensures safe data exchange with the motor controllers. Even in applications on rotary tables etc., the distributed motor controllers are reliably supplied with new set values. All internal states of the axes can be checked via the real-time bus and processed by the PacDrive controller.

In addition to digital and analog inputs and outputs, the PacDrive Controller has two serial interfaces and one Ethernet interface. A variety of process visualization and control systems can be connected to PacDrive™ via the integrated OPC interface. Further peripheral components can be connected via field bus interface modules. The PacDrive Controller can act as field bus master or slave. The built-in interfaces enable remote diagnosis via telephone modem or Internet.

Particularly in the beverage sector (bottle cappers, bottle labeling machines) it is necessary to install servo motors on a rotary table. The small dimensions of the rotary table require innovative solutions, as the switching cabinet with the standard products PacDrive Controller and PacDrive MC-4 can usually not be mounted on the rotary table. To keep additional wiring to the rotary table down to a minimum, ELAU developed the PacDrive SCL-055 for such applications - a compact servo motor with integrated motor controller that is suitable for aseptic closing/sealing machines. The PacDrive SCL-055 Aseptic has a special surface coating that makes it resistant against many cleaners and disinfectants.

To keep the size of the SCL drives down to a minimum, the power supply is arranged centrally via the external power supply unit PacDrive PS-4 in combination with PacDrive PD-8.

3.3 Structure

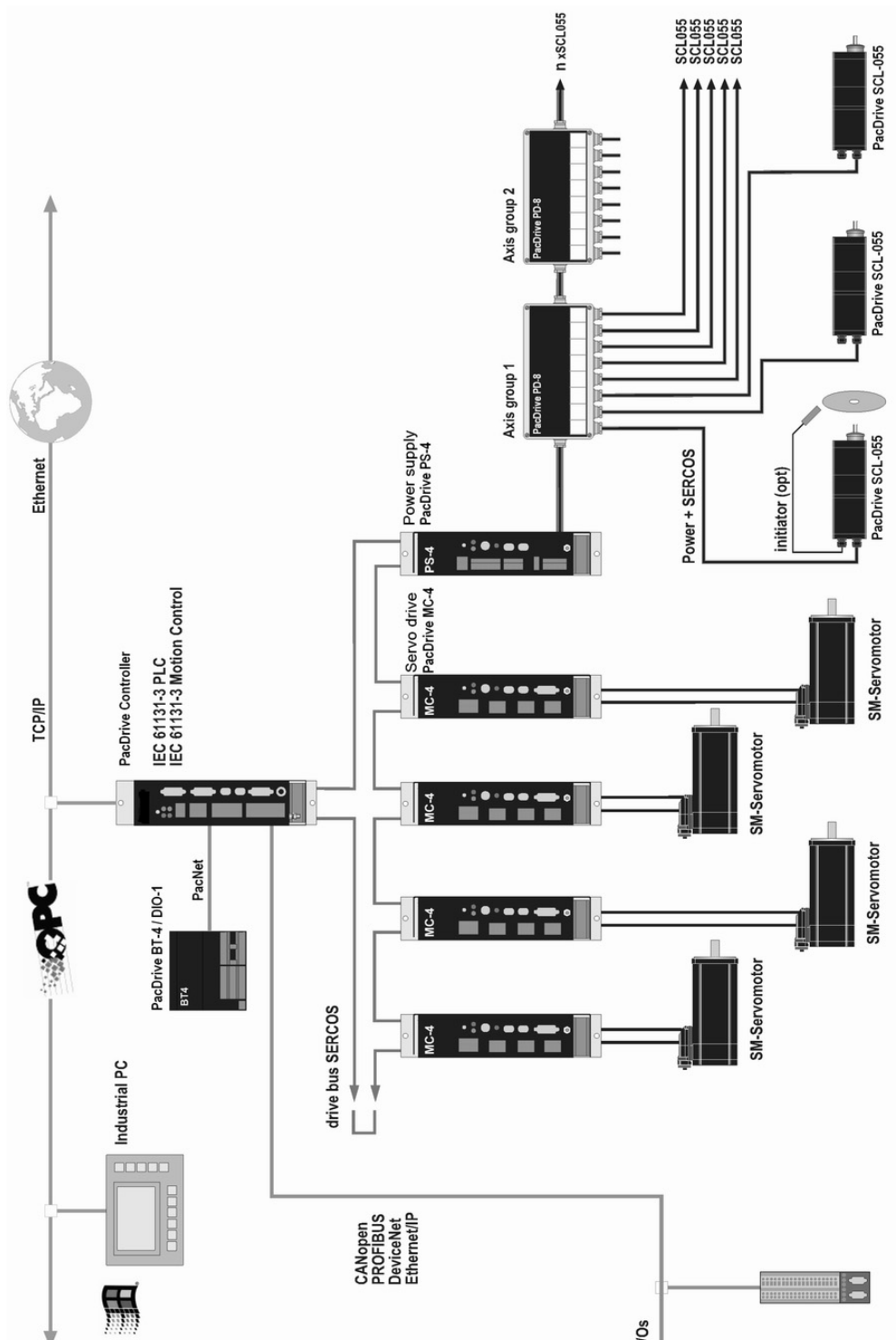


Fig. 3-2: System overview of the PackDrive™ Automation System

3.4 Components

Automation Toolkit EPAS-4

EPAS-4 has extensive and proven functions and tools. A key advantage of EPAS-4 is that all components are tuned to each other.

For you as a user, this means:

Quick familiarization, easy handling, all tools integrated.

Libraries Extensive libraries, tailored to the target group, help to save costs and improve the quality of user programs.

Highlights

- Runs under Windows (Windows XP Professional recommended)
- IEC 61131-3 programming languages
- SCOPE tool (oscilloscope functions)
- Diagnosing tool
- Very good debugging features
- Serial or TCP/IP connection to the PacDrive controller

PacDrive Controller

The PacDrive controller, a Pentium-based control hardware with the real-time operating system VxWorks, centrally realizes the PLC and motion functions.

A PacDrive controller synchronizes, coordinates and generates the positioning functions for the drives of a food and packaging machine.

A variety of standard HMIs are used for HMI tasks. Whether low-cost clear text or IPC - no problem for the flexible PacDrive Controller.

Highlights

- Pentium controller hardware
- Real-time operating system VxWorks
- IEC 61131 PLC and Motion Control
- Scalable performance
- Standard interfaces to low-cost operating units or PC-based HMI
- Compact book-size form
- Ethernet interface
- Standard field buses
- VarioCam® Motion Control
- SERCOS drive bus

PacDrive SCL

Motor with integrated MotorController The compact size of the PacDrive SCL combines motor and power electronics in the smallest space. The innovative SCL has the motor, the power output level and the digital servo controller for an axis in one casing, which saves space. Thanks to the compact size with integrated controller, it is perfectly suited for distributed installation. It is available with single- or multi-turn encoder and configures itself with the help of the electronic type plate inside the SCL.

Highlights

- Compact size
- 3.5-fold peak torque
- Integrated SERCOS interface
- High-resolution single- or multi-turn encoders
- IP65 / IP67 protection means
- Easy wiring
- High failure proofness
- Trapezoid shape
- Aseptic variant IP67 (with positive pressure option)

PacDrive PS-4

Centralized supply The power supply unit PS-4 is characterized by a compact and autonomous structure for switching cabinet installation plus highly modern technology. All PacDrive SCLs are served on just one line via the PacDrive PS-4, which is quick to install. PS-4 thus fits smoothly into the extremely flexible modular drive concept.

Highlights

- 1- or 3-phase power supply
- Integrated mains filter and bleeder
- 5 kW permanent power / 10 kW peak power
- DC-circuit power for up to 32 SCL-055s (depending on the application)
- Integrated SERCOS interface
- Full diagnosis facilities thanks to integrated controller
- Easy installation

PacDrive PD-8

Flexible distributor The PacDrive PD-8 power distribution box is the link between PS-4 and SCL. One "distributor" to which 1 to 8 SCL hybrid cables can be connected, depending on the number of drives. If more than 8 drives are operated, simply extend the system by one or several PD-8 distributors. Like the SCL, the PacDrive PD-8 is available in standard and aseptic variants.

Information on further components is available in the operating manual PacDrive PS-4 and PacDrive PD-8. Information on further components is available in the Project Manual.

4 Transportation, Storage, Unpacking

4.1 Transportation

- ▶ Avoid shocks.
- ▶ Check units for transport damage and immediately inform your transport company, if necessary.

4.2 Storage

- ▶ Store the units in a clean, dry place.

Storage conditions:

- Air temperature between -25°C and $+70^{\circ}\text{C}$
- Temperature fluctuations max. 30 K per hour.

4.3 Unpacking

- ▶ Check whether the consignment is complete.
- ▶ Check all units for transport damage.

PS-4 type plate

The type plates contain all necessary data:

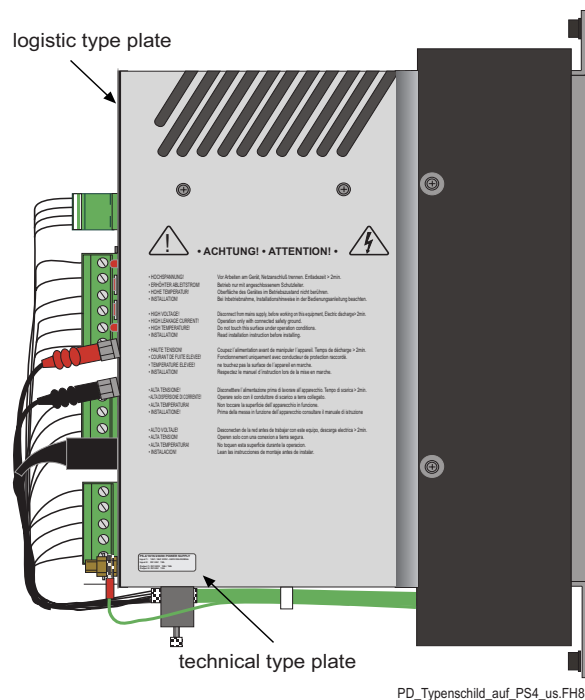


Fig. 4-1: Type plate on PacDrive PS-4

Article name → **PS-4/10/16/230/00 POWER SUPPLY**
13130258 **HW: C00000**
001000.0010 **W37** **SW: 00.14.00**

Made in Germany

Fig. 4-2: Logistic type plate of a PacDrive PS-4

Article name → **PS-4/10/16/230/00 POWER SUPPLY**
Input 1: 1AC / 3AC 220V - 240V 20A 50/60Hz
Input 2: DC 24V 13A
Output 1: DC 325V 10A / 18A
Output 2: DC 24V 13A

Fig. 4-3: Technical type plate of a PacDrive PS-4

PD-8 type plate

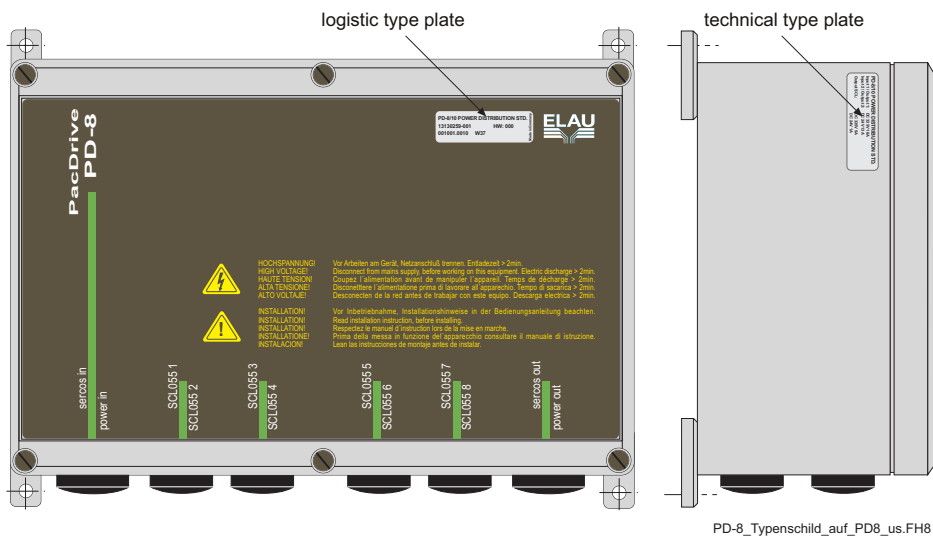


Fig. 4-4: Type plate on PD-8

Article name → **PD-8/10 POWER DISTRIBUTION STD.**
13130259-001 **HW: 000**
001001.0010 **W37**

Made in Germany

Fig. 4-5: Logistic type plate of a PacDrive PD-8

Article name → **PD-8/10 POWER DISTRIBUTION STD.**
Input 1 / Output 1: DC 325V 16A
Input 2 / Output 2: DC 24V 13A
Output SCL: DC 325V 5A
DC 24V 1A

Fig. 4-6: Technical type plate of a PacDrive PD-8

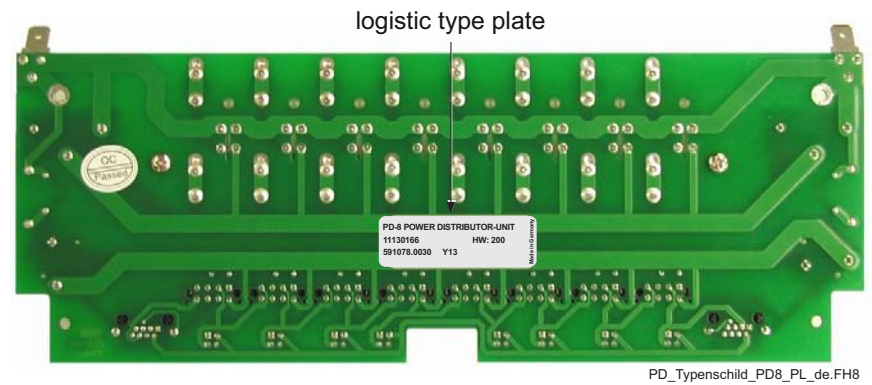
Type plate PD-8 / PD-4 board version

Fig. 4-7: Logistic type plate on the board version of PacDrive PD-8/4

5 Maintenance

Recognizing and clearing an error quickly helps to keep the related production loss down to a minimum.

The diagnosis messages of the PacDrive™ system, which can be checked using the Automation Toolkit EPAS-4, make it possible to look for errors deliberately and effectively.

In case of an error, defective components can easily be exchanged. This ensures that the problem can be solved quickly and operation can be resumed soon. This work must be done by qualified service staff only.

When returning a defective unit to the ELAU customer service, please complete the attached error report form.

5.1 Spare Parts, Components

Stock keeping of spare parts:

Keeping a stock of the essential components is a key prerequisite for the permanent functionality of the equipment.



NOTE

Only devices with identical hardware configuration and software version may be exchanged. This ensures that the plant will work correctly after the component change.

When ordering spare parts, please give the following data:

- Article name: e.g. PS-4/10/16/230/00
- Article number: e.g. 13 13 02 59-001



NOTE

You can find this information on the type plate of the equipment (see Fig. 4-1) or in the configuration of the PacDrive™ system.

5.2 Repair

By all means complete the attached error report form when returning defective components.
You can also make a photocopy of the error report form and use it as a fax message.



CAUTION!

Electro static discharge!

Components may be damaged!

- Return electronic components in original or equivalent packaging only.
 - Always use ESD packaging/foil.
-

5.3 Service Addresses

For ordering spare parts

ELAU AG
Postfach 1255
D-97821 Marktheidenfeld
Phone: +49 (0) 93 91 / 606 - 0
Fax: +49 (0) 93 91 / 606 - 300

Repairs and customer service

Please send the components to be repaired or checked, along with the error report, to this address:

ELAU AG
Abt. Kundendienst street address:
Postfach 1255 Dillberg 12
D-97821 Marktheidenfeld D-97828 Marktheidenfeld
Phone: +49 (0) 93 91 / 606 - 142
Fax: +49 (0) 93 91 / 606 - 340

Service team

Should you need to talk to a member of our service team or require on-site service, please contact:

ELAU AG
Abt. Applikation
Postfach 1255
D-97821 Marktheidenfeld
Phone: +49 (0) 93 91 / 606 - 0
Fax: +49 (0) 93 91 / 606 - 300

5.4 Exchanging units

In addition to the notes below, please observe the information of the machine producer when exchanging the PacDrive PS-4.



DANGER!

High voltage!

Life hazard!

High voltage possible with servo motors in generator operation!

- Before working on electrical units, disconnect from mains supply and lock out.
 - Make sure that the drives are standing still.
 - Do not disconnect connector plugs while they are carrying voltage.
 - Before working on the unit, discharge the DC-circuit and use a voltmeter to check that there is no voltage.
-



CAUTION!

Electro static discharge!

Components may be damaged!

- Only touch the boards on the edges.
Do not touch any connections or components.
 - Existing static charges can be discharged by touching a grounded metallic surface, e.g. a grounded equipment casing.
 - Prevent the formation of electrostatic charge by using suitable clothing, carpets or furniture and by moving the boards as little as possible.
-

Exchanging the PacDrive PS-4

- ▶ Open main switch.
- ▶ Lock out main switch.



DANGER!

High voltage!
Life hazard!

- Disconnect and connect power supply only when the plant is voltage-free!
-



CAUTION!

Hot surfaces on the PS-4 casing!
Risk of burns!

- Wear protective gloves or wait until the surface temperature permits touching without risk!
-

- ▶ Disconnect PS-4 from power supply.
- ▶ Open screws on the top and bottom of the casing.
- ▶ Remove PacDrive PS-4
- ▶ Install new PS-4 and tighten the screws.
- ▶ Connect PS-4 according to the machine wiring diagram.
- ▶ Restart the plant.

Exchange PacDrive PD-8

- ▶ Open main switch.
- ▶ Lock out main switch.



DANGER!

High voltage!
Life hazard!

- Disconnect and connect power supply only when the plant is voltage-free!
-

- ▶ Open the clamp and remove the power in/out cable.
- ▶ Open the SERCOS in/out connection and remove the cable.
- ▶ Open the SCL connections and remove the cable.
- ▶ Exchange the PC-8.
- ▶ Insert the power in/out cable in the corresponding cable duct, fix the clamp and fix the strain relief on the cable duct while the cable is relieved.

- ▶ Insert the SERCOS in/out cable in the corresponding cable duct, snap the connector into the outlet and fix the strain relief on the cable duct while the cable is relieved.
- ▶ Insert the SCL connections in the corresponding cable duct, snap the connector into the outlet and fix the strain relief on the cable duct while the cable is relieved.

Exchanging cables

- ▶ Open main switch.
- ▶ Lock out main switch.



DANGER!

High voltage!

Life hazard!

- Disconnect and connect power supply only when the plant is voltage-free!
 - Do not insert the connectors unless both sides are dry and clean!
 - If no ready made ELAU cables are used, make sure the assignment of the new cables matches the wiring diagram of the machine manufacturer!
-

- ▶ Remove cables from the PS-4 / fix them back (see Exchanging PacDrive PS-4).
- ▶ Remove cables from the PD-8 / fix them back (see Exchanging PacDrive PD-8).
- ▶ When exchanging cables, also observe the instructions of the machine manufacturer.

5.5 Cleaning

If installed as directed, the units are to a large extent maintenance-free.

To remove dust and foreign objects brought in by the cooling air flow, disconnect the units from the power supply, remove them and use dry compressed air (max. 1 bar) to blow away the pollution.

5.6 EMC Rules

To control and regulate motors, the mains voltage is stored in the DC-circuit of the PS-4 by means of rectification. This DC-circuit voltage supplies all connected SCL-055s. In the SCL-055, this stored energy is fed to the motor by deliberately activating and deactivating six semiconductor switches. The steep rise and fall of the voltage puts high demands on the insulation strength of the motor winding. Another essential aspect to be considered is **Electro Magnetic Compatibility (EMC)** with other system components. The flank steepness of the clocked voltage generates harmonic oscillation of great intensity, up into the high-frequency range.

Therefore observe the following EMC rules:

- Choose the grounding option with the lowest possible ohm rate for the PS-4 (e.g. unpainted mounting board of switching cabinet) for installation.
- Contact the largest possible surface (skin effect). If necessary, remove existing paint to achieve large-surface contact.
- From the **Central Earthing Point**, lay the grounding wires to the respective connections in a star structure. Earthing loops are not allowed and can cause unnecessary distortions.
- Use shielded cables only.
- Only large-surface shield transitions are allowed.
- By all means observe the switching proposals.
- Do not lay any cable loops inside the switching cabinet.

**CAUTION!**

Electromagnetic fields!

Disturbances or failure of the system possible!

The rules described below must be observed for installation, in order to rule out the consequences of excessive disturbance effects as far as possible.

- In correlation with electronic controls, no inductive loads must be switched without suitable interference elimination.
- For DC operation, suitable interference elimination can be achieved by arranging recovery diodes. For AC operation, commercially available erasing elements matching the connector type can be used.
- Only the interference elimination element mounted immediately at the point of inductivity serves its purpose. Otherwise, the switching pulse may even emit increased interference via the interference elimination elements. It is much easier to avoid sources of interference in the first place, than to eliminate the effects of existing interference.
- In no case must the contacts switching unerased inductive loads be arranged in the same room as the PacDrive™ components. The same goes for cables carrying unerased, switched inductivity and cables running parallel to them. The controller must be separated from such "disturbers" by a Faraday cage (own section in the switching cabinet).

5.7 Commissioning

We urgently recommend that you use ELAU staff for commissioning.

You should do so not only for warranty reasons. At the same time

- the equipment is checked,
- the optimum configuration is determined,
- and the operating staff are instructed.

**DANGER!**

High leakage current!

Life hazard!

- The leakage current is greater than 3.5 mA. Therefore the units must have a firm connection to the power grid (according to DIN EN 50178 - equipment of high-voltage systems).

Commissioning procedure:

Unpacking and checking

- ▶ Remove packaging.
- ▶ Make sure the units are not damaged. Only undamaged units should be put into operation.
- ▶ Check if the consignment is complete.
- ▶ Check the data with the help of the type plate.
See also "Unpacking" on page 21.
See also "Exchanging units" on page 27.

Setting the SERCOS address

- ▶ Set the intended SERCOS address (0-99) with a suitable tool.



NOTE

Make sure no address is used twice in a SERCOS ring! Each SERCOS slave needs its own, unambiguous SERCOS address.

Installation

- ▶ Observe the requirements for the place in which the equipment may be used.
- ▶ Observe the requirements for protection and EMC rules.

CAUTION!

PacDrive PS-4 has a rated connection voltage of 230 V!
Incorrect connection voltage may result in the destruction of the device!

- When using the device in rotary current networks (3 AC 380...480 V), use an autotransformer to avoid a destruction of the PS-4.

- ▶ Mount the device.

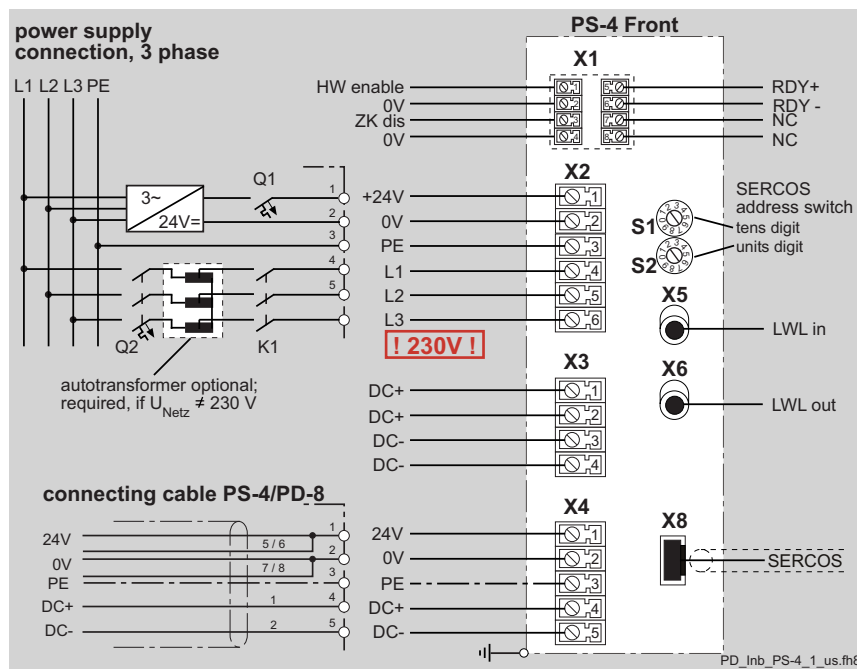


Fig. 5-1: Assignment for connections to PS-4

- Electrical connections of PS-4**
- ▶ Make connections for X1 and X2 according to the wiring diagram. (Wiring examples: See also "Electrical connections" on page 53.)
 - ▶ Connect the prefabricated cable (PS-4/PD-8) with X4.
 - ▶ Insert the prefabricated SERCOS cable into X8 and snap it on.

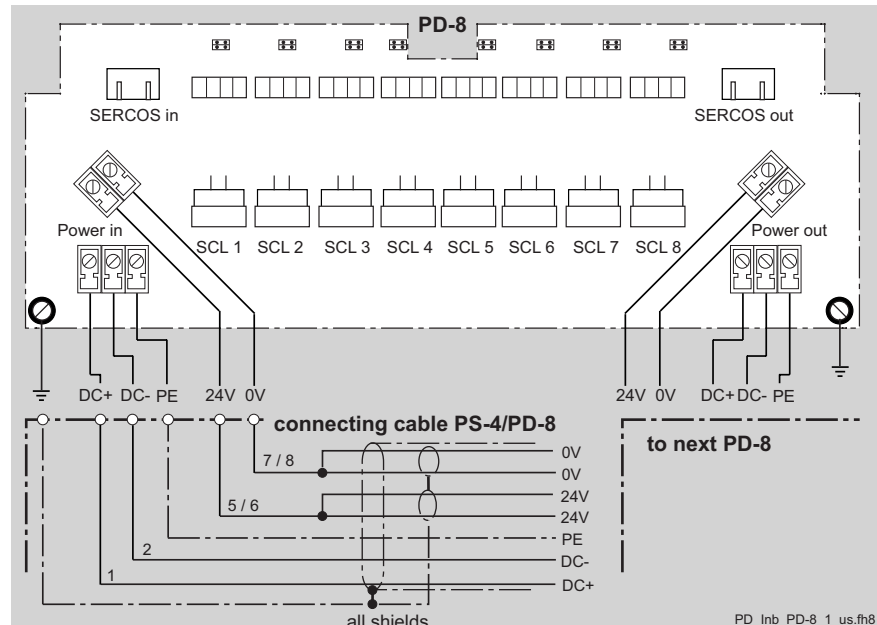


Fig. 5-2: Assignment for connections to PD-8

- Electrical connections of PD-8**
- ▶ Remove the blind plugs ("power in" and SERCOS in) from the cable ducts on the PD-8.

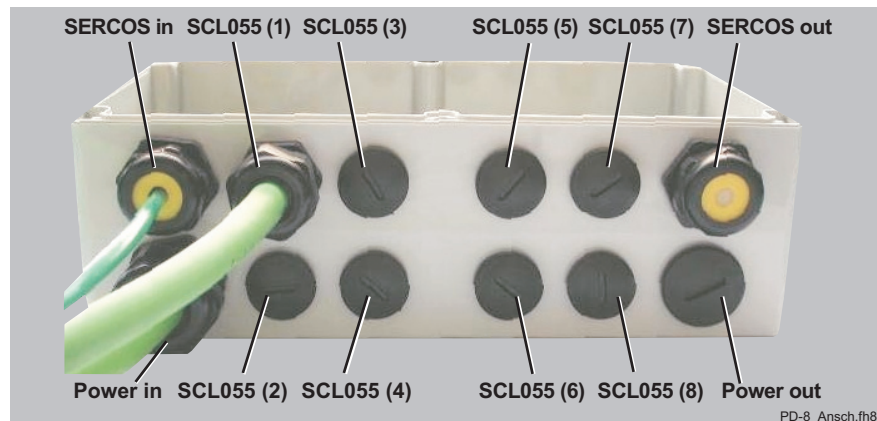


Fig. 5-3: PD-8 cable ducts

- ▶ Insert the PS-4/PD-8 connection cables in the "power in" opening.
- ▶ Insert the SERCOS cable in the opening "SERCOS in".

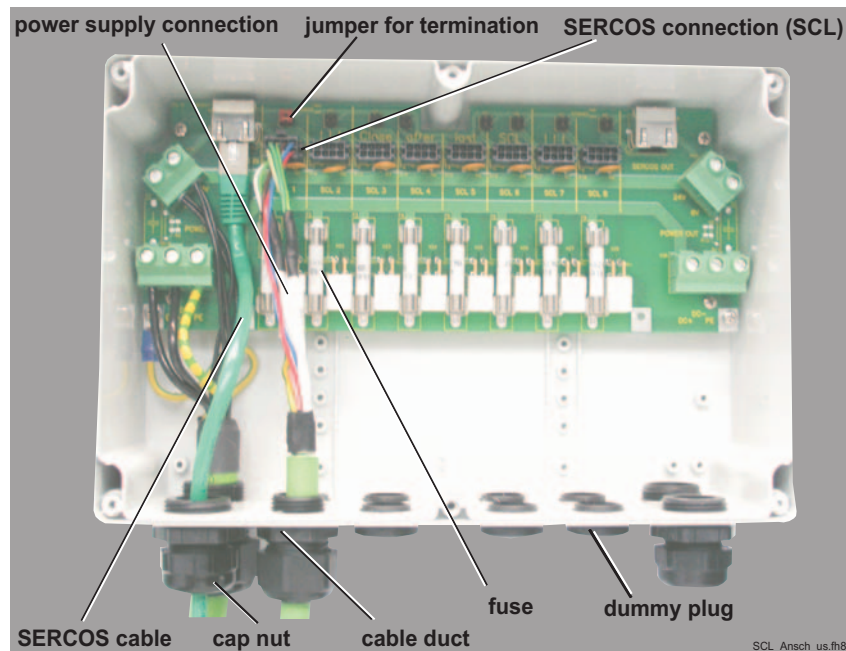


Fig. 5-4: Wire the PS-4/

- ▶ connection cable PS-4/PD-8 and fix the strain relief on the cable duct while the cable is relieved.
- ▶ Insert the prefabricated SERCOS cable into the outlet and snap it on. Fix the strain relief on the cable duct while the cable is relieved.
- ▶ If more PD-8s are connected, connect prefabricated "PD-8/PD-8" connection cable with the power in/out connections and the next SERCOS cable with SERCOS in/out as described above.



CAUTION!

Penetrating liquid due to inexpert installation of cable ducts or missing blind plugs!

Damage to electrical parts!

- Check if the cable ducts are tight.
- Immediately replace missing or defective blind plugs on unused cable ducts. Do not run the PD-8 without having fixed the blind plugs and checked if they are tight.
- Do not run the PD-8 while the cover is open. Before starting the plant, close the cover and check if it is tight.

See also "Technical Data" on page 47.

**NOTE**

The two jumpers must be placed in "closed" position over the SERCOS connector only at the connection of the last PacDrive SCL-055, even if several PD-8s are used. This closes the SERCOS ring.

The physical order of the SERCOS slaves is different from the numbers on the PD-8 cable ducts.

- ▶ Check safety functions such as the EMERGENCY OFF switch.
- Continue commissioning.** ▶ the plant according to the operating manual of the packaging machine producer.

Information on the connection of the PacDrive SCL to the PacDrive PD-8 is available in the "PacDrive SCL" operating manual. Further information on the slaves in the SERCOS ring and system solutions with air barriers can also be found in the "PacDrive SCL" operating manual.

5.7.1 Slaves in the SERCOS ring

Removing a single PacDrive SCL from the SERCOS ring

For test purposes, single PacDrive SCLs can be removed from the SERCOS ring during commissioning or when exchanging units.

Proceed as follows:

- ▶ Remove the connector of the corresponding SCL.
- ▶ Insert a SERCOS jumper (Art. no. 53150032) in the free place.
- ✓ The SCL in the SERCOS ring has now been substituted.

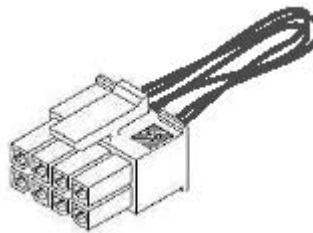


Fig. 5-5: SERCOS jumper as SCL substitute

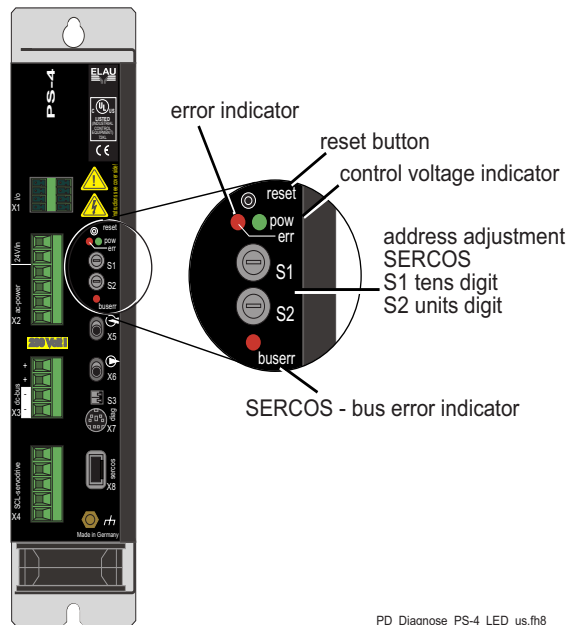
5.8 Configuration / Programming / Diagnosis

The PacDrive PS-4 is matched by ELAU. The customer needs not match them.

Error diagnosis and monitoring of operating states are done in the PacDrive controllers. For information, consult the corresponding manuals.

In addition, diagnosis is possible by means of the LEDs on the PacDrive PS-4.

5.8.1 Diagnosis LEDs



PD_Diagnose_PS-4_LED_us.fm8

Fig. 5-6: Diagnosis LEDs of the PacDrive PS-4

- reset** Button to reset the PacDrive PS-4. Only the PacDrive PS-4 is restarted.
- pow** Green control voltage indicator
 - Off: Control voltage (24 V) missing or too low
 - On: Normal operation; control voltage in normal range
- err** Red error LED (indicated by the PacDrive system)

The error indicator signals the operating state of the PacDrive PS-4 based on the following states:

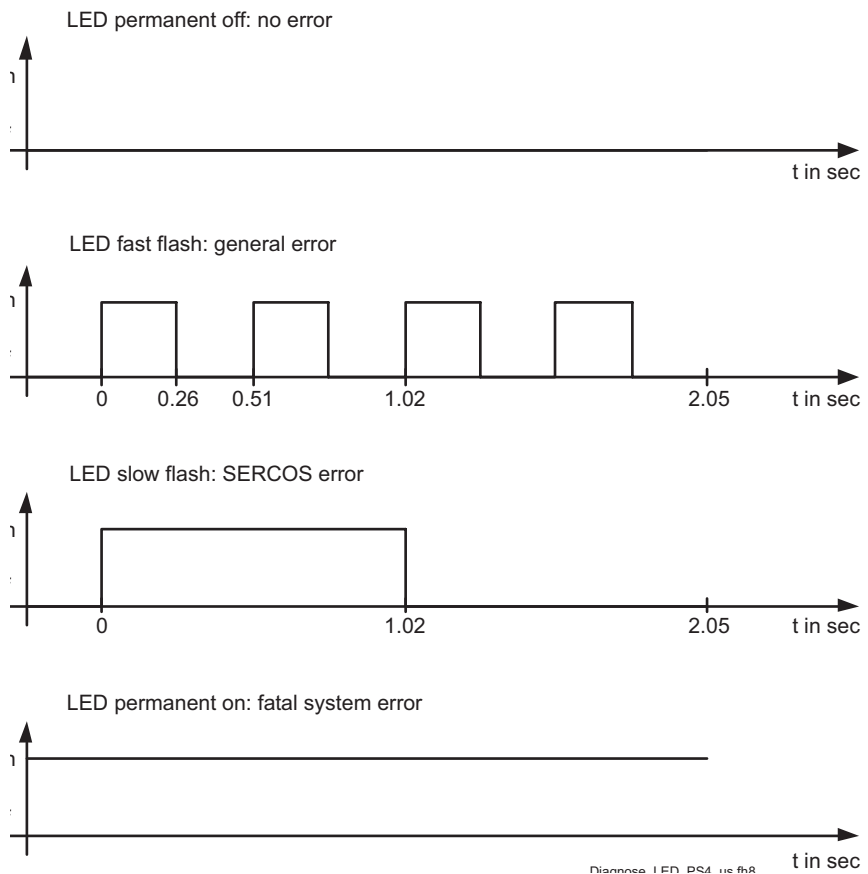


Fig. 5-7: Display state of diagnosis LED "err"

S1/S2 address setting rotary switch

The double-digit SERCOS (00 - 99) must be unambiguous for each SERCOS slave.

S1: Tens digit of the SERCOS address

S2: Ones digit of the SERCOS address

buserr SERCOS bus error indicator (signalled from SERCOS bus)

Display that shows errors of the SERCOS bus. It is on, if a bus error occurs. This state can also occur for a short time and cannot be quitted.

5.8.2 Combination of PacDrive SCL and PacDrive PS-4

SCL signals in the m PS-4

All Ready signals of the individual PacDrive SCLs come together in the PS-4, where they are evaluated. The Ready contact on the PS-4 is not set until all SCLs and the PS-4 supply a Ready signal.

Influence of the PS-4 signals on the SCL

There is no *HardwareEnable* input on the SCL. However, the input *HardwareEnable*, the signal *PowerSupplyEnable* and error messages of the PS-4 have to lead to reactions in the SCL.

Therefore the following signals are sent from the PacDrive PS-4 to the MAn-4:

- PS-4 is active
- Class 1 error message from PS-4
- Error message with error reaction A from PS-4.

The ramping-down of the motor (error reaction B) is initiated in the SCL if the PS-4 is reported to be inactive or an error message with error reaction B is reported from the PS-4.

In case of error messages with error reaction A from the PS-4, the final stages of the corresponding SCL are switched off immediately. The motor coasts to a stop. The SCL behaves like an MC-4 on which *CoastEnable* is set and *HardwareEnable* is deactivated. No error message is triggered.



NOTE

The function "InverterEnable" is not integrated in the PacDrive PS-4. A safety connection has to be implemented by means of a RDY contact.

5.9 Order numbers

5.9.1 PacDrive PS-4

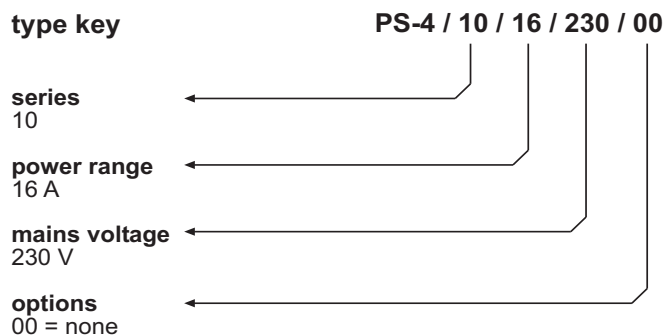


Fig. 5-8: Type key legend of the PacDrive PS-4

Order number	Article name	Explanations
13 13 02 58	PacDrive PS-4	

Table 5-1: Order numbers for PacDrive PS-4

PacDrive PD-8

Order number	Article name	Explanations
13 13 02 59 - 001	PacDrive PD-8	Plastic (standard)
13 13 02 59 - 002	PacDrive PD-8	Stainless steel
11 13 01 66	PD-8 unit	Curcuit board version
11 13 01 67	PD-4 power distributor	Curcuit board version

Table 5-2: Order numbers for PacDrive PD-8 / PD-4

5.9.2 Cables**Connection cables**

Order number	Article name	Explanations
15 15 45 02 - XXX	E-MO 102	Connection cable PS-4/PD-8 max. 20 m total length from PS-4 to last PD-8
15 15 45 04 - XXX	E-MO 104	Connection cable PD-8/PD-8 max. 20 m total length from PS-4 to last PD-8
15 15 45 11-XXX	E-MO 109	Connection cable PS-4/PD-8, aseptic max. 20 m total length from PS-4 to last PD-8
15 15 45 12-XXX	E-MO 110	Connection cable PD-8/PD-8, aseptic max. 20 m total length from PS-4 to last PD-8
*) cable lengths up to 2 m in steps of 10 cm cable lengths up to 10 m in steps of 50 cm		

Fig. 5-9: Order numbers for connection cables

**CAUTION!**

Bending radius for ELAU hybrid cables:

- for fixed installation, 3 x cable diameter!
- for permanent motion, 10 x cable diameter!

Cables may be damaged!

- Observe the defined bending radius.

SERCOS cables

Order number	Article name	Explanations
KA 99 037 - 005	Patch cable category 7	RJ45 patch cable (Cat 7 / 0.5 m)
KA 99 037 - 010	Patch cable category 7	RJ45 patch cable (Cat 7 / 1 m)
KA 99 037 - 020	Patch cable category 7	RJ45 patch cable (Cat 7 / 2m)

Table 5-3: Order numbers for SERCOS cables

6 Project definition

6.1 Creation of a PacDrive PS-4/PD-8, SCL055 application

In addition to their use in normal industrial environments, the units PacDrive PD-8 and PacDrive SCL-055 are also designed for aseptic applications. Aseptic applications have special requirements regarding the surface quality of devices and cables. The figure below shows a PacDrive PS-4, PD-8, SCL-055 combination with an outline of possible fields of application.

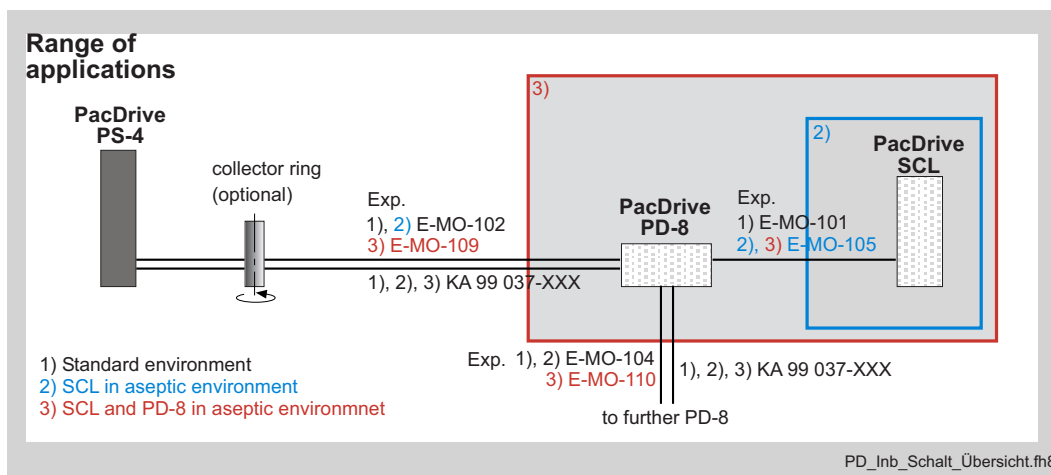


Fig. 6-1: Overview of applications

6.2 PacDrive PS-4

6.2.1 Mains Connection of PacDrive PS-4

Switching on

When the mains voltage is switched on, the DC-circuit capacitors in the PacDrive PS-4 are "gently" charged via the built-in bleeder resistor. The minimum time between to precharge procedures is 15 s.

Grounding conditions of the mains network

Grounded rotary current networks PacDrive PS-4s can be operated without potential separation on rotary current networks with grounded star point.

ungrounded rotary current networks In ungrounded networks (IT networks) or networks that are not grounded in the star point, there is an increased risk of impermissible excess voltages between the outer conductors and the casing of the PacDrive servo amplifier.

For operations in such networks, we therefore prescribe a separating transformer with a grounded star point on the output side and a grounded PE connection of the PacDrive PS-4.

Adjustment of the Mains Voltage

If the mains voltage is outside the range indicated in the technical data, a transformer is required to adjust it to the power intake of the plant.

In star point grounded networks, the voltage is adjusted by means of an autotransformer.

In all other networks, a separating transformer is required.

CAUTION!

PacDrive PS-4 has a rated connection voltage of 230 V!
Incorrect connection voltage may result in the destruction of the device!

- For wiring and installation, make sure that the DC-bus of PacDrive MC-4 units with a rated connection voltage of 400 V is not coupled with a PacDrive PS-4 unit with a rated voltage of 230 V.
- When using the unit in rotary current networks (3 AC 380...480 V), use a transformer to prevent the destruction of the PS-4.

Wiring examples

The PacDrive PS-4 can be directly connected to grounded rotary current networks with 3 x AC 230 V, +/- 10%. For lower requirements, a single-phase power connection 1 x AC 230 V is possible.

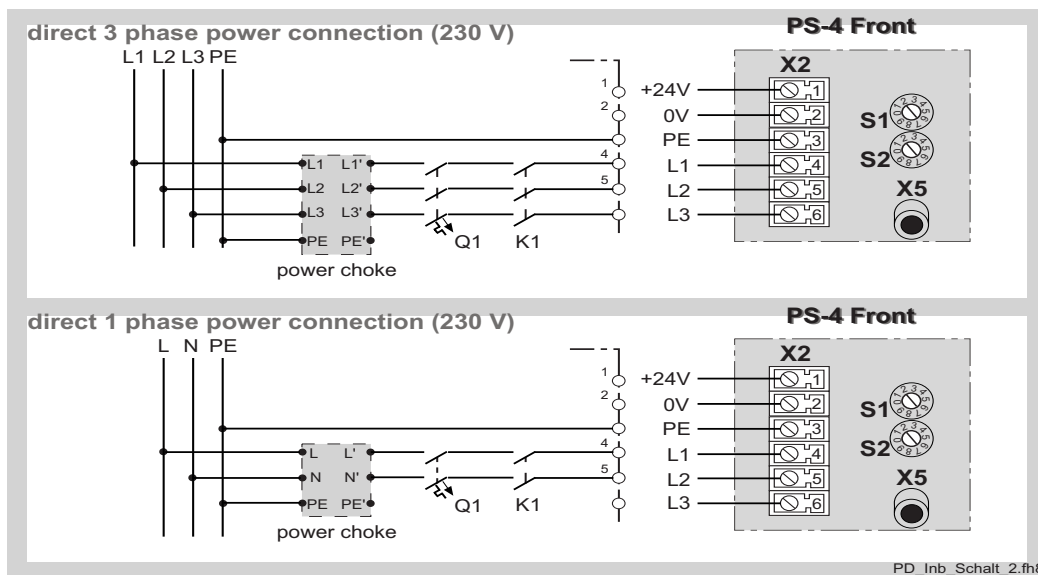


Fig. 6-2: Wiring examples for direct mains connection

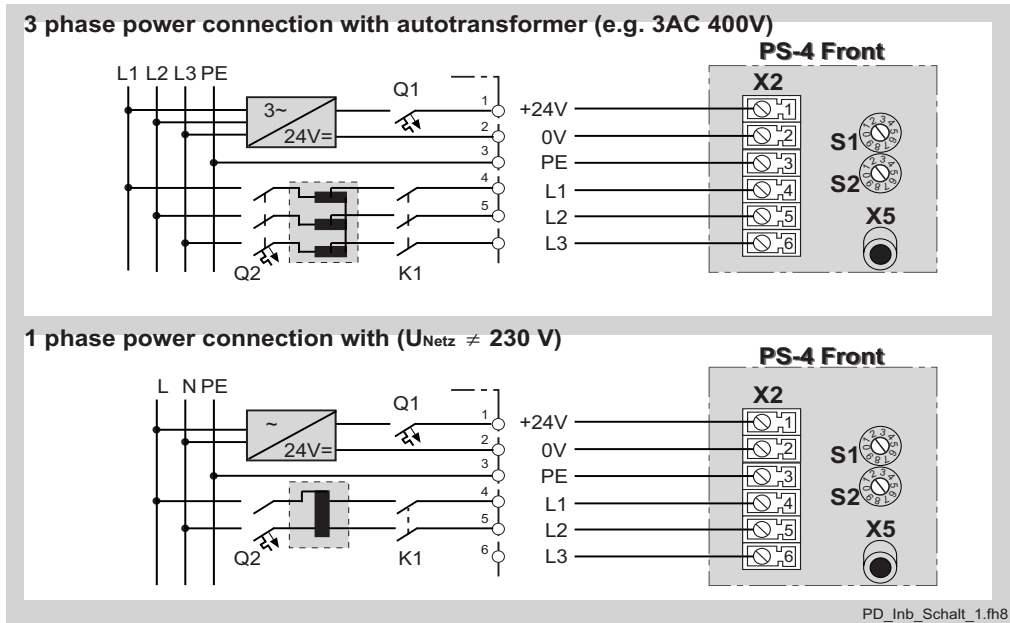


Fig. 6-3: Wiring examples for connection via autotransformer

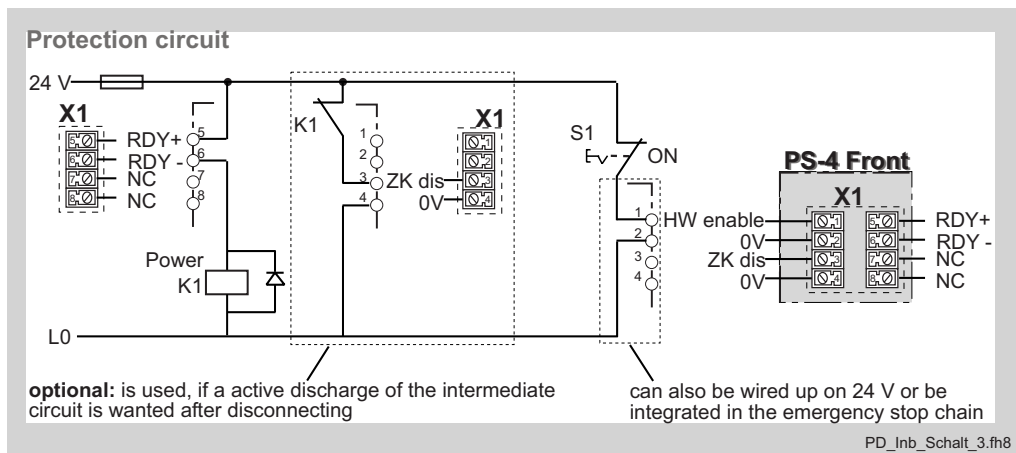


Fig. 6-4: Wiring examples for mains contactor connection

6.2.2 Transformer dimensioning

The following formula can be used for the power of the DC-circuit:

$$P_{ZK} = M_{\text{eff}} \cdot n_{\text{Mittel}} \cdot \frac{2 \cdot \pi}{60} \cdot k \cdot a \cdot g$$

P_{DC} = DC-circuit power in W

M_{EFF} = effective torque in Nm

n_{average} = average torque in min^{-1}

k = factor for motor and controller efficiency = 1.25

a = number of PacDrive SCL's

g = percentage of PacDrive SCL's simultaneously in control (min 0.2 ...1)

The transformer connection power is calculated as follows:

$$S_{AT} = P_{ZK} \cdot F$$

S_{AT} = transformer connection power in W

P_{DC} = DC-circuit power in W

F = factor for connection power = 2

Calculation of phase currents on the mains side:

Single-phase connection:

$$I_{TS} = \frac{S_{AT}}{230V}$$

Three-phase connection:

$$I_{TS} = \frac{S_{AT}}{230V \cdot \sqrt{3}}$$

I_{TS} = transformer secondary phase current in A

S_{AT} = transformer connection power in VA

With the detected current value, an autotransformer can be selected from the table below.

If motion developments and mechanical ambient conditions can only be determined insufficiently or not at all, the transformer or choke should be dimensioned for the permanent current of the PacDrive PS-4. A measurement on the machine can supply the actual mains burden and thus the necessary performance sizes.

In addition, you can use the tool ECAM-4 version V2.3 or higher for the calculation. This makes it possible to take almost any possible combination into account.

Selection table for autotransformers by Block (third-party products)

Type	DSP 400/1,5	DSP 400/3	DSP 400/6	DSP 400/9	DSP 400/15
Output current	3 x 1.5 A	3 x 3 A	3 x 6 A	3 x 9 A	3 x 15 A

Table 6-1: Selection table for autotransformers

If no transformer is used, you have to select and used a mains choke from the following table:

Order number	Article name	Permanent current
FI 078 80	NKD 10 / 2.93	10 A
FI 078 74	NKD 25 / 1.17	25 A

Table 6-2: Selection table for mains chokes

6.3 Electricity Supply via Slip Ring

For applications where the PacDrive PD-8 and PacDrive SCL-055 are installed on a turning machine rack (rotary), it is possible to use a slip ring to supply electricity to the components on the rotary rack. The following connection proposal shows the connection plan for the power cable and data cable.

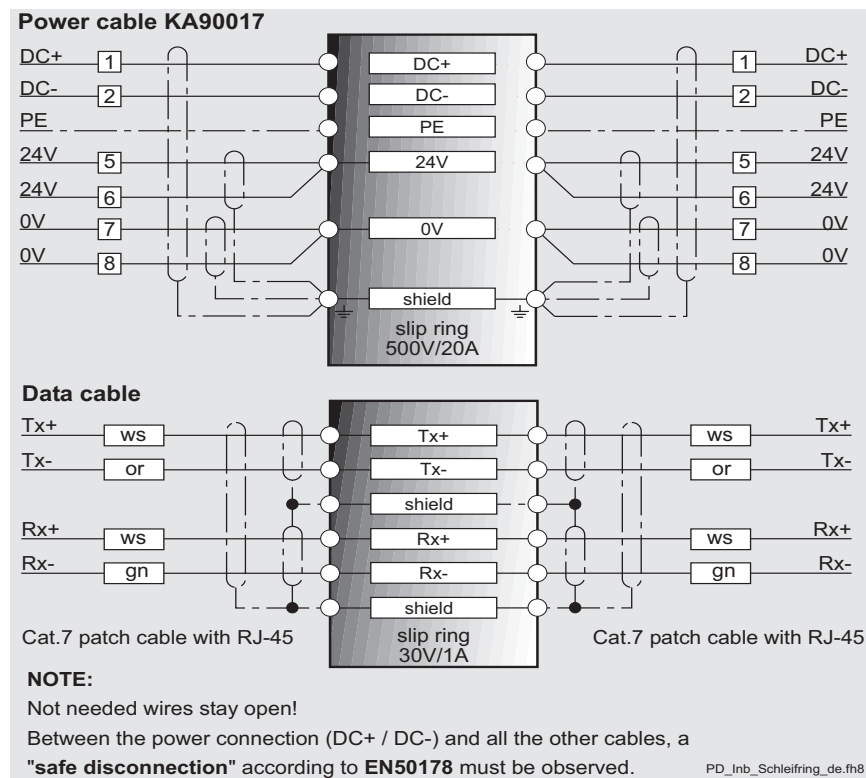


Fig. 6-5: Connection proposal for slip ring transmission

The colors above can be different in practice, as they are not standardized.

For the Tx and Rx lines, use the respective pairs of leads in the Cat7 cable.

Pairs that belong together can be identified by their twisting and common shielding.

7 Technical Data

7.1 PacDrive PS-4

7.1.1 General

PacDrive PS-4/10/16/230

Parameter	Value
Article name	PS-4 / 10 / 16 / 230
Order number	13 13 02 58
Supply - rated connected voltage - mains frequency - control voltage/current	rotary current 3 AC / 1 AC 220V (-10%) to 240V (+10%) 48 .. 62 Hz DC 24 V (-15%..+25%) / max 13 A own consumption max. 1 A
DC-circuit - DC-circuit voltage - capacity - $U_{\text{Bleeder ON}}$ - $U_{\text{Bleeder OFF}}$ - excess voltage - bleeder resistance - bleeder - permanent power - bleeder - peak power	DC 270 V to 370 V 660 μF (SCL cap.) DC 410 V DC 400 V DC 430 V 21.5 Ohm 100 W 7 kW
Motor connection - DC-circuit voltage - DC-circuit permanent current - DC-circuit peak current (1s) - control voltage - permanent current - peak current (1s)	DC 270 V to 370 V 16 A (for supply with 3 AC...) 10 A (for supply with 1 AC...) 32 A DC 24V (like input voltage) 13 A 25 A
Stray power - electronic supply - bleeder (internal) - power part	approx. 12 W 0 ... 100 W (depending on the application) approx. 4 W / A
Inputs - input voltage/current - input filter:	DC 20..30V / 5 mA 5 ms
Outputs - relay outputs	DC 20..30 V / 2 A
Weight	3.5 kg
Ventilation	internal fan
Ambient conditions - protection means - ambient temperature during operation - for storage and transport - insulation - excess voltage category - excess voltage resistance - degree of radio interference	IP20 +5 .. +45 °C (+55 °C with reduced power - 2% per K at I_{NC} and I_{SC}) -25 .. +70 °C degree of pollution 2 ..., no dewing allowed K III, T2 (DIN VDE 0110) class 1 (DIN VDE 0160) class A EN 55011 / EN 61800 - 3
Approvals	in preparation

Table 7-1: Technical data PacDrive PS-4 /10/16/230



NOTE

In case of ambient temperatures >45 °C, ensure additional circulation of the cooling air in the switching cabinet (external fan).

7.1.2 Electrical connections

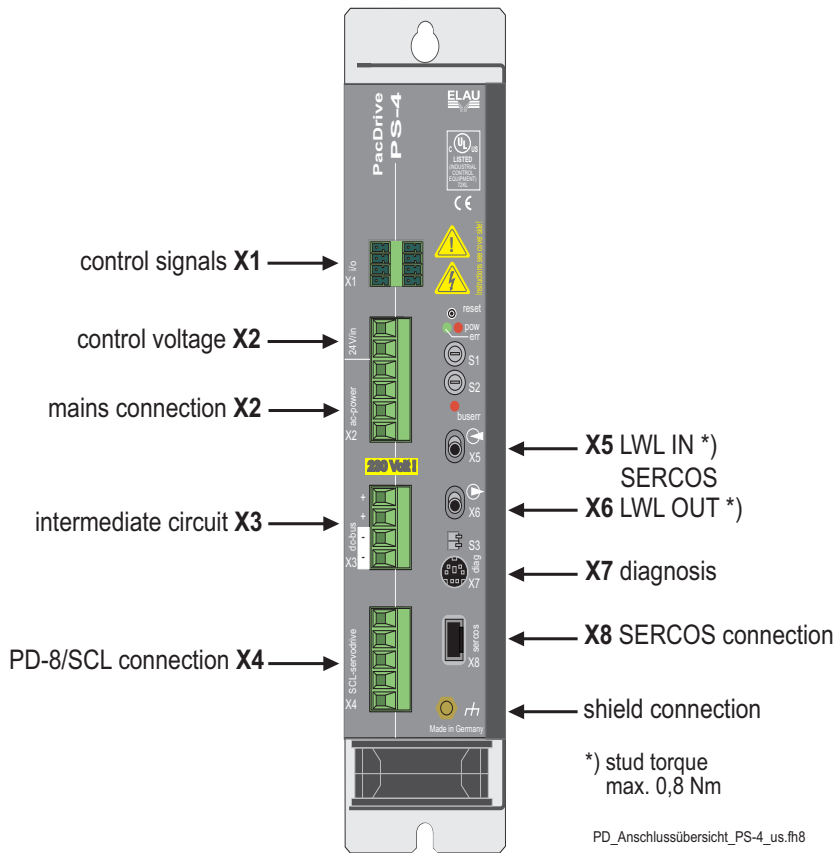
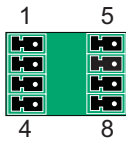


Fig. 7-1: Overview of the connections of the PacDrive PS-4

X1 - Control signals

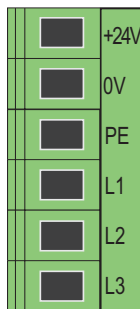


Pin	Designation	Meaning	Range	max. cross section
1	HW enable	Hardware enable	DC24V (pursuant to IEC61131-2 type I)	1.5 mm ²
2	0 V			1.5 mm ²
3	DC dis	DC-circuit discharge	DC24V (pursuant to IEC61131-2 type I)	1.5 mm ²
4	0 V			1.5 mm ²
5 *)	RDY +	Ready contact (opens in case of an error)	DC 20...30 V / 2 A	1.5 mm ²
6 *)	RDY -	Ready contact	DC 20...30 V / 2 A	1.5 mm ²
7	NC	not connected		1.5 mm ²
8	NC	not connected		1.5 mm ²

*) The Ready contact indicates that the PS-4 and the connected components are ready for operation. If the Ready contact is closed, the system is ready for mains connection. In case of an error, the Ready contact opens. The ready contact has to be included in the mains contactor control, so that the mains is switched off in case of an error.

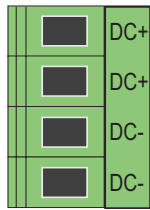
Table 7-2: Connection X1 - control signals

X2 - Control Voltage and Mains Connection



Pin	Designation	Meaning	Range	max. cross section
1	24 V	24 V control voltage	-15%..+25%	4 mm ²
2	0 V	0 V control voltage		4 mm ²
3	PE	Protective conductor connection		4 mm ²
4	L1	Phase L1	3AC/1AC 220..240 V	4 mm ²
5	L2	Phase L2	3AC/1AC 220..240 V	4 mm ²
6	L3	Phase L3	3AC/1AC 220..240 V	4 mm ²

Table 7-3: Connection X2 - control voltage and mains connection

X3 - DC-Circuit

Pin	Designation	Meaning	Range	max. cross section
1	DC+	DC-circuit +	DC 270..370 V	4 mm ²
2	DC +	DC-circuit +	DC 270..370 V	4 mm ²
3	DC -	DC-circuit -	DC 270..370 V	4 mm ²
4	DC -	DC-circuit -	DC 270..370 V	4 mm ²

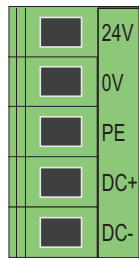
Table 7-4: Connection X3 - DC-circuit

**CAUTION!**

PacDrive PS-4 has a rated connection voltage of 230 V!

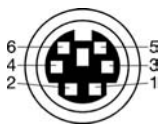
Wrong connection voltage can destroy the unit!

For wiring and installation, make sure that the DC-bus of PacDrive MC-4 units with a rated connection voltage of 400 V is not coupled with a PacDrive PS-4 unit with a rated voltage of 230 V.

X4 PD-8 / SCL Connection

Pin	Designation	Meaning	Range	max. cross section
1	24 V	24 V control voltage	-15%..+25%	4 mm ²
2	0 V	0 V control voltage		4 mm ²
3	PE	Protective conductor connection		4 mm ²
4	DC +	DC-circuit +	DC 270..370 V	4 mm ²
5	DC -	DC-circuit -	DC 270..370 V	4 mm ²

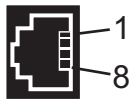
Table 7-5: Connection X4 PD-8 / SCL connection

X7 - Diagnosis

Pin	Designation	Meaning	Range	max. cross section
1	PRO_SEL			0.25 mm ²
2	RxD	receive data		0.25 mm ²
3	TxD	transmit data		0.25 mm ²
4	GND	signal ground		0.25 mm ²
5	RS232_SEL			0.25 mm ²
6	VCC			0.25 mm ²

Table 7-6: Connection X7 - diagnosis

X8 - SERCOS



Pin	Designation	Meaning	Range	max. cross section
1	SEROUT+	SERCOS Out +		
2	SEROUT-	SERCOS Out -		
3	SERIN+	SERCOS In +		
4	NC	not connected		
5	NC	not connected		
6	SERIN-	SERCOS In -		
7	NC	not connected		
8	NC	not connected		

Table 7-7: Connection X8 - SERCOS connection

7.1.3 Dimensions

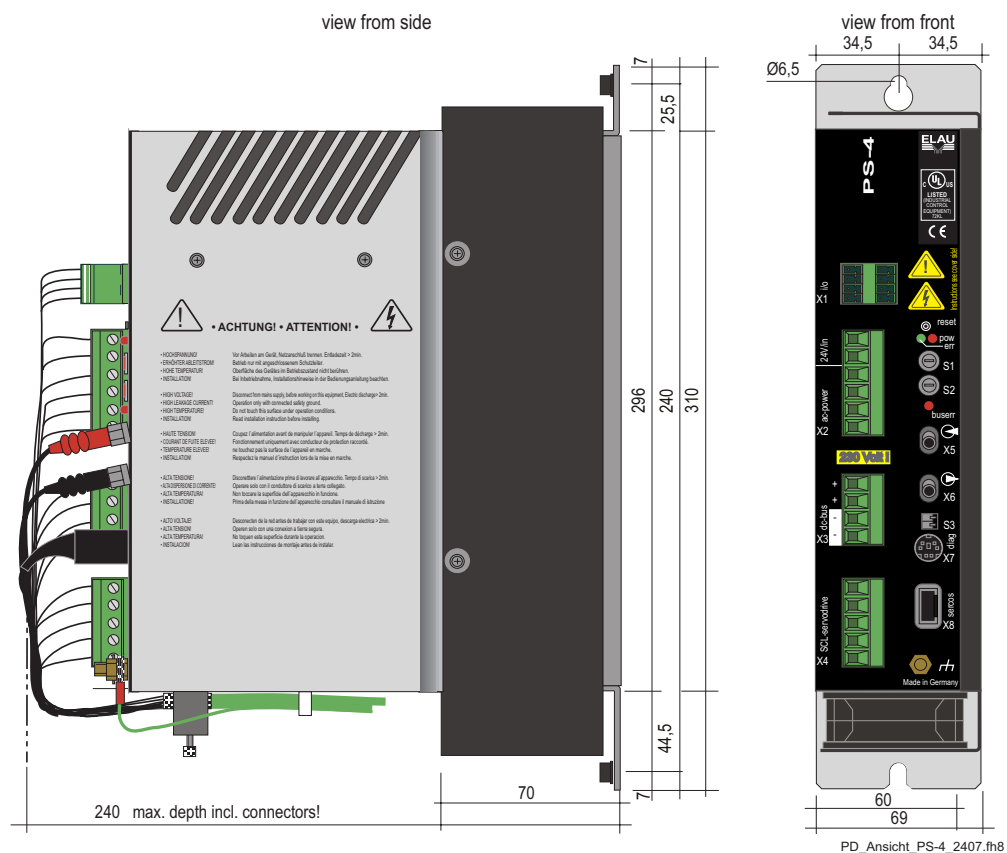


Fig. 7-2: Connections of the PacDrive PS-4

PD_OpManPS-4_07_us.fm

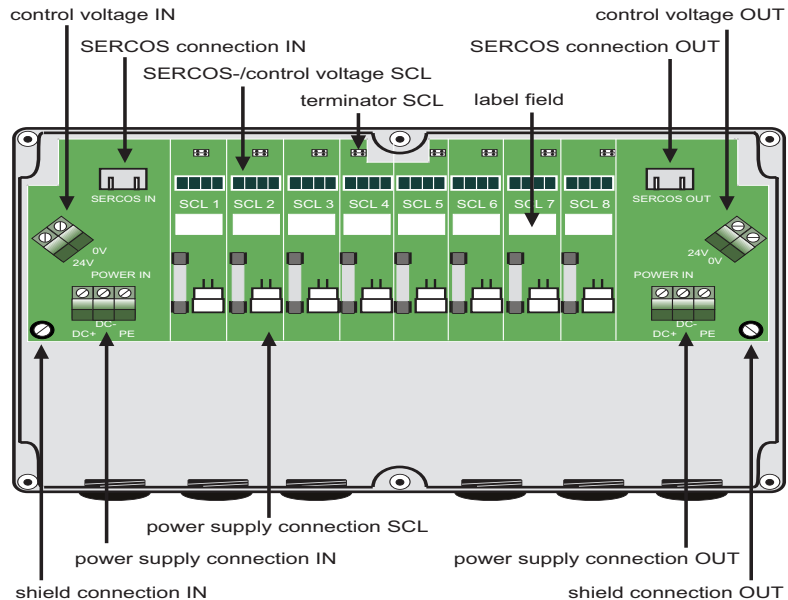
7.2 PacDrive PD-8

7.2.1 General

Parameter	Value
Article name	PacDrive PD-8
Order number	13 13 02 59 - 001/002
Supply - DC-circuit voltage/current - control voltage/current	DC 270V..370V / 16 A DC 24 V (-15%..+25%) / max 13 A
Power supply SCL DC-circuit permanent current	5 A
Control voltage SCL - permanent current (24V)	1 A
Weight	0.86 kg
Ventilation	natural convection
Ambient conditions - protection means - ambient temperature during operation - for storage and transport - insulation - excess voltage category - excess voltage resistance - degree of radio interference	IP65 +5 .. +55 °C -25 .. +70 °C degree of pollution 2 ..., no bedewing allowed K III, T2 (DIN VDE 0110) class 1 (DIN VDE 0160) class A EN 55011 / EN 61800 - 3
Approvals	

Table 7-8: Technical data for PacDrive PD-8

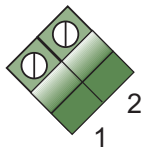
7.2.2 Electrical connections



PD-8_Ansicht_de_0308.fb8

Fig. 7-3: Overview of the connections of the PacDrive PD-8

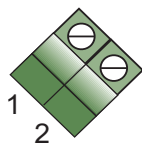
Control Signals IN



Pin	Designation	Meaning	Range	max. cross section
1	24 V	24V control voltage	-15%..+25%	4 mm ²
2	0 V	0V control voltage		4 mm ²

Table 7-9: Connection - control signals IN

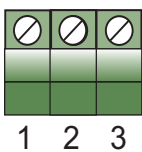
Control Signals OUT



Pin	Designation	Meaning	Range	max. cross section
1	24 V	24V control voltage	-15%..+25%	4 mm ²
2	0 V	0V control voltage		4 mm ²

Table 7-10: Connection - control signals OUT

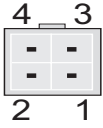
Power Supply IN/OUT



Pin	Designation	Meaning	Range	max. cross section
1	DC +	Power supply DC+	DC 270V-370V	4 mm ²
2	DC-	Power supply DC-	DC 270V-370V	4 mm ²
3	PE	Protective conductor connection		4 mm ²

Table 7-11: Connection - power supply IN/OUT

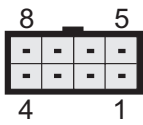
Power supply SCL



Pin	Designation	Meaning	Range	max. cross section
1	PE	protective conductor		1 mm ²
2	PE	shield		1 mm ²
3	DC-	DC-circuit -	DC 270V-370V	1 mm ²
4	DC+	DC-circuit +	DC 270V-370V	1 mm ²

Table 7-12: Connection - power supply SCL

SERCOS Connection SCL



Pin	Designation	Meaning	Range	max. cross section
1	24 V	24V control voltage	-15%..+25%	0.5 mm ²
2	SERCOS Out +	SERCOS Transmit +		0.5 mm ²
3	shield	shield SERCOS Out		0.5 mm ²
4	SERCOS In +	SERCOS Receive +		0.5 mm ²
5	0 V	0V control voltage		0.5 mm ²
6	SERCOS Out -	SERCOS Transmit -		0.5 mm ²
7	shield	shield SERCOS In		0.5 mm ²
8	SERCOS IN -	SERCOS Receive -		0.5 mm ²

Table 7-13: Connection - SERCOS SCL

7.2.3 Dimensions

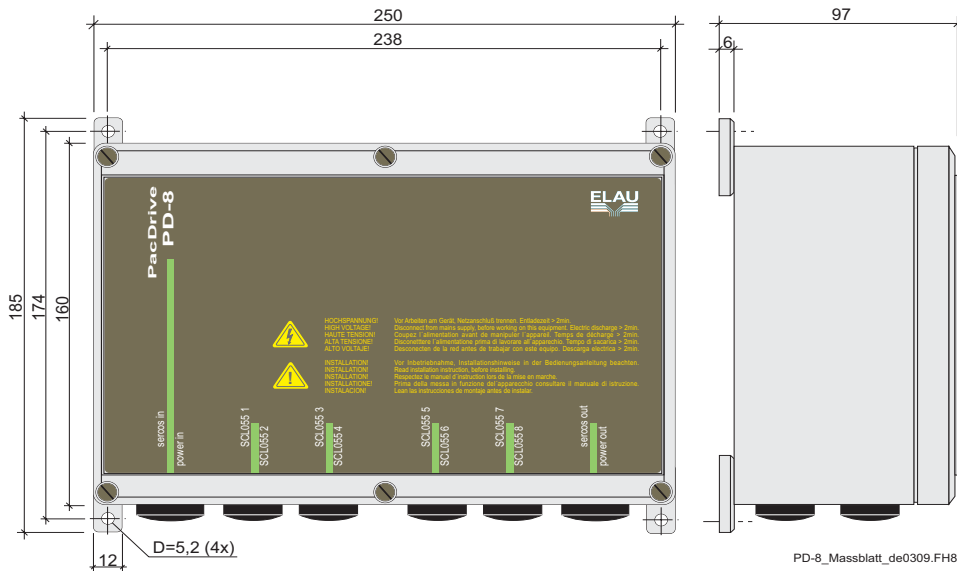
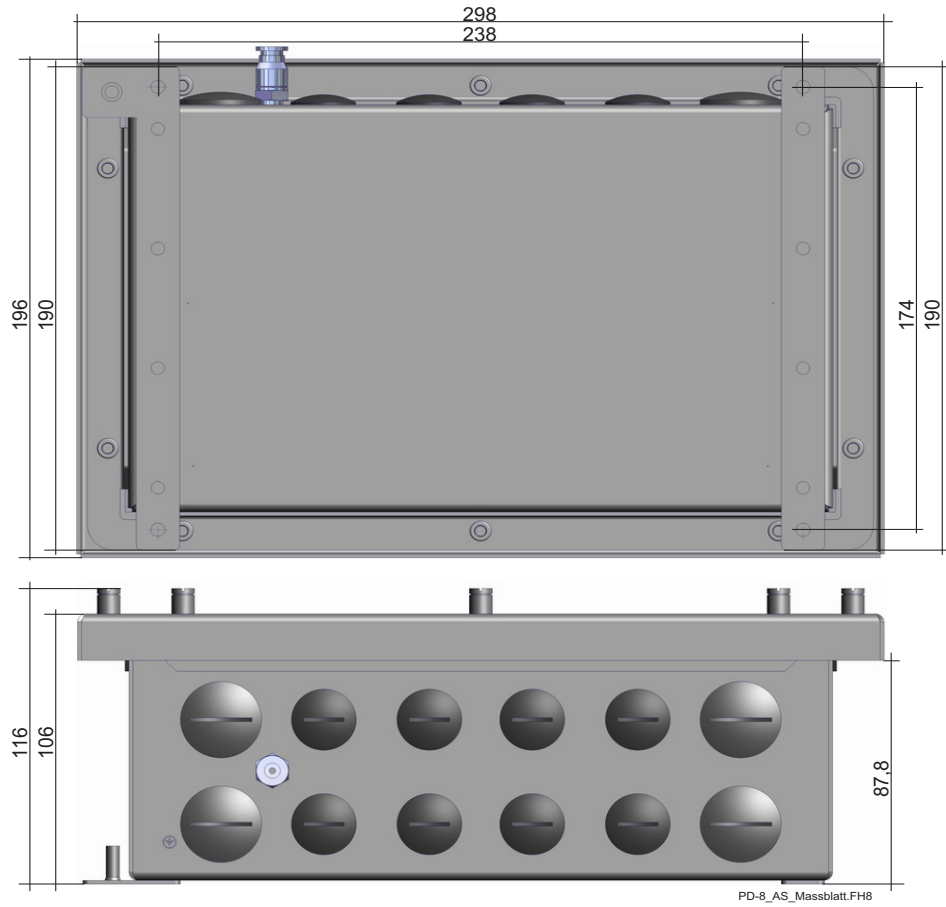
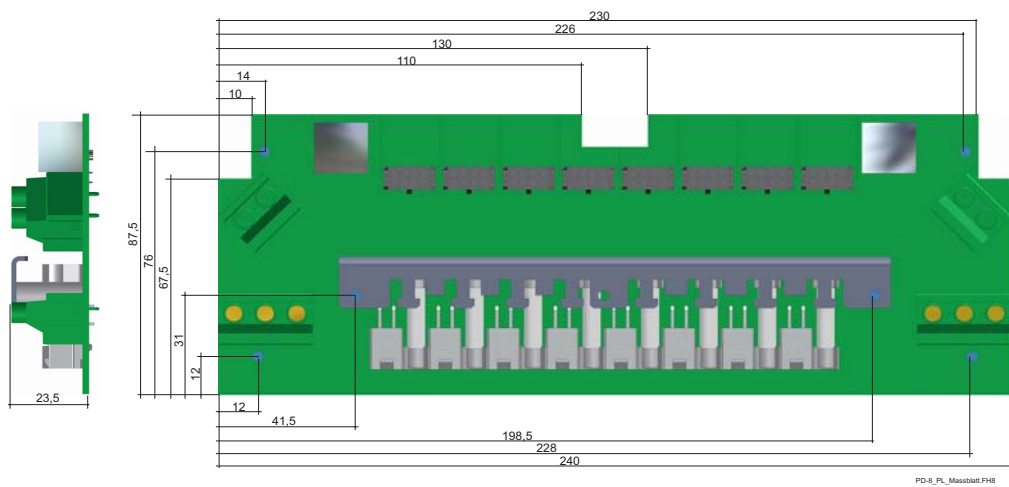


Fig. 7-4: Dimensions of the PacDrive PD-8 (standard version)



PD-8_AS_Massblatt.FH8

Fig. 7-5: Dimensions of the PacDrive PD-8 (aseptic version)



PD-8_PL_Massblatt.FH8

Fig. 7-6: Dimensions of the PacDrive PD-8 (board version)

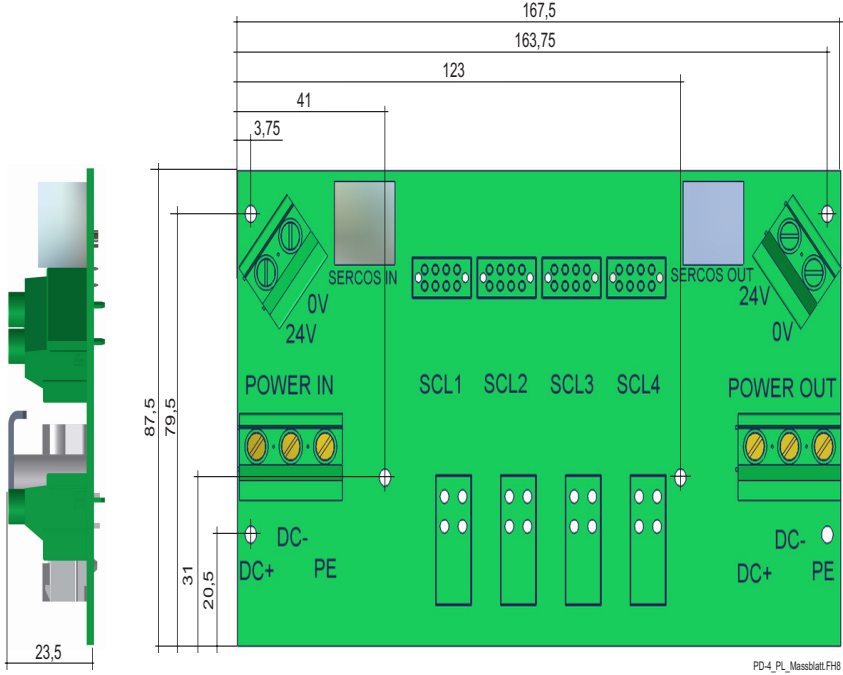

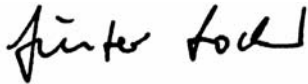


Fig. 7-7: Dimensions of the PacDrive PD-4 (board version)

7.3 Declaration by the manufacturer

	<p style="text-align: center;">Herstellereklärung / EC-Declaration by the manufacturer / CE-Déclaration du fabricant</p> <p style="text-align: center;">im Sinne der EG-Maschinenrichtlinie 89/392 EWG, Anhang II Abschnitt B as defined by EC-machinery directive 89/392 EEC, Annexe II Section B conformément à la directive "CE" relative aux machines 89/392 CEE Annexe II Section B</p>	<p style="text-align: center;">ELN 122-00/08.03</p> <p style="text-align: center;">Seite 1/1</p>
<p>Das von uns gelieferte Produkt PacDrive PS-4 / PacDrive PD-8</p> <p>ist zum Einbau in eine Maschine bestimmt.</p> <p>Die Inbetriebnahme ist solange untersagt, bis festgestellt wurde, dass die Maschine, in die dieses Produkt eingebaut werden soll, den Bestimmungen der EG-Richtlinie entspricht.</p> <p>Hersteller: ELAU AG Dillberg 12 D-97828 Marktheidenfeld</p> <p>Stellung im Betrieb / Position : Vorstand/Chairman</p> <p style="text-align: center;"></p> <p>3.8.2003 Günter Locherer (Datum, Date / Unterschrift, Signature)</p>	<p>The product delivered by our company PacDrive PS-4 / PacDrive PD-8</p> <p>is intended to be incorporated into a machine.</p> <p>The product must not be operated until the machine into which this product is to be incorporated has been declared in conformity with the provisions of the directive.</p> <p>Manufacturer: ELAU AG Dillberg 12 D-97828 Marktheidenfeld</p>	<p>Le produit livré par notre société PacDrive PS-4 / PacDrive PD-8</p> <p>est destiné à être installé dans une machine.</p> <p>La mise en service des composants est fortement déconseillée avant que la machine dans laquelle le produit sera installé n'ait été déclarée conforme aux dispositions de la directive.</p> <p>Fabricant: ELAU AG Dillberg 12 D-97828 Marktheidenfeld</p>

7.4 Modifications

08 / 2003

- Operating manual newly written

04 / 2005

- Aseptic variant, PD-8 connectors and cables updated
- Various error Corrections and supplements
- Document structure updated
- Product names, definitions and layout updated



NOTE

The latest documentation of the modification service for this product can be found on ELAU's homepage (<http://www.elau.de>).

8 Appendix

8.1 Contact

For repair

Please send the components to be repaired or checked, along with the error report, to this address:

ELAU AG

Abt. Kundendienst house address:
Postfach 1255 Dillberg 12
97821 Marktheidenfeld 97828 Marktheidenfeld
Phone: +49 (0) 93 91 / 606-142
Fax: +49 (0) 93 91 / 606-340

Service team

Should you need to talk to a member of our service team or require on-site service, please contact:

ELAU AG

Dillberg 12
D-97828 Marktheidenfeld
Phone: +49 (0) 9391 / 606 - 0
Fax: +49 (0) 9391 / 606 - 300
e-mail: info@elau.de
Internet: www.elau.de

ELAU, Inc.

4201 West Wrightwood Avenue
Chicago, Illinois 60639 - USA
Phone: +1 773 342 8400
Fax: +1 773 342 8404
e-mail: sales@elau.com
Internet: www.elau.com

ELAU SYSTEMS ITALIA S.r.l.

Via Tosarelli 300
I-40050 Villanova di Castenaso (BO)
Phone: +39 051 / 7818 70
Fax: +39 051 / 7818 69
e-mail: info@elau.it
Internet: www.elau.it



NOTE

Further contact addresses you can find on the ELAU homepage (www.elau.de).

8.2 Further Literature

ELAU can provide you with these manuals and instructions on the PacDrive™ System:¹

Project Manual

Art.No. 17 13 00 58 - 00x (DE, EN, FR)

Programming Manual

Art.No. 17 13 00 61 - 00x (DE, EN)

Operating Manual MC-4 MotorController

Art.No. 17 13 00 62 - 00x (DE, EN, IT, FR)

Operating Manual CAN L2

Art.No. 17 13 00 66 - 00x (DE, EN)

Operating Manual PROFIBUS-DP

Art.No. 17 13 00 67 - 00x (DE, EN)

Operating Manual SM Motor

Art.No. 17 13 00 68 - 00x (DE, EN, IT, FR)

Operating Manual EPAS-4

Art.No. 17 13 00 70 - 00x (DE, EN)

Operating Manual PacDrive Controller

Art.No. 17 13 00 71 - 00x (DE, EN, IT, FR)

Operating Manual OPC-Server

Art.No. 17 13 00 73 - 00x (DE, EN)

Operating Manual Device Net

Art.No. 17 13 00 76 - 00x (DE, EN)

Operating Manual HMI Libraries

Art.No. 17 13 00 77 - 00x (DE, EN)

Operating Manual INC-4 Incremental Encoder Module

Art.No. 17 13 00 78 - 00x (DE, EN)

Operating Manual CANopen

Art.No. 17 13 00 79 - 00x (DE, EN)

Operating Manual VarioCam® Editor ECAM-4

Art.No. 17 13 00 80 - 00x (DE, EN)

Operating Manual PacNet Module PN-4

Art.No. 17 13 00 81 - 00x (DE, EN)

Operating Manual SR Motor

Art.No. 17 13 00 82 - 00x (DE, EN)

1. Art.No. -000 (DE) german -001 (EN) english -002 (IT) italian -003 (FR) french

Operating Manual BusTerminal BT-4/DIO1

Art.No. 17 13 00 83 - 00x (DE, EN)

Operating Manual TTS

Art.No. 17 13 00 88 - 00x (DE)

User Manual Automatic Controller Optimization

Art.No. 17 13 00 89 - 00x (DE, EN)

Operating Manual PacDrive SCL

Art.No. 17 13 00 93 - 00x (DE, EN)

Operating Manual PacDrive PS-4 und PacDrive PD-8

Art.No. 17 13 00 94 - 00x (DE, EN)

Operating Manual Evaluation Kit

Art.No. 17 13 00 95 - 00x (DE)

Operating Manual PacDrive Controller P600

Art.No. 17 13 00 96 - 00x (DE)

8.3 Product Training

We offer practical workshops and seminars.

Our experienced seminar leaders will enable you to make optimum use of the vast possibilities of the PacDrive™ system.



NOTE

Please contact us for further information or to order our seminar program. See also our homepage (www.elau.de).

8.4 Index

A

Approvals
 MC-4 / 03 A 47, 52
 automation system
 structure 17

C

Cleaning 29
 commissioning 31
 Configuration 35
 connection voltage 42
 connections 48, 53
 X2 - motor 49, 53
 X4 - encoder (SinCos) 49,
 50
 contact 59
 contents 3

D

declaration by the manufacturer 57
 Definitions 47, 52

E

EC-declaration 57
 ELAU AG 2
 eMail
 ELAU AG 2
 EMC rules 30
 Exchanging units 27
 Exchanging cables 29
 Exchanging the motor 28

F

features
 EPAS-4 19
 PacDrive Controller 19
 PacDrive PS-4 20
 PacDrive SCL 20

G

grounding conditions 41

H

homepage
 ELAU AG 2

I

internet
 ELAU AG 2

L

literature 60

M

mains voltage
 adjustment 42
 Maintenance 25
 manuals 60
 modifications 58

O

operating manual 60
 order numbers 38
 Cables 39
 SR motor 38
 Overview 15

P

Packaging machine 15
 physical correlations 47, 52
 programming 35

R

rated voltage 42
 repair 26, 59
 risk
 classification 8
 rotary current networks
 -grounded 41
 -ungrounded 41

S

safety notes 8
 seminars 62
 service
 -personnel 59
 slip ring 46
 spare parts 25
 Storage 21

T

Technical data 41, 47

trademarks 2
training 62
Transportation 21
Type plate 21, 22

U

Unpacking 21

8.5 Form for Error Report

This error report is absolutely necessary in order to enable efficient processing.

Send the error report to your ELAU representative or to:

ELAU AG, Abt. Kundendienst
Dillberg 12, D-97828 Marktheidenfeld
Fax: +49 (0) 93 91 / 606 - 340

Sender:

Company:	City:	Date:
Department:	Name:	Phone:

Details on the defective product

Product name:

Article number:

Serial number:

Software version:

Hardware code:

Parameter enclosed: yes [] no []

IEC program enclosed: yes [] no []

Details of the machine on which the problem occurred:

Machine producer:

Type:

Hours of operation:

Machine number:

Date of commissioning:

Producer/Type of machine control:
.....

Description of the problem:

.....
.....
.....

Additional information:

Problem state:

- persistent
- when commissioning
- occurs sporadically
- occurs after about.....hours
- occurs in case of shocks
- depends on temperature
- foreign object inside unit

Causes:

- unknown
- wiring error
- mechanical damage
- moisture inside the unit
- encoder defective

Concomitant phenomena:

- mechanical problems
- failure of mains supply (24V)
- failure of PMC-2
- motor failure
- broken cable
- insufficient ventilation

Does the switching cabinet have an air conditioning system?Y/N []

Have similar problems occurred before on the same axis?

How often:

Did the problems occur on certain days or times of day?

.....
further information:
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....