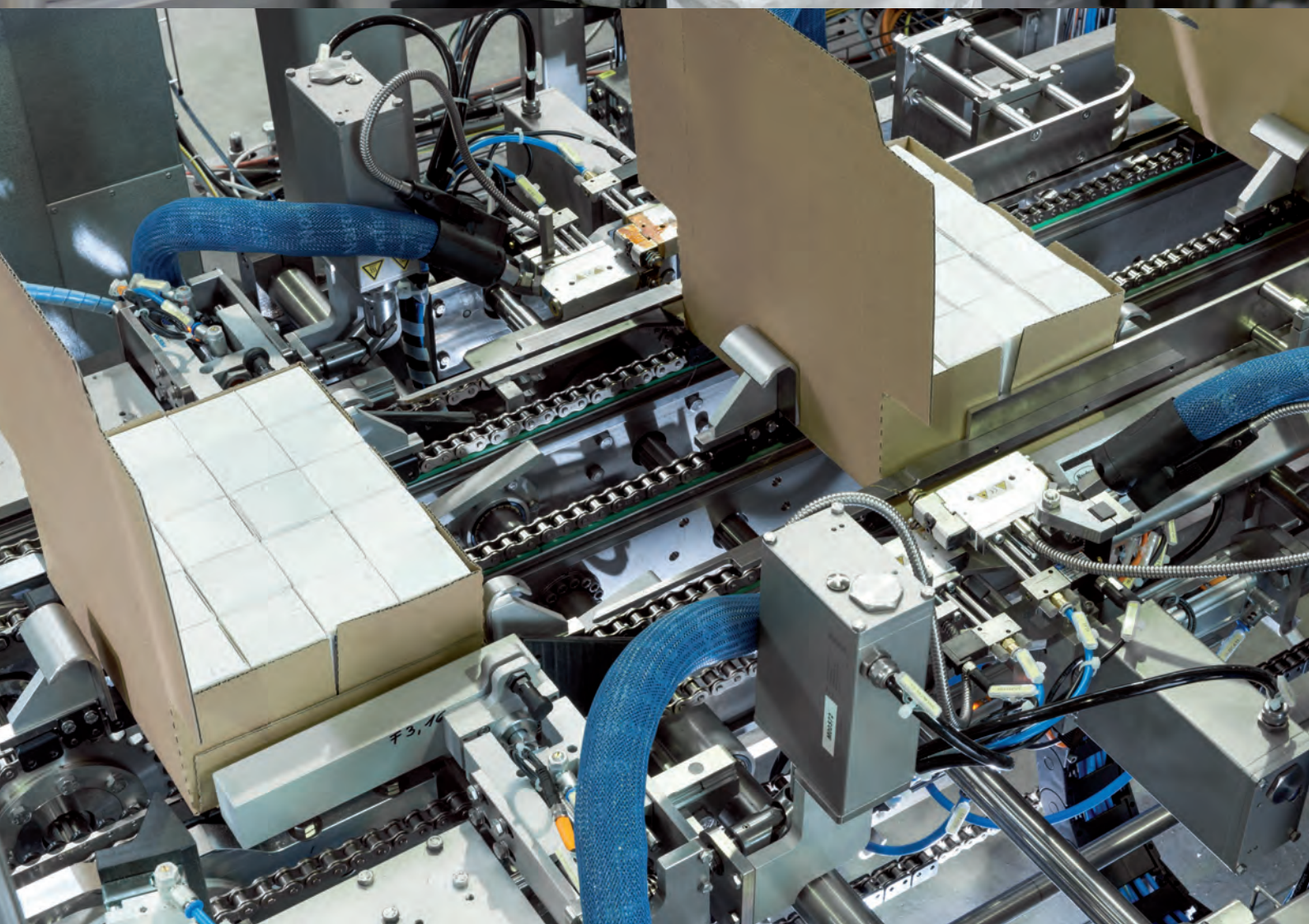
LENORD +BAUER
... automates motion.

PowerDRIVE-System
Fully automatic positioning drives and drive solutions



The innovative PowerDRIVE-System reduces set-up times and increases flexibility

In the past, formats were adjusted time-consumingly by hand, however these days modern production plants are both efficient and versatile.

The requirements on modern production plants are becoming more and more demanding from year to year. With an increasing number of product variants, production plants and packaging plants must become increasingly flexible. At the same time, operating companies expect a high level of utilisation of machinery and plants. For this reason, format changes are only allowed to take a few minutes and must be reproducible without problems. Shorter set-up times, exact repeat accuracy and high flexibility require increasing automation in this area.

This is our core business, as for almost 50 years the name Lenord + Bauer has stood for the automation of industrial motion sequences. We develop, produce and market customised, innovative and highly integrated automation solutions for a broad range of industries and applications. As a specialist for customer-specific solutions we manufacture our products in batches from small quantities to thousands of pieces per year.

For each development and each new solution our focus is on customer satisfaction. This statement also applies to our innovative PowerDRIVE-System, an intelligent system solution – not only for the automation of format adjustments. The system can be integrated flexibly and efficiently into modern plants in the packaging and food industry sectors, as well as into plastic processing machines and machine tools. With the complete system, everything becomes easier, faster and more flexible.

The following pages will provide you with detailed information on how reliably and efficiently the PowerDRIVE-System operates, and how easily it can be integrated into a wide range of machine and plant concepts.

PowerDRIVE-System
The fully automatic complete solution

Easy integration, quicker changes, fewer sources of error – but the innovative positioning system has much more to offer.

A change in batch size and frequent product changes require quick conversion of production plants and machines. If this task is still performed by handwheel, valuable time may be lost. This is particularly the case on processing smaller batch sizes. Furthermore, manual conversion does not ensure absolute repeat accuracy.

To save time, money and trouble, it is better to rely on innovative solutions: fully-automated feed axes that permit the efficient production even of smaller batch sizes. Like the PowerDRIVE-System from Lenord + Bauer.

The clever complete package

The innovative positioning system offers a complete system solution for the efficient and flexible integration of positioning drives in modern production plants. It makes the integration and commissioning of automated feed axes extremely easy and greatly reduces cabling work. The PowerDRIVE-System is also an innovative solution for continuous cyclic operation.

The system consists of three main components. Firstly: the compact, fully-automated positioning drives PowerDRIVE. Secondly: the intelligent decentralised communication unit, the PowerDRIVE-Box, which controls the complete power management of the positioning drives and greatly simplifies the connection work. And thirdly: the hybrid cable suitable for drag chains, PowerDRIVE-Connect.

Efficient to the core

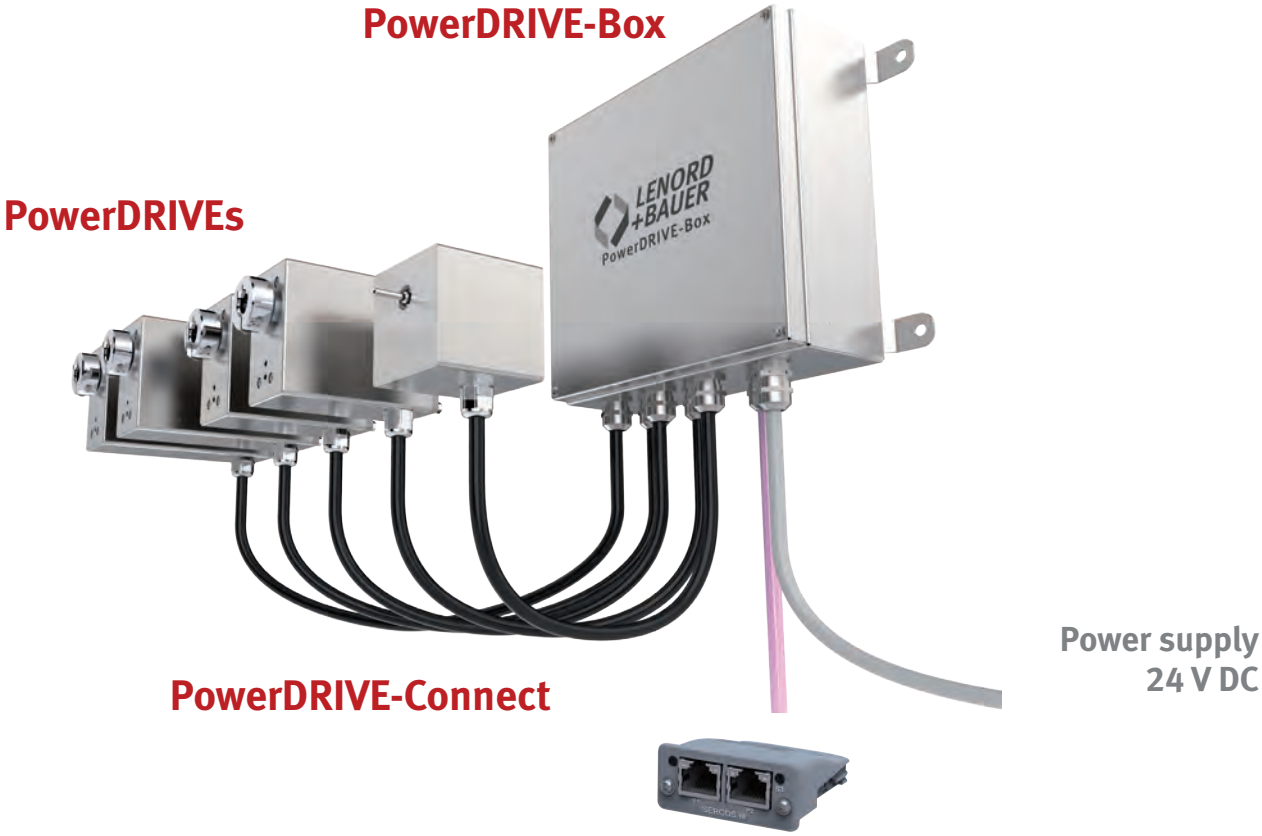
The PowerDRIVE-System guarantees maximum repeat accuracy and prevents adjustment errors. Once formats have been set they can be managed in a database as "recipes". However, new formats are also added quickly and easily. This feature increases the plant availability and increases the productivity. In this way the cost-effectiveness is significantly increased, particularly in the case of frequent format changes and small batch sizes. At the same time the flexibility of the machine or plant is increased.

In addition to the numerous advantages of the individual components, which will be addressed in more detail on the following pages, the PowerDRIVE-System also offers you distinct advantages in relation to support or the logistics chain. The basic system, which is always the same and consists of the PowerDRIVE and PowerDRIVE-Box, can be used in conjunction with all control systems and interfaces thanks to the plug-in communication modules. In this way maximum flexibility is ensured.

The entire system at a glance

PowerDRIVE-System	
PowerDRIVE	Compact design: 2 Nm at 230 min^{-1} / 5 Nm at 100 min^{-1} / 10 Nm at 40 min^{-1} Short design: 1.4 Nm at 230 min^{-1} / 3.5 Nm at 100 min^{-1} / 7 Nm at 40 min^{-1} Cube design: 0.4 Nm (750 min^{-1}, duty cycle 25 %), continuous operation: 0.25 Nm (duty cycle 50 %, 500 ms) Supply voltage 24 V DC / hybrid cable / plug outlet / joystick for commissioning / manual emergency adjustment / holding brake optional
PowerDRIVE-Connect	Freely configurable hybrid cable suitable for drag chains Auto-configuration of the PowerDRIVEs Automatic PowerDRIVE parameter settings
PowerDRIVE-Box	Connection of up to 5 PowerDRIVEs Integrated power management and electronic fuse for cable protection Plug-in interface modules For mounting on top hat rails and for installation outside the switch cabinet

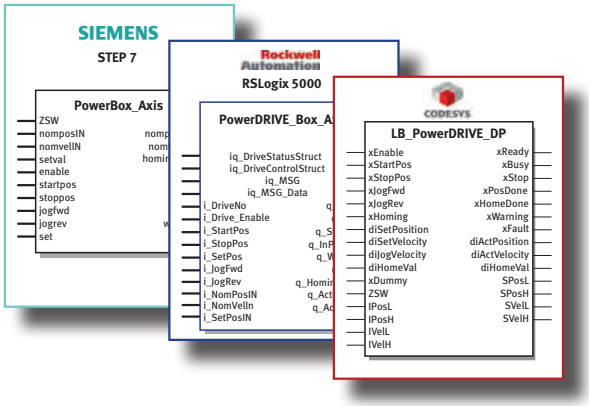
The components of the PowerDRIVE-System



Plug-in modules for all common bus systems

PROFINET
EtherCAT
EtherNet/IP
PROFIBUS
sercos the automation bus
CANopen
DeviceNet

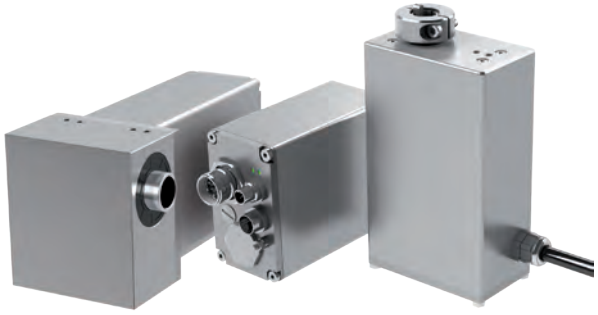
Function blocks for CODESYS, STEP 7 and RSLogix 5000



PowerDRIVE
A format change can be so efficient

The compact and fully automatic positioning drives can be completely integrated into a wide range of machinery and plants.

The core of the system is formed by the compact positioning drives PowerDRIVE specially developed for fully automatic format adjustment. Each positioning drive forms a complete mechatronic unit, consisting of a DC brushless motor, a novel magnetic multiturn absolute rotary encoder, a 32-bit microcontroller, a compact power amplifier, as well as an efficient spur gear. Optionally, robust stainless steel housings (1.4301) or stiff aluminium housings (AlMgSi) are available in two designs. With its high protection class (IP 67), the PowerDRIVE is suitable for a wide range of applications in various industrial areas.



Depending on application and mounting position, mechanical self-locking of the feed axes is not always ensured. The optional holding brake guarantees secure retention even in case of shock and vibration loads - especially on vertical feed axes. All devices are equipped with a mechanical manual emergency adjustment feature and have a micro-joystick with which the positioning drives can also be operated without prior PLC programming.

Fully automatic format adjustment with high repeat accuracy

A prerequisite for exact format adjustment with high repeat accuracy is the exact acquisition of the shaft position. The integrated, battery-less, magnetic, absolute measuring system detects the position immediately after the power is switched on. Reference search routines are therefore a thing of the past. Once formats have been prepared they can be saved in a database as "recipes" and can therefore be retrieved at any time. In this way adjustment errors on a format change are avoided and set-up times significantly reduced.

Advantages of the connection technology

The PowerDRIVEs can be supplied with a hybrid cable or connectors. The power supply for the motor and the logic, as well as the bus connection, is integrated into the hybrid cable PowerDRIVE. In addition, hybrid connectors are also available; these have a quick-release feature. This innovative connection technology is therefore extremely cost-effective and cost-saving.

Variety also in the shaft connection

The positioning drives are designed for connection to the following shafts with a form-fit, clamped connection:

- Semi hollow shaft from 10 to 20 mm diameter
- 10 mm square / 10 mm solid shaft
- Flush hollow shaft (only form-fit)
- Angled gear with through hollow shaft 20 mm

The PowerDRIVE reduces the set-up times on format adjustment.

- DC brushless motor
- Compact spur gear
- Designs:
  - Compact with length of 163 mm
  - Short with length of 125 mm
  - Angled gear with total length of 221 mm
- Robust housing made of stainless steel (1.4301) or aluminium (AlMgSi), sealed using Viton
- Magnetic absolute multiturn sensor
- Operating temperatures -10 °C to + 60 °C
- Integrated joystick

Technical data

PowerDRIVE	GEL 6110 compact design	GEL 6110 short design
Dimensions (W × H × D)	60 × 100 × 163 mm	60 × 100 × 125 mm
Protection class	IP 67	IP 67
Housing material	Aluminium / stainless steel	Aluminium / stainless steel
Nominal torque	2 / 5 / 10 / 15 Nm	1.4 / 3.5 / 7 / 10.5 Nm
Measuring system	Magnetic, multiturn	Magnetic, multiturn
Accuracy	± 1.8°	± 1.8°
Acquisition	342 turns	342 turns
Motor	DC brushless	DC brushless
Operating temperature range	-10 °C to +60 °C	-10 °C to +60 °C
Duty cycle	Duty cycle › 50 % (load-dependent)	Duty cycle › 50 % (load-dependent)
Interfaces	PROFIBUS-DP / CANopen	PROFIBUS-DP/ CANopen
Cable outlets	Connector M12 / hybrid cable	Connector M12 / hybrid cable

PowerDRIVE
Unrivalled in continuous cyclic operation

The innovative drive solution is optimised for usage in the food and feed industry.

High requirements are placed on machines for the food sector, as food must be transported, dispensed, packed and labelled under hygienic conditions. As such all areas of the machinery, above all the parts that carry product, must be easy to clean. Such machinery often operates continuously. To ensure a long service life, the drive solution used must not be overloaded. At the same time, the drives must operate quietly and evenly to prevent damage to delicate foods during transport. Clever, flexible drive technology that can be operated continuously is therefore required.

Drive solution for continuous cyclic operation

For continuous cyclic operation, Lenord + Bauer developed a cube-shaped PowerDRIVE with an edge length of only 80 mm and a nominal torque of 0.4 Nm. It is excellently suited to continuous cyclic operation at 0.25 Nm, 50 % duty cycle and a cycle time of 1 s. This positioning drive is equipped with a robust, incremental measuring system. The position of the shaft is referenced once per turn via a proximity switch input. This PowerDRIVE is also extremely compact and meets the requirements as per IP 67. At temperatures from -10 °C to +60 °C this positioning drive operates reliably over the long-term.

Quickly and easily disconnected

This variant is designed for connection to the PowerDRIVE-Box and is supplied with a hybrid cable outlet or hybrid connector. With the M23 quick-release connector, the positioning drive is quickly connected and just as quickly disconnected again. Along with the contacts to the power supply, there is a screened bus element for the communication in the connector. For maintenance and service work, the positioning drive can therefore be reliably and quickly disconnected from the power supply in a matter of seconds.

Tailored to the requirements

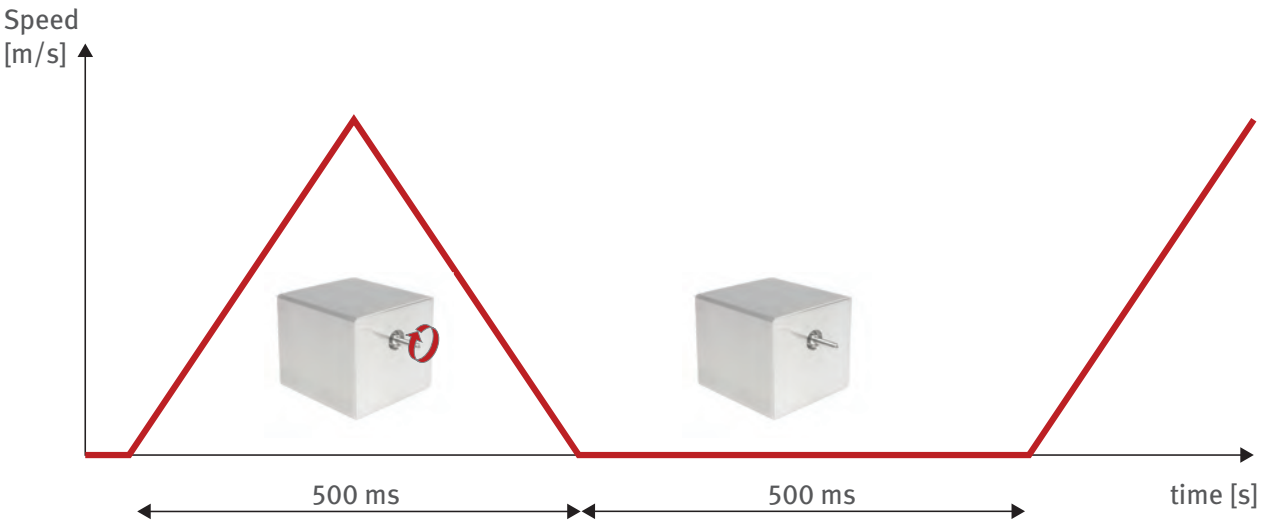
The installation of the PowerDRIVE is flexible and can be adjusted to the related application. The hygiene requirements have also been taken into account here. All external parts can be cleaned easily. If necessary, the drive can be removed or rotated easily to clean also the drive wheels if necessary.

Technical data

PowerDRIVE	GEL 6108 – for continuous cyclic operation
Dimensions (W × H × D)	80 × 80 × 80 mm
Protection class	IP 67
Housing material	Stainless steel
Nominal torque	Positioning: 0.4 Nm (750 min^{-1}, duty cycle 25 %), continuous cyclic operation: 0.25 Nm (duty cycle 50 %, 500 ms)
Measuring system	Magnetic, incremental (single turn upon request)
Accuracy	± 7.5°
Acquisition	96 increments per turn, proximity input for referencing
Motor	DC brushless
Operating temperature range	-10 °C to +60 °C
Duty cycle	Duty cycle › 50 % (load-dependent)
Interfaces	CANopen
Cable outlets	M12 connector and hybrid cable

The PowerDRIVE operates reliably in continuous cyclic operation and is problem-free in relation to hygiene.

- DC brushless motor
- 0.25 Nm in cyclic operation (at 50% duty cycle, 500 ms)
- Operating torque 0.4 Nm
- Laser-welded stainless steel housing (1.4301), sealed using Viton
- Compact size (80 mm x 80 mm x 80 mm)
- Incremental measuring system with proximity switch input for referencing
- Optional with single turn absolute sensor



PowerDRIVE-Box
Full power with half the effort

The decentral control unit minimises the wiring effort and has an extremely flexible interface.

Each positioning drive is part of a complete system and must be integrated into the plant control system. This task is very simple with the decentral control unit. Up to 5 PowerDRIVEs can be connected to the PowerDRIVE-Box. The motor power for the positioning drives connected is monitored and switched by the integrated power management in the PowerDRIVE-Box.

Simple, powerful communication

The communication with the plant control system is via the variable interface modules. Irrespective of whether PROFINET, EtherNet/IP, sercos III, EtherCAT, CANopen, PROFIBUS-DP or DeviceNet, all common interfaces are available with the plug-in modules. This flexibility of the interface eases component management and reduces the inventory costs.

Demanding applications

The PowerDRIVE-Box comes in a compact housing made of die-cast aluminium for mounting on top hat rails. For particularly demanding applications, a variant with stainless steel housing and cable glands is available. This variant meets the requirements of protection class IP 69K. As such it is suitable for installation outside the switch cabinet in food production plants.

The hybrid cables of the positioning drives are fixed directly to the easily accessible spring-cage terminals to ensure a simple and economical connection work. It is recommended to use a 24 V DC / 40 A voltage-stabilised power supply unit.

Safe shut-down

The supply of power to the motor and logic in the positioning drives is separate. As such the drives can also be shut down via certified safety relays. In this case the drive is shut down safely. At the same time the state monitoring remains in operation. Essential requirements from the new Machinery Directive can therefore be met.

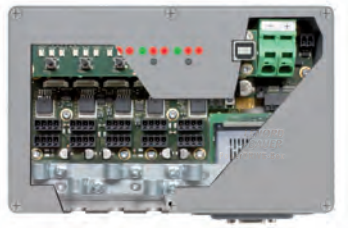
With the aid of the auto-configuration and automatic parameter settings, the intelligent PowerDRIVE-Box simplifies commissioning and ensures the PowerDRIVEs are integrated efficiently. In the case of an error, the positioning drive can be switched back on either via the higher level control system or directly on the PowerDRIVE-Box using push-buttons.

Technical data

PowerDRIVE-Box	GEL 6505A – IP 20	GEL 6505B – food grade / IP 69K
Logic supply	24 V DC / 1 A	
Motor supply	24 V DC / 40 A	
Dimensions (W× H × D)	188 × 120 × 56 mm	250 × 250 × 100 mm
Protection class	IP 20	IP 69K
Housing material	Aluminium cast	Stainless steel
Assembly	Top hat rail	Installation outside the switch cabinet
Connection of PowerDRIVEs	5	
Possible interface modules	PROFINET-I/O, EtherNet/IP, sercos III I/O profile, EtherCAT, PROFIBUS-DP, CANopen, DeviceNet	
Operating temperature range	-10 °C to +60 °C	
Features	Integrated power management / auto-configuration of the PowerDRIVEs / Motor protection and cable protection integrated into PowerDRIVE-Box	

The PowerDRIVE-Box optimises component management.

IP 20 design



IP 69K design

- Integrated power management for up to 5 PowerDRIVEs
- Electronic fuse for cable protection
- Plug-in interface modules
- Robust housing made of stainless steel or die-cast aluminium
- Automatic configuration and setting of parameters for the PowerDRIVEs
- Easy to install connection technology with PowerDRIVE-Connect

EtherCAT

PROFINET

PROFIBUS

EtherNet/IP

CANopen

sercos the automation bus

DeviceNet

PowerDRIVE-Connect
Reliable connection with easy disconnection

The electrical connection with the hybrid cable suitable for drag chains saves time and money during maintenance and installation.

In principle the PowerDRIVEs can be integrated directly in a higher level plant control system via CANopen or PROFIBUS-DP. However it is significantly easier to connect the positioning drives to the decentral control unit PowerDRIVE-Box using the hybrid cable PowerDRIVE-Connect. In this case the hybrid cable replaces two fieldbus cables and the separate power supply. This aspect saves time and reduces the wiring effort.

Versatile in use

The hybrid cable can be used in a very wide range of plants and machinery. It is food grade and matched to the range of system products. Designed for moving applications in drag chains, the hybrid cable has a permissible dynamic bending radius of ten times the cable diameter in a temperature range from – 40 °C to + 80 °C. And that without screening compromises, even though the cable diameter is only 9.5 mm. The separately screened communication cores include a ground wire and the complete cable has a further screen under the PUR sheath.

Modern cabling technology

The PowerDRIVEs are now also available with a hybrid cable outlet and hybrid connector. With this connection technology the positioning drive is connected quickly, as the M23 connector system is equipped with a quick-release feature. Along with the contacts to the power supply, there is a screened bus element for the communication in the connector. For maintenance and service work, the positioning drive can therefore be reliably and quickly disconnected from the power supply in a matter of seconds.

Technical data

PowerDRIVE-Connect	Hybrid cable
Communication	2 x 0.25 mm², 1x 0.14 mm², screened
Logic supply	2 x 0.5 mm², operating voltage 24 V DC
Motor supply	2 x 1.5 mm², operating voltage 24 V DC
Diameter (d)	9.5 mm
Sheath material	PUR
Bending radius	Permanently flexible 10 x d
Temperature range	-40 °C to +80 °C, dynamic

The freely configurable PowerDRIVE-Connect hybrid cables are the ideal supplement.

A well though-out system also makes the electrical interfacing easy. With the new hybrid connectors, wiring the positioning drives and the PowerDRIVE-Box is child's play. The motto here is "plug-and-play".

A freely configurable hybrid cable is included in the scope of supply. This cable offers the advantage that it can be matched to the related connection situation. The cable is manufactured in lengths from 3 to 20 m as required.

The hybrid cable is available with pre-assembled connection terminals for the PowerDRIVE-Box and hybrid connector for the PowerDRIVEs. As such the positioning drives and PowerDRIVE-Box are quickly connected and ready for operation.

The hybrid connectors make it possible to disconnect the electrical connection easily and quickly at any time. This feature reduces not only the cabling effort, it also saves time during maintenance and service.

In this way the entire system is connected quickly.

- Drag-chain suitable hybrid cable
- Freely configurable and pre-assembled
- M23 hybrid connector with quick-release feature
- Food grade components

Autonomous PowerDRIVE-System solution
Modifying a complex plant efficiently

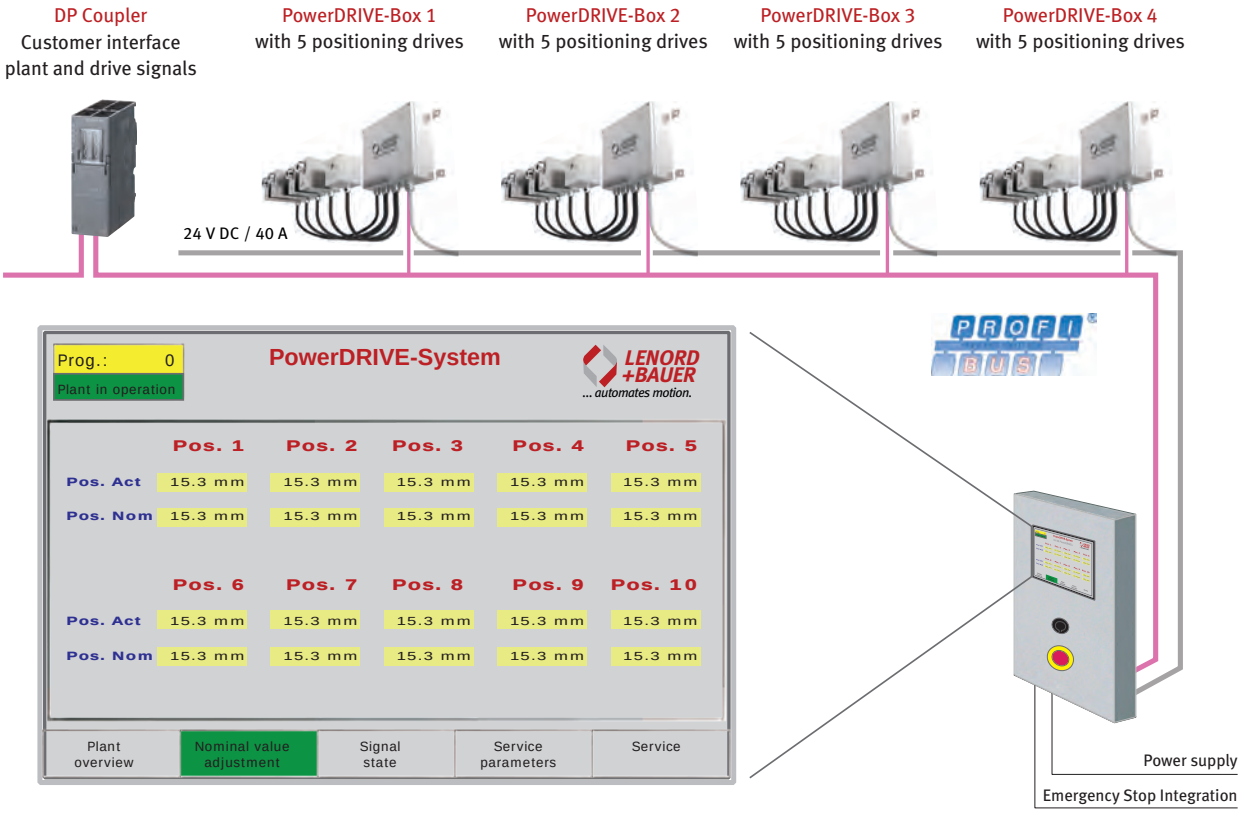
Fully automatic format adjustment makes an existing packaging line more efficient.

The level of automation plays a key role in the productivity and quality of a plant or machine. The replacement of obsolete components, the inclusion of the latest technology as well as the upgrading of the automation technology result in a higher level of automation and greater efficiency. As a rule, productivity and product quality are increased by the modernisation.

With the PowerDRIVE-System, Lenord + Bauer makes it possible to modernise a complex plant with a large number of positioning units. By using several PowerDRIVE-Boxes the number of active bus users is kept low. Particularly in the case of an upgrade, this aspect is an essential point. Not every plant control system can manage an infinite number of bus addresses.

As a rule, the switch cabinet must also be modified or extended during extensive modernisation work. Or the program for the plant control system must be expanded. Only by means of the optimal interaction between the hardware used and the specific application software can ideal results be achieved in the production process.

Lenord + Bauer offers a complete package for this process. The package ranges from engineering, through switch cabinet manufacture, commissioning, to the start of production.



Hardware and software upgrades to a packaging plant with touchpanel data display including recipe management, mounted in the switch cabinet to suit the specific customer.

An existing plant can be reliably and safely updated easily and without tying up in-house resources.

- Autonomous automation solution e.g. in a separate switch cabinet
- Parallel operation with easy-to-use touchpanel
- Coupling of the system to the plant control system, e.g., possible via DP coupler
- Recipe management for several thousand different formats
- Easy modification of existing recipes including data backup
- Integration into existing safety concepts

Everything from a single-source from engineering to commissioning

Our services reduce the load on your planning and design department.

As is generally known, many roads lead to Rome. However, only a few are equally efficient, economical and practical. The same also applies to the development of automation solutions. Every automation solution starts with an assessment of the current situation and advice.

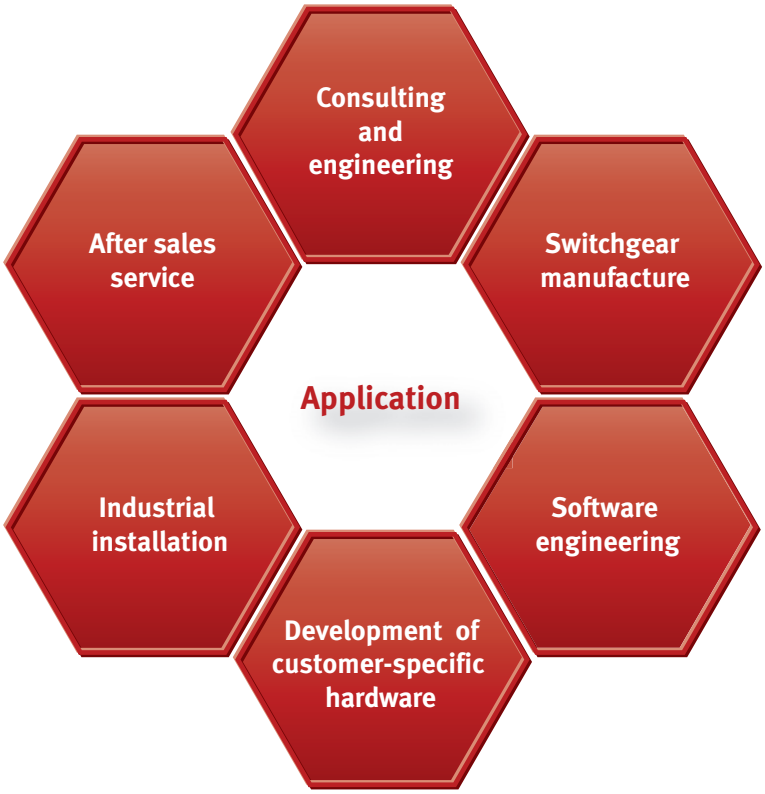
We optimise plants taking into account all relevant aspects such as efficiency, availability and reliability. Together with TAR Automation GmbH, also a company in the LENORD + BAUER corporate group, we are available to assist you from planning and configuration, through implementation and monitoring of the measures, to acceptance.

Of course, we also accompany you at the start of production and continue to provide practical help until the plant is running optimally.

In the case of new installations we would be pleased to supply you with turn-key switchgear. Here our range of services covers the areas of planning, engineering, programming, manufacture, installation, training, service and maintenance.

Reduce the load on your planning and engineering department and save valuable resources.

An overview of our services



From the electrical design to the complete switch cabinet

We would be pleased to undertake the integration of the complete system in the existing plant. If required we plan, design and manufacture your switch cabinet based on all common standards.

A function test as well as the pre-adjustment of all components prior to delivery are just as much a matter of course as quality control.

If required, we can also undertake installation and commissioning on site.

- Planning, design and manufacture of customer-specific switch cabinets
- Installation and electrical commissioning on site
- Complete circuit diagram documentation
- Customer-specific standards and works regulations taken into account

Modern control systems with meaningful data display

The interface between the PowerDRIVE-System and the complete plant is the software application. Here we utilise bus systems such as PROFIBUS-DP, ProfiNET, EtherNet/IP or CANopen depending on the requirements. We connect the system to any plant control system and use control system components from renowned manufacturers, for instance Siemens, Phoenix Contact, Rockwell Automation or Wago.

Easy, logical usage is a prerequisite for smooth operation. We prepare you a clearly understandable, meaningful data display. Depending on customer requirements, all production data is documented and prepared for further processing or checking. In this way our automation solutions ensure your plant or machine is operated correctly.

- Integration via standard PLC programming (e.g. Siemens STEP 7)
- PC-based system programming (CODESYS)
- User-friendly data display (Prepared using WinCC or Galileo)
- Plant programming in high-level languages such as C++ or Visual Basic
- Motion Control / CNC system
- Modern image processing systems for quality assurance

Software function blocks
Efficient integration in the control system

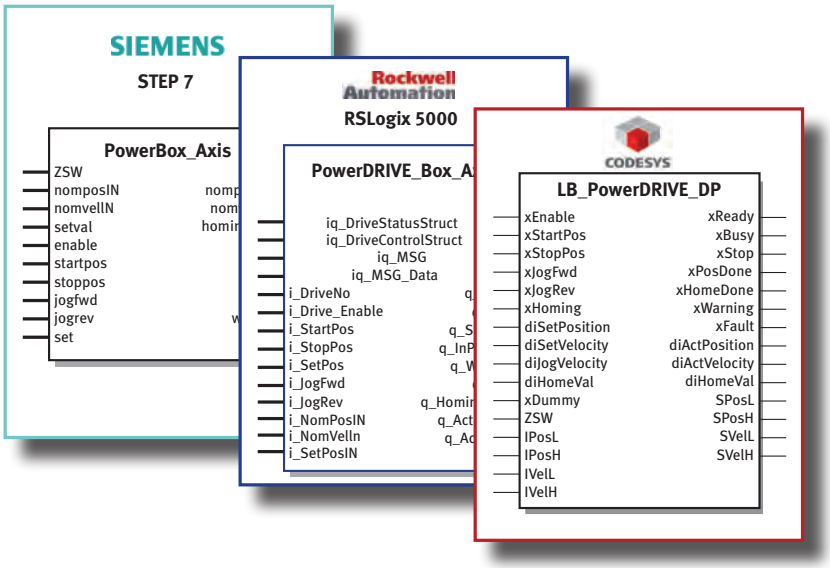
Pre-defined templates and software modules minimise the engineering effort and reduce the commissioning costs.

Time is money, particularly in the software, testing and commissioning area. We support you with pre-defined software function blocks for CODESYS, STEP7® and RSLogix software, the integration of the PowerDRIVE-System in existing applications.

Function blocks for the direct coupling of the PowerDRIVEs via CANopen or PROFIBUS-DP to the higher level control system are available to the user. The function blocks are simply instanced to suit the number of PowerDRIVEs in the application.

Lenord + Bauer also offers, free of charge, function blocks and templates for the integration of the PowerDRIVE-Box in the control system concept. These are matched to the plug-in module's bus system and provide the communication with the plant control system.

As such the function blocks significantly ease the integration of the PowerDRIVE-System into the plant control system and save time and money during software engineering and during commissioning.



Function blocks already exist for these control systems

Manufacturer	Control system	Bus system	Programming system
Siemens	S7 300/400	PROFIBUS-DP and ProfiNET I/O	STEP 7
ELAU / Schneider	C200/400/600	PROFIBUS-DP	CODESYS V2.3
	PacDRIVE3	PROFIBUS-DP	CODESYS V3.1
	PacDRIVE3	sercosIII	CODESYS V3.1
Eaton	V1xx	CANopen	CODESYS V2.3
Janz	eMPC	CANopen	CODESYS V2.3
AMK	A5	EtherCAT	CODESYS V2.3
Lenze	Lenze (3200C)	EtherCAT	CODESYS V3.0
Rockwell	CompactLogix	Ethernet IP	RSLogix 5000

Comprehensive service
For high availability

Our range of services goes beyond commissioning.

The availability of a machine or plant must be ensured around the clock. Here the minimisation of set-up times by means of technical upgrades and modification is only one aspect. With our products and services we help you to minimise your plant or machine's downtimes and to increase your productivity. As we do not leave you as the operating company on your own with the new technology. Upon request we offer additional services.

- Technical support during commissioning and production startup
- Product and software training for your staff on site
- Quick, uncomplicated assistance by means of remote maintenance and remote diagnostics
- Support during the correct execution of electrical servicing and maintenance tasks

Your contacts at Lenord + Bauer

For new developments and/or further developments you will find the right contact for your projects in Lenord + Bauer. We offer you our know-how and our support.

PowerDRIVE-System support +49 208 9963 - 215

Do you have technical questions about our PowerDRIVE-System or do you need help with commissioning? Our competent support staff in the office will be happy to offer you advice and practical help.

support-powerdrive-system@lenord.de

Customer Service Center +49 208 9963 - 216

You need the products urgently, or have questions on delivery conditions, repairs or status of a current order? Our Customer Service Center will be happy to assist you with commercial queries!

kundencenter@lenord.de

Call center +49 208 9963 - 0

Are you looking for a competent contact person or the relevant employee for your topic in our company? Our call center will be happy to assist you!

info@lenord.de

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... automates motion.

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