



ESR Pollmeier GmbH
www.esr-pollmeier.de

Servo Drive Technology



Products · Solutions · Services

ESR. The Dynamic Solution



Servo Drive Technology by ESR Pollmeier

Drive Systems and Components

"The complete drive system from a single source" – this is an accurate summary of ESR's corporate philosophy. This encompasses core products such as

- servo drives, digital or analog
- positioning and technology functions
- fieldbus interfaces and function blocks for integration in automation systems
- software for commissioning, diagnostics, and easy programming

supplemented by

- servo motors, complete with encoder systems, if required with gear boxes and/or brakes
- torque motors and special motors
- linear drives and linear motors
- operator terminals and controllers
- multi-axis servo systems
- accessories for assembly and cabling.

All parts of an ESR drive package are matched and have been tested as combinations. This guarantees

- smooth installation,
- reliable operation, and
- definite system responsibility on the part of one single supplier.

The "complete drive system from a single source" also includes a comprehensive service system. With our long-standing experience, we offer competent pre- and after-sales support, from drive system configuration and commissioning services to repair and shipping of spare parts throughout the entire machine life. For further information on this please see page 11.

The Specialist for Servo Drives and Servo Systems

More than 100,000 ESR drive systems are in successful operation around the world and substantiate the company's claim to offer optimum products and services.



Ernst E. Pollmeier
1929–2017



Stefan Pollmeier

We develop our products in close cooperation with manufacturers of higher-level controllers, servo motors, and position sensors. Open interfaces and the comprehensive know-how in this field are of benefit to the customers: Servo drives by ESR can be used in a flexible way and are easy to integrate into common automation systems.

If desired, we provide together with our partners complete solutions ready for installation that are made-to-measure for the requirements in the machine. For special applications, customer-specific adaptations are possible – even with a "lot size of 1".

Development – Production – Sales

Development, production, and sales are concentrated in one location and bundle up a comprehensive expertise in various areas.

Hardware R&D covers digital and analog technology, power electronics, and unit design. Our software engineers develop firmware for the servo drives as well as software for higher-level controllers and PCs from function blocks to user interface.

Assembly and test of every individual device – including endurance testing under load – are performed entirely in-house at ESR. Thus, short delivery periods and high product reliability can be guaranteed.

Sales and application departments are ready to answer questions on every aspect of servo drive technology. Special requirements can be backed by computer simulations or measurements at the drive test stand.

Applications

Both machinery manufacturers and end users building machines for use in their own companies use servo drive systems by ESR, e. g. in the following fields

- handling and assembly systems
- electronics production machinery
- semiconductor production machinery
- measuring and testing machinery, test stands
- machine tools and metal working machinery
- packaging machinery
- textile machinery
- plastics processing machines
- coiling machines
- and many more

Besides that, system integrators, motor manufacturers, and controller manufacturers also use our products to complement their scope of delivery.

Single-Axis and Multi-Axis Servo Systems

Due to their high dynamics, high accuracy, wide speed range, and good control behavior, ESR servo drives are particularly suitable for positioning applications and coordinated movement of multiple axes (motion control).

Stand-alone Applications without Higher-level Controller

Point-to-point positioning, based on the digital servo drives

- with integrated positioning control
- matching operator terminals, connection via Industrial Ethernet or fieldbus interface
- very reasonable solution
- on request as complete solution made-to-measure for your application

Made-to-Measure Drive Packages – and More

As an independent specialist for servo drive technology, we have access to the broad range of complementary products available on the market, and we supplement our range of products with partners from the electro-mechanical field. With this, we put together drive packages that perfectly match your application, build complete solutions ready for installation according to your wishes, and provide for a smooth drive integration.

Automation Systems with Higher-level Controllers (CNC/PLC/IPC)

Point-to-point positioning, based on the digital servo drives

- modular design with standard components
- servo drive-integrated positioning control relieves the controller
- highest flexibility and dynamics due to multi-tasking operation and minimum reaction times
- easy integration with function blocks following PLCopen specification and IEC 61131-3
- different predefined motion profiles, e. g. for jerk-free movements or path optimization

Coordinated movement of multiple axes (motion control)

- with the digital servo drives in interpolated position mode or three cyclic-synchronous operating modes
- with all servo drives via setpoint assignment using the ± 10 V interface
- with multi-axis servo systems
- real-time communication for synchronous, cyclic setpoint assignment to numerous axes
- low jitter, leading to minimum following error
- on request with programming according to your specifications

Digital Servo Drives

ESR's digital servo drives can be used in many different ways. They are suitable for automation systems with fieldbus networks as well as single-axis applications with operator terminal



Servo Drives New Generation for AC servo motors and direct drives (torque motors, linear motors)

- direct mains connection to 230 V~ or 3×400/480 V~ (wide-range inputs)
- nine power levels in three sizes with rated continuous current from 0.8 to 32 A
- matching servo motors with up to 160 Nm peak torque, torque motors up to 1600 Nm, linear motors up to 6 kN peak force
- rapid acceleration, deceleration, and reversing of the motor by momentary current increase to double or three times the rated current
- complete with integrated safety technology, internal shunt circuit, and resistor
- position control loop and numerous technology functions integrated in the servo drive
- for various position sensor types such as resolvers, incremental encoders, single-turn or multi-turn absolute encoders
- Industrial Ethernet or fieldbus interfaces for connection to higher-level controllers, personal computers, or operator terminals and for integration into automation systems

Further characteristics:

- high dynamics and control quality due to digital control of current and velocity (controller cycle time 62.5 μs)
- operating modes in command mode or program mode: torque mode, velocity mode, profile position mode, and more
- setting setpoints via Ethernet or fieldbus interface, USB, serial interface RS232, RS422, or RS485, analog input, or internal positioning control
- 8 digital inputs, 4 digital outputs, freely programmable, expandable via fieldbus
- on request with integrated positioning control with 500 program command blocks
- comfortable commissioning and diagnostics using a PC with "SPP Windows" software
- software libraries and function blocks for development of customized application programs and integration into automation systems
- clear and easy wiring, pluggable
- design conforms to EMC requirements through integrated line filters
- switching frequency 8 or 16 kHz for optimum dynamic characteristics and small motor power loss

More information, data sheet, CAD data:
www.esr-pollmeier.de/pr19-e4



EtherCAT

CANopen

PROFI
NET

Modbus

PROFI
BUS

CAN

Ethernet TCP/IP + UDP

Our software makes parameterization, commissioning, and diagnostics of the digital ESR servo drives easy and assists you in writing your own application programs and integrating the drives into automation systems.

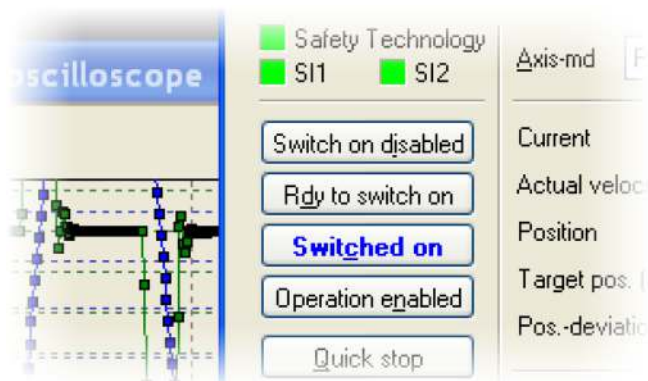
More information and data sheet:
www.esr-pollmeier.de/pr19-e5



SPP Windows

Command and Commissioning Software

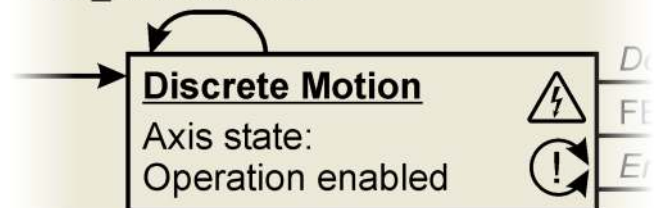
- easy operation and commissioning of the digital servo drives using a PC
- bilingual English/German (switchable), other languages on request
- controlling the drives in nearly all operating modes for commissioning purposes
- oscilloscope functions for comfortable controller parameter setup
- for entering and editing machine data and part programs
- data archives and documentation functions
- export functions supporting controllers of various manufacturers
- one software for all device families and all variants
- connection to the servo drive via USB, serial interface, fieldbus, and DriveServer (OPC)
- also available as "SPP Windows light" for free with reduced scope of functions



Function Blocks

- for easy integration of ESR servo drives systems into automation systems
- for Siemens Simatic S7 and many controllers according to IEC 61131-3 with CoDeSys or PC Worx / Multiprog programming systems (3S, Phoenix Contact Software, KW)
- following PLCopen specification "Function Blocks for Motion Control" (IEC 61131-3 based)
- controller-induced servo drive parameterization (e. g. after switch-on)
- initiating motion (positioning, homing, velocity control, ...), input/output of binary signals, etc.
- example programs as starting point for developing customized programs

ESR_MoveAbsolute
ESR_MoveRelative
ESR_MoveAdditive



2 Homing

Drivers and DLL Libraries

- for developing customized application programs under Windows
- modules for various programming languages included (C++, C#, Visual Basic, Python, Pascal, Labview; further on request)
- Windows-DLL libraries for accessing the functions of the digital servo drives
- interface drivers for USB, serial interface, fieldbus, TCP/IP (e. g. Ethernet), and DriveServer (OPC)
- example programs as starting point for developing customized programs

Analog Servo Drives

Analog servo drives by ESR are particularly suited for multi-axis applications with higher-level controller (CNC). They can be used as drives with speed or torque control and offer high power at small dimensions.



TrioDrive A and MidiDrive A Servo Drives for AC Servo Motors

- direct mains connection to 230 V \sim or 3 \times 400/480 V \sim (wide-range inputs)
- eight power levels in three sizes with rated continuous current from 2 to 20 A
- matching servo motors with up to 60 Nm peak torque
- numerous additional functions
- smooth running even at low speed because of sinusoidal commutation
- encoder emulation with selectable pulse numbers (50 to 1024 pulses per revolution)
- load and speed monitoring with current and speed monitor outputs
- switching frequency selectable 16 kHz / 8 kHz
- no re-adjustment necessary when replacing the servo drive thanks to plug-in customer module
- 24 V DC control supply voltage fed externally to retain position information in an emergency stop
- easy error diagnosis with LEDs
- frequent switching off and on possible

UnoDrive Servo Drives for DC Servo Motors

- 24 V to 125 V supply voltage
- rated current 6 to 12 A, matching DC servo motors in the torque range 0.3 to 5.5 Nm
- suitable for motors with or without tachometer due to tacho and I \times R control
- especially suited for measuring machinery, grinding and die sinking machinery due to smooth running
- no noise due to switching frequency well above audible range
- available as compact device or as 19" plug-in module

Common Characteristics of the Analog Servo Drives:

- rapid acceleration, deceleration, and reversing by momentary current increase
- safe operation due to various protection and monitoring circuits
- design conforms to EMC requirements
- convenient and easy commissioning
- easily adapted to non-standard applications with plug-in option modules

More information, data sheets, CAD data:
www.esr-pollmeier.de/pr19-e6



Servo Motors and Gear Boxes

ESR servo motors provide high dynamics, wide speed control range, and a very compact design. Common characteristics are:

- high power density due to permanent magnets
- rotor dynamically balanced
- holding brake optional
- bearing plates and housings made of high-quality light metal alloy
- design with flange, installation position as required
- ball bearings with grease filling for 20,000 operating hours

AC Servo Motors MR 6 and MR 7

- rated speed typically up to 6,000 r.p.m. (higher speeds possible, e. g. 15,000 r.p.m.)
- rated torque 0.05 to 70 Nm, peak torque up to 160 Nm
- shaft power 0.04 to 16 kW
- integrated resolver for sinusoidal commutation
- optional incremental encoders, single- or multi-turn absolute encoders with different resolutions and precision
- maintenance-free, since brushless
- easy connection of motor and position sensor using connectors
- also available as short motors
- degree of protection IP 40, IP 54, or IP 65, depending on the motor series
- self-cooling, optional water-cooling
- insulation withstanding tropical conditions
- standard shaft end without groove, special version possible, e. g. with keyway
- special motors, e. g. motors with high-grade steel flange and shaft, for example for food industries, or motors with hollow-shaft design
- short delivery period



DC Servo Motors MB 2 and MB 3

- rated speed 2,300 to 4,800 r.p.m., max. speed up to 9,000 r.p.m.
- rated torque 0.05 to 4.9 Nm, stall torque 0.06 to 5.3 Nm, higher torques possible
- shaft power up to 1.5 kW, more on request
- very smooth running
- optional with tachogenerator and/or incremental encoder
- long brush life
- degree of protection IP 40 to 54 (IP 55 option)
- radiation-proof design optional

For replacement needs, DC servo motors of other manufacturers are available on request e. g. by

- Bautz/ElectroCraft (E series)
- Parvex (RS, RX, AXEM)

or other compatible motors.

Motor-Gear Combinations:

For adapting the motor (speed, torque, and moment of inertia) to the machine, we build motor-gear combinations from our extensive range of gear boxes, e. g. planetary gear boxes (low backlash, one-stage or more stages, gear ratio 1 : 3 to 1 : 512) or angular gear boxes (worm gears or bevel gears with low backlash, gear ratio 1 : 4 to 1 : 270) with solid or hollow shafts. Gear boxes for servo applications have low torsional backlash and high torsional rigidity (stiffness).

More information, data sheets, CAD data:
www.esr-pollmeier.de/pr19-e7



Torque and Special Motors

Torque Motors MH

In applications where particular high torques are needed at rather low speeds, direct drive rotary motors are used in an increasing number of machines. These so-called torque motors offer high precision and dynamics. With spacious hollow shafts, many variants offer a lot of space for cable bushing etc. Indexing tables and test stands are typical fields of application.

- rotary direct drives, complete with housing and bearing
- high torques for quick acceleration and deceleration
- particular high dynamics due to direct torque transmission
- highest precision with high-resolution optical encoders
- high number of poles, therefore high torque at low currents
- rated torques up to 600 Nm, peak torques up to 1,200 Nm and more
- rigid (stiff) drive without elasticity and backlash
- compact design



More information, data sheets, CAD data:
www.esr-pollmeier.de/pr19-e8



- design with hollow shaft, full shaft, or loose flange
- degree of protection IP 40, IP 54, or IP 65, depending on the motor series
- maintenance-free
- with holding brake as an option

Special Motors and Customer-Specific Motors

On request, we also offer special motors or customer-specific motors, for example:

- particularly slim motors with low moment of inertia
- compact motor-gear combinations with extra high torsional rigidity (stiffness), with angular or planetary gears
- motors with hollow shafts or extended shaft end
- motors in high-grade steel design
- motors with water cooling
- customer-specific motors, e. g. with special winding

Linear Drives and Motors

In general, two approaches exist to realize linear movements: linear drives, in which the rotation of a servo motor is mechanically transformed into a linear movement, and linear motors that directly generate linear movements.

Linear Drives

Based upon our servo motors, we offer complete linear axis modules, e. g. toothed-belt, ball-screw, or rack and pinion drives.

Ball-Screw Drives

- for smaller distances, typically up to 1 m
- high accuracy (up to $\pm 10 \mu\text{m}$ possible with ball screws)
- forces up to 12 kN possible
- for applications with lower velocities (up to 2.5 m/s possible, depending on lead screw pitch)
- also available as compact linear actuators, e. g. as a replacement for hydraulic systems

Linear Motors (Linear Direct Drives)

Linear motors combine the advantages of the different linear drive systems: high dynamics, high speed, and high precision.

- uniform force
- compact size
- low weight
- iron-core design for medium to large masses and distances, up to 12 m/s and more than 6 kN peak force
- iron-less design for small to medium masses and distances, up to 18 m/s and 2 kN peak force, no attractive forces
- smooth running with low cogging using iron-core motors; no cogging with iron-less motors
- motor length as required due to secondary part (magnetic plate) consisting of elements



Toothed-Belt Drives

- for distances from several centimeters to meters
- high positioning speed (up to 10 m/s)
- forces up to 5 kN possible
- for applications with medium accuracy demands (up to $\pm 50 \mu\text{m}$)



- low power dissipation, water cooling possible depending on the motor series
- other designs available, such as compact linear motor actuators, e. g. as a replacement for pneumatic systems

More information, data sheets, CAD data:
www.esr-pollmeier.de/pr19-e9



Small Voltage Drives

For low-power applications, we provide solutions based on small voltage drives.

- compact four quadrant controllers
- available for AC servo, DC and BLDC motors as well as stepper motors or linear motors
- supply voltage 12 to 48 V
- rated currents up to 2 A, peak up to 5 A, higher currents in preparation
- available with CANopen®, Profibus DP, EtherCAT, or Modbus interface
- optionally with freely programmable positioning controller

Accessories

With our extensive accessories we supply the complete servo drive from a single source – for easy installation, easy wiring, and easy commissioning. We supply

Cables and Connectors

- motor supply cables and resolver/encoder connection cables
- connectors and connector sets
- complete cable sets, ready-assembled
- connection cables for fieldbus etc.

Electrical Accessories

(if not already built-in), for example

- external shunt resistors
- line chokes and motor chokes

For Complete Solutions Also:

- controllers
- operator terminals
- I/O terminals
- further accessories according to customer requests

ESR in the Internet

Further information on our products, as well as on the ESR company, the support, and much more is available at

www.esr-pollmeier.de



in the internet. You can find there up-to-date

- new products
- latest news
- our presence at fairs and exhibitions
- electronic data sheets
- 3D CAD data of servo motors
- operating instructions for customers
- software for direct download
- your direct contact persons at ESR
- our sales partners abroad
- and much more

Using our online contact form, you can reach us in a convenient way at any time.

Solutions and Services

ESR offers competent pre-sales and after-sales support, from drive system configuration to servicing throughout the entire machine life.

Drive System Configuration

A professional drive system configuration is the first and most important step to an energy-efficient drive system. For each axis, we determine the best motor, if required with gear box, and the corresponding servo drive.

Customer-Specific Adaptations

If the drive system off the shelf is not suitable for your application, we will make you a suitable one – even with a “lot size of 1”.

Software Solutions

Using the integrated positioning control of the digital servo drives, a higher-level controller is not needed for many applications with point-to-point positioning. If required, we will create programs adjusted to your application.

Our function blocks and DLL libraries will assist you in the integration of the drive systems in your automation system. If desired, we will carry out the programming for you. For special applications, customer-specific adaptations are possible.

Complete Solutions

With our servo drives and multi-axis systems as well as servo motors or direct drives, we will build your drive system solution to your specifications. Depending on the requirements, additionally needed mechanical equipment (e. g. guidances and bearings), operating terminals, or controllers programmed to your specifications can be supplied as well as control cabinets and the complete wiring to the first commissioning on site or at your customer.

Assistance in Drive System Integration

We will assist you during each product phase of your machine and ensure that drive system and controller understand each other. If desired, we

Made-to-Measure Solutions

ESR servo drive systems are suitable for many applications. Especially the digital servo drives and our multi-axis servo systems with

- their operating modes and technology functions,
- the integrated positioning control, and
- the versatile communication interfaces

offer a great potential for intelligent drive system solutions. Thus, we are able to offer perfectly matching drive system packages according to your wishes, to create the software for your application, or to offer a complete solution ready for installation which meets the requirements in your machine perfectly.

Support

Important for you as our customer: our after-sales support. We are at your service and assist you in integrating the drive system into the machine and to commission it. For repairs, we are your reliable and competent partner.

will consult you in selecting the communication interface and provide the optimal drive system integration.

Technical Support

When questions arise during commissioning, operation, or in case of a fault, we will be glad to answer them – just give us a call or send us an e-mail.

Commissioning Services

If desired, we will support you during the commissioning on site or by remote maintenance, matched to your individual drive requirements.

Repair and Spare Parts Service Throughout the Entire Machine Life

Today, ESR is still capable of repairing devices which were delivered in the 1970's. In addition to overnight shipping of spare parts, we offer servicing on site in very urgent cases and immediate repair of parts brought in by the customer.



Products, Solutions, and Services

ESR provides the complete servo drive system from a single source. This encompasses core products such as

- **servo drives** for single-axis and multi-axis applications, for direct mains connection to 230 V~ or 3 × 400/480 V~ (wide range inputs), rated continuous current from 0.8 to 32 A (up to 64 A peak)
- **positioning and technology functions**, servo drive-integrated
- **Industrial Ethernet** and **fieldbus interfaces** as well as **function blocks** for integration into automation systems
- **software** for commissioning, diagnostics, and simple programming

supplemented by

- **servo motors**, if required with brake, peak torque from 0.8 to 160 Nm, speed and torque adaptable via gear boxes
- **torque motors** up to 1,200 Nm peak torque
- **linear motors** up to 6,000 N peak force
- **multi-axis servo systems**
- **accessories** for assembly and cabling

All parts of an ESR drive system package are matched and have been tested as combinations. This guarantees smooth installation, reliable operation, and definite system responsibility on the part of one single supplier.

Our services:

- drive system configuration in cooperation with users
- customer-specific adaptations
- assistance in drive system integration into controller systems
- commissioning services
- servicing throughout the entire machine life

Based upon our experience we offer made-to-measure solutions for your application if desired:

- software solutions, e. g. based on the integrated positioning control
- complete solutions, e. g. consisting of servo motor, servo drive, and operator terminal

With open interfaces and our comprehensive know-how we ensure optimum drive integration.

handed over by:



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