

# 9300 Servo PLC

*Servo inverter with integrated PLC*



Drive-based automation – Intelligent and precise



**Lenze**

# 9300 Servo PLC | Powerful and freely programmable

Drive-based automation is becoming increasingly important in mechanical engineering. Modular machine concepts are the driving force behind this trend. They provide an efficient means of creating complex systems by combining ready-to-use machine modules.

Freely programmable, intelligent servo controllers are the key elements in implementing these concepts. For this purpose, Lenze has developed a servo controller with an integrated PLC. Combined with our expertly designed offer of additional hardware and software, this creates a complete automation system.

## 9300 Servo PLC

The 9300 Servo PLC is bound to impress with its high levels of flexibility and integration options. It is for this reason that a PLC has been integrated into the high-performance servo inverters in the 9300 range. It can be freely programmed in the IEC 61131-3 languages.

## 9300 Servo PLC technology

If you would like to be able to use pre-configured solutions in complex drive tasks, choose the variants of the 9300 Servo PLC. The “Winder”, “Positioner” and “Cam” software packages will provide you with tailor-made library functions, ready-to-use solutions and application examples for individual drive tasks.



“Winder”, “Positioner” and “Cam” software packages

The 9300 Servo PLC is a variant of the proven 9300 servo inverter range with drive rated powers of 0.37 ... 75 kW. A signal processor developed specifically for servo drives is responsible for the precision control of synchronous and asynchronous motors, thereby ensuring precise, fast and dynamic motion sequences. Resolvers, incremental encoders, SinCos encoders or absolute value encoders can be used as feedback systems for speed and position feedback.

Communication with higher-level controls takes place either directly via digital and analog interfaces or via any

current fieldbus, in which case communication modules simply need to be plugged into the front panel of the devices.

Lenze provides a system bus based on CANopen as standard for internetworking the controllers. This open device interface also provides the basis for synchronising internal program sequences if required - a precondition if a number of axes are to be co-ordinated in motion control applications.

Device types	9321	9322	9323	9324	9325	9326	9327	9328	9329	9330	9331	9332
Rated motor power [kW]	0.37	0.75	1.5	3.0	5.5	11.0	15.0	22.0	30.0	45.0	55.0	75.0
Rated output current [A] 8 kHz switching frequency	1.5	2.5	3.9	7.0	13.0	23.5	32.0	47.0	59.0	89.0	110.0	145.0
Max. output current [A] 8 kHz switching frequency	2.3	3.8	5.9	10.5	19.5	35.3	48.0	70.5	88.5	133.5	165.0	217.5
Output power [kVA]	1.0	1.7	2.7	4.8	9.0	16.3	22.2	32.6	40.9	61.6	76.2	100.5
Mains voltage [V]	320 ... 528 ± 0 %; 45 ... 65 Hz ± 0 %											
Dimensions (H x W x D) [mm]	350 x 78 x 250	350 x 97 x 250	350 x 135 x 250	350 x 350 x 250	591 x 340 x 285	680 x 440 x 285						
Weight [kg]	3.5	5.0	7.5	12.5	36.5	59.0						

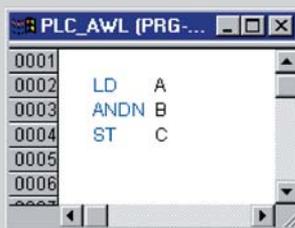
# Engineering | Quick and easy

The 9300 Servo PLC is programmed with a high-performance software development environment. Five different editors in the standardised IEC 61131-3 programming languages are available for this purpose. The programmer can therefore select the most suitable language according to the application or level of knowledge. The languages can even be mixed. In Debugging and Monitor modes, the values of all variables are displayed. Break points may be set in order to optimise the new program quickly and easily.

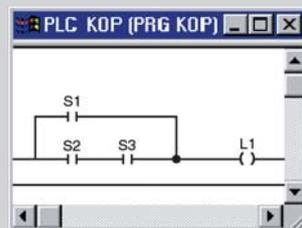
## CFC Editor

The high-performance CFC Editor is a graphic function block diagram editor in which program elements can be positioned freely on the viewport. For improved clarity, elements and blocks can also be combined to create macros.

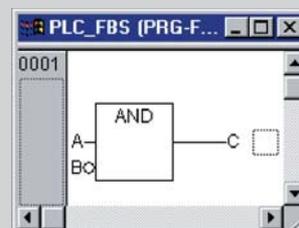
## Programming languages of the Drive PLC Developer Studio



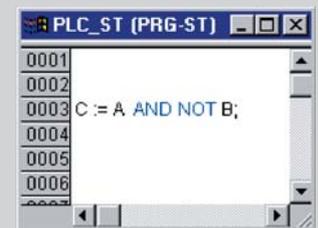
1 Instruction List



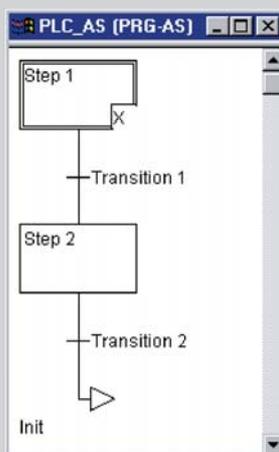
2 Ladder Diagram



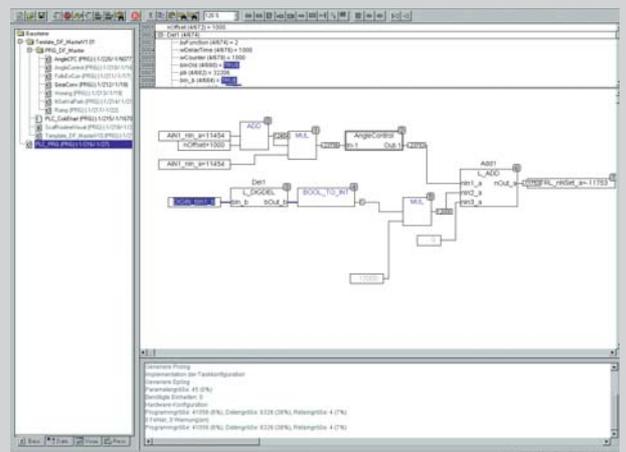
3 Function Block Diagram



4 Structured Text



5 Sequential Function Chart



CFC (Continuous Function Chart) Editor

The technology variant of the 9300 Servo PLC features a special option which enables library functions or ready-to-use solutions from software packages to be used. There are currently three software packages which can be added to the “Drive PLC Developer Studio”:

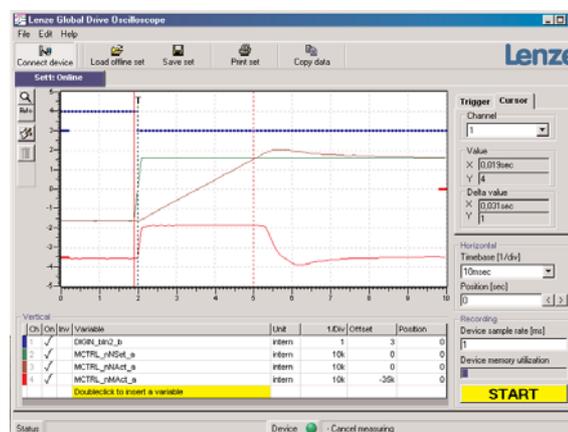
- ▶ “Positioner” software package
  - For point-to-point positioning drives
- ▶ “Cam” software package
  - For single-axis and multiple axis cam drives with individual motion profiles
- ▶ “Winder” software package
  - For winder drives with open-loop/closed-loop tension control or dancer position control

### 9300 Servo PLC system features

- ▶ 655 kB program memory
- ▶ 7 kB EEPROM parameter memory
- ▶ 11.2 kB RAM
- ▶ 192 B power fail-safe RAM
- ▶ 1 cyclical task
- ▶ 8 time or event-controlled tasks
- ▶ Min. task run time: 1 ms
- ▶ Bit operation processing time: 0.7  $\mu$ s

### Global Drive Oscilloscope

Lenze has designed the Global Drive Oscilloscope specifically for the 9300 Servo PLC. The software renders the connection or installation of expensive measuring instruments superfluous. The servo controller itself is the single measuring instrument for all measured quantities affecting the drive.



### The advantages this brings are obvious:

- ▶ Precise detection of drive-specific process factors with eight channels
- ▶ No need to install provisional measuring sensors in the system
- ▶ User-friendly documentation when fine-tuning control loops
- ▶ Easy to maintain and trouble shoot

The Global Drive Oscilloscope is supplied together with the Drive PLC Developer Studio.

# Positioning | Precision from point to point

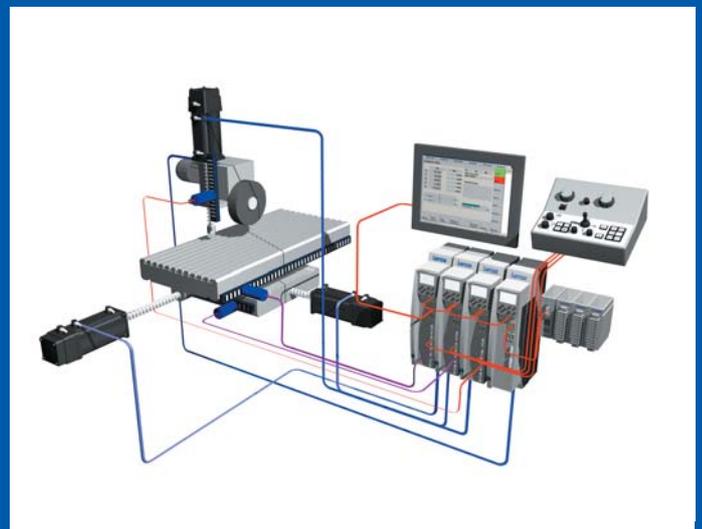
Materials handling, gantries, surface machining, rotary tables, robots or machine tools are all areas of application in which positioning drives are used. The motion control is stored in the controller itself and offers the advantage of high levels of flexibility as the motion sequences are freely programmable. Optimum travel profiles and jerk-free acceleration reduce energy consumption whilst protecting the mechanics at the same time.

## Features of the Positioner software package

- ▶ Up to 128 freely selectable travel profiles
- ▶ Travel profiles can be activated in any order
- ▶ Sequence control via IEC 61131-3
- ▶ Positioning with jerk limitation, speed override, final speed (changeover of velocity) and remaining distance (touch probe)
- ▶ Set sixteen homing modes or homing point
- ▶ Manual control for example for reading in positions (teach-in)



Palletizer



Surface grinding machine

# Cam drives | Smooth and dynamic

Contouring, filling, packaging, paper processing or cross cutting are examples of applications in which electronic cams are able to prove their capabilities.

Wherever intelligent servo drives are able to take over dynamic motion control, mechanical cams - which were expensive to set up - are becoming a thing of the past.

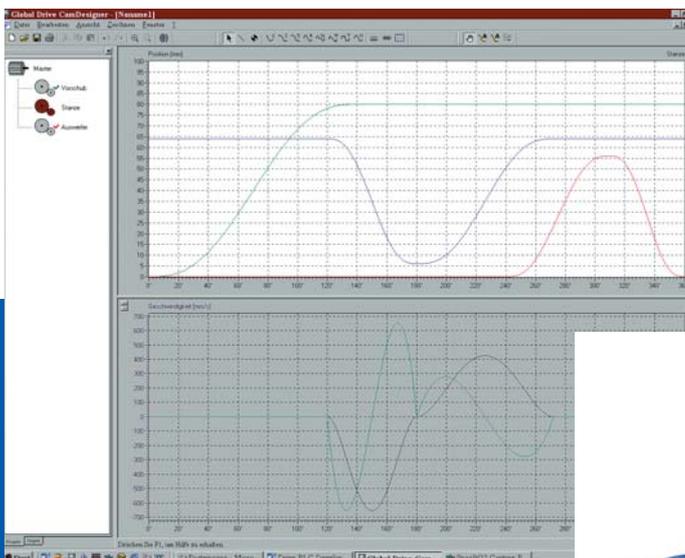
Advantages include high dynamics with optimum drive management, reduced wear due to soft starting and not least a significant reduction in set-up time. Products can be changed at the touch of a button, as different motion profiles can be set on the controller easily via the software.

The "CamDesigner" is an engineering tool which provides an easy-to-use means of creating motion profiles.

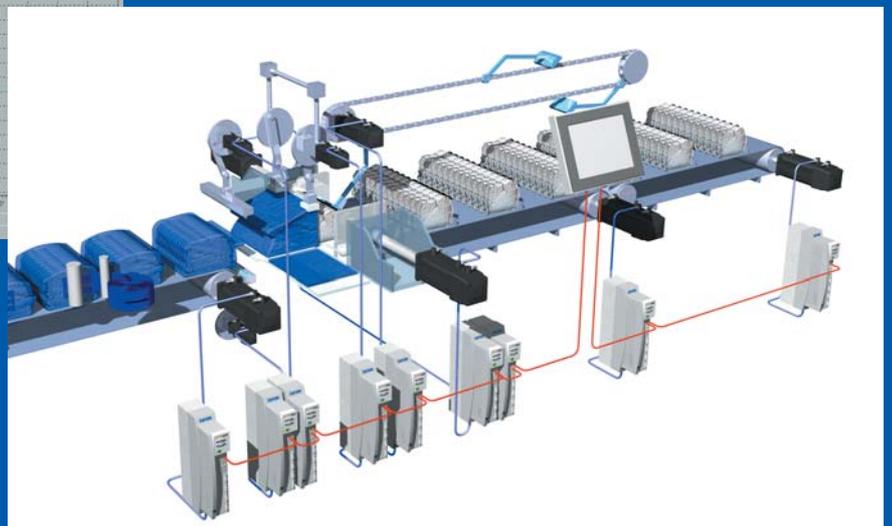
The program enables all motion profiles to be displayed and edited in parallel according to the motion diagram for all drives in the machine.

## Features of the Cam software package

- ▶ Up to 48 cams each with 290 interpolation points
- ▶ Speed and torque pilot control for high dynamics
- ▶ Cam group with three tracks for four cams each, maximum 48 data records
- ▶ Motion profiles can be activated in any order; sequence control via sequencer
- ▶ Online stretching, compression and shifting of the current profile
- ▶ Set fourteen homing modes or homing point
- ▶ Virtual master with inching mode or manual operation, handwheel, switching mode or automatic operation
- ▶ Virtual clutch with position override function



CamDesigner



Packaging machine

# Winding | Quick and easy

Winder drives are used in numerous production processes to wind up the material produced or forward it for further processing. Examples of such materials include cables, wires, textiles, paper, steel or thin films. In the past, an expensive control technique which was usually implemented in a higher-level PLC had to be used for this purpose. Now, intelligent controllers like Lenze's 9300 Servo PLC are able to take over these functions.

The drive-based solution relieves the load on the higher-level control and the bus systems. The integration of drive-based functions directly in the drive paves the way for removing components which were previously required in the control cabinet.

## Features of the Winder software package

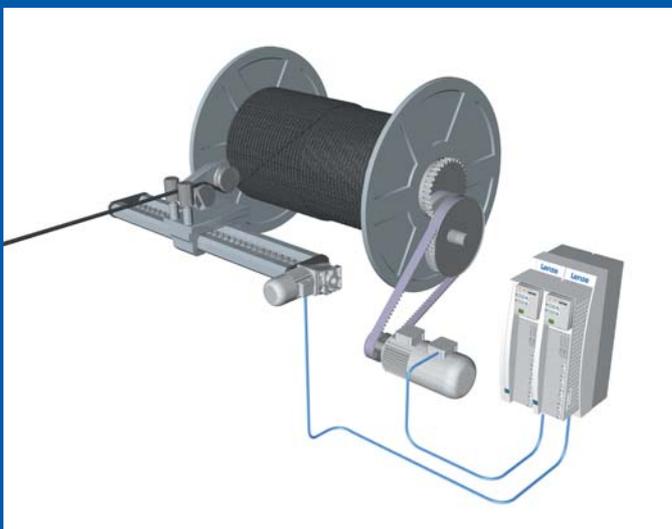
The software package offers solutions both for open-loop/closed-loop tension control and for dancer control winders.

### Open-loop/closed-loop tension control

- ▶ Internal diameter calculation
- ▶ Generation of tensile force via ramp generator
- ▶ Control of tensile force using characteristic curve function
- ▶ Automatic identification of the current moment of inertia and prevailing friction
- ▶ Compensation of acceleration torque and friction
- ▶ Calculation of material density with stop controller

### Dancer position control

- ▶ Internal diameter calculation with compensation of dancer motion
- ▶ Teach-in of dancer stop positions
- ▶ Tensile force control via characteristic curve function using dancing roller
- ▶ Automatic identification of the current moment of inertia
- ▶ Compensation of acceleration torque
- ▶ Calculation of material density with stop controller



Cable winder



Paper winder

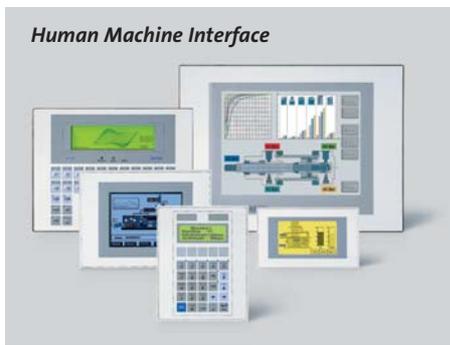
# Advantages | The PLC which is the ideal partner for the drive

Lenze can provide servo motors, operator and display units, I/O systems and software solutions to complement the servo controllers in the 9300 Servo PLC range, thereby creating the basis for the rational implementation of your machine electronics. For example, signals from actuators and sensors can be processed directly in the drive. This relieves the load on a higher-level PLC.

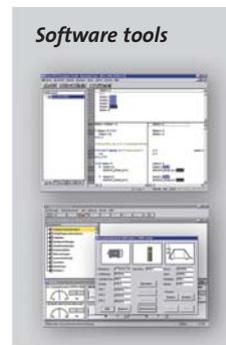
Tailor-made and tested software solutions are based on a high-performance device platform. Programming in the IEC 61131-3 standard languages maximises flexibility.

The programming options offered by the 9300 Servo PLC also mean that drive-based functions can be integrated into the controller. This removes the need for additional control components and even enables control functions to be executed completely without the need for a PLC.

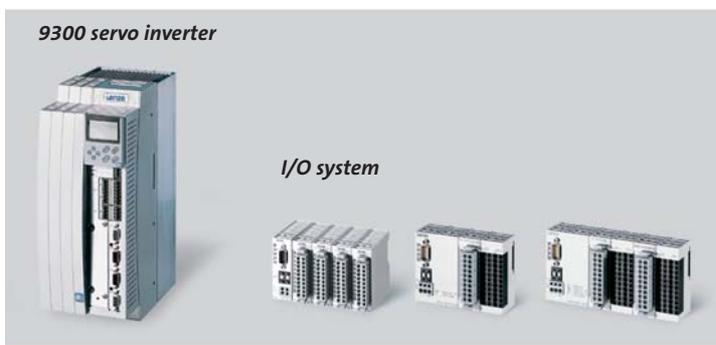
*Human Machine Interface*



*Software tools*



*9300 servo inverter*



*I/O system*

*Servo motors*



# Service | you can trust

For us, service is more than just supporting the use of our drives. The Lenze system approach begins with your enquiry. Next you get technical information and advice from a network of sales outlets staffed by knowledgeable engineers. If you want, we follow up with training, commissioning, maintenance and repair. Our service is always at your disposal.

## With passion

The Lenze team does not just offer the necessary manpower and technical know-how – we are passionate and meticulous about what we do. We will only be happy once you are entirely satisfied with our work. Our team of professionals provides assistance over the telephone or on site, ensures the express delivery of spare parts and carries out repairs with incredible urgency. We're fast and reliable.

## Someone to talk to

Expert advice is available for all your technical queries via our helpline. In cases of urgent need, call 008000 24 hours (008000 24 46877), Lenze's worldwide expert helpline – 24 hours a day, 365 days a year. For more direct assistance, you can of course contact your local Lenze service support centre. We can tell you where it is – or you can find out for yourself by visiting us on the Internet at [www.Lenze.com](http://www.Lenze.com).

## Around the world

Our products are available for speedy delivery worldwide. Lenze companies, Lenze factories and sales agencies are based in major industrial countries around the world. Contact them through our website [www.Lenze.com](http://www.Lenze.com), which also gives you 24-hour access to technical instructions and product manuals. Local support, on site if you need it, is available.

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Estonia  
Finland  
France

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Greece  
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