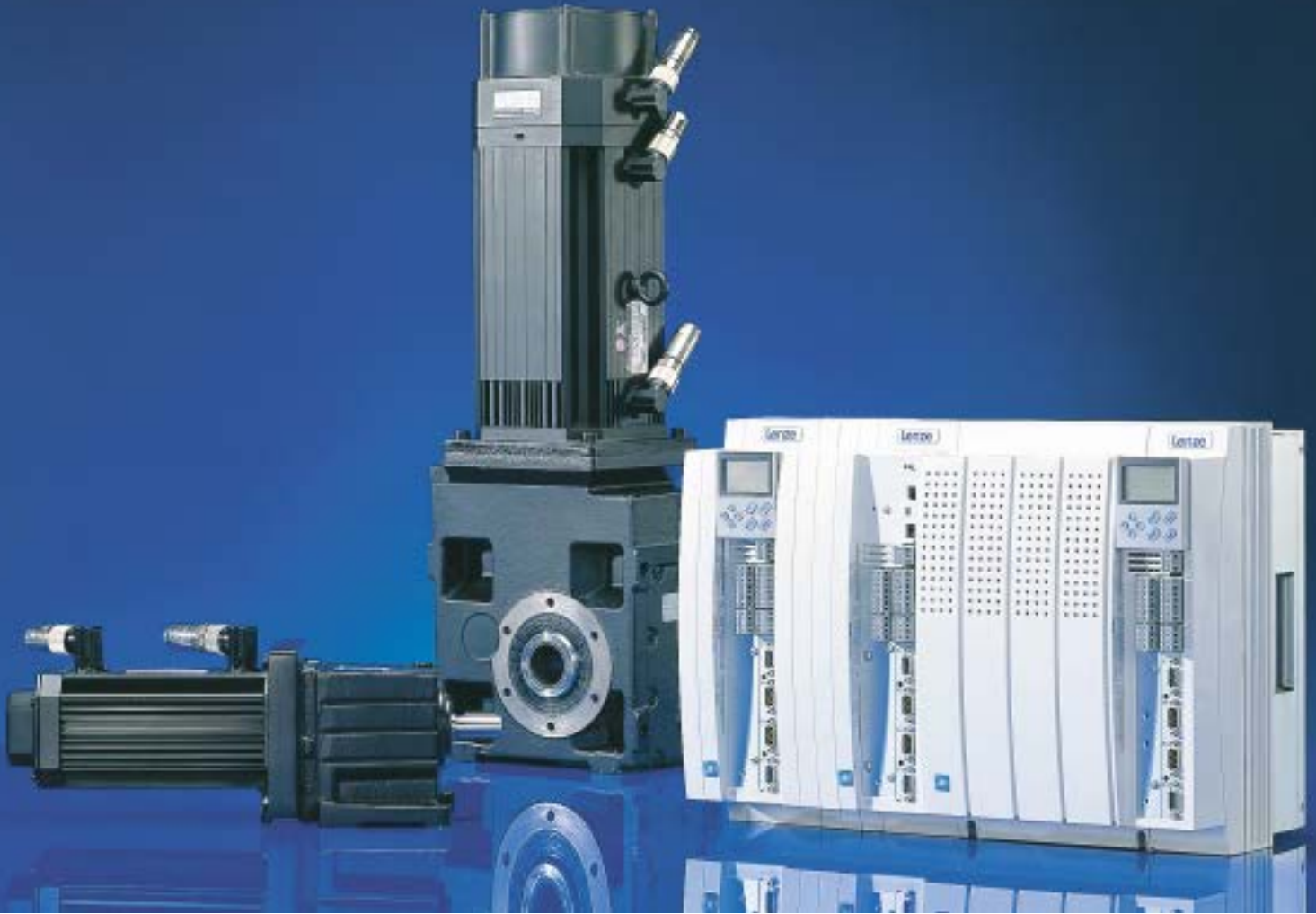


Lenze



Global Drive

9300 servo inverters

0.37 – 75 kW

Global Drive

9300 servo inverter – flexible and modern automation

High-performance 9300 servo inverters with a matching motor program form a perfect drive system. Market-oriented intelligence allow general technology functions (electrical shaft or positioning control) as well as electronic alternatives to mechanical components (register control, cam profiler). Thus, costly upgrades with control cams, pull rods, and also clutches are not necessary in the manufacturing process.

These intelligent drives coordinate – accurately and precisely – all different movements of the machines to one another. No matter whether the system is equipped with a central control station or is controlled locally - high flexibility is guaranteed.

This drive concept offers automation solutions based on a consistent platform. Attachable InterBus and PROFIBUS fieldbus modules are available for the connection to a host control system.

The hardware of the servo product series is uniformly equipped with the following features:

Universality – the product series is universally applicable in the power range from 0.37 to 75 kW.

Integrated mains input – for single drive operations only one element instead of two separated elements is required.

Regenerative power supplies – ensure energy-saving group applications and multi-axis applications.

Feedback systems – ensure a perfect adaptation to the machine requirements by means of resolvers or SinCos feedback.



Global Drive

Intelligent drives with 9300 servo inverters

- Ability to execute complete processes or subprocesses through integrated technology functions and control functionality
- Local control of subprocesses
- Intelligent drives

The solution:

Intelligent Global Drive systems by Lenze.

The drive technology “operating system”

The 9300 servo inverters of the Global Drive product series are based upon their drive technology features.

The “operating system” comprises the conventional tasks of speed control such as dynamic field-oriented speed control, torque control, and phase control. The usual requirements for the drive are high initial breakaway torque and smooth running at low speeds.

This poses no problems for Global Drive motors and geared motors, in conjunction with Global Drive controllers.

And there is more: 9300 servo inverters can also take over tasks – at the input side – for local operation, control, and monitoring as well as communication and parameter setting.

Technology functions

What does this mean?

For Lenze it means taking on all control functions a certain single process may require.

Our solution:

Global Drive controllers with integrated technology functions.

Utilising our experience and closeness to the customer we can provide an appropriate solution. Global Drive controllers offer ready-made software solutions that are tailored to the respective technology. All you have to do is select your technology and configure it with only a few variables for your system.

For example, you can directly select the autosyn for several drives and thus save costs for installation and commissioning. This also applies to other technologies such as cam profiler or register control.

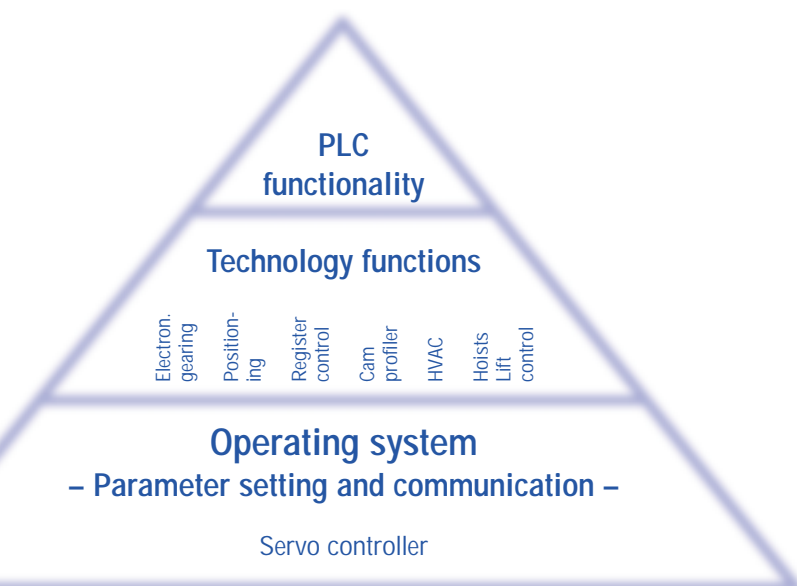
PLC functionality

The PLC functionality in Global Drive controllers allow freely usable control functions.

You can use it to

- adapt the drives to your special application or
- customise the technology functions for your special process.

The function blocks of the intelligent Global Drive 9300 servo inverters form a library of controller building blocks such as Boolean operators, arithmetic functions, comparators, flip-flops, as well as PID controllers, ramp-function generators (linear, S-shaped), etc. These functions provide easy and individual access to the control circuit of the 9300 servo inverter. In addition to the control of the system, the drive controller can be used to evaluate messages and reactions. Thereby responses can be effected directly at the process or via the host system.



Global Drive

Integrated technologies

The integrated technology function forms a vital part of the intelligent drive solution. The 9300 servo inverter series comprise four software variants in identical hardware devices:

- 9300 servo inverter
- 9300 register control
- 9300 cam profile generator
- 9300 positioning control

All four variants are equipped with a uniform user interface. The respective technology function can be set quickly and easily. In detail:

9300 servo inverter

This servo inverter implements frequently used functions of a servo drive. The electronic gearbox is an essential technology function in this device. As an alternative to the mechanical vertical shaft, several drives can be operated at exact synchronisation by master frequency preselection. Proportional synchronisation can be implemented easily and flexibly by means of adjustable gearing. Feedback systems such as resolvers or SinCos encoders provide highest precision.

9300 register control

There are many machines that are processing material lengths. Second printings, cuts, perforations, embossings, or splices require the material length to be positioned precisely to form the resulting print image. However, due to process-dependant fluctuations (material characteristics, production parameters) the position of the print image tends to drift. The basic prerequisite "autosyn" is added by the requirement for overlaid register alignment of the rotative motion at the print image. The register control already integrated in the servo inverter always re-aligns the angular position of draw-in rollers, printing cylinders, or other processing stations with the print image. Thus, second printings, cuts, perforations, embossings, or splices will always be at the required position. Finally, drift errors are a thing of the past. Even without host control and without phase shifter gearboxes.

9300 cam profile generator

Mechanical cams can be found quite frequently in production machinery. Changing or modifying the product cause lengthy and complicated set-up procedures. The 9300 servo cam profile generator can store up to 8 different cam profiles, so that cam profiles can be switched without delay during production. For a multitude of potential applications of the cam profile generator a variety of additional functions have been integrated, e. g. electronic cam switches and marker-controlled cam start. Especially for opening and closing of welding bars, a function has been integrated in order to achieve constant welding periods at variable clock frequencies.

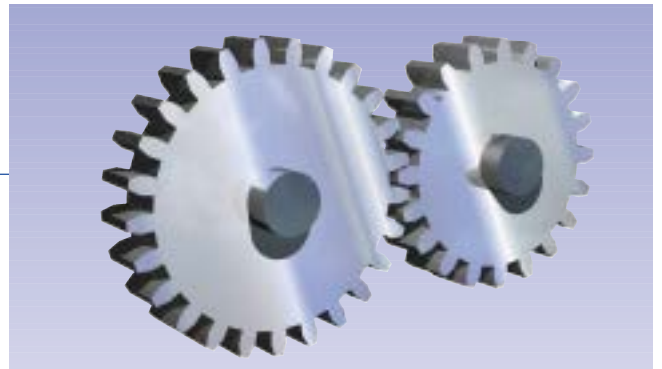
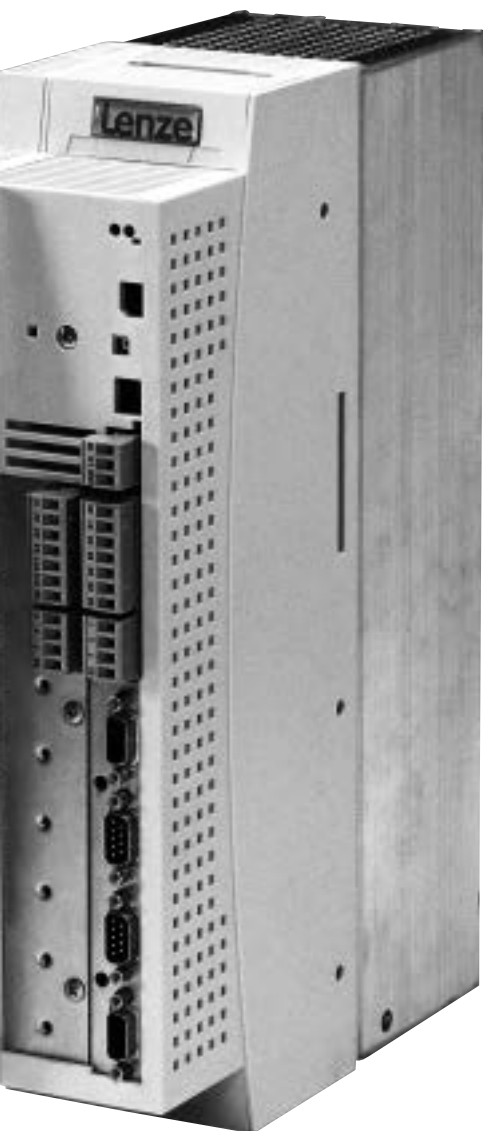
9300 positioning control

Positioning made deceptively simple. The 9300 positioning control includes a complete position controller with sequence control. Easy commissioning with only few input values is a modern solution as compared with external position controllers and their complicated programming language. Responses from limit switches or other drives can be evaluated at the same time. If the initial position of the product is tainted with considerable tolerances, the target position is reliably found by automatic material correction.



Global Drive

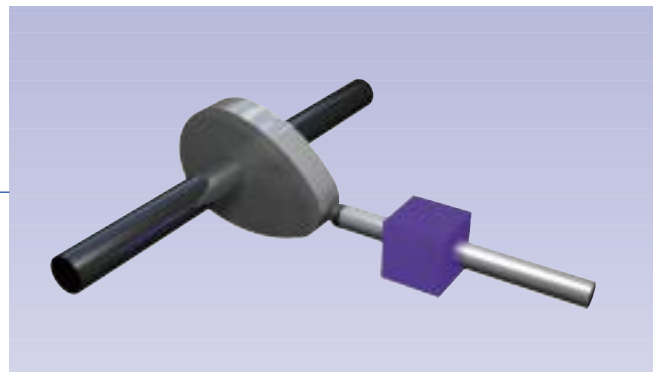
Integrated technologies



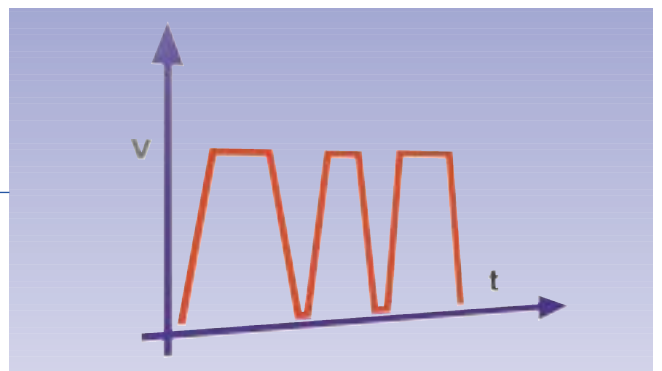
Servo inverters



Register control






Cam profile generator



Positioning control

Global Drive

9300 servo inverter technology

Technical Data						
Type	9321	9322	9323	9324	9325	9326
Rated motor power [kW]	0.37	0.75	1.5	3.0	5.5	11.0
Rated output current [A]	1.5 / 1.05 ¹⁾	2.5 / 1.7 ¹⁾	3.9 / 2.6 ¹⁾	7.0 / 4.7 ¹⁾	13.0	23.5
Mains voltage [V]	3 x 320...528 ± 0%					
Maximum current	2.3 / 3.0 ¹⁾	3.8 / 5.0 ¹⁾	5.9 / 7.8 ¹⁾	10.5 / 14.0 ¹⁾	19.5	35.3
Dimensions (H x W x D) [mm]	350x 78x 250		350x 97x 250		350x 135x 250	
Weight [kg]	3.5		5.0		7.5	
Ambient temperature	0...40 °C					
Enclosure	IP20					
Approvals	CE, VDE, UL approval					
Regenerative power supply 9341 Connected load 9342 Connected load 9343 Connected load	For group drives and regenerative power supply, especially for multi-axis applications 5.5 kW 11.0 kW 22.0 kW					
Brake unit Resistance	Brake module 9351 35 Ohm internal					
Automation modules RS 232/485 InterBus-S PROFIBUS-DP System bus CAN	With the following attachable modules: Module 2102IB Module 2111IB Module 2131IB integrated					
Operating module	9371BB attachable operating module, which can also be used for parameter transfer					
Components for the system bus	9374 IB terminal expansion with 8 terminals, individually programmable as inputs or outputs 9372 IB hand-held terminal for parameter setting if a bus module is attached PC system bus adapter 2173 IB for parameter setting via PC BCD decade switch for setpoint input (e. g. gearbox factors) Operating terminal for the input of 128 arbitrary data sets in drive group operation					


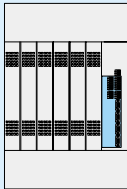
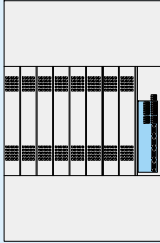
1) Acceleration drive operating mode

Drive packages

Inverter type	Continuous current [A]	Maximum current [A]	Combinations and standard settings $I_{max} = 1.5 I_r$ Maximum torque in Nm Chopper frequency $f_{chopp} = 8$ kHz							Combinations and acceleration drive operating mode Maximum torque in Nm Chopper frequency $f_{chopp} = 8$ kHz				
			9321	9322	9323	9324	9325	9326	9327	9321	9322	9323	9324	
Motor type	h mm	Mn3000 Nm	M_r Nm											
Synchronous servo motors without fan														
MDSKS 036-13, 200	35		0.6	1.50	2.24					1.85	2.89			
MDSKS 036-23, 200	35		1.3	2.73	4.29	5.60				3.50	5.04	7.20		
MDSKS 056-23, 190	51	2.9	2.8	2.80	4.56	6.87				3.65	5.99	8.72		
MDSKS 056-33, 200	51	4.3	4.2		4.38	6.88	11.48				5.83	8.96	14.75	
MDSKS 071-03, 170	51	5.9	5.7			8.00	13.68	23.60				10.59	17.48	
MDSKS 071-13, 185	51	8.8	8.3			7.00	12.45	23.10				9.25	16.60	
MDSKS 071-33, 180	51	13	12.3				12.90	24.00	39.70					
with separate fan														
MDFKS 071-33, 165	65	7.7	7.5			8.00	13.68	23.60				10.59	17.48	
MDFKS 071-13, 180	65	11.7	11.0				12.45	23.10					16.60	
MDFKS 071-33, 175	65	17	16.2				12.90	24.00	39.70				17.22	

Global Drive

9300 servo inverter technology

Technical data							
Type	9327	9328	9329	9330	9331	9332	
Rated motor power [kW]	15.0	22.0	30.0	45.0	55.0	75.0	
Rated output current [A]	32.0	47.0	59.0	89.0	110.0	150.0	
Mains voltage [V]	3 x 320...528 ± 0 %						
Maximum current	48.0	70.5	88.5	133.5	165.0	225.0	
Dimensions (H x W x D) [mm]	350x	591x 250x 250	680x	340x 285	440x 285		
Weight [kg]		12.5		36.5	59.0		
Ambient temperature	0...40 °C						
Enclosure	IP20						
Approvals	CE, VDE, UL approval						
Regenerative power supply 9341 Connected load 9342 Connected load 9343 Connected load	For group drives and regenerative power supply, especially for multi-axis applications 5.5 kW 11.0 kW 22.0 kW						
Brake unit Resistance	Brake chopper 9352 18 Ohm minimum						
Automation modules RS 232/485 InterBus-S PROFIBUS-DP System bus CAN	With the following attachable modules: Module 2102IB Module 2111IB Module 2131IB integrated						
Operating module	9371BB attachable operating module, which can also be used for parameter transfer						
Components for the system bus	9374 IB terminal expansion with 8 terminals, individually programmable as inputs or outputs 9372 IB hand-held terminal for parameter setting if a bus module is attached PC system bus adapter 2173 IB for parameter setting via PC BCD decade switch for setpoint input (e. g. gearbox factors) Operating terminal for the input of 128 arbitrary data sets in drive group operation						

Motor / inverter assignment servo motors / 9300 servo controller																
Inverter type		9321	9321	9322	9322	9323	9323	9324	9324	9325	9325	9326	9326	9327	9328	9329
Chopper frequency	[kHz]	8	16	8	16	8	16	8	16	8	16	8	16	8	8	85
Continuous current	[A]	1.5	1.1	2.5	1.8	3.9	2.9	7	5.2	13	9.7	23.5	17.6	32	47	59
Maximum current	[A]	2.25	1.65	3.75	2.7	5.85	4.35	10.5	7.8	19.5	14.6	35.3	26.4	48	70.5	88.5
Motor data					Maximum torque with the selected motor / inverter combination											
Motor type	Axis height h [mm]	n _r [min ⁻¹]	M _r [Nm]	P _r [kW]												
Asynchronous servo motors																
MDSKA 056-22	51	3950	2	0.8		4.4	5.3									
MDSKA 071-22	65	4050	4	1.7				12.6	9.2							
MDFKA 071-22	65	3410	6.3	2.2				13	10							
MDSKA 080-22	71	4100	5.4	2.3				13.2	9.1							
MDFKA 080-22	71	3455	10.8	3.9						26	19.1					
MDSKA 090-22	83	4110	9.5	4.1						23.4	16.9					
MDFKA 090-22	83	3480	19	6.9								50.7	35			
MDSKA 100-22	96	4150	12	5.2								43.3	25.6			
MDFKA 100-22	96	3510	36	13.2										67.6		
MDSKA 112-22	107	4160	17	7.4								43.9	25			
MDFKA 112-22	107	3520	55	20.3											107.7	135.9

Global Drive

Servo motors, geared servo motors

Servo motors of enclosures type IP54 and IP23 are adapted components belonging to the servo inverters. These motors can be combined with Lenze helical gearboxes, low-profile gearboxes and helical-bevel gearboxes. Thus a compact drive unit can be created – directly integrated with an optimum of power transmission.

The motors feature low circumferential backlash and high power density with non-positive shaft-to-hub connection between motor and gearbox.

Additional features are low construction volume, high life expectancy, and high operating safety.

The servo motors of enclosure IP54 are available in performance ranges from 0.25 to 20.3 kW with the following features:

- Synchronous servo motors with permanent magnet excitation:
 - high-quality permanent magnets
 - power range 250 W - 5.9 kW
 - rated speed 3300 - 4000 rpm
 - low moment of inertia
 - maximum response
- Asynchronous squirrel cage servo motors:
 - slim, solid cage motor construction
 - power range 800 W - 20.3 kW
 - rated speed 3500 - 4300 rpm
 - field weakening range up to 8000 min⁻¹ with constant power
 - high dynamic response
- Common features for both motor series:
 - reinforced insulation
 - thermal class F and enameled wire according to thermal class H
 - external fan attachment possible
 - holding brake attachment possible
 - continuous temperature measurement

The servo motors of enclosure IP23 are available in performance ranges from 10 to 61 kW with the following features:

- Enclosed-ventilated three-phase A.C. motors:
 - high power density from 10.6 kW to 61.0 kW
 - excellent running features
 - enclosure IP23
 - thermal class F and enameled wire according to thermal class H
 - KTY temperature monitoring or thermal contact
 - terminal box for power connections, brake, feedbacks
 - external radial fan
 - mounting position B5 or B35



Global Drive

Servo motors, geared servo motors

Servo motors with helical gearboxes

Lenze helical gearboxes (GST) are parallel-axial gearboxes with high power density and high functionality. The open gear system is a system without compromise. Because of the broad range of input and output designs, you will always find a suitable drive tailor-made for your application. Output designs:

- Solid shaft
- Foot
- Flange
- Pitch circle with centering

Lenze helical geared motors are available in the power range of 0.25 kW - 45 kW. The broad range of gear ratios up to $i = 330$ – combined with the small step ratio = 1.12 – allows the precise selection of the required drive speed.

Servo motors with low-profile gearboxes

Lenze low-profile gearboxes (GFL) are parallel-axial gearboxes with high functionality. The two-step basic design and the high power density – achieved by ground

gearwheels with optimised tooth profiles – allow extremely compact constructions. The versatile pitch circle at the drive side and the cuboid design with an outside surface without extruding ribs allow Lenze low-profile gearboxes to be integrated easily into the installation.

Output designs:

- Solid shaft
- Hollow shaft
- Hollow shaft with shrink disc
- Foot
- Flange
- Pitch circle with centering

Lenze low-profile geared motors are available in the power range of 0.25 kW - 45 kW. The broad range of gear ratios up to $i = 856$ – combined with the small step ratio = 1.12 – allows the precise selection of the required drive speed.

Servo motors with helical-bevel gearboxes

Lenze helical-bevel gearboxes (GKS) are right-angle gearboxes with high power density and high functionality. The three-step basic design, connecting elements with low backlash, and high tooth quality achieved by precision manufacturing, guarantee low backlash at the drive side in relation to comparable gears.

Output designs:

- Solid shaft
- Hollow shaft
- Hollow shaft with shrink disc
- Foot
- Flange
- Pitch circle with centering

Lenze helical-bevel gearboxes are available in the power range of 0.25 kW - 45 kW. The broad range of gear ratios up to $i = 1510$ – combined with the small step ratio = 1.12 – allows the precise selection of the required drive speed.

Servo motors and planetary speed drives or bevel gearboxes

Lenze planetary speed drives and bevel gearboxes offer large gear ratios with low backlash. The compact design and an optimum of adaptation to the servo motors set a standard for the application in almost any system. Because impact loads and ambient temperatures are taken into consideration for dimensioning, reliable operation with the servo motors is guaranteed.

Bevel gearboxes are available with solid or hollow shaft, foot or flange design at the drive side. The torque of these motors ranges from 15 to 9000 Nm at gear ratios of 1:1 to 1:6.

Planetary speed drives are equipped with solid shafts at the drive side.

The series comprises three different products: Low-backlash gearboxes with a torque range from 70 to 500 Nm and ratios between 1:4 and 1:143.

Small planetary speed drives with a torque range from 19 to 125 Nm and ratios between 1:3 and 1:100.

Planetary speed drives with a torque range up to 13000 Nm and ratios between 1:3.4 and 1:245.



Global Drive

9300 servo inverters – accessories

9300 servo inverters fulfill manifold tasks and are used in many different systems and areas of the industry. The modular functional design of the product series allows configurations tailor-made to individual requirements. The following accessories are available according to the requirements:

- Attachable LCD operating unit or hand-held terminal:
For adaptation and display of parameters.
- Global Drive Control:
Operating software for commissioning and individual configuration of the controller.
- Mains chokes:
To reduce mains currents and feedbacks and to save energy.
- Matched mains and RFI filters:
To comply with the regulations and limit values.
- Regenerative power supply units:
To save energy in multi-axis and group drives
- Brake modules with integrated brake resistor:
Economical alternative to regenerative power supply units especially for single drives.
- Brake choppers with external brake resistor.
- System cables:
Pre-assembled system cables in different lengths for motor connection. Plugs at both end facilitate the connection. Ask for the overview of our system cables.



Global Drive

Automation

The Global Drive AC system supports all common bus systems. All typical PC and PLC systems can be used as host. Additional interface modules enable the control of the different drive components via bus systems. Global Drive systems offer new, economic, and reliable solutions, e. g. via InterBus from the host to the component, and via system bus in the decentralised part of the system.

Networking in the Global Drive system:

- **InterBus-S**

For applications with high process accuracy and dynamic response, the system can be connected to the InterBus-S. This attachable module is based on the DRIVECOM profile 21 and offers the following advantages:

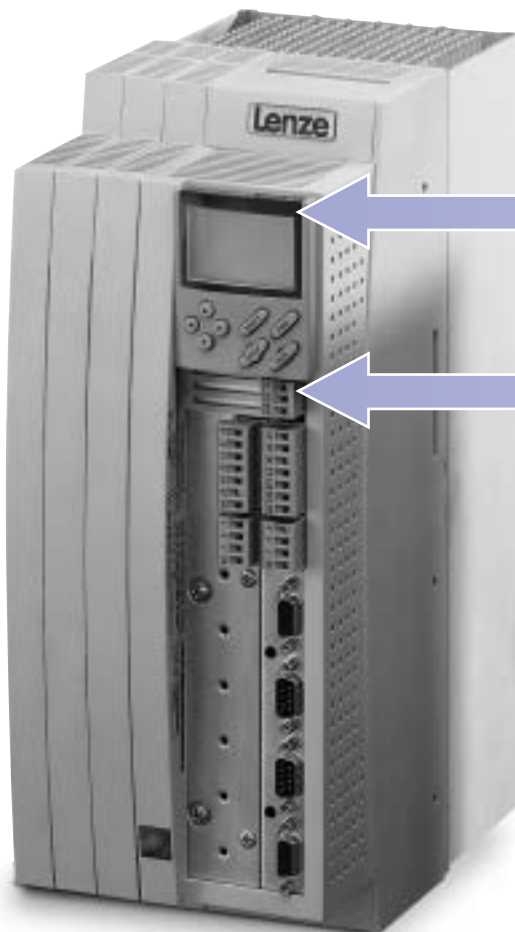
- up to 64 participants possible
- directly connectable to the long-distance bus
- cyclic process data within 0.5 - 7 ms

- **Interface RS 232/485**

Global Drive offers a ready-to-use concept for connections to all different types of PLC systems by means of the RS 232/485 interface. For this, a compact module is attached to the front of the controller. Networking is possible either via the standard RS 232/485 interface or an optical fibre.

- **System bus**

The exchange of data between individual drive controllers creates an intelligent drive group. The data is transferred in real-time via the system bus which is used at the same time, e. g. for expanding the terminal signals or for operating the system. The entire computing power and functionality of all devices is thus combined into one entity. Host controllers are relieved or can even be completely omitted. Because of simple handling no special bus knowledge is required.



Communication to the host system



System bus components

