

L-force

9400 HighLine Servo Drives



Productive, economical, simple



Lenze

L-force | your future is what drives us

Demands are increasing all the time. In future, key challenges will lie in the areas of cost efficiency, time-saving and quality improvements. Faster project planning and commissioning, improved performance and increased flexibility in production are expected. New ideas are therefore needed for the machines of the future.

Lenze has risen to this challenge and, with L-force, we can now not only offer you an innovative family of drive and automation products, but also a new, comprehensive portfolio of solutions.

Driven by innovation – New ideas for new possibilities

Always on the lookout: Our idea of innovation is working on even better solutions for our customers, every day.

Driven by flexibility – High degree of scalability for individual solutions

Scalability is an important aspect of the **L-force** philosophy. Performance, scope of functions, software, service provisions and aftersales care – Lenze will provide you with exactly the combination you require.

Driven by usability – Simple solutions, even for complex applications

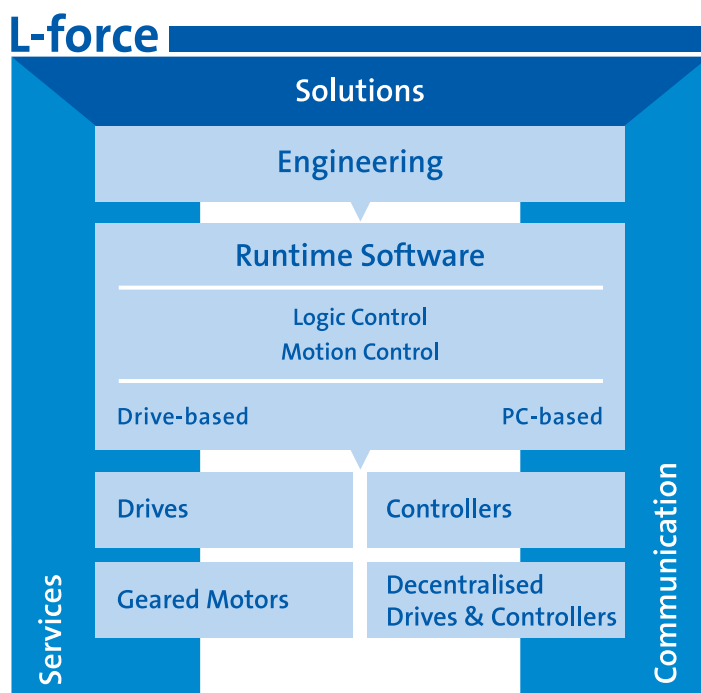
We always focus on the user. Therefore, when we developed **L-force**, we made sure that people with plenty of practical experience were involved, right from the start.

Driven by compatibility – Universal products and solutions

Don't waste any more time searching for suitable components and the right interfaces. With **L-force**, everything is compatible.

Driven by completeness – Comprehensive and modular

Our drive electronics include the modules to meet your requirements.



9400 HighLine Servo Drives | a new dimension

Experience the highlights of the 9400 Servo Drives – installation design, modularity and integrable safety.

Profit from the levels of freedom the drive system offers you. Choose from a wide spectrum of equipment features.

Whether you are concerned with the connection to the control level or with the functionality of the drive – the options available to you allow a high level of flexibility.

Innovative – a completely new concept in installation

The 9400 Servo Drives benefit from a revolutionary electromechanical concept: the separation of installation backplane and drive electronics creates previously unknown levels of simplicity in installation, mounting and application.

Tailor-made – a modular architecture

The drive system can be customized to your application. We would be pleased to take on this task for you and will supply a tested, complete system – just install and commission. The design of our drive systems makes configuration child's play. You can even put together your favoured solution yourself with little effort.

Safety simply integrated

Play it safe with the optional safety modules. The pluggable modules meet the requirements of IEC 61508 SIL 3 and are TÜV-tested. This modular approach offers you the security of being able to grow with your requirements.



Drive technology | that convinces

Quick pit-stop

The innovative architecture of the 9400 HighLine Servo Drives system considerably simplifies mounting and installation, all application data is stored on a pluggable memory module (MM xxx). All service and maintenance work can thus be completed cost-effectively in just a few actions.

Single drives

Our single-axis drives combine mains supply, DC bus and inverter in a single unit. The filter elements and the brake chopper are integrated into the controller and permit self-sufficient application in distributed control cabinet installations. Higher interference levels can be achieved without additional mounting area by the use of suitable footprint filters.

Multi drives

Our multi-axis drives are particularly suitable for centralised, compact multi-axis installations. The energy exchange via the DC bus reduces the power requirement on the mains side. The axes use the mains supply, the brake chopper and the EMC filter in common. The materials requirements and installation efforts are thus significantly reduced. The integrated DC busbar system provides for compact installations for drives rated up to 11 kW.

Further benefits

- ▶ May be used throughout the world
 - Wide operating voltage range
 - UL certified
 - CE compliant
- ▶ Integrable brake control
 - Low space requirement
 - Minimal wiring
 - Intelligent brake logic in the standard scope



*L-force 9400 Highline
Servo Drives,
0.37 to 11.0 kW*

Scalable functionality

Various different memory modules allow you to customise functionality.



HighLine with ...

MM 220 memory module	MM 330 memory module
The intelligent drive for modular mechanical engineering	The high-tech drive for demanding motion control
Both solutions offer: <ul style="list-style-type: none">▶ Parameterisable technology applications for simple entry level applications▶ Individual solutions thanks to tried-and-tested function block libraries	



*Innovative installation
backplane*

Simple and cost-effective

All drive settings and application data are stored on a pluggable memory module. This means that it is only necessary to plug the memory module into the new drive in the event of a hardware replacement, for instance. No further modifications are required to restart operations. Since the module additionally contains all the information regarding the functional scope required and configures the drive accordingly, only one type of drive needs be held in stock. The costs of maintenance and spare parts stock are thus reduced to a minimum.

Right from the start – The versatile standard equipment offers you a comprehensive range of options for the solutions to your tasks.

Onboard

► CANopen system bus

Able to communicate from the outset thanks to integrated CANopen system bus interface. This guarantees the interaction with further Lenze system elements.

► Conventional I/O

A wide range of analog and digital inputs and outputs makes drive expansion superfluous in many application cases.

► Diagnostic LEDs

The six built-in diagnostic LEDs reveal the drive's status at a glance.

► Local diagnostics

More in-depth diagnostics on a PC connected by a USB adapter, or a keypad with plain text display is possible at any time via the local diagnostic interface.

► Feedback systems

The resolver input, standard on Lenze drives, is supplemented by a versatile multi-encoder interface. This creates space for the simultaneous use of a direct position encoder or an alternative motor feedback.



Communication | for harmonious interplay

Communication without limits

All communication options are open thanks to the modularity of the drive. Pluggable modules, e. g. for PROFIBUS networking, guarantee case-by-case adaptation to preferred communication standards.



PROFIBUS

Ethernet in the drive

Ethernet offers you a platform for consistent vertical and horizontal communication. ETHERNET Powerlink is one of the first industrial Ethernet standards supported by Lenze for motion control applications with the highest demands on real-time capability. The modular approach for its part also allows the integration of future standards.



Ethernet

Remote maintenance

You can access the process data, parameters and application programs in the 9400 HighLine drive controller at any time and from any location. All you need is an Ethernet network or even a simple telephone connection. Thanks to the latest OPC technology, software integration is not a problem.



*ModemCAN,
EthernetCAN and
OPC DriveServer
(from left to right)*

Safety | integrated into the drive

The challenge: personal safety in the workplace. According to the European Machinery Directive, the manufacturer of a machine must ensure that operation, set-up and maintenance of the machine may be carried out without endangering the health and safety of workers (provided the machinery is used appropriately and for the intended purpose). In the case of drive systems, this means safe and reliable protection against uncontrolled movements.



Certified safety

We can support you in the implementation of your safety requirements with our optionally integrable safety technology. All functions have been developed in accordance with IEC 61508, SIL 3 and, depending on the module, meet the requirements of EN 954-1 to category 4.

This has been confirmed in acceptance by the TÜV.

The benefits of Lenze safety technology at a glance

- ▶ Cost and time savings thanks to the reduced number of components and reduced wiring requirements
- ▶ Faster response times mean shorter cycle times for the machine
- ▶ Simple understanding of a complex subject – the functions are integrated into the controller
- ▶ May be expanded to accommodate future safety concepts

The following safety options are currently available

- ▶ **Safety module 100 (SM100)**
This module offers the following functionality
 - Safe torque off in accordance with EN 954-1, cat. 4
 - Connection of safety sensor systems
- ▶ **Safety module 300 (SM 300)**
 - Safe torque off in accordance with EN 954-1, cat. 3
 - Safe stop 1
 - Connection and monitoring of safety sensor systems
 - In combination with a PROFIBUS communication module PROFISafe can be used

→ Further information may be found in the L-force drive-based safety product information flyer.



Software architecture | a true system

Flexible and yet uncomplicated in use. 9400 Servo Drive HighLine simply and consistently solves motion and process tasks as well as complex machine functions. The basis for this is a multi-layered software architecture which ensures scalability, flexibility and expansion capability in a unique way.

Scalable functionality

Pre-prepared technology applications, which need only be configured, reduce the engineering effort and lead quickly to the goal. The drives can be configured using the keypad or custom PC dialogues in L-force Engineer.

Technology level

► MotionControl TopLevel

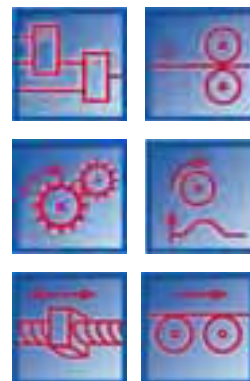
(MM330 required)

- Additionally: integrated multi-purpose positioning

► MotionControl HighLevel

(MM220 required)

- Actuators
- Electrical shaft and synchronised systems
- Table positioning
- Comprehensive function block library



Operating system

- Basic functions, e.g. referencing, manual jog, brake control
- Motor control, drive monitoring and diagnostics, communication

Graphical support

The sequence chains act as graphically assisted input options for positioning programs and lead to simple operation and a clear representation of complex processes.



Engineer | to increase productivity

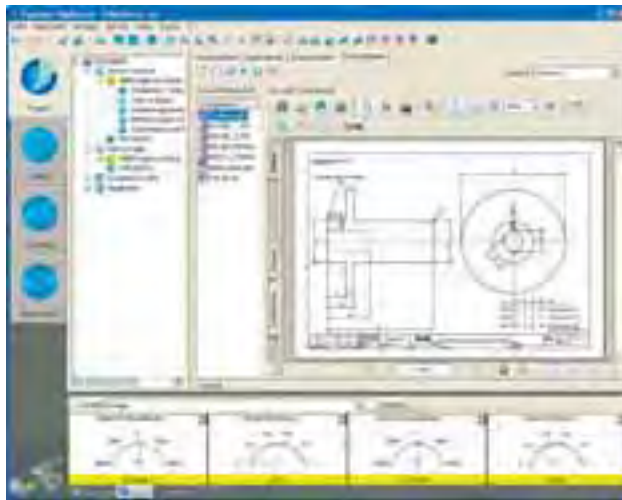
The Engineer HighLevel software comes with all the functions you need to start using 9400 successfully. Even large projects can be solved simply with the software. Extensions such as network configuration and function block editor are incorporated, as is a new wiring/interconnections editor.



Hardware configurator and document archive

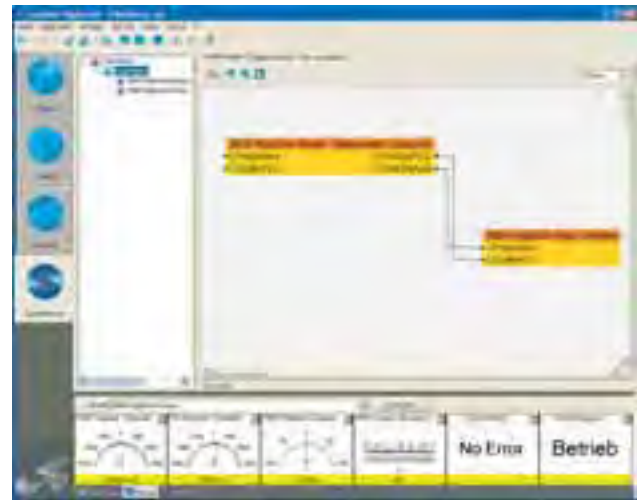
You have your initial ideas in your head and already know roughly what your new machine will be like? No problem, just bring your thoughts together into a new project in Engineer. You can start building up the project, without having to worry about the network configuration.

You have already drawn the initial sketches? Excellent. Scan your sketches and add them to the project straight away. Further documents (Word, PDF etc.) can also be stored here – and so you always have all the information to hand.



Document archive

- Store the documents relating to the project
- Distribute and read the documents
- Print the documents



Configuration options

- Hardware
- Network
- Function blocks
- Wiring/interconnections editor

Network configurator

Later you can carry out network configurations. You can quickly and easily configure the network for the integrated CAN in the 9400 Servo Drives.

Wiring/interconnections editor

In the wiring/interconnections editor, you can determine graphically which inputs and outputs (ports, usually called PDO in the context of a CAN) are to be transmitted over the CAN bus. The Engineer can then assign the identifiers automatically.

Parameter setting interface

New graphics-based parameter setting interfaces have been created. You will find it easy to locate the most important parameters for your application.

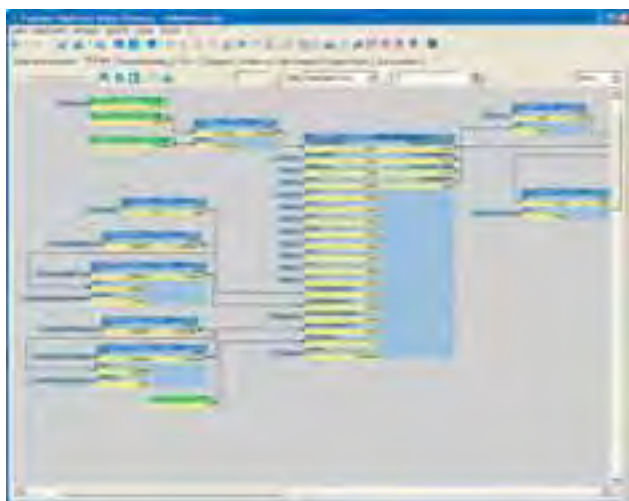
Function block editor

In addition, the tried-and-tested Lenze function block editor has been substantially improved. You can now see the entire diagram in one window. It is easy to work in this window and, when you are finished, you can print out the function block overview.

Diagnostics

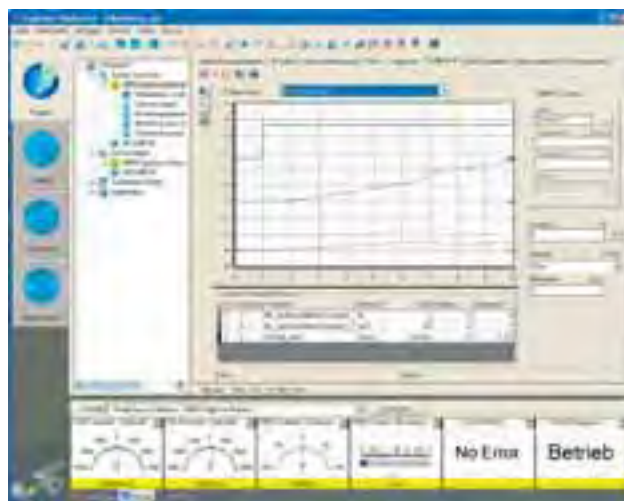
Any faults can be found immediately in the easy-to-use diagnostics interfaces and the monitor window. An oscilloscope is even provided without the need for you to connect up external measuring equipment.

→ Further information may be found in the L-force engineering product information flyer.



Parameter setting/configuration

- ▶ Parameter setting interfaces
- ▶ Function block editor



Diagnostics

- ▶ Diagnostics interfaces
- ▶ Oscilloscope
- ▶ Monitor window

A perfect couple | 9400 HighLine Servo Drives and servo motors

The MCS, MCA and MDFQA series of servo motors are a perfect complement to the 9400 Servo Drives. The motors in these series are all characterised by low moments of inertia, compact designs with a high power density and a robust construction.

MCS and MCA servo motors

Looking for optimum dynamics and precision in a compact package? Then MCS synchronous servo motors are the right choice for you.

With a power range from 0.25 kW to 10.0 kW, a rated torque range of 0.5 Nm to 51 Nm and peak torque values of up to 191 Nm, these motors will meet all your needs for compact and dynamic drive technology.

The innovative Single Element Pole Technology, high-quality magnetic materials and special pole forms lay a sound basis for excellent drive characteristics.

The minimal detent torques offer excellent smooth running characteristics and thus ensure excellent control behaviour. The robust mechanical design with reinforced bearings, a high degree of protection and full stator encapsulation increase operational reliability even in harsh ambient conditions.

The compact design of the MCA asynchronous servo motors and their low moment of inertia make the motors suitable for use in dynamic applications. In the event of a wide speed setting range and requirements for a rugged construction, there's no better choice than Lenze MCA asynchronous servo motors.

Whether naturally ventilated or with forced ventilation – in a power range from 0.8 to 20.3 kW, MCA asynchronous servo motors make rated torques of up to 61.4 Nm available. By comparison with normal three-phase AC motors, the motors in this product family excel in their low moment of inertia, low weight and high maximum speeds. The MCA series motors may also be used in field weakening operation.



The benefits of MCS and MCA series motors at a glance

- ▶ Extremely dynamic performance thanks to the low moments of inertia
- ▶ Compact design with high power density
- ▶ Robust resolver feedback system; alternatively SinCos encoder (MCA: additionally incremental encoder) for the highest precision
- ▶ Plug-in connections offer user-friendly installation and servicing (terminal box available as an option)
- ▶ IP54 protection (IP65 available as an option)
- ▶ UR certified (MCS: additionally certified in accordance with CSA), CE-compliant
- ▶ Electronic nameplate

MDFQA servo motors

Designed for the harsh conditions of continuous operation at high torques, the through blown motors in the MDFQA range offer long service life and optimum operational performance in all drive situations.

The motors have a power range between 10 kW and 95 kW and a compact design with IP23 protection. They have

been designed specifically for operation with Lenze frequency and servo inverters. A wide range of feedback systems, brakes and blowers ensures that the perfect system configuration is available for virtually all operating conditions.

The benefits of MDFQA series motors at a glance

- ▶ High power density
- ▶ Exceptionally smooth running characteristics
- ▶ IP23 protection
- ▶ Terminal box for power, brake, encoder
- ▶ Temperature class F
- ▶ KTY temperature monitoring
- ▶ Radial blower
- ▶ Blower on non-drive end, may be fitted either end
- ▶ B 5 or B 35 design
- ▶ Wide speed control range
- ▶ May be used in field weakening operation

→ Further information may be found in our product information relating to our motor and geared motor ranges.



Overview | performance characteristics

Basic functions	E.g. referencing, manual jog, speed, torque and position follower, brake logic, electronic nameplate, oscilloscope function	✓
Interfaces	Analog inputs/outputs	2/2
	Digital inputs/outputs	9/4
	CANopen system bus	✓
	Resolver input	✓
	Multiple encoder interface for one of the following feedback systems: – TTL incremental encoder – SinCos incremental encoder – SinCos absolute value encoder with Hiperface® interface – SinCos absolute value encoder with Endat V2.1 interface	✓
Extension modules	Number of slots	2
	Ethernet, ETHERNET Powerlink*, PROFIBUS, CANopen system bus, TTL master frequency	○
Memory modules – functionality	MM220 – MotionControl HighLevel	●
	MM330 – MotionControl TopLevel	○
Safety modules	SM0 – no safety functions	●
	SM100 – safe torque off, EN954-1, cat. 4	○
	SM300 – safe torque off, EN954-1, cat. 3 safe stop 1, PROFIsafe ①	○
Motor brake module	24 V – 2.5 A, may be integrated into installation backplane up to 11 kW	○
	24 V – 5 A, may be integrated into drive from 15 kW	○

✓ Included

● Standard

○ Option

* In preparation

① In conjunction with PROFIBUS communication module

Technical data | 9400 Servo Drives

Single drive axis modules

Supply voltage range	3 AC 180 ... 550 V \pm 0 %; alternatively DC 260 ... 775 V \pm 0 %									
Rated output current in A	1.5	2.5	4	7	13	16.5	23.5	32	47	59
Maximum output current* (500 ms) in A	4.9	8.1	13	17	31.6	40.1	47.7	57	84	105
Typical motor power [kW]	0.37	0.75	1.5	3	5.5	7.5	11	15	22	30
Electronics supply	Internal; alternatively DC 24 V external									
Brake chopper	Integrated									
Brake resistor	External									
Dimensions of axis module [mm]	60 x 350 x 288		90 x 350 x 288		120 x 350 x 288			206 x 602 x 294		

* Switching frequency adapted automatically as a function of utilisation

Multi drive axis modules

Supply voltage range	DC 260 ... 775 V \pm 0 %							
Rated output current in A	1.5	2.5	4	7	9.3	13	16.5	23.5
Maximum output current* (500 ms) in A	4.9	8.1	13	17	22.7	31.6	40.1	57.2
Typical motor power [kW]	0.37	0.75	1.5	3	4	5.5	7.5	11
Electronics supply	DC 24 V external							
Brake chopper	By power supply module							
Brake resistor	By power supply module							
Dimensions of axis module [mm]	60 x 350 x 288			90 x 350 x 288		120 x 350 x 288		

* Switching frequency adapted automatically as a function of utilisation

Supply modules

Supply voltage range	3 AC 180 ... 550 V \pm 0 %	
DC rated current in A	10	36
DC maximum current (500 ms) in A	40	108
Mains current at rated current in A	8	29
Electronics supply	DC 24 V external	
Brake chopper	Integrated	
Brake resistor	External	
Dimensions of power supply module [mm]	60 x 350 x 288	120 x 350 x 288