



# *L-force*

MF three-phase AC motors

Simply multiple



# Lenze

# Optimised | for frequency inverter operation

**More than a third of newly installed three-phase AC motors are now operated using electronic control systems. And with ever increasing automation and improved energy efficiency, this technology is set to increase even further.**

## From the idea ...

If frequency inverters are already available for motor control, then why do these motors need to be designed for a mains frequency of 50/60 hertz? Why not optimise them for inverter operation?

Lenze's studies showed that the ideal operating condition for the most commonly used 4-pole three-phase AC motor is around 120 hertz. This provides a high power output, a wide speed range and a high degree of efficiency.

## ... to the product

The L-force MF three-phase AC motors were developed based on these results.

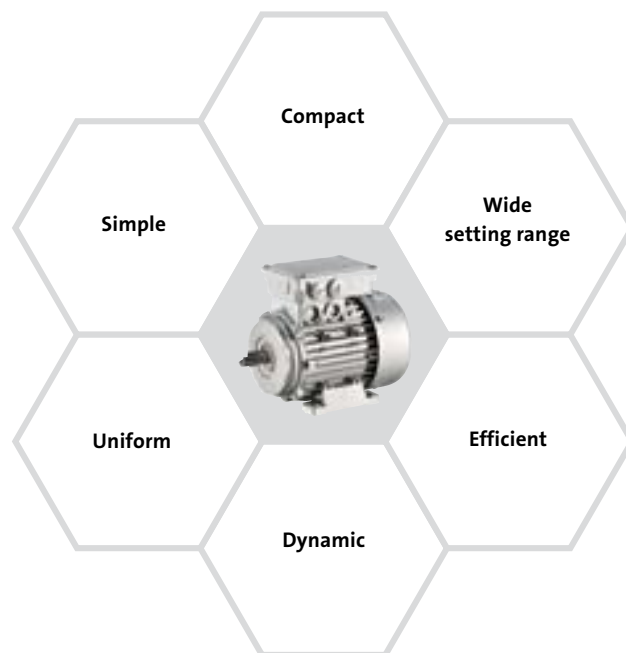
- ▶ 4-pole L-force three-phase AC motor as the base
- ▶ Electrical winding design geared to a rated frequency of 120 hertz, with a supply voltage of around 400 V (roughly 3,500 rpm)
- ▶ Optimised ball bearings
- ▶ Optimised rotary shaft seals
- ▶ Optimised motor connections due to the greater ampacity of smaller motors

## In summary – simply multiple

The L-force three-phase AC motors provide added value in many ways for variable-speed applications:

## Benefit from the advantages of the new MF motors

- ▶ Save space in your machines thanks to its compact design.
- ▶ Standardise your logistics and inventory processes, as you can cover many applications with a single motor version.
- ▶ Improve the energy efficiency of your application.
- ▶ Increase your productivity thanks to improved dynamics.
- ▶ Use the end-to-end integrity of our products, as our gearboxes and frequency inverters support the MF motors.



# Saving space | with compact MF motors

Would you like to increase the productivity of your machine and save space at the same time? Would you like to make the switch to more energy-efficient motors, but do not have any extra space available for this?

## Small yet powerful

This is no problem with the L-force MF three-phase AC motors, as they offer the same performance as a conventional IE2 three-phase AC motor, but are up to 2 sizes smaller.

Rated power [kW]	Conventional IE2 motor	MF motor
0.55		63
0.75	80	63
1.10	90	71
1.50	90	71
2.20	100	80
3.00	100	80
4.00	112	90
5.50	132	100
7.50	132	100
11.00	160	112
15.00	160	132
18.50	180	132
22.00	180	132

Comparison of axis heights per power output



## Practical applications

### “No space for large IE2 motors”

#### The task

A manufacturer of textile machines was keen to comply with the European Union's ErP Directive. Since June 2001, this directive has required the use of energy-efficient motors. However, due to the greater physical size of classic IE2 motors, this would have required constructional changes and thereby major investment.

#### The Lenze solution

It was possible to avoid constructional alterations by using Lenze's L-force MF three-phase AC motors. The new motors are significantly smaller than the previous solution, yet offer the efficiency of IE2 motors.

## The customer's summary

### “A perfectly tailored solution”

#### Advantages

- ▶ Up to 2 sizes smaller than a conventional IE2 motor
- ▶ No space issues with conversions/modifications
- ▶ Greater freedom for new designs

# One for all | wide speed setting range



**One version for multiple applications?**  
**Most companies today are striving for at least some kind of standardisation. Reducing the number of different versions also reduces project planning, purchasing and warehousing costs.**

Thanks to their large speed range of 24:1, the L-force MF three-phase AC motors are suitable for many areas of application. By way of comparison – conventional motors offer an adjustment range of only 10:1.

## Practical applications

“Two become one”

### The task

Depending on the speed and output power required, a machine builder has always had to employ different motor and gearbox combinations for its two rotary tables: a 0.75 kW motor with an axis height of 80 mm or a 1.5 kW motor with an axis height of 90 mm.

### The Lenze solution

Thanks to their power density and large speed setting range of 24:1, both applications can now be handled by a single combination of gearbox and MF motor (1.5 kW, axis height 71 mm), while at the same time reducing the amount of space required for the solution.

### The customer's summary

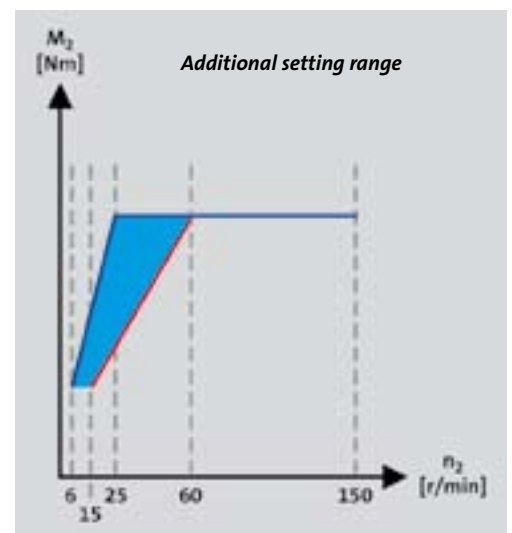
“With the MF three-phase AC motors, we can reduce the number of different models we use. This fits in perfectly with our concept.”

### Whether fast or slow

Since their speed setting range is more than double that of conventional motors, the MF motors allow applications that require both slow and fast speeds to be implemented using a single motor. When using a blower, constant torque is even available throughout the entire setting range.

### Lean design

Greater design freedom thanks to more compact overall dimensions. In the past, motors had to be precisely matched to the required power of applications due to the limited amount of space available. However, that has changed and a smaller motor can now provide a greater output and thereby replace a large motor.



*IE2 geared motor (4-pole) with a ratio of  $i=10$   
L-force MF geared motor with a ratio of  $i=23$*

### Advantages

- ▶ Large setting range of 24:1 (conventional 10:1) allows a broad spectrum of speeds to be covered
- ▶ Compact design: high power output from a small motor
- ▶ Simplified logistics: one motor for many different applications reduces the number of different motors that have to be ordered, stored and managed

# Universal | energy efficiency

For Lenze, the trend of “energy efficiency” means saving energy and costs with drives. This is where the Lenze BlueGreen Solutions really come to the fore.

Classic three-phase AC motors generally increase in size as their energy efficiency improves. This not only leads to space issues inside the machine, but also has other negative effects, since greater moments of inertia actually increase energy consumption when changing speeds and are therefore counter-productive.

## Suitable for worldwide use

Things can become particularly complicated when motors need to be exported to “far-flung” countries around the globe. The most diverse of energy efficiency regulations for three-phase AC motors then need to be observed, making it difficult for a single motor to be deployed in all target markets.

The L-force MF three-phase AC motors solve these problems, as they are up to 2 sizes smaller than a conventional IE2 motor, yet offer comparable energy-efficiency. Their lower mass moment of inertia also reduces the amount of energy required for speed variations.

At the same time, the L-force MF three-phase AC motors are not covered by any energy efficiency directive anywhere in the world. This means that they can be used at any location with zero issues – making them truly universal.



## Practical applications

“Compact and efficient”

### The task

Finding a way of securing high material flow performance in the tightest of spaces, while also ensuring maximum energy efficiency - this was the request of one order-picking system manufacturer in the textile industry. The goal here was to set up a new warehouse, offering capacity for storage of up to 600,000 pairs of trousers on hangers.

### The Lenze solution

The decision was ultimately taken to go with L-force MF three-phase AC motors. Offering levels of energy efficiency comparable with IE2 motors, the MF motors are smaller and therefore require less space. In addition to this, the energy requirements in partial load operation were reduced even further by using the energy saving function of the 8400 L-force Inverter Drives.

## The customer's summary

“This meets our requirements exactly and is both compact and energy-efficient.”

## Advantages

- ▶ Highly efficient, just like IE2 motors
- ▶ Lower mass inertia and thereby reduced energy consumption for variable-speed applications
- ▶ Not governed by any energy efficiency directive anywhere in the world, so fully universal



# Dynamics | for servo applications



**Is a servo motor really always needed when implementing servo motor tasks? The extremely high dynamic performance of a servo motor is often excessive, particularly for simple positioning tasks, but conventional three-phase AC motors can be too sluggish.**

Indeed, in some cases, a servo motor's moment of inertia can even be too low to achieve optimum control characteristics, therefore requiring additional mass inertia.

With the L-force MF three-phase AC motors, Lenze offers the perfect alternative, as these sit right between conventional three-phase AC motors and servo motors in terms of dynamic performance.

They also offer an important advantage over many servo motors, as their optional spring-applied brake is easily accessible and therefore easier to maintain.

## **Advantages**

- ▶ More dynamic than a conventional three-phase AC motor
- ▶ An alternative to servo technology
- ▶ Easy servicing of spring-applied brakes

## **Practical applications: “Fast and dynamic”**

### **The task**

An industrial rolling gate needed to be opened and closed quickly and precisely with optimum control characteristics.

### **The Lenze solution**

Like servo motors, the L-force MF three-phase AC motors offer a particularly low moment of inertia. As such, a large proportion of the torque made available by the motor could be used to accelerate the actual rolling gate and not just wasted on accelerating the motor shaft. The result? Maximum dynamics at moderate costs.

## **The customer's summary**

**“Given its high dynamic performance and large speed setting range, making the switch to the MF three-phase AC motor was the next logical step.”**

# Uniform | advantages

The many advantages of the L-force MF three-phase AC motors become even more apparent in Drive Packages with gearboxes and frequency inverters from Lenze. Our L-force gearboxes and Inverter Drives 8400 consistently support the properties of the MF motors across the whole range.

## L-force gearboxes

The direct attachment of the motors to the gearboxes is particularly space-saving. Thanks to their efficiency levels of 92% to 98%, the right-angle and axial gearboxes in the L-force range ensure that the energy output by the motor is transferred to the application with minimal losses. As Lenze offers diverse gearbox options, such as flanges, torque plates and stainless steel shafts, gearboxes can be adapted to the respective requirements both quickly and easily.

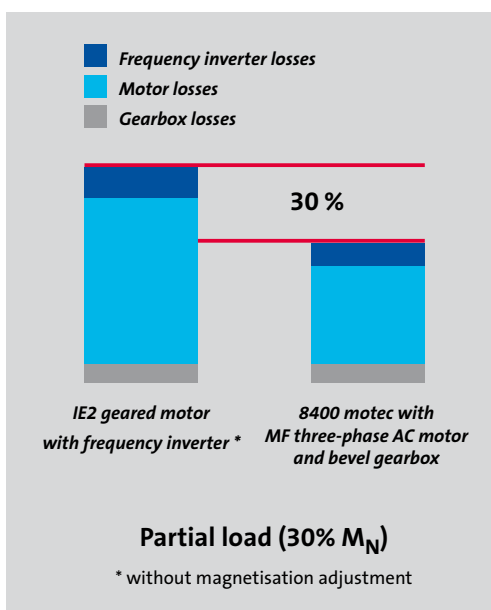
## L-force Inverter Drives 8400

Regardless of whether you choose to go with the central 8400 control cabinet device or the decentralised 8400 motor inverter – in both cases you will benefit from the energy-saving function “VFC eco” (Voltage Frequency Control economic). This enables the magnetising current to be reduced in the partial load operational range, which in turn dramatically improves efficiency and reduces energy consumption by up to 30%.

The decentralised 8400 motec is particularly compact when mounted directly on the motor. The combination of MF motor and attached inverter impresses with its low peak height.

The scaled 8400 control cabinet inverters are also available for more dynamic applications, such as travelling and positioning. Here, you can simply select the most suitable device based on the drive task at hand, whether switch-off positioning or point-to-point positioning.

By selecting Drive Packages with MF motors, you get everything from a single source and do not have to worry about interfaces.



# It's good to know | why we are there for you



*"Our customers come first. Customer satisfaction is what motivates us. By thinking in terms of how we can add value for our customers we can increase productivity through reliability."*



*"We will provide you with exactly what you need – perfectly co-ordinated products and solutions with the right functions for your machines and installations. That is what we mean by 'quality'."*



*"Take advantage of our wealth of expertise. For more than 60 years now we have been gathering experience in various fields and implementing it consistently and rigorously in our products, motion functions and pre-configured solutions for industry."*



*"The world is our marketplace. Wherever you are in the world, we are nearby, providing you with our drive and automation solutions."*

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**You can rely on our service. Expert advice is available 24 hours a day, 365 days a year, in more than 30 countries via our international helpline: 008000 24 Hours (008000 2446877).**

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