



## LC Liquid cooled motors IMfinity® platform

**Variable speed and fixed speed  
IE3 Premium efficiency induction motors**

Frame size 315 to 500

150 to 1500 kW

**LEROY-SOMER™**

***Nidec***

All for dreams

# LC series

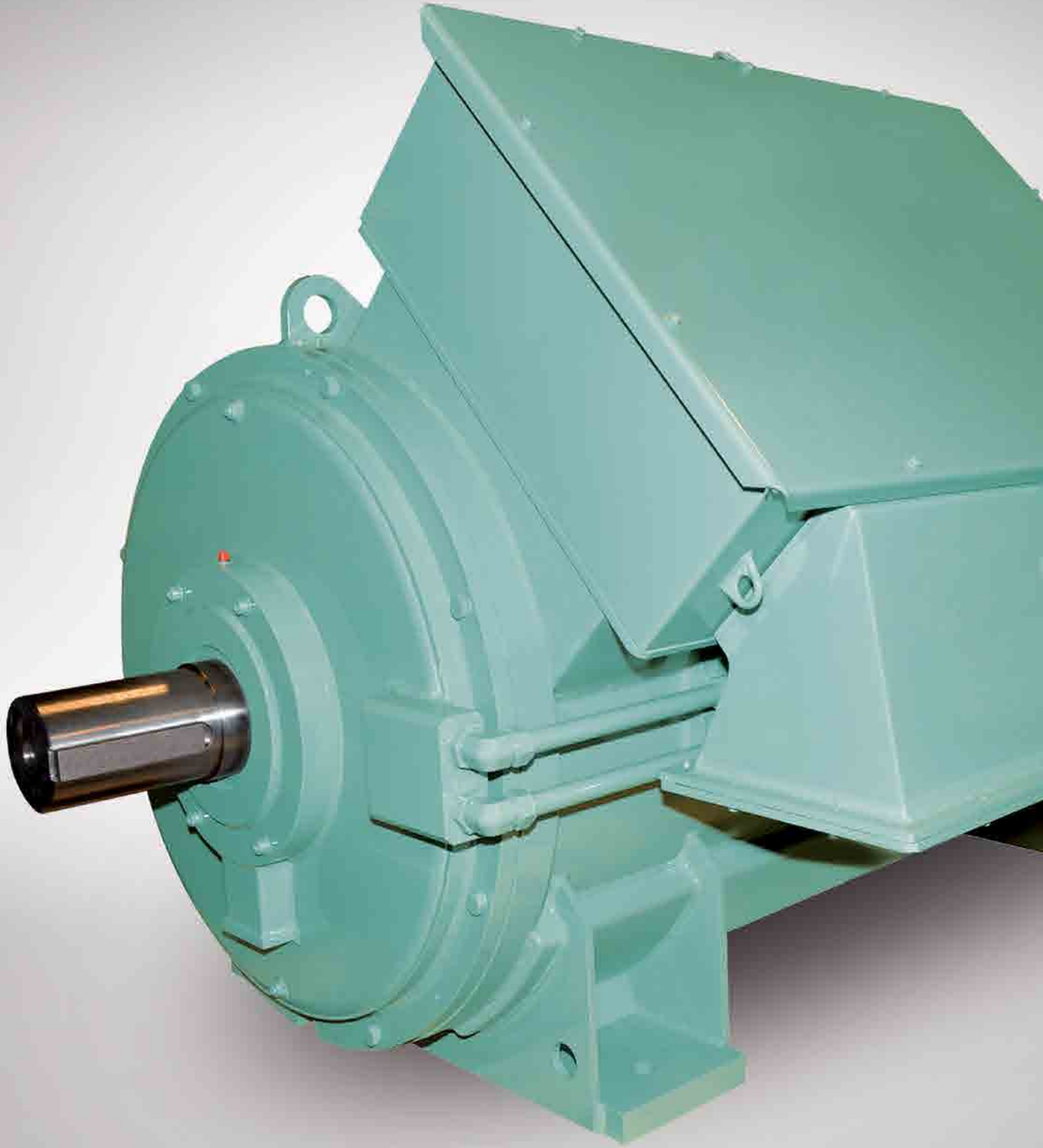
# Outstanding motor range

## LC series, based on the IMfinity® platform, the highest standards to meet your expectations

As part of Nidec, Control Techniques and Leroy-Somer have operated globally for many years, each providing unparalleled specialist drives and motor technology, expertise and customer care for a wide range of industries. Our quality products with renowned reliability, automation knowledge and technical support have helped our customers to meet and exceed their own requirements.

The IMfinity® induction motor range developed by Leroy-Somer has now expanded with the Liquid Cooled (LC) series. It is a new step forward to satisfy the most demanding customer expectations:

- **High reliability**
  - Robust housing, with cast iron or steel flanges for DE and NDE bearing, providing better operation
  - Advanced mechanical and electrical design (magnetic core optimization, high grade components, high quality machining and winding processes)
- **Energy savings**
  - Fixed speed: Premium efficiency motor IE3 as standard
  - Variable speed: Easy to use, high performance motor and drive package for greater energy savings
- **Compliance with the highest customer demands**
  - High compacity saving up to 25% of volume compared to an air-cooled motor
  - Reduced noise level offering ultimate comfort



# LC series

# Customer benefits

## Performing Design

Whatever the conditions are, the LC series has been designed for a clean environment (IP55) or harsh environments (IP56/65). Based on the success and reliability of the IMfinity platform, the LC motors achieved the highest electrical and mechanical performances, including some innovative characteristics:

- Modern housing allowing excellent heat dissipation
- Sophisticated cooling system reducing the noise level
- Improved modularity thanks to its fabricated steel design
- Patented breathable membrane that ensures continuity in production and low or no maintenance

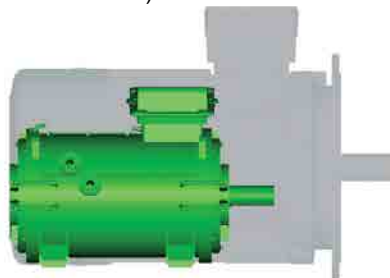
## Cost-effective adaptability

- Its liquid cooled design enables:
  - higher power in an equivalent standard motor frame size
  - compactness of the motor for easier and less costly integration within a machine or a system
  - no need for any external component, such as ventilation

Combined with the high efficiency level of the motors, it particularly allows a quick Return On Investment

- Ideal for DC motor retrofit (for a reduced maintenance cost)

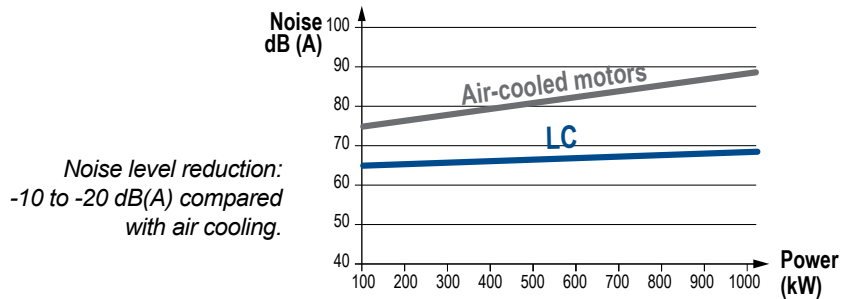
*Compact design: Space, weight and dimensions can be as much as 25% less than an air-cooled motor.*





## Reduced Noise level

The LC series has been designed to significantly decrease the noise level by -10 to -20 dB (A) compared to air-cooled motors



## Patented high performance membrane

LC motors are delivered with a waterproof breather plug. This type of PTFE membrane is air and steam permeable, but perfectly tight to liquids (mini IP66).

Usually, in liquid cooled motors, the cooling liquid circulates around the motor submitting it to a huge difference in temperature. Depending on the environmental conditions, the condensation generated can be very significant and can damage the motor if not treated.

LC motors have draining holes and thanks to their performing patented breathable waterproof membrane the maintenance operations are dramatically reduced.

The breather plug regulates the condensation level in a time and cost-effective way:

- Reduced machine downtime maximizing production continuity
- Decreased maintenance cost

# LC series

## Clever simplicity

### Energy Savings

The LC series has been designed to achieve the efficiency levels defined in IEC 60034-30-1 standards. As standard, LC motors are IE3 Premium from 150 to 1500 kW.

### Ready for heavy-duty applications

The liquid cooling system of LC motors is provided by water circulation over the frame housing.

This system maintains the thermal efficiency, enabling the motor to be used together with a drive, from low to high speed, for heavy-duty applications that require constant torque.

- Cooling circuit: IC71W
- Frame: steel, jacket cooled
- Liquid inlet /outlet: by flanges or threaded holes
- Windings impregnated with VPI system

### Variable speed application

The LC motor has been designed integrating specific features as standard:

- Thermal reserve for maintaining the rated torque over an extended speed range

In order to meet particular requirements, options can be provided upon request:

- Reinforced winding insulation and insulated bearings for main voltages > 400 V, long cable lengths and frequent operation during the braking phase
- Motors can be equipped with an encoder for applications that require precise positioning

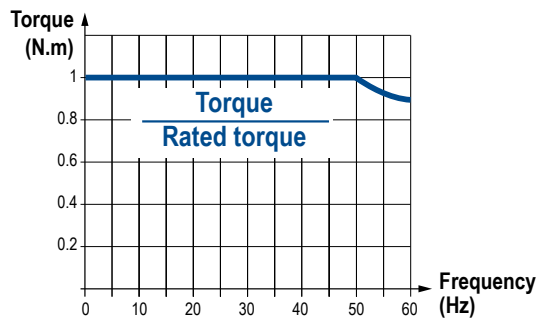




### Benefit from a variable speed solution

Choosing to convert to variable speed can generate immediate operating profits:

- Up to 50% energy savings depending on the application and operating conditions
- Reduced maintenance cost for the mechanical control components
- Better productivity as a result of improving the process and reducing machine downtime



*Operation at constant torque across the entire speed range, without derating.*

*No external fan required as is the case for air-cooled motors.*

# LC series

## Impressive advanced technology

### Easy to use and optimized maintenance

LC motors have been developed to reduce operating costs without compromising the industry needs:

#### Easy to use

- Protection degree IP56 or IP65 to reinforce tightness against external aggressions
- Space heaters to ensure safety during motor start-up
- Winding and endshield thermal protection to control and monitor the motor temperature
- Adaptation on endshields for vibration measurement
- Water leakage detector to control the water circuit reliability
- 1 auxiliary terminal box with 2 x ISO 16 drilling holes to ease the connexion of the water leakage detector and space heaters

#### Optimized maintenance

- Drain plugs to facilitate condensate evacuation
- Breather Plug (breathable waterproof membrane), considerably reducing the condensates, to facilitate maintenance
- Insensitive to pollution to extend the motor winding lifetime
- No more pollution associated with the airflow maintaining a clean surrounding environment
- No impact on ambient temperature (waste heat from the motor is carried away by the cooling circulation)
- Improved modularity in case of retrofit installation
- Water leakage detector to control the water circuit reliability

Protection degree



*Design particularly suitable for sealed applications*

Modular mechanical system



*The steel frame is designed to meet customers' requirements*



## Drive & motor technology

Our advanced drive and motor technology and automation solutions are designed focusing on maximizing energy savings across a wide range of industries, enhancing performance and optimizing productivity.

New regulations define the minimum efficiency level of the motor, but variable speed systems made from motor and drive solutions are increasingly being considered as the most effective combination to generate the highest energy savings.

The new LC motors are developed to offer state of the art reliability and efficiency, offering customers the choice of an easy-to-select and easy-to-install solution.



Variable and fixed speed

## Benefit from state of the art reliability and efficiency

	Performance	Reliability	Selection	Installation
<b>Construction &amp; Design</b>				
Magnetic circuit optimization	•	•		
Air gap optimization	•	•		
Low loss steel lamination	•	•		
Enhanced slot filling	•	•		
Component rationalization			•	•
Robust mechanical parts	•	•		•
High quality components	•	•		
Breather Plug for condensates		•		
<b>Characteristics</b>				
Reduced starting current	•	•		•
Reduced sound pressure level			•	•
Compacity / Higher outputs	•		•	•
IE3 efficiency level	•			
<b>Variable speed use</b>				
Fully characterized	•	•	•	•

# LC series

## Designed to last

### Mechanically robust

- Robust design based on simulation and testing
- Robust cast iron or steel end shields
- Rigorous balancing provides a reduced level of vibration

### Approved sealing

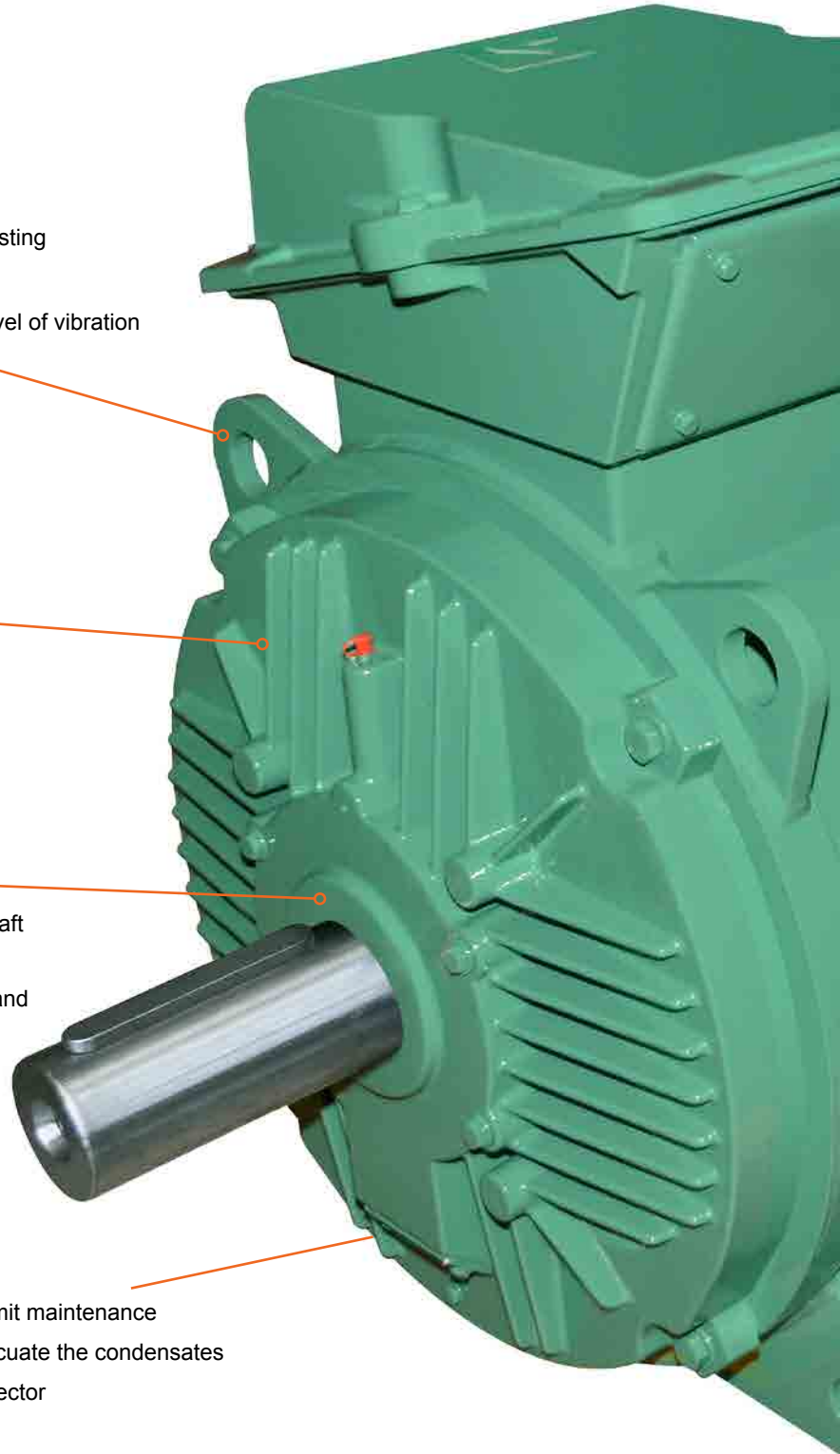
- IP55 Sealing system approved by an independent and qualified laboratory
- Low energy loss shaft sealing

### Extended bearing life time

- Properly sized bearing to accept a high shaft load
- High quality grease for a long service life and spaced greasing intervals

### Maintenance

- Breather plug to limit maintenance
- Drain holes to evacuate the condensates
- Water leakage detector





## Electrical safety

- Large terminal box for an easier and safer access to connexion

## Easy Connection

- Flanges for water inlet & outlet
- Auxiliary terminal box to facilitate the connexion with the detector

## Optimized characteristics

- Magnetic circuit optimized to match the IE3 efficiency class
- Reduced  $I_d/I_n$
- Designed and characterized for use with an inverter or direct-on-line
- Encoder adaptation

## Thermal protection

- Various models are available upon request (PTC, PT100, KTY, etc.)

## Electrical specifications

- 1 nameplate for main supply
- 1 nameplate for drive supply

## Electrically robust

- Dedicated options for variable speed use:
  - reinforced insulated winding system
  - insulated bearings
- Impregnation varnish without solvent
- Designed with a 25K thermal reserve

# LC series

## A complete optimized offer

### Standard features

- Frame sizes: 315 to 500 (< 315 and > 500 on request)
- Voltage: 400V for 315 to 450 mm / 690V for 500 mm
- Number of poles: 2, 4 & 6
- Frequency: 50 or 60 Hz
- Insulation class: F or H
- Mounting: B3, B35 and V1 (other position on request)
- Double nameplate: DOL + variable speed characteristics
- Water leakage detector

### Main optional features

- Insulated DE & NDE bearings
- Winding and endshield thermal protections (PT100, CTP, KTY or others)
- Encoder
- Space heaters, etc.

### Special features

- Marine certification: ABS, Lloyd's, DNV, BV, etc.
- Conformity cURus (winding insulation system)



## Output power per frame size (f = 50 Hz)

### IE3 Premium Efficiency Motors

3000 rpm		1500 rpm		1000 rpm	
Type	kW	Type	kW	Type	kW
LC 315 LA	220	LC 315 LA	220	LC 315 LA	150
LC 315 LB	250	LC 315 LB	250	LC 315 LB	170
LC 315 LKA	315	LC 315 LKA	315	LC 315 LKA	270
LC 315 LKB	355	LC 315 LKB	355	LC 315 LKB	315
LC 315 LKC	400	LC 315 LKC	400	LC 355 LA	270
LC 355 LA	400	LC 355 LA	400	LC 355 LB	315
LC 355 LB	450	LC 355 LB	450	LC 355 LKA	355
LC 355 LKA	550	LC 355 LC	500	LC 355 LKB	400
LC 355 LKB	700	LC 355 LKA	560	LC 355 LKC	500
		LC 355 LKB	630	LC 400 LA	500
		LC 400 LA	750	LC 400 LB	650
		LC 400 LKA	850	LC 400 LKA	850
		LC 450 LA	1000	LC 450 LA	950
		LC 450 LB	1200	LC 450 LB	1050
		LC 500 L	1500	LC 500 M	1300

# IMfinity®

## Powerful versatility

IMfinity® motors are available in several different construction variants and finishes, to meet the varied requirements of applications on the market. Whether for manufacturing with constraints on the load factor, cycle profile, productivity, etc., or for processes under harsh operating and environments, there is an IMfinity® motor that fits the bill.

**LC motors are particularly recommended for Plastics & Rubber, test rigs and Marine applications.**

### Typical industries:

Plastics & Rubber

Test Rigs

Printing

Food & Beverage

Port Logistics

Packaging

Textile



Marine

Industrial Refrigeration

Glass

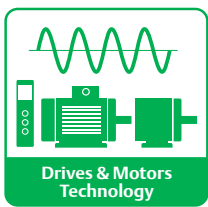
Metals

Nuclear power

Water







# Drive & Motor Technology

## The widest range of motors and combinations adapted to the various needs of industries and applications

The IMfinity® motor ranges (aluminium, cast iron, IP23 drip-proof and liquid cooled frames) are designed to allow a large combination of adaptations, such as gearboxes, brakes, speed feedback (encoders), forced ventilation units, etc.

All of these motors, with or without special adaptation, are designed to work with variable speed drives, such as the Unidrive M & Powerdrive ranges.

### Single manufacturer warranty

The combination of a motor-drive package made by a single manufacturer ensures excellent performance of components designed for optimum operation, backed up by a comprehensive warranty from a single source.

### IMfinity® platform



**LS**  
Non IE  
Aluminium IP55  
Frame size 56 up to 225 mm  
2, 4 & 6 poles  
0.09 up to 45 kW



**LSES**  
IE2 - IE3  
Aluminium IP55  
Frame size 80 up to 315 mm  
2, 4 & 6 poles  
0.75 up to 200 kW



**FLSES**  
IE2 - IE3 - IE4  
Cast iron IP55  
Frame size 80 up to 450 mm  
2, 4 & 6 poles  
0.75 up to 900 kW



**PLSES**  
IE2 - IE3  
ODP / IP23  
Frame size 225 up to 450 mm  
2, 4 & 6 poles  
55 up to 900 kW



**LC**  
IE3  
Liquid cooled / IP55  
Frame size 315 up to 500 mm  
2, 4 & 6 poles  
150 up to 1500 kW

### Geared motors



**Compabloc**  
up to 14,500 Nm



**Orthobloc**  
up to 23,000 Nm



**Manubloc**  
up to 14,500 Nm

### Brake motors



FFB from 0.12 to 22 kW



FCPL from 37 to 400 kW

### Drives



Unidrive M - 0.25 to 2.8 MW



**Powerdrive F300**  
1.1 to 200 kW



**Powerdrive MD2**  
45 kW to 2.8 MW



**Varmeca**  
Built-in variable speed drive  
0.25 to 11 kW

# Drive and Motor Services

## Local, continuous, customized support



- Audit and consultancy
- Standard installation audits by an industry expert
- Optimized energy savings and return on investment
- System customization and upgrading
- Installation and commissioning
- Full training
- Maintenance
- Installations and resources throughout the world



## An enhanced global presence that benefits all of our customers

Through our integrated organization, we have an extensive global presence that provides comprehensive local support and services. This includes:

 5,500 employees



### 40+ Automation Centers

Providing excellent customer support for any product, automation solution or service requirements



### 23 Manufacturing sites

Producing a comprehensive range of high quality products, optimized for industry-specific customer requirements



### 8 Engineering and Design facilities

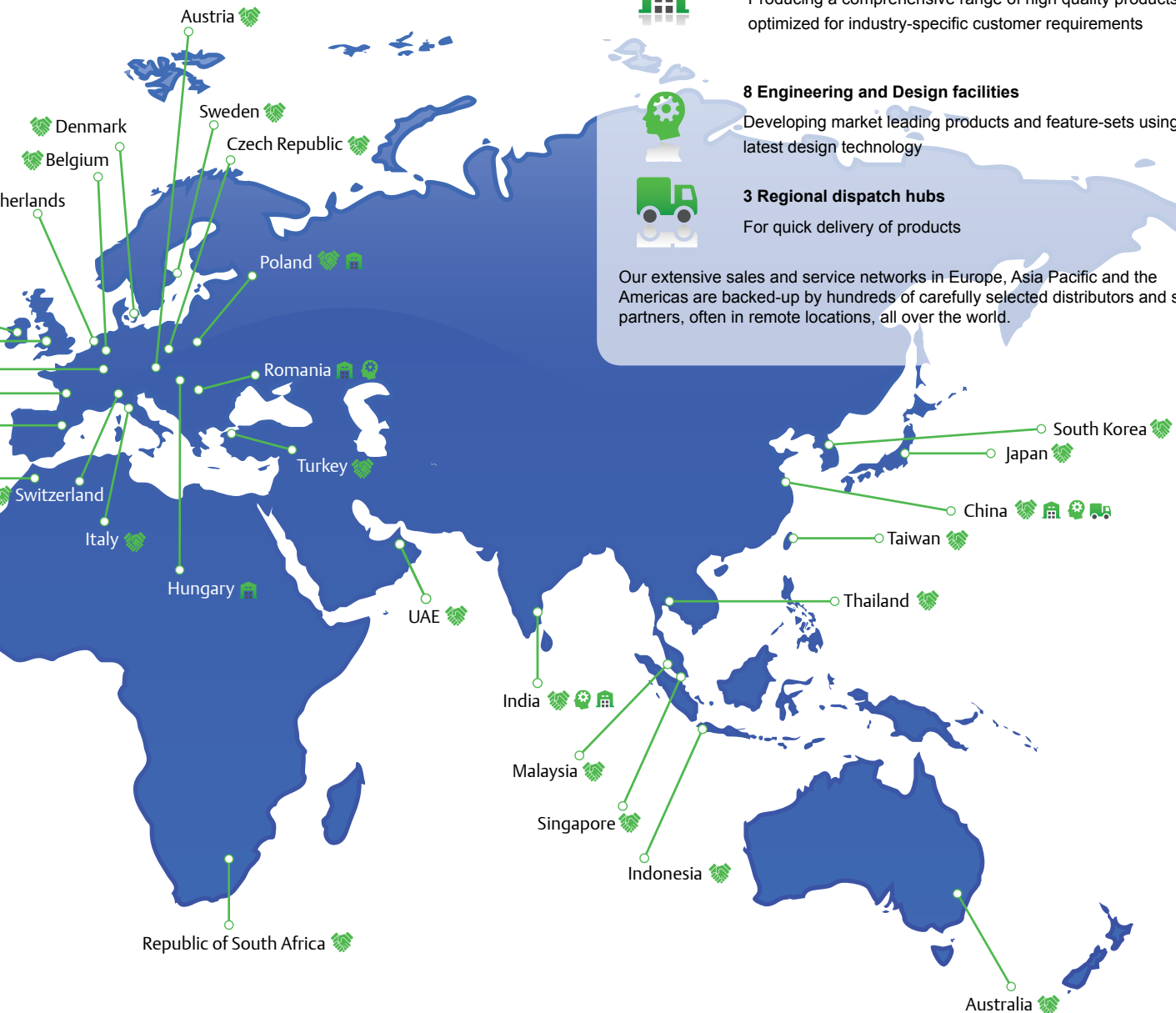
Developing market leading products and feature-sets using the latest design technology



### 3 Regional dispatch hubs

For quick delivery of products

Our extensive sales and service networks in Europe, Asia Pacific and the Americas are backed-up by hundreds of carefully selected distributors and service partners, often in remote locations, all over the world.



Note that several countries have more than one of the facilities represented by the icons.

Services are optimized independently for each country. Please contact your local representative for more details of regarding our offer in your country.

# LC series

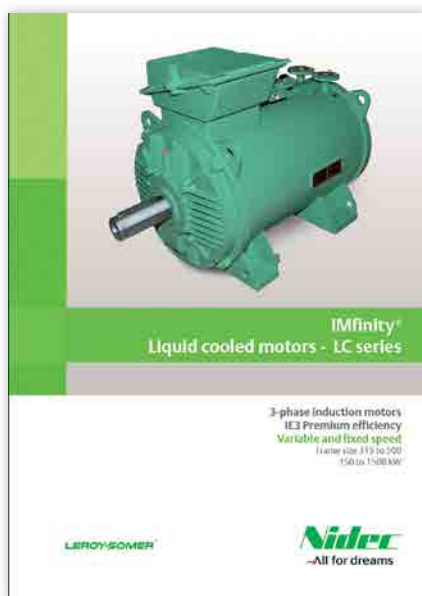
## Make it your own

LC motors fully comply with regulations on efficiency and are tailored for variable speed and fixed speed operations. Powerful tools have been developed or adapted to help you to choose the right combination of motor and drive package or direct-on-line motor.

### Motor technical catalogue

This catalogue contains, in one single volume, all of the information related to mechanical/electrical performance and dimensions of the LC motors.

The performances are given for direct-on-line or drive power supply.



A dedicated guide is available for more information about new versions of the IEC standards and new projects currently in preparation, European directives and their updates, as well as future regulations currently in preparation.

## Configurator

Configurator is a powerful tool to assist in the selection of motors combined with variable speed drives. The continuous evolution of this software reaches a new level with IMfinity® motors, offering the user the possibility of linking up the motor and drive selection.

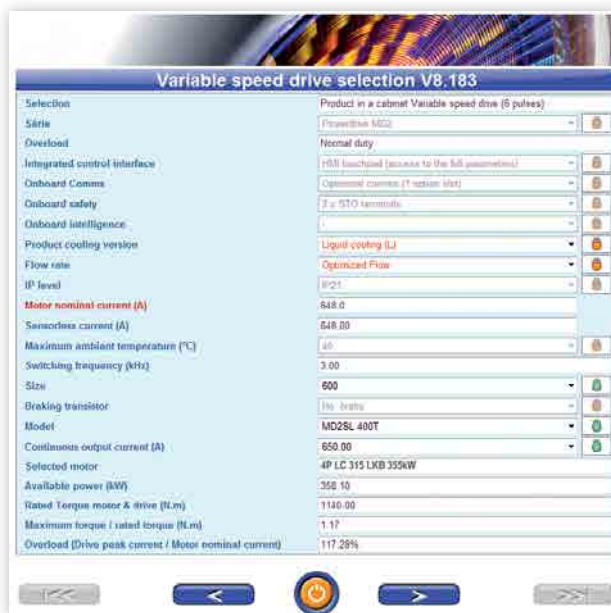
Best-in-class motors and drives combined with this advanced tool ensure that the best association is made when selecting products.



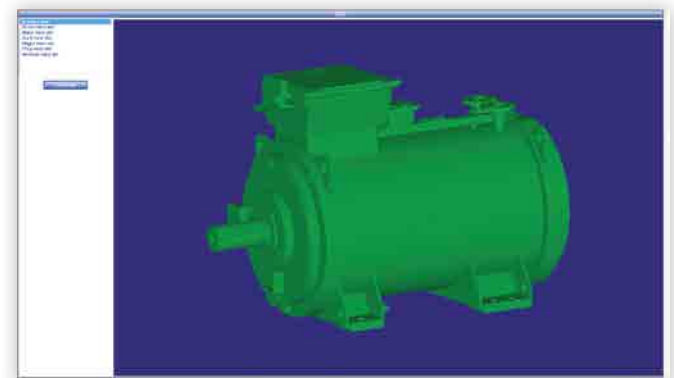
Type of control selection



Motor selection



Drive selection, linked to motor selection



CAD files for motors (2D, 3D)

# Leroy-Somer™

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[theautomationengineer.com](http://theautomationengineer.com) (blog)



***Nidec***  
All for dreams

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