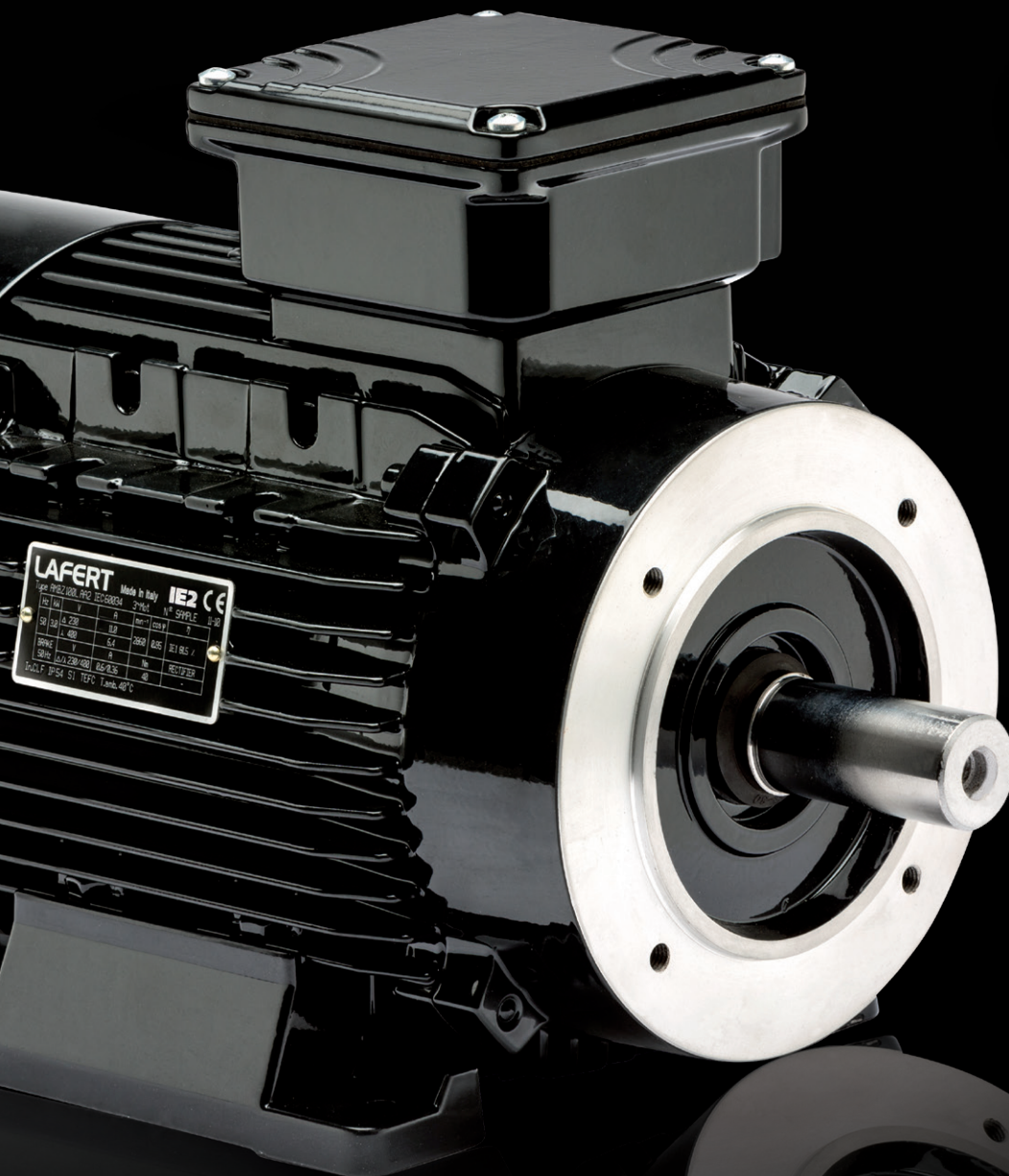


SOLUTIONS FOR THE GLOBAL WIND INDUSTRY





WORLD LEADING MOTOR SUPPLIER FOR THE WIND INDUSTRY

The offshore and onshore wind turbine business fits perfectly into the Lafert Group portfolio of industry sectors due to the experiences gained in over 50 years of specialist application motor production.

Focusing on the areas of Industrial Automation, Energy saving and Wind Industry, Lafert is the preferred partner for many of the world leaders in the Wind Industry with motors installed in more than 20,000 nacelles on turbine installations worldwide.

The strong focus on quality and lifetime reliability, combined with the challenge of continuous improvements in motor efficiencies puts Lafert in a strong position as the partner of choice.

The motor range includes:

- AC and PM motors designed specifically for Wind Industry applications with an efficiency level IE2-IE3-IE4-IE5;
- Single speed and two speed AC motors;
- PM motor and drive packages, combined or integrated, to optimize performance;
- Dedicated multispeed PM motors controlled by VFD;
- Brake motors with AC or DC brake;
- Mechanical and electrical adaptations to specific applications;
- Pad mounting design for ventilation systems;
- Mechanical components and paint systems delivering high corrosion protection for offshore environment.

Lafert can offer, where there is a strong focus on efficiency and weight, IE4-IE5 PM motor technology, in general PM motors are half the weight of AC motors of a similar power/size.

Mechanical components and paint systems have been tested thoroughly with an in-house life cycle climatic chamber test system for arduous environments to a point that we have exceeded our customers expectations in many areas.

This combined with the ability to friction weld motor shafts with magnetic and stainless steel materials mean that corrosion of critical components really can be a concern of the past.

Especially for the offshore applications, Lafert can achieve a corrosive category of up to C5-M(H) which means that our corrosion protection system meets the highest requirements for protection of water condensation and neutral salt spray as defined in DS/EN ISO 12944.

Lafert focuses on many motor applications within the Wind Industry, especially:

- Yaw and Pitch drive
- Oil hydraulic and power pack
- Pumps and ventilation
- Service or person lift.

MOTORS' DEDICATED DESIGN

- Reliable, robust and high quality
- Mechanical components and paint systems tested for severe environments
- High corrosion protection level for offshore environment (ISO 12944)
- Specific motor internal protection (moisture-proof varnish)
- Specific wire insulation design for high voltage

IE2 IE3 IE4 IE5

CORROSIONITY CATEGORY as defined in DS/EN ISO 12944	DURABILITY RANGES	DS/EN ISO 6270 (water condensation) Hours	EN ISO 9227 (neutral salt spray) Hours
C3	Low (L)	48	120
	Medium (M)	120	240
	High (H)	240	480
C4	Low (L)	120	240
	Medium (M)	240	480
	High (H)	480	720
C5-M	Low (L)	240	480
	Medium (M)	480	720
	High (H)	720	1440



YAW BRAKE MOTORS

In order to generate a maximum amount of energy from wind, the optimal orientation and the positioning of the nacelle are of a fundamental importance.

The **Yaw Drive** mechanism require reliable and efficient components.

- **Brake Motors** size 100 to 132, 2 to 6 poles, depending on needed brake torque and system design.
- Soft start based on a dedicated winding design, to secure long lifetime of the Yaw gear.
- AC or DC brake with a dedicated corrosion protection thanks to stainless steel brake disks.

PITCH CONTROL MOTORS

Pitch Control Motors have the primary purpose of set wind turbine blades at the best angle to the wind.

- Strong **AC Motor range** that includes possibilities for customisation to meet specific application needs.
- Compact high performance **PM Servo Motors** optimized by size/output, in IE4 or IE5; PM Motors can be in IEC housing and are half the weight of AC Motors of a similar power/size.
- Specifically designed for harsh environment in the hub/Nacelle, with special attention to vibration and temperature level.

HYDRAULIC PUMPS AND VENTILATION

Different applications in the Nacelle system require driving and control of hydraulic pumps for on board motorizations (for example pitch positioning) and cooling/ lubrication liquid.

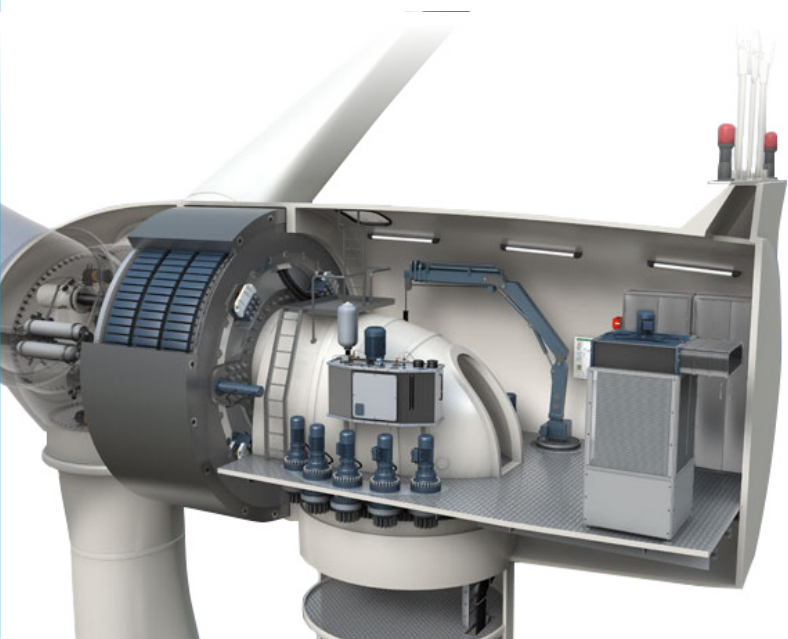
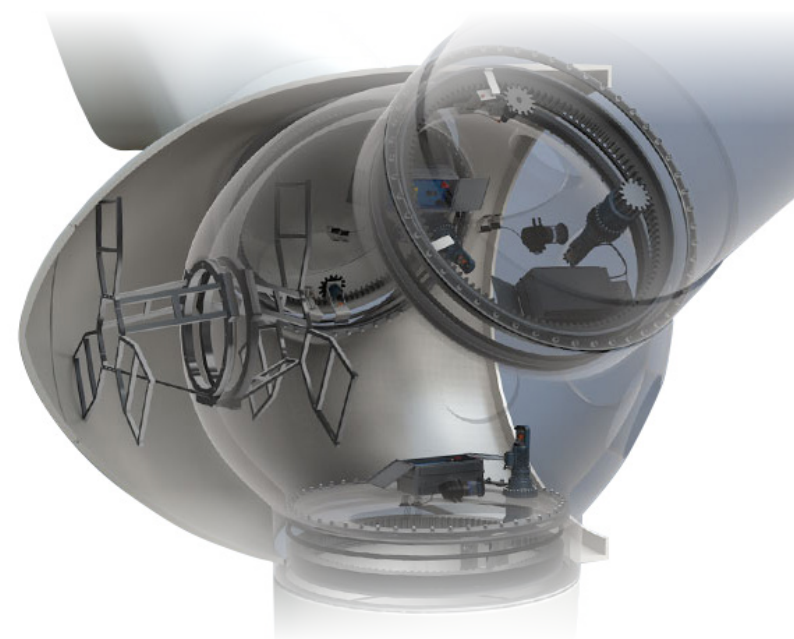
- **Cooler Motors** 0.37 to 22kW with strong customisation of the motor components such as shaft, flange or electrical design.
- **Hydraulic Pump Motors** with output up to 37kW and possible use of two speed motors.

These installations often operate in harsh environments and this demands guaranteed quality on special finishes and anti-corrosion treatments.

LIFT MOTORS

Laferet can offer different solutions for **service and persons lift**.

- **Brake Motors**, 1.5 to 3kW, according to specific Wind Turbine rules.
- **Small Brake Motors**, 0.37 to 2.2kW, single or two speed.



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