Nuclear Applications

Low voltage safety related induction motors

Alternators for emergency diesel generators

LEROY-SOMER™

Nidec

All for dreams

Trusting our nuclear expertise & safety culture

A world-class organization at your service

Leroy-Somer is a world leading manufacturer of drive systems, electric motors and alternators.
The company has built a global organization and processes connecting some of the best experts in Motor & Drive systems and Power Generation around the world. This unique approach allows for global project management, with direct input from R&D and engineering.
We also provide comprehensive customer support, from initial specifications to equipment commissioning stage, including equipment qualification and personnel training.

50 years of commitment in the nuclear industry

We have been designing and manufacturing motors and alternators for the nuclear industry for over 50 years.
Tapping into the French ecosystem of nuclear innovation and development, we have developed a unique expertise that encompasses installed base management and new projects.
Thousands of our products are making nuclear facilities safer around the globe.

Our offer covers solutions for both safety and non-safety applications:

- Motors from 0.55 kW to 675 kW, low voltage
- Alternators from 20 kVA to 20 MW, low & medium voltage

Long term nuclear strategy

Over the years, Leroy-Somer has developed a strong nuclear knowledge and a dedicated organization for the specific activities that are core of the nuclear expertise.
Our team is trained and expertized all along the complete value chain.

A dedicated team with recognized expertise

We have built a team of nuclear experts understanding all the requirements and expectations for the management of any nuclear project.

- Applicable nuclear qualification standards
- Supply chain
- Design, manufacturing and test processes
- Quality & traceability controls
- Surveillance management from our client and the operator
- Complete testing
- End Of Manufacturing Report (EOMR)

Meeting the highest standards

Well established Quality Management System (QMS)

Our general Quality Management System is ISO 9001 and ISO 14001 certified.
Our nuclear activities are compliant with the IAEA international nuclear quality standards such as IAEA-50-C-Q or GS-R-3.
All staff involved in nuclear activities attend special training session to maintain their safety awareness and expertise at the highest level.
Our organization is fully audited by our main clients and international operators on a regular basis. Our offering also satisfies with key quality requirements such as EDF SGAQ.

Certification ISO 19443

Our nuclear motor factory is certified according to the ISO19443 quality standard (design & manufacturing).

Proven qualification processes

Our nuclear range of motors and alternators is qualified for normal & accidental conditions (Earthquake – LOCA)

Our qualification file follows the requirements of the main international codes & standards:

- RCC-E (1EK1, K2, K3, K3AD, NC)
- IEEE 323-334-344-387
- IEC 60-980
- IEC 60-034 series
- Others

Our products have been tested by recognized certifying laboratories regarding all required specifications:

- Thermal ageing
- Mechanical ageing
- Irradiation ageing
- Electromagnetic compatibility test
- Vibration & Seismic test

All personnel involved in nuclear activities (research, manufacturing, quality assurance, testing, etc) are subject to special qualification procedures (such as ACQPA paint certification for example).

Providing high-end project management

Comprehensive project organization

Our dedicated nuclear teams are organized to meet your expectations. A single project manager will follow-up on your order, from the initial specifications to the final delivery phases and the maintenance program.

We ensure an efficient execution of the contract during the design and manufacturing phase in close relationship with our customer (schedule management, supply of qualification documentation, customer review, witness management, review of the End Of Manufacturing Report).

This project organization is key to satisfy client's expectations.

Review of requirements

▼

Order launch

▼

Documentation & product delivery schedule management

▼

Design documents
(plans, data sheet, torque curve, etc.)

▼

Accident conditions design specifications
(seismic resistance calculation, estimated radiation resistance rating)

▼

Project Quality Assurance Plan (PQAP)
(quality plan)

▼

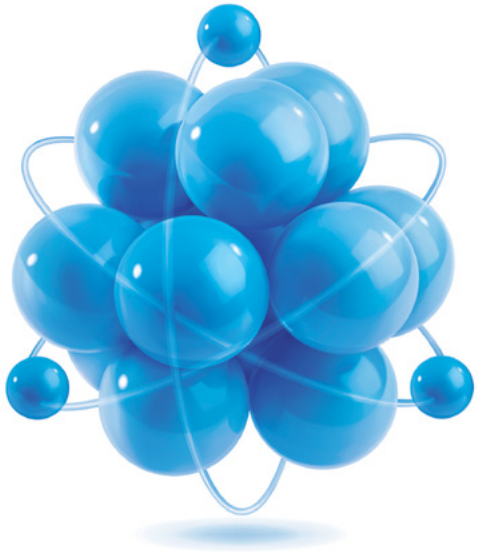
Product manufacturing follow-up
(witness point, holding point etc...)

▼

End of Manufacturing Report (EOMR)

Document workflow

- Project Schedule
- Follow-up document
- Quality Related Activity list (QRA)
- Data sheet
- Torque and current curves
- List of electrical consumers
- Motor drawings
- Seismic calculation note
- Natural frequency note
- Qualification summary note
- End Of Manufacturing Report



Applications for nuclear power plants

Actuator & Valve control

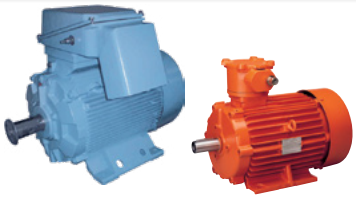
K1 and K2 qualified motors

Containment room

Various Pumping, Ventilation, Compressor, Filtering, Hoisting Systems, ...

NC, K3, K3AD qualified motors

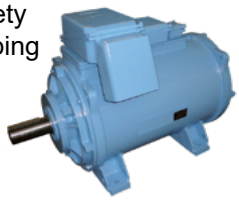
ATEX



LHSI pump

Low head safety injection pumping system

K3 AD



EFWS-ASG pump

Emergency feed water system

K3

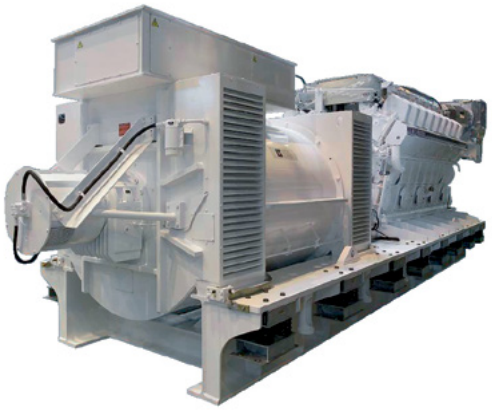
CHRS - EVU pump

Containment heat removal system

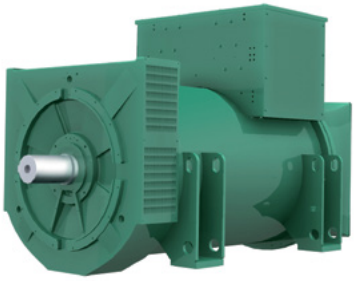
K3AD

AREVA, representation of the EPR™ reactor

Alternator for Emergency Diesel Genset



Alternator for Ultimate Diesel Gensets



Double Analog Voltage Regulator cabinet

RCCE K3 qualified cabinet

Single Analog Voltage Regulator

Analog AVR for cabinet mounting

Outstanding product range

Solid design

Our highly skilled engineering teams focus on optimization and continuous improvement resulting in outstanding electrical performances, life span and mechanical behavior. For this purpose, we use the best computation tools relying on Finite Element Analysis (FEA) and 3D CAD design. We work at every stage, from initial specifications to final testing, with the aim to ensure a sound behavior of the motor-generator system on site.

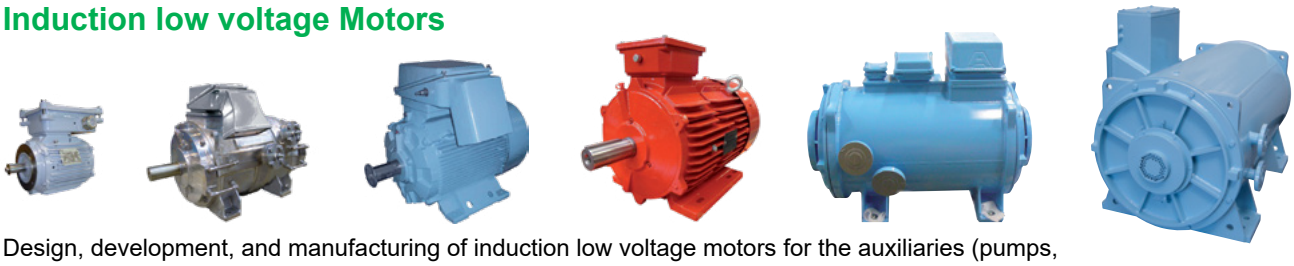
High-quality production

Our production sites, located in France for the nuclear, are equipped with state-of-the-art machinery. We achieve product excellence and reach expected performances through high quality components and controlled processes at every step. CNC plasma and laser cutting tools, precision form-wound winding, vacuum-pressure impregnation are some of the equipment operated by qualified and dedicated workers.

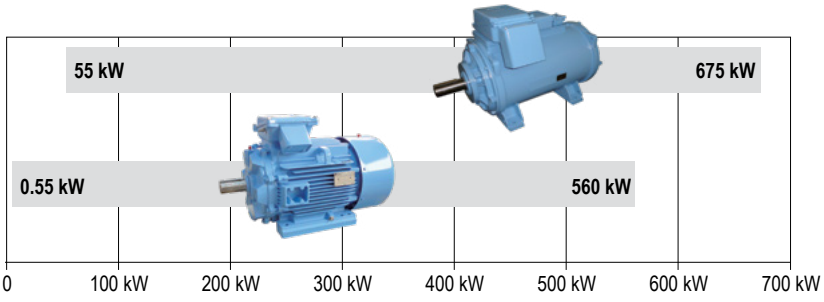
Advanced testing

All system components are tested in vibration, thermal and electric stress tests. Our facilities are equipped to validate all key specifications, from design to completion.

Induction low voltage Motors



Design, development, and manufacturing of induction low voltage motors for the auxiliaries (pumps, compressors, fans, valves, handling…) in nuclear power plants.
The dedicated nuclear range of induction motors meet the performance requirement for energy using product specified in the European legislation (directive EU 2009/125/EC/ of October 21, 2009 and the ERP regulation 640/2009 of July 22, 2009).
Our motors are K1, K2 safety classified inside reactor building, or K3, K3AD, NC, NC AD inside conventional islands.
Range of power supplied: from 0.55 kW to 675 kW.



IE3 IE4

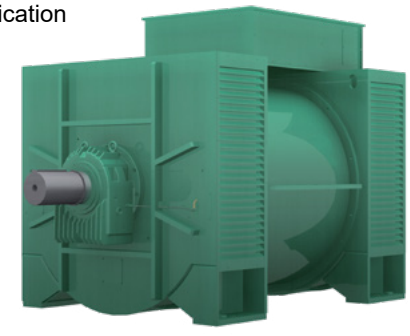
	Classification							
	Seismic resistance			Radiation accumulation (kGy)		Decontaminable paint		
	SC1	SC2	n.a.	< 5	> 5 < 100	No (PIA/PEC)	Yes (PIC)	No (PID)
NC		■	■	■		■	■	■
NC.AD		■	■		■		■	■
K3	■			■		■		■
K3.AD	■				■			■
K2	■				■		■	
K1	■				■		■	

Seismic resistance SC1 - SC2 Radiation from 5 to 850 kGy (85 Mrad) K1 - K2 - K3 - K3AD ; 1EC - 1EB

Emergency & Stand-by Generators

Design, development and manufacturing of K3 emergency and stand-by generators with analog AVR.
Synchronous self-excited alternators, medium and high speed range from 1 to 20 MW and from 380 V to 15 KV.

- Auxiliary winding AREP excitation with permanent magnet inductor (PMI), PMG available on request
- Alternators designed according to RCCE K3 requirement or IEEE 1E classification
- Other nuclear design references available upon request
- 40 or 60 years lifetime qualification
- Alternator seismic qualification performed by Leroy-Somer
- Single Analog AVR our double AVR cabinet RCCE K3 qualified



Global industrial footprint


Czech Republic
Poland
Romania
Hungary
India
China

World-class references

Motors

France

EDF Flamanville EPR (EFWS, CHRS, UCWS, JAC, ISBP, …)
- Pump and ventilation applications
- NC, K1, K2, K3, K3.AD & Atex qualified motors

EDF UTO: replacement motors for 58 nuclear power plants in France
- Motorisation for valves
- NC, K1, K2 & K3 qualified motors

UK

Hinkley Point C Project
- 2 EPR, various safety related applications - pumps, fans, valves, and others

Belgium

Tractebel / Suez
- Doel and Tihange power plant
- Replacement motors for pump, ventilation and other applications
- 1EB qualified motors according to IEEE standard

China

Taïshan EPR (EFWS, CHRS, ISPB, …)
- Pump and ventilation applications, etc.
- NC, K1, K2, K3, K3.AD & Atex qualified motors

1000 MW power plants: Ling Ao, Guangdong, Qinshan, Hongyanhe, Ningde, Yang Jiang, Tianwan Lianyun gang
- Pump, ventilation and valve control applications
- NC, K1, K2 & K3 qualified motors

South Africa

Koeberg: replacement motors for pump and ventilation applications
- K3 qualified motors

To name but a few …

Alternators

France	EDF DUS/CCL and FARN projects
China	Sanmen AP1000 Haiyang AP1000 Ningde Hongyanhe Qinshan 2 Ling Ao
India	Kudankulam
Korea	Wolsong 2, 3 & 4
Romania	Cernavoda
Russia	Leningrad 2 - Unit 1 Beloyarsk 3
Sweden	Ringhals Oskarshamn OKG2
Taiwan	Maanshan

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All for dreams

Moteurs Leroy-Somer SAS. Headquarters: Bd Marcellin Leroy, CS 10015, 16915 Angoulême Cedex 9, France. Share Capital: 32,239,235 €, RCS Angoulême 338 567 258.

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