



Franklin motors maneuvering a submarine in 1000 meters under the sea



The technically unique submarine LULA1000 is the heart of the Rebikoff-Niggeler Foundation (FRN), a non-for-profit organization for marine research based on the Island of Faial in the Azores/Portugal. On board are 5 Franklin Electric 4" encapsulated motors for the main drive as well as the maneuvers in all axes.

Rebikoff-Niggeler Foundation

The Foundation's goal is to facilitate research and in-situ observation and documentation of deep-sea environments by means of manned submersible technology. The research and film projects are being realized with different national and international partners, such as the Governments of the Azores and of Madeira, the University of the Azores, the University of Cologne, the BBC („Blue Planet II“) and several other TV companies, and technology partners such as Franklin Electric.

The interior has a special ergonomic design for maximum comfort during the long dives with an average duration of five hours. It has excellent maneuverability, even in difficult underwater terrain.

Before the LULA1000 actually dives into the deep sea, multibeam sonar surveys are carried out to create bathymetric maps, which can then be used to identify areas of special interest.

LULA1000 is a stable work platform which was built according to the rules of the classification society Germanischer Lloyd (DNV-GL), who carries out yearly inspections and tests. These rules are very strict and have been established to guarantee a safe operation.

Looking for a cost-effective, yet reliable motor to drive the submarine's positioning propellers, the designers approached Franklin Electric in 2009. Although the requested use lies well outside the scope of the original

motor design, Franklin Electric engineers were appealed by the challenge to see their creation working on board of a submarine. With minimal modifications, Franklin Electric 4" submersible motors are now part of a 11-year success story.

The LULA1000

The LULA1000 can take three people to a depth of 1000 m. The submarine is equipped with a large viewport of 1.4 m in diameter and the latest technology to collect oceanographic data and samples. It is perfectly prepared to take high-quality video and audio documentation about deep-sea animal life and behaviour.



Technical data LULA1000:

Classification:	DNV-GL/Hamburg
Viewport:	150° spherical viewport (diameter: 1414mm)
Length over all:	7.50m
Propulsion:	5 x Franklin Electric submersible motors 2.2 kW
Equipment:	Ultra HD video cameras
Illumination:	4 x HMI 400W 6 x HMI 200W
Navigation:	360°-sonar, fluxgate compass, DVL, depth sounder, USBL tracking system, auto pilot
Sampling box:	hydraulically retractable, 50 litres



In addition to the overarching vision of being able to offer clean drinking water to everyone, Franklin Electric also has the goal to contribute to the sustainability of the planet. Of course, this also includes the world's oceans. Franklin is therefore happy to be able to support such projects.

Franklin Electric motors on board

LULA 1000 is maneuvered by 5 submersible motors 2.2 kW each. The electrical winding design was modified to match the submarine on-board voltage, the mechanical design remained almost unchanged. Like the standard deep well motors, these motors were 100 % factory tested before being delivered to the building shipyard. After more than 180 successful dives, these motors are now being replaced as part of a larger submarine overhaul.



The Franklin motors are used for the main drive and for the maneuvers in all axes. A planetary gear is used in the LULA1000 to drive a large diameter propeller. This is the main propulsion unit and has the advantage that the submarine can accelerate and stop quickly. Small, directly driven propellers are used for the lateral and vertical drive.

Technical data of LULA1000 integrated 4" encapsulated submersible motors:

Three phase motor with highest efficiency and maximum product life under extreme working conditions:

Rating:	2.2 kW
Thrust load:	4 kN
Voltage:	100V / 50 Hz
Material:	316SS

- Stainless Steel splined shaft
- StatorShield™ - Franklin encapsulation system: Hermetically-sealed stator resin
- Factory filled with Franklin's non-toxic water based fill solution
- High capacity Kingsbury type liquid lubricated thrust bearing for 100 % maintenance free operation
- Field replaceable lead using Franklin's exclusive Water Bloc technology
- Pressure-equalizing diaphragm
- High efficiency electrical design for low operation costs
- Manufactured in ISO 9001 certified plant, 100% tested
- Drinking water approvals



For more information to 4" Franklin Electric encapsulated motors please visit the website: franklinwater.eu/products

