



Project
Nacelle Wind Turbine
Workskills 2024

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Your contact
services.didactic@festo.com

Festo Didactic Ltd
675 rue du Carbone
Québec City, QC G2N 2K7
Canada

Phone +1 418 849 1000
services.didactic@festo.com

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Festo Didactic – Technical Education Solutions

Festo Didactic is the world-leading provider of equipment and solutions for industrial education. We design and implement learning centers and laboratories, educational equipment and programs that train people to perform in highly dynamic and complex industrial environments. Our goal is to maximize learning success in educational institutions and industrial companies around the globe.

Festo Didactic educational solutions directly evolve from technologies and innovations in automation and engineering. They place students in real-life situations and enable them to gain practical experience with high-tech industrial components and current systems. The product design focuses on excellence in usability and practice orientation: All functional components stand out from their complex industrial surroundings. They are easy to use and easy to remember. Their specific functions, positions and connections within the learning system intuitively show how technologies really work.

All learning environments, such as learning factories, laboratory equipment and e-learning products, are offered in conjunction with technical, organizational and people-oriented training programs – in 40 languages worldwide – and are associated with services like planning and operating complex learning centers, and with consultancy services for industrial companies.



Summary of the offer

Quantity	Description	Order no.
1	Nacelle - Wind Turbine Learning System with power generator, 400 V, 3Ø ¹	610876
1	Campus Licence, Nacelle – Wind Turbine Learning System ²	8166512

¹ The system is also available in the variant 208 V, 3Ø (order no. 610875).

² The courseware is available as a campus license (PDF files) or as courses on the digital portal Festo LX (subscription required). Order no. 8133287 for 25 users, 1 year.

Items are described on the following pages.

Nacelle - Wind Turbine Learning System 46122-20



The Nacelle - Wind Turbine Learning System is a complete scaled-down version of commercial wind turbine nacelles, making it an excellent substitute for expensive actual equipment. Space efficient and affordable the machine fully interacts with users, thus enhancing the learning experience.

The training system consists of a complete drive train that includes the main shaft, a gearbox with a transparent side cover, speed sensors, a hydraulic brake, and an asynchronous generator. The yaw system is fully operational and features a 61 cm (24 in) slewing bearing, a gear motor, a drive, a position sensor, and fail-safe hydraulic brakes. A manual hydraulic pump and an accumulator, as found in real-world wind turbines, are also included. A PLC controls the different functions of the nacelle and is located in an electrical enclosure together with all the other electrical components.

A wind vane and an anemometer are in a transparent enclosure on top of the training system to monitor wind speed and wind direction. Although they are not measuring actual wind, the control system managed by the user simulates the process, causing the weather sensors to react and send signals to the control system which take the simulated parameters into account.

The Nacelle – Wind Turbine Learning System features a three-phase induction generator that can produce power. It can be considered a mechanical load unless it is connected to a grid. The optional Power generator creates such a connection, enabling the system to produce electricity. Students can then measure and monitor several actual (not simulated) electrical parameters, such as VAR, W, VA, power factor, etc.

Learning Goals

- Wind aerodynamics, Safety
- Hub and Low-Speed Shaft, Gearbox, Coupling, and Alignment
- Basic Hydraulic Circuit, Hydraulic Brakes
- Electrical Circuits and Control Systems
- Troubleshooting

Benefits

- Demonstrates how a wind turbine nacelle operates.
- Helps practice maintenance and troubleshooting skills in a safe environment.
- Faultable through the HMI.
- Cost-effective, Full hands-on training with rugged equipment.
- Comprehensive curriculum and lab exercises.

Further Information

Maintaining and operating wind turbines requires essential technical and troubleshooting skills. The Nacelle - Wind Turbine Learning System offers hands-on training for real-world operation and maintenance situations, preparing students with the skills and training for jobs as wind turbine technicians. The training system consists of a complete drive train that includes the main shaft, a gearbox with a transparent side cover, speed sensors, a hydraulic brake, and an asynchronous generator. The yaw system is fully operational and features a 61 cm (24 in) slewing bearing, a gear motor, a drive, a position sensor, and fail-safe hydraulic brakes. A manual hydraulic pump and an accumulator, as found in real-world wind turbines, are also included. A PLC controls the different functions of the nacelle and is located in a transparent electrical enclosure, with all the other electrical components. An HMI enables student to operate the nacelle. Full electrical schematics are provided. Emergency buttons and protective guards with limit switches ensure safe operation.



Campus License, Nacelle – Wind Turbine Learning System



This Campus License includes PDF versions of two workbooks (student and teacher versions), the electrical schematics, and the nacelle's user guide in English.

Further Information

The following workbooks are included:

- Nacelle
- Grid-Tied Nacelle

The course "Nacelle – Operation and Maintenance" covers the production of electrical energy from wind power with a focus on operation, troubleshooting, and maintenance of the Nacelle Wind Turbine Learning System.

The course "Grid-Tied Nacelle" is an add-on to the course "Nacelle – Operation and Maintenance". It focuses on the power generation module that allows sending electrical power back to the local power network.