

Hydraulic Pitch Hub – Wind Turbine Learning System

8095227 (46124-10)

FESTO

LabVolt Series

Datasheet



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Festo Didactic
en 120 V - 60 Hz
10/2021

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General Description

Blade-angle optimization for harnessing wind power

Housed in the hub that supports the blades, the pitch system is a combination of components that monitor and manipulate blade angles to control rotation speed, as well as the area exposed to the wind.

Pitch control is an important element of the overall wind turbine system that improves turbine efficiency by optimizing wind utilization. Pitch systems also stabilize rotational speed for uniform power generation and synchronization with the power grid. They protect the system by preventing turbine overspeed and reducing forces on the rotor during system idle or servicing.

Understanding blade positioning systems

A thorough understanding of pitch control hardware and mechanisms is essential for wind power technicians. The Hydraulic Pitch Hub – Wind Turbine Learning System provides hands-on training in real-world operation, maintenance, and troubleshooting situations.

The fully-operational system features all the components typically found in the hub of a commercial wind turbine, as well as a representation of the wind turbine blade. It addresses blade pitch control and emergency back-up systems using the technologies typical to hydraulic pitch control systems.

Compact design

The learning system is mounted on a mobile, compact frame and integrates components commonly used in industry for realistic training. The electrical enclosure, located near the HMI, houses a programmable logic controller (PLC), contactors, breakers, and an uninterruptible power supply (UPS).

Interactive wind simulations

The system is controlled and monitored using a Siemens PLC for motion control, located inside the electrical enclosure; a HMI touch screen allows communication with the PLC.

The main screen shows blade angle and rotor speed. The wind and the yaw system are simulated. With the touch screen, students can easily create wind simulations, entering values for duration, direction, and speed. In the automatic mode, the PLC determines blade angles. The manual mode allows students to perform certain actions on the blade (change angles, stop, jog, etc.) to observe the effects on the pitch system. The HMI also allows instructors to insert faults to improve troubleshooting skills.

Control through a hydraulic closed-loop positioning system

The movement of the blade, which is mounted on a slewing bearing, is controlled by a hydraulic closed-loop positioning system, composed of a solenoid-operated proportional valve for flow control, and a hydraulic

cylinder equipped with a position sensor. The cylinder is attached to the slew bearing to translate the blade pitch to the requested angle.

Topic Coverage

- Introduction to energy production with wind power
- Machine safety
- Introduction to SCADA
- Rotor
- Hydraulic systems and pitch control operation
- Electrical system
- Back-up power
- Troubleshooting

Features & Benefits

- Fully-operational, single-blade positioning systems
- Blade movement actuated by a hydraulic cylinder
- Industrial components: electrical panel with servo motion controller, programmable logic controller (PLC), contactors, breakers, and uninterruptible power supply (UPS)
- Human-Machine Interface (HMI) to control the system and set faults
- Emergency pushbutton and protective guard for safe operation
- Can be connected to the Nacelle Wind Power Learning System
- Turnkey courseware

Manual

Description	Manual number
Hydraulic Pitch Hub – Wind Turbine Learning System (Drawing Set) _____	8098171 (55555-00)

Optional Equipment

Qty	Description	Model number
1	Hydraulic Pitch Hub - Campus License _____	8098185 (55555-0C)

Optional Manual(s)

Qty	Description	Model number
1	Hydraulic Pitch Hub – Wind Turbine Learning System (Drawing Set) _____	8098171 (55555-00)
1	Hydraulic Pitch Hub (Workbook) _____	8098175 (55555-20)
1	Hydraulic Pitch Hub (Workbook (Instructor)) _____	8098173 (55555-30)

Specifications

Parameter	Value
Dimension	
without HMI	L1300 x l750 x H1370 mm
HMI behind	L1570 x l750 x H1370 mm
HMI on side	L1350 x l970 x H1370 mm
Weight	226 kg
Electrics	
Nominal current	6 Amp.

Module Options Description

Hydraulic Pitch Hub - Campus License
8098185 (55555-0C)

List of Manuals

Description	Manual number
Hydraulic Pitch Hub (User Guide) _____	8098169
Hydraulic Pitch Hub – Wind Turbine Learning System (Drawing Set) _____	8098171 (55555-00)
Hydraulic Pitch Hub (Workbook (Instructor)) _____	8098173 (55555-30)
Hydraulic Pitch Hub (Workbook (Instructor)) _____	8098174
Hydraulic Pitch Hub (Workbook) _____	8098175 (55555-20)
Hydraulic Pitch Hub (Workbook) _____	8098176
Hydraulic Pitch Hub – Wind Turbine Learning System (Drawing Set) _____	8107371 (55555-06)
Hydraulic Pitch Hub – Wind Turbine Learning System (Drawing Set) _____	8107372
Hydraulic Pitch Hub (Workbook (Instructor)) _____	8125434
Hydraulic Pitch Hub (Workbook) _____	8125436

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