



Curriculum Coverage

- Acquiring Physical Phenomena
- On/Off Control
- PID Feedback Control
- Setpoint Profile Generation
- Lead-Lag Compensation
- Feedback/Feedforward Control
- Multiloop Cascade Control
- Ratio Control
- Flow Meters Comparison (with option)

Features

- Computer based Process Trainer used to teach level, flow, temperature, and pressure Measurement & Control
- Includes all required sensors to measure different process variables
- For use with National Instruments Data Acquisition & Control hardware

Description

A bench-mount trainer for teaching Process Measurement & Control through level, flow, temperature, and pressure. The PT001 trainer includes all the required sensors and actuators to perform the full experiment list for teaching process control and measurement. Using PT001, the student will acquire better understanding and hands-on experience in process control.

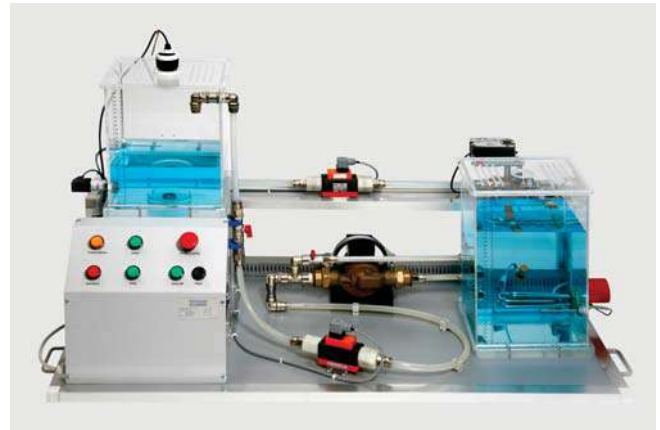
The PT001 was developed for use with National Instruments measurement and control platforms. It utilizes the platform features such as; real-time and FPGA processing, intelligent communication interfaces, rugged I/O modules, among others. The industrial I/O modules filter, calibrate, and scale raw sensor signals to engineering units and performs self diagnostics.

The curriculum covered includes teaching the principles of acquiring different physical phenomena, On/Off Control, PID control, Feedforward and other types of control used in the industry.

Components	NI ¹ Compatible Platforms	Required NI Modules
<ul style="list-style-type: none">• Thermocouples• Heater• Level Sensor• Pressure Sensor• Magnetic Flow Meters• Flow Control Valve• Pump• Variable Frequency Drive• Turbine Flow Meter (Option)	<ul style="list-style-type: none">• PXIe• Compact RIO• Others² <p>¹ NI: National Instruments</p> <p>² Please check with us about compatibility of other NI Platforms</p>	<ul style="list-style-type: none">• PXIe³: PXI-6236, PXIe-6251, PXI-6513, PXIe-4353• cRIO: NI-9211, NI-9207, NI-9472, NI-9263 <p>³ PXIe: for Turbine Flow Meter option, replace PXI-6236 with PXI-6238</p>

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use



Ordering Information Process Trainer

PT001 - A - B - C

NI* Platform

1... PXIe
2... cRIO

Power

1... 110 VAC
2... 220 VAC

Options

0... No Option
1... Turbine Flow Meter

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
e-mail: info@saabrd.com / website: www.saabrd.com



Technical Specifications

Process Control & Measurement Trainer Specifications:

Dimensions & Volumes:

- Dimensions (LxWxH): 1200 x 700 x 600 mm
- Lower Tank Dimensions: 400 x 255 x 205 mm
- Upper Tank Dimensions: 300 x 255 x 205 mm
- Lower Tank Volume: 18.7 Liters
- Upper Tank Volume: 14 Liters

Safety Considerations:

- Maximum allowable temperature: 55 °C
- Maximum allowable water level in the upper tank: 23 cm

Heater:

- Heater Power: 2000 Watts

Maximum Flow Rate:

- Upper: 4-5 Liters/minute
- Lower: 11-12 Liters/minute

Pump:

- Pressure: 10 Bars
- Power: 115 Watts



Curriculum Coverage

- Introduction to Signal Processing
- Vibration Fundamentals
- Free Damped & Undamped Vibration
- Acquiring Vibration Signals
- Shaft Balancing
- Bearing Faults

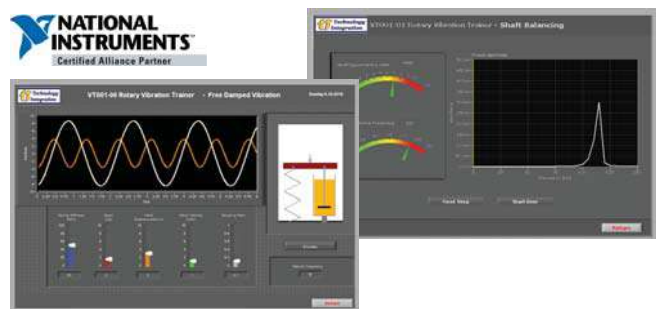
Features

- Computer based Vibration Trainer used to teach vibrations in rotary motors
- Includes all required sensors to measure vibration and shaft speed
- For use with National Instruments Data Acquisition & Control hardware

Description

Rotating components are basic parts in almost all industrial machinery; examples are generators, turbines, pumps... etc. The objective of using this trainer is to provide students with a systematic and scientific understanding of the vibrations in rotary motors. The trainer comes with an extensive experiments list including basic signal acquisition, signal and fault analysis.

VT001 helps bridge the gap that usually exists between theory and practice. It will help expose the students to numerous basic problems relevant to rotating machinery through computer animation, experimental applications, and the use of up-to-date computerized data acquisition hardware.



Components

- Accelerometer
- Speed Sensor
- High Speed Motor
- Variable Speed Drive
- Bearings
- Unbalancing Screws

NI¹ Compatible Platforms

- PXI
- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- PXI: PXI-4472
- cRIO: NI-9234, NI-9474

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Vibration Trainer

VT001 - A - B

NI* Platform

2... cRIO
6... PXI

Power

1... 110 VAC
2... 220 VAC

*Purchase NI Hardware Separately

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Technical Specifications

Vibration Trainer Specifications:

Dimensions:

- Dimensions (LxWxH): 590 x 270 x 210 mm

Motor:

- Power: 1/10 hp
- Speed: 8,000 rpm
- Voltage: 115V / 60 Hz
- Load: 1.5 A

Speed Sensor:

- Output Signal: TTL compatible pulse, 0-5V or 5-0V
- Power: Built in rechargeable battery pack (NiMH), 4.8 VDC

Accelerometer:

- Sensitivity: ($\pm 10\%$) 10.2 mV/(m/s²)
- Measurement Range: ± 490 m/s²
- Settling Time (within 1% of bias): ≤ 2.0 sec
- Excitation Voltage: 18 to 28 VDC
- Constant Current Excitation: 2 to 20 mA



Curriculum Coverage

- Introduction to Signal Processing
- Acquiring Physical Phenomena
- Vibrations Fundamentals
- Shaft Balancing & Bearing Faults
- Voltage & Current Waveforms
- Phasor Diagrams
- Power Fundamentals & Calculations
- Harmonics
- Temperature Monitoring

Features

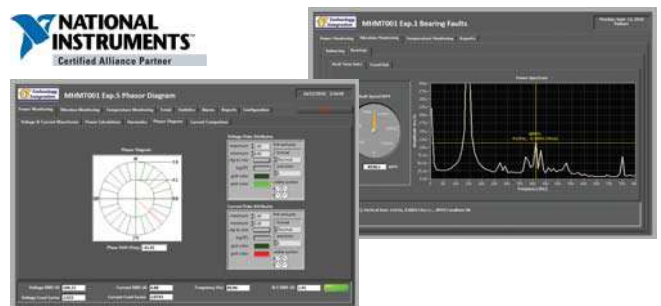
- Computer based Machine Health Monitoring Trainer used to teach vibration, power and temperature monitoring in rotary motors
- Includes all required sensors to measure vibration, temperature and power parameters
- For use with National Instruments Data Acquisition & Control hardware

Description

The Machine Health Monitoring Trainer is used to demonstrate “Intelligent Maintenance” concepts. Through a series of experiments and investigations that study mechanical and electrical components of a machine, the student is introduced to machine health monitoring main parameters; vibration, power and temperature.

Learning to monitor these parameters helps the student better understand machine and components’ degradation that lead to failure.

Students will learn what vibration parameters to monitor for detecting motor balance and bearings status. They will also be introduced to power quality measures contributing to machine health including voltage and current waveforms, harmonics, frequency, active and reactive power, power factor, etc...



Components

- Accelerometer
- Speed Sensor
- High Speed Motor
- Speed Controller
- Bearings
- Unbalancing Screws
- Thermocouple

NI¹ Compatible Platforms

- PXIe
- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- PXIe: PXIe-4300, PXIe-4353, PXI-4472
- cRIO: NI-9225, NI-9227, NI-9211, NI-9234, NI-9474

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students’ use

Ordering Information Machine Health Monitoring Trainer

MHMT001 - A - B

NI* Platform

- 1... PXIe
- 2... cRIO

Power

- 1... 110 VAC
- 2... 220 VAC

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
e-mail: info@saabrd.com / website: www.saabrd.com



Technical Specifications

Machine Health Measurement Trainer Specifications:

Dimensions:

- Dimensions (LxWxH): 590 x 270 x 210 mm

Motor:

- Power: 1/10 hp
- Speed: 8,000 rpm
- Voltage: 115V / 60 Hz
- Load: 1.5 A

Speed Sensor:

- Output Signal: TTL compatible pulse, 0-5V or 5-0V
- Power: Built in rechargeable battery pack (NiMH), 4.8 VDC

Accelerometer:

- Sensitivity: ($\pm 10\%$) 10.2 mV/(m/s²)
- Measurement Range: ± 490 m/s²
- Settling Time (within 1% of bias): ≤ 2.0 sec
- Excitation Voltage: 18 to 28 VDC
- Constant Current Excitation: 2 to 20 mA

Thermocouple:

- T-Type thermocouple
- Temp. Range: 0°C to 260°C



Curriculum Coverage

- Thermocouple Characteristics
- RTD Characteristics
- Thermistor Characteristics
- Comparison between Temperature Sensing Devices

Features

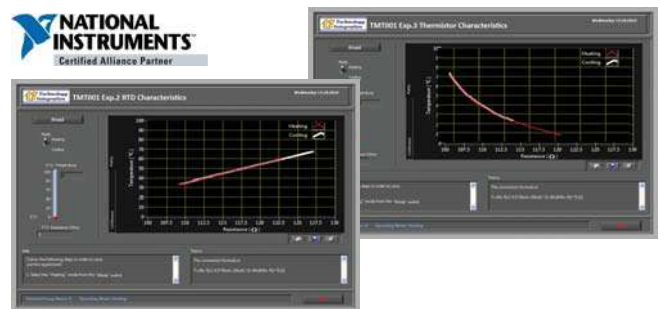
- Computer based Temperature Measurement Trainer used to teach temperature sensing technologies
- Comprises all required sensors to measure temperature in a chamber
- For use with National Instruments Data Acquisition & Control hardware

Description

TMT001 is a bench-mount trainer that is used to teach students how to measure temperature using different types of sensing devices; Thermocouple (TC), Resistive Temperature Device (RTD) and Thermistor.

Developed for use with a wide variety of National Instruments data acquisition and control platforms - easy-to-use, highly expandable programmable automation controllers, intelligent communication interfaces, and rugged I/O modules.

The curriculum covered includes understanding the characteristics of the different temperature measuring devices and comparing between their different behaviors and characteristics.



Components

- Thermocouple
- RTD
- Thermistor
- Heater
- Fan
- Temperature Controller

NI¹ Compatible Platforms

- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- cRIO: NI-9219, NI-9474

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Temperature Measurement Trainer

TMT001 - A - B

NI* Platform

2... cRIO

Power

1... 110 VAC
2... 220 VAC

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
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Technical Specifications

Temperature Measurement Trainer Specifications:

Dimensions:

- Dimensions (LxWxH): 30 x 20 x 25 mm

Safety Considerations:

- Maximum Allowable Temperature: 90 °C

Thermocouple:

- J-Type
- Probe Length: 10 cm

Thermistor:

- Resistance @ 25 °C 6000 ohms
- Probe Length: 10 cm

RTD:

- PT100
- Class B
- Probe Length: 10 cm

Glass Thermometer:

- Mercury
- 0-200 °C

Heater:

- Dimensions: 15 x 10 cm
- Power: 150 Watt
- 220 Volt 50 Hz

Temperature Controller:

- Set point: 30 °C
- On/off control

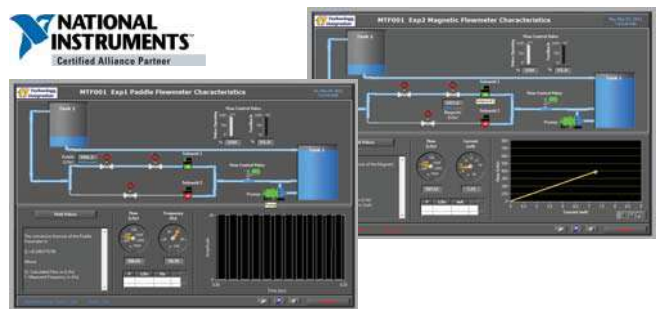


Curriculum Coverage

- Magnetic Flow Meter Characteristics
- Paddle Wheel Flow Meter Characteristics
- Differential Pressure Flow Meter Characteristics
- Vortex Flow Meter Characteristics (with option)
- Comparison between Flow Meters

Features

- Computer based Flow Measurement Trainer used to teach flow sensing technologies
- Includes all required sensors to measure flow
- For use with National Instruments Data Acquisition & Control hardware



Description

FMT001 is a bench-mount trainer that is used to teach students how to measure flow between two tanks using different flow measuring devices; Magnetic Flow Meter, Paddle Wheel Flow Meter, Venturi Flow Meter, Rota Meter and Vortex Flow Meter (option).

Developed for use with a wide variety of National Instruments data acquisition and control platforms - easy-to-use, highly expandable programmable automation controllers, intelligent communication interfaces, and rugged I/O modules. These industrial I/O modules filter, calibrate, and scale raw sensor signals to engineering units and perform self-diagnostics to look for problems.

The curriculum covered includes understanding the characteristics of the different flow measuring devices and comparing between their different behaviors and characteristics.

Components

- Pump
- Magnetic Meter
- Paddle Wheel Meter
- Diff. Pressure Meter
- Rota Meter
- Flow Control Valve
- Vortex Flow Meter (Option)

NI¹ Compatible Platforms

- PXIe
- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- PXIe: PXI-6236, PXIe-6251, PXI-6514
- cRIO: NI-9215, NI-9203, NI-9474, NI-9263, NI-9422

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Flow Measurement Trainer

FMT001 - A - B - C

NI* Platform

- 1... PXIe
- 2... cRIO

Power

- 1... 110 VAC
- 2... 220 VAC

Options

- 0... No Option
- 1... Vortex Flow Meter

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
e-mail: info@saabrd.com / website: www.saabrd.com

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Technical Specifications

Flow Measurement Trainer Specifications:

Dimensions & Volumes:

- Dimensions (LxWxH): 1200 x 700 x 600 mm
- Lower Tank Dimensions: 400 x 255 x 205 mm
- Upper Tank Dimensions: 300 x 255 x 205 mm
- Lower Tank Volume: 18.7 Liters
- Upper Tank Volume: 14 Liters

Safety Considerations:

- Maximum allowable temperature: 55 °C
- Maximum allowable water level in the upper tank: 23 cm

Electromagnetic Flow Meter:

- Flow Rate: 0.01-0.5 ... 35-700 L/min
- Maximum pressure: 10 BAR
- Maximum temperature: 80 °C
- Output: 4-20 mA, 3-wire
- Max. Load: 500 Ω
- Power Supply: 24 VDC
- Power Consumption: 80 mA

Differential Pressure Flow Meter:

- Flow Rate: 0.5-3.3, ..., 300-2350 L/Min. water
- Output: 4-20 mA, 3-wire
- Maximum pressure: 10 BAR
- Maximum temperature: 80 °C
- Power Supply: 24 VDC
- Power Consumption: 100 mA

Rotating Vane Flow Meter:

- Flow Rate: 1-26 L/min water
- Output: 4-20 mA, 3-wire
- Maximum pressure: 16 BAR
- Maximum temperature: 80 °C
- Power Supply: 24 VDC
- Power Consumption: 15 mA

Maximum Flow Rate:

- Upper: 4-5 Liters/minute
- Lower: 11-12 Liters/minute

Pump:

- Pressure: Max. 10 Bars
- Power: 115 Watts

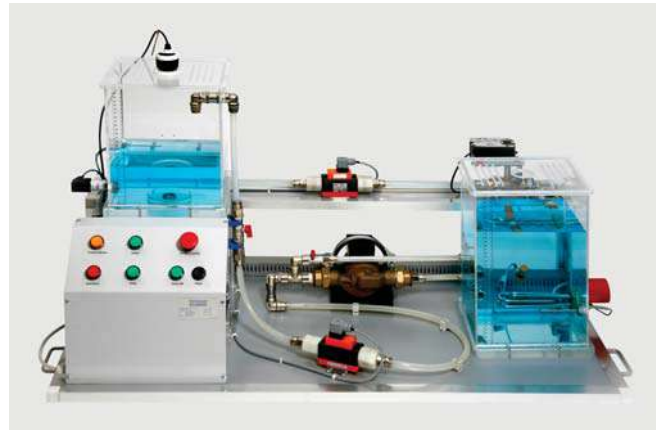


Curriculum Coverage

- Acquiring Physical Phenomena
- On/Off Control
- PID Feedback Control
- Lead-Lag Compensation
- Feedback/Feedforward Control
- Ratio Control

Features

- Computer based Flow Control Trainer used to teach Flow Control
- Includes all required sensors to measure the flow
- For use with National Instruments Data Acquisition & Control hardware



Description

A bench-mount trainer for teaching flow control. It includes all the required sensors and actuators to perform a full experiments list for teaching flow control.

Developed for use with a wide variety of National Instruments data acquisition and control platforms - easy-to-use, highly expandable programmable automation controllers, intelligent communication interfaces, and rugged I/O modules. These industrial I/O modules filter, calibrate, and scale raw sensor signals to engineering units and perform self-diagnostics to look for problems.

The curriculum covered includes teaching the principles of On/Off Control, PID control, Feedforward and other types of control used in the industry.

Components

- Level Switches
- Flow Meters
- Flow Control Valve
- Pump
- Variable Frequency Drive

NI¹ Compatible Platforms

- PXIe
- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- PXIe: PXI-6236, PXIe-6251, PXI-6514
- cRIO: NI-9215, NI-9203, NI-9474, NI-9263

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Flow Control Trainer

FLCT001 - A - B

NI* Platform

- 1... PXIe
- 2... cRIO

Power

- 1... 110 VAC
- 2... 220 VAC

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
e-mail: info@saabrd.com / website: www.saabrd.com

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Curriculum Coverage

- Acquiring Physical Phenomena
- Flow Measurement
- Pressure Measurement
- Level Measurement
- Temperature Measurement
- Humidity Measurement (with option)

Features

- Computer based Process Variables Measurement Trainer used to teach acquiring and measuring different physical phenomena
- Includes all required sensors to measure process variables
- For use with National Instruments Data Acquisition & Control hardware

Description

PVMT001 is a bench-mount trainer that is used to teach students how to acquire and measure different physical phenomena. The sensors used include: Electromagnetic and Paddle Wheel for Flow; Piezoresistive for Pressure; Capacitance for Level; Thermocouple, RTD and Thermistor for Temperature; and Humidity Sensor for Humidity (option).

Developed for use with a wide variety of National Instruments data acquisition and control platforms - easy-to-use, highly expandable programmable automation controllers, intelligent communication interfaces, and rugged I/O modules. These industrial I/O modules filter, calibrate, and scale raw sensor signals to engineering units and perform self-diagnostics to look for problems.

The curriculum covered includes understanding the characteristics of the different sensing devices and comparing between their different behaviors and characteristics.

Components

- Electromagnetic Sensor
- Paddle Wheel Sensor
- Piezoresistive Sensor
- Capacitance Sensor
- Thermocouple
- RTD
- Thermistor
- Flow Control Valve
- Pump
- Humidity Sensor (Option)

NI¹ Compatible Platforms

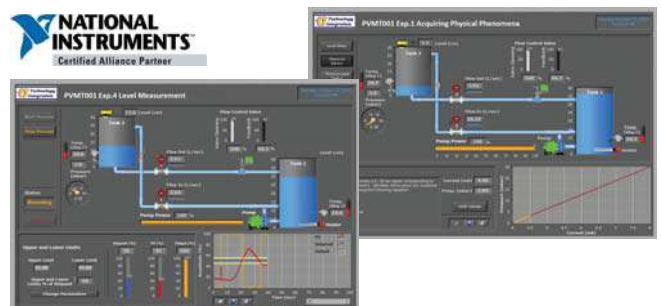
- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- cRIO: NI-9219, NI-9203, NI-9474, NI-9263, NI-9215, NI-9422



Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Process Variables Measurement Trainer

PVMT001 - A - B - C

NI* Platform

2... cRIO

Power

1... 110 VAC
2... 220 VAC

Options

0... No Option
1... Humidity Sensor

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
e-mail: info@saabrds.com / website: www.saabrds.com

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Curriculum Coverage

- Capacitance Level Meter Characteristics
- Ultrasonic Level Meter Characteristics
- Piezoresistive Sensor Characteristics
- Capacitance Change Sensor Characteristics (with option)

Features

- Computer based Level & Pressure Measurement Trainer used to teach level and pressure sensing technologies
- Includes all required sensors to measure level and pressure
- For use with National Instruments Data Acquisition & Control hardware

Description

LPMT001 is a bench-mount trainer that is used to teach students how to measure level and pressure using different types of measuring devices; Capacitance Level Meter, Ultrasonic Level Meter, Piezoresistive Pressure Sensor and Capacitance Change Pressure Sensor (**option**).

Developed for use with a wide variety of National Instruments data acquisition and control platforms - easy-to-use, highly expandable programmable automation controllers, intelligent communication interfaces, and rugged I/O modules. These industrial I/O modules filter, calibrate, and scale raw sensor signals to engineering units and perform self-diagnostics to look for problems.

The curriculum covered includes understanding the characteristics of the different level measuring devices and comparing between their different behaviors and characteristics.

Components

- Pump
- Flow Control Valve
- Piezoresistive Sensor
- Ultrasonic Level Meter
- Capacitance Level
- Capacitance Change Pressure Sensor (Option)

NI¹ Compatible Platforms

- PXIe
 - Compact RIO
 - Others²
- ¹ NI: National Instruments
² Please check with us about compatibility of other NI Platforms

Required NI Modules

- PXIe: PXI-6236, PXIe-6251, PXI-6514
- cRIO: NI-9215, NI-9203, NI-9474, NI-9263

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use



Ordering Information Level & Pressure Measurement Trainer

LPMT001 - A - B - C

NI* Platform

- 1... PXIe
- 2... cRIO

Power

- 1... 110 VAC
- 2... 220 VAC

Options

- 0... No Option
- 1... Capacitance Change Pressure Sensor

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
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Curriculum Coverage

- Acquiring Physical Phenomena
- On/Off Control
- PID Feedback Control
- Lead-Lag Compensation
- Feedback/Feedforward Control

Features

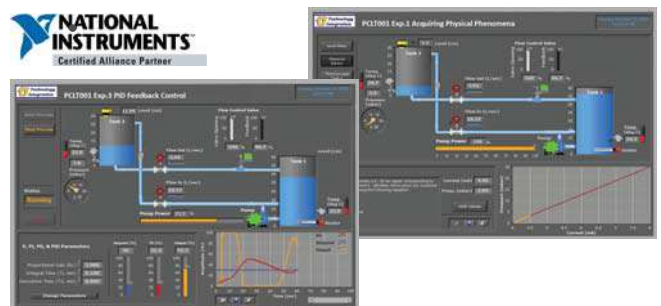
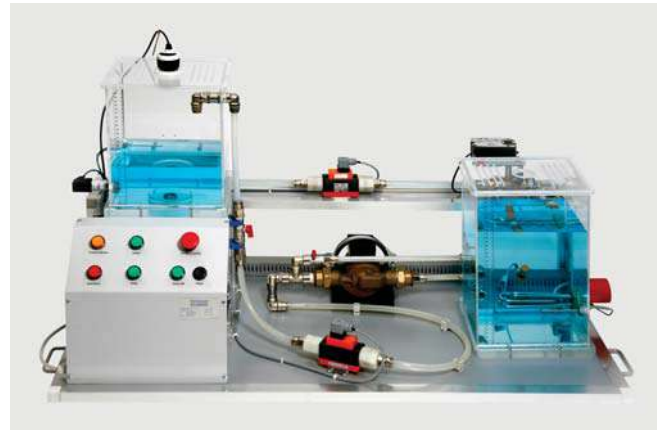
- Computer based Pressure Control Trainer used to teach Pressure Control
- Includes all required sensors to measure the Pressure
- For use with National Instruments Data Acquisition & Control hardware

Description

A bench-mount trainer for teaching pressure control. It includes all the required sensors and actuators to perform a full experiments list for teaching pressure control.

Developed for use with a wide variety of National Instruments data acquisition and control platforms - easy-to-use, highly expandable programmable automation controllers, intelligent communication interfaces, and rugged I/O modules. These industrial I/O modules filter, calibrate, and scale raw sensor signals to engineering units and perform self-diagnostics to look for problems.

The curriculum covered includes teaching the principles of On/Off Control, PID control, Feedforward and other types of control used in the industry.



Components

- Level Switches
- Pressure Sensor
- Flow Control Valve
- Pump
- Variable Frequency Drive

NI¹ Compatible Platforms

- PXIe
- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- PXIe: PXI-6236, PXIe-6251, PXI-6514
- cRIO: NI-9215, NI-9203, NI-9474, NI-9263

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Pressure Control Trainer

PC17001 - A - B

NI* Platform

- 1... PXIe
- 2... cRIO

Power

- 1... 110 VAC
- 2... 220 VAC

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
e-mail: info@saabrd.com / website: www.saabrd.com

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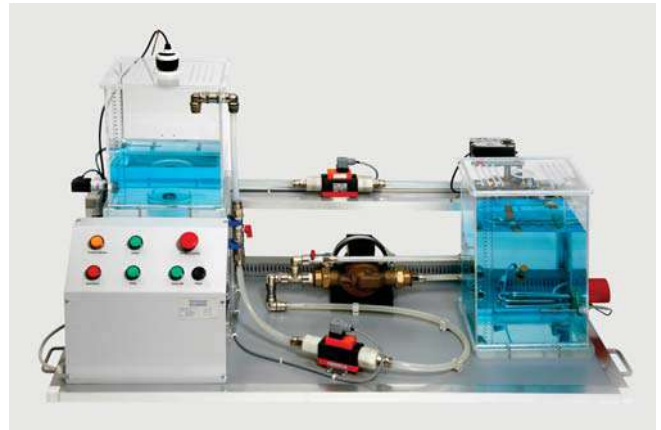


Curriculum Coverage

- Acquiring Physical Phenomena
- On/Off Control
- PID Feedback Control
- Lead-Lag Compensation
- Feedback/Feedforward Control

Features

- Computer based Level Control Trainer used to teach Level Control
- Includes all required sensors to measure the Level
- For use with National Instruments Data Acquisition & Control hardware



Description

A bench-mount trainer for teaching level control. It includes all the required sensors and actuators to perform a full experiments list for teaching level control.

Developed for use with a wide variety of National Instruments data acquisition and control platforms - easy-to-use, highly expandable programmable automation controllers, intelligent communication interfaces, and rugged I/O modules. These industrial I/O modules filter, calibrate, and scale raw sensor signals to engineering units and perform self-diagnostics to look for problems.

The curriculum covered includes teaching the principles of On/Off Control, PID control, Feedforward and other types of control used in the industry.

Components

- Level Switches
- Level Sensor
- Flow Control Valve
- Pump
- Variable Frequency Drive

NI¹ Compatible Platforms

- PXIe
- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- PXIe: PXI-6236, PXIe-6251, PXI-6514
- cRIO: NI-9215, NI-9203, NI-9474, NI-9263

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Level Control Trainer

LCLT001 - A - B

NI* Platform

- 1... PXIe
- 2... cRIO

Power

- 1... 110 VAC
- 2... 220 VAC

*Purchase NI Hardware Separately

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Curriculum Coverage

- Photoelectric Characteristics
- Electromagnetic Proximity Characteristics
- DC Tachometer Generator Characteristics
- Magnetic Pickup & Fly Wheel Sensor Characteristics (with option)
- Speed Sensors Comparison

Features

- Computer based Speed Trainer used to teach students how to measure the speed of a rotating shaft
- Comprises all required sensors to measure shaft speed
- For use with National Instruments Data Acquisition & Control hardware

Description

Rotating components are basic parts in almost all industrial machinery; examples are generators, turbines, pumps... etc. The objective of this trainer is to teach students measuring the speed of a rotating shaft using different types of speed sensors and comparing between their different behaviors and characteristics.

The speed sensors used are: Photoelectric sensor, Electromagnetic Proximity sensor, DC Tachometer Generator, and Magnetic Pickup & Fly Wheel sensor (option). The different sensors are mounted in a position where they can measure the same speed of the rotating shaft; as a result the student will be able to note the differences between them.



Components

- Motor
- Variable Speed Drive
- Photoelectric Sensor
- Electromagnetic Sensor
- DC Tachometer Generator
- Mag. Pickup & Fly Wheel Sensor (Option)

NI¹ Compatible Platforms

- PXIe
- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- PXIe: PXIe-4300, PXIe-6251, PXI-6514
- cRIO: NI-9229, NI-9422, NI-9474, NI-9263

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Speed Measurement Trainer

SMT001 - A - B - C

NI* Platform

- 1... PXIe
- 2... cRIO

Power

- 1... 110 VAC
- 2... 220 VAC

Options

- 0... No Option
- 1... Magnetic Pickup & Fly Wheel Sensor

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
e-mail: info@saabrds.com / website: www.saabrds.com

Design, Text, and Images are subject to change at anytime without prior notice.



Technical Specifications

Speed Measurement Trainer Specifications:

Dimensions:

- Dimensions (LxWxH): 690 x 270 x 210 mm

Motor:

- Power: 1/10 hp
- Speed: 8,000 rpm
- Voltage: 115V / 60 Hz
- Load: 1.5 A

Photoelectric Sensor:

- Sensing distance: 7m
- Housing material: Plastic, nickel plated brass and stainless steel
- Enclosure rating: IP67
- Operating voltage range: 10 to 30 VDC

Electromagnetic Sensor:

- Sensing method: Inductive type
- Sensing distance: 16 mm $\pm 10\%$
- Sensing object: Ferrous metal
- Operating voltage range: 10 to 32 VDC
- Current consumption: 10 mA Max
- Control output: NPN open collector output

DC Tachometer Generator:

- Inertia: 1.23×10^{-4} oz-in-sec²
- V/1000 RPM: 2.6 V
- Speed: 12,000 rpm



Curriculum Coverage

- Photoelectric Characteristics
- Rotary Encoder Characteristics
- Electromagnetic Sensor
- Speed Sensors Comparison

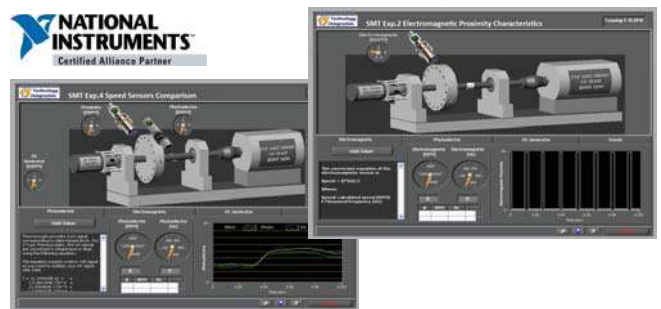
Features

- Computer based Speed Trainer used to teach students how to measure the position and the speed of a rotating shaft
- Includes all required sensors to measure shaft speed and position
- For use with National Instruments Data Acquisition & Control hardware

Description

Rotating components are basic parts in almost all industrial machinery; examples are generators, turbines, pumps... etc.

The objective of this trainer is to teach students how to measure the position and the speed of a rotating shaft using speed & position sensors, and using a graded disc from 0° to 360°. In addition, the student will have the chance to compare between the characteristics and behavior of different speed sensors; as a result the student will be able to note the differences between them.



Components

- Motor
- Variable Speed Drive
- Photoelectric Sensor
- Electromagnetic Sensor
- Rotary Encoder Sensor

NI¹ Compatible Platforms

- PXIe
- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- PXIe: PXIe-6251, PXI-6514
- cRIO: NI-9425, NI-9422, NI-9263, NI-9474

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Position & Speed Measurement Trainer

PMT001 - A - B

NI* Platform

- 1... PXIe
- 2... cRIO

Power

- 1... 110 VAC
- 2... 220 VAC

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
e-mail: info@saabrds.com / website: www.saabrds.com

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Curriculum Coverage

- Acquiring Physical Phenomena
- Bending Strain & Stress
- Torsional Strain & Stress
- Tensile Strain & Stress

Features

- Computer based Force & Strain Measurement Trainer
- Includes all required weight specimens and sensors to measure force & strain
- For use with National Instruments Data Acquisition & Control hardware

Description

Strain and Force Measurement Trainer is an ideal setup for introducing strain gauge measurement to students. It introduces the operation principle of strain gauges and the conversion methods between electronic raw data and strain and force.

Developed for use with a wide variety of National Instruments data acquisition platforms - easy-to-use, highly expandable programmable automation controllers, intelligent communication interfaces, and rugged I/O modules. These industrial I/O modules filter, calibrate, and scale raw sensor signals to engineering units and perform self-diagnostics to look for problems.

Students will learn how to connect bridge type sensors, strain in bending, torsion, and tension, force measurement using load cells and measurements using the LVDT, ...etc.

Components

- Strain Gauge
- Load Cell
- Weights
- LVDT (Option)
- Aluminum Shaft (SP)
Dim (mm): Dia10, L 350
- Aluminum Beam (SP)
Dim (mm): L 340, W25, T3
- Aluminum Plate (SP)
Dim (mm): L 120, W25, T2

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

NI¹ Compatible Platforms

- PXIe
- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- PXIe³: PXIe-4330
- cRIO⁴: NI-9237
- ³ PXIe: for LVDT option, add PXI-6251
- ⁴ cRIO: for LVDT option, add NI-9219



Ordering Information Force & Strain Measurement Trainer

FSMT001 - A - B - C		
NI* Platform	Power	Options
1... PXIe	1... 110 VAC	0... No Option
2... cRIO	2... 220 VAC	1... With LVDT Option

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
e-mail: info@saabrd.com / website: www.saabrd.com

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Technical Specifications

Force & Strain Measurement Trainer Specifications:

Dimensions & Volume:

- Dimensions (LxWxH): 950 x 900 x 50 mm

Torsion:

- Shaft Material: Aluminum
- Shaft Dimensions: 350 x 10 mm
- Strain Gauges: 350 Ω , 4 wires, qty. 2
- Maximum Load: 5.0 Kg

Bending:

- Beam Material: Aluminum
- Dimensions: 340 x 25 x 3 mm
- Strain Gauges: 350 Ω , 2 wires, qty. 4
- Maximum Load: 0.5 Kg

Tension:

- Specimen Material: Aluminum
- Dimensions: 10 x 125 x 3 mm
- Strain Gauges: 350 Ω , 4 wires, qty. 2
- Maximum Load: 5.0 Kg

LVDT:

- Linearity: <0.2% FSO
- Excitation: 3 ± 1 Vrms
- Excitation Frequency: 5 ± 0.5 kHz
- Protection Rating: IP67

Load Cell:

- Rated output: 1.0 ± 0.1 mV/V
- Zero balance: 0 ± 0.05 mV/V
- Excitation: 10 V
- Input Resistance: 400 Ω
- Output Resistance: 350 Ω
- Material: Anodized Aluminum
- Maximum load: 3 Kg



Curriculum Coverage

- Rotary Encoder Characteristics
- Photoelectric Sensor Characteristics
- Magnetic Pickup & Fly Wheel Sensor Characteristics (with option)
- Speed Measuring Sensors Comparison
- Torque Measurement
- Measuring Speed & Position of the Shaft using the Encoder

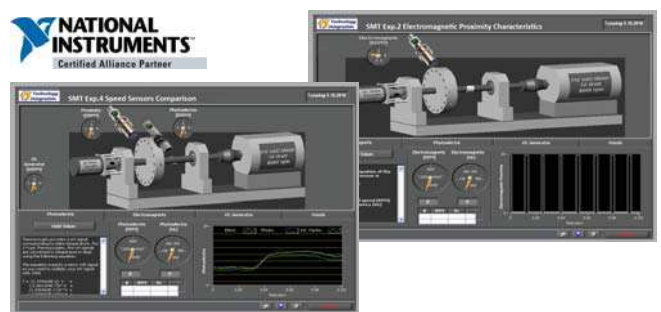
Features

- Computer based trainer used to teach students how to measure the different parameters in rotating machinery including: speed, position and torque
- Includes all required sensors to do the different types of measurements
- For use with National Instruments Data Acquisition & Control hardware

Description

Rotating Components are basic parts in almost all industrial machinery; examples are generators, turbines, pumps...etc.

The objective of this trainer is to teach students how to measure the different parameters of rotating machinery, including speed, torque, and position. The student will learn how to measure the speed of a rotating shaft using different types of speed sensors and comparing between their different behaviors and characteristics. He will also learn how to measure the position of the shaft using a graded disc from 0° to 360°, and how to measure the torque using a torque sensor.



Components

- Motor
- Variable Speed Drive
- Photoelectric Sensor
- Rotary Encoder
- Torque Meter
- Mag. Pickup & Fly Wheel Sensor (Option)

NI¹ Compatible Platforms

- PXIe
- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- PXIe: PXIe-6251, PXI-6514
- cRIO: NI-9425, NI-9422, NI-9215, NI-9263, NI-9474

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Rotating Parameters Measurements Trainer

RPMT001 - A - B - C		
NI* Platform	Power	Options
1... PXIe	1... 110 VAC	0... No Option
2... cRIO	2... 220 VAC	1... Magnetic Pickup & Fly Wheel Sensor

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
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Curriculum Coverage

- Acquiring Physical Phenomena
- Solar Panel Characteristics
- Wind Turbine Power Curve
- Off-Grid Renewable Energy System

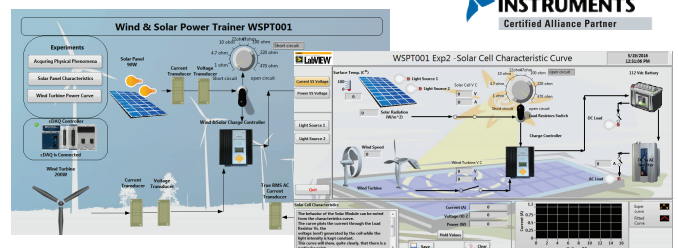
Features

- Computer based Wind and Solar Power Trainer
- Includes all required sensors to measure the light level, temperature, wind speed, voltage, current, and power
- For use with National Instruments Data Acquisition & Control hardware

Description

The Wind and Solar Power Trainer is designed to teach students the characteristics of solar panels and wind power generators. Using this trainer, students will be able to monitor data such as the output current, voltage and power from solar panels and wind mills, in addition they will be able to measure temperature, wind speed, battery voltage, load current, etc....

Developed for use with a wide variety of National Instruments data acquisition and control platforms - easy-to-use, highly expandable programmable automation controllers, intelligent communication interfaces, and rugged I/O modules.



Components

- Wind Turbine
- PV Panel
- DC to AC Inverter
- Temperature Sensor
- Wind Speed Sensor
- Solar Radiation Sensor
- AC/DC Loads

NI¹ Compatible Platforms

- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- cRIO: NI-9208, NI-9476, NI-9263

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Wind and Solar Power Trainer

WSPT001 - A - B

NI* Platform
1... cRIO

Power
1... 220 VAC

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
e-mail: info@saabrd.com / website: www.saabrd.com



Technical Specifications

Wind Turbin:

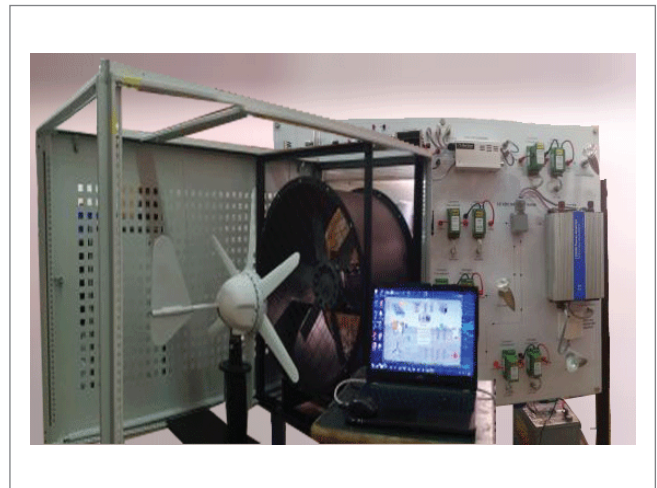
- *Peak Power: 100 W*
- *Rotor Diameter: 1 m*
- *Start-up wind Speed: 1.5 m/s*
- *Survival wind Speed: 35 m/s*
- *Voltage: 12V*
- *Overspeed protection: electronic torque control*
- *Blades: Carbon fiber compsite*

60W Solar Panel



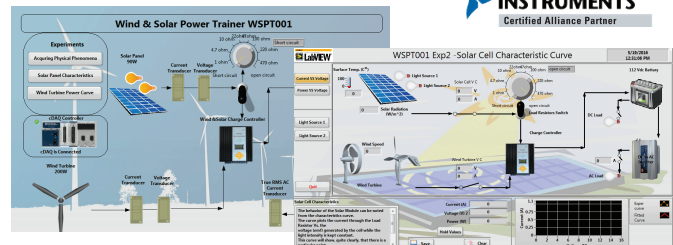
Curriculum Coverage

- Acquiring Physical Phenomena:
 - To introduce the principles of computer-based signal acquisition of physical phenomena.
 - To acquire signals from the different types of sensors used in this trainer including wind speed sensor, current and voltage transducers
- Wind Turbine Power Curve:
 - To investigate the behavior of a wind Turbine when exposed to variable wind speeds.
 - To obtain the power curves of a wind turbine.
- Determining the efficiency of a wind power plant



Features

- Computer based Wind Power Trainer
- Includes all required sensors
- For use with National Instruments Data Acquisition & Control hardware



Components

- Wind Turbine
- Inverter
- Wind Speed Sensor
- Loads
- VFD
- CTs & VTs

NI¹ Compatible Platforms

- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- cRIO: NI-9208, NI-9476, NI-9263

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Wind Power Trainer

WPT001 - A - B

NI* Platform
1... cRIO

Power
1... 220 VAC

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
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Solar Tracking Control Trainer

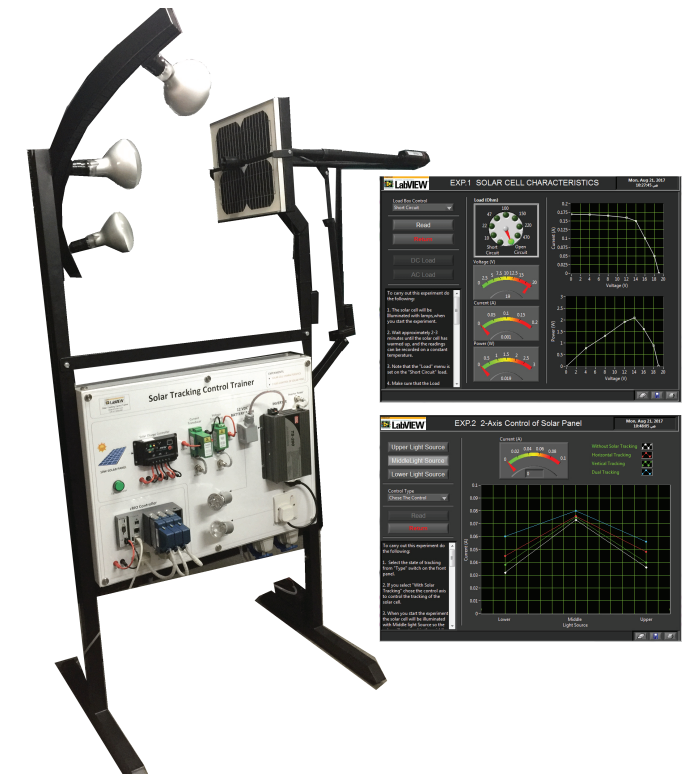


Curriculum Coverage

- Solar Cell Characteristics
- Two -Axis Solar Tracking

Features

- Computer based Solar Tracking Control Trainer
- Includes all required sensors and actuators to perform solar tracking
- For use with National Instruments Data Acquisition & Control hardware



Description

The Solar Tracking Control Trainer is a solar tracking system that is designed to teach students about solar cells, and how to get advantage of the sun's direct heat or light using two axis solar tracking systems.

Developed for use with a wide variety of National Instruments data acquisition and control platforms - easy-to-use, highly expandable programmable automation controllers, intelligent communication interfaces, and rugged I/O modules.

Components

- PV Panel 10W
- Charge Controller
- Photo Diodes
- Linear Motors
- DC Load

NI¹ Compatible Platforms

- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- cRIO: NI 9207, NI 9403, NI 9375

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Solar Tracking Control Trainer

STCT001 - A - B

NI* Platform
1... cRIO

Power
1... 220 VAC

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
e-mail: info@saabrd.com / website: www.saabrd.com

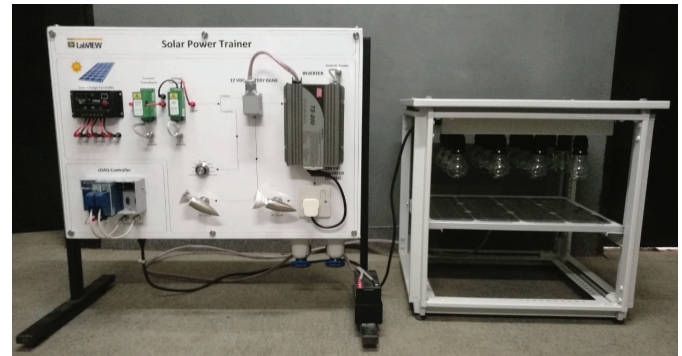
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Solar Power Trainer

Curriculum Coverage

- Acquiring Physical Phenomena:
 - To introduce the principles of computer-based signal acquisition of physical phenomena.
 - To acquire signals from different types of sensors, including solar radiation, temperature sensors, current and voltage transducers
- Solar Panel Characteristics:
 - To investigate the behavior of a Solar Panel when exposed to variable light intensities.
 - To obtain the Current VS Voltage curve of the solar panel.
 - To obtain the Current VS Voltage curve of the solar panel under different temperatures (Day and Night).
 - To obtain the Power VS Voltage curve of the solar panel.
- Determining the efficiency of a solar panel



Features

- Computer based Solar Power Trainer
- Includes all required sensors
- For use with National Instruments Data Acquisition & Control hardware



Components

- PV Panel
- Inverter
- Temperature Sensor
- Solar Radiation Sensor
- Loads
- CTs & VTs

NI¹ Compatible Platforms

- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- cRIO: NI-9208, NI-9476, NI-9263

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Solar Power Trainer

SPT001 - A - B

NI* Platform
1... cRIO

Power
1... 220 VAC

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
e-mail: info@saabrd.com / website: www.saabrd.com



Curriculum Coverage

- Solar Cell Characteristics
- Adjust Solar Cell to Electrolyzer
- Electrolysis Characteristics
- Fuel Cell Characteristics

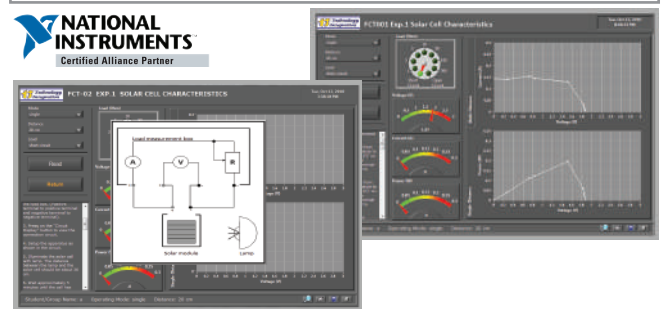
Features

- Computer based Fuel Cell Trainer
- Includes all required sensors to monitor cells and calculate the electrical characteristics.
- For use with National Instruments Data Acquisition & Control hardware

Description

Fuel cells are one of the key technologies of the 21st Century. Today manufacturers worldwide are actively engaged in developing fuel cells for use in mobile devices, automobiles and stationary power plants.

The Medium Power Fuel Cell Trainer setup allows a wide range of experiments with fuel cell technology, and our software provides all the data needed for sophisticated research into fuel cell operation. It also allows real-time monitoring of every cell in the stack, and can calculate the efficiencies and electrical characteristics of both fuel cells and electrolyzers.



Components

- Fuel Cell Stack 10
- Electrolyzer 65 Cell
- Hydrogen Storage Tank
- Oxygen Storage Tank
- 6.0V Solar Module
- 10mW Fan

NI¹ Compatible Platforms

- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- cRIO: NI 9207, NI 9375

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Medium Power Fuel Cell Trainer

MPFCT001 - A - B

NI* Platform
1... cRIO

Power
1... 220 VAC

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
e-mail: info@saabrd.com / website: www.saabrd.com

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Curriculum Coverage

- Solar Cell Characteristics
- Solar Cell as Diode
- Electrolysis Characteristics
- Adjusting Solar Cell to Electrolysis
- Fuel Cell Characteristics

Features

- Computer based Fuel Cell Trainer
- Includes all required sensors to measure the light intensity, temperature, voltage and current
- For use with National Instruments Data Acquisition & Control hardware



Description

Fuel cells are one of the key technologies of the 21st Century. Today manufacturers worldwide are actively engaged in developing fuel cells for use in mobile devices, automobiles and stationary power plants.

The Fuel Cell Trainer setup is designed as a quick and easy way to introduce the concepts of energy conversion and fuel cells. This unique package allows instructors to quickly demonstrate the concepts of using solar or kinetic energy as a power source for an electrolyser, which will in turn, produce hydrogen that will be used to feed a fuel cell, from which a load will be powered. A great tool for exposing students to the technologies of tomorrow and introducing “green energy” alternatives.

Components

- 500mW Solar Module
- 500mW PEM Fuel Cell
- 1.16W PEM Electrolyser
- 10mW Fan
- Banana Plug Cables

NI¹ Compatible Platforms

- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- cRIO: NI-9219, NI-9263

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Fuel Cell Trainer

FCT001 - A - B

NI* Platform
1... cRIO

Power
1... 220 VAC

*Purchase NI Hardware Separately

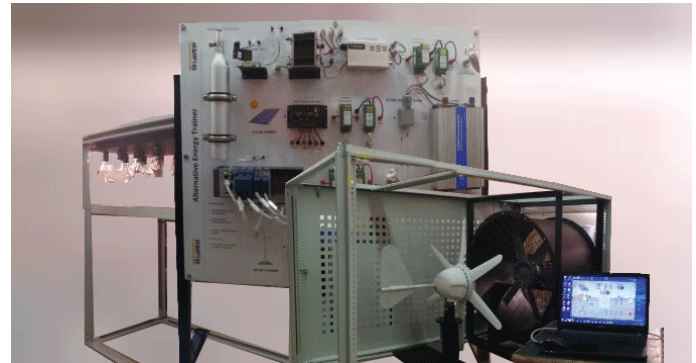
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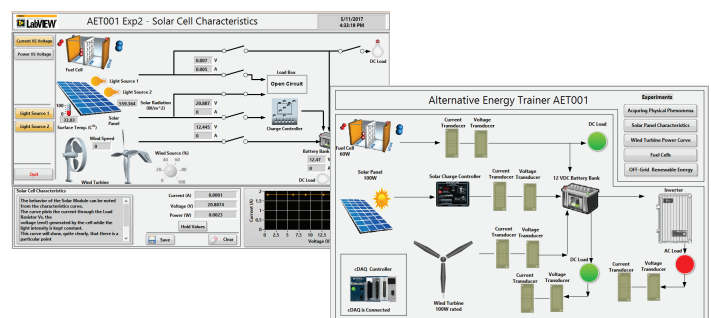
Curriculum Coverage

- Acquiring Physical Phenomena
- Solar Panel Characteristics
- Wind Turbine Power Curve
- Off-Grid Renewable Energy System
- Fuel Cells



Features

- Computer based Alternative Energy Trainer
- Includes all required components for the students to learn about the different technologies of Alternative Energy Generation
- For use with National Instruments Data Acquisition & Control hardware



Description

Using the Alternative Energy Trainer students will be introduced to the major alternative energy generation technologies. Using a user friendly training panel, the theory of generating power using solar, wind and fuel cells will be covered in details. Students will learn the design and engineering principles required to implement and scale these technologies.

Developed for use with a wide variety of National Instruments data acquisition and control platforms - easy-to-use, highly expandable programmable automation controllers, intelligent communication interfaces, and rugged I/O modules.

Components

- Fuel Cell System
- Wind Turbine
- Wind Speed Sensor
- Solar Radiation Sensor
- Temperature Sensor
- AC/DC Loads
- DC to AC Inverter
- PV Panel

NI¹ Compatible Platforms

- Compact RIO
- Others²

¹ NI: National Instruments

² Please check with us about compatibility of other NI Platforms

Required NI Modules

- cRIO: NI-9208, NI-9476, NI-9263

Software

- User friendly with easy to use interface
- Developed using NI LabVIEW package
- Built-in safety features & limitations, and designed for students' use

Ordering Information Alternative Energy Trainer

AET001 - A - B

NI* Platform

1... cRIO

Power

1... 220 VAC

*Purchase NI Hardware Separately

For complete product specifications, pricing and information:
e-mail: info@saabrd.com / website: www.saabrd.com

Design, Text, and Images are subject to change at anytime without prior notice.



Technical Specifications

Fuel Cell Stack & Controller:

- Number of Cells: 20
- Rated Power: 60W
- Performance: 12V @ 5A
- Reactants: Hydrogen and Air

Hydrogen Canister:

- Hydrogen Storage Capacity: 350 NL
- Dimensions: O.D60XL330 mm
- Weight: 3.1 Kg

Wind Turbine:

- *Peak Power: 100 W*
- *Rotor Diameter: 1 m*
- *Start-up wind Speed: 1.5 m/s*
- *Survival wind Speed: 35 m/s*
- *Voltage: 12V*
- *Overspeed protection: electronic torque control*

60W Solar Panel