



Product Summary

- Mobile Test Platform for Comprehensive Exploration of Fluid Process Automation
- Purpose-Designed for Academic Education and Industrial Training
- Clear-View Centrifugal Pump with Easy Change-Out Impeller Profiles
- Clear-View Fluid Flow Circuitry Reveals All Flow and Cavitation Phenomena
- Fully Instrumented for Fluid Flow, Pressure, Temperature, Level, Power, and Efficiency Analysis
- Industrial Programmable Automation Controller (PAC) for Program and Control of Pump Performance Characteristics, Flow Rates, Pressures, Temperatures, Multiple Tank Levels, Mixing, Alarms, Lock Out/Tag Out
- Industrial Human-Machine Interface (HMI) Touch Screen for Operator Process Automation Control
- Industrial Variable Frequency Drive (VFD) for Full PAC Control of Centrifugal Pump in System
- Industrial Ethernet Communications Network Enabling Local and Remote System Communications/Control
- Industrial Control System DC Power Supply Providing Consistent System Control Voltage
- Extensive “Basic Concepts to High-End Skills Training” Curriculum Included

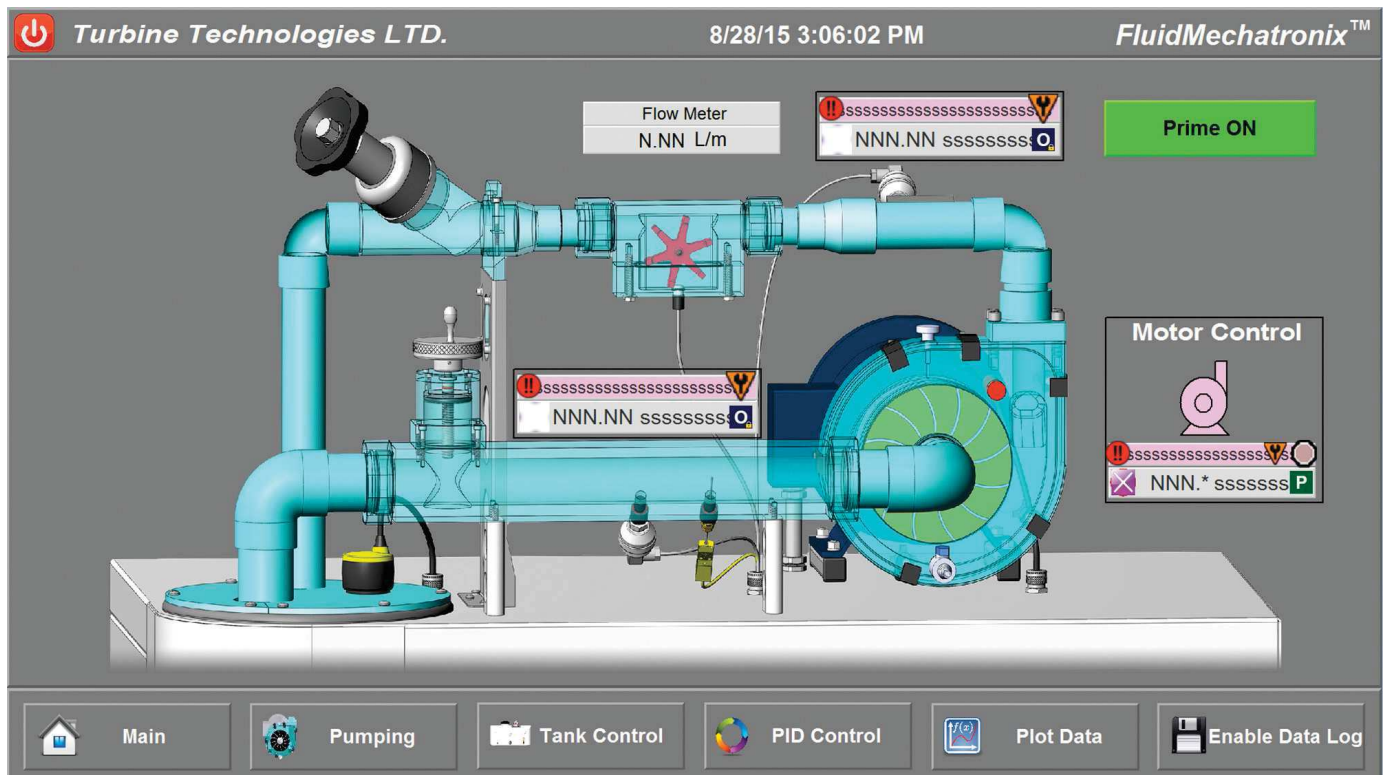
FluidMechatronics™ is a unique, all-in-one, hands-on learning system that brings real industrial fluid process automation training into the educational lab setting. It showcases the same industrial components and controls students will work with in industry and is structured to perform the same kinds of processes found in full-scale fluid process plants.

Description

FluidMechatronics™ features a see-through flow circuit with three interchangeable centrifugal pump impeller profiles. Students learn to develop pump performance curves to use in process control scenarios based on pressure, flow and temperature feedback loops. An included strobe light “freeze frames” the spinning impeller to show students what cavitation looks like in the system.

The pump system is driven by an industrial Variable Frequency Drive (VFD) controlled by an industrial Programmable Automation Controller (PAC). The PAC features ladder logic, PIDE Autotune and lock-out/tag-out. An industrial spec Human-Machine Interface (HMI) allows an operator to interact with the whole system to program controls, monitor and control processes and react to alarms and tag out situations. An industrial DC Power Supply powers all of this equipment with the proper voltage level to assure operational integrity. An industrial LAN/WLAN Ethernet System connects all these elements so they can effectively communicate with each other. It even enables operators to connect with and control the system remotely through wireless devices, versus having to accomplish all communications strictly through the local HMI.

FluidMechatronics™ features primary and secondary liquid storage tanks, which enable fluid transfer education along with tank level sensors (ultrasonic and float-type) and alarms. Secondary tank features a liquid heater to enable temperature control and mixing education.



Studio 5000 Logix Designer and FactoryTalk View ME Software Included

A comprehensive lab curriculum is included with the system. The curriculum takes students through a building block style educational process, introducing classroom concepts that are then effectively learned through system hands-on processes.



Dimensions

PumpLab™: 48L x 29W x 74H inches
(122L x 74W x 188H cm)

As Shipped: 55L x 36W x 79H inches
(140L x 91W x 201H cm)

Weight

PumpLab™: 470 lbs (212 kg)

As Shipped: 635 lbs (288 kg)

Operating Requirements

Typical Laboratory or Classroom Setting Power:
220V single-phase 50/60Hz

Additional Items

Stroboscope ~ adjustable from 0 to 3000 fps
Impeller Change Tool
Prime / Drain T-Handle

Operating Conditions / Limitations

Main Pump and Supply Tank:

Maximum Flow Rate: 40 GPM (151 lpm)

Maximum Head: 40 ft (12 mtrs)

Tank Capacity: 20 Gallons (76 ltrs)

Main Pump Motor:

Maximum RPM: 1725

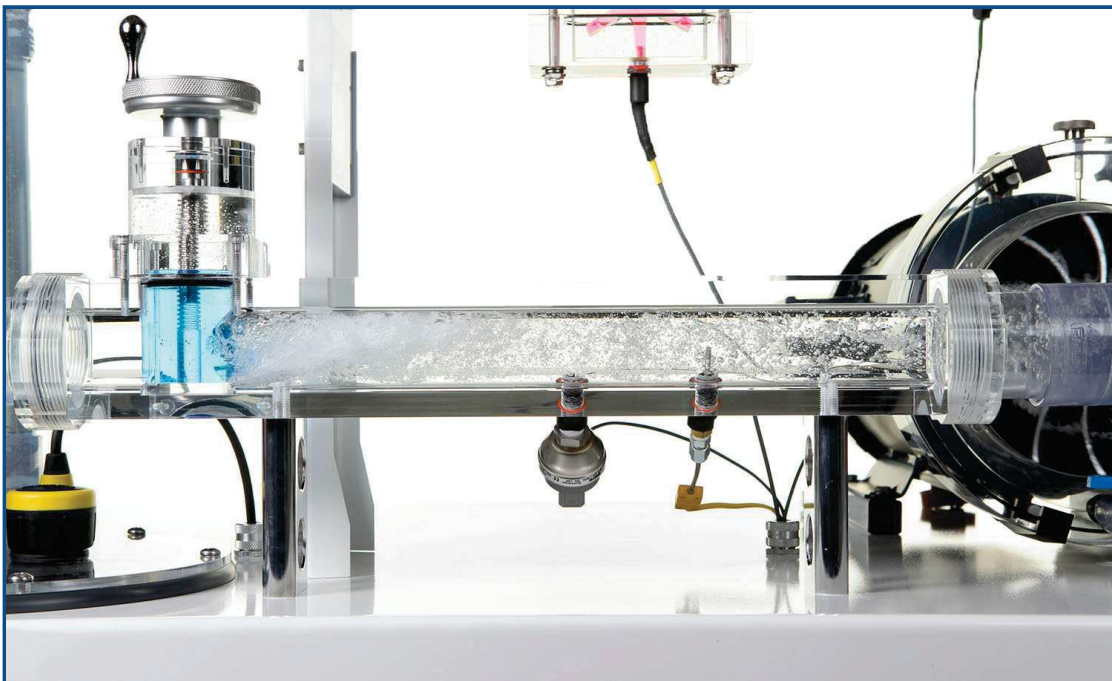
Shaft Power: 3.0 HP (2.2 kW)

Current: 8.2 Amps

Frame Style: JM

Prime / Drain / Transfer Pumps:

Maximum Flow Rate: 5.5 GPM (21 lpm)



Clear View with Cavitation

TTL Clear View Centrifugal Pump

Three Pump Impeller Profiles:

- Straight
- Forward-Curved
- Backward Curved

Clear View Pump Housing (Volute):

- View Cavitation on Impeller Faces with Included Stroboscope
- View Pump Motor Interface Seals

TTL Clear View Flow Circuit

- Square Cavitation View Section
- Clear View Inlet and Outlet Valves
- Clear View Paddle Wheel Flow Meter
- Clear View Water Tank with Ultrasonic Level Sensor

Sensors (Pre-installed and Calibrated)

- Pump Suction Pressure
- Pump Outlet Pressure
- Pump Motor Data (Frequency, RPM, Torque, Current, Power In/Out, HP, Efficiency)
- Primary Tank Level (Ultrasonic)
- Secondary Tank Level (High/Low Level Switches)
- Secondary Tank Temperature
- Flow Inlet Temperature
- System Flow Rate

Safety

- Rear Door Safety Relay
- Pump Volute Power Safety Relay
- Operator Panel E-Stop
- Dual Input VFD Safety



Automation System Structure

Allen Bradley™ Powerflex 525 3HP 2.2kW Variable Frequency Drive (VFD): 25B-A011N104

- Embedded Ethernet control
- Safe Torque-Off and Embedded Safety
- PIDE pressure, suction, and flow control with AutoTune

Allen Bradley™ Programmable Automation Controller (PAC) :1769-L18ER-BB1B

- Dual Ethernet with up to 4 connected nodes
- 1734-IE2C Dual Channel Analog I/O Module
- 1734-VHSC24 High Speed Counter I/O Module
- 1734-IT2I Thermocouple Input Module
- Studio 5000 Logix Designer Rockwell Software with Ladder Logic

Dynics™ Human-Machine Interface (HMI): SW15S-BTMIJAA7W86TEG

- Fan-less Industrial 15" Touchscreen Computer
- Windows 8.1 Pro
- VNC Server - Admin (control) and Guest (viewing)
- Wireless N Network - Control Unit with tablets and laptop computers
- FactoryTalk[®] View ME (Virtual Instrument, VI, Panel Display Software)
- Studio 5000[®] Logix Designer Rockwell Automation Software

Planet™ Ethernet Wireless Router: IAP2000PE

- Industrial 802.11n wireless interface

Mean Well™ 24V Power Supply: SDR-240-24

- Small size with high efficiency and temperature rating
- Provides 24V power to PLC, HMI, prime/tank pumps, and switches
- Low inrush current
- DC-OK and short-circuit, overload, over-voltage, over-temperature protections

NorthStar™ NSQ Diaphragm Pump (qty. 2): M2682273B.2

- 100% continuous duty rating with no cool down period required
- One pump for priming the main centrifugal pump
- One pump for changing fluid levels between tanks
- Self-priming up to 12 feet above liquid level

NorthStar™ Secondary Water Tank 16G

- High/Low Level Sensors
- Water Heating Element

Leeson™ 3 HP Pump Motor: G131579.00

- (TEFC) Totally enclosed, external fan-cooled motor for use in dusty or damp environments
- Rated at 1,800 rpm
- 230/460V input voltage, three phase, 3 hp
- UL Listed and CSA certified for quality assurance

Educational Opportunities

FLUIDMechatronics™ Process Automation Lab effectively connects students with the fluid process automation industry by providing a scaled fluid process automation plant with integrated leading-edge, industrial brand-name controls and devices.

The comprehensive curriculum steps students through a well-balanced and up-to-date presentation of concepts and their applications in real-life fluid process automation scenarios. Students learn the principles of centrifugal pumping, including:

- Pump Performance Curves
- Affinity Laws
- Cavitation Analysis

Students apply that knowledge to practical centrifugal pumping fluid process automation scenarios. In the process, they become knowledgeable on how an actual industrial Human Machine Interface (HMI) works and how it can talk to the rest of the process systems. They discover how a Programmable Automation Controller (PAC) is programmed and how it automatically controls process system elements. They learn the PAC drives a Variable Frequency Drive (VFD), which controls the speed of the centrifugal pump motor driving the process pump. This pump speed can be controlled by flow, pressure and temperature feedback loops that are PIDE tuned.

Students become familiar with the integrated Ethernet communications system which enables system elements to talk to each other and respond as needed. Built in wireless on-site and remote control of the system. The process plant features two tanks, primary and secondary, that are used for fluid transfer, process heating and mixing scenario education. Control loops include:

- Tank Levels
- Temperature
- Mixing
- Pressure
- Suction
- Flow

Purchase Specifications

A self-contained, mobile centrifugal flow fluid process automation system, with:

- Clear-view Centrifugal Pump and flow circuit
- Calibrated transducers to measure pump inlet and exit pressure, system flow rate, process temperature, fluid tank levels, tank temp
- Industrial Human-Machine Interface
- Industrial Programmable Automation Controller with software
- Industrial Variable Frequency Drive
- Industrial Ethernet Communications System
- Industrial DC Voltage Controls Power System
- Clear-View Primary Fluid Tank with Ultrasonic Level Sensor
- Secondary Fluid Process/Transfer Tank with High/Low Float Level Switches and Tank Heater
- Control Loops to include Pressure, Suction, Flow, Temperature, Primary and Secondary Tank Levels and Mixing



FLUIDMechatronics™ has a free two year warranty on the entire system

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All FLUIDMechatronics™ specifications are subject to change