INTEGRATED CIRCUITS

ELECTROINC INDUSTRIES

Pressure Control Unit

Software

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Overview

The Pressure Control Unit software allows the user to operate the trainer experiments directly via USB connection to a computer. The software displays the Process Variable (PV) output for each experiment and plots PV over time for easy monitoring.

System Connection

- **Connection Type:** USB from the device to the computer.
- **Procedure:**
    1. Connect the USB cable from the unit to the computer.
    2. Launch the software using the Run button.
    3. Select "Connect Trainer" and choose the correct port.

Available Experiments

Total Experiments: 6

1. **Open-loop pressure control** – Experiment without feedback.
2. **ON/OFF control** – Simple on/off pressure control.
3. **Proportional (P) control** – Proportional control.
4. **Proportional-Integral (PI) control** – Proportional-Integral control.
5. **Proportional-Derivative (PD) control** – Proportional-Derivative control.
6. **Proportional-Integral-Derivative (PID) control** – Full PID control.

Data Monitoring

- Each experiment displays the **Output PV (Process Variable)**.
- PV is plotted over time for real-time performance tracking.

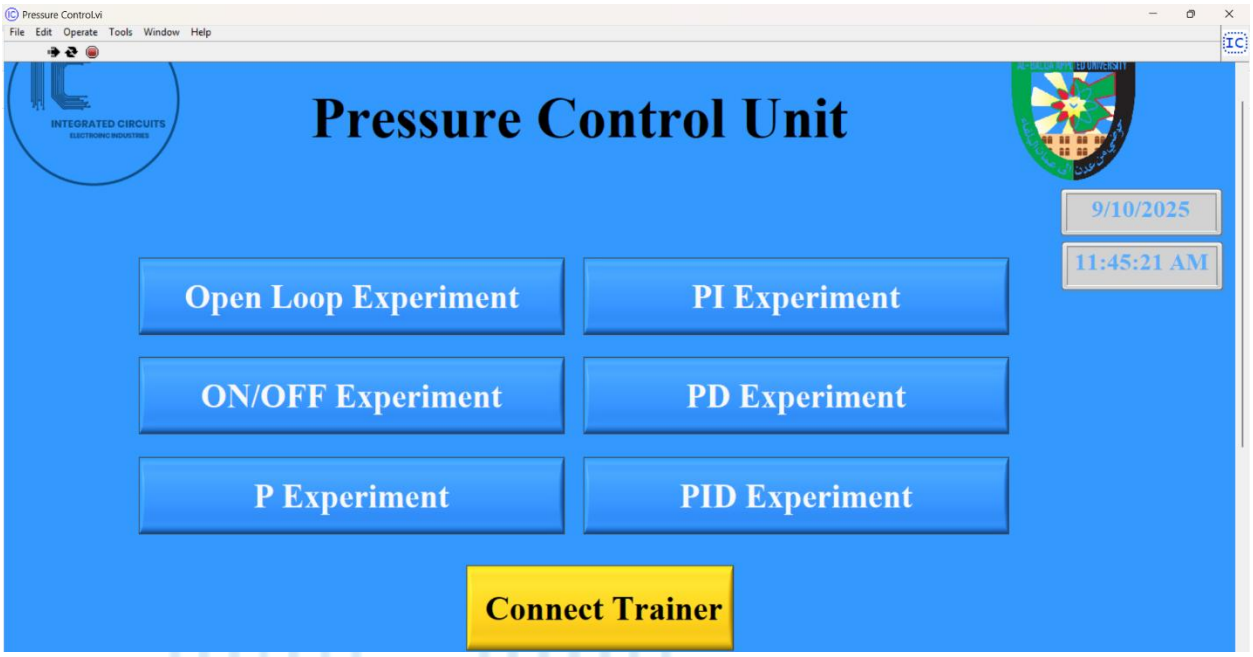
Features

- Direct USB connection.
- Real-time display and plotting of process variables.
- Supports all control types: Open-loop, ON/OFF, P, PI, PD, PID.

Troubleshooting

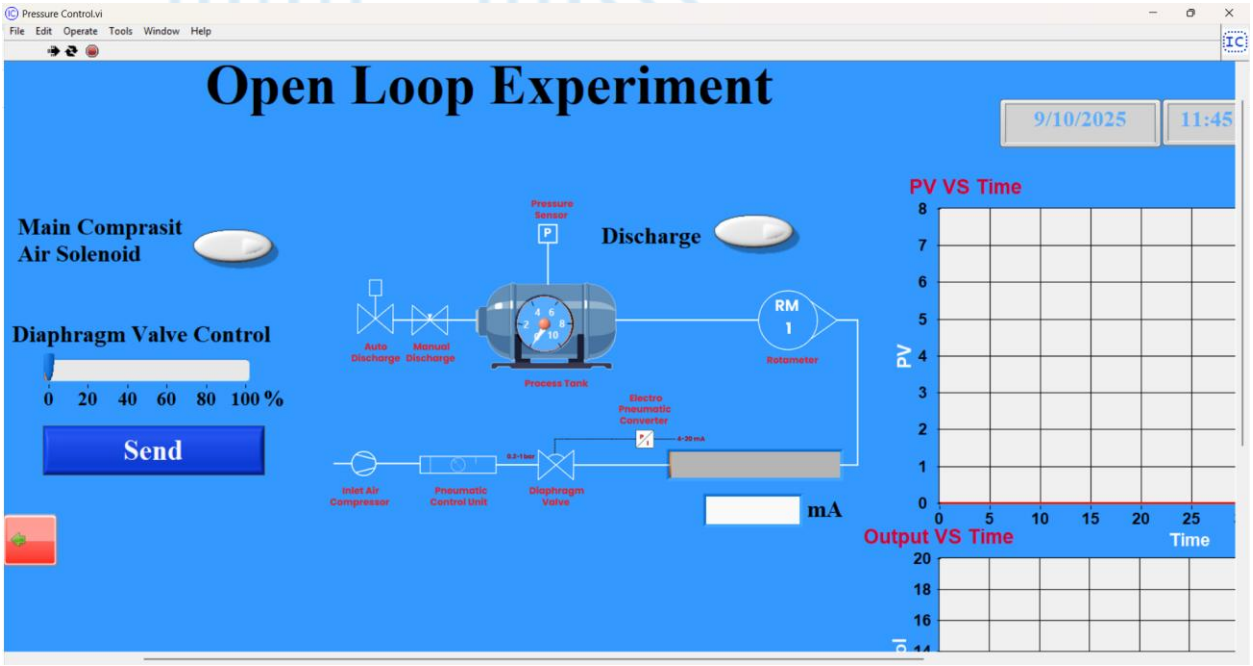
- **Port not visible:** Ensure the USB cable is connected properly and restart the software.
- **PV not displayed or plot not working:** Check port settings and unit connection.

After verifying the connection, you can select the experiment you want to work with from this interface.



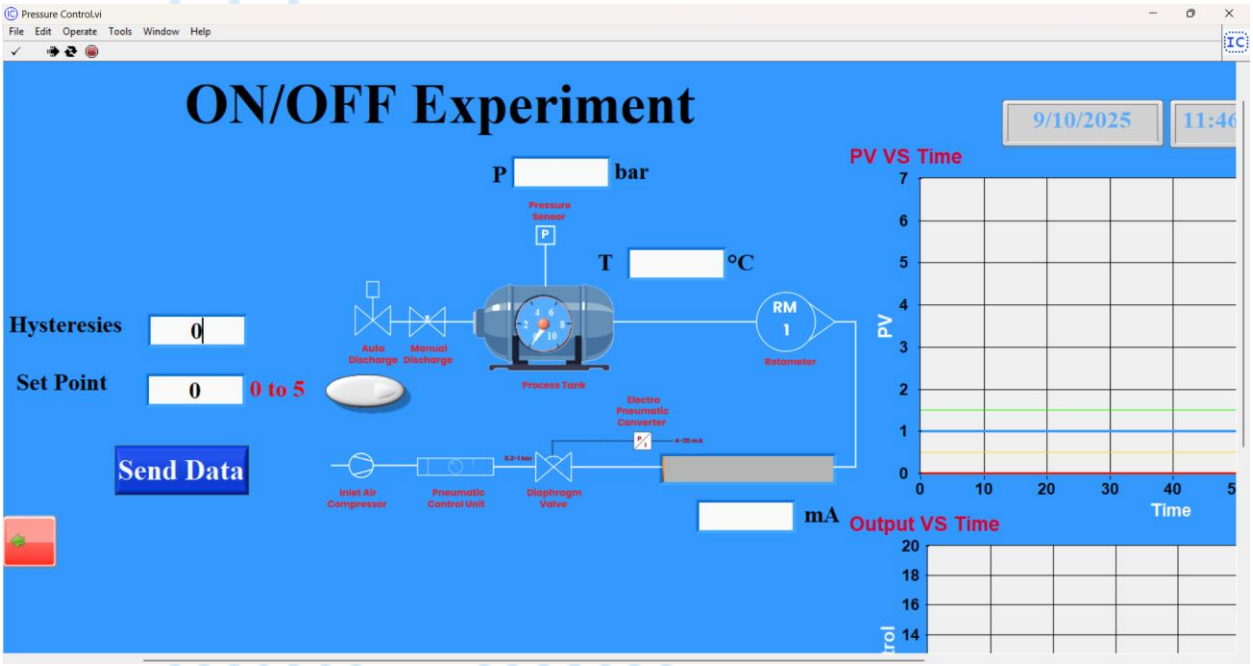
1. Open-loop Pressure Control

Description: This experiment demonstrates pressure control without feedback.
Purpose: Understand how the system behaves in open-loop mode.



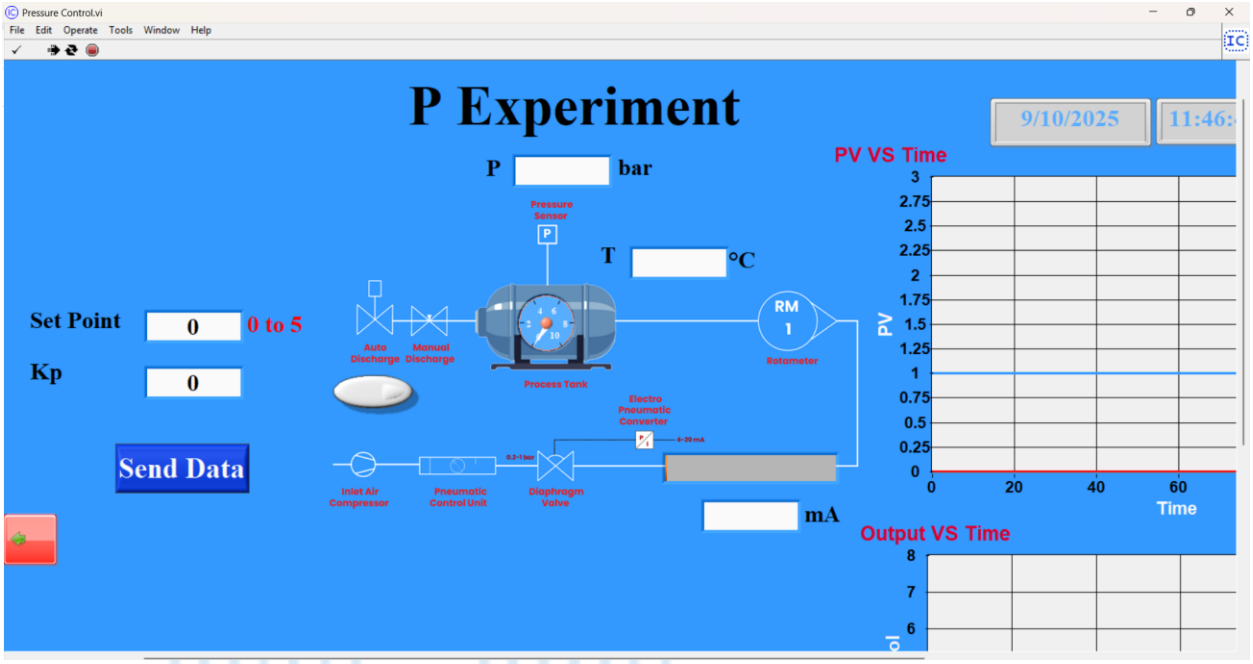
2. ON/OFF Control (with Hysteresis)

Description: This experiment uses simple on/off logic with hysteresis to control the pressure. The actuator turns fully on when the PV is below the lower threshold and fully off when the PV exceeds the upper threshold. Hysteresis prevents rapid switching near the setpoint.
Purpose: Learn basic control, understand the effect of hysteresis and how it reduces oscillations.



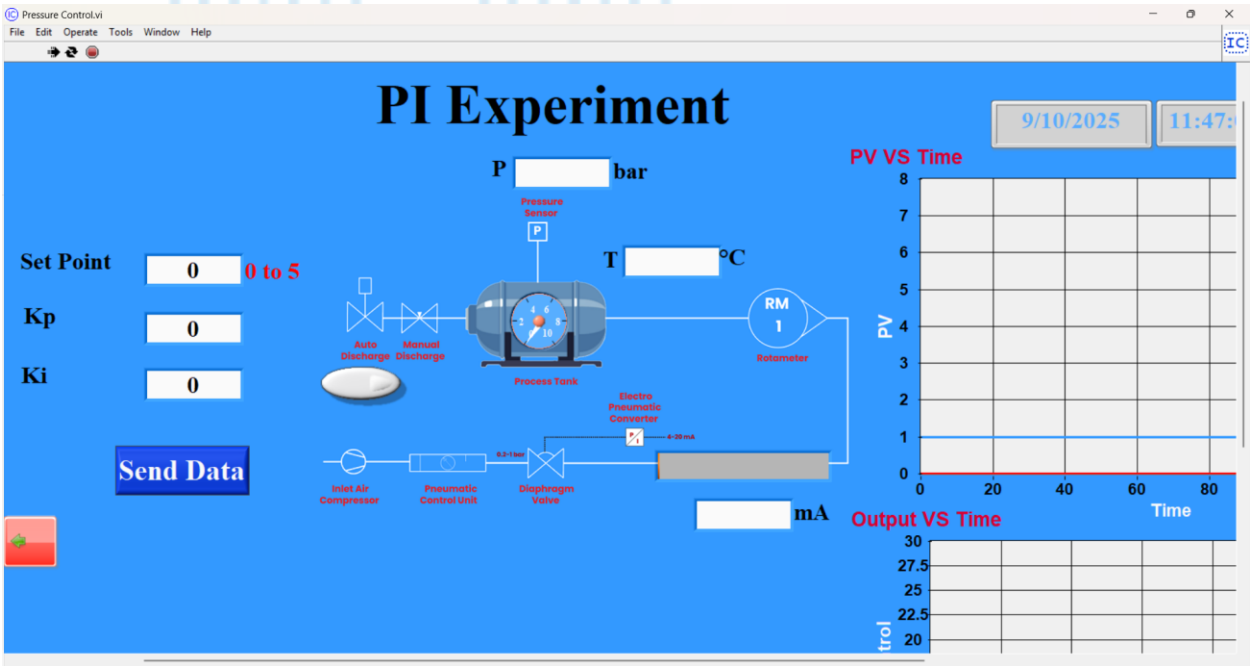
3. Proportional (P) Control

Description: Pressure is controlled proportionally to the error between setpoint and PV. Larger error results in stronger control action.
Purpose: Understand proportional control and steady-state error.



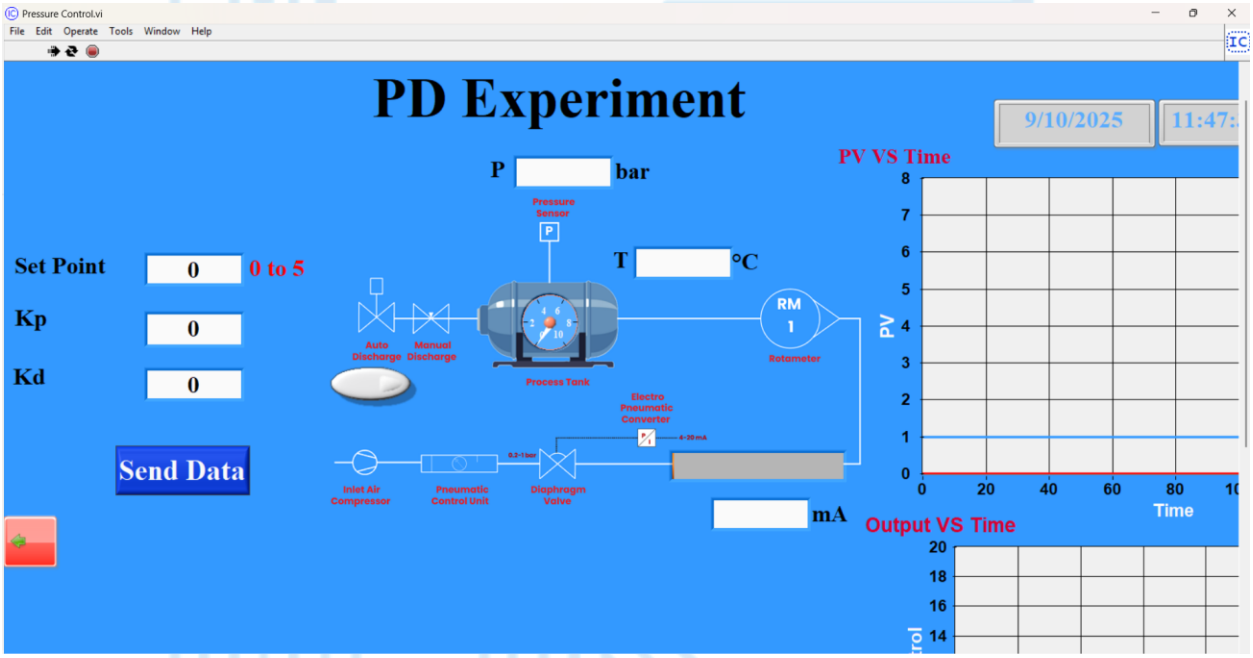
4. Proportional-Integral (PI) Control

Description: Combines proportional and integral actions to reduce steady-state error.
Purpose: Learn how integral action eliminates long-term offset.



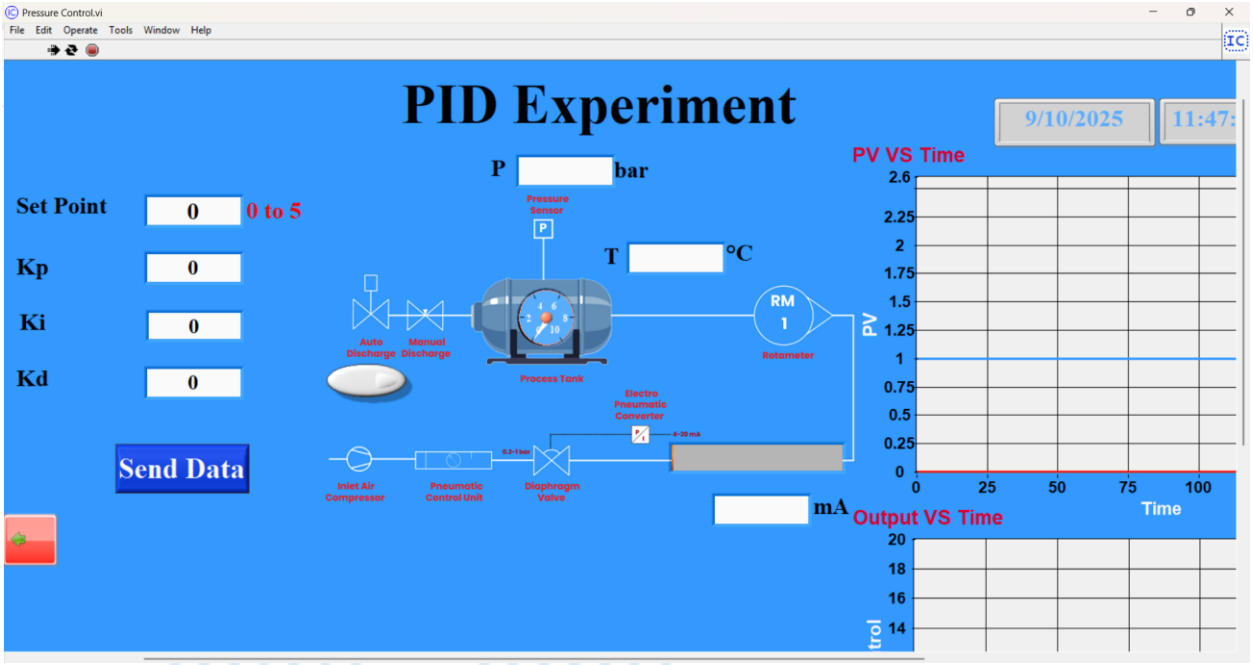
5. Proportional-Derivative (PD) Control

Description: Combines proportional and derivative actions to improve response and reduce overshoot.
Purpose: Study derivative action effect on transient behavior.



6. Proportional-Integral-Derivative (PID) Control

Description: Full PID control using proportional, integral, and derivative actions for precise pressure regulation.
Purpose: Learn how PID achieves stable and accurate control.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Process Tank
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Electro Pneumatic Converter
Inlet Air Compressor
Pneumatic Control Unit
Diaphragm Valve
mA
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PV
Time
Output VS Time