

# LabVIEW PID Control Toolset

## LabVIEW PID Control Toolset

- Graphical development of control algorithms
- P, PI, PD, and PID control algorithms
- Autotuning to improve performance of PID control
- Fuzzy logic tools for complex systems
- Fuzzy logic control designer

### PID Control Tools

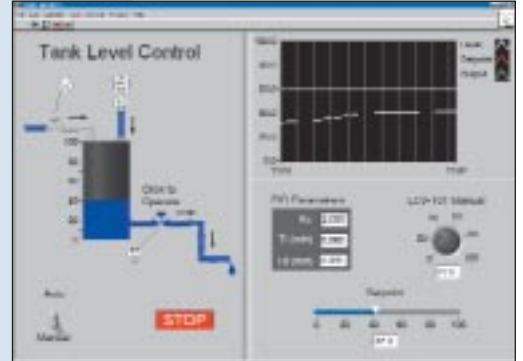
- Error-squared PID
- Lead-lag compensation
- Setpoint ramp generation
- Gain scheduling
- 2 degrees of freedom
- Multiloop cascade control
- Feedforward control
- Override (min/max selector) control
- Ratio/bias control
- Integrator antiwindup
- Bumpless transfer

### Fuzzy Logic Control Tools

- Up to 4 inputs and one output per fuzzy controller
- Cascade multiple controllers for complex control
- Membership functions including: triangular, trapezoidal, Z-shaped, S-shaped, Singleton
- Defuzzification methods including center of area, center of maximum, mean of maximum

### Advanced Control Tools

- Continuous linear for control or simulation
- Discrete linear for control or simulation
- Nonlinear for control or simulation



## Overview

The National Instruments LabVIEW PID Control Toolset adds sophisticated control algorithms to your instrumentation software development system. By combining the control functions in this toolset with the math and logic functions in NI LabVIEW, you can quickly develop programs for automated control. Integrate these control tools with NI data acquisition hardware to easily create control systems. These tools are included with the LabVIEW Real-Time Module and can be downloaded to a real-time controller for deterministic control applications.

## PID Control Tools

The PID functions implement a set of PID algorithms including error-squared and external-reset feedback. The PID algorithms feature bumpless transfer, integrator anti-windup, direct/inverse action, manual output adjustment, and a run/hold switch. The PID tools also feature gain scheduling, so you can improve performance by defining several regions of operation for your controller.

The autotuning tools automatically test the control system to determine new PID parameters that improve controller performance. This method maintains closed-loop control during the tuning process.

## Fuzzy Logic Control Tools

Use fuzzy logic to accelerate development and implementation of control for nonlinear or highly complex systems. The control strategy is implemented with simple, intuitive, linguistic rules. You can also use the fuzzy logic software for expert decision making, such as pattern recognition or fault diagnosis.

## Fuzzy Logic Control Designer

Each fuzzy controller can have up to four inputs and one output. For systems with large numbers of controller inputs, you can cascade multiple fuzzy controllers for control while implementing rules that are easy to understand. Linguistic terms for rules are defined with membership functions, and then a set of rules are generated automatically using the interactive fuzzy logic software. The output of each rule is manually selected, and you can assign weight values for the purpose of controller tuning.

## Advanced Control Tools

The advanced control tools include continuous, discrete, and nonlinear control functions for applications such as rapid control prototyping and hardware-in-the-loop simulation. Use continuous linear functions to simulate real-world, continuous signals, such as the voltage in a simple analog circuit. Implement discrete digital controllers with discrete linear functions. You can also simulate physical effects such as friction using the nonlinear functions.

## Ordering Information

LabVIEW PID Control Toolset

Windows 2000/NT/XP.....777874-03

Mac OS X\* .....777874-23

NI Developer Suite offers this product bundled with other NI software tailored for test or control applications. See page 39 for ordering information.

\*Please visit [ni.com/mac](http://ni.com/mac) for the latest Mac information.

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Debug License .....	900866-01

#### Modules

LabVIEW Datalogging and Supervisory Control Module .....	778311-03
LabVIEW Real-Time Module .....	777844-03
LabVIEW PDA Module for	
Palm OS .....	778595-03
Pocket PC OS .....	778596-03
LabVIEW FPGA Module .....	778694-03
LabVIEW Vision Development Module .....	777859-03

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Report Generation Toolset for Microsoft Office .....	778406-03
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PID Control Toolkit .....	777874-03
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### NI LabVIEW for Mac OS X\*

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LabVIEW Real-Time Module .....	777842-03
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Enterprise Connectivity Toolkit .....	777871-23
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SPC Toolkit .....	776954-01
PID Control Toolkit .....	777874-23
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Express VI Development Toolkit .....	778594-03
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Internet Developers Toolkit .....	777343-01
SPC Toolkit .....	776954-01

### NI LabVIEW Service and Support

#### Software Subscription Program (SSP)

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#### Training

Basics I Training Course .....	910013-xx†
Basics II Training Course .....	910017-xx†
Advanced Performance and Communication Course .....	910514-xx†
Advanced Application Development .....	910607-xx†
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NI Developer Suite offers many of these products bundled with other NI software tailored for test or control applications. See page 39 for more information.

Part numbers listed denote single-user licenses. For multi-user licenses, contact National Instruments.

†Please refer to the Training Services section on page 758 to complete the part number.

\*Visit [ni.com/mac](http://ni.com/mac) for the latest Mac OS information.

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