


PID Server

6/6/04

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PID Server

The PID Server PC utility enables you to auto-tune PID loops for both the Vision and M90/91 controller series. Although it is installed as part of the VisiLogic/U90 Setup, PID Server runs independently of other Unitronics software.

How Auto-tune works

The PID Server utility tunes a PID loop by temporarily disabling the PLC's PID function, and tuning the loop while the PC controls the PID output.

To enable a PID loop to be auto-tuned:

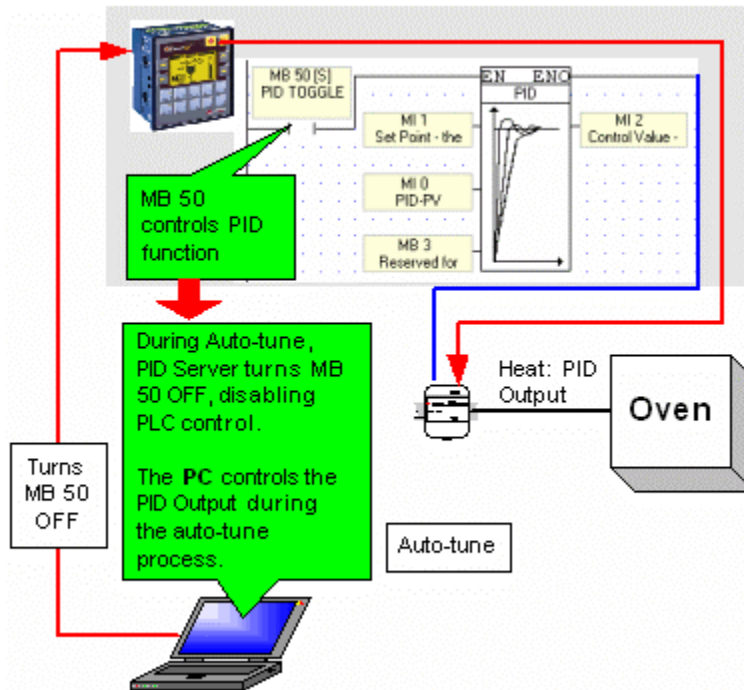
- The controller must be connected to the I/O module whose output feeds energy into PID system.
- The PC running PID Server must have an established communication link to the controller.
- The PID Server parameters must be linked to the same operands linked to the PLC's PID function.

Note ♦ PID Server will only work with Vision 3.73 and U90 3.70. and higher projects saved with the most current version of VisiLogic. To update older projects, open them with the current VisiLogic version and save them.

Vision Auto-tune

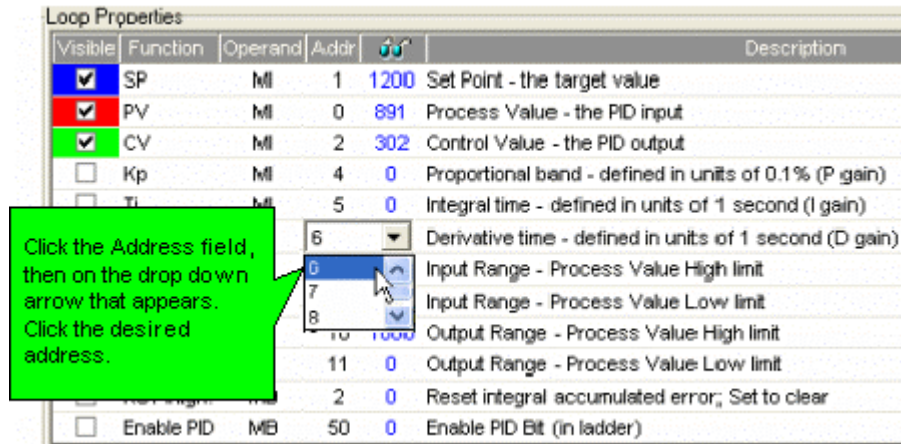
Before a PID loop can be auto-tuned:

- The OPLC must be connected to the I/O module whose output feeds energy into the PID-controlled system.
- The OPLC must be installed with a Ladder application that **contains a PID function; the function must be activated by an MB that is used only for that purpose.** When the loop is auto-tuned, the PID Server utility uses this MB to disable the PLC's PID function.
- The PC running PID Server must have an established communication link to the controller.
- The PID Server parameters must be linked to the same operands linked to the OPLC's PID function.



Auto-tuning with PID Server (Vision)

1. Start PID Server from:
 - within VisiLogic via the menu bar, Tools> PID Server,
 - or
 - within Windows via Start>Programs>Unitronics> PID Server.
2. Click on the New File icon to create a new PID loop Auto-tune file.
3. Locate Loop Properties in the lower right-hand part of the screen. Link all of the parameters to the same operands used in the PID function within the Ladder application. To link a parameter, click on the Address field and select the desired address.



The last parameter is the Enable PID bit, which must be the MB used to activate the PID function within the Ladder application.

The parameter links must be identical

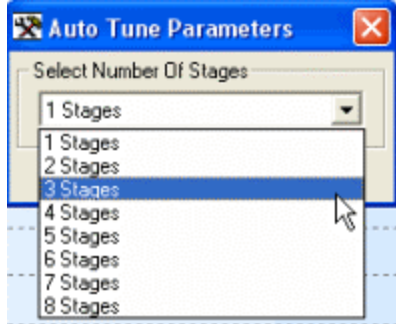
Enable PID MB

Visible	Function	Operand	Addr	Description
<input checked="" type="checkbox"/>	SP	MI	1 1200	Set Point - the target value
<input checked="" type="checkbox"/>	PV	MI	0 891	Process Value - the PID input
<input checked="" type="checkbox"/>	CV	MI	2 302	Control Value - the PID output
<input type="checkbox"/>	Kp	MI	4 0	Proportional band - defined in units of 0.1% (P gain)
<input type="checkbox"/>	Ti	MI	5 0	Integral time - defined in units of 1 second (I gain)
<input type="checkbox"/>	Td	MI	6 0	Derivative time - defined in units of 1 second (D gain)
<input type="checkbox"/>	SpPv-High	MI	7 0	Input Range - Process Value High limit
<input type="checkbox"/>	SpPv-Low	MI	8 0	Input Range - Process Value Low limit
<input type="checkbox"/>	Cv-High	MI	10 1000	Output Range - Process Value High limit
<input type="checkbox"/>	Cv-Low	MI	11 0	Output Range - Process Value Low limit
<input type="checkbox"/>	RST Intgrl	MB	2 0	Reset integral accumulated error; Set to clear
<input type="checkbox"/>	Enable PID	MB	50 0	Enable PID Bit (in ladder)

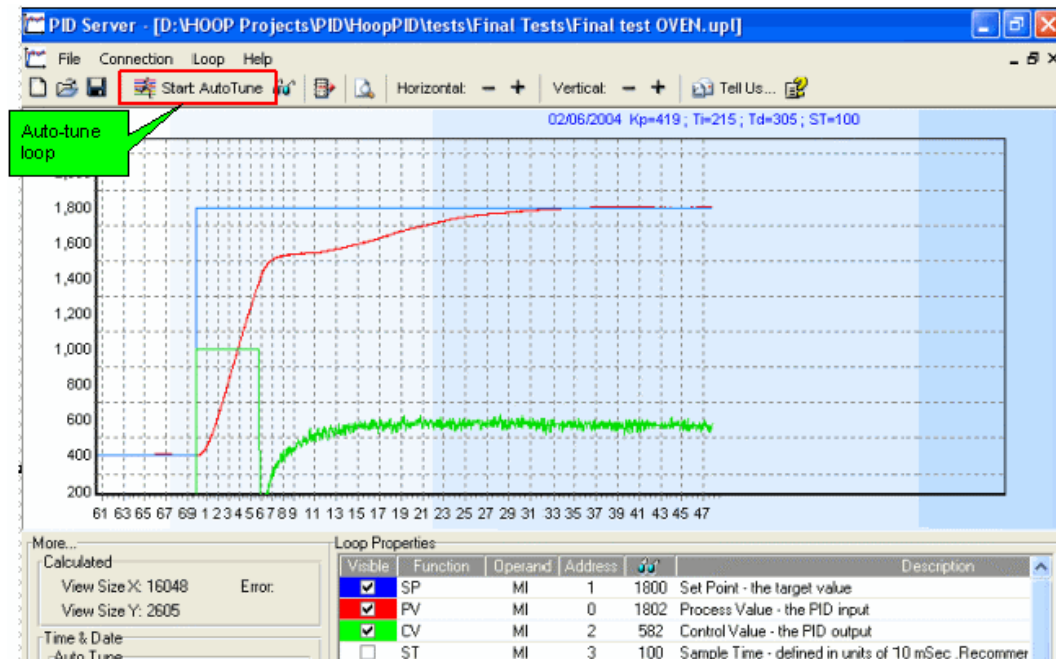
Params	Func	Operand	Address	Format	Description
PV	MI	0		DEC	PID-PV
SP	MI	1		DEC	Set Point - the target value
ST	MI	3	10	DEC	Sample Time - defined in units of 10 mSec (Recomm
Kp	MI	4		DEC	Proportional band - defined in units of 0.1% (P gain)
Ti	MI	5		DEC	Integral time - defined in units of 1 second (I gain)
Td	MI	6		DEC	Derivative time - defined in units of 1 second (D gain)
Reserved	MI	7		DEC	Reserved for future use
SpPv-High	MI	8	2000	DEC	Input Range - Process Value High limit
SpPv-Low	MI	9	0	DEC	Input Range - Process Value Low limit
Cv-High	MI	10	1000	DEC	Output Range - Control Value High limit
Cv-Low	MI	11	0	DEC	Output Range - Control Value Low limit
Reserved	MI	12		DEC	Reserved for future use
Direct	MB	1	RESET		0: DirectControl type Cooling) 1: ReverseControl type
RST Intgrl	MB	2			Reset integral accumulated error; Set to clear
Ctrl Ntype	MB	3			Reserved for future use
CV	MI	2		DEC	Control Value - the PID output
CV(p)	MI	20		DEC	Control Value CVp/(CVp+CVi+CVd)
CV(i)	MI	21		DEC	Control Value CVi/(CVp+CVi+CVd)
CV(d)	MI	22		DEC	Control Value CVd/(CVp+CVi+CVd)

- From the Connection menu, click OPLC model, and then select your controller type.
- From the Connection menu, click Communication - PC Settings, and select the appropriate settings.
- Click the Auto-tune icon. The Stages box opens.

7. Click on the drop-down arrow to select the number of desired Stages, which is the number of samples that Autotune will use in order to analyze the system.



8. Click OK; the PID Server utility begins to run.
Note that by checking the Visible option in Loop Properties, you cause PID Server to display a color-coded graphical representation of the Auto-tune process.



Controlling the Physical Output

Before beginning auto-tune, you may want to control and initialize the actual physical output that feeds energy into the PID-controlled system. If, for example, you are using a V120-12-UN2, you can suspend the action of a high-speed output by using Ladder Logic to turn off the Output's Run MB, and initialize the output by storing 0 into the linked MI in the Ladder program.

Calculated Error:
Zoom Factor: 13552

Time & Date
Auto Tune

Loop Properties

Visible	Function	Operand	Addr	Description
<input checked="" type="checkbox"/>	SP	MI	1 1200	Set Point - the target value
<input checked="" type="checkbox"/>	PV	MI	0 891	Process Value - the PID input
<input checked="" type="checkbox"/>	CV	MI	2 302	Control Value - the PID output

V120-12-UN2

High Speed Inputs High Speed Outputs

Address	Type	Op	Addr	Description
	High Speed Output (PWM)	MI	17	Operand for Frequency
0 0		MI	2	Control Value - the PID ou
		MB	40	Run MB

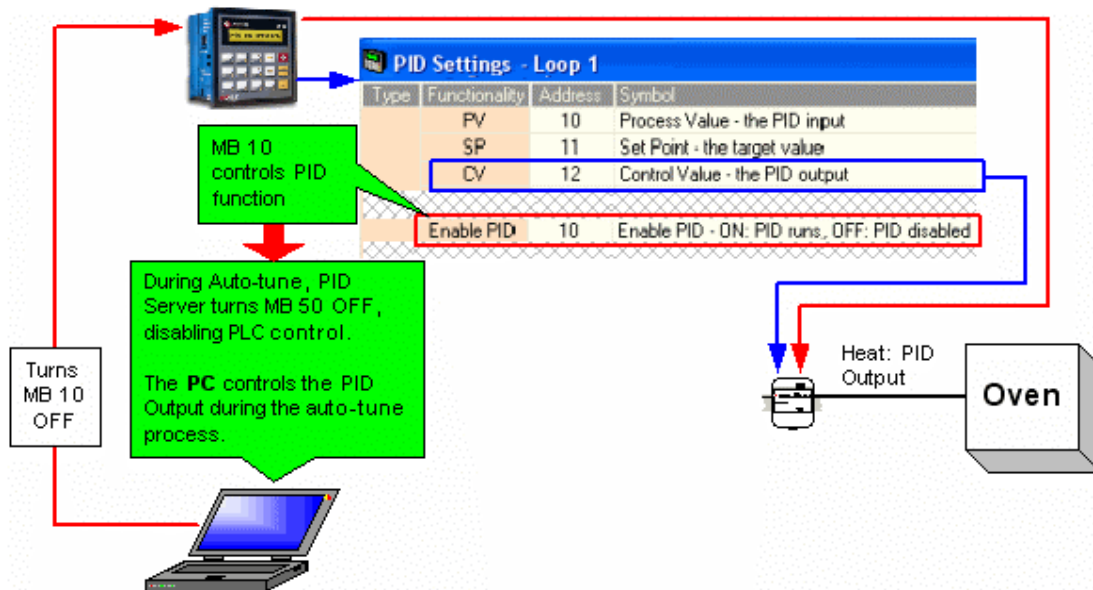
Initialize the physical Output bying storing 0 to the linked MI.

Use the Run MB to control HSO action.

M90/91 Auto-tune

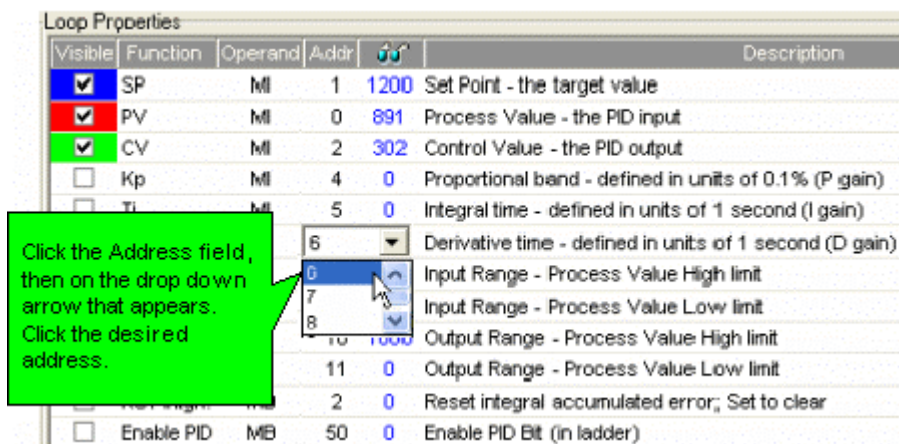
Before a PID loop can be auto-tuned:

- The OPLC must be connected to the I/O module whose output feeds energy into the PID-controlled system.
- The OPLC's Ladder application must **contain a PID function that is activated by an MB that is used only for that purpose**. When the loop is auto-tuned, the PID Server utility uses this MB to disable the PLC's PID function.
- The PC running PID Server must have an established communication link to the controller.
- The PID Server parameters must be linked to the same operands linked to the PLC's PID function.

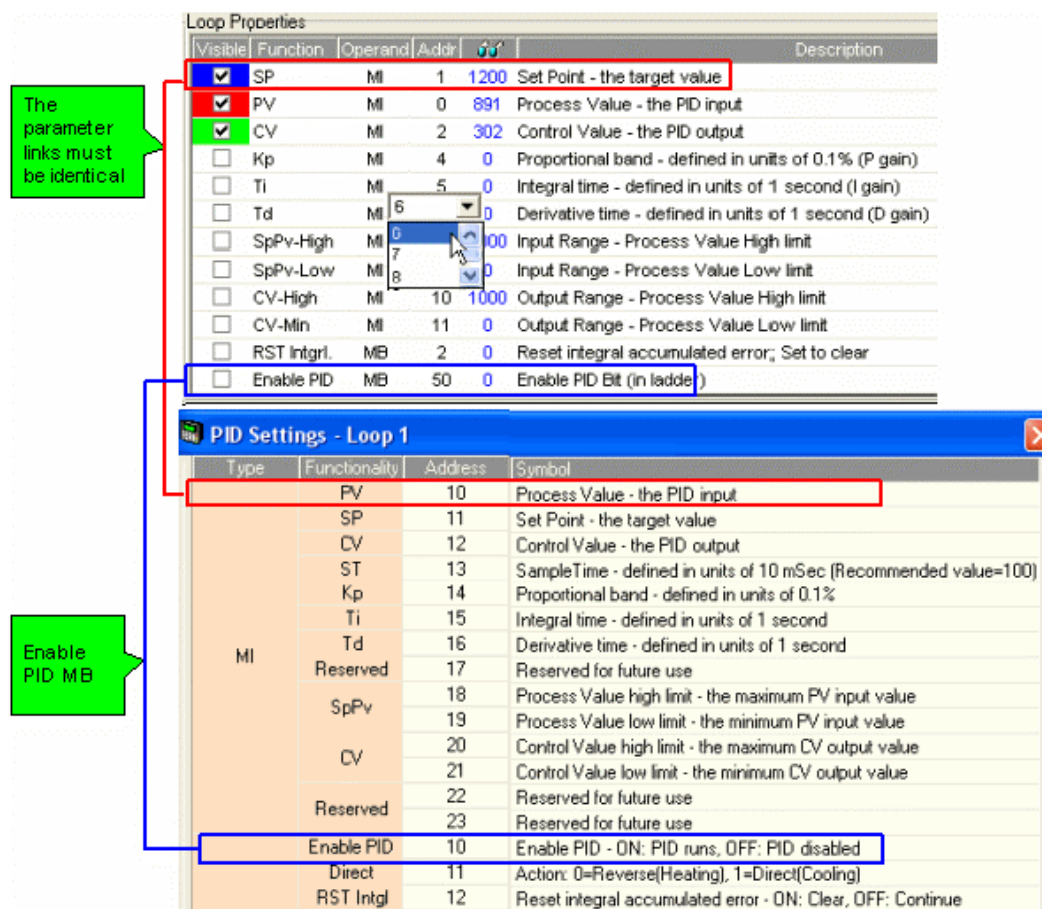


Auto-tuning with PID Server (M90/91)

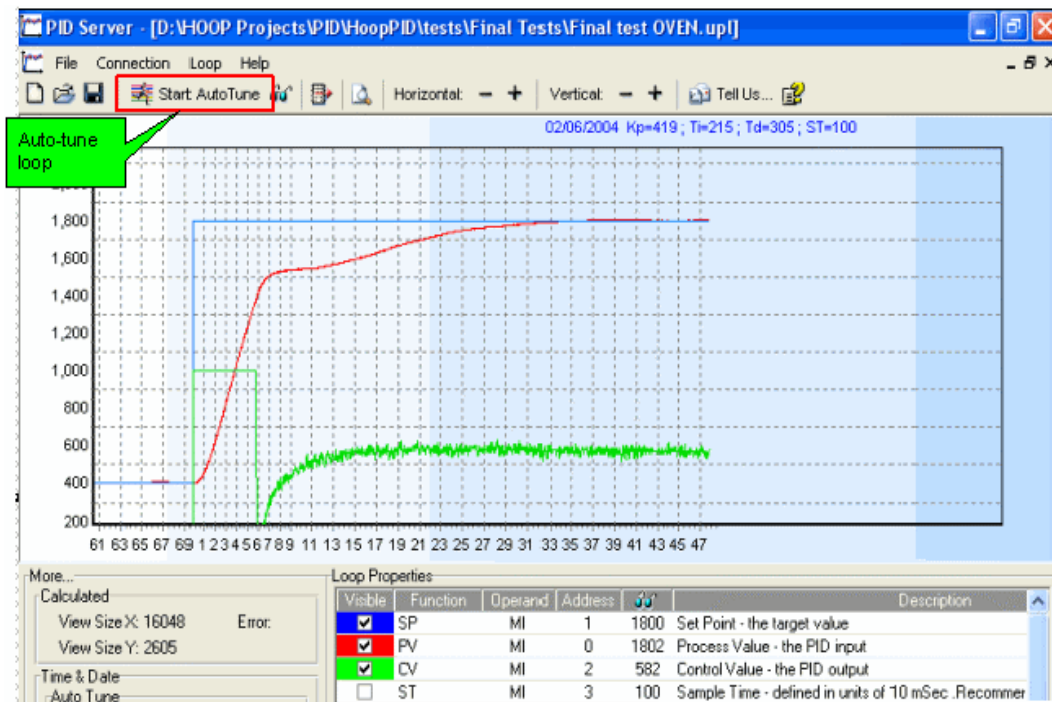
1. Start PID Server from:
 - within VisiLogic via the menu bar, Tools> PID Server,
 - or
 - within Windows via Start>Programs>Unitronics> PID Server.
2. Click on the New File icon to create a new PID loop Auto-tune file.
3. Locate Loop Properties in the lower right-hand part of the screen. Link all of the parameters to the same operands used in the PID function within the U90Ladder application. To link a parameter, click on the Address field and select the desired address.



The last parameter is the Enable PID bit, which must be the MB used to activate the PID function within the U90Ladder application.



- From the Connection menu, click OPLC model, and then select your controller type.
- From the Connection menu, click Communication - PC Settings, and select the appropriate settings.
- Click the Auto-tune icon. The PID Server utility begins to run.
Note that by checking the Visible option in Loop Properties, you cause PID Server to display a color-coded graphical representation of the Auto-tune process.



Controlling the Physical Output

Before beginning auto-tune, you may want to control and initialize the actual physical output that feeds energy into the PID-controlled system. If, for example, you are using an M91-12-UN2, you can suspend the action of a high-speed output by using Ladder Logic to turn off the Output's HSO Enable MB, and initialize the output by storing 0 into the linked MI in the Ladder program.

Visible	Function	Operand	Address	Description
<input checked="" type="checkbox"/>	SP	MI	1	Set Point - the target value
<input checked="" type="checkbox"/>	PV	MI	2	Process Value - the PID input
<input checked="" type="checkbox"/>	CV	MI	3	Control Value - the PID output

M91-19-4UN2

No.	Link	Type	Address	Description
1	High Speed Output	MI	2	HSO duty cycle
		MI	3	HSO enable
		MB	1	HSO enable

Initialize the physical Output by storing 0 to the linked MI.

Use the HSO enable bit to control HSO action.

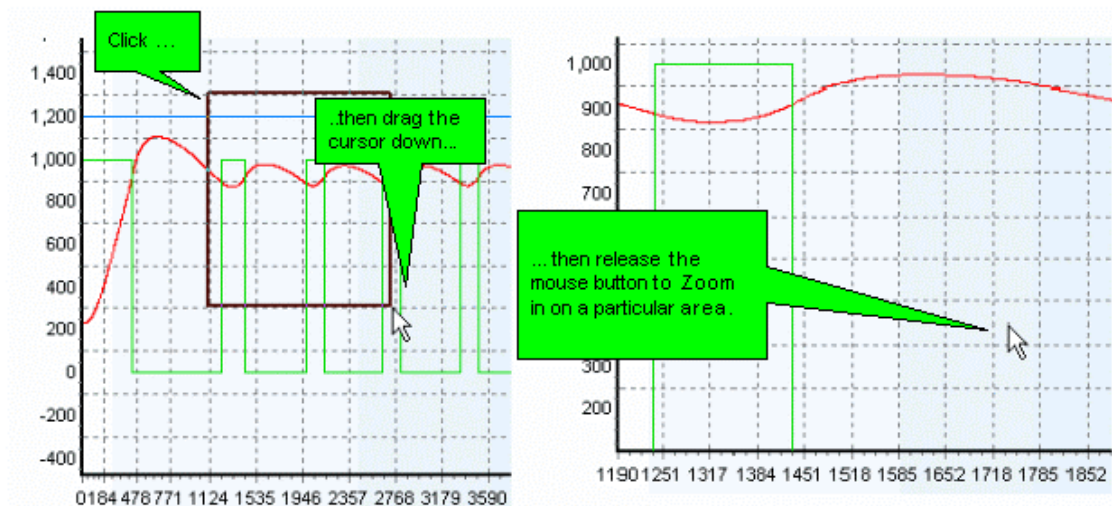
PID Server Features

Saving File Parameters

Whenever you click the Save icon, the file is saved as a .upl file. This file may be opened by any PC running PID Server. .upl files include the Loop Properties parameter links, comments, and PID auto-tune data up to the time that you click Save. If you wish to save only the Loop Properties without the data, by creating them, clicking Save, and storing the file.

Zoom

Click, then drag the cursor down, then release the mouse button to Zoom in on a particular area.



Click and drag the cursor up to reverse the Zoom effect.



Increase/Decrease Display View Size

Click the + icon on the toolbar to increase the graph sample size; click the - icon to decrease it.

Export

Located on the Loop menu, Export enables you to either export the auto-tune data to Excel, or to save a .bmp file of the auto-tune graph.

Comments

The Comment field is located in the lower left-hand corner of the PID server window. Any text you enter here is saved together with the .upl file.

Tell Us... **What's this ?**

Our mission is to make automation simple and efficient. Unitronics' R&D has developed and field-tested PID Server in order to provide you with fast, easy loop tuning.

To enable us to fine-tune PID Server to suit a broad range of PID applications, we would appreciate your using the 'Tell Us' feature. Clicking 'Tell us' will create an email with an attached copy of your auto-tune and PID process.

If possible, before you send the email, please take a moment to put the details of your application in the body of the email.

Note that in Windows XP, Windows will display the following dialog box; simply click yes to send the message to Unitronics.

