

# UDC6300 Process Controller Product Manual 51-52-25-45 Addendum (Rev.0)

## Overview

### Introduction

---

Honeywell ACCUTUNE II tuning algorithm for the UDC6300 Controller incorporates new **Fuzzy Overshoot Suppression** and **TUNE Auto-tuning**. These provide faster tuning, reduced overshoot, ability to tune integrating type processes, and the ability to re-tune while at a fixed setpoint.

---

### Fuzzy Overshoot Suppression

*Fuzzy Overshoot Suppression* minimizes overshoot after a setpoint change or a process disturbance. This is especially useful in processes which experience load changes or where even a small overshoot beyond the setpoint may result in damage or lost product.

It operates independently from Accutune Tuning. It does not change the PID constants. The fuzzy logic observes the speed and direction of the PV signal as it approaches the setpoint and temporarily modifies the internal controller action to suppress overshoot as necessary. This allows more aggressive tuning to co-exist with smooth process variable response.

It can be enabled or disabled depending on the application or the control criteria.

---

### TUNE Auto-tuning

*TUNE* provides foolproof, trouble-free on demand tuning in the UDC6300 Controller. No knowledge of the process is required at start-up. The operator simply enters the desired setpoint and initiates the tuning. The UDC controller immediately starts controlling to the setpoint while it identifies the process, calculates the tuning constants, and begins PID control with the correct tuning parameters.

This works with any process, including integrating processes, and allows re-tuning at a fixed setpoint.

---

### Additions and Changes to the manual

Please make additions and changes to the UDC6300 Controller Product Manual to reflect the addition of the new Accutune II.

**Attached are configuration and operation information that has been expanded to include the new Accutune II selections.**

*Subsection 3.9* - Accutune Set Up Group Function Prompts expanded to include "FUZZY", "TUNE", and "TUNE+PV" for Loop 1 and Loop 2.

*Subsection 4.5* - Accutune Function Prompt Definitions expanded to include "FUZZY", "TUNE", and "TUNE+PV" for Loop 1 and Loop 2.

*Subsection 5.19* - Fuzzy Overshoot Suppression Operation added.

*Subsection 5.20* - Accutune II Introduction and Operation of "TUNE" added.

**Add the following information to Subsections 3.17 and 4.13**

Under "Options" set up group, Digital Input 1 and Digital Input 2 selections expanded to include "ToTUNE" selection as the last selection. "SP"(Setpoint) and "SP+PV" tuning remains the same. **It works as stated in *Subsection 5.20 in the Product Manual*.**

---

*Continued on next page*

## Overview, Continued

---

### Two loop and cascade operation

Accutune II can be used on either or both loops. However, while one loop is operating **SP Only** tuning, the configuration of either loop cannot be changed.

When one loop is operating by **PV** adaptive tuning, the other loop can have its configuration changed.

---

### Aborting Tuning

If it is necessary to stop or abort the tuning process, press the

**Manual/Auto** key and the controller will return to Manual mode.

You can also disable “TUNE” OR “TUNE + PV” in the “ACCUTUNE” OR “ACCUTUNE2” set up group.

---

## 3.9 Accutune Set Up Group

---

### Introduction

The Accutune Set Up group offers these selections:

- **(FUZZY) Fuzzy Overshoot Suppression** - uses fuzzy logic to suppress or eliminate any overshoot that may occur when the PV approaches setpoint.
- **(TUNE) Demand Tuning** - The tuning process is initiated through the operator interface keys or via a digital input (if configured). The algorithm then calculates new tuning parameters and enters them in the tuning group.
- **(SP Only) Setpoint Tuning** -SP Only Tune continuously adjusts the PID parameters in response to setpoint changes. You can select tuning on minimum setpoint changes of 5% up to 15% span. Perform SP tuning after you have configured the controller.

*SP Tuning does not work with 3 Position Step Control algorithm.*

- **(TUNE + PV) or (SP + PV) PV Tuning** - The **(TUNE) Demand Tuning** or the **(SP Only) Setpoint Tuning** portions of these selections work as stated above.

**PV Adapt** will occur during Process Variable (PV) disturbances (0.3% span or larger) which result from non-linearities, process dynamics, load changes, or other operating conditions. When this condition exists, the controller monitors the process response for 1 and 1/2 process cycles around the setpoint to determine whether there has been a true process change or a momentary upset.

---

*Continued on next page*

### 3.9 Accutune Set Up Group, Continued

**Function prompts** Table 3-6 lists the function prompts in the “ACCUTUNE” Set Up group.

Table 3-6 Accutune Group Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
<b>FUZZY</b>	Fuzzy Overshoot Suppression	DISABLE ENABLE	Disabl
<b>ACCUTUNE</b>	Accutune	DISABLE TUNE (Demand Tuning) SP Only(SP Tuning) TUNE + PV SP + PV	Disabl
<b>ACCUTUNE2</b>	Accutune2	DISABLE TUNE (Demand Tuning) SP Only (SP Tuning) TUNE + PV SP + PV	Disabl
<b>SP CHANG*</b>	Setpoint Change Value	5 to 15% Input Span	10
<b>PROC GAIN*</b>	Process Gain	0.10 to 10.00	1.0
<b>SP CHANG2*</b>	Setpoint Change Value	5 to 15% Input Span	10
<b>PROCGAIN2*</b>	Process Gain	0.10 to 10.00	1.0
<b>CRITERIA*</b>	Tuning Criteria - Loop 1	NORMAL FAST	FAST
<b>CRITERIA2*</b>	Tuning Criteria - Loop 2	NORMAL FAST	FAST
<b>AT ERROR or AT ERROR 2</b> (depending on Loop)	Accutune Error codes	Read Only NONE OUT LIMIT ID FAIL ABORT LOW PV RUNNING	--

\* APPLIES TO “SP ONLY” AND “SP + PV) ONLY

## 4.5 Accutune Set Up Group

### Introduction

Accutune offers the following selections:

- (FUZZY) Fuzzy Overshoot Suppression
- (TUNE) Demand Tuning, or
- (SP Only) Setpoint Tuning, or
- (TUNE+PV) Demand Tuning + PV Adaptive Tune
- (SP+PV) Setpoint Tuning + PV Adaptive Tune

Descriptions of their functions are listed with each selection in Table 4-4.

**ATTENTION** Selecting "Gain Scheduling" in the "CONTROL" or "CONTROL 2" Set Up groups automatically disables Accutune for that group.

### Accutune group prompts

Table 4-4 lists all the function prompts in the Accutune setup group and their definitions.

Table 4-4 Accutune Group Definitions

Lower Display Prompt	Upper Display Range of Setting or Selection	Parameter Definition
FUZZY	DISABL ENABLE	<b>FUZZY OVERSHOOT SUPPRESSION</b> - can be enabled or disabled independently of whether Demand tuning or SP tuning is enabled or disabled. <b>DISABLE</b> - Disable Fuzzy Overshoot Suppression <b>ENABLE</b> - The UDC uses Fuzzy Logic to suppress or minimize any overshoot that may occur when PV approaches SP. It will not recalculate any new tuning parameters.
ACCUTUNE	DISABL TUNE SP Only TUNE+PV SP + PV <i>(SP Only and SP+PV do not operate with TPSC Algorithm)</i>	<b>ACCUTUNE</b> <b>DISABLE</b> – Disables the Accutune function. <b>TUNE</b> - If "TUNE" is selected, and tuning is initiated through the operator interface or digital input (if configured), the algorithm calculates new tuning parameters and enters them into the tuning group. <b>SETPOINT ONLY</b> – This selection tunes on setpoint changes only. It employs time domain analysis to accelerate line out at any desired setpoint without prior process knowledge. <b>TUNE + PV</b> - This selection provides "TUNE" On Demand tuning Plus PV adaptive tuning whenever a PV process disturbance of 0.3% span or greater occurs. It will take 1 and 1/2 process cycles around setpoint before any process recognition and re-tuning can occur due to PV disturbances. <b>SP + PV</b> - This selection tunes on setpoint changes but also whenever a PV process disturbance of 0.3% span or greater occurs. It will take 1 and 1/2 process cycles around setpoint before any process recognition and re-tuning can occur due to PV disturbances.

Table 4-4 continued on next page

## 4.5 Accutune Set Up Group, Continued

Table 4-4 Accutune Group Definitions, continued

Lower Display Prompt	Upper Display Range of Setting or Selection	Parameter Definition
<b>ACCUTUNE 2</b>	DISABL TUNE SP Only TUNE + PV SP + PV	<b>ACCUTUNE - Loop 2</b> Available only if configured for 2Loop or Cascade. <b>DISABLE ACCUTUNE 2</b> – Disables the Accutune function for Loop 2. <b>TUNE</b> - same as ACCUTUNE <b>SETPOINT ONLY</b> – Same as ACCUTUNE <b>TUNE + PROCESS VARIABLE</b> - Same as ACCUTUNE <b>SETPOINT ONLY PLUS PROCESS VARIABLE</b> - Same as ACCUTUNE
<b>SP CHANG*</b>	5 to 15%	<b>SETPOINT CHANGE</b> - The minimum setpoint change that will result in re-tuning must be configured between 5% and 15%:( i.e. If the range is 0 to 2400 and 5% is configured, re-tuning will occur if the setpoint change is 120 or larger.)
<b>PROC GAIN*</b>	0.10 to 10.00	<b>PROCESS GAIN</b> – This is the Gain of the process being tuned on Loop 1. It is automatically calculated during tuning process. This is normally a READ only value. It should only need to be changed if the controller fails to identify the process. In this case, set the value to the algebraic value of PV in percent, divided by output in percent while in the manual mode.
<b>SP CHANG2*</b>	5 to 15%	<b>SETPOINT CHANGE LOOP 2</b> - The minimum setpoint change on Loop 2 that will result in re-tuning must be configured between 5% and 15%:
<b>PROC GAIN 2*</b>	0.10 to 10.00	<b>PROCESS GAIN LOOP 2</b> – This is the Gain of the process being tuned on Loop 2. It is automatically calculated during tuning process. This is normally a READ only value. It should only need to be changed if the controller fails to identify the process. In this case, set the value to the algebraic value of PV in percent, divided by output in percent while in the manual mode.  <b>ATTENTION</b> Note you must disable Accutune to change tuning constant values from the keyboard.
<b>CRITERIA*</b>	<b>NORMAL</b> <b>FAST</b>	<b>TUNING CRITERIA (SETPOINT ADAPT)</b> - Select a criteria best suited for your process on loop 1. <b>NORMAL</b> - Original critical damping (no overshoot) <b>FAST</b> - a more aggressive tuning with a minimal possible overshoot of less than 0.5%.

\* Applies to "SP Only" and "SP+PV" tuning only

*Continued on next page*

## 4.5 Accutune Set Up Group, Continued

Table 4-4 Accutune Group Definitions, continued

Lower Display Prompt	Upper Display Range of Setting or Selection	Parameter Definition
<b>CRITERIA2*</b>	<b>NORMAL</b> <b>FAST</b>	<b>TUNING CRITERIA FOR LOOP 2 (SETPOINT ADAPT)</b> - Select a criteria best suited for your process on Loop 2  <b>NORMAL</b> - Original critical damping (no overshoot) <b>FAST</b> - a more aggressive tuning with a minimal possible overshoot of less than 0.5%. For Example: Slightly underdamped
<b>AT ERROR</b>	See <i>Section 5 -Operation</i> for a list of error prompts.	<b>ADAPTIVE TUNE ERROR STATUS LOOP1-</b> When an error is detected in the Accutune process, an error prompt will appear.
<b>AT ERROR2</b>	See <i>Section 5 -Operation</i> for a list of error prompts.	<b>ADAPTIVE TUNE ERROR STATUS LOOP 2 -</b> When an error is detected in the Accutune process, an error prompt will appear.

\* Applies to "SP Only" and "SP+PV" tuning only

## 5.19 Fuzzy Overshoot Suppression

---

### Introduction

Fuzzy Overshoot Suppression minimizes overshoot after a setpoint change or a process disturbance. This is especially useful in processes which experience load changes or where even a small overshoot beyond the setpoint may result in damage or lost product.

---

### How it works

The fuzzy logic observes the speed and direction of the PV signal as it approaches the setpoint and temporarily modifies the internal controller response action as necessary to avoid an overshoot. There is no change to the PID algorithm, and the fuzzy logic does not alter the PID tuning parameters. This feature can be independently Enabled or Disabled as required by the application to work with “TUNE” On-Demand tuning or the “SP” tuning algorithm.

---

### Configuration

To configure this item, refer to Section 3 - Configuration:

- Set Up Group “ACCUTUNE”
  - Function Prompt “FUZZY”
  - Select “ENABLE” or “DISABLE” (▲ or ▼)
-

## 5.20 Accutune™

---

### Introduction

There are several types of Accutune from which to choose:

- **(TUNE) Demand Tuning** - Tuning is done on demand by:
    - pressing the **Lower Display** and **▲** keys simultaneously, or
    - by selecting prompt “TUNE RUN” in the lower display, or
    - via Digital Input.
  - **(SP Only) Setpoint Tuning** - SP Only tuning will continually adjust the Gain or Proportional Band (P), Reset (I), and Rate (D) tuning constants in response to setpoint changes.
  - **(TUNE) Demand Tuning + PV Adapt** - provides “TUNE” On Demand tuning plus “PV” adaptive tuning whenever a PV process disturbance of 0.3% span or greater occurs.
  - **(SP Only) Setpoint Tuning + PV Adapt** - provides “SP Only” tuning plus “PV” adaptive tuning whenever a PV process disturbance of 0.3% span or greater occurs.
- 

### Configuration

To configure this item, refer to Section 3 - Configuration:

- Set Up Group “**ACCUTUNE**”
  - Function Prompt “**ACCUTUNE**” or “**ACCUTUNE 2**” depending on which loop you are tuning.
  - Select “**DISABLE**”, “**TUNE**”, “**SP Only**”, “**TUNE + PV**”, or “**SP Only + PV. USE(▲ or ▼)**”
- If “**SP Only**” Selected:
- Enter the Setpoint Change Value, Function Prompt “**SP CHANG(2)**”
  - Verify or change the Process Gain Value, Function Prompt “**KPG(2)**”
  - Verify Criteria, Function Prompt “**CRITERIA(2)**”
- 

### Two loop and cascade operation

Accutune II can be used on either or both loops. However, while one loop is operating **SP Only** tuning, the configuration of either loop cannot be changed.

When one loop is operating by **PV** adaptive tuning, the other loop can have its configuration changed.

---

*Continued on next page*

## 5.20 Accutune™, Continued

**Rules and regulations** Table 5-37 is a list of rules and regulations for Accutune.

Table 5-37 Accutune Rules and Regulations

TUNE	SP Only	Applicable Rule or Regulation
X		TUNE (On Demand) tuning will work for all Control Algorithms except "On/Off".
X		TUNE (On Demand) tuning works for Integrating Processes.
	X	SP tuning will work only for algorithms PID-A or PID-B selections, i.e. it will <b>NOT</b> work with ON/OFF, THREE POSITION STEP, or PD+MR control algorithms.
	X	SP tuning can tune on all Local or Computer setpoints <i>except ramping setpoints</i> , i.e. cannot be done during SP Ramp or SP Program or when using Remote Setpoint.
X	X	Tuning is done in Automatic mode.
X	X	Tuning can be monitored or re-configured using communications option.
X	X	Tuning can be enabled via Digital Inputs.
X	X	Tuning can be aborted by going to Manual mode or disabling via configuration.
X	X	When tuning is in progress, a large "T" appears in the upper display and disappears as soon as tuning is completed.
X	X	can tune two independent loops

*Continued on next page*

## 5.20 Accutune™, Continued

### How TUNE (Demand) tuning works

TUNE tuning provides virtually foolproof, trouble-free on-demand tuning in the UDC6300 controller. No knowledge of the process is required at start-up. The operator simply enters the desired setpoint and initiates the tuning.

The UDC controller immediately starts controlling to the setpoint while it identifies the process, calculates the tuning constants and enters them into the Tuning group, and begins PID control with the correct tuning parameters. This works with any process, including integrating type processes, and allows re-tuning at a fixed setpoint.

The tuning sequence will cycle the controller's output two full cycles between 0% and 100 % (or configured output limits) while allowing only a very small Process Variable change above and below the SP during each cycle.

The algorithm then calculates new tuning parameters and enters them into the tuning group. A large "T" appears in the upper display

### Starting TUNE (Demand) tuning

After "TUNE" or "TUNE+PV" has been enabled, use the procedure in Table 5-38 to start tuning

Table 5-38 Procedure for Starting TUNE (Demand) Tuning

Step	Action
1	Set the Setpoint to the desired value.
2	Switch to "Automatic" mode - <input type="button" value="Manual/Auto"/> key.
3	Initiate Tuning by: <ul style="list-style-type: none"> <li>• pressing the <input type="button" value="▲"/> key when the Lower Display prompt = "TUNE-OFF",</li> <li>• pressing the <input type="button" value="Lower Display"/> and <input type="button" value="▲"/> keys simultaneously, or</li> <li>• using the Digital Input (if configured).</li> </ul>

### Aborting Tuning

If it is necessary to stop or abort the tuning process, press the  key and the controller will return to Manual mode.

You can also disable "TUNE" OR "TUNE + PV" in the "ACCUTUNE" OR "ACCUTUNE2" set up group.

*Continued on next page*

## 5.20 Accutune™, Continued

### TUNE for Duplex (Heat/Cool)

“TUNE” can be done for applications using Duplex (Heat/Cool) control. During tuning, Accutune II requires SP 1 will cause a Heating demand, and then the calculated tuning parameters will be automatically entered as PID SET 1. Likewise, it requires tuning at Local SP 2 will cause a Cooling demand, and the cooling parameters will be entered as PID SET 2.

The tuning sequence will cycle the controller’s output two full cycles between the high output limit and 50% for HEAT or between 50% and the low output limit for COOL while allowing only a small process variable change above and below the setpoint during each cycle.

### Configuring TUNE for Duplex (Heat/Cool)

To configure this item, refer to Section 3 - Configuration:

- Set Up Group “ACCUTUNE”
- Function Prompt “ACCUTUNE” OR “ACCUTUNE2”
- Select “TUNE” OR “TUNE+PV”. Use (▲ or ▼)

### Using TUNE at Start-up for Duplex (Heat/Cool)

After “TUNE” or “TUNE+PV” has been enabled, use the procedure in Table 5-39 to use “TUNE” at Start-up for Duplex (Heat/Cool) control.

Table 5-39 Procedure for Using TUNE at Start-up for Duplex

Step	Action
1	<p><b>Heat Zone:</b></p> <p>a. Adjust the <b>Local SP1</b> to a value within the <b>Heat Zone</b>.</p> <p>b. Insure that the UDC is in <i>Automatic</i> mode.</p> <p>c. Press the <span style="border: 1px solid black; padding: 2px;">Lower Display</span> and <span style="border: 1px solid black; padding: 2px;">▲</span> keys simultaneously to initiate <b>Heat</b> tuning.</p> <p>The output will cycle between 50% and 100% (or high output limit).</p> <p>A large “T” appears in the upper display until tuning is completed and final <b>Heat</b> parameters are entered for <b>PID Set 1</b> in the Tuning group.</p>
2	<p><b>Cool Zone:</b></p> <p>a. Adjust the <b>Local SP2</b> to a value within the <b>Cool Zone</b>.</p> <p>b. Insure that the UDC is in <i>Automatic</i> mode.</p> <p>c. Press the <span style="border: 1px solid black; padding: 2px;">Lower Display</span> and <span style="border: 1px solid black; padding: 2px;">▲</span> keys simultaneously to initiate <b>Cool</b> tuning.</p> <p>The output will cycle between 0% and 50% (or low output limit).</p> <p>A large “T” appears in the upper display until tuning is completed and final <b>Cool</b> parameters are entered for <b>PID Set 2</b> in the Tuning group.</p>

*Continued on next page*

## 5.20 Accutune™, Continued

### How “SP Only” Tuning works

“SP Only” tuning will continually adjust the Gain or Proportional Band (P), Reset (I), and Rate (D) tuning constants in response to setpoint changes.

SP Only tuning handles all Local and Computer Setpoint changes. It uses time domain analysis, and the rule based expert system techniques to identify the two most dominant process lags plus any dead time.

It then automatically readjusts the PID parameters as necessary. It does this while controlling to setpoint in automatic (closed loop) control mode.

These calculated PID values can be changed, if desired, by disabling SP Tune and entering different values.

Tuning can be aborted by pushing **Manual** key to return to manual mode.

Two criteria are available — “Normal” and “Fast” through configuration.

### Setpoint changes

During start-up, or whenever the setpoint changes beyond the “SP Change” value, SP Only tuning employs time domain analysis to tune the process at any desired setpoint without any prior initialization or process knowledge.

### Using SP Only tuning at Start-up

After “SP Only” or “SP Only + PV” has been enabled, use the procedure in Table 5-40 to use “SP Only” tuning at Start-up.

Table 5-40 Procedure for Using SP Only Tuning at Start-up

Step	Action
1	Put the controller into manual mode- <b>Manual/Auto</b> key.
2	Let the PV stabilize.
3	Adjust the Setpoint to the desired value.
4	Put the controller into automatic mode- <b>Manual/Auto</b> key.  The controller will switch to automatic mode and the process will start to move toward the setpoint and will line out with the proper tuning constants.  A large “T” appears on the left side of the upper display to indicate that (SP ) tuning is in progress.

*Continued on next page*

## 5.20 Accutune™, Continued

### SP Only Tuning for Duplex (Heat/Cool)

“SP Only” tune can be done for applications using Duplex (Heat/Cool) control.

### Configuring SP Only Tuning for Duplex (Heat/Cool)

To configure this item, refer to Section 3 - Configuration:

- Set Up Group “ACCUTUNE”
- Function Prompt “ACCUTUNE” or “ACCUTUNE2”
- Select “SP Only” or SP Only + PV”. Use (▲ or ▼)
- Enter the Setpoint Change Value, Function Prompt “SP CHANG” or “SPCHANG2”.
- Verify the Process Gain Value to be 1.0, Function Prompt “KPG” or “KPG2”
- Verify Criteria selected is “FAST”, Function Prompt “CRITERIA” or “CRITERIA2”

### Using SP Only tuning at Start-up for Duplex (Heat/Cool)

After “SP Only” or “SP Only + PV” has been enabled, use the procedure in Table 5-41 to use “SP” tuning at Start-up for Duplex (Heat/Cool) control.

Table 5-41 Procedure for Using SP Tuning at Start-up for Duplex

Step	Action
1	Put the controller into manual mode- <input type="button" value="Manual/Auto"/> key.
2	<p><b>Heat Zone:</b></p> <p>a. Adjust the output to a value ABOVE 50% and at least 5% lower than the normal Heating Setpoint value.</p> <p>b. Let the PV stabilize.</p> <p>c. Press the <input type="button" value="Manual/Auto"/> key to start tuning for Heat Zone.</p> <p>The controller will switch to automatic mode and the process will start to move toward the setpoint and will line out with the proper HEAT tuning constants.</p> <p>A large “T” appears on the left side of the upper display to indicate that (SP ) tuning is in progress.</p> <p>When the “T” disappears, tuning is completed and final values are entered for PID Set 1 parameters in the Tuning group.</p>
3	<p><b>Cool Zone:</b></p> <p>a. Adjust the output to a value BELOW 50% and at least 5% above the normal Cooling Setpoint value.</p> <p>b. Let the PV stabilize.</p> <p>c. Press the <input type="button" value="Manual/Auto"/> key to start tuning for Cool Zone.</p> <p>The controller will switch to automatic mode and the process will start to move toward the setpoint and will line out with the proper COOL tuning constants.</p> <p>A large “T” appears on the left side of the upper display to indicate that (SP ) tuning is in progress.</p> <p>When the “T” disappears, tuning is completed and final values are entered for PID Set 2 parameters in the Tuning group.</p>

*Continued on next page*

## 5.20 Accutune™, Continued

---

### SP Only tuning (after Start-up)

SP Only tune will occur whenever the controller is in automatic mode and a setpoint change occurs which is greater than the previously configured minimum setpoint change value.

The controller will delay using any setpoint changes for 30 seconds to enable it to calculate whether to “SP” tune or not. But, if the controller is toggled between LSP1 and LSP2 or if any other key (such as LOWER/DISPLAY) is pressed, the setpoint change is immediate.

A large “T” is displayed in the upper display whenever tuning is in progress. During this time, no changes to the configuration parameters, including the setpoint, are permitted.

---

### Aborting SP Only Tuning

If it is necessary to stop or abort the tuning:

- press the **Manual/Auto** key to return to Manual mode. This will cause an immediate abort of tuning.
  - Disable “SP Only” or “SP Only + PV” in the Accutune Set Up group at function prompt “ACCUTUNE” or “ACCUTUNE2”.
- 

### Re-Tuning

The controller will evaluate current tuning as SP changes occur. When re-tuning is required, the controller operates in automatic mode and identifies new tuning constants.

At that point, the “T” disappears and tuning values are entered and used until re-tuning occurs again.

---

*Continued on next page*

## 5.20 Accutune™, Continued

---

### TUNE+PV ADAPT or SP+PV ADAPT (Process variable disturbances)

The (TUNE) Demand Tuning or the (SP Only) Setpoint Tuning portions of these selections work as stated previously.

During Process Variable (PV) disturbances which result from non-linearities, process dynamics, load changes or other operating conditions, **PV ADAPT** will occur whenever a PV disturbance of 0.3% span or larger occurs. When this condition exists, the controller monitors the process response to determine whether there has been a true process change or a momentary upset. It will take 1 and 1/2 process cycles around the setpoint before any process recognition can occur.

For this configuration, the controller operates with only one set of Tuning Parameters for each loop. The second set, normally used for Duplex Output or for Keyboard, PV or SP Switching, is not used because Adaptive Tune continually updates the tuning parameters based on the PV deviation.

---

### PV tuning indications

A **small “T”** is displayed in the upper display whenever PV ADAPT mode is in progress. During this time, changes to the configuration parameters are permitted. However, this may cause the PV ADAPT process to abort. The selection of Fast or Normal criteria has no effect on PV Adapt.

---

### Aborting PV Adaptive Tuning

If it is necessary to stop or abort the tuning:

- press the **Manual/Auto** key to return to Manual mode. This will cause an immediate abort of tuning.
- Disable “TUNE+PV” or “SP Only + PV” in the Accutune Set Up group at function prompt “ACCTUNE” or “ACCTUNE2”.

---

*Continued on next page*

## 5.20 Accutune™, Continued

### Error prompt accessing procedure

When an error is detected in the Accutune process, the message “AT ABORT” will appear in the lower display.

In order to determine what is causing the error:

- Select “ACCUTUNE” or “ACCUTUNE2” Set Up Group
- Access function prompt “AT ERROR” or “AT ERR2” for error prompt.

Table 5-30 lists the Accutune error codes that will be displayed in the **Upper Display** and their definitions.

### Error prompt

Table 5-42 lists the Adaptive Tune error prompts and their definitions.

Table 5-42 Adaptive Tune Error Prompt Definitions

Upper Display Prompt	Prompt Definition	Action to Take
NONE	NO ERRORS	None
OUTLIMIT*	SP Adapt step is greater than high output limit or less than low output limit Output step insufficient to get to SP Value	<ul style="list-style-type: none"> <li>• Check the output limits under Set Up group prompt “CONTROL”, function prompts “OUTHILIM” and “OUTLOLIM” in <i>Section 3 - Configuration</i>.</li> <li>• Check “PROCESS GAIN”. Refer to Table 5-36.</li> </ul>
IDFAIL*	Process Identification Failure A illegal value of gain, Rate, or reset was calculated.	Try to SP tune again.
ABORT (Only error code available for “TUNE”)	<ul style="list-style-type: none"> <li>• Manual abort has occurred                             <ul style="list-style-type: none"> <li>– Accutune will abort if the <span style="border: 1px solid black; padding: 0 2px;">MAN/AUTO</span> key is pressed during tuning</li> </ul> </li> <li>• Digital Input detected</li> <li>• Automatic Abort has occurred                             <ul style="list-style-type: none"> <li>– Accutune will automatically abort when a PV oscillation has been detected during “SP ADAPT”, whenever any SP values are changed during a “PV ADAPT”, or when Accutune is disabled.</li> </ul> </li> </ul>	Try to TUNE or SP tune again.
LOW PV*	PV not changed sufficiently or the PV has increased by more than 4% and Deadtime not determined.	NONE - After a period of about 5 minutes, the “SP Only” will be retried automatically with a larger output step.
RUNNING*	Informational prompt indicating that “SP Only” is still active checking process gain even though “T” is not lit. It does not affect the keyboard operation.	None

\* Does not apply to “TUNE”.