



UDC 2500 Application Note

Tuning Set Up Group

Introduction

Tuning consists of establishing the appropriate values for the tuning constants you are using so that your controller responds correctly to changes in process variable and setpoint. You can start with predetermined values but you will have to watch the system to see how to modify them. The Accutune feature automatically selects Gain, Rate, and Reset on demand.

ATTENTION

Because this group contains functions that have to do with security and lockout, we recommend that you configure this group last, after all other configuration data has been loaded.

Function Prompts

Table 1 TUNING Group (Numeric Code 100) Function Prompts

Function Prompt Lower Display		Selection or Range of Setting Upper Display		Parameter Definition
English	Numeri c Code	English	Numeri c Code	
PB or GAIN	101	PB = 0.1 to 1000 % Gain = 0.01 to 1000		<p>PROPORTIONAL BAND (simplex) is the percent of the range of the measured variable for which a proportional controller will produce a 100 % change in its output</p> <p>GAIN is the ratio of output change (%) over the measured variable change (%) that caused it.</p> $G = \frac{100\%}{PB\%}$ <p>where PB is the proportional band (in %)</p> <p>If the PB is 20 %, then the Gain is 5. And, at those settings, a 3 % change in the error signal (SP-PV) will result in a 15 % change in the controller's output due to proportional action. If the Gain is 2, then the PB is 50 %.</p> <p>Also defined as "HEAT" Gain on Duplex models for variations of Heat/Cool applications.</p> <p><i>The selection of Proportional Band or Gain is made in the CONTROL parameter group under prompt PBorGAIN.</i></p>
RATE T	102	0.00 to 10.00 minutes 0.08 or less = OFF		<p>RATE action, in minutes, affects the controller's output whenever the deviation is changing; and affects it more when the deviation is changing faster.</p>



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Function Prompt Lower Display		Selection or Range of Setting Upper Display		Parameter Definition
English	Numeri c Code	English	Numeri c Code	
				Also defined as "HEAT" Rate on Duplex models for variations of Heat/Cool applications.
I MIN or I RPM	103	0.02 to 50.00 0.02 to 50.00		<p>I MIN = Reset in Minutes per Repeat I RPM = Reset in Repeats per Minute</p> <p>Integral Time (or Reset) adjusts the controller's output in accordance with both the size of the deviation (SP–PV) and the time that it lasts. The amount of the corrective action depends on the value of Gain. The Reset adjustment is measured as how many times proportional action is repeated per minute or how many minutes before one repeat of the proportional action occurs.</p> <p>Used with control algorithm PID-A or PID-B. Also defined as "HEAT" Reset on Duplex models for variations of Heat/Cool applications.</p> <p>ATTENTION The selection of whether Minutes per Repeat or Repeats per Minute is used is made in the CONTRL parameters group under the prompt MINorRPM.</p>
MANRST	104	-100 to 100 % Output		<p>MANUAL RESET is only applicable if you use control algorithm PD WITH MANUAL RESET in the Algorithm Set Up group. Because a proportional controller will not necessarily line out at setpoint, there will be a deviation (offset) from setpoint. This eliminates the offset and lets the PV line out at setpoint.</p> <p>ATTENTION Bias is shown on the lower display.</p>
PB 2 or GAIN 2	105	PB = 0.1 to 1000 % Gain = 0.01 to 1000		<p>PROPORTIONAL BAND 2 or GAIN 2, RATE 2, and RESET 2 parameters are the same as previously described for "Heat" except that they refer to the cool zone tuning constants on duplex models or the second set of PID constants, whichever is pertinent</p>
RATE2T	106	0.00 to 10.00 minutes 0.08 or less = OFF		<p>This is the same as above except that it applies to Duplex models for the "COOL" zone of Heat/Cool applications or for the second set of PID constants.</p>



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Function Prompt Lower Display		Selection or Range of Setting Upper Display		Parameter Definition
English	Numeri c Code	English	Numeri c Code	
I2 MIN or I2 RPM	107	0.02 to 50.00 0.02 to 50.00		These are the same as above except that they apply to Duplex models for the "COOL" zone of Heat/Cool applications or for the second set of PID constants.
CYC T1 or CT1 X3	108	1 to 120		<p>CYCLE TIME (HEAT) determines the length of one time proportional output relay cycle. Defined as "HEAT" cycle time for Heat/Cool applications.</p> <p>CYC T1—Electromechanical relays CT1 X3—Solid state relays</p> <p>ATTENTION <i>Cycle times are in either second or 1/3-second increments depending upon the configuration of RLYTYP in the Output Algorithm Set Up group.</i></p>
CYC2T2 or CT2 X3	109	1 to 120		<p>CYCLE TIME 2 (COOL) is the same as above except it applies to Duplex models as the cycle time in the "COOL" zone of Heat/Cool applications or for the second set of PID constants</p> <p>CYC2T2—Electromechanical relays CT2 X3—Solid state relays</p> <p>ATTENTION <i>Cycle times are in either second or 1/3-second increments depending upon the configuration of RLYTYP in the Output Algorithm Set Up group.</i></p>
SECUR	110	0 to 9999		<p>SECURITY CODE—The level of keyboard lockout may be changed in the Set Up mode. Knowledge of a security code may be required to change from one level to another. This configuration should be copied and kept in a secure location.</p> <p>NOTE: The Security Code is for keyboard entry only and is not available via communications.</p> <p>ATTENTION <i>Can only be changed if LOCK selection is NONE.</i></p>
LOCK	111			<p>LOCKOUT applies to one of the functional groups: Configuration, Calibration, Tuning, Accutune DO NOT CONFIGURE UNTIL ALL CONFIGURATION IS COMPLETE.</p>



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Function Prompt Lower Display		Selection or Range of Setting Upper Display		Parameter Definition
English	Numeri c Code	English	Numeri c Code	
		NONE	0	NONE —No lockout; all groups are read/write.
		CAL	1	CALIBRATION —All groups are available for read/write except for the Calibration and Keyboard Lockout groups.
		CONF	2	+ CONFIGURATION —Tuning, SP Ramp, and Accutune groups are read/write. All other groups are read only. Calibration and Keyboard Lockout groups are not available.
		VIEW	3	+ VIEW —Tuning and Setpoint Ramp parameters are read/write. No other parameters are viewable.
		ALL	4	ALL —Tuning and Setpoint Ramp parameters are available for read only. No other parameters are viewable.
AUTOMA	112	DIS ENAB	0 1	MANUAL/AUTO KEY LOCKOUT —Allows you to disable the Manual/Auto key DISABLE ENABLE ATTENTION <i>Can only be viewed if LOCKOUT is configured for NONE.</i>
RN HLD	114	DIS ENAB	0 1	SETPOINT SELECT KEY LOCKOUT —Allows you to disable the Setpoint Select key DISABLE ENABLE ATTENTION <i>Can only be viewed if LOCKOUT is configured for NONE.</i>
SP SEL	115	DIS ENAB	0 1	RUN/HOLD KEY LOCKOUT —Allows you to disable the Run/Hold key, for either SP Ramp or SP Program. <i>The Run/Hold key is never disabled when used to acknowledge a latched alarm 1 or a Diagnostic Message</i> DISABLE ENABLE ATTENTION <i>Can only be viewed if LOCKOUT is configured for NONE.</i>