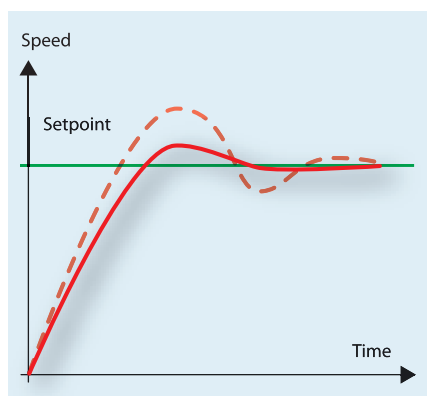# VLT® HVAC Drive – PID Autotuning

The perfect solution for
- Optimum control
- HVAC system protection
- Ease of use

The VLT® HVAC Drive provides a new PID autotuning feature for HVAC systems. This feature is used with the frequency converter's PID closed loop controller to ensure accurate PI control adjustment. When autotuning is enabled, the LCP prompts the user with on-screen instructions.

Creating Value – simplifying the commissions process

PID auto tuning is used to automatically set the values of proportional gain and the integral time simplifying the commissioning process and saving time.

Automatically sets the optimum values for HVAC performance

PID auto tuning is used to automatically set the values of proportional gain (P) and the integral time (I) for the closed loop controller, ensuring optimum control adjustment and operation. Differentiation time (D) is not commonly used in HVAC applications and is generally set to 0 or OFF.

Programming is quick and easy

The drive software makes programming auto feature quick and easy by choosing PID Autotuning 20-7* function under the Main Menu.

Actual autotuning is done when the fan or pump is running with a typical load to provide accurate tuning. PI auto tuning functions by introducing changes in the output frequency (the motor speed) and measuring the response of the feedback signal. From the feedback response, the values of P and I are calculated and presented on the LCP. The user determines whether to accept or reject them. If accepted, the values are written into the parameters and autotuning is disabled. When using autotuning it is best to set the ramp up and down times as short as the load driven inertia allows, so that the actual response of the controlled system can be measured.
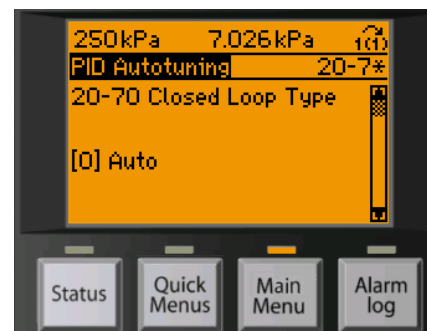
The frequency converter will automatically set the values of proportional gain (P) and integral time (I).

Features	Benefits
Accurate PI control adjustment	Reduce installation and commissioning cost
Provides best noise immunity	A short time period makes it easier to distinguish between noise and the system oscillation
Live zero detection	Used to detect when the analog signal is lost
Programming is quick and easy with pre-programmed software	Saves time and increases reliability

Programming PI Autotuning

Programming PI autotuning is simplified with a number of parameters that are pre-programmed into the drive.

Prior to programming this feature, commission the drive by using the parameters in the Quick Menu Q2 Quick Set-Up. Then perform the following steps for programming PI Autotuning.

Para-meter	Description	Settings		Comments
		Factory setting	Recom-mended setting	
1 - 00	Configuration Mode		Closed Loop	FC 102 must be set in Closed Loop for PI Autotuning
20-12	Reference/Feedback Unit	%		Choose the unit the PI Controller will use for controlling the output frequency of the frequency converter.
3-02	Minimum Reference			These are the min. and max. values of the set point. The effective set point will be in this range.
3-03	Maximum reference			
6-24	Terminal 54 Low Reference/ Feedback value			This is the range of signals from the feedback sensor.
6-25	Terminal 54 High Reference/ Feedback value			
6-26	Terminal 54 Filter Time Constant			To filter noise from the feedback signal
6-27	Terminal 54 Live Zero	[1] Enabled	[1] Enabled	Live Zero is used to detect when an analog signal is lost. It can be enabled or disabled for each analog input. The function of the drive when the feedback signal is lost is programmed in parameter 6-10.
6-00	Live Zero Timeout Time	10 s		Set an appropriate timeout time.
6-01	Live Zero Timeout Function	[0] Off		Select action.
22-81	PID Normal/Inverse Control	[0] Normal		Choose **Normal** to make the frequency converter's speed increase when feedback is low. (Supply fans and pumps). Choose **Inverse** to make the frequency converter's speed decrease when feedback is low (Cooling tower fans).
22-83	PID Start Speed [Hz]	0 Hz%		Set the minimum speed the frequency converter must quickly accelerate to when it is started.
20-21	Setpoint 1			The desired value of the feedback signal.

To automatically set the values of Proportional Gain and Integral Time with PI Autotuning				
20-70	Closed Loop Type	[0] Auto		Leave the parameter at [0] Auto if the system response speed is not known.
20-71	PID Performance	[0] Normal		Normal is appropriate in most applications.
20-72	PID Output Change	0.1		The amount of change in drive frequency that will be made during the test. Default is 0.1 (10%).
20-73	Minimum Feedback Level			These parameters limit the amount that the feedback signal is allowed to change during auto tuning to keep from damaging the system. If the feedback signal goes outside this range, auto tuning will stop.
20-74	Maximum Feedback Level			
20-79	PID Auto tuning	[0] Disabled	[1] Enabled	Selecting Enabled and pressing OK starts the PID Auto Tuning procedure.