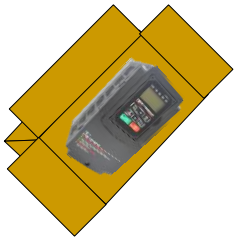


OUT of the Box Startup – Overview

This document is intended as a quick setup guide for the F510 PID function. Please note this document is not a substitute for the F510 User Manual and it is important that you reference the F510 user manual before proceeding.

Introduction to PID Control

The PID function in the inverter can be used to maintain a constant process variable such as pressure, flow, temperature by regulating the output frequency (motor speed).

A feedback device (transducer) signal is used to compare the actual process variable to a specified setpoint. The difference between the set-point and feedback signal is called the error signal.

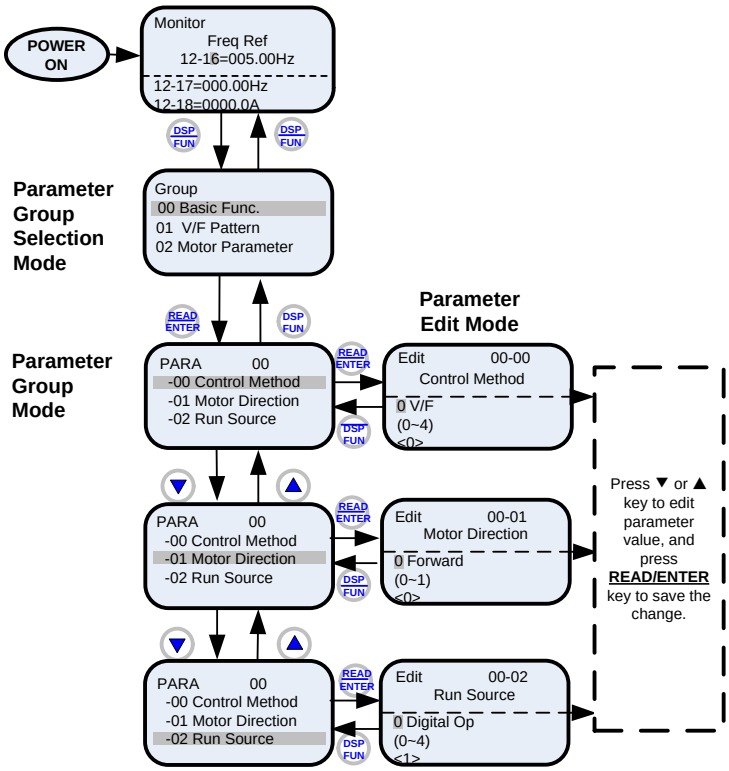
The PID control tries to minimize this error to maintain a constant process variable by regulating the output frequency (motor speed). The amplitude of the error can be adjusted with the Proportional Gain parameter ***10-05*** and is directly related to the output of the PID controller, so the greater the gain the larger the output correction.

However, in any system as the gain is increased there is a point that the system becomes unstable (oscillation).

To compensate for instability, the response time of the system may be ***slowed*** down by increasing the ***Integral Time*** set by parameter ***10-06***. Slowing the system down too much may be unsatisfactory for the process.

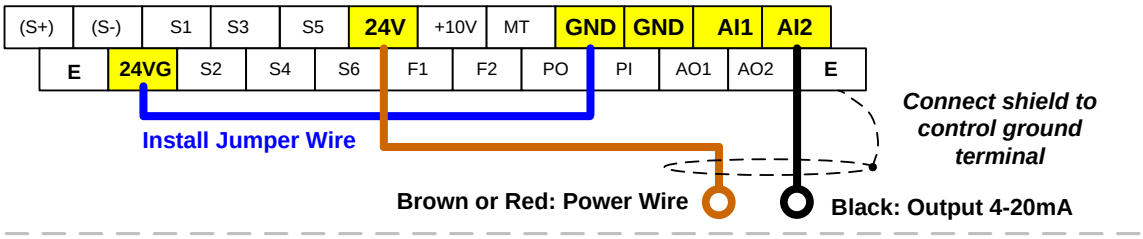
The end result is that these two parameters in conjunction with the acceleration (***00-14***) and deceleration (***00-15***) times require to be adjusted to achieve optimum regulation of the process.

STEP 1 How to Change Parameters

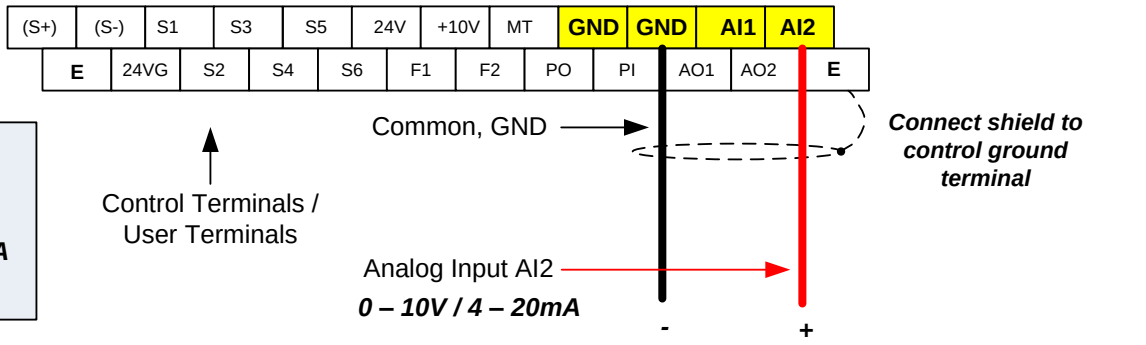


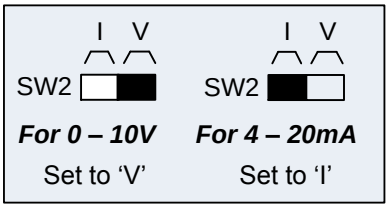
STEP 2 Transducer Wiring

2 Wire / 4-20mA Transducer



0-10V or 4-20mA Transducer w/ Ext. Power Supply





Step 3 Enable PID Control

The PID control mode 10-03 has to be enabled, as well as the correct settings for the setpoint 10-00 and feedback source 10-01.
10-00 = 4; Setpoint 10-02/12-28
10-01 = Set to 1 for 0-10VDC and 2 for 4-20mA; Transducer
10-03 = 0001b; PID Control Enable

Application Example:

Maintain 60.0 PSI with a feedback transducer maximum of 150.0PSI (4-20mA) and use the keypad as the setpoint source.

Step 4 PID Setpoint

10-00 = 4 (10-02/12-38); the main keypad display or actual parameter 10-02 will be the PID setpoint source.

Step 5 Scaling of PID Feedback Signal

10-01 = 2; 4-20mA Transducer
10-33 = 1500; Maximum Feedback Value
10-34 = 1; Maximum Feedback Value Scaling
10-35 = 3; Engineering Units

After setting 10-33~35 this display will scale to a maximum of 150.0 and will show 'PSI' as the engineering units. When you return to the main screen you can set 12-38 = 0060.0PSI.

Step 6 PID Tuning

10-05 = 1.00; Proportion Gain
10-06 = 10.00; Integral Time
00-14 = 10.00; Acceleration Time
00-15 = 10.00; Deceleration Time

Slowing the system down too much may be unsatisfactory for the process. The end result is that these two parameters (10-05 and 10-06) in conjunction with the acceleration (00-14) and deceleration (00-15) times are adjusted to achieve optimum performance for a particular application.

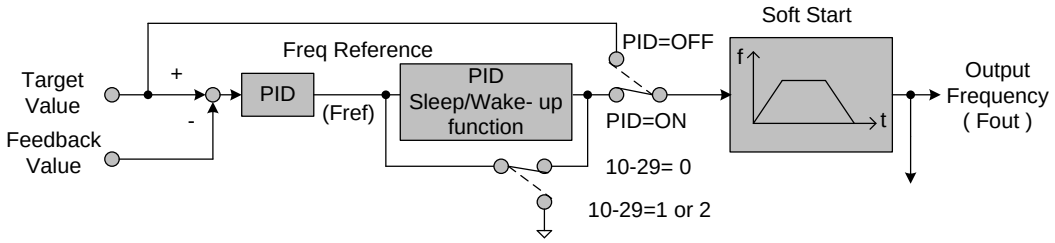
For typical fan and pump applications a Proportional Gain (10-05) of 2.0 and an Integral Time (10-06) of 5.0 seconds is recommended. Increase or decrease these values in small increments.

Step 7 Sleep / Wakeup Function (Optional)

The PID Sleep function can be used to prevent a system from running at low speeds and is frequently used in pumping applications. The PID Sleep function is turned on by setting parameter 10-29 to 1. The inverter output turns off when the PID output falls below the PID sleep level (10-17) for the time specified in the PID sleep delay time parameter (10-18).

The inverter wakes up from a sleep condition when the PID output (Reference frequency) rises above the PID wake-up frequency (10-19) for the time specified in the PID wake-up delay time (10-20).

10-17 = Set to minimum motor Sleep frequency; PID Sleep Frequency
10-19 = Set to the motor Wake-Up frequency; PID Wake-Up Frequency
10-29 = 1; PID Sleep Function



For the complete F510 parameter listing and descriptions, refer to the F510 Instruction manual on our website www.tecowestinghouse.com