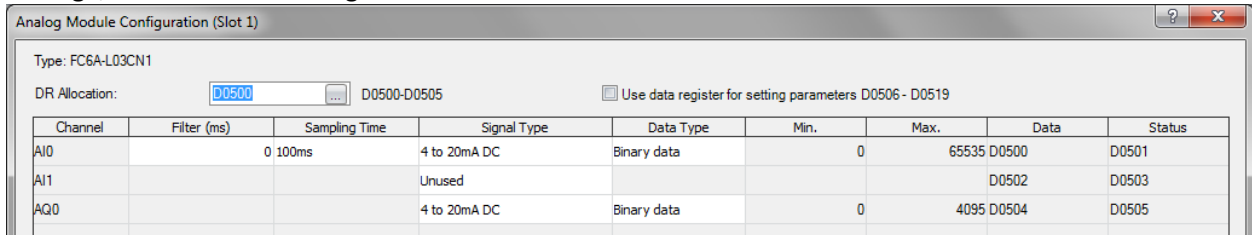


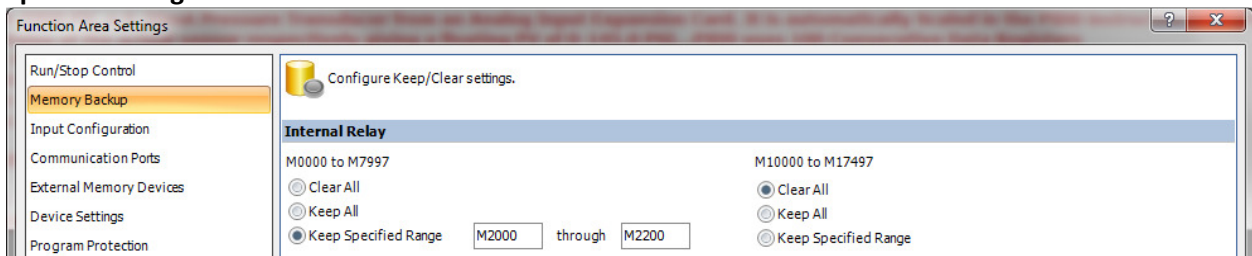
Application Notes

How to configure PIDD (PID with Derivative Decay) Instruction

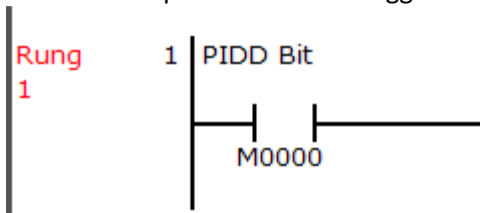
1. In WindLDR software (make sure FC6A PLC is selected), click **Module Configuration** tab, add the FC6A-L03CN1 analog I/O module and configure it as follow:



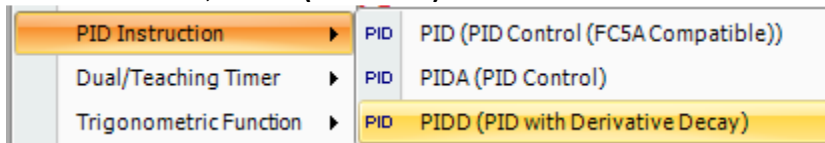
2. In the **Configuration** tab, click **Memory Backup**, enter M2000 through M2200 in the **Internal Relay, Keep Specified Range**



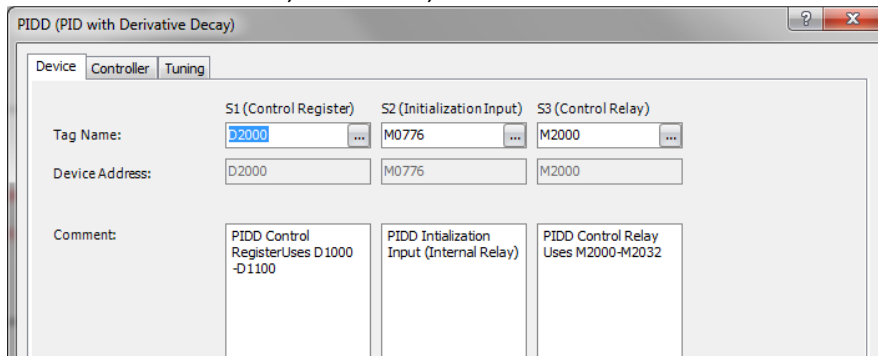
3. Insert a NO open M0 as PIDD trigger bit



4. Under **Home** tab, click **A (Advanced)** and select **PID Instruction** → **PIDD (PID with Derivative Decay)**



5. Configure the PIDD parameters as follow:
 - a. Device tab: S1 = D2000, S2 = M776, S3 = M2000



b. Controller tab:

- i. In this example, assume that we are working with a pressure transducer which produces a 4-20ma signal to the analog module and the range we're working with is 0-145 PSI.
- ii. As a result, fill in the Controller tab parameters as follow:
 - PV (process variable) Upper Range Value = 145.0 EU
 - PV (Process variable) Lower Range Value = 0.0 EU
*Note: The FC6A PLC automatically scale the analog signal in the analog module to this range Upper and Lower Range Value you specify here.
EU stands for engineering unit.*

 - SP (set point) High Limit = 145.0 EU
 - SP (set point) Low Limit = 0.0 EU
Note: An operator can't enter a set point value below or beyond the values you specify here.

 - Set Point (SP) = 50.0 EU
Note: This is the initial set point which can also be controlled with data register D2002

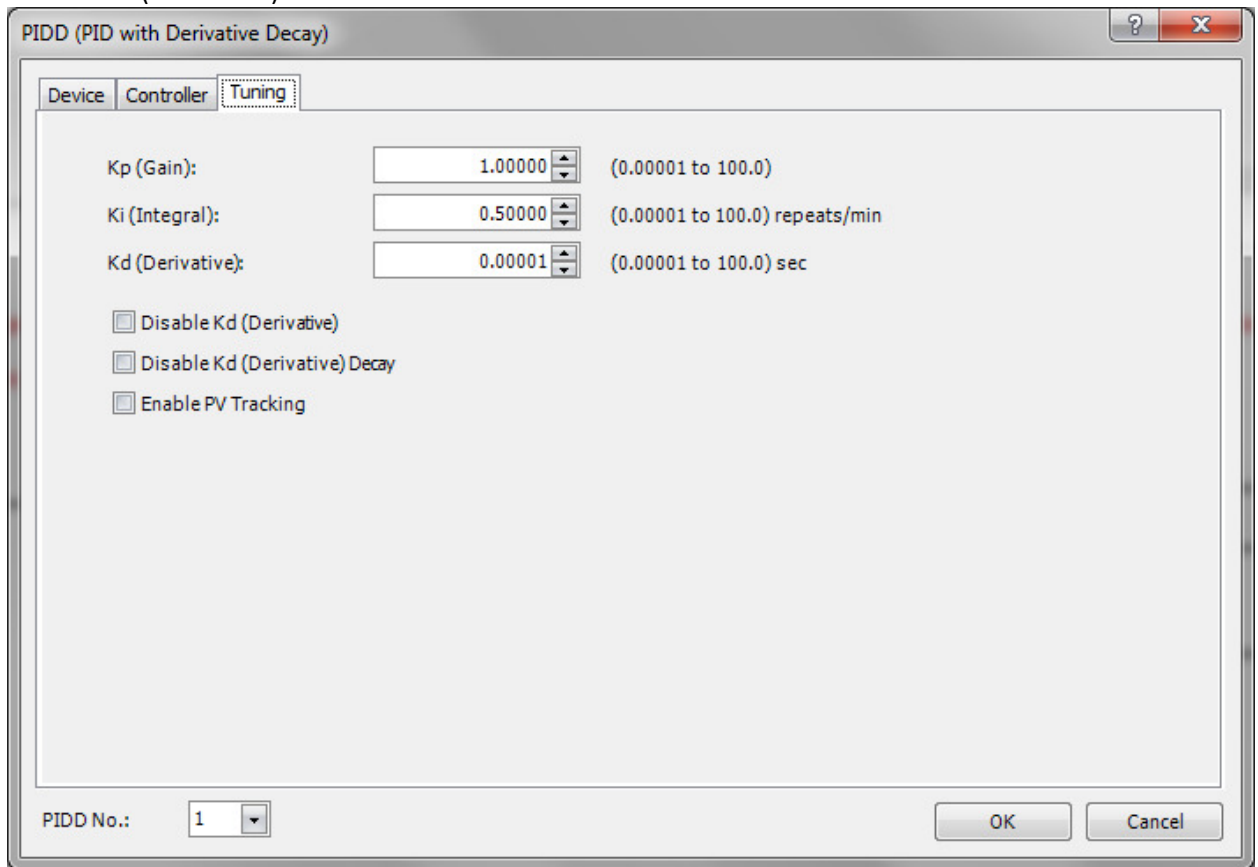
 - MV (manipulated variable) High Limit = 100.0 %
 - MV (manipulated variable) Low Limit = 0.0%
*Note: If, MV+PID Control > MV High Limit, then MV = MV High Limit
If, MV+PID Control < MV Low Limit, then MV = MV Low Limit*

The screenshot shows the 'PIDD (PID with Derivative Decay)' configuration window, specifically the 'Controller' tab. The window is divided into three sections: 'Device', 'Controller', and 'Tuning'. The 'Controller' tab is active, showing the following parameters:

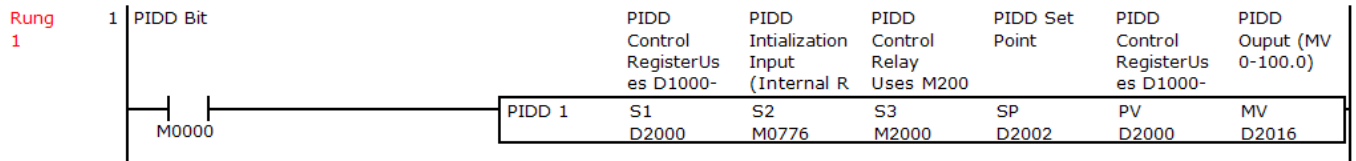
- Control Mode and SetPoint:** Auto Mode - LSP (S1+2, S1+3)
- Control Action:** Reverse Control Action
- Kp Dependent:** Dependent
- Process Variable (PV):** Analog Input (selected), Expansion Module 1, AI000
- PV Upper Range Value (URV):** 145.0 EU
- PV Lower Range Value (LRV):** 0.0 EU
- SP High Limit:** 145.0 (0.0 to 145.0) EU
- SP Low Limit:** 0.0 (0.0 to 145.0) EU
- Set Point (SP):** 50.0 (0.0 to 145.0) EU
- MV High Limit:** 100.0 (0.0 to 100.0) %
- MV Low Limit:** 0.0 (0.0 to 100.0) %

At the bottom, the 'PIDD No.' is set to 1. The window includes 'OK' and 'Cancel' buttons.

- c. Tuning tab:
 - i. We'll start off with the following K parameters
 - Kp (Gain) = 1
 - Ki (Integral) = 0.5
 - Kd (Derivative) = 0.00001

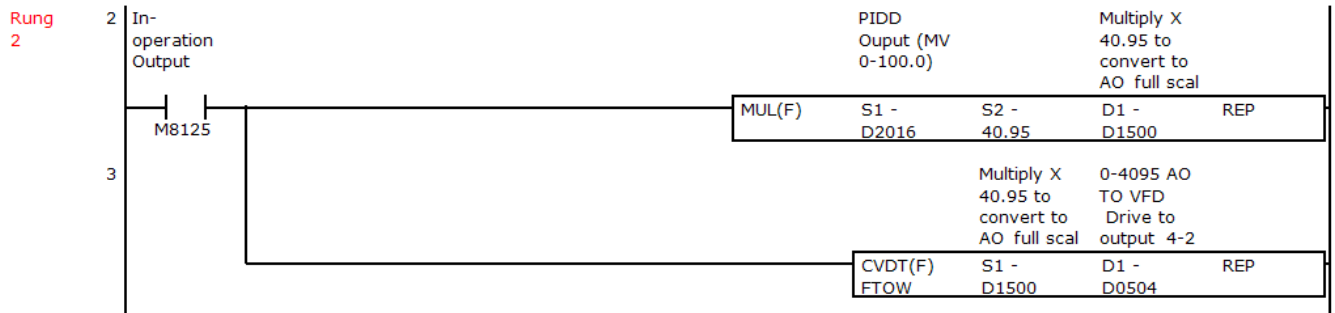


6. Click **OK**. Your ladder program should look like this.

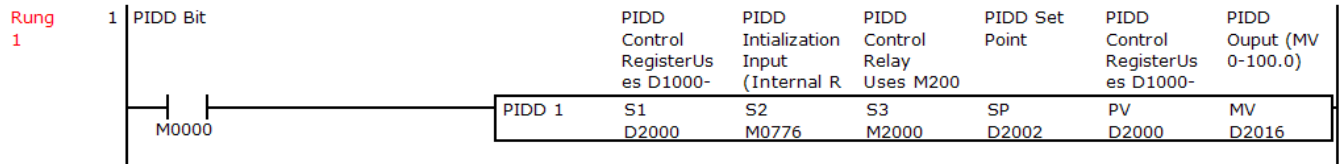


7. To convert the PIDD Output (as percentage) to 4-20mA output, insert the following ladder code:

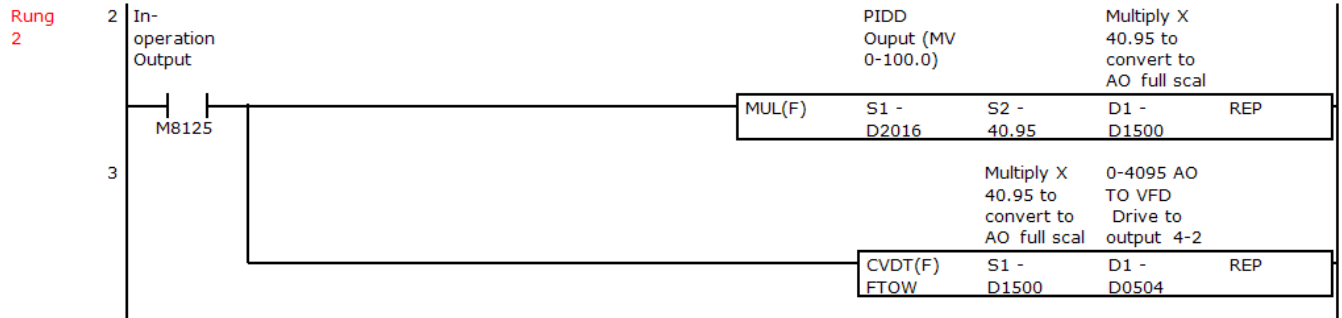
-D2016: PIDD MV (PIDD Output) of 0-100.0% is multiplied by 40.95 in order to scale the PIDD output from 0-100.0% to 0-4095 (Resolution of Analog Output Point) Floating Data is stored into D1500 and then converted to a Word producing 0-4095 into D504 (AO 4-20mA to drive the VFD of Water Pump)



8. Your completed ladder program should look like this:



-D2016: PIDD MV (PIDD Ouput) of 0-100.0% is multiplied by 40.95 in order to scale the PIDD output from 0-100.0% to 0-4095 (Resolution of Analog Output Point) Floating Data is stored into D1500 and then converted to a Word producing 0-4095 into D504 (AO 4-20mA to drive the VFD of Water Pump)



9. Click **Online** tab → **Download** to download the project into your FC6A PLC.

10. To execute the PID instruction, go to WindLDR Monitor mode and turn On these two internal bits:

- a. **M0776** PIDD initialization bit
- b. **M0** PIDD trigger bit