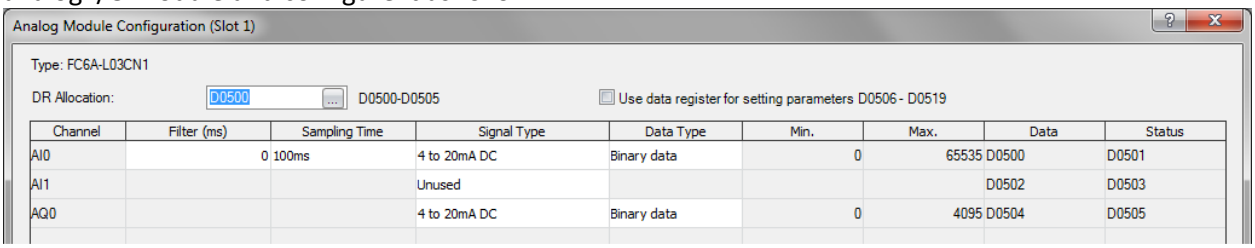
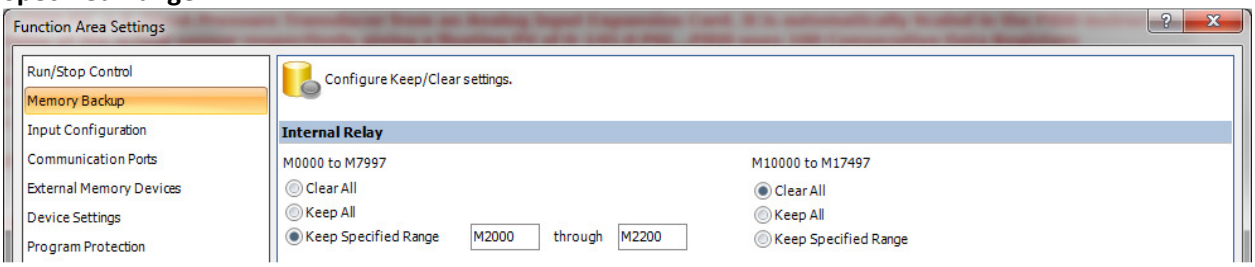
Application Notes

How to configure PIDD (PID with Derivative Decay) Instruction

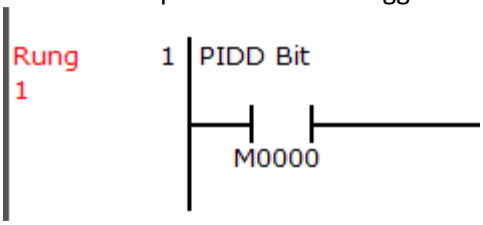
1. In WindLDR software (make sure FC6A PLC is selected), click **Module Configuration** tab, add the FC6A-L03CN1 analog I/O module and configure it as follow:



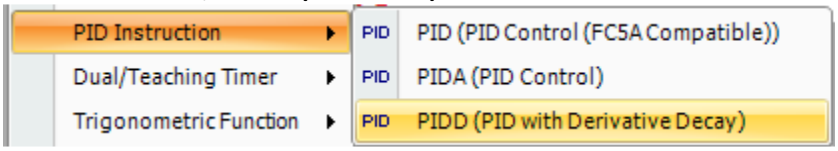
2. In the **Configuration** tab, click **Memory Backup**, enter M2000 through M2200 in the **Internal Relay, Keep Specified Range**



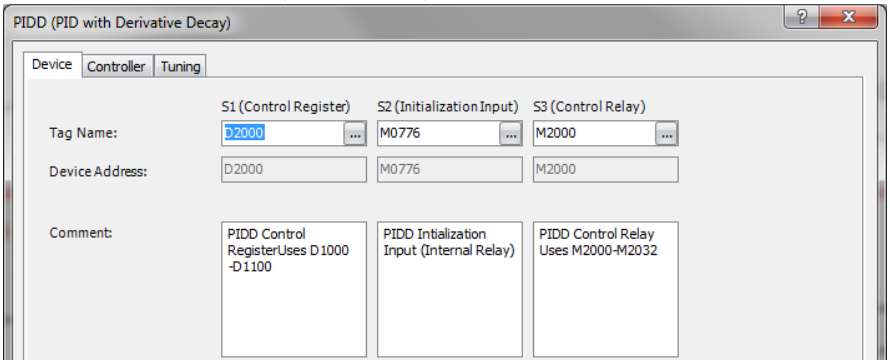
3. Insert a NO open M0 as PIDD trigger bit



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

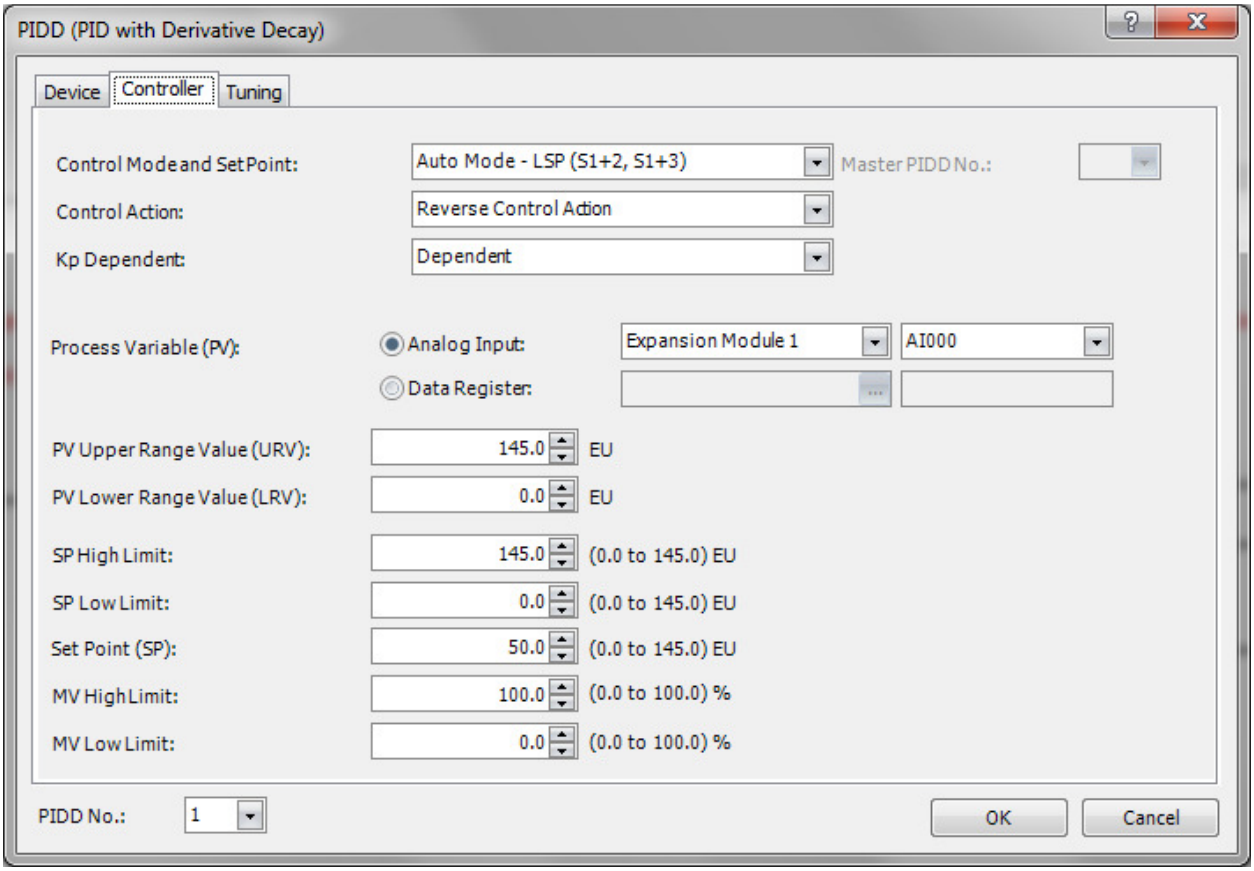
Note: An operator can't enter a set point value below or beyond the values you specify here.

- Set Point (SP) = 50.0 EU

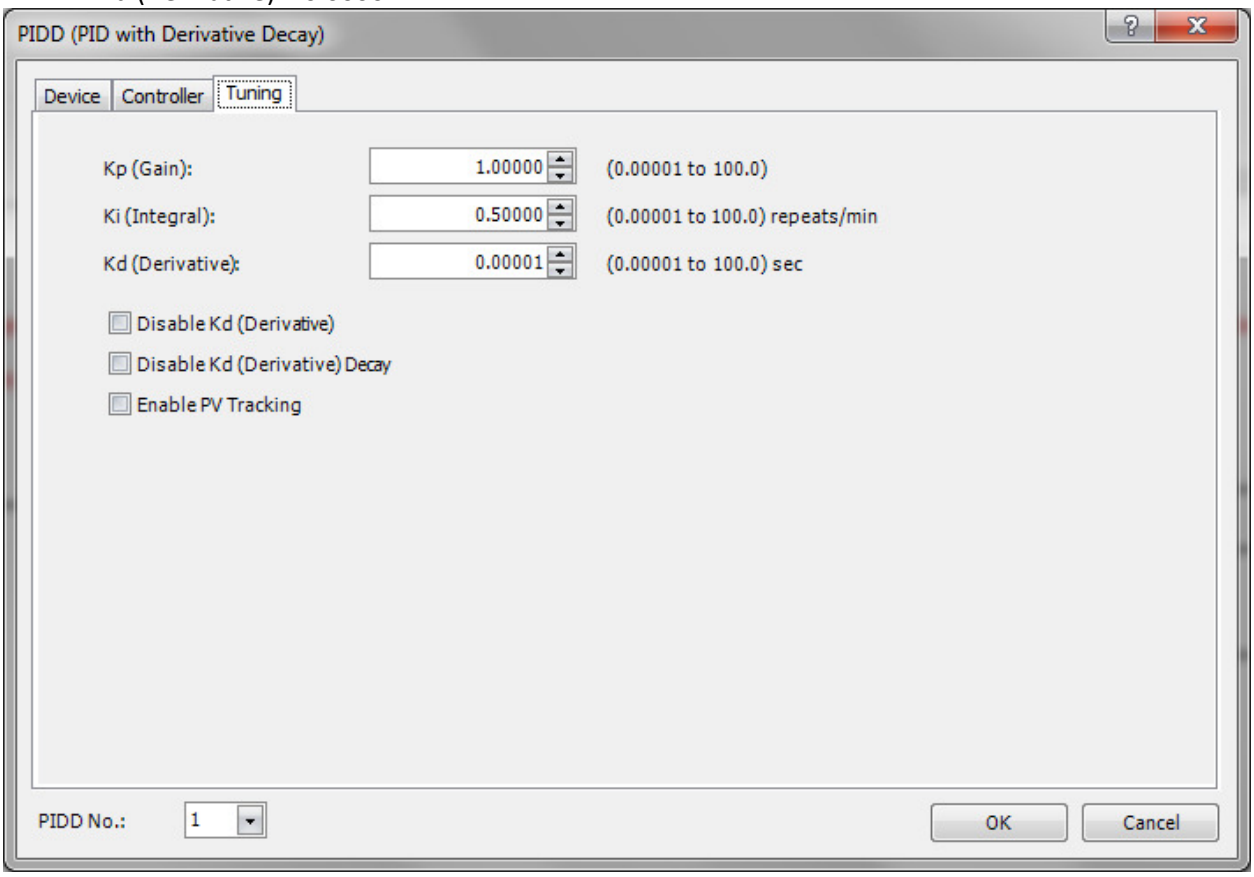
Note: This is the initial set point which can also be controlled with data register D2002

- MV (manipulated variable) High Limit = 100.0 %
- MV (manipulated variable) Low Limit = 0.0%

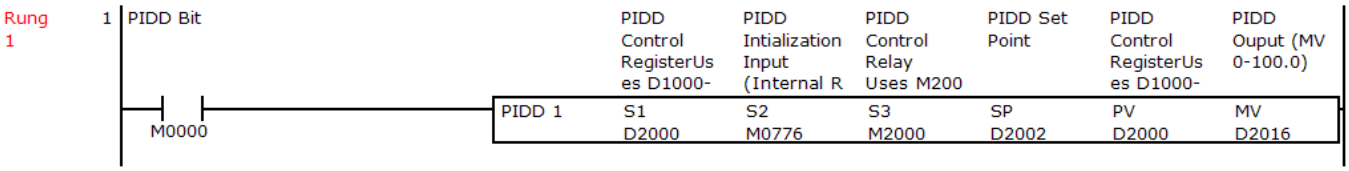
Note: If, MV+PID Control > MV High Limit, then MV = MV High Limit
If, MV+PID Control < MV Low Limit, then MV = MV Low Limit



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

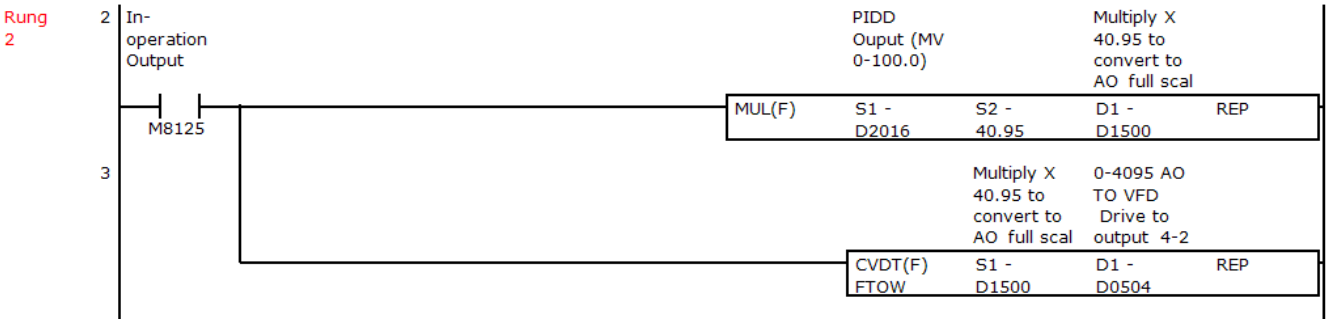


6. Click **OK**. Your ladder program should look like this.

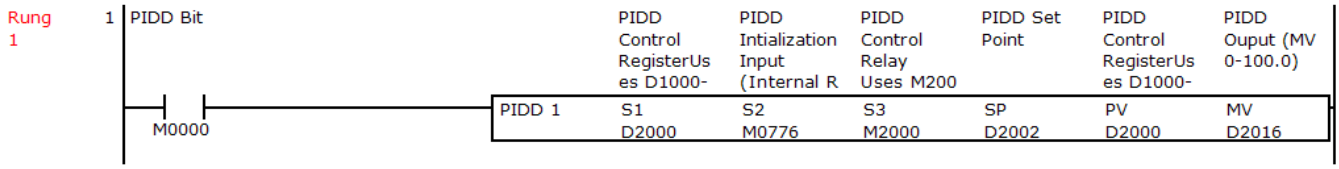


7. To convert the PIDD Output (as percentage) to 4-20mA output, insert the following ladder code:

-D2016: PIDD MV (PIDD 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)



8. Your completed ladder program should look like this:



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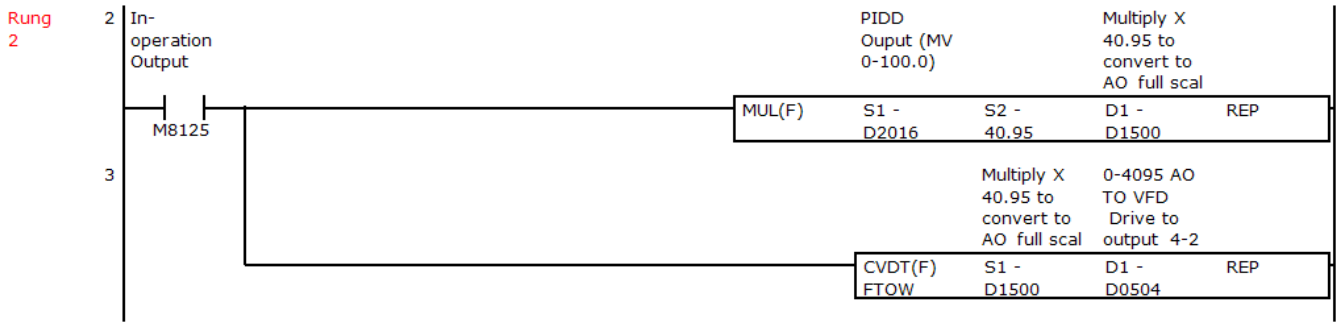

9. Click **Online** tab → **Download** to download the project into your FC6A PLC.
10. To execute the PID instruction, go to WindLDR Monitor mode and turn On these two internal bits:
    a. **M0776** PIDD initialization bit
    b. **M0** PIDD trigger bit