

From: Cara Levy

Page: 1 Of: 1

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E-Mail: avnerb@unitronic.com

File name: I:\M90 help additions,docs\PID_help.doc

Ref: 3126-719-2 (C.L.)

- **Preliminary** -

Release Notes

April 2001

In This Document...

Apply PLC intelligence to PID efficiency. Use the M90 to implement Closed Loop Control and smoothly regulate 4 parallel PID loops.

PID: Control 4 PID loops with your M90

Dear Customer,

M90 OPLCs that use operating system (OS) V2.01 or later enable you to use 4 parallel PID loops to control an application.

To enable an M90 with PID functions, you simply download the appropriate OS. **No changes** are required to the M90 hardware.

OS V2.01 requires manual operation. Later OS versions will offer PID auto-tune.

1. Using the M90 micro-OPLC's PID function

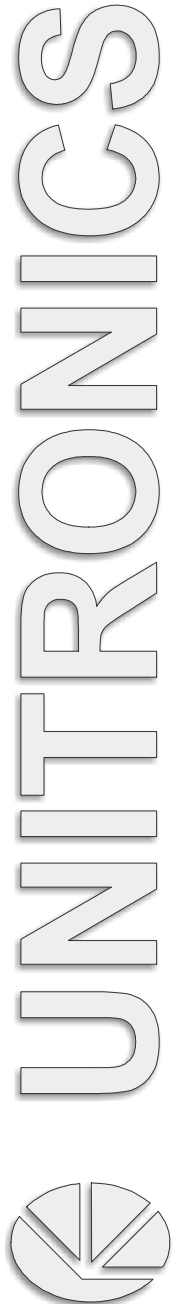
To close 4 parallel PID loops, you must define the P, I, and D gains in your control application.

Each loop is linked to 2 System Integers (SI):

- The first SI is the start address of an array (vector) of 12 Memory Integers (MI)
- The second SI is the start address of an array (vector) of 3 Memory Bits (MB)

Loop #	SI : Array of 12 MIs	SI : Array of 3 MBs
1	SI 101	SI 102
2	SI 103	SI 104
3	SI 105	SI 106
4	SI 107	SI 108

SI 100 contains the number of active loops. Note that you should enter data into SI 101—108 **before** you store a value into SI 100. Define the number of active loops by



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storing number 1 through 4 in SI 100. This causes the operating system to capture and enter default values in the relevant arrays. The operating system enters default values that will most likely suit the process.

Note that the default values will over write any data that are contained in SI 101—108. To avoid overwriting, set SB 100 to ON **before** storing values into SI 101—108.

MI Vector Elements

0	Process Value (PV)—the PID input
1	Set Point (SP)—the target value
2	Control Value (CV)—the PID output
3	Sample Time—defined in units of 10msec
4	Proportional band (P)—defined in units of 0.1%.
5	Integral time (I)—defined in units of 1 second
6	Derivative time (D)—defined in units of 1 second
7	Deadband (DB)—defined in units of 0.1%
8	Process Value high limit—the maximum PV input value
9	Process Value low limit—the minimum PV input value
10	Control Value high limit—the maximum CV input value
11	Control Value low limit—the minimum CV value

MB Vector Elements

0	Enable PID	ON: PID runs	OFF: PID disabled
1	Reverse action	ON: Reverse action (cooling)	OFF: Direct action (heating)
2	Reset integral error	ON: Clear accumulated Integral error	OFF: Continue accumulating error

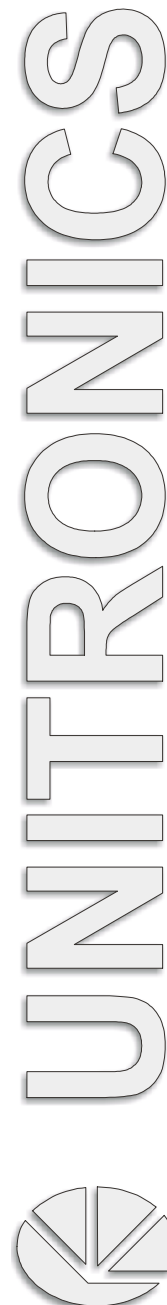
Note that defining high and low limits for the PV and the CV allow you to correctly define the inputs and outputs used with the PID function.

Different I/O types have different limits according to resolution and range as listed below:

Input types

M90 on-board 10-bit analog input: define a high limit of 1023 and a low limit of 0.

I/O Expansion Module 12-bit analog input: define a high limit of 4096 and a low limit of 0.



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Page: 3 Of: 3

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PT4 I/O Expansion Module PT100 input: define a high limit of 4600 and a low limit of – 500, the range of the PT100 input.

Output types

M90 on-board 10-bit analog output: define a high limit of 1023 and a low limit of 0.

I/O Expansion Module 12-bit analog output: define a high limit of 4096 and a low limit of 0.

M90 on-board PWM output: define a high limit of 1000 and a low limit of 0; the control is according to the duty cycle.

2. Viewing the PID loop output

Via SIs, the operating system can display the output of each loop.

Loop #	SI : P Factor Output	SI : I Factor Output	SI : D Factor Output
1	SI 120	SI 121	SI 122
2	SI 123	SI 124	SI 125
3	SI 126	SI 127	SI 128
4	SI 129	SI 130	SI 131

This data can be very useful in easily determining the P, I and D gains.

Any Questions?

If you would like to learn more regarding this new product, please contact your sales representative or distributor. Complete technical specifications are available on request.

How to Order

Contact your local Unitronics sales representative, or contact us directly at sales@unitronic.com.

