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## MOTION CONTROL FOR THE PRODUCTIVITY3000

Productivity3000 has introduced two new modules for advanced applications. The High Speed Input (HSI) and High Speed Output (HSO) modules make working with servo and stepper motors easier and more flexible.

### **Motion and Specialty Modules for Productivity3000 PAC (P3000)**



#### **P3-HSI High-Speed Input Module**

The P3-HSI is a high-speed (1MHz) input module that has both differential and single ended inputs.

- This module accepts Pulse/Direction and Quadrature signals on each of the two independent input channels.
- It also provides four general purpose high-speed inputs and four general purpose 5-24 VDC 0.5 amp, outputs.



#### **P3-HSO High-Speed Output Module**

The P3-HSO is a high-speed (1MHz) output module that supports Pulse/Direction, Up/Down and Quadrature pulse output on each of the two independent output channels.

- The high-speed output module has both line driver and open drain outputs.
- Additionally, it has six general purpose high-speed inputs and four general purpose outputs.
- Simple move, velocity move, and additional high level instructions make

it easy to implement the application's motion profile.

The Productivity3000 gives you a lot more utilities to work with these modules by providing some new tools and instructions, such as:

### High Speed Module Tester

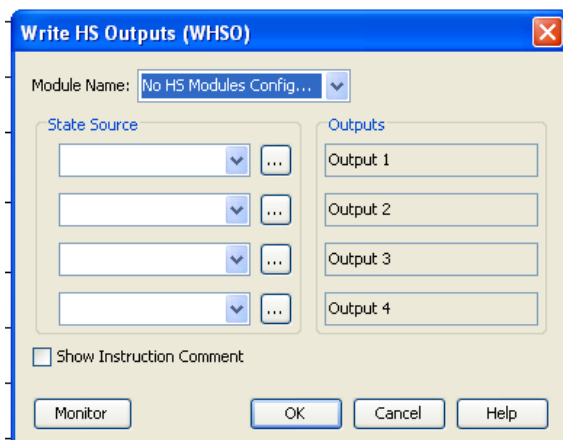
The High Speed Module Tester is a software utility that allows a user to test the P3-HSO module's inputs and outputs. This utility can be useful with debugging, confirming field wiring and verifying external device operation. Without actually connecting the PLC to load we can check if the system for any errors.

### High Speed I/O Instructions

Except for the Registration instruction, all the High Speed I/O Functions are available for use with the P3-HSO module. The Registration instruction is used for the P3-HSI module.

### Write HS Outputs (WHSO) Instruction

- The Write HS Outputs instruction allows the user to set the state of outputs 3-6 on the HSO module and outputs 1-4 on the HSI module. You just need to specify which module and output you are using and you are done!



### Find Home (HOME) Instruction

The Find Home instruction allows the user to run a variety of homing routines. Homing is needed to bind the HSO channel position to that of a real world physical position. Using High speed modules you do not need to write long ladder logic for homing, we have an inbuilt homing instruction now to do this work for us.

The 'Find Home (HOME)' dialog box contains the following fields and options:

- Channel Name:** No HSO Channels Conf...
- Module Name:** (empty text field)
- Channel:** 0
- In Progress:** (empty dropdown)
- Complete:** (empty dropdown)
- Move Status:** (empty dropdown)
- Mode Selection:**
  - Mode 1 - Move to Switch 1 then to Switch 2
  - Mode 2 - Move to Switch 1 and Halt
  - Mode 3 - Move to Switch 1 and Decel
  - Mode 4 - Move to Switch 1 and Return
- Initial Travel Direction:**
  - Positive
  - Negative
- Switch 1 Definition:** None
- Switch 2 Definition:** None
- Edge 1 Transition:**
  - Rising Edge
  - Falling Edge
- Edge 2 Transition:**
  - Rising Edge
  - Falling Edge
- First Speed:** <Units Not Configured>
- Second Speed:** <Units Not Configured>
- Accel Rate:** <Units Not Configured>
- Decel Rate:** <Units Not Configured>
- Set Position To:** <Units Not Configured>
- Show Instruction Comment
- Buttons:** Monitor, OK, Cancel, Help

### Set Position (SPOS)

The Set Position instruction will change the current position and/or backlash direction state for HSO or HSI channels.

The 'Set Position (SPOS)' dialog box contains the following fields and options:

- Channel Name:** No HS Channels Config...
- Module Name:** (empty text field)
- Channel:** 0
- In Progress:** (empty dropdown)
- Complete:** (empty dropdown)
- Instruction Status:** (empty dropdown)
- Set Position To:** <Units Not Configured>
- Init Backlash Direction:** No Change
- Show Instruction Comment
- Buttons:** Monitor, OK, Cancel, Help

### Registration (REG)

The Registration instruction can trigger several internal and external positions based on events. Inputs can be used to trigger the capturing of positions, setting a tag, counting events, turning on, turning off or pulsing an output.

The screenshot shows the 'Registration (REG)' dialog box with the following fields and options:

- Channel Name:** No HSI Channels Confi... (dropdown)
- In Progress:** (dropdown)
- Module Name:** (text field)
- Channel:** 0 (text field)
- Instruction Status:** (dropdown)
- Use Trigger Group 1**
- Trigger Group 1:**
  - Registration Input:** Select Input (dropdown)
  - Edge:** Rising Edge (dropdown)
  - Event Count:** (dropdown)
  - Set Tag:** (dropdown)
  - Delay Registration Action by:** (dropdown) <Units Not Configured>
  - Capture and Store Current Position to:** (dropdown)
  - Turn On** output: Select Output (dropdown) >> **Output Pulse Time:** (dropdown) (msecs)
- Use Trigger Group 2**
- Show Instruction Comment**
- Buttons:** Monitor, OK, Cancel, Help

### Simple Move (SMOV)

The Simple Move instruction will create a motion profile based on a target position, target velocity, acceleration rate, deceleration rate, and optional jerk value (for S-curves).

Simple Move (SMOV)

Channel Name:  In Progress:

Module Name:  Channel:  Complete:

Move Status:

Move Setup

Addressing:  Absolute  Relative

Direction:

Target:   <Units Not Configured>

Velocity:   <Units Not Configured>

Acceleration:   <Units Not Configured>

Deceleration:   <Units Not Configured>

Use Jerk   <Units Not Configured>

Stop Setup

Immediate Stop  Stop at Maximum Decel Rate

Enable Registration

Show Instruction Comment

Monitor OK Cancel Help

## Velocity Move (VMOV)

The Velocity Move will ramp to a target velocity at a user specified ramp rate. An optional jerk value (for S-Curves) can be added to smooth the Acceleration or Deceleration.

The screenshot shows the 'Velocity Move (VMOV)' dialog box. It has a title bar with a close button. The main area is divided into several sections:

- Channel Name:** A dropdown menu showing 'No HSO Channels Conf...'. To its right are three status dropdowns: 'In Progress', 'Complete', and 'Move Status', each with a '...' button.
- Module Name:** An empty text field. To its right is a 'Channel' field with the value '0'.
- Move Setup:** A section containing:
  - Direction:** A dropdown menu set to 'Positive'.
  - Velocity:** A dropdown menu with a '...' button and the text '<Units Not Configured>'.
  - Ramp Rate:** A dropdown menu with a '...' button and the text '<Units Not Configured>'.
  - Use Jerk:** A checkbox that is unchecked, followed by a dropdown menu with a '...' button and the text '<Units Not Configured>'.
- Stop Setup:** A section with two radio buttons: 'Immediate Stop' (which is selected) and 'Stop at Maximum Decel Rate'.
- Options:** Two checkboxes: 'Enable Registration' and 'Show Instruction Comment', both of which are unchecked.
- Buttons:** At the bottom, there are three buttons: 'Monitor', 'OK', 'Cancel', and 'Help'.

**Conclusion:** Compared to the 05/06/205 high speed counter solution for controlling stepper and servo motors, the Productivity3000 reduces overall configuration and startup time as well as providing additional features that can control more applications. Please call me if/when you need assistance.

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