To minimize the risk of potential safety problems, you should follow all applicable local and national codes that regulate the installation and operation of your equipment. These codes vary from area to area and it is your responsibility to determine which codes should be followed, and to verify that the equipment, installation, and operation are in compliance with the latest revision of these codes.

Equipment damage or serious injury to personnel can result from the failure to follow all applicable codes and standards. We do not guarantee the products described in this publication are suitable for your particular application, nor do we assume any responsibility for your product design, installation, or operation.

If you have any questions concerning the installation or operation of this equipment, or if you need additional information, please call Technical Support at 770-844-4200.

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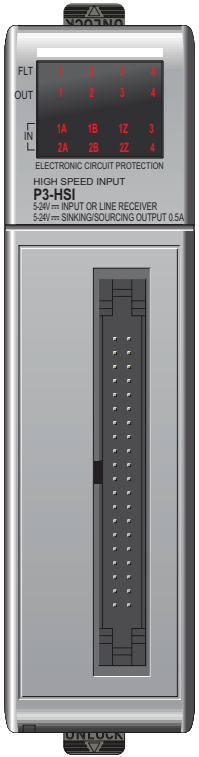
Connector Specifications

Connector Type	IDC style header with latch, Omron XG4A-4034
Number of Pins	40 point
Pitch	0.1 in. (2.54 mm)



P3-HSI High Speed Pulse Input

The P3-HSI is a high speed (1MHz) input module. It has both differential (line receiver, 5V max) and single ended (5-24V) inputs that accept Pulse/Direction and Quadrature signals on each of the two independent input channels. Additionally, it has 4 general purpose high speed inputs and 4 general purpose 5-24 VDC 0.5 amp, outputs. All inputs are isolated for use with the Productivity3000 Programmable Automation Controller.

Document Name	Edition/Revision	Date
P3-HSI-M	2nd Edition	5/14/2020

Warranty: Thirty-day money-back guarantee. Two-year limited replacement. (See www.automationdirect.com/P3000 for details).

General Specifications

Module Type	Intelligent
Modules per Base	No limit
I/O Points Used	None, mapped directly to tags in PAC
Surrounding Air Temperature	0° to 60°C (32° to 140°F)
Storage Temperature	-20° to 70°C (-4° to 158°F)
Humidity	5 to 95% (non-condensing)
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Field to Logic Side Isolation	1800 VAC applied for 1 second
Insulation Resistance	>10 MΩ @ 500 VDC
Heat Dissipation	5.76W
Enclosure Type	Open Equipment
Emissions	EN61000-6-4 (Conducted and radiated RF emissions)
Agency Approvals	UL508 file E157382, Canada & USA CE (EN61131-2*)
Module Keying to Backplane	Electronic
Module Location	Any I/O slot in any local, expansion, or remote base in a Productivity3000 System.
Field Wiring	Use ZIPLink Wiring System. See "Wiring Options" on page 4. Must use copper conductors rated 75 degrees C or equivalent.
EU Directive	See the "EU Directive" topic in the Productivity3000 Help File. Information can also be obtained at: www.automationdirect.com/P3000
Weight	113.4g (4 oz)

*Meets EMC and Safety requirements. See the D.O.C. for details.

Status LEDs

4 Fault Status LEDs	One per status output (FLT1, 2, 3, & 4)
8 Input LEDs	One per status input (1A, 1B, 1Z, 2A, 2B, 2Z, IN3 & IN4)
4 Output Status LEDs	(OUT1, OUT 2, OUT3, & OUT4)

NOTE: All front panel fault LED's blinking indicates loss of external power.

Status Output Specifications

Status Outputs	4 Channels	
Output Signal Type, per Channel Select	Current Sinking	Current Sourcing
Operating Voltage[1]	5-24 VDC	5-24 VDC[1]
Output Volts Maximum	36 VDC	26.4 VDC[1]
Output Current Maximum	500 mA	500 mA
Overcurrent Protection	Short circuit detect and current limit with automatic retry for each output	
Output Self Limiting Current	1.2 to 2.4 amps	
Max Inrush Current	Self limited	
Output Voltage Drop	0.7 VDC @ 0.5A	0.7 VDC @ 0.5A
Thermal Protection	Independent overtemperature protection each output	
Output Voltage Clamp During Inductive Switching	+45 VDC	
Maximum OFF to ON Response	25 µs[2]	
Maximum ON to OFF Response	25 µs[2]	

NOTES:
1. Operating voltage of current sourcing outputs must be no greater than external power.
2. Measured at 5 VDC operating voltage, 0.5A load curent.

Power Specifications

External Power	24 VDC +10%/-15%, Class 2
Maximum Voltage	26.4 VDC
Minimum Voltage	20.4 VDC
Current Consumption Excluding Outputs	47 mA
Maximum Current Consumption Total of the 4 Status Outputs	2A

Single Ended (5-24V) Input Specifications

Status Input	Single ended inputs (8 pts: 1A, 1B, 1Z, 2A, 2B, 2Z, 3IN, 4IN)
Isolation	Each input is isolated from other circuits
Input Volts Range	5-24 VDC
Input Volts Maximum	+/-34 VDC, limited by protection
Input Impedance	1 kΩ min., 5 kΩ max.
Inputs Rated Current	5-24 VDC, 16 mA 5.2 mA typ. @ 5 VDC 22 m A max. @ 34 VDC
Input Minimum ON Voltage	4.5 VDC
Input Maximum OFF Voltage	2.0 VDC
Input Minimum ON Current	5.0 mA
Input Maximum OFF Current	1.4 mA
OFF to ON Response Time	1A, 1B, 2A, 2B: 0.48 µs 1Z, 2Z, 3IN, 4IN: 6 µs
ON to OFF Response Time	1A, 1B, 2A, 2B: 0.48 µs 1Z, 2Z, 3IN, 4IN: 6 µs
Max. Input Frequency	1A, 1B, 2A, 2B: 200 kHz* 1Z, 2Z, 3IN, 4IN: 200 kHz*

* Inputs are not limited to this speed but singled ended signals are not usually reliable above 200 kHz due to cabling capacitance.

Differential (5V) Input Specifications

Pulse Inputs	Differential inputs (6 pts: 1A, 1B, 1Z, 2A, 2B, 2Z)
Isolation	Each input is isolated from other circuits
Input Signal Type, per Channel Select	Differential
Input Volts	5 VDC
Input Volts Maximum	+/-5.6 VDC, limited by protection
Input Impedance	200Ω min., 500Ω max.
Inputs Rated Current	5 VDC, 15 mA 8 mA typ., 15 mA max.
Input Minimum ON Voltage	3.0 VDC
Input Maximum OFF Voltage	1.0 VDC
Input Minimum ON Current	5.0 mA
Input Maximum OFF Current	2.0 mA
OFF to ON Response Time	1A, 1B, 2A, 2B: 0.48 µs 1Z, 2Z, 3IN, 4IN: 6 µs
ON to OFF Response Time	1A, 1B, 2A, 2B: 0.48 µs 1Z, 2Z, 3IN, 4IN: 6 µs
Max. Input Frequency	1A, 1B, 2A, 2B: 1 Mhz 1Z, 2Z, 3IN, 4IN: 300 kHz*

NOTE: The voltage difference between the input pairs must be between 3-5.6 volts.

* The Z pulse input (1Z & 2Z) is capable of capturing a 1 MHz wide pulse for the purpose of resetting an encoder count but a 3 microsecond pause (300 kHz) is required between pulses.

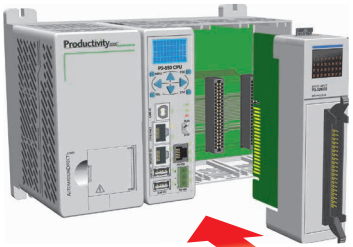
Important Hot-Swap Information

The Productivity3000 PAC supports hot-swap! Individual modules, expansion bases, and entire remote base groups can be taken offline, removed, and replaced while the rest of the PAC system continues controlling your process. Before attempting to use the hot-swap feature, be sure to read the hot-swap topic in the programming software's help file or our online documentation at AutomationDirect.com for details on how to plan your installation for use of this powerful feature.

Module Installation Procedure

WARNING: Do not apply field power until the following steps are completed. See hot-swapping procedure for exceptions.

AVERTISSEMENT: Ne pas appliquer la puissance de champ avant l'exécution des étapes qui suivent. Consultez la procédure de remplacement à chaud pour les exceptions.

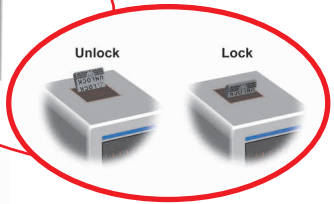


Step One:

Align circuit card with slot and press firmly to seat module into connector.

Step Two

Pull top and bottom locking tabs toward module face. Click indicates lock is engaged.



Step Three

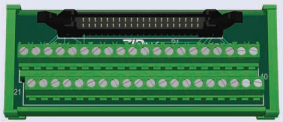
Attach field wiring using the ZIPLink wiring system.

Wiring Options

ZIPLink Connection System
Cable + ZIPLink Module = Complete System

ZIPLink pre-wired cables

0.5m (1.6FT) cable	ZL-CBL40-S
1.0m (3.3FT) cable	ZL-CBL40-1S
2.0m (6.6FT) cable	ZL-CBL40-2S



ZIPLink Modules

Feed through	ZL-RTB40

Note: P3-HSI is UL/CUL listed when used with ZL-RTB40.

Inaccuracy of Frequency Measurements Due to Time Base Errors

25 MHz Crystal for Time Base	
Inaccuracy at 25°C, Maximum	±30 PPM
Inaccuracy 0-60°C, Referenced to 25°C	±30 PPM
Inaccuracy Due to Aging, Maximum	±5 PPM/Year
Max. Time Base Inaccuracy 0-60°C and 10 Years Operation	0.01%

Resolution of Frequency Measurements for "Fast Mode"

Input Frequency	Sampling Period	Resolution
1 Hz to 1 MHz	1000 ms	±1 Hz
10 Hz to 1 MHz	100 ms	±10 Hz
100 Hz to 1 MHz	10 ms	±100 Hz
1 MHz	1 ms	±1000 Hz

Module Range:	Target position range ± 2.147 billion (32-bit signed integer)

Inaccuracy of Frequency Measurements[1,2] for "Slow Mode"

Input Frequency	Step/Dir	Quadrature 1X	Quadrature 4X
1 Hz	±0.002 Hz	±0.002 Hz	±0.002 Hz
10 Hz	±0.009 Hz	±0.009 Hz	±0.009 Hz
100 Hz	±0.015 Hz	±0.015 Hz	±0.015 Hz
1 kHz	±1 Hz	±1 Hz	±1 Hz
10 kHz	±100 Hz	±100 Hz	±100 Hz
100 kHz	±1000 Hz	±1000 Hz	±1000 Hz
1 MHz	±40000 Hz	±40000 Hz	±40000 Hz

Inaccuracy of Frequency Measurements[1,2] for "Fast Mode"

Input Frequency	Sampling Period	Step/Dir	Quadrature 1X	Quadrature 4X
1 Hz	±1 Second	±1 Hz	±1 Hz	±1 Hz
10 Hz	±1 Second	±1 Hz	±1 Hz	±1 Hz
100 Hz	±1 Second	±1 Hz	±1 Hz	±1 Hz
1 kHz	±1 Second	±1 Hz	±1 Hz	±1 Hz
10 kHz	±1 Second	±1 Hz	±1 Hz	±1 Hz
100 kHz	±1 Second	±1 Hz	±1 Hz	±1 Hz
1 MHz	±1 Second	±1 Hz	±1 Hz	±1 Hz

Inaccuracy of Frequency Measurements[1,2,3,4] for "Auto Mode"

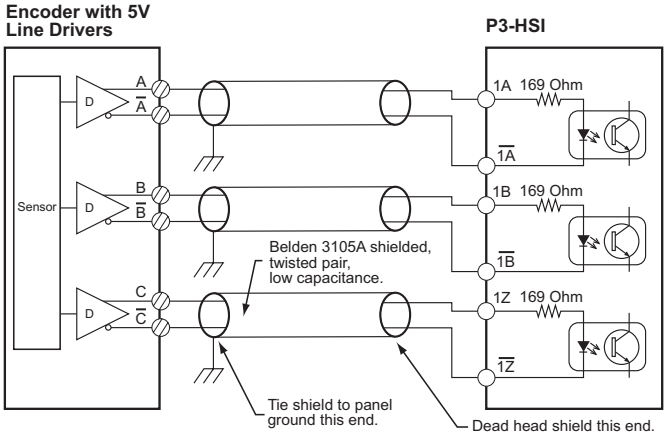
Input Frequency	Step/Dir	Quadrature 1X	Quadrature 4X
1 Hz	±1 Hz	±1 Hz	±1 Hz
10 Hz	±1 Hz	±1 Hz	±1 Hz
100 Hz	±1 Hz	±1 Hz	±1 Hz
1 kHz	±1 Hz	±1 Hz	±1 Hz
10 kHz	±100 Hz	±100 Hz	±100 Hz
100 kHz	±1000 Hz	±1000 Hz	±1000 Hz
1 MHz	±10000 Hz	±10000 Hz	±10000 Hz

1. For stable input signal at given input frequency.
2. For total measurement error add the time base error to the tabulated error.
3. Maximum sample period: 1 second.
4. Minimum sample period: 0.001.

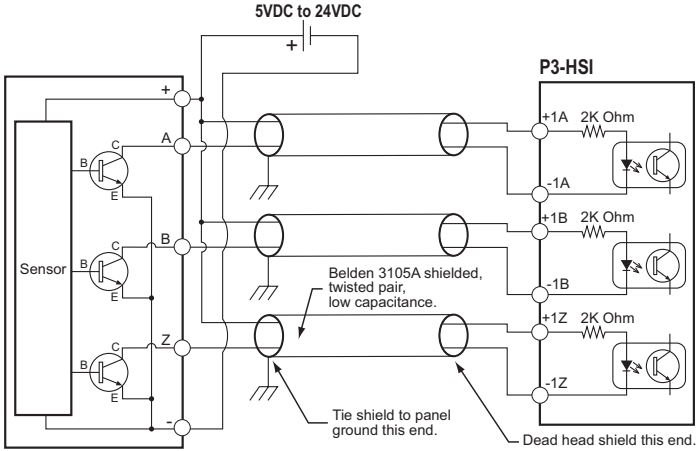
NOTE: Refer to the I/O Module Configuration Help File Topic (P212) in the Productivity Suite Software for more information on Mode selections.

5V Encoder Inputs Wiring Diagram

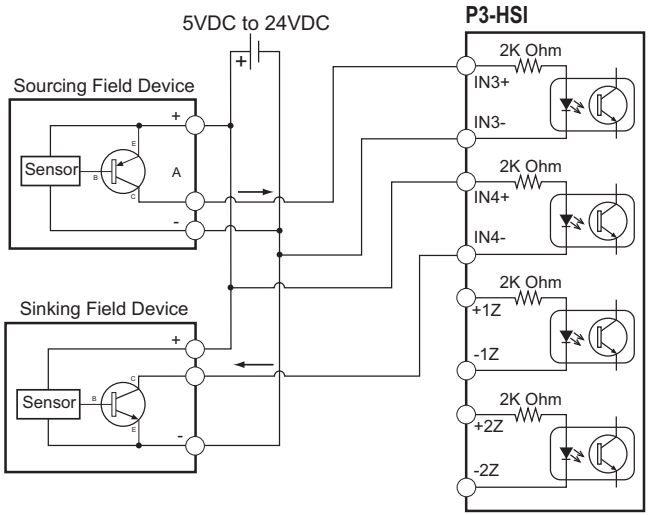
To prevent damage to P3-HSI 5V inputs,
do not exceed 6.8V or 30 mA on inputs
1A, $\overline{1A}$, 1B, $\overline{1B}$, 1Z, $\overline{1Z}$, 2A, $\overline{2A}$, 2B, $\overline{2B}$, 2Z, & $\overline{2Z}$.



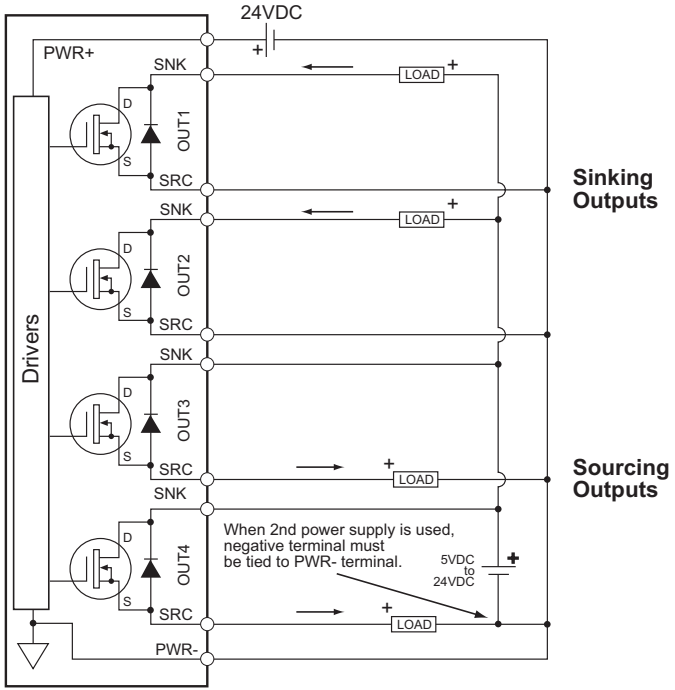
24V Encoder Inputs Wiring Diagram



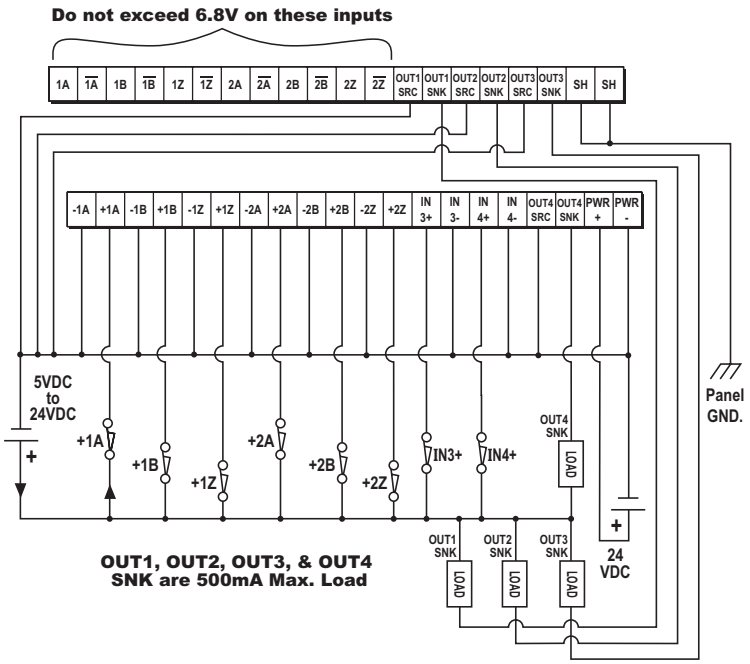
Status Inputs Wiring Diagram



Status Outputs Wiring Diagram



Sinking I/O



Sourcing I/O