maxPAC Hardware Reference Guide

277596 Rev. C1

Refer to this publication for complete and accurate information that helps you better operate and service Metso Automation MAX Controls equipment. Your comments and suggestions are welcome.

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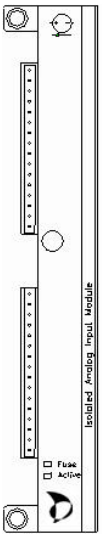
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Chapter 2

Analog Input Modules
Isolated Input Module IOP301

Overview

This module, featuring 16 isolated input channels, can be configured for any mix of voltage or current inputs. The current loop can be powered from a field supply or from a system loop supply provided via the backplane edge connector. For current inputs, this module is pin and function compatible with the IOP302 input module.



Features

- Self-calibration on power up
- Periodic re-calibration online.
- Open input detection each measurement
- Software stored in FLASH
- Low power dissipation
- 500V Channel to channel isolation
- Field to Logic isolation
- Excellent line frequency normal mode and common mode rejection
- ADC per each two channels
- 100 msec scan time

LED Indication

A green LED, labeled Active at the bottom of the module front panel, is on when system power is present and the module is communicating with the

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DPU. This LED blinks on and off when the module is not being scanned by the DPU.

Bus Address

This module supports two modes of operation selected by jumper setting. For use with DPU4A/B this module requires 16 addresses and provides 15 channels.

When used with DPU4E, the module only requires two addresses and provides 16 channels.

Jumper Configuration

The module contains two jumpers, located near the address switches. Refer to the following table for jumper setting information.

Jumper	Installed	Not Installed
W1	50 Hz	60Hz
W6	DPU4A/B	DPU4E

In addition, five jumpers per channel determine the type of input connected to the channel.

Input Type	A	B	C	D	E
4-20 mA powered by Metso Automation MAX Controls	IN	IN	IN	IN	OUT
4-20 mA powered by user	IN	IN	OUT	OUT	IN
Voltage input	OUT	OUT	OUT	OUT	IN

Program Resistors

Jacks are provides at the front of the module for the installation of a pair of resistors per channel. These resistors can be used to scale a voltage input to the 2.4V span of the A/D measurement. These resistors are identified as follows:

Channel	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Series R	1	7	26	32	51	57	78	85	113	120	142	148	175	193	211	233
Shunt R	3	10	29	35	53	60	80	88	115	123	144	151	177	196	215	234

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Module Operation

This microprocessor-based module supports up to 16 isolated high level inputs. A sigma delta A/D and precision reference is provided for each pair of inputs. The A/D reads the voltage generated by the selected input and converts the differential measurement to a 15-bit plus sign binary value representing the voltage input, which is read by the microcontroller. The microcontroller initiates the conversion and waits for the conversion to complete.

The digital filter in the oversampling A/D provides excellent 50/60 Hz normal mode rejection. Prior to starting each conversion, the microcontroller selects one of the two input channels by means of two solid-state, optically coupled relays. The two inputs are multiplexed with optical relays to provide channel to channel isolation. Immediately following each measurement, open input and over range conditions are checked.

A separate DC/DC converter provides isolated power to each A/D converter measuring circuit. Communication between the microcontroller and each A/D is serial at 100kHz. A separate group of optical isolators provide the isolation between each A/D and the serial logic circuits. The microprocessor provides the input data to the DPU on demand via the bus FPGA. The FPGA provides the I/O bus interface logic; its program is loaded from the FLASH on power up.

Module calibration is done automatically at power up following startup diagnostics. Calibration is repeated periodically online to compensate for temperature effects.

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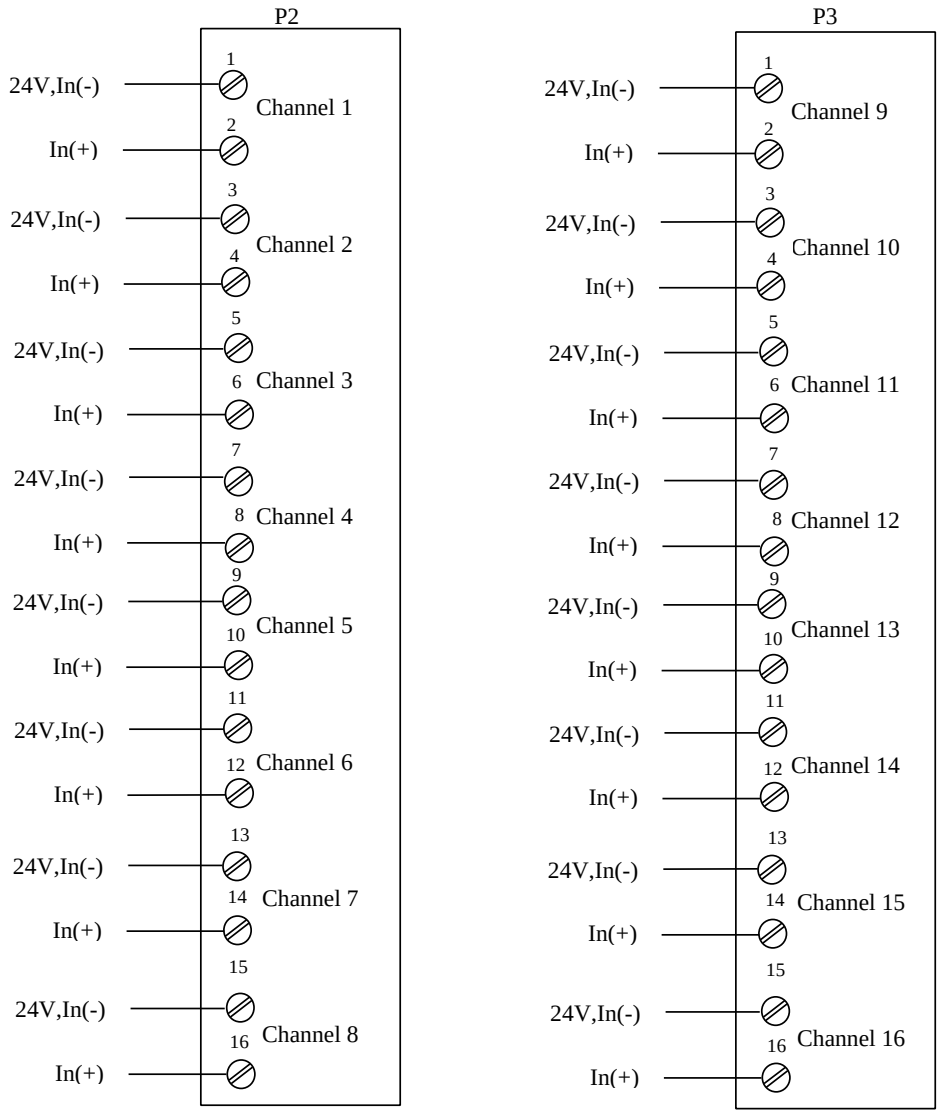
CPU Stack Error (power-on)	0x23
CPU Error (power-on)	0x24
Checksum Error (power-on)	0x25
Interrupt Error (power-on)	0x26
FPGA Download Error (power-on)	0x32

Module specifications

Resolution	15 bits plus sign
Scan Rate	100 msec.
Temperature Sensitivity	±0.004% of reading/^{o}C ±1.5uv/^{o}C RTI
Accuracy	±0.1% of reading at 25^{o}C
Source Impedance Effect	10 MOhm operational, 20K Ohms on loss of power
Conversion method	Sigma Delta oversampling. Single A/D per channel
Span	4 to 20 mA, 0-2.4V
Calibration	Self-calibration on power up. Periodically on line to compensate for temperature effects
Input Impedance - 4-20 mA input - voltage input	300 Ohms 1 Mohm
Normal Mode Voltage	50 Volts
Normal Mode Rejection	60db @ 50/60 Hz
Common Mode Voltage	500 Volts ac or peak ac
Common Mode Rejection	120db @ 50/60 Hz, 100 Ohm imbalance
Isolation	1500 Vac (field to logic) 500 Vac (channel to channel)
Input Power (from 24V system supply)	400 mA

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Field Wiring



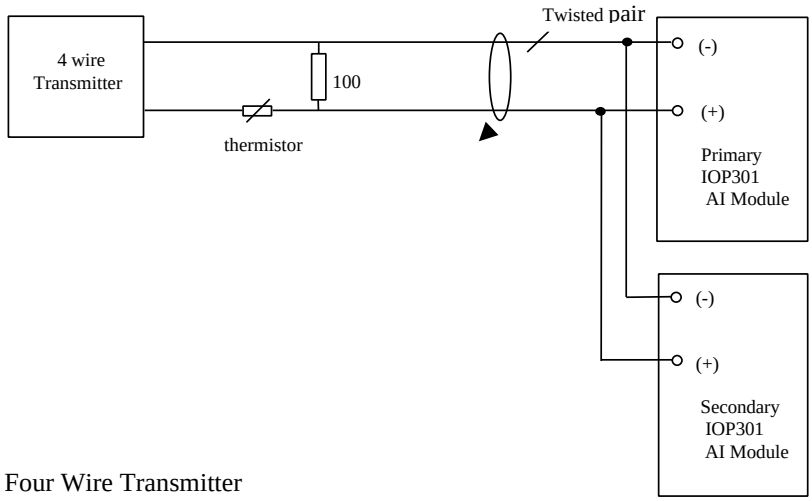
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Field Wiring for Redundant Modules with Common Transmitter

The following figure shows the recommended wiring for two redundant IOP301 analog input modules that share a common two-wire or four-wire transmitter.

Redundant inputs must be configured as voltage inputs with an external 100-Ohm shunt resistor. The recommended maximum distance between the shunt and the I/O module is 10 meters. The +24V connection should be independently fused to each transmitter.

The connection to the (-) terminal of the 24v supply must be made at the (-) side of the shunt resistor. The voltage that is developed across each 100-Ohm shunt by the 4-20 mA signal from the transmitter is wired to the AI module using twisted pair cables. A PTC thermistor is recommended between the transmitter output and the 100-Ohm shunt. This protects the 100-Ohm shunt against over voltage and provides additional resistance to increase the transmitter load to 250 Ohms. Kit IOP306 supplies 16 pairs of 100-Ohm shunts and thermistors to support two IOP301 analog input modules.



Four Wire Transmitter

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PRODUCT: IOP301 / MAXPAC 16-CHANNEL ISOLATED ANALOG INPUT MODULE

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