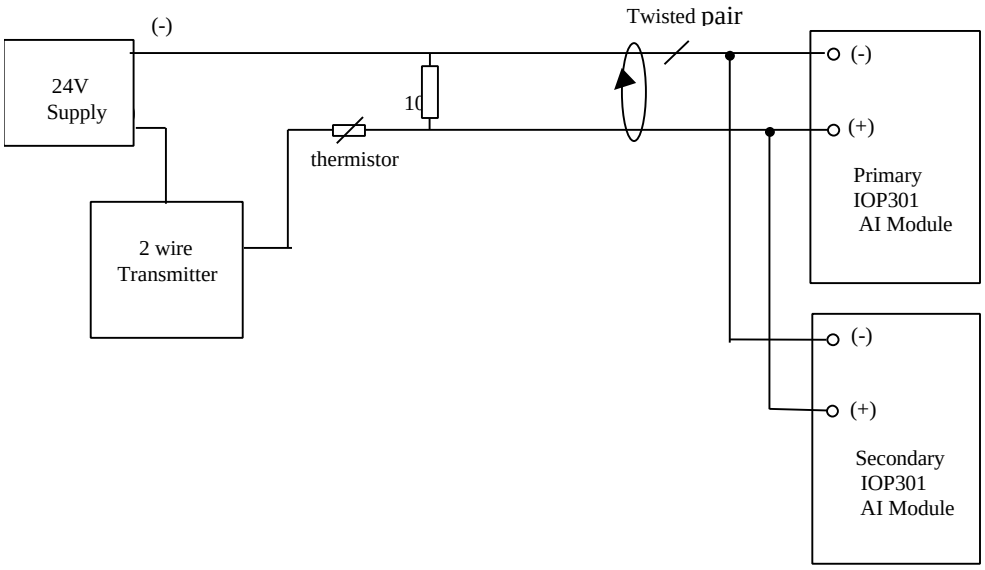


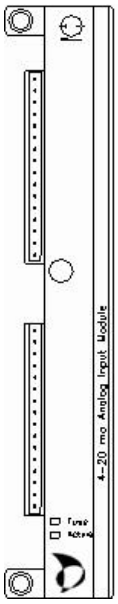
Two Wire Transmitter

Chapter 3

Analog Input Modules
4-20 mA Input Module IOP302
Voltage Input Module IOP305

Overview

The IOP302 module features sixteen 4-20 mA common input channels. The IOP305 module features 16 voltage input (not current input) channels. Transmitter loop power is available to the module via the backplane, providing individually fused 24V transmitter power for each channel.



Features

- Self-calibration on power up
- Periodic re-calibration online.
- Open input detection each measuremen
- Software stored in FLASH
- Low power dissipation
- Field to Logic isolation
- Excellent line frequency normal moderejection
- ADC per channel
- 20 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

DPU. This LED blinks on and off at a constant rate 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. Refer to the following table for jumper setting information.

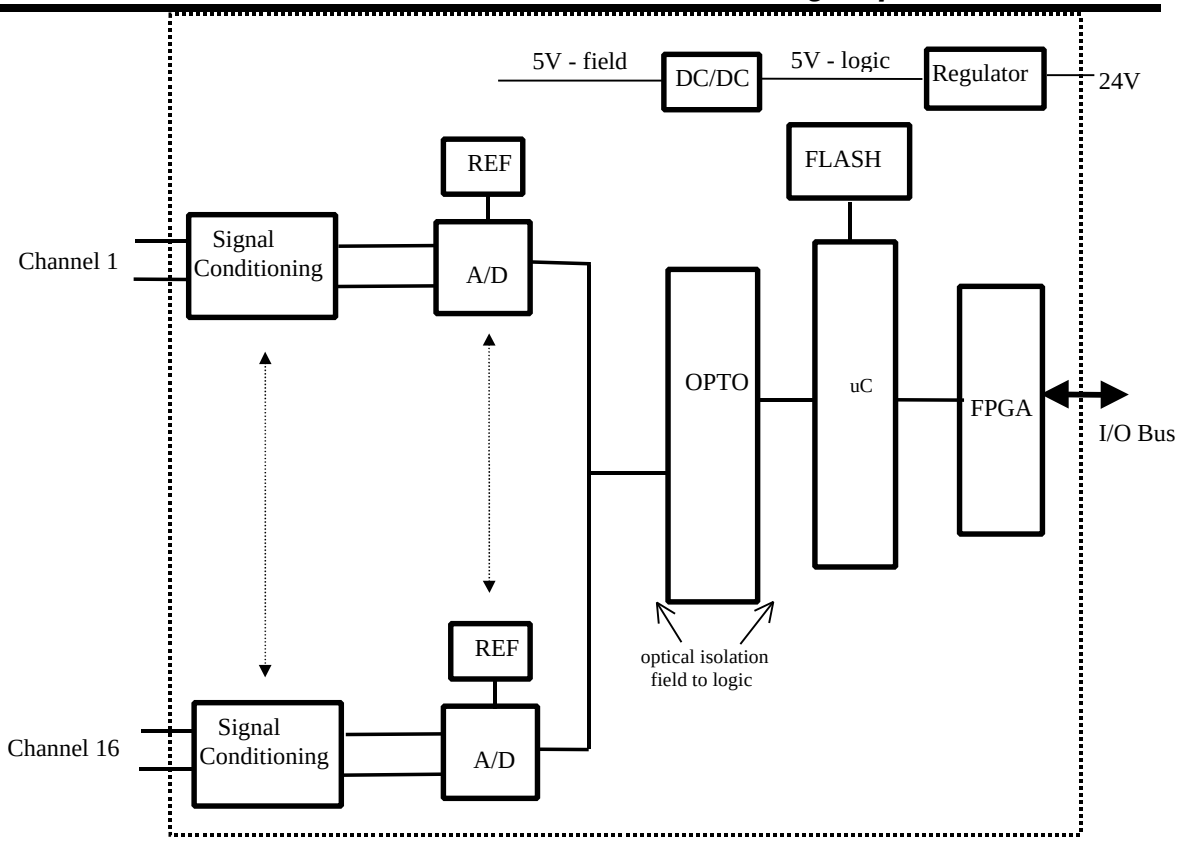
Jumper	Installed	Not Installed
W1	50 Hz	60Hz
W6	DPU4A/B	DPU4E

Module Operation

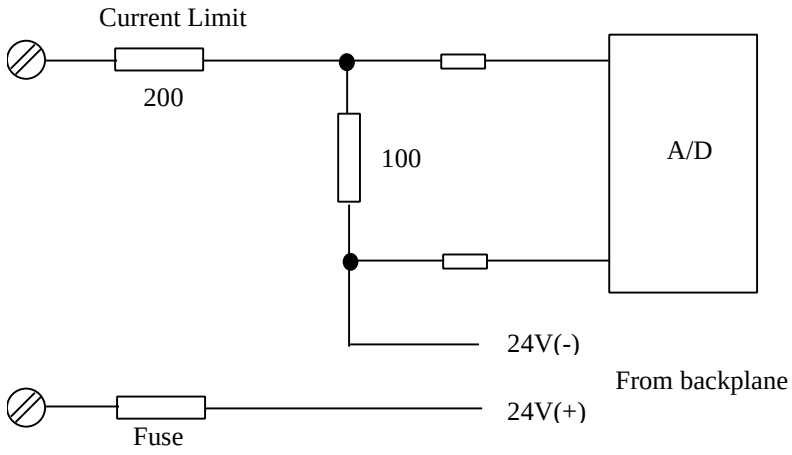
This microprocessor-based module supports up to 16 4-20 mA inputs, all powered from a local 24V loop supply. A sigma delta A/D and reference are provided for each input. Each A/D constantly reads the voltage generated by the input and converts the differential measurement to a 15-bit plus sign binary value, which is read by the microcontroller.

The digital filter in the oversampling A/D provides excellent 50/60 Hz normal mode rejection. Immediately following each measurement, open input and over range conditions are checked. A DC/DC converter provides isolated power to the A/D measuring circuit. Communication between the microcontroller and the A/D is serial at 100kHz. Optical isolators provide the isolation between the A/D and the serial logic circuits.

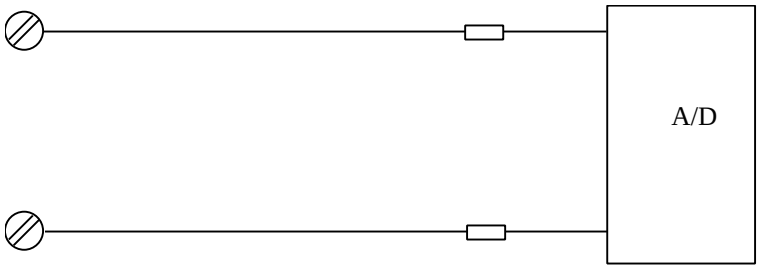
The microprocessor provides the input data to the DPU on demand via the bus FPGA. The FPGA provides the I/O bus interface logic; its program is loaded from the FLASH on power up. Module calibration is done automatically at power up following startup diagnostics. Calibration is repeated periodically online to compensate for temperature effects.



The input circuit for each channel of the 4-20 mA input module is shown in the following sketch. An electronic fuse protects the 24V loop power to the transmitter. A 200-Ohm thermistor in series with the input provides current limiting for overvoltage conditions up to 100 Volts. The 24-volt supply is available to the module from the backplane.



The following sketch shows the input circuit for the voltage-input module.



Voltage Input Module

Diagnostics

The module executes diagnostics on power up. When an error is detected on power-up or during online operation, the front-panel green LED, labeled Active, blinks the first digit at a slower rate and the second digit at a faster rate. During normal operation the active LED is on continuously or flashes at a steady one-second rate when the module is not being scanned. The diagnostic codes are as follows:

Error Condition	Code
A/D send fault	0x12
A/D receive fault	0x13
A/D self calibration failure	0x14
Bad A/D communication	0x15
A/D does not complete conversion	0x16
RAM Test Failure (power-on)	0x22
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	20 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, 1-2.4V.
Calibration	Self-calibration on power up. Periodically on line to compensate for temperature effects
Input Impedance	IOP302, 300 Ohms; IOP305, 1mOhm
Normal Mode Voltage	IOP302, 50 Volts; IOP305, 24 Volts
Normal Mode Rejection	60db @ 50/60 Hz
Input Power (from 24V system supply)	125 mA