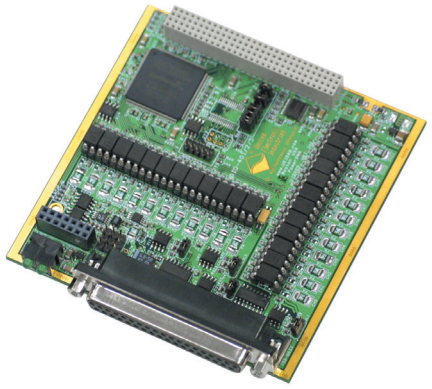
DNA/DNR-DIO-401

24-Channel Digital Input / Data Acquisition Board

- DNA-DIO-401 for use with "Cube" I/O chassis
- DNR-DIO-401 for use wit RACKtangle™ I/O chassis
- 24 digital input channels
- Supports wide range of digital logic levels
- User-programmable hysteresis
- I/O throughput rate of 1kS/sec
- Requires external 7-36V (24V nominal) power source

10-Year Availability Guarantee



Supports **UEIDaq Framework** Data Acquisition Software Library for Windows. Linux and QNX drivers available. Visit our website for more details.

General Description:

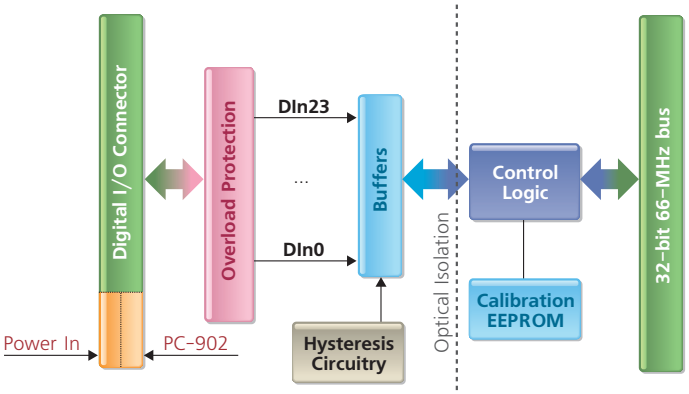
The DNA/DNR-DIO-401 are digital input boards designed for low-speed, high-reliability isolated industrial digital I/O. The DNA-DIO-401 is compatible with UEI's "Cube" chassis while the DNR-DIO-401 is designed for installation in the RACKtangle I/O chassis.

The DNA/DNR-DIO-401 features 24 digital input channels, I/O throughput rate of 1kHz, and offers 350Vrms isolation between layers. The board is compatible with 5-36V digital logic levels and can accept a wide range of user-supplied power sources (7 to 36V DC). In Cube based applications, the DNA-DIO-401 can be powered internally using a DNA-PC-912 power conversion layer. When a single DNA-PC-912 is used to power multiple DNA-DIO layers, total power consumption should not exceed 40W. Digital inputs on the DNA-DIO-401 use a unique programmable hysteresis feature which dramatically improves noise immunity of input signals. All digital inputs are protected with a 100mA PTC fuse and ESD/overvoltage protection device.

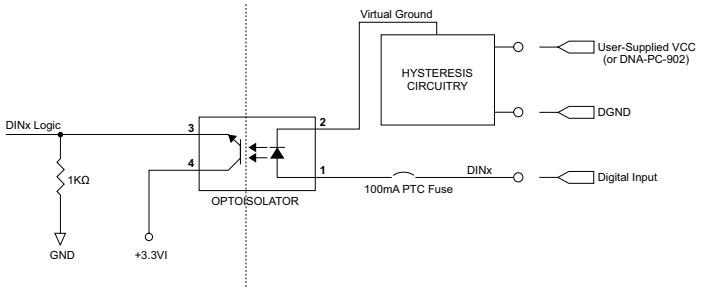
Technical Specifications:

Number of channels	24 digital inputs			
Logic Level	5V - VCC			
Input FIFO	1024 samples			
Default Hysteresis Values	Lower DAC limit: 200 Upper DAC limit: 300			
Input High Voltage: (with default hysteresis)	@7V	@12V	@24V	@36V
	4.5V	4.75V	10.5V	13V
Input Low Voltage: (with default hysteresis)	@7V	@12V	@24V	@36V
	4.25V	4V	6.75V	8.75V
Input Protection	±40V over/under voltage, 7kV ESD			
Internal Sampling Rate	2 kHz			
I/O Throughput Rate	1 kHz max			
Power Requirements (VCC)	7-36V (24V nominal) - external source or DNA-PC-912 internally			
Power Consumption	@7V	@12V	@24V	@36V
	0.5W	0.6W	0.8W	1.6W
Physical Dimensions	3.875" x 3.875" (98 x 98 mm)			
Operating Temp. Range	Tested -40 to +85 °C			
Operating Humidity	0 - 95%, non-condensing			
Isolation	350Vrms			

Block Diagram:



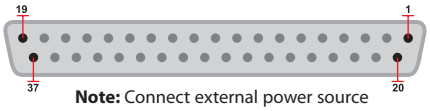
Simplified Input Channel Diagram



Pinout Diagram:

VCC	37	19	VCC
DGND	36	18	VCC
DIN23	35	17	DGND
DIN21	34	16	DIN22
DIN20	33	15	DGND
DIN18	32	14	DIN19
DIN17	31	13	DGND
DIN15	30	12	DIN16
DIN14	29	11	DGND
DIN12	28	10	DIN13
DIN11	27	9	DGND
DIN9	26	8	DIN10
DIN8	25	7	DGND
DIN6	24	6	DIN7
DIN5	23	5	DGND
DIN3	22	4	DIN4
DIN2	21	3	DGND
DIN0	20	2	DIN1
		1	DGND

DB-37 (female)
37-pin connector:



Note: Connect external power source to **VCC** pins. All VCC and a minimum of 3 **DGND** pins should be used to supply external power.

Connection Options:

Cable	Screw Terminal Panel	Description
DNA-CBL-37S	DNA-STP-37	Shielded cable connection to 37-way terminal panel.
DNA-CBL-37	DNA-STP-37	Ribbon cable connection to 37-way terminal panel.

Hysteresis Setup:

Hysteresis is a very powerful feature that improves noise immunity on the digital inputs in industrial environments. Hysteresis on the DNA-DIO-401 is implemented as follows:

Two user programmable digital-to-analog converters are used to set upper and lower limits for the hysteresis function. These D/A converters are referred to as Lower limit DAC and Upper limit DAC. DAC outputs are connected to the multiplexer and then amplified using the high-speed amplifier. The amplifier drives the 'virtual' ground of the optical isolator.

- All inputs initially read while optical isolators are driven with virtual ground level that corresponds to the value of Lower DAC
- Another read is performed while the optical isolators are driven with a virtual ground level that corresponds to the value of Upper limit DAC
- If digital input values from both reads are the same – the input signal state is assigned to the last read value, otherwise input signal state is unchanged
- This process repeats itself 1000 times a second

To set the hysteresis values, program the Lower and Upper DACs with an arbitrary number from 0 to 1023. The value of the Upper DAC should always be greater than LowerDAC by at least 50. Actual DAC values should be selected based on user requirements using the formula below:

$$\text{DAC Value}^{3} = \frac{\text{Desired Hysteresis Voltage}}{\text{VCC x 800}}$$

[3] Since different optocouplers have different characteristics, this formula gives you approx ±10% accuracy.