# CDN503
# HIGH DENSITY I/O ADAPTER
# USER GUIDE

13050301


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# DN503 INSTALLATION

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# DN503 INSTALLATION

## DN503 PRODUCT OVERVIEW

The DN503 High Density I/O controller provides 16 digital inputs, 16 digital outputs, 8 analog inputs, 4 analog outputs and 3 quadrature counters in a DeviceNet compatible board level module. The device may be powered from a local power source or from the DeviceNet Power. A configuration switch allows setting the adapter MAC ID and communication speed.

The digital inputs may be specified as either 120 Vac or 24 Vac/dc. Units are available with mixes of input types in groups of 4.

The digital outputs may be specified as either relays (up to 240 Vac, 2 Amp), 120 Vac, 2 Amp TRIACS's or 24 Vdc 2 Amp solid state drivers. Units are available with mixes of output types in groups of 4.

The eight 12 bit analog inputs are software programmable to support 0-5, 0-10, +/-10 or current loop.

The four 12 bit analog outputs are fixed as 0-10 volts.

The three 16 bit quadrature inputs accept 0-5 volt signals. Power (5 Vdc @ 100 mA) is provided on the connectors to drive the external encoder devices.

The DeviceNet channel is optically isolated when the unit is powered from a local power source.

The unit may be powered from a local 120 Vac, 24 Vac/dc or from the DeviceNet power. Minimum input voltage is 16 Volts.

## DN503 INSTALLATION

The DN503 provides 4 mounting screws. See Physical layout.

**NOTE: All detachable screw terminals are numbered with pin 1 on the left.**

# DN503 INSTALLATION

One mounting screw has provides for connecting the DeviceNet Shield to local earth ground through a R/C circuit as specified in the ODVA DeviceNet specifications. To include this circuit install jumper JP1.

| Jumper | Description |
|---|---|
| JP1 | Connect DeviceNet Shield to Mtg. Hole |

## POWER CONNECTIONS

The DN503 may be powered from a local power source or from the DeviceNet power signals.

**NOTE: If the unit is powered from the DeviceNet power connection the analog input common signals will be directly coupled to the DeviceNet BUS - signal.**

The local power source is connected to ST3 terminals. These signals are polarity independent for both AC and DC power.

| Terminal | Description |
|---|---|
| ST3-1 | Power Source (Polarity independent) |
| ST3-2 | Power Source (Polarity independent) - Fused |

The (unregulated) processor power source is current limited (100 mA) and provided on three screw terminals to provide sensor activation power.

| Terminal | Description |
|---|---|
| ST1-1 | Sensor Activation power - |
| ST1-2 | Sensor Activation power + |
| ST1-3 | No Connection |

Power for the processor circuitry may be provided from an external power source or the DeviceNet BUS+ and BUS- signals.

| Jumper | Description |
|---|---|
| JP3 V24 | Power supplied by external power source |
| JP4 removed | |

# DN503 INSTALLATION

| Jumper | Description |
|---|---|
| JP3 VBUS+ | Power supplied by DeviceNet BUS +/- |
| JP4 installed | |

# DN503 INSTALLATION

## Digital Inputs

Digital inputs are connected to the 24 position connector P5. The inputs are organized as 8 groups of 2, with each group sharing a common input terminal. For DC inputs the input common may be connected to either the positive (sinking input device) or the common (sourcing input device) of the sensor activation power. The DN503 provides a unregulated power source at the ST1 terminals if the sensors require local power.

**NOTE: Connecting the ST1 terminals to the local sensors defeats the optical isolation between the digital inputs and the processor power. This will also propagate back to the DeviceNet connections if the unit uses the DeviceNet to provide local power.**

| Terminal | Description |
|---|---|
| P5-1 | Input 1 |
| P5-2 | Input 1 & 2 Common |
| P5-2 | Input 2 |
| P5-4 | Input 3 |
| P5-5 | Input 3 & 4 Common |
| P5-6 | Input 4 |
| P5-7 | Input 5 |
| P5-8 | Input 5 & 6 Common |
| P5-9 | Input 6 |
| P5-10 | Input 7 |
| P5-11 | Input 7 & 8 Common |
| P5-12 | Input 8 |
| P5-13 | Input 9 |
| P5-14 | Input 9 & 10 Common |
| P5-15 | Input 10 |
| P5-16 | Input 11 |
| P5-17 | Input 11 & 12 Common |
| P5-18 | Input 12 |
| P5-19 | Input 13 |
| P5-20 | Input 13 & 14 Common |
| P5-21 | Input 14 |
| P5-22 | Input 15 |
| P5-23 | Input 15 & 16 Common |
| P5-24 | Input 16 |

# DN503 INSTALLATION

## DIGITAL OUTPUTS

Digital outputs are connected to the 20 position connector P7. The inputs are organized as 4 groups of 4, with each group sharing a common input terminal.

For DC outputs the output common must be connected to the positive power source. The outputs provide Sourcing outputs.

For AC outputs the output common should be connected to the AC L1.

| Terminal | Description |
|---|---|
| P7-1 | Output Common 13..16 |
| P7-2 | Output 16 |
| P7-2 | Output 15 |
| P7-4 | Output 14 |
| P7-5 | Output 13 |
| P7-6 | Output Common 9..12 |
| P7-7 | Output 12 |
| P7-8 | Output 11 |
| P7-9 | Output 10 |
| P7-10 | Output 9 |
| P7-11 | Output Common 5..8 |
| P7-12 | Output 8 |
| P7-13 | Output 7 |
| P7-14 | Output 6 |
| P7-15 | Output 5 |
| P7-16 | Output Common 1..4 |
| P7-17 | Output 4 |
| P7-18 | Output 3 |
| P7-19 | Output 2 |
| P7-20 | Output 1 |

# DN503 INSTALLATION

## ANALOG INPUTS

Analog inputs are connected to the 16 position connector P2. The inputs are organized as 8 input pairs consisting of the analog signal and analog return. All analog returns are common. No isolation is provided between the analog inputs and the processor ground.

| Terminal | Description |
|---|---|
| P2-1 | Analog input 1 |
| P2-2 | Analog return (common) |
| P2-3 | Analog Input 2 |
| P2-4 | Analog return (common) |
| P2-5 | Analog Input 3 |
| P2-6 | Analog return (common) |
| P2-7 | Analog Input 4 |
| P2-8 | Analog return (common) |
| P2-9 | Analog Input 5 |
| P2-10 | Analog return (common) |
| P2-11 | Analog Input 6 |
| P2-12 | Analog return (common) |
| P2-13 | Analog Input 7 |
| P2-14 | Analog return (common) |
| P2-15 | Analog Input 8 |
| P2-16 | Analog return (common) |

To support current loop applications on-board 500 ohm resistors are provided. These are enabled by installing jumpers.

| Jumper | Description |
|---|---|
| JP8 | Install 500 ohm load to Analog input 1 |
| JP12 | Install 500 ohm load to Analog input 2 |
| JP16 | Install 500 ohm load to Analog input 3 |
| JP20 | Install 500 ohm load to Analog input 4 |
| JP10 | Install 500 ohm load to Analog input 5 |
| JP14 | Install 500 ohm load to Analog input 6 |
| JP18 | Install 500 ohm load to Analog input 7 |
| JP22 | Install 500 ohm load to Analog input 8 |

# DN503 INSTALLATION

## ANALOG OUTPUTS

Analog outputs are connected to the 12 position connector P4. The outputs are organized as 4 pairs consisting of the analog signal and analog return. All analog returns are common. The analog outputs may be isolated from the processor ground if separate 24 Vdc power is supplied.

| Terminal | Description |
|---|---|
| P4-1 | Auxiliary Power - |
| P4-2 | Auxiliary Power + |
| P4-3 | Analog return (common) |
| P4-4 | Analog Output 4 |
| P4-5 | Analog return (common) |
| P4-6 | Analog Output 3 |
| P4-7 | Analog return (common) |
| P4-8 | Analog Output 2 |
| P4-9 | Analog return (common) |
| P4-10 | Analog Output 1 |

The analog output circuitry may be powered from the processor power or from the auxiliary power connections on connector P4.

| Jumper | Description |
|---|---|
| JP25 - P4 | Analog output return powered from P4-1 |
| JP24 - P4 | Analog output power from P4-2 |
| JP25 - GND | Analog output return power processor Gnd |
| JP24 - Vin | Analog output powered from Processor power |

# DN503 INSTALLATION

## QUADRATURE COUNTER

The DN503 provides three quadrature counters on connector P10. Each counter is provided with a 5 Vdc power source and the A and B signals. The quadrature inputs are not optically isolated but are provided with 4.7k pull up resisters and clamping diodes.

| Connector | Description |
|---|---|
| P10-1 | Ground return |
| P10-2 | Quad Channel 3 signal B |
| P10-3 | Quad Channel 3 signal A |
| P10-4 | +5 Vdc @ 100 mA |
| P10-5 | Ground return |
| P10-6 | Quad Channel 2 signal B |
| P10-7 | Quad Channel 2 signal A |
| P10-8 | +5 Vdc @ 100 mA |
| P10-9 | Ground return |
| P10-10 | Quad Channel 1 signal B |
| P10-11 | Quad Channel 1 signal A |
| P10-12 | +5 Vdc @ 100 mA |

The quadrature counter circuits require an external clock. Jumper JP6 must be installed in the XTL position.

| Jumper | Description |
|---|---|
| JP5 - XTL | Install to enable quadrature counters |
| JP4 - PORT | Reserved for future use |

# DN503 INSTALLATION

## DeviceNet INTERFACE

The DeviceNet interface is connected to connector ST2. The DeviceNet interface may be optically isolated.

| Terminal | Description |
|---|---|
| ST2-1 | BUS - |
| ST2-2 | CAN L |
| ST2-3 | Shield |
| ST2-4 | CAN H |
| ST2-5 | BUS + |

The interface may be powered from either the local power supply or from the DeviceNet Bus power.

| Jumper | Description |
|---|---|
| JP4 install | Connect local processor Gnd to BUS - |
| JP5 - GND | Power CAN transceiver from processor (non-isolated) |
| JP2 - Vcc | Power CAN transceiver from processor (non-isolated) |
| JP5 - V- | Power CAN transceiver from BUS - |
| JP2 - V+ | Power CAN transceiver from BUS + |

## LED INDICATORS

The DN503 has two bi-color LED indicators, referred to as the HEALTH (D7) and the COMM (D6) indicator. Refer to the DeviceNet specifications for a complete description of these LED's. During the power up sequence each LED will cycle from RED to GREEN as part of the self diagnostics firmware.

Four light bar indicators are provided to show the state of the digital inputs and the digital outputs.

| Indicator | Description |
|---|---|
| U41 | Input 1-8 |
| U43 | Input 9-16 |

| | |
|---|---|
| U27 | Output 1-8 |
| U34 | Output 9-16 |

## CONFIGURATION SWITCH

The DN503 has a 8 position DIP switch used to configure the DeviceNet MACID and communications speed. Switch positions 1-6 configure the MACID to values 0-3F hex. Switch positions 7 and 8 configure the operating speed. If both are on the swtich is disabled and internal non-volatile storage to retains MACID and baud rate information.

| Switch S8 | S7 | Description |
|---|---|---|
| Off | Off | 125 kbit/second |
| Off | On | 250 kbit/second |
| On | Off | 500 kbit/second |
| On | On | Software Settable baudrate and MacID |

## SERIAL INTERFACE

The DN503 provides a serial RS232 interface used to load DeviceNet firmware during production using a 10 pin header to DB-9 ribbon cable assembly. The serial channel is configured for 9600 baud, 8 bit, no parity, 1 stop bit.

| Connector | Description |
|---|---|
| P1-3 | Rx Data (from HOST to DN503) |
| P1-4 | RTS (not used) |
| P1-5 | Tx Data (from DN503 to HOST) |
| P1-6 | CTS (not used) |
| P1-9 | Ground return |

## ORDERING INFORMATION

The DN503 may be ordered with optional power, digital input and digital output configurations. Two standard configurations are offered. Please contact D.I.P. Inc. for custom configurations.

:

DN503 - 120 Vac power, 120 Vac Digital inputs, Relay outputs

# DN503 INSTALLATION

DN503-24 - 24 Vac/dc power, 24 Vac/dc Digital inputs, Relay outputs
13050301 - Installation Manual