

CDN220
HIGH DENSITY I/O ADAPTER
USER GUIDE

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CDN220 INSTALLATION

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Please Note:

MKS Instruments provides these documents as the latest version for the revision indicated. The material is subject to change without notice, and should be verified if used in a critical application.

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CDN220 PRODUCT OVERVIEW

The CDN220 High Density I/O controller provides 4 analog inputs.

- Four Channel, 12 bit A/D converter with +/- 16.5V fault protection on each channel.
- Software selectable inputs (0 to 5V, 0 to 10V, -10 to 10V, or 4-20 mA).
- Low power (24 Vdc @ 40 mA).
- High efficiency DC to DC converter, 500 Volt isolation.
- Software selectable operating modes for each channel (four single ended inputs, four differential inputs or four 4-20 mA).
- Optically isolated CAN DeviceNet compatible CAN interface with loss of ground and reverse polarity protection.
- Die-cast aluminum enclosure (1.5" X 2.5" X 6.0"), RTV encapsulated.

The CDN220 is a 4 channel DeviceNet compatible analog input module. Fully encapsulated and housed in a die-cast aluminum enclosure the unit may be mounted directly to industrial machinery.

External signals are connected through 'euro-fast' connectors, simplifying field installation. An internal switch allows setting operating speed and node address, allowing quick replacement with minimum configuration requirements.

Software parameters, set using standard DeviceNet tools, allow the unit to be configured to meet a wide range of industrial interface requirements. The analog subsystem is optically isolated from the DeviceNet network, minimizing grounding issues.

Powered from the standard DeviceNet 24 Vdc power, a DC to DC converter provides 500 volt isolation for the analog and microcontroller subsystem. Current consumption is typically 40 mA at 24 Vdc.

Circuitry includes protection against mis-wiring the CAN interface connection, including loss of ground and reverse polarity connections.

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The CDN220 provides 4 mounting screws. External signal are connected through 'euro-fast' connectors, simplifying field installation. An internal switch allows setting operating speed and node address.

NOTE: Removing these screws should be done only to change the node address and/or operating speed.

POWER CONNECTIONS

The CDN220 is powered from DeviceNet power signals.

NOTE: If the unit is powered from the DeviceNet power connection the analog input common signals will NOT be directly coupled to the DeviceNet network.

Terminal	Description
BUS IN	Power Source Female Connector
BUS OUT	Power Source Male Connector

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ANALOG INPUTS

Analog inputs are connected to 4 position connector. The inputs are organized as individual inputs 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.. However the processor ground is isolated from DeviceNet return.

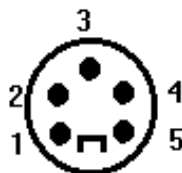
Operating range	Pin 1	Pin 2	Pin 3	Pin 4
-10V to 10V	Ground	Analog input	Ground	NC
0V to 5V	Ground	Analog input	Ground	NC
0V to 10V	Ground	Analog input	Ground	NC
4mA to 20mA	Ground	Analog input pos	Ground	Analog input neg

To support current loop applications on-board 200 ohm resistors are provided. These are enabled by connecting Analog input pos. (Pin 2) and Analog input neg.(Pin 4)

DeviceNet INTERFACE

The DeviceNet interface is connected to connector BUS IN and BUS OUT. The DeviceNet interface is optically isolated.

Terminal Female Connector (BUS IN)	Description
1	Shield
2	BUS +
3	BUS -
4	CAN H
5	CAN L



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LED INDICATORS

The CDN220 has two bi-color LED indicators, referred to as the Module Status and Network Status 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.

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CONFIGURATION SWITCH

The CDN220 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 switch is disabled and internal non-volatile storage to retains MacID and baud rate information.

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

ANALOG INTERFACE

The CDN220 provides 4 analog interface point (AIP). The recommended cable to interface with the unit is TURCK RS 4.4T-2.



Pin 1 is V⁻. This pin is normally grounded. However, it can be used as a differential input voltage where the value of Pin 2 is subtracted from Pin 1 (V⁺ - V⁻).

Pin 2 is V⁺. This pin is the normal analog input to the device.

Pin 3 is GRND. This is ground use by the A/D.

Pin 4 is Current loop. A current loop is formed between Pin2 & Pin 4. Analog input neg. (Pin 4) should be tied to Pin 1 and Pin 3 to ensure the right result.

Operating range	Pin 1	Pin 2	Pin 3	Pin 4
-10V to 10V	Ground	Analog input	Ground	NC
0V to 5V	Ground	Analog input	Ground	NC
0V to 10V	Ground	Analog input	Ground	NC
4mA to 20mA	Ground	Analog input pos.	Ground	Analog input neg.

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NOTE:

CDN220 uses a 12-bit A/D which requires two bytes to represent the digital value. In the case of negative voltages, the A/D signs extend the result to 16-bit (two bytes) and the upper 4-bit of the second byte are set to 1. In the case of positive voltages, the A/D signs extend the result to 16-bit and the upper 4-bit of the second byte are set to 0.

EDS FILE

The EDS file provided allows the user to monitor and change the information uploaded from CDN220.

To install the EDS file provided, choose **Utilities** and **Install EDS files...** from DeviceNet Manager menu.

The following description applies to A-B DeviceNet Manager. The Enhanced Mode EDS contains four groups under **Parameter Group**.

1. Analog Input Point. It groups all four analog values and their operating range. The value displayed on the dialog box is a 12-bit A/D value depending on the operating range.

A-B DeviceNet Manager displays the value of the A/D conversion in decimal. This value may range between Min and Max and the Formula gives the value in either volts or amps.

The value following table shows how to read the value:

Operating range	Min	Max	Formula
0V to 5V	0	4095	value*5 / 4096 volts
0V to 10V	0	4095	value*10 / 4096 volts
4mA to 20mA	655	3276	value*5/819200 amps

Note: The 4mA to 20mA matches to 1-5VDC signal. The value is valid within the min and max as specified in the table above. The 819200 relates to the internal resistance and conversion factors.

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The conversion is more difficult when the analog input is set to operate in the range of -10V to 10V. The reason is that the A/D represents all values in 2-complement and sign extended the negative values. Therefore, the decimal interpretation is rather complicated.

In order to simplify the interpretation of the value being displayed, use the following procedure.

A. If the value falls within the Neg Range, use Formula (Neg). The formula gives a voltage value from 0V to -10V.

B. If the value falls within the Pos Range, use Formula (Pos). The formula gives a voltage value from 0V to 10V.

Operating Range	Neg Range	Pos Range	Formula(Pos)	Formula(Neg)
-10V to 10V	65535-63488	0-2047	value*10/ 2048	(65535-value)*(-10) / 2048

2. AIP Input Value. It groups all four analog input values.

3. AIP Input Range. It groups all four operating ranges.

4. AIP Set Range. It allows the user to change the operating range of the corresponding AIP. Use scroll bar or type the value to set the operating range. The operating range for the AIP chosen will not changed until the user clicks on **Save to Device**.