

CDN127  
DeviceNet  
SPECIFICATIONS

# CDN127 DeviceNet Specifications

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# CDN127 DeviceNet Specifications

## Revision History

Revision	Description of changes	Date
1.0	First Release	2/24/99
1.1	Alpha Hardware Release	2/27/99
1.2	Revision of Input states	9/16/99
1.3	Upgrade to reflect hardware options	1/26/00
1.4	Review Copy	2/20/01
1.5	Update drawing and relay reference	02/08/08
1.6	Fixed pinout error	04/01/08

# CDN127 DeviceNet Specifications

## Overview

The CDN127 (Peripheral Device Interface) device operates as a Group II slave on the DeviceNet network. The unit supports Explicit Messages and Polled I/O Messages of the predefined master/slave connection set. It does not support the Explicit Unconnected Message Manager (UCMM).

The device has been designed to specifically support peripheral devices used within the Semiconductor Equipment market including Dry Vacuum pumps, generators and chiller devices. It provides 5 digital inputs, 3 digital outputs, a 12 bit Analog Output (0-10 Vdc) and dual 12 bit analog inputs (0-10Vdc). Hardware interlocks are provided on one of the digital outputs.

The Device Profile for the CDN127-1 has been based on the Vacuum Dry Pump Device Profile, Revision 1.7. This profile has been extended to support the additional Analog Output available on the device and support for the additional analog inputs and digital outputs. The device may be configured to provide generic I/O interfaces for the entire I/O mix available.

The digital inputs provide feedback signals from the external unit. Three of the digital inputs are active low (sinking) inputs and two are active high (sourced) inputs. A +24 Vdc current source is provided by the CDN127. Inputs are typically connected to dry contacts or sourcing/sinking electronic outputs. The CDN127 digital outputs control the device ON/OFF state and auxiliary functions and may be configured as sourcing, sinking or dry contact outputs. The CDN127 provides a +24 Vdc current source to activate the outputs. The ON/OFF control signal and the fail interlock input are routed to an interlock connector.

All digital inputs are designed to be 'fail safe'. For warnings and errors the inputs are ON if the signal is active, indicating the related condition is in the NORMAL or OPERATIONAL state (ie: if Over Temperature is ON it indicates that the temperature is in the NORMAL operating range). Removal of the signal indicates a fault condition. All input LED's are ON if the signal is ON.

The CDN127 may be configured to support a wide range of peripheral devices. The following description is specific to it's use as a Dry Pump interface device.

## Device Description

The CDN127-1 is implemented to support integration into specific pump units or to act as an external device that may be connected to existing pump units using the SPI interface provided on current units. When connected internally to a pump unit the SPI signals are used. The SPI signals are presented on a 25 pin D connector.

## Switches

The CDN127 has 3 rotary switches accessible from the front of the unit to allow setting the MAC ID (address) and Data Rate of the device. Valid addresses are in the range 0-63. Setting the address switches to an invalid address disables the switches and allows the unit Mac ID to be set through software.

The Data rate switch allows setting the unit to 125k baud, 250k baud or 500k baud. Setting the switch to an invalid data rate disables the switch and allows the unit Data rate to be set through software.

The switches are only read during the power up sequence.

# CDN127 DeviceNet Specifications

## Indicators

The CDN127 has 2 DeviceNet status indicators and 8 I/O indicators visible from the front of the unit.

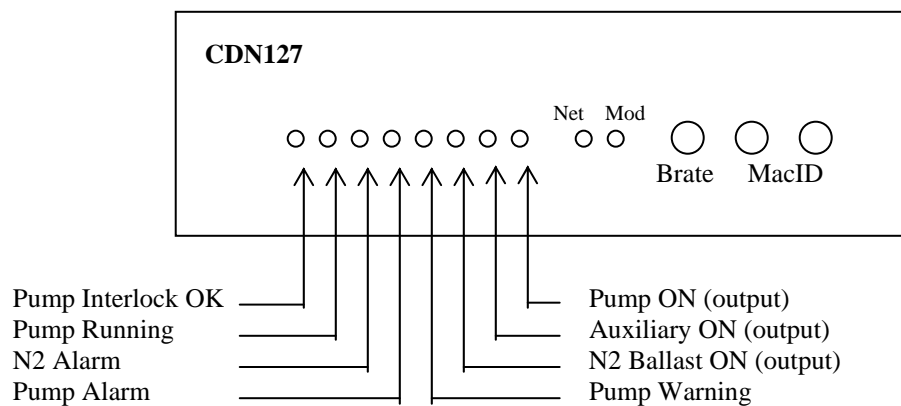
The DeviceNet status indicators include a Module status and a Network status LED. Refer to the ODVA DeviceNet specification for a complete description of the LED's. The following provides a summary of the functions.

Network Status LED	Interpretation
OFF	Power up, no access to DeviceNet
Blinking Green	Waiting for connection to be established
Solid Green	Connected to DeviceNet, no errors detected
Blinking Red	Network Fault
Solid Red	Device removed from network due to fault condition (duplicate MacID or incorrect Data Rate)

Module Status LED	Interpretation
OFF	Power up
Solid Green	No module status errors detected
Blinking Red	Minor module error detected
Solid Red	Major error detected, Connections timed out

Both LED's are sequenced through a RED-GREEN cycle during power up.

The I/O indicators show the state of each I/O point. The LED is ON if the input or output is active (current flow).





# CDN127 DeviceNet Specifications

I/O Indicator	Interpretation
0	Pump On
1	Auxiliary Output On
2	N2 Ballast On
3	Pump Warning OKAY
4	Pump (Temperature) Alarm OK
5	N2 Alarm OKAY
6	Pump Running
7	Pump Interlock OK

## Internal Jumpers

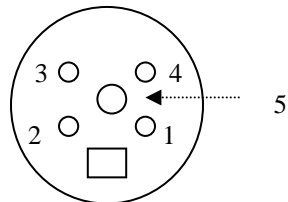
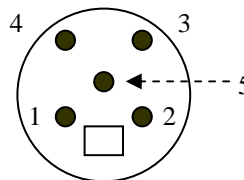
Internal jumpers allow two options for the control of the interaction between the Pump Run output, the internal control relay and the associated external interlock signals.

## DeviceNet Interface

The DeviceNet interface uses the ISO12798 compliant 82C251 transceiver. No optical isolation is provided between the transceiver and the control processor. The DeviceNet interface connector is a circular micro DIN connector mounted on the back side of the unit.

- 1 - Drain (bare)
- 2 - V+ (red)
- 3 - V- (black)
- 4 - CAN\_H (white)
- 5 - CAN\_L (grey)

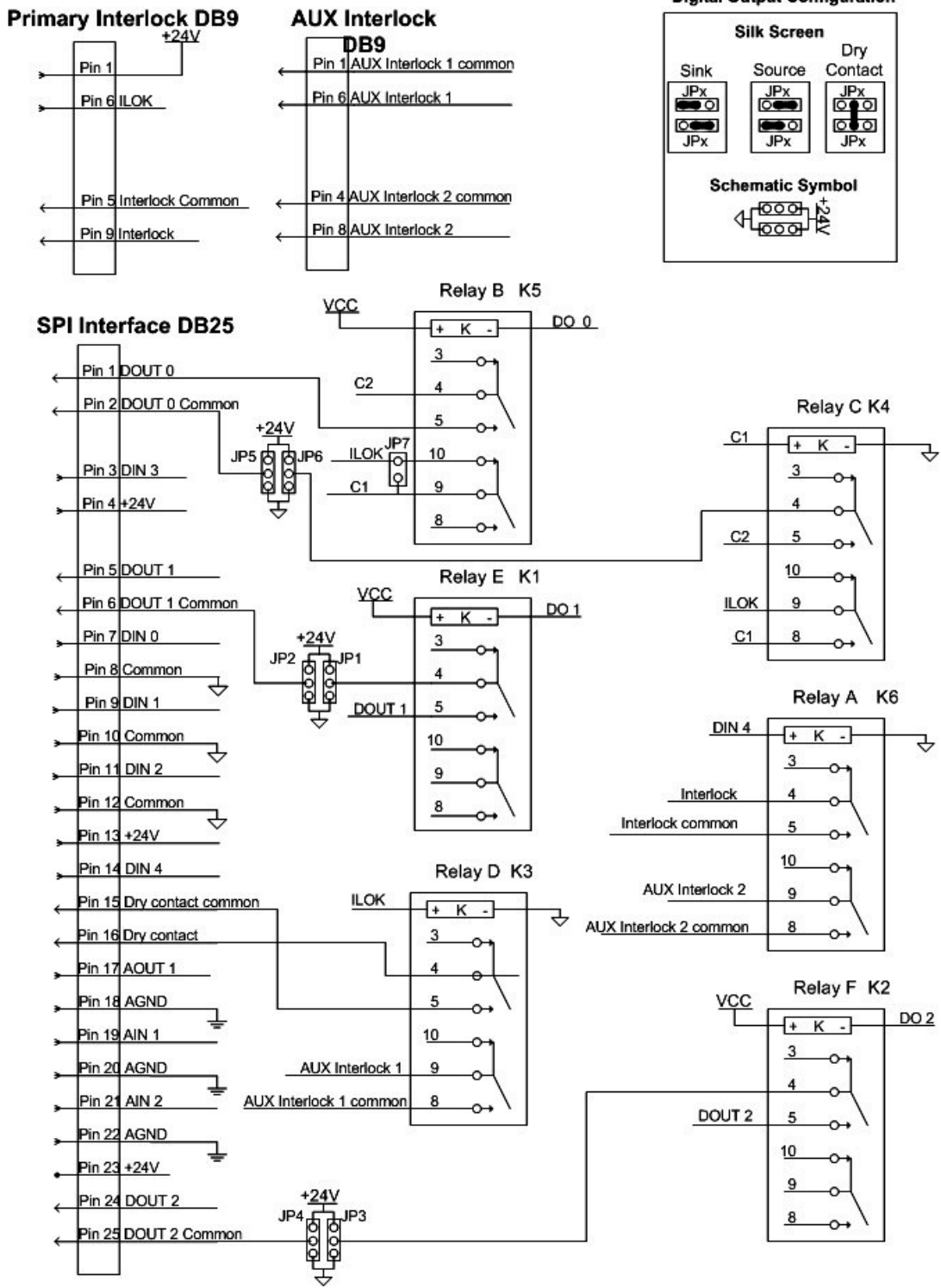
CDN127 Connector (Male)



Mating Connector (Female)

# CDN127 DeviceNet Specifications

## CDN127 I/O Interface.



# CDN127 DeviceNet Specifications

## Analog I/O.

The Analog I/O is connected to DB-22 pins 17..22. Pins 17 and 18 connect to the 0-10 Vdc Aout. Pins 19 and 20 connect to the Ain 1 (0-10) and pins 21 and 22 connect to Ain 2 (0-10). Note that analog I/O shares a common reference point which is isolated from both DeviceNet and the Digital I/O.

Analog inputs provide a 10 kohm, 1.0 uf RC filter and a high impedance input amplifier to provide 1 Mohm input impedance and a 16 hertz input filter.

Analog outputs provide a 5 mA drive capability at 0-10 Vdc.

## Connector PinOuts

### Primary Interlock Connector PinOut

The options offered for Pump interlocking are available for Heat Exchangers and Generators.

Pin	Signal Name	Type	Function
1	Interlock State Source	Input	source +24 Vdc, 40 mA
2		-	no connection
3		-	no connection
4		-	no connection
5	Dry contact, closed if Unit I/L okay	Output	Common for Unit Interlock
6	Interlock State Sense Return	Input	Sense of I/L 'okay'
7		-	no connection
8		-	no connection
9	Dry contact, closed if Unit I/L okay	Output	Sense of Unit I/L 'okay'

The DB9 pins 1 and 6 are driven by external Interlock signals which must provide a dry contact closure indicate that the interlock has been satisfied.

The DB9 pins 5 and 9 provide a dry contact to indicate that all interlocks have been satisfied. This condition is met when the dry contacts for pin 14 of the DB25 connector are closed, activating relay A (K6).

### Auxiliary Interlock Connector Table PinOut

The auxiliary interlock allows daisy chaining the system interlock for Generators.

Pin	Signal Name	Type	Function
1	Dry contact, closed if Sys I/L okay	Output	Common for System Interlock
2		-	no connection
3		-	no connection
4	Dry contact, closed if Unit I/L okay	Output	Common for Unit Interlock
5			No connection
6	Dry contact, closed if Sys I/L okay	Output	Sense of System I/L 'okay'
7		-	no connection
8	Dry contact, closed if Unit I/L okay	Output	Sense of Unit I/L 'okay'
9		-	No connection

## CDN127 DeviceNet Specifications

The DB9 pins 1 and 6 provide a dry contact to indicate that the system interlock has been satisfied. This condition is met when the dry contacts across pins 1 and 3 of the primary interlock DB9 connector is closed, activating relay D (K3).

The DB9 pins 4 and 8 provide a dry contact to indicate that all interlocks have been satisfied. This condition is met when the dry contacts for pin 14 of the DB25 connector are closed, activating relay A (K6).

### SPI Interface

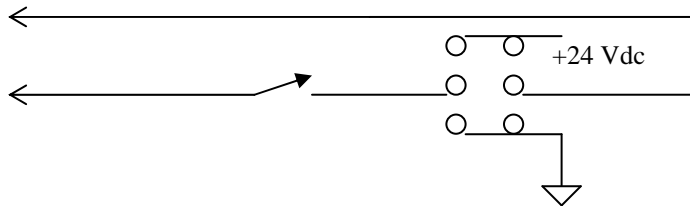
The SPI interface consists of the following signals.

Pin	Type	Heat Exchange	Generator	Pump
1	Output	Pump On/Off	On/Off	On/Off Enable
2	Output	Pump On/Off	On/Off Com	On/Off Com
3	Input	Water Flow	MS/RF/Plasma ON Status	Running
4	+24Vdc			
5	Output	Chill On		N2 Enable
6	Output	Chill On		N2 Com
7	Input	Water Level Low	Filament/AC OK	Warning
8	Input	Water Level Com	Filament/AC OK Com	Com
9	Input		Fil. Preheat/Ready	Over Temp
10	Input		Fil. Preheat/Ready Com	Com
11	Input			N2 Flow
12	Input			Com
13	+24Vdc			
14	Input			Pump Fail
15	Output			Dry Contact
16	Output			Dry Contact
17	Aout	Temp Setting	Setting	Analog Output
18	Agnd	Analog Com	Analog Com	Analog Com
19	Ain	Temperature	Forward Power	Analog Input 1
20	Agnd	Analog Com	Analog Com	Analog Com
21	Ain	Resistivity	Ref Power	Analog Input 2
22	Agnd	Analog Com	Ref Com	Analog Com
23	+24 Vdc			
24	Output	Heater On		
25	Output	Heater On Com		

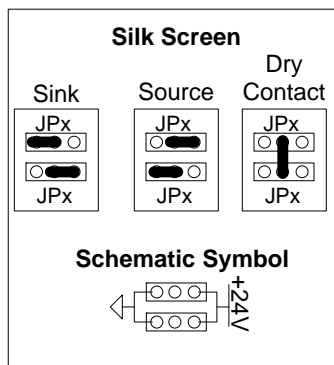
# CDN127 DeviceNet Specifications

## Description of Digital Outputs

Each output consists of a set of contacts that connect to the DB25 connector. Board jumpers allow the outputs to be configured as Sourcing (source +24 Vdc), Sinking (sink to 24 Vdc common) or dry contacts.



### Digital Output Configuration



## CDN127 Interlock

The CDN127 supports sequential (latching) circuitry for the interlock. With the Sequential I/L jumper JP7 removed, relay C (K4) will only become active if the System Interlock is satisfied **and** the Pump ON (DIO1) signal is **inactive**. Once engaged, relay C (K4) will latch on until the system interlock condition is removed. Relay C (K4) will not re-engage until the Pump On (DIO1) is in the inactive state. Installing the Seq. I/L jumper will disable the latch function.

Each of the input signals shares a common +24 Vdc, 120 mA power source. When an input condition is active on the pump it electrically connects the +24 Vdc source to the associated input, acting as a current source to the CDN127 input connection. Each of the CDN127 inputs except the Pump Fail Interlock are designed to sense an ON state with a current flow > 4 mA.

The Pump Fail Interlock signal requires special handling to preserve the safety interlock requirements. The contact closure provided by the pump activates an input to the CDN127 as well as providing a *dry* relay closure to the pump interlock connector. The dry relay closure must be rated at 50 Vdc, 1 Amp.

The Pump On/Off signal is provided by the DeviceNet interface as an active high +24 Vdc signal capable of providing 40 mA. This signal is routed to the safety interlock connector which (through relay contacts etc.) conditions the signal and provides a return signal which is routed to the SPI Pump On/Off Enable, pin 2 of SPI connector. The +24 volt return for the Pump On/Off control is provided on pin 1 of the SPI connector.

# CDN127 DeviceNet Specifications

## Power Distribution

The CDN127 is completely powered from the DeviceNet +24 volt power, specified to range from 11-28 Volt DC.

DeviceNet power is converted to +5 Vdc, 500 mA which supplies the control processor and the CAN transceivers. This power is then applied to an isolated 5 volt to +24 Vdc DC to DC converter (2 X NML0512S) to provide isolated power to the digital I/O.

A separate isolated 5 volt to +15 Vdc DC/DC converter (NML0515S) is used to power the analog output.

## Specifications

Specification	Min	Typ.	Max	Description/notes
DeviceNet				ISO 12798 transceiver, optically coupled
MacID	0		63	Hardware settable (switch), Software settable
Data Rate	125		500	Kbit/second, hardware or software settable
Vpwr	11		25	Vdc
Ipwr		250	300	mA at 24 Vdc
Digital Inputs				7 Channels
Ion	+4			MA
Ioff			+2	mA – Corresponding output must be in OFF state
Vin	-1		28	Vdc
Digital Outputs				2 Channels
Ion		100	200	Individual channels will drive up to 2 Amps.
Ioff			.1 mA	Off leakage current for voltages less than $V_{DIO}$
V <sub>OL</sub>		.9 1.1	1.1 1.2	@ 100 mA load @ 200 mA load
Digital Power				
V <sub>DIO</sub>	18	24	28	Vdc.
I <sub>DIO</sub>		40		mA + 6 mA / active I/O point
Analog Outputs				8 Channels
Resolution			12	Bits
Output Range				0 to +10 Vdc
Output Drive	2000			Ohms output load impedance

# CDN127 DeviceNet Specifications

## Firmware

The CDN127 supports ODVA the standard Digital Input Point (DIP), Digital Output Point (DOP) and Analog Output Points (AOP). In addition, it supports the objects required for the ODVA/SemiSig Dry Pump Device Profile.

### DeviceNet Message Types

As a group 2 slave device the CDN127 supports the following message types.

CAN IDENTIFIER	GROUP 2 Message Type
10xxxxxx111	Duplicate MACID Check Message
10xxxxxx110	Unconnected Explicit Request Message
10xxxxxx101	Master I/O Poll Command Message
10xxxxxx100	Master Explicit Request Message

xxxxxx = Node Address

The CDN127 supports the Group 4 Offline Connection set.

CAN IDENTIFIER	GROUP 2 Message Type
1111101100	Communication Faulted Response Message
1111101101	Communication Faulted Request Message
1111101110	Communication Ownership Response Message
1111101111	Communication Ownership Request Message

### DeviceNet Class Services

As a group 2 slave device the CDN127 supports the following class services and instance services.

SERVICE CODE	SERVICE NAME
05 (0x05)	Reset
14 (0x0E)	Get Attribute Single
16 (0x10)	Set Attribute Single
75 (0x4B)	Allocate Group 2 Identifier Set
76 (0x4C)	Release Group 2 Identifier Set

# CDN127 DeviceNet Specifications

## DeviceNet Object Classes

The CDN127 device supports the following DeviceNet object classes.

<b>CLASS CODE</b>	<b>OBJECT TYPE</b>
01 (0x01)	Identity
02 (0x02)	Router
03 (0x03)	DeviceNet
04 (0x04)	Assembly
05 (0x05)	Connection
08 (0x08)	Digital Input Point
09 (0x09)	Digital Output Point
10 (0x0A)	Analog Input Point
11 (0x0B)	Analog Oupt Point
50 (032)	Device Supervisor
64 (0x40)	Configuration



# CDN127 DeviceNet Specifications

## Identity Object Class Code: 01 (0x01)

The Identity Object is required on all devices and provides identification of and general information about the device.

### Identity Object Class Attributes

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	1
2	Get	Max Object Instance	UINT	1
6	Get	Max Class Identifier	UINT	7
7	Get	Max Instance Attribute	UINT	7

### Identity Object Instance Attributes

Attribute	Access	Name	Type	Value
1	Get	Vendor	UINT	59 (DIP)
2	Get	Product Type	UINT	27 = Dry Pump Device
3	Get	Product Code	UINT	1888
4	Get	Revision	STRUCT OF	
		Major Revision	USINT	
		Minor Revision	USINT	
5	Get	Device Status	UINT	
6	Get	Serial Number	UINT	
7	Get	Product Name	STRUCT OF	
		Length	USINT	6
		Name	STRING [6]	CDN127
8	Get	State	USINT	

### Identity Common Services

Service Code	Class	Instance	Service Name
05 (0x05)	No	Yes	Reset
14 (0x0E)	Yes	Yes	Get_Attribute_Single

# CDN127 DeviceNet Specifications

## Identity Object Attributes

### Product Code – Attribute 3

The Product code is fixed at 1888 for the CDN127. The product code is used within the Electronic Data Sheet format to uniquely identify the product type.

### Revision Information – Attribute 4

D.I.P. maintains strict version control. The major revision number will increment as functional enhancements are implemented. The minor firmware revision control number is incremented if minor changes are incorporated.

### Device Status – Attribute 5

Bit Number	Name	Meaning
0	Owned	= 0, not owned = 1, allocated
1	Reserved	
2	Configured	= 0, not configured – this bit is not supported
3	Reserved	
4-7	User defined	
8	Minor Recoverable fault	= 0, no fault = 1, minor recoverable faults (DOP short circuit)
9	Minor Unrecoverable fault	= 0, no fault = 1, minor unrecoverable faults
8	Major Recoverable fault	= 0, no fault = 1, major recoverable faults (Loss of +24 Vdc)
9	Major Unrecoverable fault	= 0, no fault = 1, major unrecoverable faults (Checksum, A/D)
12-15	Reserved	

### Serial Number – Attribute 6

The serial number is encoded in the product during the manufacturing cycle and is guaranteed to be unique across all product lines produced by D.I.P.

### Device Name – Attribute 7

The Device Name provides a character array containing the short string CDN127.

## CDN127 DeviceNet Specifications

### Device State – Attribute 8

The Device State reflects whether any errors have occurred and the severity. The following states are supported. The only exit from a Major Unrecoverable fault condition is power cycling the device.

State	Interpretation	Causes
0	Non-existent	
1	Self Test	
2	Standby	
3	Operating	Normal operating mode
4	Major Recoverable fault	Loss of +24 Vdc power
5	Major Unrecoverable fault	Memory Checksum failure

# CDN127 DeviceNet Specifications

## Router Object Class Code: 02 (0x02)

The Message Router Object provides a messaging connection point through which a Client may address a service to any object class or instance residing in the physical device.

### Router Object Class Attributes

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	1
6	Get	Max Class Identifier	UINT	7
7	Get	Max Instance Attribute	UINT	2

### Router Object, Instance 1 Attributes

Attribute	Access	Name	Type	Value
2	Get	Number of Connections	UINT	2

### Router Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single

# CDN127 DeviceNet Specifications

## DeviceNet Object Class Code: 03 (0x03)

The DeviceNet object provides general information on the specific node.

### DeviceNet Object Class Attributes

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	2

### DeviceNet Object, Instance 1 Attributes

Attribute	Access	Name	Type	Value
1	Get/Set	MACID	USINT	(1)
2	Get/Set	Baud Rate	USINT	(2)
3	Get/Set	Bus Off Interrupt	BOOL	(3)
4	Get/Set	Bus Off Counter	USINT	(4)
5	Get/Spc	Allocation Information	STRUCT of	(5)
		Choice Byte	BYTE	
		Master Node Addr.	USINT	
6	Get	Mac Switch Changed	BOOLEAN	
7	Get	Baud Switch Changed	BOOLEAN	
8	Get	Current Mac Switch	USINT	
9	Get	Current Baud Switch	USINT	

### DeviceNet Object Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single
75 (0x4B)	No	Yes	Allocate Master/Slave
76 (0x4C)	No	Yes	Release Master/Slave

### DeviceNet Object Attributes

#### MacID – Attribute 1

The MACID is set using two BCD rotary switches located on the front panel. Valid MACID addresses are 0 to 63 (0 to 3F Hex). Setting the switch address to a value greater than 63 will disable the switch and allow software setting of the MACID. The software setting defaults to the last hardware setting. The switch is only read during power up.

#### Data Rate – Attribute 2

The Data Rate is set using a BCD rotary switch located on the front panel. Valid Data Rates are 0 to 2. Setting the switch address to a value greater than 2 will disable the switch and allow software setting of the Data Rate. The software setting defaults to the last hardware setting. The switch is only read during power up.

# CDN127 DeviceNet Specifications

## Bus Off Interrupt – Attribute 3

Bus Off Interrupt (BOI) determines the action if a Bus Off state is encountered.

BOI	Action
0	Hold chip in OFF state (default)
1	If possible reset CAN chip

## Bus Off Counter – Attribute 4

Bus Off Counter will be forced to 0 whenever set regardless of the data value provided.

## Allocation Byte – Attribute 5

Allocation_byte	
bit 0	explicit set to 1 to allocate
bit 1	polled set to 1 to allocate
bit 2-7	reserved (always 0)

## Mac Switch Changed – Attribute 6

The Mac Switch Changed flag will be set if the Mac Switch has changed since the last power up sequence. Note that if the Mac Switch is set in the 'disabled' or 'program' position it is considered to be removed from the circuit and reading this attribute will result in an 'Attribute Not Supported' error response.

## Baud Switch Changed – Attribute 7

The Baud Switch Changed flag will be set if the Baud Switch has changed since the last power up sequence. Note that if the Baud Switch is set in the 'disabled' or 'program' position it is considered to be removed from the circuit and reading this attribute will result in an 'Attribute Not Supported' error response.

## Mac Switch Value – Attribute 8

The Mac Switch Value attribute returns the actual state of the Mac Switch. Note that if the Mac Switch is set in the 'disabled' or 'program' position it is considered to be removed from the circuit and reading this attribute will result in an 'Attribute Not Supported' error response.

## Baud Switch Value – Attribute 9

The Baud Switch Value attribute returns the actual state of the Baud Switch. Note that if the Baud Switch is set in the 'disabled' or 'program' position it is considered to be removed from the circuit and reading this attribute will result in an 'Attribute Not Supported' error response.

# CDN127 DeviceNet Specifications

## Assembly Object Class Code: 04 (0x04)

The Assembly Objects bind attributes of multiple objects to allow data to or from each object to be sent or received over a single connection.

Assembly instances 1..3 are associated with the Poll Produced messages. The appropriate assembly is selected by writing the corresponding DeviceNet Path information to the Poll Produced path attribute of Connection class instance 2.

Assembly instances 5 and 100 are associated with the Poll Consumed messages. The appropriate assembly is selected by writing the corresponding DeviceNet Path information to the Poll Consumed path attribute of Connection class instance 2.

### Assembly Object Class Attributes

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	1
2	Get	Max Class ID	UINT	100

### Assembly Object, Instance 1 Attributes

Attribute	Access	Name	Type	Value
3	Get	Data	STRUCT of	(1)
		Exception Alarms	Byte	

### Assembly Object, Instance 2 Attributes

Attribute	Access	Name	Type	Value
3	Get	Data	STRUCT of	(1)
		Exception Alarms	Byte	
		Input States	Byte	

### Assembly Object, Instance 3 Attributes

Attribute	Access	Name	Type	Value
3	Get	Data	STRUCT of	(1)
		Input States	Byte	

### Assembly Object, Instance 5 Attributes

Attribute	Access	Name	Type	Value
3	Get/Set	Data	STRUCT of	(2)
		Output States	Byte	

# CDN127 DeviceNet Specifications

## Assembly Object, Instance 100 Attributes

Attribute	Access	Name	Type	Value
3	Get/Set	Data	STRUCT of	(2)
		Output States	Byte	
		Analog Output	UINT	

## Assembly Object Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

- (1) The produced data consists of the Device Supervisor Exception Status byte and/or the Pump Status byte. These bytes have the following format

Byte Number	Bit Number	Contents
0	---	Exception Status
	0	Device Common Error
	1	Device Specific Error
	2	Manufacturer Specific Error
	3	Reserved for future use
	4	Device Common Warning
	5	Device Specific Warning
	6	Manufacturer Specific Warning
0 or 1	7	Reserved for future use
	---	Discrete Inputs
	0	Pump Running = 1 if pump is running
	1	Pump Warning = 1 if NO warning condition
	2	N2 flow = 1 if N2 flow OKAY
	3	Pump Alarm = 1 if NO alarm
	4	Pump Fail Interlock = 1 if interlock NOT failed
	5	Reserved for future use
6	Reserved for future use	
	7	Reserved for future use

The Device Specific Error bit is set if the N2 flow error, Pump Alarm error or Pump Fail error bits are set. The Device Specific Warning bit is set if the Pump Warning bit is set. See Device Supervisor object for further information.

- (2) The consumed packet consists of the Pump Control Assembly Data consisting of the Pump Discrete Outputs and optionally the Analog Output word.



## CDN127 DeviceNet Specifications

Byte Number	Bit Number	Contents
0	---	Discrete Outputs
	0	Pump On/Off = 1 to turn pump on
	1	Reserved for future use
	2	N2 Ballast On/Off = 1 to turn on Ballast
	3	Reserved for future use
	4	Reserved for future use
	5	Reserved for future use
	6	Reserved for future use
	7	Reserved for future use
2 and 3		Analog output, byte 2 == lsb, byte 3 == msb

### Assembly Object, Instance 101 Attributes

Attribute	Access	Name	Type	Value
3	Get	Data	STRUCT of	(2)
		Exception Alarms	Byte	
		Input States	Byte	
		Analog Inputs	UINT[2]	

### Assembly Object, Instance 102 Attributes

Attribute	Access	Name	Type	Value
3	Get	Data	STRUCT of	(2)
		Input States	Byte	
		Pad Byte	Byte	
		Analog Inputs	UINT[2]	

### Assembly Object, Instance 103 Attributes

Attribute	Access	Name	Type	Value
3	Get	Data	STRUCT of	See Config Obj.
		Input States	Byte	
		Pad Byte	Byte	
		Analog Inputs	UINT[2]	

Instance 103 uses the configuration defined by Class 64 to determine the format of the Produced packets.

### Assembly Object, Instance 104 Attributes

Attribute	Access	Name	Type	Value
3	Get/Set	Data	STRUCT of	
		Output States	Byte	
		Pad Byte	Byte	
		Analog Output	UINT	

Instance 104 uses the configuration defined by Class 64 to determine the format of the Consumed packets.

# CDN127 DeviceNet Specifications

## Connection Object Class Code: 05 (0x05)

The Connection Objects manage the characteristics of each communication connection. As a Group II Only Slave device the unit supports one explicit message connection and a POLL message connection.

### Connection Object Class Attributes

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	1

### Connection Object, Instance 1 Attributes (Explicit Message)

Attribute	Access	Name	Type	Value
1	Get	State	USINT	(1)
2	Get	Instance Type	USINT	0 = Explicit Message
3	Get	Transport Class Trigger	USINT	0x83
4	Get	Production Connection	UINT	(2)
5	Get	Consumed Connection	UINT	(2)
6	Get	Initial Comm. Char.	USINT	0x21
7	Get	Production Size	UINT	24
8	Get	Consumed Size	UINT	24
9	Get/Set	Expected Packet Rate	UINT	default 2500 msec
12	Get	Timeout Action	USINT	1 = AutoDelete
13	Get	Prod. Path Length	USINT	0
14	Get	Production Path		(null)
15	Get	Cons. Path Length	USINT	0
16	Get	Consumed Path		(null)
17	Get	Inhibit Timer	UINT	0

# CDN127 DeviceNet Specifications

## Connection Object, Instance 2 Attributes (POLL connection)

Attribute	Access	Name	Type	Value
1	Get	State	USINT	(1)
2	Get	Instance Type	USINT	1 = I/O Message
3	Get	Transport Class Trigger	USINT	0x82
4	Get	Production Connection	UINT	(2)
5	Get	Consumed Connection	UINT	(2)
6	Get	Initial Comm. Char.	USINT	0x1
7	Get	Production Size	UINT	2
8	Get	Consumed Size	UINT	1
9	Get/Set	Expected Packet Rate	UINT	default 2500 msec
12	Get/Set	Timeout Action	USINT	(3)
13	Get	Prod. Path Length	USINT	6
14	Get	Production Path	STRUCT of	
		Log. Seg., Class	USINT	0x20
		Class Number	USINT	0x04
		Log.Seg., Instance	USINT	0x24
		Instance Number	USINT	(4)
		Log.Seg., Attribute	USINT	0x30
		Attribute Number	USINT	0x03
15	Get	Cons. Path Length	USINT	6
16	Get	Production Path	STRUCT of	
		Log. Seg., Class	USINT	0x20
		Class Number	USINT	0x04
		Log.Seg., Instance	USINT	0x24
		Instance Number	USINT	(5)
		Log.Seg., Attribute	USINT	0x30
		Attribute Number	USINT	0x03
17	Get	Inhibit Timer	UINT	0

## Connection Object Common Services

Service Code	Class	Instance	Service Name
05 (0x05)	Yes	Yes	Reset
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

# CDN127 DeviceNet Specifications

## Connection Object Attributes

### Connection Status – Attribute 1

Connection State	Interpretation
0	Non-existent
1	Configuring
3	Established
4	Timed Out

### Connection ID – Attribute 4 and 5

Connection 1 Produced Connection ID: 10xxxxxx011  
Connection 1 Consumed Connection ID: 10xxxxxx100

Connection 2 Produced Connection ID: 01111xxxxxx  
Connection 2 Consumed Connection ID: 10xxxxxx101

xxxxxx = Node Address.

### Watch Dog Activity – Attribute 9

Watch Dog Timeout Activity:

0 = Timeout (I/O Messaging default)  
1 = Auto Delete (Explicit Messaging, fixed value)  
2 = Auto Reset

# CDN127 DeviceNet Specifications

## Discrete Input Point (DIP) Object Class Code: 08 (0x08)

The Discrete Input Point (DIP) Objects map to the physical inputs available on the device.

### DIP Object Class Attributes

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	2
2	Get	Max Object Instance	UINT	7
6	Get	Max Class Identifier	UINT	7
7	Get	Max Instance Attribute	UINT	4

### DIP Object, Instance 1..7 Attributes

Attribute	Access	Name	Type	Value
3	Get	State	BOOL	0 = OFF
4	Get	Status	BOOL	0

### DIP Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single

### DIP Attributes

#### State – Attribute 3

Attribute 3 provides the state of the specific digital input. Value of 0 indicates an OFF state and value of 1 indicates an ON state.

Input 1 (Pump Running) is active high. Current flow into the input will turn on the LED 1 and will be interpreted as a logic 1 state.

Input 2 (Pump No Warning) is active high. Current flow into the input will turn on the LED 2 and will be interpreted as a logic 1 (no warning present).

Input 3 (Flow No Fail) is active high. Current flow into the input will turn on the LED 3 and will be interpreted as a logic 1 (no failure present).

Input 4 (Pump Fail) is active high. Current flow into the input will turn on the LED 4 and will be interpreted as a logic 1 (no warning present).

Input 5 (Interlock Fail) is active high. Current flow into the input will turn on the LED 5 and will be interpreted as a logic 1 (no warning present). An alternative connection (J2:14) allows this signal to be routed through interlock connector J1:5 – J1:9.

## CDN127 DeviceNet Specifications

DI Instance	Connector	Pin Number	Contents	Logic State
1	J2	3	Pump Running	= 1 if pump is running
	J2	4	Input Source	
2	J2	7	Pump Warning	= 1 if no warnings
	J2	8	Input Source	
4	J2	9	Pump Fail	= 1 if no errors
	J2	10	Input Source	
3	J2	11	N2 flow	= 1 if N2 flow is OK
	J2	12	Input Source	
5	J2	13	Pump Interlock	= 1 if Interlock OK
	J2	14	Pump Interlock	same as J2:13 but interlocked through J1:5 & J1:9

### Status – Attribute 4

The status will return a value of 0 (no fault).

# CDN127 DeviceNet Specifications

## Discrete Output Point (DOP) Object Class Code: 09 (0x09)

The Discrete Output Point (DOP) Objects provide access to the Pump ON/OFF and Ballast ON/OFF control points.

### DOP Object Class Attributes

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	1
2	Get	Max Object Instance	UINT	8
6	Get	Max Class Identifier	UINT	7
7	Get	Max Instance Attribute	UINT	8

### DOP Object, Instance 1..2 Attributes

Attribute	Access	Name	Type	Value
3	Get/Set	State	BOOL	State of Output
4	Get	Status	BOOL	0 = no fault
5	Get/Set	Fault Action	BOOL	0=fault value, 1=no chg
6	Get/Set	Fault Value	BOOL	0=Off, 1=On
7	Get/Set	Idle Action	BOOL	0=Idle value, 1=no chg
8	Get/Set	Idle Value	BOOL	0=Off, 1=On

### DOP Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

## DOP Attributes

### State – Attribute 3

The output attribute provides the status of the specific output. Value of 0 indicates an OFF state and value of 1 indicates an ON state.

### Output Status – Attribute 4

The output status bit indicates a fault condition.

### Fault State – Attribute 5

The Fault State determines what action is taken if a software fault condition is detected due to a connection timeout.

## CDN127 DeviceNet Specifications

Fault State	Action Taken
0	Set the output to the stated determined by the Fault Value
1	Leave the output in the current state

### Fault Value – Attribute 6

The Fault Value determines the state of the DOP output if the Fault State bit is clear and a fault condition occurs.

### Idle State – Attribute 7

The Idle State determines what action is taken if an idle condition is detected. Idle conditions occur if a Poll request packet is received with less than the calculated number of bytes. Refer to the Configuration object to determine the size of the Poll Request packets. A poll request of 0 bytes is typically used to force an idle condition.

Idle State	Action Taken
0	Set the output to the stated determined by the Idle Value
1	Leave the output in the current state

### Idle Value – Attribute 8

The Fault Value is used to set the output if the Idle State bit is clear and an idle condition occurs.



# CDN127 DeviceNet Specifications

## Analog Input Point (AIP) Object Class Code: 10 (0x0A)

The CDN127 supports 2 X 12 Bit analog inputs. There is a separate instance for each discrete input available on the device.

### AIP Object Class Attributes

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	1
2	Get	Max Object Instance	UINT	2
6	Get	Max Class Identifier	UINT	7
7	Get	Max Instance Attribute	UINT	8

### AIP Object, Instance 1..2 Attributes

Attribute	Access	Name	Type	Value
3	Get	Value	UINT	0 – 4095
4	Get	Status	BOOLEAN	0 = ok
7	Get	Range	USINT	2 = 0..10 Vdc
8	Get	Type	USINT	0 = INT

### Common Services

Service Code	Class	Instance	Service Name
14 (0x0e)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

# CDN127 DeviceNet Specifications

## AIP Object Attributes

### Value - Attribute 3

Analog input values are reported as integers in the range 0..4095 corresponding to voltages in the range 0-10Vdc.

### Status – Attribute 4

If the analog input status bit is set it indicates that a hardware fault has occurred during the previous analog read. The value is left at the last valid value read. A fault during the analog input function results in a Major Unrecoverable Fault condition (see Identity object).

### Range – Attribute 7

The AIP Range value is fixed as 2 (0 – 10 Vdc).

### Type – Attribute 8

This attribute is fixed as in INTEGER (0).

# CDN127 DeviceNet Specifications

## Analog Output Point (AOP) Object Class Code: 11 (0x0B)

The CDN127 supports 1 X 12 bit Analog Output Point (AOP). There is a separate instance for each discrete output available on the device.

### AOP Object Class Attributes

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	1
2	Get	Max Object Instance	UINT	1
6	Get	Max Class Identifier	UINT	7
7	Get	Max Instance Attribute	UINT	12

### AOP Object, Instance 1 Attributes

Attribute	Access	Name	Type	Value
3	Get	Value	UINT	0 – 4095
7	Get	Output Range	BYTE	1 = 0 to +10
8	Get	Value Data Type	USINT	0 = INT
9	Get/Set	Fault State	BYTE	0..3
10	Get/Set	Idle State	BYTE	0..3
11	Get/Set	Fault Value	INT	0..4095
12	Get/Set	Idle Value	INT	0..4095

### AOP Object Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

### AOP Object Attributes

#### Value – Attribute 3

The analog output value is given in binary format. The value provided must be in the range 0..4095 (0 .. 0FFFh).

Value	Output voltage
000h (0)	0 volts
FFFh (4095)	+10 volts

#### Range – Attribute 7

The analog output Range is fixed as 1 (0 to +10 Vdc).

# CDN127 DeviceNet Specifications

## Type – Attribute 8

The analog output data type is fixed as 0 (INT).

## Fault State – Attribute 9

The Fault State determines what action is taken if a fault condition is detected. Fault conditions include software conditions (connection timeout).

Fault State	Action Taken
0	Hold the last value
1	Set to low limit (0 Vdc)
2	Set to high limit (+10 Vdc)
3	Set to value determined by Fault Value.

## Idle State – Attribute 10

The Idle State determines what action is taken if an idle condition is detected. Idle conditions occur if a Poll request packet is received with less than the calculated number of bytes. Refer to the Configuration object to determine the size of the Poll Request packets. A poll request of 0 bytes is typically used to force an idle condition.

Idle State	Action Taken
0	Hold the last value
1	Set to low limit (0 Vdc)
2	Set to high limit (+10 Vdc)
3	Set to value determined by Idle Value.

## Fault Value – Attribute 11

The Fault Value determines the output if the Fault State bit is set to 3 and a fault condition occurs. The value must be in the range 0..4095 (0..0FFFH).

## Idle Value – Attribute 12

The Fault Value is used to set the output if the Idle State bit is set to 3 and an idle condition occurs. The value must be in the range 0..4095 (0..0FFFH).

# CDN127 DeviceNet Specifications

## Device Supervisor Object Class Code: 50 (0x32)

The Device Supervisor object provides summary information on the Device.

### Device Supervisor Object Class Attributes

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	1
2	Get	Max Object Instance	UINT	1
6	Get	Max Class Identifier	UINT	7
7	Get	Max Instance Attribute	UINT	16

### Configuration Object, Instance 1 Attributes

Attribute	Access	Name	Type	Value
3	Get	Manufacturer Type	SSTRING	ANALOG IO
4	Get	Semi Revision Level	SSTRING	E00-0000
5	Get	Manufacturer Name	SSTRING	D.I.P. Inc.
6	Get	Manufacturer Model	SSTRING	CDN127
7	Get	Software Revision	SSTRING	XX.YYY (see below)
8	Get	Hardware Revision	SSTRING	XX.YYY (see below)
11	Get	Device Status	USINT	See Below
12	Get	Exception Status	USINT	
13	Get	Exception Detail	STRUCT of	
		Common Detail	STRUCT of	
		Size	USINT	2
		Detail	BYTE[2]	
		Device Detail	STRUCT of	
		Device Size	USINT	8
		DIP Status	STRUCT of	
		Number DIP	USINT	8 == Number of DIP
		DIP Status	BYTE	See Below
		DOP Status	STRUCT of	
		Number DOP	USINT	8 == Number of DOP
		DOP Status	BYTE	See Below
		AIP Status	STRUCT of	
		Number AIP	USINT	2 == Number of AIP
		AIP Status	BYTE	See Below
		AOP Status	STRUCT of	
		Number AOP	USINT	1 == Number of AOP
		AOP Status	BYTE	See Below
		Man. Detail	STRUCT of	
		Man. Detail Size	USINT	1
		Detail	BYTE	See Below
14	Get	Warning Detail	STRUCT of	
		Common Detail	STRUCT of	
		Common Size	USINT	2
		Common Detail	BYTE[2]	

## CDN127 DeviceNet Specifications

		Device Detail	STRUCT of	
		Device Size	USINT	0
		Man. Detail	STRUCT of	
		Man. Size	USINT	1
		Man. Detail	USINT	See Below
15	Get/Set	Alarm Enable	BOOLEAN	
16	Get/Set	Warning Enable	BOOLEAN	

### Device Supervisor Object Common Services

Service Code	Class	Instance	Service Name
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

### Device Supervisor Object Attributes

#### Manufacturer Model – Attribute 6

The Manufacturer Model string will be CDN127 based on the product code (see Identity Object, Class 1, Instance 1, Attribute 3).

#### Software Revision – Attribute 7

The Software Revision will be a text string of the Major and Minor revision information of the Identity object. It will have the format XX.YYY, where XX is the major revision and YYY is the Minor revision. The revision code will match that provided by the Identity object.

#### Hardware Revision – Attribute 8

The Hardware Revision will be a text string reflecting the current revision of the hardware. It will have the format XX.YYY, where XX is the major revision and YYY is the Minor revision.

#### Device Status – Attribute 9

The Device Status reflects the current state of the Device Supervisor object.

Attribute Value	State
0	Undefined
1	Self Testing
2	Idle
3	Self-Test Exception
4	Executing
5	Abort
6	Critical Fault
7-50	Reserved – unused on CDN127
51-99	Device Specific – unused on CDN127
100-255	Vendor Specific – unused on CDN127

# CDN127 DeviceNet Specifications

## Exception Status – Attribute 12

The Exception status provides information on the current alarm and warning status of the device. This byte may be optionally reported as part of the Poll Response message. The byte provides a summary of the state of the Exception and Alarm Detail attributes and has the following interpretation.

Status Bit	Function
0	ALARM / Device Common
1	ALARM / Device Specific
2	ALARM / Manufacturer – specific
3	0
4	WARNING / Device Common
5	WARNING / Device Specific
6	WARNING / Manufacturer – specific
7	1 == Expanded Mode

## Exception Details – Attribute 13

The Exception Detail contains information on Common exception conditions, General Purpose I/O Device exception conditions and CDN127 specific exception conditions.

The General Purpose I/O Device exception conditions provide 4 nested structures containing status information from each of the available DIP, DOP, AIP and AOP object instances. For the CDN127 the DIP and DOP structures each contain 8 *bits*.

For the AIP the number of status *bits* is 2.  
For the AOP the number of status *bits* is 1.

Note that the status information is contained in a bit packed format. The number of bytes may be calculated as:

$$\text{Number of bytes} = ((\text{number of status bits}) + 7) / 8$$

## Warning Details – Attribute 14

The Warning Detail contains information on common warning conditions, General Purpose I/O Device exception conditions and CDN127 specific exception conditions.  
The General Purpose I/O Device contains no warning status information.

## Alarm Enable – Attribute 15

The Alarm enable bit enables the reporting of alarm conditions. Clearing this bit causes alarm bits to be cleared. Setting the bit causes the alarm monitoring to be enabled.

## Warning Enable – Attribute 16

The Alarm enable bit enables the reporting of alarm conditions. Clearing this bit causes alarm bits to be cleared. Setting the bit causes the alarm monitoring to be enabled.

# CDN127 DeviceNet Specifications

## Configuration Object Class Code: 64 (0x40)

The CDN127 poll request/response packets are large. In some applications it may be desired to reduce the packet size if not all the I/O channels are in use. The configuration object will adjust the poll request/response packet sizes. In addition, the configuration object gives access to several operational parameters such as power supply and temperature conditions.

### Configuration Object Class Attributes

Attribute	Access	Name	Type	Value
1	Get	Revision	UINT	1
2	Get	Max Object Instance	UINT	1
6	Get	Max Class Identifier	UINT	7
7	Get	Max Instance Attribute	UINT	17

### Configuration Object, Instance 1 Attributes

Attribute	Access	Name	Type	Value
1	Get/Set	Mode	USINT (1)	Configuration mode
2	Get/Set	Num Digital Input	USINT (1)	Poll response count
3	Get/Set	Num Digital Output	USINT (1)	Poll request count
4	Get/Set	Num Analog Input	USINT (1)	Poll response count
5	Get/Set	Num Analog Output	USINT (1)	Poll request count
10	Get/Set	NoNcMask	USINT	See Below
16	Get	Number Produced	USINT	See Below
17	Get	Number Consumed	USINT	See Below

### Configuration Object Common Services

Service Code	Class	Instance	Service Name
05 (0x05)	No	Yes	Reset
14 (0x0E)	Yes	Yes	Get_Attribute_Single
16 (0x10)	No	Yes	Set_Attribute_Single

**NOTE 1:** Changing the configuration object will cause the CONSUMED and PRODUCED size of the POLL connection to be changed. These values are retained in E2 memory and may only be set when the POLL connection is not in the RUNNING state.

### Configuration Reset Service

The Reset service causes the device configuration to return to a preset condition. The Reset service accepts a single byte to determine the configuration desired following the reset command.

Reset Command Byte	Reset Description
0	Reset to provide full configuration (all I/O options included in Poll transactions)
1	Reset to match CDN118 configuration



## CDN127 DeviceNet Specifications

The CDN127 configuration uses the following configuration setup. The CDN127-1 values are shown in parenthesis.

Attribute	Value	Description
Mode	086H	Include DSUP in poll response. No I/O updated between poll request and poll response. Analog I/O maintained on even boundary.
Num Digital Input	8	Returns 1 byte (8 bits) during POLL response
Num Digital Output	8	Expects 1 bytes (8 bits) during POLL request
Num Analog Input	2	Returns 4 bytes during POLL response
Num Analog Output	1	Expects 2 bytes during POLL request

The CDN118 configuration uses the following configuration setup.

Attribute	Value	Description
Mode	81	Forces Analog I/O data to even byte boundary. Forces Analog I/O update during POLL processing.
Num Digital Input	8	Returns 1 byte (8 bits) during POLL response
Num Digital Output	8	Expects 1 byte (8 bits) during POLL request
Num Analog Input	0	Returns 0 bytes of AI data during POLL response
Num Analog Output	1	Expects 2 bytes of AO data during POLL request

### Configuration Object Attributes

#### Mode Byte – Attribute 1

The Mode byte determines the format of the POLL request and response packets and the overall operation of the unit during the I/O scanning function. Bits 3..5 should be set to 0.

Bit 7	Bit 6	Bit5	Bit4	Bit3	Bit 2	Bit 1	Bit 0
IncludeDSUP	0	0	0	0	NoPollUpdate	0	NoEvenByte

If the NoPollUpdate bit is set then the I/O is not updated between the POLL REQUEST and the POLL RESPONSE operations. Analog and digital input data will reflect data collected immediately prior to the current Poll request. Analog and digital output data will be updated after the POLL RESPONSE is generated. Note that data aging is ~ 2 msec.

If the NoEvenByte bit is set then no padding bytes will be inserted or expected during the POLL REQUEST and POLL RESPONSE processing. If this bit is cleared then the POLL REQUEST and POLL RESPONSE packets will be adjusted to ensure that the Analog I/O data starts on an even byte boundary. Pad bytes will be eliminated in the Poll Request if the Num Analog Input is 0. Pad bytes will be eliminated in the Poll Response if the Num Analog Output is 0.

If the IncludeDSUP bit is set the POLL response will include the Device Supervisor Status information in the Poll response.

# CDN127 DeviceNet Specifications

## Num Digital Input – Attribute 2

The Num Digital Input attribute determines the number of input channels to be returned in the POLL RESPONSE packet. The maximum number 8 bits. The number of poll response bytes can be calculated as:

$$\text{Number of bytes} = ((\text{number of channels}) + 7) / 8$$

## Num Digital Output – Attribute 3

The Num Digital Output attribute determines the number of output bytes to be processed in the POLL REQUEST packet. The maximum number 8 bits. The number of poll response bytes can be calculated as:

$$\text{Number of bytes} = ((\text{number of channels}) + 7) / 8$$

## Num Analog Input – Attribute 4

The Num Analog Input attribute determines the number of analog input channels returned in the POLL RESPONSE packet. The maximum number is 2. Each analog input produces 2 bytes of data in the poll response packet. The number of bytes may be calculated as:

$$\text{Number of bytes} = ((\text{number of channels}) * 2)$$

## Num Analog Output – Attribute 5

The Num Analog Output attribute determines the number of analog output channels. The maximum size is 1. Each analog output consumes two bytes of data in the poll request packet. The number of bytes may be calculated as:

$$\text{Number of bytes} = ((\text{number of channels}) * 2)$$

## NoNcMask – Attribute 10

The NoNcMask determines if the digital inputs report a '1' state when active or inactive. The USINT value is bit-mapped to the 5 digital inputs (bit 0 maps to DIP Instance 1 etc.). If the bit is clear the input is reported as a '1' when the input is active. If the NoNcMask bit is set the input is reported as a '0' when the input is active.

## Number Produced – Attribute 16

The Number Produced attribute returns the number of bytes produced by the Poll connection (see Class 5, Instance 2, Attribute 7). Access to this attribute is not dependent on the Poll connection being created and may simplify configuration of scanner software. Refer to the Poll Packet Sizes description below.

## Number Consumed – Attribute 17

## CDN127 DeviceNet Specifications

The Number Consumed attribute returns the number of bytes consumed by the Poll connection (see Class 5, Instance 2, Attribute 8). Access to this attribute is not dependent on the Poll connection being created and may simplify configuration of scanner software. Refer to the Poll Packet Sizes description below.

### Poll Packet Sizes

The Poll Request and Response formats are determined by the configuration class attributes.

#### Poll Request Format

[DOUT(0..1)] [PAD(0..1)] [AOUT(0..2)]

DOUT will be either 0..1 bytes, determined by the Num Digital Output attribute.  
PAD will be either 0 or 1 byte. It is included to ensure that the AOUT are positioned on even byte boundaries if the MODE NoEvenByte attribute is cleared.  
AOUT will be 2 times the value set in the Num Analog Output attribute.

#### Poll Response Format

[DSUP] [DIN(0..1)] [PAD(0..1)] [AIN(0..4)]

DSUP will be 1 byte, determined by Mode IncludeDSUP bit  
DIN will be either 0..1 bytes, determined by the Num Digital Input attribute.  
PAD will be either 0 or 1 byte. It is included to ensure that the AIN are positioned on even byte boundaries if the MODE NoEvenByte attribute is cleared.  
AIN will be 2 times the value set in the Num Analog Input attribute.

If the Num Digital Output and Num Analog Output are both 0 then the CONSUMED SIZE for the POLL connection will be 0. In this case there is no POLL IDLE condition.