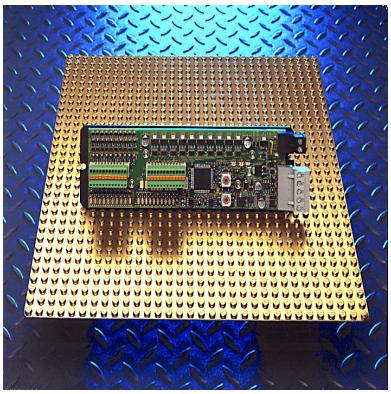
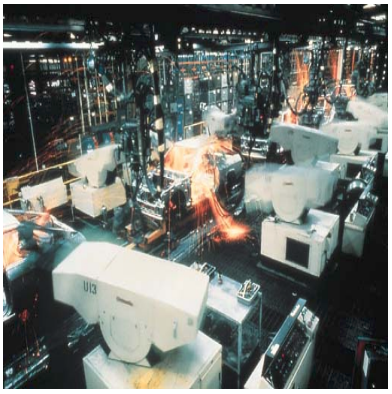
Allen-Bradley

Technical Data

Embedded I/O for DeviceNet

1799 Family





The 1799 Embedded I/O family provides 24V dc digital I/O modules that can be mounted directly inside a machine in a conveyor rail or within a field replaceable unit. The 1799 modules contain I/O circuits, a built-in power supply, and a built-in DeviceNet™ I/O adapter. These modules are sold as Printed Circuit Board assemblies with optional hardware available to suit your equipment's packaging and mounting needs. The 1799 Embedded I/O modules are ideal for applications restricted by space limitations, applications requiring highly distributed I/O close to sensors and actuators, and applications that have their own enclosures.

The following Embedded I/O modules are available:

1799 Embedded I/O

- 10 universal input/10 sourcing output module (1799-D10U10B)
- 10 universal input/10 sinking output module (1799-D10U10V)
- 16 universal input/16 sourcing output module (1799-D16U16B)
- 16 universal input/16 sinking output module (1799-D16U16V)
- Zone Control I/O 10 input/10 sourcing output module with DeviceLogix (1799-ZCIOB and 1799-D10U10BZC)
- 10 universal input/10 sourcing output module with DeviceLogix (1799-D10U10BL)
- 10 universal input/10 sinking output module with DeviceLogix (1799-D10U10VL)
- 16 universal input/16 sourcing output module with DeviceLogix (1799-D16U16BL)
- 16 universal input/16 sinking output module with DeviceLogix (1799-D16U16VL)
- Zone Control I/O 10 input/10 sinking output module with DeviceLogix (1799-ZCIOV and 1799-D10U10VZC)

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. *Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls* (Publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://www.ab.com/manuals/gi) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary we use notes to make you aware of safety considerations.

WARNING

Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

IMPORTANT Identifies information that is critical for successful application and understanding of the product.

ATTENTION

Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you:

- identify a hazard
- avoid a hazard
- recognize the consequence

SHOCK HAZARD

Labels may be located on or inside the equipment (e.g., drive or motor) to alert people that dangerous voltage may be present.

BURN HAZARD

Labels may be located on or inside the equipment (e.g., drive or motor) to alert people that surfaces may be dangerous temperatures.

ATTENTION

Preventing Electrostatic Discharge

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- If available, use a static-safe workstation.
- When not in use, store the equipment in appropriate static-safe packaging.

Environment and Enclosure

This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 2000 meters without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

ATTENTION

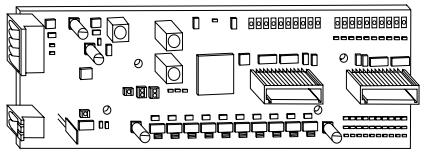
This equipment is supplied as "open type" equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

See NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure. Also, see the appropriate sections in this publication, as well as the Allen-Bradley publication 1770-4.1 ("Industrial Automation Wiring and Grounding Guidelines"), for additional installation requirements pertaining to this equipment.

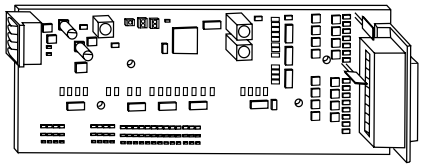
DeviceNet is a trademark of Open DeviceNet Vendor Association (ODVA).
RediSTATION, FLEX I/O, DeviceLink, RSNetWorx for DeviceNet, DeviceNetManager, SoftLogix, and SLC are trademarks of Rockwell Automation.
PLC is a registered trademark of Rockwell Automation.

Overview

Embedded I/O Module



1799-D10 42495



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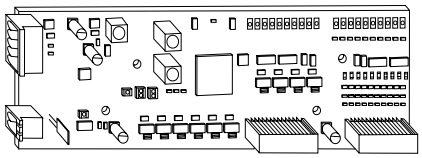


1799-ZCIO

43040

The 1799 Embedded I/O modules are compatible with PLC®, SLC™ or SoftLogix™ programmable controllers using DeviceNet scanners. All Embedded I/O module values are accessible through the data tables of the PLC or SLC programmable controller.

The DeviceLogix technology is available in the Embedded I/O family as well. This functionality lets you control outputs and manage status information locally within the module. This is accomplished through the DeviceLogix Editor, a function block based tool that is a part of RSNetWorx for DeviceNet.

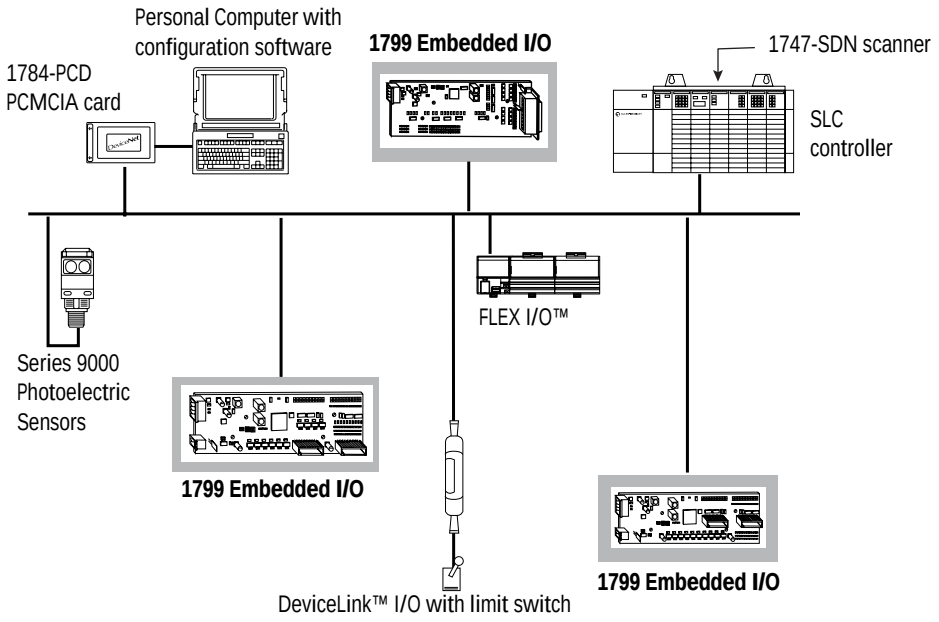
The Zone Control I/O (ZCIO) versions of the Embedded I/O cards also have Zone Interlocking Parameter (ZIP) that lets the cards communicate with each other directly. The Zone Control I/O versions of the Embedded I/O cards include the catalog numbers 1799-ZCIOB, -ZCIOV, -D10U10BZC, and -D10U10VZC.

Features and Benefits

Feature	Benefit
10–30V dc device power	accommodates a broad range of power supplies and multiple voltage levels from the network
universal NEMA type 1+ inputs	compatible with a broad range of sensors, both NPN and PNP
output short-circuit protection	protects outputs against accidental miswiring
hardware watchdog function	puts outputs in a known state if the microprocessor or crystal fails
I/O module located close to sensors and actuators	lower wiring costs
compact size of I/O module	can be easily embedded directly into a machine
autobaud detection	module automatically matches system baud rate - no crashing due to incorrect baud setting
rotary node address switches	set module address without software and therefore reducing node commissioning time
selectable input filters	select off-to-on and on-to-off delays best suited for your application
change-of-state operation	improves network throughput by reducing network bandwidth usage
ODVA conformance tested to DeviceNet version 2.0	assures interoperability with other DeviceNet compliant devices and systems
DeviceLogix	local logic control
extended temperature specifications	facilitates embedding module within equipment

Typical Configuration

This graphic shows how your Embedded I/O fits into a typical DeviceNet system.



System Compatibility

Embedded I/O modules are compatible with PLC, SLC or SoftLogix programmable controllers when used with DeviceNet scanners.

Embedded Family Module Communication

The Embedded I/O modules act as a slave in a master/slave environment. Their I/O data is exchanged with the master through either a polled, cyclic, or change-of-state connection. The type of connection is selected in the DeviceNet scanner module's configuration.

Polled

When configured as a polled device, a master initiates communication by sending its polled I/O message to the Embedded I/O module.

Cyclic

When using cyclic operation, the master only sends data to the Embedded I/O module and only receives data from the Embedded I/O module at a preconfigured time interval.

Change-of-State

With a change-of-state connection, data changes are automatically sent to the master, i.e., the master no longer has to request data. In addition, the Embedded I/O module periodically produces an adjustable ‘heartbeat’ to let the master device know that the module connection is alive and ready to communicate.

When an Embedded I/O module is configured for change-of-state, the master only sends output data when the user's control program wants to update the module's outputs.

The Embedded I/O module's input and any fault status is only sent to the master when an input or any fault status changes.

Input Filtering

Input filtering limits the effect of voltage transients caused by contact bounce and/or electrical noise. If not filtered, voltage transients could produce false data.

To configure an input filter, an input signal delay is set to turn off-to-on or on-to-off for nominal amounts of time (0, 2, 4, 8, or 16 ms). When an input transitions from off-to-on, it must remain on for the specified amount of time before the module considers it.

The mode and filter time is set through RSNetWorx for DeviceNet, DeviceNetManager™ software or a similar configuration tool.

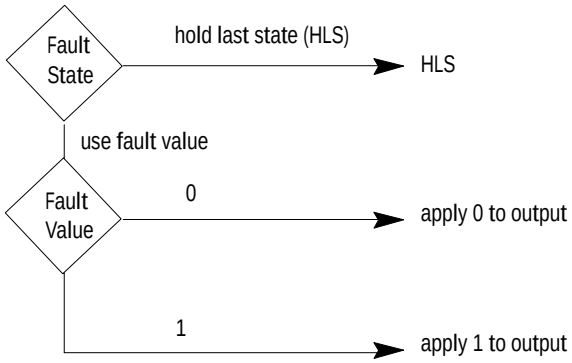
AutoBaud Detect

The Embedded I/O modules have an AutoBaud Detect feature. These modules automatically sense the baud rate of the network they are connected to and adjust the module’s communication rate accordingly. You can disable the AutoBaud feature through your configuration software.

Idle and Fault Mode Selection

When the PLC, SLC or PC-based programmable controller is in program mode, the DeviceNet scanner puts the Embedded module in an idle state. If the DeviceNet scanner drops off the network, the module goes to a fault state.

In both idle and fault states, the module resets its outputs by default. Use RSNetWorx for DeviceNet software or a similar configuration tool to change the default and set the module to save the last received outputs.



The fault state can be set to HLS or use the fault value. The fault value can be set to 0 or 1. The same logic applies for idle conditions. 42455

The Embedded I/O module is designed to let you select how its outputs will respond to either a Network Communication Fault or placing the controller in program mode (idle state). To have the module respond in the desired manner, you must configure the Fault State parameter of the Embedded module to hold last state. If you elect not to enable hold last state, the module will defer to the Fault Value parameter.

The Fault Value parameter is where you select either 0 or 1 as the Communication Fault value. The default value is 0.

DeviceLogix Functionality

The Embedded I/O family also offers modules that have DeviceLogix, a local logic capability that provides you with the ability to control outputs and manage status information locally within the device. DeviceLogix is configured through a Function Block Editor that is accessed through RSNetWorx for DeviceNet. This editor lets you create local logic using boolean logic (AND, OR, etc.), set and reset latches, as well as a variety of timers and counters. For more information about the editor, refer to the DeviceLogix User Manual, publication number ACIG-UM001, and online help.

Embedded I/O products that support DeviceLogix have some device-specific capabilities and capacities, which are identified in the DeviceLogix Capabilities and Capacities table.

DeviceLogix Capabilities and Capacities

Capability/Capacity	Embedded I/O
function blocks supported	• boolean • latches • timers • counters
maximum number of function blocks included in a configuration ZCIO Card	48 72
function block processing time ZCIO Card	2msec/24 blocks 4msec/48 blocks 6msec/72 blocks
network input bits	32
network output bits	8
available fault bits	output fault (16U16B/BL only)
available status bits	• explicit message connection • polled connection • change-of-state/cyclic connection • change-of-state/cyclic fault • network fault • minor module fault
logic status indication • none • solid green • flashing green	 • logic disabled • logic enabled • local forces are applied and local logic is enabled

Zone Interlocking Parameter

Zone Interlocking Parameter provides the means for a Zone Control card to consume data directly from up to four other Zone Control cards without going through a scanner. This enables the fast transfer of information from one conveyor zone using a Zone Control card to the next. For example, a Zone Control card could consume data from the previous Zone Control card in a conveyer then provide data to a three lane diverter that follows. This interaction is configured through a series of new parameters in the EDS file for the device. These parameters include the MacID of the producing device, masks and offsets to put the data where you want it to be, and data security parameters to ensure against timeouts and bad data.

The data consumed from a Zone Control device will be used in a DeviceLogix program. It will appear in the DeviceLogix Editor as Zone Data in the Network Inputs pulldown boxes. They can be used as any other Network Input would be used. For more information about ZIP, see the Zone Interlocking Parameters section.

Optional I/O Assemblies

The DeviceLogix-capable versions of Embedded I/O lets you choose how much data the modules produce or consume over DeviceNet. Two parameters in the EDS files let you select the amount of data that will be transmitted or received.

Note that for the ZCIO cards, you can select only the consumed I/O assembly size. The produced size is fixed at 7 bytes.

Produced I/O Assembly

There are three options for Produced Data:

- **Default assembly** - Produces the device's input data and any fault/status data the device has.
- **Input only assembly** - Produces only the state of the device's inputs. This lets those who do not make use of the diagnostic bits to reduce their network traffic.
- **DeviceLogix assembly** - Produces all of the standard information from the default assembly plus the data that is available as a result of invoking DeviceLogix.

The DeviceLogix data that is available includes:

- **Logic Enabled bit** - This bit is high when DeviceLogix is running a device and when DeviceLogix has been enabled. This bit can be used, for example, in the PLC program or on a DeviceNet MMI to indicate the presence of local logic control.
- **Eight Network Output bits** - These bits are used in the DeviceLogix configuration to send information back over the network. The output of any function block can be connected to a network output bit.
- **Hardware Output bits** - DeviceLogix lets you locally control the state of hardware outputs. Therefore, these bits are produced by the device so that the state of the outputs can be sent back to the network master. If an output in the device is not under DeviceLogix control, its status is still controlled by the normal consumed data.

DeviceLogix Assemblies for Embedded I/O devices:

1799-D10U10BL and 1799-D10U10VL

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	In 7	In 6	In 5	In 4	In 3	In 2	In 1	In 0
Byte 1	Reserved	Logic Ena	Reserved				In 9	In 8
Byte 2	Out 7	Out 6	Out 5	Out 4	Out 3	Out 2	Out 1	Out 0
Byte 3	Reserved						Out 9	Out 8
Byte 4	NetOut 7	NetOut 6	NetOut 5	NetOut 4	NetOut 3	NetOut 2	NetOut 1	NetOut 0

Logic Ena = DeviceLogix Enabled, NetOut = Network Output

1799-D16U16BL

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	In 7	In 6	In 5	In 4	In 3	In 2	In 1	In 0
Byte 1	In 15	In 14	In 13	In 12	In 11	In 10	In 9	In 8
Byte 2	Reserved	Logic Ena	Reserved				OFLT 1	OFLT 0
Byte 3	Out 7	Out 6	Out 5	Out 4	Out 3	Out 2	Out 1	Out 0
Byte 4	Out 15	Out 14	Out 13	Out 12	Out 11	Out 10	Out 9	Out 8
Byte 5	NetOut 7	NetOut 6	NetOut 5	NetOut 4	NetOut 3	NetOut 2	NetOut 1	NetOut 0

Logic Ena = DeviceLogix Enabled, OFLT 0 = Output Fault on one or more outputs in GRP 0,
OFLT 1 = Output Fault on one or more outputs in GRP 1, NetOut = Network Output

1799-D16U16VL								
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Byte 0	In 7	In 6	In 5	In 4	In 3	In 2	In 1	In 0
Byte 1	In 15	In 14	In 13	In 12	In 11	In 10	In 9	In 8
Byte 2	Reserved	Logic Ena	Reserved					
Byte 3	Out 7	Out 6	Out 5	Out 4	Out 3	Out 2	Out 1	Out 0
Byte 4	Out 15	Out 14	Out 13	Out 12	Out 11	Out 10	Out 9	Out 8
Byte 5	NetOut 7	NetOut 6	NetOut 5	NetOut 4	NetOut 3	NetOut 2	NetOut 1	NetOut 0
Logic Ena = DeviceLogix Enabled, NetOut = Network Output								

Consumed I/O Assembly

DeviceLogix lets the device consume data from the DeviceNet master in a manner other than the normal state of the hardware outputs. This data is called Network Input bits. The device can consume up to 32 of these bits. Five options exist for the variable amount of consumed data: 0, 1, 2, 3, or 4 bytes. A standard Embedded I/O module, for instance, consumes 16 bits (2 bytes). With DeviceLogix, you can choose to consume an additional 2 bytes of network inputs. If a hardware output is controlled by local logic, its state is no longer consumed and that bit becomes available to be used as a network input. For more information on this concept, please see the DeviceLogix User Manual, publication number ACIG-UM001.

Zone Interlocking Parameters

Zone Interlocking Parameter (ZIP) is a method of having Zone Control cards share data directly without hard wiring them together and without using a scanner. One Zone Control card can consume data from up to four other Zone Control cards. A consumer of ZIP data can also produce ZIP data to another Zone Control card. Change-of-state data can only be consumed from other Zone Control cards. Other devices can reside on the network and can be communicated with normally. Data from a Zone Control card can still be accessed by a controller or EOI as in any other application through an explicit or polled connection. A total of 8 bytes of data can be consumed per Zone Control card. This data can be configured as 2 bytes from each of four cards or up to 5 bytes from a single card.

Mask and offset parameters have been provided to let you pick the data you want to consume from each Zone Control card and pack it where you want to within the 8 bytes available. Expected Packet Rate and Production Inhibit Time parameters are also provided. One more feature is a Data Security Key that, if enabled, lets you check that the device being consumed from is the right device and has the expected configuration. The following sections provide details about the parameters and explains how to implement them.

ZCIO Data Production

Each Zone Control card will produce 7 bytes. The produced assembly is as follows:

1799-ZCIOB, 1799-D10U10BZC, 1799-ZCIOV, and 1799-D10U10VZC

	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Produced 0	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
Produced 1	Reserved	Logic Ena	Reserved				Input 9	Input 8
Produced 2	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
Produced 3	Reserved						Output 9	Output 8
Produced 4	NetOut 7	NetOut 6	NetOut 5	NetOut 4	NetOut 3	NetOut 2	NetOut 1	NetOut 0
Produced 5	CCV 7	CCV 6	CCV 5	CCV 4	CCV 3	CCV 2	CCV 1	CCV 0
Produced 6	CCV 15	CCV 14	CCV 13	CCV 12	CCV 11	CCV 10	CCV 9	CCV 8

NetOut = Network Output (0-7), CCV = Configuration Consistency Value (0-15), shown in Parameter 40

Therefore, the production data size will always be 7. The last two bytes (Produced 5 & 6) are used to calculate the Module Security Key value and are not accessible as Zone Control data.

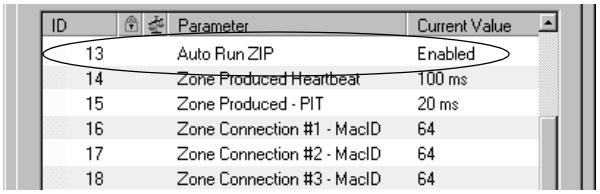
ZCIO Data Parameters

A total of 8 bytes of data can be consumed by each Zone Control card. Use the ZCIO data parameters to determine how much and what data is available from each Zone Control card.

Please note that if the application is running without a master, Autobaud (Parameter 1) must be disabled on at least one of the Zone Control modules. The 1799-D10U10BZC and 1799-D10U10VZC cards have 5 additional parameters for relative consumed address implementation. This changes the parameter order for those cards.

Control Parameters

Parameter 13: AutoRun ZIP - Parameter 13 lets the producing device automatically create and configure an unacknowledged change-of-state I/O connection at powerup. This lets you set up a network of devices without using a scanner. This parameter is disabled by default. It must be enabled in a producing ZCIO if no scanner is used to communicate with the producer. A consuming ZCIO needs to have this parameter enabled only if it is also a producer. Power must be cycled or a reset sent to the ZCIO for this change to take affect.



ID	Parameter	Current Value
13	Auto Run ZIP	Enabled
14	Zone Produced Heartbeat	100 ms
15	Zone Produced - PIT	20 ms
16	Zone Connection #1 - MacID	64
17	Zone Connection #2 - MacID	64
18	Zone Connection #3 - MacID	64

Parameter 42 or 47: Zone Control Enable - The Zone Control Enable parameter lets you enable or disable the Zone Control functionality for the entire device. The parameter is disabled by default. Zone Control must first be disabled before any other Zone Control changes are made and DeviceLogix must be in the Logic Disabled state for this parameter to take affect. An Enable message will be rejected if DeviceLogix is enabled or a parameter setup error, such as a masking or data offset error, is detected.

Timing Parameters

Parameter 14: Zone Produced Heartbeat - This parameter defines in milliseconds the heartbeat time associated with this module's production. If no data has changed for a period equal to this Expected Packet Rate (EPR), the producing Zone Control will send old data to let consuming connections know that it is still alive.

Parameter 32-35 or 37-40: Zone Connection # (1-4) - EPR - The EPR parameter will let you set the Expected Packet Rate, in milliseconds, from the producing device. The default EPR is 75. If the consumer does not hear from the producer in 4 times the EPR, it will drop the connection and attempt to open a new connection during subsequent scan cycles. Note that the consuming EPR should match the value of the producer's EPR.

Parameter 15: Zone Produced PIT - The PIT parameter lets you set the Production Inhibit Time of the Zone Control card's producing connection. This limits how often the producer is allowed to send data to the consumer. The producer must wait until the PIT expires before sending new data. If it is set to 0, the producer can send data anytime it changes. The default is set to 1 msec.

Data Management Parameters

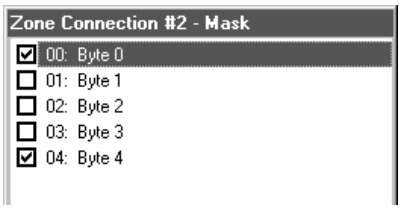
Data management parameters map zone data into the Zone Control card's 8-byte data space. This is similar to mapping data in a DeviceNet scanner. Mapping errors can prevent Zone Control from enabling.

Parameter 16 (1799-10U10BZC and 1799-10U10VZC only): Relative MacID Offset - Parameter 16 lets the consumed node address be set relative to the consuming modules's node. The default is Enabled.

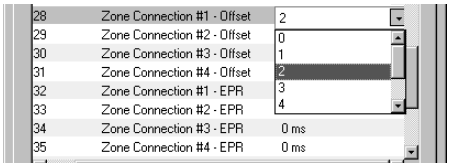
Parameters 16-19 or 21-24 Zone Connection #(1-4) MacID - This is the DeviceNet MacID number for each Zone Control card from which the device wants to consume data. The default is set to 64. Setting this parameter back to 64 disables the consumption of data.

Parameter 17-20 (1799-10U10BZC and 1799-10U10VZC only): Zone Connection #(1-4) MacID Offset - This parameter is the offset that determines the DeviceNet MacID number for each Zone Control card from which the device consumes data. The default is Invalid value. Setting this parameter to Invalid value disables the consumption of data on this connection. The range is consumers MacID -4 to consumers MacID 4.

Parameters 24-27 or 29-32: Zone Connection # (1-4) Mask - A mask parameter is provided that lets you select the consumed bytes in which you are interested. For example, a Zone Control may need only the first and fifth bytes of consumed data for the application from a particular Zone Control card, as shown in the illustration.



Parameters 28-31 or 33-36: Zone Connection # (1-4) Offset - An offset parameter is provided that lets you place the consumed data in the 8-byte data space reserved in the consuming device. For example, you may want to put the 2 bytes of data from address 10 into the third and fourth byte of the data space. This would lead to an offset of 2 being set. Offset conflict errors will prevent Zone Control from enabling.



Data Security Parameters

Parameters 20-23 or 25-28: Zone Connection # (1-4) Health - This parameter indicates whether the connection between this Zone Control card and the one with the corresponding MacID is healthy. This parameter will indicate Not Healthy if the connection between the producer and consumer fails or if the Data Security Key is enabled and doesn't match the value loaded for that connection (see the description for Parameter 41, Data Security).

Parameters 36-39 or 41-44: Cnxn 1-4 Security Key Value - If Data Security Parameter is enabled, take the value from the Module Security Key Value parameter of the producing device and enter it into this parameter. The consuming connection will validate the key received on each data packet against the stored value.

Parameter 40 or 45: Module Security Key Value - This value is calculated for this module based on the configuration resident in the module. If Data Security is enabled in a consuming Zone Control card, this number is entered into the Data Security Key Parameter on the consuming module, as noted in the description of Parameters 36-39.

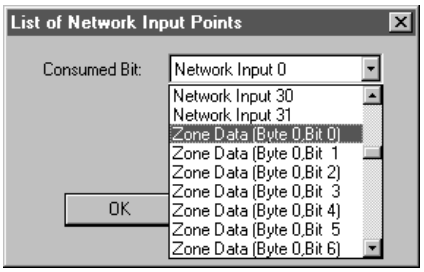
Parameter 41 or 46: Data Security - This parameter enables Data Security on a consuming module. Enabling this parameter and placing the producer's Data Security Key value in the consumer's Cnxn x Security Key Value (Parameters 36-39) assures that the configuration in the producing device is the one that the consumer is expecting. This protects against a module being replaced and not having the correct parameters set or the DeviceLogix configuration being loaded improperly. This parameter is enabled by default.

Interaction With DeviceLogix

Once the data has been configured in the consuming ZCIO and enabled, it is ready for deployment in the DeviceLogix Editor.

ZIP Data Bits

The ZIP bits that are available will be shown in the Network Inputs pulldown menu immediately after the listing of the Network Inputs, as shown in the illustration.



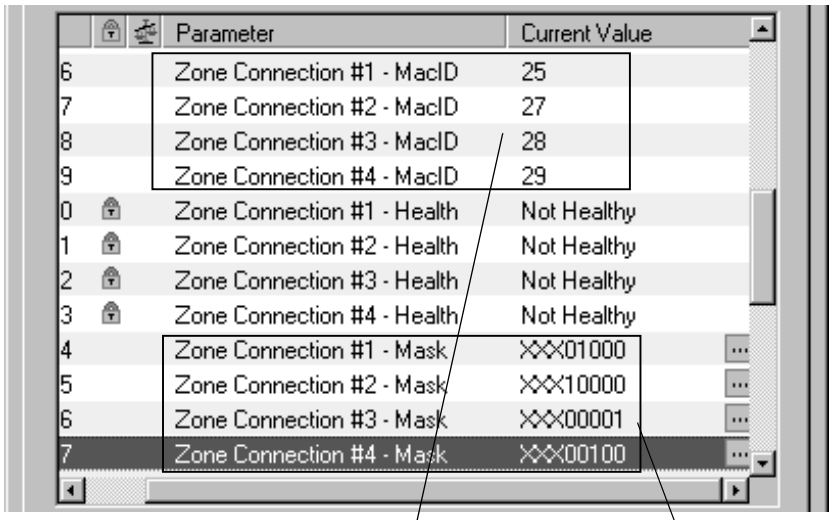
The bits are then placed on the DeviceLogix programming grid in the same manner as other inputs.

ZIP Connection Status

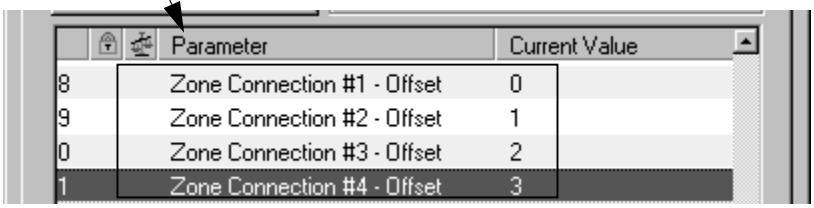
ZIP Connection Status bits are available through the Module Status Points pulldown menu in the DeviceLogix Editor. Two bits will be available for each of the 4 Zone Connections - Zone Connection # (1-4) Exists and Zone Connection # (1-4) Data Valid. These bits can be used in the logic to alter the status of the outputs under local control depending on the health of the ZIP connection. If a connection faults, the consuming ZCIO will attempt to re-establish a connection during the subsequent scan cycle.

ZIP Data Example

Below is an example of a ZCIO configuration. In this instance, the consumer is MacID 26 and the producers are MacIDs 25, 27, 28, and 29.



Offset Position In ZIP Data Table, Parameter (28-31)	Address Of Producing Device Parameter (16-19)	Byte From Producer Chosen By Mask Parameter (24-27)
Byte 0	MacID 25	Byte 3
Byte 1	MacID 27	Byte 4
Byte 2	MacID 28	Byte 0
Byte 3	MacID 29	Byte 2
Byte 4	Not Used	Not Used
Byte 5	Not Used	Not Used
Byte 6	Not Used	Not Used
Byte 7	Not Used	Not Used

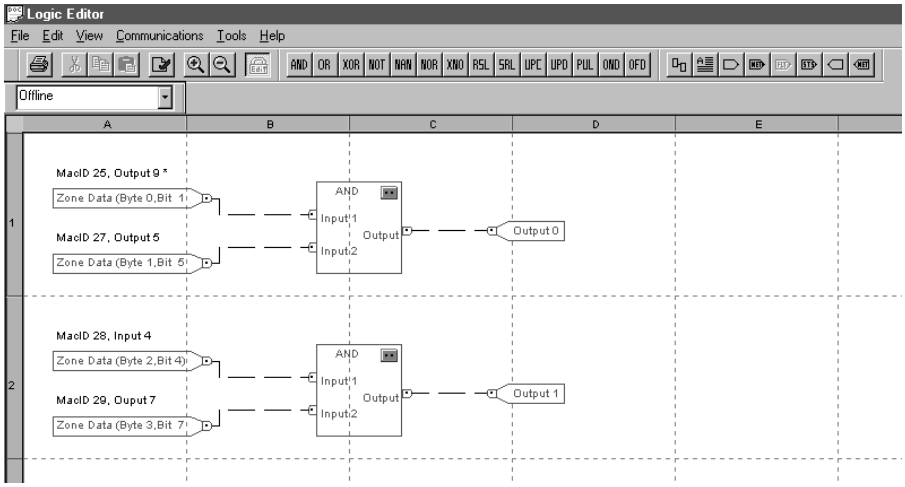


This ZIP data table will not be visible, but the individual bits are available for use in DeviceLogix as Zone Data, as noted.

The produced assembly makes the following data available to the consuming ZCIO:

MacID 25	Output 8, Output 9 (other bits are unused)
MacID 27	Network Output 0-7
MacID 28	Input 0-7
MacID 29	Output 0-7

In DeviceLogix, the bits will appear as follows:

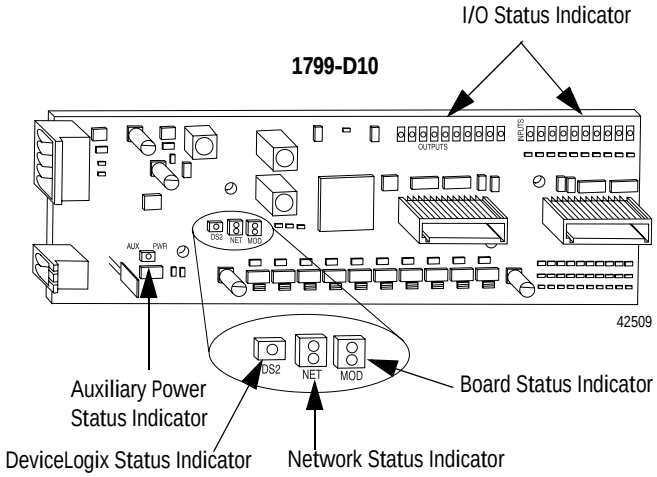


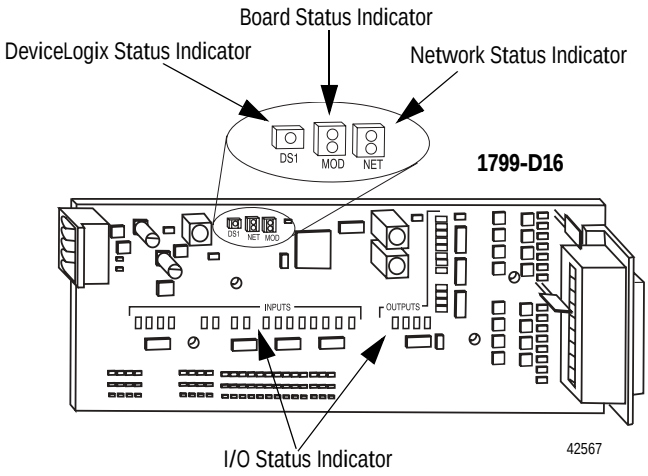
The ZIP data can be used as an input to any Function Block, as can any of the ZIP Connection Status Bits.

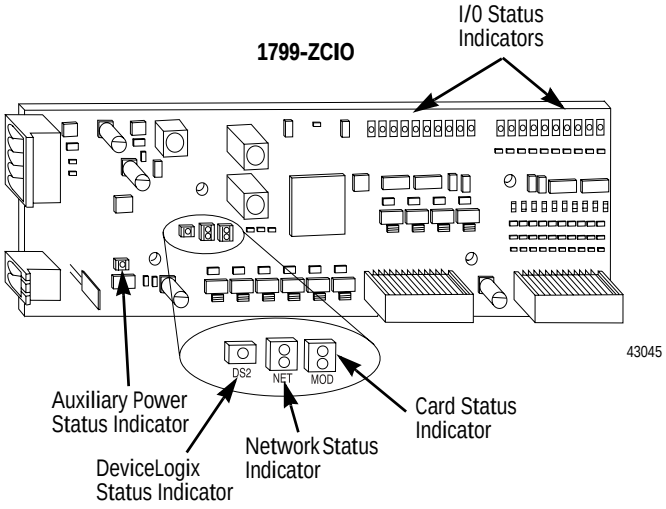
Please note that comments are entered manually. Use comments to trace the source of the data.

Status Indicators

Each Embedded I/O module has indicators to provide a diagnostic readout.







Network Status Indicators

Indication	Status
Off	Not powered/Not online - Device is not online. • The device has not completed the duplicate MacID test. • The device is not powered.
Green	Online, connected - Device is operating normally and is online with connections established.
Flashing green	Online, not connected: • Device is online with no connections established. • The device has passed duplicate MacID tests, but has not established connections to other nodes.
Red	Critical link failure - Failed communication device The device has detected an error and has been rendered incapable of network communication.
Flashing red	Connection timed-out - An I/O connection has timed-out. Communication previously established with the master has been lost.

Board/Card Status Indicators

Indication	Status
Off	No power - No power applied to the module.
Green	Device operational - Module is operating normally.
Flashing green	Needs commissioning - The module has a missing, incomplete, or an incorrect commissioning.
Flashing red	Minor fault - Recoverable fault has occurred.
Red	Critical fault - Watchdog timeout or the module has an unrecoverable fault and may need replacing.

Logic Status Indicators

Indication	Status
Off	Logic is disabled.
Solid green	Logic is enabled.
Flashing green	Local forces are applied and local logic is enabled.

I/O Status Indicators

Indication	Status
Outputs	
None	Output not energized
Yellow	Output energized
Inputs	
None	No valid input
Yellow	Valid input

Auxiliary Power Status Indicator

Indication	Status
None	No auxiliary power
Green	Auxiliary power present

Power Supply Requirements

The DeviceNet network supplies power to the Embedded I/O modules. Inputs and outputs are powered by an external 24V dc source which is independent of the network.

Auxiliary Power Specifications

The power source used to supply the auxiliary power to the outputs must be one of the following:

- a 10-30V dc Class 2 Power Supply

or

- a 10-30V dc Class 2 Power Supply or a 10-30V dc UL Listed or Recognized Power Supply with isolated outputs limited to 200 volt-amperes in each ungrounded output line. This condition requires that the board and power source be mounted in a suitable ultimate enclosure with proper spacings maintained.

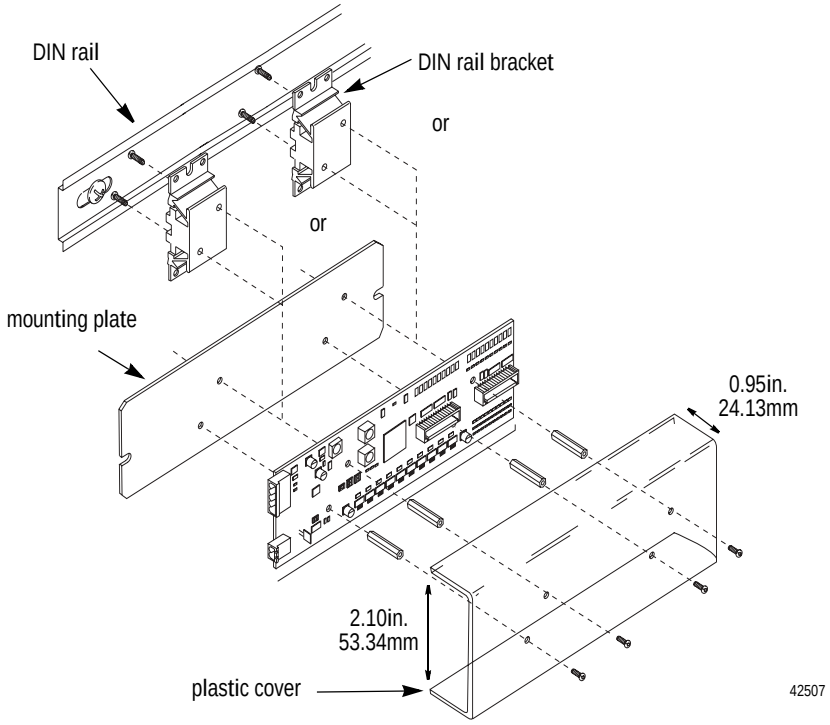
Mount the 10 Input/ 10 Output Board

The Embedded I/O module can be mounted directly to a panel or on a DIN rail, using the appropriate accessory items.

Mount the Board and Optional Cover

Use the illustrations to help you mount the board to a DIN rail using DIN rail brackets (1799-BRKD) or to a mounting plate (1799-MP20).

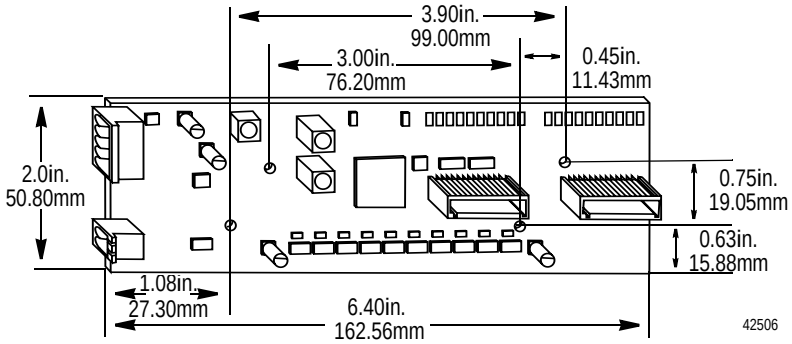
Mount the 10 Input/10 Output Board



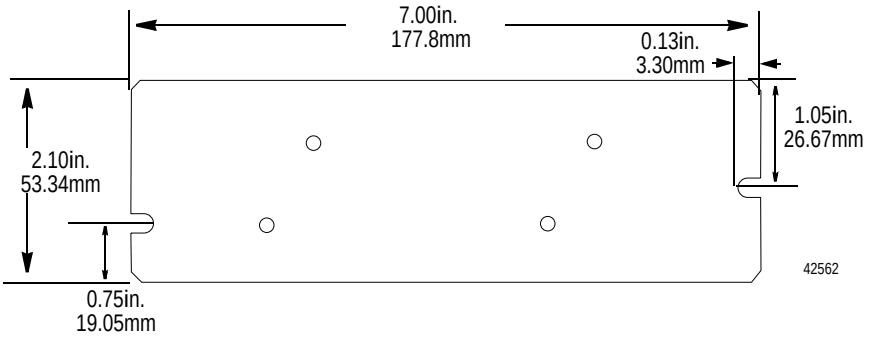
The board can also be mounted in an enclosure with pre-tapped holes, which accommodate M3 x 0.5 mm screws.

Note that with the addition of the cover, the width of the board increases from 2.0 in. to 2.10 in. (50.8 mm to 53.34 mm) and the height increases from 0.75 in. to 0.95 in.(19.05 mm to 24.13 mm).

Board Dimensions



Mounting Plate Dimensions (front view)

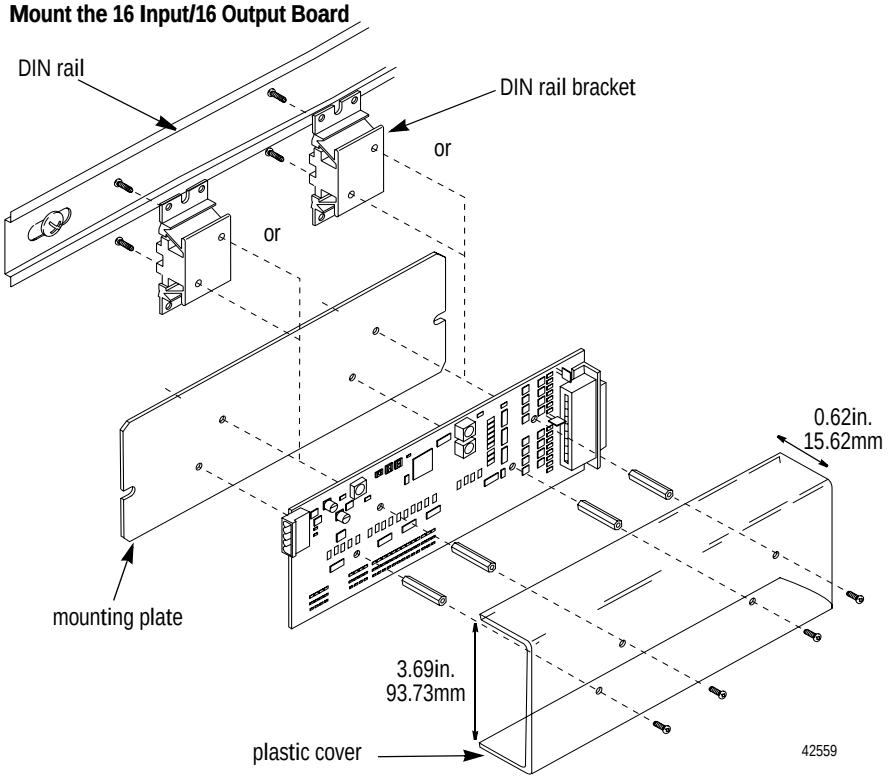


Mount the 16 Input/ 16 Output Board

Mount the Board and Optional Cover

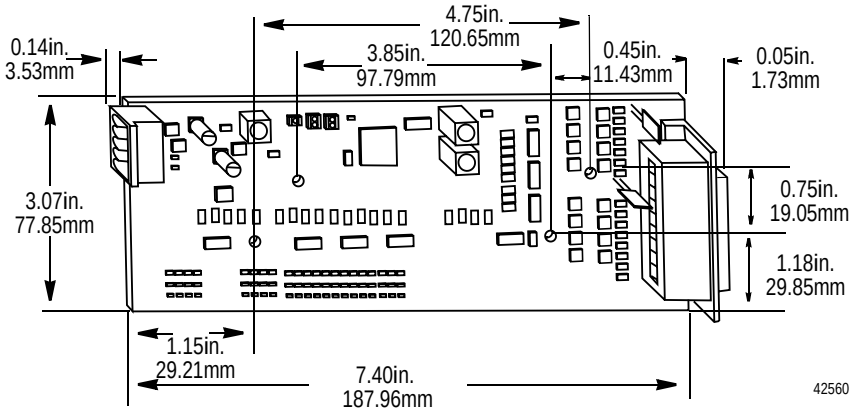
Use the pictures to help you mount the board to a DIN rail using DIN rail brackets (1799-BRKD) or to a mounting plate (1799-MP32). The board can also be mounted in an enclosure with pre-tapped holes, which accommodate M3 x 0.5 mm screws.

Mount the 16 Input/16 Output Board

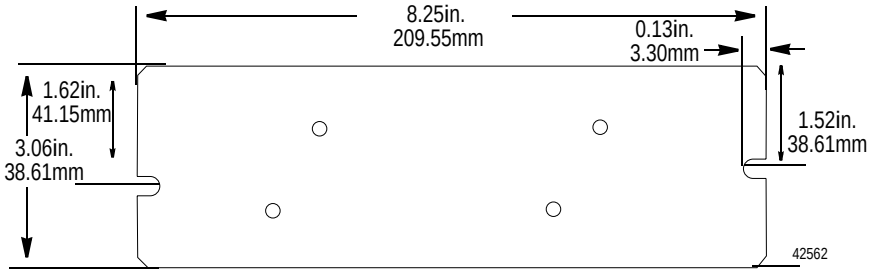


Note that with the addition of the cover, the width of the board increases from 3.07 in. to 3.69 in. to (77.85 mm 93.73 mm) and the height increases from 0.75 in. to 1.38 in. (19.05 mm to 35.05 mm).

Board Dimensions



Mounting Plate Dimensions (front view)

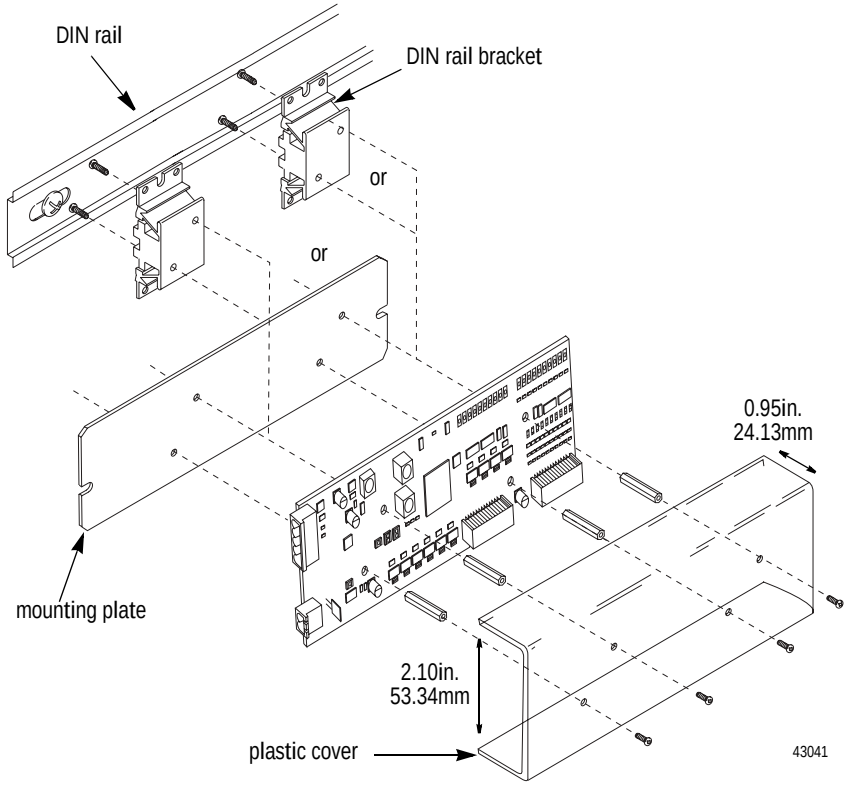


Mount the Zone Control Card

Mount the Card and Optional Cover

The ZCIO card comes with a mounting plate. You have the option to reset the DIN rail brackets (1799-BRKD) for mounting directly on a DIN rail.

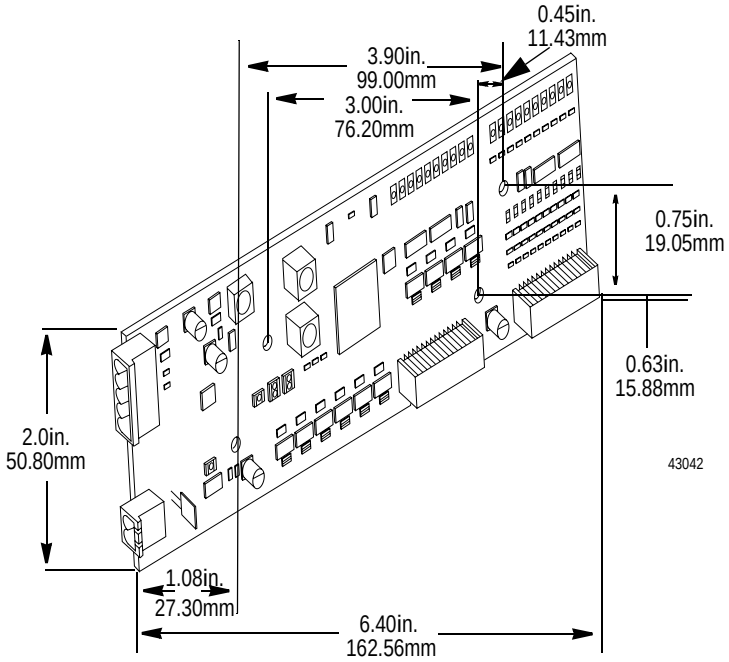
Mount the ZCIO Card



The card can also be mounted in an enclosure with pre-tapped holes, which accommodate M3 x 0.5 mm screws.

Note that with the addition of the cover, the width of the board increases from 2.0 in. to 2.10 in. (50.8 mm to 53.34 mm) and the height increases from 0.75 in. to 0.95 in.(19.05 mm to 24.13 mm).

Card Dimensions



Embedded I/O Accessories

The Embedded I/O Optional Hardware table lists part numbers and descriptions for optional hardware.

Optional Hardware

All mating connectors and mounting hardware must be ordered separately. The Embedded I/O Optional Hardware table identifies the different connector and hardware options.

Embedded I/O Optional Hardware

Option	Catalog Number	Third Party Supplier & Part Number	Used With
2 DIN rail brackets (4 screws)	1799-BRKD	N/A	All
clear plastic cover (4 stand-offs, 4 screws)	1799-COV20	N/A	10 in/10 out
clear plastic cover (4 stand-offs, 4 screws)	1799-COV32	N/A	16 in/16 out
clear plastic cover (4 stand-offs, 4 screws)	1799-COVZC	N/A	ZCIOB ZCIOV D10U10BZC D10U10VZC
mounting plate (4 screws)	1799-MP20	N/A	10 in/10 out
2, 12-position, gold-plated I/O mating connectors	1799-12SPCON	Phoenix - FK-MC 0.5/12-ST-2.5AU - 1923432	10 in/10 out
5-position, open-style plug for DeviceNet	1799-DNETCON	DeviceNet Buyer's Guide at http://www.odva.org	10 in/10 out
5-position, open-style plug/locking screws for DeviceNet	1799-DNETSCON	DeviceNet Buyer's Guide at http://www.odva.org	16 in/16 out
2-position plug for auxiliary power	1799-AUXCON	Weidmuller - 171385 PCD - ELFP02211	10 in/10 out
50-pin, D-sub I/O mating connector - solder cup	1799-DSSCON	Amphenol Corp. - 777DF-D50P ITT Cannon - DDM50PK127	16 in/16 out
50-pin, D-sub I/O mating connector - header and crimp pins	1799-DSCCON	Tyco Electronics - 205212-1 (header) Tyco Electronics - 66506-4 (pins) EBY Co. - DR50-P02-0S (header only)	16 in/16 out
mounting plate (4 screws)	1799-MP32	N/A	16 in/16 out

Specific Module Information

The remainder of this publication contains specification information for each Embedded I/O module. Refer to the table below for information about a specific module.

For information about	See page
10 universal input/10 sourcing output module (1799-D10U10B) and 10 universal input/10 sinking output module (1799-D10U10V)	31
10 universal input/10 sourcing output module with DeviceLogix (1799-D10U10BL) and 10 universal input/10 sinking output module with DeviceLogix (1799-D10U10VL)	37
16 universal input/16 sourcing output module (1799-D16U16B) and 16 universal input/16 sourcing output module with DeviceLogix (1799-D16U16BL)	43
16 universal input/16 sinking output module (1799-D16U16V) and 16 universal input/16 sinking output module with DeviceLogix (1799-D16U16VL)	49
10 input/10 sourcing output module with DeviceLogix (1799-ZCIOB) and 10 input/10 sinking output module with DeviceLogix (1799-ZCIOV)	55
10 input/10 sourcing output module with DeviceLogix (1799-D10U10BZC) and 10 input/10 sinking output module with DeviceLogix (1799-D10U10VZC)	61

Related Publications

Refer to the following list of publications for more information about the DeviceNet network, DeviceNet products, and DeviceLogix.

Title	Publication Number
DeviceNet Product Overview	DN-2.5
DeviceNet Media Design Installation Guide	DNET-UM072
DeviceLogix User Manual	ACIG-UM001

Refer to the installation instructions for your product for information on input and output connections, wiring instructions, torque specifications, and other installation instructions.

1799-D10U10B or 1799-D10U10V Module

Communication Information

This board exchanges I/O with the master on DeviceNet through a cyclic, polled, or change-of-state connection. See the 1799-D10U10B/-D10U10V Consume and Produce Data table for more information.

1799-D10U10B/-D10U10V Consume and Produce Data

I/O Connection Type	Consumes	Produces
Cyclic	2 Bytes	2 Bytes
Polled	2 Bytes	2 Bytes
Change-of-State	2 Bytes	2 Bytes

Cyclic - the board will produce and consume its I/O cyclically at the rate configured by the master on DeviceNet.

Polled - the master initiates communication by sending its polled I/O message to the board. The board consumes the message, updates any outputs and produces a response containing the input data.

Change-of-State - a production occurs when an input changes. A heartbeat production occurs if no input condition change occurs within the expected packet rate. This heartbeat production tells the master that the board is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the board.

See the 1799-D10U10B/-D10U10V Word/Bit table for the word/bit definitions.

1799-D10U10B/-D10U10V Word/Bit Table

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Produced 0	In 7	In 6	In 5	In 4	In 3	In 2	In 1	In 0
Produced 1	Reserved						In 9	In 8
Consumed 0	Out 7	Out 6	Out 5	Out 4	Out 3	Out 2	Out 1	Out 0
Consumed 1	Reserved						Out 9	Out 8

Troubleshooting Indicators

This board has the following indicators:

- Board status
- Network status
- Auxiliary power
- I/O status

Board Status Indicator (labeled MOD)

1799-D10U10B and 1799-D10U10V Board Status Indicator Descriptions

Indication	Status
Off	No power - No power applied to the module.
Green	Device operational - Module is operating normally.
Flashing green	Needs commissioning - The module has a missing, incomplete, or an incorrect commissioning.
Flashing red	Minor fault - Recoverable fault has occurred.
Red	Critical fault - Watchdog timeout or the module has an unrecoverable fault and may need replacing.

Network Status Indicator (labeled NET)

1799-D10U10B and 1799-D10U10V Network Status Indicator Descriptions

Indication	Status
Off	Not powered/Not online - Device is not online. • The device has not completed the duplicate MacID test. • The device is not powered.
Green	Online, connected - Device is operating normally and is online with connections established.
Flashing green	Online, not connected: • Device is online with no connections established. • The device has passed duplicate MacID tests, but has not established connections to other nodes.
Red	Critical link failure - Failed communication device The device has detected an error and has been rendered incapable of network communication.
Flashing red	Connection timed-out - An I/O connection has timed-out. Communication previously established with the master has been lost.

Auxiliary Power Indicator (labeled AUX PWR)

1799-D10U10B and 1799-D10U10V Auxiliary Power Status Indicator Descriptions

Indication	Status
None	No auxiliary power
Green	Auxiliary power present

I/O Status Indicators (labeled Inputs and Outputs)

1799-D10U10B and 1799-D10U10V I/O Status Indicator Descriptions

Indication	Status
Outputs	
None	Output not energized
Yellow	Output energized
Inputs	
None	No valid input
Yellow	Valid input

Specifications

Specifications are listed below.

10 Input/10 Output Board - Cat. No. 1799-D10U10B or 1799-D10U10V Specifications

Input Specifications	Max.	Min.
Inputs per block	10 Sinking or Sourcing, Type 1 + compatible	
Off-State Voltage Current	 5V dc 1.5 mA	 - -
On-State Voltage Current	 30V dc 6 mA	 10V dc 2 mA
Output Specifications	**Max.**	**Min.**
Outputs per block	10 Sourcing, 0.5 A, Short Circuit Protected, Pilot Duty	
Output Auxiliary Voltage	30V	10V
On-State Voltage Drop	250 mV	-
On-State Current	0.5 A	-
Off-State Leakage	20 μA	-
Board Current (all outputs on)	4.0 A	-

10 Input/10 Output Board - Cat. No. 1799-D10U10B or 1799-D10U10V Specifications

General Specifications	Max.	Min.
Surge Current - for 10ms, repeatable every 2s (individual outputs)	1.0 A	-
DeviceNet Power Voltage Current	 25V dc 125 mA	 11V dc -
Auxiliary Power Voltage Current	 30V dc 4.3 A (all outputs on)	 10V dc 100 mA (all outputs off)
DeviceNet Power Circuit Type	Class 2	
LED Indicators	Board Status - red/green Network Status - red/green Auxiliary Status - green Input Point Status - yellow Output Point Status -yellow	
Dimensions inches (millimeters)	1.0H x 2.0W x 6.4D (26H x 51W x 163D)	
Operational Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IIEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -10 to 60^{o} C (14 to 140^{o} F)	
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock): -40 to 85^{o} C (-40 to 185^{o} F)	
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5 to 95% non-condensing	
Vibration	IEC 60068-2-6 (Test Fc, Operating): 5g @ 10-500Hz	
Operating Shock	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 30g	
Non-Operating Shock	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 50g	
Emissions	CISPR 11: Group 1, Class A	
ESD Immunity	IEC 61000-4-2: 6kV indirect contact discharges	
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 30MHz to 1000MHz 10V/m with 200Hz 50% Pulse 100%AM at 900MHz	
EFT/B Immunity	IEC 61000-4-4: ±2kV at 5kHz on power ports ±4kV at 2.5kHz on signal ports ±2kV at 5kHz on communications ports	

10 Input/10 Output Board - Cat. No. 1799-D10U10B or 1799-D10U10V Specifications

General Specifications (Continued)	
Surge Transient Immunity	IEC 61000-4-5: ±2kV line-earth(CM) on power ports ±2kV line-line(DM) and ±4kV line-earth(CM) on signal ports ±2kV line-earth(CM) on communication ports
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz
Enclosure Type Rating	None (open-style)
Auxiliary Supply Power Rating	Isolated outputs limited to 200 volt-amperes in each ungrounded output line
Isolation voltage (continuous-voltage withstand rating)	Tested to withstand 1000V dc for 60 seconds
Conductors Wire Size[1]	DeviceNet Power: 14 gauge ($2mm^2$) stranded maximum Auxiliary Power: 14 gauge ($2mm^2$) stranded maximum DeviceNet: 14 gauge ($2mm^2$) stranded maximum (See Publication DNET-UM072) I/O: 20 AWG to 24 AWG
Wiring Category[1]	1 - on signal ports 1 - on power ports 2 - on communications ports
Wire Type	Copper
Certifications:[2] (when product is marked)	c-UR-us UL Recognized Component Industrial Control Equipment, certified for US and Canada CE European Union 89/336/EEC EMC Directive, compliant with: EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) C-Tick Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions ODVA ODVA conformance tested to DeviceNet specifications

Note: In order to comply with CE Low Voltage Directives (LVD), you must use either a NEC Class 2, a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter. A SELV supply cannot exceed 30V rms, 42.4V peak or 60V dc under normal conditions and under single fault conditions. A PELV supply has the same rating and is connected to protected earth.

1. Use this conductor category information for planning conductor routing. Refer to publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.
2. See the Product Certification link at www.ab.com for Declarations of Conformity, Certificates, and other certification details.

Notes:

1799-D10U10BL or 1799-D10U10VL Module

Communication Information

This board exchanges with the master on DeviceNet through a cyclic, polled, or change-of-state connection. See the 1799-D10U10BL/-D10U10VL Consume and Produce Data table for more information.

1799-D10U10BL/-D10U10VL Consume and Produce Data

I/O Connection Type	Consumes	Produces
Cyclic	2 Bytes	2 Bytes
Polled	2 Bytes	2 Bytes
Change-of-State	2 Bytes	2 Bytes

Cyclic - the board will produce and consume its I/O cyclically at the rate configured by the master on DeviceNet.

Polled - the master initiates communication by sending its polled I/O message to the board. The board consumes the message, updates any outputs and produces a response containing the input data.

Change-of-State - a production occurs when an input changes. A heartbeat production occurs if no input condition change occurs within the expected packet rate. This heartbeat production tells the master that the board is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the board.

See the 1799-D10U10BL/-D10U10VL Word/Bit table for the word/bit definitions.

1799-D10U10BL/-D10U10VL Word/Bit Table

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Produced 0	In 7	In 6	In 5	In 4	In 3	In 2	In 1	In 0
Produced 1	Reserved						In 9	In 8
Consumed 0	Out 7	Out 6	Out 5	Out 4	Out 3	Out 2	Out 1	Out 0
Consumed 1	Reserved						Out 9	Out 8
Logic Ena = DeviceLogix Enabled								

Also refer to the 1799-D10U10BL and 1799-D10U10VL table in the Produced I/O Assembly section for the optional produced I/O data.

Troubleshooting Indicators

This board has the following indicators:

- Board status
- Network status
- DeviceLogix status
- Auxiliary power status
- I/O status

Board Status Indicator (labeled MOD)

1799-D10U10BL and 1799-D10U10VL Board Status Indicator Descriptions

Indication	Status
Off	No power - No power applied to the module.
Green	Device operational - Module is operating normally.
Flashing green	Needs commissioning - The module has a missing, incomplete, or an incorrect commissioning.
Flashing red	Minor fault - Recoverable fault has occurred.
Red	Critical fault - Watchdog timeout or the module has an unrecoverable fault and may need replacing.

Network Status Indicator (labeled NET)

1799-D10U10BL and 1799-D10U10VL Network Status Indicator Descriptions

Indication	Status
Off	Not powered/Not online - Device is not online. • The device has not completed the duplicate MacID test. • The device is not powered.
Green	Online, connected - Device is operating normally and is online with connections established.
Flashing green	Online, not connected: • Device is online with no connections established. • The device has passed duplicate MacID tests, but has not established connections to other nodes.
Red	Critical link failure - Failed communication device The device has detected an error and has been rendered incapable of network communication.
Flashing red	Connection timed-out - An I/O connection has timed-out. Communication previously established with the master has been lost.

DeviceLogix Status Indicator (labeled DS2)

1799-D10U10BL and 1799-D10U10VL DeviceLogix Status Indicator Descriptions

Indication	Status
None	Logic disabled
Green	
Solid	Logic enabled
Blinking	Local forces applied and local logic enabled

Auxiliary Power Indicator (labeled AUX PWR)

1799-D10U10BL and 1799-D10U10VL Auxiliary Power Status Indicator Descriptions

Indication	Status
None	No auxiliary power
Green	Auxiliary power present

I/O Status Indicators (labeled Inputs and Outputs)

1799-D10U10BL and 1799-D10U10VL I/O Status Indicator Descriptions

Indication	Status
Outputs	
None	Output not energized
Yellow	Output energized
Inputs	
None	No valid input
Yellow	Valid input

Specifications

Specifications are listed below.

10 Input/10 Output Board - Cat. No. 1799-D10U10BL or 1799-D10U10VL Specifications

Input Specifications	**Max.**	**Min.**
Inputs per block	10 Sinking or Sourcing, Type 1 + compatible	
Off-State Voltage Current	 5V dc 1.5 mA	 - -
On-State Voltage Current	 30V dc 6 mA	 10V dc 2 mA
Output Specifications	**Max.**	**Min.**
Outputs per block	10 Sourcing, 0.5 A, Short Circuit Protected, Pilot Duty	
Output Auxiliary Voltage	30V	10V
On-State Voltage Drop	250 mV	-
On-State Current	0.5 A	-
Off-State Leakage	20 μA	-
Board Current (all outputs on)	4.0 A	-
Surge Current - for 10ms, repeatable every 2s (individual outputs)	1.0 A	-
General Specifications	**Max.**	**Min.**
DeviceNet Power Voltage Current	 25V dc 125 mA	 11V dc -
DeviceNet Power Circuit Type	Class 2	
Auxiliary Power Voltage Current	 30V dc 4.3 A (all outputs on)	 10V dc 100 mA (all outputs off)
LED Indicators	Board Status - red/green Network Status - red/green DeviceLogix Status - green Auxiliary Status - green Input Point Status - yellow Output Point Status -yellow	
Dimensions inches (millimeters)	1.0H x 2.0W x 6.4D (26H x 51W x 163D)	
Operational Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IIEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -10 to 60^{o} C (14 to 140^{o} F)	
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock): -40 to 85^{o} C (-40 to 185^{o} F)	

10 Input/10 Output Board - Cat. No. 1799-D10U10BL or 1799-D10U10VL Specifications

General Specifications (continued)	
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5 to 95% non-condensing
Vibration	IEC 60068-2-6 (Test Fc, Operating): 5g @ 10-500Hz
Operating Shock	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 30g
Non-Operating Shock	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 50g
Emissions	CISPR 11: Group 1, Class A
ESD Immunity	IEC 61000-4-2: 6kV indirect contact discharges
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 30MHz to 1000MHz 10V/m with 200Hz 50% Pulse 100%AM at 900MHz
EFT/B Immunity	IEC 61000-4-4: ±2kV at 5kHz on power ports ±4kV at 2.5kHz on signal ports ±2kV at 5kHz on communications ports
Surge Transient Immunity	IEC 61000-4-5: ±2kV line-earth(CM) on power ports ±2kV line-line(DM) and ±4kV line-earth(CM) on signal ports ±2kV line-earth(CM) on communication ports
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz
Enclosure Type Rating	None (open-style)
Auxiliary Supply Power Rating	Isolated outputs limited to 200 volt-amperes in each ungrounded output line
Isolation voltage (continuous-voltage withstand rating)	Tested to withstand 1000V dc for 60 seconds
Conductors Wire Size[1]	DeviceNet Power: 14 gauge ($2mm^2$) stranded maximum Auxiliary Power: 14 gauge ($2mm^2$) stranded maximum DeviceNet: 14 gauge ($2mm^2$) stranded maximum (See Publication DNET-UM072) I/O: 20 AWG to 24 AWG
Wiring Category[1]	1 - on signal ports 1 - on power ports 2 - on communications ports
Wire Type	Copper

10 Input/10 Output Board - Cat. No. 1799-D10U10BL or 1799-D10U10VL Specifications

General Specifications (continued)		
Certifications:[2] (when product is marked)	c-UR-us	UL Recognized Component Industrial Control Equipment, certified for US and Canada
	CE	European Union 89/336/EEC EMC Directive, compliant with: EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)
	C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions
	ODVA	ODVA conformance tested to DeviceNet specifications

Note: In order to comply with CE Low Voltage Directives (LVD), you must use either a NEC Class 2, a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter. A SELV supply cannot exceed 30V rms, 42.4V peak or 60V dc under normal conditions and under single fault conditions. A PELV supply has the same rating and is connected to protected earth.

1. You use this conductor category information for planning conductor routing. Refer to publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.
2. See the Product Certification link at www.ab.com for Declarations of Conformity, Certificates, and other certification details.

1799-D16U16B or 1799-D16U16BL Module

Communication Information

This board exchanges I/O with the master on DeviceNet through a cyclic, polled, or change-of-state connection. See the 1799-D16U16B/-D16U16BL Consume and Produce Data table for more information.

The board consumes and produces I/O data as follows:

1799-D16U16B/-D16U16BL Consume and Produce Data

I/O Connection Type	Consumes	Produces
Cyclic	2 Bytes	3 Bytes
Polled	2 Bytes	3 Bytes
Change-of-State	2 Bytes	3 Bytes

Cyclic - the board will produce and consume its I/O cyclically at the rate configured by the master on DeviceNet.

Polled - the master initiates communication by sending its polled I/O message to the board. The board consumes the message, updates any outputs and produces a response containing the input data.

Change-of-State - a production occurs when an input changes. A heartbeat production occurs if no input condition change occurs within the expected packet rate. This heartbeat production tells the master that the board is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the board.

See the 1799-D16U16B/-D16U16BL Word/Bit table for the word/bit definitions.

1799-D10U10B/-D16U16BL Word/Bit Table

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Produced 0	In 7	In 6	In 5	In 4	In 3	In 2	In 1	In 0
Produced 1	In 15	In 14	In 13	In 12	In 11	In 10	In 9	In 8
Produced 2	Reserved						OFLT 1	OFLT 2
Consumed 0	Out 7	Out 6	Out 5	Out 4	Out 3	Out 2	Out 1	Out 0
Consumed 1	Out 15	Out 14	Out 13	Out 12	Out 11	Out 10	Out 9	Out 8
OFLT 0 = Output Fault on one or more output in GRP 0 OFLT 1 = Output Fault on one or more output in GRP 1								

Also refer to the 1799-D10U10BL table in the Produced I/O Assembly section for the optional produced I/O data.

Troubleshooting Indicators

This board has the following indicators:

- Board status
- Network status
- DeviceLogix status
- I/O status

Board Status Indicator (labeled MOD)

1799-D16U16B and 1799-D16U16BL Board Status Indicator Descriptions

Indication	Status
Off	No power - No power applied to the module.
Green	Device operational - Module is operating normally.
Flashing green	Needs commissioning - The module has a missing, incomplete, or an incorrect commissioning.
Flashing red	Minor fault - Recoverable fault has occurred.
Red	Critical fault - Watchdog timeout or the module has an unrecoverable fault and may need replacing.

Network Status Indicator (labeled NET)

1799-D16U16B and 1799-D16U16BL Network Status Indicator Descriptions

Indication	Status
Off	Not powered/Not online - Device is not online. • The device has not completed the duplicate MacID test. • The device is not powered.
Green	Online, connected - Device is operating normally and is online with connections established.
Flashing green	Online, not connected: • Device is online with no connections established. • The device has passed duplicate MacID tests, but has not established connections to other nodes.
Red	Critical link failure - Failed communication device The device has detected an error and has been rendered incapable of network communication.
Flashing red	Connection timed-out - An I/O connection has timed-out. Communication previously established with the master has been lost.

DeviceLogix Status Indicators (labeled DS1)

1799-D16U16B and 1799-D16U16BL DeviceLogix Status Indicator Descriptions

Indication	Status
None	Logic disabled
Green	
Solid	Logic enabled
Blinking	Local forces applied and local logic enabled

I/O Status Indicators (labeled Inputs and Outputs)

1799-D16U16B and 1799-D16U16BL I/O Status Indicator Descriptions

Indication	Status
Outputs	
None	Output not energized
Yellow	Output energized
Inputs	
None	No valid input
Yellow	Valid input

Specifications

Specifications are listed below.

16 Input/16 Output Board - Cat. Nos. 1799-D16U16B or 1799-D16U16BL Specifications

Input Specifications	**Max.**	**Min.**
Inputs per block	16 Sinking or Sourcing, Type 1 + compatible	
Off-State Voltage Current	 5V dc 1.5 mA	 - -
On-State Voltage Current	 30V dc 6 mA	 10V dc 2 mA
Output Specifications	**Max.**	**Min.**
Outputs per block	16 Sinking or Sourcing, 0.5 A, Short Circuit Protected, Pilot Duty	
Output Auxiliary Voltage	30V	10V
On-State Voltage Drop	250mV	-
On-State Current	0.5A	-
Off-State Leakage	65 μA	-
Board Current (all outputs on)	8.0 A	-
Surge Current - for 10ms, repeatable every 2s (individual outputs)	1.0 A	-
General Specifications	**Max.**	**Min.**
DeviceNet Power Voltage Current	 25V dc 125 mA	 11V dc -
Auxiliary Power Voltage Current	 30V dc 8 A (all outputs on)	 10V dc 30 mA (all outputs off)
I/O Wire Gauge	20 AWG	24 AWG
DeviceNet Power Circuit Type	Class 2	
LED Indicators	Board Status - red/green Network Status - red/green DeviceLogix Status - green Input Point LED - yellow Output Point LED -yellow	
Dimensions inches (millimeters)	0.75H x3.07W x 7.45D (19.05H x77.85W x 189.33D)	
Operational Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IIEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -10 to 70^{o} C (14 to 158^{o} F)	
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock): -40 to 85^{o} C (-40 to 185^{o} F)	

16 Input/16 Output Board - Cat. Nos. 1799-D16U16B or 1799-D16U16BL Specifications

General Specifications (continued)	
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5 to 95% non-condensing
Vibration	IEC 60068-2-6 (Test Fc, Operating): 5g @ 10-500Hz
Operating Shock	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 30g
Non-Operating Shock	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 50g
Emissions	CISPR 11: Group 1, Class A
ESD Immunity	IEC 61000-4-2: 6kV indirect contact discharges
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 30MHz to 1000MHz 10V/m with 200Hz 50% Pulse 100%AM at 900MHz
EFT/B Immunity	IEC 61000-4-4: ±2kV at 5kHz on power ports ±4kV at 2.5kHz on signal ports ±2kV at 5kHz on communications ports
Surge Transient Immunity	IEC 61000-4-5: ±2kV line-earth(CM) on power ports ±2kV line-line(DM) and ±4kV line-earth(CM) on signal ports ±2kV line-earth(CM) on communications ports
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz
Enclosure Type Rating	None (open-style)
Supply Voltages Voltage Ranges	10-30V dc Class 2 Power Supply 10-30V dc UL Listed or Recognized Power Supply
Supply Power/Current Ratings	Isolated outputs limited to 200 volt-amperes in each ungrounded output line
Isolation voltage (continuous-voltage withstand rating)	Tested to withstand 2300V dc for 60 seconds
Wire Size	24 AWG to 20 AWG
Wire Size, Maximum	20 AWG
Wire Size, Minimum	24 AWG
Wiring Category[1]	1 - on signal ports 1 - on power ports 2 - on communications ports
Wire Type	Copper

16 Input/16 Output Board - Cat. Nos. 1799-D16U16B or 1799-D16U16BL Specifications

General Specifications (continued)		
Certifications:[2] (when product is marked)	c-UR-us	UL Recognized Component Industrial Control Equipment, certified for US and Canada
	CE	European Union 89/336/EEC EMC Directive, compliant with: EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)
	C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions
	ODVA	ODVA conformance tested to DeviceNet specifications

Note: In order to comply with CE Low Voltage Directives (LVD), you must use either a NEC Class 2, a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter. A SELV supply cannot exceed 30V rms, 42.4V peak or 60V dc under normal conditions and under single fault conditions. A PELV supply has the same rating and is connected to protected earth.

1. Use this Conductor Category information for planning conductor routing. Refer to Publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.

2. See the Product Certification link at www.ab.com for Declarations of Conformity, Certificates, and other certification details.

1799-D16U16V or 1799-D16U16VL Module

Communication Information

This board exchanges I/O with the master on DeviceNet through a cyclic, polled, or change-of-state connection. See the 1799-D16U16V/-D16U16VL Consume and Produce Data table for more information.

1799-D16U16V/-D16U16VL Consume and Produce Data

I/O Connection Type	Consumes	Produces
Cyclic	2 Bytes	2 Bytes
Polled	2 Bytes	2 Bytes
Change-of-State	2 Bytes	2 Bytes

Cyclic - the board will produce and consume its I/O cyclically at the rate configured by the master on DeviceNet.

Polled - the master initiates communication by sending its polled I/O message to the board. The board consumes the message, updates any outputs and produces a response containing the input data.

Change-of-State - a production occurs when an input changes. A heartbeat production occurs if no input condition change occurs within the expected packet rate. This heartbeat production tells the master that the board is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the board.

See the 1799-D16U16V/-D16U16VL Word/Bit table for word/bit definitions.

1799-D16U16V/-D16U16VL Word/Bit Table

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Produced 0	In 7	In 6	In 5	In 4	In 3	In 2	In 1	In 0
Produced 1	In 15	In 14	In 13	In 12	In 11	In 10	In 9	In 8
Consumed 0	Out 7	Out 6	Out 5	Out 4	Out 3	Out 2	Out 1	Out 0
Consumed 1	Out 15	Out 14	Out 13	Out 12	Out 11	Out 10	Out 9	Out 8

Also refer to the 1799-D16U16VL table in the Produced I/O Assembly section for the optional produced I/O data.

Troubleshooting Indicators

This board has the following indicators:

- Board status
- Network status
- DeviceLogix status
- I/O status

Board Status Indicator (labeled MOD)

1799-D16U16V and 1799-D16U16VL Board Status Indicator Descriptions

Indication	Status
Off	No power - No power applied to the module.
Green	Device operational - Module is operating normally.
Flashing green	Needs commissioning - The module has a missing, incomplete, or an incorrect commissioning.
Flashing red	Minor fault - Recoverable fault has occurred.
Red	Critical fault - Watchdog timeout or the module has an unrecoverable fault and may need replacing.

Network Status Indicator (labeled NET)

1799-D16U16V and 1799-D16U16VL Network Status Indicator Descriptions

Indication	Status
Off	Not powered/Not online - Device is not online. • The device has not completed the duplicate MacID test. • The device is not powered.
Green	Online, connected - Device is operating normally and is online with connections established.
Flashing green	Online, not connected: • Device is online with no connections established. • The device has passed duplicate MacID tests, but has not established connections to other nodes.
Red	Critical link failure - Failed communication device The device has detected an error and has been rendered incapable of network communication.
Flashing red	Connection timed-out - An I/O connection has timed-out. Communication previously established with the master has been lost.

DeviceLogix Status Indicators (labeled DS1)

1799-D16U16V and 1799-D16U16VL DeviceLogix Status Indicator Descriptions

Indication	Status
None	Logic disabled
Green	
Solid	Logic enabled
Blinking	Local forces applied and local logic enabled

I/O Status Indicators (labeled Inputs and Outputs)

1799-D16U16V and 1799-D16U16VL I/O Status Indicator Descriptions

Indication	Status
Outputs	
None	Output not energized
Yellow	Output energized
Inputs	
None	No valid input
Yellow	Valid input

Specifications

Specifications are listed below.

16 Input/16 Output Board - Cat. No. 1799-D16U16V or 1799-D16U16VL Specifications

Input Specifications	**Max.**	**Min.**
Inputs per block	16 Sinking or Sourcing, Type 1 + compatible	
Off-State Voltage Current	 5V dc 1.5 mA	 - -
On-State Voltage Current	 30V dc 6 mA	 10V dc 2 mA
Output Specifications	**Max.**	**Min.**
Outputs per block	16 Sinking or Sourcing, 0.5A, Short Circuit Protected, Pilot Duty	
Output Auxiliary Voltage	30V	10V
On-State Voltage Drop	250 mV	-
On-State Current	0.5 A	-
Off-State Leakage	65 μA	-
Board Current (all outputs on)	8.0 A	-
Surge Current - for 10ms, repeatable every 2s (individual outputs)	1.0 A	-
General Specifications	**Max.**	**Min.**
DeviceNet Power Voltage Current	 25V dc 125 mA	 11V dc -
Auxiliary Power Voltage Current	 30V dc 8 A (all outputs on)	 10V dc 30 mA (all outputs off)
I/O Wire Gauge	20 AWG	24 AWG
DeviceNet Power Circuit Type	Class 2	
LED Indicators	Board Status - red/green Network Status - red/green DeviceLogix Status - green Input Point LED - yellow Output Point LED -yellow	
Dimensions inches (millimeters)	0.75H x3.07W x 7.45D (19.05H x77.85W x 189.33D)	
Operational Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IIEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -10 to 70^{o} C (14 to 158^{o} F)	
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock): -40 to 85^{o} C (-40 to 185^{o} F)	

16 Input/16 Output Board - Cat. No. 1799-D16U16V or 1799-D16U16VL Specifications

General Specifications (continued)	
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5 to 95% non-condensing
Vibration	IEC 60068-2-6 (Test Fc, Operating): 5g @ 10-500Hz
Operating Shock	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 30g
Non-Operating Shock	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 50g
Emissions	CISPR 11: Group 1, Class A
ESD Immunity	IEC 61000-4-2: 6kV indirect contact discharges
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 30MHz to 2000MHz 10V/m with 200Hz 50% Pulse 100%AM at 900MHz 10V/m with 200Hz 50% Pulse 100%AM at 1890MHz
EFT/B Immunity	IEC 61000-4-4: ±2kV at 5kHz on power ports ±4kV at 5kHz on signal ports ±2kV at 5kHz on communications ports
Surge Transient Immunity	IEC 61000-4-5: ±2kV line-earth(CM) on power ports ±2kV line-line(DM) and ±4kV line-earth(CM) on signal ports ±2kV line-earth(CM) on communications ports
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz
Enclosure Type Rating	None (open-style)
Supply Voltages Voltage Ranges	10-30V dc Class 2 Power Supply 10-30V dc UL Listed or Recognized Power Supply
Supply Power/Current Ratings	Isolated outputs limited to 200 volt-amperes in each ungrounded output line
Isolation voltage (continuous-voltage withstand rating)	Tested to withstand 2300V dc for 60 seconds
Wire Size	24 AWG to 20 AWG
Wire Size, Maximum	20 AWG
Wire Size, Minimum	24 AWG
Wiring Category[1]	1 - on signal ports 1 - on power ports 2 - on communications ports
Wire Type	Copper

16 Input/16 Output Board - Cat. No. 1799-D16U16V or 1799-D16U16VL Specifications

General Specifications (continued)		
Certifications:[2] (when product is marked)	c-UR-us CE C-Tick ODVA	UL Recognized Component Industrial Control Equipment, certified for US and Canada European Union 89/336/EEC EMC Directive, compliant with: EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions ODVA conformance tested to DeviceNet specifications

Note: In order to comply with CE Low Voltage Directives (LVD), you must use either a NEC Class 2, a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter. A SELV supply cannot exceed 30V rms, 42.4V peak or 60V dc under normal conditions and under single fault conditions. A PELV supply has the same rating and is connected to protected earth.

1. Use this Conductor Category information for planning conductor routing. Refer to Publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.

2. See the Product Certification link at www.ab.com for Declarations of Conformity, Certificates, and other certification details.

1799-ZCIOB or 1799-ZCIOV Module

Communication Information

This board exchanges I/O with the master on DeviceNet through a cyclic, polled, or change-of-state connection. See the 1799-ZCIOB/-ZCIOV Consume and Produce Data table for more information.

1799-ZCIOB/-ZCIOV Consume and Produce Data

I/O Connection Type	Consumes	Produces
Cyclic	7 Bytes	2 Bytes
Polled	7 Bytes	2 Bytes
Change-of-State	7 Bytes	2 Bytes

Cyclic - the board will produce and consume its I/O cyclically at the rate configured by the master on DeviceNet.

Polled - the master initiates communication by sending its polled I/O message to the board. The board consumes the message, updates any outputs and produces a response containing the input data.

Change-of-State - a production occurs when an input changes. A heartbeat production occurs if no input condition change occurs within the expected packet rate. This heartbeat production tells the master that the board is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the board.

See the 1799-ZCIOB/-ZCIOV Word/Bit table for word/bit definitions.

1799-ZCIOB/-ZCIOV Word/Bit Table

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Produced 0	In 7	In 6	In 5	In 4	In 3	In 2	In 1	In 0
Produced 1	Reserved	Logic Ena	Reserved				In 9	In 8
Produced 2	Out 7	Out 6	Out 5	Out 4	Out 3	Out 2	Out 1	Out 0
Produced 3	Reserved						Out 9	Out 8
Produced 4	NetOut 7	NetOut 6	NetOut 5	NetOut 4	NetOut 3	NetOut 2	NetOut 1	NetOut 0
Produced 5	CCV 7	CCV 6	CCV 5	CCV 4	CCV 3	CCV 2	CCV 1	CCV 0
Produced 6	CCV 15	CCV 14	CCV 13	CCV 12	CCV 11	CCV 10	CCV 9	CCV 8
Consumed 0	Out 7	Out 6	Out 5	Out 4	Out 3	Out 2	Out 1	Out 0
Consumed 1	Reserved						Out 9	Out 8

Logic Ena = DeviceLogix Enabled, NetOut = Network Output, CCV = Configuration Consistency Value. The CCV appears in the EDS file as a whole number. The individual bits shown here are compiled to create that number.

Troubleshooting Indicators

This board has the following indicators:

- Card status
- Network status
- DeviceLogix status
- Auxiliary power
- I/O status

Card Status Indicator (labeled MOD)

1799-ZCIOB and 1799-ZCIOV Board Status Indicator Descriptions

Indication	Status
Off	No power - No power applied to the module.
Green	Device operational - Module is operating normally.
Flashing green	Needs commissioning - The module has a missing, incomplete, or an incorrect commissioning.
Flashing red	Minor fault - Recoverable fault has occurred.
Red	Critical fault - Watchdog timeout or the module has an unrecoverable fault and may need replacing.

Network Status Indicator (labeled NET)

1799-ZCIOB and 1799-ZCIOV Network Status Indicator Descriptions

Indication	Status
Off	Not powered/Not online - Device is not online. • The device has not completed the duplicate MacID test. • The device is not powered.
Green	Online, connected - Device is operating normally and is online with connections established.
Flashing green	Online, not connected: • Device is online with no connections established. • The device has passed duplicate MacID tests, but has not established connections to other nodes.
Red	Critical link failure - Failed communication device The device has detected an error and has been rendered incapable of network communication.
Flashing red	Connection timed-out - An I/O connection has timed-out. Communication previously established with the master has been lost.

DeviceLogix Status Indicator (labeled DS2)

1799-ZCIOB and 1799-ZCIOV DeviceLogix Status Indicator Descriptions

Indication	Status
None	Logic disabled
Green	
Solid	Logic enabled
Blinking	Local forces applied and local logic enabled

Auxiliary Power Indicator (labeled AUX PWR)

1799-ZCIOB and 1799-ZCIOV Auxiliary Power Status Indicator Descriptions

Indication	Status
None	No auxiliary power
Green	Auxiliary power present

I/O Status Indicators (labeled Inputs and Outputs)

1799-ZCIOB and 1799-ZCIOV I/O Status Indicator Descriptions

Indication	Status
Outputs	
None	Output not energized
Yellow	Output energized
Inputs	
None	No valid input
Yellow	Valid input

Specifications

Specifications are listed below.

10 Input/10 Output Card-Cat. Nos. 1799-ZCIOB or 1799-ZCIOV Specifications

Input Specification	**Max.**	**Min.**
Inputs per block	10 Sinking or Sourcing, Type 1 + compatible	
Off-State: Voltage Current	5V dc 1.5 mA	- -
On-State: Voltage Current	30V dc 6 mA	10V dc 2 mA
Output Specification	**Max.**	**Min.**
Outputs per block	10 Sinking or Sourcing, 0.5A, Short Circuit Protected, Pilot Duty	
Output Auxiliary Voltage	30V	10V
On-State Voltage Drop	250 mV	-
On-State Current	0.5 A	-
Off-State Leakage	20 μA	-
Card Current (all outputs on)	4.0 A	-
Surge Current - for 10ms, repeatable every 2s (individual outputs)	1.0 A	
General Specifications	**Max.**	**Min.**
DeviceNet Power: Voltage Current	 25V dc 125 mA	 11V dc -
Auxiliary Power: Voltage Current	 30V dc 4.0 A (all outputs on)	 10V dc 100 mA (all outputs off)
LED Indicators	Card Status - red/green Network Status - red/green Auxiliary Power - green DeviceLogix Status - green Input Point LED - yellow Output Point LED -yellow	
Dimensions - inches (millimeters)	1.0H x 2.0W x 6.4D (26H x 51W x 163D)	
Operating Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -10 to 60^{o} C (14 to 140^{o} F)	
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock): -40 to 85^{o} C (-40 to 185^{o} F)	
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5 to 95% non-condensing	

10 Input/10 Output Card-Cat. Nos. 1799-ZCIOB or 1799-ZCIOV Specifications

General Specifications (continued)	
Vibration	IEC60068-2-6 (Test Fc, Operating): 5g @ 10-500Hz
Shock	IEC60068-2-27 (Test Ea, Unpackaged Shock): Operating 30g Non-operating 50g
Emissions	CISPR 11: Group 1, Class A
ESD Immunity	IEC 61000-4-2: 6kV indirect contact discharges
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 30MHz to 1000MHz 10V/m with 200Hz 50% Pulse 100%AM at 900Mhz
EFT/B Immunity	IEC 61000-4-4: ±2kV at 5kHz on power ports ±4kV at 2.5kHz on signal ports ±2kV at 5kHz on communications ports
Surge Transient Immunity	IEC 61000-4-5: ±2kV line-earth(CM) on power ports ±2kV line-line(DM) and ±4kV line-earth(CM) on signal ports ±2kV line-line(CM) on communications ports
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz
Enclosure Type Rating	None (open-style)
DeviceNet Power Circuit Type	Class 2
Auxiliary Supply Power Rating	Isolated outputs limited to 200 volt-amperes in each ungrounded output line
Isolation voltage (continuous-voltage withstand rating)	Tested to withstand 1000V dc for 60 seconds
Conductors Wire Size[1, 2]	DeviceNet Power: 14 gauge ($2mm^2$) stranded maximum Auxiliary Power: 14 gauge ($2mm^2$) stranded maximum DeviceNet: 14 gauge ($2mm^2$) stranded maximum (See Publication DNET-UM072) I/O: 26 AWG to 20 AWG
Wire Type	Copper

10 Input/10 Output Card-Cat. Nos. 1799-ZCIOB or 1799-ZCIOV Specifications

General Specifications (continued)		
Certifications[3] (When product is marked)	c-UR-us CE C-Tick ODVA	UL Recognized Component Industrial Control Equipment, certified for US and Canada European Union 89/336/EEC EMC Directive, compliant with: EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6.4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions ODVA conformance tested to DeviceNet specifications

Note: In order to comply with CE Low Voltage Directives (LVD), you must use either a NEC Class 2, a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter. A SELV supply cannot exceed 30V rms, 42.4V peak or 60V dc under normal conditions and under single fault conditions. A PELV supply has the same rating and is connected to protected earth.

1.You use this conductor category information for planning conductor routing as described in the system level installation manual.

2.See publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.

3.See the Product Certification link at www.ab.com for Declarations of Conformity, Certificates, and other certification details.

1799-D10U10BZC or 1799-D10U10VZC Module

Communication Information

This board exchanges I/O with the master on DeviceNet through a cyclic, polled, or change-of-state connection. See the 1799-D10U10BZC/-D10U10VZC Consume and Produce Data table for more information.

1799-D10U10BZC/-D10U10VZC Consume and Produce Data

I/O Connection Type	Consumes	Produces
Cyclic	7 Bytes	2 Bytes
Polled	7 Bytes	2 Bytes
Change-of-State	7 Bytes	2 Bytes

Cyclic - the board will produce and consume its I/O cyclically at the rate configured by the master on DeviceNet.

Polled - the master initiates communication by sending its polled I/O message to the board. The board consumes the message, updates any outputs and produces a response containing the input data.

Change-of-State - a production occurs when an input changes. A heartbeat production occurs if no input condition change occurs within the expected packet rate. This heartbeat production tells the master that the board is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the board.

See the 1799-D10U10BZC/-D10U10VZC Word/Bit table for word/bit definitions.

1799-D10U10BZC/-D10U10VZC Word/Bit Table

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Produced 0	In 7	In 6	In 5	In 4	In 3	In 2	In 1	In 0
Produced 1	Reserved	Logic Ena	Reserved				In 9	In 8
Produced 2	Out 7	Out 6	Out 5	Out 4	Out 3	Out 2	Out 1	Out 0
Produced 3	Reserved						Out 9	Out 8
Produced 4	NetOut 7	NetOut 6	NetOut 5	NetOut 4	NetOut 3	NetOut 2	NetOut 1	NetOut 0
Produced 5	CCV 7	CCV 6	CCV 5	CCV 4	CCV 3	CCV 2	CCV 1	CCV 0
Produced 6	CCV 15	CCV 14	CCV 13	CCV 12	CCV 11	CCV 10	CCV 9	CCV 8
Consumed 0	Out 7	Out 6	Out 5	Out 4	Out 3	Out 2	Out 1	Out 0
Consumed 1	Reserved						Out 9	Out 8

Logic Ena = DeviceLogix Enabled, NetOut = Network Output, CCV = Configuration Consistency Value. The CCV appears in the EDS file as a whole number. The individual bits shown here are compiled to create that number.

Troubleshooting Indicators

This board has the following indicators:

- Card status
- Network status
- DeviceLogix status
- Auxiliary power
- I/O status

Card Status Indicator (labeled MOD)

1799-D10U10BZC and 1799-D10U10VZC Card Status Indicator Descriptions

Indication	Status
Off	No power - No power applied to the module.
Green	Device operational - Module is operating normally.
Flashing green	Needs commissioning - The module has a missing, incomplete, or an incorrect commissioning.
Flashing red	Minor fault - Recoverable fault has occurred.
Red	Critical fault - Watchdog timeout or the module has an unrecoverable fault and may need replacing.

Network Status Indicator (labeled NET)

1799-D10U10BZC and 1799-D10U10VZC Network Status Indicator Descriptions

Indication	Status
Off	Not powered/Not online - Device is not online. • The device has not completed the duplicate MacID test. • The device is not powered.
Green	Online, connected - Device is operating normally and is online with connections established.
Flashing green	Online, not connected: • Device is online with no connections established. • The device has passed duplicate MacID tests, but has not established connections to other nodes.
Red	Critical link failure - Failed communication device The device has detected an error and has been rendered incapable of network communication.
Flashing red	Connection timed-out - An I/O connection has timed-out. Communication previously established with the master has been lost.

DeviceLogix Status Indicator (labeled DS2)

1799-D10U10BZC and 1799-D10U10VZC DeviceLogix Status Indicator Descriptions

Indication	Status
None	Logic disabled
Green	
Solid	Logic enabled
Blinking	Local forces applied and local logic enabled

Auxiliary Power Indicator (labeled AUX PWR)

1799-D10U10BZC/-D10U10VZC Auxiliary Power Status Indicator Descriptions

Indication	Status
None	No auxiliary power
Green	Auxiliary power present

I/O Status Indicators (labeled Inputs and Outputs)

1799-D10U10BZC and 1799-D10U10VZC I/O Status Indicator Descriptions

Indication	Status
Outputs	
None	Output not energized
Yellow	Output energized
Inputs	
None	No valid input
Yellow	Valid input

Specifications

Specifications are listed below.

10 Input/10 Output Card-Cat. Nos. 1799-D10U10BZC or 1799-D10U10VZC Specifications

Input Specification	**Max.**	**Min.**
Inputs per block	10 Sinking or Sourcing, Type 1 + compatible	
Off-State: Voltage Current	5V dc 1.5 mA	- -
On-State: Voltage Current	30V dc 6 mA	10V dc 2 mA
Output Specification	**Max.**	**Min.**
Outputs per block	10 Sinking or Sourcing, 0.5A, Short Circuit Protected, Pilot Duty	
Output Auxiliary Voltage	30V	10V
On-State Voltage Drop	250 mV	-
On-State Current	0.5A	-
Off-State Leakage	20 μA	-
Card Current (all outputs on)	4.0 A	-
Surge Current - for 10ms, repeatable every 2s (individual outputs)	1.0 A	
General Specifications	**Max.**	**Min.**
DeviceNet Power: Voltage Current	 25V dc 125 mA	 11V dc -
Auxiliary Power: Voltage Current	 30V dc 4.0A (all outputs on)	 10V dc 100 mA (all outputs off)
LED Indicators	Card Status - red/green Network Status - red/green Auxiliary Power - green DeviceLogix Status - green Input Point LED - yellow Output Point LED -yellow	
Dimensions - inches (millimeters)	1.0H x 2.0W x 6.4D (26H x 51W x 163D)	
Operating Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -10 to 60^{o} C (14 to 140^{o} F)	
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock): -40 to 85^{o} C (-40 to 185^{o} F)	
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5 to 95% non-condensing	

10 Input/10 Output Card-Cat. Nos. 1799-D10U10BZC or 1799-D10U10VZC Specifications

General Specifications (continued)	
Vibration	IEC60068-2-6 (Test Fc, Operating): 5g @ 10-500Hz
Shock	IEC60068-2-27 (Test Ea, Unpackaged Shock): Operating 30g Non-operating 50g
Emissions	CISPR 11: Group 1, Class A
ESD Immunity	IEC 61000-4-2: 6kV indirect contact discharges
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Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz
Enclosure Type Rating	None (open-style)
DeviceNet Power Circuit Type	Class 2
Auxiliary Supply Power Rating	Isolated outputs limited to 200 volt-amperes in each ungrounded output line
Isolation voltage (continuous-voltage withstand rating)	Tested to withstand 1000V dc for 60 seconds
Conductors Wire Size[1, 2]	DeviceNet Power: 14 gauge ($2mm^2$) stranded maximum Auxiliary Power: 14 gauge ($2mm^2$) stranded maximum DeviceNet: 14 gauge ($2mm^2$) stranded maximum (See Publication DNET-UM072) I/O: 26 AWG to 20 AWG
Wire Type	Copper

10 Input/10 Output Card-Cat. Nos. 1799-D10U10BZC or 1799-D10U10VZC Specifications

General Specifications (continued)		
Certifications[3] (When product is marked)	c-UR-us	UL Recognized Component Industrial Control Equipment, certified for US and Canada
	CE	European Union 89/336/EEC EMC Directive, compliant with: EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6.4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)
	C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions
	ODVA	ODVA conformance tested to DeviceNet specifications

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Rockwell Automation Support

Rockwell Automation provides technical information on the web to assist you in using its products. At http://support.rockwellautomation.com, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect Support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://support.rockwellautomation.com.

Installation Assistance

If you experience a problem with a hardware module within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your module up and running:

United States	1.440.646.3223 Monday – Friday, 8am – 5pm EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

New Product Satisfaction Return

Rockwell tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned:

United States	Contact your distributor. You must provide a Customer Support case number (see phone number above to obtain one) to your distributor in order to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for return procedure.

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

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