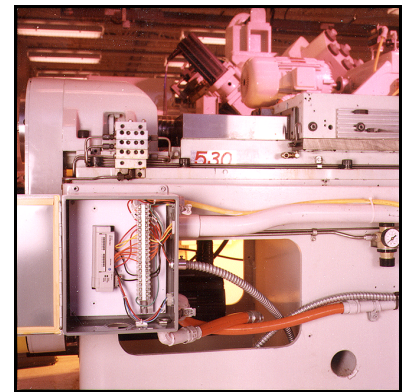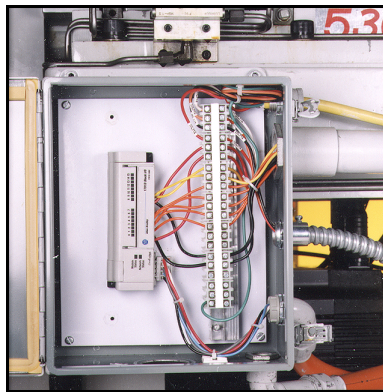# CompactBlock I/O for DeviceNet

1791D

The 1791D CompactBlock I/O modules contain I/O circuits, a built-in power supply, and a built-in DeviceNet™ I/O adapter. CompactBlock I/O modules are ideal for applications restricted by space limitations and applications requiring highly distributed I/O blocks close to sensors and actuators.

The following CompactBlock I/O modules are available:

CompactBlock I/O

- 4 sinking input base module (1791D-4B0)

- 8 sourcing input/ 8 sinking output base module (1791D-8V8P)

- 16 sourcing input base module (1791D-16V0)

- 16 sourcing output base module (1791D-0B16P)

- 16 sinking output expansion module (1791D-0V16PX)

- 4 sinking input/ 4 sourcing output base module (1791D-4B4P)

- 16 sinking input base module (1791D-16B0)

- 16 sourcing input expansion module (1791D-16V0X)

- 16 sourcing output expansion module (1791D-0B16PX)

- 8 sinking input/ 8 sourcing output base module (1791D-8B8P)

- 16 sinking input expansion module (1791D-16B0X)

- 8 sourcing output base module (1791D-0B8P)

- 16 sinking output base module (1791D-0V16P)

Overview

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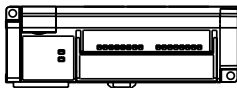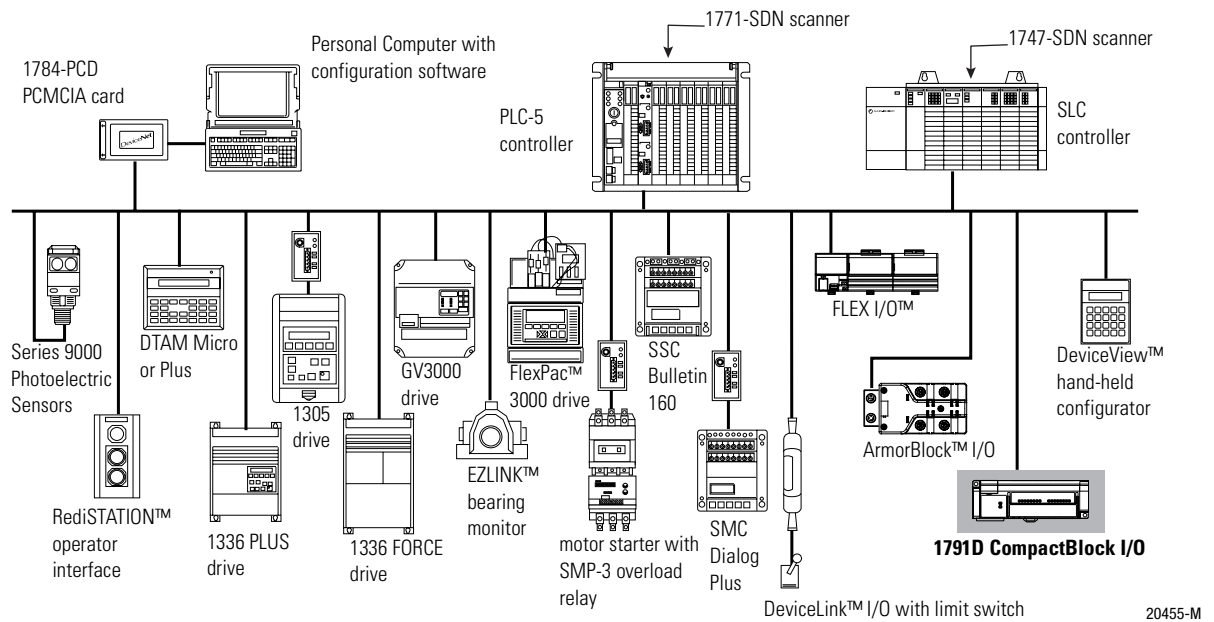

Compact Block I/O Module

Node addresses on the modules are set using rotary switches, located on the module, RSNetworx™ for DeviceNet software or a similar configuration tool. All other module parameters are set using a similiar configuration tool.

Features and Benefits

Feature:	Benefit:
10–30V dc device power	accommodates broad range of power supplies and multiple voltage levels from the network
NEMA type 1+ inputs	compatible with a broad range of sensors
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 block located close to sensors and actuators	lower wiring costs
compact size of I/O block	module requires no adapter or power supply
autobaud detection	module automatically matches system baud rate - no crashing due to incorrect baud setting
rotary node address switches	reduces 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

Typical Configuration

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

System Compatibility

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

CompactBlock Family Module Communication

The CompactBlock modules act as a slave in a master/slave environment. Their I/O data is exchanged with the master through a polled, cyclic, or change-of-state connection. This selection is made 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 CompactBlock module.

Cyclic

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

Change-of-State

When the CompactBlock 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 output
- the time period for communication has expired

The CompactBlock module's input is only sent to the master when:
- an input changes
- the time period for communication has expired

With change-of-state, the master does not have to request input data from the slave, it is sent automatically when data changes. In addition, an adjustable "heartbeat" is produced periodically by the CompactBlock module to let the consuming device know that the module connection is alive and ready to communicate.

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

Idle and Fault Mode Selection

When the PLC, SLC or PC-based programmable controller is in program mode, the DeviceNet scanner puts the CompactBlock 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. RSNetworx for DeviceNet software or a similar configuration tool can change the default and set the module to save the last received outputs.
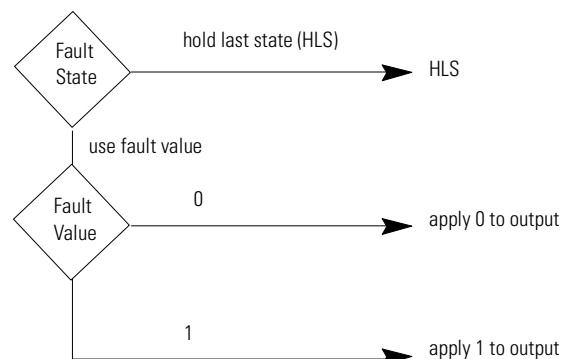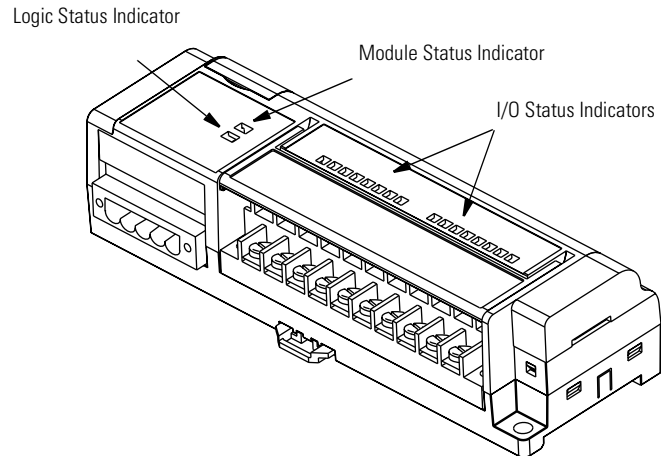

Fault state can be set to HLS or use fault value. The fault value can be set to 0 or 1. The same logic applies for idle conditions.

42455

Status Indicators

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

Logic Status Indicator

Module Status Indicator

I/O Status Indicators

42499

Module/Network Status Indicators

Indication:	Status:
Off	No power or auto bauding
Flashing Green/Off	On line but not connected
Solid Green	On line, link OK, connected
Flashing Red	Recoverable fault - (expansion module fault or module configuration error)
	I/O connection fault - one or more I/O connections in the timed-out state
Solid Red	Unrecoverable fault
	Communication failure - duplicate node address present or incorrect baud rate
Green to Red to Off	At powerup only - LED test

Logic Status Indicators (base only)

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 (base and expansion)

Function:	LED Color:	Module Illumination:	Condition:
Outputs	Yellow	None Yellow	Output not energized Output energized
Inputs	Yellow	None Yellow	No valid input Valid input

Power Supply Requirements

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

Mounting

The CompactBlock I/O base and expansion modules can be mounted directly to a panel or on a DIN rail.

The following graphic shows the base and expansion modules mounting dimensions.
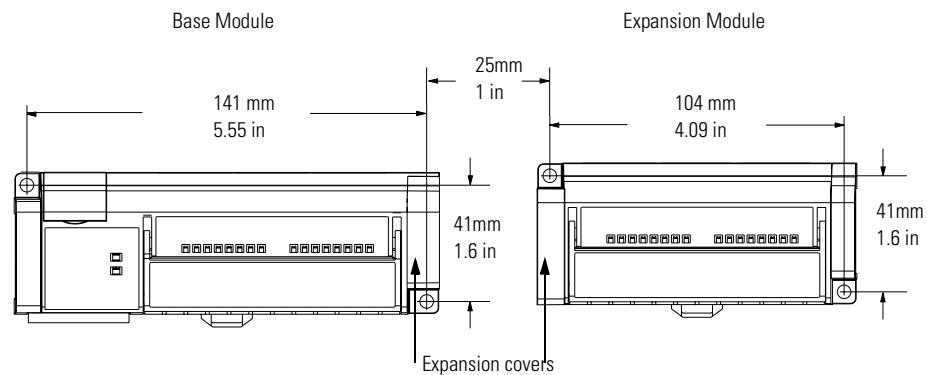
30358

Remember to consider the length of the expansion ribbon cable when installing a base module with an expansion. The expansion module must be close enough for the expansion cable to reach from the base module to the expansion module. Modules can be mounted vertically or horizontally.

Base and expansion modules can be mounted side-by-side. The graphic below shows a base module connected to an expansion module.
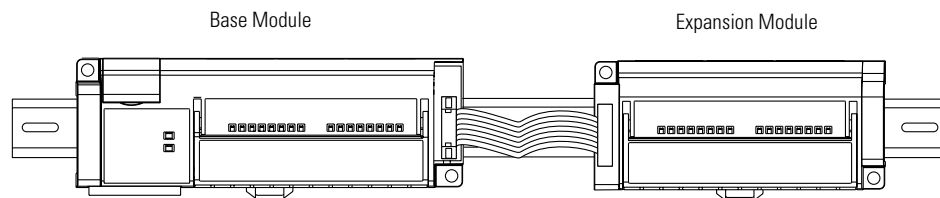
30360

CompactBlock I/O Cables

The following tables lists part numbers and descriptions for CompactBlock cables

CompactBlock I/O Expansion Cables

Description	Length cm(in)	Part Number
DeviceNet Expansion Cable[1]	4 (1.6)	1791D-4CMCBL
Expansion Cable	10 (4)	1791D-10CMCBL

[1] This cable is shipped with the product, catalog number is for spare cables only.

DeviceNet Cables

Description	Length m	Part Number (aluminum):	Part Number (stainless steel):	Application:
Mini male to conductor (unshielded)	1	1485-P1M5-C	1485RS-P1M5-C	DeviceNet drop cable (flat media)
	6	1485R-P6M5-C	1485RS-P6M5-C	
Mini male to conductor (shielded)	1	1485R-P1M5-C	1485P-1M5-C	DeviceNet drop cable (round media)
	2	1485R-P2M5-C	1485RS-P2M5-C	
	3	1485RS-P3M5-C	1485RS-P3M5-C	

Specific Module Information

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

For information about:	See page:
4 sinking input base module (1791D-4B0)	9
4 sinking input/ 4 sourcing output base module (1791D-4B4P0	11
8 sinking input / 8 sourcing output base module (1791D-8B8P)	13
8 sourcinginput/ 8 sinking output base module (1791D-8V8P)	15
16 sinking input base module (1791D-16B0)	17
16 sinking input expansion module (1791D-16B0X)	19
16 sourcing input base module (1791D-16V0)	21
16 sourcing input expansion module (1791D-16V0X)	23
8 sourcing output base module (1791D-0B8P)	25
16 sourcing output base module (1791D-0B16P)	27
16 sourcing output expansion module (1791D-0B16PX)	29
16 sinking output base module (1791D-0V16P)	31
16 sinking output expansion module (1791D-0V16PX)	33

Related Publications

Refer to the following list of publications for more information about the CompactBlock I/O modules as well as the DeviceNet network and its products.

Title:	Publication Number:
CompactBlock I/O Product Profile	1791D-1.4
CompactBlock I/O Installation Instructions	1791D-IN001A-EN-P
DeviceNet Product Overview	DN-2.5
DeviceNet Cable System Planning and Installation Manual	DN-6.7.2

Notes:

4 Sinking Input Base Module 1791D-4B0

Simplified Schematic

Input

Opto Isolation

System Circuitry

Input Indication LED (Logic)

+

24V dc

−

GND

42501

The CompactBlock base module I/O is exchanged with the master through a poll, change-of-state, or cyclic connection.

Polled - a master initiates communication by sending its polled I/O message to the CompactBlock module. The module consumes the message, updates any outputs, and produces a response. If any inputs are present, the response will contain the input data.

Change-of-state - productions occur when an input changes. If no input change occurs within the expected packet rate, a heartbeat production occurs. This heartbeat production tells the scanner module that the CompactBlock I/O module is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the I/O block.

Cyclic - allows configuration of the block as an I/O client. The block will produce and consume its I/O cyclically at the rate configured.

The module produces 1 byte for every 4 inputs.

The following table contains the connection sizes for this module:

Module	I/O Points	Produce (input bytes)	Consume (output bytes)
1791D-4B0	4 input	1	0

Refer to the tables below for the word/bit definitions.

Bit	03	02	01	00
Produces 0	I3	I2	I1	I0

Word	Bit	Description
Produces 0	00-03	Input Status bits - when the bit is set (1), the input is on. Bit 00 corresponds to input I0, bit 01 corresponds to input I1, bit 02 corresponds to input I2, bit 03 corresponds to input I3.

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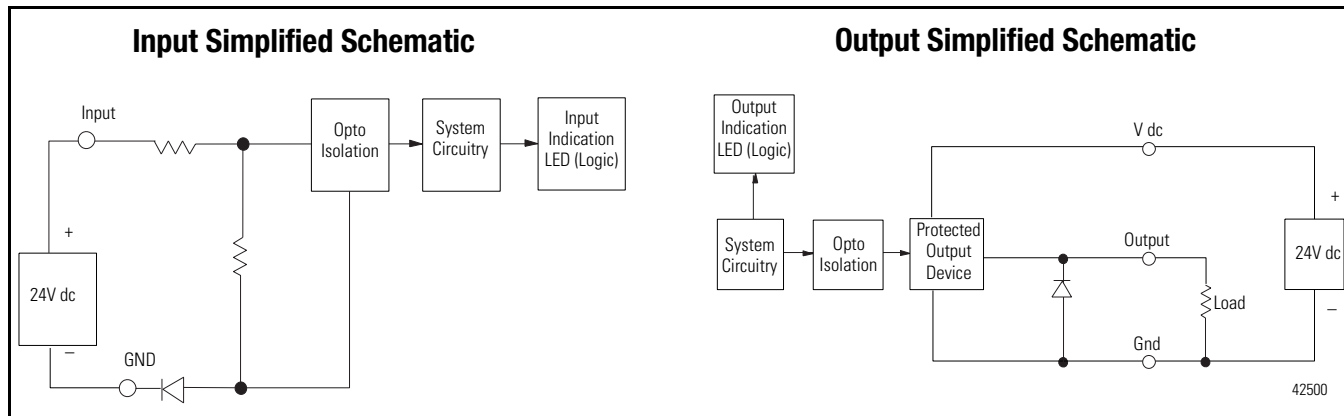## Wiring Connections

Input Wiring Diagram for 1791D-4BO

Typical PNP 3-wire sensor

42343

Specifications

Sinking Inputs	Max	Min
Inputs per Block	4	
Off-state Voltage	5V	-
On-state Voltage	30V dc @ 40°C 25V dc @ 60°C	10V dc
Off-state Current	-	1.5mA @ 5V dc
On-state Current	11mA @ 30V dc	2mA @ 10V dc

General Specifications

Indicators	Mod/Net status - red/green Logic status - green I/O status - yellow

Communication Rate
    Thick Cable
 	
    Flat Media
	
	125Kbps @ 500m (1600ft)
	250Kbps @ 200m (600ft)
	500Kbps @ 100m (330ft)
	
	125Kbps @ 420m (1230ft)
	250Kbps @ 200m (490ft)
	500Kbps @ 75m (245ft)

Isolation
    I/O to DeviceNet
    I/O group-to-group
    I/O group-to-logic
	
	500V ac
	500V ac
	500V ac

DeviceNet Power
    Voltage
    Current
	
	11V - 25 V dc
	150mA maximum

Base Module Dimensions	150mm X 48mm X 38mm 5.91in X 1.9in X 1.5in

Environmental Conditions
    Operating Temperature
    Non-Operating Temperature
    Relative Humidity
    Operating Shock
       Non-operating Shock
    Vibration
	
	0 to 60°C (32 to 140°F)
	-40 to 85°C (-40 to 185°F)
	5-95% non-condensing
	30g
	50g
	tested 5g @ 10-500Hz per IEC 68-2-6

Conductors
    Wire Size
 	
    Category
	
	14 gauge (2mm^2) stranded maximum
	3/64 inch insulation maximum
	2[1, 2]

Product Certifications	UL, UL Hazardous Class I, Div 2, Groups A, B, C, D. C-UL, C-UL Hazardous Class I, Div 2, Groups A, B, C, D. CE marked for all applicable directives
Enclosure	IEC IP20

[1] Use this conductor category information for planning conductor routing as described in the system level installation manual.

[2] Refer to, Programmable Controller Wiring and Grounding Guidelines, publication 1770-4.1.

4 Sinking Input/4 Sourcing Output Base Module 1791D-4B4P

The CompactBlock base module I/O is exchanged with the master through a poll, change-of-state, or cyclic connection.

Polled - a master initiates communication by sending its polled I/O message to the CompactBlock module. The module consumes the message, updates any outputs, and produces a response. If any inputs are present, the response will contain the input data.

Change-of-state - productions occur when an input changes. If no input change occurs within the expected packet rate, a heartbeat production occurs. This heartbeat production tells the scanner module that the CompactBlock I/O module is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the I/O block.

Cyclic - allows configuration of the block as an I/O client. The block will produce and consume its I/O cyclically at the rate configured.

The module produces 1 byte for every 4 inputs. Similarly, the module consumes 1 byte for every 4 outputs. When an expansion module is connected, an additional byte will be returned indicating the health of the expansion module.

The following table contains connection sizes for this module:

Module(s)	I/O Points	Produce (input bytes)	Consume (output bytes)
1791D-4B4P	4 input / 4 output	1	1
1791D-4B4P with expansion output	4 input/ 20 output	1	3
1791D-4B4P with expansion input	20 input/ 4 output	3	1

Refer to the table below for the word/bit definitions.

Bit	03	02	01	00
Produces	I3	I2	I1	I0
Consumes	O3	O2	O1	O0

Word	Bit	Description
Produces	00-03	Input Status bits - when the bit is set (1), the input is on. Bit 00 corresponds to input I0, bit 01 corresponds to input I1, bit 02 corresponds to input I2, bit 03 corresponds to input I3.
Consumes	00-03	Output bits - when the bit is set (1), the output is on. Bit 00 corresponds to output O0, bit 01 corresponds to output O1, bit 02 to output O2, bit 03 to output O3.

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Wiring Connections

Wiring Diagram for the 1791D-4B4P Base Module

Specifications

Sinking Inputs	Max	Min
Inputs per block	4	

Off-state
    Voltage
    Current
	5V dc
	-
		-
		1.5mA @ 5Vdc

On-state
    Voltage
 	
    Current
	30V dc @ 40°C
	
	25V dc @ 60°C
	11mA @ 30V dc
		10V dc
		
		2mA @ 10V dc

Sourcing Outputs		
Outputs per block	4	
On-state Voltage Range	10–30V dc	
On-state Voltage Drop	0.5V dc @ rated current	
On-state Current	0.5 A	-
Off-state Leakage	1.0mA	-
Module Current (all outputs)	4.0 A	-
Surge Current - for 10 mS repeatable every 2 S	1.0 A	-

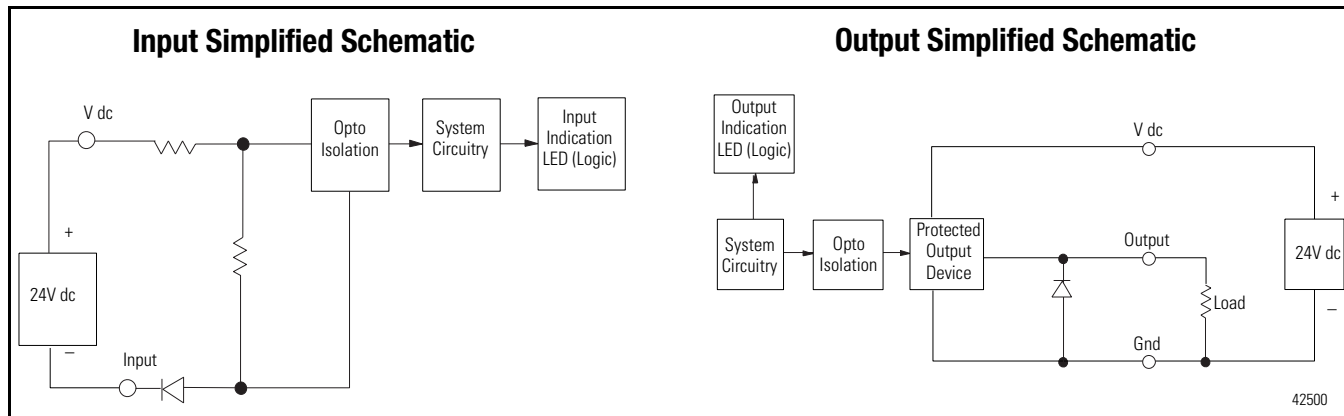| General Specifications	
Indicators	Mod/Net status - red/green Logic status - green I/O status - yellow

Communication Rate
    Thick Cable
 	
    Flat Media
	
	125Kbps @ 500m (1600ft)
	250Kbps @ 200m (600ft)
	500Kbps @ 100m (330ft)
	125Kbps @ 420m (1230ft)
	250Kbps @ 200m (490ft)
	500Kbps @ 75m (245ft)

Isolation
    Power supply to DeviceNet
    I/O group-to-group
    I/O group-to-logic
	
	500V ac
	500V ac
	500V ac

DeviceNet Power
    Voltage
    Current
	
	11–30V dc
	200mA maximum (with expansion)

Auxiliary Power
    Voltage
    Current
	
	10–30V dc
	4A maximum

Base Module Dimensions	150mm X 48mm X 38mm 5.91in X 1.9in X 1.5in

Environmental Conditions
    Operating Temperature
    Non-Operating Temperature
    Relative Humidity
    Operating Shock
        Non-operating Shock
    Vibration
	
	0 to 60°C (32 to 140°F)
	-40 to 85°C (-40 to 185°F)
	5-95% non-condensing
	30g
	50g
	tested 5g @ 10-500Hz per IEC 68-2-6

Conductors
    Wire Size
 	
    Category
	
	14 gauge ($2mm^2$) stranded maximum
	3/64 inch insulation maximum
	$2^{1,\ 2}$

Product Certifications (where product or packaging is marked)	UL, UL Hazardous Class I, Div 2, Groups A, B, C, D. C-UL, C-UL Hazardous Class I, Div 2, Groups A, B, C, D. CE marked for all applicable directives
Enclosure	IEC IP20

[1] Use this conductor category information for planning conductor routing as described in the system level installation manual.

[2] Refer to, Programmable Controller Wiring and Grounding Guidelines, publication 1770-4.1.

8 Sinking Input/8 Sourcing Output Base Module 1791D-8B8P

Input Simplified Schematic	Output Simplified Schematic

42500

The CompactBlock base module I/O is exchanged with the master through a poll, change-of-state, or cyclic connection.

Polled - a master initiates communication by sending its polled I/O message to the CompactBlock module. The module consumes the message, updates any outputs, and produces a response. If any inputs are present, the response will contain the input data.

Change-of-state - productions occur when an input changes. If no input change occurs within the expected packet rate, a heartbeat production occurs. This heartbeat production tells the scanner module that the CompactBlock I/O module is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the I/O block.

Cyclic - allows configuration of the block as an I/O client. The block will produce and consume its I/O cyclically at the rate configured.

The module produces 1 byte for every 8 inputs. Similarly, the module consumes 1 byte for every 8 outputs. When an expansion module is connected, an additional byte will be returned indicating the health of the expansion module.

The following table contains connection sizes for this module:

Module(s)	I/O Points	Produce (input bytes)	Consume (output bytes)
1791D-8B8P	8 input / 8 output	1	1
1791D-8B8P with expansion output	8 input/ 24 output	2	3
1791D-8B8P with expansion input	24 input/ 8 output	4	1

Refer to the table below for the word/bit definitions.

Bit	07	06	05	04	03	02	01	00
Produces	I7	I6	I5	I4	I3	I2	I1	I0
Consumes	O7	O6	O5	O4	O3	O2	O1	O0

Word	Bit	Description
Produces	00-07	Input Status bits - when the bit is set (1), the input is on. Bit 00 corresponds to input I0, bit 01 corresponds to input I1, bit 02 corresponds to input I2, bit 03 corresponds to input I3, etc.
Consumes	00-07	Output bits - when the bit is set (1), the output is on. Bit 00 corresponds to output O0, bit 01 corresponds to output O1, bit 02 to output O2, bit 03 to output O3, etc.

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Wiring Connections

Wiring Diagram for the 1791D-8B8P Base Module

41672
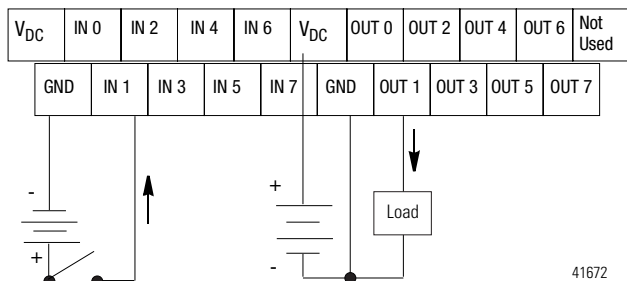
Specifications

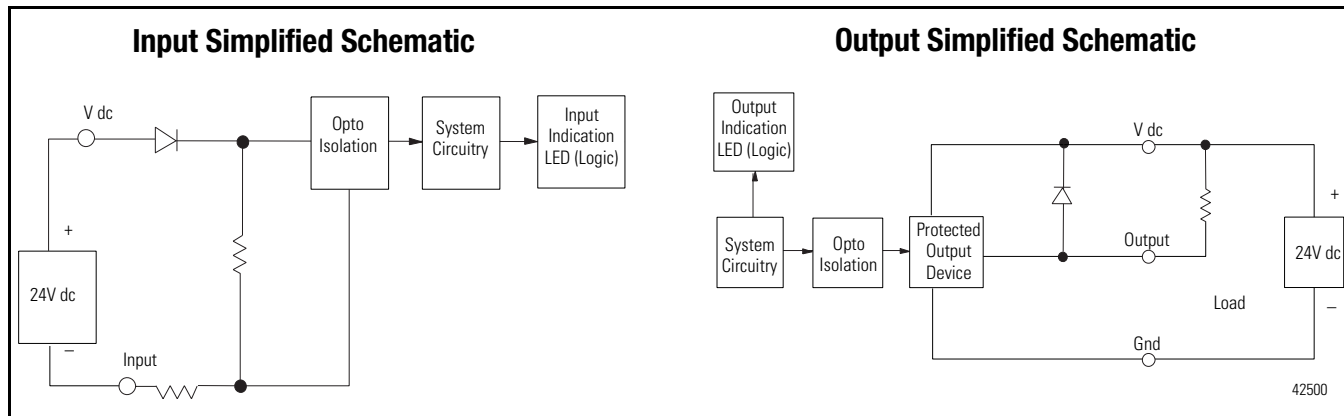| Sinking Inputs	Max	Min
Inputs per block	1 group of 8	
Off-state Voltage	5V	-
On-state Voltage	30V dc @ 40°C 25V dc @ 60°C	10V dc
Off-state Current	-	1.5mA @ 5V dc
On-state Current	11mA @ 30V dc	2mA @ 10V dc
Sourcing Outputs		
On-state Voltage Range	10 - 30V dc	
On-state Voltage Drop	0.5V dc @ rated current	
On-state Current	0.5A maximum	
Off-state Leakage	1.0mA maximum	
Module Current (all outputs)	4.0A maximum	
Surge Current - for 10ms, repeatable every 2 s	1.0A maximum	

General Specifications	
Indicators	Mod/Net status - red/green Logic status - green I/O status - yellow

Communication Rate
    Thick Cable
 	
    Flat Media
	
	125Kbps @ 500m (1600ft)
	250Kbps @ 200m (600ft)
	500Kbps @ 100m (330ft)
	125Kbps @ 420m (1230ft)
	250Kbps @ 200m (490ft)
	500Kbps @ 75m (245ft)

Isolation
    Power supply to DeviceNet
    I/O group-to-group
    I/O group-to-logic
	
	500V ac
	500V ac
	500V ac

DeviceNet Power
    Voltage
    Current
	
	11V dc minimum
	200mA maximum (with expansion)

Auxiliary Power
    Voltage
    Current
	
	10V dc minimum
	4A maximum

Base Module Dimensions	150mm X 48mm X 38mm 5.91in X 1.9in X 1.5in

Environmental Conditions
    Operating Temperature
    Non-Operating Temperature
    Relative Humidity
    Operating Shock
        Non-operating Shock
    Vibration
	
	0 to 60°C (32 to 140°F)
	-40 to 85°C (-40 to 185°F)
	5-95% non-condensing
	30g
	50g
	tested 5g @ 10-500Hz per IEC 68-2-6

Conductors
    Wire Size
 	
    Category
	
	14 gauge (2mm^2) stranded maximum
	3/64 inch insulation maximum
	2[1, 2]

Product Certifications (where product or packaging is marked)	UL, UL Hazardous Class I, Div 2, Groups A, B, C, D. C-UL, C-UL Hazardous Class I, Div 2, Groups A, B, C, D. CE marked for all applicable directives
Enclosure	IEC IP20

[1] Use this conductor category information for planning conductor routing as described in the system level installation manual.

[2] Refer to, Programmable Controller Wiring and Grounding Guidelines, publication 1770-4.1.

8 Sourcing Input/8 Sinking Output Base Module 1791D-8V8P

The CompactBlock base module I/O is exchanged with the master through a poll, change-of-state, or cyclic connection.

Polled - a master initiates communication by sending its polled I/O message to the CompactBlock module. The module consumes the message, updates any outputs, and produces a response. If any inputs are present, the response will contain the input data.

Change of state - productions occur when an input changes. If no input change occurs within the expected packet rate, a heartbeat production occurs. This heartbeat production tells the scanner module that the CompactBlock I/O module is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the I/O block.

Cyclic - allows configuration of the block as an I/O client. The block will produce and consume its I/O cyclically at the rate configured.

The module produces 1 byte for every 8 inputs. Similarly, the module consumes 1 byte for every 8 outputs. When an expansion module is connected, an additional byte will be returned indicating the health of the expansion module.

The following table contains connection sizes for this module:

Module(s)	I/O Points	Produce (input bytes)	Consume (output bytes)
1791D-8V8P	8 input / 8 output	1	1
1791D-8V8P with expansion output	8 input/ 24 output	2	3
1791D-8V8P with expansion input	24 input/ 8 output	4	1

Refer to the table below for the word/bit definitions.

Bit	07	06	05	04	03	02	01	00
Produces	I7	I6	I5	I4	I3	I2	I1	I0
Consumes	O7	O6	O5	O4	O3	O2	O1	O0

Word	Bit	Description
Produces	00-07	Input Status bits - when the bit is set (1), the input is on. Bit 00 corresponds to input I0, bit 01 corresponds to input I1, bit 02 corresponds to input I2, bit 03 corresponds to input I3, etc.
Consumes	00-07	Output bits - when the bit is set (1), the output is on. Bit 00 corresponds to output O0, bit 01 corresponds to output O1, bit 02 to output O2, bit 03 to output O3, etc.

The DeviceNet Network uses advanced network technology, producer/consumer communication, to increase network functionality and throughput. Visit our Web site at http://www.ab.com/networks for producer/consumer technology information and updates.

Wiring Connections

Wiring Diagram for the 1791D-8V8P Base Module
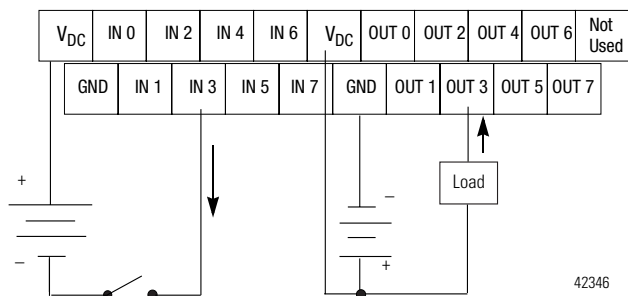
42346

Specifications

Sinking Inputs	Max	Min
Inputs per block	8	

Off-state
  Voltage
  Current
	5V dc
	-
		-
		1.5mA @ 5Vdc

On-state
  Voltage
 	
  Current
	30V dc @ 40°C
	25V dc @ 60°C
	11mA @ 30V dc
		10V dc
		
		2mA @ 10V dc

Sourcing Outputs		
Outputs per block	8	
On-state Voltage Range	10–30V dc	
On-state Voltage Drop	0.5V dc @ rated current	
On-state Current	0.5 A	-
Off-state Leakage	1.0mA	-
Module Current (all outputs)	4.0 A	-
Surge Current - for 10 mS repeatable every 2 S	1.0 A	-

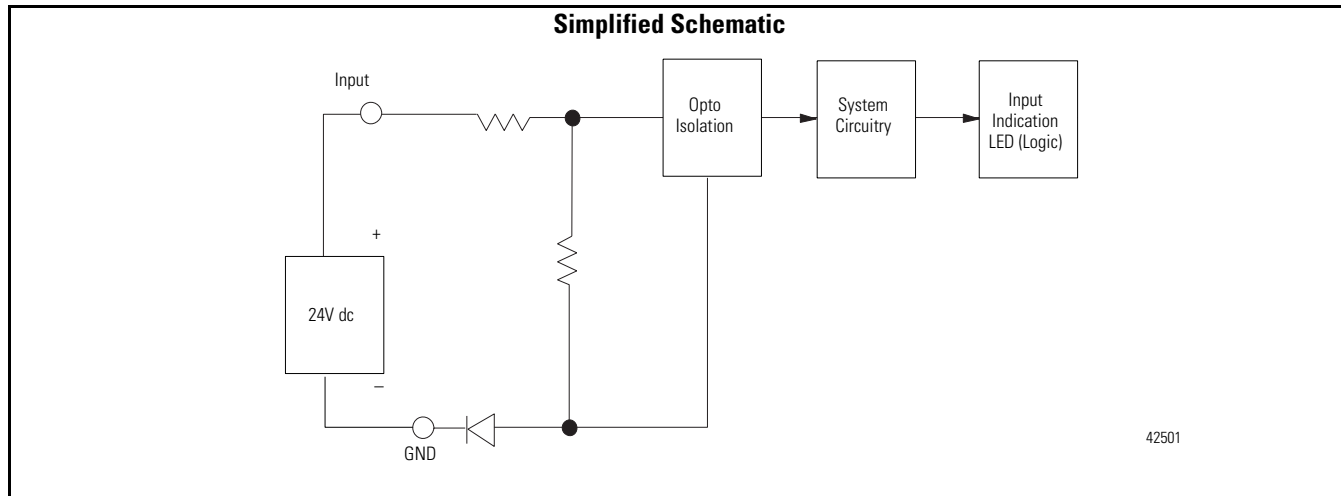| General Specifications	
Indicators	Mod/Net status - red/green Logic status - green I/O status - yellow

Communication Rate
  Thick Cable
 	
  Flat Media
	
	125Kbps @ 500m (1600ft)
	250Kbps @ 200m (600ft)
	500Kbps @ 100m (330ft)
	125Kbps @ 420m (1230ft)
	250Kbps @ 200m (490ft)
	500Kbps @ 75m (245ft)

Isolation
  Power supply to DeviceNet
  I/O group-to-group
  I/O group-to-logic
	
	500V ac
	500V ac
	500V ac

DeviceNet Power
  Voltage
  Current
	
	11–30V dc
	200mA maximum (with expansion)

Auxiliary Power
  Voltage
  Current
	
	10–30V dc
	4A maximum

Base Module Dimensions	150mm X 48mm X 38mm 5.91in X 1.9in X 1.5in

Environmental Conditions
  Operating Temperature
  Non-Operating Temperature
  Relative Humidity
  Operating Shock
    Non-operating Shock
  Vibration
	
	0 to 60°C (32 to 140°F)
	-40 to 85°C (-40 to 185°F)
	5-95% non-condensing
	30g
	50g
	tested 5g @ 10-500Hz per IEC 68-2-6

Conductors
  Wire Size
 	
  Category
	
	14 gauge (2mm^2) stranded maximum
	3/64 inch insulation maximum
	2[1, 2]

Product Certifications (where product or packaging is marked)	UL, UL Hazardous Class I, Div 2, Groups A, B, C, D. C-UL, C-UL Hazardous Class I, Div 2, Groups A, B, C, D. CE marked for all applicable directives
Enclosure	IEC IP20

[1] Use this conductor category information for planning conductor routing as described in the system level installation manual.

[2] Refer to, Programmable Controller Wiring and Grounding Guidelines, publication 1770-4.1.

16 Sinking Input Base Module
1791D-16BO

Simplified Schematic

The CompactBlock base module I/O is exchanged with the master through a poll, change-of-state, or cyclic connection.

Polled - a master initiates communication by sending its polled I/O message to the CompactBlock module. The module consumes the message, updates any outputs, and produces a response. If any inputs are present, the response will contain the input data.

Change-of-state - productions occur when an input changes. If no input change occurs within the expected packet rate, a heartbeat production occurs. This heartbeat production tells the scanner module that the CompactBlock I/O module is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the I/O block.

Cyclic - allows configuration of the block as an I/O client. The block will produce and consume its I/O cyclically at the rate configured.

The module produces 1 byte for every 8 inputs. When an expansion module is connected, an additional byte will be returned indicating the health of the expansion module.

The following table contains the connection sizes for this module:

Module	I/O Points	Produce (input bytes)	Consume (output bytes)
1791D-16B0	16 input	2	0
1791D-16B0 with expansion input	32 input	5	0
1791D-16B0 with expansion output	16 input/ 16 output	3	2

Refer to the tables below for the word/bit definitions.

Bit	07	06	05	04	03	02	01	00
Produces 0	I7	I6	I5	I4	I3	I2	I1	I0
Produces 1	I15	I14	I13	I12	I11	I10	I9	I8

Word	Bit	Description
Produces 0	00-07	Input Status bits - when the bit is set (1), the input is on. Bit 00 corresponds to input I0, bit 01 corresponds to input I1, bit 02 corresponds to input I2, bit 03 corresponds to input I3, etc.
Produces 1	08-15	Input Status bits - when the bit is set (1), the input is on. Bit 00 corresponds to input I8, bit 01 corresponds to input I9, bit 02 corresponds to input I10, bit 03 corresponds to input I11, etc.

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Wiring Connections

Input Wiring Diagram for 1791D-16BO

41671

Specifications

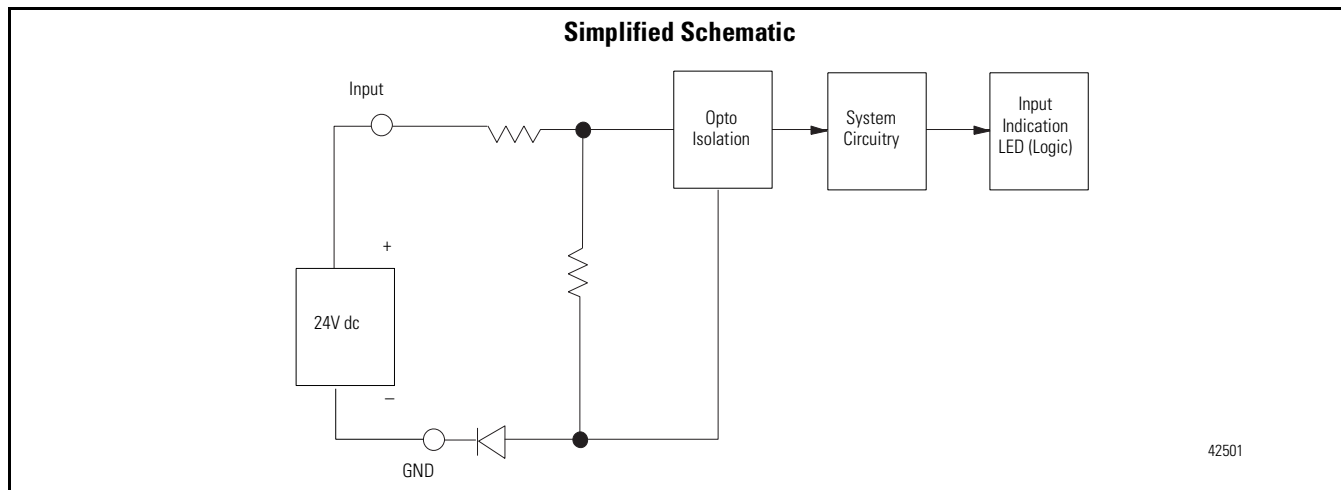| Sinking Inputs	Max	Min
Inputs per Block	2 groups of 8	
Off-state Voltage	5V	-
On-state Voltage	30V dc @ 40°C 25V dc @ 60°C	10V dc
Off-state Current	-	1.5mA @ 5V dc
On-state Current	11mA @ 30V dc	2mA @ 10V dc

General Specifications	
Indicators	Mod/Net status - red/green Logic status - green I/O status - yellow

Communication Rate
    Thick Cable
 	
    Flat Media
	
	125Kbps @ 500m (1600ft)
	250Kbps @ 200m (600ft)
	500Kbps @ 100m (330ft)
	125Kbps @ 420m (1230ft)
	250Kbps @ 200m (490ft)
	500Kbps @ 75m (245ft)

Isolation
    I/O to DeviceNet
    I/O group-to-group
    I/O group-to-logic
	
	500V ac
	500V ac
	500V ac

DeviceNet Power
    Voltage
    Current
	
	11V - 25 V dc
	200mA maximum (with expansion)

Base Module Dimensions	150mm X 48mm X 38mm 5.91in X 1.9in X 1.5in

Environmental Conditions
    Operating Temperature
    Non-Operating Temperature
    Relative Humidity
    Operating Shock
       Non-operating Shock
    Vibration
	
	0 to 60°C (32 to 140°F)
	-40 to 85°C (-40 to 185°F)
	5-95% non-condensing
	30g
	50g
	tested 5g @ 10-500Hz per IEC 68-2-6

Conductors
    Wire Size
 	
    Category
	
	14 gauge (2mm^2) stranded maximum
	3/64 inch insulation maximum
	2[1, 2]

Product Certifications	UL, UL Hazardous Class I, Div 2, Groups A, B, C, D. C-UL, C-UL Hazardous Class I, Div 2, Groups A, B, C, D. CE marked for all applicable directives
Enclosure	IEC IP20

[1] Use this conductor category information for planning conductor routing as described in the system level installation manual.

[2] Refer to, Programmable Controller Wiring and Grounding Guidelines, publication 1770-4.1.

16 Sinking Input Expansion module 1791D-16B0X

Simplified Schematic

The CompactBlock expansion module I/O is exchanged with the master through a poll, change-of-state, or cyclic connection.

Polled - a master initiates communication by sending its polled I/O message to the CompactBlock module. The module consumes the message, updates any outputs, and produces a response. If any inputs are present, the response will contain the input data.

Change-of-state - productions occur when an input changes. If no input change occurs within the expected packet rate, a heartbeat production occurs. This heartbeat production tells the scanner module that the CompactBlock I/O module is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the I/O block.

Cyclic - allows configuration of the block as an I/O client. The block will produce and consume its I/O cyclically at the rate configured.

This module produces 1 byte for every 8 inputs. When it is connected to a base module, an additional byte will be returned indicating the health of the expansion module.

The following table contains the connection sizes for this module:

Module(s)	I/O Points	Produce (input bytes)	Consume (output bytes)
1791D-16B0X with base input module	32 input	5	0
1791D-16B0X with base output module	16 input/ 16 output	3	2
1791D-16B0X with combination base module	24 input/ 8 output	4	1

Refer to the table below for the word/bit definitions.

Bit	07	06	05	04	03	02	01	00
Produces	I7	I6	I5	I4	I3	I2	I1	I0
Produces 1	I15	I14	I13	I12	I11	I10	I9	I8

Word	Bit	Description
Produces	00-07	Input Status bits - when the bit is set (1), the input is on. Bit 00 corresponds to input I0, bit 01 corresponds to input I1, bit 02 corresponds to input I2, bit 03 corresponds to input I3, etc.
Produces 1	08-15	Input Status bits - when the bit is set (1), the input is on. Bit 00 corresponds to input I8, bit 01 corresponds to input I9, bit 02 corresponds to input I10, bit 03 corresponds to input I11, etc.

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Wiring Connections

Input Wiring Diagram for 1791D-16BOX Expansion Module

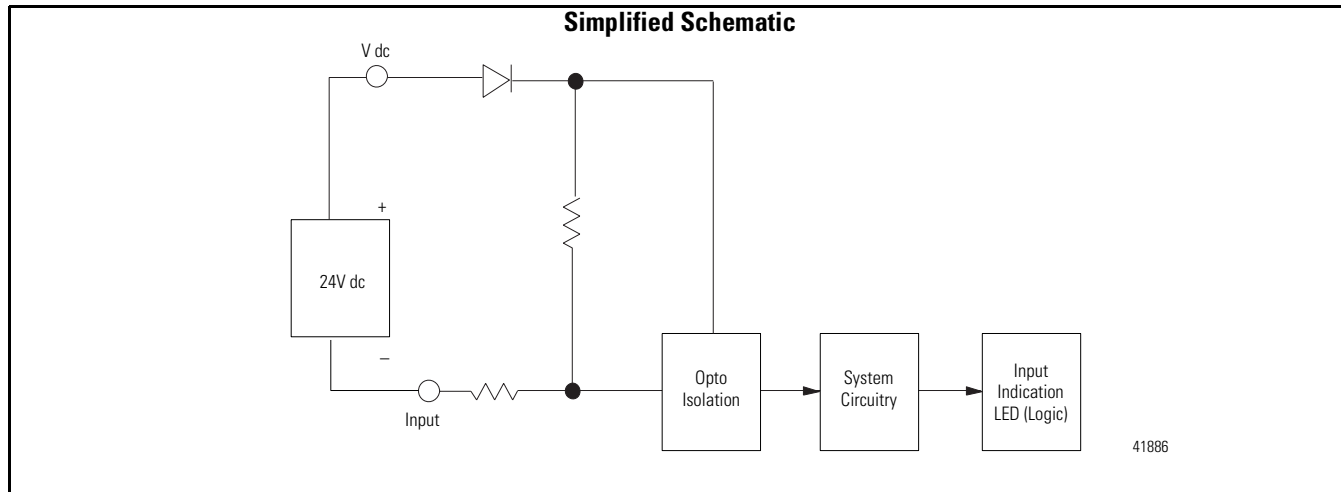| V_{DC}	IN 0	IN 2	IN 4	IN 6	V_{DC}	IN 8	IN 10	IN 12	IN 14	Not Used
	GND	IN 1	IN 3	IN 5	IN 7	GND	IN 9	IN 11	IN 13	IN 15

41671

Specifications

Sinking Inputs	Max	Min
Inputs per Block	2 groups of 8	
Off-state Voltage	5V dc	-
On-state Voltage	30V dc @ 40°C 24V dc @ 60°C	10V dc
Off-state Current	1.5mA @ 5V dc	-
On-state Current	11mA @ 30V dc	2mA @ 10V dc

General Specifications	
Indicators	Mod/Net status - red/green Logic status - green I/O status - yellow
Communication Rate Thick Cable	125Kbps @ 500m (1600ft) 250Kbps @ 200m (600ft) 500Kbps @ 100m (330ft)
Flat Media	125Kbps @ 420m (1230ft) 250Kbps @ 200m (490ft) 500Kbps @ 75m (245ft)

Isolation
    I/O to DeviceNet
    I/O group-to-group
    I/O group-to-logic
	500V ac
	500V ac
	500V ac

Expansion Power
    Voltage
    Current
	5V dc
	100mA

Expansion Module Dimensions	113mm X 48mm X 38mm 4.4in X 1.9in X 1.5in

Environmental Conditions
    Operating Temperature
    Non-Operating Temperature
    Relative Humidity
    Operating Shock
        Non-operating Shock
    Vibration
	0 to 60°C (32 to 140°F)
	-40 to 85°C (-40 to 185°F)
	5-95% non-condensing
	30 g
	50g
	tested 5g @ 10-500Hz per IEC 68-2-6

Conductors
    Wire Size
 	
    Category
	14 gauge (2mm^2) stranded maximum
	3/64 inch insulation maximum
	2[1, 2]

Product Certifications	UL, UL Hazardous Class I, Div 2, Groups A, B, C, D. C-UL, C-UL Hazardous Class I, Div 2, Groups A, B, C, D. CE marked for all applicable directives
Enclosure	IEC IP20

[1] Use this conductor category information for planning conductor routing as described in the system level installation manual.

[2] Refer to, Programmable Controller Wiring and Grounding Guidelines, publication 1770-4.1.

16 Sourcing Input Base Module 1791D-16V0

Simplified Schematic

The CompactBlock base module I/O is exchanged with the master through a poll, change-of-state, or cyclic connection.

Polled - a master initiates communication by sending its polled I/O message to the CompactBlock module. The module consumes the message, updates any outputs, and produces a response. If any inputs are present, the response will contain the input data.

Change-of-state - productions occur when an input changes. If no input change occurs within the expected packet rate, a heartbeat production occurs. This heartbeat production tells the scanner module that the CompactBlock I/O module is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the I/O block.

Cyclic - allows configuration of the block as an I/O client. The block will produce and consume its I/O cyclically at the rate configured.

The module produces 1 byte for every 8 inputs. When an expansion module is connected, an additional byte will be returned indicating the health of the expansion module.

The following table contains the connection sizes for this module:

Module(s)	I/O Points	Produce (input bytes)	Consume (output bytes)
1791D-16V0	16 input	2	0
1791D-16V0 with expansion input	32 input	5	0
1791D-16V0 with expansion output	16 input/ 16 output	3	2

Refer to the table below for the word/bit definitions.

Bit	07	06	05	04	03	02	01	00
Produces 0	I7	I6	I5	I4	I3	I2	I1	I0
Produces 1	I15	I14	I13	I12	I11	I10	I9	I8

Word	Bit	Description
Produces 0	00-07	Input Status bits - when the bit is set (1), the input is on. Bit 00 corresponds to input I0, bit 01 corresponds to input I1, bit 02 corresponds to input I2, bit 03 corresponds to input I3, etc.
Produces 1	00-07	Input Status bits - when the bit is set (1), the input is on. Bit 00 corresponds to input I8, bit 01 corresponds to input I9, bit 02 corresponds to input I10, bit 03 corresponds to input I11, etc.

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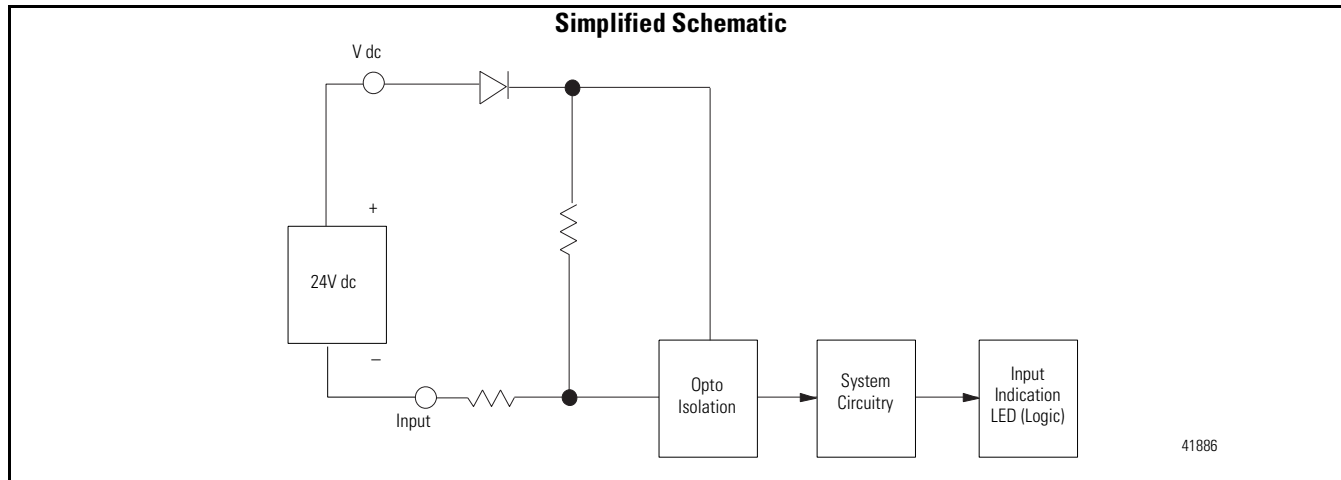## Wiring Connections

Input Wiring Diagram for 1791D-16VO

V$_{DC}$	IN 0	IN 2	IN 4	IN 6	V$_{DC}$	IN 8	IN 10	IN 12	IN 14	Not Used
GND	IN 1	IN 3	IN 5	IN 7	GND	IN 9	IN 11	IN 13	IN 15	

+

-

41670

Specifications

Sourcing Inputs	Max	Min
Inputs per Block	2 groups of 8	
Off-state Voltage	5V dc	-
On-state Voltage	30V dc @ 40°C 25V dc @ 60°C	10V dc
Off-state Current	1.5mA @ 5V dc	-
On-state Current	11mA @ 30V dc	2mA @ 10V dc

General Specifications	
Indicators	Mod/Net status - red/green Logic status - green I/O status - yellow
Communication Rate Thick Cable	125Kbps @ 500m (1600ft) 250Kbps @ 200m (600ft) 500Kbps @ 100m (330ft)
Flat Media	125Kbps @ 420m (1230ft) 250Kbps @ 200m (490ft) 500Kbps @ 75m (245ft)
Isolation I/O to DeviceNet I/O group-to-group I/O group-to-logic	500V ac 500V ac 500V ac
DeviceNet Power Voltage Current	11 - 25 V dc 200mA maximum (with expansion)
Base Module Dimensions	150mm X 48mm X 38mm 5.91in X 1.9in X 1.5in
Environmental Conditions Operating Temperature Non-Operating Temperature Relative Humidity Operating Shock Non-operating Shock Vibration	0 to 60°C (32 to 140°F) -40 to 85°C (-40 to 185°F) 5-95% non-condensing 30g 50g tested 5g @ 10-500Hz per IEC 68-2-6
Conductors Wire Size Category	14 gauge (2mm^2) stranded maximum 3/64 inch insulation maximum 2[1, 2]
Product Certifications	UL, UL Hazardous Class I, Div 2, Groups A, B, C, D. C-UL, C-UL Hazardous Class I, Div 2, Groups A, B, C, D. CE marked for all applicable directives
Enclosure	IEC IP20

[1] Use this conductor category information for planning conductor routing as described in the system level installation manual.

[2] Refer to, Programmable Controller Wiring and Grounding Guidelines, publication 1770-4.1.

16 Sourcing Input Expansion Module 1791D-16V0X

Simplified Schematic

41886

The CompactBlock expansion module I/O is exchanged with the master through a poll, change-of-state, or cyclic connection.

Polled - a master initiates communication by sending its polled I/O message to the CompactBlock module. The module consumes the message, updates any outputs, and produces a response. If any inputs are present, the response will contain the input data.

Change-of-state - productions occur when an input changes. If no input change occurs within the expected packet rate, a heartbeat production occurs. This heartbeat production tells the scanner module that the CompactBlock I/O module is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the I/O block.

Cyclic - allows configuration of the block as an I/O client. The block will produce and consume its I/O cyclically at the rate configured.

This module produces 1 byte for every 8 inputs. When it is connected to a base module, an additional byte will be returned indicating the health of the expansion module.

The following table contains the connection sizes for this module:

Module(s)	I/O Points	Produce (input bytes)	Consume (output bytes)
1791D-16B0X with base input module	32 input	5	0
1791D-16B0X with base output module	16 input/ 16 output	3	2
1791D-16B0X with combination base module	24 input/8 output	4	1

Refer to the table below for the word/bit definitions.

Bit	07	06	05	04	03	02	01	00
Produces	I7	I6	I5	I4	I3	I2	I1	I0
Produces 1	I15	I14	I13	I12	I11	I10	I9	I8

Word	Bit	Description
Produces	00-07	Input Status bits - when the bit is set (1), the input is on. Bit 00 corresponds to input I0, bit 01 corresponds to input I1, bit 02 corresponds to input I2, bit 03 corresponds to input I3, ect.
Produces 1	08-15	Input Status bits - when the bit is set (1), the input is on. Bit 00 corresponds to input I8, bit 01 corresponds to input I9, bit 02 corresponds to input I10, bit 03 corresponds to input I11, etc.

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Wiring Connections
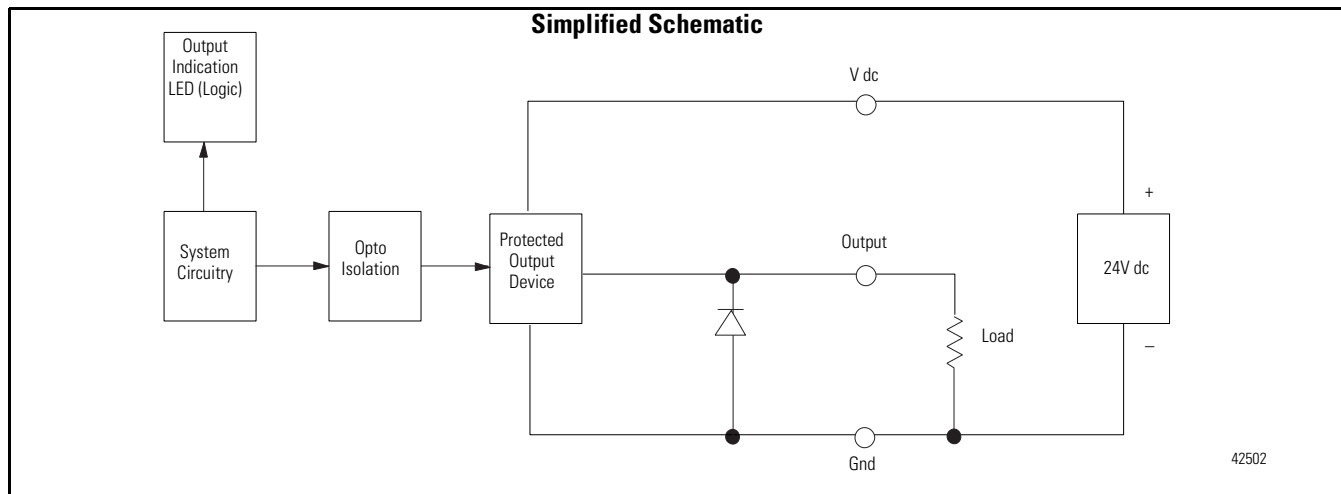
Input Wiring Diagram for 1791D-16VOX Expansion Module

V_{DC}	IN 0	IN 2	IN 4	IN 6	V_{DC}	IN 8	IN 10	IN 12	IN 14	Not Used
GND	IN 1	IN 3	IN 5	IN 7	GND	IN 9	IN 11	IN 13	IN 15	

41670

Specifications

Sourcing Inputs	Max	Min
Inputs per Block	2 groups of 8	
Off-state Voltage	5V dc	-
On-state Voltage	30V dc @ 40°C 24V dc @ 60°C	10V dc
Off-state Current	1.5mA @ 5V dc	-
On-state Current	11mA @ 30V dc	2mA @ 10V dc

General Specifications

Indicators	Mod/Net status - red/green Logic status - green I/O status - yellow
Communication Rate Thick Cable	 125Kbps @ 500m (1600ft) 250Kbps @ 200m (600ft) 500Kbps @ 100m (330ft)
Flat Media	125Kbps @ 420m (1230ft) 250Kbps @ 200m (490ft) 500Kbps @ 75m (245ft)

Isolation
    I/O to DeviceNet
    I/O group-to-group
    I/O group-to-logic
	
	500V ac
	500V ac
	500V ac

Expansion Power
    Voltage
    Current
	
	5V dc
	100mA

Expansion Module Dimensions	113mm X 48mm X 38mm 4.4in X 1.9in X 1.5in

Environmental Conditions
    Operating Temperature
    Non-Operating Temperature
    Relative Humidity
    Operating Shock
        Non-operating Shock
    Vibration
	
	0 to 60°C (32 to 140°F)
	-40 to 85°C (-40 to 185°F)
	5-95% non-condensing
	30 g
	50g
	tested 5g @ 10-500Hz per IEC 68-2-6

Conductors
    Wire Size
 	
    Category
	
	14 gauge (2mm^2) stranded maximum
	3/64 inch insulation maximum
	2[1, 2]

Product Certifications	UL, UL Hazardous Class I, Div 2, Groups A, B, C, D. C-UL, C-UL Hazardous Class I, Div 2, Groups A, B, C, D. CE marked for all applicable directives
Enclosure	IEC IP20

[1] Use this conductor category information for planning conductor routing as described in the system level installation manual.

[2] Refer to, Programmable Controller Wiring and Grounding Guidelines, publication 1770-4.1.

8 Sourcing Output Base Module 1791D-0B8P

Simplified Schematic

The CompactBlock base module I/O is exchanged with the master through a poll, change-of-state, or cyclic connection.

Polled - a master initiates communication by sending its polled I/O message to the CompactBlock module. The module consumes the message, updates any outputs, and produces a response. If any inputs are present, the response will contain the input data.

Change-of-state - productions occur when an input changes. If no input change occurs within the expected packet rate, a heartbeat production occurs. This heartbeat production tells the scanner module that the CompactBlock I/O module is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the I/O block.

Cyclic - allows configuration of the block as an I/O client. The block will produce and consume its I/O cyclically at the rate configured.

The module consumes 1 byte for every 8 outputs. When an expansion module is connected, an additional byte will be returned indicating the health of the expansion module.

The following table contains connection sizes for this module:

Module	I/O Points	Produce (input bytes)	Consume (output bytes)
1791D-0B8P	8 outputs	0	1
1791D-0B8P with expansion output	24 outputs	1	3
1791D-0B8P with expansion input	8 output/ 16 inputs	3	1

Refer to the tables below for the word/bit definitions.

Bit	07	06	05	04	03	02	01	00
Consumes 0	07	06	05	04	03	02	01	00

Word	Bit	Description
Consumes 0	00-07	Output bits - when the bit is set (1), the output will be turned on. Bit 00 corresponds to output 00, bit 01 corresponds to output 01, bit 02 to output 02, bit 03 to output 03, etc.

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Wiring Connections

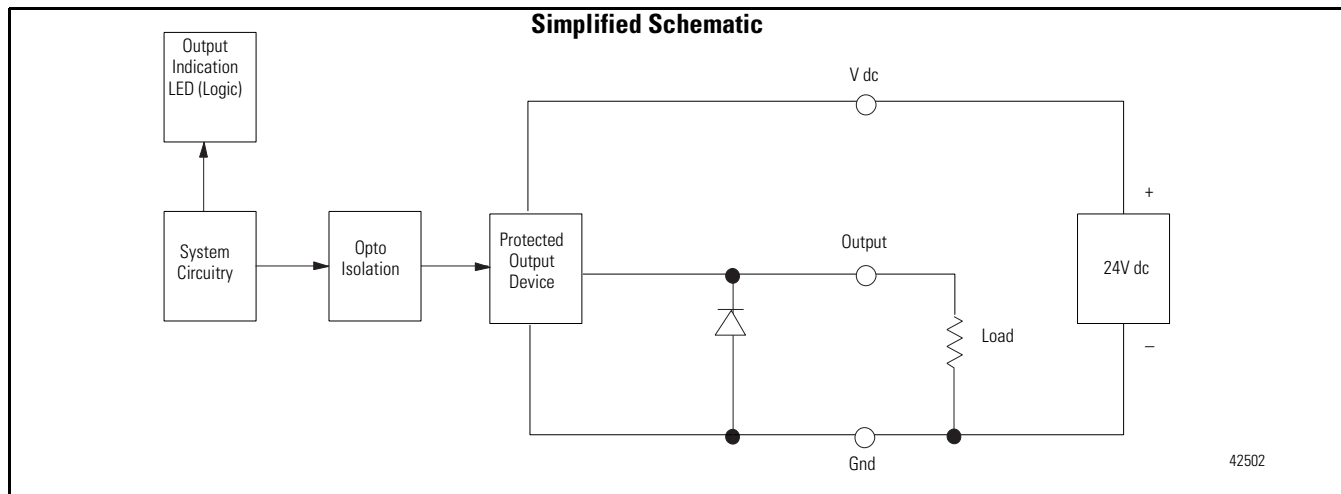*Output Wiring Diagram for 1791D-OB8P*

42345

Specifications

Sourcing Outputs	
Outputs per Block	8
On-state Voltage Range	10 - 30V dc
On-state Voltage Drop	0.5V dc @ rated current
On-state Current	0.5A maximum
Off-state Leakage	1.0mA maximum
Module Current (all outputs)	4.0A maximum
Surge Current - for 10ms, repeatable every 2 s	1.0A maximum

General Specifications	
Indicators	Mod/Net status - red/green Logic status - green I/O status - yellow

Communication Rate
    Thick Cable
 	
    Flat Media
	
	125Kbps @ 500m (1600ft)
	250Kbps @ 200m (600ft)
	500Kbps @ 100m (330ft)
	
	125Kbps @ 420m (1230ft)
	250Kbps @ 200m (490ft)
	500Kbps @ 75m (245ft)

Isolation
    I/O to DeviceNet
    I/O group-to-group
    I/O group-to-logic
	
	500V ac
	500V ac
	500V ac

DeviceNet Power
    Voltage
    Current
	
	11V - 25 V dc
	200mA maximum (with expansion)

Auxiliary Power
    Voltage
    Current
	
	10 - 30V dc
	4A maximum

Base Module Dimensions	150mm X 48mm X 38mm 5.91 in X 1.9 in X 1.5 in

Environmental Conditions
    Operating Temperature
    Non-Operating Temperature
    Relative Humidity
    Operating Shock
        Non-operating Shock
    Vibration
	
	0 to 60°C (32 to 140°F)
	-40 to 85°C (-40 to 185°F)
	5-95% non-condensing
	30g
	50g
	tested 5g @ 10-500Hz per IEC 68-2-6

Conductors
    Wire Size
 	
    Category
	
	14 gauge (2mm^2) stranded maximum
	3/64 inch insulation maximum
	2[1, 2]

Product Certifications	UL, UL Hazardous Class I, Div 2, Groups A, B, C, D. C-UL, C-UL Hazardous Class I, Div 2, Groups A, B, C, D. CE marked for all applicable directives
Enclosure	IEC IP20

[1] Use this conductor category information for planning conductor routing as described in the system level installation manual.

[2] Refer to, Programmable Controller Wiring and Grounding Guidelines, publication 1770-4.1.

16 Sourcing Output Base Module 1791D-0B16P

Simplified Schematic

Output Indication LED (Logic)

System Circuitry

Opto Isolation

Protected Output Device

V dc

Output

24V dc

Load

Gnd

+

−

42502

The CompactBlock base module I/O is exchanged with the master through a poll, change-of-state, or cyclic connection.

Polled - a master initiates communication by sending its polled I/O message to the CompactBlock module. The module consumes the message, updates any outputs, and produces a response. If any inputs are present, the response will contain the input data.

Change-of-state - productions occur when an input changes. If no input change occurs within the expected packet rate, a heartbeat production occurs. This heartbeat production tells the scanner module that the CompactBlock I/O module is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the I/O block.

Cyclic - allows configuration of the block as an I/O client. The block will produce and consume its I/O cyclically at the rate configured.

The module consumes 1 byte for every 8 outputs. When an expansion module is connected, an additional byte will be returned indicating the health of the expansion module.

The following table contains connection sizes for this module:

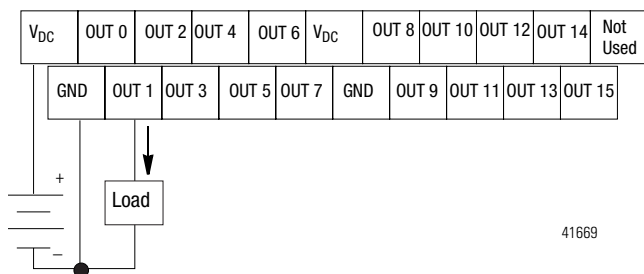| Module	I/O Points	Produce (input bytes)	Consume (output bytes)
1791D-0B16P	16 outputs	0	2
1791D-0B16P with expansion output	32 outputs	1	4
1791D-0B16P with expansion input	16 output/ 16 inputs	3	2

Refer to the tables below for the word/bit definitions.

Bit	07	06	05	04	03	02	01	00
Consumes 0	O7	O6	O5	O4	O3	O2	O1	O0
Consumes 1	O15	O14	O13	O12	O11	O10	O9	O8

Word	Bit	Description
Consumes 0	00-07	Output bits - when the bit is set (1), the output will be turned on. Bit 00 corresponds to output O0, bit 01 corresponds to output O1, bit 02 to output O2, bit 03 to output O3, etc.
Consumes 1	08-15	Output bits - when the bit is set (1), the output will be turned on. Bit 00 corresponds to output O8, bit 01 corresponds to output O9, bit 02 to output O10, bit 03 to output O11, etc.

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Wiring Connections

Output Wiring Diagram for 1791D-OB16P
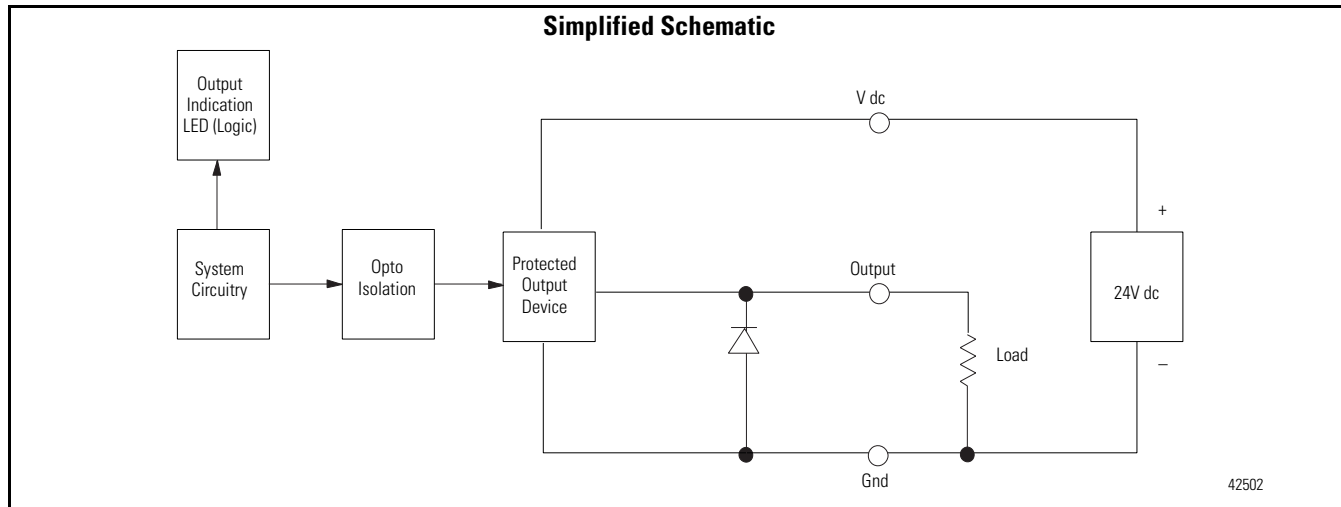

41669

Specifications

Sourcing Outputs	
Outputs per Block	2 groups of 8
On-state Voltage Range	10 - 30V dc
On-state Voltage Drop	0.5V dc @ rated current
On-state Current	0.5A maximum
Off-state Leakage	1.0mA maximum
Module Current (all outputs)	4.0A maximum
Surge Current - for 10ms, repeatable every 2 s	1.0A maximum

General Specifications	
Indicators	Mod/Net status - red/green Logic status - green I/O status - yellow

Communication Rate
  Thick Cable
 	
  Flat Media
	
	125Kbps @ 500m (1600ft)
	250Kbps @ 200m (600ft)
	500Kbps @ 100m (330ft)
	
	125Kbps @ 420m (1230ft)
	250Kbps @ 200m (490ft)
	500Kbps @ 75m (245ft)

Isolation
  I/O to DeviceNet
  I/O group-to-group
  I/O group-to-logic
	
	500V ac
	500V ac
	500V ac

DeviceNet Power
  Voltage
  Current
	
	11V - 25 V dc
	200mA maximum (with expansion)

Auxiliary Power
  Voltage
  Current
	
	10 - 30V dc
	4A maximum

Base Module Dimensions	150mm X 48mm X 38mm 5.91 in X 1.9 in X 1.5 in

Environmental Conditions
  Operating Temperature
  Non-Operating Temperature
  Relative Humidity
  Operating Shock
    Non-operating Shock
  Vibration
	
	0 to 60°C (32 to 140°F)
	-40 to 85°C (-40 to 185°F)
	5-95% non-condensing
	30g
	50g
	tested 5g @ 10-500Hz per IEC 68-2-6

Conductors
  Wire Size
 	
  Category
	
	14 gauge (2mm^2) stranded maximum
	3/64 inch insulation maximum
	2[1, 2]

Product Certifications	UL, UL Hazardous Class I, Div 2, Groups A, B, C, D. C-UL, C-UL Hazardous Class I, Div 2, Groups A, B, C, D. CE marked for all applicable directives
Enclosure	IEC IP20

[1] Use this conductor category information for planning conductor routing as described in the system level installation manual.

[2] Refer to, Programmable Controller Wiring and Grounding Guidelines, publication 1770-4.1.

16 Sourcing Output Expansion Module 1791D-0B16PX

Simplified Schematic

The CompactBlock expansion module I/O is exchanged with the master through a poll, change-of-state, or cyclic connection.

Polled - a master initiates communication by sending its polled I/O message to the CompactBlock module. The module consumes the message, updates any outputs, and produces a response. If any inputs are present, the response will contain the input data.

Change-of-state - productions occur when an input changes. If no input change occurs within the expected packet rate, a heartbeat production occurs. This heartbeat production tells the scanner module that the CompactBlock I/O module is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the I/O block.

Cyclic - allows configuration of the block as an I/O client. The block will produce and consume its I/O cyclically at the rate configured.

This modules consumes 1 byte for every 8 outputs. When it is connected to a base module, an additional byte will be returned indicating the health of the expansion module.

The following table contains connection sizes for this module:

Module(s)	I/O Points	Produce (input bytes)	Consume (output bytes)
1791D-0B16PX with base input module	16 input/16 output	3	2
1791D-0B16PX with base output module	32 output	1	4
1791D-0B16PX with combination base module	8 input/ 24 output	2	3

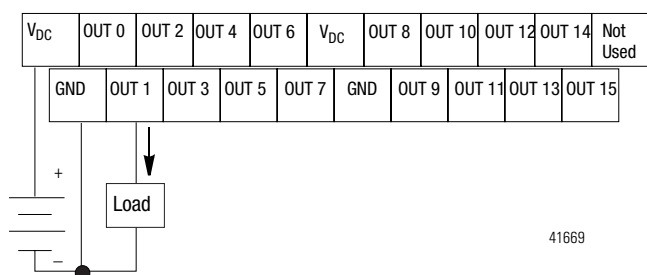Refer to the table below for the word/bit definitions.

Bit	07	06	05	04	03	02	01	00
Consumes 0	O7	O6	O5	O4	O3	O2	O1	O0
Consumes 1	O15	O14	O13	O12	O11	O10	O9	O8

Word	Bit	Description
Consumes 0	00-07	Output bits - when the bit is set (1), the output will be turned on. Bit 00 corresponds to output O0, bit 01 corresponds to output O1, bit 02 to output O2, bit 03 to output O3, etc.
Consumes 1	08-15	Output bits - when the bit is set (1), the output will be turned on. Bit 00 corresponds to output O8, bit 01 corresponds to output O9, bit 02 to output O10, bit 03 to output O11, etc.

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Wiring Connections
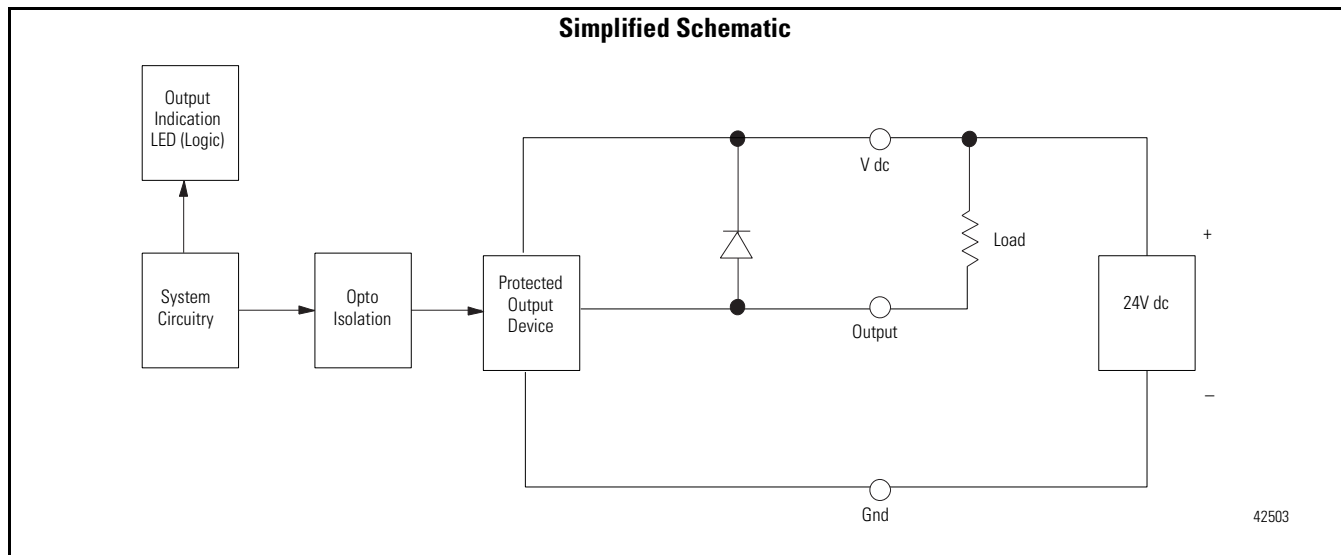
Output Wiring Diagram for 1791D-OB16PX Expansion Module

V_{DC}	OUT 0	OUT 2	OUT 4	OUT 6	V_{DC}	OUT 8	OUT 10	OUT 12	OUT 14	Not Used
	GND	OUT 1	OUT 3	OUT 5	OUT 7	GND	OUT 9	OUT 11	OUT 13	OUT 15

41669

Specifications

Sourcing Outputs

Outputs per Block	2 groups of 8
On-state Voltage Range	10 - 30V dc
On-state Voltage Drop	0.5V dc @ rated current
On-state Current	0.5A maximum
Off-state Leakage	1.0mA maximum
Module Current (all outputs)	4.0A maximum
Surge Current - for 10ms, repeatable every 2 s	1.0A maximum

General Specifications

Indicators	Mod/Net status - red/green Logic status - green I/O status - yellow
Communication Rate Thick Cable	 125Kbps @ 500m (1600ft) 250Kbps @ 200m (600ft) 500Kbps @ 100m (330ft)
Flat Media	125Kbps @ 420m (1230ft) 250Kbps @ 200m (490ft) 500Kbps @ 75m (245ft)

Isolation
    I/O to DeviceNet
    I/O group-to-group
    I/O group-to-logic
	
	500V ac
	500V ac
	500V ac

Expansion Power
    Voltage
    Current
	
	5V dc
	100mA

Auxiliary Power
    Voltage
    Current
	
	10 - 30V dc
	4A maximum

Expansion Module Dimensions	113mm X 48mm X 38mm 4.4in X 1.9in X 1.5in

Environmental Conditions
    Operating Temperature
    Non-Operating Temperature
    Relative Humidity
    Operating Shock
        Non-operating Shock
    Vibration
	
	0 to 60°C (32 to 140°F)
	-40 to 85°C (-40 to 185°F)
	5-95% non-condensing
	30g
	50g
	tested 5g @ 10-500Hz per IEC 68-2-6

Conductors
    Wire Size
 	
    Category
	
	14 gauge (2mm^2) stranded maximum
	3/64 inch insulation maximum
	2[1, 2]

Product Certifications	UL, UL Hazardous Class I, Div 2, Groups A, B, C, D. C-UL, C-UL Hazardous Class I, Div 2, Groups A, B, C, D. CE marked for all applicable directives
Enclosure	IEC IP20

[1] Use this conductor category information for planning conductor routing as described in the system level installation manual.

[2] Refer to, Programmable Controller Wiring and Grounding Guidelines, publication 1770-4.1.

16 Sourcing Output Base Module 1791D-0V16P

Simplified Schematic

The CompactBlock base module I/O is exchanged with the master through a poll, change-of-state, or cyclic connection.

Polled - a master initiates communication by sending its polled I/O message to the CompactBlock module. The module consumes the message, updates any outputs, and produces a response. If any inputs are present, the response will contain the input data.

Change-of-state - productions occur when an input changes. If no input change occurs within the expected packet rate, a heartbeat production occurs. This heartbeat production tells the scanner module that the CompactBlock I/O module is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the I/O block.

Cyclic - allows configuration of the block as an I/O client. The block will produce and consume its I/O cyclically at the rate configured.

The module consumes 1 byte for every 8 outputs. When an expansion module is connected, an additional byte will be returned indicating the health of the expansion module.

The following table contains connection sizes for this module:

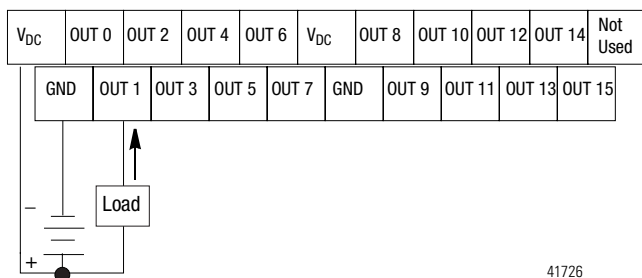| Module(s)	I/O Points	Produce (input bytes)	Consume (output bytes)
1791D-0V16P	16 output	0	2
1791D-0V16P with expansion output	32 output	1	4
1791D-0V16P with expansion input	16 output/ 16 input	3	2

Refer to the table below for the word/bit definitions.

Bit	07	06	05	04	03	02	01	00
Consumes 0	O7	O6	O5	O4	O3	O2	O1	O0
Consumes 1	O15	O14	O13	O12	O11	O10	O9	O8

Word	Bit	Description
Consumes 0	00-07	Output bits - when the bit is set (1), the output will be turned on. Bit 00 corresponds to output O0, bit 01 corresponds to output O1, bit 02 to output O2, bit 03 to output O3, etc.
Consumes 1	08-15	Output bits - when the bit is set (1), the output will be turned on. Bit 00 corresponds to output O8, bit 01 corresponds to output O9, bit 02 to output O10, bit 03 to output O11, etc.

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Wiring Connections

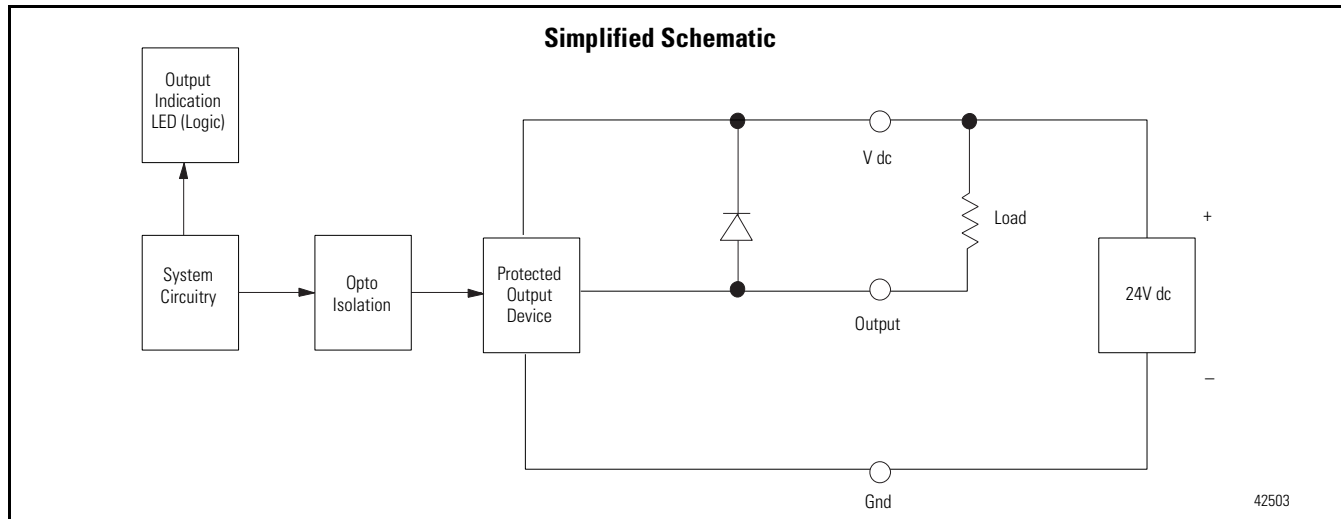*Output Wiring Diagram for 1791D-OV16P*

41726

Specifications

Sourcing Outputs	
Outputs per Block	2 groups of 8
On-state Voltage Range	10 - 30V dc
On-state Voltage Drop	0.5V dc @ rated current
On-state Current	0.5A maximum
Off-state Leakage	1.0mA maximum
Module Current (all outputs)	4.0A maximum
Surge Current - for 10ms repeatable every 2 s	1.0A maximum

General Specifications	
Indicators	Mod/Net status - red/green Logic status - green I/O status - yellow

Communication Rate
    Thick Cable
 	
    Flat Media
	
	125Kbps @ 500m (1600ft)
	250Kbps @ 200m (600ft)
	500Kbps @ 100m (330ft)
	125Kbps @ 420m (1230ft)
	250Kbps @ 200m (490ft)
	500Kbps @ 75m (245ft)

Isolation
    I/O to DeviceNet
    I/O group-to-group
    I/O group-to-logic
	
	500V ac
	500V ac
	500V ac

DeviceNet Power
    Voltage
    Current
	
	11V - 25 V dc
	200mA maximum (with expansion)

Auxiliary Power
    Voltage
    Current
	
	10 - 30V dc
	4A maximum

Base Module Dimensions	150mm X 48mm X 38mm 5.91in X 1.9in X 1.5in

Environmental Conditions
    Operating Temperature
    Non-Operating Temperature
    Relative Humidity
    Operating Shock
        Non-operating Shock
    Vibration
	
	0 to 60°C (32 to 140°F)
	-40 to 85°C (-40 to 185°F)
	5-95% non-condensing
	30 g
	50g
	tested 5g @ 10-500Hz per IEC 68-2-6

Conductors
    Wire Size
 	
    Category
	
	14 gauge (2mm^2) stranded maximum
	3/64 inch insulation maximum
	2[1, 2]

Product Certifications	UL, UL Hazardous Class I, Div 2, Groups A, B, C, D. C-UL, C-UL Hazardous Class I, Div 2, Groups A, B, C, D. CE marked for all applicable directives
Enclosure	IEC IP20

[1] Use this conductor category information for planning conductor routing as described in the system level installation manual.

[2] Refer to, Programmable Controller Wiring and Grounding Guidelines, publication 1770-4.1.

16 Sourcing Output Expansion Module 1791D-0V16PX

Simplified Schematic

Output Indication LED (Logic)

System Circuitry

Opto Isolation

Protected Output Device

V dc

Load

Output

24V dc

+

−

Gnd

42503

The CompactBlock expansion module I/O is exchanged with the master through a poll, change-of-state, or cyclic connection.

Polled - a master initiates communication by sending its polled I/O message to the CompactBlock module. The module consumes the message, updates any outputs, and produces a response. If any inputs are present, the response will contain the input data.

Change-of-state - productions occur when an input changes. If no input change occurs within the expected packet rate, a heartbeat production occurs. This heartbeat production tells the scanner module that the CompactBlock I/O module is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the I/O block.

Cyclic - allows configuration of the block as an I/O client. The block will produce and consume its I/O cyclically at the rate configured.

This module produces 1 byte for every 8 outputs. When it is connected to a base module, an additional byte will be returned indicating the health of the expansion module.

The following table contains connection sizes for this module:

| Module(s)	I/O Points	Produce (input bytes)	Consume (output bytes)
1791D-0V16PX with base output module	32 output	1	4
1791D-0V16PX with base input module	16 input/ 16 output	3	2
1791D-0V16PX with combination base module	24 output/ 8 input	2	3

Refer to the table below for the word/bit definitions.

Bit	07	06	05	04	03	02	01	00
Consumes 0	07	06	05	04	03	02	01	00
Consumes 1	015	014	013	012	011	010	09	08

Word	Bit	Description
Consumes 0	00-07	Output bits - when the bit is set (1), the output will be turned on. Bit 00 corresponds to output 00, bit 01 corresponds to output 01, bit 02 to output 02, bit 03 to output 03, etc.
Consumes 1	08-15	Output bits - when the bit is set (1), the output will be turned on. Bit 00 corresponds to output 08, bit 01 corresponds to output 09, bit 02 to output 010, bit 03 to output 011, etc.

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Wiring Connections

Output Wiring Diagram for 1791D-OV16PX Expansion Module

41726
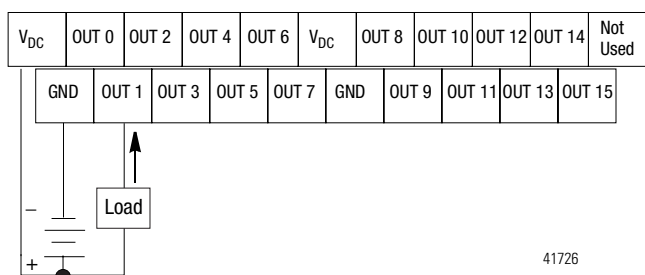
Specifications

Sinking Outputs	
Outputs per Block	2 groups of 8
On-state Voltage Range	10 - 30V dc
On-state Voltage Drop	0.5V dc @ rated current
On-state Current	0.5A maximum
Off-state Leakage	1.0mA maximum
Module Current (all outputs)	4.0A maximum
Surge Current - for 10ms repeatable every 2 s	1.0A maximum

General Specifications	
Indicators	Mod/Net status - red/green Logic status - green I/O status - yellow

Communication Rate
    Thick Cable
 	
    Flat Media
	
	125Kbps @ 500m (1600ft)
	250Kbps @ 200m (600ft)
	500Kbps @ 100m (330ft)
	125Kbps @ 420m (1230ft)
	250Kbps @ 200m (490ft)
	500Kbps @ 75m (245ft)

Isolation
    I/O to DeviceNet
    I/O group-to-group
    I/O group-to-logic
	
	500V ac
	500V ac
	500V ac

Expansion Power
    Voltage
    Current
	
	5V dc
	100mA

Auxiliary Power
    Voltage
    Current
	
	10 - 30V dc
	4A maximum

Base Module Dimensions	113mm X 48mm X 38mm 4.4in X 1.9in X 1.5in

Environmental Conditions
    Operating Temperature
    Non-Operating Temperature
    Relative Humidity
    Operating Shock
        Non-operating Shock
    Vibration
	
	0 to 60°C (32 to 140°F)
	-40 to 85°C (-40 to 185°F)
	5-95% non-condensing
	30g
	50g
	tested 5g @ 10-500Hz per IEC 68-2-6

Conductors
    Wire Size
 	
    Category
	
	14 gauge (2mm^2) stranded maximum
	3/64 inch insulation maximum
	2[1, 2]

Product Certifications	UL, UL Hazardous Class I, Div 2, Groups A, B, C, D. C-UL, C-UL Hazardous Class I, Div 2, Groups A, B, C, D. CE marked for all applicable directives
Enclosure	IEC IP20

[1] Use this conductor category information for planning conductor routing as described in the system level installation manual.

[2] Refer to, Programmable Controller Wiring and Grounding Guidelines, publication 1770-4.1.

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