

I/O connection diagrams have been moved to publication [B112/I/O, "I/O Connection Diagrams."](#)

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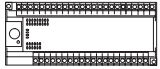
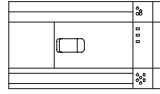
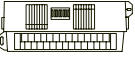


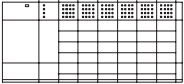
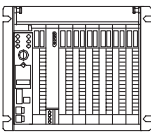
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Heading	Content
I/O Form Factors	A brief overview of each form factor of I/O available and the characteristics that differentiate it from each of the other I/O form factors. Differentiating factors include: <ul style="list-style-type: none"> • whether the I/O is modular • which processors are compatible • what kind of I/O communication is available • what kind of I/O is available.
I/O Scanner Modules	A full description of each specific I/O scanner module that is not an integral part of a PLC or SLC processor. An I/O scanner interfaces a processor to I/O adapters across an I/O link.
Direct Communication Modules	A full description of each direct communication module. A direct communication module provides a remote I/O adapter port for a processor.
I/O Adapter Modules	A full description of each I/O adapter module. An I/O adapter interfaces I/O modules to an I/O scanner port across an I/O link.
I/O Block Families	An overview of each family of I/O block. To pick out a specific I/O block, proceed to the selection charts for the I/O block family.
I/O Module Families	An overview of each family of I/O module. To pick out a specific I/O module, proceed to the selection charts for the I/O module family.
1770 I/O Communication Products	A full description of the smart transmitter (HART® protocol) interface products.
Selection Charts	Selection charts for all I/O blocks and I/O modules. The charts are broken down first by function and then by form factor.
Process Control, Positioning, and Specialized I/O Modules	A full description of each I/O module that's too unique to differentiate adequately in the selection charts.
1402 Specialized Modules	A full description of the line synchronization module.

		Digital	Analog	Positioning	Process Control	Specialized	Prod. Page
Fixed	1761 I/O on Fixed-Hardware Controllers  <ul style="list-style-type: none"> Local I/O 	✓					1-3
	<ul style="list-style-type: none"> MicroLogix 1000 Controllers offer 16 or 32 fixed digital I/O. 						
Block	1747 I/O on Fixed-Hardware Controllers  <ul style="list-style-type: none"> Local I/O 	✓					1-5
	<ul style="list-style-type: none"> SLC 500 controllers offer 20, 30, or 40 fixed digital I/O. 						
Block	1791 I/O Blocks  <ul style="list-style-type: none"> Universal Remote I/O 	✓	✓				3-16
	<ul style="list-style-type: none"> An I/O block is a compact integrated unit. Has a built-in power supply. Has a built-in remote I/O adapter. Can be used in a PLC or SLC system on a remote I/O link. 						
Block	1792 ArmorBlock I/O Blocks  <ul style="list-style-type: none"> DeviceNet I/O 	✓					3-17
	<ul style="list-style-type: none"> An I/O block is a compact integrated unit. Has a built-in power supply. Has a built-in DeviceNet I/O adapter. No enclosure required. Can be used in a PLC or SLC system on a DeviceNet network. 						
Modular	1794 FLEX I/O™ Modules  <ul style="list-style-type: none"> ControlNet I/O Universal Remote I/O DeviceNet I/O 	✓	✓				3-18
	<ul style="list-style-type: none"> The 1794 FLEX I/O come in a compact modular assembly. Configure the size of the backplane by plugging in terminal bases. Connect I/O directly thru terminal bases — no separate terminal blocks. In a PLC system on a ControlNet network. In a PLC or SLC system on a remote I/O or DeviceNet network. 						
Modular	1746 I/O Modules  <ul style="list-style-type: none"> Local I/O Universal Remote I/O 	✓	✓	✓			3-20
	<ul style="list-style-type: none"> The 1746 I/O come in a compact modular assembly. In expansion slots of a fixed-hardware-style SLC controller. In the local chassis of a modular SLC controller. In a PLC system on a ControlNet network. In a PLC or SLC system on a universal remote I/O link. 						
Modular	1771 I/O Modules  <ul style="list-style-type: none"> Local I/O Extended-Local I/O ControlNet I/O Universal Remote I/O 	✓	✓	✓	✓	✓	3-21
	<ul style="list-style-type: none"> The 1771 I/O provide a full range of I/O in a modular assembly. In the processor-resident local chassis of a PLC-5 controller. In a PLC system on an extended-local I/O or ControlNet network. In a PLC or SLC system on a universal remote I/O link. 						
Modular	Smart Transmitter Interface <ul style="list-style-type: none"> Universal Remote I/O 	✓	✓				3-22
	<ul style="list-style-type: none"> Interfaces with smart transmitters. Uses HART protocol. Decodes digital signals embedded in analog loop. 						

I/O Scanner Modules
SLC 500 DeviceNet Scanner Module
 (Cat. No. 1747-SDN)



The SLC 500 DeviceNet scanner acts as an interface between DeviceNet devices and the SLC processor. The 1747-SDN is a single-slot I/O module that resides in the SLC modular chassis and provides a connection to one DeviceNet network. The scanner can communicate with 63 DeviceNet devices over the DeviceNet network to read inputs from a device, write outputs to a device, and monitor a device's operational status.

Scanner communication with the processor can be in the form of M1/M0 files and/or the I/O image. You can map input data into a maximum of 150 words in an M1 file and a maximum of 32 words (for high-priority data) in the input image. You can map output data into a maximum of 150 words in an M0 file and a maximum of 32 words (for high-priority data) in the output image.

The SLC 500 DeviceNet scanner is compatible with the SLC 5/02, 5/03, and 5/04 processors mounted in the leftmost slot of a 1746-A4, -A7, -A10, or -A13 local SLC chassis. The number of DeviceNet scanners that can reside in the same SLC chassis is limited only by chassis size, power supply capacity, and available memory.

Features

- Can be connected to a maximum of 63 slave devices on one DeviceNet network
- Can be configured as a master and a slave to another DeviceNet scanner, so that the scanners can transfer data between each other, while at the same time each can pass I/O data back and forth with its own slave devices
- Can transfer up to 150 words of input data and 150 words of output data through M1/M0 files
- Can transfer up to 32 input image words and 32 output image words of high-priority I/O data
- Has a two-digit LED display for network and module status and diagnostics that facilitates troubleshooting

- Has a diagnostic device failure table that you can monitor from the SLC processor ladder logic
- DeviceNet time can be saved by not transferring I/O values unless a change-of-state (COS) has occurred.
- DeviceNet transfer of I/O data can be scheduled (cyclic data)

Specifications



DeviceNet Data	Strobe, poll, COS, or cyclic I/O data. Configurable data parameters include: <ul style="list-style-type: none"> • Complete data mapping between M files and I/O image to DeviceNet devices • Background poll rate • Strobe or poll for each node
SLC Processor-to-Scanner Communication	<ul style="list-style-type: none"> • M1/M0 File Transfer of 150 words input / 150 words output • I/O Image Transfer of 32 words input / 32 words output
Power Consumption	DeviceNet Current Load: 90 mA maximum Backplane Current Load: 500 mA @ 5V dc
Communication Rates	125k bit/s, 250k bit/s, 500k bit/s
Messaging Capabilities	Master: Poll, strobe, COS, or cyclic Explicit: Initiate and respond
Isolation	<ul style="list-style-type: none"> • Optical isolation between backplane and DeviceNet channel • 1 MΩ resistor from Channel 1 to chassis
Module Location	Any slot except left-most slot of any local chassis in a modular SLC system
Network Address	00 - 63
Environmental Conditions	Operating Temperature: 0 to 60° C (32 to 140° F) Storage Temperature: -40 to 85° C (-40 to 185° F) Relative Humidity: 5 to 95% (without condensation) Shock Unpackaged Operating 30g Non-operating 50g Vibration Unpackaged 5g from 10 to 150 Hz
Weight	0.3 kg (0.6 lb)

For more information, see the *DeviceNet Product Overview*, publication [DN-2.5](#).

Typical Configuration

For a drawing showing a typical DeviceNet configuration that includes the SLC 500 DeviceNet Scanner Module, see page [5-27](#).

PLC DeviceNet Scanner Module

(Cat. No. 1771-SDN)



The PLC DeviceNet scanner acts as an interface between DeviceNet devices and a PLC processor. The DeviceNet scanner provides connections to two DeviceNet networks.

Input data gathered by the scanner from the two DeviceNet networks is block-transferred and single-transferred to PLC processors. The size of the single-transfer depends on the 1771 I/O address mode: 1/2-slot addressing provides a maximum of 24 bits of input image and 24 bits out of output image, and 1-slot addressing provides up to 8 bits of input image and 8 bits of output image (2-slot addressing does not provide any single-transfer). Data to and from DeviceNet devices can be user-mapped into I/O image (as available) for single-transfer, or into areas for block-transfers.

The DeviceNet scanner is a single-slot module that can reside in a 1771 I/O chassis that either contains PLC processor or is on an extended-local I/O link, universal remote I/O link, or ControlNet network connected to a PLC processor. The number of PLC DeviceNet scanners that can reside in the same I/O chassis is limited only by the I/O chassis size, power supply capacity, and available memory.

Features

- Has two channels that let you connect to two DeviceNet networks
- Lets you connect up to 63 slave devices per channel
- Lets you install multiple scanners in a local I/O chassis or in an I/O chassis on an I/O link
- Has a two-digit LED display for network and module status and diagnostics, which facilitates troubleshooting and maintenance
- Module reset pushbutton
- Communicates with PLC processors via bi-directional block-transfers and single-transfers

- Can block-transfer a maximum of 358 words of input data and 358 words of output data (blocks of 62, 61, 60, 59, 58, and 57 words)
- Provides a maximum of 24 input image bits and 24 output image bits for single-transfer of high-priority I/O data, depending on I/O addressing density
- DeviceNet time can be saved by not transferring I/O values unless a change-of-state (COS) has occurred.
- DeviceNet transfer of I/O data can be scheduled (cyclic data)

Specifications



DeviceNet Data	Strobe, poll, COS, or cyclic I/O data Configurable data parameters include: <ul style="list-style-type: none"> • Complete data mapping between block transfer and I/O image tables and DeviceNet devices • Background poll rate • Strobe or poll for each node 								
PLC Processor-to-Scanner Communication	Block Transfers: 242 input words / 242 output words Single-Transfers: <table border="1"> <thead> <tr> <th>Addressing</th> <th>I/O Image Available</th> </tr> </thead> <tbody> <tr> <td>2-slot:</td> <td>0 bits in / 0 bits out</td> </tr> <tr> <td>1-slot:</td> <td>8 bits in / 8 bits out</td> </tr> <tr> <td>1/2-slot:</td> <td>24 bits in / 24 bits out</td> </tr> </tbody> </table>	Addressing	I/O Image Available	2-slot:	0 bits in / 0 bits out	1-slot:	8 bits in / 8 bits out	1/2-slot:	24 bits in / 24 bits out
Addressing	I/O Image Available								
2-slot:	0 bits in / 0 bits out								
1-slot:	8 bits in / 8 bits out								
1/2-slot:	24 bits in / 24 bits out								
Power Consumption	DeviceNet Current Load: 90 mA (max) per channel Backplane Current Load: 1.2A @ 5V dc max.								
Communication Rates	125k bits/s, 250k bits/s, 500k bits/s								
Messaging Capabilities	Master: Poll, strobe, COS, or cyclic Explicit: Initiate and respond								
Isolation	Optical isolation between: <ul style="list-style-type: none"> Backplane and channel 1 Backplane and channel 2 Channel 1 and channel 2 1 MΩ resistor from Channels 1 and 2 to chassis								
Module Location	1771-A1 / B through -A4 / B or later I/O chassis, any slot except leftmost slot								
Network Address	00 - 63								
Environmental Conditions	Operating Temperature: 0 to 60° C (32 to 140° F) Storage Temperature: -40 to 85° C (-40 to 185° F) Relative Humidity: 5 to 95% (without condensation) Shock Unpackaged <table border="1"> <tbody> <tr> <td>Operating</td> <td>30g</td> </tr> <tr> <td>Non-operating</td> <td>50g</td> </tr> </tbody> </table> Vibration Unpackaged 5g from 10 to 500 Hz	Operating	30g	Non-operating	50g				
Operating	30g								
Non-operating	50g								
Dimensions (HxWxD)	270 x 30 x 170 mm (10.6 x 1.2 x 6.7 inches)								
Weight	0.9 kg (1.9 lb)								

For more information, see the DeviceNet Product Overview, publication [DN-2.5](#).

For a drawing showing a typical DeviceNet configuration that includes the PLC DeviceNet Scanner Module, see page [5-27](#).



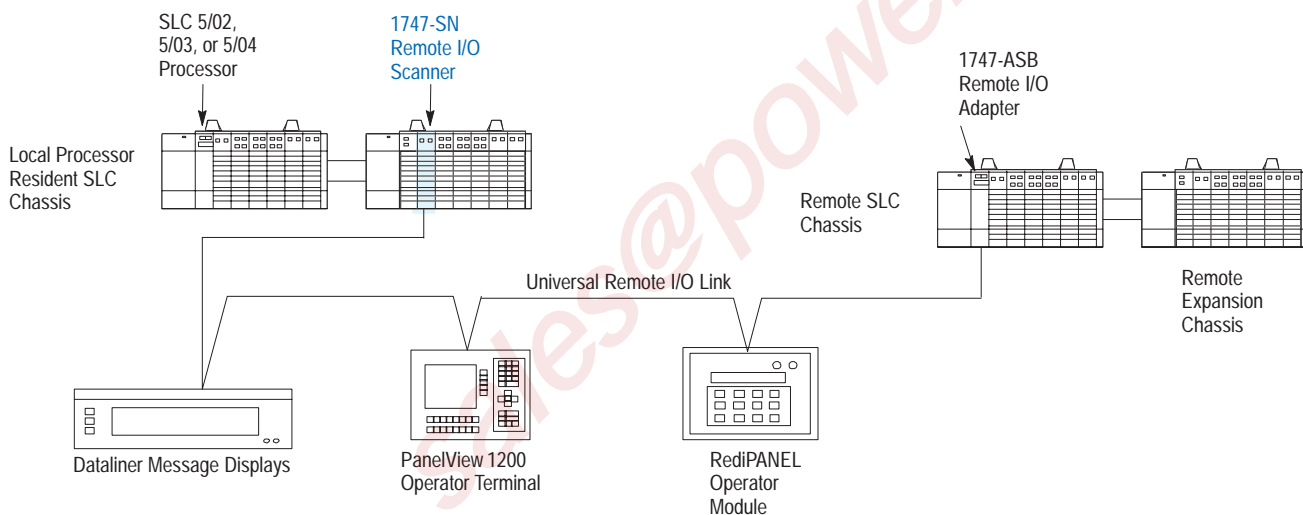
The SLC 500 Remote I/O Scanner enables communication between an SLC 5/02, 5/03, or 5/04 processor and remotely located operator interface and other adapter devices over the Universal Remote I/O link. The scanner can communicate with 1746 I/O, 1771 I/O, and 1794 I/O (FLEX I/O) modules and 1791 I/O blocks located up to 3048m (10,000 ft) away from the local SLC chassis.

The remote I/O scanner provides an SLC processor with a remote I/O port to interface with up to four I/O racks (512 unique addresses). When configured for normal operating mode, the scanner can support up to 16 remote I/O adapter devices.

The scanner also lets you configure your system so devices can make efficient use of the scanner's I/O image table for your application. Configuring the scanner for complementary I/O takes advantage of the unused portions of the scanner's I/O image table by overlapping the I/O images from two adapters. In complementary mode, the scanner can support up to 32 adapters.

The remote I/O scanner module must reside in a local chassis (in the same chassis as the SLC 500 processor or a local expansion chassis).

Typical Configuration



Features

- Has user-selectable 57.6, 115.2, or 230.4k bit/s communication rates
- Supports block-transfers of up to 64 words in addition to discrete transfers of I/O data to and from I/O modules
- Connects to 32 adapter devices (max) on a remote I/O link in complementary mode, and 16 adapter devices (max) in normal mode
- Addresses up to four I/O racks (512 unique I/O addresses, or 1024 complementary I/O addresses)
- Can address adapters with 1/4-rack, 1/2-rack, 3/4-rack, and full-rack I/O configurations
- Communicates with 1746 I/O, 1771 I/O, and 1794 (FLEX I/O) modules, and 1791 I/O blocks
- Lets you distribute adapter devices over a wide physical area
- Includes indicators for scanner and communication status

Specifications



	Comm Rate	Termin. Resistor	Max Cable Length
Extended Node Capability	57.6k bit/s	82Ω 1/2 W	3048 m (10,000 ft)
	115.2k bit/s	82Ω 1/2 W	1524 m (5,000 ft)
	230.4k bit/s	82Ω 1/2 W	762 m (2,500 ft)
No Extended Node Capability	57.6k bit/s	150Ω 1/2 W	3048 m (10,000 ft)
	115.2k bit/s	150Ω 1/2 W	1524 m (5,000 ft)
	230.4k bit/s	82Ω 1/2 W	762 m (2,500 ft)
Module Weight:	0.2 kg	(0.4 lb)	

For more information, see the Remote I/O Scanner Module Product Data, publication [1747-2.34](#).

VMEbus Remote I/O Scanner Modules

(Cat. Nos. 6008-SV2R, -SV1R)



The Allen-Bradley VMEbus remote I/O scanner modules allow a VME master processor direct access to I/O adapter devices on the Allen-Bradley Universal Remote I/O link.

You can install multiple VME master processors and multiple scanners in each VME chassis. The 6008-SV2R supports two remote I/O channels, while the 6008-SV1R supports one remote I/O channel.

The VMEbus I/O scanner modules provide up to 230.4k bit/s communication and continuous block-transfers, and support additional memory and a maximum of 32 adapters per I/O channel.

Set your scanner to SV-compatible mode if you are replacing a 6008-SV scanner and want the 6008-SV2R or -SV1R to operate like your old scanner. In SV-compatible mode, you can run previously developed applications with only minor modifications, and the scanner can support a maximum of 16 adapters per channel.

The VME master processor sends commands to the scanner to control remote I/O. The scanner then transfers the information necessary to complete high-priority single-transfers and block-transfers of data to and from the VMEbus. The scanner is always a slave device on the VMEbus.

Features

- Let you manage as many as 16 racks (32 adapters) per scanner channel in SV-superset mode, and 8 racks (16 adapters) per channel in SV-compatible mode
- Let you select the I/O scan time by configuring a communication rate of 57.6k bit/s, 115.2k bit/s, or 230.4k bit/s
- Incorporate an embedded communication microprocessor, which increases scanner performance
- Changes in the scanner input table can cause VME interrupts
- Support two configurable VME operating modes that let you select scanner features that match your needs
- Replace bundles of I/O ribbon cables with industrially rugged, single twisted-pair remote I/O cable, which reduces setup time and installation and integration costs

- Let you program continuous block-transfers (in addition to single block transfers), which reduces operating overhead
- Can initiate one-shot block-transfers while maintaining in-progress continuous block-transfers

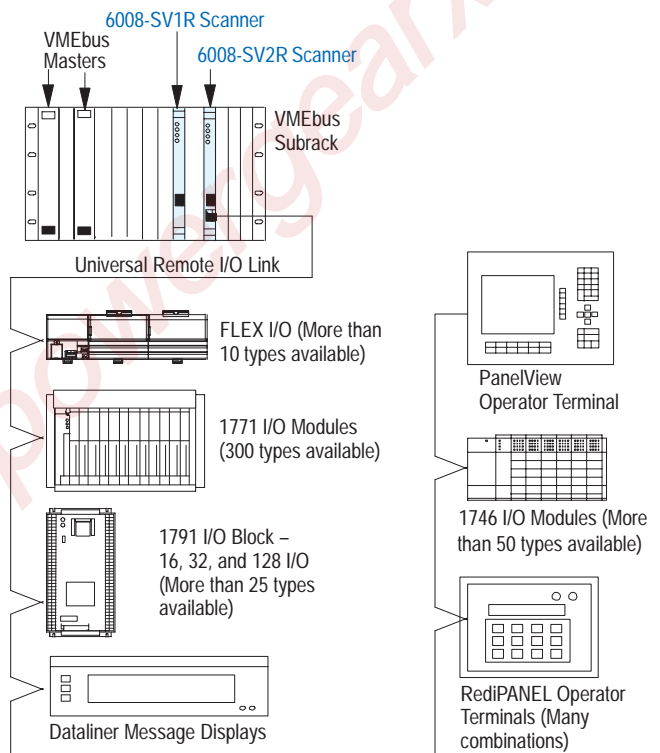
Specifications



Power	Maximum:	5V dc @ 2.5A
	Typical:	5V dc @ 2.3A
Temperature	Operating:	0 to 60°C (32 to 140°F) derated 2°C per 1000 ft (300m) over 6600 ft (2000m)
	Non-operating:	-40 to 85°C
Humidity	Operating:	5 to 95% (without condensation)
	Non-operating:	5 to 95% (without condensation)
Altitude	Operating:	0 to 10,000 ft (3000m)
	Non-operating:	0 to 40,000 ft (12,000m)
Shock	Operating:	30g, 11ms duration, ½ sine shock pulse
	Non-operating:	50g, 11 ms duration, ½ sine shock pulse
Vibration	Operating:	2.5g peak (max)
	Non-operating:	5.0g peak (max) acceleration over 5 - 500Hz sine wave (point-to-point) 1 oct/min sine sweep

For more information, see the VMEbus Remote I/O Scanner Product Data, publication [6008-2.6](#).

Typical Configuration



I/O Scanner Modules
Sub I/O Scanner Module
 (Cat. No. 1771-SN)

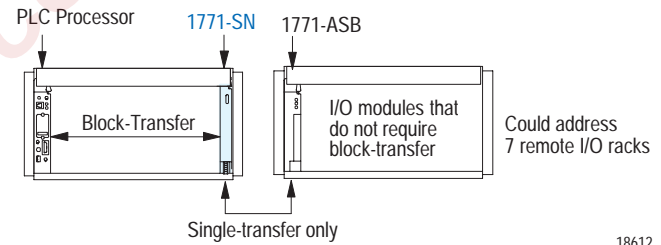


The Sub I/O Scanner Module provides additional Universal Remote I/O channels for PLC-5 processors. The 1771-SN lets a local PLC processor communicate with up to seven remote I/O racks, allowing you to expand a local system to include up to 896 additional remote I/O that do not require block-transfer. The 1771-SN can not block-transfer I/O data to or from a remote I/O chassis.

Specifications   **Class I Div 2 Hazardous** 

I/O configuration	Maximum of 7 remote I/O racks
Backplane current load	1.2A
Remote-I/O-link maximum cable length and transmission rate	<ul style="list-style-type: none"> • 10,000 ft @ 57.6k bit/s • 5,000 ft @ 115.2k bit/s
Terminating resistors	150Ω

Typical Configuration



18612

Direct Communication Modules
Direct Communication Module
 (Cat. No. 1747-DCM)



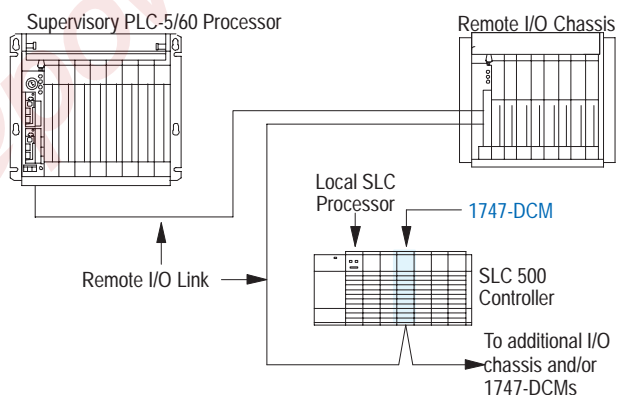
The Direct Communication Module provides a remote I/O adapter port for a local SLC processor to communicate with a remote I/O scanner port of a supervisory PLC/SLC processor across a Universal Remote I/O link. With the 1747-DCM module in a chassis with an SLC processor, the SLC processor can control its own I/O while communicating with a supervisory processor. You can pass 2, 4, or 8 words in each direction across a Universal Remote I/O link. Direct communication allows control within a plant to be distributed among individual control stations rather than concentrated at one central processor.

Specifications 

	Comm Rate	Termination Resistor
Extended Node Capability	All rates	82Ω ½ W
No Extended Node Capability	57.6k bit/s	150Ω ½ W
	115.2k bit/s	150Ω ½ W
	230.4k bit/s	82Ω ½ W
Module Weight::	0.2 kg (0.3 lb)	

For more information, see the *Direct Communication Module Product Data*, publication [1747-2.33](#).

Typical Configuration



1794 Remote FLEX I/O Adapter Modules

(Cat. No. 1794-ASB, -ASB2)



The 1794 remote FLEX I/O adapter module can interface FLEX I/O modules to a remote I/O scanner port of an SLC or PLC processor across a Universal Remote I/O link.

By using this FLEX remote I/O adapter, you gain all the benefits of FLEX I/O. FLEX I/O provides a compact, low-cost, modular I/O assembly that you create by combining I/O modules, terminal bases, and an adapter. You configure the size of the FLEXbus backplane by assembling terminal bases, to which the I/O is directly wired. This remote I/O adapter contains a built-in power supply that converts 24V dc to 5V dc for the backplane to power the FLEX I/O modules.

All FLEX I/O modules are supported by this remote FLEX I/O adapter.

- The 1794-ASB2 FLEX I/O adapter module can interface a maximum of 2 I/O modules (32 I/O maximum). This adapter can only be used in the mode that requires a unique location address for each I/O module.
- The 1794-ASB FLEX I/O adapter module can interface a maximum of 8 I/O modules (128 I/O maximum). This adapter can be used in the mode that requires a unique location address for each I/O module and can also be used in a mode that allows duplicate addressing of I/O modules.

This duplicate addressing of I/O modules allows the maximum amount of I/O in a system for a given amount of I/O image area. An input module can have the same location address as an output module because they complement each other. The input module uses only the input image area corresponding to the address. The output module uses only the output image area corresponding to the address.

Features

- Connects a maximum of 8 FLEX I/O modules to a universal remote I/O link
- Interfaces a maximum of 128 I/O to a Universal Remote I/O link
- Lets you mix and match I/O types and termination styles
- Lets you remove and insert FLEX I/O modules under backplane power

- Has diagnostic indicators for link and I/O status
- Mounts horizontally or vertically to fit tight space requirements

Specifications

I/O Capacity 1794-ASB	8 I/O modules 128 I/O	
I/O Capacity 1794-ASB2	2 I/O modules 32 I/O	
Interconnect cable	1770-CD (Belden Cable 9463)	
Remote-I/O-link max cable length and transmission rate	<ul style="list-style-type: none"> • 2,500 ft @ 230.4k bit/s • 5,000 ft @ 115.2k bit/s • 10,000 ft @ 57.6k bit/s 	
Built-in Power Supply	Input Voltage	24V dc
	Input Voltage Range	19.2-31.2V dc (5% ac ripple)
	Max Input Power	8.6W
	Max Backplane Output Current	640mA @ 5V dc
Isolation Voltage	100% tested at 850V dc for 1s between user power and FLEXbus	
Environmental Conditions	Operating Temperature	0 to 55° C (32 to 131° F)
	Storage Temperature	-40 to 85° C (-40 to 185° F)
	Relative Humidity	5 to 95% (without condensation)
Shock	Operating	30g peak accel/11(±1)ms pulse width
	Non-operating	50g peak accel/11(±1)ms pulse width
Vibration	Tested 5g from 10 to 500Hz per IEC 68-2-6	
Dimensions (HxWxD)	87 x 68 x 69 mm (3.4 x 2.7 x 2.7 in)	
Weight	0.2 kg (0.4 lb)	

For more information, see the FLEX I/O Product Data, publication [1794-2.1](#).

For a drawing showing a typical Universal Remote I/O configuration that includes the FLEX Remote I/O Adapter module, see page [3-19](#).

I/O Adapter Modules
1794 DeviceNet FLEX I/O Adapter Module
 (Cat. No. 1794-ADN)



The DeviceNet FLEX I/O adapter module can interface 8 FLEX I/O modules (128 I/O devices *that are not DeviceNet-compatible*) to a DeviceNet scanner over a DeviceNet network. The DeviceNet FLEX I/O adapter lets you add many I/O devices to a system that has minimal PLC or SLC processor I/O image space available.

By using the DeviceNet FLEX I/O adapter, you gain all the benefits of FLEX I/O. FLEX I/O provides a compact, low-cost, modular I/O assembly that you create by combining I/O modules, terminal bases, and an adapter. You configure the size of the FLEXbus backplane by assembling terminal bases, to which the I/O is directly wired.

The DeviceNet FLEX I/O adapter module contains a built-in power supply that converts 24V dc to 5V dc for the backplane to power the FLEX I/O modules. The adapter counts as one of the 64 node addresses that a DeviceNet network can support.

All FLEX I/O modules are supported by this DeviceNet FLEX I/O adapter.

Features

- Lets you connect a maximum of 8 FLEX I/O modules to a single DeviceNet adapter
- Interfaces a maximum of 128 I/O devices that are not DeviceNet-compatible to a DeviceNet network
- Small, compact design, which saves space
- Individual components let you mix and match I/O types and termination styles, so you buy only what you need
- Has LED indicators for network and I/O status, which facilitates troubleshooting and maintenance
- Lets you add up to 128 I/O to a system without using additional PLC or SLC processor I/O image
- Includes an “auto baud” feature that automatically sets the adapter to the appropriate communication rate when it is connected to a DeviceNet network
- I/O input data contains a status word (1 bit for each of the 8 possible FLEX I/O modules)
- Can be mounted on a DIN rail anywhere within existing enclosures

Specifications Class I Div 2 Hazardous

I/O Capacity	8 I/O modules 128 I/O	
DeviceNet Data	I/O Input: Status word which includes 1 bit per FLEX module and input from each FLEX module, depending on module type(s) I/O Output: Depends on module type(s) Configurable Parameters: Depends on options for particular modules DeviceNet Current Draw: 90 mA maximum	
Built-in Power Supply	Input Voltage	24V dc
	Input Voltage Range	19.2-31.2V dc (5% ac ripple)
	Max Input Power	7.7W
	Max Backplane Output Current	640mA @ 5V dc
Communication Rates (auto baud)	125k bits/s, 250k bits/s, 500k bits/s	
Messaging Capabilities	Slave: I/O poll, explicit Peer-to-peer Respond only: I/O and explicit	
Isolation Voltage	100% tested at 850V dc for 1s between user power and FLEXbus backplane	
Environmental Conditions	Operating Temperature: 0 to 55° C (32 to 131° F)	
	Storage Temperature: -40 to 85° C (-40 to 185° F)	
	Relative Humidity: 5 to 95% (without condensation)	
	Shock	Operating 30g peak accel/11(±1)ms pulse width Non-operating 50g peak accel/11(±1)ms pulse width
	Vibration	Tested 5g from 10 to 500Hz per IEC 68-2-6
Dimensions (HxWxD)	87 x 68 x 69 mm (3.4 x 2.7 x 2.7 in)	
Weight	0.2 kg (0.4 lb)	

For more information, see the *DeviceNet Product Overview*, publication [DN-2.5](#).

Typical Configuration

For a drawing showing a typical DeviceNet configuration that includes the DeviceNet FLEX I/O Adapter Module, see page [5-27](#).

1794 ControlNet FLEX I/O Adapter Modules

(Cat. No. 1794-ACN15, -ACNR15)



The ControlNet FLEX I/O adapter module can interface 128 I/O (8 FLEX I/O modules) to a ControlNet PLC processor across a ControlNet network.

The 1794-ACN15 has one NAP (an RJ-48 8-pin with shield) and one BNC connector for non-redundant media operation. The 1794-ACNR15 also has a second BNC connector that permits redundant media operation.

By using the ControlNet FLEX I/O adapter, you gain all the benefits of FLEX I/O. FLEX I/O provides a compact, low-cost, modular I/O assembly that you create by combining I/O modules, terminal bases, and an adapter. You configure the size of the FLEXbus backplane by assembling terminal bases, to which the I/O is directly wired. The ControlNet FLEX I/O adapter contains a built-in power supply that converts 24V dc to 5V dc for the backplane to power the FLEX I/O modules.

All FLEX I/O modules are supported by the ControlNet FLEX I/O adapter.

Features

- Connects 8 FLEX I/O modules to a ControlNet network
- Interfaces 128 I/O to a ControlNet network
- Lets you mix and match I/O types and termination styles
- Lets you remove and insert FLEX I/O modules under backplane power
- Has diagnostic indicators for network and I/O status
- Mounts horizontally or vertically to fit tight space requirements
- Allows for redundant media support (1794-ACNR15 only)

Specifications

I/O Capacity	8 I/O modules 128 I/O	
ControlNet Interface	Media Connection	1 BNC connector for non-redundant media operation 1 NAP (RJ-48 8-pin w/shield)
	Cable Ground Isolation Communication Rate	Quad shield RG-6 coax Transformer 5M bits/s
Built-in Power Supply	Input Voltage	24V dc
	Input Voltage Range	19.2-31.2V dc (5% ac ripple)
	Max Input Power	7.7W
	Max Backplane Output Current	640mA @ 5V dc
Isolation Voltage	100% tested at 850V dc for 1s between user power and FLEXbus backplane	
Environmental Conditions	Operating Temperature	0 to 55° C (32 to 131° F)
	Storage Temperature	-40 to 85° C (-40 to 185° F)
	Relative Humidity	5 to 95% (without condensation)
	Shock	Operating 30g peak accel/11(±1)ms pulse width Non-operating 50g peak accel/11(±1)ms pulse width
Vibration	Tested 5g from 10 to 500Hz per IEC 68-2-6	
Dimensions (HxWxD)	87 x 94 x 69 mm (3.4 x 3.7 x 2.7 in)	
Weight	0.2 kg (0.5 lb)	

For more information, see the *ControlNet Network System Overview*, publication 1786-2.12.

For a drawing showing a typical ControlNet configuration that includes the ControlNet FLEX I/O Adapter module, see page 5-22.



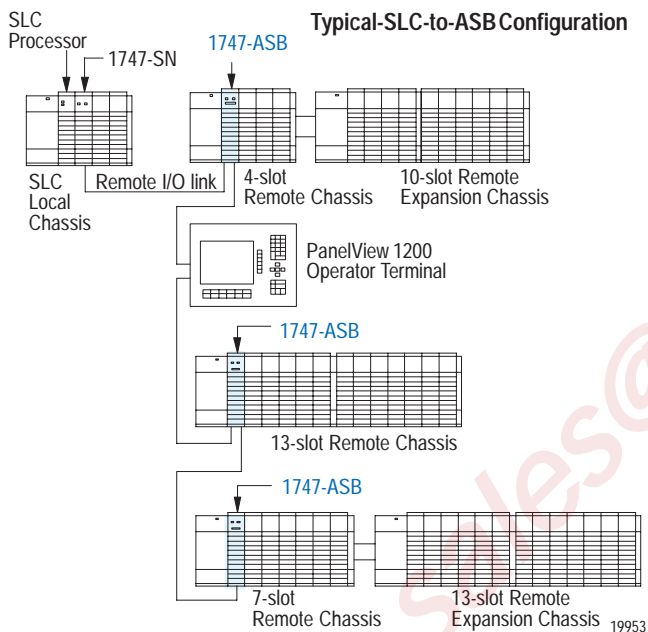
The SLC 500 Remote I/O Adapter Module provides access to a communication link between SLC or PLC scanners and a variety of 1746 I/O modules; it can control up to 30 slots of I/O installed in three remote 1746 I/O chassis. The 1747-ASB module uses the time-tested Allen-Bradley Universal Remote I/O link for remote I/O communication.

Each 1747-ASB module features a status display that provides alphanumeric status of the ASB module, the 1746 I/O that it controls, and the communication with the remote I/O system. When combined with the COMM and FAULT indicators, this display can be an effective diagnostic tool.

Features

- Does *not* require user programming
- Supports 1/2-slot, 1-slot, and 2-slot addressing modes and provides efficient image use by allowing you to assign the amount of image space required per slot for your particular I/O configuration

Typical Configuration



- Provides switch-selectable single- or block-transfer of I/O data with SLC CPUs or to PLC processors (for I/O modules capable of block-transfers)
- Secures I/O and switch configurations in non-volatile memory. To help prevent system problems and save troubleshooting time, you can inhibit operation of the 1747-ASB module if the I/O configuration or switch settings were modified since the last save
- Uses the switch assemblies to establish an expanded selection of operational settings and safeguards for the ASB module. The ASB module has a processor-restart lockout feature, single- or block-transfer mapping options, and selectable remote I/O image size, making it easier to optimize system performance

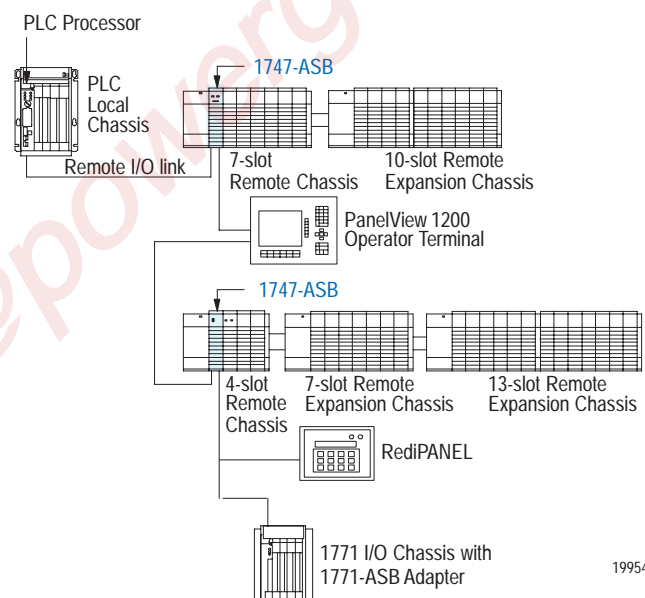
Specifications



	Communication Rate	Termination Resistor	Max Cable Length
Extended Node Capability	57.6k bit/s	82Ω 1/2 W	3048 m (10,000 ft)
	115.2k bit/s	82Ω 1/2 W	1524 m (5,000 ft)
	230.4k bit/s	82Ω 1/2 W	762 m (2,500 ft)
No Extended Node Capability	57.6k bit/s	150Ω 1/2 W	3048 m (10,000 ft)
	115.2k bit/s	150Ω 1/2 W	1524 m (5,000 ft)
	230.4k bit/s	82Ω 1/2 W	762 m (2,500 ft)
Backplane Current: Load	375mA @ 5V dc		
Module Weight:	0.2 kg	(0.4 lb)	

For more information, see the SLC 500 Remote I/O Adapter Module Product Data, publication [1747-2.38](#).

Typical PLC-to-ASB Configuration



I/O Adapter Modules

1771 Extended Local I/O Adapter Module

(Cat. No. 1771-ALX)



The 1771-ALX Extended Local I/O Adapter Module interfaces I/O modules in an extended local I/O chassis to a local I/O scanner port of a PLC-5/40L, -5/60L, or -V5/40L processor across the extended-local (parallel) I/O link.

Features

- Can connect 16 I/O chassis on a link
- Allows disconnection of a chassis from the bus without shutting down the system

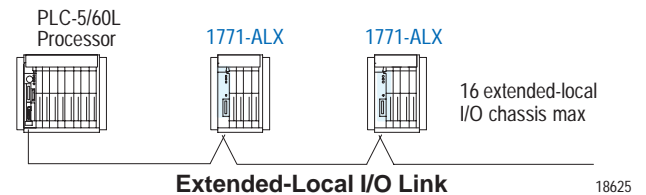
- Parallel I/O link provides short I/O update period

Specifications



Module location	Leftmost slot in 1771 I/O chassis
Chassis distance	32 cable-meters (100 cable-ft)
Interconnect cable	<ul style="list-style-type: none">• 1771-CX1 (1 meter)• 1771-CX2 (2 meters)• 1771-CX5 (5 meters)
Backplane current load	1.2A
Type of communication	Parallel
Weight	0.6 kg (1.2 lb)

Typical Configuration



I/O Adapter Modules

1771 Remote I/O Adapter Module

(Cat. No. 1771-ASB)



The Remote I/O Adapter Module interfaces I/O modules in a remote I/O chassis to a remote I/O scanner port of a PLC processor across the Allen Bradley Universal Remote I/O link. The 1771-ASB adapter operates at 57.6k, 115.2k, or 230.4k bit/s on this serial I/O link. This I/O adapter supports 1/2-slot, 1-slot, and 2-slot addressing modes.

Note: The 1771-ASB is compatible with an I/O link with 32 I/O-adapter devices and either 82Ω or 150Ω termination.

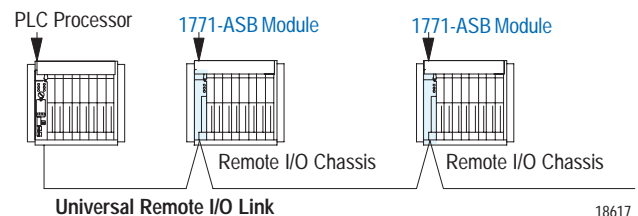
Specifications



Module location	Leftmost slot of 1771 I/O chassis
Backplane current load	1.0A
Type of communication	Serial
Remote-I/O-link maximum cable length and transmission rate	<ul style="list-style-type: none">• 2,500 ft @ 230.4k bit/s• 5,000 ft @ 115.2k bit/s• 10,000 ft @ 57.6k bit/s
Wiring arm	1771-WB
Weight	0.9 kg (1.9 lb)

For more information, see the Remote I/O Adapter Module Product Data, publication [1771-2.48](#).

Typical Configuration



1771 ControlNet I/O Adapter Modules

(Cat. Nos. 1771-ACN15, -ACNR15)



The ControlNet 1771 I/O adapter modules interface 1771 I/O modules with a PLC processor across a ControlNet network.

The 1771-ACN15 has one NAP (an RJ-48 8-pin with shield) and one BNC connector for non-redundant media operation. The 1771-ACNR15 also has a second BNC connector that permits redundant media operation.

Features

- Support 1/2-slot, 1-slot, and 2-slot addressing modes
- Have diagnostic indicators for network and I/O status, and to display the node address
- Provide local communication network access through the network access port, which makes troubleshooting and maintenance easier
- Provide high-speed data transfer
- Allow for redundant media support (1771-ACNR15 only)

Specifications



ControlNet Interface	Media Connection	1771-ACN15	1 BNC connector for non-redundant media operation 1 NAP (RJ-48 8-pin w/shield)
		1771-ACNR15	2 BNC connectors for redundant media operation 1 NAP (RJ-48 8-pin w/shield)
	Cable Ground Isolation		Quad shield RG-6 coax Transformer
Backplane current load			1.0A @ 5V
Physical	Module Location		1771 I/O chassis, leftmost slot
	Keying Locations		Between 54 and 56 Between 16 and 18
	Weight	1771-ACN15 1771-ACNR15	1.0 kg (2.1 lb) 1.0 kg (2.2 lb)
Environmental	Operating Temperature		0 to 60° C (32 to 140° F)
	Storage Temperature		-40 to 85° C (-40 to 185° F)
	Relative Humidity		5 to 95% (without condensation)

For more information, see the *ControlNet Network System Overview*, publication 1786-2.12.

For a drawing showing a typical ControlNet configuration that includes the ControlNet 1771 Interface module, see page [5-22](#).

I/O Block Types
1791 I/O Blocks
 (Cat. No. 1791 Series)



A 1791 I/O block is a compact unit that contains I/O circuits, a built-in power supply, and a remote I/O adapter. A 1791 I/O block is compatible with a remote I/O scanner of a PLC or SLC programmable controller when connected on an Allen-Bradley Universal Remote I/O link. The I/O values are accessible from the PLC or SLC data table.

Typical Applications

Applications requiring distributed I/O to be located close to sensors and actuators, or located in small enclosures.

Features

- Compact size of total package for I/O with built-in I/O adapter and power supply
- Low enclosure cost because of compact size
- Low wiring cost because I/O blocks can be located close to sensors and actuators
- Easy to replace without rewiring because of removable terminal strips
- Compatible with Allen-Bradley Universal Remote I/O link
- I/O blocks are available in sizes of 16, 32, 64, and 128 I/O
- Blocks of 16 and 32 I/O (except for relay contact outputs) can be mounted vertically or horizontally on a panel or DIN rail
- Analog I/O blocks supply loop power for analog-input current loops
- Analog I/O blocks can be scaled to engineering units
- Analog blocks are compatible with both PLC and SLC processors

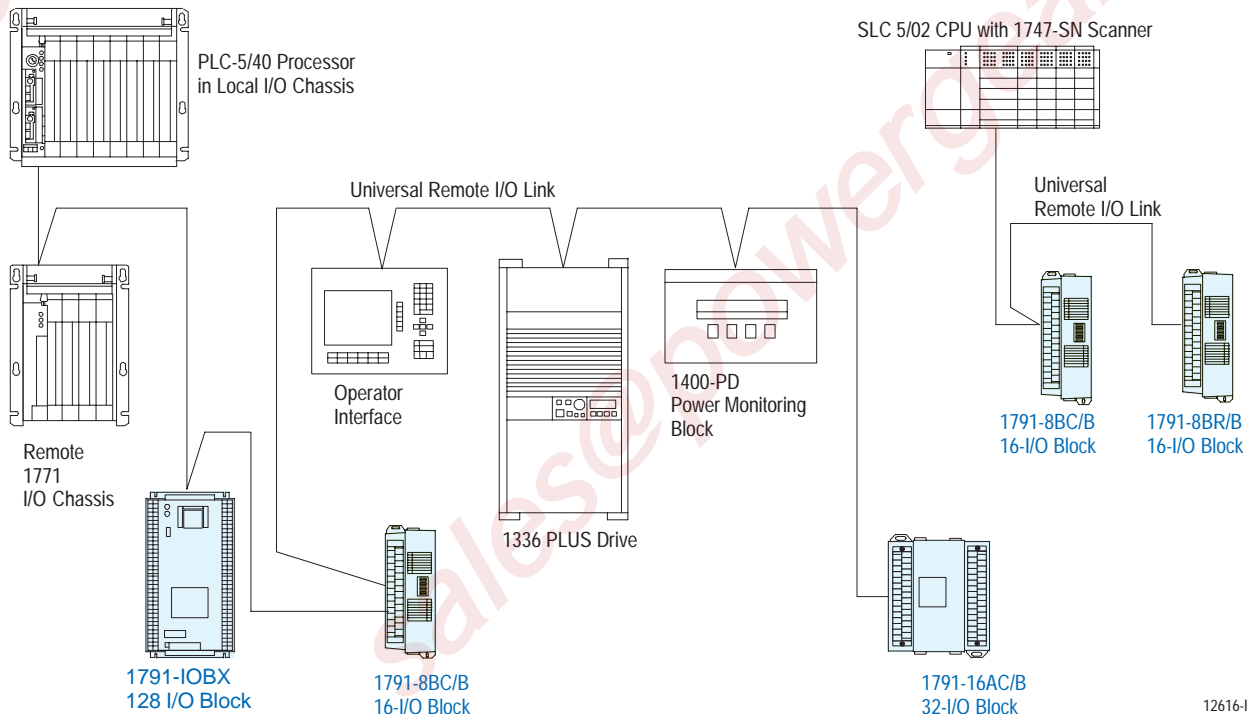
Specifications  **Class I Div 2 Hazardous**

Weight	• analog I/O: 0.4 (0.9)	• 16 digital I/O: 0.4 (0.9)
kg (lb)	• 32 digital I/O: 0.8 (1.7)	• 64 digital I/O: 1.0 (2.2)
	• 128 digital I/O: 1.8 (3.9)	

For 1791 digital I/O block selection charts, see page 3-24.
 For 1791 analog I/O block selection charts, see page 3-34.

For more information, see the 1791 Block I/O Product Data, pub. 1791-2.1.

Typical Configuration





A 1792 ArmorBlock™ I/O block is a compact unit that contains I/O circuits, a built-in power supply, and a built-in DeviceNet I/O adapter. Because of its sealed housing, a 1792 I/O block requires no enclosure. It is compatible with a PLC or SLC programmable controller or other DeviceNet scanners. The I/O values are accessible from the PLC or SLC data table.

Typical Applications

Applications that require highly distributed I/O blocks in locations close to sensors and actuators and do not have space for enclosures, and communicating on open networks.

Features

- Built-in DeviceNet communication
- Compact size of total package for I/O with built-in I/O adapter and power supply
- Eliminates enclosure cost because of sealed housing rated for IP67 and NEMA 4X and 6P
- Low wiring cost because I/O block can be located close to sensors and actuators
- Low installation cost and easy to replace without rewiring, since industry-standard mini-connectors are used for connection to the DeviceNet network and output-circuit power supply, and micro-connectors for connection to each sensor or actuator
- Blocks can be mounted vertically or horizontally
- Blocks with stainless steel connector shells can be used in chemical and food-processing environments.
- DeviceNet time can be saved by not transferring I/O values unless a change-of-state has occurred.

Specifications

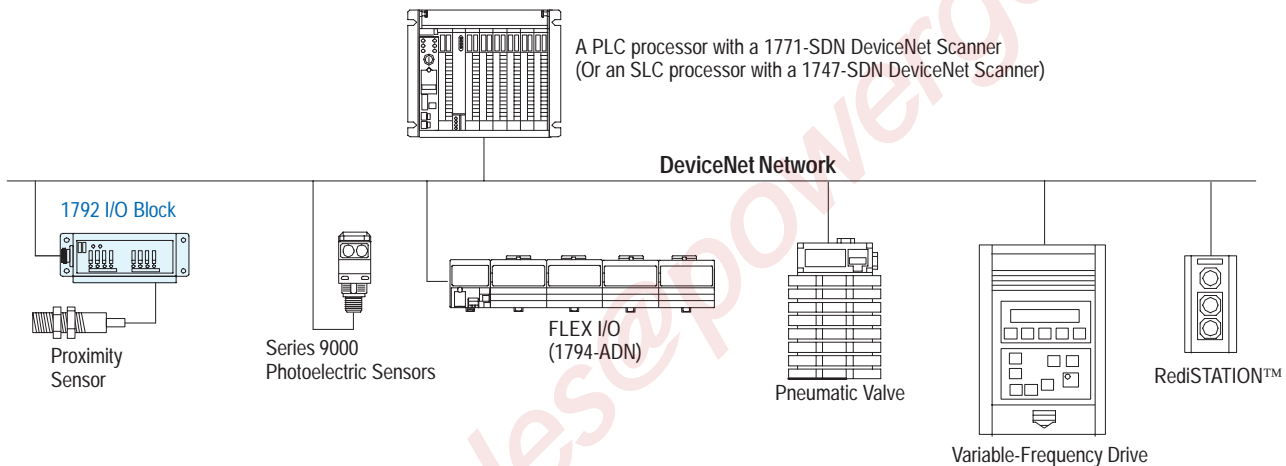


Housing Rating	<ul style="list-style-type: none"> • IP67 • NEMA 4X and 6P
Shock	Operating: 30g peak acceleration, 11 (± 1) ms pulse width Non-operating: 50g peak acceleration, 11 (± 1) ms pulse width
Vibration	5g @ 10-500Hz (displacement .030 in peak-to-peak)
Weight	0.5 kg (1.1 lb)

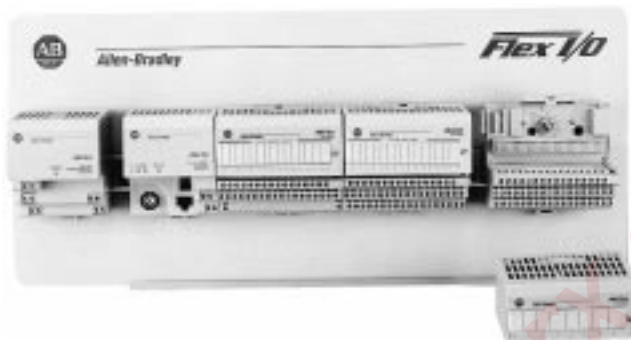
For 1792 I/O block selection charts, see page 3-25.

For more information, see the 1792 Block I/O Product Data, pub. 1792-2.1.

Typical Configuration



20191-M



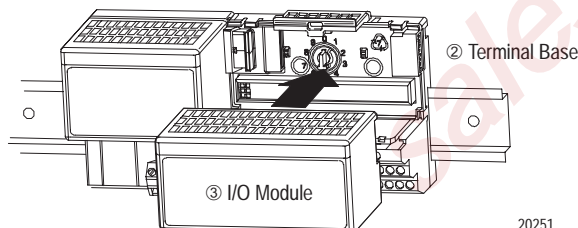
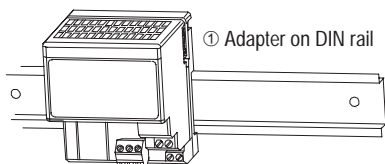
FLEX I/O provides a compact modular I/O assembly that consists of a maximum of 8 I/O modules, a terminal base for each I/O module, and an I/O adapter module with a built-in 24V-dc-input power supply. FLEX I/O can be used in PLC and SLC systems.

- To connect FLEX I/O on a Universal Remote I/O link, choose the 1794-ASB, -ASB2, FLEX I/O adapter ([page 3-10](#)).
- To connect FLEX I/O on a DeviceNet network (an open-standard device-level network) choose the 1794-ADN FLEX I/O adapter ([page 3-11](#)).
- To connect FLEX I/O on a ControlNet network, choose the 1794-ACN, -ACNR FLEX I/O adapter ([page 3-12](#)).

Saves Installation Time

The adapter, terminal base, and I/O modules are separate components that snap together easily onto a DIN rail.

- Snap the I/O adapter onto the DIN rail.
- For each I/O module (8 maximum) snap a terminal base onto the DIN rail to the right of adapter.
- Plug each I/O module into its terminal base.
- Wire sensors/actuators directly to the terminal base.



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Saves Panel Space

The flexible compact design of the FLEX I/O assembly saves panel space.

- No space wasted for unused I/O module slots. You only add the number of terminal bases needed for the number of I/O modules.
- No space wasted for a separate power supply because the I/O adapter converts 24V dc into 5V dc backplane power for I/O.
- No space wasted for separate terminal blocks. FLEX I/O terminal bases provide all the screw terminals you need for two-wire or three-wire sensors/actuators in the same compact space.
- Mount in horizontal or vertical rows.

Saves Troubleshooting Time

- Remove and insert I/O modules under backplane power.¹
- Each I/O status indicator on the I/O module lines up directly above the I/O terminal on the termination base.
- For diagnostics, use the Series 9000 Heartbeat™ Diagnostic Controls with the FLEX sensor input module. The Heartbeat Diagnostic Controls can detect a lack of margin (excess gain), a short, or an open circuit condition.

¹ Remove user-side power before removing or inserting this module. This module is designed so you can remove and insert it under backplane power.

Features

- Modular I/O
- Compact design
- Low-cost I/O system
- Keyed interlocks (mechanical and electrical)
- Integrated terminations

Typical Applications

Use FLEX I/O for distributed applications where you need multiple types of I/O near a machine.

Specifications

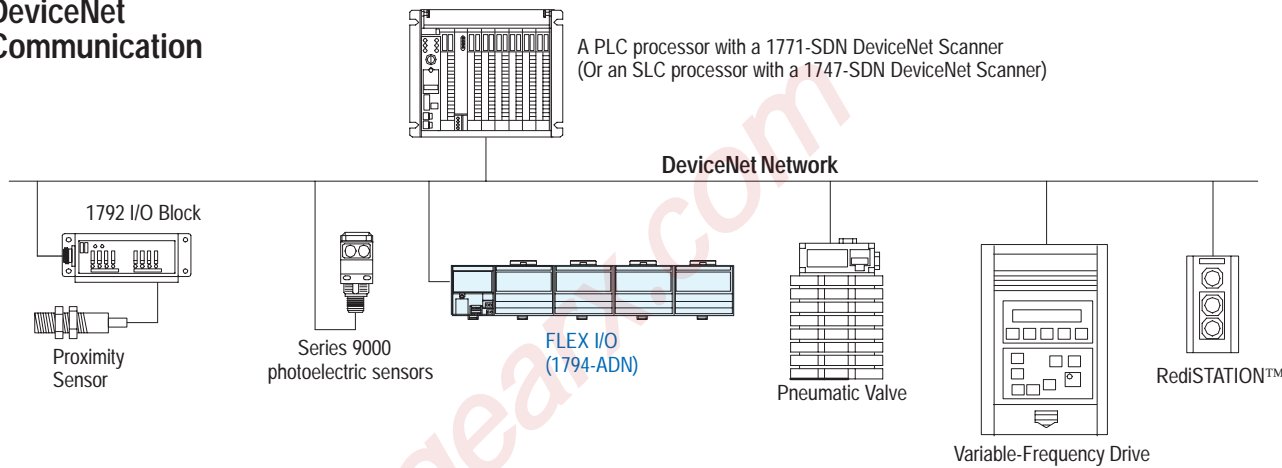
Shock	
Operating:	30g peak acceleration, 11 (± 1) ms pulse width
Non-operating:	50g peak acceleration, 11 (± 1) ms pulse width
Vibration	Tested 5g @ 10-500Hz per IEC 68-2-6
Dimensions (HxWxD)	46 x 94 x 53 mm (1.8 x 3.7 x 2.1 in)
Weight	0.1 kg (0.3 lb)

For more information, see the [FLEX I/O Product Data, pub. 1794-2.1](#).

FLEX I/O selection charts start on [page 3-25](#) for digital I/O and [page 3-34](#) for analog I/O. For drawings showing typical configurations, see [page 3-19](#). For terminal bases and extender cables refer to [page 4-8](#).

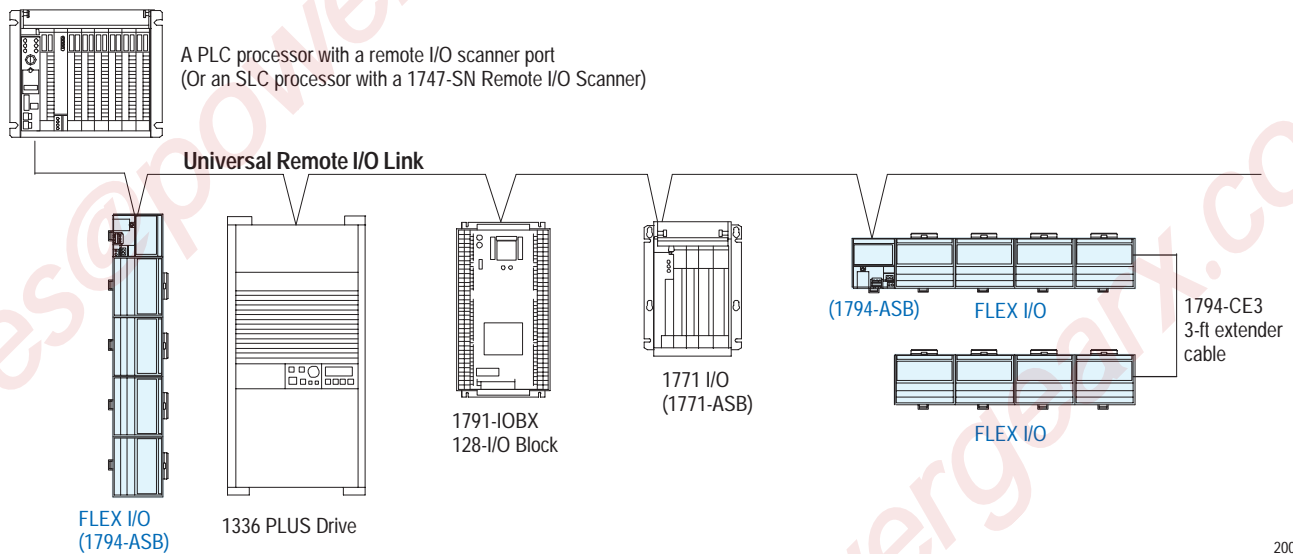
Typical Configuration

**DeviceNet
 Communication**



**Universal Remote I/O
 Communication**

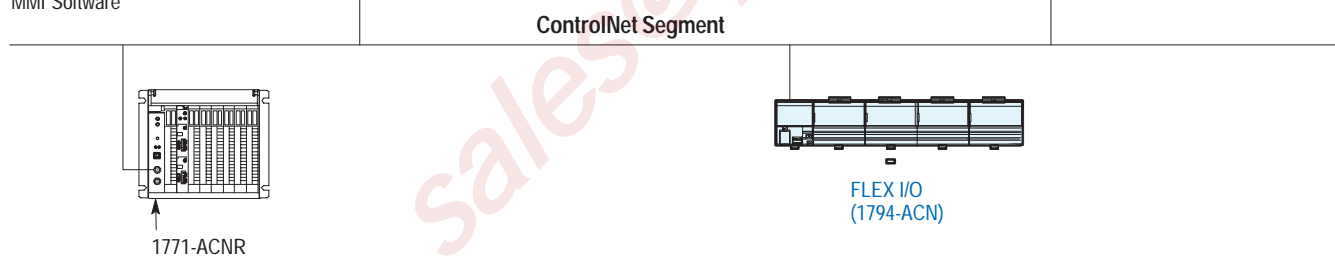
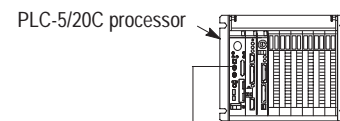
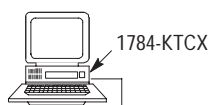
20191-M



20063

**ControlNet
 Communication**

IBM-PC, XT, AT or compatible computer running Rockwell Software Programming Software or MMI Software



I/O Module Types

1746 I/O Modules

(Cat. No. 1746 Series)



The 1746 I/O product line provides more than 40 modules to meet your application needs in a modular assembly — including intelligent I/O modules.

- digital I/O modules provide 32 I/O per module — digital I/O circuits interface to on/off sensors/actuators — ladder logic has direct access to I/O values — input modules, output modules, and combination input/output modules — ac and dc input modules — ac, dc, and relay-contact output modules
- analog I/O modules provide 4 I/O per module — D/A and A/D conversions interface analog signals to data-table values — ladder logic has direct access to I/O values — input modules, output modules, and combination input/output modules — a high level of resolution for accurate control in a broad range of analog applications
- intelligent I/O modules are available to enhance your control system. These modules include a high-speed counter module, a BASIC language module, a motion control module and communication modules. Each provides a unique easy-to-use interface between the I/O circuits (digital and/or analog) and the CPU.

Module Uses

This modular hardware design uses cost- and space-effective means to add I/O to your control system. These modules can be used in:

- a 2-slot expansion chassis to augment an SLC 500 fixed-I/O controller
- a local I/O chassis of an SLC 500 modular-I/O controller
- a remote 1746 I/O chassis (with a 1747-ASB adapter) of a PLC-2, PLC-3, PLC-5, SLC 5/02, SLC 5/03, SLC 5/04 controller

Features

- Hardware-platform sharing makes spare-parts stocking convenient
- Combinations of input and outputs in the same digital and analog modules provide expansion capabilities without sacrificing space or increasing cost
- Variety of voltages creates a precise power fit for your application
- No need to disconnect wiring to replace module of 16 or more I/O; removable terminal blocks are shipped with I/O modules
- Broad range of signal interfaces to ac and dc sensors/actuators for a wide variety of applications
- LED indicators show input/output status for easier troubleshooting
- Modules available in different densities (32 I/O per module max) for greater flexibility and cost savings
- 1746 I/O modules include optical coupling and filter circuitry for signal noise reduction
- A wide range of analog signal levels including standard analog inputs and outputs, and direct thermocouple and RTD temperature inputs

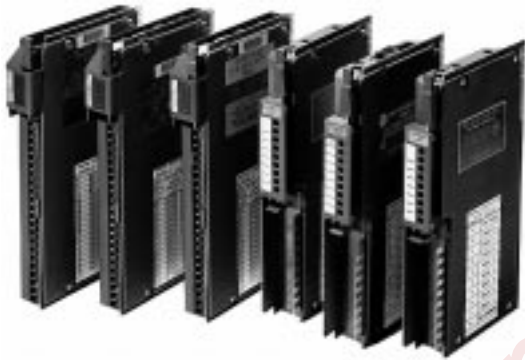
Specifications

The 1746 digital I/O module selection charts start on page [3-26](#). The 1746 analog I/O module selection charts start on page [3-35](#).

For SLC wiring systems, see page [4-10](#).

For specifications and a listing of 1746 I/O chassis and chassis interconnect cables, see page [4-22](#). For a listing of 1746 removable terminal blocks, see page [4-23](#).

For more information, see: *SLC 500 Family System Overview*, pub. [1747-2.30](#); *Analog I/O Modules Product Data*, pub. [1746-2.34](#); *Thermocouple Input Module Product Data*, pub. [1746-2.36](#); *High-Speed Counter Product Data*, pub. [1746-2.32](#); *Discrete I/O Modules Product Data*, pub. [1746-2.35](#).



The 1771 I/O product line provides a full range of digital and analog I/O to meet your application needs in a modular assembly — including intelligent I/O modules.

- Digital I/O modules have digital I/O circuits that interface to on/off sensors such as pushbutton and limit switches; and on/off actuators such as motor starters, pilot lights, and annunciators. These outputs are directly controlled by the state of corresponding bits in the PLC data table. These inputs directly control the state of corresponding bits in the PLC data table.
- Analog I/O modules perform the required A/D and D/A conversions to directly interface analog signals to PLC data table values using up to 16-bit resolution. Analog I/O can be user-configured for the desired fault-response state in the event that I/O communication is disrupted. This feature provides a safe reaction/response in case of a fault, limits the extent of faults, and provides a predictable fault response.
- N-series analog I/O modules provide high (1000V) isolation between channels. Their I/O connection points are on remote termination panels (RTPs) which reduce installation costs and allow you to replace module without disturbing current loop. RTPs have optional fuses and resistors for user-defined termination flexibility.
- Intelligent I/O modules are available to enhance your control system. These modules include process control modules, positioning modules, and specialized modules such as the high-speed logic controller module and the configurable flowmeter module. Each provides a unique easy-to-use interface between the I/O (digital and/or analog) circuits and the PLC processor.

This modular hardware design uses cost- and space-effective means to add I/O to your control system. These modules can be used in:

- a processor-resident local I/O chassis of a PLC-5 controller
- in a PLC system on an extended-local I/O link
- in a PLC system on a ControlNet network
- in a PLC system on a Universal Remote I/O link
- in an SLC system on a Universal Remote I/O link

Features

- No need to disconnect wiring to replace module; for some modules, wiring arms are shipped with I/O modules; the others use remote termination panels; for N-series modules, order remote termination panels separately
- Solid-state outputs are fused for module-circuit protection
- Modules available in different densities (32 I/O per module max) for greater flexibility and cost savings
- Isolated inputs and outputs can be used in applications, such as motor control centers where individual control transformers are used
- 1771 I/O modules include optical coupling and filter circuitry for signal noise reduction
- As a troubleshooting aid, status indicators are provided on the front of modules to input or output and fuse blown status
- Digital I/O modules cover electrical ranges from 5 thru 276V ac or dc; relay contact output modules are available for ranges from 0 thru 276V ac or 0 thru 175V dc
- A wide range of analog signal levels including standard analog inputs and outputs; and direct thermocouple and RTD temperature inputs
- Analog module software-selectable features include digital filtering for noisy transmitters and environments, and range selection per I/O for added flexibility
- Analog module comprehensive self-diagnostic tests: over/under range, high/low rate-of-change alarming, open input/open loop detection, on-board error checking
- Scaling to engineering units makes incoming analog signals easier to work with
- User-configurable output response (min, max, mid-range or last value) for safe reaction to an analog module fault
- An analog module status block provides information to the processor for alarming and troubleshooting
- Current inputs with individual embedded 24V dc loop power for analog transmitters
- A 1771 intelligent I/O module may perform the function of three modules of a smaller physical size.

Specifications

For specifications and a complete list of 1771 digital I/O modules, see the I/O selection chart that begins on page 3-27. For specifications and a complete list of 1771 analog I/O modules, see the selection chart on page 3-36. For PLC wiring systems, see page 4-10. For specifications and a complete list of 1771 N-series analog I/O modules, RTPs, and cables, see the selection chart on page 3-37. For specifications and a listing of 1771 I/O chassis, see page 4-22. For a listing of 1771 wiring arms, see page 4-23.

For more information, see: 1771 Digital I/O DC Input and Output Modules Product Data, publication 1771-2.180; 1771 Digital I/O AC Input and Output Modules Product Data, publication 1771-2.182; 1771 Analog I/O Module Product Data, publication 1771-2.183; High-Resolution Isolated Analog Module Product Data, pub. 1771-2.193.

Smart Transmitter (HART Protocol) Interface Products

(Cat. Nos. 1770-HT1, -HT8, -HT16)



The Allen-Bradley Smart Transmitter (HART Protocol) Interface products let your PLC-5 family processors access all of the analog and digital information generated by your HART-compliant field devices (FDs). The digital process values can be used to qualify analog FD inputs, enabling your PLC-based programs to compensate more precisely and control your process more accurately.

Smart Transmitter Interface products are based on the HART communication protocol, which carries digital information with the analog signal over industry-standard 4-20mA process control loops. The interface separates the analog signal from the digital signal, sending the analog signal to an analog input module, and the digital signal to the PLC processor. The PLC processor, in turn, transmits digital configuration, diagnostics, and maintenance information through the smart transmitter interface to your FDs.

To interface a PLC processor to smart FDs, you need a Communication Controller (1770-HT1) and at least one 8- or 16-channel Terminal Block (1770-HT8 or -HT16). The Smart Transmitter Toolkit (STT) Utility, which is included with the

Communication Controller, provides ladder logic for the most commonly used HART commands, and can be used to access the digital data generated by FDs.

Cornerstone™ Software, from Applied System Technologies, Inc., is a Windows-based product designed for device management and maintenance in installations with a large number of FDs. Tailored for use with Smart Transmitter Interface products, this software makes it easier to configure, calibrate, and monitor your FDs.

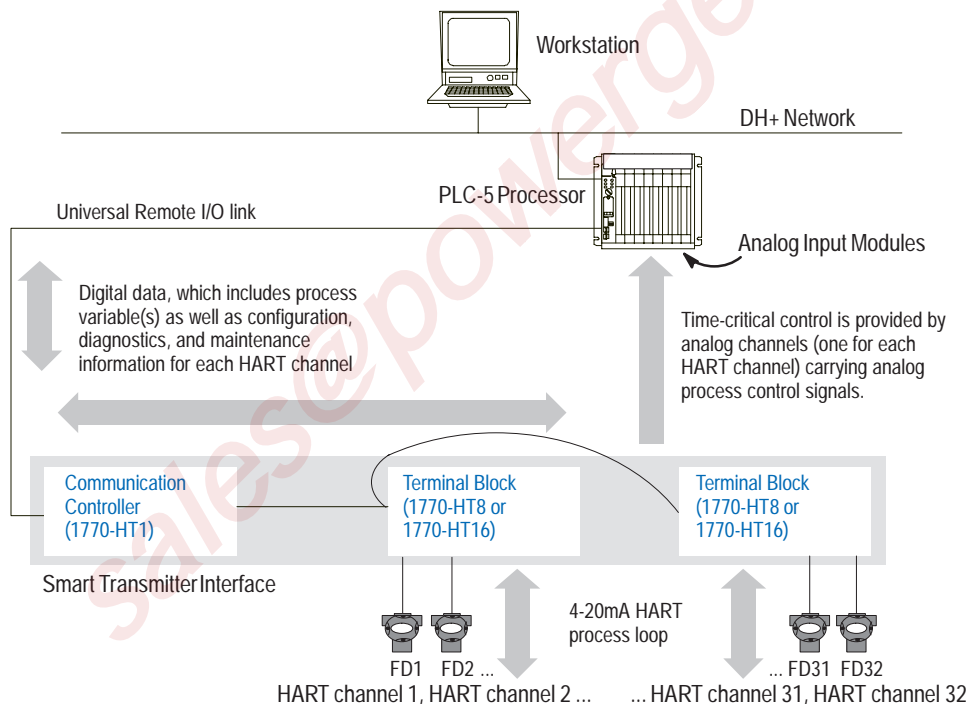
Features

- Interface easily with Allen-Bradley programmable logic controllers and 4-20mA analog wiring and FDs
- Leverage the capabilities of your existing PLC processor-based control system while allowing you to gradually implement digital capabilities
- Let you combine products to create modules tailored to the scale and needs of each part of your process: you buy only the products you need to implement the process control required
- Give you enhanced maintenance and troubleshooting capabilities with your existing wiring, even allowing you to verify wiring and program FDs remotely
- Support two communication masters simultaneously, and allow you to interface to a variety of remote and local operator interface workstations

Typical Configuration

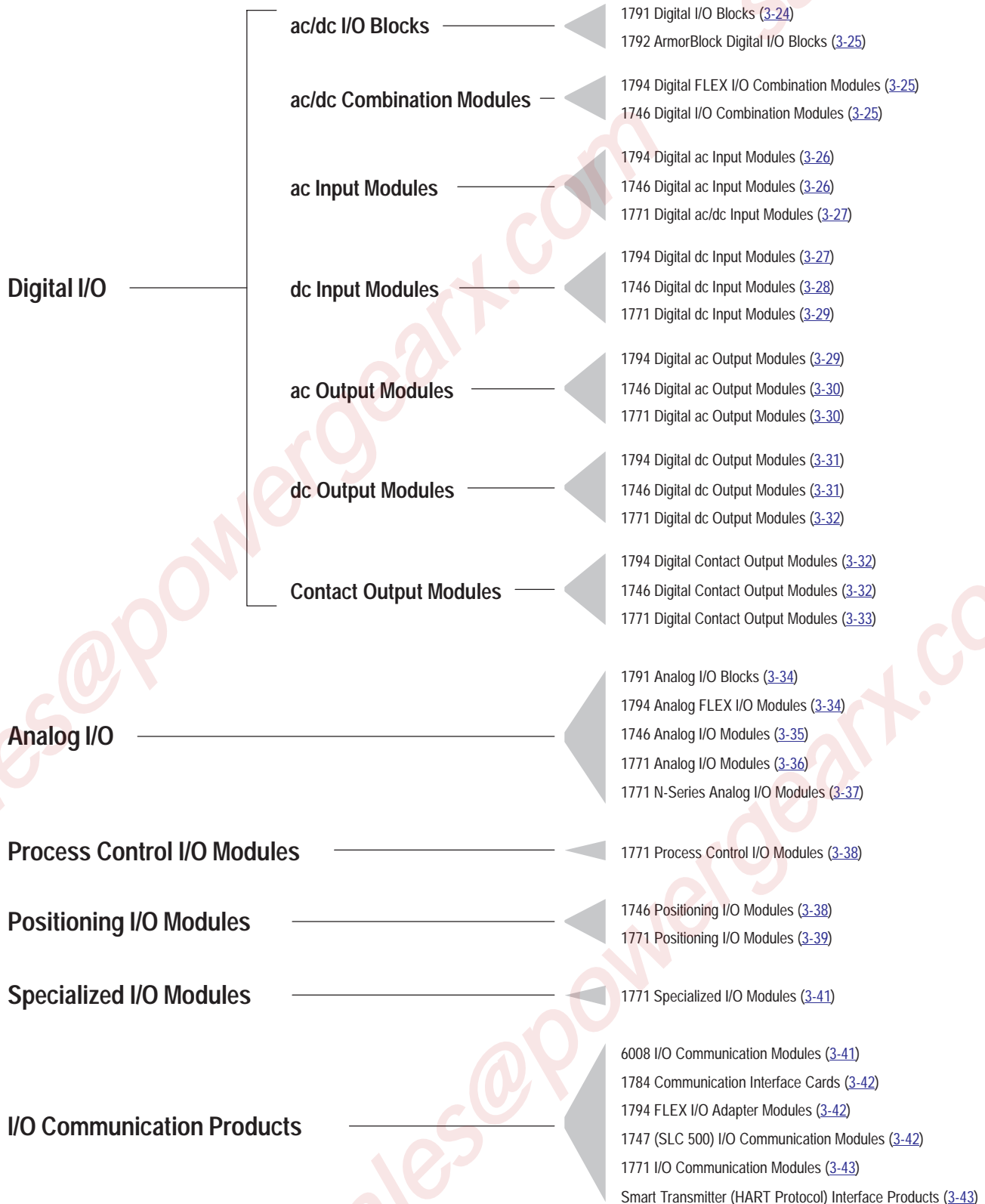
You can connect a Communication Controller to 4 terminal blocks totaling up to 32 HART channels. Smart Transmitter Interface products are inserted in your process between the FDs and the PLC processor control system.

For more information, see the *Integrating Smart Transmitter-Based Applications with Allen-Bradley PLC Processors Product Overview*, publication 1770-2.49.



What is HART?

- The HART - or Highway Addressable Remote Transducer - protocol is the de facto industry standard field communication protocol for instrumentation networks. It was developed by Rosemount.



1791 Digital I/O Blocks

Inputs				Outputs			Catalog Number	I/O Block Power Source	Clearance Dimensions (rounded up) HxWxD
Operating Voltage /Type	Signal Delay	Max Off-state Current	Number of Inputs	Operating Voltage /Type	Max Current Per Output ² (All outputs on unless otherwise noted)	Number of Outputs			
10-30 dc sinking (source load)	1.0ms on 5.0ms off or 1.0ms on 18ms off (switch selectable block-wide)	1.5 mA	16	—	500 mA @ 60° C 1A @ 30° C	0	1791-16B0	19.2-30V dc 300 mA @ 24V dc	178x69x99 mm (7x2.7x3.9 in)
			0	10-30 dc source		16	1791-0B16		
			8			8	1791-8BC		
			8	N.O. contact ¹		8	1791-8BR		
			32	10-30 dc source		0	1791-32B0		
			0			32	1791-0B32		
			16			16	1791-16BC		
			24			8	1791-24B8		
			24	N.O. contact ¹		8	1791-24BR		
			79-132 ac, 47-63 Hz	1.0ms on 26ms off		2.3 mA @ 60 Hz	16		
0	20-132 ac	16			1791-0A16				
8		8			1791-8AC				
8	N.O. contact ¹	8			1791-8AR				
32		0			1791-32A0				
0	20-132 ac	32			1791-0A32				
16		16			1791-16AC				
24		8			1791-24A8				
24	N.O. contact ¹	8			1791-24AR				
18-26.4 dc sink (source load)	10ms on 10ms off	1.0 mA			32		18-26.4 dc source	300 mA @ 60° C (2.4A per set of 16 outputs)	32
			64		64	1791-IOBX	330x157x44 mm (13x6.2x1.8 in)		
			32	18-26.4 dc sink	32	1791-IOVW	178x157x44 mm (7x6.2x1.8 in)		
			64		64	1791-IOVX	330x157x44 mm (13x6.2x1.8 in)		

¹ Output current at rated power over entire temperature range

Resistive: P.F. = 1, cos θ = 1.0
1A @ 20-132V ac
1A @ 20-30V dc
0.2A @ 125V dc

Inductive: P.F. = 0.4, cos θ = 0.4
0.5A @ 20-132V ac
1A @ 20-30V dc,
L/R = 7ms
0.1A @ 125V dc,
L/R = 7ms

² vertical mounting

For more information, see the 1791 Block I/O Product Data, pub. no. [1791-2.1](#).

1792 ArmorBlock Digital I/O Blocks

Inputs				Outputs			Catalog Number	I/O Block Power Source ³	Clearance Dimensions (rounded up) HxWxD
Operating Voltage /Type	Signal Delay	Max Off-state Current	Number of Inputs	Operating Voltage /Type	Max Current Per Output	Number of Outputs			
11-25V dc sinking (source load)	selectable per input for <1ms, 2ms, 4ms, 8ms, or 16ms (<1ms is default)	1.6mA	4	—	—	0	1792-IB4A ¹ 1792-IB4S ²	11-25V dc 325mA	76x158x67 mm (3.0x6.2x2.6 in)
			8			0	1792-IB8A ¹ 1792-IB8S ²	11-25V dc 525mA	
			16			0	1792-IB16A ¹ 1792-IB16S ²	11-25V dc 925mA	
			2			2	1792-IB2XOB2EA ¹ 1792-IB2XOB2ES ²	11-25V dc 125mA	
—	—	—	0	19.2-30V dc source	2A	4	1792-OB4EA ¹ 1792-OB4ES ²	11-25V dc 125mA	

¹ The "A" suffix designates an aluminium connector shell.

² The "S" suffix designates a stainless steel connector shell.

³ The input circuit power source is the same as the I/O block power source, which comes thru the DeviceNet connection.

For more information, see the 1792 Block I/O Product Data, pub. [1792-2.1](#).

1794 Digital I/O Combination Modules

Inputs				Outputs			Module Cat. No. 1794-	Module/TB Cat. No. 1794-	Backplane Current Load
Operating Voltage/ Type	Signal Delay	Maximum Off-State Current	Number of Inputs	Operating Voltage /Type	Max Contin. Current per Output	Number of Outputs			
19.2-31.2 dc sink (source load)	512µs ¹	1.5mA	10	19.2-31.2 dc source	1.0mA min 2.0A max	6	IB10XOB6	TB3, TB3S	80mA

¹ On/off = 512µs default. Programmable to 512µs, 1ms, 2ms, 4ms, 8ms, 16ms, 32ms, or 64ms.

1746 Digital I/O Combination Modules

Inputs				Outputs			Cat. No. 1746-	Backplane Current Load	Applications
Operating Voltage	Signal Delay (max)	Maximum Off-State Current	Number of Inputs	Operating Voltage /Type	Max Continuous Current per Output	Number of Outputs			
85-132 ac	on = 35 ms off = 45 ms	2 mA	2	5-265 ac 5-125 dc	1.5A @ 120V ac ¹	2	IO4	30mA @ 5V 25mA @ 24V	Combination 120V ac inputs and relay contact outputs
			4	N.O. relay contact	1.2A @ 24V dc ¹	4	IO8	60mA @ 5V 45mA @ 24V	
			6			6	IO12	90mA @ 5V 70mA @ 24V	

¹ Inductive load rating.

1794 Digital ac Input Modules

Type	Voltage Category	Operating Voltage	Signal Delay	Max Off-State Current	Number of Inputs	Module Cat. No. 1794-	TB Cat. No. 1794-	Backplane Current Load	Applications
ac	120	85-132	on=8.6ms ¹ off=26.6ms	2.9mA	8	IA8	TB2, TB3, TBN, TB3S	30mA	General-purpose 120V ac inputs

¹ On = 8.6ms by default. Programmable to 8.6, 9, 10, 12, 17, 26, 43, or 78ms. Off = 26.6ms by default. Programmable to 26.6, 27, 28, 30, 35, 44, 61, or 96ms.

1746 Digital ac Input Modules

Type	Operating Voltage	Signal Delay (max)	Maximum Off-State Current	Number of Inputs	Cat. No. 1746	Backplane Current Load @ 5V	Applications
ac	85-132	on=35ms off=45ms	2 mA	4	-IA4	35mA	General-purpose 120V ac inputs
			2 mA	8	-IA8	50mA	
			2 mA	16	-IA16	85mA	
	170-265	on=35ms off=45ms	2 mA	4	-IM4	35mA	General-purpose 220/240V ac inputs
			2 mA	8	-IM8	50mA	
			2 mA	16	-IM16	85mA	
ac/dc	24 ac dc Sink (Source Load)	on=15ms dc off=15ms dc on=25ms ac off=25ms ac	1 mA	16	-IN16	85mA	V-ac or V-dc operation
	80-150 ac 85-170 dc Sink or Source Load	on=7ms dc off=40ms dc on=17ms ac off=45ms ac	0.5 mA dc 4 mA ac @ 20V	8	sc-IA8I ¹	110mA	Isolated V-ac or V-dc operation
	160-264 ac 170-276 dc Sink or Source Load	on=7ms dc off=36ms dc on=15ms ac off=40ms ac	0.85 mA dc 2.5 mA ac @ 40V	8	sc-IM8I ¹	110mA	

¹ These products are sold and supported by Spectrum Controls, Inc., Bellevue, WA and can be purchased through an Allen-Bradley distributor.

1771 Digital ac/dc Input Modules

Type	Voltage Category	Operating Voltage	Signal Delay (typical)	Max Off-State Current	Number of Inputs	Module Cat. No. 1771	Wiring Arm 1771-	B-plane Current Load	Applications ¹
ac/dc	24	12-28 ac	on=18 (±10) ms off=18 (±10) ms	2.8mA	8	-IN	WA	80mA	General-purpose 24V ac inputs
		16-30 ac 9-30 dc	on ac=35 (±10) ms off ac=45 (±15) ms on dc=10 ms off dc=50 ms	1.5mA ac 0.6mA dc	16	-IND	WH	250mA	General-purpose 24V ac/dc inputs
	120	92-138 ac 92-138 dc	on/off ac=24 (±10) ms on dc=10 (±4) ms off dc=20 (±9) ms	1.7mA	6	-ID	WD	74mA	Isolated-circuit multi-phase applications
		87-138 ac 97-138 dc		2.8mA	8	-IA/B, -IA2	WA	75mA	Gen-purpose 120V ac/dc Proximity switches
		79-138 ac 79-138 dc	on ac =5 (±3) ms on dc is selectable: 3 (±0.1)ms or 10(±1)ms off ac/dc=25 (±5) ms	3.0mA ac 0.8mA dc	16	-IAD	WH	195mA	General-purpose 120V ac/dc inputs
		85-138 ac	on=10 (±7) ms off=20 (±15) ms	2.3mA @ 60Hz 1.9mA @ 50Hz	32 (4 sets of 8)	-IAN	WN	280mA	General-purpose 120V ac inputs
		77-138 ac 105-138 dc	on=1 ms off ac = 9 or 18 ms off dc = 9 ms	4.0mA ac 0.8mA dc	16	-ID16	WN	75mA	General-purpose 120V ac/dc isolated-circuit multi-phase applications
		184-276 ac 184-276 dc	on/off ac=20 (±10) ms on dc=10 (±4) ms off dc=20 (±9) ms	0.7mA ac 1.0mA dc	6	-ID01	WD	74mA	Isolated-circuit multiple-phase applications
	220	184-276 ac 184-276 dc	on ac =20 (±6) ms on dc = 10 (±4) ms off ac=20 (±6) ms off dc=20 (±9) ms	1.0mA	8	-IM	WA	75mA	General-purpose 220V ac/dc inputs
		184-250 ac 166-230 dc	on=15 (±8) ms off =172 (±56) ms	13.0mA ac 0.25mA dc	16	-IMD	WH	250mA	
		159-264 ac 184-276 dc	on ac=11 (±6) ms on dc = 3 (±2) ms off ac =29 (±8) ms off dc =30 (±7) ms	2.8mA ac 0.35mA dc	16	sc-IMI16 ²	WN	100mA	Isolated-circuit multiple-phase applications

¹ Each module occupies one slot

² These products are sold and supported by Spectrum Controls, Inc., Bellevue, WA and can be purchased through an Allen-Bradley distributor.

For more information, see 1771 Digital I/O AC Input and Output Modules Product Data, pub. no. [1771-2.182](#).

1794 Digital dc Input Modules

Type	Voltage Category	Operating Voltage	Signal Delay	Max Off-State Current	Number of Inputs	Module Cat. No. 1794-	TB Cat. No. 1794-	Backplane Current Load	Applications
dc	24 sink (source load)	19.2-31.2	512µs ¹	1.5mA	16	IB16	TB3, TB3S	30mA	General-purpose 24V dc inputs including proximity sensors
			512µs ¹	1.5mA	8	IB8S	TB3, TB3S	30mA	Smart proximity-sensor 24V dc inputs
	24 source (sink load)	19.2-31.2	256µs ²	1.5mA	16	IV16	TB3, TB3S	30mA	General-purpose 24V dc inputs including proximity sensors

¹ On/off = 512µs default. Programmable to 512µs, 1ms, 2ms, 4ms, 8ms, 16ms, 32ms, or 64ms.

² On/off = 256µs default. Programmable to 256µs, 512µs, 1ms, 2ms, 4ms, 8ms, 16ms, or 32ms.

Selection Charts
Digital I/O

1746 Digital dc Input Modules

Type	Operating Voltage	Signal Delay (max)	Maximum Off-State Current	Number of Inputs	Cat. No. 1746	Backplane Current Load @ 5V	Applications
dc	5 Source (Sink Load)	on=0.25ms off=0.50ms	NA	16	-IG16	140mA	<ul style="list-style-type: none"> •TTL input •BCD inputs
	10-30 Sink (Source Load)	on=8ms off=8ms	1 mA	8	-IB8	50mA	General-purpose dc inputs
			1 mA	16	-IB16	85mA	
	10-30 Source (Sink Load)	on=8ms off=8ms	1 mA	8	-IV8	50mA	Fast response for time-critical applications
			1 mA	16	-IV16	85mA	
	10-30 Sink (Source Load)	on=0.3ms ¹ off=0.5ms	1.5 mA	16	-ITB16	85mA	
	24 Sink (Source Load)	on=3ms off=3ms	1 mA	32	-IB32	106mA	General-purpose dc inputs. High-density for limited panel space
	18-26.4 Source (Sink Load)	on=3ms off=3ms	1 mA	32	-IV32	106mA	
	30-55 Sink (Source Load)	on=4ms off=4ms	1.5 mA	16	-IC16	85mA	General-purpose 48V dc inputs
90-146 Sink ² (Source Load)	on=9ms off=9ms	0.8 mA	16	-IH16	85mA	General-purpose 125V dc inputs	

¹ Typical signal delay for these modules: on=0.1ms, off=0.25ms @ 24V dc.

² Consult the user manual for module deratings at 146V dc and 60° C

1771 Digital dc Input Modules

Type	Voltage Category		Operating Voltage	Signal Delay (typical)	Max Off-State Current	Number of Inputs	Module Cat. No. 1771-	Wiring Arm 1771-	Backplane Current Load	Applications ¹		
dc	5	TTL	TTL-compatible 5.0-5.3	< 1ms	NA	8	IG	WC	122mA	TTL interfaces, BCD interfaces encoders (A-B Bulletin 854C)		
				< 1ms	NA	16	IGD	WH	130mA			
10 to 60	Sink (Source Load)		15-27	contact status • on/off=33(±6)ms	1.0mA	7	DW (See pg 3-54)	WA	300mA	Line monitoring current @ 24V dc • 6mA contact open • 20mA contact closed • < 4mA for detection of wire fault		
				wire-fault status • on/off=3(±2)ms								
				10-27	on=12 (±7) ms off=20 (±7) ms	3.0mA	8	IB	WA	74mA	Compatible with source switching devices, including: • dry-contact switches • electro-mechanical transmitters • panel switching devices, such as pushbutton and selector switches	
				42-56	on=15 (±7) ms off=20 (±7) ms	3.7mA	8	IC	WA	74mA		
				24-50	on/off=15 (±7) ms	0.7mA	8	IH	WA	74mA		
				12-27	on=0.6 (±0.2) ms off=0.6 (±0.2) ms	1.3mA	8	IT	WA	74mA		
				10-30	on=1.3 (±0.1) ms off=1.3 (±0.1) ms	2.0mA	16	IBD	WH	250mA		
				20-60	on= 6 (±2) ms off= 20 (±1) ms	1.2mA	16	ICD	WH	250mA		
				10-30	on=6 (±2) ms (digital filter) off=6 (±2) ms	1.7mA	32 (4 sets of 8)	IBN	WN	280mA		
				Source (Sink Load)	12-24	on/off=15(±7) ms	3.0mA	8	IV	WA	74mA	Sink dc input signal termination.
					10-30	on=6(±2)ms (digital filter) off=6(±2) ms	1.7mA	32 (4 sets of 8)	IVN	WN	280mA	
				Sink or Source Load		5-30	fast,on/off < 1ms slow,on/off=12ms (-7, +14 ms)	NA	8	IQ	WC	150mA
10-32	4 filter times 0,1,9 and 18ms	2.0mA	16			IQ16	WN	100mA	Source or sink input signal termination time-critical applications, isolated circuits			

¹ Each module occupies one slot

For more information, see the 1771 Digital I/O DC Input and Output Modules Product Data, pub. no. [1771-2.180](#).

1794 Digital ac Output Modules

Type	Voltage Category	Operating Voltage	Max Continuous Current Per Output	Max Continuous Current Per Module	Number of Outputs	Module Cat. No. 1794-	TB Cat. No. 1794-	Backplane Current Load	Applications
ac	120	85-132	50mA min 1A max	4A	8	OA8	TB3, TB3S	80mA	General-purpose 120V ac outputs

1746 Digital ac Output Modules

Type	Operating Voltage	Max Continuous Current per Output	Max Continuous Current/Module	Number of Outputs	Catalog Number 1746	Backplane Current Load	Applications
ac	85-265	1.0A @ 30° C 0.5A @ 60° C	8A @ 30° C 4A @ 60° C	8	-OA8	185mA @ 5V	General-purpose 120/240V ac outputs
		0.5A @ 30° C 0.25A @ 60° C	8A @ 30° C 4A @ 60° C	16	-OA16	370mA @ 5V	
		2.0A @ 30° C 1.25A @ 55° C 1.0A @ 60° C	9.0A @ 30° C 6.0A @ 60° C	12	-OAP12	370mA @ 5V	High-current 120/240V ac outputs; 6 outputs per common; fused commons protect module
	74-276	1.5A @ 30° C 1.0A @ 60° C	9.0A @ 30° C 4.0A @ 60° C	8	sc-OAP81 ¹	170mA @ 5V	At each isolated output, a blown fuse is reported in the input image table

¹ These products are sold and supported by Spectrum Controls, Inc., Bellevue, WA and can be purchased through an Allen-Bradley distributor.

1771 Digital ac Output Modules

Type	Voltage Category	Operating Voltage	Max Continuous Current Per Output	Maximum Current Per Module	Number of Outputs	Catalog Number 1771	Wiring Arm Number 1771-	B-plane Current Load	Applications ¹
ac	24	20-30	1.5A	6A	8	-ON	WA	225mA	Relay coil driver. Low voltage inductive loads.
		24/48	10-60	2A	8A	16	-OND	WH	
	120	92-138	2A	6A	4	-OP	WA	350mA	Each output is protected by opening its fuse if its triac fails shorted
		92-138	2A	6A	6	-OD	WD	225mA	Isolated circuits. Multiple solenoids and transformers
		85-138	2A	8A	16	-ODD	WN	420mA	Isolated circuits with individual fuse indication. Multiple solenoids and transformers
		74-138	2A	8A	16	-OD16	WN	200mA	Isolated circuits, multiple solenoids and transformers
		92-138	2A	6A	8 (4 sets of 2)	-ODZ	WD	350mA	Isolated circuit pairs; replaces 1771-OZ and -OA with resistor, 1771-IA interlocks
		92-138	1.5A	6A	8	-OA	WA	210mA	General purpose 120V ac
		10-138	2A	8A	16	-OAD	WH ²	295mA	At each output, a blown fuse is reported in the input image table
		220	184-276	2A	6A	6	-OR	WD	255mA
	184-250		2A	6A	8	-OM	WA	225mA	General purpose 220V ac
	184-250		2A	8A	16	-OMD	WH ²	700mA	
	120/220	80-265	1.0A @ 30° C 0.3A @ 60° C	8A	32 (4 sets of 8)	-OAN	WN	800mA	General purpose 120/220V ac
		74-276	2A	8A	16	sc-OMI16 ³	WN	330mA	At each isolated output, a blown fuse is reported in the input image table

¹ Each module occupies one slot.

² The optional 1771-WHF wiring arms provide 1 fuse per output (see publication [1771-2.116](#) for details).

³ These products are sold and supported by Spectrum Controls, Inc., Bellevue, WA and can be purchased through an Allen-Bradley distributor.

For more information, see the [1771 Digital I/O AC Input and Output Modules Product Data](#), pub. no. [1771-2.182](#).

1794 Digital dc Output Modules

Type	Voltage Category	Operating Voltage	Max Continuous Current Per Output	Max Continuous Current Per Module	Number of Outputs	Module Cat. No. 1794-	TB Cat. No. 1794-	Backplane Current Load	Applications
dc	24 source	19.2 thru 31.2	1.0mA min 2A max	10A	8	OB8EP	TB3, TB3S, TBN, TBNF	73mA	24V dc outputs with electronic fusing
			1.0mA min 500mA max	8A	16	OB16	TB3, TB3S	80mA	General-purpose 24V dc outputs
	24 sink	19.2 thru 31.2	1.0mA min 500mA max	8A	16	OV16	TB3, TB3S	80mA	General-purpose 24V dc outputs

1746 Digital dc Output Modules

Type	Operating Voltage	Max Continuous Current per Output	Max Continuous Current/Module	Number of Outputs	Catalog Number 1746-	Backplane Current Load	Applications
dc	10-50 Source	1.0A @ 30° C 0.5A @ 60° C	8A @ 30° C 4A @ 60° C	8	OB8	135mA @ 5V	General-purpose dc outputs
	10-50 Sink	1.0A @ 30° C 0.5A @ 60° C	8A @ 30° C 4A @ 60° C	8	OV8	135mA @ 5V	
	10-50 Source	0.50A @ 30° C 0.25A @ 60° C	8A @ 30° C 4A @ 60° C	16	OB16	280mA @ 5V	
	10-50 Sink	0.5A @ 30° C 0.25A @ 60° C	8A @ 30° C 4A @ 60° C	16	OV16	270mA @ 5V	
	20.4-26.4 Source	2.0A @ 60° C	8.0A @ 0 to 60° C	8	OBP8	135mA @ 5V	High-current dc source output
	20.4-26.4 Source	1.5A @ 30° C 1.0A @ 60° C	6.4A @ 0 to 60° C	16	OBP16	250mA @ 5V	High-current dc source output, fused common
	20.4-26.4 Sink	1.5A @ 30° C 1.0A @ 60° C	6.4A @ 0 to 60° C	16	OVP16	250mA @ 5V	High-current dc sink output, fused common
	5V Sink	0.024A	—	16	OG16	180mA @ 5V	TTL loads; sink-load display devices
	5-50 Source	0.1A @ 60° C	3.2A @ 60° C	32	OB32	452mA @ 5V	High-density low-current dc outputs
	5-50 Sink	0.1A @ 60° C	3.2A @ 60° C	32	OV32	452mA @ 5V	

1771 Digital dc Output Modules

Type	Voltage Category		Operating Voltage	Max Continuous Current Per Output	Max Cont Current Per Module	Number of Outputs	Catalog Number 1771-	Wiring Arm Number 1771-	Backplane Current Load	Applications ¹
dc	5	TTL	TTL compatible 5.0-5.3	0.02A sink 0.001A source	N/A	8	OG	WC	168mA	TTL interfaces
				0.20A sink 0.001A source	N/A	16	OGD	WH	230mA	
10 to 60	Source		10-27	1.5A	8A	8	OB	WA	165mA	-V dc output signal termination
			42-53	1.5A	8A	8	OC	WA	165mA	
			10-60	2A	8A	16	OBD	WH ²	400mA	
			10-40	1A	8A	16	OBDS	WH	300mA	electronic fusing/current limiting
			10-30	0.5A (2A/set)	8A	32 (4 sets of 8)	OBN	WN	330mA	-V dc output signal termination
			20.4-26.4	2.25A	9A	8	OQ	WF	225mA	-V dc signal termination Isolated circuits
10 to 32	Sink or Source		10-32	2A	32A	16	OQ16	WN	400mA	isolated circuits general purpose
			Sink	10-30	0.5A	8A	32 (4 sets of 8)	OVN	WN	330mA

¹ Each module occupies one slot

² Optional 1771-WHF wiring arms provide 1 fuse per output (See publication [1771-2.116](#) for details)

For more information, see the 1771 Digital I/O DC Input and Output Modules Product Data, pub. no. [1771-2.180](#).

1794 Digital Contact Output Modules

Voltage Category	Operating Voltage	Max Continuous Current Per Output	Max Cont Current Per Module	Number of Outputs	Type of Contact Outputs	Module Cat. No. 1794-	TB Cat. No. 1794-	Backplane Current Load	Applications
5-125V dc 5-240V ac	5 thru 240	2A @ 240V ac resistive	16A	8	N.O. relay contact outputs	OW8	TB3, TB3S, TBN	69mA	Individually isolated contact outputs

1746 Digital Contact Output Modules

Operating Voltage	Max Continuous Current per Output	Max Continuous Current/Module	Number of Outputs	Type of Contact Outputs	Catalog Number 1746-	Backplane Current Load	Applications
5-265 ac 5-125 dc	3A @ 120V ac ¹ 1.2A @ 24V dc ¹	See ²	8	N.O. relay contact Outputs	OX8	85mA @ 5V 90mA @ 24V	Individually isolated high-current relay contact outputs
	1.5A @ 120V ac ¹ 1.2A @ 24V dc ¹	8A	4		OW4	45mA @ 5V 45mA @ 24V	Relay contact outputs
	1.5A @ 120V ac ¹ 1.2A @ 24V dc ¹	16A 8A/common	8 (2 sets of 4)		OW8	85mA @ 5V 90mA @ 24V	Relay contact outputs; 4 outputs per common
	1.5A @ 120V ac ¹ 1.2A @ 24V dc ¹	16A ² 8A/common	16 (2 sets of 8)		OW16	170mA @ 5V 180mA @ 24V	Relay contact outputs; 8 outputs per common

¹ Inductive load rating.

² The continuous current per module must be limited to 1440 VA.

For more information, see Discrete Input and Output Modules Product Data, pub. [1746-2.35](#).

1771 Digital Contact Output Modules

Operating Voltage	Max Continuous Current Per Output	Max Cont Current Per Module	Number of Outputs	Type of Contact Outputs	Catalog Number 1771-	Wiring Arm Number 1771-	Backplane Current Load	Applications ¹
24-138 ac ³ 24-125 dc	0.25A @ 120V ac/dc or 1A @ 30V ac/dc (30 watts max)	N/A	8 (4 sets of 2)	8 selectable	OW	WD	700mA	no leakage current
24-250 ac, 24-150 dc	2A (80W dc max) (500VA ac max)	1280W dc 1440VA ac	16 (2 sets of 8)	8 N.O. 8 selectable	OW16	WN	1,300mA	<ul style="list-style-type: none"> • isolated • no leakage current
24-138 ac ³ 24-125 dc	0.25A @ 120V ac/dc or 1A @ 30V ac/dc (30 watts max)	12A @ 45° C	32 (4 sets of 8)	32 N.O.	OWNA	WN	2,500mA	<ul style="list-style-type: none"> • mixed voltages • no leakage current
24-138 ac 24-125 dc			32 (4 sets of 8)	32 selectable	OWN	WN	2,500mA	<ul style="list-style-type: none"> • mixed voltages • signal switches • no leakage current
0-250 ac ² 0-175 dc	2A @ 100V ac (200VA max)	N/A	4 (isolated)	4 selectable	OX	WC	550mA	<ul style="list-style-type: none"> • signal switching • mercury-wetted relays • isolated circuits
0-24 ac/dc	0.1A (max)	N/A	8 (4 sets of 2)	4 N.O. 4 N.C.	OYL	WD	420mA	<ul style="list-style-type: none"> • physical isolation • low power dissipation • no leakage current
0-24 ac/dc	0.1A (max)	N/A	8 (4 sets of 2)	8 N.O.	OZL	WD	420mA	<ul style="list-style-type: none"> • no leakage current

¹ Each module occupies one slot

² Inductive loads

³ Resistive loads

For more information, see the 1771 Digital I/O Relay Contact Output Modules Product Data, pub. no. [1771-2.181](#).

1791 Analog I/O Blocks

Inputs				Outputs				Catalog Number	I/O Block Power Source	Clearance Dimension (rounded up) HxWxD
Number of Inputs	Ranges	Channel Update	Resolution	Number of Outputs	Ranges	Channel Update	Resolution			
4 diff	± 10V; ± 5V 0-10V; 0-5V 0-20 mA (block supplies loop power)	108ms 4 channels	14 bits	2 diff	± 10V	10ms/ 2 channels	14 bits	1791-N4V2	85-132V ac 47-63 Hz 150 mA @ 120V ac	
4 diff			14 bits	2 diff	0-20 mA		13 bits	1791-N4C2		
4 diff			14 bits	2 diff	± 10V	14 bits	1791-NDV	19.2-30V dc 600 mA @ 24V dc		
4 diff			14 bits	2 diff	0-20 mA	13 bits	1791-NDC			

For each I/O, the data format is natural binary.

1794 Analog I/O Modules

Number of Inputs/Outputs/	Voltage Range	Current Range	Data Format	Module Cat. No. 1794-	TB Cat. No. 1794-	B-plane Current Load	External Power Required	Step Response @ 63%	Channel Update/Resolution/Accuracy
4 single-ended inputs 2 single-ended outputs	user configurable • ±10 • 0 thru 10	user configurable ¹ • 4 thru 20mA (default) • 0 thru 20mA	Natural binary Left-justified	IE4XOE2	TB2, TB3, or TB3S	20mA	+24V dc 70mA	V in 9.4ms C in 18.2ms out 24ms	256µs/4-input channels. 1.024ms/2-output channels. Input 12-bit resolution or 11-bit resolution plus sign. Output 12-bit resolution plus sign. Inputs 0.29% FS @ 25°C. Outputs 0.133% FS @ 25°C.
8 single-ended inputs	user configurable • ±10 • 0 thru 10	user configurable ¹ • 4 thru 20mA (default) • 0 thru 20mA	Natural binary Left-justified	IE8	TB2, TB3, or TB3S	20mA	+24V dc 60mA	V in 9.4ms C in 18.2ms	256µs/8 channels. 12-bit resolution (unipolar). 11-bit resolution plus sign (bipolar). 0.29% FS @ 25°C.
8 RTD inputs	RTD sensors supported: • 100Ω Pt, Eur (385) (-200 to +870°C) • 100Ω Pt, U.S. (3916) (-200 to +630°C) • 200Ω Pt, Eur (385) (-200 to +630°C) • 500Ω Pt, Eur (385) (-60 to +250°C) • 100Ω Nickel (-60 to +250°C) • 120Ω Nickel (-80 to 290°C) • 200Ω Nickel (-60 to +250°C) • 500Ω Nickel (-60 to +250°C) • 10Ω Copper (-200 to 260°C)		Natural binary	IR8	TB2, TB3, or TB3S	20mA	+24V dc 140mA	N/A	Programmable from 28 thru 325ms/channel. 16-bit resolution. ±0.2°C.
8 single-ended thermocouple inputs	• ±76.5mV Thermocouples supported: • Type B: 300 to 1800°C (572 to 3272°F) • Type C: 0 to 2315°C (23 to 4199°F) • Type E: -270 to 1000°C (-454 to 1832°F) • Type J: -210 to 1200°C (-346 to 2192°F) • Type K: -270 to 1372°C (-454 to 2502°F) • Type N: -270 to 1300°C (-454 to 2372°F) • Type R: -50 to 1768°C (-58 to 3214°F) • Type S: -50 to 1768°C (-58 to 3214°F) • Type T: -270 to 400°C (-454 to 752°F)		Natural binary	IT8	TB3T	20mA	+24V dc 140mA	N/A	Programmable from 28 thru 325ms/channel. 16-bit resolution. ±0.2°C.
4 single-ended outputs	user configurable • ±10 • 0 thru 10	user configurable • 4 thru 20mA (default) • 0 thru 20mA	Natural binary Left-justified	OE4	TB2, TB3, or TB3S	20mA	+24V dc 70mA (not including current outputs)	24ms	1.024ms/4 channels. 12-bit resolution plus sign. 0.133% FS @ 25°C.

¹ The module does not supply input current loop power.

1746 Analog I/O Modules

Number of Inputs/Outputs	Catalog Number/Module	Backplane Current Load	Ext. Power Required	Bandwidth	Step Response @ 95%	Update Period	Max. Resolution (bits) ²
4 inputs ($\pm 10V$ dc, ± 20 mA)	1746-NI4 Analog Input	25mA @ 5V 85mA @ 24V	None	10 Hz	60ms	512 μ s	16
4 outputs (0-20 mA)	1746-NO4I Analog Output	55mA @ 5V 195mA @ 24V	None	N/A	2.5ms	512 μ s	14
4 outputs ($\pm 10V$ dc)	1746-NO4V Analog Output	55mA @ 5V 145mA @ 24V	None	N/A	2.5ms	512 μ s	14
2 inputs ($\pm 10V$ dc, ± 20 mA) 2 outputs ($\pm 10V$ dc)	1746-NIO4V Analog Combo Module	55mA @ 5V 115mA @ 24V	None	10 Hz	60ms in 2.5ms out	512 μ s	16 in 14 out
2 inputs ($\pm 10V$ dc, ± 20 mA) 2 outputs (0-20 mA)	1746-NIO4I Analog Combo Module	55mA @ 5V 145mA @ 24V	None	10 Hz	60ms in 2.5ms out	512 μ s	16 in 14 out
2 inputs (differential, 0-10V dc, 0-20 mA) 2 outputs (0-20 mA)	1746-FIO4I Analog Combo Module (current outputs)	55mA @ 5V 150mA @ 24V	None	7k Hz	100 μ s in 2.5ms out	512 μ s	12 in 14 out
2 inputs (differential, 0-10V dc, 0-20 mA) 2 outputs ($\pm 10V$ dc)	1746-FIO4V Analog Combo Module (voltage outputs)	55mA @ 5V 120mA @ 24V	None	7k Hz	100 μ s in 2.5ms out	512 μ s	12 in 14 out
4 inputs 100 Ω , 200 Ω , 500 Ω Platinum 120 Ω Nickel 604 Ω Nickel/Iron 10 Ω Copper 150 Ω , 500 Ω , 1,000 Ω , 3,000 Ω direct resistance	1746-NR4 RTD/Resistance Analog Input Module	50mA @ 5V 50mA @ 24V	None	2.62 to 65.5 Hz	12 to 300ms	17ms to 1.2s	16
4 inputs B, E, J, K, N, R, S, T Thermocouple and $\pm 50mV$ or $\pm 100mV$	1746-NT4 Thermocouple/mV Analog Input Module	60mA @ 5V 40mA @ 24V	None	2.62 to 65.5 Hz	12 to 300ms	26ms to 1.2s	16
4 inputs B, C, D, E, J, K, N, R, S, T Thermocouple and $\pm 50mV$ or $\pm 100mV$	1746-INT4 Isolated Thermocouple/mV Analog Input Module	110mA @ 5V 85mA @ 24V	None	8 Hz	400ms	500ms	16
4 inputs (isolated 4-20mA, 0-20mA)	1746sc-INI4i ¹ Isolated Analog Input Module	470mA @ 5V	None	13.1 to 131 Hz	8 to 80ms	4 to 21ms	16
4 inputs (isolated $\pm 10V$, 0-10V, 0-5V, 1-5V dc, 4-20mA, 0-20mA)	1746sc-INI4vi ¹ Isolated Analog Input Module	570mA @ 5V	None	13.1 to 131 Hz	8 to 80ms	4 to 21ms	16
4 outputs (isolated 4-20mA, 0-20mA)	1746sc-INO4i ¹ Isolated Analog output Module	120mA @ 5V 250mA @ 24V	The 24V backplane load can be eliminated by using an external supply	N/A	1ms	24 to 34ms	16
4 outputs (isolated $\pm 10V$, 0-10V, 0-5V, 1-5V dc, 4-20mA, 0-20mA)	1746sc-INO4vi ¹ Isolated Analog output Module	120mA @ 5V 250mA @ 24V		N/A	1ms	24 to 34ms	16

¹ These products are sold and supported by Spectrum Controls, Inc., Bellevue, WA and can be purchased through an Allen-Bradley distributor.

² For each module, the data format is BCD or natural binary.

For more information, see: Analog I/O Modules Product Data, pub. [1746-2.34](#); SLC 500 Thermocouple/mV Input Module Product Data, pub. [1746-2.36](#); SLC 500 RTD/Resistance Input Module Product Data, pub. [1746-2.37](#).

1771 Analog I/O Modules

Number of Inputs/Outputs/	Data Format	Voltage Range	Current Range	Catalog Number/Modules ¹	Wiring Arm 1771-	Backplane Current Load	External Power Required	Channel Update/Resolution
8 differential or 16 single-ended inputs — selectable	Natural Binary or BCD scaling to ±9999	0-5V dc 1-5 dc ±5V dc ±10V dc	4-20mA 0-20mA ±20mA	1771-IFE Analog Input	WG	750mA	None	18ms/8 channels 36ms/16 channels 12-bits + sign
8 differential or 16 single-ended inputs — selectable	Natural Binary or BCD scaling to ±9999	0-5V dc 1-5 dc ±5V dc ±10V dc	4-20mA 0-20mA ±20mA ±40mA	1771-IFF Analog Input	WG	750mA	None	5ms/8 channels 10ms/16 channels 12 bits + sign
8 differential inputs	±9999 BCD ±32,767 Binary	0-50mV	N/A	1771-IFM Fast Millivolt Input	WG	750mA	None	12.5ms/8 channels 12 bits
8 differential inputs thru intrinsically safe conn.	±9999 BCD ±32,767 Binary	0-50mV	N/A	1771-IFMS Fast Millivolt Input	WG	750mA	None	14.5ms/8 channels 12 bits
8 isolated (1000 V) differential inputs	Natural Binary or BCD scaling to ±9999	0-5V dc 1-5V dc ±5V dc 0-10V dc ±10V dc	4-20mA 0-20mA ±20mA	1771-IL Isolated Analog Input	WF	1.3A	None	500ms/8 channels 15 bits + sign
8 floating differential inputs	Natural Binary or BCD Actual temperature or mV readings	Type E, J, K, R, S, T ±99.99mV	N/A	1771-IXE Thermocouple Millivolt Input	WI	750 mA	None	50ms/8 channels 15 bits + sign (1.0° C / 1.0° F/bit)
8 floating differential inputs	Natural Binary only	Type B, E, J, K, R, S, T ±99.99mV	N/A	1771-IXHR High-Res TC/mV Input	WI	750 mA	None	25ms/8 channels 15 bits + sign (0.1° C/0.1° F/bit)
6 RTD inputs (three-wire)	Natural Binary or BCD Actual temperature or Ohm readings	100Ω platinum 10Ω copper or other	N/A	1771-IR RTD Input	WF	800 mA	None	50ms/8 channels 16 bits (0.1° C/0.1° F/bit)
8 single-ended inputs	BCD 000 to 255	<ul style="list-style-type: none"> • 1-5V dc • 0-5V dc • ±10V dc • 0-10V dc 	<ul style="list-style-type: none"> • 4-20mA • 0-20mA • ±20mA 	Analog Input <ul style="list-style-type: none"> • 1771-IE01 • 1771-IE02 • 1771-IE03 • 1771-IE04 • 1771-IE05 • 1771-IE06 • 1771-IE07 	WB	400 mA	+5V dc ±15V dc	8ms/ 8 channels 8 bits
4 isolated (1000 V) differential outputs	Natural Binary or BCD Scaled to ±9999	1-5V dc 0-10V dc ±10V dc (OFE1)	4-20mA (OFE2) 0-50mA (OFE3)	1771-OFE1, -OFE2, -OFE3 Analog Output	WC	1.5A (OFE1) 1.5A (OFE2) 2.5A (OFE3)	None	8.0ms/4 channels (BCD) 1.6ms/4 channels (Natural Binary) 12 bits

¹ Each module occupies one slot

For more information, see the 1771 Analog Input and Output Module product data, publication [1771-2.183](#).

1771 N-Series Analog I/O Modules

Inputs — Type — Resolution	Outputs	Catalog Number	RTP Choice 1771-	Backplane Current Load
2 — Current only — 4-20 mA (0.34 μ A/bit) (module supplies loop power)	2 — Current — 0-25 mA (3.20 μ A/bit)	1771-NB4S	RT44	1.4A
2 — mV/TC — \pm 100mV (3.3 μ V/bit) B, R, S, Thermocouple (0.3°C/bit, 0.6°F/bit) E, J, K, T Thermocouple (0.1°C/bit, 0.2°F/bit)	2 — Current — 0-25 mA (3.20 μ A/bit)	1771-NB4T	RT41	1.0A
6 — RTD — 1-650 Ω (0.01 Ω /bit) 100 Ω Platinum, Eur (385) (0.03°C/bit, 0.06°F/bit) 100 Ω Platinum, U.S. (3916) (0.03°C/bit, 0.06°F/bit) 120 Ω Nickel 10 Ω Copper	2 — Current — 0-25 mA (3.20 μ A/bit)	1771-NBRC	RTP4	1.7A
6 — Current only — 4-20 mA (0.34 μ A/bit) (module supplies loop power)	2 — Current — 0-25 mA (3.20 μ A/bit)	1771-NBSC	RTP4	2.6A
6 — mV/TC — \pm 100mV (3.3 μ V/bit) B, R, S, Thermocouple (0.3°C/bit, 0.6°F/bit) E, J, K, T Thermocouple (0.1°C/bit, 0.2°F/bit)	2 — Current — 0-25 mA (3.20 μ A/bit)	1771-NBTC	RTP1	1.5A
6 — Voltage/Current — \pm 10V dc (0.34mV/bit) \pm 20 mA (1.3 μ A/bit)	2 — Voltage — \pm 10V dc (1.32mV/bit)	1771-NBV1	RTP4 Voltage in, RTP3 Current in	1.6A
6 — Voltage/Current — \pm 5V dc (0.17mV/bit) \pm 20 mA (0.67 μ A/bit)	2 — Current — 0-25 mA (3.20 μ A/bit)	1771-NBVC	RTP4 Voltage in, RTP3 Current in	1.7A
8 — Current only — 4-20 mA (0.34 μ A/bit) (module supplies loop power)	0	1771-NIS	RTP4	2.4A
8 — Voltage/Current — \pm 5V dc (0.17mV/bit) \pm 20 mA (0.67 μ A/bit)	0	1771-NIV	RTP4 Voltage in, RTP3 Current in	1.2A
8 — Voltage/Current — \pm 10V dc (0.34mV/bit) \pm 20 mA (1.3 μ A/bit)	0	1771-NIV1	RTP4 Voltage in, RTP3 Current in	1.2A
4 — Voltage/Current — \pm 5V dc (0.17mV/bit) \pm 20 mA (0.67 μ A/bit) 4 — RTD — 1-650 Ω (0.01 Ω /bit) 100 Ω Platinum, Eur (385) (0.03°C/bit, 0.06°F/bit) 100 Ω Platinum, U.S. (3916) (0.03°C/bit, 0.06°F/bit) 120 Ω Nickel 10 Ω Copper	0	1771-NIVR	RTP4 — To use a voltage channel for current application, you must install a 250 Ω resistor at the RTP.	1.2A
4 — Volt/Current — \pm 5V dc (0.17mV/bit) \pm 20 mA (0.67 μ A/bit) 4 — mV/TC — \pm 100mV (3.3 μ V/bit) B, R, S, Thermocouple (0.3°C/bit, 0.6°F/bit) E, J, K, T Thermocouple (0.1°C/bit, 0.2°F/bit)	0	1771-NIVT	RTP1 — To use a voltage channel for current application, you must install a 250 Ω resistor at the RTP.	1.1A
0	8 — Current — 0-25 mA (3.20 μ A/bit)	1771-NOC	RTP4 unfused RTP3 fused	2.8A @ 20 mA 3.2A @ 25 mA
0	8 — Voltage — \pm 10V dc (1.32mV/bit)	1771-NOV	RTP4 unfused RTP3 fused	2.0A
8 — RTD — 1-650 Ω (0.01 Ω /bit) 100 Ω Platinum, Eur (385) (0.03°C/bit, 0.06°F/bit) 100 Ω Platinum, U.S. (3916) (0.03°C/bit, 0.06°F/bit) 120 Ω Nickel 10 Ω Copper	0	1771-NR	RTP4	1.2A
8 — mV/TC — \pm 100mV (3.3 μ V/bit) B, R, S, Thermocouple (0.3°C/bit, 0.6°F/bit) E, J, K, T Thermocouple (0.1°C/bit, 0.2°F/bit)	0	1771-NT1	RTP1	1.0A
8 — mV/TC — -5/+55mV (0.95 μ V/bit) B, R, S, Thermocouple (0.03°C/bit, 0.06°F/bit) E, J, K, T Thermocouple (0.1°C/bit, 0.2°F/bit) C Thermocouple (0.07°C/bit, 0.1°F/bit) N Thermocouple (0.03°C/bit, 0.5°F/bit)	0	1771-NT2	RTP1	1.0A

- All input channels have scaling, high/low alarms with dead band, rate alarm, and digital filtering
- Each 4-channel module requires **one** cable assembly for connection to its RTP
- Each 8-channel module requires **two** cable assemblies for connection to its RTP
- The available cable assemblies are: 1771-NC6 (6 ft) and 1771-NC15 (15 ft)
- Each module has a channel update period of 25ms per module

- For each module, the data format is BCD or natural binary
- All output channels have scaling, user-defined last state, high/low clamp limits, and rate-of-change alarm
- For each module the step response @ 99.9% is 125ms
- Each module occupies one slot

For more information, see the High-Resolution Isolated Analog Module Product Data, pub. no. [1771-2.193](#).

Process Control and Positioning I/O Modules

1771 Process Control I/O Modules

Catalog Number/Module	Number of Inputs/Outputs	Resolution	Analog Inputs	Analog Outputs	Data Format	Slots	Backplane Current Load	External Power Required	Remote Termination Panel or Wiring Arm
1771-PD PID Control Module	2 temp. inputs 2 tieback inputs 2 outputs (for 2 PID loops)	12-bit resolution	1-5V dc 4-20 mA	1-5V dc 4-20 mA	Scaled BCD ±9999	2	1.2A	±15V dc	1771-WF
1771-TCM Temperature Control Module (See pg 3-44)	8 temp. inputs (for 8 PID heat/cool loops)	16-bit resolution or 15-bits plus sign bit	Thermo-couple	None	16-bit Integer (natural binary)	1	1.1A	None	1771-RTP1
1771-WS Weigh Scale Module (See pg 3-45)	10-V output Sense input Weigh signal C2-Cal input (for 1 weigh scale)	20-bit resolution	0-30mV dc (load cells)	None	16-bit integer (natural binary) or 32-bit floating-point	1	1.5A	None	1771-RT44

For more information, see the PID Control (2 Loop) Module Assembly Product Data, pub. no. [1771-2.34](#).

1746 Positioning I/O Modules

Catalog Number/Module	Description	Inputs	Maximum Input Frequency	Outputs	Module Update Time	Slots	Backplane Current Load	Terminal Block 1746-
1746-HS ¹ IMC 110 Servo Controller Module	Provides closed-loop servo control for one independent axis per module	+24V dc	300 kHz @ 0° quadrature	+24V dc	4.8ms	1	300mA @ +5V 104mA @ +24V (when using hand-held terminal)	N/A
1746-HSCE ¹ High-Speed Counter Encoder Module	Three modes of operation: • Range • Rate • Sequencer	1 count input (5V dc, 12V dc or 24V dc)	• 50 KHz for Range • 32 KHz for Rate • 50KHz for Sequencer	4 outputs (5V dc, 12V dc or 24V dc)	• Sequencer mode: 1.8ms • Range mode: 3.9ms • Rate mode: 70.0ms + rate period	1	32mA @ 5V dc	RT25G
1746-QV ¹ Open-Loop Velocity Control Module	Open-loop velocity control of a hydraulic ram	1 linear displacement transducer	160 inches @ 0.01-inch resolution	1 analog out 0-10V dc or ±10V dc	2ms	1	215mA @ 5V dc	RT27 (input) RT26 (output)

¹ This module is not compatible with an SLC 500 or SLC 5/01 processors.

1771 Positioning I/O Modules

Catalog Number/Module	Description	Inputs	Maximum Input Frequency	Outputs	Module Update Time	Slots	Backplane Current Load	Wiring Arm
1771-QA	Stepper Motor Positioning Assembly, open loop stepper control, point-to-point positioning. Consists of one 1771-M1 and one thru three 1771-OJ modules.							
1771-QB Linear Positioning Module (See pg 3-47)	Hydraulic positioning of two independent axes using Temposonics Linear Position Transducer	Auxiliary digital: • 8 mA/input@12V dc • 16 mA/input@ 24V dc • Logic 0: 0 to 4V dc • Logic 1: 10 to 30V dc Transducer	N/A	Auxiliary • digital source Servo valve: • Analog-±10V dc, ±20 mA, ±50mA, ±100 mA	2ms/axis	1	1.6A (max) 1.1 (typ)	1771-WN
1771-QC	Servo Positioning Assembly, closed-loop servo control, point-to-point positioning. Consists of one 1771-M3 and one thru three 1771-ES modules.							
1771-M3 Servo Controller Module	Controls up to 3 independent axes	N/A	N/A	N/A	N/A	1	1.75A	None
1771-ES Servo Encoder Feedback Expander Module	Performs closed-loop algorithm. One module for each independent axis (3 max)	5-30V dc, Incremental encoder. Auxiliary digital inputs: Jog, Start-stop, Override	250 kHz differential input	±10V dc analog command	2.4ms to update analog output voltage	2 per ES	1.7A	1771-WB
1771-M1 Stepper Motor Controller Module	Controls up to 3 independent axes	N/A	N/A	N/A	N/A	1	1.75A	None
1771-QD Injection Control Module	For injection molding machine control system	3 analog inputs	N/A	2 analog outputs	2ms scan auto tune PID and Velocity	1	0.5A	1771-WF
1771-QDC Plastic Molding Module (See pg 3-48)	For plastic molding machines	4 analog inputs	N/A	4 analog outputs	2ms scan auto tune PID and Velocity	1	1.2A	1771-WF
1771-QI Co-injection Module (See pg 3-49)	For plastic molding machines with 2 injection heads	4 analog inputs	N/A	4 analog outputs	2ms scan	1 per QI	1.2A	1771-WF
1771-QH Force Control Module (See pg 3-50)	Hydraulic velocity and pressure control	4 analog inputs	N/A	4 analog outputs	2ms	1	1.2A	1771-WF
1771-OJ Pulse Output Expander Assembly	One module for each independent axis (3 max)	5-30V dc digital inputs for Jogging & E Stop	N/A	20 kHz output to translator Source/Sink Push-Pull	2.4-3.1ms to update output	1 per OJ	0.80A	1771-WB
1771-DE Absolute Encoder Module (See pg 3-51)	Programmable Limit Switch and CAM Limit Switch Replacement	5V dc, 12 Bit Absolute Encoder (BCD, Natural Binary, or Gray Code Format)	50 kHz	(8) 5-24V dc Current Sourcing 2.0A Continuous per Output (current sourcing)	200µs	2	0.80A	1771-WG
1771-DL Gray Encoder Input Module (See pg 3-51)	Programmable Limit Switch Replacement	12-24V dc 8 Bit Absolute Encoder (Gray Code Format Only)	1 kHz	(1) 120V ac 0.5A Continuous Zero Speed Switch	1ms	1	0.12A	1771-WB

For 1771-QA, -M1, and -OJ see the Stepper Positioning Assembly Product Data, pub. [1771-2.36](#); for 1771-QB, see the Linear Positioning Module Product Data, pub. [1771-2.13Z](#); for 1771-QC and -ES, see the Servo (Encoder Feedback) Positioning Assembly Product Data, pub. [1771-2.4Z](#); for 1771-DE, see the Encoder Module Product Data, pub. [1771-2.8Q](#); for 1771-DL, see the Gray Encoder Input Module Product Data, pub. [1771-2.29](#).

Selection Charts
Positioning I/O Modules

1771 Positioning Modules (continued)

Catalog Number/ Module	Description	Inputs	Maximum Input Frequency	Outputs	Module Update Time	Slots	Backplane Current Load	Wiring Arm
1771-IJ Encoder Counter Module	High-speed 3 digit BCD or binary 12 Bit Counter	5V TTL Single-ended or Differential Incremental Encoder or Single-Channel Device	50 kHz	(2) 5V dc Open- Collector 0.5A Per Output	1.3ms	2	1.2A	1771-WB
1771-IK Encoder Counter Module	High-speed BCD or Binary 12 Bit Counter	12-24V dc Single-ended Incremental Encoder or Single Channel Device	50 kHz	(2) 12-24V dc Open- Collector 0.5A Per Output	1.3ms	2	1.2A	1771-WB
1771-VHSC High-Speed Counter Module (See pg 3-52)	4 High-speed BCD or natural-binary 12-bit counters	12 digital inputs 3 per counter	250 kHz	8 digital outputs	100 μ s	1	0.65A	1771-WN
1771-HS Motion Controller Module (IMC-120,120AR) ¹	Provides closed-loop control for one independent axis	+24V dc	77 kHz	+24V dc	3.2ms servo sample 9.6ms command update	1	0.72A	N/A
1771-HS1 Motion Controller Module (IMC-121) ¹	Provides closed-loop control for one independent axis with analog output	+24V dc	1 MHz	+24V dc	User-selectable 800 μ s to 3.2ms	2	1.06A	N/A
1771-HS3 Motion Controller Module (IMC-123) ¹	Provides closed-loop contouring control up to three axes with linear, circular and helical interpolation	+24V dc	1 MHz	+24V dc	User-selectable 800 μ s to 3.2ms	2	1.06A	N/A
1771-HRA Resolver Excitation Module	Interfaces resolver feed-back to up to 3 1771-HS,-HS1 or 1 1771-HS3 modules	None	2500 Hz	Sine and cosine resolver reference signals	N/A	1	0.065A	None

¹ For a complete description of IMC™ control systems, see publications 1746-ND001 (IMC 110); [1771-2.121](#) (IMC 120, 120AR), [1771-2.194](#) (IMC121), or [1771-2.144](#) (IMC 123)

For 1771-IJ, -IK: see the Encoder/Counter Module Product Data, pub. [1771-2.21](#); for 1771-VHSC: see the Very High Speed Counter Module Product Data, pub. [1771-2.207](#).

1771 Specialized I/O Modules

Catalog Number/ Module	Number of Inputs/Outputs	Voltage Range	Backplane Current Load	Slots	Wiring Arm	Miscellaneous
1771-CFM Configurable Flowmeter Module (See pg 3-53)	4 digital inputs 4 digital outputs	Inputs: • 50mV-200V ac peak — magnetic pickup • 4-40V dc (TTL compatible) • Bently 3300 5 & 8 mm — proximity pickups Outputs: 5-40V dc (supplied by user)	1A max	1	1771-WN	Module scan time: 1.3-5ms (depending on configuration and frequency)
1771-DR High Speed Logic Controller (See pg 3-52)	8 digital inputs 4 digital outputs	Inputs: 12-24V dc Outputs: 5-24V dc	1.1A	2	1771-WG	Module response time: < 1ms Pulse capture time: 50µs to 9.999ms
1771-DS Latching Input Module (See pg 3-54)	8 direct digital inputs	10-27V dc	0.375A	1	1771-WF	Pulse capture time: 0.1, 0.5, 1, 2.5 or 5ms
1771-IS Multiplexer Input Module (See pg 3-55)	72 direct digital inputs for: • up to four 4-digit BCD TW • up to six 3-digit BCD TW • up to 72 discrete switches	5V dc (supplied by module)	0.8A	1	1771-WF	Module scan: • 15.3ms (normal) • 5.1ms (fast)
1771-PM Clutch/Brake Control System	N/A	N/A	1.2A	2	1771-WB (2)	—
1771-SIM I/O Simulator Module (See pg 3-55)	8 input switches 8 output indicators	N/A	0.2A	1	N/A	—
1402-LS51 (See pg 3-56)	line voltage inputs 1 analog output	N/A	1.1A	2	1771-WC	Synchronization, load sharing, and high-speed power system monitoring.

For 1771-CFM, see the Configurable Flowmeter Module Product Data, pub. [1771-2.226](#); for 1771-DC, see the Real Time Clock Module Product Data, pub. [1771-2.45](#); for 1771-DR, see the I/O Logic Controller Module Product Data, pub. [1771-2.89](#); for 1771-DS, see the Latching Input Module Product Data, pub. [1771-2.68](#); for 1771-IS, see the DC Multiplexer Input Module Product Data, pub. [1771-2.35](#); for 1771-PM, see the Clutch/Brake Module Product Data, pub. [1771-2.67](#); for 1771-SIM, see the Input/Output Simulation Module Product Data, pub. [1771-2.106](#); for 1402-LS51, see the Line Synchronization Module Product Data, pub. 1402-2.0.

I/O Communication Products

6008 I/O Communication Modules

Catalog Number / Module	Function	Number of Remote I/O Ports	Communication Medium	Transmission Rate	Power Requirements
6008-SV1R VMEbus Remote I/O Scanner Module	Gives a VME master processor direct access to adapter devices on the universal remote I/O link	1	Twinax	• 57.6k bit/s @ 10k ft • 115.2k bit/s @ 5k ft • 230.4k bit/s @ 2.5k ft	2.5A @ 5V dc
6008-SV2R VMEbus Remote I/O Scanner Module	Gives a VME master processor direct access to adapter devices on the universal remote I/O link	2	Twinax	• 57.6k bit/s @ 10k ft • 115.2k bit/s @ 5k ft • 230.4k bit/s @ 2.5k ft	2.5A @ 5V dc

1784 Communication Interface Cards

Catalog Number / Card	Function	Number of Remote I/O Ports	Communication Medium (Remote I/O)	Transmission Rate (Remote I/O)	Power Requirements
1784-KTX Communication Interface Card ¹	Gives an ISA/ISA-bus PC direct access to adapter devices on the universal remote I/O link. Also provides for DH+, DH-485, PLC-3 direct or PLC-2 direct communication.	1	Twinax	<ul style="list-style-type: none"> • 57.6k bit/s @ 10k ft • 115.2k bit/s @ 5k ft • 230.4k bit/s @ 2.5k ft 	<ul style="list-style-type: none"> • 1.75A @ 5V dc • 0.1A @ ±12V dc
1784-KTXD Communication Interface Card ¹	Gives an ISA/ISA-bus PC direct access to adapter devices on the universal remote I/O link. Also provides for DH+ or DH-485 communication.	2	Twinax	<ul style="list-style-type: none"> • 57.6k bit/s @ 10k ft • 115.2k bit/s @ 5k ft • 230.4k bit/s @ 2.5k ft 	<ul style="list-style-type: none"> • 1.75A @ 5V dc • 0.1A @ ±12V dc
1784-KTS Communication Interface Card ¹	Gives an ISA/ISA-bus PC direct access to adapter devices on the universal remote I/O link.	1	Twinax	<ul style="list-style-type: none"> • 57.6k bit/s @ 10k ft • 115.2k bit/s @ 5k ft • 230.4k bit/s @ 2.5k ft 	<ul style="list-style-type: none"> • 1.75A @ 5V dc • 0.1A @ ±12V dc

¹ For more information on 1784 communication interface cards, see page 5-13.

1794 FLEX I/O Adapter Modules

Catalog Number/ Module	Function	Communication Medium	Transmission Rate	Backplane Current Load
1794-ACN15, -ACNR15 ControlNet FLEX I/O Adapter Module with power supply	Interfaces 8 FLEX I/O modules to a ControlNet PLC processor across a ControlNet network	Quad-shield RG-6 Coax	5M bit/s	640mA
1794-ASB, -ASB2 Remote I/O Adapter Module with power supply	Interfaces FLEX I/O modules to a remote I/O scanner port across a remote I/O link (1794-ASB interfaces 8 modules max; 1794-ASB2 interfaces 2 modules max)	Twinax	<ul style="list-style-type: none"> • 57.6k bit/s @ 10k ft • 115.2k bit/s @ 5k ft • 230.4k bit/s @ 2.5k ft 	640mA
1794-ADN DeviceNet I/O Adapter Module with power supply	Interfaces 8 FLEX I/O modules to a DeviceNet scanner across a DeviceNet network	Twisted Pair (DeviceNet network)	<ul style="list-style-type: none"> • 125k bit/s • 250k bit/s • 500k bit/s 	640mA

For more information on FLEX I/O see publication [1794-2.1](#). For more information on 1794-ADN, see publication [DN-2.5](#).

1747 (SLC 500) I/O Communication Modules

Catalog Number/ Module	Function	Communication Medium	Transmission Rate	Backplane Current Load	Chassis Location
1747-ASB Remote I/O Adapter Module	Interfaces I/O modules in an I/O chassis to a remote I/O scanner port across a remote I/O link	Twinax	<ul style="list-style-type: none"> • 57.6k bit/s @ 10k ft • 115.2k bit/s @ 5k ft • 230.4k bit/s @ 2.5k ft 	375mA @ 5V dc	Slot 0
1747-DCM Direct Communication Module	Provides a remote I/O adapter port for a local SLC processor to communicate with a remote I/O scanner port of a supervisory PLC/SLC processor across a remote I/O link	Twinax	<ul style="list-style-type: none"> • 57.6k bit/s @ 10k ft • 115.2k bit/s @ 5k ft • 230.4k bit/s @ 2.5k ft 	36mA @ 5V dc	Any slot of a local chassis except slot 0
1747-SN ¹ Remote I/O Scanner Module	Provides communication between a local SLC 5/02, 5/03, or 5/04 processor and remote I/O adapters, A-B operator interfaces, drives, etc.	Twinax	<ul style="list-style-type: none"> • 57.6k bit/s @ 10k ft • 115.2k bit/s @ 5k ft • 230.4k bit/s @ 2.5k ft 	90mA @ 5V dc	Any slot of a local chassis except slot 0
1747-SDN ¹ SLC 500 DeviceNet Scanner	Interfaces a local or remote SLC processor to one DeviceNet networks	Twisted Pair (DeviceNet network)	<ul style="list-style-type: none"> • 125k bit/s • 250k bit/s • 500k bit/s 	500mA @ 5V dc	Any slot of a local chassis except slot 0

¹ This module is not compatible with an SLC 500 or SLC 5/01 processors.

For more information on 1747-SN, see publication [1747-2.34](#). For more information on 1747-SDN, see publication [DN-2.5](#).

1771 I/O Communication Modules

Catalog Number/ Module	Function	Communication Medium	Transmission Rate	Backplane Current Load	Chassis Location	Wiring Arm
1771-ALX Extended Local I/O Adapter Module	Interfaces I/O modules in an I/O chassis to the extended local I/O scanner port of a PLC processor across an extended local I/O link	<ul style="list-style-type: none"> • 1771-CX1 (1m) • 1771-CX2 (2m) • 1771-CX5 (5m) 	2.5M bit/s	1.2A	Left-most (adapter) slot	None
1771-ACN15, -ACNR15 ControlNet I/O Adapter Module	Interfaces I/O modules in an I/O chassis to a ControlNet scanner port across a ControlNet network	Quad-shield RG-6 Coax	5M bit/s	1.0A	Left-most (adapter) slot	None
1771-ASB Remote I/O Adapter Module	Interfaces I/O modules in an I/O chassis to a remote I/O scanner port across a remote I/O link	Twinax	<ul style="list-style-type: none"> • 57.6k bit/s @ 10k ft • 115.2k bit/s @ 5k ft • 230.4k bit/s @ 2.5k ft 	1.0A	Left-most (adapter) slot	None
1771-DCM PLC Direct Communication Module	Provides a remote I/O adapter port for a local PLC processor to communicate with a remote I/O scanner port of a supervisory processor across a remote I/O link	Twinax	<ul style="list-style-type: none"> • 57.6k bit/s @ 10k ft • 115.2k bit/s @ 5k ft 	1.2A	1 I/O slot	None
1771-SDN PLC DeviceNet Scanner	Interfaces a local or remote PLC processor to a maximum of 2 DeviceNet networks	Twisted Pair (DeviceNet network)	<ul style="list-style-type: none"> • 125k bit/s • 250k bit/s • 500k bit/s 	1.2A	1 I/O slot	None
1771-L1 Loop Controller Interface Module	Provides interface for up to 15 1771-LC Loop Controllers	Twisted pair	4800 bit/s	1.3A	1 I/O slot	1771-WA
1771-SN Sub I/O Scanner Module	Provides communication between a local PLC processor and a maximum of 7 remote I/O racks (non-time-critical single-transfer digital I/O only)	Twinax	<ul style="list-style-type: none"> • 57.6k bit/s @ 10k ft • 115.2k bit/s @ 5k ft 	1.2A	1 I/O slot	None

For more information on 1771-ASB, see publication [1771-2.48](#). For more information on 1771-DCM, see publication [1771-2.70](#). For more information on 1771-L1, see publication [1771-2.109](#).

Smart Transmitter (HART Protocol) Interface Products

Catalog Number / Module	Function	Communication Medium	Transmission Rate	Power Supply Current Load (separate 24V dc)
1770-HT1 Smart Transmitter (HART Protocol) Communication Controller	Interfaces terminal blocks to a remote I/O link for a total of 32 HART channels maximum	Twinax (remote I/O link)	Remote I/O link: <ul style="list-style-type: none"> • 57.6k bit/s @ 10k ft • 115.2k bit/s @ 5k ft • 230.4k bit/s @ 2.5k ft 	600 mA
1770-HT8 Smart Transmitter (HART Protocol) 8-channel Terminal Block	Interfaces communication controller to up to 8 HART channels	N/A	N/A	200 mA
1770-HT16 Smart Transmitter (HART Protocol) 16-channel Terminal Block	Interfaces communication controller to up to 16 HART channels	N/A	N/A	400 mA

1771 Process Control I/O Modules

Temperature Control Module

(Cat. No. 1771-TCM)



The temperature control module is an intelligent I/O module that can accommodate 8 heat/cool PID loops for barrel temperature control or other injection molding temperature control applications. The module has 8 analog inputs, each of which functions as the controlled variable (C) input for a PID loop. The PID algorithm is performed on the module for each of the loops. The manipulated variable (M) output of each loop is sent from the module to the PLC processor's data table as both a numeric value and as a time-proportioned output (TPO) signal. Your ladder logic can send either the M numeric value to an analog output module, or the TPO signal to a digital output module to close the loop. For very fast cut-off, your ladder logic can use the TPO signal single-transferred to the input image.

With the 1771-TCM module, we provide configuration software that consists of easy-to-use faceplates.

Features

- 8 PID loops
- auto-tuning of PID loops (optimized for tuning barrel temperature control loops)
- a thermocouple input ($\pm 100\text{mV}$) for each PID loop
- 16-bit analog-to-digital converter resolution (0.1°)
- writes a heat and cool M value (for each PID loop) to the data table as a numeric value and as the duty cycle of a TPO bit
- single-transfers the TPO signals to the input image for applications requiring very fast cut-off
- temperature values in $^\circ\text{C}$ or $^\circ\text{F}$
- self-calibration (external reference required)
- software configuration
- user-selectable high and low alarms with dead band for hysteresis
- self-diagnostics
- input open-circuit detection

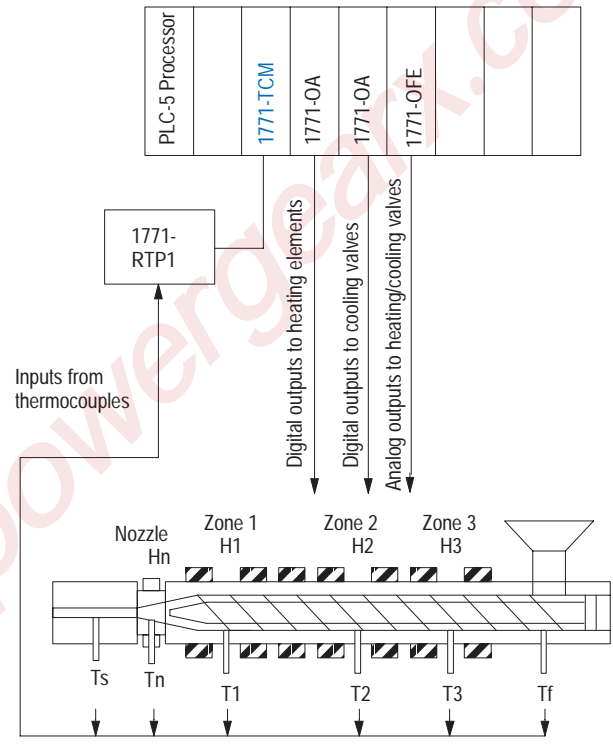
Specifications



Number of PID loops	8 individually isolated
I/O chassis location	any single I/O module slot
A/D resolution	16 bits or 15 bits plus sign bit
Input filtering	6-pole low-pass hardware filter
Calibration interval	<ul style="list-style-type: none"> • 6 months for first interval • 1 year for subsequent intervals
Isolation voltage	Designed to withstand 1000V dc continuous between input channels and between input and backplane connections. Modules are 100% tested at 1200V dc for 1 second between input channels and backplane connections.
Backplane current load	1.1A (1.5A surge at power turn on)
Environmental conditions:	
<ul style="list-style-type: none"> • Operating temperature • Rate of change 	<ul style="list-style-type: none"> • 0 to 60°C (32 to 140°F) • Ambient changes greater than $0.5^\circ\text{C}/\text{minute}$ may temporarily degrade performance during periods of change.
<ul style="list-style-type: none"> • Storage temperature • Relative humidity 	<ul style="list-style-type: none"> • -40 to 85°C (-40 to 185°F) • 5 to 95% (without condensation)
Connecting cable(s)	1771-NC6 = 1.8m (6 ft) 1771-NC15 = 4.6m (15 ft)
RTP choice	1771-RTP1
Weight	0.8 kg (1.8 lb)

For selection chart, see page 3-38.

Typical Configuration



T = temperature measurement point (thermocouple)
 H = heater band (element)



The Weigh Scale Module reads data from industry-standard load cells on storage tanks, reactors, and other vessels used in batching and blending operations. It reads the weight values directly from the load-cell junction box without the need for weigh-scales, and puts the value into the PLC-5 processor. It also compares the weight to set-point values (with pre-act values) and single-transfers the results to the input image for quick response.

With the module, we provide calibration and configuration software that consists of easy-to-use faceplates.

Features

- You can set the gross or net weight to zero at any point in the process
- Two set-points can be established in the module with corresponding pre-act and dead-band values
- The set-point comparison status can be read in the input image table for quick response
- The module provides 10V excitation voltage for up to four load cells associated with a single vessel
- The Weigh Scale module supports either 3mV/V or 2mV/V industry standard load cells and load points with the C2™ Second-Generation-Calibration feature
- You get accurate readings with 20-bit A/D conversion, providing 985,000 counts of displayed resolution over the 0-30mV range
- Hard calibration, which requires test weights, is supported
- Soft calibration, which minimizes the need for test weights, is also available when used with load cells of known sensitivity and range
- C2 calibration, which minimizes the need for test weights and eliminates the need for manual entry of values, is also available when used with load points with the C2 Second-Generation-Calibration feature
- The 1771-WS module incorporates WEVERSAVER® technology of Hardy Instruments to filter out mechanical vibrations
- The module returns “weight-in-motion” and other status information

- Stand-alone Windows-based WeighScale configurator software (which we provide with the module) lets you configure and calibrate without 6200 Series and A.I. 5 Programming Software or ControlView System Software
- The 1771-WS module A/D conversion period is 50ms

Typical Applications

- Batch weighing of ingredients
- Bin inventory
- Vessel-filling applications
- Adding materials into mixing vessels

Specific applications include:

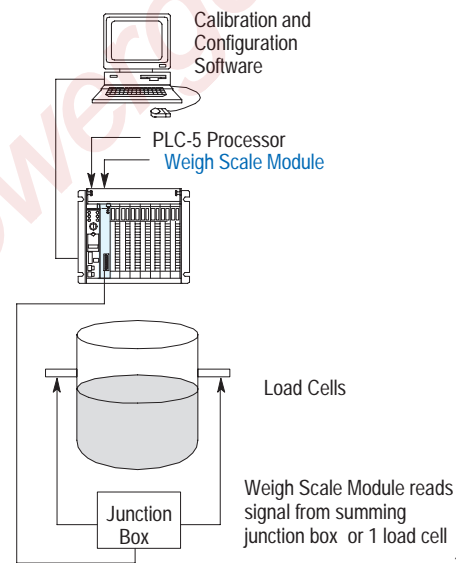
- Food and beverage batch processing
- Concrete plants
- Specialty chemical batch control
- Pharmaceuticals

Specifications

Inputs	<ul style="list-style-type: none"> • 1 ± signal -0.3mV thru +30.3mV • 1 ± sense +/- 5V dc ±5%
Outputs	<ul style="list-style-type: none"> • 1 ± excitation output: 10V dc +/- 5%, 1.15W max 1,000V dc minimum isolation from backplane logic circuitry • 1 C2 second-generation calibration output: 1,000V dc minimum isolation from backplane logic circuitry
Resolution	20-bit A/D resolution (985,000 counts of displayed resolution over 0-30mV range)
Number of slots	1
RTP choice	1771-RT44
Weight	0.7 kg (1.6 lb)

For selection chart, see page 3-38.

Typical Configuration



20617-M

Open-Loop Velocity Control Module

(Cat. No. 1746-QV)



The 1746-QV Velocity Control Module is part of an SLC-based system for open-loop velocity control of a hydraulic ram. This intelligent I/O module receives velocity profiles from the SLC 500 processor. Profile set points define where to accelerate and decelerate for each new segment. The profile specifies the analog output to execute for each of 7 segments.

As the module executes a profile, it receives position feedback from a linear displacement transducer to trigger a change in output as it reaches each new segment.

Features

Compared to simple on/off control of a hydraulic ram, the velocity control module provides these advantages:

- Reduce cycle time by increasing speed
- Reduce or eliminate pressure spikes and hammering for smoother operation and less wear by using profile segments to control acceleration and deceleration
- Save energy by modulating the speed of the hydraulic pump and apply only the power need (when using directional valves)
- Faster change-over between operations (mechanical re-adjustments of valves are minimized) because new profiles can be downloaded

Typical Applications

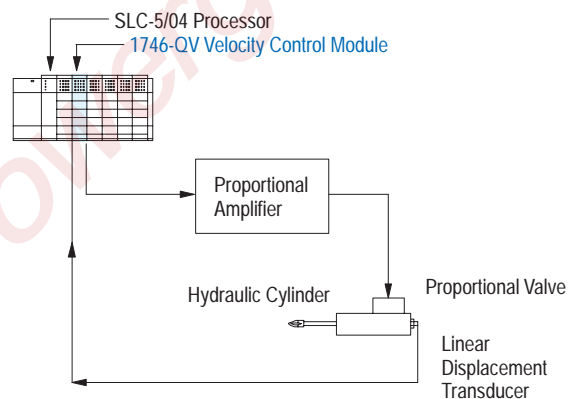
- Hydraulic machinery
- Hydraulic press
- Die casting
- Welder placement
- Pneumatic actuators for clamping or placement

Specifications

Module location	<ul style="list-style-type: none"> • 1746 I/O chassis • one slot
Number of axes	one
Update time	2 ms
Inputs	<ul style="list-style-type: none"> • From linear displacement transducer • 160 inch max. @ 0.01 inch resolution
Analog Output	0 to 10V dc, or -10 to +10V dc @ 0.005V increments
Operational temperature	0 to 60° C (32 to 140° F)
Storage temperature	-40 to 85° C (-40 to 185° F)
Relative Humidity	5 to 95% (without condensation)
Backplane current load	0.215A
External power supply current load	<ul style="list-style-type: none"> • 100mA @ -15V dc • 100mA @ +15V dc
Removable terminal block	<ul style="list-style-type: none"> • input: 1746-RT27 • output: 1746-RT26
Weight	0.2 kg (0.4 lb)

For selection chart, see page [3-38](#).

Typical Configuration





The 1771-QB Linear Positioning Module is an intelligent I/O module designed specifically for closed-loop hydraulic servo control using a magnetostrictive linear displacement transducer.

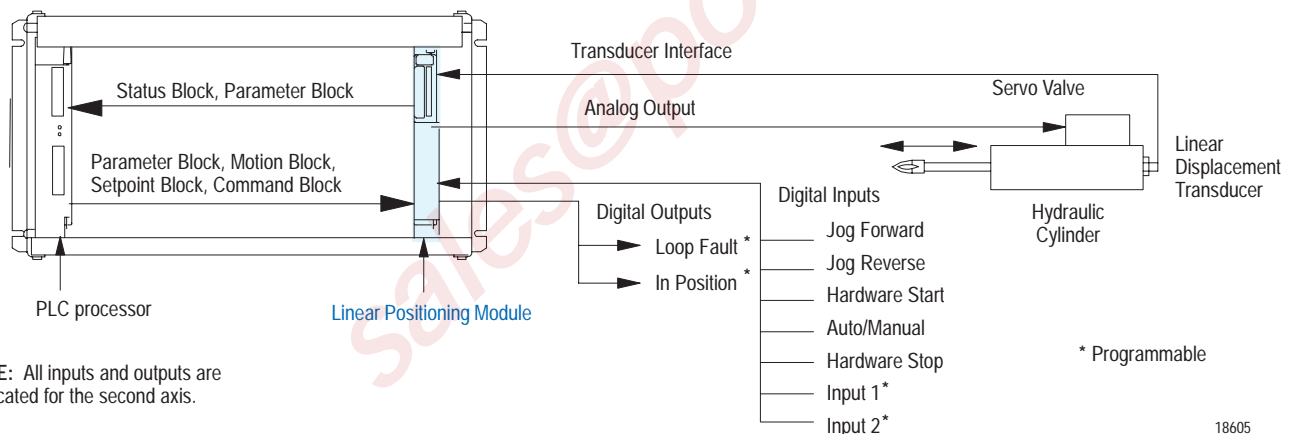
Axis motion profiles reside in the module and provide blended, chained, or continuous operations. The velocity or position of the axis triggers the next segment in the profile. Segments control the state of programmable outputs. The user can configure 242 segments within a single profile.

Operator interfacing is achieved with an Allen-Bradley industrial computer running Hydraulics Configuration and Operation Software option (cat. no. 9302-HCO).

Features

- Direct connection to transmitter and hydraulic servo valve
- Profiles are started by the processor or module's input
- Cam emulation using programmable inputs and outputs
- Monitors position, velocity, servo valve output, following error, and hydraulic system performance
- Acceleration, velocity, and position parameters permit on-the-fly changes
- Loss of position detection guards against uncontrolled operations

Typical Configuration



NOTE: All inputs and outputs are duplicated for the second axis.

- High-speed trending and tuning with 9302-HCO software release 4.0

Specifications

Module location	<ul style="list-style-type: none"> • 1771 Universal I/O chassis (local and extended local) • One slot (two independent closed-loop axes)
Operating Temperature	0 to 60° C (32 to 140° F)
Update time	2ms for servo loop and digital measurement
Controller checkout	Test mode permits programmable controller checkout without transducer or hydraulic system
Power Requirements	
Backplane current load	1.6A (max) 1.1A (typical)
Transducer interface external power requirements	+5V dc $\pm 5\%$ @ 300 mA (max)
Analog interface external power requirements	<ul style="list-style-type: none"> • +15V dc $\pm 5\%$ @ 540 mA (max) • -15V dc $\pm 5\%$ @ 360 mA (max)
Digital input external power requirements	<ul style="list-style-type: none"> • 24V dc maximum @ 50 mA maximum • Maximum voltage drop from supply to output = 1.6V dc @ 100 mA (requires +11.6V dc minimum for compatibility with digital inputs, digital outputs)
Inputs and Outputs	
Digital inputs	Current: 8 mA/input @ 12V dc; 16 mA/input @ 24V dc; Logic 0: 0 to 4V dc; Logic 1: 10 to 30V dc
Digital outputs	Single-ended, source; 100 mA, maximum source drive (On state); 1.0 mA, maximum source leakage (Off state); Logic 0: No voltage applied to output (low); Logic 1: User-supplied voltage applied to output (high)
Analog outputs (switch-selectable)	$\pm 10V$ dc up to 10 mA; ± 20 mA up to 600 ohms; ± 50 mA up to 240 ohms; ± 100 mA up to 120 ohms; 12-bit resolution
Wiring Arm	40-terminal 1771-WN

For selection chart, see page 3-39.

For more information, see: *Linear Positioning Module Product Data*, pub. [1771-2.137](#); *Integrating Hydraulics and Sequencing for Improved Productivity Brochure*, pub. [1771-1.39](#).

1771 Positioning Modules
Plastic Molding Module
 (Cat. No. 1771-QDC)



The Plastic Molding Module is a dedicated process module that controls the inject, clamp, and eject phases of an injection molding machine.

The 1771-QDC module can be placed in any single I/O slot in a 1771 I/O chassis. The intelligent Plastic Molding Module performs open- or closed-loop control on injection molding machines and is adaptable to most hydraulic configurations.

The 1771-QDC module automatically compensates for variations in the molding machine's hydraulic characteristics without user intervention with Allen-Bradley Expert Response Compensation™ (ERC) feature. ERC is an adaptive “learning” capability — the most advanced form of closed-loop process control in the plastics industry, which automatically compensates for process variations.

Process variations affecting machine response include:

- changes in material viscosity
- changes in percent regrind
- hydraulic valve wear
- mechanical/structural elasticity

Features

The 1771-QDC module reduces the engineering time required to design the system by providing the flexibility for:

- one to four valve systems
- proportional or servo valves
- open- or closed-loop (with ERC control for each phase in the cycle when in closed-loop)
- selectable profiles per phase
- trending of injection profile

The 1771-QDC module is designed to accommodate a variety of plastic molding processes. The module has the user-selectable capability to control the process with the appropriate pressure or speed algorithm as required. The ample number of steps in each profile lets you accurately model the desired flow or motion to be performed during each molding task.

Process Control Options ¹

Phase	Type of Profile
Injection (boost) phase: 11-step profile with selectable transition (boost cut-off)	<ul style="list-style-type: none"> • velocity vs. position or • velocity vs. position pressure limited or • injection pressure vs. position or • injection pressure vs. time
Pack phase: 5-step profile	<ul style="list-style-type: none"> • ram (screw) pressure vs. time or • cavity pressure vs. time
Hold phase: 5-step profile	<ul style="list-style-type: none"> • ram (screw) pressure vs. time or • cavity pressure vs. time
Plastication (extrude) phase: 11-step profile	<ul style="list-style-type: none"> • back pressure vs. position or • back pressure vs. time • screw rpm vs. position • screw rpm vs. time
Clamp close phase: three 3-step profile (for a total of 9 steps)	<ul style="list-style-type: none"> • velocity vs. position or • pressure vs. position
Clamp low pressure close (with re-try: 2-step profile)	<ul style="list-style-type: none"> • pressure vs. position
Clamp open phase: three 3-step profile (for a total of 9 steps)	<ul style="list-style-type: none"> • velocity vs. position or • pressure vs. position
Clamp open slow phase: 2-step profile	<ul style="list-style-type: none"> • velocity vs. position or • pressure vs. position
Eject adv. phase: 3-step profile (with tip strokes)	<ul style="list-style-type: none"> • velocity vs. position or • pressure vs. position
Ejector ret. phase: 3-step profile	<ul style="list-style-type: none"> • velocity vs. position or • pressure vs. position

¹ Depending on module mode of configuration.

Specifications



Inputs	4 analog (4-20 mA, 1 to +5V dc, 0 to +10V dc)
Outputs	4 analog (4-20 mA, 0 to +10V dc, -10 to +10V dc)
Alarms	Process Programming
Advanced control	PID and FF Expert Response Compensation Open/Closed Loop
Injection mode	10-step profile, Injection (boost) 5-step profile - Pack 5-step profile - Hold 10-step profile - Plastication (extrude)
Clamp mode	Three 3-step profile (close phase) Three 3-step profile - (open phase) 2-step profile (low pressure close) 2-step profile (open slow)
Ejector mode	3-step (adv) 3-step (ret) Tip strokes Ejector advanced dwell
Selectable transition (boost cut-off)	Time Ram pressure Cavity pressure Ram position
Backplane current load	1.2A
Wiring arm	1771-WF
Weight	0.6 kg (1.3 lb)

For related software products, see page 10-4.

For selection chart, see page 3-39.



A pair of Co-injection Modules can control the injection phase of a plastic injection molding machine with two injection heads. Each module controls one of the two injection heads. In conjunction with the two 1771-QI modules controlling co-injection, you can use a 1771-QDC module for controlling clamping and ejection.

The 1771-QI module can be placed in any single I/O slot in a 1771 I/O chassis. The intelligent co-injection module performs open- or closed-loop control on injection molding machines and is adaptable to most hydraulic configurations.

The 1771-QI module automatically compensates for variations in the molding machine's hydraulic characteristics without user intervention with Allen-Bradley Expert Response Compensation™ (ERC) feature. ERC is an adaptive "learning" capability — the most advanced form of closed-loop process control in the plastics industry, which automatically compensates for process variations.

Process variations affecting machine response include:

- changes in material viscosity
- changes in percent regrind
- hydraulic valve wear
- mechanical/structural elasticity

Features

The 1771-QI module reduces the engineering time required to design the system by providing the flexibility for:

- one to four valve systems
- proportional or servo valves
- open- or closed-loop (with ERC control for each phase in the cycle when in closed-loop)
- selectable profiles per phase
- trending of injection profile

The 1771-QI module is designed to accommodate a variety of plastic molding processes. The module has the user-selectable capability to control the process with the appropriate pressure or speed algorithm as required. The ample number of steps in each profile lets you accurately model the desired flow or motion to be performed during each molding task.

Process Control Options ¹

Phase	Type of Profile
Injection (boost) phase: 11-step profile with selectable transition (boost cut-off)	<ul style="list-style-type: none"> • velocity vs. position or • velocity vs. position pressure limited or • injection pressure vs. position or • injection pressure vs. time
Suspend phase:	<ul style="list-style-type: none"> • velocity or • injection pressure
Pack phase: 5-step profile	<ul style="list-style-type: none"> • ram (screw) pressure vs. time or • cavity pressure vs. time
Hold phase: 5-step profile	<ul style="list-style-type: none"> • ram (screw) pressure vs. time or • cavity pressure vs. time
Plastication (extrude) phase: 11-step profile	<ul style="list-style-type: none"> • back pressure vs. position or • back pressure vs. time • screw rpm vs. position • screw rpm vs. time

¹ Depending on module mode of configuration.

Specifications



Inputs	4 analog (4-20 mA, 1 to +5V dc, 0 to +10V dc)
Alarms	Process Programming
Advanced control	PID and FF Expert Response Compensation Open/Closed Loop
Injection mode	10-step profile, Injection (boost) 5-step profile - Pack 5-step profile - Hold 10-step profile - Plastication (extrude)
Selectable transition (boost cut-off)	Time Ram pressure Cavity pressure Ram position
Backplane current load	1.2A
Wiring arm	1771-WF
Weight	0.6 kg (1.3 lb)

For related software products, see page [10-4](#).

For selection chart, see page [3-39](#).

1771 Positioning Modules
Force Control Module
 (Cat. No. 1771-QH)



The 1771-QH Force Control Module acts as a single-axis hydraulic controller for high-speed transparent transitions between velocity control and pressure control.

By configuring motion control profiles to change from velocity to pressure control at a specified axis position, you can optimize force control for faster, smoother operation. You can also configure the profile to control auxiliary outputs to hydraulic pump controllers and proportional valve amplifiers.

All parameters are stored in the PLC processor data table. This helps reduce setup time and helps eliminate the need for re-calibration. By changing parameters on-the-fly, you can make required mechanical adjustments during operation without shutdown, and without reprogramming the module.

You help improve efficiency and productivity and reduce waste by integrating the 1771-QH module with existing machine controls and hydraulics.

Features

- Transition between force and velocity in each direction within an operational cycle
- Loss-of-input detection helps guard against uncontrolled motion
- Pre-programmed alarm and status prompts facilitate operation, troubleshooting, and programming
- Executing velocity and pressure algorithms every 2ms (independent of the PLC processor program scan and I/O scan) gives faster real-time decision making, which is essential for force limiting
- Compatible with hydraulic control hardware readily available from major manufacturers
- Hydraulics Configuration and Operation Software Option (cat. no. 9302-HCO) provides easy, fill-in-the-blanks configuration with error checking

Typical Applications

- Hydraulic press
- Drilling
- Grinding
- Plywood

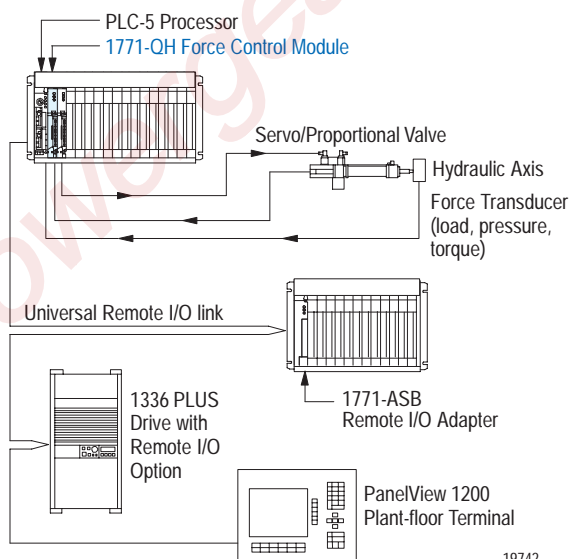
Specifications



Module location	<ul style="list-style-type: none"> • local 1771 I/O chassis • one slot
Number of axes	one closed-loop axis
Update time	2ms for servo loop and position/pressure measurement
Inputs	4 analog (4-20 mA, 1 to 5V dc, 0 to +10V dc selectable)
Outputs	4 analog (4-20 mA, 0 to 10V dc, -10 to +10V dc selectable)
I/O resolution	12-bit binary
I/O accuracy	0.1% full-scale @ 25° C, and ±50 ppm/° C full-scale range
Operational temperature	0 to 60° C (32 to 140° F)
Thermal dissipation	21 BTU/hr (outputs full ON)
Backplane current load	1.2A
Wiring arm style	1771-WF

For selection chart, see page 3-39.

Typical Configuration



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1771 Positioning Modules
Absolute Encoder Module
 (Cat. No. 1771-DE)



The Absolute Encoder Module converts a 12-bit (maximum) natural-binary or Gray-code value from an absolute encoder into a 16-bit (4-digit) BCD value. The module can also pass through a 12-bit (3-digit) BCD value from the encoder.

The module accepts a turn-on preset value and a turn-off preset value for each of 8 outputs. The module compares the position value to these preset values for an output to provide a very fast (200µs) response to position change.

Specifications



Compatible Allen-Bradley encoders	<ul style="list-style-type: none"> • Bulletin 845A • Bulletin 845C 	<ul style="list-style-type: none"> • Bulletin 845B • Bulletin 845D
Input logic level	<ul style="list-style-type: none"> • Logic 1: >2.4V dc • Logic 0: <0.6V dc 	
Encoder output sink current required per channel for logic 0	<ul style="list-style-type: none"> • 11 mA for single-ended drivers • 18 mA for differential drivers 	
Maximum input frequency	50k Hz	
Slot requirements	2 slots	
Input power supply	300 mA (max) @ +5V dc ±0.25V (tolerance includes line regulation, load regulation, drift, and ripple)	
Number of outputs	8	
Output current rating	2A sourced per output	
Output power supply	Selectable: +5 to +24V dc	
Backplane current load	800 mA	
Wiring arm type	1771-WG	

For selection chart, see page 3-39.

For more information, see Encoder Module Product Data, pub. [1771-2.80](#).

1771 Positioning Modules
Gray Encoder (12-24V dc) Input Module (8-bit)
 (Cat. No. 1771-DL)



The Gray Encoder input Module contains a decoder that converts an 8-bit gray-code input value from an absolute encoder into an 8-bit natural binary value. This absolute position value is available through the I/O scan to the input image table. A zero-speed output disables machine motion if encoder failure is detected

Specifications



Compatible Allen-Bradley encoders	<ul style="list-style-type: none"> • Bulletin 845A • Bulletin 845D
Input logic level	<ul style="list-style-type: none"> • Logic 1:>10V dc • Logic 0:<2V dc
Encoder output sink current required per channel for logic 0	<ul style="list-style-type: none"> • 6 mA with 12V dc supply • 15 mA with 24V dc supply
Input power supply	12-24V dc
Input delay	1ms max
Zero-speed output	<ul style="list-style-type: none"> • Voltage: 120V ac (92-138V ac, 47-63Hz) • Timer: adjustable from 0.3 to 6 sec • Continuous output current: 0.5A max • Maximum surge current: 2A for 10ms • Minimum load current: 50 mA • On-state voltage drop: 2V @ 100 mA • Off-state leakage current: 5 mA max • Output fuse: 8 AG, 1A normal blow
Slot requirements	1 slot
Backplane current load	120 mA
Wiring arm	1771-WB

For selection chart, see page 3-39.

For more information, see Gray Encoder Input Module Product Data, pub. [1771-2.29](#).

1771 Positioning Modules

High-Speed Counter Module

(Cat. No. 1771-VHSC)



The 1771-VHSC is a single-slot module that contains four counters for encoders and provides one of the lowest costs-per-channel in the market. It features eight assignable high-current outputs and gives you the flexibility to assign any number of the eight outputs to a single counter.

This module provides six different modes of operation to achieve application-specific results that help increase overall system performance. You can independently configure any of the four input counters for any one of these modes.

1771 Specialized I/O Modules

High-Speed Logic Controller Module

(Cat. No. 1771-DR)



This programmable module controls outputs that are based on the status of its inputs and according to its own internal logic without the delay of going through the I/O scan or PLC processor program scan. Its fast response time makes it ideal for high-speed sensing applications that include:

- distributed high-speed machine sequencing
- canning or bottling operations
- sorting materials on conveyers

Specifications

UL SR Class I Div 2 Hazardous CE

Number of counters	4
Maximum input frequency	<ul style="list-style-type: none"> • 100 Hz for switch bounce; electro-mechanical switch (user-selectable) • 250 kHz in encoder modes (2-channel quadrature) • 500k Hz in period/rate, rate/measurement and continuous/rate modes • 1 MHz in counter modes (single channel)
Slot requirements	1 slot
Maximum count	999,999
Number of outputs	8 (each assignable to any counter)
Number of presets	1 turn-on preset and 1 turn-off preset per output
Customer-supplied power for outputs	5-24V dc
Output current rating	2A per output
Backplane current load	650 mA
Wiring arm	1771-WN
Weight	0.6 kg (1.4 lb)

For selection chart, see page 3-40.

For more information, see Very High Speed Counter Module Product Data, pub. [1771-2.207](#).

- counting fast events over programmed time periods

Specifications

UL SR CE

Number and type of inputs	• 8 digital single-ended current sinking (source load) inputs
Number and type of outputs	• 4 digital single-ended current sourcing outputs
Input voltage range and logic state	<ul style="list-style-type: none"> • Logic 0: 0 to 4.0V dc • Logic 1: 10 to 24.0V dc
Output voltage range (user supply)	5 to 24V dc
Input and output isolation	1500V dc
Response time	1 ms when input filter is 50 μ s
Backplane current load	1.1A
Wiring arm	1771-WG

For selection chart, see page 3-41.

For more information, see I/O Logic Controller Module Product Data, pub. [1771-2.89](#).

1771 Specialized I/O Modules
Configurable Flowmeter Module
 (Cat. No. 1771-CFM)



The 1771-CFM module interfaces PLC processors with magnetic pickups, single channel shaft encoders, turbine flowmeters, or any source of TTL pulses. The CFM module supports rates as high as 100kHz and counts as large as 9,999,999.

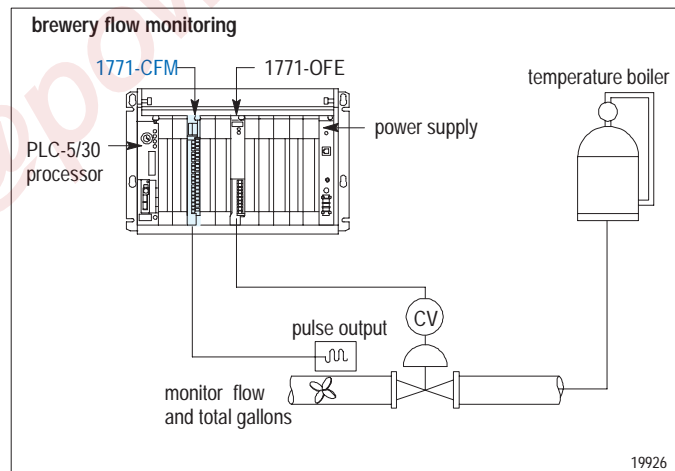
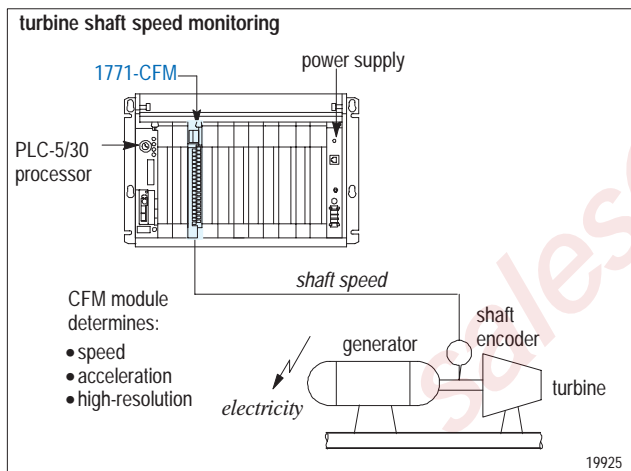
The CFM module has four independent input channels and outputs. The PLC processor can configure each channel in any of four modes. You can configure the outputs to operate based on the values in any of the channels. The CFM module is capable of performing a prover function for custody transfer.

Typical Applications

You can use a CFM module in power management, automotive, food and beverage, and oil and gas industries for various flow and/or turbine metering applications. Some sample applications include:

- turbine shaft speed monitoring
- automotive paint booths
- brewery flow monitoring
- petrochemical flow and custody transfer

Typical Configurations



Basic Operating Modes

Use this Mode	To
Totalizer mode	<ul style="list-style-type: none"> • accurately measure counts using a flowmeter or positive displacement meter • trigger outputs directly from the CFM module — trigger on total, frequency, acceleration • monitor flow total, rate, and rate of change independent of your PLC processor scan times • store counts based on external input • scale the frequency and count to engineering units • interface to a prover
Nonresettable Totalizer mode	operate in the Totalizer mode with the count reset function disabled to prevent loss of accumulated value
High-resolution Frequency mode [this mode uses 2 channels, 0 & 1 or 2 & 3]	<ul style="list-style-type: none"> • monitor the frequency of an input with high accuracy [eg. shaft] • monitor the rate of speed change • operate outputs based on speed or rate of change • scale the frequency to engineering units
Direction sensor mode [this mode uses 2 channels, 0 & 1 or 2 & 3]	<ul style="list-style-type: none"> • monitor the direction of shaft rotation • monitor rate of change and frequency • trigger outputs based on direction, frequency, rate of change • scale the frequency and count to engineering units

Specifications **Class I Div 2 Hazardous**

For selection chart, see page 3-41.

For more information, see *Configurable Flowmeter Module Product Data*, pub. [1771-2.226](#).

Latching (10-27V dc) Input Module

(Cat. No. 1771-DS)



The Latching Input Module detects and latches pulses of 0.1 to 5.0ms duration from optical transmitters that have isolated pulse and gate outputs. You select the mode of input operation: **independent** for a single-pulse environment, **paired** for a multi-pulse environment.

1771 Specialized I/O Modules

Wire Fault (15-27V dc) Input Module

(Cat. No. 1771-DW)



This module provides 7 digital inputs, and detects whether any wire between the switching device and the module or power supply is either short-circuited to ground or open-circuited. Communication is bidirectional. With an output image bit, you select what the module will write directly into the input image byte — the state of each input or the fault status of each input. Typical hard-contact switching devices that are compatible with the module include dc pushbutton, limit, float, and selector switches.

Specifications 

Inputs	8 direct digital inputs
Selectable pulse capture/ Module recovery time (ms)	<ul style="list-style-type: none"> • 0.1/0.5 • 0.5/2.5 • 1.0/5.0 • 2.5/12.5 • 5.0/25.0
Input voltage range	<ul style="list-style-type: none"> • 10 to 27V dc for a logic 1 • 0 to 4V dc for a logic 0
Nominal input current	20 mA @ 27V dc, typical
Max off-state current	1 mA @ 4V dc
Backplane current load	375 mA, typical
Wiring arm	1771-WF

For selection chart, see page [3-41](#).

For more information, see *Latching Input Module Product Data*, pub. [1771-2.68](#).

Specifications 

Inputs	7 direct digital inputs
Input voltage range	15-27V dc
Max off-state current	1 mA @ 24V dc
Line monitoring current @ 24V dc	<ul style="list-style-type: none"> • 6 mA (contacts open) • 20 mA (contacts closed) • less than 4 mA for detection of a wire fault
Input impedance	<ul style="list-style-type: none"> • 1K-2K ohms (on-state) • 2K-3K ohms (off-state)
Input signal delay	<ul style="list-style-type: none"> • 33ms ±6ms for contact status • 3ms ±2ms for wire-fault status
Backplane current load	300 mA max
Wiring arm	1771-WA

For more information, see *Wire Fault Input Module Product Data*, pub. [1771-2.69](#).

1771 Specialized I/O Modules
DC (5V) Multiplexer Input Module
 (Cat. No. 1771-IS)



This input module reads the steady-state status of six 3-digit or four 4-digit BCD thumbwheel switches, latches the off-to-on transition of up to 72 momentary hard-contact switches from a keyboard, or reads the steady-state status of up to 72 discrete hard-contact switches.

Features

- Automatic multiplexing of inputs-replaces up to nine direct digital input modules and removes multiplexing logic from your ladder program
- Latching input — responds to momentary contact closures of keyboard switches
- Block-transfer of all switch status data to the processor in a single operation

Specifications



Inputs	Direct digital inputs from: <ul style="list-style-type: none"> • Four 4-digit BCD thumbwheel switches • Six 3-digit BCD thumbwheel switches • 72 discrete switches (maintained or momentary contact)
Module current requirements	Nominal 13 mA @ 5V dc per switch contact supplied by the module
Selectable scan time	<ul style="list-style-type: none"> • Fast (5.1ms) • Normal (15.3ms)
Backplane current load	800 mA
Cable length	400 cable ft between module and switches
Wiring arm	1771-WF

For selection chart, see page 3-41.

For more information, see DC Multiplexer Input Module Product Data, pub. [1771-2.35](#).

1771 Specialized I/O Modules
Simulator Module
 (Cat. No. 1771-SIM)



The Simulator Module has 8 dedicated inputs for 8 toggle switches and 8 dedicated outputs for 8 indicators built into its front panel. You can use the 8 switches to simulate other open/close devices. The 8 indicators identify which addressed outputs are turned on in its byte in the output image table.

One or more 1771-SIM modules can be installed in various slots of a 1771 Universal I/O chassis to do a processor/chassis-level checkout prior to connecting inputs or outputs. If one is installed in a spare chassis slot, the switches may be used to effect program changes and the indicators can be addressed to show program status.

Features

- Replaces temporary switch hookups to test input channels and addressing
- Replaces temporary socket-and-lamp output test fixtures to check output channel addressing
- Requires no external power

Specifications



No. of inputs/outputs	<ul style="list-style-type: none"> • 8 dedicated inputs for built-in toggle-switches • 8 dedicated outputs for built-in indicators
Backplane current load	200 mA
Slots	1

For selection chart, see page 3-41.

For more information, see Input/Output Simulation Module Product Data, pub. [1771-2.106](#).

1402 Specialized I/O Modules

Line Synchronization Module

(Cat. No. 1402-LS51)



The Line Synchronization Module, which fits into a standard Allen-Bradley 1771 I/O chassis, provides an integrated power-generation control solution. This module is designed to meet the needs of manufacturers, system integrators, and sophisticated users of industrial and commercial alternators and cogeneration systems, or in applications that require two 3-phase systems to be synchronized with each other. This module provides a means for synchronization, load sharing, and high-speed power system monitoring.

The design of this module reduces the complexity of conventional technology, increases generator control performance, and provides an easily integrated automation platform for both retrofit and new-power facilities.

The line synchronization module performs 3 functions:

- The module measures appropriate parameters from the two three-phase systems and provides control and error signals to implement engine governor control synchronization.
- The module provides an analog output that is representative of the ratio of the power being supplied by the alternator to the output rating of the alternator, reads an analog input that represents the ratio of the total system load being supplied to the total system capacity, and provides an error signal to adjust the alternator for proper load sharing based on the load requirements.
- The module performs as a multi-function digital monitor for the power system.

Data and control signals are communicated to the PLC processor via the 1771 backplane.

Features

- Synchronization — simultaneous multi-channel A/D conversion, digital zero-cross detection, and numerically-generated contact-closing windows yield accurate precisely repeatable breaker-closure commands
- Anti-motoring — digital control allows for the implementation of asymmetrical breaker-closure windows. This feature provides module-based anti-motoring protection

- Load sharing — a load sharing circuit is incorporated for use in multi-generator applications. The module regulates generator power output for optimal utilization of the total nameplate ratings
- Power monitoring — the module provides a full-feature power monitoring solution. This information may be used for load control, protection, fault location, and line conditioning

Specifications



Inputs	
Current	0 to 5A rms Cont., 200A rms 1 second
Frequency	47 to 63 Hz (steady-state)
Dielectric withstand voltage	2500V rms
Burden	0.0025 VA
Voltage	120V rms (339 Vpk-pk) maximum peak
Input impedance/burden	728K Ω /0.02 VA
Synchronization window Independent upper & lower thresholds	
Voltage	0.05% steps
Frequency	0.01 Hz steps
Phase	1 degree steps
Isolated load sharing input/output	
Maximum common-mode voltage	240V ac
Continuous voltage	2 to 4V dc
Input impedance	45K Ω
Backplane current load	
1.1A	
Environmental conditions	
Operating temperature	0 to 60° C (32 to 140° F)
Storage temperature	-40 to 85° C (-40 to 185° F)
Relative humidity	5 - 95% (without condensation)
Update rate	
Alternator error parameters table	100 ms
Monitoring parameters tables	200 ms (synchronization inactive) 2 seconds (synchronization active)
Accuracy	
Current measurement =	$\pm 0.2\%$ of full scale (full scale = $1.4 \times$ CT primary)
Voltage measurement =	$\pm 0.2\%$ of full scale (full scale = $1.25 \times$ PT primary)
Frequency measurement =	± 0.05 Hz (within the 47 to 63 range)
Slip frequency =	± 0.05 Hz (within the 47 to 63 range)
Power, power factor, VA =	$\pm 0.4\%$ of full-scale power consumption (full scale = $1.75 \times$ CT primary \times PT primary)

For selection chart, see page 3-41.

For more information, see Line Synchronization Module Product Data, pub. no. 1402-2.0.

Catalog Number and Weight in kg (lb)

•1402-LS51	2.7 (6.0)	•1771-ALX	0.6 (1.2)
•1746-FIO4I	0.2 (0.5)	•1771-ASB	0.9 (1.9)
•1746-FIO4V	0.2 (0.4)	•1771-IA	0.5 (1.1)
•1746-HSCE	0.2 (0.6)	•1771-IAD	0.5 (1.2)
•1746-IA4	0.2 (0.4)	•1771-IA2	0.5 (1.1)
•1746-IA8	0.2 (0.4)	•1771-IBN	0.5 (1.1)
•1746-IA16	0.3 (0.6)	•1771-ICD	0.5 (1.2)
•1746-IB8	0.2 (0.4)	•1771-IFE	0.7 (1.5)
•1746-IB16	0.2 (0.5)	•1771-IFF	0.7 (1.5)
•1746-IB32	0.2 (0.5)	•1771-IL	0.7 (1.5)
•1746-IG16	0.2 (0.5)	•1771-IMD	0.6 (1.3)
•1746-IM4	0.2 (0.4)	•1771-IQ16	0.6 (1.2)
•1746-IM8	0.2 (0.4)	•1771-IR	0.6 (1.4)
•1746-IM16	0.3 (0.6)	•1771-IXE	0.7 (1.5)
•1746-INT4	0.3 (0.6)	•1771-IXHR	0.7 (1.5)
•1746-IO4	0.2 (0.4)	•1771-NB4S	0.6 (1.4)
•1746-IO8	0.2 (0.5)	•1771-NB4T	0.6 (1.4)
•1746-IO12	0.3 (0.6)	•1771-NBRC	0.8 (1.7)
•1746-ITB16	0.0 (0.5)	•1771-NBSC	0.8 (1.8)
•1746-ITV16	0.2 (0.5)	•1771-NBTC	0.8 (1.7)
•1746-IV8	0.2 (0.4)	•1771-NBVC	0.8 (1.7)
•1746-IV16	0.2 (0.5)	•1771-NBV1	0.8 (1.7)
•1746-IV32	0.2 (0.5)	•1771-NIS	0.8 (1.7)
•1746-NI4	0.2 (0.4)	•1771-NIV	0.8 (1.7)
•1746-NIO4I	0.2 (0.5)	•1771-NIVR	0.8 (1.7)
•1746-NIO4V	0.2 (0.4)	•1771-NIVT	0.8 (1.7)
•1746-NO4I	0.2 (0.4)	•1771-NIV1	0.8 (1.7)
•1746-NO4V	0.2 (0.5)	•1771-NOC	0.8 (1.8)
•1746-NR4	0.3 (0.6)	•1771-NOV	0.8 (1.7)
•1746-NT4	0.2 (0.5)	•1771-NR	0.8 (1.8)
•1746-OA8	0.3 (0.7)	•1771-NT1	0.8 (1.7)
•1746-OA16	0.4 (0.8)	•1771-NT2	0.8 (1.7)
•1746-OAP12	0.4 (0.9)	•1771-OA	0.7 (1.6)
•1746-OB8	0.2 (0.4)	•1771-OAD	0.7 (1.6)
•1746-OB16	0.3 (0.5)	•1771-OB	0.7 (1.6)
•1746-OB32	0.2 (0.5)	•1771-OBDS	0.8 (1.8)
•1746-OBP16	0.3 (0.6)	•1771-OBN	0.5 (1.2)
•1746-OV8	0.2 (0.4)	•1771-ODD	0.8 (1.8)
•1746-OV16	0.2 (0.5)	•1771-OD16	0.8 (1.7)
•1746-OV32	0.2 (0.5)	•1771-OFE1	0.6 (1.3)
•1746-OVP16	0.3 (0.6)	•1771-OFE2	0.6 (1.3)
•1746-OW4	0.2 (0.4)	•1771-OFE3	0.6 (1.3)
•1746-OW8	0.2 (0.4)	•1771-OGD	0.5 (1.2)
•1746-OW16	0.3 (0.7)	•1771-OM	0.7 (1.6)
•1746-OX8	0.3 (0.6)	•1771-OQ16	0.7 (1.4)
•1746-QV	0.2 (0.4)	•1771-OR	0.7 (1.5)
•1746sc-IA8I	0.3 (0.6)	•1771-OW	0.6 (1.2)
•1746sc-IM8I	0.3 (0.6)	•1771-OW16	0.6 (1.4)
•1746sc-INI4i	0.2 (0.4)	•1771-OZ	0.7 (1.5)
•1746sc-INI4vi	0.2 (0.4)	•1771-QDC	0.6 (1.3)
•1746sc-INO4i	0.3 (0.7)	•1771-QI	0.6 (1.3)
•1746sc-INO4vi	0.3 (0.7)	•1771-SDN	0.9 (1.9)
•1746sc-OAP8I	0.3 (0.6)	•1771-TCM	0.8 (1.8)
•1747-ASB	0.2 (0.4)	•1771-VHSC	0.6 (1.4)
•1747-DCM	0.2 (0.3)	•1771-WS	0.7 (1.6)
•1771-ACN	1.0 (2.1)	•1771sc-IMI16	0.6 (1.4)
•1771-ACNR	1.0 (2.2)	•1771sc-OMI16	0.7 (1.6)

Catalog Number and Weight in kg (lb)

•1791-IOBW	1.0 (2.2)	•1791-BAR	0.4 (0.9)
•1791-IOBX	1.8 (3.9)	•1791-BBC	0.4 (0.9)
•1791-IOVW	1.0 (2.2)	•1791-8BR	0.4 (0.9)
•1791-IOVX	1.8 (3.9)	•1794-ACN	0.2 (0.5)
•1791-NDC	0.4 (0.9)	•1794-ACNR	0.2 (0.5)
•1791-NDV	0.4 (0.9)	•1794-ADN	0.2 (0.4)
•1791-N4C2	0.4 (0.9)	•1794-ASB	0.2 (0.4)
•1791-N4V2	0.4 (0.9)	•1794-ASB2	0.2 (0.4)
•1791-0A16	0.4 (0.9)	•1794-IA8	0.1 (0.3)
•1791-0A32	0.8 (1.7)	•1794-IB8S	0.1 (0.3)
•1791-0B16	0.4 (0.9)	•1794-IB16	0.1 (0.3)
•1791-0B32	0.8 (1.7)	•1794-IE4XOE2	0.1 (0.3)
•1791-16AC	0.8 (1.7)	•1794-IE8	0.1 (0.3)
•1791-16A0	0.4 (0.9)	•1794-IR8	0.1 (0.3)
•1791-16BC	0.8 (1.7)	•1794-IT8	0.1 (0.3)
•1791-16B0	0.8 (1.7)	•1794-IV16	0.1 (0.3)
•1791-24AR	0.8 (1.7)	•1794-OA8	0.1 (0.3)
•1791-24A8	0.8 (1.7)	•1794-OB16	0.1 (0.3)
•1791-24BR	0.8 (1.7)	•1794-OB8EP	0.1 (0.3)
•1791-24B8	0.8 (1.7)	•1794-OE4	0.1 (0.3)
•1791-32A0	0.8 (1.7)	•1794-OV16	0.1 (0.3)
•1791-32B0	0.8 (1.7)	•1794-OW8	0.1 (0.3)
•1791-8AC	0.4 (0.9)		

CE






The following products (in addition to the ones we've already identified in this section) have CE certification.



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|-------------|----------------|------------|-----------------|
| •1336 FORCE | •1746-OW4 | •1771-IQ | •1771-OWNA |
| •1336 PLUS | •1746-OW8 | •1771-IQ16 | •1771-OYL |
| •1746-A4 | •1746-OW16 | •1771-IR | •1771-OZL |
| •1746-A7 | •1746sc-INI4i | •1771-IS | •1771-QA |
| •1746-A10 | •1746sc-INI4vi | •1771-IT | •1771-QC |
| •1746-A13 | •1746sc-INO4i | •1771-IXE | •1771-SDN |
| •1746-FIO4I | •1746sc-INO4vi | •1771-IXHR | •1771-SIM |
| •1746-FIO4V | •1746sc-IA8I | •1771-NBRC | •1771-SN |
| •1746-HSCE | •1746sc-IM8I | •1771-NBSC | •1771-TCM |
| •1746-IA4 | •1746sc-OAP8I | •1771-NB4S | •1771-VHSC |
| •1746-IA8 | •1747-AIC | •1771-NB4T | •1784-KTCX |
| •1746-IA16 | •1747-ASB | •1771-NBTC | •1784-KTS |
| •1746-IB8 | •1747-DCM | •1771-NBV1 | •1784-KTX |
| •1746-IB16 | •1747-SDN | •1771-NBVC | •1784-KTXD |
| •1746-IB32 | •1747-SN | •1771-NIS | •1792-IB4A |
| •1746-IG16 | •1770-HT1 | •1771-NIV | •1792-IB4S |
| •1746-IM4 | •1770-HT8 | •1771-NIV1 | •1792-IB8A |
| •1746-IM8 | •1770-HT16 | •1771-NIVR | •1792-IB8S |
| •1746-IM16 | •1771-ACN15 | •1771-NIVT | •1792-IB16A |
| •1746-IN16 | •1771-ACNR15 | •1771-NOC | •1792-IB16S |
| •1746-IO4 | •1771-ALX | •1771-NOV | •1792-IB2XOB2EA |
| •1746-IO8 | •1771-ASB | •1771-NR | •1792-IB2XOB2ES |
| •1746-IO12 | •1771-CFM | •1771-NT1 | •1792-OB4EA |
| •1746-ITB16 | •1771-DCM | •1771-NT2 | •1792-OB4ES |
| •1746-ITV16 | •1771-DE | •1771-OAD | •1794-ACN15 |
| •1746-IV8 | •1771-DL | •1771-OAN | •1794-ACNR15 |
| •1746-IV16 | •1771-DR | •1771-OB | •1794-ADN |
| •1746-IV32 | •1771-DS | •1771-OBBD | •1794-ASB |
| •1746-NI4 | •1771-DW | •1771-OBDS | •1794-ASB2 |
| •1746-NIO4I | •1771-ES | •1771-OBND | •1794-CE1 |
| •1746-NIO4V | •1771-IAD | •1771-OC | •1794-IA8 |
| •1746-NO4I | •1771-IAN | •1771-OD16 | •1794-IB8S |
| •1746-NO4V | •1771-IB | •1771-ODD | •1794-IB16 |
| •1746-NR4 | •1771-IBD | •1771-OFE1 | •1794-IE4XOE2 |
| •1746-NT4 | •1771-IBN | •1771-OFE2 | •1794-IE8 |
| •1746-OA8 | •1771-IC | •1771-OFE3 | •1794-IR8 |
| •1746-OA16 | •1771-ICD | •1771-OG | •1794-IT8 |
| •1746-OAP12 | •1771-ID16 | •1771-OGD | •1794-OA8 |
| •1746-OB8 | •1771-IFE | •1771-OJ | •1794-OB16 |
| •1746-OB16 | •1771-IFM | •1771-OM | •1794-OB16 |
| •1746-OB32 | •1771-IFMS | •1771-OMD | •1794-OE4 |
| •1746-OBP8 | •1771-IG | •1771-OND | •1794-OW8 |
| •1746-OBP16 | •1771-IGD | •1771-OQ | •1794-TB2 |
| •1746-OV8 | •1771-IJ | •1771-OQ16 | •1794-TB3 |
| •1746-OV16 | •1771-IK | •1771-OR | •1794-TBN |
| •1746-OV32 | •1771-IL | •1771-OVN | •1794-TBNF |
| •1746-OVP16 | •1771-IM | •1771-OW16 | •6008-SV1R |
| •1746-OX8 | •1771-IMD | •1771-OWN | •6008-SV2R |
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UL/CSA

The following products (in addition to the ones we've already identified in this section) have UL/CSA approval.

 Class I Div 2 Hazardous^{1 2}							
<ul style="list-style-type: none"> •1746-A4 •1746-A7 •1746-A10 •1746-A13 •1746-HSCE •1746-IA4 •1746-IA8 •1746-IA16 •1746-IB8 •1746-IB16 •1746-IB32² •1746-FIO4I •1746-FIO4V •1746-IG16 •1746-IH16 •1746-IM4 •1746-IM8 •1746-IM16 •1746-IN16 •1746-INT4 •1746-IO4² •1746-IO8² •1746-IO12² •1746-ITB16 •1746-ITV16 •1746-IV8 •1746-IV16 •1746-IV32² •1746-NI4 •1746-NIO4I •1746-NIO4V •1746-NO4I •1746-NO4V •1746-NR4 •1746-NT4 •1746-OA8 •1746-OA16 •1746-OAP12² •1746-OB8 •1746-OB16 •1746-OB32² •1746-OBP16² •1746-OG16 •1746-OV8 •1746-OV16 •1746-OV32² •1746-OVP16² •1746-OW4² •1746-OW8² •1746-OW16² •1746-OX8² •1747-AIC 	<ul style="list-style-type: none"> •1747-ASB •1747-DCM •1747-SDN •1747-SN •1771-ALX •1771-ASB •1771-CFM •1771-IA •1771-IAD •1771-IB •1771-IBD •1771-IBN •1771-ICD •1771-ID16 •1771-IFE •1771-IFF •1771-IL •1771-IQ16 •1771-IR •1771-IXE •1771-IXHR •1771-LI •1771-NB4S •1771-NB4T •1771-NBRC •1771-NBSC •1771-NBTC •1771-NBV1 •1771-NBVC •1771-NIS •1771-NIV •1771-NIVR •1771-NIVT •1771-NOC •1771-NOV •1771-NR •1771-NT1 •1771-NT2 •1771-OA •1771-OAD •1771-OB •1771-OB16 •1771-OBDS •1771-ODD •1771-OD16 •1771-OFE1 •1771-OFE2 •1771-OFE3 •1771-OQ16 	<ul style="list-style-type: none"> •1771-OW •1771-OW16 •1771-SDN •1771-SN •1771-TCM •1771-VHSC •1791-IOBW •1791-IOBX •1791-IOVW •1791-IOVX •1791-NDC •1791-NDV •1791-N4C2 •1791-N4V2 •1791-OA16 •1791-OA32 •1791-OB16 •1791-OB32 •1791-16AC •1791-16A0 •1791-16BC •1791-16B0 •1791-24AR •1791-24A8 •1791-24BR •1791-24B8 •1791-32A0 •1791-32B0 •1791-8AC •1791-8AR •1791-8BC •1791-8BR •1794-ACN15 •1794-ADN •1794-ASB •1794-IA8³ •1794-IB10XOB6 •1794-IB8S •1794-IB16 •1794-IE4XOE2 •1794-IE8 •1794-IR8 •1794-IT8 •1794-OA8³ •1794-OB16 •1794-OE4 •1794-TBN •1794-TBNF •1794-TB2 •1794-TB3 •1794-TB3T 	<ul style="list-style-type: none"> •1402-LS51 •1747-ASB •1771-DCM •1771-DE •1771-DL •1771-DR •1771-ES •1771-HRA •1771-HS •1771-HS1 •1771-HS3 •1771-IA2 •1771-IAN •1771-IC •1771-ID •1771-IE01 •1771-IE02 •1771-IE03 •1771-IE04 •1771-IE05 •1771-IE06 •1771-IE07 •1771-IG •1771-IGD •1771-IH •1771-IJ •1771-IK •1771-IM •1771-IN •1771-IND •1771-IQ 	<ul style="list-style-type: none"> •1771-IS •1771-IT •1771-IV •1771-IVN •1771-LI •1771-M1 •1771-M3 •1771-OAN •1771-OC •1771-OD •1771-ODZ •1771-OG •1771-OGD •1771-OJ •1771-ON •1771-OND •1771-OP •1771-OQ •1771-OVN •1771-OZL •1771-PD •1771-PM •1771-QA •1771-QC •1771-QD •1771-QDC •1771-QH •1771-QI •1771-SIM •1791-AIC 	<ul style="list-style-type: none"> •1746sc-INI4i⁴ •1746sc-INO4i⁴ •1746sc-INO4vi⁴ •1746sc-IA8i⁴ •1746sc-IM8i⁴ •1746sc-OAP8i⁴ •1770-HT1 •1770-HT8 •1770-HT16 •1771-IFM •1771-IMD •1771-OM •1771-OMD •1771sc-OM16⁴ •1771sc-IM16⁴ •1784-KTCX 	<ul style="list-style-type: none"> •1771-OR •1771-WHF 	<ul style="list-style-type: none"> •1771-WG •1771-WH •1784-KTS⁵ •1784-KTX⁵ •1784-KTXD⁵

¹ The majority of SLC 500 products are rated Class I, Div. 2 by UL and CSA.

² PLC products and some SLC products are rated Class I, Div. 2 by CSA only.

³ 1794-IA8 and -OA8 do not bear the UL Listed Mark.

⁴ This product also bears the UL Listing Mark for Canada.

⁵ This product bears the UL Recognized Component Mark only.

Certification for Marine and Off-shore Applications



The following products have certification for off-shore applications.

- 1746-A4
- 1746-A7
- 1746-A10
- 1746-A13
- 1746-FIO4I
- 1746-FIO4V
- 1746-HSCE
- 1746-IA16
- 1746-IB16
- 1746-IB32
- 1746-ITB16
- 1746-ITV16
- 1746-IV16
- 1746-IV32
- 1746-NI4
- 1746-NIO4I
- 1746-NIO4V
- 1746-NO4I
- 1746-NO4V
- 1746-NR4
- 1746-NT4
- 1746-OA8
- 1746-OA16
- 1746-OAP12
- 1746-OB16
- 1746-OB32
- 1746-OBP16
- 1746-OV16
- 1746-OV32
- 1746-OW16
- 1746-OX8
- 1747-ASB
- 1747-SDN
- 1747-SN
- 1770-CD
- 1771-ACN15
- 1771-ACNR15
- 1771-ALX
- 1771-ASB
- 1771-CFM
- 1771-DW
- 1771-IAD
- 1771-IAN
- 1771-IBD
- 1771-IBN
- 1771-ID16
- 1771-IFE
- 1771-IFM
- 1771-IFMS
- 1771-IGD
- 1771-IMD
- 1771-IND
- 1771-IR
- 1771-IXE
- 1771-IXHR
- 1771-NBRC
- 1771-NBSC
- 1771-NBTC
- 1771-NBVC
- 1771-NBV1
- 1771-NB4S
- 1771-NB4T
- 1771-NIS
- 1771-NIV
- 1771-NIVR
- 1771-NIVT
- 1771-NIV1
- 1771-NOC
- 1771-NOV
- 1771-NR
- 1771-NT1
- 1771-NT2
- 1771-OAD
- 1771-OB
- 1771-OB
- 1771-OB
- 1771-OB
- 1771-OD16
- 1771-ODD
- 1771-OFE1
- 1771-OG
- 1771-OMD
- 1771-OND
- 1771-OVN
- 1771-OWN
- 1771-OWNA
- 1771-OW16
- 1771-RTP1
- 1771-RTP3
- 1771-RTP4
- 1771-RT41
- 1771-RT44
- 1771-SDN
- 1771-VHSC
- 1785-L11B
- 1785-L20B
- 1785-L30B
- 1785-L40B
- 1785-L40L
- 1785-L60B
- 1785-L60L
- 1792-IB16A
- 1792-IB16S
- 1792-IB2XOB2EA
- 1792-IB2XOB2ES
- 1792-IB4A
- 1792-IB4S
- 1792-IB8A
- 1792-IB8S
- 1792-OB4EA
- 1792-OB4ES
- 1794-ACN15
- 1794-ACNR15
- 1794-ADN
- 1794-ASB
- 1794-ASB2
- 1794-IA8
- 1794-IB10XOB6
- 1794-IB8S
- 1794-IB16
- 1794-IE4XOE2
- 1794-IE8
- 1794-IR8
- 1794-IT8
- 1794-IV16
- 1794-OA8
- 1794-OB8EP
- 1794-OB16
- 1794-OE4
- 1794-OV16
- 1794-OW8
- 1794-TB2
- 1794-TB2
- 1794-TB3
- 1794-TB3S
- 1794-TB3T
- 1794-TBN
- 1794-TBNF