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ArmorPoint I/O

SELECTION GUIDE



1738 SERIES



The ArmorPoint I/O System

ArmorPoint™ I/O has three major components:

- **I/O modules** provide the field interface, system-interface circuitry, and bases for mounting
- **Communication interface modules** provide the network-interface circuitry
- **Power distribution modules** provide the solution to expandability of the ArmorPoint I/O system and the flexibility to mix a variety of signal types



ArmorPoint I/O Features

- Highly modular design (1 pt — 8 pt modularity)
- Broad application coverage
- Channel-level diagnostics (LED and electronic)
- Channel-level alarm and annunciation (electronic)
- Channel-level open-wire detection with electronic feedback
- Channel-level short-circuit detection with electronic feedback
- Parameter-level explicit messaging
- Removal and insertion under power (RIUP)
- DeviceNet™ expansion
- Horizontal and vertical mounting without derating
- 5g vibration
- Flash upgradable adapters and digital I/O
- Electronic and mechanical keying
- Robust backplane design
- Hot swapping of I/O modules
- Quick-disconnects for I/O and network connectivity
- Built-in panel grounding
- Color-coded module labels
- UL, C-UL, and CE certifications (as marked)
- Highly reliable structural integrity
- Optical isolation between field and system circuits

ArmorPoint I/O Product Compatibility

The following chart illustrates the compatibility of ArmorPoint I/O with other control platforms, especially within Rockwell Automation. For information regarding the differences between the networks and ArmorPoint I/O, please refer to the Selecting a Network Interface section in this document.

| | 1738-ADN(X) | 1738-ACNR | 1738-AENT | 1738-APB |
|---|--------------------|------------------|------------------|-----------------|
| PLC-5™ with Network Port | IOD | NS | NS | NA |
| SLC 500™ with Network Port | IOD | NS | NS | NA |
| PLC-5 Processor via Network Module | IOD | NS | NS | 3 |
| 1756 Logix™ Communication Interface | IOD | IOD | IOD | 3 |
| PanelView™ Terminal | NA | NA | NA | NA |
| RSLinx™ Software | NA | NA | NA | NA |
| 1769-L20, -L30 Controller with 1761-NET Interface | NA | NS | NS | NA |
| 1769-L35E | NA | NA | IOD | NA |
| SoftLogix5800™ | NS | NS | NS | NA |
| PC with RSLinx Only | NS | NS | NS | NA |

IOD = I/O Data
 NS = Not Supported
 NA = Not Applicable
 3 = Requires third party scanner module

Communication Considerations

ArmorPoint I/O features are impacted by your network choice.

| Network | Impact |
|--|--|
| DeviceNet 1738-ADN12, -ADN18, -ADN18P, and -ADNX | <p>The 1738-ADN12, -ADN18, and -ADN18P provide three means of connecting a node of I/O to DeviceNet.</p> <p>The 1738-ADNX expansion network port allows for a DeviceNet subnet.</p> <p>A total of 63 ArmorPoint I/O modules can be assembled on a single DeviceNet node.</p> <p>Expansion power supplies may be used to provide additional POINTBus backplane current.</p> |
| ControlNet™ 1738-ACNR | <p>A total of 63 ArmorPoint I/O modules can be assembled on a single ControlNet node.</p> <p>Expansion power supplies may be used to provide additional POINTBus backplane current.</p> <p>Up to 25 direct connections and 5 rack connections are allowed.</p> |
| EtherNet/IP™ 1738-AENT | <p>A total of 63 ArmorPoint I/O modules can be assembled on a single EtherNet/IP node.</p> <p>Expansion power supplies may be used to provide additional POINTBus backplane current.</p> <p>Refer to the User Manual, publication 1738-UM004 to determine the ratings for direct and rack connections allowed.</p> |
| PROFIBUS DP™ 1738-APB | <p>A total of 63 ArmorPoint I/O modules can be assembled on a single PROFIBUS node.</p> <p>Expansion power supplies may be used to provide additional POINTBus backplane current.</p> |

Specifying an ArmorPoint I/O System

Follow these steps as you specify your ArmorPoint I/O system:

| ✓ | Step | See Page |
|---|--|---|
| | <p>1 Select a communication interface</p> <p>Choose the interface module for your operating system.</p> | <p>NetLinx™ architecture 6</p> <p>Selecting a network 7</p> <p>Selecting the DeviceNet communication interface 8</p> |
| | <p>2 Select I/O devices based on field devices</p> <ul style="list-style-type: none"> • Location of the device • Number of ArmorPoint modules needed • Appropriate catalog number • Number of I/O available per module • Number of modules | <p>Digital I/O modules 12</p> <p>Analog, thermocouple, and RTD I/O modules 15</p> <p>Specialty I/O modules 20</p> <p>Counter I/O modules 23</p> |
| | <p>3 Select optional power components</p> <p>Choose optional components to extend backplane power or change the field power distribution source.</p> | <p>Field power distributor 26</p> <p>Expansion power unit 27</p> <p>Typical configurations 29</p> |
| | <p>4 Select optional accessories</p> <p>Choose expansion cable units, if necessary.</p> | <p>Accessories, Cables, and Cordsets 30</p> |
| | <p>5 Determine mounting requirement</p> <p>Determine necessary dimensions based on the communication interface chosen.</p> | <p>Placing ArmorPoint I/O modules 33</p> <p>Mounting the ArmorPoint I/O system 35</p> |

Step 1 - Select:

- a communication interface module

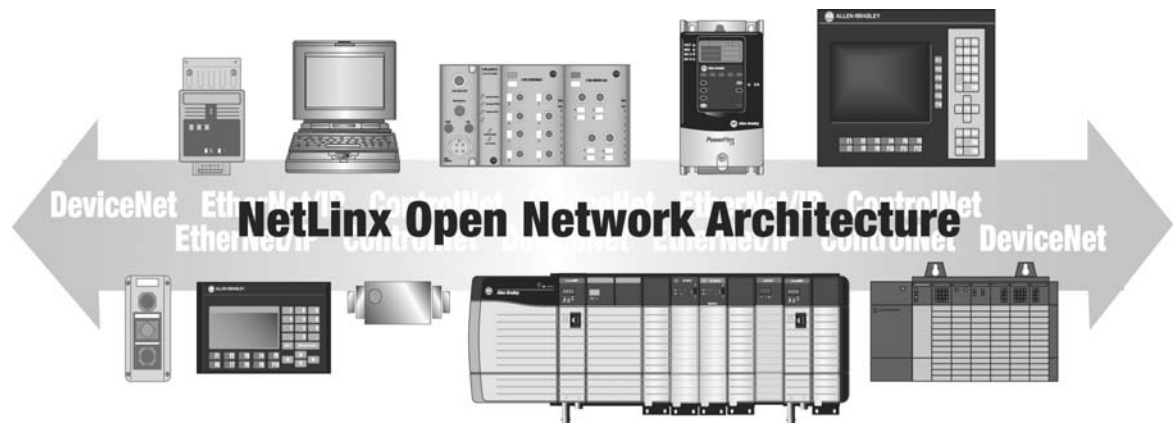
Selecting ArmorPoint I/O Communication Interfaces

Separate communication interface adapters are available for different networks. Install adapters into the POINTBus backplane to allow ArmorPoint I/O modules to communicate with a controller.

NetLinx Architecture

NetLinx open network architecture is the Rockwell Automation strategy of using open networking technology for seamless, top-floor to shop-floor integration. The networks in the NetLinx architecture — DeviceNet, ControlNet, and EtherNet/IP — speak a common language and share a universal set of communication services. NetLinx architecture, part of the Integrated Architecture, seamlessly integrates all the components in an automation system from a few devices on one network to multiple devices on multiple networks including access to the Internet — helping you to improve flexibility, reduce installation costs, and increase productivity.

- EtherNet/IP is an open industrial networking standard that supports implicit and explicit messaging and uses commercial, off-the-shelf EtherNet equipment and physical media.
- ControlNet allows intelligent, high-speed control devices to share the information required for supervisory control, work-cell coordination, operator interface, remote device configuration, programming, and troubleshooting.
- DeviceNet offers high-speed access to plant-floor data from a broad range of plant-floor devices and a significant reduction in wiring.



Selecting a Network

You can configure your system for information exchange between a range of devices and computing platforms and operating systems.

| Application Requirements: | Network: | Select: |
|---|-------------|--|
| <ul style="list-style-type: none"> • Plant management (material handling) • Configuration, data collection, and control on a single, high-speed network • Time-critical applications with no established schedule • Data sent regularly • Internet/Intranet connection | EtherNet/IP | 1738-AENT |
| <ul style="list-style-type: none"> • High-speed transfer of time-critical data between controllers and I/O devices • Deterministic and repeatable data delivery • Media redundancy • Controller redundancy • Intrinsic safety • Redundant controller systems | ControlNet | 1738-ACNR |
| <ul style="list-style-type: none"> • Connections of low-level devices directly to plant-floor controllers, without interfacing them • Data sent as needed • More diagnostics for improved data collection and fault detection • Less wiring and reduced start-up time than a traditional, hard-wired system | DeviceNet | 1738-ADN12 1738-ADN18 1738-ADN18P 1738-ADNX |
| <ul style="list-style-type: none"> • Connecting to an existing PROFIBUS DP 5m bus, 12 MB network | PROFIBUS | 1738-APB |

Selecting the DeviceNet Communication Interface

ArmorPoint I/O offers four interfaces for connecting to DeviceNet. Refer to the following table.

| For These Features: | Remember: | Select: |
|---|--|--|
| <ul style="list-style-type: none"> Behaves as a slave device on the Main Network and a master on the POINTBus Allows a group of I/O modules on the Subnet to act as a single node on the Main Network RSNetWorx™ for DeviceNet software is needed for configuration of the 1738-ADN12, -ADN18, or -ADN18P on the Main Network and the POINTBus Configuration on the POINTBus consists of a scan list that is very similar to those used in all of the DeviceNet master scanner modules | <ul style="list-style-type: none"> All ArmorPoint I/O modules count as a single node on the Main Network. The Main Network distance is acceptable. ArmorPoint I/O expansion power supplies are permitted to add more ArmorPoint I/O modules. | 1738-ADN12 (M12-style network connectors) 1738-ADN18 (mini-style network connectors) 1738-ADN18P (mini-style network connectors with pass-through) |
| <ul style="list-style-type: none"> Acts like a 1738-ADN12 or -ADN18, with additional capabilities Has a second, M12-style connector that extends the Subnet off the module, so that any DeviceNet-capable device could be connected to a subnet and scanned by the 1738-ADNX Node numbers of the devices on the POINTBus and subnet would not count against the 63 slave nodes allowed on the Main Network Data from these devices would be included in the data being sent to/from the 1738-ADNX on the main network Network on the second connector is electrically isolated from the Main Network and can be used to extend the total DeviceNet trunk line distance <p>For example: with thick round media at 125K baud, you could run a maximum of 500m to a 1738-ADNX on the Main Network. You could then wire an additional 500m of cable on the subnet connector and double the distance of the network. <i>Remember that this Subnet needs terminating resistors and a 24V dc power connection, the same as any other DeviceNet network.</i></p> | <ul style="list-style-type: none"> All ArmorPoint I/O modules and some third-party field devices count as a single node on the Main Network Devices on the Subnet and the Main Network need to be connected at different baud rate speeds or use different sampling methods (i.e., COS, polled, etc.) The Main Network distance is not acceptable, and additional distance is required. An expansion power supply may be required to add more modules. ArmorPoint I/O expansion power supplies are permitted. | 1738-ADNX |

With the introduction of the 1738-232ASCM12 module, the amount of data to be transferred over the Subnet could become substantial. This could also occur with the 1738-ADNX and the standard DeviceNet devices connected to its Subnet connector. It is important that the total amount of data coming from the Subnet does not exceed the data capability of either the 1738-ADN12, -ADN18, -ADN18P, or -ADNX.

- 250 bytes (248 data + 2 bytes command info) for output data (used as either COS, cyclic, or poll)
- 250 bytes (248 data + 2 bytes status info) for polled input data
- 250 bytes (248 data + 2 bytes status info) for COS/cyclic input data
- 8 bytes (6 data + 2 status info) for strobe input data

The data coming through the 1738 adapter combined with the other data from the Main Network cannot exceed the data capability of the Main Network master scanner. If this occurs, you will need multiple master scanners on the Main Network and the I/O modules on the Subnet will need to be split between multiple 1738-ADN12, -ADN18, -ADN18P, or -ADNX adapters.

Step 2 - Select:

- I/O modules - some modules have diagnostic features, electronic fusing, or individually isolated inputs/outputs

Selecting ArmorPoint I/O Modules

The ArmorPoint I/O family provides a wide range of input and output modules to span many applications, from high-speed discrete to process control. ArmorPoint I/O supports producer/consumer technology, which allows input information and output status to be shared among multiple Logix controllers.



The ArmorPoint family of I/O modules includes:

- 1738 digital I/O modules
- 1738 analog I/O modules
- 1738 specialty I/O modules
- 1738 network communication adapters
- 1738 power supply
- 1738 backplane extenders

Digital I/O Modules

Choose digital I/O modules when you need:

- **Input modules.** An input module responds to an input signal in the following manner:
 - Input filtering limits the effect of voltage transients caused by contact bounce and/or electrical noise. If not filtered, voltage transients could produce false data. All input modules use input filtering.
 - Optical isolation shields logic circuits from possible damage due to electrical transients.
 - Logic circuits process the signal.
 - An input LED turns on or off indicating the status of the corresponding input device.

- **Output modules.** An output module controls the output signal in the following manner:
 - Logic circuits determine the output status.
 - An output LED indicates the status of the output signal.
 - Optical isolation separates module logic and bus circuits from field power.
 - The output driver turns the corresponding output on or off.

- **Surge suppression.** Most output modules have built-in surge suppression to reduce the effects of high-voltage transients. However, we recommend that you use an additional suppression device if an output is being used to control inductive devices, such as:
 - Relays
 - Motor starters
 - Solenoids
 - MotorsAdditional suppression is especially important if your inductive device is in series with or parallel to hard contacts, such as:
 - Push buttons
 - Selector switches

The 1738 digital I/O modules support:

- a wide variety of voltage interface capabilities
- isolated and non-isolated module types
- point-level output fault states
- choice of direct-connect or rack-optimized communications
- field-side diagnostics on select modules

Connector types are indicated by the catalog number. For example, the 1738-IB2M12 has an M12 connector.

Digital AC Input Modules

| | 1738-IA2M12AC3 1738-IA2M12AC4 |
|---|---|
| Number of Inputs | 2 |
| Keyswitch Position | 8 |
| Voltage, On-State Input, Nom. | 120V ac |
| Voltage, On-State Input, Min. | 65V ac |
| Voltage, On-State Input, Max. | 132V ac |
| Input Delay Time, ON to OFF, Hardware Delay, Max. | 20 ms hardware filter plus 0...65 ms digital filter programmable in increments of 1 ms* |
| Current, On-State Input, Min. | 3.7 mA |
| Input Impedance, Nom. | 10.6 kΩ |
| Current, Off-State Input, Max. | 2.5 mA |
| PointBus Current (mA) | 75 |
| Power Dissipation, Max. | 0.7 W @ 132V ac |

*Input ON-to-OFF delay time is the time from a valid input signal to recognition by the module.

Digital AC Output Module

| | 1738-OA2M12AC3 |
|--------------------------------|----------------------------------|
| Number of Outputs | 2 |
| Keyswitch Position | 8 |
| Voltage, On-State Output, Nom. | 120V ac, 220V ac |
| Voltage, On-State Output, Min. | 74V ac |
| Voltage, On-State Output, Max. | 264V ac |
| Output Current Rating | 1.5 A (2 channels @ 0.75 A each) |
| PointBus Current (mA) | 75 |
| Power Dissipation, Max. | 0.8 W @ 28.8V dc |

Digital DC Input Modules

| | 1738-IB2M12 | 1738-IB4M8 1738-IB4M12 | 1738-IB8M8 1738-IB8M12 1738-IB8M23 | 1738-IV4M12 | 1738-IV8M8 1738-IV8M12 1738-IV8M23 |
|--------------------------------|---|---|---|---|---|
| Number of Inputs | 2 Sinking | 4 Sinking | 8 Sinking | 4 Sourcing | 8 Sourcing |
| Keyswitch Position | 1 | 1 | 1 | 1 | 1 |
| Voltage, On-State Input, Nom. | 24V dc | 24V dc | 24V dc | 24V dc | 24V dc |
| Voltage, On-State Input, Min. | 10V dc | 10V dc | 10V dc | 10V dc | 10V dc |
| Voltage, On-State Input, Max. | 28.8V dc | 28.8V dc | 28.8V dc | 28.8V dc | 28.8V dc |
| Input Delay Time, ON to OFF | 0.5 ms hardware + (0...65 ms selectable)* | 0.5 ms hardware + (0...65 ms selectable)* | 0.5 ms hardware + (0...65 ms selectable)* | 0.5 ms hardware + (0...65 ms selectable)* | 0.5 ms hardware + (0...65 ms selectable)* |
| Current, On-State Input, Min. | 2 mA | 2 mA | 2 mA | 2 mA | 2 mA |
| Current, On-State Input, Max. | 5 mA | 5 mA | 5 mA | 5 mA | 5 mA |
| Current, Off-State Input, Max. | 1.5 mA | 1.5 mA | 1.5 mA | 1.5 mA | 1.5 mA |
| PointBus Current (mA) | 75 | 75 | 75 | 75 | 75 |
| Power Dissipation, Max. | 0.7 W @ 28.8V dc | 1.0 W @ 28.8V dc | 1.6 W @ 28.8V dc | 1.0 W @ 28.8V dc | 1.6 W @ 28.8V dc |

*Input ON-to-OFF delay time is the time from a valid input signal to recognition by the module.

Digital DC Output Modules

| | 1738-OB2EM12 | 1738-OB2EPM12 | 1738-OB4EM8 1738-OB4EM12 | 1738-OB8EM8 1738-OB8EM12 1738-OB8M23 | 1738-OV4EM12 |
|--------------------------------|-------------------------------------|-------------------------------------|---|---|-------------------------------------|
| Number of Outputs | 2 | 2 | 4 | 8 | 4 |
| Keyswitch Position | 1 | 1 | 1 | 1 | 1 |
| Voltage, On-State Output, Nom. | 24V dc | 24V dc | 24V dc | 24V dc | 24V dc |
| Voltage, On-State Output, Min. | 10V dc | 10V dc | 10V dc | 10V dc | 10V dc |
| Voltage, On-State Output, Max. | 28.8V dc | 28.8V dc | 28.8V dc | 28.8V dc | 28.8V dc |
| Output Current Rating, Max. | 2.0 A per module, 1.0 A per channel | 4.0 A per module, 2.0 A per channel | 3.0 A per module, 1.0 A per channel | 3.0 A per module, 1.0 A per channel | 4.0 A per module, 1.0 A per channel |
| PointBus Current (mA) | 75 | 75 | 75 | 75 | 75 |
| Power Dissipation, Max. | 0.8 W @ 28.8V dc | 3.4 W @ 28.8V dc | 1.2 W @ 28.8V dc | 2.0 W @ 28.8V dc | 2.9 W @ 28.8V dc |

Digital Contact Output Modules

| | 1738-OW4M12 1738-OW4M12AC4 |
|---|--|
| Number of Outputs | 4 Form A (N.O.) relays, isolated |
| Keyswitch Position | 7 |
| Output Delay Time, ON to OFF, Max. | 26 ms* |
| Contact Resistance, Initial | 30 m Ω |
| Leakage Current, Off-State Output, Max. | 1.2 mA and bleed resistor thru snubber circuit @ 240V ac |
| PointBus Current (mA) | 80 |
| Power Dissipation, Max. | 0.5 W |

*Time from valid output off signal to relay deenergization by module.

Analog, Thermocouple, and RTD I/O Modules

The ArmorPoint analog and temperature I/O modules support: on-board, channel-level data alarming (four set-points per channel); scaling to engineering units; channel-level diagnostics (electronic bits and LEDs); and integer format.

Choose analog, thermocouple, and/or RTD I/O modules when you need:

- **Individually configurable channels** to use the module(s) with a variety of sensors.
- **On-board scaling** to eliminate the need to scale the data in the controller. Controller processing time and power are preserved for more important tasks, such as I/O control, communications, or other user-driven functions.
- **On-line configuration.** Modules can be configured in the RUN mode using the programming software or the control program. This allows you to change configuration while the system is operating. For example, the input filter for a particular channel could be changed, or a channel could be disabled based on a batch condition. *To use this feature, the controller and network interface must also support this feature.*
- **Over- and under-range detections and indications.** This eliminates the need to test values in the control program, saving valuable processing power of the controller. In addition, since alarms are handled by the module, the response is faster and only a single bit per channel is monitored to determine if an error condition has occurred.
- **Ability to direct output device operation during an abnormal condition.** Each channel of the output module can be individually configured to hold its last value or assume a user-defined value on a fault condition. This feature allows you to set the condition of your analog devices, and therefore your control process, which may help to ensure a reliable shutdown.
- **Ability to individually enable and disable channels.** Disabling unused channels improves module performance.
- **Selectable input filters** This lets you select the filter frequencies for each channel that best meets the performance needs of your application based on environmental limitations. Lower filter settings provide greater noise rejection and resolution. Higher filter settings provide faster performance. *Note: The analog modules provide four input filter selections; RTD and thermocouple modules provide six.*
- **Selectable response to broken input sensor.** This feature provides feedback to the controller that a field device is not connected or operating properly. This lets you specify corrective action based on the bit or channel condition.
- **High accuracy.** The modules share a high accuracy rating of $\pm 0.1\%$ of full-scale accuracy at 25 °C.

Analog Input Modules

| | 1738-IE2CM12 | 1738-IE2VM12 | 1738-IR2M12* | 1738-IT2IM12* |
|----------------------------------|---|---|---|---------------------------------------|
| Number of Inputs | 2 | 2 | 2 | 2 |
| Keyswitch Position | 3 | 3 | 6 | 6 |
| Input Signal Range | 4...20 mA 0...20 mA | 0...10V ±10V | 0...600 Ω | ±75 mV |
| Input Resolution, Bits | 16 bits - over 21 mA 0.32 μA/cnt | 15 bits plus sign 320 μV/cnt in unipolar or bipolar mode | 16 bits 9.5 mV/cnt 0.03 °C/cnt (pt 385 @ 25 °C) | 15 bits plus sign 2.5 mV per count |
| Absolute Accuracy, Current Input | 0.1% Full Scale @ 25 °C* | — | — | — |
| Absolute Accuracy, Voltage Input | — | 0.1% Full Scale @ 25 °C * | 0.1% Full Scale @ 25 °C*‡ | 0.1% Full Scale @ 25 °C*‡ |
| Input Step Response, per Channel | 70 ms @ Notch = 60 Hz (default) 80 ms @ Notch = 50 Hz 16 ms @ Notch = 250 Hz 8 ms @ Notch = 500 Hz | 70 ms @ Notch = 60 Hz (default) 80 ms @ Notch = 50 Hz 16 ms @ Notch = 250 Hz 8 ms @ Notch = 500 Hz | — | — |
| Input Conversion Type | Delta Sigma | Delta Sigma | — | — |
| PointBus Current (mA) | 75 | 75 | 220 | 175 |
| Power Dissipation, Max. | 0.6 W @ 28.8V dc | 0.75 W @ 28.8V dc | 1.0 W | 1.0 W |

*Includes offset, gain, non-linearity and repeatability error terms.

‡ Analog and temperature input modules support these configurable parameters and diagnostics: open-wire with LED and electronic reporting; four-alarm and annunciation set-points; calibration mode and electronic reporting; under- and over-range and electronic reporting; channel signal range and update rate and on-board scaling; filter-type; temperature scale; channel update rate.

Analog Output Modules

| | 1738-OE2CM12 | 1738-OE2VM12 |
|--|------------------------------------|---|
| Number of Outputs | 2 | 2 |
| Keyswitch Position | 4 | 4 |
| Output Signal Range | 4...20 mA 0...20 mA | 0...10V ±10V |
| Output Resolution, Bits | 13 bits - over 21 mA 2.5 μA/cnt | 14 bits (13 plus sign) 1.28 mV/cnt in unipolar or bipolar mode |
| Absolute Accuracy, Current Output | 0.1% Full Scale @ 25 °C*‡ | — |
| Absolute Accuracy, Voltage Output | — | 0.1% Full Scale @ 25 °C *‡ |
| Step Response to 63% of FS, Current Output | 24 μs | — |
| Step Response to 63% of FS, Voltage Output | — | 20 μs |
| Output Conversion Rate | 16 μs | 20 μs |
| PointBus Current (mA) | 75 | 75 |
| Power Dissipation, Max. | 1.0 W @ 28.8V dc | 1.0 W @ 28.8V dc |

*Includes offset, gain, non-linearity and repeatability error terms.

‡ Analog output modules support these configurable parameters and diagnostics: open-wire with LED and electronic reporting (OE2C only); fault mode; idle mode; alarms; channel signal range and on-board scaling.

Temperature Module Alarms

ArmorPoint I/O temperature modules are capable of detecting and communicating the following electronic conditions:

- over-range alarm
- under-range alarm
- level alarm (low-low, low, high, high-high)
- open-wire alarm

Over-Range Alarm

The channel over-range alarm is set if the input is greater than the maximum temperature (thermocouple or RTD range dependent), millivolt (+75V) or resistance (600 Ω) range value, or above the maximum range of the thermocouple or RTD.

The cold-junction compensator has its own over-range alarm. If the CJC temperature goes above 70 °C, the over-range alarm is set.

Under-Range Alarm

The channel under-range alarm is set if the input is less than the minimum temperature (thermocouple or RTD range dependent), millivolt (-75 mV) or resistance (10 Ω) range value, or below the minimum range of the thermocouple or RTD.

The cold-junction compensator has its own under-range alarm. If the CJC temperature goes below 0 °C, the under-range alarm is set.

Level Alarms

There are four level alarms:

- low
- low-low
- high
- high-high

When the channel input goes below a low alarm or above a high alarm, a bit is set in the data table. All alarm status bits can be read individually or by reading the channel status byte (bits 2-5 for channel 0; bits 10-13 for channel 1).

Each channel alarm can be configured individually.

Open-Wire Alarm

The module has the ability to check for a broken or detached wire. In any mode, if a broken/detached lead is detected, the data value is forced to maximum and the over-range alarm is set. Once the alarm is issued, it remains active as long as the input signal is faulted.

Cold-Junction Compensation (1738-IT2IM12 Only)

When using thermocouples, cold-junction compensation is required at the termination of the thermocouple wire. Cold-junction can be accomplished in two ways:

- enter an estimated temperature
- an M12 terminal chamber with built-in CJC

To use the M12 terminal chamber, order 871A-TS4CJC-DM (straight) or 871A-TR4CJC-DM (right-angle)

Entering an estimated temperature is the least accurate way for cold-junction compensation.

An open cold-junction compensator sets the input point to the maximum temperature value for the selected input type, setting an alarm. Once the alarm is issued, it remains active as long as the input signal is faulted (above maximum).

Cold-Junction Enable (1738-IT2IM12 Only)

Set this bit to enable or disable the cold-junction linearization. If enabled, the proper cold-junction compensation value will be applied to the selected thermocouple. If disabled, the data (cold-junction temperature) will still be available but not applied to the input. A cold-junction value can be added using the cold-junction offset parameter.

You can select the type and amount of noise filtering on each individual channel:

- notch filter of analog to digital converter
- first-order, low-pass digital filter

Choose the filter that provides you with the update and step response that most closely matches your system requirements.

Noise Filtering (1738-IR2M12 Only)

ArmorPoint I/O Temperature Input Module Specifications

| | 1738-IR2M12 | 1738-IT2IM12 |
|--|---|--|
| Number of Inputs | 2 | 2 |
| Input Resolution, Bits | — | — |
| Thermocouple Type and Resolution Average Over Span | — | Type B, 30...1820° C, 3 counts/ ° C Type C, 0...2315° C, 6 counts/ ° C Type E, -270...1000° C, 24 counts/ ° C Type J, -210...1200° C, 21 counts/ ° C Type K, -270...1372° C, 13 counts/ ° C Type N, -270...1300° C, 11 counts/ ° C Type R, -50...1768.1° C, 4 counts/ ° C Type S, -50...1768.1° C, 4 counts/ ° C Type T, -270...400° C, 15 counts/ ° C |
| Cold Junction Compensation | — | 871A-TS4CJC-DM (Straight) or 871A-TR4CJC-DM (Right Angle) |
| Cold Junction Compensation Range | — | 0...70 °C |
| Absolute Accuracy, Voltage Input | 0.1% Full Scale @ 25 °C*⊛ | 0.1% Full Scale @ 25 °C*⊛ |
| Accuracy Drift w/Temp., Current Input | 30 ppm/°C | 30 ppm/°C |
| Input Update Rate, per Module | 20 ms @ Notch = 50 Hz 17 ms @ Notch = 60 Hz (default) 10 ms @ Notch = 100 Hz 8 ms @ Notch = 120 Hz 5 ms @ Notch = 200 Hz 4 ms @ Notch = 240 Hz 3 ms @ Notch = 300 Hz 3 ms @ Notch = 400 Hz 2 ms @ Notch = 480 Hz | 20 ms @ Notch = 50 Hz 17 ms @ Notch = 60 Hz (default) 10 ms @ Notch = 100 Hz 8 ms @ Notch = 120 Hz 5 ms @ Notch = 200 Hz 4 ms @ Notch = 240 Hz 3 ms @ Notch = 300 Hz 3 ms @ Notch = 400 Hz 2 ms @ Notch = 480 Hz |
| Input Step Response, per Channel | 60 ms @ Notch = 50 Hz 50 ms @ Notch = 60 Hz 30 ms @ Notch = 100 Hz 25 ms @ Notch = 120 Hz 15 ms @ Notch = 200 Hz 13 ms @ Notch = 240 Hz 10 ms @ Notch = 300 Hz 8 ms @ Notch = 400 Hz 6 ms @ Notch = 480 Hz | 60 ms @ Notch = 50 Hz 50 ms @ Notch = 60 Hz 30 ms @ Notch = 100 Hz 25 ms @ Notch = 120 Hz 15 ms @ Notch = 200 Hz 13 ms @ Notch = 240 Hz 10 ms @ Notch = 300 Hz 8 ms @ Notch = 400 Hz 6 ms @ Notch = 480 Hz |
| Input Impedance | — | 100 kΩ |
| Input Resistance | — | 1 MΩ |
| Input Conversion Type | Delta Sigma | Delta Sigma |
| Input Common Mode Rejection Ratio | 120 dB | 120 dB |
| Normal Mode Rejection Ratio | 100 dB ±3 db Notch filter: 13.1 Hz @ Notch = 50 Hz 15.7 Hz @ Notch = 60 Hz 26.2 Hz @ Notch = 100 Hz 31.4 Hz @ Notch = 120 Hz 52.4 Hz @ Notch = 200 Hz 62.9 Hz @ Notch = 240 Hz 78.6 Hz @ Notch = 300 Hz 104.8 Hz @ Notch = 400 Hz 125.7 Hz @ Notch = 380 Hz | -60 dB, -3 dB Notch filter: 13.1 Hz @ Notch = 50 Hz 15.7 Hz @ Notch = 60 Hz 26.2 Hz @ Notch = 100 Hz 31.4 Hz @ Notch = 120 Hz 52.4 Hz @ Notch = 200 Hz 62.9 Hz @ Notch = 240 Hz 78.6 Hz @ Notch = 300 Hz 104.8 Hz @ Notch = 400 Hz 125.7 Hz @ Notch = 380 Hz |
| Input Data Format | Signed integer | Signed integer |
| Overvoltage Protection, Inputs | No input protection | Input not overvoltage protected |
| Input Calibration | Factory calibrated | Factory calibrated |
| Keyswitch Position | 6 | 6 |
| PointBus Current (mA) | 220 | 175 |
| Power Dissipation, Max. | 1.0 W | 1.0 W |
| Thermal Dissipation, Max. | 3.3 BTU/hr @ rated load | 3.3 BTU/hr @ rated load |
| Isolation Voltage | 50V rms | 50V rms Isolation between individual channels |
| External DC Power Supply Voltage, Nom. | 24V dc | — |
| External DC Power Supply Voltage Range | 10...28.8V dc | — |
| External DC Power Supply Current | 15 mA @ 24V dc | — |

*Includes offset, gain, non-linearity and repeatability error terms.

⊛ Analog and temperature input modules support these configurable parameters and diagnostics: open-wire with LED and electronic reporting; four-alarm and annunciation set-points; calibration mode and electronic reporting; under- and over-range and electronic reporting; channel signal range and update rate and on-board scaling; filter-type; temperature scale; channel update rate.

Specialty I/O Modules

1738-232ASCM12 and 1738-485ASCM12

The 1738-232ASCM12 and -485ASCM12 serial-interface modules offer a serial-link communication interface solution for peripheral products with:

- RS-232 ports

use the 1738-232ASCM12

- RS-485 and RS-422 ports

use the 1738-485ASCM12

These modules allow a device with serial-interface output, i.e., bar code readers, to communicate up to 128 bytes of ASCII data onto any network supported by ArmorPoint I/O. Each module is a single-channel, full-duplex interface and is rated for up to 38.4 kbaud. LED indicators on the modules offer diagnostics for the module, ArmorPointBus backplane, and transmit/receive status indication.

1738-SSIM23

The 1738-SSIM23 module collects serial data from industrial absolute-position encoding sensors that use standard SSI protocol. The SSI module is inserted into an ArmorPoint I/O terminal base that provides common power, communications, and wiring connections for the SSI sensors.

ArmorPoint I/O ASCII Module Specifications

| | 1738-232ASCM12 1738-485ASCM12 |
|---|---|
| Number of Serial Channels | 1 |
| Keyswitch Position | 2 (specialty) |
| PointBus Current (mA) | 75 |
| Power Dissipation | 1.75 W @ 28.8V dc |
| Serial Port Parameters | |
| Serial Character Framing | 7N2, 7E1, 7O1, 8N1, 8N2, 8E1, 8O1, 7E2, 7O2 |
| Serial Port Comm Speed | 9600, 1200, 2400, 4800, 19.2 k, 38.4 k |
| Serial Port Receive from ASCII Device | |
| Number of Receive Chars, Max | 1...128 |
| Receive Record Start Mode | No, exclude, include start delimiter |
| Receive Start Delimiter | ASCII character |
| Receive Record End Mode | No, exclude, include end delimiter |
| Receive End Delimiter | ASCII character |
| Send (Produce) on DeviceNet to Master | |
| Receive String Data Type | Array, short_string, string |
| Pad Mode | Pad mode disabled, enabled |
| Pad Character | ASCII character |
| Receive Swap Mode | Disabled, 16-bit, 24-bit, 32-bit swap |
| DeviceNet Handshake Mode | Master/slave handshake, produce immediate |
| Produce Assembly Size | 4...132 |
| Serial Data Size | 0...128 bytes |
| Receive Transaction ID | 0...255 |
| Serial Port Transmit to ASCII Device | |
| Number of Transmit Chars, Max | 1...128 |
| Transmit End Delimiter Mode | No, exclude, include end delimiter |
| Transmit End Delimiter Character | ASCII |
| Consume on DeviceNet from Master | |
| Consume String Data Type | Array, short_string, string |
| Transmit Swap Mode | Disabled, 16-bit, 24-bit, 32-bit swap |
| DeviceNet Record Header Mode | Transmit handshake/immediate |
| Consume Assembly Size | 4...132 |
| Serial Port Transmit/Explicit Messages from Configuration Tool | |
| Transmit Serial Data String Size | 0...128 bytes |
| Transmitted Serial Data Length | 0...128 bytes |
| Transmit Transaction ID | 0...255 |
| Serial Port Status | TX FIFO overflow, RX FIFO overflow, RX parity error, handshake error, new data flag |

1738-SSIM23 Module Specifications

| | 1738-SSIM23 |
|---|--|
| Number of SSI Channels | 1 |
| Keyswitch Position | 2 |
| PointBus Current (mA) | 110 |
| Power Dissipation, Max. | 0.94 W |
| Isolation Voltage | Tested to 1250V ac for 60 s between each of these isolated areas: Logic side and field power Logic side and shield Shield and field power |
| External DC Power Supply Voltage, Nom. | 24V dc |
| Encoder Type | Any absolute encoder supporting standard SSI protocol including linear, rotary, and optical distance measuring devices |
| SSI Data Rate | 125 kHz, 250 kHz, 500 kHz, 1 MHz, 2 MHz (software selectable) |
| SSI Bits Per Word | 2...31 (software selectable) |
| SSI Word Length | 4 bytes (32 bits) |
| SSI Word Delay Time | 16 μ s...64 ms (software selectable)* |
| SSI Features | Gray or binary code capable with gray to binary conversion, increasing or decreasing SSI count indication, 2 SSI word comparator values, SSI word latching with I1 input |
| SSI Cable Type | UL CM/AWM 2464/CSA Type CMG FT4 or similar cable utilizing shielded twisted pairs for D+/- and C+/- connections. See sensor manufacturer for actual cable required for the SSI sensor under use. I1 input can be wired separate from SSI cable.* |
| SSI Cable Length | Depends on desired SSI data rate: 125 kHz...1050 ft(320m) 250 kHz...525 ft(160m) 500 kHz...195 ft(60m) 1 MHz...65 ft(20m) 2 MHz...25 ft(8m) |
| SSI Sensor Power (At V+/- Terminals) | 10...28.8V dc common with field power voltage, 0.75A dc maximum with short circuit protection |
| SSI Clock Drive Current, Max. (Out of C+/- Terminals) | 750 mA |
| Input I1 Category/Type | Similar to IEC Type 3, sourcing |
| Voltage, On-State Input, Min. | 0V dc |
| Voltage, On-State Input, Max. | Field Power Supply Voltage minus 10V |
| Current, On-State Input, Min. | 2 mA |
| Current, On-State Input, Nom. | 4 mA (Field Power Supply Voltage = 24V dc) |
| Current, On-State Input, Max. | 5 mA |
| Voltage, Off-State Input, Min. | Field Power Supply Voltage minus 5V |
| Voltage, Off-State Input, Max. | Equal to Field Power Supply Voltage |
| Current, Off-State Input, Max. | — |
| Input Impedance, Nom. | 3.6 k Ω |
| Input Impedance, Max. | 4.7 k Ω |
| Input Filter Time, Nom. | 0.5 ms |
| Field Power Bus Supply Voltage, Min. | 10V dc |
| Field Power Bus Supply Voltage, Nom. | 24V dc |
| Field Power Bus Supply Voltage, Max. | 28.8V dc |

*Time between successive SSI words (Tp). Also called Dwell Time.

* Use this conductor category information for planning conductor routing as described in publication 1770-4.1, "Industrial Automation Wiring and Grounding Guidelines."

ArmorPoint I/O Counter Modules

Choose the ArmorPoint I/O high-speed counters when you need:

- **Intelligent counter modules** with their own microprocessors and I/O that are capable of reacting to high-frequency input signals up to 1 MHz.
- **Signals received at the inputs** to be filtered, decoded, and counted.
- **A pulse width modulated signal.** (1738-VHSC24M23 only)
- **Count and rate values** that can be used to activate up to two embedded outputs in less than 1 ms (1738-VHSC24M23 only).
- **Signals that are also processed** to generate rate and time-between pulses (pulse interval) data.

Counter Modules Specifications

| | 1738-IJM23 | 1738-VHSC24M23 |
|-------------------------------|---|---|
| Number of Counters | 1 | 1 |
| Keyswitch Position | 2 | 2 |
| Output Groups | — | 1 group of 2 |
| Input Frequency, Max. | 1.0 MHz counter and encoder X1 configurations (no filter) 500 kHz encoder X2 configuration (no filter) 250 kHz encoder X4 configuration (no filter) | 1.0 MHz counter and encoder X1 configurations (no filter) 500 kHz encoder X2 configuration (no filter) 250 kHz encoder X4 configuration (no filter) |
| Voltage, On-State Input, Nom. | 5V dc | 24V dc |
| Output Delay Time, OFF to ON | — | 25 μ s (load dependent)* |
| Current, On-State Input, Min. | \geq 5 mA | \geq 5 mA |
| PointBus Current (mA) | 160 | 110 |
| Power Dissipation, Max. | 1.1 W @ rated load | 1.9 W @ rated load |

*OFF to ON delay is time from a valid output "on" signal to output energization.

The counter modules serve as signal conditioners and function blocks, i.e., counters, between the customer process signals on the mounting base and the POINTBus backplane containing the command information. The three main functional blocks are the customer digital I/O interface, the counter ASIC, and the microprocessor.

The counter modules accept feedback from:

- encoders (single-ended or differential)
- pulse generators
- mechanical limit switches
- frequencies up to 1 MHz

A filter is available with four settings:

- 50 Hz
- 500 Hz
- 5 kHz
- 50 kHz

This filter can be turned off to achieve the fastest counting rate.

The input voltage range is 5V dc (1738-IJM23) or 15-24V dc (1738-VHSC24M23). The module returns the count (or frequency) in the form of a 24-bit binary number (0 to 16,777,215) expressed in a 32-bit word. Each counter has a user-selectable preset and rollover value associated with it.

The counter modules operate in the following modes:

- counter mode - read incoming single-phase pulses, return a binary count
- encoder mode - read incoming two-phase quadrature pulses, return a binary count
- period/rate mode - count internal clocks during the on period, return a frequency (1738-VHSC24M23 outputs are updated only at the end of the period)
- continuous/rate mode - count internal clocks during the on period, return a frequency (1738-VHSC24M23 outputs are updated continuously during this period)
- rate measurement mode - read pulses during the sample period, return a frequency
- pulse width modulation (PWM) mode - generate a pulse width modulated signal (1738-VHSC24M23)
- pulse generator mode - generates a pulse of defined width, returns width and quantity of trigger (1738-VHSC24M23 only)

The operation of the counter and encoder modes is nearly identical. The difference between the two modes is in the type of feedback (one-phase versus two-phase) for the count direction (up or down). In encoder mode, a transition is expected on the B input for counting to proceed in a direction, whereas, in counter mode, the B input may be left at a static level. All operating modes are selected by writing appropriate configuration data to the module.

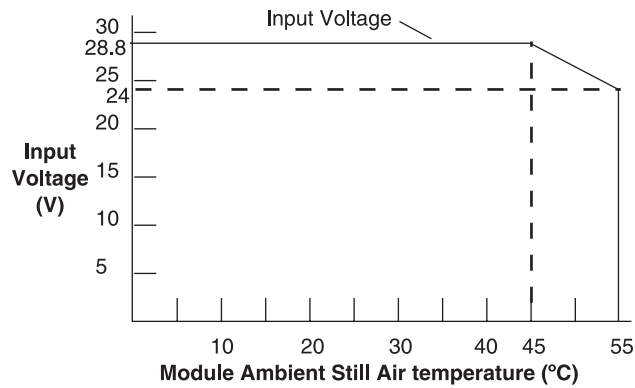
1738-IJM23 Specifications

| | 1738-IJM23 |
|--|--|
| Voltage Category/Type, Input | — |
| Current, Off-State Input, Max. | ≤0.250 mA |
| Voltage, Off-State Input, Max. | ≤1.25V dc |
| Current, On-State Input, Max. | 25.7 mA @ 6V dc 19.1 mA @ 5V dc |
| Voltage, On-State Input, Min. | ≥2.6V dc |
| Voltage, On-State Input, Max. | ≥2.6V dc |
| Input Filter Selections, per A/B/Z group | Off 10 μs (50 kHz) 100 μs (5 kHz) 1.0 ms (500 Hz) 10.0 ms (50 Hz) |
| Keyswitch Position | 2 |
| Thermal Dissipation, Max. | 3.75 BTU/hr @ rated load |
| Isolation Voltage, Min. | Prequalified at 1250V ac/rms between: System side Chassis ground A/B/Z inputs |
| External DC Power Supply Voltage, Nom. | No additional external power required to power module. |

1738-VHSC24M23 Specifications

| 1738-VHSC24M23 | |
|--|--|
| Voltage Category/Type, Input | 24V dc |
| Current, Off-State Input, Max. | ≤0.250 mA |
| Voltage, Off-State Input, Max. | ≤1.8V dc |
| Current, On-State Input, Max. | 10.2 mA @ 24V dc or 6.1 mA @ 15V dc |
| Voltage, On-State Input, Min. | ≥12.5V dc |
| Input Filter Selections | Off 10 μs (50 kHz) 100 μs (5 kHz) 1.0 ms (500 Hz) 10.0 ms (50 Hz) |
| Input Frequency, Max. | 1.0 MHz counter and encoder X1 configurations (no filter) 500 kHz encoder X2 configuration (no filter) 250 kHz encoder X4 configuration (no filter) |
| Keyswitch Position | 2 |
| Thermal Dissipation, Max. | 6.5 BTU/hr @ rated load |
| Isolation Voltage, Min. | Prequalified for 1250V ac/rms between: Module 1 System side (PointBus) Chassis ground A/B/Z inputs 00/01 and user power supply Module 2 System side Chassis ground Vaux ± User power supply common |
| External DC Power Supply Voltage, Nom. | None required |

1738-VHSC24M23 Input Derating Curve



Note: Exceeding the maximum input voltage can cause permanent damage to the input.

Step 3 - Select:

- *the appropriate power unit*

Selecting a Power Supply Unit

ArmorPoint I/O adapters have built-in POINTBus power supplies. All ArmorPoint I/O modules are powered from the POINTBus by either an adapter or expansion power supply.

Power Specifications

| Cat. No. | Power Supply Input Voltage, Nom. | Operating Voltage Range | Field Side Power Requirements, Max. | Power Supply Inrush Current, Max. | Overvoltage Protection, Inputs | Power Supply Interruption Protection |
|-------------|----------------------------------|-------------------------|-------------------------------------|-----------------------------------|--------------------------------|--|
| 1738-ADN12 | 24V dc | 10...28.8V dc | 24V dc (+20% = 28.8V dc) @ 400 mA | 6 A for 10 ms | Reverse polarity protected | Output voltage will stay within specifications when input drops out for 10 ms at 10V with max. load. |
| 1738-ADN18 | | | | | | |
| 1738-ADN18P | | | | | | |
| 1738-ADNX | | | | | | |
| 1738-ACNR | | | | | | |
| 1738-AENT | | | | | | |
| 1738-APB | | | | | | |
| 1738-EP24DC | | | | | | |

Power units are divided into three categories:

- Communication adapters with built-in power supply (dc-dc)
- Field power distributor
- Expansion power supply

Field Power Distributor

The 1738-FPD field power distributor passes through all ArmorPoint I/O backplane signals, but does not provide additional POINTBus backplane power. The field power distributor gives you the ability to change the field power distribution source for I/O modules to the right of the 1738-FPD field power distributor. This facilitates logical or functional partitioning of low-channel count, high I/O-mix applications using any of the communication adapters.

You can use the 1738-FPD field power distributor with a broad range of voltage inputs including 5V dc to 250V dc and/or 24V ac to 240V ac applications and I/O modules.

- Field-side voltage distribution module
- AC or DC input
- For use with all communication interfaces
- Partitioning (auxiliary power, major motion, minor motion, etc.)
- Starts new voltage distribution point

Consider using the 1738-FPD module to isolate field power segments.

Expansion Power Unit

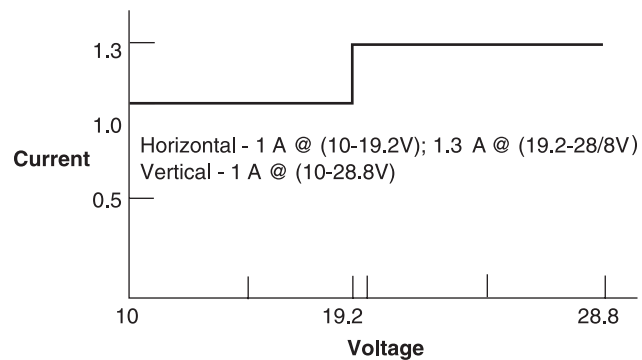
The 1738-EP24DC expansion power unit passes 24V dc field power to the I/O modules to the right of it. This unit extends the backplane bus power and creates a new field voltage partition segment for driving field devices for up to 17 I/O modules. The expansion power unit separates field power from I/O modules to the left of the unit, effectively providing functional and logical partitioning for:

- separating field power between input and output modules
- separating field power to the analog and digital modules
- grouping modules to perform a specific task or function

You can use multiple expansion power units with any of the communication adapters to assemble a full system. If you are using the 1738-ADN12 adapter, you may use a 1738-EP24DC expansion power unit to add additional modules. For example, if you had a 36 module system with a 1738-ADN12 adapter, you would have at least two or more 1738-EP24DC expansion power units to provide more POINTBus current for modules to the right of the supply.

- 24V dc to 5V dc converter
- 1.3A, 5V dc output (extend backplane power)
- Starts new voltage distribution
- Partitioning

1738-EP24DC Current Derating for Mounting



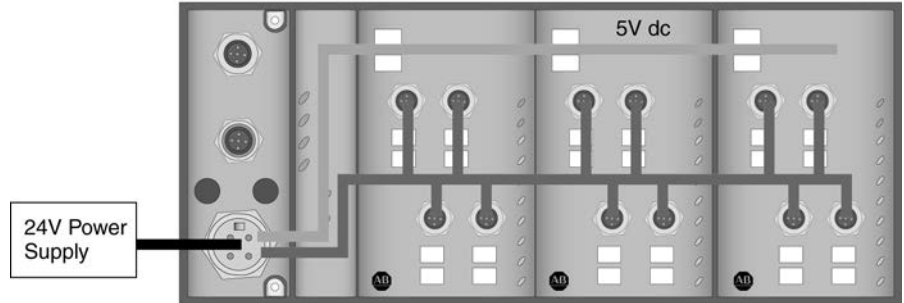
Power Distribution General Specifications

| | 1738-FPD | 1738-EP24DC |
|--------------------------------------|--|--|
| Power Supply Requirements | — | Note: In order to comply with CE Low Voltage Directives (LVD), you must use a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter |
| Field Side Power Requirements, Max. | 24V dc (+20% = 28.8V dc max.) @ 400 mA | 24V dc (+20% = 28.8V dc max.) @ 400 mA |
| Inrush Current, Max. | — | 6 A for 10 ms |
| Overvoltage Protection, Inputs | Reverse polarity protected | Reverse polarity protected |
| Power Supply Interruption Protection | — | Output voltage will stay within specifications when input drops out for 10 ms at 10V with max load |
| Power Supply Input Voltage, Nom. | 12V/24V dc 120V/220V ac | 24V dc |
| Operating Voltage Range | 10...28.8V dc 120V/240V ac | 10...28.8V dc |
| Power Consumption, Max. | — | 9.8 W @ 28.8V dc |
| Power Dissipation, Max. | — | 3.0 W @ 28.8V dc |
| Thermal Dissipation, Max. | — | 10.0 BTU/hr @ 28.8V dc |
| Isolation Voltage | 1528V rms | 1250V rms |
| Field Power Bus Supply Voltage, Nom. | 12V dc, 24V dc, (10...28.8V dc range) 120V ac, 240V ac 50/60 Hz | 12V dc or 24V dc |
| Field Power Bus Supply Current, Max. | 10 A | 10 A |

Typical Configurations

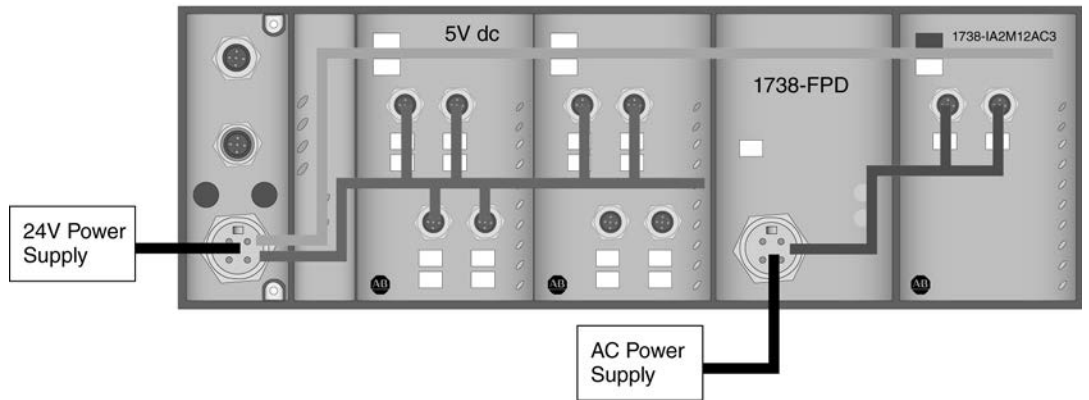
Power Distribution Options

ArmorPoint Communication Adapter and I/O Modules



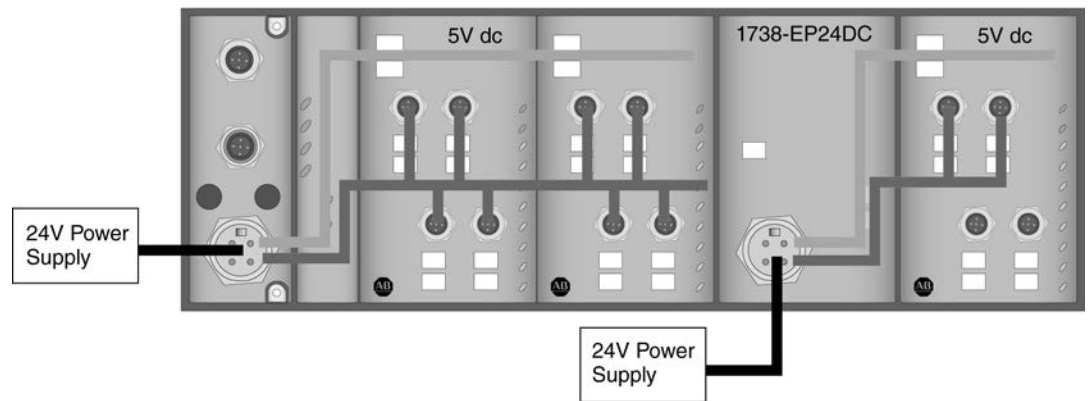
An auxiliary 24V dc power supply provides power to the POINTBus backplane and I/O modules. You can connect up to 17 I/O modules and an adapter with a maximum of 10 A field power, using the auxiliary power.

ArmorPoint I/O System with Field Power Distributor (1738-FPD)



The ArmorPoint field power distributor (1738-FPD) discontinues the I/O circuit power bus in order to change the field power source for I/O modules to the right of it. This allows a broad range of voltage inputs in the I/O assembly.

ArmorPoint I/O System with 24V dc Expansion Power Unit (1738-EP24DC)

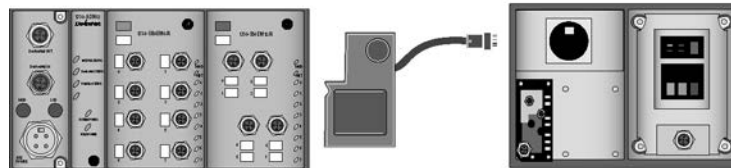
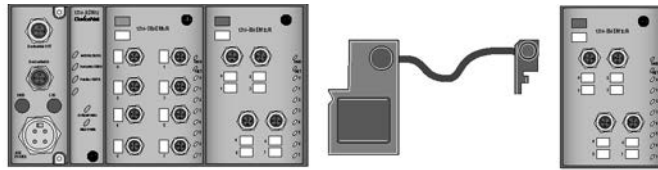


The auxiliary power supports up to 17 I/O modules and an adapter with a maximum of 10 A field power. The 24V dc expansion power unit (1738-EP24DC) extends the backplane bus power to support up to 17 more I/O modules. Connect additional expansion power units to expand the I/O assembly up to the maximum of 63 I/O modules.

Step 4 - Select:

- optional accessories, cables, and cordsets

Selecting Optional Accessories



Any network adapter

Bus Extenders

ArmorStart

Accessories, Cables and Cordsets

ArmorPoint Bus Extension Bases

| Cat. No. | Description |
|-----------|---------------------------------------|
| 1738-EXT1 | ArmorPoint 1 meter bus extension unit |
| 1738-EXT3 | ArmorPoint 3 meter bus extension unit |

The following rules apply for the 1738-EXT1 and -EXT3 extension units.

- Use as many as four extension units per network adapter, except the 1738-ADNX adapter.
- Use only one extension unit with the 1738-ADNX adapter if there are fewer than 32 modules on the backplane.
- You must use a 1738-EP24DC or -FPD module immediately after an extension unit:

Use a 1738-EP24DC module if you need additional backplane power because of module current consumption or after two extension units.

Use a 1738-FPD module for almost all other configurations. The exception is if the modules in the segment after the extension unit are 1738-IT2IM12, -IR2M12, -OW4M12, or -OW4M12AC modules, in which case the 1734-FPD is not necessary.

- Do not exceed the rated adapter or 1734-EP24DC module current. Otherwise, the number or mix of modules used between extension cables does not matter.

Cables and Cordsets

For additional information on selecting cables and cordsets for ArmorPoint I/O see:

- On-Machine Connectivity Catalog, publication M115-CA001
- On-Machine Solutions Selection Guide, publication ONMACH-SG001

ArmorPoint Digital Input Module Cables

| Cat. No. | For Using: | Recommended Patchcord (double-ended) | Recommended Male Cordset (single-ended) |
|-------------|------------------------|--------------------------------------|---|
| 1738-IB2M12 | — | 889D-F4ACDM-x | 889D-M4AC-y |
| 1738-IB4M8 | 3-pin pico connectors | 889P-F3ABPM-x | 889P-M3AB-y |
| | 4-pin pico connectors | 889P-F4ABPM3-x | |
| 1738-IB4M12 | — | 889D-F4ACDM-x | 889D-M4AC-y |
| 1738-IV4M12 | — | 889D-F4ACDM-x | 889D-M4AC-y |
| 1738-IB8M8 | 3-pin pico connectors | 889P-F3ABPM-x | 889P-M3AB-y |
| 1738-IV8M8 | 4-pin pico connectors | 889P-F4ABPM3-x | |
| 1738-IB8M12 | 2 inputs per connector | 879D-F4ACDM-x | 879-C3AEDM4-5 |
| 1738-IV8M12 | 1 input per connector | 889D-F4ACDM-x | 889D-M4AC-y |
| 1738-IB8M23 | — | 889M-F12AHMU-z | — |
| 1738-IV8M23 | — | 889M-F12AHMU-z | — |

x = length in meters (1, 2, 3, 5, and 10 standard).
y = length in meters (2, 5, and 10 standard).
z = length in meters (1, 2, and 3 standard)

ArmorPoint Digital Output Module Cables

| Cat. No. | For Using: | Recommended Patchcord (double-ended) | Recommended Male Cordset (single-ended) |
|---------------|------------------------|--------------------------------------|---|
| 1738-OB2EM12 | — | 889D-F4ACDM-x | 889D-M4AC-y |
| 1738-OB2EPM12 | — | 889D-F4ACDM-x | 889D-M4AC-y |
| 1738-OB4EM8 | 3-pin pico connectors | 889P-F3ABPM-x | 889P-M3AB-y |
| | 4-pin pico connectors | 889P-F4ABPM3-x | |
| 1738-OB4EM12 | — | 889D-F4ACDM-x | 889D-M4AC-y |
| 1738-OV4EM12 | — | 889D-F4ACDM-x | 889D-M4AC-y |
| 1738-OB8EM8 | 3-pin pico connectors | 889P-F3ABPM-x | 889P-M3AB-y |
| | 4-pin pico connectors | 889P-F4ABPM3-x | |
| 1738-OB8EM12 | 2 inputs per connector | 879D-F4ACDM-x | 879-C3AEDM4-5 |
| | 1 input per connector | 889D-F4ACDM-x | 889D-M4AC-y |
| 1738-OB8EM23 | — | 889M-F12AHMU-z | — |

x = length in meters (1, 2, 3, 5, and 10 standard).
y = length in meters (2, 5, and 10 standard).

ArmorPoint Analog Module Cables

| Cat. No. | Recommended Patchcord (double-ended) | Recommended Male Cordset (single-ended) |
|--------------|--------------------------------------|---|
| 1738-IE2CM12 | — | — |
| 1738-IE2VM12 | — | — |
| 1738-OE2CM12 | — | — |
| 1738-OE2VM12 | — | — |

ArmorPoint AC and Relay Module Cables

| Cat. No. | Recommended Patchcord (double-ended) | Recommended Male Cordset (single-ended) |
|----------------|--------------------------------------|---|
| 1738-OW4M12 | 889D-F4ACDM-x | 889D-M4AC-y |
| 1738-OW4M12AC4 | 889R-F4AERM-x | 889R-M4AE-y |
| 1738-IA2M12AC3 | 889R-F3AERM-x | 889R-M3AEA-y |
| 1738-IA2M12AC4 | 889R-F4AERM-x | 889R-M4AE-y |
| 1738-OA2M12AC3 | 889R-F3AERM-x | 889R-M3AEA-y |

x = length in meters (1, 2, 3, 5, and 10 standard).

y = length in meters (2, 5, and 10 standard).

ArmorPoint Specialty Module Cables

| Cat. No. | Recommended Patchcord (double-ended) | Recommended Male Cordset (single-ended) |
|----------------|--------------------------------------|---|
| 1738-232ASCM12 | 889D-F4ACDM-x | 889D-M4AC-y |
| 1738-485ASCM12 | | |
| 1738-IR2M12 | | |
| 1738-VHSC24M23 | 889M-F12AHMU-z | — |
| 1738-IJM23 | | |
| 1738-SSIM23 | | |

x = length in meters (1, 2, 3, 5, and 10 standard).

y = length in meters (2, 5, and 10 standard).

z = length in meters (1, 2, and 3 standard).

ArmorPoint Thermocouple Terminal Chambers

| Cat. No. | Straight | Right Angle |
|--------------|----------------|----------------|
| 1738-IT2IM12 | 871A-TS4CJC-DM | 871A-TR4CJC-DM |

ArmorPoint DeviceNet and Auxiliary Power Cables

| Cat. No. | Network | Recommended Network Cable | Recommended Auxiliary Power Cables |
|---|-------------|---|--|
| 1738-ADNX | DeviceNet | KwikLink Flat Media system standard drop cable: 1485K-PzF5-R5 Thick Round system standard drop cable: 1485R-PzM5-R5 Thin Round system standard drop or trunk: 1485R-PzR5-D5 | Standard Cordset (single-ended): 889N-F4AFC-yF Standard Patchcord (double-ended): 889N-F4AFNM-x |
| 1738-ADN12 1738-ADN18 1738-ADN18P | DeviceNet | KwikLink Flat Media system standard drop cable: 1485K-PzF5-R5 Thin Round system standard drop cable: 1485R-PzN5-M5 Thick Round system standard drop cable: 1485C-PzN5-M5 | |
| 1738-ACNR | ControlNet | — | |
| 1738-AENT | EtherNet/IP | — | |
| 1738-APB | PROFIBUS DP | — | Standard Cordset (single-ended): 889N-F5AFC-y |

x = length in meters (1, 2, 3, and 6 standard).
 y = length in feet (6, 12, and 20 standard).
 z = length in feet (1, 2, 3, 4, 5, and 6 standard).

Step 5 - Select:

Determining Mounting Requirements

Placing ArmorPoint I/O Modules

The producer/consumer model multicasts messages. This means that multiple nodes can consume the same data at the same time from a single device. Where you place I/O modules in the control system determines how the modules exchange data.

For a Rockwell controller to control ArmorPoint I/O, the I/O must be:

- on the same network as the controller **or**
- on a ControlNet network that is local to that controller **or**
- on an EtherNet/IP network that is local to that controller

Maximum Size Layout

| | POINTBus Current (mA) | Maximum I/O Modules with 24V dc Backplane Current at 75 mA each | Maximum I/O Modules with Expansion Power Supplies | Maximum Number of I/O Module Connections |
|-----------------------------|--|---|---|--|
| 1738-ADN12 on DeviceNet | 1000 | Up to 17 | 63 | 5 rack and 20 direct |
| 1738-ADN18 on DeviceNet | | | | |
| 1738-ADN18P on DeviceNet | | | | |
| 1738-ADNX on DeviceNet | | | | |
| 1738-ACNR on ControlNet | | | | |
| 1738-AENT on EtherNet/IP | | | | |
| 1738-APB on PROFIBUS | | | | 20 total connections including rack and direct |
| 1738-EP24DC Expansion Power | Not to exceed scanner capacity | | | |
| | Horizontal mounting: 1 A @ 5V dc for 10...19.2V input; 1.3 A @ 5V dc for 19.2...28.8V input Vertical mounting: 1 A @ 5V dc for 10...28.8V input | | | |

Power Supply Distance Rating

Modules are placed to the right of the power supply. Each ArmorPoint I/O module can be placed in any of the slots to the right of the power supply until the usable backplane current of that supply has been exhausted. An adapter provides 1 A current to the POINTBus. The 1738-EP24DC provides up to 1.3 A and I/O modules require from 75 mA (typical for the digital and analog I/O modules) up to 220 mA or more.

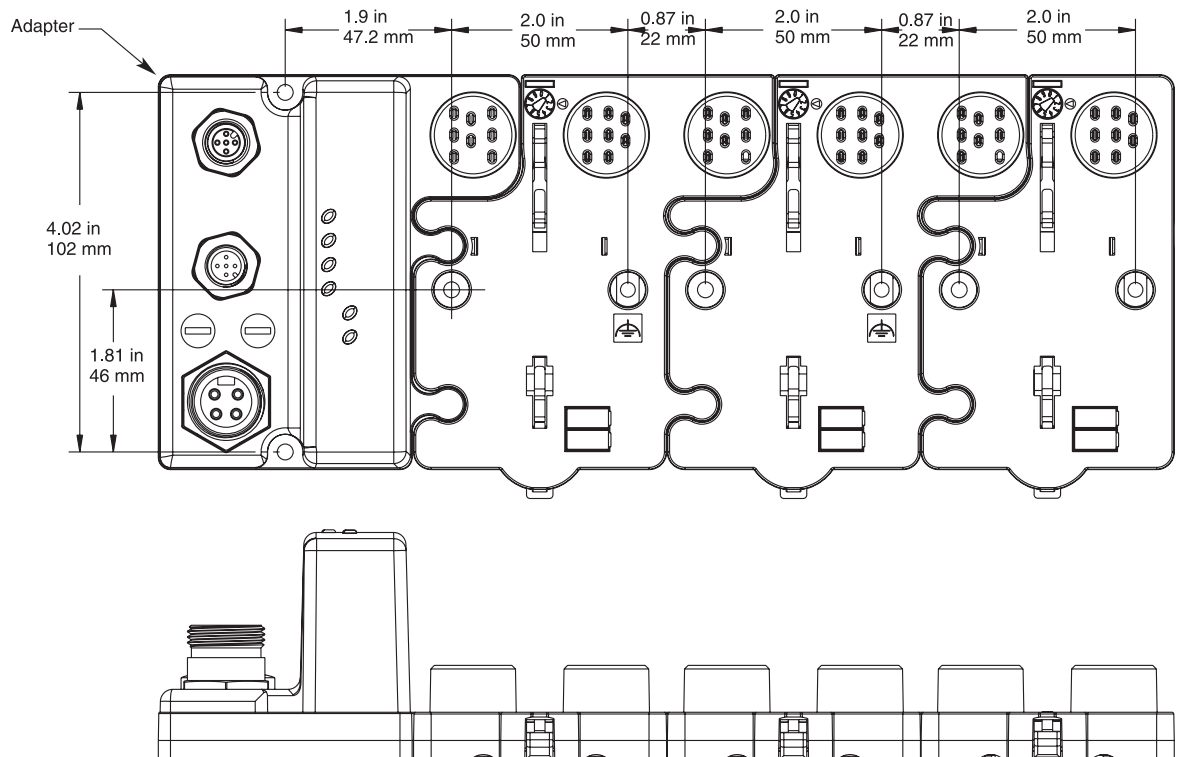
POINTBus Current Requirements

| Cat. No. | POINTBus Current Requirements |
|----------------|-------------------------------|
| 1738-IB2M12 | 75 mA |
| 1738-IB4xxx | |
| 1738-IB8xxx | |
| 1738-IV4xxx | |
| 1738-IV8xxx | |
| 1738-OB2EM12 | |
| 1738-OB2EPM12 | |
| 1738-OB4Exxx | |
| 1738-OB8Exxx | |
| 1738-OV4EM12 | |
| 1738-OW4xxx | 90 mA |
| 1738-IE2CM12 | 75 mA |
| 1738-OE2CM12 | |
| 1738-IE2VM12 | |
| 1738-OE2VM12 | |
| 1738-IA2xxx | |
| 1738-OA2xxx | |
| 1738-IJM23 | 160 mA |
| 1738-SSIM23 | 110 mA |
| 1738-IR2M12 | 220 mA |
| 1738-IT2IM12 | 175 mA |
| 1738-VHSC24M23 | 180 mA |
| 1738-232ASCM12 | 75 mA |
| 1738-485ASCM12 | |

Mounting the ArmorPoint I/O System

You can panel mount the ArmorPoint I/O system in the horizontal or vertical orientation.

ArmorPoint I/O with 1738-ADN12, -ADN18, -ADN18P, -ADNX, -ACNR, -AENT, -APB Mounting Dimensions



Related Documentation

Additional user documentation presents information according to the tasks you perform and the programming environment you use. Refer to the table below for information on 1738 ArmorPoint I/O products.

ArmorPoint I/O Related Publications*

| | Cat. No. | Description | Pub.No. |
|---------------------------------|---|--|---|
| General Information | | DeviceNet Media (Media, Sensors and Distributed I/O) Catalog Guide | 1485-CG001 |
| | | DeviceNet Adapter Quick Start | 1734-QS002 |
| | | ControlNet Media | AG-PA002 |
| | | EtherNet/IP Performance and Application Guide | ENET-AP001 |
| | | Industrial Automation Wiring and Grounding Guidelines | 1770-4.1 |
| | | Allen-Bradley Terminal Marking System Product Profile | 1492-1.18 |
| | | Literature Library | http://www.rockwellautomation.com/literature |
| Pinout Wiring Diagrams | 1738-IB2M12, -IB4EM8, -IB4M12, -IB8M12, -IB8M23, -IB8M8, -IV4M12, -OB2EPM12, -OB4EM12, -OB4EM8, -OB8EM8, -OV4EM12, -OB8EM12 | Pinout Guide for 1738 ArmorPoint Digital I/O Modules | 1738-WD001 |
| | 1738-IA2M12AC3, -IA2M12AC4, -OA2M12AC3, -OW2M12, -OW2M12AC | Pinout Guide for 1738 ArmorPoint AC and Relay Modules | 1738-WD002 |
| | 1738-232ASCM12, -485ASCM12, -IE2CM12, -IE2VM12, -IJM23, -IR2M12, -IT2IM12, -OE2CM12, -OE2VM12, -SSIM23, -VHSC24M23 | Pinout Guide for 1738 ArmorPoint Analog, Serial, Encoder/Counter Modules | 1738-WD003 |
| | 1738-ADN12, -ADN18, -ADN18P, -ADNX, -ACNR, -APB, -AENT, -EP24DC, -FPD | Pinout Guide for 1738 ArmorPoint Adapters and Power Supplies | 1738-WD004 |
| Communication Interfaces | 1738-ADN12 | ArmorPoint DeviceNet Adapter Module, Drop or Pass-through, with male and female M12 connectors | 1738-IN014 |
| | 1738-ADN18 | ArmorPoint DeviceNet Adapter Module, Drop only, with male M18 connector | |
| | 1738-ADN18P | ArmorPoint DeviceNet Adapter Module, Drop or Pass-through, with male and female M18 connectors | |
| | 1738-ADNX | ArmorPoint DeviceNet 24V dc Adapter Module with subnet expansion | |
| | 1738-ACNR | ArmorPoint Redundant ControlNet Adapter Module | 1738-IN016 |
| | 1738-AENT | ArmorPoint Ethernet/IP 10/100 Mbps Adapter Module | 1738-IN017 |
| | 1738-APB | ArmorPoint PROFIBUS Adapter Module | 1738-IN015 |
| AC | 1738-IA2M12AC3 | 120V ac 2 Input w/ 2 AC 3 pin M12 connections | 1738-IN006 |
| | 1738-IA2M12AC4 | 120V ac 2 Input w/ 2 AC 4 pin M12 connectors | 1738-IN006 |
| | 1738-OA2M12AC3 | 120/230V ac 2 Output w/ 2 AC 3 pin M12 connectors | 1738-IN007 |
| DC | 1738-IB2M12 | 24V dc 2 Sink Input w/ 2 M12 connectors | 1738-IN002 |
| | 1738-IB4M12 | 24V dc 4 Input w/ 4 M12 connectors | |
| | 1738-IB4M8 | 24V dc 4 Sink Input w/ 4 M8 connectors | |
| | 1738-IB8M12 | 24V dc 8 Sink Input w/ 4 M12 connectors, 2 points per connector | |
| | 1738-IB8M23 | 24V dc 8 Sink Input w/ 1 M23 connector | |
| | 1738-IB8M8 | 24V dc 8 Sink Input w/ 8 M8 connectors | |
| | 1738-OB2EM12 | 24V dc 2 Source Output w/ 2 M12 connectors | 1738-IN001 |
| | 1738-OB2EPM12 | 24V dc 2 Source Output - 2A Prot. w/ 2 M12 connectors | |
| | 1738-OB4EM12 | 24V dc 4 Source Output w/4 M12 | |
| | 1738-OB4EM8 | 24V dc 4 Source Output w/ 4 M8 connectors | |
| | 1738-OB8EM12 | 24V dc 8 Source Output w/ 8 M12 | |
| | 1738-OB8EM8 | 24V dc 8 Source Output w/ 8 M8 | |

* Contact your local A-B distributor for information on ordering any of the above publications. For electronic copies of these publications, go to: <http://www.rockwellautomation.com/literature>

ArmorPoint I/O Related Publications*

| | Cat. No. | Description | Pub.No. |
|---------------------------------|-----------------|--|----------------|
| Analog | 1738-IE2CM12 | 24V dc Analog Current Input w/ 2 M12 connectors | 1738-IN003 |
| | 1738-IE2VM12 | 24V dc 2 Analog Voltage Input w/ 2 M12 connectors | |
| | 1738-OE2CM12 | 24V dc Analog Current Output w/ 2 M12 connectors | 1738-IN004 |
| | 1738-OE2VM12 | 24V dc Analog Voltage Output w/ 2 M12 connectors | |
| | 1738-IR2M12 | 24V dc 2 RTD Input | 1738-IN005 |
| | 1738-IT2IM12 | 24V dc 2 Thermocouple Input | |
| Serial Interface Modules | 1738-232ASCM12 | ArmorPoint I/O RS-232 ASCII Serial Interface Module | 1738-IN009 |
| | 1738-485ASCM12 | ArmorPoint I/O RS-485 ASCII Serial Interface Module† | 1738-IN010 |
| | 1738-SSIM23 | ArmorPoint Synchronous Serial Interface Module with Absolute Encoder | 1738-IN013 |
| Counters | 1738-IJM23 | ArmorPoint 5V Encoder/Counter Module | 1738-IN012 |
| | 1738-VHSC24M23 | 24V dc Very High Speed Counter Module | 1738-IN011 |
| Power Units | 1738-FPD | ArmorPoint I/O Field Potential Distributor Module | 1738-IN019 |
| | 1738-EP24DC | 24V dc Expansion Power Supply | 1738-IN020 |

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