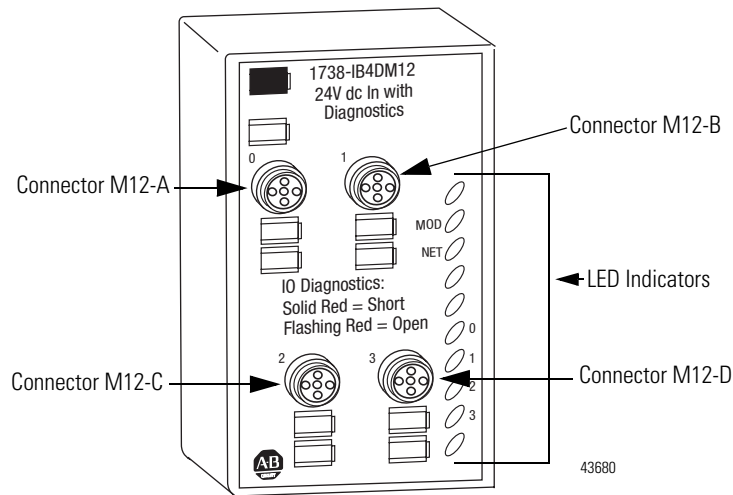




ArmorPoint 24V dc 4-channel Digital Input Module with Diagnostics

Catalog Number 1738-IB4DM12

The ArmorPoint™ I/O family consists of modular I/O modules. The sealed IP67 housing of these modules requires no enclosure. (Note that environmental requirements other than IP67 may require an additional appropriate housing.) I/O connectors are sealed M8 (pico), M12 (micro) or M23 styles. The mounting base ships with the module.



Important User Information

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





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

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

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

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

<p>WARNING</p> 	<p>Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.</p>
<p>IMPORTANT</p>	<p>Identifies information that is critical for successful application and understanding of the product.</p>
<p>ATTENTION</p> 	<p>Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you to identify a hazard, avoid a hazard, and recognize the consequences.</p>
<p>SHOCK HAZARD</p> 	<p>Labels may be located on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.</p>
<p>BURN HAZARD</p> 	<p>Labels may be located on or inside the equipment, for example, a drive or motor, to alert people that surfaces may be dangerous temperatures.</p>

ATTENTION**Environment and Enclosure**

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

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

This equipment is supplied as "enclosed" equipment. It should not require additional system enclosure when used in locations consistent with the enclosure type ratings stated in the Specifications section of this publication. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings, beyond what this product provides, that are required to comply with certain product safety certifications.

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

ATTENTION**Preventing Electrostatic Discharge**

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

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

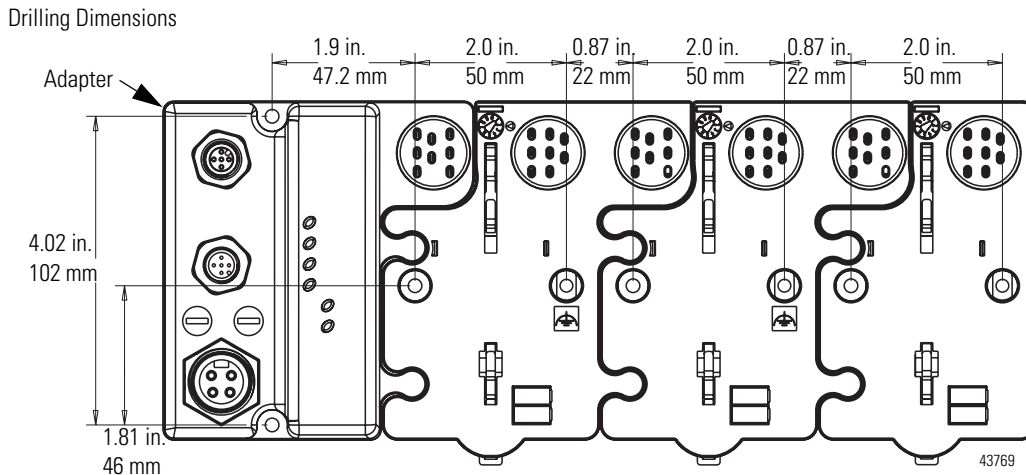
Mount the I/O Base

To mount the base on a wall or panel, use the screw holes provided in the base.

IMPORTANT

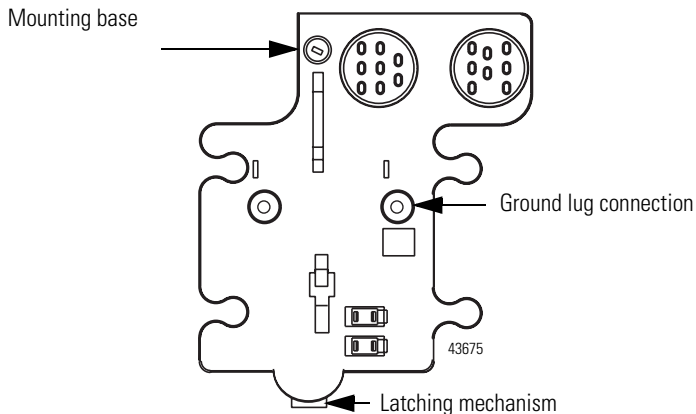
The module must be mounted on a grounded metal mounting plate or other conductive surface.

A drilling dimensions mounting illustration for the base with an adapter is shown below.



Install the mounting base as follows:

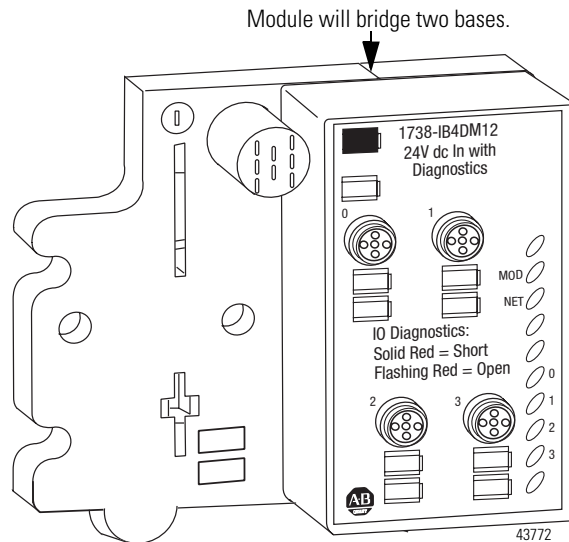
1. Lay out the required points as shown in the drilling dimension drawing.
2. Drill the necessary holes for #8 (M4) machine or self-tapping screws.
3. Mount the base using #8 (M4) screws.
4. Ground the system using the ground lug connection. (The ground lug connection is also a mounting hole.)



Install the Digital Input Module

To install the digital input module:

1. Using a bladed screwdriver, rotate the keyswitch on the mounting base clockwise until the number 1 aligns with the notch in the base.
2. Position the module vertically above the mounting base. The module will bridge two bases.



3. Push the module down until it engages the latching mechanism. You will hear a clicking sound when the module is properly engaged.

The locking mechanism will lock the module to the base.

Remove the Module From the Mounting Base

To remove the module from the mounting base:

1. Put a flat blade screwdriver into the slot of the orange latching mechanism.
2. Push the screwdriver toward the module to disengage the latch. The module will lift up off the base.
3. Pull the module off of the base.

Understand Short-circuit Detection

The sensor source voltage (SSV) for each input is protected against short circuits. For currents above 200 mA, a fault signal is issued and the input LED indicator is illuminated solid red. A thermally-actuated smart-power device or PTC is used as the protection means. On a per-input basis, the circuit and produced data automatically reset and SSV energizes upon removal of the short circuit. An individual fault signal is issued for each shorted SSV condition.

The shorted input LED indicator illuminates red to denote short-circuit fault status.

See the section on interpreting LED indicators for related information.

When the SSV is loaded to the maximum rated current of 50 mA, a voltage drop of as much as 2.5V dc can exist between the user auxiliary power and the SSV connection. For example, for a supply of 10V dc to a sensor with power derived from the SSV, a supply of 12.5V dc is needed at the auxiliary power connection.

Understand Open-wire Detection

Sensor source voltage (SSV) current for each input is monitored. Monitoring is accomplished in the SSV leg to accommodate the largest number of sensors possible. For currents below 0.5 mA, a fault signal is issued and the input's LED indicator blinks red. On a per-input basis, the circuit and produced data automatically reset upon removal of the open-wire condition. See the information about interpreting LED indicators for related information.

By using a configuration tool, you can disable the open-wire diagnostics on an input-point basis to keep unused input indicators from turning red and signaling a fault when an input is not in use. Enabling or disabling input-point level open-wire diagnostics is implemented via the module's EDS file, GSD file, or Logix profile and its firmware.

You can also disable all the open-wire diagnostics, using a single entry via the software user interface. The default configuration has all four input channels's open-wire indication enabled.

If a sensor with a dry contact output is used, wire one side of the contact to the SSV terminal for the corresponding input. Wire the other side of the contact to the input. Additionally, place a shunt resistor in parallel with the contact, at the sensor, to cause greater than 0.5 mA to be drawn through the SSV terminal at all times.

Wire the Module

Following are wiring instructions for the module.

ATTENTION

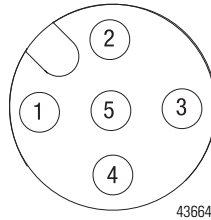


Make sure all connectors and caps are securely tightened to properly seal the connections against leaks and maintain IP enclosure type requirements.

To comply with the CE Low Voltage Directive (LVD), all connected I/O must be powered from a source compliant with the following:

- Safety Extra Low Voltage (SELV) or Protected Extra Low Voltage (PELV).

1738-IB4DM12



- (view into connector)
- Pin 1 - 24V dc (Sensor Source Voltage SSV)
 - Pin 2 - No Connect
 - Pin 3 - Common
 - Pin 4 - Input 0 (M12-A)
Input 1 (M12-B)
Input 2 (M12-C)
Input 3 (M12-D)
 - Pin 5 - No Connect

Communicate With Your Module

I/O messages are sent to (consumed) and received from (produced) the module. These messages are mapped into the processor's or scanner's memory. The module produces 1 or 2 bytes of input data (scanner Rx - status) based on which produced assembly is selected. The default setup is 2 bytes.

Default Data Map - Produced Assembly Instance 101

Message Size: 2 Bytes

	7	6	5	4	3	2	1	0
Produce 0 (Rx)	Fault 3	Fault 2	Fault 1	Fault 0	Input 3	Input 2	Input 1	Input 0
Produce 1 (Rx)	SC 3	SC 2	SC 1	SC 0	OW 3	OW 2	OW 1	OW 0
Consume (Tx)	No consumed data							

Where: OW = open wire, SC = short circuit, fault = open wire or short circuit.

Data Map - Produced Assembly Instance 23

Message Size: 1 Bytes								
	7	6	5	4	3	2	1	0
Produce 0 (Rx)	Fault 3	Fault 2	Fault 1	Fault 0	Input 3	Input 2	Input 1	Input 0
Consume (Tx)	No consumed data							

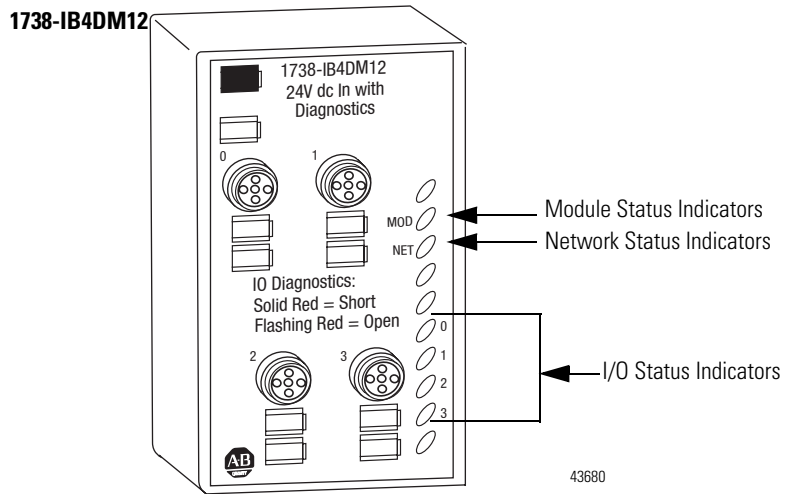
Where: Fault = open wire or short circuit.

Default Data Map - Configuration Assembly Instance 103

Message Size: 18 Bytes								
	7	6	5	4	3	2	1	0
Consume 0	Input 0 Off to On Filter Byte 0							
Consume 1	Input 0 Off to On Filter Byte 1							
Consume 2	Input 0 On to Off Filter Byte 0							
Consume 3	Input 0 On to Off Filter Byte 1							
Consume 4	Input 1 Off to On Filter Byte 0							
Consume 5	Input 1 Off to On Filter Byte 1							
Consume 6	Input 1 On to Off Filter Byte 0							
Consume 7	Input 1 On to Off Filter Byte 1							
Consume 8	Input 2 Off to On Filter Byte 0							
Consume 9	Input 2 Off to On Filter Byte 1							
Consume 10	Input 2 On to Off Filter Byte 0							
Consume 11	Input 2 On to Off Filter Byte 1							
Consume 12	Input 3 Off to On Filter Byte 0							
Consume 13	Input 3 Off to On Filter Byte 1							
Consume 14	Input 3 On to Off Filter Byte 0							
Consume 15	Input 3 On to Off Filter Byte 1							
Consume 16	Autobaud Disabled				Enable OW3	Enable OW3	Enable OW3	Enable OW3
Consume 17	Produced Assembly Instance							
Produce (Tx)	No produced data							

Where: OW = open wire.

Troubleshoot With the Indicators



Interpret LED Indicators

Indication	Probable Cause	Recommended Action
Module Status		
Off	No power applied to device	Apply power to device.
Green	Device operating normally	None.
Flashing Green	Device needs commissioning due to configuration missing, incomplete or incorrect.	Configure device properly.
Flashing Red	Recoverable fault	1. Cycle power to device. 2. If condition persists, replace device.
Red	Unrecoverable fault - may require device replacement	Replace device.
Flashing Red/Green	Device is in self-test	None.
Network Status		
Off	Device is not on line: - Device has not completed dup_MAC_ID test. - Device not powered - check module status indicator.	Apply power to device, wait for dup_MAC_id to complete, and correct, as needed.
Flashing Green	Device is on line but has no connections in the established state.	None - device is in Idle or Program mode.
Green	Device is on line and has connections in the established state.	None.
Flashing Red	One or more I/O connections in timed-out state.	Check for I/O module failure, and correct, as needed.

Indication	Probable Cause	Recommended Action
Red	Critical link failure - failed communication device. Device detected error that prevents it from communicating on the network.	Verify that adapter and terminal bases are properly installed, and reinstall, as needed.
Flashing Red/Green	Communication faulted device - the device has detected a network access error and is in communication faulted state. Device has received and accepted an Identity Communication Faulted Request - long protocol message.	Verify that adapter is properly installed, and reinstall, as needed.
I/O Status		
Off	Input is in the off state.	None.
Yellow	Input is in the on state.	None.
Red	Short circuit detected.	Check I/O wiring.
Flashing Red	Open wire detected.	Check I/O wiring.

Specifications

Following are specifications for the ArmorPoint 24V dc 4-channel Digital Input Module.

ArmorPoint 24V dc 4-channel Digital Input Module	
General Specifications	
Inputs	4 (1 group of 4) nonisolated, sinking
Voltage, Off-State Input, Maximum	5V dc
Voltage, On-State Input	
Maximum	28.8V dc
Minimum	11V dc
Nominal	24V dc
Current, Off-State Input, Maximum	1.5 mA
Current, On-State Input	
Maximum	15 mA
Minimum	2 mA
Nominal	3 mA @ 24V dc
Input Delay Time OFF to ON	0-65535 us selectable ⁽³⁾ in 1 us intervals (rounded to nearest 333 us) Default is 1000 us.
Input Delay Time, ON to OFF	0-65535 us selectable ⁽⁴⁾ in 1 us intervals (rounded to nearest 333 us) Default is 1000 us.
Field Power Bus Supply	
Voltage Range	10-28.8V dc
Nominal	24V dc
Keyswitch Position	1
Reverse Polarity Protection	Yes
LED Indicators	1 green/red network status, logic side 1 green/red module status, logic side 4 yellow/red input status, logic side
PointBus Current, Maximum	50 mA @ 5V dc
Power Dissipation, Maximum	0.6W max @ 28.8V dc
Thermal Dissipation, Maximum	1.9BTU/hr max @ 28.8V dc
Isolation Voltage (continuous-voltage withstand rating)	50V (continuous), Reinforced Insulation Type Tested at 1000V dc for 60s, field-side to system
Dimensions	
Imperial	4.72H x 2.83W x 1.65D (Includes I/O module and mounting base)
Metric	120H x 72W x 42D (Includes I/O module and mounting base)
Enclosure Type Rating	Meets IP65/66/67/69k (when marked)
Mounting Base Screw Torque	#8 screw, 7.5 in. lbs. in Aluminum, 16 in. lbs. in Steel
Weight	
Imperial	0.64 lb.
Metric	0.29 kg
Wiring Category ⁽¹⁾	1 - on signal ports

ArmorPoint 24V dc 4-channel Digital Input Module**Environmental Specifications**

Operating Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -20 to 60°C (-4 to 140°F)
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), -40 to 85°C (-40 to 185°F)
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Damp Heat): 5-95% non-condensing
Shock	IEC60068-2-27 (Test Ea, Unpackaged Shock): Operating 30g Non-operating 50g
Vibration	IEC60068-2-6 (Test Fc, Operating): 5g @ 10-500Hz
ESD Immunity	IEC 61000-4-2: 6kV contact discharges 8kV air discharges
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 30MHz to 2000MHz 10V/m with 200Hz 50% Pulse 100%AM at 900Mhz 10V/m with 200Hz 50% Pulse 100%AM at 1890Mhz 1V/m with 1 kHz sine-wave 80%AM from 2000 to 2700Mhz
EFT/B Immunity	IEC 61000-4-4: ±3kV at 5kHz on signal ports
Surge Transient Immunity	IEC 61000-4-5: ±1kV line-line(DM) and ±2kV line-earth(CM) on signal ports
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz
Emissions	CSPR 11: Group 1, Class A

ArmorPoint 24V dc 4-channel Digital Input Module

Environmental Specifications (continued)

Certifications

Certifications: ⁽²⁾ (when product is marked)	<table border="0"> <tr> <td data-bbox="727 352 808 667">CE</td> <td data-bbox="808 352 1489 667"> European Union 89/336/EEC EMC Directive, compliant with: EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) </td> </tr> <tr> <td data-bbox="727 598 808 667">C-Tick</td> <td data-bbox="808 598 1489 667"> Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions </td> </tr> </table>	CE	European Union 89/336/EEC EMC Directive, compliant with: EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)	C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions
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C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions				

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

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

⁽³⁾ Input OFF to ON or ON to OFF delay is time from a valid input signal to recognition by the module.

⁽⁴⁾ Input OFF to ON or ON to OFF delay is time from a valid input signal to recognition by the module.

Rockwell Automation Support

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

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

Installation Assistance

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

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

New Product Satisfaction Return

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

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

www.rockwellautomation.com

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