Installation Instructions

ArmorPoint 4-Channel 24V dc Analog Input Module, Series A

Catalog Number 1738-IE4CM12

ALLEN-BRADLEY • ROCKWELL SOFTWARE

**Rockwell
Automation**

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.

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

Environment and Enclosure

ATTENTION

⚠️

This equipment is intended for use in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 2000 meters (6562 ft) 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.

In addition to this publication, see:
- Industrial Automation Wiring and Grounding Guidelines, Allen-Bradley publication 1770-4.1, for additional installation requirements.
- NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure

Prevent Electrostatic Discharge

ATTENTION

⚠️

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.
- Use a static-safe workstation, if available.
- Store the equipment in appropriate static-safe packaging when not in use.

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

ATTENTION ⚠	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).

About the Module

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 M12 style. The mounting base ships with the module. The 1738-IE4CM12 module is shown below.
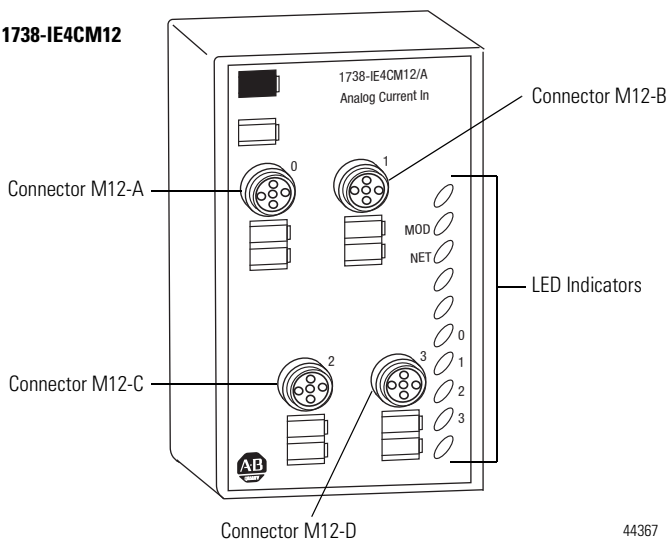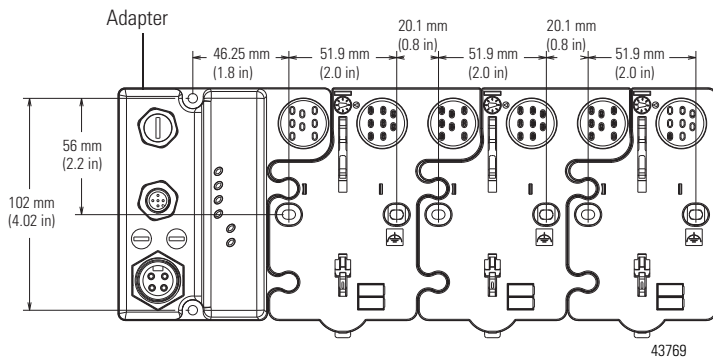

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Mount the I/O Base

Mount the I/O base on a wall or panel, using the screw holes provided in the base.

IMPORTANT	The ArmorPoint I/O module must be mounted on a grounded metal mounting plate or other conductive surface.

Mounting illustration for the ArmorPoint adapter with I/O bases


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Follow the instructions to install the mounting base.

1. Lay out the required points as shown above in the drilling dimension drawing.

2. Drill the necessary holes for M4 (#8) machine or self-tapping screws.

3. Mount the base using M4 (#8) screws.

4. Ground the system using the ground lug connection.

   The ground lug connection is also a mounting hole.

Mounting base

Set the keyswitch position to 3, for the 1738 analog input modules


Ground lug connection

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Latching mechanism
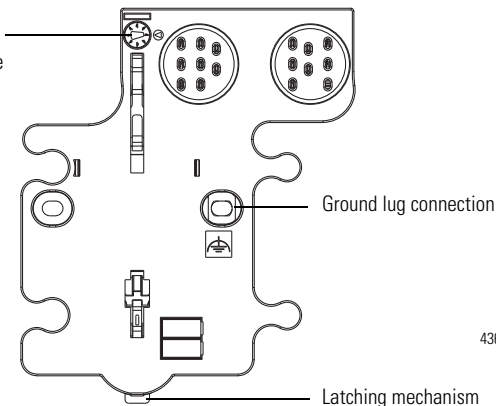
Install the Module

Follow the instructions to install the analog input module.

1. Using a bladed screwdriver, rotate the keyswitch on the mounting base clockwise until the number 3 aligns with the notch in the base.

2. Position the module vertically above the mounting base.

   The module bridges two bases.

Module bridges two bases.

1738-IE4CM12/A
Analog Current In

MOD
NET

0
1
2
3

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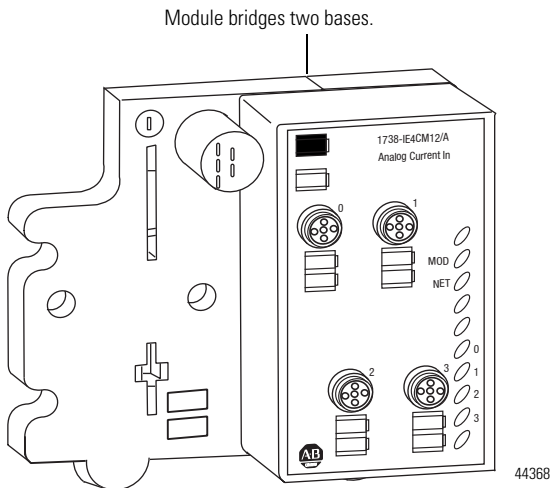
3. Push the module down until it engages the latching mechanism.

You will hear a clicking sound when the module is properly engaged.

The locking mechanism locks the module to the base.

Remove the Module From the Mounting Base

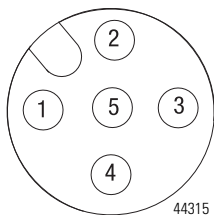Follow the instructions to remove the module from the mounting base.

1. Put a flat blade screwdriver into the slot of the orange latching mechanism.

2. Push the screwdriver toward the I/O module to disengage the latch.

The module lifts up off the base.

3. Pull the module off of the base.

Wire the Module

1738-IE4CM12

(view into connector)
Pin 1 - 24V dc
Pin 2 - Input
Pin 3 - Common
Pin 4 - Common
Pin 5 - No Connect

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IMPORTANT	Analog modules have earth grounded metal rings. This should be considered when choosing shielded cables and grounding techniques.

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

Communicate with Your Module

I/O messages are sent to (consumed) and received from (produced) the ArmorPoint I/O modules. These messages are mapped into the processor's memory. These ArmorPoint I/O analog input modules produce 12 bytes of input data (scanner Rx) and fault status data. They do not consume I/O data (scanner Tx).

Default Data Map for the Module

1738-IE4CM12

Message size: 12 Bytes

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Produces (Scanner Rx)	Input Channel 0 High Byte								Input Channel 0 Low Byte							
	Input Channel 1 High Byte								Input Channel 1 Low Byte							
	Input Channel 2 High Byte								Input Channel 2 Low Byte							
	Input Channel 3 High Byte								Input Channel 3 Low Byte							
	Status Byte for Channel 1								Status Byte for Channel 0							
	OR	UR	HHA	LLA	HA	LA	CM	CF	OR	UR	HHA	LLA	HA	LA	CM	CF
	Status Byte for Channel 3								Status Byte for Channel 2							
	OR	UR	HHA	LLA	HA	LA	CM	CF	OR	UR	HHA	LLA	HA	LA	CM	CF
Consumes (scanner Tx)	No consumed data															

Where:

CF = Channel Fault Status, 0 = no error, 1 = fault
CM = Calibration Mode; 0 = normal, 1 = calibration mode
LA = Low Alarm; 0 = no error, 1 = fault
HA = High Alarm; 0 = no error, 1 = fault
LLA = Low/Low Alarm; 0 = no error, 1 = fault
HHA = High/High Alarm; 0 = no error, 1 = fault
UR = Underrange; 0 = no error; 1 = fault
OR = Overrange; 0 = no error; 1 = fault

Interpret the Status Indicators
1738-IE4CM12

- Module Status Indicator
- Network Status Indicator
- I/O Status Indicators
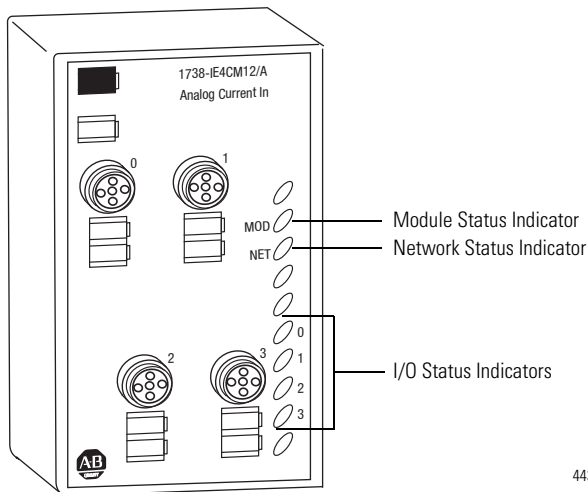
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Status Indicators

Indicator	State	Description
Module Status	Off	No power applied to device.
	Green	Device operating normally.
	Flashing green	Device needs commissioning due to missing, incomplete, or incorrect configuration.
	Flashing red	Recoverable fault.
	Red	Unrecoverable fault - may require device replacement.
	Flashing red/green	Device is in self-test.

Status Indicators (Continued)

Indicator	State	Description
Network Status	Off	Device is not on line: - Device has not completed dup_MAC-id test. - Device not powered.Check module status indicator.
	Flashing green	Device is on line but has no connections in the established state.
	Green	Device is on line and has connections in the established state.
	Flashing red	One or more I/O connections in timed-out state.
	Red	Critical link failure - failed communication device. Device detected error that prevents it from communicating on the network.
	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.
I/O Status	Off	Module in CAL mode.
	Solid green	Normal (channel scanning inputs).
	Flashing green	Channel being calibrated.
	Solid red	No power or major channel fault.
	Flashing red	Channel at end of range (over or under).

Specifications

IMPORTANT	Note that the input step response and input update rate for 1738-IE4CM12 differ from those of catalog number 1738-IE2CM12.

General

Attribute	Value
Number of inputs	4
Input point density	4 single-ended, non-isolated
Input current signal range	4…20 mA 0…20 mA
Absolute accuracy[1]	0.1% Full Scale @ 25°C
Accuracy drift w/temp., current input	30 ppm/°C
Digital filter time constant	0…10,000 ms (default = 0 ms)
Input common mode rejection ratio	120 dB
Input conversion type	Sigma Delta
Input impedance	60 Ω
Input normal mode rejection ratio	-60 dB Notch filter 15.7 Hz @ Notch = 60 Hz (default) 13.1 Hz @ Notch = 50 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 = 480 Hz
Input resistance	60 Ω
Input resolution, bits	16 bits - over 0…21 mA; 0.32 μA/cnt

General (Continued)

Attribute	Value
Input step response (per channel)	50 ms @ Notch = 60 Hz (default) 60 ms @ Notch = 50 Hz 30 ms @ Notch = 100 Hz 25 ms @ Notch = 120 Hz 15 ms @ Notch = 200 Hz 12.5 ms @ Notch = 240 Hz 10 ms @ Notch = 300 Hz 7.5 ms @ Notch = 400 Hz 6.25 ms @ Notch = 480 Hz
Input update rate (per module)	200 ms @ Notch = 60 Hz (default) 240 ms @ Notch = 50 Hz 120 ms @ Notch = 100 Hz 100 ms @ Notch = 120 Hz 60 ms @ Notch = 200 Hz 50 ms @ Notch = 240 Hz 40 ms @ Notch = 300 Hz 30 ms @ Notch = 400 Hz 25 ms @ Notch = 480 Hz
Input data format	Signed integer
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
Overvoltage protection, input	Fault protected to 28.8V dc
PointBus current	75 mA @ 5V dc
Power dissipation, max.	0.6 W @ 28.8V dc
Thermal dissipation, max.	2.0 BTU/hr @ 28.8V dc
Calibration	Factory calibrated
Keyswitch position	3

General (Continued)

Attribute	Value
Indicators	1 green/red module status indicator, logic side 1 green/red network status indicator, logic side 4 green/red input status indicators, logic side
Isolation voltage	50V (continuous), Reinforced Insulation Type, field-side to system Type tested at 1250V ac for 60 s, field-side to system No isolation between individual channels
Dimensions (HxWxD), approx.	71.6 x 33.1 x 111.6 mm (2.82 x1.30 x 4.39 in.)
Enclosure type rating	Meets IP65/66/67/69K (when marked)
Mounting base screw torque	M4 (#8) screw 0.85 Nm (7.5 lb-in) in Aluminum 1.81 Nm (16 lb-in) in Steel
Wiring category[2]	2 - on signal ports
Weight, approx.	290 g (10.2 oz)

[1] Includes offset, gain, non-linearity and repeatability error terms.

[2] Use this Conductor Category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Environmental

Attribute	Value
Temperature, operating	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…60 °C (-4…140 °F)
Temperature, nonoperating	IEC 60068-2-1 (Test Ab, Unpackaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Non-operating Dry Heat): -40…85 °C (-40…185 °F)
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5…95% non-condensing
Vibration	IEC 60068-2-6 (Test Fc, Operating): 5g @ 10…500 Hz

Environmental (Continued)

Attribute	Value
Shock, operating	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 30g
Shock, nonoperating	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 50g
Emissions	CISPR 11: Group 1, Class A
ESD immunity	IEC 61000-4-2: 6 kV contact discharges 8 kV air discharges
Radiated RF immunity	IEC 61000-4-3: 10V/m with 1 kHz sine-wave 80%AM from 80…2000 MHz 10V/m with 200 Hz 50% Pulse 100%AM at 900 MHz 10V/m with 200 Hz 50% Pulse 100%AM at 1890 MHz 3V/m with 1 kHz sine-wave 80%AM from 2000…2700 MHz
EFT/B immunity	IEC 61000-4-4: ±3 kV at 5 kHz on signal ports
Surge transient immunity	IEC 61000-4-5: ±1 kV line-line (DM) on signal ports ±2 kV line-earth (CM) on signal ports
Conducted RF immunity	IEC 61000-4-6: 10V rms with 1 kHz sine-wave 80%AM from 150 kHz…80 MHz

Certifications

Certification (when product is marked)[1]	Value

CE	European Union 2004/108/EC EMC Directive, compliant with:
	   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 CISPR11; Industrial Emissions

[1]   See the Product Certification link at http://www.ab.com for Declaration of Conformity, Certificates, and other certification details.

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 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 product up and running.

United States	1.440.646.3434 Monday – Friday, 8 a.m. – 5 p.m. EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

New Product Satisfaction Return

Rockwell Automation 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, follow these procedures.

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 the return procedure.