

ArmorPOINT™ 24V DC Analog Output Modules

Catalog numbers 1738-OE2CM12, 1738-OE2VM12, Series A

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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://www.rockwellautomation.com/literature/>) 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.
	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.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Environment and Enclosure



ATTENTION: This equipment is intended for use in overvoltage Category II applications (as defined in IEC 60664-1), at altitudes up to 2000 m (6562 ft) without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR 11. Without appropriate precautions, there may be difficulties with electromagnetic compatibility in residential and other environments due to conducted and radiated disturbances.

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, Rockwell Automation publication [1770-4.1](#), for additional installation requirements.
- NEMA Standard 250 and IEC 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.

Prevent Electrostatic Discharge

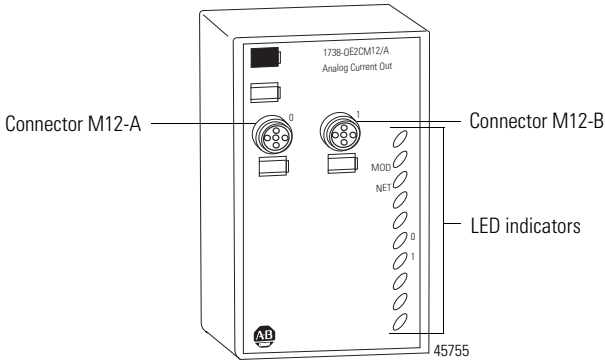


ATTENTION: This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- 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.
-

About the Modules

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-OE2CM12 module is shown here.



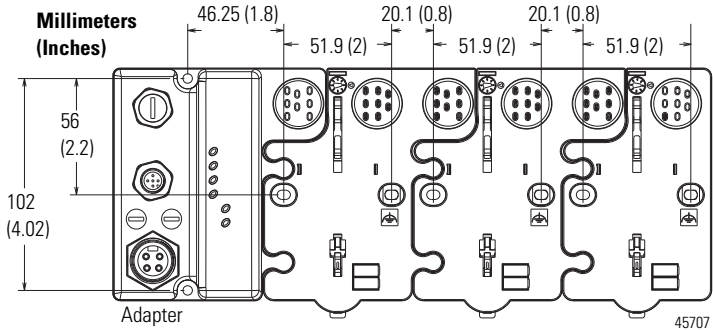
Mount the I/O Base

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



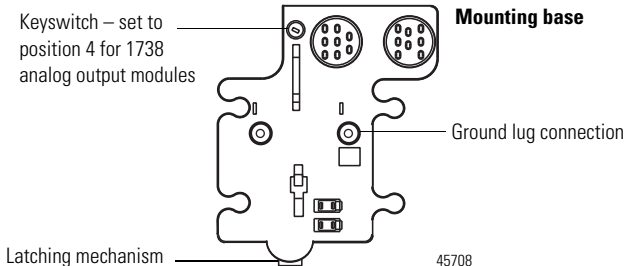
ATTENTION: The ArmorPOINT I/O module must be mounted on a grounded metal mounting plate or other conductive surface.

A mounting diagram for the ArmorPOINT base with adapter is shown here.



Install the mounting base as follows:

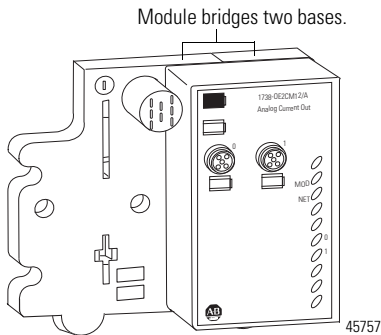
1. Lay out the required points as shown above in the drilling dimension diagram.
2. Drill the necessary holes for M4 (#8) machine or self-tapping screws.
3. Mount the base using M4 (#8) screws.
4. Ground the system using the ground lug connection. The ground lug connection is also a mounting hole.



Install the Module

To install the analog output module, proceed as follows:

1. Using a bladed screwdriver, rotate the keyswitch on the mounting base clockwise until the number 4 aligns with the notch in the base.
2. Position the module vertically above the mounting base. The module bridges two bases.



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

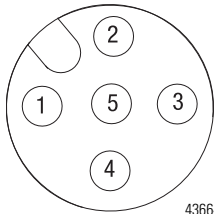
To remove the module from the mounting base:

1. Insert 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 the base.

Wire the Modules

The wiring instructions for the modules are shown here.

1738-OE2CM12, 1738-OE2VM12



(View into connector)

Pin 1 Output 0 (M12-A)

Output 1 (M12-B)

Pin 2 24V DC

Pin 3 Common

Pin 4 Common

Pin 5 No connect

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 the Module

I/O messages are sent to (consumed) and received from (produced) the ArmorPOINT modules. These messages are mapped onto the processor's memory. The ArmorPOINT analog output modules produce 2 Bytes of input data (scanner Rx – fault status). They consume 4 Bytes of output data (scanner Tx).

Default Data Map for Output Modules

Message size: 2 Bytes

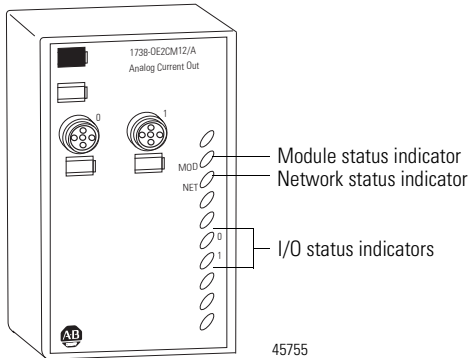
	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Produces (Scanner Rx)	High byte – channel 1 status								Low byte – channel 0 status							
	Not used				HCA	LCA	CM	CF	Not used				HCA	LCA	CM	CF
Where:	HCA = High Clamp Alarm; 0 = No error, 1 = Fault LCA = Low Clamp Alarm; 0 = No error, 1 = Fault CM = Calibration Mode; 0 = Normal, 1 = Calibration mode CF = Channel Fault Status; 0 = No error, 1 = Fault															

Message size: 4 Bytes

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Consumes (Scanner Tx)	Output channel 0 high byte								Output channel 0 low byte							
	Output channel 1 high byte								Output channel 1 low byte							

Interpret Status Indicators

1738-0E2CM12



Indicator Status for Modules

	Status	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.
Network status	Off	Device is not online: - Device has not completed dup_MAC-id test. - Device not powered – check module status indicator.
	Flashing green	Device is online but has no connections in the established state.
	Green	Device is online and has connections in the established state.
	Flashing red	One or more I/O connections is 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.

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Indicator Status for Modules

	Status	Description
I/O status	Off	Module in CAL mode.
	Solid green	Device operating normally.
	Flashing green	Channel being calibrated.
	Flashing red	1738-0E2VM12 – Low or high clamp. 1738-0E2CM12 – Open wire or no power.
	Solid red	1738-0E2VM12 only – No power.

Specifications

ArmorPOINT 24V DC Analog Output Modules – 1738-OE2CM12, 1738-OE2VM12

Attribute	Value
Outputs per module	2 single-ended, nonisolated
Output voltage	1738-OE2V 0V output until communication established 0...10V (user-configurable; 0V under, 5V over) 10V (user-configurable; -0.5V under, 5V over)
Output current	0 mA output until communication established 4...20 mA user configurable 0...20 mA user configurable
Resolution	1738-OE2C 13 bits – over 0...21 mA 2.5 $\mu\text{A}/\text{cnt}$ (average value – typical range: 2.3...2.7 $\mu\text{A}/\text{cnt}$) 1738-OE2V 14 bits (13 plus sign) 1.28 $\mu\text{V}/\text{cnt}$ in unipolar or bipolar mode
Absolute accuracy ⁽¹⁾	0.1% full scale @ 25 °C
Accuracy drift w/temp	1738-OE2C – 30 ppm/°C 1738-OE2V – 5 ppm/°C
Resistive load on mA output	1738-OE2C – 0...750 Ω
Current load on output, max	1738-OE2V – 3 mA
Conversion type	Digital-to-analog converter
Conversion rate	1738-OE2C – 16 μs 1738-OE2V – 20 μs
Data format	Signed integer

⁽¹⁾ Includes offset, gain, non-linearity and repeatability error terms

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General Specifications

Attribute	Value
Calibration	Factory-calibrated
Mounting base screw torque	#8 screw 0.85 Nm (7.5 lb-in.) in aluminum 1.8 Nm (16 lb-in.) in steel
Indicators	1 green/red – module status indicator, logic side 1 green/red – network status indicator, logic side 2 green/red – output status indicators, logic side
Power dissipation, max @ 28.8V DC	1738-0E2C 750 Ω load on each output – 1.23 W 0 Ω load on each output – 1.83 W 1738-0E2V 1.0 W
Thermal dissipation, max @ 28.8V DC	1738-0E2C 750 Ω load on each output – 4.19 BTU/hr 0 Ω load on each output – 6.24 BTU/hr 1738-0E2V 3.4 BTU/hr
Isolation voltage	50V rms Tested @ 1250V AC rms for 60 s
POINTBus current	75 mA @ 5V DC
External DC power supply voltage, nom	24V DC
External DC power voltage range	10...28.8V DC
External DC power supply current	1738-0E2C 70 mA @ 24V DC (including outputs @ 20 mA) 1738-0E2V 35 mA @ 24V DC (including outputs @ 3 mA)
Dimensions, HxWxD	31.75 x 66.80 x 107.95 mm (1.25 x 2.63 x 4.25 in.)
Weight	0.289 kg (0.637 lb)
Wiring category ⁽¹⁾	1 – on signal ports
Keyswitch position	4
Step Response to 63% of FS	24 μ s

⁽¹⁾ Use this conductor category information for planning conductor routing. Refer to publication [1770-4.1](#), Industrial Automation Wiring and Grounding Guidelines.

Environmental Specifications

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 Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock): -40...85 °C (-40...185 °F)
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Nonoperating Damp Heat): 5...95% noncondensing
Vibration	IEC60068-2-6 (Test Fc, Operating): 5 g @ 10...500 Hz
Shock, operating	IEC60068-2-27 (Test Ea, Unpackaged Shock): 30 g
Shock, nonoperating	IEC60068-2-27 (Test Ea, Unpackaged Shock): 50 g
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 @ 80 MHz...2000 MHz 10V/m with 200 Hz 50% pulse 100% AM @ 900 Mhz 10V/m with 200 Hz 50% pulse 100% AM @ 1890 Mhz
EFT/B immunity	IEC 61000-4-4: ±3 kV @ 5 kHz on signal ports
Surge transient immunity	IEC 61000-4-5: ±2 kV line-earth (CM) on shielded ports
Conducted RF immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80% AM @ 150 kHz...80 MHz
Emissions	CSPR 11: Group 1, Class A
Enclosure type rating	Meets IP65/66/67 (when marked)

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Certifications

Certification (when product is marked)⁽¹⁾	Value
CE	European Union 89/336/EEC EMC Directive, compliant with: EN 50081-2; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions

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

Notes:

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At <http://www.rockwellautomation.com/support/>, 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://www.rockwellautomation.com/support/>.

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 or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/support/americas/phone_en.html , or contact your local Rockwell Automation representative.

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 (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete this form, publication [RA-DU002](#), available at <http://www.rockwellautomation.com/literature/>.

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