

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
RSLogix™ 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 RSLogix 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
	1 Select a communication interface Choose the interface module for your operating system.	NetLinx™ architecture 6 Selecting a network 7 Selecting the DeviceNet communication interface 8
	2 Select I/O devices based on field devices <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 	Digital I/O modules 12 Analog, thermocouple, and RTD I/O modules 15 Specialty I/O modules 20 Counter I/O modules 23
	3 Select optional power components Choose optional components to extend backplane power or change the field power distribution source.	Field power distributor 26 Expansion power unit 27 Typical configurations 29
	4 Select optional accessories Choose expansion cable units, if necessary.	Accessories, Cables, and Cordsets 30
	5 Determine mounting requirement Determine necessary dimensions based on the communication interface chosen.	Placing ArmorPoint I/O modules 33 Mounting the ArmorPoint I/O system 35

Step 1 - Select:

- a communication interface module

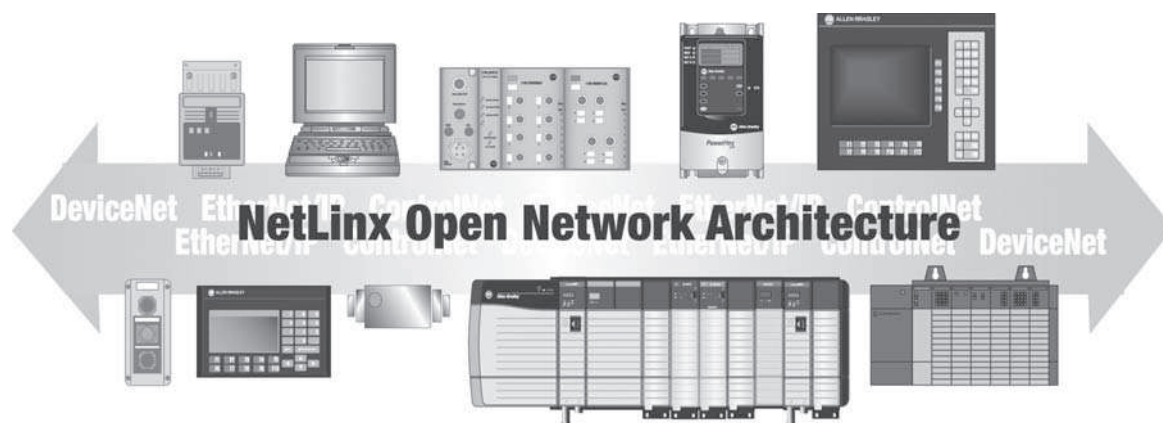
Selecting ArmorPoint I/O Communication Interfaces

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

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

AarmorPoint 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.

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).

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.

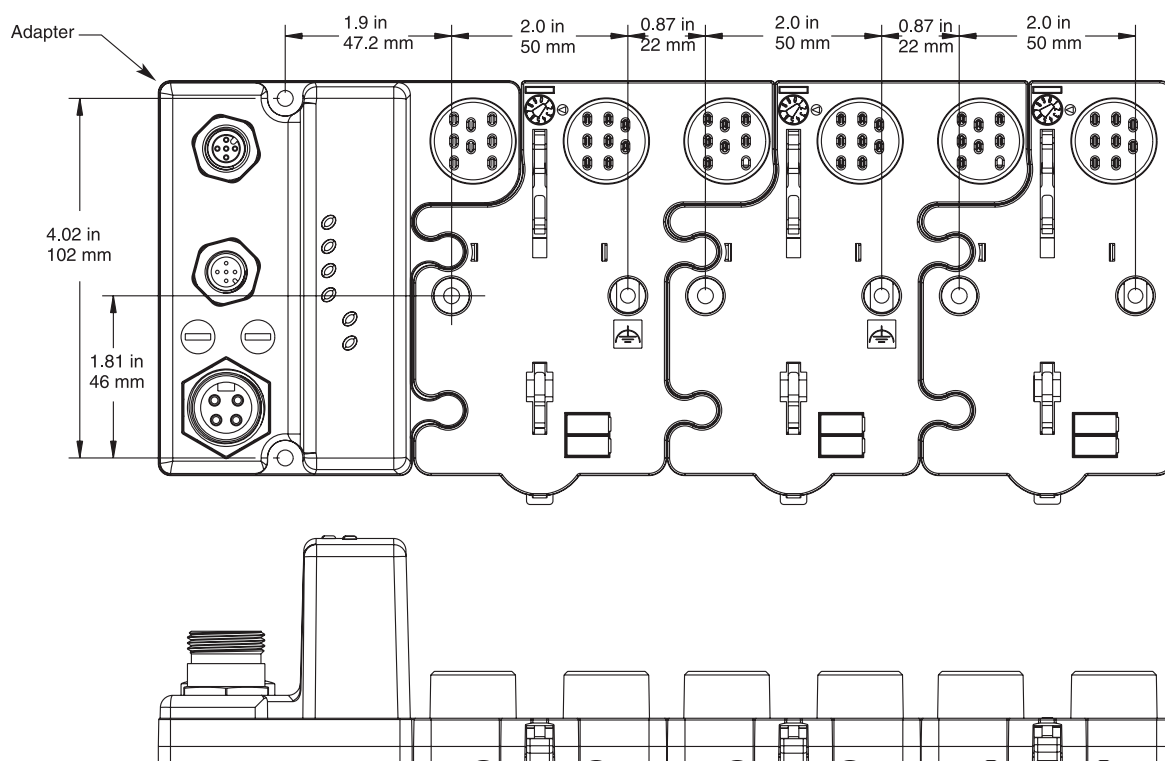
POINTBus Current Requirements

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	160 mA
1738-IJM23	
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 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>