ROCKWELL AUTOMATION PROCUREMENT SPECIFICATION

**PROCUREMENT SPECIFICATION**

**5094 FLEX 5000™ I/O Modules with EtherNet/IP**™ **Architecture**

**Note:** Procurement Specification for CompactLogix™ 5380 Programmable Automation Controllers (PAC) is Publication 5069-SR001B-EN-P. Procurement Specification for ControlLogix® 5580 Plant-Wide Programmable Automation Controllers (PAC) is Publication 1756-SR002A-EN-P.

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**I/O MODULES WITH ETHERNET/IP ARCHITECTURE**

# PART 1 GENERAL

## 1.01 SUMMARY

A. The I/O modules with EtherNet/IP™ architecture shall be integral to a programmable automation controller (PAC) system, which shall meet the specified criteria for control of process equipment, machinery, and systems.

## 1.02 RELATED DOCUMENTS

1. Drawings and general provisions of the contract apply to this section.
2. The following sections contain requirements that relate to this section:
	1. Section 40 90 00 – Process Control System General Requirements
	2. Section 40 95 13 – Process Control Panels and Hardware
	3. Section 01 33 00 – Submittal Procedures
	4. Section \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## 1.03 REFERENCES

1. The I/O modules shall be listed or recognized by the following registrations:
	1. cULus Listed
		1. Industrial Control Equipment, File E334470
		2. Class I, Division 2, Groups A, B, C, and D Hazardous Locations, File E334470
	2. CE marked
		1. 2004/108/EC EMC Directive, compliant with:
			1. EN 61326-1; Meas./Control/Lab., Industrial Requirements
			2. EN 61000-6-2; Industrial Immunity
			3. EN 61000-6-4; Industrial Emissions
			4. EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)
		2. 2006/95/EC LVD, compliant with:
			1. EN 61010-2-201; Control Equipment Safety Requirements
	3. RCM marked, compliant with EN 61000-6-4, Industrial Emissions
	4. Ex marked, 2014/30/EU ATEX Directive, and IECEx System compliant with:
		1. EN/IEC 60079-15; Potentially Explosive Atmospheres, Protection “n”
		2. EN/IEC 60079-0; General Requirements
		3. II 3 G Ex nA IIC T4 Gc
		4. DEMKO17 ATEX 1922X and IECEx UL 17.0066X when used at or below 125V AC
		5. KC marked, compliant with Article 58-2 of Radio Waves Act, Clause 3
2. The I/O modules shall meet Institute of Electrical and Electronics Engineers, Inc. (IEEE) applicable standards.
3. The I/O modules shall be ODVA conformance tested to EtherNet/IP™ specifications.

## 1.04 SUBMITTALS

1. As specified in Section 01 33 00.
2. The supplier shall provide product data for the programmable automation controller (PAC) and any component equipment, including:
	1. Programmable automation controller (PAC) information
		1. Memory
		2. Input/output (I/O) capacity
		3. Nonvolatile program and data retention
	2. I/O modules information
		1. Type and rating
		2. Standard wiring diagram
	3. Bill of materials for supplied equipment
	4. Spare parts list

## 1.05 QUALITY ASSURANCE

1. The supplier shall provide programmable automation controller (PAC) system components by a single manufacturer:
	1. Only communication modules for communication or network media functions that are not provided by the programmable automation controller (PAC) manufacturer may be produced by third-party sources.
	2. Only programmable automation controller (PAC) manufacturer-approved hardware, including cables, mounting hardware, connectors, enclosures, racks, communication cables, splitters, terminators, taps, and removable media, may be used.
2. All programmable automation controller (PAC) system components shall be new, free from anomalies, and produced by manufacturers regularly engaged in the manufacture of these products.

1.06 DELIVERY, STORAGE, AND HANDLING

1. The supplier shall deliver programmable automation controller (PAC) components in packaging designed to help prevent damage from static electricity and physical damage.
2. The supplier shall store the equipment according to manufacturer requirements and in a clean and dry space at an ambient temperature range of -40…+85°C (-40…+185°F).
3. The supplier shall help protect the units from exposure to dirt, water, fumes, corrosive substances, and physical damage.

## 1.07 WARRANTY

1. The manufacturer shall provide their standard parts warranty for eighteen (18) months from the date of shipment or twelve (12) months from the date of being energized, whichever occurs first.
2. This warranty applies to programmable automation controllers (PACs) and components.

## 1.08 MAINTENANCE

1. As specified in Section 40 61 00.
2. Provisions shall meet the following installed-spare requirements:
	1. I/O points – 25 percent spare I/O capacity for each type of I/O signal at every programmable automation controller (PAC) and remote I/O location. All spare I/O signal shall be wired to the I/O terminal blocks directly.
	2. Programmable automation controller (PAC) backplane – the greater of:
		1. 25 percent spare capacity, or
		2. Three spare backplane slots.
	3. Programmable automation controller (PAC) memory – 50 percent spare program volatile memory.

# PART 2 PRODUCTS

## 2.01 MANUFACTURERS

A. Allen-Bradley® – 5094 FLEX 5000™ I/O Modules with EtherNet/IP™ Architecture (No substitutions)

## 2.02 CONSTRUCTION

1. The I/O modules shall be part of a modular programmable automation controller (PAC) system with expansion and modification capability. The available expansion shall be distributed (remote) I/O connected through a network. The remote system shall include:
	1. A DIN rail mounted EtherNet/IP adapter with CPU, memory and embedded Ethernet ports.
	2. The system shall support up to 16 local expansion I/O modules from its family of modules with EtherNet/IP architecture and high-speed backplane.
	3. Power shall begin at the adapter and pass across the local I/O module internal circuitry via power buses.
	4. The manufacturer shall have various I/O modules available, including digital input, digital output, isolated relay output, analog input (including universal and HART), analog output, safety, high-speed counter, and Serial with Modbus RTU/ ASCII.
	5. The supplier shall configure each expansion module to the optimum requested packet interval (RPI) for the application.
	6. Each I/O module shall have, at a minimum, a light-emitting diode (LED) indicator to provide module status, with or without adapter connection.
	7. An end cap.
	8. I/O modules with EtherNet/IP architecture.
2. All system modules shall be designed to operate in:
	1. An industrial environment with an ambient temperature of -40…+70°C (-40…+158°F) and with a relative humidity range of 5…95%, noncondensing.
	2. A free airflow environment (convection cooling only, no fans or other air moving devices shall be required).
3. All system modules shall be designed and tested to operate in high electrical noise environments.
4. The I/O module bases shall have interlocking side pieces and DIN rail latches.
5. The system shall be capable of inherently supporting unused slots for future addition of I/O modules.
6. All I/O modules shall support removal insertion under power (RIUP) to facilitate replacement of failed modules in the future.

## 2.03 AVAILABLE I/O MODULES

1. Digital I/O modules shall include:
	1. 10...32V DC 16-point, sinking input module
	2. 10...32V DC 32-point, sinking input module
	3. 18...32V DC 8-point, high current sourcing output module
	4. 18...32V DC 16-point, sourcing output module
	5. 18...32V DC 32-point, sourcing output module
	6. 5...240V AC, 5…125V DC 8-point, isolated N.O. relay output module
2. AC I/O modules shall include:
3. 74…132V AC 16-point, AC input module
4. 159…264V AC 8-point, AC input module
5. 85…264V AC 16-point, AC output module
6. Analog I/O modules shall include:
	1. 8-channel – configurable current/voltage/RTD/thermocouple/millivolt input
	2. 8-channel – current/voltage input
	3. 8-channel – current/voltage isolated HART capable input with digital input mode
	4. 8-channel – current/voltage output
	5. 8-channel – current/voltage isolated HART capable output
7. The high-speed counter module shall support:
8. 2-quadrature (ABZ) differential inputs
9. 4-point 18…32V DC sourcing output
10. Safety
11. 10...32V DC 16-point, sinking input module
12. 18...32V DC 16-point, sourcing output module
13. 125/240V AC, 5…125V DC 4-point, isolated N.O. relay output module
14. 4-channel – current/voltage isolated HART capable input
15. 4-channel – current/voltage isolated HART capable output
16. 8-channel – configurable RTD/thermocouple/millivolt input 4 groups of 2
17. 2-channel – isolated frequency input module
18. The EtherNet/IP™ adapter shall:
	1. Be capable of –
		1. Facilitating high-speed data transfer across an EtherNet/IP network between I/O modules with EtherNet/IP architecture and the programmable automation controller (PAC).
		2. Providing system-side power to the I/O modules with EtherNet/IP architecture.
		3. Connecting to multiple EtherNet/IP network topologies and media, which include fiber, copper, Device Level Ring, Star, and Parallel Redundancy Protocol (PRP).
		4. Supporting up to 16 I/O modules and full/half-duplex 10/100/1000 Mbps/s operation.
	2. Have at a minimum –
		1. Connections for system-side power (MOD power)
		2. Two Ethernet ports
	3. Provide additionally –
		1. Power status indicators for SA power
		2. General health status indicator
		3. Overall network health indicator
		4. Ethernet link activity indicator

## 2.04 COMMUNICATION

1. The I/O modules shall feature:
	1. Fault-tolerant communication
	2. Ability to operate on Device Level Ring (DLR), Parallel Redundancy Protocol (PRP) Star, Linear and other EtherNet/IP topologies
2. The I/O modules shall connect to the programmable automation controller (PAC), which has a 1-GB, EtherNet/IP embedded switch and 1 (or 2) 10/100/1000 MB/s EtherNet/IP port (ports). The interface shall support:
	1. IEEE 802.3 Physical and Datalink Standard
	2. Common Industrial Protocol (CIP™), the protocol that provides real-time I/O messaging and information/peer-to-peer messaging
	3. Standard TCP/IP and UDP/IP communication
	4. 10/100/1000 MB/s auto sensing and auto switching
	5. Standard Ethernet media
	6. Subnet masking
	7. BOOTP and DHCP support
	8. Manual configuration using specified software
	9. Programmable Automation Controller (PAC) messaging to peer controllers and workstations
	10. I/O data, real-time interlocking and information
	11. Full-duplex and auto-negotiate communication
	12. Built-in Web access to diagnostics
	13. I/O control
	14. Precision Time Protocol (CIP Sync™, IEEE 1588)

## 2.05 POWER SUPPLY

1. System-side power shall be provided through the MOD power connection with the following attributes:
	1. Voltage range – 18...32V DC
	2. Inrush – 1130/5700 mA for 100 ms
	3. Maximum current rating – 1.25/1.88 A

## 2.06 MOUNTING

1. The I/O system shall be capable of the following mounting configurations with no temperature derating -
2. Vertical
3. Horizontal
4. Inverted vertical
5. Inverted horizontal

## 2.07 ENVIRONMENT

1. The I/O system shall be capable of installation in the following environments-
2. All modules shall support a G2 Moderate environment per ISA S71.04.
3. As an available option, all modules shall support a G3 Harsh environment per ISA S71.04.

## 2.08 RATINGS

A. The I/O modules shall be able to withstand conducted susceptibility tests as outlined in:

 Temperature IEC 60068-2-1

IEC 60068-2-2

IEC 60068-2-14

Humidity IEC 60068-2-30

Vibration IEC 60068-2-6

 Shock, Operating and Nonoperating IEC 60068-2-27

Emissions IEC 61000-6-4

ESD Immunity IEC 61000-4-2

Radiated RF Immunity IEC 61000-4-3

EFT/B Immunity IEC 61000-4-4

Surge Transient Immunity IEC 61000-4-5

Conducted RF Immunity IEC 61000-4-6

 Voltage Variation IEC 61000-4-29

# PART 3 EXECUTION

## 3.01 EXAMINATION

1. The supplier shall verify that jobsite is ready to receive equipment.
2. The supplier shall verify that the jobsite environment can be maintained during and after installation within the service conditions required by the manufacturer of the programmable automation controller (PAC) system.

## 3.02 INSTALLATION

1. Installation shall be in compliance with all manufacturer requirements, instructions, and contract drawings, including:
	1. Space surrounding the programmable automation controller (PAC) components to maintain adequate cooling.
	2. Conditioning of space surrounding the programmable automation controller (PAC) component enclosure to maintain the manufacturer’s ambient temperature and humidity ranges.
	3. Accessibility of programmable automation controller (PAC) component diagnostic lights, communication ports and memory modules – these components shall always be free from obstructions.
2. Control Panels
	1. As specified in Section 40 95 13 – Process Control Panels and Hardware.
	2. The supplier shall provide all required cables and connectors to interface with other control system equipment.
	3. The supplier shall ensure that communication media, analog signals and digital I/O wiring are properly protected in accordance with manufacturer recommendations.