

PROCUREMENT SPECIFICATION

5069 Compact I/O™ Modules with EtherNet/IP™ Architecture

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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

- A. Drawings and general provisions of the contract apply to this section.
- B. 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

- A. The I/O modules shall be listed or recognized by the following registrations:
 - 1. cULus Listed
 - a) Industrial Control Equipment, File E65584
 - b) Class I, Division 2, Groups A, B, C, and D Hazardous Locations, File E194810
 - 2. CE marked
 - a) 2004/108/EC EMC Directive, compliant with:
 - i. EN 61326-1; Meas./Control/Lab., Industrial Requirements
 - ii. EN 61000-6-2; Industrial Immunity
 - iii. EN 61000-6-4; Industrial Emissions
 - iv. EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)
 - b) 2006/95/EC LVD, compliant with:
 - i. EN 61010-2-201; Control Equipment Safety Requirements
 - 3. RCM marked, compliant with EN 61000-6-4; Industrial Emissions
 - 4. Ex marked, 94/9/EC ATEX Directive, and IECEx System compliant with:
 - a) EN/IEC 60079-15; Potentially Explosive Atmospheres, Protection “n”
 - b) EN/IEC 60079-0; General Requirements
 - c) II 3 G Ex nA IIC T4 Gc
 - d) DEMKO15ATEX1484X and IECEx UL 15.0055X
when used at or below 125 VAC

- 5. KC marked, compliant with Article 58-2 of Radio Waves Act, Clause 3
- B. The I/O modules shall meet Institute of Electrical and Electronics Engineers, Inc. (IEEE) applicable standards.
- C. The I/O modules shall be ODVA conformance tested to EtherNet/IP specifications.

1.04 SUBMITTALS

- A. As specified in Section 01 33 00.
- B. The supplier shall provide product data for the PAC and any component equipment, including:
 - 1. PAC information
 - a) Memory
 - b) Input/Output (I/O) capacity
 - c) Nonvolatile program and data retention
 - 2. I/O Modules information
 - a) Type and rating
 - b) Standard wiring diagram
 - 3. Bill of materials for supplied equipment
 - 4. Spare parts list

1.05 QUALITY ASSURANCE

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

1.06 DELIVERY, STORAGE, AND HANDLING

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

1.07 WARRANTY

- A. 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.
- B. This warranty applies to PACs and components.

1.08 MAINTENANCE

- A. As specified in Section 40 61 00.
- B. 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 PAC and remote I/O location. All spare I/O shall be wired to field terminal blocks.
 - 2. PAC backplane – the greater of:
 - a) 25 percent spare capacity, or
 - b) 3 spare backplane slots.
 - 3. PAC memory – 50 percent spare program volatile memory.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Allen-Bradley – 5069 Compact I/O Modules with EtherNet/IP Architecture (No substitutions)

2.02 CONSTRUCTION

- A. 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 local I/O modules or distributed (remote) I/O connected through a network. The local system shall include:
 - 1. A DIN rail-mounted PAC with CPU, memory, embedded Ethernet port(s), and embedded energy storage.
 - 2. An end cap.
 - 3. A separate system-side power supply (“Module” or “MOD” power).
 - 4. A separate field-side power supply (“Sensor/Actuator” or “SA” power), connected through removable terminal blocks (RTB).
 - 5. I/O modules with EtherNet/IP architecture.
 - 6. EtherNet/IP adapter.
 - 7. Field potential distributor (FPD). [option]
- B. All system modules shall be designed to operate in:
 - 1. An industrial environment with an ambient temperature of 0°C to 60°C (32°F to 140°F) and with a relative humidity range of 5% to 95%, non-condensing.
 - 2. A free airflow environment (convection cooling only, no fans or other air moving devices shall be required).
- C. All system modules, and local and remote chassis shall be designed and tested to operate in high electrical noise environments.
- D. The system shall support up to 31 local expansion modules, along with remote I/O expansion via network.
 - 1. Power shall begin at the PAC and pass across the local I/O module internal circuitry via power buses.

2. The manufacturer shall have available a variety of I/O modules, including digital input, digital output, isolated relay output, analog input (including universal), analog output, high-speed counter, and address reserve.
- E. The I/O modules shall have interlocking side pieces and DIN rail latches and shall be supplied with RTBs for connection to field power.
- F. The manufacturer shall have available address reserve modules (ARMs) to reserve node addresses for specific locations.

2.03 I/O MODULES, ETHERNET/IP ADAPTER, AND FPD

- A. The PAC system shall support up to 31 local expansion modules from its family of modules with EtherNet/IP architecture and high-speed backplane.
 1. The supplier shall configure each expansion module to the optimum requested packet interval (RPI) for the application.
 2. Each I/O module shall have, at a minimum, an LED indicator to provide module status, with or without adapter connection.

[B – H, include applicable modules]

- B. Digital I/O modules shall include:

1. 10 to 32 VDC 16-point, sink input module.
2. 10 to 32 VDC 16-point, sink fast input module.
3. 10 to 32 VDC 6-point, 3-wire sink fast input module.
4. 10 to 32 VDC 16-point, sourcing output module.
5. 10 to 32 VDC 16-point, sourcing fast output module.
6. 10 to 32 VDC 8-point, sourcing high current output module.
7. 5 to 264 VAC/125 VDC 4-point, isolated N.O. relay output module.
8. 5 to 264 VAC/125 VDC 4-point, isolated N.O./N.C. relay output module.
9. 5 to 264 VAC/125 VDC 16-point, N.O. relay output module.

- C. AC I/O modules shall include:

1. 79 to 264 VAC 16-point, AC input module.
2. 85 to 264 VAC 16-point, AC output module.

- D. Analog I/O modules shall include:

1. 4-Input – current/voltage/RTD/thermocouple/millivolt.
2. 8-Input – current/voltage.
3. 4-Output – current/voltage.
4. 8-Output – current/voltage.

- E. The high-speed counter module shall support:

1. 2-quadrature (ABZ) differential inputs.
2. 4-channel, sourcing output.

- F. The address reserve module (ARM) shall reserve a node address for a specific location for planned expansion.

G. The EtherNet/IP adapter shall:

1. Be capable of –
 - a) Facilitating high-speed data transfer across an EtherNet/IP network between I/O modules with EtherNet/IP architecture and the PAC.
 - b) Providing system-side and field-side power to the I/O modules with EtherNet/IP architecture.
 - c) Connecting to multiple EtherNet/IP network topologies.
 - d) Supporting up to 31 I/O modules and half-duplex 10/100/1000 MB/s operation.
2. Have at a minimum –
 - a) Connections for system-side power (MOD power) and field-side power (SA power).
 - b) Two Ethernet ports.
3. Provide additionally – [option]
 - a) A 4-digit display.
 - b) Power status indicators for MOD and SA power.
 - c) LED indicators with sequences for module status, Secure Digital (SD) card status, network connection status, and EtherNet/IP network activity.
 - d) A USB port for temporary, local programming purposes.
 - e) Behind its door, a slot securing a 1-GB or 2-GB SD non-volatile memory card and a reset button.

H. The field potential distributor (FPD) shall break field-side power distribution. The FPD is capable of:

1. Blocking the passage of field-side power to its left.
2. Functioning as a field-side power source for modules to its right.

2.04 COMMUNICATION

A. The I/O modules shall feature:

1. Fault-tolerant I/O.
2. Ability to operate on Device Level Ring (DLR), Linear and other EtherNet/IP topologies.

B. The I/O modules shall connect to the 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 Data Link 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 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

- A. System-side power shall be provided through the MOD Power connection with the following attributes:
 1. Voltage range – 18 to 32 VDC.
 2. Inrush – 850 mA for 125 ms.
 3. Maximum current rating – 9.55 A.
- B. Field-side power shall be provided through the SA Power connection with the following attributes:
 1. Voltage range – 0 to 32 VDC; 0 to 240 VAC, 47 to 63 Hz (ATEX/IECEX, maximum 125 VAC).
 2. Pass-through voltage ranges – 0 to 32 VDC; 0 to 240 VAC, 47 to 63 Hz (ATEX/IECEX, maximum 125 VAC).
 3. Maximum current rating – 9.95 A (DC power); 9.975 A (AC power).

2.06 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 & Non-operating	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

- A. The supplier shall verify that jobsite is ready to receive equipment.

- B. 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

- A. Installation shall be in compliance with all manufacturer requirements, instructions, and contract drawings, including:
 - 1. Space surrounding the PAC components to maintain adequate cooling.
 - 2. Conditioning of space surrounding the PAC component enclosure to maintain the manufacturer's ambient temperature and humidity ranges.
 - 3. Accessibility of PAC component diagnostic lights, communication ports, and memory modules – these components shall be free from obstructions at all times.
- B. 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 discrete I/O wiring are properly protected in accordance with manufacturer recommendations.

END OF SECTION