SECTION 406343 - PROGRAMMABLE LOGIC CONTROLLERS

Note that this section has only been edited for NYSOGS standardization and has not been technically edited. The designer shall make all technical edits specific to the project for this section.

This Section includes programmable controllers for stand-alone or networked applications.

1. GENERAL
	* + 1. SUMMARY
				1. Section Includes: Programmable controllers and accessories.
				2. Related Requirements:

List other Sections directly related to or affecting Work of this Section. Include Sections specifying information expected to be found in this Section, as well as Sections required to describe complete system or assembly requirements.

Section 260526 - Grounding and Bonding for Electrical Systems: Grounding components.

Section 260553 - Identification for Electrical Systems: Identification methods.

* + - 1. REFERENCE STANDARDS

List reference standards included within text of this Section, with designations, numbers, and complete document titles.

* + - * 1. National Electrical Manufacturers Association:

NEMA IA 2.2 - Programmable Controllers - Equipment Requirements and Tests.

NEMA IA 2.3 - Programmable Controllers - Programming Languages.

NEMA ICS 3 - Industrial Control and Systems: Factory Built Assemblies.

NEMA ICS 6 - Industrial Control and Systems: Enclosures.

* + - 1. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: Submit catalog data for each component specified showing electrical characteristics and connection requirements.
				5. Shop Drawings: Indicate electrical characteristics and connection requirements, including layout of completed assemblies, interconnecting cabling, dimensions, weights, and external power requirements.
				6. Test and Evaluation Reports: Indicate procedures and results for specified factory and field testing and inspection.
				7. Manufacturer Reports: Indicate activities on-Site, adverse findings, and recommendations.
				8. Qualifications Statements:

Coordinate the following Subparagraphs with the requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer and supplier.

Submit manufacturer's approval of supplier.

* + - 1. CLOSEOUT SUBMITTALS
				1. Project Record Documents: Record actual locations of controller cabinets and input and output devices connected to system. Include interconnection wiring and cabling information, and terminal block layouts in controller cabinets. [**Include copy of manufacturer's certified drawings.**]
				2. Operation and Maintenance Data: Submit bound copies of operating and programming instructions, and include card replacement, adjustments, and preventive maintenance procedures and materials.
			2. MAINTENANCE MATERIAL SUBMITTALS
				1. Spare Parts: Furnish [**one**] <**\_\_\_\_\_\_\_\_**> spare circuit card for each unique circuit card type installed.
			3. QUALIFICATIONS
				1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience[**, and with service facilities within 100 miles of Project**] [**, and with service facilities within <\_\_\_\_\_\_\_\_> miles of Project**].
				2. Supplier: [**Authorized**] [**Franchised**] distributor of specified manufacturer with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
			4. AMBIENT CONDITIONS
				1. Conform to specified service conditions during and after installation of programmable controllers.
				2. Maintain area free of dirt and dust during and after installation of products.
1. PRODUCTS
	* + 1. SYSTEM DESCRIPTION
				1. Configuration: [**Standalone**] [**Networked**] programmable controller [**incorporated into <\_\_\_\_\_\_\_\_> system control panel**] [**for controlling <\_\_\_\_\_\_\_\_> system**].

Write sequence of operation in Paragraph below to parallel process system functional description and to describe interaction of controller functions with system.

* + - * 1. Sequence of Operation: <**\_\_\_\_\_\_\_\_**>.
			1. PROGRAMMABLE CONTROLLER
				1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=8846&mf=04&src=wd):

designer to provide two manufacturers and approved equivalent for all listed products.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above. Include configuration, size, color, material composition, and other properties needed to describe product.

* + - * 1. Description: Controller conforming to NEMA IA 2.2, and with required memory and functional capacity to perform specified sequence of operation with scheduled input and output points.

Use the following Paragraph only when necessary to specify unusual service conditions. NEMA ICS 3 defines usual service conditions as 32 to 104 degrees F ambient; 5 to 95 percent relative humidity, non-condensing; and installation below 6,600 ft altitude.

* + - * 1. Service Conditions: Conform to NEMA ICS 3 and the following:

Temperature: <**\_\_\_\_\_\_\_\_**>.

Humidity: <**\_\_\_\_\_\_\_\_**>.

Altitude: <**\_\_\_\_\_\_\_\_**>.

Other Unusual Conditions: <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Programming Language: Conform to NEMA IA 2.3.
				2. Programming Software: Furnish [**one**] <**\_\_\_\_\_\_\_\_**> license for program for use with general purpose microcomputer and [**Microsoft Windows <\_\_\_\_\_\_\_\_>**] [**Unix**] <**\_\_\_\_\_\_\_\_**> operating system.

Describe networking connections, including parameters required for programmable controller manufacturer to determine appropriate hardware configurations and communication protocols for linking controller and network.

* + - * 1. Networking Connections: <**\_\_\_\_\_\_\_\_**>.
				2. Spare Input/Output Capacity: [**15**] <**\_\_\_\_\_\_\_\_**> percent.

Options listed below are NEMA standard. Consult manufacturer when different input voltage characteristics are required for Project.

* + - * 1. Input Voltage: [**120 volts, 60 Hz**] [**220 volts, 50 Hz**] [**24 volts, DC**] <**\_\_\_\_\_\_\_\_**>.
				2. Enclosure: NEMA ICS 6; Type [**12**] <**\_\_\_\_\_\_\_\_**>.
			1. SOURCE QUALITY CONTROL
				1. Testing: Test programmable controller according to NEMA IA 2.2.
1. EXECUTION
	* + 1. PREPARATION
				1. Disconnect and remove abandoned programmable controller components.
				2. Extend existing programmable controller installations using materials and methods [**compatible with existing installations, or**] as specified.
				3. Clean[**, reprogram,**] and repair existing programmable controllers to remain or to be reinstalled.
			2. INSTALLATION
				1. Do not install products until major construction is complete and building interior is enclosed and heated.
				2. Connect input and output devices [**as indicated on the Drawings**].
				3. Install engraved plastic nameplates according to Section 260553 - Identification for Electrical Systems.
				4. Ground and bond programmable controllers according to Section 260526 - Grounding and Bonding for Electrical Systems.
			3. FIELD QUALITY CONTROL
				1. Perform operational testing on control systems to verify proper operation and field wiring connections.
				2. Manufacturer's Field Services: Prepare and start up programmable controller.
			4. DEMONSTRATION AND TRAINING
				1. Furnish <**\_\_\_\_\_\_\_\_**> hours of instruction each for [**two**] <**\_\_\_\_\_\_\_\_**> persons, to be conducted at [**Project Site with manufacturer's representative**] [**manufacturer's training facility, including travel and living expenses for Director’s Representative personnel**] [**manufacturer's training facility**].
			5. MAINTENANCE
				1. Furnish service and maintenance of programmable controllers for [**one year**] <**\_\_\_\_\_\_\_\_**> from date of Substantial Completion.
			6. ATTACHMENTS

When relying on separate schedules, tables, illustrations, or forms to specify product requirements, include list of each attachment. Include identical list of attachments in Project Manual table of contents.

Insert attachments following END OF SECTION.

* + - * 1. Input/Output Schedule:

Consider including schedule to list input and output points. Consider the following examples when developing Project schedules.

Device Tag (Service): PT-101 (Main Header Pressure)

Range: 0 to 300 psig

Signal: 4 to 20 mA analog input

Device Tag (Service): PI-101 (Main Header Pressure)

Range: 0 to 300 psig

Signal: 4 to 20 mA analog output

Remarks: Remote indicator at [**Director’s Representative**] <**\_\_\_\_\_\_\_\_**> office

Device Tag (Service): FV-221 (Chilled Water Bypass)

Range: Full closed to full open

Signal: 3 to 15 psig analog output

Action: Direct, fail open

Device Tag (Service): HC-117-1 (Main Fan Run)

Signal: Discrete input (NO)

Device Tag (Service): SV-322 (Main Air Supply)

Signal: Discrete output (24 v)

Action: Fail closed

END OF SECTION 406343