SECTION 26 0916 - ELECTRICAL CONTROLS AND RELAYS

Maintain Section format, including the UH master spec designation and version date in bold in the center columns of the header and footer. Complete the header and footer with Project information.

Revise this Section by deleting and inserting text to meet Project-specific requirements.

This Section uses the term "Engineer." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

Delete hidden text after this Section has been edited for the Project.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:

1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas, available on the web site of the Texas Facilities Commission.
2. The University of Houston's *Supplemental General Conditions and Special Conditions for Construction.*

1.2 DESCRIPTION OF WORK

A. Work Included: The extent of electrical control device work is as shown and scheduled, as indicated by the requirements of this Section, and as specified elsewhere in these Specifications.

B. Types: The types of electrical control devices required for the project include, but are not limited to, the following:

1. Contactors
2. Relays
3. Photocells
4. Time switches
5. Sensors
6. Sonic Sensors
7. Probes
8. PLC

1.3 QUALITY ASSURANCE

A. Manufacturers: Provide products complying with these specifications and produced by one of the following:

1. Contactors and Relays:
   a. Allen-Bradley by Rockwell Automation
   b. Automatic Switch Company
   c. ABB
   d. Square D Company
2. Photocells and Time Switches:
   a. Intermatic Time Controls
   b. Tork, Inc

B. UL Standards: Products shall conform to all applicable UL standards and shall be UL-labeled.

1.4 SUBMITTALS

A. Shop Drawings submittals shall include, but not be limited to, the following:
   1. Cut sheets on contactors, relays, photocells, and time switches.
   2. Component wiring diagrams, where applicable.
   3. Additional information as required in Section26 0001 “Electrical General Provisions.”

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver components in factory-fabricated water resistant packaging.

B. Handle components carefully to avoid damage to components, enclosures, and finish.

C. Store components in a clean, dry space and protect from weather.

PART 2 - PRODUCTS

2.1 CONTACTORS AND RELAYS

A. General: Provide contactors and relays as shown and specified herein. The number of poles, ampere ratings, and pole arrangements shall be as shown. All contactors and relays shall conform to the following:
   1. Be rated for continuous duty at full-rated current in an unventilated enclosure. Eight hour duty ratings will not be acceptable.
   2. Contacts shall be readily replaceable, self-aligning, silver, or silver tungsten alloy and shall be rated for environment.
   3. Control voltage shall be 120 volt, 60 Hz, unless otherwise specified.
   4. All auxiliary contacts shall be rated for not less than 10 amperes.
   5. Contactors rated for lighting and mixed loads shall have an interrupting capacity of 150 percent of their continuous duty rating.
   6. Be capable of successfully handling inrush currents at 20 times rating.

B. Enclosures: Contactors shall be furnished with a NEMA 1 gasketed enclosure where installed indoors in dry locations and a NEMA 3R enclosure where installed outdoors or in damp areas, unless noted otherwise

C. Mechanically-held Devices: Mechanically-held devices shall conform to the following:
   1. Be single solenoid operated.

2. Be positive locking without the use of latches, hooks, or magnets.
3. Control stations shall be momentary action, unless otherwise shown, and make-but-not break coil current.
4. Permit manual operation in either direction and provide visual indication of contact position.
5. Control circuits shall be 3-wire with separate open and close circuits, unless otherwise shown.
6. Maintained contact, 2-wire control interface modules, shall be provided when noted on the Drawings.
7. Contactors rated at 225 amperes or less shall operate satisfactorily in any mounting position.

D. Magnetically-held Devices: Magnetically-held devices shall conform to the following:

1. AC operated units shall have laminated low loss electrical steel core pieces with machine ground pole faces and shading coils.
2. Units rated at 300 amperes and above shall have DC operating coils and include the necessary rectifier for the AC/DC operation.
3. Normally open contactors shall be spring-loaded open and magnetically closed. Not to be used on lighting or motor circuits.

2.2 PHOTOCELLS

A. General: Provide self-contained, adjustable, weatherproof photoelectric controls designed for mounting on a 3/4 inch conduit fitting. Photoelectric control shall switch on at dusk and off at dawn and be adjustable in a range of 2 to 50 fc.

1. Photoelectric control shall have 2000 watt contacts suitable for the voltage shown and shall include an inherent 5 second delay in operation to prevent false switching.
2. Photocells shall be Tork 2100 Series, Paragon CW Series or an approved equal. All exterior lighting shall be photo cell ON and time clock OFF. Time clock ON shall backup photocell.

2.3 TIME SWITCHES

A. General: Provide time switches as shown and specified herein. The number of channels, contact type, dial type, voltage, enclosure, and arrangement shall be as shown. All time switches shall conform to the following:

1. Time switches shall be an all-electronic design with a minimum of 48 hours quartz clock/battery power outage carry over.
2. Time switches shall be 7 day, 1 or 2 channel type with a minimum of three on/off cycles per day and shall be 356 day programmable for Daylight Savings Time and holidays. Time switches shall also feature an Astronomic dial feature.
3. Output contacts shall be maintained.
4. Time switches shall have NEMA 1 surface, enclosures and shall be installed inside next to panel circuits controlled.
5. Time switches shall be Tork DZS Series or Intermatic.

2.4 WIRING AND RACEWAYS

A. Line Voltage Control Wiring: This wiring shall be as specified in Section 26 0519 "Insulated Conductors, Cables, Wires and Terminations."

B. Low Voltage Control Wiring: This wiring shall be as specified in Section 26 0519 "Insulated Conductors, Cables, Wires and Terminations," except that conductors shall consist of a multi-conductor jacketed cable whenever possible.

C. Raceways: Raceways for line voltage and low voltage control wiring shall be as specified in Sections 26 0535 "Electrical Raceways" and 26 0534 "Electrical Boxes."

PART 3 - EXECUTION

3.1 INSTALLATION OF MISCELLANEOUS ELECTRICAL CONTROLS

A. General: Install miscellaneous electrical control devices as shown, in accordance with applicable portions of the NECA's "Standard of Installation", and recognized industry practices to ensure that products serve the intended functions.

B. Conductors: Connect electrical conductors to miscellaneous electrical control devices in accordance with equipment manufacturer's written instructions and wiring diagrams. Wherever possible, match conductors of the electrical connection for proper interface between the electrical supply and the installed equipment.

C. Contactors and Relays: Install contactors and relays mounted in panelboards or individual enclosures as shown and be complete, including all control wiring and devices.

D. Photocells and Time Switches: Install lighting controls as shown. Photocell and time switch settings shall be as photo cell ON, time clock OFF time clock ON back up to photocell.

E. Line and Low Voltage Control Wiring: Line and low voltage control wiring shall be installed in a suitable raceway.

F. Connections: Refer to Section 26 2717 "Equipment Wiring" for connections to equipment.

3.2 TESTING

A. Test contactors, relays, photocells, time switches, and related controls to verify that they function as designed and specified.

B. Repair or replace any devices or installation which does not function as designed and specified. All controllers shall have manual override at the controllers.

3.3 ADJUSTMENT

A. Set or program time switches to criteria provided by the Owner. Train Owner's personnel in proper programming and adjustment of time switches.

B. Adjust photocells to properly sense dusk and dawn conditions. Confirm building layout and surrounding obstruction prior to installation.

3.4 IDENTIFICATION

A. General: Refer to Section 26 0553 "Identification for Electrical Systems" for nameplates and identification.

END OF SECTION 26 0916