

## SECTION 262933 - CONTROLLERS FOR FIRE PUMP DRIVERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Full-service, full-voltage controllers rated 600 V and less.
2. Controllers for pressure-maintenance pumps.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

#### 1.2 DEFINITIONS

- A. ECM: Electronic control module.
- B. ATS: Automatic transfer switch(es).
- C. MCCB: Molded-case circuit breaker.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each type of product indicated. Include dimensioned plans, elevations, sections, details, and attachments to other work, including required clearances and service spaces around controller enclosures.
1. Detail equipment assemblies and indicate dimensions, weights, loads, method of field assembly, components, and location and size of each field connection.
  2. Schematic and Connection Diagrams: For power, signal, alarm, and control wiring and for pressure-sensing tubing.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Manufacturer's factory test reports of fully assembled and tested equipment.

## 1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

## 1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire-pump controllers and all associated equipment from single source or producer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with standards of authorities having jurisdiction pertaining to materials and installation.
- D. Comply with NFPA 20 and NFPA 70.
- E. IEEE Compliance: Fabricate and test enclosed controllers according to IEEE 344 to withstand seismic forces defined in Section 260548 "Vibration and Seismic Controls for Electrical Systems."

## PART 2 - PRODUCTS

### 2.1 FULL-SERVICE CONTROLLERS

- A. General Requirements for Full-Service Controllers:
  - 1. Comply with NFPA 20 and UL 218.
  - 2. Listed by an NRTL for electric-motor driver for fire-pump service.
  - 3. Combined automatic and nonautomatic operation.
  - 4. Factory assembled, wired, and tested; continuous-duty rated.
  - 5. Service Equipment Label: NRTL labeled for use as service equipment.
- B. Method of Starting:
  - 1. Pressure-switch actuated.
    - a. Water-pressure-actuated switch and pressure transducer with independent high- and low-calibrated adjustments responsive to water pressure in fire-suppression piping.
    - b. System pressure recorder, electric ac driven, with spring backup.
    - c. Programmable minimum-run-time relay to prevent short cycling.
    - d. Programmable timer for weekly tests.
  - 2. Magnetic Controller: Across-the-line type.
  - 3. Emergency Start: Mechanically operated start handle that closes and retains the motor RUN contactor independent of electric or pressure actuators.
- C. Method of Stopping: Automatic and nonautomatic shutdown after automatic starting.

- D. Capacity: Rated for fire-pump-driver horsepower and short-circuit-current (withstand) rating equal to or greater than short-circuit current available at controller location.
- E. Method of Isolation and Overcurrent Protection: Interlocked isolating switch and nonthermal MCCB; with a common, externally mounted operating handle, and providing locked-rotor protection.
- F. Door-Mounted Operator Interface and Controls:
  - 1. Monitor, display, and control the devices, alarms, functions, and operations listed in NFPA 20 as required for drivers and controller types used.
  - 2. Method of Control and Indication:
    - a. Microprocessor-based logic controller, with multiline digital readout.
    - b. Membrane keypad.
    - c. LED alarm and status indicating lights.
  - 3. Local Alarm and Status Indications:
    - a. Controller power on.
    - b. Motor running condition.
    - c. Loss-of-line power.
    - d. Line-power phase reversal.
    - e. Line-power single-phase condition.
    - f. .
  - 4. Audible alarm, with silence push button.
  - 5. Nonautomatic START and STOP push buttons or switches.
  - 6. .

## 2.2 CONTROLLERS FOR PRESSURE-MAINTENANCE PUMPS

- A. General Requirements for Pressure-Maintenance-Pump Controllers:
  - 1. Type: UL 508, factory-assembled, -wired, and -tested, across-the-line controller; for combined automatic and manual operation.
  - 2. Enclosure: UL 508 and NEMA 250, Type 2 for wall-mounting.
  - 3. Factory assembled, wired, and tested.
  - 4. Finish: Manufacturer's standard color paint.
- B. Rate controller for scheduled horsepower and include the following:
  - 1. Fusible disconnect switch.
  - 2. Pressure switch.
  - 3. Hand-off-auto selector switch.
  - 4. Pilot light.
  - 5. Running period timer.

## 2.3 ENCLOSURES

- A. Fire-Pump Controllers: NEMA 250, to comply with environmental conditions at installed locations and NFPA 20.
  - 1. Indoor, Dry and Clean Locations: Type 1 (IEC IP10).
  - 2. Indoor Locations Subject to Dripping Noncorrosive Liquids: Type 2 (IEC IP11).
- B. Enclosure Color: Manufacturer's standard "fire-pump-controller red".
- C. Nameplates: Comply with NFPA 20; complete with capacity, characteristics, approvals, listings, and other pertinent data.
- D. Floor stands, **12 inch** high, for floor-mounted controllers.

## 2.4 SOURCE QUALITY CONTROL

- A. Testing: Test and inspect fire-pump controllers in accordance with requirements in NFPA 20 and UL 218.
  - 1. Verification of Performance: Rate controllers in accordance with operation of functions and features specified.
- B. Fire-pump controllers will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF CONTROLLERS

- A. Coordinate installation of controllers with other construction including conduit, piping, fire-pump equipment, and adjacent surfaces. Maintain required clearances for workspace and equipment access doors and panels. Ensure that controllers are within sight of fire-pump drivers.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided.
- C. Install controllers within sight of their respective drivers.
- D. Connect controllers to their dedicated pressure-sensing lines.
- E. Wall-Mounting Controllers: Install controllers on walls with disconnect operating handles not higher than **79 inch** above finished floor, and bottom of enclosure not less than **12 inch** above finished floor unless otherwise indicated. Bolt units to wall or mount on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems."

- F. Floor-Mounting Controllers: Install controllers on **4-inch** nominal-thickness concrete base(s), using floor stands high enough so that the bottom of enclosure cabinet is not less than **12 inch** above finished floor. Comply with requirements for concrete bases specified in Section 260529 "Hangers and Supports for Electrical Systems."
  - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch** centers around the full perimeter of concrete base.
  - 2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete floor.
  - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
- G. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- H. Comply with NEMA ICS 15.

### 3.2 INSTALLATION OF POWER WIRING

- A. Install power wiring between controllers and their services or sources, and between controllers and their drivers. Comply with requirements in NFPA 20, NFPA 70, and Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Comply with NECA 1.

### 3.3 INSTALLATION OF CONTROL AND ALARM WIRING

- A. Install wiring between controllers and remote devices. Comply with requirements in NFPA 20, NFPA 70, and Section 260523 "Control-Voltage Electrical Power Cables."
- B. Install wiring between remote alarm panels and controllers. Comply with requirements in NFPA 20, NFPA 70.
- C. Install wiring between controllers and the building's fire-alarm system. Comply with requirements specified in Section 284621.11 "Addressable Fire-Alarm Systems."
- D. Bundle, train, and support wiring in enclosures.
- E. Connect remote manual and automatic activation devices where applicable.

### 3.4 IDENTIFICATION

- A. Comply with requirements in NFPA 20 for marking fire-pump controllers.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification in NFPA 20 and as specified in Section 260553 "Identification for Electrical Systems."

### 3.5 FIELD QUALITY CONTROL

#### A. Acceptance Testing Preparation:

##### 1. Inspect and Test Each Component:

- a. Inspect wiring, components, connections, and equipment installations. Test and adjust components and equipment.
- b. Test insulation resistance for each element, component, connecting supply, feeder, and control circuits.
- c. Test continuity of each circuit.

##### 2. Verify and Test Each Electric-Drive Controller:

- a. Verify that voltages at controller locations are within plus 10 or minus 1 percent of motor nameplate rated voltages, with motors off. If outside this range for motor, notify Architect before starting the motor(s).
- b. Test each motor for proper phase rotation.

##### 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.

##### 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

#### B. Representatives from manufacturers of fire-pump controllers must be present during acceptance tests and inspections in accordance with NFPA 20.

#### C. Acceptance Tests and Inspections:

1. Do not begin field acceptance testing until suction piping has been flushed and hydrostatically tested and the certificate for flushing and testing has been submitted to Architect and authorities having jurisdiction.
2. Prior to starting, notify authorities having jurisdiction of the time and place of the acceptance testing.
3. Engage manufacturer's factory-authorized service representative to be present during the testing.
4. Perform field acceptance tests as outlined in NFPA 20.

#### D. Nonconforming Work:

1. Controllers will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

#### E. Prepare test and inspection reports.

### 3.6 STARTUP SERVICE

#### A. Perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's written instructions.
2. .

### 3.7 ADJUSTING

- A. Adjust controllers to function smoothly and as recommended by manufacturer.
- B. Set field-adjustable switches, auxiliary relays, time-delay relays, and timers.
- C. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.
- D. Set field-adjustable pressure switches.

END OF SECTION 262933