

SECTION 26 29 00
LOW VOLTAGE CONTROLLERS, PUMP CONTROL PANELS

PART 1 - GENERAL

1.1 SCOPE

- A. NEMA rated full voltage pump control panels for three phase induction type motors rated up to 400 Hp @ 575 VAC.
- B. NEMA rated vacuum starter pump control panels for three phase induction type motors rated up to 400 Hp @ 575 VAC.
- C. NEMA rated electromechanical reduced voltage pump control panels for three phase induction type motors rated up to 700 Hp @ 575 VAC.

1.2 RELATED DOCUMENTS

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

1.3 SUBMITTALS

- A. Submit shop drawings and product data for approval and final documentation in the quantities listed according to the Conditions of the Contract. All transmittals shall be identified by customer name, customer location and customer order number.

1.4 RELATED STANDARDS

- A. The pump control panels shall be manufactured and tested according to the latest applicable standards of the following agencies:
 - 1. NFPA 70 – National Electrical Code.
 - 2. NEMA ICS 2 – Controllers, Contactors and Overload Relays.
 - 3. NEMA ICS 5 – Control Circuit and Pilot Devices.
 - 4. NEMA ICS 6 – Enclosures for Industrial Controls and Systems.
 - 5. UL 508, Industrial Control Equipment.
 - 6. Unit(s) must be certified by the following agencies
 - a. UL
 - 7. Unit(s) must be UL rated as Service Entrance Equipment

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage a firm with at least 50 years experience in manufacturing pump control panels.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in factory labeled packages.
- B. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from potential damage from weather and construction operations. Store so condensation will not form on or in controller and if necessary, apply temporary heat where required to obtain suitable service conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The pump control panels shall be manufactured by Siemens or pre-approved equal. Approved manufacturers are as follows:
 - 1. SIEMENS
 - 2. []

2.2 STANDARD NEMA RATED FULL VOLTAGE PUMP CONTROL PANEL (SIEMENS CLASS 87 OR EQUAL)

A. Overview

1. Description: NEMA ICS 2, AC general purpose Class A pump control panel for induction motors rated in horsepower. Unit shall contain a color coded externally operated handle. Handle shall give positive visual indication of ON/OFF status and be lockable in the ON or OFF positions with up to three padlocks. Half size starters are not referenced in NEMA standards. They conform to specified regulatory requirements and shall be utilized where possible to reduce costs.
2. Disconnect Type: **Select a or b below**
 - a. ***[Fusible Switch Assembly: NEMA KS 1, enclosed knife switch with fuse block and fuse clips. Fuse clips will be designed to accommodate [UL 198E, Class [RK1] [RK5]] [UL 198C, Class J] fuse clips that accept [250] [600] volt, [dual element] [current limiting] [time delay] [one-time] fuses. Short-circuit current rating: 100,000 RMS amperes up to 600 volts when protected with Class R fuses].***
 - b. ***[Circuit breaker employing adjustable magnetic trip settings. Short-circuit current rating: 100,000 RMS amperes up to 480 volts].***
3. Size: ***[1] [1¼] [2] [2½] [3] [3½] [4] [] [as scheduled] [as indicated].***
4. Poles: 3.
5. Power Contacts shall be:
 - a. Composed of silver-cadmium-oxide.
 - b. Totally enclosed in contactor housing
 - c. Double break, 45° wedge action operation with gravity dropout.
6. Contact inspection and replacement shall be possible without disturbing line or load wiring.
7. Coil type: Pull out design, encapsulated Class A construction.
8. Coil operating voltage: ***[[120][240][480][] volts single voltage,] [[120/240][240/480] volts dual voltage,] [60] [] Hz.***
9. Wiring: Straight-through wiring with all terminals clearly marked.
10. Overload Relay:
 - a. Solid State:
 - 1.) Trip current rating will be established by selection of overload relay and shall be adjustable, minimum 4 to 1 current range. The overload relay shall have selectable trip classes conforming to NEMA Trip Class 5, 10, 20 and 30.
 - 2.) The overload relay shall provide
 - a.) Protection against:
 - (1.) Phase loss by tripping within 3 seconds, selectable
 - (2.) Ground fault, selectable
 - (3.) Phase imbalance, selectable
 - b.) Components
 - (1.) 1 N.O. & 1 N.C. contacts
 - (2.) Self-powered
 - (3.) Ambient insensitive
 - (4.) Built-in remote test
 - (5.) Automatic/manual reset modes
 - (6.) Mechanical and electrical test functions
 - (7.) Conformally coated circuit board
 - (8.) Visible trip indicator
 - (9.) Provisions for panel and DIN rail mounting without requiring adaptors
 - (10.) Provisions to accept a tamper guard
 - (11.) Repeat accuracy <1%
 - (12.) Auxiliary contact terminal boards, finger safe and removeable.

11. Enclosure: Shall conform to NEMA ICS 6, fully gasketed, Type **[3R] [] [as indicated] [as required to meet conditions of installation]**.
12. Fabrication: Enclosure shall be fabricated from galvanized steel.
13. Door: Shall be removable and shall include a wind catch as standard.
14. Pilot Devices: NEMA ICS 5, flange-mounted oil-tight 30mm type. Contacts shall be rated NEMA A600. Hand/Off/Auto selector switch and Start pushbutton shall be furnished as standard.

B. Accessories

1. Pilot Devices: NEMA ICS 5, flange-mounted oil-tight 30mm type.
 - a. Indicating Light(s): **[Red Run] [Green Off] []**
2. Auxiliary Contacts: NEMA ICS 5 rated A600, **[1] [2] []** normally open and **[1] [2] []** normally closed contacts in addition to the seal in contact.
3. Control Power Transformers: **[480] [240] []** volt primary, and **[120] []** volt secondary, **[_ VA minimum, in each motor starter] [as scheduled]**. Provide fused [primary and] secondary and connect non-fused leg of secondary to enclosure.
4. Lightning Arrestors.

2.3 NEMA RATED VACUUM STARTER PUMP CONTROL PANEL (SIEMENS CLASS 87 OR EQUAL)

A. Overview

1. Description: NEMA ICS 2, AC general purpose Class A pump control panel for induction motors rated in horsepower. Unit shall contain a color coded externally operated handle. Handle shall give positive visual indication of ON/OFF status and be lockable in the ON or OFF positions with up to three padlocks.
2. Disconnect Type: **[Select a or b below]**
 - a. **[Fusible Switch Assembly: NEMA KS 1, enclosed knife switch with fuse block and fuse clips. Fuse clips will be designed to accommodate [UL 198E, Class [RK1] [RK5]] [UL 198C, Class J] fuse clips that accept [250] [600] volt, [dual element] [current limiting] [time delay] [one-time] fuses. Short-circuit current rating: 100,000 RMS amperes up to 600 volts when protected with Class R fuses.]**
 - b. **[Circuit breaker employing adjustable magnetic trip settings. Short-circuit current rating: 100,000 RMS amperes up to 480 volts.]**
3. Size: **[4] [5] [6] [] [as scheduled] [as indicated]**.
4. Poles: 3.
5. Power Contacts: Hermetically sealed.
6. Coil operating voltage: **[120] [240] [480] []** volts **[60] []** Hz.
7. Wiring: Straight-through wiring with all terminals clearly marked.
8. Overload Relay:
 - a. Solid State:
 - 1.) Trip current rating will be established by selection of overload relay and shall be adjustable, minimum 4 to 1 current range. The overload relay shall have selectable trip classes conforming to NEMA Trip Class 5, 10, 20 and 30.
 - 2.) The overload relay shall provide
 - a.) Protection against:
 - (1.) Phase loss by tripping within 3 seconds, selectable
 - (2.) Ground fault, selectable
 - (3.) Phase imbalance, selectable
 - b.) Components
 - (1.) 1 N.O. & 1 N.C. contacts
 - (2.) Self-powered
 - (3.) Ambient insensitive
 - (4.) Built-in remote test
 - (5.) Automatic/manual reset modes
 - (6.) Mechanical and electrical test functions

- (7.) Conformally coated circuit board
 - (8.) Visible trip indicator
 - (9.) Provisions for panel and DIN rail mounting without requiring adaptors
 - (10.) Provisions to accept a tamper guard
 - (11.) Repeat accuracy <1%
 - (12.) Auxiliary contact terminal boards, finger safe and removeable.
9. Enclosure: Shall conform to NEMA ICS 6, fully gasketed, Type **[3R] [] [as indicated] [as required to meet conditions of installation]**.
 10. Door: Shall be removable and shall include a wind catch as standard.
 11. Pilot Devices: NEMA ICS 5, flange-mounted oil-tight 30mm type. Contacts shall be rated NEMA A600. Hand/Off/Auto selector switch and Start pushbutton shall be furnished as standard.
- B. Accessories
1. Pilot Devices: NEMA ICS 5, flange-mounted oil-tight 30mm type.
 - a. Indicating Light(s): **[Red Run] [Green Off] []**
 2. Auxiliary Contacts: NEMA ICS 5 rated B300 minimum, **[1] [2] []** normally open and **[1] [2] []** normally closed contacts in addition to the seal in contact.
 3. Control Power Transformers: **[480] [240] []** volt primary, and **[120] []** volt secondary, **[VA minimum, in each motor starter] [as scheduled]**. Provide fused **[primary and] secondary** and connect non-fused leg of secondary to enclosure.
 4. Lightning Arrestors.
- 2.4 NEMA RATED ELECTROMECHANICAL REDUCED VOLTAGE PUMP CONTROL PANEL (SIEMENS CLASS 88 OR EQUAL)
- A. Overview
1. Description: NEMA ICS 2, AC general purpose Class A electromechanical reduced voltage pump control panel for induction motors rated in horsepower. Unit shall contain a color coded externally operated handle. Handle shall give positive visual indication of ON/OFF status and be lockable in the ON or OFF positions with up to three padlocks. Half size starters are not referenced in NEMA standards. They conform to specified regulatory requirements and shall be utilized where possible to reduce costs.
 2. Starter Type: **[Select a, b or c below]**
 - a. **[Autotransformer Type]**
 - 1.) **Three coil transformer**
 - 2.) **50, 65 and 80% voltage taps**
 - 3.) **Closed circuit transition**
 - 4.) **Adjustable starting time]**
 - b. **[Wye-Delta Type]**
 - 1.) **[Closed] [Open] transition**
 - 2.) **Adjustable starting time]**
 - c. **[Part-Winding Type]**
 - 1.) **Adjustable starting time]**
 3. Disconnect Type: **[Select a or b below]**
 - a. **[Fusible Switch Assembly: NEMA KS 1, enclosed knife switch with fuse block and fuse clips. Fuse clips will be designed to accommodate [UL 198E, Class [RK1] [RK5]] [UL 198C, Class J] fuse clips that accept [250] [600] volt, [dual element] [current limiting] [time delay] [one-time] fuses. Short-circuit current rating: 100,000 RMS amperes up to 600 volts when protected with Class R fuses.]**
 - b. **[Circuit breaker employing adjustable magnetic trip settings. Short-circuit current rating: 100,000 RMS amperes up to 480 volts.]**
 4. Size: **[1] [1¾] [2] [2½] [3] [3½] [4] [5] [6] [] [as scheduled] [as indicated]**.
 5. Poles: 3.
 6. Power Contacts shall be:

- a. Composed of silver-cadmium-oxide.
 - b. Totally enclosed in contactor housing
 - c. Double break, 45° wedge action operation with gravity dropout.
7. Contact inspection and replacement shall be possible without disturbing line or load wiring.
8. Coil type: Pull out design, encapsulated Class A construction.
9. Coil operating voltage: **[match motor voltage] [Volts] [60] [50] Hz.]**
10. Control voltage: **[120V with CPT] [[120V] [24V] [V] separate source]**
11. Wiring: Straight-through wiring with all terminals clearly marked.
12. Overload Relay:
- a. Solid State:
 - 1.) Trip current rating will be established by selection of overload relay and shall be adjustable, minimum 4 to 1 current range. The overload relay shall have selectable trip classes conforming to NEMA Trip Class 5, 10, 20 and 30.
 - 2.) The overload relay shall provide
 - a.) Protection against:
 - (1.) Phase loss by tripping within 3 seconds, selectable
 - (2.) Ground fault, selectable
 - (3.) Phase imbalance, selectable
 - b.) Components
 - (1.) 1 N.O. & 1 N.C. contacts
 - (2.) Self-powered
 - (3.) Ambient insensitive
 - (4.) Built-in remote test
 - (5.) Automatic/manual reset modes
 - (6.) Mechanical and electrical test functions
 - (7.) Conformally coated circuit board
 - (8.) Visible trip indicator
 - (9.) Provisions for panel and DIN rail mounting without requiring adaptors
 - (10.) Provisions to accept a tamper guard
 - (11.) Repeat accuracy <1%
 - (12.) Auxiliary contact terminal boards, finger safe and removeable.
13. Enclosure: Shall conform to NEMA ICS 6, fully gasketed, Type **[3R] [] [as indicated] [as required to meet conditions of installation].**
14. Door: Shall be removable and shall include a wind catch as standard.
15. Pilot Devices: NEMA ICS 5, flange-mounted oil-tight 30mm type. Contacts shall be rated NEMA A600. Hand/Off/Auto selector switch and Start pushbutton shall be furnished as standard.
- B. Accessories
- 1. Pilot Devices: NEMA ICS 5, flange-mounted oil-tight 30mm type.
 - a. Indicating Light(s): **[Red Run] [Green Off] []**
 - 2. Auxiliary Contacts: NEMA ICS 5 rated A600, **[1] [2] []** normally open and **[1] [2] []** normally closed contacts in addition to the seal in contact.
 - 3. Lightning Arrestors.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The Contractor shall install all equipment in accordance with the contract drawings and manufacturers recommendations and manuals.
- B. Install pump control panels where indicated, in accordance with manufacturer's instructions.
- C. Install fuses in fusible switches.

- D. Solid state overload relay shall be dial set to match installed motor characteristics.
- E. Adjust all circuit breakers, switches, access doors and operating handles for free mechanical and electrical operation as described in manufacturer's instructions.
- F. Clean interiors of all enclosed electrical equipment to remove construction debris, dirt and shipping materials.
- G. Repaint scratched or marred exterior surfaces to match original finish.

3.2 ADJUSTMENTS AND CLEANING

- A. The Contractor shall perform necessary field adjustments of the circuit breakers to place the equipment in final operating condition. The settings shall be in accordance with the approved protective device coordination study or as directed by the Engineer.

3.3 TESTING

- A. Perform factory and installation tests in accordance with applicable NEC, NEMA and UL requirements.

3.4 WARRANTY

- A. Equipment manufacturer warrants that all goods supplied are free of non-conformities in workmanship and materials for one year from date of initial operation, but not more than eighteen months from date of shipment.

END OF SECTION