

SECTION 26 28 00 MOTOR STARTER PROTECTORS

PART 1 - GENERAL

1.1 SCOPE

- A. This specification describes the requirements for a Motor Starter Protector (MSP) to provide motor starting and protection for a standard three phase AC induction motor. MSP are used to switch and protect single phase and three-phase induction motors of up to 75 HP at 480 VAC and for loads with rated currents of up to 100 Amps. MSP shall have 3 poles.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract including Division 1 requirements 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 motor starter protectors shall be manufactured and tested according to the latest applicable standards of the following agencies:
 - 1. Unit(s) must be manufactured to the codes and standards listed below:
 - a. NEC
 - 2. Unit(s) must be approved or certified by the following agencies:
 - a. UL
 - b. CSA or CUL
 - 3. Unit(s) must be CE marked.
 - 4. MSP shall comply to UL508 or UL489.
 - 5. MSP shall comply with IEC 60947-2/DIN VDE 0660, Part 101.
 - 6. MSP shall comply with IEC 60947-4-1/DIN VDE 0660, Part 102.
 - 7. MSP auxiliary switches shall comply with IEC 60947-5-1/DIN VDE 0660 Part 200.
 - 8. The MSP terminal markings shall comply with DIN EN 50 011.
 - 9. MSP Utilization categories shall comply in accordance with IEC 60947-2: A
 - 10. Motor Starter in accordance with IEC 60947-4-1: AC-3 (main conducting paths)
 - 11. DC - 11 / AC - 15 (control and auxiliary conducting paths)
 - 12. Shock protection - MSP are shock resistant in accordance with DIN VDE 0106 Part 100.
 - 13. Degree of protection -The degree of protection of the MSP is IP20. In the terminal area of frame sizes S2 and S3, the degree of protection is IP00.
 - 14. Characteristics -The MSP current limitation characteristics and the I2t characteristics are in accordance with IEC 60947 and DIN VDE 0660.
 - 15. Explosion-proof motors - For motor protection the MSP, CLASS 10 and for motor protection MSP with overload function 3RV11, CLASS 10: DIN VDE 0165 and EN 50 019, DMT-Certificate according to directive 94/9 EG (ATEX-Approval).
 - 16. Railway vehicles- MSP shall be DIN EN 50 155
 - 17. Ships and docks - MSP have shipbuilding certificates of ABS, GL, LRS or DNV.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage a firm with at least 10 years experience in manufacturing motor starter protectors.

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 Motor Starter Protectors shall be manufactured by Siemens or pre-approved equal. Approved manufacturers are as follows:
 - 1. SIEMENS
 - 2. []

2.2 MOTOR STARTER PROTECTORS

A. OVERVIEW

- 1. MSP shall switch and protect three-phase induction motors of up to 75 HP at 480 VAC and for loads with rated currents of up to 110 Amps. The MSP have 3 poles.
- 2. MSP shall be as shown on the drawings. Refer to drawings for details regarding location of components, voltage and current rating of devices and other required details. Provide the following MSP:
 - a. *[Frame S00, Width 45 mm, Maximum Current 16 A, 3-Phase induction motor power 10 HP (7.5 kW)]*
 - b. *[Frame S0, Width 45 mm, Maximum Current 38 A, 3-Phase induction motor power 25 HP (18.5 kW)]*
 - c. *[Frame S2, Width 55 mm, Maximum Current 80 A, 3-Phase induction motor power 50 HP (37 kW)]*
 - d. *[Frame S3, Width 70 mm, Maximum Current 110 A, 3-Phase induction motor power 75 HP (45 kW)]*
 - e. *[As shown on the drawings]*

WARNING: Selecting operational currents and starting currents can vary even in motors of the same power. The motor powers listed above are to serve only as guideline.
- 3. Switches
 - a. The state of the MSP shall be visually determined by the position of the rotary handle.
- 4. Locking the MSP
 - a. The MSP shall be prevented from being switched on by unauthorized persons by securing the switching mechanism (rotary switch) with a padlock (shackle diameter 3.5 to 4.5 mm). The MSP shall only be locked in the off position.
- 5. Reset After Trip Operation
 - a. When the MSP trips, the switch shall go into the tripped position. The switch shall be used to reset the circuit again. In the case of all frame sizes, the rotary switch shall be manually turned to the OFF position after the device trips, then the MSP shall be able to be turned on again. *[The product offering shall include a remote-control reset for overload conditions to avoid having to go to the panel.]*
- 6. Testing Overload Tripping
 - a. The MSP overload trip shall be able to be tested.
- 7. Short-Circuit Protection
 - a. The short-circuit shall release the MSP and shall execute a three phase isolation of the faulted motor circuit from the network. MSP shall have a UL circuit breaking capacity of 25 kA at 480Y/277VAC.
- 8. Conditions Of Application
 - a. MSP shall be climate-proof. MSP shall be used in enclosed areas where there are no hazardous operating conditions such as dust, corrosive fumes or destructive

gases. The MSP shall be sized to the specific starting data and rating of the motor to be protected.

9. Phase Loss Sensitivity
 - a. The phase loss sensitivity of the MSP shall ensure that the MSP trips in the event of the loss of a phase and the resulting over currents in the other phases. During normal operation, the device shall have a three-pole load. To protect single-phase loads or direct current loads, all 3 main conducting paths shall be switched in series.
10. Explosion Protection
 - a. In the case of a three-pole load, at 3 to 8 times the set current, the release time shall deviate by a maximum of $\pm 20\%$ and shall comply with the requirement of DIN VDE 0165 and EN 50019. The MSP for motor protection, CLASS 10, and the MSP for motor protection with overload relay function, CLASS 10, shall have ATEX-Approval in accordance with the EU-requirement 94/9/EG (DMTCertificate).
11. Characteristics
 - a. The tripping characteristic of the inverse-time delayed overload release (thermal overload release) shall be valid for alternating current with frequencies of 0 to 400 Hz. The characteristics shall be valid for tripping operations from a cold state. From a warm state, the release times shall be reduced up to 75 % depending on the motor current and the ambient temperature. The tripping characteristics of the instantaneous electromagnetic over-current releases (short-circuit release, n-release) shall be based on the rated current in which the MSP with an adjustable overload release is also the upper value of the adjustment range. Time-current characteristics, current-limiting characteristics and I²t characteristics shall be requested directly from your sales representative, if necessary.
12. Releases
 - a. MSP shall have a:
 - 1.) Inverse-time delay, thermal overload releases
 - a.) The MSP overload release can be adjusted to the load current.
 - 2.) Instantaneous short-circuit releases
 - a.) The short-circuit releases are permanently set to 13 times the rated current.
13. Tripping
 - a. A tripped MSP shall move the rotary switch into the tripped position (S00, S0, S2 and S3).
 - 1.) The rotary switch shall be manually put in the 0 position to restart to avoid switching to the fault inadvertently.
 - 2.) The tripping operation shall be reported electrically by means of an alarm switch.
 - b. Tripping classes in accordance with IEC 947-4-1:
 - 1.) Frame sizes S00 to S3: class 10
 - 2.) Frame sizes S2/S3: **[class 10] [class 20]**
14. Snap-On Mounting
 - a. The MSP shall be DIN rail mounted. The DIN rail(s) shall comply with IEC 60715.
 - 1.) The MSP with a frame size S0 shall require a 35 mm DIN rail with an installation height of 15 mm.
 - 2.) The MSP with a frame sizes S3 shall require a 75 mm DIN rail with an installation height of 75 mm.
15. Panel Mounting
 - a. The MSP shall be capable of being to be attached to a flat surface with 2 screws.

B. ACCESSORIES

1. Auxiliary Contacts and Releases
 - a. Each MSP shall be able to mount up to a maximum of 4 auxiliary contacts with auxiliary release. The auxiliaries required are: **[Select either 1, 2, 3, or 4 below]**

- 1.) *[One transverse auxiliary contact] [One side mounted auxiliary contact with 2 contacts] [One alarm switch] [One auxiliary release]*
 - 2.) *[One side mounted auxiliary contact with 2 NO + 2 NC.] [One alarm switch] [One auxiliary release]*
 - 3.) *[As shown on the drawings]*
 - 4.) *[None]*
2. Auxiliary Switches and Alarm Switches
- a. Each MSP shall have the following combinations of auxiliary switches and alarm switches mounted: **[Select 1 2, 3, 4, or 5 below]**
 - 1.) *[Auxiliary contacts with 2 contacts and alarm switches shall be installed [individually] [together]. The side-mounted auxiliary contact shall be installed on the left of the alarm switch.]*
 - 2.) *[Transverse and lateral auxiliary switches can be combined. Maximum of 4 auxiliary contacts is possible.]*
 - 3.) *[One auxiliary release can be attached on the right for each MSP.]*
 - 4.) *[As shown on the drawings]*
 - 5.) *[None]*
3. **[Auxiliary Release Options]**
- a. *[The MSP shall be equipped to allow for the installation of the following auxiliary release(s):] [Shunt release] [Undervoltage release] [Undervoltage release with leading auxiliary contacts]*
 - b. *[The auxiliary release shall be designed to install without tools to ease installation. Designs requiring tools are not premitted.]*
 - 1.) **[Shunt release]**
 - a.) **Remote release of the MSP:**
 - (1.) *Via PLC: The coil of the release should be connected to the voltage only briefly]*
 - 2.) **[Undervoltage release]**
 - a.) *The UVR shall trip the MSP in the event of a voltage interruption and prevents the motor starting up inadvertently when the voltage returns.]*
 - 3.) **[Undervoltage release with leading auxiliary contacts: 2 NO]**
 - a.) *The UVR shall trip the MSP in the event of a voltage interruption and prevents the motor starting up inadvertently when the voltage returns. When the switch is in the off position, the auxiliary contacts shall isolate the undervoltage release from the power system on both sides to prevent voltage distortion to the control circuit during breaking or tripping. It shall be possible to reset the circuit breaker/MSP because the contacts reset.]]*
4. **[Auxiliary Contact Options]**
- a. *The MSP shall be designed to allow for the use a [transverse auxiliary contacts] [and] [or] [a side mounted auxiliary contact.] as selected in Section 2.2.E.*
 - b. *[The auxiliary contacts shall be designed to install without tools to ease installation. Designs requiring tools are not permitted.]]*
 - c. Transverse Auxiliary Switch - The transverse auxiliary switch shall mount horizontally within the outside dimensions of the MSP and provide contacts which indicate the state of the MSP.
 - 1.) The contacts of the auxiliary switches shall close and open together with the main contacts of the MSP. One transverse auxiliary switch shall be attached for each MSP: **[Select a, b, c, or d below]**
 - a.) **[1 changeover contact]**
 - b.) **[1 NO + 1 NC contact]**
 - c.) **[2 NO contacts]**
 - d.) **[Electronically optimized transverse auxiliary switch]**
 - d. Lateral Auxiliary Switch

- 1.) The lateral auxiliary switch shall mount vertically on the side of the MSP and provide contacts which indicate the state of the MSP.
- 2.) One lateral auxiliary switch shall be attached for each Motor Starter Protector: **[Select a, b, c, or d below]**
 - a.) **[1 NO + 1 NC contact]**
 - b.) **[2 NO contacts]**
 - c.) **[2 NC contacts]**
 - d.) **[2 NO + 2 NC contacts]**
- e. Alarm Switch
 - 1.) The alarm switch shall be snapped onto the side of the MSP and has contacts which indicated and differentiate whether the MSP has experienced a trip condition (short circuit, overload, shunt trip) or a short circuit condition.
 - 2.) **[The alarm switch shall be designed to install without tools to ease installation. Designs requiring tools are not permitted.]**
5. **[Disconnecting Module]**
 - a. **The disconnection module shall be installed onto the top of the MSP to create a visible isolation distance and which allows for the use of padlocks when open.]**
6. Isolated 3-Phase Busbar System
 - a. The insulated busbar system shall be busbars which allow for the simple connection of the line side of several side by side mounted MSP **(Up to a maximum of 63 A for Frame sizes S00 and S0; up to a maximum of 100 A for Frame size S2)** on a standard mounting rail.
7. **[Rotary Switches]**
 - a. **The rotary switch shall be attached to the actuator of the MSP and the cabinet door and shall serve as a link between the two which enables the MSP to be turned on or off with the cabinet door closed.]**
8. Terminal Adaptors shall be specified for "Combination Motor Controller Type E" in accordance with UL 508.
9. Link modules shall be supplied for "Combination Motor Controller Type F" when close couple combined with a 3RT contactor.
10. Infeed System
 - a. The MSP shall be mounted in the same manufacturers UL508A type E infeed system rated up to 63A for frame sizes S00 and S0 up to 40A. The infeed system shall allow the bussing of a single line side connection. The infeed system shall be expandable by the addition of more than one module. It shall accept both screw terminal version MSP as well as spring loaded terminal version MSP. It shall provide infeed capabilities from either the left hand or right hand side of the system.

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. For panel mounting MSP in frame sizes S00 and S0, two push-in lugs (3RV2928-0B) (pack of 10) are also required. MSP in frame sizes S2 and S3 can be screwed directly onto a base plate.
- C. Connection Tools The following items are required to connect the MSP:
 1. Frame sizes S00 to S2: Pozidriv 2 screwdriver
 2. Frame size S3: Allen key (4 mm)

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

END OF SECTION