

SECTION 16482001  
NEMA MOTOR STARTERS (300 LINE)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. NEMA Open and Enclosed Motor Starters, with Thermal or Solid State Electronic Overload. Starters may be of the Full Voltage, Reversing, Two-Speed, or Reduced Voltage Type.

1.02 RELATED SECTIONS

1.03 REFERENCES

The full voltage starters and protection devices in this specification are designed and manufactured according to latest revision of the following standards (unless otherwise noted).

A. ANSI/NFPA 70, National Electrical Code

B. CSA C22.2 No. 14, Industrial Control Equipment

C. NEMA ICS 2, Industrial Control and Systems: Controllers, Contactors and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC

D. UL 508, Industrial Control Equipment

1.04 DEFINITIONS

A. Overload Relay Class - A classification of an overload relay time current characteristic by means of a number which designates the maximum time in seconds at which it will operate (trip) when carrying a current equal to 600 percent of its current rating.

B. Type 2 Protection - Following a short circuit, there shall be no danger to personnel or electrical and fire hazard, only slight welding of the contacts is allowed, and the starter must be reusable.

1.05 SYSTEM DESCRIPTION

A. Motor starters shall be rated in accordance with NEMA sizes and horsepower ratings. No starter shall be listed as a ½-Size. Motor starters shall be used in discrete control, in motor control centers, and in other user and OEM custom control panels.

B. Contacts shall be silver alloy, double break, and shall be inspectable on NEMA Sizes 00 through 4 without the use of tools. Size 5 and larger shall be inspectable with standard tools. They shall be replaceable without removing the line, load, or control wiring from the starter, and replaceable without removing the starter from the enclosure.

C. Coils shall be the encapsulated type, and shall be replaceable on NEMA Sizes 00 through 4 without the use of tools. Size 5 and larger shall be replaceable with standard tools. They shall be replaceable without removing the line, load, or control wiring from the starter, and replaceable without removing the starter from the enclosure.

D. Overload protection shall be provided by [thermal bi-metallic]{solid state electronic}] overload relay. Single-phase starters shall provide one- or two-leg overload protection; three-phase starters shall provide three-leg overload protection.

[E. Thermal overloads shall be Class 20 bi-metallic type] with interchangeable heaters. They shall be provided with plus or minus 10 percent trip point adjustment and be [ambient

SECTION 16482001  
NEMA MOTOR STARTERS (300 LINE)

compensated.} {non-ambient compensated.} ] [ {They shall have a visible trip indicator.} ] [ {They shall have a reset mechanism } that resets on the upstroke only. They shall have a manual weld check which checks the overload contacts for welding. They shall provide] [ {1 Normally Closed contact.} ] [ {1 Normally Closed plus 1 Normally Open isolated contact.} ]

[ {F. NEMA solid state electronic overload relay shall provide user selectable settings}, Class 10, 20 and 30. They shall have a visible trip indicator. They shall be ambient insensitive within an operating temperature range to minus 20 to plus 70 degrees Celsius. They shall provide built in thermal memory to prevent hot motor restarts. Relay shall be capable of monitoring for motor single phasing with adjustable current unbalance of 20 to 50 percent, and incorporating a signal to an external device. They shall have a reset mechanism that resets on the upstroke only.] [ {They shall have remote reset capability} ] [ {24 VDC.} ] [ {120VAC.} ] [ {They shall provide 1 Normally Closed plus 1 Normally Open isolated contact.} ]

G. Starter shall be: (Choose only one of the following five types)

[ {1. Full voltage non-reversing, } consisting of one contactor and one overload relay assembled together.]

[ {2. Full voltage reversing type, } consisting of two contactors and one overload relay assembled together. The contactors shall be mechanically and electrically interlocked to prevent energizing both contactors simultaneously.]

[ {3. Two-speed, two-winding motor type, } consisting of two three pole contactors and two overload relays assembled together. The contactors shall be mechanically and electrically interlocked to prevent energizing both contactors simultaneously.]

[ {4. Two-speed, one-winding } {4. Variable torque } {4. Constant torque } {4. Constant horsepower } ] [ {motor type, with one five pole and one three pole contactor } and two overload relays assembled together. The contactors shall be mechanically and electrically interlocked to prevent energizing both contactors simultaneously.]

[ {5. Reduced voltage non-reversing, } {5. Closed transition auto-transformer } {5. Closed transition wye-delta } {5. Part winding } ] [ {type, consisting of fully assembled and self-contained components} .]

H. Starter shall be suitable for straight through wiring, with separate provision for control power connections at the L1 and L2 terminals.

1.06 SUBMITTALS

A. Manufacturer shall provide [quantity] copies of following documents to owner for review and evaluation:

1. Product Data on specified product;
2. Shop Drawings on specified product;

1.07 PROJECT RECORD DOCUMENTS

Maintain an up-to-date set of Contract documents. Note any and all revisions and deviations that are made during the course of the project.

1.08 OPERATION AND MAINTENANCE DATA

A. Manufacturer shall provide copies of installation, operation and maintenance procedures to owner in accordance with general requirements of Division 1 and Division 16.

SECTION 16482001  
NEMA MOTOR STARTERS (300 LINE)

B. Submit operation and maintenance data based on factory and field testing, operation and maintenance of specified product.

1.09 QUALITY ASSURANCE (QUALIFICATIONS)

A. Manufacturer shall have specialized in the manufacture and assembly of motor starters for [50] years.

B. Motor starters shall be listed and/or classified by Underwriters Laboratories in accordance with standards listed in Article 1.03 of this specification.

C. Manufacturer's Certificate of ISO 9000 Compliance.

D. Installer's Certificate of ISO 9000 Compliance.

<{E. Installer has specialized in installing motor starters with} {minimum}> < \_\_\_\_ years>  
<{documented} {experience.}>

1.10 REGULATORY REQUIREMENTS

1.11 MOCK-UPS (FIELD SAMPLES)

1.12 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products in accordance with recommended practices listed in manufacturer's Installation and Maintenance Manuals.

B. Deliver each motor starter in individual shipping cartons for ease of handling. Each starter shall be wrapped for protection.

C. Inspect and report concealed damage to carrier within specified time.

D. Store in a clean, dry space. Storage temperature shall be minus 30 to plus 65 degrees C. Maintain factory protection or cover with <{heavy canvas} {plastic}> to keep out dirt, water, construction debris, and traffic. (Heat enclosures to prevent condensation.)

E. Handle in accordance with NAED and manufacturer's written instructions to avoid damaging the motor starters, installed devices, and finish.

1.13 PROJECT CONDITIONS (SITE ENVIRONMENTAL CONDITIONS)

A. Follow [standard(s)] service conditions before, during and after motor starter installation.

B. [{Starters equipped with solid state overload} shall be ambient insensitive within an operating temperature range to minus 20 to plus 70 degrees C.

{Starters equipped with thermal bi-metallic overloads} are suitable for ambient temperatures outside of the enclosure from minus 25 to plus 40 degrees C. When contactor is energized, temperatures will be above outside ambient within the enclosure. Temperature rises inside the enclosure shall not exceed 65 degrees C for sizes 00 through 6 and 60 degrees C for sizes 7 through 9.]

C. Relative humidity: 95 percent non-condensing.

D. Maximum altitude: 6600 feet (2000 meters).

SECTION 16482001  
NEMA MOTOR STARTERS (300 LINE)

E. Mounting position: vertical.

1.14 SEQUENCING AND SCHEDULING

1.15 WARRANTY

A. Manufacturer warrants equipment to be free from defects in materials and workmanship for 1 year from date of installation or 18 months from date of purchase, whichever occurs first.

1.16 MAINTENANCE SERVICE

A. Furnish complete service and maintenance of NEMA motor starters for  $\{1\}\{5\}$  years from date of substantial completion.

B. Include \_\_\_\_\_.

1.17 EXTRA MATERIALS

A. Provide [quantity] of  $\langle\{\text{parts}\}\{\text{spares}\}\rangle$   $\langle\text{other}\rangle$  as indicated in drawings.

B. Provide  $\{2\}$   $\langle$  other  $\rangle$  of each size and rating of spare fuse.

C. Provide fuse cabinet.

1.18 FIELD MEASUREMENTS

A. Make all necessary field measurements to verify that equipment shall fit in allocated space in full compliance with minimum required clearances specified in National Electrical Code.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. General Electric Company products have been used as the basis for design. Other manufacturers' products of equivalent quality, dimensions and operating features may be acceptable, at the Engineer's discretion, if they comply with all requirements specified or indicated in these Contract documents.

2.02 MANUFACTURED ASSEMBLIES

A. Furnish [quantity] motor starters GE 300 Line (or equal).

2.03 COMPONENTS

Refer to Drawings for: actual layout and location of equipment and components; current ratings of devices, bus bars, and components; voltage ratings of devices, components and assemblies; and other required details.

A. Controller shall be  $\langle\{\text{open type}\}\{\text{housed in a NEMA}\}\{1\}\{3R\}\{4\}\{4X\}\{12\}\{\text{enclosure}\}\rangle$ .

**(NOTE:** Choose only one of the following four types of starters. For a starter, choose only one push-button and switch combination, the words "...and with...", and only one indicating light combination.)

$\langle\{\text{B. Enclosed full voltage non-reversing starter}\}\rangle$  shall be provided with  $\langle\{\text{start and stop push buttons}\}\{\text{hand-off-auto selector switch}\}\{\text{hand-off-auto selector switch and start push button}\}\{\text{off-on selector switch}\}\{\text{hand-off-auto keyed selector switch (key removable in off)}\}\}\{\text{and with}\}\rangle$

SECTION 16482001  
NEMA MOTOR STARTERS (300 LINE)

[{red on light (across coil).}{green on light (across coil).}{red on light (across coil) and green off light (NC auxiliary contact).}{red push-to-test on light (across coil).}{green push-to-test on light (across coil).}{red on light (NO auxiliary contact).}{green off light (NC auxiliary contact).}{red on light (NO auxiliary contact) and green off light (NC auxiliary contact).}{red push-to-test on light (across coil) and green push-to-test off light (NC auxiliary contact).}]

<{C. Enclosed full voltage reversing starter} shall be provided with >[{forward, reverse, and stop push buttons}{up, down, and stop push buttons}{open, close, and stop push buttons}{hand-off-auto and forward-reverse selector switches}{forward-off-reverse selector switch}] [{and with}] [{two red direction lights (across coils).}{two green direction lights (across coils).}{red and green direction lights (across coils).}{red and amber direction lights (across coils).}]

<{D. Enclosed two-speed starter} shall be provided with >[{fast, slow, and stop push buttons}{high, low, and off push buttons}{high and low push buttons and hand-off-auto selector switch}{fast and slow push buttons and hand-off-auto selector switch}{fast-slow and hand-off-auto selector switches}{high-low and hand-off-auto selector switches}{slow-off-fast selector switch}{low-off-high selector switch}{fast-off-slow-auto selector switch}{high-low-off-auto selector switch}] [{and with}] [{two red speed indicator lights (across coils).}{two green speed indicator lights (across coils).}{red and green speed indicator lights (across coils).}{red and amber speed indicator lights (across coils).}]

<{E. Enclosed reduced voltage starter} shall be provided with >[{start and stop push buttons}{hand-off-auto selector switch}{hand-off-auto selector switch and start and stop push buttons}] [{and with}] [{red on light (across coil).}{green on light (across coil).}{red on light (NO auxiliary contact).}{green on light (NO auxiliary contact).}{red on light (NO auxiliary contact) and green off light (NC auxiliary contact).}]

**NOTE** *Select either item F or item G below, not both.*

<{F. Control power transformer fusing shall be provided by two primary fuses plus one secondary fuse}. Control power transformer secondary voltage shall be >[{120 VAC.}{24 VAC.}]

<{G. Control power transformer fusing shall be provided by one secondary fuse.} Control power transformer secondary voltage shall be >[{120VAC.}{24 VAC.}]

H. Starter shall meet criteria for Type 2 protection when protected by time delay class J fuses.

2.04 FINISH

A. Painted enclosures shall meet the requirements of ANSI 61.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that motor starters are ready to install.

B. Verify field measurements are as <{shown on Drawings}{instructed by manufacturer}>.

3.02 LOCATION

3.03 INSTALLATION

Additional provisions and editing may be required for this part.

A. Starters shall be protected from chips and debris during installation.

SECTION 16482001  
NEMA MOTOR STARTERS (300 LINE)

B. All signal wiring to electronic overload should be shielded or twisted pair.

3.04 FIELD QUALITY CONTROL

A. Inspect installed motor starters for anchoring, alignment, grounding and physical damage.

B. Check tightness of all accessible mechanical and electrical connections <{with calibrated torque wrench}>. Minimum acceptable values are specified in manufacturer's instructions.

3.05 ADJUSTING

A. Adjust all <{circuit breakers}{, }{switches}{, }{access doors}{, }{operating handles}> for free <{mechanical}{ and / or }{electrical}> operation as described in manufacturer's instructions.

3.06 CLEANING

A. Clean interiors of <{switchboards}{, }{panels}{, }{separate enclosures}> to remove construction debris, dirt, shipping materials.

B. Repaint scratched or marred exterior surfaces to match original finish.

END OF SECTION