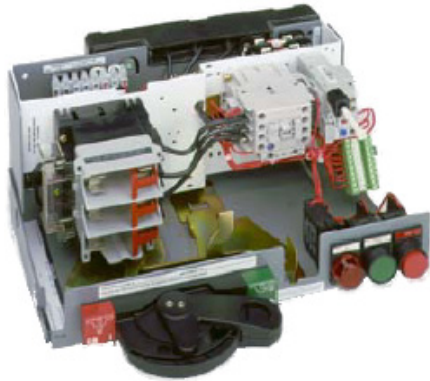


CENTERLINE® Motor Control Centers

Bulletin 2400 Application-Rated Units



Bulletin 2412
Full Voltage Non-Reversing Starter



Bulletin 2413
Full Voltage Non-Reversing Starter

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Publication 2400-PL001D-EN-P is a pricing publication for Bulletin 2400 Application-Rated Units for CENTERLINE Motor Control Centers

Publication Overview

Publication 2400-PL001D-EN-P is a pricing publication for Bulletin 2400 application-rated units for CENTERLINE motor control centers. Publication 2400-PL001D-EN-P is used in conjunction with publication 2100-PL001x-EN-P. Contact your local Rockwell Automation sales representative for copies.

Other Pricing Publications for CENTERLINE Motor Control Centers

| Publication | Title |
|---------------------------------|---|
| 2100-PL001x-EN-P ^[1] | <i>Bulletin 2100 CENTERLINE Motor Control Centers</i> |

[1] Publication numbers of this format contain a revision character (i.e., 2100-PL001G-EN-P). This character will increase alphabetically with successive revisions. Always order and use the latest revision available. The publication numbers that appear in this pricing publication use x, as a placeholder for the revision letter. When referencing and/or ordering always use the latest revision available.

Footnotes

While using this publication, please read all footnotes appearing in the tables and throughout the publication. Footnotes contain necessary information about the configuration and limitations of sections, units, and options being ordered.

UL/cUL Marking

CENTERLINE motor control centers (MCCs) are listed by Underwriters Laboratories, Inc. (file number E49289) as complying with Standard Safety UL 845 (UL) and either listed by Underwriters Laboratories, Inc. or certified by Canadian Standards Association (CSA) as complying with standard C22-2, No. 254.05 (cUL or CSA). CENTERLINE Motor Control Centers also meet the requirements in Mexican standard for MCCs, NMXJ-353-ANCE-2005. The MCC product, sections and units will therefore carry the respective marking unless otherwise indicated in the footnotes on the various pages in this publication.

ISO 9001 Certification

The facilities that develop and manufacture CENTERLINE motor control centers are located in Milwaukee and Richland Center, Wisconsin, Cambridge, Ontario, Canada and Tecate, Mexico. All facilities have been certified since 1992 as in conformance to the requirements of Quality Management System ISO 9001. These facilities presently are certified by Det Norske Veritas to ISO 9001: 2000, certificate number CERT-09379-2001-AQ-HOU-RvA/RAB R3, effective February 5, 2003

CE Marking

The European Union (EU) has established a program whereby products are tested and qualified to meet its harmonized standards and to fulfill the EN Directives. Upon completion of this testing and qualification, special documentation is required so the products may bear CE marking. Included with this program is the requirement for special instruction literature, product labeling, quality programs, special design requirements, etc. Generally, the Bulletin 2100 CENTERLINE motor control center product can fulfill these requirements, but due to the customization that is required, the CE marking of the product is available only on the Engineered delivery program. In case of variable frequency drives (as well as other solid-state devices), the EU deemed it necessary to add an EMC directive (89/336/EEC). This directive requires more stringent RF emission and immunity standards than normal. To meet these requirements and carry the CE mark, the Bulletin 2100 drive packages can be adapted with EMC tested RFI filters and additional shielding hardware. These special packages may require larger MCC enclosures. Note: The CE requirement is for the European Union/Community and is not a mandate for other parts of the world. For more information, visit <http://www.ab.com/certification/#cemark>.

IEC 60439

The Bulletin 2100 structures, Bulletin 2400 units and many Bulletin 2100 units fulfill IEC 60439 type tested assembly (TTA) and unit requirements. Should custom designs and modifications be required, these can be qualified to IEC 60439 as partially pre-tested assembly (PTTA) and unit requirements.

Other Resource Publications for CENTERLINE Motor Control Centers

| Publication | Title |
|------------------|--|
| 2100-TD027x-EN-P | CENTERLINE LV MCC Technical Data |
| 2100-SR003x-EN-P | CENTERLINE MCC Specification Checklist |
| 2400-SR001x-EN-P | IEC Specification Checklist |
| 2100-4.2 | Mains and Incoming Lines Dimension |
| 2100-IN012x-EN-P | Bulletin 2100/2400 User Manual |
| 2100-6.0.2 | Renewal Parts Publication |
| 2100-DD1 | Dimension Drawings |
| 2100-TD005x-EN-P | DeviceNet Specification Guide |
| 2100-TD019x-EN-P | DeviceNet Hardware Manual |

Contact your local Rockwell Automation sales representative, Allen-Bradley distributor or www.rockwellautomation.com/literature.

American Bureau of Shipping (ABS)

CENTERLINE motor control centers have fulfilled the requirements and are approved by the American Bureau of Shipping (certificate 99-SB55875-X). CENTERLINE MCCs do meet ABS shipping requirements, but due to required customization, ABS maritime shipping is available only on the Engineered program.

Seismic Applications

CENTERLINE MCCs meet the requirements for Uniform Building Code (UBC) Zone 4 seismic applications. Rollout Drive construction (Bulletins 2162P and 2163P) are not seismic rated.

NEMA Defined

NEMA—National Electrical Manufacturers Association.

NEMA Class

The following is a description of Class I, as paraphrased from NEMA standard ICS 3-1993: class I motor control centers shall consist of mechanical groupings of combination motor control units, feeder tap units, other units, and electrical devices arranged in a convenient assembly. They include connections from the common horizontal power bus to the units. They do not include interwiring or interlocking between units or to remotely mounted devices, nor do they include control system engineering. Only diagrams of the individual units are supplied.

NEMA Type

Class I motor control centers can be provided in NEMA Type A or B construction:

- Type A—User’s power and control connections are made directly to the device within the unit.
- Type B—Terminal blocks are supplied for user’s control termination in unit insert.

NEMA/IEC Enclosure Comparison

The following table is a comparison of Allen-Bradley Bulletin 2100 and 2400 NEMA enclosure type numbers to IEC Standard 60529, *Classification of Degrees of Protection Provided by Enclosures*. The comparison is based on data from tests conducted on the Bulletin 2100 enclosures and the NEMA enclosure type test requirements, which meet or exceed the IEC enclosure classification designation test requirements (i.e., the comparison is for Bulletin 2100 enclosures only).

| | |
|---|------|
| NEMA Type 1 vented (with or without gasketed doors) | IP20 |
| NEMA Type 1 vented with filters (with or without gasketed doors) | IP30 |
| NEMA Type 1 non-vented (without gasketed doors) | IP40 |
| NEMA Type 1 with drip hood = NEMA Type 2 (with or without gasketed doors) | IP41 |
| NEMA Type 3R | IP44 |
| NEMA Type 12 without bottom plates | IP53 |
| NEMA Type 12 with bottom plates | IP54 |
| NEMA Type 4 | IP65 |

NEMA Enclosure Type Descriptions

NEMA Type 1:

Type 1 units and sections are intended for indoor use, primarily to provide a degree of protection against contact with the enclosed equipment in locations where unusual service conditions do not exist. The enclosures are designed to meet the rod entry and rust resistance design tests. The enclosure is sheet steel, treated to resist corrosion.

NEMA Type 1 with gasketed doors (sometimes referred to as 1G):

Type 1 with gasketed unit doors are completely gasketed around the perimeter of the unit doors. All gasketing is closed cell neoprene.

NEMA Type 3R:

Non-walk-in front mounted only. Door-within-a-door construction. Type 3R units and sections are intended for outdoor use, primarily to provide a degree of protection against falling rain and to avoid damage from the formation of ice on the enclosure. They are designed to meet rod entry, rain, external icing, and rust resistance design tests. They are not intended to provide protection against conditions such as dust, internal condensation, or internal icing.

NEMA Type 4:

Non-walk-in front mounted only. Door-within-a-door construction. Type 4 units and sections are designed for indoor and outdoor use, primarily to provide protection against windblown dust and rain, splashing water, and hose-directed water. They are also designed to remain undamaged by the formation of ice on the enclosure. They are designed to meet hosedown, external icing, rod entry, and rust-resistance design tests. The enclosures are not designed to protect against internal condensation or internal icing.

NEMA Type 12 [1]:

Type 12 enclosures are intended for indoor use, primarily to provide a degree of protection against dust, falling dirt, and non-corrosive dripping liquids. They are designed to meet drip, dust, and rust resistance tests. They are not intended to provide protection against conditions such as internal condensation.

[1] This pricing publication refers to standard NEMA Type 12 design (i.e., standard sheet steel). For stainless steel NEMA Type 12 enclosures, Contact your local Rockwell Automation Sales Office.

Service and Storage Conditions

CENTERLINE MCCs conform to NEMA standard ICS I-1993 for service and storage conditions. All CENTERLINE MCCs should have an ambient operating temperature above 0°C but shall not exceed 40°C. If the equipment is stored, the ambient temperature shall be above -30°C but shall not exceed 65°C. In addition, CENTERLINE MCCs have an altitude class 2 km. The altitude class 2 Km designates equipment for installation where the altitude does not exceed 2,000 meters (6,600 feet). For installations above 2,000 meters, consult the your local Rockwell Automation Sales Office for derating requirements.

DeviceNet™ Products *DeviceNet*

Look for the DeviceNet logo throughout this book to find units and options that are DeviceNet ready for use in the IntelliCENTER or Bulletin 2100 DeviceNet MCCs. The components used in these units are DeviceNet compatible and ODVA certified. Also, the installation conforms to the rules and guidelines of *The Planning and Installation Manual for DeviceNet*.

The Bulletin 2100 DeviceNet system (power supply unit, built-in cabling system, unit cables, etc.) is UL and cUL listed and meets the requirements of a class 1 power limited circuit (in Canada, class 1 extra-low-voltage power circuit). Per NEC, this circuit is supplied from a source that has a rated output of not more than 30 volts and 1000 volt-amperes. The power supply unit has an 8A, 24V output and the DeviceNet cabling is rated 8A, 600V. See NEC Article 725 for more detailed information.

Refer to publication 2100-PL001x-EN-P, *CENTERLINE Motor Control Centers Pricing Publication*, for DeviceNet and IntelliCENTER MCC specifications and pricing.

Type 2 Protection

Short circuit coordination is defined in IEC 947-4-1.

Type 2 protection (also referred to as type 2 coordination) is obtainable when the fuses are specified and sized according to publication 100-2.8, *Certified Type “2” Short Circuit Coordination with Allen-Bradley Motor Starters*. Only type “1” coordination is available on other than specified fuses and circuit breaker units.

Motor Applications

The motor control center business has made engineering evaluations for the protective device (circuit breaker or fuse) selection, sizing, and setting range based on the protection rules/requirements and motor criteria as stipulated in NEC, NEMA, and UL standards (e.g., motor full load currents [FLC], X/R ratios, locked rotor currents, nominal utilization voltages, etc.). Should the motor application have criteria that deviate from those stated in the aforementioned standards, higher FLC and/or motor inrush currents (greater than 1300% or even 1700% of the nominal FLC) may be experienced (e.g., special motors, non-standard NEMA motors, energy efficient motors, design E motors, IEC type N motors, etc.). To address these cases, consult the NEC for selection guidance. Should additional guidance or information be needed, consult your local Rockwell Automation Sales Office.

Short Circuit Withstand

CENTERLINE Bulletin 2400 application-rated units offer a wide range of unit withstand ratings. The Bulletin 2400 units with circuit breakers offer a withstand rating ranging from 5,000 to 42,000 rms symmetrical amperes available. Bulletin 2400 units with fused disconnects offer a withstand rating of 100,000 rms symmetrical amperes available. When selecting the short circuit protective device, care should be taken to choose a unit with a higher short circuit withstand rating than the actual rms symmetrical fault current available at the installation.

Documentation

For assembled motor control centers, the customer is supplied with a copy of the motor control center layout and specification (Form 385) and publication 2100-IN012x-EN-P, *Bulletin 2100 CENTERLINE Motor Control Centers User Manual*. Publication 2100-IN040x-EN-P, *Receiving, Handling and Storing Motor Control Centers*, is attached to the outside packaging of each shipping block. Information on field termination and bus torquing instructions are located on the inside of each vertical wireway door. Documentation for individual units consists of a copy of the unit wiring diagram and installation instructions. This documentation may be located in a centralized wiring diagram holder or other location depending on configuration. Manuals for SMC units, AC drive units, PLC units, etc. are included in the diagram pocket of each MCC containing these products.

Up to three electronic documentation CDs can be also be provided at no additional cost for each motor control center. The CD contains the following:

- Equipment list (Elevation) drawings
- One-line diagrams
- Unit wiring diagrams
- Spare parts list
- User and installation manuals for Rockwell Automation products, supplied in the specific motor control center
- Test reporting

For other documentation, consult your local Rockwell Automation sales representative.

General Description

Bulletin 2400 motor control center units are application-rated products for both application-specific and global markets. They are built to the latest published NEMA, UL/cUL, and IEC standards, offering high density packaging (up to twelve [12] 30A full voltage contactors or 23A full voltage reversing or non-reversing starters can be plugged into a single vertical section) for applications where space and cost considerations are critical.

Bulletin 2400 units feature Allen-Bradley quality-built IEC rated devices, such as Bulletin 100 contactors, Bulletin 194R fused disconnect switches, and Bulletin 193 (E3, SMP-1, SMP-2, or MCS) overload relays. Like their NEMA rated Bulletin 2100 unit counterparts, Bulletin 2400 units can be ordered with a variety of options, including transformers, relays, and pilot devices (a maximum of three pilot devices can be specified in 0.5 space factor units). Units are installed and removed from CENTERLINE vertical sections easily, just like in Bulletin 2100 units.

The units are wired with #18 AWG control wire as standard. Optional #16 AWG control wire is available, requiring a minimum of 1.0 space factor when specified.

All Bulletin 2400 units have a unit lockout feature. When a padlock is used, this feature prevents the unit power stabs from being plugged into the vertical bus.

Post Shipment Support

- Field Service
- Repair & Modifications
- GMC Code 10 Authorization
- Domestic and International Renewal Parts Order Services
- Field Complaints
- Technical Issues
- Warranty Issues

CENTERLINE MCC:

Email: RAMCCSupport@ra.rockwell.com

Fax: 1-414-382-4045

Phone: 1-440-646-5800

Select Options 2, 5, 1 for Allen-Bradley Brand Products, Motor Control Centers, Hardware Support

IntelliCENTER MCC:

Email: RAICTechSupport@ra.rockwell.com

Fax: 1-414-382-0505

Phone: 1-440-646-5800

Select Options 2, 5, 2 for Allen-Bradley Brand Products, Motor Control Centers, IntelliCENTER Support

General Terms and Conditions of Sale

A copy of the general terms and conditions of sale for CENTERLINE Motor Control Centers can be obtained at www.rockwellautomation.com/termsofsale.

Ordering Information

All plug-in units and all miscellaneous hardware items must be specified by the complete and correct catalog number. **To order CENTERLINE vertical sections, refer to publication 2100-PL001x-EN-P.**

Bulletin 2400 half (0.5) space factor units only can be plugged into CENTERLINE MCC sections that are of Series E design or later. Units that are one (1.0) space factor or greater can be plugged into all previous series designs.

The first table below gives the history of series letter changes for structures and units since the original design of the Bulletin 2400 units.

Use the second table to determine additional parts required (if any) to install Bulletin 2400 units in your vertical section. Catalog numbers and pricing for retrofit kits are listed in the “Miscellaneous Hardware and Kits for Field Installations” section.

| Series Letter | Scope | Description of Change | Date Implemented in U.S. |
|---------------|---------------|---|--------------------------|
| A | All sizes | Original design | June 1990 |
| B | 18A, 24A, 30A | Changed to Series B, Bulletin 194R, 30A disconnect | March 1992 |
| C | 18A, 24A, 30A | Changed to (3) Bulletin 800E pilot devices on 0.5 space factor units | July 1992 |
| D | All sizes | New disconnect external auxiliary contacts and new 600A-1200A circuit breaker operating mechanism | February 1996 |
| | 16A-85A | Original design of units with a Bulletin 100-C device | September 1999 |

| If mounted in this type of NEMA section [1],[2] | Size of Bulletin 2400 Units | No Additional Parts Required | Requires Style 1 Unit Support Pan | Requires Style 3 (or 2) Unit Support Pan | Requires Style 3 Unit Support Pan w/ Bushing | Requires Alternate Top Horizontal Wireway Pan | Requires Door Gasketing Kit | Requires Retrofit Kit | Requires Ground Bus Kit |
|--|-----------------------------|------------------------------|-----------------------------------|--|--|---|-----------------------------|-----------------------|-------------------------|
| Type 1 Series A through D | 1.0 SF or larger | | ✓ | | | ✓ [3] | | | |
| Type 1 Series E through J | 0.5 SF [4] | | | | ✓ | | | ✓ | ✓ |
| | 1.0 SF or larger [5] | | | ✓ | | | | | ✓ |
| Type 1 Series K or later | 0.5 SF | ✓ | | | | | | | |
| | 1.0 SF or larger | ✓ | | | | | | | |
| Type 1 (w/ gasket) or Type 12 Series A through D | 1.0 SF or larger | | 4 | | | ✓ [3] | 4 | | |
| Type 1 (w/ gasket) or Type 12 Series E through J | 0.5 SF [4] | | | | ✓ | | | ✓ | ✓ |
| | 1.0 SF or larger [5] | | | ✓ | | | | | ✓ |
| Type 1 (w/ gasket) or Type 12 Series K or later | 0.5 SF | ✓ | | | | | | | |
| | 1.0 SF or larger | ✓ | | | | | | | |

[1] When installing a unit in the topmost location in a vertical section, care must be taken to comply with the National Electrical Code 6’7” (2.0 m) unit handle-to-floor height limitation. A unit operating handle extender (2100H-NE1) is available for compliance to this limitation. See Miscellaneous Hardware and Kits section beginning on page 32 of this publication.

[2] If Bulletin 2400 units are ordered unassembled or are ordered for existing sections, a centralized wiring diagram holder kit (2400H-WDH) should be ordered for each shipping split. See Miscellaneous Hardware and Kits section beginning on page 32 of this publication.

[3] Required only if 1.0 space factor (or larger) Bulletin 2400 unit is installed in topmost location of Series A-E vertical sections.

[4] A 0.5 space factor unit cannot be mounted in bottom-most 0.5 space factor of series E-J.

[5] Requires adding bonding jumper between the unit and the structure.

Choosing the Correct Contactor

Application Data

When selecting Bulletin 2400 application-rated motor control center units, it is important to properly size the contactor for the required application and desired electrical life. The life load curves on pages 8 and 9 are supplied to provide guidance in correctly sizing the contactors. For the enclosed ratings, see individual unit information. For additional contactor specifications, refer to publication 0100C-1.0.1, *MCS, The Modular Control System* or publication A11_, *Allen-Bradley Industrial Controls*.

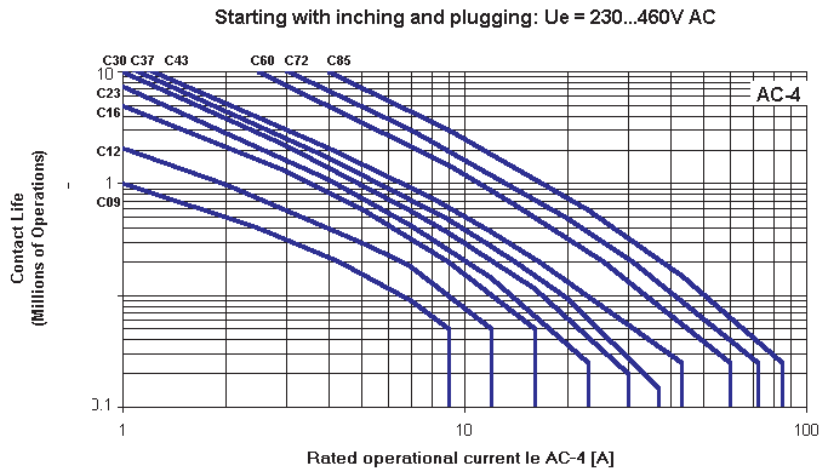
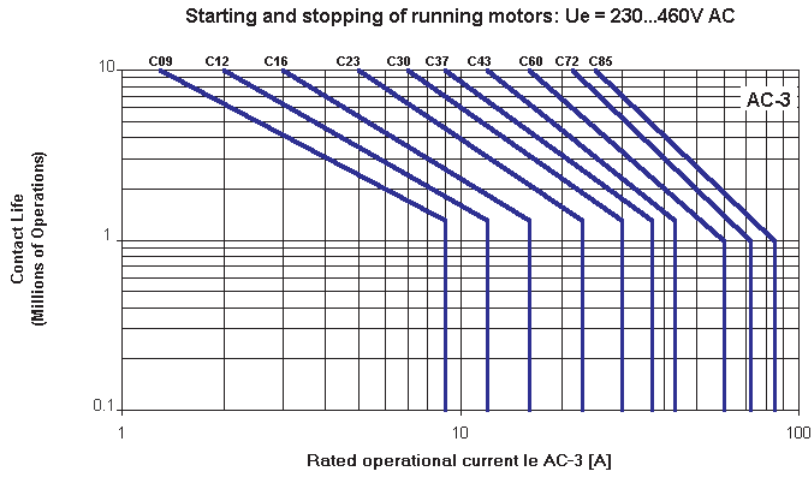
Estimated Electrical Life

Life Load Curves

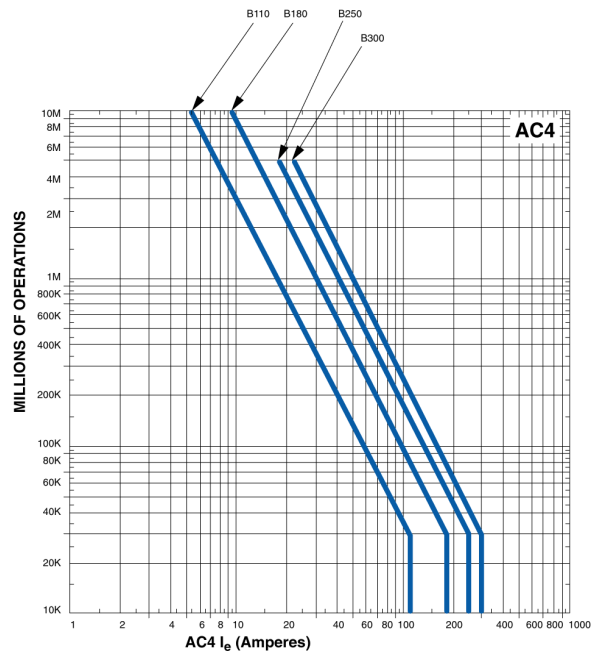
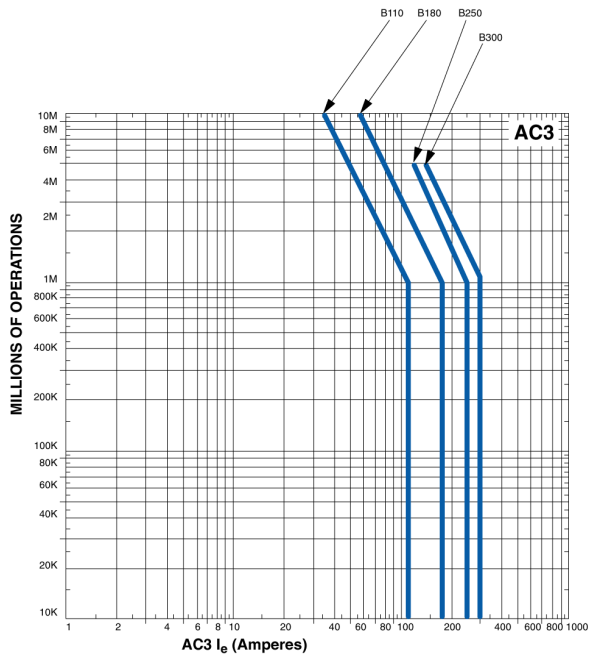
The Bulletin 100 IEC based contactors used in Bulletin 2400 MCC units are designed for superior performance in a wide variety of applications. When selecting IEC based products, the user must give consideration to the specific load, utilization category, and required electrical life of the application. The life load curves shown on pages 8 and 9 are based on Rockwell Automation tests according to the requirements defined in IEC 947. Since contact life in application conditions is dependent on environmental conditions and duty cycle, actual application contact life may vary from that indicated by the curves shown. To find the contactor's estimated electrical life, follow these guidelines:

1. Choose the appropriate graph for the utilization category. (Typical duty for each category is listed below.)
2. Find the operating current, I_e on the horizontal axis, for the contactor's application.
3. Find the number of operations desired on the vertical axis.
4. Find the point where the lines from 2 and 3 intersect. To determine the contactor size, pick the contactor life load curve that is nearest to the point of intersection.

| Category | Typical Duty |
|----------|---|
| AC1 | Non-inductive or slightly inductive loads (consult your local Rockwell Automation Sales Office for life curves) |
| AC2 | Starting of slip-ring motors (consult your local Rockwell Automation Sales Office for life curves) |
| AC3 | Starting of squirrel cage motors and switching off only after the motor is up to speed |
| AC4 | Starting of squirrel cage motors with inching and plugging duty (assuming locked rotor current $\leq 600\%$ of full load current) |



Life load curves used for sizing 16A-85A contactors or starters.
For additional information, refer to publication 0100C-1.0.1, *MCS, Modular Control System*.



Life load curves used for sizing 110A-300A contactors or starters.
 For additional information, refer to publication A11_, *Allen-Bradley Industrial Controls*.

Product Descriptions for Application-Rated 2400 Units

Bulletins 2402 and 2403—Combination Full Voltage Contactor Units (FVC)

These combination full voltage contactor units are supplied with Allen-Bradley Bulletin 100-C MCS contactors rated through 60A, 100-B contactors rated 110A through 300A, and either a fusible disconnect or a circuit breaker. Each application-rated unit is provided as a NEMA class I, type B-D unit with terminals mounted in the unit for connection to remote devices.

Bulletins 2406 and 2407—Combination Full Voltage Reversing Starter Units (FVR)

These combination full voltage reversing starter units are supplied with Allen-Bradley Bulletin 104-C MCS reversing contactors rated through 85A, Bulletin 104-B reversing contactors rated 110A through 304A, and either a fusible disconnect or a circuit breaker. The Bulletin 2406 and 2407 starters are application-rated and are mechanically and electronically interlocked to avoid both contactors being closed simultaneously. Each unit is provided as a NEMA class I, type B-D unit with terminals mounted in the unit for connection to remote devices. Full voltage reversing starter units are available with Bulletin 193-E MCS or Bulletin 193 E3 Basic and E3 Plus electronic overload relays for starters rated through 85A or Bulletin 193 Smart Motor Protectors (SMPs) for starters rated 110A through 304A.

Bulletins 2412 and 2413—Combination Full Voltage Non-Reversing Starter Units (FVNR)

These combination full voltage non-reversing starter units are supplied with Allen-Bradley Bulletin 100-C MCS non-reversing contactors rated through 85A, Bulletin 100-B non-reversing contactors rated 110A through 304A, and either a fusible disconnect or a circuit breaker. The full voltage non-reversing starters are application-rated and each unit is provided as a NEMA class I, type B-D unit with terminals mounted in the unit for connection to remote devices. Full voltage non-reversing starter units are available with Bulletin 193-E MCS and Bulletin 193 E3 Basic and E3 Plus electronic overload relays for starters rated through 85A or Bulletin 193 Smart Motor Protectors (SMPs) for starters rated 110A through 304A.

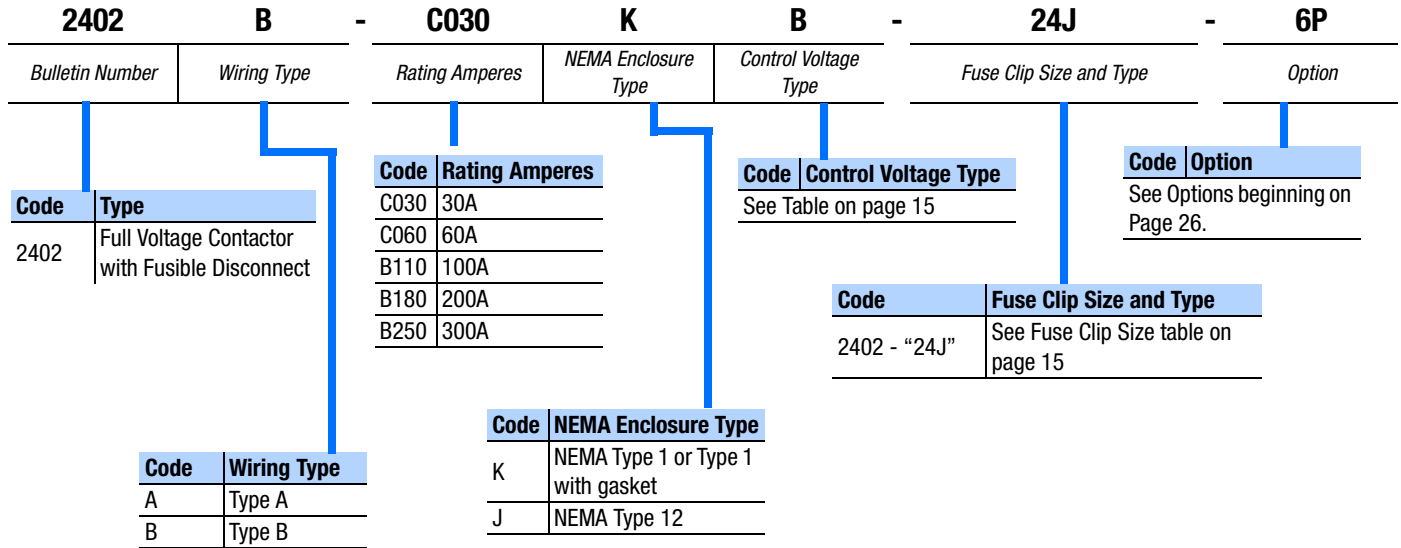
Please Read (*Important information for ordering units*)

- **Price Sections:** Price sections separately from unit (refer to publication 2100-PL001x-EN-P for section pricing).
- **Unit Prices:** Unit prices include unit, unit door, hinges, hinge pins, and unit support pan.
- **Certifications:** All units are UL listed and cUL certified unless otherwise indicated.
- **Overload Relays:** Starter units require the specification of an overload relay.
- **Wiring Type:** Units are available with either type A or type B-D wiring. Catalog numbers and prices are for type B-D wiring. To order type A wired units, substitute the letter A in the catalog number for the letter B, then deduct \$30 from the list price. For example, change 2402B-C030KBD-24J to 2402A-C030KBD-24J.

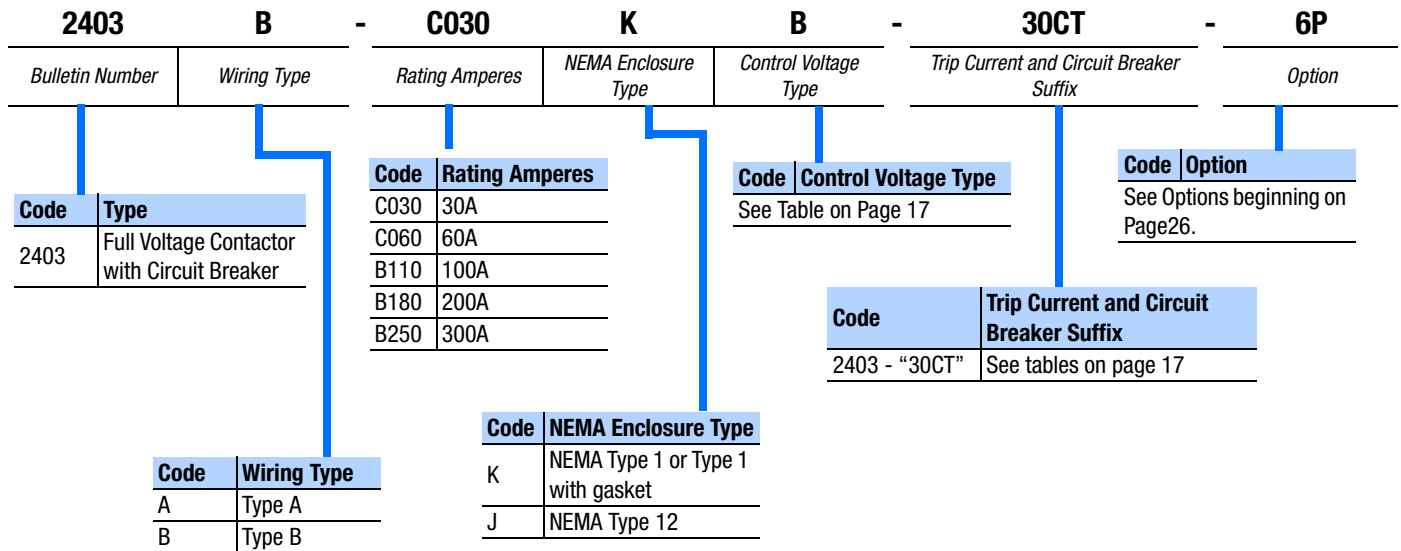
Catalog Number Explanation for 2400 Units

Option numbers added to catalog numbers are separated by a dash and listed in ascending order.

Full Voltage Contactor with Fusible Disconnect Switch



Full Voltage Contactor with Circuit Breaker



Catalog Number Explanation for 2400 Units

Option numbers added to catalog numbers are separated by a dash and listed in ascending order.

Full Voltage Reversing Starter with Fusible Disconnect Switch

| 2406 | | B | C030 | | A | B | 41-24J | | 7FEC1A | 6P |
|-----------------|---|----------------|-----------------------|----------------------|--|---------------------|-----------------------------------|--|--------|----|
| Bulletin Number | Wiring Type | Contactor Size | NEMA Enclosure Type | Control Voltage Type | Horsepower and Fuse Clip Size and Type | Overload Relay Code | Option | | | |
| Code | Type | Code | Contactor Size | Code | Control Voltage Type | Code | Option | | | |
| 2406 | Full Voltage Reversing Starter with Fusible Disconnect | C016 | 16A | A | See Control Voltage Table on Page 19 | 7FEC1A | See Options beginning on Page 26. | | | |
| | | C023 | 23A | K | | | | | | |
| | | C030 | 30A | D | | | | | | |
| | | C037 | 37A | J | | | | | | |
| | | C043 | 43A | | | | | | | |
| | | C060 | 60A | | | | | | | |
| | | C072 | 72A | | | | | | | |
| | | C085 | 85A | | | | | | | |
| | | B110 | 110A | | | | | | | |
| | | B180 | 180A | | | | | | | |
| | | B250 | 250A | | | | | | | |
| | | B300 | 304A | | | | | | | |
| | | | | | | | | | | |
| Code | Wiring Type | | | | | | | | | |
| A | Type A | | | | | | | | | |
| B | Type B | | | | | | | | | |
| Code | Horsepower and Fuse Clip Size and Type | | | | | | | | | |
| 2406 - "41-24J" | See tables on page 19 | | | | | | | | | |
| Code | NEMA Enclosure Type | | | | | | | | | |
| A | NEMA Type 1 or Type 1 with gasket with external reset button | | | | | | | | | |
| K | NEMA Type 1 or Type 1 with gasket without external reset button | | | | | | | | | |
| D | NEMA Type 12 with external reset button | | | | | | | | | |
| J | NEMA Type 12 without external reset button | | | | | | | | | |
| Code | Overload Relay Code | | | | | | | | | |
| 7FEC1A | See Overload Relay Option Code on page 29 | | | | | | | | | |

Full Voltage Reversing Starter with Circuit Breaker

| 2407 | | B | C030 | | A | B | 41CA | | 7FEC1A | 6P |
|-----------------|---|----------------|-----------------------|----------------------|---------------------------------------|---------------------|-----------------------------------|--|--------|----|
| Bulletin Number | Wiring Type | Contactor Size | NEMA Enclosure Type | Control Voltage Type | Horsepower and Circuit Breaker Suffix | Overload Relay Code | Option | | | |
| Code | Type | Code | Contactor Size | Code | Control Voltage Type | Code | Option | | | |
| 2407 | Full Voltage Reversing Starter with Circuit Breaker | C016 | 16A | A | See Control Voltage Table on Page 21 | 7FEC1A | See Options beginning on Page 26. | | | |
| | | C023 | 23A | K | | | | | | |
| | | C030 | 30A | D | | | | | | |
| | | C037 | 37A | J | | | | | | |
| | | C043 | 43A | | | | | | | |
| | | C060 | 60A | | | | | | | |
| | | C072 | 72A | | | | | | | |
| | | C085 | 85A | | | | | | | |
| | | B110 | 110A | | | | | | | |
| | | B180 | 180A | | | | | | | |
| | | B250 | 250A | | | | | | | |
| | | B300 | 304A | | | | | | | |
| | | | | | | | | | | |
| Code | Wiring Type | | | | | | | | | |
| A | Type A | | | | | | | | | |
| B | Type B | | | | | | | | | |
| Code | Horsepower and Circuit Breaker Suffix | | | | | | | | | |
| 2407 - "41CA" | See tables on page 21 | | | | | | | | | |
| Code | NEMA Enclosure Type | | | | | | | | | |
| A | NEMA Type 1 or Type 1 with gasket with external reset button | | | | | | | | | |
| K | NEMA Type 1 or Type 1 with gasket without external reset button | | | | | | | | | |
| D | NEMA Type 12 with external reset button | | | | | | | | | |
| J | NEMA Type 12 without external reset button | | | | | | | | | |
| Code | Overload Relay Code | | | | | | | | | |
| 7FEC1A | See Overload Relay Option Code on page 29 | | | | | | | | | |

Catalog Number Explanation for 2400 Units

Option numbers added to catalog numbers are separated by a dash and listed in ascending order.

Full Voltage Non-Reversing Starter with Fusible Disconnect Switch

| 2412 | B | - | C030 | A | B | - | 41-24J | - | 7FEC1A | - | 6P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|----------|-----------------------|--|---|----------|---|----------|----------------------------|----------|---------------|--|--|------|----------------|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|------|------|------|------|------|------|------|---|------|---------------------|---|--|---|---|---|---|---|--|---|------|----------------------|--------------------------------------|--|---|------|--|---------------|-----------------------|--|---|------|---------------------|--------|---|--|------|--------|-----------------------------------|--|
| <i>Bulletin Number</i> | <i>Wiring Type</i> | | <i>Contactor Size</i> | <i>NEMA Enclosure Type</i> | <i>Control Voltage Type</i> | | <i>Horsepower and Fuse Clip Size and Type</i> | | <i>Overload Relay Code</i> | | <i>Option</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>2412</td> <td>Full Voltage Non-Reversing Starter with Fusible Disconnect</td> </tr> </tbody> </table> | Code | Type | 2412 | Full Voltage Non-Reversing Starter with Fusible Disconnect | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Wiring Type</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Type A</td> </tr> <tr> <td>B</td> <td>Type B</td> </tr> </tbody> </table> | Code | Wiring Type | A | Type A | B | Type B | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Contactor Size</th> </tr> </thead> <tbody> <tr><td>C016</td><td>16A</td></tr> <tr><td>C023</td><td>23A</td></tr> <tr><td>C030</td><td>30A</td></tr> <tr><td>C037</td><td>37A</td></tr> <tr><td>C043</td><td>43A</td></tr> <tr><td>C060</td><td>60A</td></tr> <tr><td>C072</td><td>72A</td></tr> <tr><td>C085</td><td>85A</td></tr> <tr><td>B110</td><td>110A</td></tr> <tr><td>B180</td><td>180A</td></tr> <tr><td>B250</td><td>250A</td></tr> <tr><td>B300</td><td>304A</td></tr> </tbody> </table> | Code | Contactor Size | C016 | 16A | C023 | 23A | C030 | 30A | C037 | 37A | C043 | 43A | C060 | 60A | C072 | 72A | C085 | 85A | B110 | 110A | B180 | 180A | B250 | 250A | B300 | 304A | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>NEMA Enclosure Type</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>NEMA Type 1 or Type 1 with gasket with external reset button</td> </tr> <tr> <td>K</td> <td>NEMA Type 1 or Type 1 with gasket without external reset button</td> </tr> <tr> <td>D</td> <td>NEMA Type 12 with external reset button</td> </tr> <tr> <td>J</td> <td>NEMA Type 12 without external reset button</td> </tr> </tbody> </table> | Code | NEMA Enclosure Type | A | NEMA Type 1 or Type 1 with gasket with external reset button | K | NEMA Type 1 or Type 1 with gasket without external reset button | D | NEMA Type 12 with external reset button | J | NEMA Type 12 without external reset button | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Control Voltage Type</th> </tr> </thead> <tbody> <tr> <td colspan="2">See Control Voltage Table on Page 23</td> </tr> </tbody> </table> | Code | Control Voltage Type | See Control Voltage Table on Page 23 | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Horsepower and Fuse Clip Size and Type</th> </tr> </thead> <tbody> <tr> <td>2407 - "41CA"</td> <td>See tables on page 23</td> </tr> </tbody> </table> | Code | Horsepower and Fuse Clip Size and Type | 2407 - "41CA" | See tables on page 23 | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Overload Relay Code</th> </tr> </thead> <tbody> <tr> <td>7FEC1A</td> <td>See Overload Relay Option Code on page 29</td> </tr> </tbody> </table> | Code | Overload Relay Code | 7FEC1A | See Overload Relay Option Code on page 29 | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Option</th> </tr> </thead> <tbody> <tr> <td colspan="2">See Options beginning on Page 26.</td> </tr> </tbody> </table> | Code | Option | See Options beginning on Page 26. | |
| | Code | Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2412 | Full Voltage Non-Reversing Starter with Fusible Disconnect | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Code | Wiring Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | Type A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | Type B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Code | Contactor Size | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C016 | 16A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C023 | 23A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C030 | 30A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C037 | 37A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C043 | 43A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C060 | 60A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C072 | 72A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C085 | 85A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B110 | 110A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B180 | 180A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B250 | 250A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B300 | 304A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Code | NEMA Enclosure Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | NEMA Type 1 or Type 1 with gasket with external reset button | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| K | NEMA Type 1 or Type 1 with gasket without external reset button | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D | NEMA Type 12 with external reset button | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| J | NEMA Type 12 without external reset button | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Code | Control Voltage Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| See Control Voltage Table on Page 23 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Code | Horsepower and Fuse Clip Size and Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2407 - "41CA" | See tables on page 23 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Code | Overload Relay Code | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7FEC1A | See Overload Relay Option Code on page 29 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Code | Option | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| See Options beginning on Page 26. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Full Voltage Non-Reversing Starter with Circuit Breaker

| 2413 | B | - | C030 | A | B | - | 41CA | - | 7FEC1A | - | 6P | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|----------|-----------------------|---|---|----------|--|----------|----------------------------|----------|---------------|--|--|------|----------------|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|------|------|------|------|------|------|------|---|------|---------------------|---|--|---|---|---|---|---|--|---|------|----------------------|--------------------------------------|--|--|------|---------------------------------------|---------------|-----------------------|--|---|------|---------------------|--------|---|--|------|--------|-----------------------------------|--|
| <i>Bulletin Number</i> | <i>Wiring Type</i> | | <i>Contactor Size</i> | <i>NEMA Enclosure Type</i> | <i>Control Voltage Type</i> | | <i>Horsepower and Circuit Breaker Suffix</i> | | <i>Overload Relay Code</i> | | <i>Option</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>2413</td> <td>Full Voltage Non-Reversing Starter with Circuit Breaker</td> </tr> </tbody> </table> | Code | Type | 2413 | Full Voltage Non-Reversing Starter with Circuit Breaker | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Wiring Type</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Type A</td> </tr> <tr> <td>B</td> <td>Type B</td> </tr> </tbody> </table> | Code | Wiring Type | A | Type A | B | Type B | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Contactor Size</th> </tr> </thead> <tbody> <tr><td>C016</td><td>16A</td></tr> <tr><td>C023</td><td>23A</td></tr> <tr><td>C030</td><td>30A</td></tr> <tr><td>C037</td><td>37A</td></tr> <tr><td>C043</td><td>43A</td></tr> <tr><td>C060</td><td>60A</td></tr> <tr><td>C072</td><td>72A</td></tr> <tr><td>C085</td><td>85A</td></tr> <tr><td>B110</td><td>110A</td></tr> <tr><td>B180</td><td>180A</td></tr> <tr><td>B250</td><td>250A</td></tr> <tr><td>B300</td><td>304A</td></tr> </tbody> </table> | Code | Contactor Size | C016 | 16A | C023 | 23A | C030 | 30A | C037 | 37A | C043 | 43A | C060 | 60A | C072 | 72A | C085 | 85A | B110 | 110A | B180 | 180A | B250 | 250A | B300 | 304A | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>NEMA Enclosure Type</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>NEMA Type 1 or Type 1 with gasket with external reset button</td> </tr> <tr> <td>K</td> <td>NEMA Type 1 or Type 1 with gasket without external reset button</td> </tr> <tr> <td>D</td> <td>NEMA Type 12 with external reset button</td> </tr> <tr> <td>J</td> <td>NEMA Type 12 without external reset button</td> </tr> </tbody> </table> | Code | NEMA Enclosure Type | A | NEMA Type 1 or Type 1 with gasket with external reset button | K | NEMA Type 1 or Type 1 with gasket without external reset button | D | NEMA Type 12 with external reset button | J | NEMA Type 12 without external reset button | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Control Voltage Type</th> </tr> </thead> <tbody> <tr> <td colspan="2">See Control Voltage Table on Page 25</td> </tr> </tbody> </table> | Code | Control Voltage Type | See Control Voltage Table on Page 25 | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Horsepower and Circuit Breaker Suffix</th> </tr> </thead> <tbody> <tr> <td>2407 - "41CA"</td> <td>See tables on page 25</td> </tr> </tbody> </table> | Code | Horsepower and Circuit Breaker Suffix | 2407 - "41CA" | See tables on page 25 | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Overload Relay Code</th> </tr> </thead> <tbody> <tr> <td>7FEC1A</td> <td>See Overload Relay Option Code on page 29</td> </tr> </tbody> </table> | Code | Overload Relay Code | 7FEC1A | See Overload Relay Option Code on page 29 | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>Option</th> </tr> </thead> <tbody> <tr> <td colspan="2">See Options beginning on Page 26.</td> </tr> </tbody> </table> | Code | Option | See Options beginning on Page 26. | |
| | Code | Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2413 | Full Voltage Non-Reversing Starter with Circuit Breaker | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Code | Wiring Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | Type A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | Type B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Code | Contactor Size | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C016 | 16A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C023 | 23A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C030 | 30A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C037 | 37A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C043 | 43A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C060 | 60A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C072 | 72A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C085 | 85A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B110 | 110A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B180 | 180A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B250 | 250A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B300 | 304A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Code | NEMA Enclosure Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | NEMA Type 1 or Type 1 with gasket with external reset button | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| K | NEMA Type 1 or Type 1 with gasket without external reset button | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D | NEMA Type 12 with external reset button | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| J | NEMA Type 12 without external reset button | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Code | Control Voltage Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| See Control Voltage Table on Page 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Code | Horsepower and Circuit Breaker Suffix | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2407 - "41CA" | See tables on page 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Code | Overload Relay Code | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7FEC1A | See Overload Relay Option Code on page 29 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Code | Option | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| See Options beginning on Page 26. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Bulletin 2402

Combination Full Voltage Contactor with Fusible Disconnect (FVC)

Power fuses are NOT included.

For unit sizing, select the unit maximum continuous rating (amperes) based upon 125% of actual load amperes. Refer to NEC/CEC.

| Max. Cont. Rating (Amps) UL/cUL [1] | Transformer Primary Switching kVA [2] | | | | | | | | | | | | | | | | Space Factor [3] | Catalog Number [4] Wiring Type B-D—Class I | | Price | Delivery Program |
|-------------------------------------|---------------------------------------|-----|----------|------|------|-----|----------|-----|----------|------|----------|-----|------|-----|------|-----|------------------|---|-----------------|--------------|------------------|
| | 220V [5] | | 230V [5] | | 240V | | 380V [5] | | 400V [5] | | 415V [5] | | 480V | | 600V | | | NEMA Type 1/1G | NEMA Type 12 | | |
| | 1Ø | 3Ø | 1Ø | 3Ø | 1Ø | 3Ø | 1Ø | 3Ø | 1Ø | 3Ø | 1Ø | 3Ø | 1Ø | 3Ø | 1Ø | 3Ø | | | | | |
| 30 | 3.5 | 6.1 | 3.5 | 6.1 | 3.5 | 6.1 | 5.4 | 9.4 | 5.4 | 9.4 | 5.4 | 9.4 | 5.4 | 9.4 | 5.4 | 9.4 | 0.5 | 2402B-C030K_-_- | 2402B-C030J_-_- | \$645 | Engineered |
| 60 | 6.3 | 11 | 6.3 | 11 | 6.3 | 11 | 11 | 19 | 11 | 19 | 11 | 19 | 11 | 19 | 11 | 19 | 1.5 | 2402B-C060K_-_- | 2402B-C060J_-_- | 895 | |
| 100 | 11 | 19 | 11.5 | 19.9 | 12 | 21 | 19 | 33 | 20 | 34.7 | 21 | 36 | 24 | 42 | 30 | 52 | 2.0 | 2402B-B110K_-_- | 2402B-B110J_-_- | 1180 | |
| 200 | 21 | 37 | 21.9 | 38.7 | 23 | 40 | 36 | 63 | 38 | 66.3 | 40 | 69 | 46 | 80 | 52 | 90 | 2.5 | 2402B-B180K_-_- | 2402B-B180J_-_- | 2130 | |
| 300 | 29 | 51 | 30 | 53.3 | 39 | 67 | 50 | 88 | 53 | 92.6 | 55 | 96 | 77 | 134 | 87 | 150 | 4.0 | 2402B-B250K_-_- | 2402B-B250J_-_- | 4785 | |

- [1] Use continuous ampere ratings to size contactors for electric discharge loads (fluorescent, mercury vapor, sodium vapor, and metal halogen lamps), tungsten loads, and incandescent lamp loads. Lighting loads are limited to 300V or less.
IMPORTANT: Contactors for applications that use a power factor correction capacitor on the load (compensated load) must be sized using the information in publication 100-SG, MCS Modular Control System, for 30A-60A or publication A113, Allen-Bradley Industrial Controls, for 100A-300A contactors. **For loads containing high harmonic content, consult your local Rockwell Automation Sales Office.**
- [2] The transformers being switched by the contactor must not have inrush currents greater than 20 times the peak continuous current ratings, regardless of the nature of the secondary load.
- [3] When selecting certain options, a larger space factor may be required than is listed in this table. To determine actual space requirements, see Options section beginning on page 26 and related footnotes.
- [4] The catalog numbers listed are not complete:
 - Select the appropriate **control voltage code** from page 15 to identify the control type desired (e.g., 2402B-C030KBD).
 - Select the appropriate **fuse clip designator** from page 15 to identify the fuse clip size and type (e.g., 2402B-C030KBD-24J).
- [5] Units with these ratings are **NOT** UL listed or cUL certified.

BULLETIN 2402

Combination Full Voltage Contactor with Fusible Disconnect (FVC)

| Control Voltage Code | | | | | | | | Control Type |
|----------------------|------|------|------|------|------|------|------|--|
| 220V | 230V | 240V | 380V | 400V | 415V | 480V | 600V | |
| — | — | A | — | — | — | B | C | 120V, 60Hz Transformer Control ^[1] |
| — | — | AD | — | — | — | BD | CD | 120V, 60Hz Separate Control ^[2] |
| P | — | — | N | — | I | — | — | 110V, 50Hz Transformer Control ^{[1],[3]} |
| PS | — | — | NS | — | IS | — | — | 110V, 50Hz Separate Control ^[2] |
| — | P | — | — | KN | — | — | — | 115V, 50Hz Transformer Control ^{[1],[3]} |
| — | PS | — | — | KNS | — | — | — | 115V, 50Hz Separate Control ^[2] |
| — | — | — | NP | — | — | — | — | 220V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | NP | — | — | — | — | 220V, 50Hz Separate Control ^[2] |
| — | — | — | — | KNP | — | — | — | 230V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | — | KNP | — | — | — | 230V, 50Hz Separate Control ^[2] |
| — | — | — | — | — | IT | — | — | 240V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | — | — | IT | — | — | 240V, 50Hz Separate Control ^[2] |
| — | — | — | NLP | — | — | — | — | 220V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |
| — | — | — | — | KNLP | — | — | — | 230V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |
| — | — | — | — | — | ILT | — | — | 240V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |

- [1] Select and price a control circuit transformer. See Options section beginning on page 26.
- [2] Control circuit fusing (option 21) and/or disconnect interlock (option 98) may be required to comply with NEC/CEC. See Options section beginning on page 26.
- [3] Incorporates primary taps for future conversion to new global IEC voltage standards (e.g., 400V/115V/230V). Allows conversion without the need to replace transformers or coils.
- [4] Requires horizontal neutral bus and vertical neutral bus in 9" (228.60 mm) vertical wireway. Refer to publication 2100-PL001x-EN-P, "Section Modifications," to select and price.
- [5] Select and price control circuit fusing (option 21—see Options section beginning on page 26).

| Fuse Clip Size | Fuse Clip Type | Fuse Clip Designator |
|----------------|----------------|----------------------|
| 30 | CC | 24C |
| | J | 24J |
| 60 | J | 25J |
| 100 | J | 26J |
| 200 | J | 27J |
| 400 | J | 28J |

BULLETIN 2403

Combination Full Voltage Contactor with Circuit Breaker (FVC)

For unit sizing, select the unit maximum continuous rating (amperes) based upon 125% of actual load amperes. Refer to NEC/CEC.

| Max. Cont. Rating (Amps) UL/cUL [1] | Transformer Primary Switching kVA [2] | | | | | | | | | | | | | | | | Space Factor [3] | Catalog Number [4] Wiring Type B-D—Class I | | Price | Delivery Program |
|-------------------------------------|---------------------------------------|-----|----------|------|------|-----|----------|-----|----------|------|----------|-----|------|-----|------|-----|------------------|---|-----------------|--------------|------------------|
| | 220V [5] | | 230V [5] | | 240V | | 380V [5] | | 400V [5] | | 415V [5] | | 480V | | 600V | | | NEMA Type 1/1G | NEMA Type 12 | | |
| | 1Ø | 3Ø | 1Ø | 3Ø | 1Ø | 3Ø | 1Ø | 3Ø | 1Ø | 3Ø | 1Ø | 3Ø | 1Ø | 3Ø | 1Ø | 3Ø | | | | | |
| 30 | 3.5 | 6.1 | 3.5 | 6.1 | 3.5 | 6.1 | 5.4 | 9.4 | 5.4 | 9.4 | 5.4 | 9.4 | 5.4 | 9.4 | 5.4 | 9.4 | 0.5 | 2403B-C030K_-_- | 2403B-C030J_-_- | \$965 | Engineered |
| 60 | 6.3 | 11 | 6.3 | 11 | 6.3 | 11 | 11 | 19 | 11 | 19 | 11 | 19 | 11 | 19 | 11 | 19 | 1.5 | 2403B-C060K_-_- | 2403B-C060J_-_- | 1215 | |
| 100 | 11 | 19 | 11.5 | 19.9 | 12 | 21 | 19 | 33 | 20 | 34.7 | 21 | 36 | 24 | 42 | 30 | 52 | 2.0 | 2403B-B110K_-_- | 2403B-B110J_-_- | 1730 | |
| 200 | 21 | 37 | 21.9 | 38.7 | 23 | 40 | 36 | 63 | 38 | 66.3 | 40 | 69 | 46 | 80 | 52 | 90 | 2.5 | 2403B-B180K_-_- | 2403B-B180J_-_- | 3055 | |
| 300 | 29 | 51 | 30 | 53.3 | 39 | 67 | 50 | 88 | 53 | 92.6 | 55 | 96 | 77 | 134 | 87 | 150 | 3.5 | 2403B-B250K_-_- | 2403B-B250J_-_- | 6210 | |

- [1] Use continuous ampere ratings to size for electric discharge loads (fluorescent, mercury vapor, sodium vapor, and metal halogen lamps), tungsten loads, and incandescent lamp loads. Lighting loads are limited to 300V or less.
IMPORTANT: Contactors for applications that use a power factor correction capacitor on the load (compensated load) must be sized using the information in publication 0100C-1.0.1, MCS Modular Control System, for 30A-60A or publication A11_, Allen-Bradley Industrial Controls, for 100A-300A contactors. **For loads containing high harmonic content, consult your local Rockwell Automation Sales Office.**
- [2] The transformers being switched by the contactor must not have inrush currents greater than 20 times the peak continuous current ratings, regardless of the nature of the secondary load.
- [3] When selecting certain options, a larger space factor may be required than is listed in this table. To determine actual space requirements, see Options section beginning on page 26 and related footnotes.
- [4] The catalog numbers listed are not complete:
 - Select the appropriate **control voltage code** from page 17 to identify the control type desired (e.g., 2403B-C030KBD).
 - Select the appropriate **number** from page 17 to identify the trip current (e.g., 2403B-C030KBD-30).
 - Select the appropriate **circuit breaker suffix** from page 17 to identify the circuit breaker type (e.g., 2403B-C030KBD-30CT).
- [5] Units with these ratings are **NOT** UL listed or cUL certified.

BULLETIN 2403

Combination Full Voltage Contactor with Circuit Breaker (FVC)

| Control Voltage Code | | | | | | | | Control Type |
|----------------------|------|------|------|------|------|------|------|--|
| 220V | 230V | 240V | 380V | 400V | 415V | 480V | 600V | |
| — | — | A | — | — | — | B | C | 120V, 60Hz Transformer Control ^[1] |
| — | — | AD | — | — | — | BD | CD | 120V, 60Hz Separate Control ^[2] |
| P | — | — | N | — | I | — | — | 110V, 50Hz Transformer Control ^{[1],[3]} |
| PS | — | — | NS | — | IS | — | — | 110V, 50Hz Separate Control ^[2] |
| — | P | — | — | KN | — | — | — | 115V, 50Hz Transformer Control ^{[1],[3]} |
| — | PS | — | — | KNS | — | — | — | 115V, 50Hz Separate Control ^[2] |
| — | — | — | NP | — | — | — | — | 220V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | NP | — | — | — | — | 220V, 50Hz Separate Control ^[2] |
| — | — | — | — | KNP | — | — | — | 230V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | — | KNP | — | — | — | 230V, 50Hz Separate Control ^[2] |
| — | — | — | — | — | IT | — | — | 240V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | — | — | IT | — | — | 240V, 50Hz Separate Control ^[2] |
| — | — | — | NLP | — | — | — | — | 220V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |
| — | — | — | — | KNLP | — | — | — | 230V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |
| — | — | — | — | — | ILT | — | — | 240V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |

- [1] Select and price a control circuit transformer. See Options section beginning on page 26.
- [2] Control circuit fusing (option 21) and/or disconnect interlock (option 98) may be required to comply with NEC/CEC. See Options section beginning on page 26.
- [3] Incorporates primary taps for future conversion to new global IEC voltage standards (e.g., 400V/115V/230V). Allows conversion without the need to replace transformers or coils.
- [4] Requires horizontal neutral bus and vertical neutral bus in 9" (228.60 mm) vertical wireway. Refer to publication 2100-PL001x-EN-P, Section Modifications, to select and price.
- [5] Select and price control circuit fusing (option 21 in Options section beginning on page 30).

| Contactor Rating (Amps) | Number | Trip Current (Amps) | Contactor Rating (Amps) | Number | Trip Current (Amps) |
|-------------------------|--------|---------------------|-------------------------|--------|---------------------|
| 30 | 30 | 15 | 100 or 200 | 40 | 100 |
| | 31 | 20 | | | |
| 30 or 60 | 32 | 30 | 200 or 300 | 41 | 125 |
| | | | | 42 | 150 |
| | | | | 43 | 175 |
| | | | | 44 | 200 |
| 60 or 100 | 34 | 40 | 300 | 45 | 225 |
| | | | | 35 | 250 |
| | | | | 36 | 300 |
| | | | | 48 | 300 |

| Rating (Amperes) | Standard Interrupting Capacity ^[1] | | | Medium Interrupting Capacity ^[1] | | | High Interrupting Capacity ^[1] | | |
|------------------|---|-----|-----|---|----|-------|---|-----|-------|
| | CT | FDB | STD | CB | FD | \$190 | CM | HFD | \$285 |
| 30-60 | CT | FDB | STD | CB | FD | \$190 | CM | HFD | \$285 |
| 100 | CT | FDB | STD | CB | FD | 410 | CM | HFD | 600 |
| 200 | CT | JD | STD | — | — | — | CM | HJD | 1520 |
| 300 | CT | KD | STD | — | — | — | CM | HKD | 1525 |

[1] See Appendix (page 34) for circuit breaker interrupting capacity and short circuit withstand ratings. Non-interchangeable circuit breakers.

BULLETIN 2406

Combination Full Voltage Reversing Starter with Fusible Disconnect Switch (FVR)

Power fuses are **NOT** included.

| Starter Size (Amps) UL/ cUL | Nominal Horsepower (Nominal kW) The horsepower and kW ratings shown are nominal. | | | | | Fuse Clip | | Space Factor [1] | Catalog Number [2] Wiring Type B-D—Class I | | Price | Delivery Program |
|--------------------------------------|--|-----------|--------------|----------|----------|-------------------|----------------|---------------------|---|-----------------|--------------|---------------------|
| | Line Voltage | | | | | Size (Amperes) | Type [3] | | NEMA Type 1/1G | NEMA Type 12 | | |
| | 220-230V [4] | 240V | 380-415V [4] | 480V | 600V | | | | | | | |
| 16 | (0.12-5.5) | 0.125-5 | (0.12-7.5) | 0.125-10 | 0.125-10 | 30 | CC, J, HRCII-C | 0.5 | 2406B-C016A_ _ | 2406B-C016D_ _ | \$830 | Engineered |
| | | | | | | 60 | J, HRCII-C | 1.0 | | | | |
| 23 | (0.12-7.5) | 0.125-7.5 | (0.12-11) | 0.125-15 | 0.125-15 | 30 | CC, J, HRCII-C | 0.5 | 2406B-C023A_ _ | 2406B-C023D_ _ | 920 | |
| | | | | | | 60 | J, HRCII-C | 1.0 | | | | |
| 30 | (5.5-7.5) | 7.5-10 | (11-15) | 15-20 | 15-20 | 30, 60 | J, HRCII-C | 1.0 | 2406B-C030A_ _ | 2406B-C030D_ _ | 1190 | |
| 37 | (5.5-11) | 7.5-10 | (11- 18.5) | 15-25 | 15-25 | 30, 60, 100 | J, HRCII-C | 1.0 | 2406B-C037A_ _ | 2406B-C037D_ _ | 1465 | |
| 43 | (5.5-11) | 7.5-15 | (11-22) | 15-30 | 15-30 | 30, 60, 100 | J, HRCII-C | 1.5 | 2406B-C043A_ _ | 2406B-C043D_ _ | 1635 | |
| 60 | (7.5-18.5) | 10-20 | (15-30) | 20-40 | 25-40 | 60, 100, 200 | J, HRCII-C | 2.0 | 2406B-C060A_ _ | 2406B-C060D_ _ | 2065 | |
| 72 | (7.5-22) | 10-25 | (15-37) | 20-50 | 25-50 | 60, 100, 200 | | | 2406B-C072A_ _ | 2406B-C072D_ _ | 2345 | |
| 85 | (7.5-22) | 10-30 | (15-37) | 20-50 | 25-50 | 60, 100, 200 | J, HRCII-C | 2.0 | 2406B-C085A_ _ | 2406B-C085D_ _ | 2575 | |
| | | | | | | 100, 200 | J, HRCII-C | | 2.5 | 2406B-C085A_ _ | | |
| | — | — | (45) | 60 | 60 | 400 | J | | | | | |
| 110 | (30) | 30-40 | (45-55) | 60-75 | 60-100 | 100, 200 | J, HRCII-C | 3.0 | 2406B-B110A_ _ | 2406B-B110D_ _ | 4005 | |
| | | | | | | 400 | J | | | | | |
| 180 | (30-45) | 50-60 | (55-90) | 100-125 | 125-150 | 200 | J, HRCII-C | 3.5 | 2406B-B180A_ _ | 2406B-B180D_ _ | 6200 | |
| | | | | | | 400 | J | | | | | |
| | | | | | | 400 | J, HRCII-C | | | | | |
| 250 | (37-75) | 75-100 | (75-132) | 200 | 200-250 | 400 | J, HRCII-C | 4.0 | 2406B-B250A_ _ | 2406B-B250D_ _ | 7710 | |
| | | | | | | 600 | J | | | | | |
| 304 [5] | (90) | — | (150-160) | 250 | 300 | 400 | J, HRCII-C | 4.0 | 2406B-B300A_ _ | 2406B-B300D_ _ | 12360 | |
| | | | | | | 600 | J | | | | | |

[1] When selecting certain options, a larger space factor may be required than is listed in this table. To determine actual space requirements, see Options section beginning on page 26 and related footnotes.

[2] The catalog numbers listed are not complete:

- Select the appropriate **control voltage code** from page 19 to identify the control type desired (e.g., 2406B-C016ABD).
- If horsepower rated, select the **number** from page 19 that corresponds to the nominal horsepower desired (e.g., 2406B-C016ABD-41).
- If kW rated, select the **number** from page 19 that corresponds to the nominal kW desired (e.g., 2406B-C016ABD-41K).
- Select the appropriate **fuse clip designator** from page 19 to identify the fuse clip size and type (e.g., 2406B-C016ABD-41-24J).
- Select the appropriate **code** from page 29 to identify the overload relay size (e.g., 2406B-C016ABD-41-24J-7FEA4H).
- The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers **without** the external reset button, replace the letter “A” with the letter “K” (e.g., 2406B-C016K_ _) or replace the letter “D” with the letter “J” (e.g., 2406B-C016J_ _).

[3] HRCII-C fuses are available in Canada only and are **NOT** UL listed.

[4] Units with these ratings are **NOT** UL listed or cUL certified.

[5] 600A vertical bus is required.

BULLETIN 2406

Combination Full Voltage Reversing Starter with Fusible Disconnect Switch (FVR)

| Control Voltage Code | | | | | | | | Control Type |
|----------------------|------|------|------|------|------|------|------|--|
| 220V | 230V | 240V | 380V | 400V | 415V | 480V | 600V | |
| — | — | A | — | — | — | B | C | 120V, 60Hz Transformer Control ^[1] |
| — | — | AD | — | — | — | BD | CD | 120V, 60Hz Separate Control ^[2] |
| P | — | — | N | — | I | — | — | 110V, 50Hz Transformer Control ^{[1],[3]} |
| PS | — | — | NS | — | IS | — | — | 110V, 50Hz Separate Control ^[2] |
| — | P | — | — | KN | — | — | — | 115V, 50Hz Transformer Control ^{[1],[3]} |
| — | PS | — | — | KNS | — | — | — | 115V, 50Hz Separate Control ^[2] |
| — | — | — | NP | — | — | — | — | 220V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | NP | — | — | — | — | 220V, 50Hz Separate Control ^[2] |
| — | — | — | — | KNP | — | — | — | 230V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | — | KNP | — | — | — | 230V, 50Hz Separate Control ^[2] |
| — | — | — | — | — | IT | — | — | 240V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | — | — | IT | — | — | 240V, 50Hz Separate Control ^[2] |
| — | — | — | NLP | — | — | — | — | 220V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |
| — | — | — | — | KNLP | — | — | — | 230V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |
| — | — | — | — | — | ILT | — | — | 240V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |

- [1] Select and price a control circuit transformer. See Options section beginning on page 26.
- [2] Control circuit fusing (option 21) and/or disconnect interlock (option 98) may be required to comply with NEC/CEC. See Options section beginning on page 26.
- [3] Incorporates primary taps for future conversion to new global IEC voltage standards (e.g., 400V/115V/230V). Allows conversion without the need to replace transformers or coils.
- [4] Requires horizontal neutral bus and vertical neutral bus in 9" (228.60 mm) vertical wireway. Refer to publication 2100-PL001x-EN-P, "Section Modifications," to select and price.
- [5] Select and price control circuit fusing (option 21—see Options section beginning on page 26).

**Numerical Values Assigned to Horsepower Ratings
(Applicable to 240V, 480V, and 600V only)**

| Horsepower | Number | Horsepower | Number |
|------------|--------|------------|--------|
| 0.125 | 30 | 20 | 43 |
| 0.25 | 31 | 25 | 44 |
| 0.33 | 32 | 30 | 45 |
| 0.5 | 33 | 40 | 46 |
| 0.75 | 34 | 50 | 47 |
| 1 | 35 | 60 | 48 |
| 1.5 | 36 | 75 | 49 |
| 2 | 37 | 100 | 50 |
| 3 | 38 | 125 | 51 |
| 5 | 39 | 150 | 52 |
| 7.5 | 40 | 200 | 54 |
| 10 | 41 | 250 | 56 |
| 15 | 42 | 300 | 57 |

**Numerical Values Assigned to kW Ratings
(Applicable to 220V, 230V, and 380-415V only)**

| kW | Number | kW | Number |
|------|--------|------|--------|
| 0.12 | 30K | 15 | 43K |
| 0.18 | 31K | 18.5 | 44K |
| 0.25 | 32K | 22 | 45K |
| 0.37 | 33K | 30 | 46K |
| 0.55 | 34K | 37 | 47K |
| 0.75 | 35K | 45 | 48K |
| 1.1 | 36K | 55 | 49K |
| 1.5 | 37K | 75 | 50K |
| 2.2 | 38K | 90 | 51K |
| 3.7 | 39K | 110 | 52K |
| 5.5 | 40K | 132 | 53K |
| 7.5 | 41K | 150 | 54K |
| 11 | 42K | 160 | 55K |

| Fuse Clip Size (amperes) ^[1] | Fuse Clip Type ^[2] | Fuse Clip Designator |
|---|-------------------------------|----------------------|
| 30 | CC | 24C |
| | J | 24J |
| | HRCII-C | 24E |
| 60 | J | 25J |
| | HRCII-C | 25E |
| 100 | J | 26J |
| | HRCII-C | 26E |
| 200 | J | 27J |
| | HRCII-C | 27E |
| 400 | J | 28J |
| | HRCII-C | 28E |
| 600 | J | 29J |

- [1] For combination unit short circuit withstand rating, see Appendix on page 34.
- [2] HRCII-C fuses are available in Canada only and are NOT UL listed.

BULLETIN 2407

Combination Full Voltage Reversing Starter with Circuit Breaker (FVR)

| Starter Size (Amps) UL/ cUL | Nominal Horsepower (Nominal kW) The horsepower and kW ratings shown are nominal. | | | | | Space Factor ^[1] | Catalog Number ^[2] Wiring Type B-D—Class I | | Price | Delivery Program |
|--------------------------------------|--|-----------|-------------------------|----------|----------|--------------------------------|--|-----------------|----------------|---------------------|
| | Line Voltage | | | | | | NEMA Type 1/1G | NEMA Type 12 | | |
| | 220-230V ^[3] | 240V | 380-415V ^[3] | 480V | 600V | | | | | |
| 16 | (0.12-5.5) | 0.125-5 | (0.12-7.5) | 0.125-10 | 0.125-10 | 0.5 | 2407B-C016A_ _ | 2407B-C016D_ _ | \$1030 | Engineered |
| 23 | (0.12-7.5) | 0.125-7.5 | (0.12-11) | 0.125-15 | 0.125-15 | 0.5 | 2407B-C023A_ _ | 2407B-C023D_ _ | 1120 | |
| 30 | (5.5-7.5) | 7.5-10 | (11-15) | 15-20 | 15-20 | 1.0 | 2407B-C030A_ _ | 2407B-C030D_ _ | 1390 | |
| 37 | (5.5-11) | 7.5-10 | (11-18.5) | 15-25 | 15-25 | 1.0 | 2407B-C037A_ _ | 2407B-C037D_ _ | 1665 | |
| 43 | (5.5-11) | 7.5-15 | (11-22) | 15-30 | 15-30 | | 2407B-C043A_ _ | 2407B-C043D_ _ | 1985 | |
| 60 | (7.5-18.5) | 10-20 | (15-30) | 20-40 | 25-40 | 1.5 | 2407B-C060A_ _ | 2407B-C060D_ _ | 2415 | |
| 72 | (7.5-22) | 10-25 | (15-37) | 20-50 | 25-50 | | 2407B-C072A_ _ | 2407B-C072D_ _ | 2695 | |
| 85 | (7.5-22) | 10-30 | (15-45) | 20-60 | 25-60 | 1.5 | 2407B-C085A_ _ | 2407B-C085D_ _ | 3500 | |
| 110 | (30) | 30-40 | (45-55) | 60-75 | 60-100 | 2.0 ^[4] | 2407B-B110A_ _ | 2407B-B110D_ _ | 4405 | |
| 180 | (30) | 50 | — | 100 | 125 | 2.5 ^[4] | 2407B-B180A_ _ | 2407B-B180D_ _ | 6600 | |
| | (45) | 60 | (55-90) | 125-150 | 150 | | 3.0 | 2407B-B180A_ _ | 2407B-B180D_ _ | |
| 250 | (37-75) | 75-100 | (75-132) | 200 | 200-250 | 3.5 | 2407B-B250A_ _ | 2407B-B250D_ _ | 8610 | |
| 304 ^[5] | (90) | — | (150-160) | 250 | 300 | 4.0 | 2407B-B300A_ _ | 2407B-B300D_ _ | 13560 | |

[1] When selecting certain options, a larger space factor may be required than is listed in this table. To determine actual space requirements, see Options section beginning on page 26 and related footnotes.

[2] The catalog numbers listed are not complete:

- Select the appropriate **control voltage code** from page 21 to identify the control type desired (e.g., 2407B-C016ABD).
- If horsepower rated, select the **number** from page 21 that corresponds to the nominal horsepower desired (e.g., 2407B-C016ABD-41).
- If kW rated, select the **number** from page 21 that corresponds to the nominal kW desired (e.g., 2407B-C016ABD-41K).
- Select the appropriate **suffix letter** from page 21 to identify the circuit breaker type (e.g., 2407B-C016ABD-41CA or 2407B-C016ABD-41KCA).
- Select the appropriate **code** from page 29 to identify the overload relay size (e.g., 2407B-C016ABD-41CA-7FEA4H).
- The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers **without** the external reset button, replace the letter "A" with the letter "K" (e.g., 2407B-C016K_ _) or replace the letter "D" with the letter "J" (e.g., 2407B-C016J_ _).

[3] Units with these ratings are **NOT** UL listed or cUL certified.

[4] When selecting circuit breaker type CT or CM, add 0.5 space factor.

[5] 600A vertical bus is required.

BULLETIN 2407

Combination Full Voltage Reversing Starter with Circuit Breaker (FVR)

| Control Voltage Code | | | | | | | | Control Type |
|----------------------|------|------|------|------|------|------|------|--|
| 220V | 230V | 240V | 380V | 400V | 415V | 480V | 600V | |
| — | — | A | — | — | — | B | C | 120V, 60Hz Transformer Control ^[1] |
| — | — | AD | — | — | — | BD | CD | 120V, 60Hz Separate Control ^[2] |
| P | — | — | N | — | I | — | — | 110V, 50Hz Transformer Control ^{[1],[3]} |
| PS | — | — | NS | — | IS | — | — | 110V, 50Hz Separate Control ^[2] |
| — | P | — | — | KN | — | — | — | 115V, 50Hz Transformer Control ^{[1],[3]} |
| — | PS | — | — | KNS | — | — | — | 115V, 50Hz Separate Control ^[2] |
| — | — | — | NP | — | — | — | — | 220V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | NP | — | — | — | — | 220V, 50Hz Separate Control ^[2] |
| — | — | — | — | KNP | — | — | — | 230V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | — | KNP | — | — | — | 230V, 50Hz Separate Control ^[2] |
| — | — | — | — | — | IT | — | — | 240V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | — | — | IT | — | — | 240V, 50Hz Separate Control ^[2] |
| — | — | — | NLP | — | — | — | — | 220V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |
| — | — | — | — | KNLP | — | — | — | 230V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |
| — | — | — | — | — | ILT | — | — | 240V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |

- [1] Select and price a control circuit transformer. See Options section beginning on page 26.
- [2] Control circuit fusing (option 21) and/or disconnect interlock (option 98) may be required to comply with NEC/CEC. See Options section beginning on page 26.
- [3] Incorporates primary taps for future conversion to new global IEC voltage standards (e.g., 400V/115V/230V). Allows conversion without the need to replace transformers or coils.
- [4] Requires horizontal neutral bus and vertical neutral bus in 9" (228.60 mm) vertical wireway. Refer to publication 2100-PL001x-EN-P, Section Modifications, to select and price.
- [5] Select and price control circuit fusing (option 21—see Options section beginning on page 26).

**Numerical Values Assigned to Horsepower Ratings
(Applicable to 240V, 480V, and 600V only)**

| Horsepower | Number | Horsepower | Number |
|------------|--------|------------|--------|
| 0.125 | 30 | 20 | 43 |
| 0.25 | 31 | 25 | 44 |
| 0.33 | 32 | 30 | 45 |
| 0.5 | 33 | 40 | 46 |
| 0.75 | 34 | 50 | 47 |
| 1 | 35 | 60 | 48 |
| 1.5 | 36 | 75 | 49 |
| 2 | 37 | 100 | 50 |
| 3 | 38 | 125 | 51 |
| 5 | 39 | 150 | 52 |
| 7.5 | 40 | 200 | 54 |
| 10 | 41 | 250 | 56 |
| 15 | 42 | 300 | 57 |

**Numerical Values Assigned to kW Ratings
(Applicable to 220V, 230V, and 380-415V only)**

| kW | Number | kW | Number |
|------|--------|------|--------|
| 0.12 | 30K | 15 | 43K |
| 0.18 | 31K | 18.5 | 44K |
| 0.25 | 32K | 22 | 45K |
| 0.37 | 33K | 30 | 46K |
| 0.55 | 34K | 37 | 47K |
| 0.75 | 35K | 45 | 48K |
| 1.1 | 36K | 55 | 49K |
| 1.5 | 37K | 75 | 50K |
| 2.2 | 38K | 90 | 51K |
| 3.7 | 39K | 110 | 52K |
| 5.5 | 40K | 132 | 53K |
| 7.5 | 41K | 150 | 54K |
| 11 | 42K | 160 | 55K |

| | | Starter Size | Suffix | Frame | Adder |
|---|---|--------------|--------|--------------|--------------|
| Instantaneous (Magnetic only) Circuit Breaker | High Interrupting Capacity ^[1] | 16A-180A | CA | HMCP | STD |
| | | 180A-250A | CA | HMCP 250-400 | STD |
| | | 304A | CA | HMCP 600 | STD |
| Inverse Time (Thermal Magnetic) Circuit Breaker | Standard Interrupting Capacity ^[1] | 16A-85A | CT | FDB | \$120 |
| | | 110A-250A | CT | JD | 525 |
| | | 180A-250A | CT | KD | 525 |
| | | 304A | CT | LD | 1365 |
| | High Interrupting Capacity ^[1] | 16A-85A | CM | HFD | 405 |
| | | 110A-250A | CM | HJD | 2045 |
| | | 180A-250A | CM | HKD | 2045 |
| | 304A | CM | HLD | 2250 | |

[1] For combination unit short circuit withstand rating, see Appendix on page 34.

BULLETIN 2412

Combination Full Voltage Non-Reversing Starter with Fusible Disconnect Switch (FVNR)

Power fuses are NOT included.

| Starter Size (Amps) UL/cUL | Nominal Horsepower (Nominal kW) The horsepower and kW ratings shown are nominal. | | | | | Fuse Clip | | Space Factor [1] | Catalog Number [2] Wiring Type B-D—Class I | | Price | Delivery Program |
|----------------------------|---|------------|--------------|------------|----------|----------------|---------------|------------------|---|----------------|-------|------------------|
| | 220-230V [3] | 240V | 380-415V [3] | 480V | 600V | Size (Amperes) | Type [4] | | NEMA Type 1/1G | NEMA Type 12 | | |
| | 16 | (0.12-5.5) | 0.125-5 | (0.12-7.5) | 0.125-10 | 0.125-10 | 30 | | CC,J, HRCII-C | 0.5 | | |
| | | | | | | 60 | J, HRCII-C | 1.0 | | | | |
| 23 | (0.12-7.5) | 0.125-7.5 | (0.12-11) | 0.125-15 | 0.125-15 | 30 | CC,J, HRCII-C | 0.5 | 2412B-C023A_ _ | 2412B-C023D_ _ | 710 | |
| | | | | | | 60 | J, HRCII-C | 1.0 | | | | |
| 30 | (5.5-7.5) | 7.5-10 | (11-15) | 15-20 | 15-20 | 30, 60 | J, HRCII-C | 1.0 | 2412B-C030A_ _ | 2412B-C030D_ _ | 780 | |
| 37 | (5.5-11) | 7.5-10 | (11-18.5) | 15-25 | 15-25 | 30 | J, HRCII-C | 1.0 | 2412B-C037A_ _ | 2412B-C037D_ _ | 865 | |
| 43 | (5.5-11) | 7.5-15 | (11-22) | 15-30 | 15-30 | 60 | | | 2412B-C043A_ _ | 2412B-C043D_ _ | 1005 | |
| 60 | (7.5-18.5) | 10-20 | (15-30) | 20-40 | 25-40 | 60 | J, HRCII-C | 1.5 | 2412B-C060A_ _ | 2412B-C060D_ _ | 1325 | |
| 72 | (7.5-22) | 10-25 | (15-37) | 20-50 | 25-50 | 100 | | | 2412B-C072A_ _ | 2412B-C072D_ _ | 1400 | |
| | | | | | | 200 | | | | | | |
| 85 | (7.5-22) | 10-30 | (15-37) | 20-50 | 25-50 | 60, 100, 200 | J, HRCII-C | 1.5 | 2412B-C085A_ _ | 2412B-C085D_ _ | 1770 | |
| | — | — | (45) | 60 | 60 | 100, 200 | J, HRCII-C | 2.5 | 2412B-C085A_ _ | 2412B-C085D_ _ | 2140 | |
| | | | | | | 400 | J | | | | | |
| 110 | (30) | 30-40 | (45-55) | 60-75 | 60-100 | 100 | J, HRCII-C | 2.5 | 2412B-B110A_ _ | 2412B-B110D_ _ | 2410 | |
| | | | | | | 200 | | | | | | |
| | | | | | | 400 | J | | | | | |
| 180 | (30-45) | 50-60 | (55-90) | 100-125 | 125-150 | 200 | J, HRCII-C | 2.5 | 2412B-B180A_ _ | 2412B-B180D_ _ | 3040 | |
| | | | | | | 400 | | | | | | |
| | | | | 150 | — | 400 | J, HRCII-C | 3.5 | 2412B-B180A_ _ | 2412B-B180D_ _ | 3365 | |
| 250 | (37-75) | 75-100 | (75-132) | 200 | 200-250 | 400 | J, HRCII-C | 4.0 | 2412B-B250A_ _ | 2412B-B250D_ _ | 5055 | |
| | | | | | | 600 | | | | | | |
| 304[5] | (90) | — | (150-160) | 250 | 300 | 400 | J, HRCII-C | 4.0 | 2412B-B300A_ _ | 2412B-B300D_ _ | 8600 | |
| | | | | | | 600 | | | | | | |

[1] When selecting certain options, a larger space factor may be required than is listed in this table. To determine actual space requirements, see Options section beginning on page 26 and related footnotes.

[2] The catalog numbers listed are not complete:

- Select the appropriate **control voltage code** from page 23 to identify the control type desired (e.g., 2412B-C016ABD).
- If horsepower rated, select the **number** from page 23 that corresponds to the nominal horsepower desired (e.g., 2412B-C016ABD-41).
- If kW rated, select the **number** from page 23 that corresponds to the nominal kW desired (e.g., 2412B-C016ABD-41K).
- Select the appropriate **fuse clip designator** from page 23 to identify the fuse clip size and type (e.g., 2412B-C016ABD-41-24J).
- Select the appropriate **code** from page 29 to identify the overload relay size (e.g., 2412B-C016ABD-41-24J-7FEA4H).
- The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers **without** the external reset button, replace the letter “A” with the letter “K” (e.g., 2412B-C016K_ _) or replace the letter “D” with the letter “J” (e.g., 2412B-C016J_ _).

[3] Units with these ratings are **NOT** UL listed or cUL certified.

[4] HRCII-C fuses are available in Canada only and are **NOT** UL listed.

[5] 600A vertical bus is required.

BULLETIN 2412

Combination Full Voltage Non-Reversing Starter with Fusible Disconnect Switch (FVNR)

| Control Voltage Code | | | | | | | | Control Type |
|----------------------|------|------|------|------|------|------|------|--|
| 220V | 230V | 240V | 380V | 400V | 415V | 480V | 600V | |
| — | — | A | — | — | — | B | C | 120V, 60Hz Transformer Control ^[1] |
| — | — | AD | — | — | — | BD | CD | 120V, 60Hz Separate Control ^[2] |
| P | — | — | N | — | I | — | — | 110V, 50Hz Transformer Control ^{[1],[3]} |
| PS | — | — | NS | — | IS | — | — | 110V, 50Hz Separate Control ^[2] |
| — | P | — | — | KN | — | — | — | 115V, 50Hz Transformer Control ^{[1],[3]} |
| — | PS | — | — | KNS | — | — | — | 115V, 50Hz Separate Control ^[2] |
| — | — | — | NP | — | — | — | — | 220V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | NP | — | — | — | — | 220V, 50Hz Separate Control ^[2] |
| — | — | — | — | KNP | — | — | — | 230V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | — | KNP | — | — | — | 230V, 50Hz Separate Control ^[2] |
| — | — | — | — | — | IT | — | — | 240V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | — | — | IT | — | — | 240V, 50Hz Separate Control ^[2] |
| — | — | — | NLP | — | — | — | — | 220V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |
| — | — | — | — | KNLP | — | — | — | 230V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |
| — | — | — | — | — | ILT | — | — | 240V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |

- [1] Select and price a control circuit transformer. See Options section beginning on page 26.
- [2] Control circuit fusing (option 21) and/or disconnect interlock (option 98) may be required to comply with NEC/CEC. See Options section beginning on page 26.
- [3] Incorporates primary taps for future conversion to new global IEC voltage standards (e.g., 400V/115V/230V). Allows conversion without the need to replace transformers or coils.
- [4] Requires horizontal neutral bus and vertical neutral bus in 9" (228.60 mm) vertical wireway. Refer to publication 2100-PL001x-EN-P, Section Modifications, to select and price.
- [5] Select and price control circuit fusing (option 21—see Options section beginning page 26).

**Numerical Values Assigned to Horsepower Ratings
(Applicable to 240V, 480V, and 600V only)**

| Horsepower | Number | Horsepower | Number |
|------------|--------|------------|--------|
| 0.125 | 30 | 20 | 43 |
| 0.25 | 31 | 25 | 44 |
| 0.33 | 32 | 30 | 45 |
| 0.50 | 33 | 40 | 46 |
| 0.75 | 34 | 50 | 47 |
| 1 | 35 | 60 | 48 |
| 1.5 | 36 | 75 | 49 |
| 2 | 37 | 100 | 50 |
| 3 | 38 | 125 | 51 |
| 5 | 39 | 150 | 52 |
| 7.5 | 40 | 200 | 54 |
| 10 | 41 | 250 | 56 |
| 15 | 42 | 300 | 57 |

**Numerical Values Assigned to kW Ratings
(Applicable to 220V, 230V, and 380V-415V only)**

| kW | Number | kW | Number |
|------|--------|------|--------|
| 0.12 | 30K | 15 | 43K |
| 0.18 | 31K | 18.5 | 44K |
| 0.25 | 32K | 22 | 45K |
| 0.37 | 33K | 30 | 46K |
| 0.55 | 34K | 37 | 47K |
| 0.75 | 35K | 45 | 48K |
| 1.1 | 36K | 55 | 49K |
| 1.5 | 37K | 75 | 50K |
| 2.2 | 38K | 90 | 51K |
| 3.7 | 39K | 110 | 52K |
| 5.5 | 40K | 132 | 53K |
| 7.5 | 41K | 150 | 54K |
| 11 | 42K | 160 | 55K |

| Fuse Clip Size (Amperes) ^[1] | Fuse Clip Type ^[2] | Fuse Clip Designator |
|---|-------------------------------|----------------------|
| 30 | CC | 24C |
| | J | 24J |
| | HRCII-C | 24E |
| 60 | J | 25J |
| | HRCII-C | 25E |
| 100 | J | 26J |
| | HRCII-C | 26E |
| 200 | J | 27J |
| | HRCII-C | 27E |
| 400 | J | 28J |
| | HRCII-C | 28E |
| 600 | J | 29J |

- [1] For combination unit short circuit withstand rating, see Appendix on page 34.
- [2] HRCII-C fuses are available in Canada only and are NOT UL listed.

BULLETIN 2413

Combination Full Voltage Non-Reversing Starter with Circuit Breaker (FVNR)

| Starter Size (Amps) UL/cUL | Nominal Horsepower (Nominal kW) The horsepower and kW ratings shown are nominal. | | | | | Space Factor [1] | Catalog Number [2] Wiring Type B-D—Class I | | Price | Delivery Program |
|----------------------------|---|------------|--------------|------------|----------|------------------|---|---------------|-------------|------------------|
| | 220-230V [3] | 240V | 380-415V [3] | 480V | 600V | | NEMA Type 1/1G | NEMA Type 12 | | |
| | 16 | (0.12-5.5) | 0.125-5 | (0.12-7.5) | 0.125-10 | | 0.125-10 | 0.5 | | |
| 23 | (0.12-7.5) | 0.125-7.5 | (0.12-11) | 0.125-15 | 0.125-15 | 2413B-C023A_- | 2413B-C023D_- | | 910 | |
| 30 | (5.5-7.5) | 7.5-10 | (11-15) | 15-20 | 15-20 | 1.0 | 2413B-C030A_- | 2413B-C030D_- | 980 | |
| 37 | (5.5-11) | 7.5-10 | (11-18.5) | 15-25 | 15-25 | | 2413B-C037A_- | 2413B-C037D_- | 1065 | |
| 43 | (5.5-11) | 7.5-15 | (11-22) | 15-30 | 15-30 | 1.5 | 2413B-C043A_- | 2413B-C043D_- | 1355 | |
| 60 | (7.5-18.5) | 10-20 | (15-30) | 20-40 | 25-40 | | 2413B-C060A_- | 2413B-C060D_- | 1675 | |
| 72 | (7.5-22) | 10-25 | (15-37) | 20-50 | 25-50 | 1.5 | 2413B-C072A_- | 2413B-C072D_- | 1750 | |
| 85 | (7.5-22) | 10-30 | (15-45) | 20-60 | 25-60 | | 2413B-C085A_- | 2413B-C085D_- | 2540 | |
| 110 | (30) | 30-40 | (45-55) | 60-75 | 60-100 | 1.5 [4] | 2413B-B110A_- | 2413B-B110D_- | 2810 | |
| 180 | (30) | 50 | — | 100 | 125 | 2.0 [4] | 2413B-B180A_- | 2413B-B180D_- | 3440 | |
| | (45) | 60 | (55-90) | 125-150 | 150 | | 2413B-B180A_- | 2413B-B180D_- | 4265 | |
| 250 | (37-75) | 75-100 | (75-132) | 200 | 200-250 | 3.5 | 2413B-B250A_- | 2413B-B250D_- | 5955 | |
| 304 [5] | (90) | — | (150-160) | 250 | 300 | 3.5 | 2413B-B300A_- | 2413B-B300D_- | 9800 | |

Engineered

[1] When selecting certain options, a larger space factor may be required than is listed in this table. To determine actual space requirements, see Options section beginning on page 26 and related footnotes.

[2] The catalog numbers listed are not complete:

- Select the appropriate **control voltage code** from page 25 to identify the control type desired (e.g., 2413B-C016ABD).
- If horsepower rated, select the **number** from page 25 that corresponds to the nominal horsepower desired (e.g., 2413B-C016ABD-41).
- If kW rated, select the **number** from page 25 that corresponds to the nominal kW power desired (e.g., 2413B-C016ABD-41K).
- Select the appropriate **suffix letter** from page 25 to identify the circuit breaker type (e.g., 2413B-C016ABD-41CA or 2413B-C016ABD-41KCA).
- Select the appropriate **code** from page 29 to identify the overload relay size (e.g., 2413B-C016ABD-41CA-7FEA4H).
- The catalog numbers listed include an external reset button for the overload relay. To order catalog numbers **without** the external reset button, replace the letter "A" with the letter "K" (e.g., 2413B-C016K_-) or replace the letter "D" with the letter "J" (e.g., 2413B-C016J_-).

[3] Units with these ratings are **NOT** UL listed or cUL certified.

[4] When selecting circuit breaker type CT or CM, add 0.5 space factor.

[5] 600A vertical bus is required.

BULLETIN 2413

Combination Full Voltage Non-Reversing Starter with Circuit Breaker (FVNR)

| Control Voltage Code | | | | | | | | Control Type |
|----------------------|------|------|------|------|------|------|------|--|
| 220V | 230V | 240V | 380V | 400V | 415V | 480V | 600V | |
| — | — | A | — | — | — | B | C | 120V, 60Hz Transformer Control ^[1] |
| — | — | AD | — | — | — | BD | CD | 120V, 60Hz Separate Control ^[2] |
| P | — | — | N | — | I | — | — | 110V, 50Hz Transformer Control ^{[1],[3]} |
| PS | — | — | NS | — | IS | — | — | 110V, 50Hz Separate Control ^[2] |
| — | P | — | — | KN | — | — | — | 115V, 50Hz Transformer Control ^{[1],[3]} |
| — | PS | — | — | KNS | — | — | — | 115V, 50Hz Separate Control ^[2] |
| — | — | — | NP | — | — | — | — | 220V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | NP | — | — | — | — | 220V, 50Hz Separate Control ^[2] |
| — | — | — | — | KNP | — | — | — | 230V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | — | KNP | — | — | — | 230V, 50Hz Separate Control ^[2] |
| — | — | — | — | — | IT | — | — | 240V, 50Hz Transformer Control ^{[1],[3]} |
| — | — | — | — | — | IT | — | — | 240V, 50Hz Separate Control ^[2] |
| — | — | — | NLP | — | — | — | — | 220V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |
| — | — | — | — | KNLP | — | — | — | 230V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |
| — | — | — | — | — | ILT | — | — | 240V, 50Hz Line to Neutral Control (Separate Control) ^{[4],[5]} |

- [1] Select and price a control circuit transformer. See Options section beginning on page 26.
- [2] Control circuit fusing (option 21) and/or disconnect interlock (option 98) may be required to comply with NEC/CEC. See Options section beginning on page 26.
- [3] Incorporates primary taps for future conversion to new global IEC voltage standards (e.g., 400V/115V/230V). Allows conversion without the need to replace transformers or coils.
- [4] Requires horizontal neutral bus and vertical neutral bus in 9" (228.60 mm) vertical wireway. Refer to publication 2100-PL001x-EN-P, Section Modifications, to select and price.
- [5] Select and price control circuit fusing (option 21—see Options section beginning on page 26).

**Numerical Values Assigned to Horsepower Ratings
(Applicable to 240V, 480V, and 600V only)**

| Horsepower | Number | Horsepower | Number |
|------------|--------|------------|--------|
| 0.125 | 30 | 20 | 43 |
| 0.25 | 31 | 25 | 44 |
| 0.33 | 32 | 30 | 45 |
| 0.5 | 33 | 40 | 46 |
| 0.75 | 34 | 50 | 47 |
| 1 | 35 | 60 | 48 |
| 1.5 | 36 | 75 | 49 |
| 2 | 37 | 100 | 50 |
| 3 | 38 | 125 | 51 |
| 5 | 39 | 150 | 52 |
| 7.5 | 40 | 200 | 54 |
| 10 | 41 | 250 | 56 |
| 15 | 42 | 300 | 57 |

**Numerical Values Assigned to kW Ratings
(Applicable to 220V, 230V, and 380-415V only)**

| kW | Number | kW | Number |
|------|--------|------|--------|
| 0.12 | 30K | 15 | 43K |
| 0.18 | 31K | 18.5 | 44K |
| 0.25 | 32K | 22 | 45K |
| 0.37 | 33K | 30 | 46K |
| 0.55 | 34K | 37 | 47K |
| 0.75 | 35K | 45 | 48K |
| 1.1 | 36K | 55 | 49K |
| 1.5 | 37K | 75 | 50K |
| 2.2 | 38K | 90 | 51K |
| 3.7 | 39K | 110 | 52K |
| 5.5 | 40K | 132 | 53K |
| 7.5 | 41K | 150 | 54K |
| 11 | 42K | 160 | 55K |

| | | Starter Size | Suffix | Frame | Adder |
|---|---|--------------|--------|--------------|--------------|
| Instantaneous (Magnetic only) Circuit Breaker | High Interrupting Capacity ^[1] | 16A-180A | CA | HMCP | STD |
| | | 180A-250A | CA | HMCP 250-400 | STD |
| | | 304A | CA | HMCP 600 | STD |
| Inverse Time (Thermal Magnetic) Circuit Breaker | Standard Interrupting Capacity ^[1] | 16A-85A | CT | FDB | \$120 |
| | | 110A-250A | CT | JD | 525 |
| | | 180A-250A | CT | KD | 525 |
| | | 304A | CT | LD | 1365 |
| | High Interrupting Capacity ^[1] | 16A-85A | CM | HFD | 405 |
| | | 110A-250A | CM | HJD | 2045 |
| | | 180A-250A | CM | HKD | 2045 |
| | | 304A | CM | HLD | 2250 |

[1] For combination unit short circuit withstand rating, see Appendix on page 34.

Factory-Installed Options, Modifications, and Accessories

All pilot devices are 800E.

Multiple options are separated by a dash and added to the base catalog number in ascending order.

| Option | Option Number | Description | FVC 2402 2403 | FVR 2406 2407 | FVNR 2412 2413 | Price | |
|--|------------------------------|---|------------------------------|---------------------|----------------------|-------|-----|
| Push Buttons [1],[2],[3] | -1 | START-STOP | | | ✓ | \$105 | |
| | | FORWARD-REVERSE-STOP | | ✓ | | 150 | |
| | -1B | OFF | ✓ | | | 65 | |
| | | STOP | | ✓ | ✓ | 65 | |
| | -1E | OFF-ON | ✓ | | | 105 | |
| Push Buttons and Selector Switch Combinations [1] | -1F [4] | Push buttons with HAND-START HAND-STOP legend plates and selector switch with HAND-OFF-AUTO legend plate. | | | ✓ | 190 | |
| | | Push buttons with HAND-OFF HAND-ON legend plates and selector switch with HAND-OFF-AUTO legend plate. | ✓ | | | | |
| Selector Switch [1],[2],[3] | -3 [5] | HAND-OFF-AUTO | ✓ | | ✓ | 105 | |
| | | FORWARD-OFF-REVERSE | | ✓ [6] | | | |
| | -3E [5] | OFF-ON | ✓ | | ✓ | | |
| Pilot Lights (transformer type) [1],[2],[7] | -4_ | Standard incandescent | ON [8],[9] | ✓ | | ✓ | 90 |
| | -4__ | | FORWARD-REVERSE [10] | | ✓ | | 160 |
| | -4___ | | ON-OFF [8],[10] | ✓ | | ✓ | 160 |
| | -4____ | | FORWARD-REVERSE-OFF [8],[11] | | ✓ | | 225 |
| | -4T_ | | OVERLOAD [12] | | ✓ | ✓ | 90 |
| | -4L_ | LED type | ON [8],[9] | ✓ | | ✓ | 100 |
| | -4L__ | | FORWARD-REVERSE [10] | | ✓ | | 180 |
| | -4L___ | | ON-OFF [8],[10] | ✓ | | ✓ | 180 |
| | -4L____ | | FORWARD-REVERSE-OFF [8],[11] | | ✓ | | 255 |
| | -4TL_ | | OVERLOAD [12] | ✓ | ✓ | ✓ | 100 |
| | -5_ | Standard incandescent (Push-to-test) | ON [8],[9] | ✓ | | ✓ | 125 |
| | -5__ | | FORWARD-REVERSE [10] | | ✓ | | 230 |
| | -5___ | | ON-OFF [8],[10] | ✓ | | ✓ | 230 |
| | -5____ | | FORWARD-REVERSE-OFF [8],[11] | | ✓ | | 335 |
| | -5T_ | | OVERLOAD [12] | | ✓ | ✓ | 125 |
| | -5L_ | LED type (Push-to-test) | ON [8],[9] | ✓ | | ✓ | 135 |
| -5L__ | FORWARD-REVERSE [10] | | | ✓ | | 250 | |
| -5L___ | ON-OFF [8],[10] | | ✓ | | ✓ | 250 | |
| -5L____ | FORWARD-REVERSE-OFF [8],[11] | | | ✓ | | 370 | |
| -5TL_ | | OVERLOAD [12] | | ✓ | ✓ | 135 | |

- [1] A maximum of three (3) pilot devices are allowed on 0.5 space factor units. Selecting four (4) or more pilot devices in the catalog string requires the unit to be a minimum of 1.0 space factor.
- [2] On 0.5 space factor Bulletin 2406 and 2407 units with starter auxiliary contacts (options 90, 91), a maximum of two (2) pilot devices can be specified. If more than two (2) pilot devices are specified, these units will require a minimum of 1.0 space factor.
- [3] Push buttons may not be used in conjunction with selector switches, with the exception of option 1F.
- [4] When option 1F is used with 11DSA2 or 11DSA3, an additional N.O. auxiliary contact (option 90) is required.
- [5] Options 3 and 3E are mutually exclusive.
- [6] Mutually exclusive with DeviceNet communication modules, DeviceNet starter auxiliary (11DSA2, 11DSA3) and E3 solid-state overload relays (-7FEC_ _).
- [7] To select pilot light lens color, add letter(s) to the option number (e.g., **R** = red, **A** = amber, **G** = green, **B** = blue, **C** = clear). Clear (C) lenses are not available on LED type pilot lights.
- [8] Select and price an N.C. auxiliary contact (option 91) for any OFF pilot light. Select and price an N.O. auxiliary contact (option 90) for any ON pilot light when option 1F is also specified.
- [9] When used in a Bulletin 2402, 2403, 2412, or 2413 with 11DSA2, 11DSA3, or 7FEC_ , a 90 (N.O. auxiliary contact) must be selected. When used in a Bulletin 2402, 2403, 2412, or 2413 with 11DSA3 or 7FEC_ and a 1F, a 900 (2 N.O. auxiliary contacts) must be selected.
- [10] When used in a Bulletin 2402, 2403, 2412, or 2413 with 11DSA3 or 7FEC_ , a 901 (1 N.O. and 1 N.C. auxiliary contact) must be selected. When used in a Bulletin 2402, 2403, 2412, or 2413 with 11DSA3 or 7FEC and a 1F, a 9001 (2 N.O. and 1 N.C. auxiliary contact) must be selected. When used in a Bulletin 2406 or 2407 with 11DSA3 or 7FEC_ , a 90 (N.O. auxiliary contact) must be selected.
- [11] When used in a Bulletin 2406 or 2407 with 11DSA3 or 7FEC, a 901 (1 N.O. and 1 N.C. auxiliary contact) must be selected.
- [12] Not available with option 11DSA3 (DeviceNet starter auxiliary) or 7FEC_ (E3 overload).

Factory-Installed Options, Modifications, and Accessories, continued

Multiple options are separated by a dash and added to the base catalog number in ascending order.

| Option | Option Number | Description | | | | FVC 2402 2403 | FVR 2406 2407 | FVNR 2412 2413 | Price |
|--|--------------------------|--|-----------------|--------------|-------------|---------------------|---------------------|----------------------|-------|
| | | | Contacting Size | Starter Size | XFMR Rating | | | | |
| Control Circuit Transformer (with grounded and fused secondary) | -6 [1] NOT UL listed | Standard capacity (no primary protection) | — | 43A | 80VA | | ✓ | ✓ | \$120 |
| | | | 60A, 100A | 60A-110A | 130VA | ✓ | ✓ | ✓ | 175 |
| | | | 200A | 180A | 200VA | ✓ | ✓ | ✓ | 195 |
| | | | 300A | 250A | 250VA | ✓ | ✓ | ✓ | 215 |
| | | | — | 304A | 250VA | | ✓ | ✓ | 215 |
| | -6X [1] NOT UL listed | Extra capacity (no primary protection) | 30A | 16A-37A | 75VA | ✓ | ✓ | ✓ | 120 |
| | | | — | 43A | 130VA | | ✓ | ✓ | 175 |
| | | | 60A, 100A | 60A-110A | 200VA | ✓ | ✓ | ✓ | 195 |
| | | | 200A | 180A | 250VA | ✓ | ✓ | ✓ | 215 |
| | | | 300A | 250A | 350VA | ✓ | ✓ | ✓ | 275 |
| | -6P | Standard capacity with primary fusing | — | 43A | 80VA | | ✓ | ✓ | 225 |
| | | | 60A, 100A | 60A-110A | 130VA | ✓ | ✓ | ✓ | 280 |
| | | | 200A | 180A | 200VA | ✓ | ✓ | ✓ | 300 |
| | | | 300A | 250A | 250VA | ✓ | ✓ | ✓ | 320 |
| | | | — | 304A | 250VA | | ✓ | ✓ | 320 |
| | -6XP | Extra capacity with primary fusing | 30A | 16A-37A | 75VA | ✓ | ✓ | ✓ | 225 |
| | | | — | 43A | 130VA | | ✓ | ✓ | 280 |
| | | | 60A, 100A | 60A-110A | 200VA | ✓ | ✓ | ✓ | 300 |
| | | | 200A | 180A | 250VA | ✓ | ✓ | ✓ | 320 |
| | | | 300A | 250A | 350VA | ✓ | ✓ | ✓ | 380 |
| | — | 304A | 350VA | | ✓ | ✓ | 380 | | |

[1] Not in compliance with NEC but can be used where NEC is not applicable (e.g., no primary protection is acceptable in Canada).

Factory-Installed Options, Modifications, and Accessories, continued

Multiple options are separated by a dash and added to the base catalog number in ascending order.

| Option | Option Number | Description | Application | FVC 2402 2403 | FVR 2406 2407 | FVNR 2412 2413 | Price |
|-----------------|--|--|-------------|---------------------|---------------------|----------------------|------------------|
| Overload Relays | -7FEC1_ [1],[2] | E3 basic solid-state overload relay with built-in DeviceNet for IEC contactors 16-85A. Provided with (2) 24VDC inputs and (1) 110-120VAC output. See page 29 for selection. <i>DeviceNet</i> | 16-23A | | | ✓ | \$1000 |
| | | | 30-43A [3] | | | ✓ | 1090 |
| | | | 60-85A | | | ✓ | 1345 |
| | -7FEC2_ [1],[2] | E3 plus solid-state overload relay with built-in DeviceNet for IEC contactors 16-85A. Provided with (4) 24VDC inputs and (2) 110-120VAC outputs. See page 29 for selection. <i>DeviceNet</i> | 16-23A | | ✓ | ✓ | 1250 |
| | | | 30-43A | | ✓ | ✓ | 1345 |
| | | | 60-85A | | ✓ | ✓ | 1595 |
| | -7FEA4_ [1] | Bulletin 193-EA MCS class 10 auto/manual reset solid-state overload relay. See page 29 for selection. | 16A-85A | | ✓ | ✓ | — |
| | -7FEB1_ [1] | Bulletin 193-EB MCS class 10, 15, or 20 auto/manual reset solid-state overload relay. Adjustable trip class 10, 15, or 20 automatic/manual reset, jam/stall, and ground fault tripping. See page 29 for selection. | 16A-43A | | ✓ | ✓ | 190 |
| | | | 60A-85A | | ✓ | ✓ | 210 |
| | -7FEAXX | Provision for field installed 193-EA MCS solid-state overload relay | 16A-23A | | ✓ | ✓ | Deduct 65 |
| -7FEBXX | Provision for field installed 193-EB MCS solid-state overload relay | 16A-23A | | ✓ | ✓ | Deduct 95 | |
| -7FA4_ [1] | SMP-1 class 10 auto/manual reset solid-state overload relay. See page 29 for selection. | 110A-304A | | ✓ | ✓ | — | |
| -7FB1_ [1] | SMP-2 class 10, 15, 20, or 30 auto/manual reset solid-state overload relay. See page 29 for selection. | 110A-180A | | ✓ | ✓ | 225 | |
| | | 250A-304A | | ✓ | ✓ | 240 | |

[1] Option numbers are not complete. Select overload relay code from page 29 and add to catalog number (e.g.; -7FECIA). If 120VAC inputs are desired place a 'Y' in the catalog screen and add \$105 list price (-7FECIAY).

[2] Not available in Bulletin 2406, 2407, 2412, or 2413 0.5 SF units.

[3] Requires an additional 0.5 SF when used in Bulletin 2407 and 2412 units rated at 43 amperes.

Factory-Installed Options, Modifications, and Accessories, continued

Overload Relay Codes for Bulletin 193-EC1 and 193-EC2, Class 5-30, Option 7FEC1_ and 7FEC2_

| Starter Size | Full Load Current Range (Amperes) ⁽¹⁾ | Overload Relay Code (e.g., 7FEC1A or 7FEC2A) |
|--------------|--|--|
| 16-23A | 1-5A | A |
| | 3-15A | B |
| | 5-25A | C |
| 30-43A | 9-45A | D |
| 60-85A | 9-45A | D |
| | 18-90A | E |

Overload Relay Codes for Bulletin 193-EA MCS, Class 10, Option 7FEA4_

| Starter Size | Full Load Current Range (Amperes) ^[1] | Overload Relay Code (e.g., 7FEA4A) |
|--------------|--|------------------------------------|
| 16A-23A | 0.1-0.32 | A |
| | 0.32-1.0 | C |
| | 1.0-2.9 | D |
| | 1.6-5.0 | E |
| | 3.7-12 | F |
| | 12-32 | G |
| 30A-37A | 12-37 | H |
| 43A | 14-45 | J |
| 60A-85A | 26-85 | K |

Overload Relay Codes for Bulletin 193-EB MCS, Class 10, 15, and 20, Option 7FEB1_

| Starter Size | Full Load Current Range (Amperes) ^[1] | Overload Relay Code (e.g., 7FEB1A) |
|--------------|--|------------------------------------|
| 16A-23A | 0.1-0.32 | A |
| | 0.32-1.0 | C |
| | 1.0-2.9 | D |
| | 1.6-5.0 | E |
| | 3.7-12 | F |
| | 12-32 | G |
| 30A-37A | 14-45 | J |
| 43A | 14-45 | J |
| 60A-85A | 23-75 | M |
| | 60-85 | N |

Overload Relay Codes SMP-1, Class 10, Option 7FA4_

| Starter Size | Full Load Current Range (Amperes) ⁽¹⁾ | Overload Relay Code (e.g., 7FA4K) |
|--------------|--|-----------------------------------|
| 110A | 23-75 | K |
| | 66-110 | L |
| 180A | 57-180 | M |
| 250A-304A | 96-300 | N |

Overload Relay Codes SMP-2, Class 10, 15, 20, and 30, Option 7FB1_

| Starter Size | Full Load Current Range (Amperes) ^[1] | Overload Relay Code (e.g., 7FB1K) |
|--------------|--|-----------------------------------|
| 110A | 23-75 | K |
| | 66-110 | L |
| 180A | 57-180 | M |
| 250A-304A | 96-300 | N |

[1] When selecting overload relays for motors with a service factor of 1.15 or greater, use the motor nameplate full load current. For motors with a service factor of 1.0, use 90% of the motor nameplate full load current.

Factory-Installed Options, Modifications, and Accessories, continued

Multiple options are separated by a dash and added to the base catalog number in ascending order.

| Option | Option Number | Description | FVC 2402 2403 | FVR 2406 2407 | FVNR 2412 2413 | Price | |
|---|-----------------------|---|--|---------------|----------------|-------------|-----|
| DeviceNet Starter Auxiliary ^[1] DeviceNet | -11DSA2 | For use with starters and contactors to provide DeviceNet inputs and outputs. Four (4) 120VAC inputs and two (2) 120VAC outputs. Available for 110V-120V control only. | ✓ | ✓ | ✓ | \$735 | |
| | -11DSA3 | For use with contactors and starters to provide DeviceNet input and outputs. Four (4) 24VDC inputs and two (2) 240VAC (max), 30VDC (max) outputs. Available for 110-120VAC or 220-240VAC control voltage. | ✓ | ✓ | ✓ | | |
| Additional Unit Space | -15 | Increases the space of standard unit by 0.5 space factor | ✓ | ✓ | ✓ | 95 | |
| Surge Suppressor ^[2] | -17 ^[3] | One per contactor mounted on coil | ✓ | ✓ | ✓ | 45 | |
| | -17R | For units with interposing relays (89CB and 89CBL) and unwired control relays (89CF_ _) | ✓ | ✓ | ✓ | 90 | |
| O/L Contact on Left Side of Circuit | -18 | Moves overload from right side to left side of circuit | | ✓ | ✓ | N/C | |
| Omit Wiring | -19 | Omit control wiring | ✓ | ✓ | ✓ | N/C | |
| Control Circuit Fuse | -21 | One (1) control circuit fuse for separate control or line to neutral control | ✓ | ✓ | ✓ | 50 | |
| Grounded Unit Door | -79GD | Hinge mounted ground wire mounted on bottom hinge of unit door | ✓ | ✓ | ✓ | 60 | |
| Unit Load Connector | -79L | Select on all plug-in units in sections with vertical unit load ground bus | ✓ | ✓ | ✓ | 15 | |
| | -79LT | | Unplated copper | ✓ | ✓ | ✓ | 25 |
| Unit Ground Stab | — | Copper unit ground stabs may be used with steel vertical ground bus | Copper alloy | ✓ | ✓ | ✓ | STD |
| | -79U | | Unplated copper | ✓ | ✓ | ✓ | 15 |
| | -79UT | | Tin plated copper | ✓ | ✓ | ✓ | 25 |
| Interposing Relay ^[4] (mutually exclusive with 89CF_ unwired control relays) | -89CB | Control circuit interposing relay. Utilizes control relay to control starter coil in control circuit. The starter or contactor coil voltage and interposing relay coil voltage are the same as the control voltage. | ✓ | ✓ | ✓ | 115 | |
| | -89CBL ^[3] | Line circuit interposing relay. Utilizes control relay to control starter coil in line circuit. The starter or contactor coil voltage is the same as the line voltage. The interposing relay coil voltage is the same as the control voltage. | ✓ | ✓ | ✓ | 230 | |
| Unwired Control Relay ^[4] (mutually exclusive with 89CB or 89CBL interposing relay) | -89CF40 | Unwired Bulletin 700CF 4-pole relay | 4 N.O. instantaneous contacts | ✓ | ✓ | ✓ | 80 |
| | -89CF31 | | 3 N.O. and 1 N.C. instantaneous contacts | ✓ | ✓ | ✓ | 160 |
| | -89CF22 | | 2 N.O. and 2 N.C. instantaneous contacts | ✓ | ✓ | ✓ | 80 |
| | | | | ✓ | ✓ | ✓ | 160 |
| Auxiliary contact options (90, 91, 98, 98X, and 99X) are listed on page 31 | | | | | | | |
| Control Terminal Block ^[5] | -107 | One (1) extra 5-pole control terminal block (unwired) | ✓ | ✓ | ✓ | 30 | |
| T-Handle | -111 | T-handle latch on unit door | ✓ | ✓ | ✓ | 25 | |
| Control Circuit Wiring ^[6] | — | Type MTW 90°C copper wire | #18 AWG | ✓ | ✓ | ✓ | STD |
| | -750A | | #16 AWG | ✓ | ✓ | ✓ | 25 |
| Control Circuit Lugs ^[6] | -750RL | Insulated ring lugs for control wires where possible | ✓ | ✓ | ✓ | 85 | |
| | -750SL | Insulated spade lugs for control wires where possible | ✓ | ✓ | ✓ | 85 | |
| Control Wire Markers ^[6] | -751D | Adhesive Brady Datab type markers at each end of control wire | ✓ | ✓ | ✓ | 50 | |
| | -751HS | Heat shrink wire marker | ✓ | ✓ | ✓ | 105 | |
| | -751S | Sleeve type wire marker | ✓ | ✓ | ✓ | 80 | |
| French Legend Plates | -860F | Legend plates printed in French are available on all pilot devices. Select 860F when pilot device options are specified. | ✓ | ✓ | ✓ | N/C | |
| Unit Door Nameplates ^[7] | — | 1-1/8ø (25.25 mm) ¥ 3-5/8ø (76.825 mm) engraved nameplate. 3-line nameplate or 4-line nameplate. | Acrylic plate (available in U.S. only). Lettering is white with black letters or black with white letters. | ✓ | ✓ | ✓ | 15 |
| | | | Phenolic plate. Lettering is white with black letters or black with white letters. | ✓ | ✓ | ✓ | 25 |
| Stainless Steel Nameplate Screws ^[7] | — | Stainless steel nameplate screws for unit nameplates (2 per unit) | ✓ | ✓ | ✓ | 10 | |
| Export Packing Below Deck ^[7] | — | Container is skid mounted and packaged in clear plastic. Packaging is not watertight or waterproof. Considerations should be taken if extended storage is expected. For sections, see publication 2100-PL001x-EN-P. | ✓ | ✓ | ✓ | 65 per unit | |

[1] Space factor of unit will increase to 1.0 when specified on 0.5 space factor 2403, 2407, and 2413 units. Not available with push buttons or selector switches except options 3 and 1F. Mutually exclusive with option 89_ relay options and E3 overload options 7FEC1_ , 7FEC1_Y, 7FEC2_ , and 7FEC2_Y. DeviceNet starter auxiliary options 11DSA2 and 11DSA3 are mutually exclusive.

[2] Available for 110-240V control voltage. Not available on B250A or B300A contactors at 220-240V control voltage.

[3] Options 17 and 89CBL are mutually exclusive.

[4] Requires 1.5 space factors when specified on Bulletin 2406 units or 2407 units with HMCP circuit breakers.

[5] An additional block of five control terminals can be supplied for customer use, provided that the total number of control terminals does not exceed 20. The space factor will be increased to 1.0 when specified on a 0.5 space factor unit. Check unit wiring diagrams for limitations.

[6] Options for factory wiring of control circuits. Does not include dedicated auxiliary devices (e.g., fans), device and component internal wiring, or wiring that could affect operation of certifications (e.g., insulation temperature class, EMC shielding requirements, communication requirements, UL, cUL, CSA, CE).

[7] Refer to publication 2100-PL001x-EN-P for ordering information.

Factory-Installed Options, Modifications, and Accessories, continued

Multiple options are separated by a dash and added to the base catalog number in ascending order.

| Option | Option Number | Description | Wiring Type | FVC | | FVR | | FVNR | | Price | | |
|-------------------|--------------------------------|---|---|---|------------------|------|------|------|------|-------|-----|-----|
| | | | | 2402 | 2403 | 2406 | 2407 | 2412 | 2413 | | | |
| Auxiliary Contact | -90 See Options table below | Normally Open (1) N.O. auxiliary contact mounted on each contactor | A | ✓ | ✓ | | | ✓ | ✓ | \$35 | | |
| | | | B [1] | ✓ | ✓ | | | ✓ | ✓ | 70 | | |
| | | | | | | ✓ | ✓ | | | 140 | | |
| | | | -91 See Options table below | Normally Closed (1) N.C. auxiliary contact mounted on each contactor | A | ✓ | ✓ | | | ✓ | ✓ | 35 |
| | B [1] | | | | | ✓ | ✓ | | | 70 | | |
| | | ✓ | | | ✓ | | | ✓ | ✓ | 70 | | |
| | | | | | ✓ | ✓ | | | 140 | | | |
| | -98 [2] | Normally Open (1) N.O. | Mounted on operating mechanism (operates with movement of external handle only) | A or B | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 70 | |
| | -98X [3] | | Mounted internally | | Circuit breakers | | ✓ | | ✓ | | ✓ | 145 |
| | -99 [2] | Normally Closed (1) N.C. | Mounted on operating mechanism (operates with movement of external handle only) | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 70 | |
| -99X [3] | | Mounted internally | Circuit breakers | | | ✓ | | ✓ | | ✓ | 145 | |

- [1] Type B auxiliary contacts are wired to terminal blocks. If the number of auxiliary contact wiring points required exceeds the number of terminals available in the unit, remaining auxiliary contacts will be unwired.
- [2] The maximum number of auxiliary contacts that can be supplied is two (2), in any combination. Contacts actuate with movement of unit handle to ON or OFF position only. Contacts are not designed to actuate as a result of a circuit breaker trip. If the application requires that the auxiliary contact must indicate state of the circuit breaker power contacts, then the auxiliary contact "mounted internally" (98X or 99X) must be specified. Auxiliary contacts are supplied unwired.
- [3] The maximum number of auxiliary contacts that can be supplied internally is two (2) N.O. and (2) N.C. (form C) on F-frame, J-frame, K-frame, and L-frame.

Auxiliary Contact Options (4 = option is available, N/A = option is not available)

| Auxiliary Contact Catalog String | Bulletins 2402, 2403, 2412, and 2413 | | Bulletins 2406 and 2407 | |
|----------------------------------|--------------------------------------|----------------------|-------------------------|----------------------|
| | 16A-85A Contactors | 110A-304A Contactors | 16A-85A Contactors | 110A-304A Contactors |
| 90 [1] | ✓ | ✓ | ✓ | ✓ |
| 91 [1] | ✓ | ✓ | ✓ | ✓ |
| 900 [1] | ✓ | ✓ | ✓ | ✓ |
| 901 [1] | ✓ | ✓ | ✓ | ✓ |
| 911 [1] | ✓ | ✓ | ✓ | ✓ |
| 9000 | ✓ | ✓ | ✓ | N/A |
| 9001 | ✓ | ✓ | ✓ | N/A |
| 9011 | ✓ | ✓ | ✓ | N/A |
| 9111 | N/A | ✓ | N/A | N/A |
| 90000 | ✓ | ✓ | ✓ | N/A |
| 90001 | ✓ | ✓ | ✓ | N/A |
| 90011 | ✓ | ✓ | ✓ | N/A |
| 90111 | N/A | ✓ | N/A | N/A |
| 91111 | N/A | ✓ | N/A | N/A |

- [1] On 0.5 space factor 2406 and 2407 units with auxiliary contacts (options 90, 91), a maximum of two (2) pilot devices can be specified. If more than two (2) pilot devices are specified, these units will be a minimum of 1.0 space factor.

Miscellaneous Hardware and Kits

for Field Installation

Installing any hardware or kit will retain UL listing and cUL certification unless otherwise indicated.

| Hardware or Kit | Description | NEMA Type | Catalog Number | Price | Delivery Program | |
|---|--|----------------------|------------------|-------------|------------------|------------|
| Gasketing Kit | Gasketing to cover two (2) 1.0 space factor or one (1) 1.5 through 5.0 space factor doors for units mounted in series A through D sections | — | 2100H-GJ10 | \$60 | SC | |
| Top Horizontal Wireway Pan | For installing plug-in units (1.0 space factor or larger) with vertically-toggled handles and interlocks in the top-most space factor of a series A through E vertical sections | 1 | 2100H-NA4A1 | 30 | | |
| | | 1 with gasket and 12 | 2100H-NA4J1 | 30 | | |
| Unit Operating Handle Extender | Permits unit operating handle to be located an additional 3" (76.20 mm) above the NEC 6'7" (2.0 m) floor height limitation. Complies with NEC and UL. | — | 2100H-NE1 | 25 | | |
| Style 1 Unit Support Pan | Style 1 unit support pan for plug-in units 1.0 space factor or larger. To be installed in series A through D sections. | 1 with gasket and 12 | 2100H-UAJ1 | 25 | | |
| Style 3 Unit Support Pan | Style 3 unit support pan for plug-in units 1.0 space factor or larger. To be installed in series E through current series sections. Replaces Style 2 unit support pans. | 1 | 2100H-UA1 | 25 | | |
| | | 1 with gasket and 12 | 2100H-UJ1 | 25 | | |
| Style 3 Unit Support Pan with Interlock Bushing | Style 3 unit support pan with interlock bushing. Used with all half (0.5) space factor plug-in units that have horizontally-toggled unit operating handles. | 1 | 2400H-USPA1 | 25 | | |
| | | 1 with gasket and 12 | 2400H-USPJ1 | 25 | | |
| Blank Unit Door | Blank unit door covers unused unit space. Includes hinges, hinge pins, card holder, and style 3 unit support pan. | 1, 1 with gasket | 0.5 space factor | 2100-BK05 | | 50 |
| | | | 1.0 space factor | 2100-BK10 | | 50 |
| | | | 1.5 space factor | 2100-BK15 | | 75 |
| | | | 2.0 space factor | 2100-BK20 | | 100 |
| | | | 2.5 space factor | 2100-BK25 | | 125 |
| | | | 3.0 space factor | 2100-BK30 | | 150 |
| | | | 3.5 space factor | 2100-BK35 | | 175 |
| | | | 4.0 space factor | 2100-BK40 | | 200 |
| | | 12 | 0.5 space factor | 2100-BJ05 | | 50 |
| | | | 1.0 space factor | 2100-BJ10 | | 50 |
| | | | 1.5 space factor | 2100-BJ15 | | 75 |
| | | | 2.0 space factor | 2100-BJ20 | 100 | |
| | | | 2.5 space factor | 2100-BJ25 | 125 | |
| | | | 3.0 space factor | 2100-BJ30 | 150 | |
| 3.5 space factor | 2100-BJ35 | 175 | | | | |
| 4.0 space factor | 2100-BJ40 | 200 | | | | |
| Vertical Ground Bus Kit | Zinc-plated steel ground bus, mounting hardware, and instructions for grounding Bulletin 2400 plug-in units to existing series E through J sections | | 2400H-GS1 | 115 | | |
| Plug-in Unit Retrofit Kit | Permits installation of half (0.5) space factor plug-in units and doors in existing series E through J Bulletin 2100 vertical sections. Includes hinges, grounding wire, and extended unit door latch. | | 2400H-R1 | 15 | | |
| Unit Load Grounding Kit | Hardware for grounding unit load wires to horizontal ground bus | | 2400H-UG1 | 10 | | |
| Unit Door Grounding Kit | Hardware and instructions for unit door. Mounts on bottom hinge of door. | | 2100H-GD1 | 25 | | |
| Unit Isolating Barriers (sections with series K or later) | Barriers to close the wire opening between the unit and vertical wireway on sections with series letter K or later. Includes six (6) barriers and instructions per package. | | 2100H-N2K | 45 | | |
| Wiring Diagram Holder Kit | For a central location of all wiring diagrams. Includes wiring diagram clip and clip location identification label for outside of horizontal wireway cover. | | 2400H-WDH | 15 | | |

Miscellaneous Hardware and Kits
for Field Installation

Installing any hardware or kit will retain UL listing and cUL certification unless otherwise indicated.

| Hardware or Kit | Description | NEMA Type | Catalog Number | Price | Delivery Program | |
|---|--|--|------------------------|---------------|------------------|----|
| External Auxiliary Contact | For circuit breaker: for 0.5 space factor units. Auxiliaries are actuated by the unit handle only and will not reflect a circuit breaker trip. | Mounts one (1) form C auxiliary contact on the operating mechanism, external to the breaker. Cutler-Hammer/Westinghouse 150A HMCP, FDB, FD, HFD, FDB-LFD, and FDC. | Unit Series C or later | 2100H-N18A | \$95 | SC |
| | | Mounts two (2) form C auxiliary contacts on the operating mechanism, external to the breaker. Cutler-Hammer/Westinghouse 150A HMCP, FDB, FD, HFD, FDB-LFD, and FDC. | Unit Series C or later | 2100H-N18B | 135 | |
| External Auxiliary Contact Adapter Kits | For circuit breaker: not available on 0.5 space factor units. Permits mounting a maximum of two (2) Bulletin 1495-N8 (normally open) or two (2) Bulletin 1495-N9 (normally closed) auxiliary contacts on the unit operating mechanism, external to the circuit breaker. Auxiliaries are actuated by the unit operating handle only and will not reflect a circuit breaker trip. | For units with single circuit breaker only. Cutler-Hammer/Westinghouse Series C 150A HMCP, FDB, FD, HFD, FDB-LFB, FDC, 250A HMCP, JD, HJD, JDC, 400A HMCP, KD, HKD, and KDC. | Unit Series A | 2100H-N17 | 55 | |
| | | For units with Cutler-Hammer/Westinghouse 600A HMCP, LD, HLD, LDC, LC, and HLC circuit breakers | Unit Series A | 1495-N13 | [1] | |
| | For circuit breaker: not available on 0.5 space factor units. Permits mounting a maximum of two (2) Bulletin 2100H-N19 (normally open) or two (2) Bulletin 2100H-N20 (normally closed) auxiliary contacts on the unit operating mechanism, external to the circuit breaker. Auxiliaries are actuated by the unit operating handle only and will not reflect a circuit breaker trip. | For units with single circuit breaker only. Cutler-Hammer/Westinghouse Series C 150A HMCP, FDB, FD, HFD, FDB-LFB, FDC, 250A HMCP, JD, HJD, JDC, 400A HMCP, KD, HKD, and KDC. | Unit Series A | 2100H-N22 | 55 | |
| | | For units with Cutler-Hammer/Westinghouse 600A HMCP, LD, HLD, and HDC circuit breakers | Unit Series B or later | 2100H-N23 | 55 | |
| External Auxiliary Contact Adapter Kits | For fusible disconnects: not available on 0.5 space factor units or dual-mounted units. Permits mounting a maximum of two (2) Bulletin 1495-N8 (normally open) or two (2) Bulletin 1495-N9 (normally closed) auxiliary contacts on the unit operating mechanism, external to the circuit breaker. Auxiliaries are actuated by the unit operating handle. | For units with 30A, 60A, 100A, 200A, or 400A fusible disconnects | Unit Series A | None required | — | |
| | For fusible disconnects: not available on 0.5 space factor units or dual-mounted units. Permits mounting a maximum of two (2) Bulletin 2100H-N19 (normally open) or two (2) Bulletin 2100H-N20 (normally closed) auxiliary contacts on the unit operating mechanism, external to the circuit breaker. Auxiliaries are actuated by the unit operating handle. | For units with 30A, 60A, 100A, 200A, or 400A fusible disconnects | Unit Series B or later | 2100H-N21 | N/C | |
| External Auxiliary Contacts | One (1) normally open | Must be used with external auxiliary adapter kit | Unit Series B or later | 2100H-N19 | 45 | |
| | One (1) normally closed | | | 2100H-N20 | 45 | |

[1] Contact your local Rockwell Automation sales office or Allen-Bradley distributor for pricing and ordering information.

Appendix

UL/cUL and NEMA Short Circuit Withstand Ratings for Combination Fusible Disconnect Units

| Fuse Class | Device/Bulletin Size/Rating | Available Short Circuit Amperes (rms Symmetrical) for UL/cUL (except where noted) | | |
|------------|-----------------------------|---|------|------|
| | | 240V | 480V | 600V |
| CC | 2406, 2412 16A-23A | 100k | 100k | 100k |
| | 2402 30A | 100k | 100k | 100k |
| J | 2406, 2412 16A-304A | 100k | 100k | 100k |
| | 2402 30A-300A | 100k | 100k | 100k |
| HRCII-C | 2406, 2412 16A-304A | 100k | 100k | 100k |

UL/cUL and NEMA Short Circuit Withstand Ratings for Combination Circuit Breaker Units

| Circuit Breaker | Device/Bulletin Size/Rating | Available Short Circuit Amperes (rms Symmetrical) for UL/cUL | | |
|-----------------|-----------------------------|--|------|------|
| | | 240V | 480V | 600V |
| HMCP | 2407, 2413 16A-180A | 42k | 42k | 25k |
| HMCP250 | 2407, 2413 180A-250A | 42k | 42k | 25k |
| HMCP400 | 2407, 2413 250A | 42k | 42k | 25k |
| HMCP600 | 2407, 2413 304A | 42k | 42k | 25k |
| FDB | 2407, 2413 16A-85A | 18k | 14k | 10k |
| HFD | 2407, 2413 16A-85A | 42k | 42k | 25k |
| FDC | 2407, 2413 16A-85A | 42k | 42k | 25k |
| JD | 2407, 2413 110A-250A | 42k | 25k | 18k |
| HJD | 2407, 2413 110A-250A | 42k | 42k | 25k |
| JDC | 2407, 2413 110A-250A | 42k | 42k | 25k |
| KD | 2407, 2413 250A | 42k | 35k | 25k |
| HKD | 2407, 2413 250A | 42k | 42k | 25k |
| KDC | 2407, 2413 250A | 42k | 42k | 25k |
| LD | 2407, 2413 304A | 42k | 35k | 25k |
| HLD | 2407, 2413 304A | 42k | 42k | 25k |
| LDC | 2407, 2413 304A | 42k | 42k | 25k |
| FDB | 2403 30A-100A | 5k | 5k | 5k |
| FD | 2403 30A-100A | 5k | 5k | 5k |
| HFD | 2403 30A-100A | 5k | 5k | 5k |
| JD | 2403 200A | 10k | 10k | 10k |
| HJD | 2403 200A | 10k | 10k | 10k |
| KD | 2403 300A | 10k | 10k | 10k |
| HKD | 2403 300A | 10k | 10k | 10k |

Appendix
Full Load Currents

The full load currents listed below are average values for kilowatt rated motors of several manufacturers at the more common rated voltages and speeds. These average values should be used only as a guide for selecting suitable components for the motor branch circuit. The rated full load current shown on the motor nameplate may vary considerably from the listed value, depending on the specific motor design.

Important: The motor nameplate full load current always should be used in determining the rating of the devices used for motor running overcurrent protection.

Full load Current of 3-Phase 50 Hertz AC Induction Motors

| KW | Full Load Current (Amperes) Average Values for 4-Pole (1500rpm) Motors | | | | |
|------|---|---------------------|------|---------------------|------|
| | 220V | 230V ^[1] | 380V | 400V ^[1] | 415V |
| 0.12 | 0.75 | 0.72 | 0.43 | 0.41 | 0.4 |
| 0.18 | 1.1 | 1.05 | 0.64 | 0.62 | 0.6 |
| 0.25 | 1.40 | 1.34 | 0.88 | 0.83 | 0.80 |
| 0.37 | 2.10 | 2.00 | 1.20 | 1.18 | 1.16 |
| 0.55 | 2.75 | 2.60 | 1.50 | 1.47 | 1.45 |
| 0.75 | 3.50 | 3.30 | 2.10 | 2.00 | 1.90 |
| 1.1 | 4.40 | 4.20 | 2.60 | 2.50 | 2.40 |
| 1.5 | 6.00 | 5.70 | 3.50 | 3.30 | 3.20 |
| 2.2 | 8.70 | 8.30 | 5.00 | 4.80 | 4.60 |
| 3.7 | 14 | 13.4 | 8.20 | 7.80 | 7.50 |
| 5.5 | 20 | 19.1 | 11.5 | 10.9 | 10.5 |
| 7.5 | 27 | 25.8 | 15.5 | 14.8 | 14.2 |
| 11 | 39 | 37.3 | 22 | 21.1 | 20.5 |
| 15 | 52 | 50 | 30 | 29 | 28 |
| 18.5 | 64 | 61 | 37 | 36 | 35 |
| 22 | 75 | 72 | 44 | 42 | 40 |
| 30 | 103 | 99 | 60 | 57 | 55 |
| 37 | 126 | 121 | 72.5 | 69 | 66 |
| 45 | 147 | 141 | 85 | 82 | 80 |
| 55 | 182 | 174 | 105 | 100 | 96 |
| 75 | 239 | 229 | 138 | 136 | 135 |
| 90 | 295 | 282 | 170 | 167 | 165 |
| 110 | 356 | 341 | 205 | 202 | 200 |
| 132 | 425 | 407 | 245 | 236 | 230 |
| 150 | 484 | 463 | 280 | 269 | 260 |
| 160 | 520 | 497 | 300 | 286 | 275 |
| 185 | 580 | 555 | 340 | 324 | 312 |
| 200 | 640 | 612 | 370 | 353 | 340 |
| 220 | 710 | 679 | 408 | 395 | 385 |
| 250 | — | — | 475 | 461 | 450 |

[1] These values are calculated.

Appendix

Full Load Currents

The full load currents listed below are average values for horsepower rated motors of several manufacturers at the more common rated voltages and speeds. These average values should be used only as a guide for selecting suitable components for the motor branch circuit. The rated full load current shown on the motor nameplate may vary considerably from the listed value, depending on the specific motor design.

Important: The motor nameplate full load current always should be used in determining the rating of the devices used for motor running overcurrent protection.

Full Load Current of 3-Phase 60 Hertz AC Induction Motors

| HP | RPM | Full Load Current | | |
|-----|------|-------------------|------|------|
| | | 240V | 480V | 600V |
| .25 | 3600 | 1.04 | 0.52 | 0.42 |
| | 1800 | 1.20 | 0.60 | 0.48 |
| | 1200 | 1.40 | 0.70 | 0.56 |
| .33 | 3600 | 1.28 | 0.64 | 0.51 |
| | 1800 | 1.46 | 0.73 | 0.58 |
| | 1200 | 1.64 | 0.82 | 0.66 |
| .50 | 3600 | 1.80 | 0.90 | 0.72 |
| | 1800 | 2.20 | 1.10 | 0.88 |
| | 1200 | 2.50 | 1.25 | 1.00 |
| .75 | 3600 | 2.50 | 1.25 | 1.00 |
| | 1800 | 3.00 | 1.50 | 1.20 |
| | 1200 | 3.30 | 1.65 | 1.32 |
| 1 | 3600 | 3.04 | 1.52 | 1.22 |
| | 1800 | 3.68 | 1.84 | 1.47 |
| | 1200 | 3.98 | 1.99 | 1.59 |
| 1.5 | 3600 | 4.36 | 2.18 | 1.74 |
| | 1800 | 5.02 | 2.51 | 2.01 |
| | 1200 | 5.62 | 2.81 | 2.25 |
| 2 | 3600 | 5.64 | 2.82 | 2.26 |
| | 1800 | 6.22 | 3.11 | 2.49 |
| | 1200 | 7.10 | 3.55 | 2.84 |
| 3 | 3600 | 8.00 | 4.00 | 3.20 |
| | 1800 | 9.04 | 4.52 | 3.62 |
| | 1200 | 10.1 | 5.04 | 4.03 |
| 5 | 3600 | 13.6 | 6.80 | 5.44 |
| | 1800 | 13.8 | 6.88 | 5.50 |
| | 1200 | 16.1 | 8.07 | 6.46 |
| 7.5 | 3600 | 19.1 | 9.57 | 7.66 |
| | 1800 | 21.7 | 10.8 | 8.66 |
| | 1200 | 23.1 | 11.5 | 9.22 |
| 10 | 3600 | 25.7 | 12.9 | 10.3 |
| | 1800 | 27.3 | 13.7 | 10.9 |
| | 1200 | 28.4 | 14.2 | 11.4 |
| 15 | 3600 | 37.2 | 18.6 | 14.9 |
| | 1800 | 40.4 | 20.2 | 16.2 |
| | 1200 | 42.5 | 21.3 | 17.0 |
| 20 | 3600 | 51.3 | 25.6 | 20.5 |
| | 1800 | 51.6 | 25.8 | 20.6 |
| | 1200 | 53.4 | 26.7 | 21.4 |
| 25 | 3600 | 61.4 | 30.7 | 24.6 |
| | 1800 | 64.7 | 32.3 | 25.9 |
| | 1200 | 65.8 | 32.9 | 26.3 |
| 30 | 3600 | 74.2 | 37.1 | 29.7 |
| | 1800 | 76.4 | 38.2 | 30.5 |
| | 1200 | 79.3 | 39.7 | 31.7 |

| HP | RPM | Full Load Current | | |
|-----|------|-------------------|------|------|
| | | 240V | 480V | 600V |
| 40 | 3600 | 96.0 | 48.0 | 38.4 |
| | 1800 | 102 | 50.8 | 40.6 |
| | 1200 | 103 | 51.7 | 41.4 |
| 50 | 3600 | 122 | 61.2 | 49.0 |
| | 1800 | 125 | 62.3 | 49.8 |
| | 1200 | 127 | 63.4 | 50.7 |
| 60 | 3600 | 143 | 71.6 | 57.3 |
| | 1800 | 149 | 74.3 | 59.4 |
| | 1200 | 150 | 74.9 | 59.9 |
| 75 | 3600 | 177 | 88.5 | 70.8 |
| | 1800 | 183 | 91.4 | 73.1 |
| | 1200 | 186 | 93.1 | 74.5 |
| 100 | 3600 | 231 | 116 | 92.6 |
| | 1800 | 239 | 119 | 95.5 |
| | 1200 | 243 | 122 | 97.2 |
| 125 | 3600 | 288 | 144 | 115 |
| | 1800 | 294 | 147 | 118 |
| | 1200 | 300 | 150 | 120 |
| 150 | 3600 | 344 | 172 | 138 |
| | 1800 | 350 | 175 | 140 |
| | 1200 | 358 | 179 | 143 |
| 200 | 3600 | 454 | 227 | 182 |
| | 1800 | 460 | 230 | 184 |
| | 1200 | 466 | 233 | 186 |
| 250 | 3600 | 556 | 278 | 222 |
| | 1800 | 570 | 285 | 228 |
| | 1200 | 590 | 295 | 236 |
| 300 | 3600 | 670 | 335 | 268 |
| | 1800 | 684 | 342 | 274 |
| | 1200 | 696 | 348 | 278 |
| 350 | 3600 | 748 | 374 | 299 |
| | 1800 | 762 | 381 | 305 |
| | 1200 | 774 | 387 | 310 |
| 400 | 3600 | 874 | 437 | 350 |
| | 1800 | 892 | 446 | 357 |
| | 1200 | 902 | 451 | 361 |
| 450 | 3600 | 972 | 486 | 389 |
| | 1800 | 992 | 496 | 397 |
| | 1200 | 1004 | 502 | 402 |
| 500 | 3600 | 1074 | 537 | 430 |
| | 1800 | 1096 | 548 | 438 |
| | 1200 | 1108 | 554 | 443 |

HP to kW Conversion Table

| NEMA HP | Required kW Rating | Required Catalog kW Code |
|----------------|---------------------------|---------------------------------|
| 0.125 | 0.12 | 30K |
| 0.25 | 0.18 | 31K |
| 0.33 | 0.25 | 32K |
| 0.50 | 0.37 | 33K |
| 0.75 | 0.55 | 34K |
| 1 | 0.75 | 35K |
| 1.5 | 1.1 | 36K |
| 2 | 1.5 | 37K |
| 3 | 2.2 | 38K |
| 5 | 3.7 | 39K |
| 7.5 | 5.5 | 40K |
| 10 | 7.5 | 41K |
| 15 | 11 | 42K |
| 20 | 15 | 43K |
| 25 | 18.5 | 44K |
| 30 | 22 | 45K |
| 40 | 30 | 46K |
| 50 | 37 | 47K |
| 60 | 45 | 48K |
| 75 | 55 | 49K |
| 100 | 75 | 50K |
| 125 | 90 | 51K |
| 150 | 110 | 52K |
| 200 | 150 | 54K |

Appendix

Conductor Size Conversion Chart—Metric Conductor Size to American Wire Gauge Conductor Size

| Metric Conductor Size | American Wire Gauge Size (Actual Size in mm ²) |
|-----------------------|--|
| 2.5 mm ² | #14 (2.08) |
| 4 mm ² | #12 (3.31) |
| 6 mm ² | #10 (5.26) |
| 10 mm ² | #8 (8.37) |
| 16 mm ² | #6 (13.30) |
| 25 mm ² | #4 (21.15) |
| 25 mm ² | #3 (26.67) ^[1] |
| 35 mm ² | #2 (33.62) |
| 35 mm ² | #1 (44.21) ^[1] |
| 50 mm ² | #1/0 (53.49) |
| 70 mm ² | #2/0 (67.43) |
| 95 mm ² | #3/0 (85.01) |
| 95 mm ² | #4/0 (107.20) ^[1] |
| 120 mm ² | 250 kcmil (127.0) |
| 150 mm ² | 300 kcmil (152.0) |
| 185 mm ² | 350 kcmil (177.0) |
| 185 mm ² | 400 kcmil (203.0) ^[1] |
| 240 mm ² | 500 kcmil (253.0) |
| 300 mm ² | 600 kcmil (304.0) |
| 400 mm ² | 750 kcmil (380.0) |

[1] This American wire gauge conductor size is the closest equivalent to the metric conductor size.

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