

# Manual motor Protectors



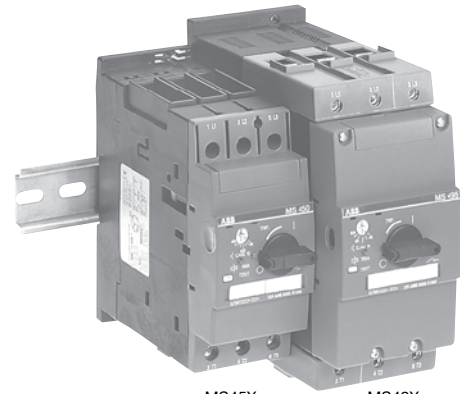
## Manual motor protectors



MS116



MS325



MS45X

MS49X

### Description

#### Type MS116

- Suitable for use with 3-phase motors up to 10 HP @ 480V
- UL Listed and CSA certified for Group Motor Installations
- 12 Setting ranges from 0.1 to 16 amps.
- Up to 30kA or 50kA with no back up fuse required
- 35mm DIN rail snap-on mounting
- Wide range of accessories

#### Type MS325

- Suitable for use with 3-phase motors up to 15 HP @ 480V
- UL Listed and CSA certified for Group Motor Installations
- 12 Setting ranges from 0.1 to 25 amps.
- Up to 50kA or 100kA with no back up fuse required
- 35mm DIN rail snap-on mounting
- Wide range of accessories

#### Type MS45x

- Suitable for use with 3-phase motors up to 40 HP @ 480V
- UL Listed and CSA certified for Group Motor Installations
- 14 Setting ranges from 11 to 50 amps
- Up to 100kA with no back up fuse required
- 35mm DIN rail snap-on mounting
- Wide range of accessories

#### Type MS49x

- Suitable for use with 3-phase motors up to 75 HP @ 480V
- UL Listed and CSA certified for Group Motor Installations
- 22 Setting ranges from 11 to 100 amps
- Up to 100kA with no back up fuse required
- 35mm DIN rail snap-on mounting
- Wide range of accessories

### Single motor applications

Single motor applications employing a manual motor protector (MMP) result in a simple, compact and economical alternative to conventional magnetic motor controllers for manual operation of a single motor. Upstream short circuit and overcurrent protection in the form of fuses or a circuit breaker is required but the MMP can replace the overload relay, contactor and associated electrical components and wiring for controlling the contactor.

### Group motor applications

Group motor installations offer several advantages when controlling two or more motors or other loads over conventional single motor starters. Several MMPs can be grouped together and fed from a single set of fuses or a circuit breaker. These devices can be installed together on a single DIN rail and fed power through three phase insulated busbars and a power feed terminal. Protecting this group of MMPs is a single circuit breaker or fusible switch, sized specifically for the load. Excellent coordination and short circuit protection can be achieved, as high as 50kAIC, when using the MS325 product in this manner. Close coupling adapters are offered to connect contactors to the load side of each MMP for automatic operation of each motor. If a single motor experiences an overload, the associated MMP trips and allows the other motors to continue running. Numerous accessories are available for signaling in the event of a trip, to indicate status, to provide shunt trip and for undervoltage release. The main benefits of group installation are quick, fool proof assembly, minimal wiring and a reduction of the necessary enclosure size. The only constraint is that the upstream circuit protective device must be sized specifically for the load – a highly desirable feature in order to provide the closest coordination and the greatest level of circuit protection. Article 430.53(C) of the *NEC*<sup>®</sup> specifies the requirements for group motor installations; all ABB MMPs meet these requirements.

## Selection

Group installation is an approach to building multi-motor control systems in accordance with Section 430-53 of the National Electrical Code. The selection of components used in group installations is a simple process which consists of several steps.

- First is the selection of the appropriate fuse as Branch Circuit Protective Device (BCPD).
- Second is the selection of the appropriate motor starter and protector.
- Third, the selected MMP must be checked for UL listing with the selected BCPD and the available short circuit current at the application location.

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### 1. Fused disconnect

Calculate maximum fuse size according to NEC 430-53 (c).  $I_{max}$  (fuse size) =  $175\% \times \text{FLC}$  (full load current for largest motor) + the sum of FLC (full load current for largest motor) + the sum of FLC values for other motors on that branch using NEC Table 430-150 on the right. Select fuse from NEC Table 240-6 below. Where  $I_{max}$  falls between two fuse ampere ratings NEC 430-53 (c) permits going to the next high ampere rating.

### 2. Motor protector selection

Select the proper MMP catalog number for each motor load from the following pages based on the actual motor full load current (FLA) using the "Thermal setting range" column for reference.

### 3. MMP Interruption ratings

Using the interruption ratings table on the next page, identify the system application voltage and interrupting capacity for the type of fuse selected in step 1 above.

NEC 240-6 Standard fuse amperes

15, 20, 25, 30, 40, 45, 50, 60, 70, 80, 90, 110, 125, 150, 175, 200, 225, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000, 1200, 1600

Examples: Select components for protecting the following 3-phase, 460VAC, squirrel cage induction motors. The nameplate data are:

1/2 HP, 1.0 FLA; 3 HP, 4.8 FLA; 5 HP, 7.6 FLA; 7.5 HP, 11 FLA; 10 HP, 14 FLA.

Example: using fused disconnect

- $I_{max} = 175\% \times 14 + (11 + 7.6 + 4.8 + 1) = 48.9\text{A}$
- Fuse rating using Table NEC 240-6 = 50A
- Minimum disconnect size =  $115\% \times \text{Total FLA}$
- NEC 430-150 table =  $115\% \times (14 + 11 + 7.6 + 4.8 + 1) = 44.16$

Disconnect for 50A fuses is ok.

Note: Refer to NEC 310-1 and NEC 430-53(d) for cable sizing.

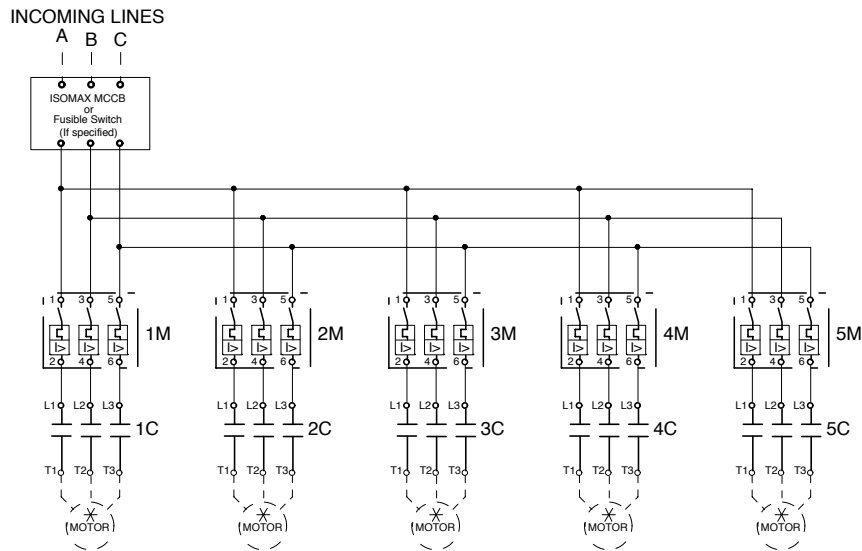
## NEC Table 430-150 full load current, 3ph AC motor

| Horsepower | Induction type squirrel cage & wound rotor ① |           |           |
|------------|----------------------------------------------|-----------|-----------|
|            | 230V amps                                    | 460V amps | 575V amps |
| 1/2        | 2                                            | 1         | .8        |
| 3/4        | 2.8                                          | 1.4       | 1.1       |
| 1          | 3.6                                          | 1.8       | 1.4       |
| 1.5        | 5.2                                          | 2.6       | 2.1       |
| 2          | 6.8                                          | 3.4       | 2.7       |
| 3          | 9.6                                          | 4.8       | 3.9       |
| 5          | 15.2                                         | 7.6       | 6.1       |
| 7.5        | 22                                           | 11        | 9         |
| 10         | 28                                           | 14        | 11        |
| 15         | 42                                           | 21        | 17        |
| 20         | 54                                           | 27        | 22        |
| 25         | 68                                           | 34        | 27        |

For full load currents of 208 and 200 volt motors, increase the corresponding 230 volt motor full-load current by 10% and 15%, respectively.

## MS325 data

| Motor rating at 460V |          | MS325      | Contactor |
|----------------------|----------|------------|-----------|
| Horsepower           | FLA, AC3 |            |           |
| 1/2                  | 1.0      | MS325-1.0  | A9C       |
| 3                    | 4.8      | MS325-6.3  | A9C       |
| 5                    | 7.6      | MS325-9.0  | A9C       |
| 7.5                  | 11       | MS325-12.5 | A12C      |
| 10                   | 14       | MS325-16   | A16C      |



① These values of full-load current are for motors running at speeds usual for belted motors and motors with normal torque characteristics. Motors built for especially low speeds or high torques may require more running current, and multispeed motors will have full-load current varying with speed, in which case the nameplate current rating shall be used.

The voltage listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, and 550 to 600 volts.

# Type MS116



MS116

## Manual motor protectors

| Thermal setting range (Amps) | Single-phase horsepower ratings ① |      | 3-phase horsepower ratings |      |      | Catalog number | List price    |
|------------------------------|-----------------------------------|------|----------------------------|------|------|----------------|---------------|
|                              | 120V                              | 240V | 240V                       | 480V | 600V |                |               |
| <b>MS116</b>                 |                                   |      |                            |      |      |                |               |
| 0.10 – 0.16                  | —                                 | —    | —                          | —    | —    | MS116-0.16     | <b>\$ 129</b> |
| 0.16 – 0.25                  | —                                 | —    | —                          | —    | —    | MS116-0.25     |               |
| 0.25 – 0.40                  | —                                 | —    | —                          | —    | —    | MS116-0.40     |               |
| 0.40 – 0.63                  | —                                 | —    | —                          | —    | —    | MS116-0.63     |               |
| 0.63 – 1.0                   | —                                 | —    | —                          | 1/2  | 1/2  | MS116-1.0      | <b>148.50</b> |
| 1.0 – 1.6                    | —                                 | 1/10 | —                          | 3/4  | 3/4  | MS116-1.6      |               |
| 1.6 – 2.5                    | —                                 | 1/6  | 1/2                        | 1    | 1.5  | MS116-2.5      |               |
| 2.5 – 4.0                    | 1/8                               | 1/3  | 1                          | 2    | 3    | MS116-4.0      |               |
| 4.0 – 6.3                    | 1/4                               | 1/2  | 1.5                        | 3    | 5    | MS116-6.3      |               |
| 6.3 – 10                     | 1/2                               | 1.5  | 3                          | 5    | 7.5  | MS116-10       |               |
| 8.0 – 12                     | 1/2                               | 2    | 3                          | 7.5  | 10   | MS116-12       | <b>172.50</b> |
| 10.0 – 16                    | 1                                 | 2    | 5                          | 10   | 10   | MS116-16       |               |

UL File # E137861  
 Short circuit rating of 18kA @ 480VAC  
 Class 10 overload  
 Accessories, UL File # E90357

① Single phase motor ratings are based upon wiring all three poles in series.

## Type MS116 Accessories

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HK1-11



HKF1-11



SK1-11



UA1-120



MS325-SA1



MS325-SA3



IB116-G

### Auxiliary contact blocks for Type MS116 (right side mount)

| Contact configuration | Catalog number | List price   |
|-----------------------|----------------|--------------|
| 1 NO & 1 NC           | HK1-11         | <b>\$ 33</b> |
| 2 NO                  | HK1-20         |              |
| 2 NC                  | HK1-02         |              |

### Auxiliary contact blocks for Type MS116 (front mount)

| Contact configuration | Catalog number | List price   |
|-----------------------|----------------|--------------|
| 1 NO & 1 NC           | HKF1-11        | <b>\$ 33</b> |

### Bell alarm contact blocks for Type MS116 (right side mount)

| Contact configuration | Catalog number | List price   |
|-----------------------|----------------|--------------|
| 1 NO & 1 NC           | SK1-11         | <b>\$ 33</b> |
| 2 NO                  | SK1-20         |              |
| 2 NC                  | SK1-02         |              |

### Undervoltage trip for Type MS116 (left side mount)

| Voltage (VAC) | Catalog number | List price      |
|---------------|----------------|-----------------|
| 24            | UA1-24         | <b>\$ 82.50</b> |
| 48            | UA1-48         |                 |
| 60            | UA1-60         |                 |
| 120           | UA1-120        |                 |
| 230           | UA1-230        |                 |
| 400           | UA1-400        |                 |
| 415           | UA1-415        |                 |

### Shunt trip for Type MS116 (left side mount)

| Voltage (VAC) | Catalog number | List price   |
|---------------|----------------|--------------|
| 24V           | AA1-24         | <b>\$ 75</b> |
| 110V          | AA1-110        |              |
| 200 – 240V    | AA1-230        |              |
| 350 – 415V    | AA1-400        |              |

### Locking device for Type MS116

| Description                                              | Catalog number | List price   |
|----------------------------------------------------------|----------------|--------------|
| Adaptor for padlock Type SA1                             | MS325-SA1      | <b>\$ 15</b> |
| Complete padlock locking kit (adaptor, padlock & 3 keys) | MS325-SA3      | <b>37.50</b> |

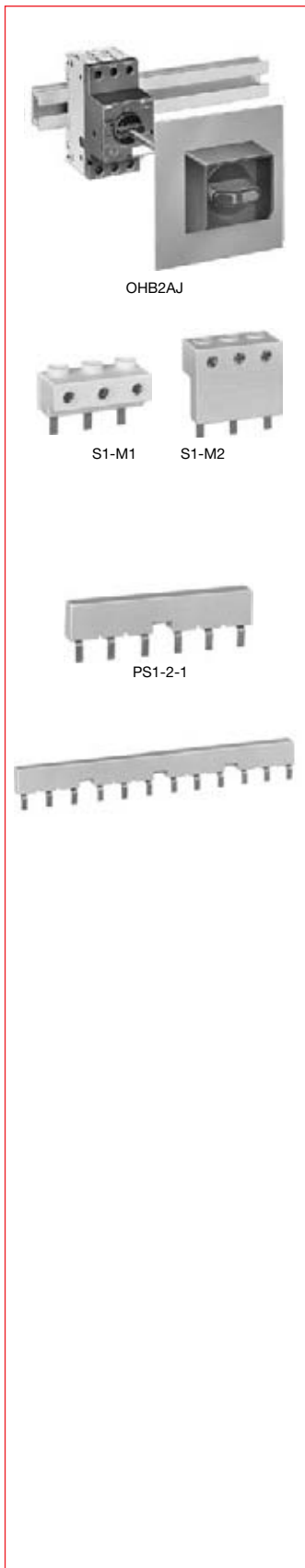
### Molded plastic enclosures for Type MS116

| Item description                 | Protection level | Catalog number | List price |
|----------------------------------|------------------|----------------|------------|
| Gray enclosure with black handle | IP65             | IB116-G        | <b>75</b>  |
| Yellow enclosure with red handle | IP65             | IB116-Y        | <b>75</b>  |

### Plastic adaptors for enclosures for Type MS116

| Description    | Catalog number | List price   |
|----------------|----------------|--------------|
| PG16 to 1/2NPT | PG16-1/2NPT    | <b>\$ 10</b> |

# Type MS116 Accessories



## Door mounting hardware for for Type MS116 ①

| Description                                | Catalog number  | List price |
|--------------------------------------------|-----------------|------------|
| Shaft coupler                              | MSMN            | \$ 15      |
| NEMA 1, 3R, 12 Black selector handle       | 1SCA022384R6940 | 30         |
| NEMA 1, 3R, 12 Red, yellow selector handle | 1SCA022384R7080 | 30         |
| 4.1" length shaft                          | 1SCA022347R3650 | 4          |
| 7.1" length shaft                          | 1SCA022353R4620 | 6          |

## Power feed terminal blocks for Type MS116

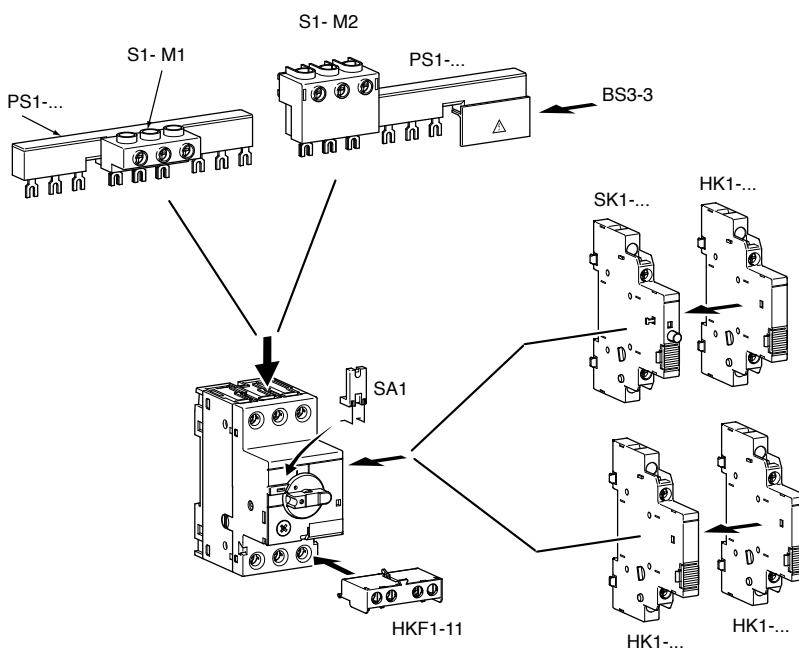
| Description         | Catalog number | List price |
|---------------------|----------------|------------|
| Flush w/bus bar     | S1-M1          | \$ 24      |
| Extends over busbar | S1-M2          |            |

## Busbars for Type MS116 (63A max.)

| Description                              | Catalog number | List price |
|------------------------------------------|----------------|------------|
| for 2 devices without auxiliary contacts | PS1-2-0        | \$ 24      |
| for 3 devices without auxiliary contacts | PS1-3-0        | 30         |
| for 4 devices without auxiliary contacts | PS1-4-0        | 36         |
| for 5 devices without auxiliary contacts | PS1-5-0        | 42         |
| for 2 devices with 1 auxiliary contact   | PS1-2-1        | 24         |
| for 3 devices with 1 auxiliary contact   | PS1-3-1        | 30         |
| for 4 devices with 1 auxiliary contact   | PS1-4-1        | 36         |
| for 5 devices with 1 auxiliary contact   | PS1-5-1        | 42         |
| for 2 devices with 2 auxiliary contacts  | PS1-2-2        | 24         |
| for 3 devices with 2 auxiliary contacts  | PS1-3-2        | 30         |
| for 4 devices with 2 auxiliary contacts  | PS1-4-2        | 36         |
| for 5 devices with 2 auxiliary contacts  | PS1-5-2        | 42         |
| Busbar cover                             | BS3-3          | 9          |

## Busbar/Close coupling adapter for direct mounting of contactors

| Description | Catalog number | List price |
|-------------|----------------|------------|
| B6/B7       | BEA7/116       | \$ 12      |
| A9/A12/A16  | BEA16/116      | 13.50      |
| A26         | BEA26/116      | 15         |
| AL9 - AL16  | BEA16/116AL    | 13.50      |



① Must have shaft coupler, handle and shaft for through-the-door operation.  
② Consult factory.

## Type MS116

### Technical data

| Softstarter type                                 |                     | MS116                                                      |
|--------------------------------------------------|---------------------|------------------------------------------------------------|
| Standards, approvals                             |                     | UL, CSA, CE                                                |
| Rated operating current                          | A                   | 16                                                         |
| Current range                                    | A                   | 0.16 – 16                                                  |
| Number of poles                                  |                     | 3                                                          |
| Frequency                                        | Hz                  | 50 / 60                                                    |
| Tripping class                                   | A                   | 10                                                         |
| Max. kAIC & 600V                                 | kAIC                | 30                                                         |
| Mechanical life                                  | Operations          | 100,000                                                    |
| Wire range                                       | AWG                 | 12 – 18                                                    |
| Terminal torque                                  | in. lbs.            | 14                                                         |
| Terminal tool options                            |                     | Flat screwdriver PZ2                                       |
| Permissible attitude without derating            | m                   | 3000                                                       |
| Degree of protection                             |                     | IP20                                                       |
| UL Listed for group installation                 |                     | Yes                                                        |
| Self-protected Type E manual combination starter |                     | No                                                         |
| <b>Accessories</b>                               |                     |                                                            |
| Terminal shroud                                  |                     | No                                                         |
| Auxiliary contacts                               |                     | Yes                                                        |
| Shunt trip                                       |                     | No                                                         |
| Trip signal contacts                             |                     | Yes                                                        |
| UV release                                       |                     | Yes                                                        |
| Busbar                                           |                     | Yes                                                        |
| Through the door handle                          |                     | Yes                                                        |
| Minimum enclosure size                           |                     | H x W x D                                                  |
| <b>Loads for accessories</b>                     |                     |                                                            |
| Auxiliary contact for front mounting, HKF        | AC15                | 24 V, 3.0 A<br>230 V, 1.5 A                                |
| Auxiliary contact for front mounting, HKF        | DC13                | 24 V, 1.0 A<br>48 / 60V, 0.7 A<br>110 V, 0.27 A            |
| Auxiliary and signal contact, HK + SK            | AC15                | 24 V, 6 A<br>230 V, 4 A<br>400 V, 3 A                      |
| Auxiliary and signal contact, HK + SK            | DC13                | 24 V, 2 A<br>110 V, 0.5 A<br>220 V, 0.25 A<br>440 V, 0.1 A |
| <b>Electromagnet trips</b>                       |                     |                                                            |
| Response value set ex-works                      |                     | 9.6 – 14.4 x I <sub>n</sub>                                |
| <b>Undervoltage release</b>                      |                     |                                                            |
| Pick-up value                                    | % of U <sub>C</sub> | 85                                                         |
| Drop-out value                                   | % of U <sub>C</sub> | 35 – 75                                                    |
| <b>Power consumption</b>                         |                     |                                                            |
| Pick-up VA                                       |                     | Consult factory                                            |
| Hold VA                                          |                     | Consult factory                                            |

# Type MS116

## Technical data

### General purpose

| MS116 range | Maximum current (600 VAC Max.) |
|-------------|--------------------------------|
| 0.1 – 0.16  | 0.16                           |
| 0.16 – 0.25 | 0.25                           |
| 0.25 – 0.40 | 0.40                           |
| 0.04 – 0.63 | 0.63                           |
| 0.63 – 1.0  | 1.0                            |
| 1.0 – 1.6   | 1.6                            |
| 1.6 – 2.5   | 2.5                            |
| 2.5 – 4.0   | 4.0                            |
| 4 – 6.3     | 6.3                            |
| 6.3 – 10    | 10                             |
| 8 – 12      | 12                             |
| 10 – 16     | 16                             |

### Maximum ratings

| MS116 Range | Horsepower, HP, Breaking-All-Lines |         |                      |         |         |
|-------------|------------------------------------|---------|----------------------|---------|---------|
|             | Single phase 50/60 Hz              |         | Three phase 50/60 Hz |         |         |
|             | 120 VAC                            | 240 VAC | 240 VAC              | 480 VAC | 600 VAC |
| 0.1 – 0.16  | –                                  | –       | –                    | –       | –       |
| 0.16 – 0.25 | –                                  | –       | –                    | –       | –       |
| 0.25 – 0.40 | –                                  | –       | –                    | –       | –       |
| 0.40 – 0.63 | –                                  | –       | –                    | –       | –       |
| 0.63 – 1.0  | –                                  | –       | –                    | 1/2     | 1/2     |
| 1.0 – 1.6   | –                                  | 1/10    | –                    | 3/4     | 3/4     |
| 1.6 – 2.5   | –                                  | 1/6     | 1/2                  | 1       | 1 1/2   |
| 2.5 – 4.0   | 1/8                                | 1/3     | 1                    | 2       | 3       |
| 4.0 – 6.3   | 1/4                                | 1/2     | 1 1/2                | 3       | 5       |
| 6.3 – 10    | 1/2                                | 1 1/2   | 3                    | 5       | 7 1/2   |
| 8 – 12      | 1/2                                | 2       | 3                    | 7 1/2   | 10      |
| 10 – 16     | 1                                  | 2       | 5                    | 10      | 10      |

### Short circuit ratings (UL & CSA)

18,000 RMS symmetrical 480 VAC  
5,000 RMS symmetrical 600 VAC

### MS116 Short circuit ratings for group installations

Short circuit ratings at 480 VAC

Maximum breaker or fuse size

| MS16       | 5 kA |         | 18 kA |         | 30 kA |      | 50kA |      |
|------------|------|---------|-------|---------|-------|------|------|------|
|            | Fuse | MCCB    | Fuse  | MCCB    | Fuse  | MCCB | Fuse | MCCB |
| 0.1 - 0.2  |      |         | 1200  | S7H1200 | -     | -    | -    | -    |
| 0.2 - 0.3  |      |         | 1200  | S7H1200 | -     | -    | -    | -    |
| 0.3 - 0.4  |      |         | 1200  | S7H1200 | -     | -    | -    | -    |
| 0.4 - 0.6  |      |         | 1200  | S7H1200 | -     | -    | -    | -    |
| 0.6 - 1.0  |      |         | 1200  | S7H1200 | -     | -    | -    | -    |
| 1.0 - 1.6  |      |         | 1200  | S7H1200 | -     | -    | -    | -    |
| 1.6 - 2.5  |      |         | 1200  | S7H1200 | -     | -    | -    | -    |
| 2.5 - 4.0  | 1200 | S7H1200 | -     | -       | -     | -    | -    | -    |
| 4.0 - 6.3  |      |         | 1200  | S7H1200 | -     | -    | -    | -    |
| 6.3 - 10.0 |      |         | 1200  | S7H1200 | -     | -    | -    | -    |
| 8.0 - 12.0 |      |         | 1200  | S7H1200 | -     | -    | -    | -    |
| 10 - 16    | -    | -       | -     | -       | -     | -    | -    | -    |

Fuse: Rated 1200 A, Listed Class L. All others, Listed K5. Both Time-delay fuses.

Circuit breaker: Listed ABB

### Short circuit ratings at 600 VAC

Maximum breaker or fuse size

| MS116      | 5 kA |         | 10 kA |         | 18kA |         |
|------------|------|---------|-------|---------|------|---------|
|            | Fuse | MCCB    | Fuse  | MCCB    | Fuse | MCCB    |
| 0.1 - 0.2  |      |         |       |         | 1200 | S7H1200 |
| 0.2 - 0.3  |      |         |       |         | 1200 | S7H1200 |
| 0.3 - 0.4  |      |         |       |         | 1200 | S7H1200 |
| 0.4 - 0.6  |      |         |       |         | 1200 | S7H1200 |
| 0.6 - 1.0  |      |         |       |         | 1200 | S7H1200 |
| 1.0 - 1.6  |      |         |       |         | 1200 | S7H1200 |
| 1.6 - 2.5  |      |         |       |         | 1200 | S7H1200 |
| 2.5 - 4.0  | -    | -       | -     | -       | -    | -       |
| 4.0 - 6.3  |      |         | 1200  | S7H1200 | -    | -       |
| 6.3 - 10.0 |      |         | 1200  | S7H1200 | -    | -       |
| 8.0 - 12.0 | 1200 | S7H1200 | -     | -       | -    | -       |
| 10 - 16    | -    | -       | -     | -       | -    | -       |

Fuse: Rated 1200 A, Listed Class L. All others, Listed K5. Both Time-delay fuses.

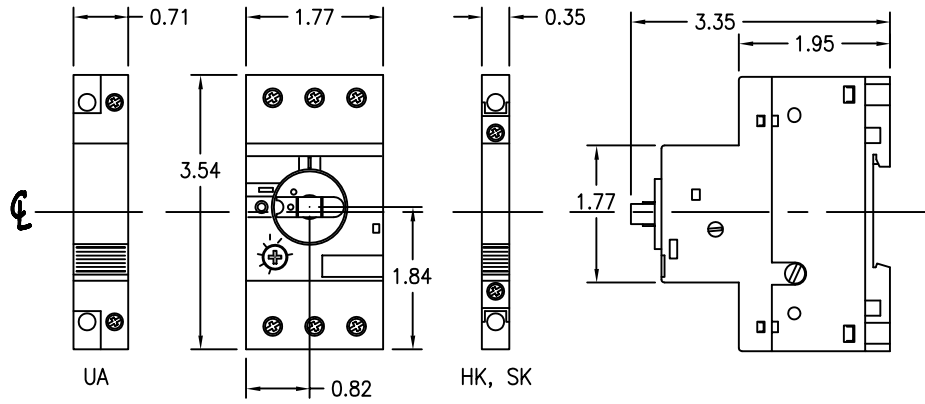
Circuit breaker: Listed ABB

# Type MS116

## Approximate dimensions

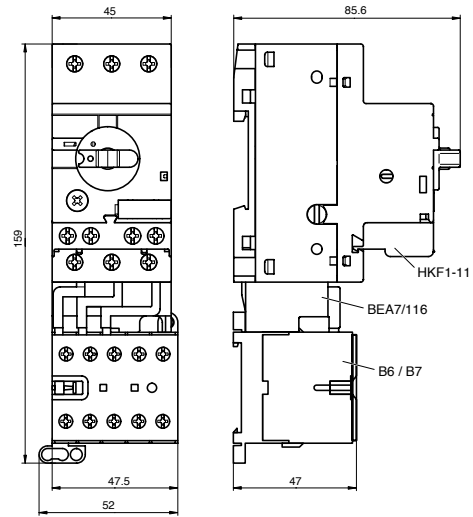
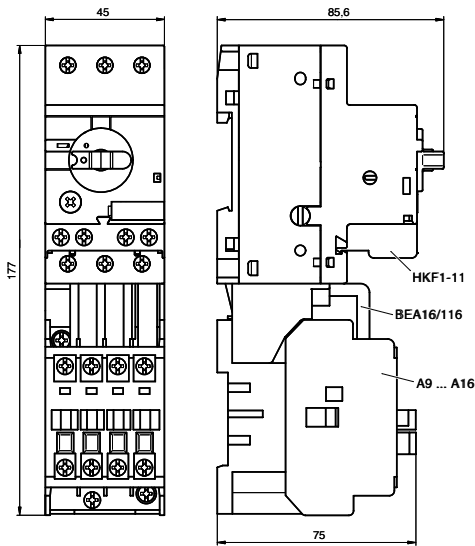
MS116

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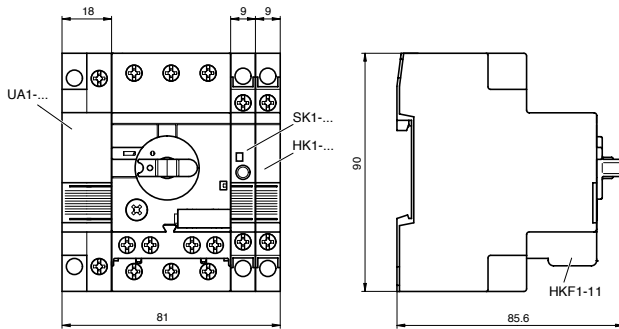


MS116 — mounted with A9 - A16 contactor

MS116 — mounted with B6/B7 minicontactor



MS116 — mounted with UA1..., SK1..., HK1..., HKF1-11

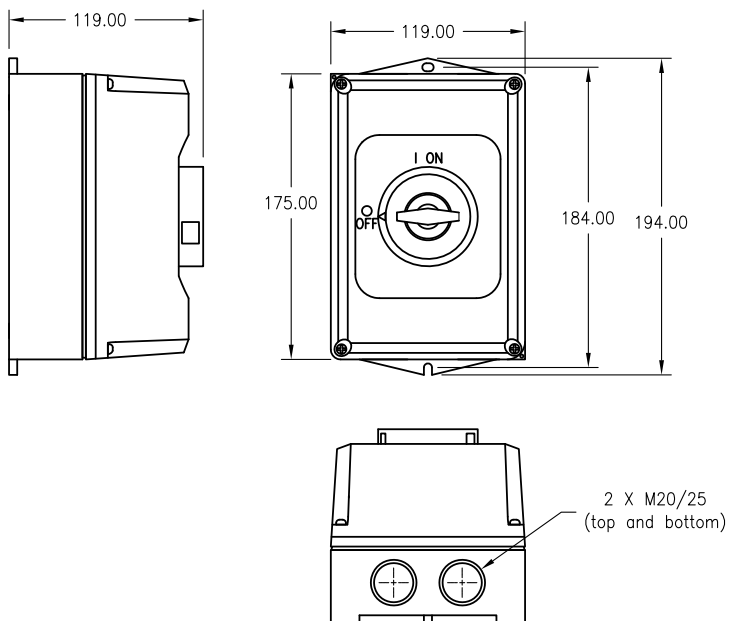




# Type MS116

Approximate dimensions

## IB116 Y/G



## Type MS325

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MS325-1.0

### Manual motor protectors – Type MS325

| Thermal setting range<br>(Amps) | Single-phase<br>horsepower ratings ① |      | 3-phase<br>horsepower ratings |      |      | Catalog number                                                | List price    |
|---------------------------------|--------------------------------------|------|-------------------------------|------|------|---------------------------------------------------------------|---------------|
|                                 | 120V                                 | 240V | 240V                          | 480V | 600V |                                                               |               |
| 0.10 – 0.16                     | —                                    | —    | —                             | —    | —    | MS325-0.16<br>MS325-0.25<br>MS325-0.40<br>MS325-0.63          | <b>\$ 144</b> |
| 0.16 – 0.25                     | —                                    | —    | —                             | —    | —    |                                                               |               |
| 0.25 – 0.40                     | —                                    | —    | —                             | —    | —    |                                                               |               |
| 0.40 – 0.63                     | —                                    | —    | —                             | —    | —    |                                                               |               |
| 0.63 – 1.0                      | —                                    | —    | —                             | 1/2  | 1/2  | MS325-1.0<br>MS325-1.6<br>MS325-2.5<br>MS325-4.0<br>MS325-6.3 | <b>165</b>    |
| 1.0 – 1.6                       | —                                    | 1/10 | —                             | 3/4  | 3/4  |                                                               |               |
| 1.6 – 2.5                       | —                                    | 1/6  | 1/2                           | 1    | 1.5  |                                                               |               |
| 2.5 – 4.0                       | 1/8                                  | 1/3  | 1                             | 2    | 3    |                                                               |               |
| 4.0 – 6.3                       | 1/4                                  | 1/2  | 1.5                           | 3    | 5    |                                                               |               |
| 6.3 – 9.0                       | 1/3                                  | 1    | 2.5                           | 5    | 7.5  | MS325-9.0<br>MS325-12.5<br>MS325-16                           | <b>192</b>    |
| 9.0 – 12.5                      | 1/2                                  | 2    | 3                             | 7.5  | 10   |                                                               |               |
| 12.5 – 16                       | 1                                    | 2.5  | 5                             | 10   | 10   |                                                               |               |
| 16 – 20                         | 1.5                                  | 3    | 5                             | 10   | 15   | MS325-20                                                      | <b>211.50</b> |
| 20 – 25                         | 2                                    | 3    | 7.5                           | 15   | 20   | MS325-25                                                      | <b>223.50</b> |

MS325 UL File #E137861  
Accessories UL File #E90353

① Single phase motor ratings are based upon wiring all three poles in series.

# Type MS325 UL 508E

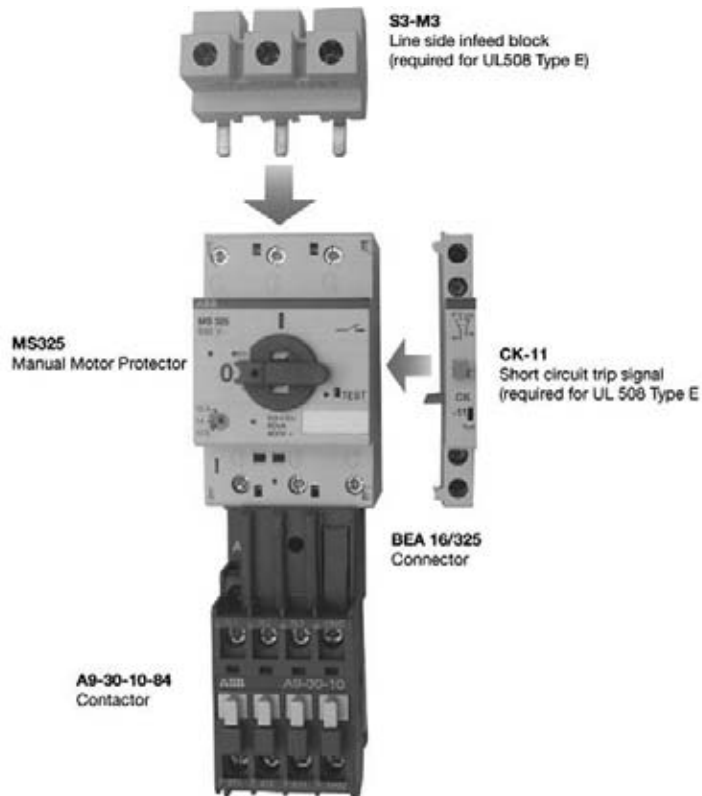


MS325-1.0

## Manual motor protectors — Type MS325

| Thermal setting range (Amps) | Single-phase horsepower ratings ① |      | 3-phase horsepower ratings |      |      | Catalog number ②                                                   | List price    |
|------------------------------|-----------------------------------|------|----------------------------|------|------|--------------------------------------------------------------------|---------------|
|                              | 120V                              | 240V | 240V                       | 480V | 600V |                                                                    |               |
| 0.10 – 0.16                  | —                                 | —    | —                          | —    | —    | MS325-0.16E<br>MS325-0.25E<br>MS325-0.40E<br>MS325-0.63E           | <b>\$ 223</b> |
| 0.16 – 0.25                  | —                                 | —    | —                          | —    | —    |                                                                    |               |
| 0.25 – 0.40                  | —                                 | —    | —                          | —    | —    |                                                                    |               |
| 0.40 – 0.63                  | —                                 | —    | —                          | —    | —    |                                                                    |               |
| 0.63 – 1.0                   | —                                 | —    | —                          | 1/2  | 1/2  | MS325-1.0E<br>MS325-1.6E<br>MS325-2.5E<br>MS325-4.0E<br>MS325-6.3E | <b>244</b>    |
| 1.0 – 1.6                    | —                                 | 1/10 | —                          | 3/4  | 3/4  |                                                                    |               |
| 1.6 – 2.5                    | —                                 | 1/6  | 1/2                        | 1    | 1.5  |                                                                    |               |
| 2.5 – 4.0                    | 1/8                               | 1/3  | 1                          | 2    | 3    |                                                                    |               |
| 4.0 – 6.3                    | 1/4                               | 1/2  | 1.5                        | 3    | 5    |                                                                    |               |
| 6.3 – 9.0                    | 1/3                               | 1    | 2.5                        | 5    | 7.5  | MS325-9.0E<br>MS325-12.5E<br>MS325-16E                             | <b>271</b>    |
| 9.0 – 12.5                   | 1/2                               | 2    | 3                          | 7.5  | 10   |                                                                    |               |
| 12.5 – 16                    | 1                                 | 2.5  | 5                          | 10   | 10   |                                                                    |               |
| 16 – 20                      | 1.5                               | 3    | 5                          | 10   | 15   | MS325-20E                                                          | <b>290</b>    |
| 20 – 25                      | 2                                 | 3    | 7.5                        | 15   | 20   | MS325-25E                                                          | <b>302</b>    |

MS325 UL File #E137861  
 Accessories UL File #E90353  
 Class 10 overload  
 Short circuit rating of 18kA @ 480V



① Single phase motor ratings are based upon wiring all three poles in series.  
 ② Part includes MMP, barrier and trip signal.

## Type MS325 Accessories

5



MS325-HK11



MS325-HKF11



MS325-UA24



MS325-AS



MS325-SA1



MS325-SA3

### Auxiliary contact blocks for Type MS325 (left side mount), 2 max.

| Item description | Catalog number | List price   |
|------------------|----------------|--------------|
| 1 NO & 1 NC      | MS325-HK11     | <b>\$ 33</b> |
| 2 NO             | MS325-HK20     |              |
| 2 NC             | MS325-HK02     |              |

### Auxiliary contact blocks for Type MS325 (front mount)

| Item description | Catalog number | List price   |
|------------------|----------------|--------------|
| 1 NO & 1 NC      | MS325-HKF11    | <b>\$ 33</b> |
| 2 NO             | MS325-HKF20    |              |

### Bell alarm contact blocks for Type MS325 (left side mount) ①

| Item description | Catalog number | List price   |
|------------------|----------------|--------------|
| 1 NO             | MS325-SK10     | <b>\$ 33</b> |
| 1 NC             | MS325-SK01     |              |

### Shunt trips for Type MS325

| Item description         | Catalog number | List price      |
|--------------------------|----------------|-----------------|
| 110 – 240 VAC/VDC, 60 Hz | MS325-ST110    | <b>\$ 82.50</b> |
| 24 – 60 VAC/DC, 60 Hz    | MS325-ST24     |                 |

### Undervoltage trip for Type MS325 (slide - internal)

| Item description | Catalog number | List price      |
|------------------|----------------|-----------------|
| 24V              | MS325-UA24     | <b>\$ 82.50</b> |
| 48V              | MS325-UA48     |                 |
| 60V              | MS325-UA60     |                 |
| 110V             | MS325-UA110    |                 |
| 230V             | MS325-UA230    |                 |
| 400V             | MS325-UA400    |                 |
| 415V             | MS325-UA415    |                 |
| 480V             | MS325-UA480    |                 |

### Supporting terminal for Type MS325

| Item description        | Catalog number | List price   |
|-------------------------|----------------|--------------|
| for UA or as N/LS clamp | MS325-AS       | <b>\$ 15</b> |

### Padlocking devices for Type MS325

| Item description                                          | Catalog number | List price   |
|-----------------------------------------------------------|----------------|--------------|
| Adapter for padlock type SA1                              | MS325-SA1      | <b>\$ 15</b> |
| Complete padlock kit (includes adaptor, padlock & 3 keys) | MS325-SA3      | <b>37.50</b> |

① Only changes state in the event of a trip.

# Type MS325 Accessories



IB325-G



Switch cubicle mounting kit



MS325-BB1



MS325-SM1



PS3-2-0



PS3-4-0



MS325 coupled to mini-contactor

## Molded plastic enclosures for Type MS325

| Item description                 | Protection level | Catalog number | List price |
|----------------------------------|------------------|----------------|------------|
| Gray enclosure with black handle | IP65             | IB325-G        | \$ 75      |
| Yellow enclosure with red handle | IP65             | IB325-Y        | 75         |

NOTE: Use Discount schedule MA [OM] for IP64 & IP65 enclosures; use Discount schedule CB21 [BZ] for IP55 enclosures. Not suitable for Type E.

## Plastic adaptors for enclosures for Type MS325

| Item description | Catalog number | List price |
|------------------|----------------|------------|
| PG16 TO 1/2 NPT  | PG16-1/2 NPT   | \$ 10      |

## Selector handles for through-the-door operation for Type MS325 ①

| Item description                          | Catalog number  | List price |
|-------------------------------------------|-----------------|------------|
| Shaft coupler                             | MSMN            | \$ 15      |
| NEMA 1, 3R, 12 black selector handle      | 1SCA022384R6940 | 30         |
| NEMA 1, 3R, 12 red/yellow selector handle | 1SCA022384R7080 | 30         |
| 4.1" length shaft                         | 1SCA022347R3650 | 4          |
| 7.1" length shaft                         | 1SCA022353R4620 | 6          |

NOTE: Use Discount schedule MA [OM] for shaft coupler; use Discount schedule H6 [DH] for handles and shafts.

## Power feed terminal blocks for Type MS325

| Item description                                     | Catalog number | List price |
|------------------------------------------------------|----------------|------------|
| Standard, accepts 4 AWG wire flush w/busbar          | MS325-SM1      | \$ 24      |
| Low profile, accepts 4 AWG wire external over busbar | MS325-BB1      | 25.50      |

## Busbars for Type MS325 ②

| Item description                         | Catalog number | List price |
|------------------------------------------|----------------|------------|
| for 2 devices; without auxiliary switch  | PS3-2-0        | \$ 24      |
| for 3 devices; without auxiliary switch  | PS3-3-0        | 30         |
| for 4 devices; without auxiliary switch  | PS3-4-0        | 33         |
| for 5 devices; without auxiliary switch  | PS3-5-0        | 39         |
| for 2 devices; with 1 auxiliary switch   | PS3-2-1        | 30         |
| for 3 devices; with 1 auxiliary switch   | PS3-3-1        | 34.50      |
| for 4 devices; with 1 auxiliary switch   | PS3-4-1        | 37.50      |
| for 5 devices; with 1 auxiliary switch   | PS3-5-1        | 42         |
| for 2 devices; with 2 auxiliary switches | PS3-2-2        | 30         |
| for 4 devices; with 2 auxiliary switches | PS3-4-2        | 37.50      |
| Busbar cover                             | BS3-3          | 9          |

Busbars can be daisy chained to connect additional MS325s.

## Close coupling adapters

| Device                              | Catalog number | List price |
|-------------------------------------|----------------|------------|
| MS325 + B6/B7 contactor             | BEA7/325       | \$ 12      |
| MS325 + VB6/VB7 reversing contactor | MS325-VB7      |            |
| MS325 + A9, A12, A16 contactor      | BEA16/325      | 13.50      |
| MS325 + A26 contactor               | BEA26/325      | 15         |
| AL9 - AL16                          | BEA16/325AL    | 13.50      |
| AL26                                | BEA26/325AL    | 15         |

## UL 508 Type E Accessories – Required

| Device                    | Catalog number | List price |
|---------------------------|----------------|------------|
| Line side infeed block    | S3-M3          | \$ 30      |
| Short circuit trip signal | CK-11          | 49         |

① Must have shaft coupler, handle and shaft for through-the-door operation.

② UL file # E167205; CSA file# LR98427M7-11.

③ Consult factory.

## Type MS450 – MS497



MS450



MS497

### Manual motor starters

|                                   | FLA adjustment range | Horsepower ratings        |      |             |      |      | Weight (lbs) | Availability code | Catalog number | List price |        |
|-----------------------------------|----------------------|---------------------------|------|-------------|------|------|--------------|-------------------|----------------|------------|--------|
|                                   |                      | Single-phase <sup>①</sup> |      | Three-phase |      |      |              |                   |                |            |        |
|                                   |                      | 115V                      | 230V | 200V – 208V | 230V | 460V |              |                   |                |            | 575V   |
| <b>Overload tripping class 10</b> | <b>MS450</b>         |                           |      |             |      |      |              |                   |                |            |        |
|                                   | 11 – 16              | 1                         | 3    | 5           | 5    | 10   | 15           | 2.12              | A              | MS450-16   | \$ 450 |
|                                   | 14 – 20              | 1.5                       | 3    | 5           | 7.5  | 15   | 20           | 2.12              | A              | MS450-20   | 450    |
|                                   | 18 – 25              | 2                         | 5    | 7.5         | 10   | 20   | 25           | 2.12              | A              | MS450-25   | 450    |
|                                   | 22 – 32              | 3                         | 5    | 10          | 10   | 25   | 30           | 2.12              | A              | MS450-32   | 450    |
|                                   | 28 – 40              | 3                         | 7.5  | 15          | 15   | 30   | 40           | 2.12              | A              | MS450-40   | 510    |
|                                   | 36 – 45              | 5                         | 7.5  | 15          | 15   | 30   | 40           | 2.12              | A              | MS450-45   | 510    |
|                                   | 40 – 50              | 5                         | 10   | 15          | 20   | 40   | 50           | 2.12              | A              | MS450-50   | 510    |
|                                   | <b>MS495</b>         |                           |      |             |      |      |              |                   |                |            |        |
|                                   | 28 – 40              | 3                         | 7.5  | 15          | 15   | 30   | 40           | 4.63              | A              | MS495-40   | 562.50 |
| 36 – 50                           | 5                    | 10                        | 15   | 20          | 40   | 50   | 4.63         | A                 | MS495-50       | 562.50     |        |
| 45 – 63                           | 5                    | 15                        | 20   | 25          | 50   | 60   | 4.63         | A                 | MS495-63       | 562.50     |        |
| 57 – 75                           | 7.5                  | 15                        | 25   | 25          | 60   | 75   | 4.63         | A                 | MS495-75       | 600        |        |
| 70 – 90                           | 10                   | 20                        | 30   | 30          | 75   | 100  | 4.63         | A                 | MS495-90       | 615        |        |
| 80 – 100                          | 10                   | 25                        | 40   | 40          | 75   | 100  | 4.63         | A                 | MS495-100      | 690        |        |
| <b>Overload tripping class 20</b> | <b>MS497</b>         |                           |      |             |      |      |              |                   |                |            |        |
|                                   | 11 – 16              | 1                         | 3    | 5           | 5    | 10   | 15           | 2.12              | B              | MS497-16   | 450    |
|                                   | 14 – 20              | 1.5                       | 3    | 5           | 7.5  | 15   | 20           | 2.12              | B              | MS497-20   | 450    |
|                                   | 18 – 25              | 2                         | 5    | 7.5         | 10   | 20   | 25           | 2.12              | B              | MS497-25   | 450    |
|                                   | 22 – 32              | 3                         | 5    | 10          | 10   | 25   | 30           | 2.12              | B              | MS497-32   | 450    |
|                                   | 28 – 40              | 3                         | 7.5  | 15          | 15   | 30   | 40           | 4.63              | B              | MS497-40   | 562.50 |
|                                   | 36 – 50              | 5                         | 10   | 15          | 20   | 40   | 50           | 4.63              | B              | MS497-50   | 562.50 |
|                                   | 45 – 63              | 5                         | —    | 20          | 25   | 50   | 60           | 4.63              | B              | MS497-63   | 562.50 |
|                                   | 57 – 75              | 7.5                       | —    | 25          | 25   | 60   | 75           | 4.63              | B              | MS497-75   | 600    |
|                                   | 70 – 90              | 10                        | —    | 30          | 30   | 75   | 100          | 4.63              | B              | MS497-90   | 615    |
| 80 – 100                          | 10                   | —                         | 30   | 40          | 75   | 100  | 4.63         | B                 | MS497-100      | 690        |        |
| <b>Overload tripping class 20</b> | <b>MS451</b>         |                           |      |             |      |      |              |                   |                |            |        |
|                                   | 11 – 16              | 1                         | 3    | 5           | 5    | 10   | 15           | 2.12              | B              | MS451-16   | 450    |
|                                   | 14 – 20              | 1.5                       | 3    | 5           | 7.5  | 15   | 20           | 2.12              | B              | MS451-20   | 450    |
|                                   | 18 – 25              | 2                         | 5    | 7.5         | 10   | 20   | 25           | 2.12              | B              | MS451-25   | 450    |
|                                   | 22 – 32              | 3                         | 5    | 10          | 10   | 25   | 30           | 2.12              | B              | MS451-32   | 450    |
|                                   | 28 – 40              | 3                         | 7.5  | 15          | 15   | 30   | 40           | 2.12              | B              | MS451-40   | 510    |
|                                   | 36 – 45              | 5                         | 7.5  | 15          | 15   | 30   | 40           | 2.12              | B              | MS451-45   | 510    |
|                                   | 40 – 50              | 5                         | 10   | 15          | 20   | 40   | 50           | 2.12              | B              | MS451-50   | 510    |
|                                   | <b>MS496</b>         |                           |      |             |      |      |              |                   |                |            |        |
|                                   | 28 – 40              | 3                         | 7.5  | 15          | 15   | 30   | 40           | 4.63              | B              | MS496-40   | 562.50 |
| 36 – 50                           | 5                    | 10                        | 15   | 20          | 40   | 50   | 4.63         | B                 | MS496-50       | 562.50     |        |
| 45 – 63                           | 5                    | 15                        | 20   | 25          | 50   | 60   | 4.63         | B                 | MS496-63       | 562.50     |        |
| 57 – 75                           | 7.5                  | 15                        | 25   | 25          | 60   | 75   | 4.63         | B                 | MS496-75       | 600        |        |
| 70 – 90                           | 10                   | 20                        | 30   | 30          | 75   | 100  | 4.63         | B                 | MS496-90       | 615        |        |
| 80 – 100 <sup>②</sup>             | 10                   | 25                        | 40   | 40          | 75   | 100  | 4.63         | B                 | MS496-100      | 690        |        |

**Availability code**

- A – Standard item, stock to two weeks lead time
- B – Stock to four weeks lead time
- C – 4 to 6 weeks lead time

UL File # E167205

① Single phase motor ratings are based upon wiring all three poles in series.  
 ② Maximum motor current 95A.

# Type MS450 – MS497 for UL 508 Type E Applications



MS450-16E



MS497-16E

## Manual motor starters

|                                   | FLA adjustment range | Horsepower ratings        |      |             |      |      | Weight (lbs) | Availability code | Catalog <sup>®</sup> number | List price                 |      |
|-----------------------------------|----------------------|---------------------------|------|-------------|------|------|--------------|-------------------|-----------------------------|----------------------------|------|
|                                   |                      | Single-phase <sup>①</sup> |      | Three-phase |      |      |              |                   |                             |                            |      |
|                                   |                      | 115V                      | 230V | 200V – 208V | 230V | 460V |              |                   |                             |                            | 575V |
| <b>Overload tripping class 10</b> | <b>MS450</b>         |                           |      |             |      |      |              |                   |                             |                            |      |
|                                   | 11 – 16              | 1                         | 3    | 5           | 5    | 10   | 15           | 2.12              | A                           | MS450-16E<br><b>\$ 525</b> |      |
|                                   | 14 – 20              | 1.5                       | 3    | 5           | 7.5  | 15   | 20           | 2.12              | A                           | MS450-20E<br><b>525</b>    |      |
|                                   | 18 – 25              | 2                         | 5    | 7.5         | 10   | 20   | 25           | 2.12              | A                           | MS450-25E<br><b>525</b>    |      |
|                                   | 22 – 32              | 3                         | 5    | 10          | 10   | 25   | 30           | 2.12              | A                           | MS450-32E<br><b>525</b>    |      |
|                                   | 28 – 40              | 3                         | 7.5  | 15          | 15   | 30   | 40           | 2.12              | A                           | MS450-40E<br><b>585</b>    |      |
|                                   | 36 – 45              | 5                         | 7.5  | 15          | 15   | 30   | 40           | 2.12              | A                           | MS450-45E<br><b>585</b>    |      |
|                                   | 40 – 50              | 5                         | 10   | 15          | 20   | 40   | 50           | 2.12              | A                           | MS450-50E<br><b>585</b>    |      |
|                                   | <b>MS495</b>         |                           |      |             |      |      |              |                   |                             |                            |      |
|                                   | 28 – 40              | 3                         | 7.5  | 15          | 15   | 30   | 40           | 4.63              | A                           | MS495-40E<br><b>622.50</b> |      |
|                                   | 36 – 50              | 5                         | 10   | 15          | 20   | 40   | 50           | 4.63              | A                           | MS495-50E<br><b>622.50</b> |      |
|                                   | 45 – 63              | 5                         | 15   | 20          | 25   | 50   | 60           | 4.63              | A                           | MS495-63E<br><b>622.50</b> |      |
| 57 – 75                           | 7.5                  | 15                        | 25   | 25          | 60   | 75   | 4.63         | A                 | MS495-75E<br><b>720</b>     |                            |      |
| 70 – 90                           | 10                   | 20                        | 30   | 30          | 75   | 100  | 4.63         | A                 | MS495-90E<br><b>735</b>     |                            |      |
| 80 – 100                          | 10                   | 25                        | 40   | 40          | 75   | 100  | 4.63         | A                 | MS495-100E<br><b>810</b>    |                            |      |
| <b>MS497</b>                      |                      |                           |      |             |      |      |              |                   |                             |                            |      |
| 11 – 16                           | 1                    | 3                         | 5    | 5           | 10   | 15   | 2.12         | B                 | MS497-16E<br><b>570</b>     |                            |      |
| 14 – 20                           | 1.5                  | 3                         | 5    | 7.5         | 15   | 20   | 2.12         | B                 | MS497-20E<br><b>570</b>     |                            |      |
| 18 – 25                           | 2                    | 5                         | 7.5  | 10          | 20   | 25   | 2.12         | B                 | MS497-25E<br><b>570</b>     |                            |      |
| 22 – 32                           | 3                    | 5                         | 10   | 10          | 25   | 30   | 2.12         | B                 | MS497-32E<br><b>570</b>     |                            |      |
| 28 – 40                           | 3                    | 7.5                       | 15   | 15          | 30   | 40   | 4.63         | B                 | MS497-40E<br><b>622.50</b>  |                            |      |
| 36 – 50                           | 5                    | 10                        | 15   | 20          | 40   | 50   | 4.63         | B                 | MS497-50E<br><b>623</b>     |                            |      |
| 45 – 63                           | 5                    | —                         | 20   | 25          | 50   | 60   | 4.63         | B                 | MS497-63E<br><b>622.50</b>  |                            |      |
| 57 – 75                           | 7.5                  | —                         | 25   | 25          | 60   | 75   | 4.63         | B                 | MS497-75E<br><b>720</b>     |                            |      |
| 70 – 90                           | 10                   | —                         | 30   | 30          | 75   | 100  | 4.63         | B                 | MS497-90E<br><b>735</b>     |                            |      |
| 80 – 100                          | 10                   | —                         | 30   | 40          | 75   | 100  | 4.63         | B                 | MS497-100E<br><b>810</b>    |                            |      |
| <b>Overload tripping class 20</b> | <b>MS451</b>         |                           |      |             |      |      |              |                   |                             |                            |      |
|                                   | 11 – 16              | 1                         | 3    | 5           | 5    | 10   | 15           | 2.12              | B                           | MS451-16E<br><b>525</b>    |      |
|                                   | 14 – 20              | 1.5                       | 3    | 5           | 7.5  | 15   | 20           | 2.12              | B                           | MS451-20E<br><b>525</b>    |      |
|                                   | 18 – 25              | 2                         | 5    | 7.5         | 10   | 20   | 25           | 2.12              | B                           | MS451-25E<br><b>525</b>    |      |
|                                   | 22 – 32              | 3                         | 5    | 10          | 10   | 25   | 30           | 2.12              | B                           | MS451-32E<br><b>525</b>    |      |
|                                   | 28 – 40              | 3                         | 7.5  | 15          | 15   | 30   | 40           | 2.12              | B                           | MS451-40E<br><b>585</b>    |      |
|                                   | 36 – 45              | 5                         | 7.5  | 15          | 15   | 30   | 40           | 2.12              | B                           | MS451-45E<br><b>585</b>    |      |
|                                   | 40 – 50              | 5                         | 10   | 15          | 20   | 40   | 50           | 2.12              | B                           | MS451-50E<br><b>585</b>    |      |
|                                   | <b>MS496</b>         |                           |      |             |      |      |              |                   |                             |                            |      |
|                                   | 28 – 40              | 3                         | 7.5  | 15          | 15   | 30   | 40           | 4.63              | B                           | MS496-40E<br><b>623</b>    |      |
|                                   | 36 – 50              | 5                         | 10   | 15          | 20   | 40   | 50           | 4.63              | B                           | MS496-50E<br><b>720</b>    |      |
|                                   | 45 – 63              | 5                         | 15   | 20          | 25   | 50   | 60           | 4.63              | B                           | MS496-63E<br><b>720</b>    |      |
| 57 – 75                           | 7.5                  | 15                        | 25   | 25          | 60   | 75   | 4.63         | B                 | MS496-75E<br><b>720</b>     |                            |      |
| 70 – 90                           | 10                   | 20                        | 30   | 30          | 75   | 100  | 4.63         | B                 | MS496-90E<br><b>735</b>     |                            |      |
| 80 – 100 <sup>②</sup>             | 10                   | 25                        | 40   | 40          | 75   | 100  | 4.63         | B                 | MS496-100E<br><b>810</b>    |                            |      |

### Availability code

A – Standard item, stock to two weeks lead time

B – Stock to four weeks lead time

C – 4 to 6 weeks lead time

① Single phase motor ratings are based upon wiring all three poles in series.

② Maximum motor current 95A.

③ Catalog number includes all parts required for UL508/E applications.

## Type MS450 – MS497 Accessories

5



HK4-11



UA4-HK-220



AA4-24

### Auxiliary contacts – top mount

| Item description | Weight (lbs) | Packaged in quantity of | Availability code | Catalog number | List price   |
|------------------|--------------|-------------------------|-------------------|----------------|--------------|
| 1 N.O. + 1 N.C.  | .044         | 10                      | A                 | HK4-11         | <b>\$ 36</b> |
| 1 changeover     | .044         | 10                      | B                 | HK-W           |              |

### Auxiliary contacts – mounts on left side, max. 1

| Item description | Weight (lbs) | Packaged in quantity of | Availability code | Catalog number | List price   |
|------------------|--------------|-------------------------|-------------------|----------------|--------------|
| 1 N.O. + 1 N.C.  | .066         | 2                       | A                 | HKS4-11        | <b>\$ 36</b> |
| 2 N.O.           | .066         | 2                       | B                 | HKS4-20        |              |
| 2 N.C.           | .066         | 2                       | B                 | HKS4-02        |              |

### Auxiliary release

- Only one auxiliary release per manual motor protector
- Mounts on right side of manual motor protector

| Item description     | Rating                            | Weight (lbs) | Pkg. qty. | Avail. code | Catalog number | List price   |           |
|----------------------|-----------------------------------|--------------|-----------|-------------|----------------|--------------|-----------|
| Undervoltage release | 24V, 50–60 Hz                     | .264         | 1         | A           | UA4-24         | <b>\$ 93</b> |           |
|                      | 110–120V, 50–60Hz                 | .264         | 1         | A           | UA4-120        |              |           |
|                      | 230–240V, 50–60Hz                 | .264         | 1         | A           | UA4-240        |              |           |
|                      | 400V, 50Hz                        | .264         | 1         | B           | UA4-400        |              |           |
| Shunt trip           | Voltage continuous 50 – 60Hz      | 20 – 24      | 20 – 70V  | .242        | 1              | B            | <b>93</b> |
|                      | Voltage 5 sec. max. 50 – 60Hz, DC |              |           |             |                |              |           |
|                      | 30 – 110                          | 70 – 190V    | .242      | 1           | A              | AA4-110      |           |
|                      | 210 – 240                         | 190 – 330V   | .242      | 1           | B              | AA4-240      |           |
|                      | 350 – 415                         | 330 – 500V   | .242      | 1           | B              | AA4-415      |           |

### Power feed terminal blocks – for MS45X

| Item description                                                                     | Catalog number | List price   |
|--------------------------------------------------------------------------------------|----------------|--------------|
| For feeding power to multiple MS45Xs when using busbar<br>Accepts 10 - 1/0 AWG, 108A | S4-M1          | <b>\$ 81</b> |

### Busbars – for MS45X (108A max.)

| Item description                       | Catalog number | List price   |
|----------------------------------------|----------------|--------------|
| Without side mounted auxiliary devices | PS4-2-0        | <b>\$ 51</b> |
|                                        | PS4-3-0        | <b>60</b>    |
|                                        | PS4-4-0        | <b>76.50</b> |
| With one side mounted auxiliary device | PS4-2-2        | <b>58.50</b> |
|                                        | PS4-3-2        | <b>60</b>    |
|                                        | PS4-4-2        | <b>84</b>    |
| Busbar cover                           | BS4-3          | <b>9</b>     |

### Close coupling adapters

| Item description      | Catalog number | List price   |
|-----------------------|----------------|--------------|
| MS45X + A30, A40      | BEA40/450      | <b>\$ 54</b> |
| MS45X + A50           | BEA50/450      | <b>63</b>    |
| MS49X + A50, A63, A75 | BEA75/495      | <b>120</b>   |
| MS495 + A95, A110     | BEA110/495     | <b>180</b>   |

① Mounting sequence: motor protection switch, pilot switch, auxiliary switch.



## Type MS450 – MS497 Accessories

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KA450



DX495



SK4-11

### Terminal shrouds

| Item description | Weight (lbs) | Packaged in quantity of | Availability code | Catalog number | List price |
|------------------|--------------|-------------------------|-------------------|----------------|------------|
| for MS45x        | .022         | 1                       | A                 | KA450 ①        | \$ 15      |
| for MX49x        | .022         | 1                       | A                 | KA495 ①        | 18         |
| for MS49x        | .066         | 1                       | A                 | KA495C ②       | 21         |

### Type E Terminal – Required for UL 508 Type E Applications ③

| Item description | Weight (lbs) | Packaged in quantity of | Availability code | Catalog number | List price |
|------------------|--------------|-------------------------|-------------------|----------------|------------|
| for MS49x        | .550         | 1                       | B                 | DX495          | \$ 45      |

### Signalling contact – indication of short-circuit trip (required for UL508 Type E applications)

| Item description                                       | Weight (lbs) | Packaged in quantity of | Availability code | Catalog number | List price |
|--------------------------------------------------------|--------------|-------------------------|-------------------|----------------|------------|
| Short circuit trip<br>1 N.O. + 1 N.C.<br>MS45x / MS49x | .154         | 1                       | A                 | SK4-11         | \$ 60      |

### Selector handles – for thru the door operation for Types MS450 & MS451 ④

| Item description                          | Catalog number | List price |
|-------------------------------------------|----------------|------------|
| Shaft coupler                             | MSMN           | \$ 15      |
| NEMA 1, 3R, 12 black selector handle      | OHB2AJ         | ⑦          |
| NEMA 1, 3R, 12 red/yellow selector handle | OHY2AJ         | ⑦          |
| 4.1" length shaft                         | OXS5X105       | 4          |
| 7.1" length shaft                         | OXS5X180       | ⑦          |

- ① Plug onto box terminals in each case.
- ② Plug onto housing after removing box terminals, if using cable lugs or buses.
- ③ Supplied only as a set of 10 scale covers.
- ④ Must have shaft coupler, handle and shaft for through-the-door operation.
- ⑤ Not required for MS45x.
- ⑥ MS49x Series are not suitable for thru-the-door operation.
- ⑦ Consult factory.

## Technical data

### Type MS325, MS45x, MS49x

| Device type                                      |            | MS325                   | MS450                   | MS451                   | MS495              | MS496              | MS497              |
|--------------------------------------------------|------------|-------------------------|-------------------------|-------------------------|--------------------|--------------------|--------------------|
| Standards, approvals                             |            | UL, CSA, CE             | UL, CSA, CE             | UL, CSA, CE             | UL, CSA, CE        | UL, CSA, CE        | UL, CSA, CE        |
| Rated operating current                          | A          | 25                      | 50                      | 50                      | 100                | 100                | 100                |
| Current range                                    | A          | 0.10 - 25               | 11 - 50                 | 11- 50                  | 40 - 100           | 28 - 100           | 11 - 100           |
| Number of poles                                  |            | 3                       | 3                       | 3                       | 3                  | 3                  | 3                  |
| Frequency                                        | Hz         | 50/60                   | 50/60                   | 50/60                   | 50/60              | 50/60              | 50/60              |
| Tripping class                                   | A          | 10                      | 10                      | 20                      | 10                 | 20                 | 10                 |
| Max. kAIC & 600V                                 | kAIC       | 50                      | 50                      | 50                      | 50                 | 100                | 100                |
| Mechanical life                                  | Operations | 100,000                 | 50,000                  | 50,000                  | 50,000             | 50,000             | 50,000             |
| Wire range                                       | AWG        | 14-8                    | 1x18-2; 2x18-3          | 1x18-2; 2x18-3          | 2x10-1/0; 1x10-2/0 | 2x10-1/0; 1x10-2/0 | 2x10-1/0; 1x10-2/0 |
| Terminal torque                                  | in. lbs    | 14                      | 27 - 40                 | 27 - 40                 | 35 - 53            | 35 - 53            | 35 - 53            |
| Terminal tool options                            |            | flat screwdriver<br>PZ2 | flat screwdriver<br>PZ2 | flat screwdriver<br>PZ2 | hex allen<br>4mm   | hex allen<br>4mm   | hex allen<br>4mm   |
| Permissible altitude without derating            | m          | 3000                    | 2000                    | 2000                    | 2000               | 2000               | 2000               |
| Degree of protection                             |            | IP20                    | IP20                    | IP20                    | IP20               | IP20               | IP20               |
| UL Listed for group installation                 |            | Yes                     | Yes                     | Yes                     | Yes                | Yes                | Yes                |
| Self-protected Type E manual combination starter |            | Yes                     | Yes                     | Yes                     | Yes                | Yes                | Yes                |
| Accessories                                      |            |                         |                         |                         |                    |                    |                    |
| Terminal shroud                                  |            | No                      | Yes                     | Yes                     | Yes                | Yes                | Yes                |
| Auxiliary contacts                               |            | Yes                     | Yes                     | Yes                     | Yes                | Yes                | Yes                |
| Shunt trip                                       |            | Yes                     | Yes                     | Yes                     | Yes                | Yes                | Yes                |
| Trip signal contacts                             |            | Yes                     | Yes                     | Yes                     | Yes                | Yes                | Yes                |
| UV release                                       |            | Yes                     | Yes                     | Yes                     | Yes                | Yes                | Yes                |
| Busbar                                           |            | Yes                     | Yes                     | Yes                     | No                 | No                 | No                 |
| Through door handle                              |            | Yes                     | Yes                     | Yes                     | No                 | No                 | No                 |

# Technical data

## Type MS325, MS45x, MS49x

| Manual motor starter type             | MS325                                                                                                             | MS450/451 | MS495/496/497                       |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------|-------------------------------------|
| <b>Auxiliary circuits</b>             |                                                                                                                   |           |                                     |
| Load rating of the auxiliary circuits |                                                                                                                   |           |                                     |
| Minimum load at:                      |                                                                                                                   |           | 5 mA at 17 VDC                      |
| 24 VDC mA                             | 5                                                                                                                 |           | —                                   |
| 12 VDC mA                             | 10                                                                                                                |           | —                                   |
| Rated operating at AC 15 to 24 VAC A  | 2.5                                                                                                               |           | —                                   |
| current $I_e$                         |                                                                                                                   |           | 3 / 0.5 / 6                         |
| 230 VAC A                             | 2                                                                                                                 |           | 1.5 / — / 3                         |
| 400 VAC A                             | 1                                                                                                                 |           | ①②                                  |
| Rated operating at DC 13 to 24 VDC A  | 2.5                                                                                                               |           | — / — / —                           |
| current $I_e$                         |                                                                                                                   |           | — / 0.15 / —                        |
| 60 VDC A                              | 2.5                                                                                                               |           | 0.22 / — / 0.5                      |
| 110 VDC A                             | 0.6                                                                                                               |           | 0.1 / — / 0.25                      |
| 220 VDC A                             | 0.25                                                                                                              |           | — / — 0.1                           |
| 440 VDC A                             | —                                                                                                                 |           | —                                   |
| Short circuit protection              |                                                                                                                   |           |                                     |
| back up fuse                          |                                                                                                                   |           |                                     |
| gL A                                  | 10                                                                                                                |           | gL / gG 10 A                        |
| aM A                                  | 6                                                                                                                 |           | —                                   |
| <b>Release</b>                        |                                                                                                                   |           |                                     |
| Device for phase failure protection   | With                                                                                                              |           | With                                |
| Electromagnetic trips                 |                                                                                                                   |           |                                     |
| Response value set ex-works           | 7.5 – 12 $I_n$ (.16 - .63)A<br>9 – 14 $I_n$ (1 - 2.5)A<br>10 – 15 $I_n$ (4 - 6.3)A<br>12.5 – 17.5 $I_n$ (9 - 25)A |           | 10.4 $I_n$ – 15.6 $I_n$             |
| Undervoltage release                  |                                                                                                                   |           |                                     |
| Pick-up value      % of $U_c$         | ≥ 85                                                                                                              |           | ≥ 85                                |
| Drop-out value    % of $U_c$          | 35 – 75                                                                                                           |           | 35 – 70                             |
| Power consumption - Pick-up   VA      | 0.9                                                                                                               |           | 20.2                                |
| Power consumption - Hold      VA      | 0.9                                                                                                               |           | 7.2                                 |
| Open circuit shunt release            |                                                                                                                   |           |                                     |
| Pick-up value      % of $U_c$         | ≥ 85                                                                                                              |           | ≥ 70                                |
| Relative duty consumption   % ED      | —                                                                                                                 |           | 100 at voltages 50 / 60 Hz to Power |
| Pick-up      VA                       | 110 - 240V: 13 - 61 ③                                                                                             |           | Consult factory                     |
| Hold      VA                          | —                                                                                                                 |           | Consult factory                     |

① Correction factors for other frequencies on request.

② On front side 1 chageover contact / on front side 1 NO + 1 NC / at side, 1 NO + 1 NC, 2 NO, 2 NC

③ 24 - 60V: 14.4 - 90VA

# Technical data

## Type MS325

### Short circuit ratings

#### Short circuit ratings – MS325

| Range       | Short Circuit rating<br>kA, 600VAC | Maximum Fuse size<br>A |
|-------------|------------------------------------|------------------------|
| 0.1 - 0.16  | 5                                  | 15                     |
| 0.16 - 0.25 | 5                                  | 15                     |
| 0.25 - 0.40 | 5                                  | 15                     |
| 0.40 - 0.63 | 5                                  | 15                     |
| 0.63 - 1.0  | 5                                  | 15                     |
| 1.0 - 1.6   | 5                                  | 15                     |
| 1.6 - 2.5   | 5                                  | 15                     |
| 2.5 - 4.0   | 5                                  | 15                     |
| 4.0 - 6.3   | 5                                  | 25                     |
| 6.3 - 9.0   | 5                                  | 35                     |
| 9.0 - 12.5  | 5                                  | 50                     |
| 12.5 - 16   | 5                                  | 60                     |
| 16 - 20     | 5                                  | 80                     |
| 20 - 25     | 5                                  | 100                    |

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#### Group installation short circuit ratings

| MS325<br>Current range | 5 kA   |         | 30 kA  |         | 50 kA  |         | 85kA   |
|------------------------|--------|---------|--------|---------|--------|---------|--------|
|                        | Fuse A | MCCB    | Fuse A | MCCB    | Fuse A | MCCB    | Fuse A |
| 0.1 - 0.16             | 1600   | S7H1200 | 1600   | S7H1200 | 1600   | S7H1200 | 1600   |
| 0.25 - 0.40            | 1600   | S7H1200 | 1600   | S7H1200 | 1600   | S7H1200 | 1600   |
| 0.40 - 0.63            | 1600   | S7H1200 | 1600   | S7H1200 | 1600   | S7H1200 | 1600   |
| 0.63 - 1.0             | 1600   | S7H1200 | 1600   | S7H1200 | 1600   | S7H1200 | 1600   |
| 1.0 - 1.6              | 1600   | S7H1200 | 1600   | S7H1200 | 1600   | S7H1200 | 1600   |
| 1.6 - 2.5              | 1600   | S7H1200 | 1600   | S7H1200 | 1600   | S7H1200 | 1600   |
| 2.5 - 4.0              | 1600   | S7H1200 | 1600   | S7H1200 | 1600   | S7H1200 | 1600   |
| 4.0 - 6.3              | 1600   | S7H1200 | 1600   | S7H1200 | 600    | S7H1200 | —      |
| 6.3 - 9.0              | 1600   | S7H1200 | 1600   | S7H1200 | 600    | S7H1200 | —      |
| 9.0 - 12.5             | 1600   | S7H1200 | 1600   | S7H1200 | 400    | S4H250  | —      |
| 12.5 - 16              | 1600   | S7H1200 | 1600   | S7H1200 | 400    | S4H250  | —      |
| 16 - 20                | 1600   | S7H1200 | 1600   | S7H1200 | 400    | S4H250  | —      |
| 20 - 25                | 1600   | S7H1200 | 1600   | S7H1200 | 400    | S4H250  | —      |

#### Up to 600V ①

|             |      |         |      |         |      |         |   |
|-------------|------|---------|------|---------|------|---------|---|
| 0.1 - 0.16  | 1200 | S7H1200 | 1200 | S7H1200 | 1200 | S7H1200 | — |
| 0.25 - 0.40 | 1200 | S7H1200 | 1200 | S7H1200 | 1200 | S7H1200 | — |
| 0.40 - 0.63 | 1200 | S7H1200 | 1200 | S7H1200 | 1200 | S7H1200 | — |
| 0.63 - 1.0  | 1200 | S7H1200 | 1200 | S7H1200 | 1200 | S7H1200 | — |
| 1.0 - 1.6   | 1200 | S7H1200 | 1200 | S7H1200 | 1200 | S7H1200 | — |
| 1.6 - 2.5   | 1200 | S7H1200 | 1200 | S7H1200 | 1200 | S7H1200 | — |
| 2.5 - 4.0   | 1200 | S7H1200 | 1200 | S7H1200 | 1200 | S7H1200 | — |
| 4.0 - 6.3   | 1200 | S7H1200 | 1200 | S7H1200 | 1200 | S7H1200 | — |
| 6.3 - 9.0   | 1200 | S7H1200 | 1200 | S7H1200 | 250  | S4H250  | — |
| 9.0 - 12.5  | 1200 | S7H1200 | 1200 | S7H1200 | —    | —       | — |
| 12.5 - 16   | 1200 | S7H1200 | 1200 | S7H1200 | —    | —       | — |
| 16 - 20     | 1200 | S7H1200 | 250  | S4H250  | —    | —       | — |
| 20 - 25     | 1200 | S7H1200 | 250  | S4H250  | —    | —       | — |

① Fuse: Rated 1600A, Listed Class L. All others, listed RK5. Both time delay fuses.

② Fuse: Rated 1600A, Listed Class L. All others, listed K5. Both time delay fuses.

# Technical data

## Type MS450/451, MS495, 6, 7

### Short circuit protection

| Catalog number | UL 508 — Manual Motor Controller |           |                                       |                                           | Motor Disconnect                |      | UL 508 Manual Self-Protected (Type E) Combination Motor Controller |           |
|----------------|----------------------------------|-----------|---------------------------------------|-------------------------------------------|---------------------------------|------|--------------------------------------------------------------------|-----------|
|                | Group Installation               |           |                                       |                                           |                                 |      |                                                                    |           |
|                | Max. Short Circuit Current [kA]  |           | Max. Fuse or C.B. per NEC 480V / 600V | For Use With Contactors Below (or larger) | Max. Short Circuit Current [kA] |      | Max. Short Circuit Current [kA]                                    |           |
|                | 480Y/277V                        | 600Y/347V |                                       |                                           | 480V                            | 600V | 480Y/277V                                                          | 600Y/347V |

#### MS45x Series

|          |    |    |     |                    |    |    |    |    |
|----------|----|----|-----|--------------------|----|----|----|----|
| MS450-16 | 65 | 25 | 500 | A/AE/AL/AF30,40,50 | 65 | 25 | 65 | 25 |
| MS451-16 | 65 | 25 | 500 | A/AE/AL/AF30,40,50 | 65 | 25 | 65 | 25 |
| MS450-20 | 65 | 25 | 500 | A/AE/AL/AF30,40,50 | 65 | 25 | 65 | 25 |
| MS451-20 | 65 | 25 | 500 | A/AE/AL/AF30,40,50 | 65 | 25 | 65 | 25 |
| MS450-25 | 65 | 25 | 500 | A/AE/AL/AF30,40,50 | 65 | 25 | 65 | 25 |
| MS451-25 | 65 | 25 | 500 | A/AE/AL/AF30,40,50 | 65 | 25 | 65 | 25 |
| MS450-32 | 65 | 25 | 500 | A/AE/AL/AF30,40,50 | 65 | 25 | 65 | 25 |
| MS451-32 | 65 | 25 | 500 | A/AE/AL/AF30,40,50 | 65 | 25 | 65 | 25 |
| MS450-40 | 65 | 25 | 500 | A/AE/AL/AF30,40,50 | 65 | 25 | 65 | 25 |
| MS451-40 | 65 | 25 | 500 | A/AE/AL/AF30,40,50 | 65 | 25 | 65 | 25 |
| MS450-45 | 65 | 25 | 500 | A/AE/AL/AF30,40,50 | 65 | 25 | 65 | 25 |
| MS451-45 | 65 | 25 | 500 | A/AE/AL/AF30,40,50 | 65 | 25 | 65 | 25 |
| MS450-50 | 65 | 25 | 500 | A/AE/AL/AF30,40,50 | 65 | 25 | 65 | 25 |
| MS451-50 | 65 | 25 | 500 | A/AE/AL/AF30,40,50 | 65 | 25 | 65 | 25 |

#### MS49x Series

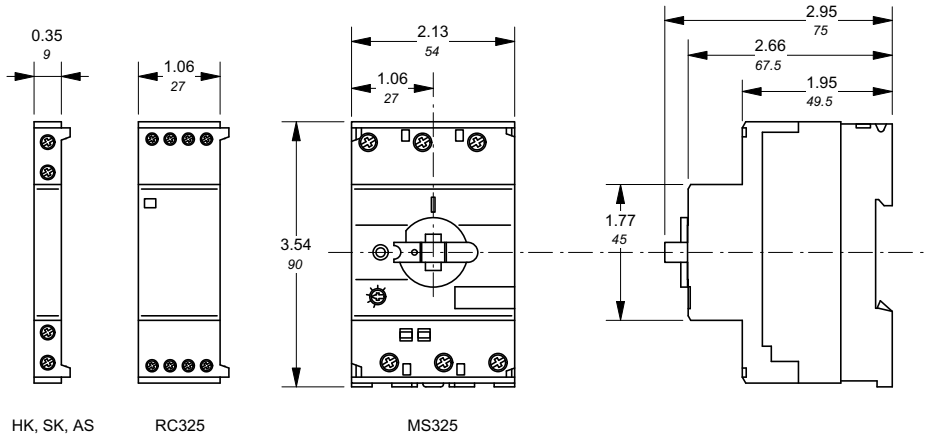
|           |    |    |     |                        |    |    |    |    |
|-----------|----|----|-----|------------------------|----|----|----|----|
| MS495-40  | 65 | 30 | 500 | A/AE/AF50,63,75,95,110 | 65 | 30 | 65 | 30 |
| MS496-40  | 65 | 30 | 500 | A/AE/AF50,63,75,95,110 | 65 | 30 | 65 | 30 |
| MS495-50  | 65 | 30 | 500 | A/AE/AF50,63,75,95,110 | 65 | 30 | 65 | 30 |
| MS496-50  | 65 | 30 | 500 | A/AE/AF50,63,75,95,110 | 65 | 30 | 65 | 30 |
| MS495-63  | 65 | 30 | 500 | A/AE/AF50,63,75,95,110 | 65 | 30 | 65 | 30 |
| MS496-63  | 65 | 30 | 500 | A/AE/AF50,63,75,95,110 | 65 | 30 | 65 | 30 |
| MS495-75  | 65 | 30 | 500 | A/AE/AF50,63,75,95,110 | 65 | 30 | 65 | 30 |
| MS496-75  | 65 | 30 | 500 | A/AE/AF50,63,75,95,110 | 65 | 30 | 65 | 30 |
| MS495-90  | 65 | 30 | 500 | A/AE/AF50,63,75,95,110 | 65 | 30 | 65 | ~  |
| MS496-90  | 65 | 30 | 500 | A/AE/AF50,63,75,95,110 | 65 | 30 | 65 | ~  |
| MS495-100 | 65 | 30 | 500 | A/AE/AF50,63,75,95,110 | 65 | 30 | 65 | ~  |
| MS496-100 | 65 | 30 | 500 | A/AE/AF50,63,75,95,110 | 65 | 30 | 65 | ~  |

# Approximate dimensions MS325

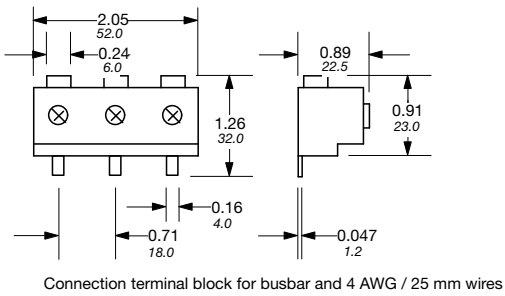
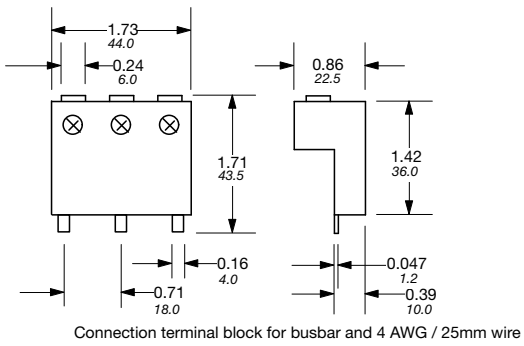
00.00 Inches  
00.00 [Millimeters]

## MS325

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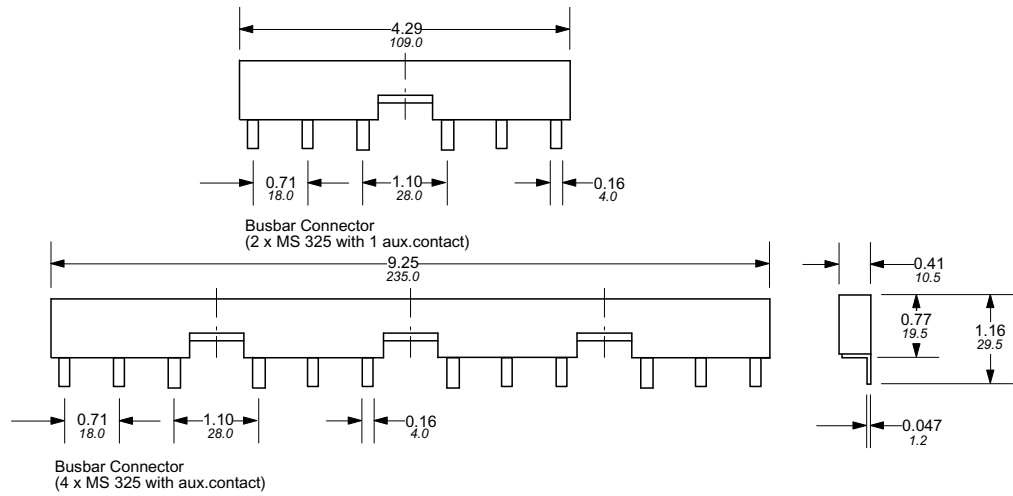
## Power feed terminal blocks for MS325



## Approximate dimensions Accessories for MS325

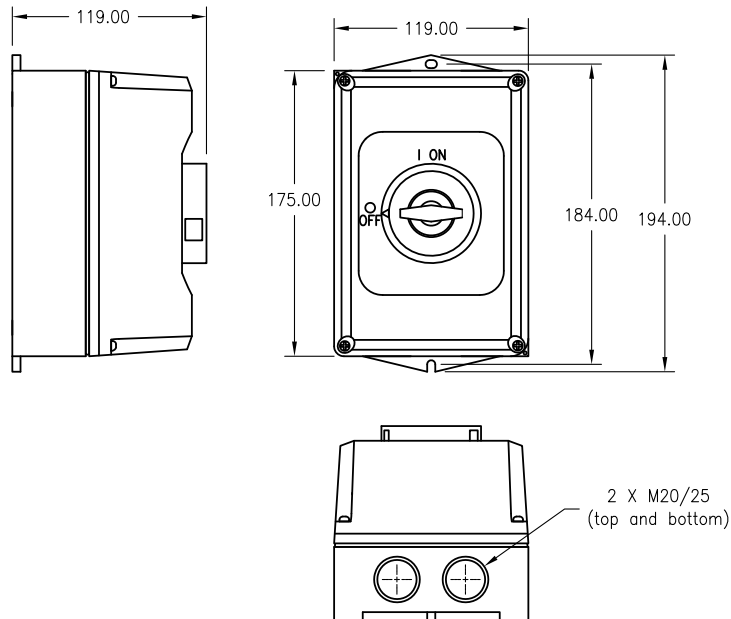
00.00 Inches  
00.00 [Millimeters]

### Busbar connectors for MS325



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### Molded plastic enclosures for MS325 & IB325-Y/G

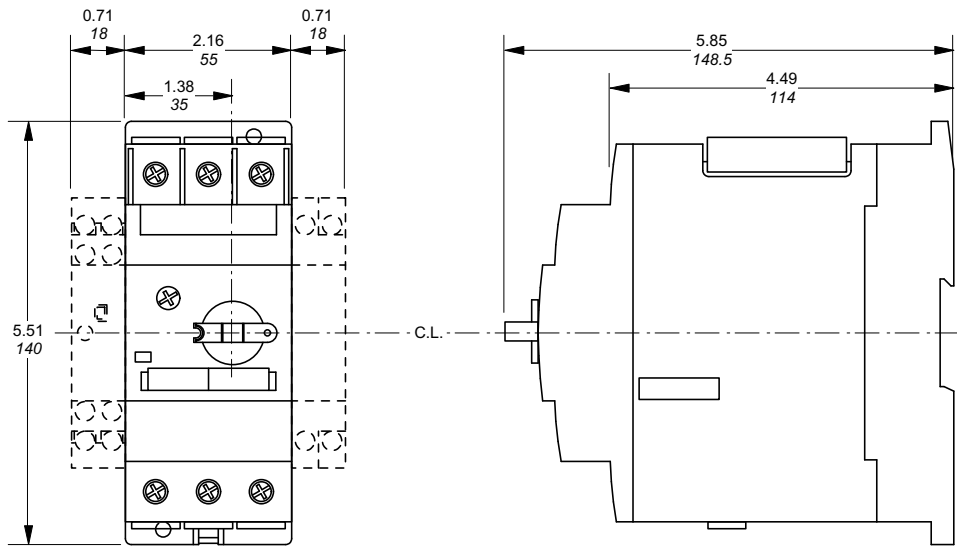


# Approximate dimensions MS450 & MS490

00.00 Inches  
00.00 [Millimeters]

## MS450

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## MS490

