

# Manual motor Protectors



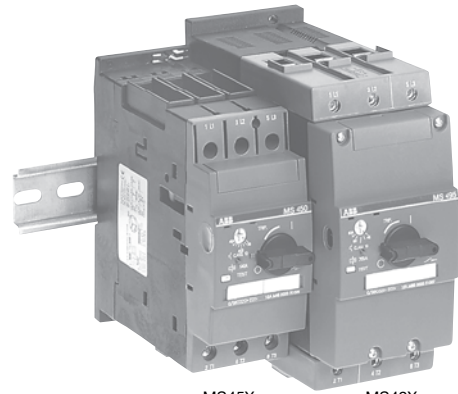
## Manual motor protectors



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.

### 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.

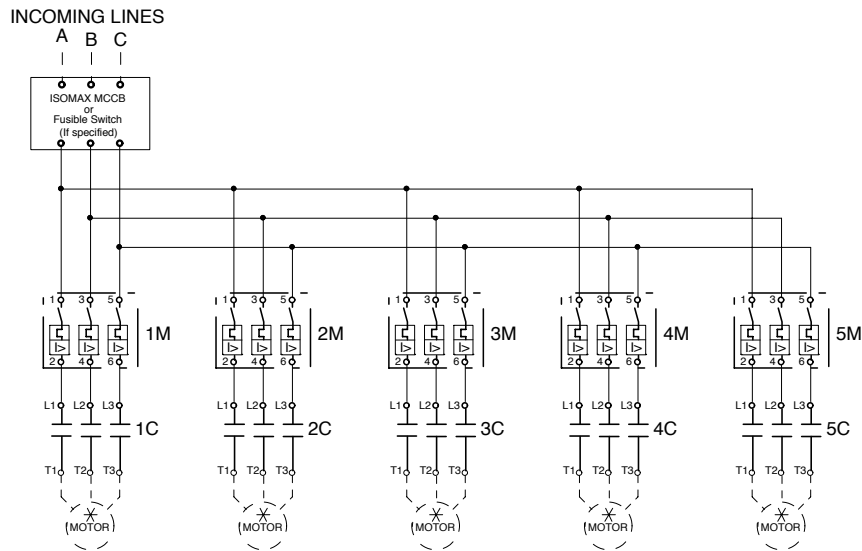
## NEC Table 430-150 full load current, 3ph AC motor

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>

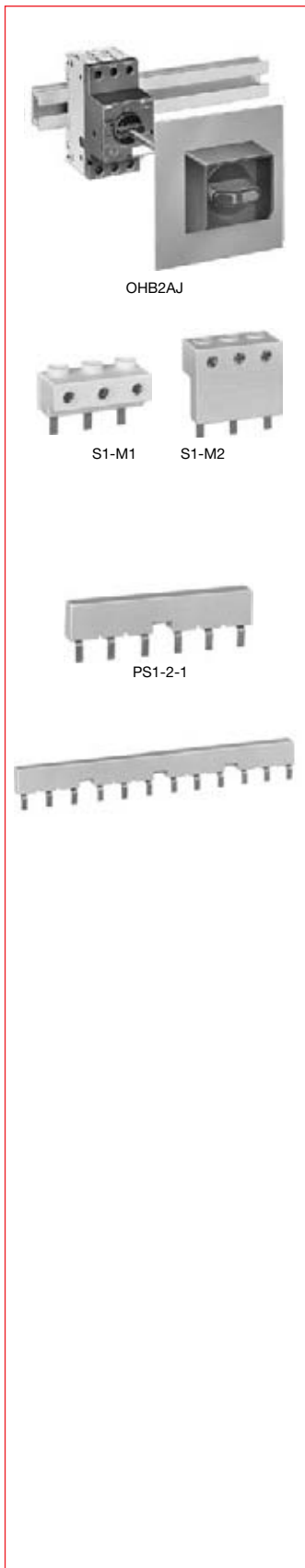
### Molded plastic enclosures for Type MS116

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

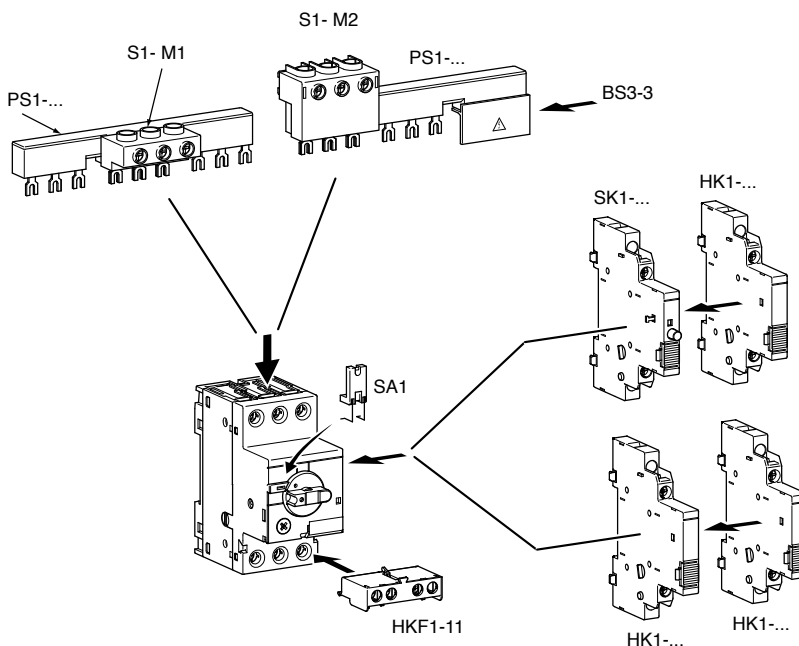
Description	Catalog number	List price
Flush w/bus bar	S1-M1	\$ 24
Extends over busbar	S1-M2	

## 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 230 V, 1.5 A
Auxiliary contact for front mounting, HKF	DC13	24 V, 1.0 A 48 / 60V, 0.7 A 110 V, 0.27 A
Auxiliary and signal contact, HK + SK	AC15	24 V, 6 A 230 V, 4 A 400 V, 3 A
Auxiliary and signal contact, HK + SK	DC13	24 V, 2 A 110 V, 0.5 A 220 V, 0.25 A 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.

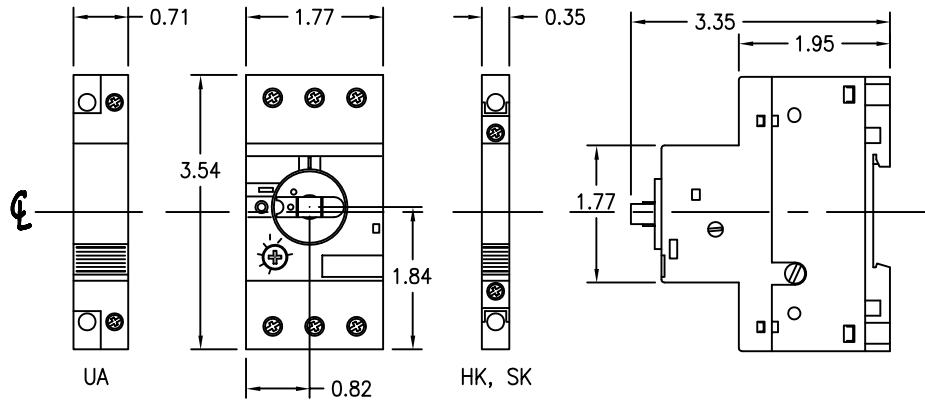
Circuit breaker: Listed ABB

# Type MS116

## Approximate dimensions

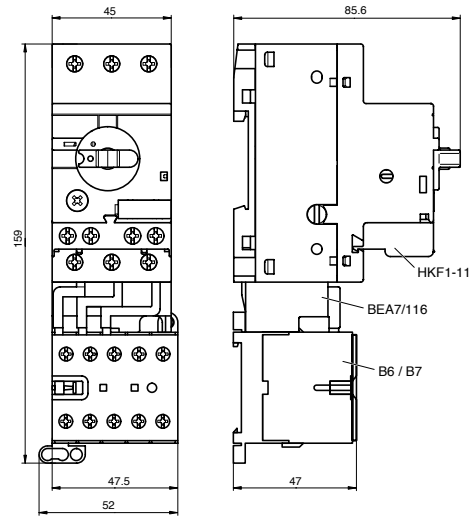
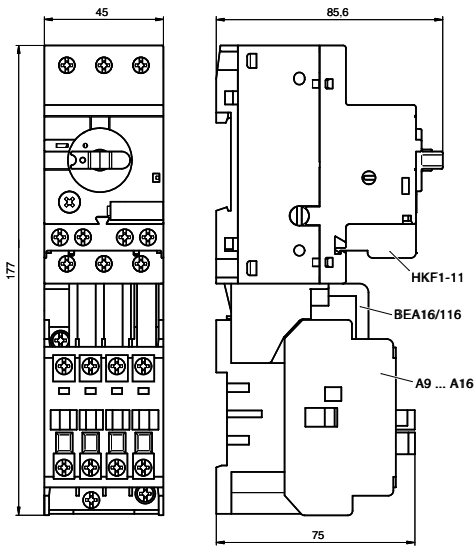
MS116

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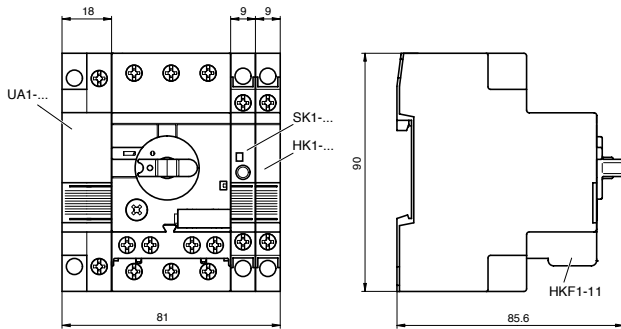


MS116 — mounted with A9 - A16 contactor

MS116 — mounted with B6/B7 minicontactor



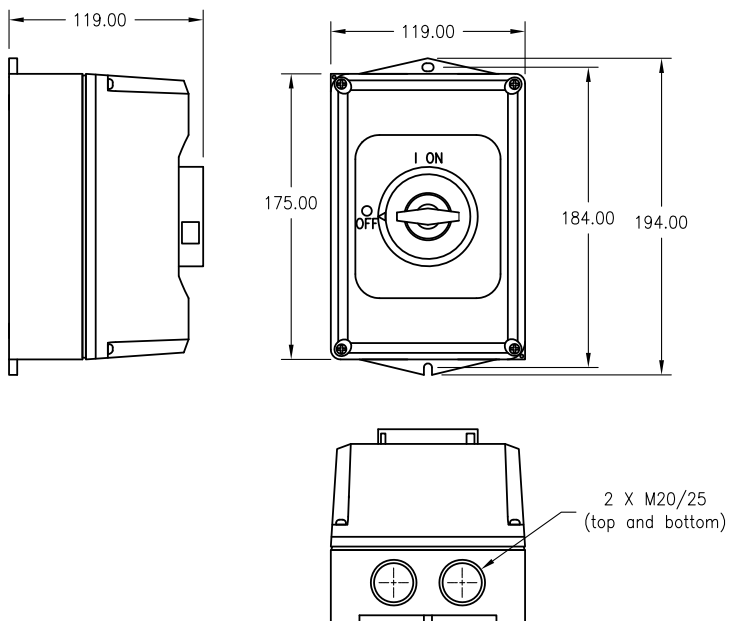
MS116 — mounted with UA1..., SK1..., HK1..., HKF1-11



# Type MS116

Approximate dimensions

## IB116 Y/G



## Type MS325

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MS325-1.0

### Manual motor protectors – Type MS325

Thermal setting range (Amps)	Single-phase horsepower ratings ①		3-phase horsepower ratings			Catalog number	List price
	120V	240V	240V	480V	600V		
0.10 – 0.16	—	—	—	—	—	MS325-0.16 MS325-0.25 MS325-0.40 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 MS325-1.6 MS325-2.5 MS325-4.0 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 MS325-12.5 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

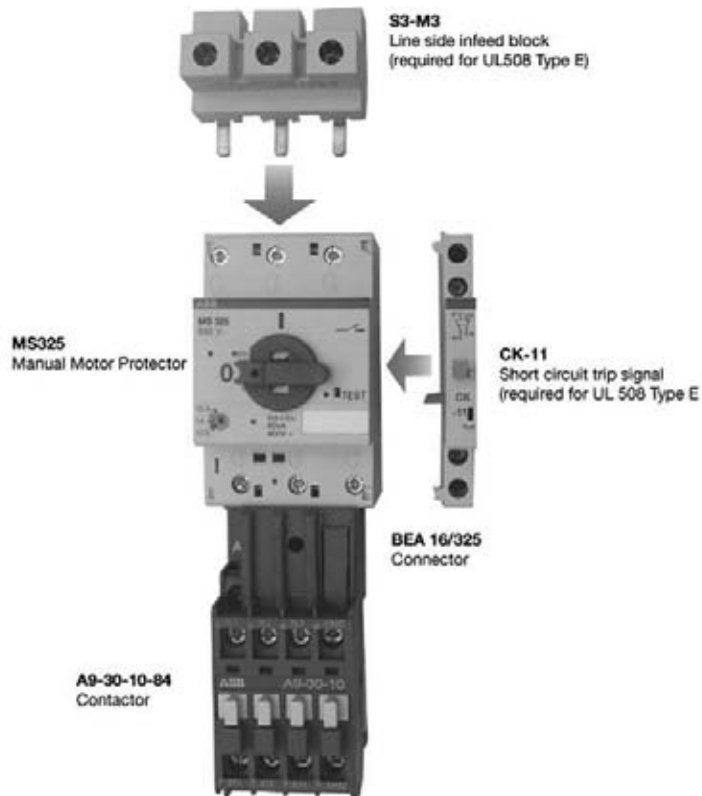


MS325-1.0

## 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 MS325-0.25E MS325-0.40E MS325-0.63E	\$ 223
0.16 – 0.25	—	—	—	—	—		
0.25 – 0.40	—	—	—	—	—		
0.40 – 0.63	—	—	—	—	—		
0.63 – 1.0	—	—	—	1/2	1/2	MS325-1.0E MS325-1.6E MS325-2.5E MS325-4.0E MS325-6.3E	244
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 MS325-12.5E MS325-16E	271
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	290
20 – 25	2	3	7.5	15	20	MS325-25E	302

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

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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

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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 <b>\$ 525</b>	
	14 – 20	1.5	3	5	7.5	15	20	2.12	A	MS450-20E <b>525</b>	
	18 – 25	2	5	7.5	10	20	25	2.12	A	MS450-25E <b>525</b>	
	22 – 32	3	5	10	10	25	30	2.12	A	MS450-32E <b>525</b>	
	28 – 40	3	7.5	15	15	30	40	2.12	A	MS450-40E <b>585</b>	
	36 – 45	5	7.5	15	15	30	40	2.12	A	MS450-45E <b>585</b>	
	40 – 50	5	10	15	20	40	50	2.12	A	MS450-50E <b>585</b>	
	<b>MS495</b>										
	28 – 40	3	7.5	15	15	30	40	4.63	A	MS495-40E <b>622.50</b>	
	36 – 50	5	10	15	20	40	50	4.63	A	MS495-50E <b>622.50</b>	
	45 – 63	5	15	20	25	50	60	4.63	A	MS495-63E <b>622.50</b>	
57 – 75	7.5	15	25	25	60	75	4.63	A	MS495-75E <b>720</b>		
70 – 90	10	20	30	30	75	100	4.63	A	MS495-90E <b>735</b>		
80 – 100	10	25	40	40	75	100	4.63	A	MS495-100E <b>810</b>		
<b>MS497</b>											
11 – 16	1	3	5	5	10	15	2.12	B	MS497-16E <b>570</b>		
14 – 20	1.5	3	5	7.5	15	20	2.12	B	MS497-20E <b>570</b>		
18 – 25	2	5	7.5	10	20	25	2.12	B	MS497-25E <b>570</b>		
22 – 32	3	5	10	10	25	30	2.12	B	MS497-32E <b>570</b>		
28 – 40	3	7.5	15	15	30	40	4.63	B	MS497-40E <b>622.50</b>		
36 – 50	5	10	15	20	40	50	4.63	B	MS497-50E <b>623</b>		
45 – 63	5	—	20	25	50	60	4.63	B	MS497-63E <b>622.50</b>		
57 – 75	7.5	—	25	25	60	75	4.63	B	MS497-75E <b>720</b>		
70 – 90	10	—	30	30	75	100	4.63	B	MS497-90E <b>735</b>		
80 – 100	10	—	30	40	75	100	4.63	B	MS497-100E <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 <b>525</b>	
	14 – 20	1.5	3	5	7.5	15	20	2.12	B	MS451-20E <b>525</b>	
	18 – 25	2	5	7.5	10	20	25	2.12	B	MS451-25E <b>525</b>	
	22 – 32	3	5	10	10	25	30	2.12	B	MS451-32E <b>525</b>	
	28 – 40	3	7.5	15	15	30	40	2.12	B	MS451-40E <b>585</b>	
	36 – 45	5	7.5	15	15	30	40	2.12	B	MS451-45E <b>585</b>	
	40 – 50	5	10	15	20	40	50	2.12	B	MS451-50E <b>585</b>	
	<b>MS496</b>										
	28 – 40	3	7.5	15	15	30	40	4.63	B	MS496-40E <b>623</b>	
	36 – 50	5	10	15	20	40	50	4.63	B	MS496-50E <b>720</b>	
	45 – 63	5	15	20	25	50	60	4.63	B	MS496-63E <b>720</b>	
57 – 75	7.5	15	25	25	60	75	4.63	B	MS496-75E <b>720</b>		
70 – 90	10	20	30	30	75	100	4.63	B	MS496-90E <b>735</b>		
80 – 100 <sup>②</sup>	10	25	40	40	75	100	4.63	B	MS496-100E <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

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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	.242	1	B	<b>93</b>
	Voltage 5 sec. max. 50 – 60Hz, DC					
	20 – 70V	30 – 110	.242	1	A	
	70 – 190V	210 – 240	.242	1	B	
	190 – 330V	350 – 415	.242	1	B	
330 – 500V					AA4-415	

### Power feed terminal blocks – for MS45X

Item description	Catalog number	List price
For feeding power to multiple MS45Xs when using busbar 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 1 N.O. + 1 N.C. 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 PZ2	flat screwdriver PZ2	flat screwdriver PZ2	hex allen 4mm	hex allen 4mm	hex allen 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 9 – 14 $I_n$ (1 - 2.5)A 10 – 15 $I_n$ (4 - 6.3)A 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 kA, 600VAC	Maximum Fuse size 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 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

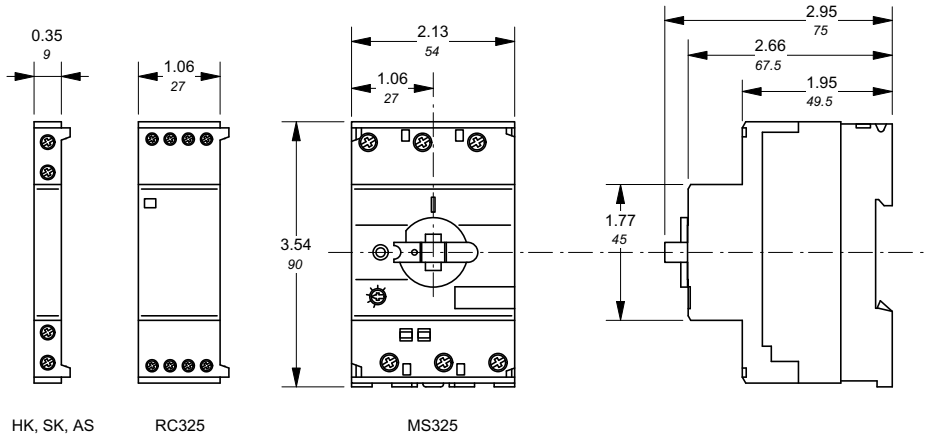
MS495-40	65	30	500	A/AE/AF50,63,75,95,110	65	30	65	30
MS496-40	65	30	500	A/AE/AF50,63,75,95,110	65	30	65	30
MS495-50	65	30	500	A/AE/AF50,63,75,95,110	65	30	65	30
MS496-50	65	30	500	A/AE/AF50,63,75,95,110	65	30	65	30
MS495-63	65	30	500	A/AE/AF50,63,75,95,110	65	30	65	30
MS496-63	65	30	500	A/AE/AF50,63,75,95,110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

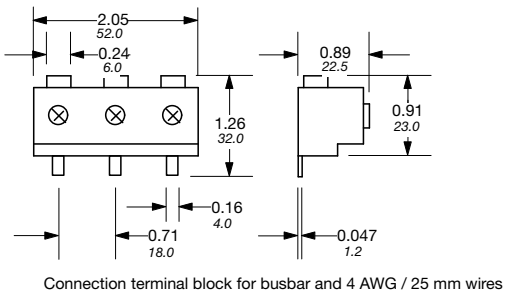
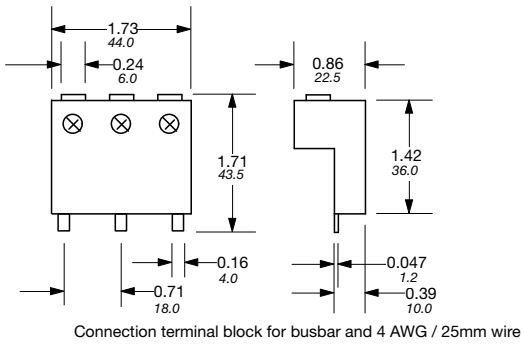
00.00 Inches  
00.00 [Millimeters]

## MS325

5



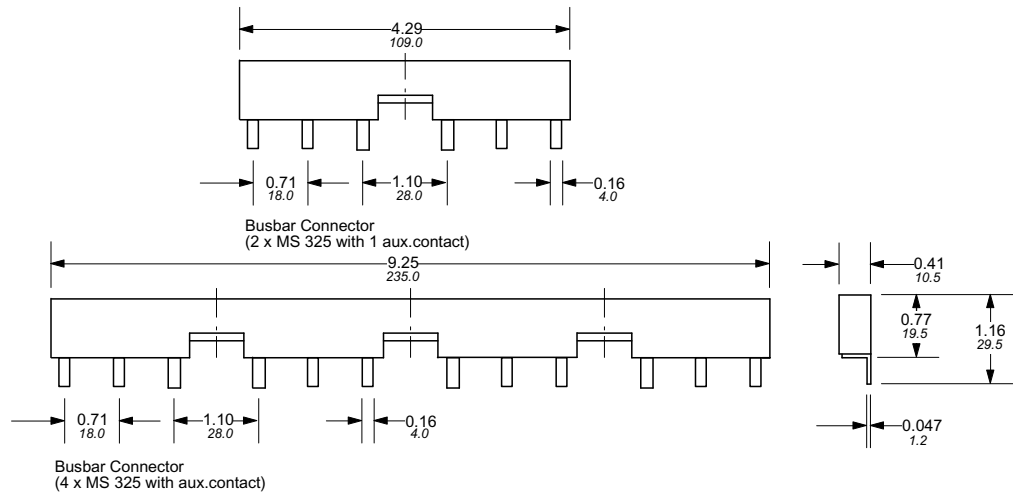
## Power feed terminal blocks for MS325



## Approximate dimensions Accessories for MS325

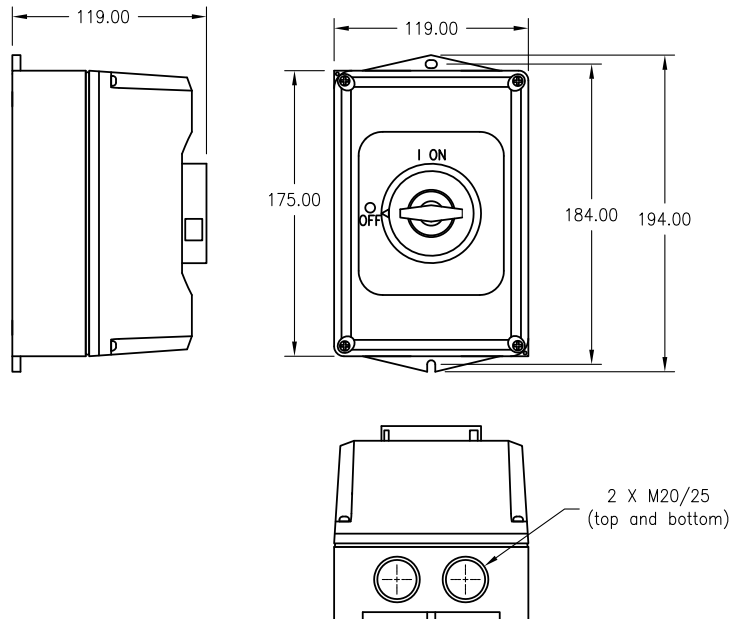
00.00 Inches  
00.00 [Millimeters]

### Busbar connectors for MS325



5

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

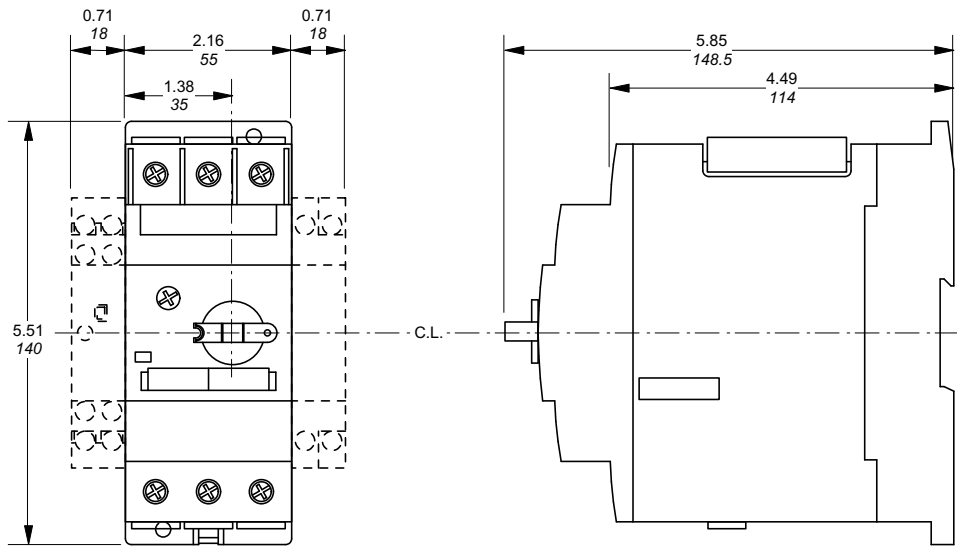


# Approximate dimensions MS450 & MS490

00.00 Inches  
00.00 [Millimeters]

## MS450

5



## MS490

