

### Product Selection

#### Product Selection for Manual Starter Applications

**When ordering, specify Catalog Numbers according to the following stipulations:**

A307, A308 and A309 starters are selected based on the overload current range required for a given motor. This current range is determined from the motor Full Load Ampere rating and Motor Service Factor usually found on the motor nameplate.

**For motors with service factors less than 1.15**, multiply the motor FLA by .92 to select appropriate starter.

Example: For motor having FLA of 6.4A and service factor of 1.0 (6.4A x .92 = 5.88A) select Catalog Number A307TN.

**For motor with service factor of 1.15 or greater**, use motor nameplate Full Load Amperes to select the appropriate starter.

Example: For motor having FLA of 6.4A and service factor of 1.15, select Catalog Number A307UN.

**Table 38-15. Manual Starters**

FLA Adjustment Range	Single-Phase hp Ratings		Three-Phase hp Ratings				Catalog Number	Price U.S. \$
	115V	230V	200V	230V	460V	575V		
<b>A307</b>								
0.11 - 0.16	—	—	—	—	—	—	A307AN	121.
0.14 - 0.2	—	—	—	—	—	—	A307BN	121.
0.18 - 0.25	—	—	—	—	—	—	A307CN	121.
0.22 - 0.32	—	—	—	—	—	—	A307DN	121.
0.28 - 0.4	—	—	—	—	—	—	A307EN	121.
0.35 - 0.5	—	—	—	—	—	—	A307FN	134.
0.45 - 0.63	—	—	—	—	—	—	A307GN	134.
0.55 - 0.8	—	—	—	—	—	1/2	A307HN	134.
0.7 - 1	—	—	—	—	1/2	1/2	A307JN	134.
0.9 - 1.25	—	—	—	—	3/4	3/4	A307KN	134.
1.1 - 1.6	—	—	—	—	3/4	1	A307LN	134.
1.4 - 2	—	—	—	—	1	1-1/2	A307MN	134.
1.8 - 2.5	—	1/6	1/2	1/2	1-1/2	1-1/2	A307NN	134.
2.2 - 3.2	—	1/4	3/4	3/4	1-1/2	2	A307PN	134.
2.8 - 4	—	1/3	3/4	1	2	3	A307RN	134.
3.5 - 5	1/6	1/2	1	1	3	3	A307SN	134.
4.5 - 6.3	1/4	3/4	1-1/2	1-1/2	5	5	A307TN	134.
5.5 - 8	1/3	1	2	2	5	5	A307UN	134.
7 - 10	1/2	1-1/2	3	3	7-1/2	10	A307VN	134.
9 - 12.5	1/2	2	3	3	7-1/2	10	A307WN	160.
11 - 16	1	3	5	5	10	15	A307XN	160.
14 - 20	1-1/2	3	5	7-1/2	15	20	A307YN	160.
17 - 22	2	3	7-1/2	7-1/2	15	20	A307ZN	160.
20 - 25	2	5	7-1/2	7-1/2	15	20	A307Z25N	160.
<b>A308</b>								
11 - 16	1	3	5	5	10	15	A308LN	258.
14 - 20	1-1/2	3	5	7-1/2	15	20	A308MN	258.
18 - 25	2	5	7-1/2	10	20	25	A308NN	258.
22 - 32	3	5	10	10	25	30	A308PN	258.
28 - 40	3	7-1/2	15	15	30	40	A308RN	290.
36 - 45	5	7-1/2	15	15	30	40	A308SN	290.
40 - 50	5	10	15	20	40	50	A308TN	290.
<b>A309</b>								
28 - 40	3	7-1/2	15	15	30	40	A309RN	322.
36 - 50	5	10	15	20	40	50	A309SN	322.
45 - 63	5	15	20	25	50	60	A309TN	322.
57 - 75	7-1/2	15	25	25	60	75	A309UV	350.
70 - 90	10	20	30	30	75	100	A309VN	375.
80 - 100	10	25	40	40	75	100	A309WN	400.



A307



A308



A309

Discount Symbol ..... 1CD-1

## Contents

<i>Description</i>	<i>Page</i>
<b>Manual Motor Starters &amp; Protectors</b>	
Product Description . . . . .	38-10
Application Description . . . . .	38-10
Features . . . . .	38-11
Standards and Certifications . . . . .	38-11
Technical Data . . . . .	38-12
Accessories . . . . .	38-14
Wiring Diagrams . . . . .	38-17
Time/Current Curve . . . . .	38-19
Dimensions . . . . .	38-20
Product Selection . . . . .	38-23



Type A307, A308 and A309

## Product Description

The A307, A308 and A309 family of Manual Motor Starters and Protectors feature a rotary ON/OFF manual disconnect, Class 10 adjustable bimetallic overload relay and fixed magnetic short circuit trip capability in one compact unit. Three frame sizes are available: A307 (45 mm) for motors with FLA ratings up to 25A, A308 (55 mm) covers motor FLA ratings up to 50A and the A309 (70 mm) is suitable for motor FLA ratings to 100A.

## Application Description

The A307, A308 and A309 Manual Motor Starters and Protectors can be used in the following applications:

### Manual Starter

All of the Manual Motor Starters and Protectors are UL Listed under UL508 as Manual Motor Controllers. They provide an economical solution for applications requiring simple manual starting and stopping of motors. When used as a Motor Starter, they are typically installed in an enclosure. IP55 enclosures are offered as accessories for the Manual Motor Starters and Protectors. Separate short-circuit protective devices, such as circuit breakers or fuses, are wired ahead of the Manual Starter and Protector. The short-circuit protective device should be sized per the NEC code and should not exceed 400% of the maximum FLA dial setting of the Manual Starter and Protector.

## Group Motor Installations

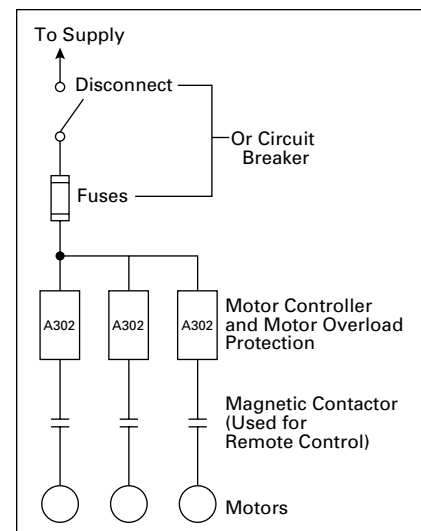
A Group Motor Installation can be defined as more than one motor circuit protected by a single set of fuses or circuit breaker on a motor branch circuit. This eliminates the need for individual fuses or circuit breakers for each motor circuit. Substantial component cost savings, panel space savings and reduced wiring installation time can be achieved in Group Motor Installations. The A307, A308 and A309 Manual Motor Starters and Protectors are UL Listed for Group Motor Installations and have a short circuit current rating of 50 kA at 480V and 10 kA at 600V. If remote operation is required, a magnetic contactor can be wired in series with the Manual Motor Starter and Protector. See **Figure 38-6** below.

Article 430-53 of the National Electric Code contains the rules and requirements for Group Motor Installations. The following are general rules from NEC Article 430-53 for sizing the Branch Circuit Protective Device (BCPD) for a Group Motor Installation.

**These general rules are to be used as a guide only, and not as a substitute for the actual requirements stated in the National Electric Code.**

### Manual Motor Starter and Protector Selection

A Manual Motor Starter and Protector is required for each motor in the Group Installation and is selected by motor FLA as described on **Page 38-24**.



**Figure 38-6. Group Motor Installation**  
NEC 430-53

### BCPD Selection for Group Motor Installation

A circuit breaker or single set of fuses can be used on a Branch Circuit of a Group Installation. Cutler-Hammer recommends the use of Cutler-Hammer Molded Case Circuit Breakers whenever possible for Group Motor Installations.

### Sizing BCPD for Group Motor Installations

If a circuit breaker is used for BCPD in a Group Motor Installation, the following formula should be used:

Max. Circuit Breaker = Largest Motor FLA x 250% + FLA of all other motors in Group.

If fuses are used for BCPD in a Group Motor Installation, the following formula should be used:

Max. Fuses = Largest Motor FLA x 175% + FLA of all other motors in Group.

### Single Motor Taps — NEC Article 430-53 (d)

This NEC Article restricts the size of the BCPD based on the wire sizes used for the application. The BCPD must protect the wires used. This section of the code should be reviewed before selecting a BCPD size.

### Important Application Notes

It is important to note that not every multi-motor application is a good candidate for the Group Motor Installation approach. The frequency and severity of potential short circuit conditions for each application should be analyzed by the customer before deciding if the Group Motor Installation approach is appropriate.

### Self-Protected Manual Combination Starter (UL508, Type E)

A307, A308 and A309 Manual Motor Starters and Protectors are also UL Listed as UL508, Type E, Self-Protected Manual Combination Starters. This UL Listing allows these devices to be used in motor circuits without having to add separate short circuit protection upstream. These devices have a short circuit rating of 50 kA at 240V and 480Y/277V.

### Component in a Combination Starter

The A307, A308 and A309 Manual Motor Starters and Protectors can also be wired in series with a magnetic contactor to complete the assembly of a remotely operated, combination starter.

### Circuit Breaker

In many countries outside of the United States and Canada, especially Europe, the Manual Motor Starters and Protectors are tested and classified as thermal magnetic circuit breakers for use in motor branch circuits. This can be an important consideration for all companies who export their equipment and machines internationally.

### Features

- ON/OFF Rotary Handle with Lockout Provision
- Visible Trip Indication
- Class 10 Overload Protection
- Optional Class 20 Overload Protection for A308 and A309 *only* (available in 2001 — contact factory for availability)
- Phase Loss Sensitivity
- Ambient Temperature Compensation to 140°F
- Fixed Short Circuit Trip — 12 times maximum setting of overload FLA dial
- Type 2 Coordination per IEC 947
- Identification Markers Standard on Starter Faceplate
- DIN Rail or Panel Mount
- Accessories include:
  - Front and Side Auxiliary Contacts
  - Trip Indicating Contacts
  - Tamperproof Cover for OLR Dial
  - Undervoltage Release
  - Shunt Trip
  - Thru-the-Door Operators
  - Enclosures
  - 3-Phase Line Side Connecting Links

### Standards and Certifications

- UL File No. E176513, Category NKJH (A307, A308, A309)  
UL File No. E37317, Category NKCR (Accessories)
- CSA File LR12530, Class 3211-05
- IEC 947-1; IEC 947-2; IEC947-4-1
- DIN VDE 0660 Part 100, Part 101 and Part 102



## Types A307, A308 and A309

## Technical Data

Table 38-10. Specifications

Specification		A307	A308	A309								
<b>Max. Rated Current</b> $I_{n \max}$ (= max. rated-operational current $I_n$ )	A	25	50	100								
<b>Permissible Ambient Temperature</b>	Storage/Transport Operation	-58 to +176/-50 to +80 -4 to +158/-20 to +70 (over +60°C current reduction required)										
	Ambient Temperature Permissible Rated Current	<table border="1"> <tr> <td>+140°F</td> <td>+158°F</td> <td>+60°C</td> <td>70°C</td> </tr> <tr> <td>100%</td> <td>87%</td> <td>100%</td> <td>87%</td> </tr> </table>			+140°F	+158°F	+60°C	70°C	100%	87%	100%	87%
+140°F	+158°F	+60°C	70°C									
100%	87%	100%	87%									
<b>Rated Operational Voltage</b> $U_e$	V	690										
<b>Rated Frequency</b>	Hz	50/60										
<b>Rated Insulation Voltage</b> $U_i$	V	690										
<b>Rated Impulse Withstand Voltage</b> $U_{imp}$	kV	6										
<b>Utilization Category</b>	IEC 947-2 (circuit breaker) IEC 947-4-1 (motor starter)	A AC-3										
<b>Class</b>	IEC 947-4-1	10										
<b>Power Loss <math>P_v</math> per MSP</b>		<b><math>I_n</math>(A)</b>	<b><math>P_v</math>(W)</b>	<b><math>I_n</math>(A)</b>	<b><math>P_v</math>(W)</b>	<b><math>I_n</math>(A)</b>	<b><math>P_v</math>(W)</b>					
Depending on Rated Current $I_n$ (upper setting range)		up to 0.63 0.8 to 6.3 8 to 16 20 to 25	5 6 7 8	up to 25 32 40 to 50	12 15 20	up to 63 75 and 90 100	20 30 38					
<b>Shock Resistance</b>	acc. to IEC 68 Part 2-27	g			25							
<b>Degree of Protection</b>		IP20		IP20 ①		IP20 ①						
<b>Shock-Hazard Protection</b>	acc. to DIN VDE 0106 Part 100	Safe from Finger Touch										
<b>Temperature Compensation</b>	acc. to IEC 957-4-1	°F/°C			-4 to +140/-20 to +60							
<b>Phase Failure Sensitivity</b>	acc. to IEC 957-4-1	Yes										
<b>KEMA Test Certificate</b>	No.	Ex -97, Y, 3236										
<b>Isolator Characteristics</b>	acc. to IEC 947-3	Yes										
<b>Main and EMERGENCY-STOP Switch Characteristics</b> ②	acc. to DIN VDE 0113	Yes										
<b>Safe Isolation between Main and Auxiliary Circuit</b>	acc. to DIN VDE 0106 Part 101	Up to 400V										
<b>Mechanical Endurance</b>	Operating Cycles	100,000	50,000	50,000	50,000	50,000	50,000					
<b>Electrical Endurance</b>	Operating Cycles	100,000	50,000	50,000	50,000	50,000	50,000					
<b>Max. Switching Frequency Per Hour (motor starts)</b>	1/h	15	15	15	15	15	15					

## Conductor Cross-Sections for Main Circuit

Terminal Type		Screw Type	Box Terminal	Allen Screw
Terminal Screw		Pozidrive	Pozidrive	5/32 inch or 4 mm
Minimum/Maximum Conductor Cross-Sections				
Finely Stranded with End Sleeve				
1 Conductor	mm <sup>2</sup>	1/6	0.75/25	2.5/50 ③
2 Conductors	mm <sup>2</sup>	1/2.5 or 2.5/6	0.75/16	2.5/35 ③
Solid or Stranded				
1 Conductor	mm <sup>2</sup>	1/6 (max. 10)	0.75/35	2.5/70 ③
2 Conductors	mm <sup>2</sup>	1/2.5 or 2.5/6	0.75/25	2.5/50 ③
Solid or Stranded	AWG	2 x (14 to 10)	2 x (18 to 2)	—
Stranded	AWG	—	—	2 x (10 to 1/0)
<b>Permissible Mounting Position</b>		Any		

① Terminal department IP00.

② With appropriate accessories.

③ After removing the box terminals, connection with cable lugs and busbars is possible.

### Product Selection

#### Product Selection for Manual Starter Applications

**When ordering, specify Catalog Numbers according to the following stipulations:**

A307, A308 and A309 starters are selected based on the overload current range required for a given motor. This current range is determined from the motor Full Load Ampere rating and Motor Service Factor usually found on the motor nameplate.

**For motors with service factors less than 1.15**, multiply the motor FLA by .92 to select appropriate starter.

Example: For motor having FLA of 6.4A and service factor of 1.0 (6.4A x .92 = 5.88A) select Catalog Number A307TN.

**For motor with service factor of 1.15 or greater**, use motor nameplate Full Load Amperes to select the appropriate starter.

Example: For motor having FLA of 6.4A and service factor of 1.15, select Catalog Number A307UN.

**Table 38-15. Manual Starters**

FLA Adjustment Range	Single-Phase hp Ratings		Three-Phase hp Ratings				Catalog Number	Price U.S. \$
	115V	230V	200V	230V	460V	575V		
<b>A307</b>								
0.11 - 0.16	—	—	—	—	—	—	A307AN	121.
0.14 - 0.2	—	—	—	—	—	—	A307BN	121.
0.18 - 0.25	—	—	—	—	—	—	A307CN	121.
0.22 - 0.32	—	—	—	—	—	—	A307DN	121.
0.28 - 0.4	—	—	—	—	—	—	A307EN	121.
0.35 - 0.5	—	—	—	—	—	—	A307FN	134.
0.45 - 0.63	—	—	—	—	—	—	A307GN	134.
0.55 - 0.8	—	—	—	—	—	1/2	A307HN	134.
0.7 - 1	—	—	—	—	1/2	1/2	A307JN	134.
0.9 - 1.25	—	—	—	—	3/4	3/4	A307KN	134.
1.1 - 1.6	—	—	—	—	3/4	1	A307LN	134.
1.4 - 2	—	—	—	—	1	1-1/2	A307MN	134.
1.8 - 2.5	—	1/6	1/2	1/2	1-1/2	1-1/2	A307NN	134.
2.2 - 3.2	—	1/4	3/4	3/4	1-1/2	2	A307PN	134.
2.8 - 4	—	1/3	3/4	1	2	3	A307RN	134.
3.5 - 5	1/6	1/2	1	1	3	3	A307SN	134.
4.5 - 6.3	1/4	3/4	1-1/2	1-1/2	5	5	A307TN	134.
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28 - 40	3	7-1/2	15	15	30	40	A308RN	290.
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45 - 63	5	15	20	25	50	60	A309TN	322.
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70 - 90	10	20	30	30	75	100	A309VN	375.
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A307



A308



A309

Discount Symbol ..... 1CD-1

## Contents

<i>Description</i>	<i>Page</i>
<b>Manual Motor Starters &amp; Protectors</b>	
Product Description . . . . .	38-10
Application Description . . . . .	38-10
Features . . . . .	38-11
Standards and Certifications . . . . .	38-11
Technical Data . . . . .	38-12
Accessories . . . . .	38-14
Wiring Diagrams . . . . .	38-17
Time/Current Curve . . . . .	38-19
Dimensions . . . . .	38-20
Product Selection . . . . .	38-23



Type A307, A308 and A309

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The A307, A308 and A309 Manual Motor Starters and Protectors can be used in the following applications:

### Manual Starter

All of the Manual Motor Starters and Protectors are UL Listed under UL508 as Manual Motor Controllers. They provide an economical solution for applications requiring simple manual starting and stopping of motors. When used as a Motor Starter, they are typically installed in an enclosure. IP55 enclosures are offered as accessories for the Manual Motor Starters and Protectors. Separate short-circuit protective devices, such as circuit breakers or fuses, are wired ahead of the Manual Starter and Protector. The short-circuit protective device should be sized per the NEC code and should not exceed 400% of the maximum FLA dial setting of the Manual Starter and Protector.

## Group Motor Installations

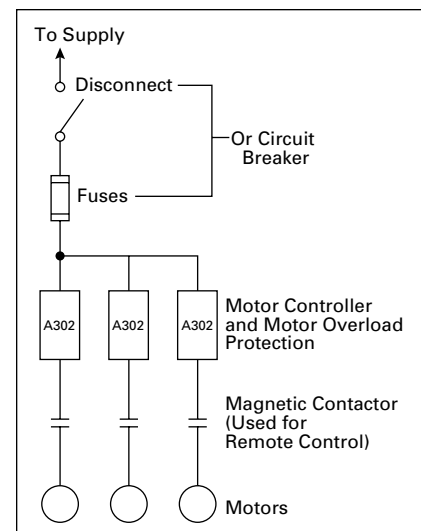
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### Manual Motor Starter and Protector Selection

A Manual Motor Starter and Protector is required for each motor in the Group Installation and is selected by motor FLA as described on **Page 38-24**.



**Figure 38-6. Group Motor Installation**  
NEC 430-53

### BCPD Selection for Group Motor Installation

A circuit breaker or single set of fuses can be used on a Branch Circuit of a Group Installation. Cutler-Hammer recommends the use of Cutler-Hammer Molded Case Circuit Breakers whenever possible for Group Motor Installations.

### Sizing BCPD for Group Motor Installations

If a circuit breaker is used for BCPD in a Group Motor Installation, the following formula should be used:

Max. Circuit Breaker = Largest Motor FLA x 250% + FLA of all other motors in Group.

If fuses are used for BCPD in a Group Motor Installation, the following formula should be used:

Max. Fuses = Largest Motor FLA x 175% + FLA of all other motors in Group.

### Single Motor Taps — NEC Article 430-53 (d)

This NEC Article restricts the size of the BCPD based on the wire sizes used for the application. The BCPD must protect the wires used. This section of the code should be reviewed before selecting a BCPD size.

### Important Application Notes

It is important to note that not every multi-motor application is a good candidate for the Group Motor Installation approach. The frequency and severity of potential short circuit conditions for each application should be analyzed by the customer before deciding if the Group Motor Installation approach is appropriate.

### Self-Protected Manual Combination Starter (UL508, Type E)

A307, A308 and A309 Manual Motor Starters and Protectors are also UL Listed as UL508, Type E, Self-Protected Manual Combination Starters. This UL Listing allows these devices to be used in motor circuits without having to add separate short circuit protection upstream. These devices have a short circuit rating of 50 kA at 240V and 480Y/277V.

### Component in a Combination Starter

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### Features

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- Optional Class 20 Overload Protection for A308 and A309 *only* (available in 2001 — contact factory for availability)
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- Ambient Temperature Compensation to 140°F
- Fixed Short Circuit Trip — 12 times maximum setting of overload FLA dial
- Type 2 Coordination per IEC 947
- Identification Markers Standard on Starter Faceplate
- DIN Rail or Panel Mount
- Accessories include:
  - Front and Side Auxiliary Contacts
  - Trip Indicating Contacts
  - Tamperproof Cover for OLR Dial
  - Undervoltage Release
  - Shunt Trip
  - Thru-the-Door Operators
  - Enclosures
  - 3-Phase Line Side Connecting Links

### Standards and Certifications

- UL File No. E176513, Category NKJH (A307, A308, A309)  
UL File No. E37317, Category NKCR (Accessories)
- CSA File LR12530, Class 3211-05
- IEC 947-1; IEC 947-2; IEC947-4-1
- DIN VDE 0660 Part 100, Part 101 and Part 102



## Types A307, A308 and A309

## Technical Data

Table 38-10. Specifications

Specification		A307	A308	A309								
<b>Max. Rated Current</b> $I_{n \max}$ (= max. rated-operational current $I_n$ )	A	25	50	100								
<b>Permissible Ambient Temperature</b>	Storage/Transport Operation	-58 to +176/-50 to +80 -4 to +158/-20 to +70 (over +60°C current reduction required)										
	Ambient Temperature Permissible Rated Current	<table border="1"> <tr> <td>+140°F</td> <td>+158°F</td> <td>+60°C</td> <td>70°C</td> </tr> <tr> <td>100%</td> <td>87%</td> <td>100%</td> <td>87%</td> </tr> </table>			+140°F	+158°F	+60°C	70°C	100%	87%	100%	87%
+140°F	+158°F	+60°C	70°C									
100%	87%	100%	87%									
<b>Rated Operational Voltage</b> $U_e$	V	690										
<b>Rated Frequency</b>	Hz	50/60										
<b>Rated Insulation Voltage</b> $U_i$	V	690										
<b>Rated Impulse Withstand Voltage</b> $U_{imp}$	kV	6										
<b>Utilization Category</b>	IEC 947-2 (circuit breaker) IEC 947-4-1 (motor starter)	A AC-3										
<b>Class</b>	IEC 947-4-1	10										
<b>Power Loss <math>P_v</math> per MSP</b>		<b><math>I_n</math>(A)</b>	<b><math>P_v</math>(W)</b>	<b><math>I_n</math>(A)</b>	<b><math>P_v</math>(W)</b>	<b><math>I_n</math>(A)</b>	<b><math>P_v</math>(W)</b>					
Depending on Rated Current $I_n$ (upper setting range)		up to 0.63 0.8 to 6.3 8 to 16 20 to 25	5 6 7 8	up to 25 32 40 to 50	12 15 20	up to 63 75 and 90 100	20 30 38					
<b>Shock Resistance</b>	acc. to IEC 68 Part 2-27	g			25							
<b>Degree of Protection</b>		IP20		IP20 ①		IP20 ①						
<b>Shock-Hazard Protection</b>	acc. to DIN VDE 0106 Part 100	Safe from Finger Touch										
<b>Temperature Compensation</b>	acc. to IEC 957-4-1	°F/°C			-4 to +140/-20 to +60							
<b>Phase Failure Sensitivity</b>	acc. to IEC 957-4-1	Yes										
<b>KEMA Test Certificate</b>	No.	Ex -97, Y, 3236										
<b>Isolator Characteristics</b>	acc. to IEC 947-3	Yes										
<b>Main and EMERGENCY-STOP Switch Characteristics</b> ②	acc. to DIN VDE 0113	Yes										
<b>Safe Isolation between Main and Auxiliary Circuit</b>	acc. to DIN VDE 0106 Part 101	Up to 400V										
<b>Mechanical Endurance</b>	Operating Cycles	100,000	50,000	50,000	50,000	50,000	50,000					
<b>Electrical Endurance</b>	Operating Cycles	100,000	50,000	50,000	50,000	50,000	50,000					
<b>Max. Switching Frequency Per Hour (motor starts)</b>	1/h	15	15	15	15	15	15					

## Conductor Cross-Sections for Main Circuit

Terminal Type		Screw Type	Box Terminal	Allen Screw
Terminal Screw		Pozidrive	Pozidrive	5/32 inch or 4 mm
Minimum/Maximum Conductor Cross-Sections				
Finely Stranded with End Sleeve				
1 Conductor	mm <sup>2</sup>	1/6	0.75/25	2.5/50 ③
2 Conductors	mm <sup>2</sup>	1/2.5 or 2.5/6	0.75/16	2.5/35 ③
Solid or Stranded				
1 Conductor	mm <sup>2</sup>	1/6 (max. 10)	0.75/35	2.5/70 ③
2 Conductors	mm <sup>2</sup>	1/2.5 or 2.5/6	0.75/25	2.5/50 ③
Solid or Stranded	AWG	2 x (14 to 10)	2 x (18 to 2)	—
Stranded	AWG	—	—	2 x (10 to 1/0)
<b>Permissible Mounting Position</b>		Any		

① Terminal department IP00.

② With appropriate accessories.

③ After removing the box terminals, connection with cable lugs and busbars is possible.