




Electrical Characteristics

Table 45-2. Electrical Characteristics

| Maximum Rated Current (Amperes) | EG | | | | | | | | | JG | | | | | | LG | | | | | | |
|--|---|-----------------|---------|--------------|-------------|-----------|---------|-------------|---------|--|--------------|------------|--------------|--------------|------|---|---------------|-----|-----|------|------|-----|
| |  | | | | | | | | |  | | | | | |  | | | | | | |
| | 125, 160 ① | | | | | | | | | 250 | | | | | | 400, 630 ② | | | | | | |
| Breaker Type | B | | E | | S | | H | | C | E | S | H | C | U | X | E | S | H | C | U | X | |
| Number of Poles | 1 | 2, 3, 4 | 2, 3, 4 | 1 | 2, 3, 4 | 1 | 2, 3, 4 | 1 | 2, 3, 4 | 3, 4 | 2, 3, 4 | | | 3, 4 | 3, 4 | 3, 4 | 3, 4 | | | 3, 4 | 3, 4 | |
| Breaker Capacity (kA rms) ac 50 – 60 Hz | | | | | | | | | | | | | | | | | | | | | | |
| NEMA®, UL, CSA | 240 Vac | 25 | 25 | 35 | 85 | 85 | 100 | 100 | 200 | 65 | 85 | 100 | 200 | 200 | 300 | 65 | 85 | 100 | 200 | 200 | 300 | |
| | 480 Vac | — | 18 | 25 | — | 35 | — | 65 | 100 | 25 | 35 | 65 | 100 | 150 | 200 | 35 | 50 | 65 | 100 | 150 | 200 | |
| | 600 Vac ③ | — | — | 18 | — | 22 | — | 25 | 35 | 18 | 25 | 35 | 35 | 50 | 50 | 18 | 25 | 35 | 50 | 65 | 65 | |
| | 125/250 Vdc ④ | 10 ⑥ | 10 | 10 | 35 ⑥ | 35 | 42 ⑥ | 42 | 42 | 10 | 22 | 22 | 42 | 50 | 50 | 22 | 22 | 42 | 42 | 50 | 50 | |
| IEC 60947-2 | 220 – 240 Vac | I _{cu} | 25 | 25 | 35 | 85 | 85 | 100 | 100 | 200 | 65 | 85 | 100 | 200 | 200 | 300 | 65 | 85 | 100 | 200 | 200 | 300 |
| | | I _{cs} | 25 | 25 | 35 | 43 | 43 | 50 | 50 | 200 | 65 | 85 | 100 | 200 | 200 | 200 | 65 | 85 | 100 | 200 | 200 | 200 |
| | 380 – 415 Vac | I _{cu} | — | 18 | 25 | — | 40 | — | 70 | 100 | 25 | 40 | 70 | 100 | 150 | 200 | 35 | 50 | 70 | 100 | 150 | 200 |
| | | I _{cs} | — | 18 | 25 | — | 30 | — | 35 | 100 | 25 | 40 | 70 | 100 | 150 | 200 | 35 | 50 | 100 | 100 | 150 | 200 |
| | 660 – 690 Vac | I _{cu} | — | — | 3 | — | 4 | — | — | 8 | 12 | 12 | 14 | 16 | 18 | 18 | 12 | 20 | 25 | 30 | 35 | 35 |
| | | I _{cs} | — | — | 3 | — | 3 | — | — | 6 | 6 | 6 | 7 | 12 | 14 | 14 | 6 | 10 | 13 | 15 | 18 | 18 |
| | 125/250 Vdc ④ | I _{cu} | 10 ⑥ | 10 | 10 | 35 ⑥ | 35 | 42 ⑥ | 42 | 42 | 10 | 35 | 42 | 42 | 50 | 50 | 22 | 22 | 42 | 42 | 50 | 50 |
| | | I _{cs} | 10 ⑥ | 10 | 10 | 35 ⑥ | 35 | 42 ⑥ | 42 | 42 | 10 | 35 | 42 | 42 | 50 | 50 | 22 | 22 | 42 | 42 | 50 | 50 |
| Ampere Range | 15 – 160 A ① | | | | | | | | | 20 – 250 A | | | | | | 100 – 630 A ② | | | | | | |
| Trip Units F = Fixed A = Adjustable T = Thermal M = Magnetic | FT-FM AT-FM | | | | | | | | | FT-AM AT-AM Electronic (Digitrip RMS 310) | | | | | | FT-AM AT-AM Electronic (Digitrip RMS 310) | | | | | | |
| | Interchangeable | — | | | | | | | | | ■ | | | | | | ■ | | | | | |
| | Built-in | ■ | | | | | | | | | ■ | | | | | | ■ | | | | | |
| Thermal Magnetic | Fixed Thermal | ■ | | | | | | | | | ■ | | | | | | ■ | | | | | |
| | Adjustable Thermal | ■ | | | | | | | | | ■ | | | | | | ■ | | | | | |
| | Magnetic | Fixed | | | | | | | | | Adjustable | | | | | | Adjustable | | | | | |
| Electronic rms ⑤ | LS | — | | | | | | | | | ■ | | | | | | ■ ④ | | | | | |
| | LSI | — | | | | | | | | | ■ | | | | | | ■ ④ | | | | | |
| | LSG | — | | | | | | | | | ■ | | | | | | ■ ④ | | | | | |
| | LSIG | — | | | | | | | | | ■ | | | | | | ■ ④ | | | | | |
| Dimensions Inches (mm) | | H | | | W | | | D | | | H | | | W | | | D | | | | | |
| | 1-Pole | 5.50 (139.7) | | | 1.00 (25.4) | | | 2.99 (76.0) | | | — | | | — | | | — | | | | | |
| | 2-Pole | — | | | 2.00 (50.8) | | | — | | | 7.00 (177.8) | | | 4.13 (105.0) | | | 3.57 (87.4) | | | | | |
| | 3-Pole | — | | | 3.00 (76.2) | | | — | | | — | | | — | | | 10.13 (258.0) | | | | | |
| 4-Pole | — | | | 4.00 (101.6) | | | — | | | — | | | 5.34 (135.6) | | | 7.22 (183.0) | | | | | | |
| Weight (approximate) lbs. (kg) | 1-Pole | 2-Pole | | 3-Pole | | 4-Pole | | 2-Pole | | 3-Pole | | 4-Pole | | 3-Pole | | 4-Pole | | | | | | |
| | 1.1 (0.5) | 2.0 (0.9) | | 3.1 (1.4) | | 3.9 (1.8) | | 11.4 (5.2) | | 11.4 (5.2) | | 15.3 (7.0) | | 16.0 (7.3) | | 20.0 (9.1) | | | | | | |
| Utilization Category | A | | | | | | | | | A | | | | | | A | | | | | | |

① 125 amperes is the maximum UL and CSA rating for the EG.
 ② 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA listed rating for the LG.
 ③ EG breaker rated 600/347 Vac.
 ④ Two poles in series.
 ⑤ Not suitable for dc application. 4-pole ground fault not available.
 ⑥ 125 Vdc only for 1-pole breakers.

Frame Sizes EG through LG

Table 45-3. EG through LG Electrical Characteristics

| Technical Data | EG | JG | LG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|------------------------------|------------------------------|------|------|---|---|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Maximum Rated Current I_n Depending on the Version | 160 A ^① | 250 A | 400, 630 A ^② | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Insulation Voltage U, According to IEC 60947-2 Main Conducting Paths Auxiliary Circuits | 690 Vac 690 Vac | 750 Vac 690 Vac | 750 Vac 690 Vac | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Impulse Withstand Voltage U_{imp} Main Conducting Paths Auxiliary Circuits | 6 kV 4 kV | 8 kV 4 kV | 8 kV 4 kV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Operational Voltage U_e IEC NEMA | 690 Vac 600 Y/347 Vac | 690 Vac 600 Vac | 690 Vac 600 Vac | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UL and CSA Listed | Yes ^③ | Yes ^③ | Yes ^③ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Permissible Ambient Temperature | -20 to +70°C | -20 to +70°C | -20 to +70°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Permissible Load for Various Ambient Temperatures Close to the Circuit Breaker, Related to the Rated Current of the Circuit Breaker <ul style="list-style-type: none"> ■ Circuit Breakers for Plant Protection <ul style="list-style-type: none"> - At 40°C - At 50°C - At 55°C - At 60°C - At 70°C ■ Circuit Breakers for Motor Protection <ul style="list-style-type: none"> - At 40°C - At 50°C - At 55°C - At 60°C - At 70°C ■ Circuit Breakers for Starter Combinations and Isolating Circuit Breakers <ul style="list-style-type: none"> - At 40°C - At 50°C - At 55°C - At 60°C - At 70°C | <table border="1"> <thead> <tr> <th>④</th> <th>⑤</th> <th>④</th> <th>⑤</th> <th>④</th> <th>⑤</th> </tr> </thead> <tbody> <tr> <td>100%</td> <td>100%</td> <td>100%</td> <td>100%</td> <td>100%</td> <td>100%</td> </tr> <tr> <td>96%</td> <td>92%</td> <td>96%</td> <td>94%</td> <td>96%</td> <td>91%</td> </tr> <tr> <td>93%</td> <td>87%</td> <td>94%</td> <td>90%</td> <td>93%</td> <td>86%</td> </tr> <tr> <td>91%</td> <td>83%</td> <td>92%</td> <td>87%</td> <td>90%</td> <td>82%</td> </tr> <tr> <td>86%</td> <td>73%</td> <td>88%</td> <td>80%</td> <td>84%</td> <td>70%</td> </tr> </tbody> </table> | ④ | ⑤ | ④ | ⑤ | ④ | ⑤ | 100% | 100% | 100% | 100% | 100% | 100% | 96% | 92% | 96% | 94% | 96% | 91% | 93% | 87% | 94% | 90% | 93% | 86% | 91% | 83% | 92% | 87% | 90% | 82% | 86% | 73% | 88% | 80% | 84% | 70% |
| ④ | ⑤ | ④ | ⑤ | ④ | ⑤ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100% | 100% | 100% | 100% | 100% | 100% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 96% | 92% | 96% | 94% | 96% | 91% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 93% | 87% | 94% | 90% | 93% | 86% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 91% | 83% | 92% | 87% | 90% | 82% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 86% | 73% | 88% | 80% | 84% | 70% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Short Circuit Breaking Capacity (dc) Not for Circuit Breakers for Motor Protection (Time Constant $\tau = 10$ rms) 2 Conducting Paths in Series For EG to LG up to 250 Vdc NEMA (Time Constant $\tau = 8$ rms) 2 Conducting Paths in Series 250 Vdc | 42 kA Max. 42 kA Max. | 42 kA Max. 42 kA Max. | 42 kA Max. 42 kA Max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Main Switch Characteristics According to IEC 60947-2 in Combination with Lockable Rotary Drives | Yes | Yes | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Short Circuit Breaking Capacity According to IEC 60947-2 (at ac 50/60 Hz) | Rated Short Circuit Breaking Capacity See Table 45-2 on Page 45-5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Endurance (Operating Cycles) | 10,000 | 10,000 | 8,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Switching Frequency | 300 1/h | 240 1/h | 240 1/h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

^① 125 amperes is the maximum UL and CSA rating for the EG.

^② 630 amperes is not a UL or CSA listed rating. 600 amperes is the maximum UL and CSA rating for the LG.

^③ See footnotes for exceptions.

^④ Thermal overload release set to the lower value.

^⑤ Thermal overload release set to the upper value.


Frame Sizes EG through LG

Table 45-3. EG through LG Electrical Characteristics (Continued)

| Technical Data | EG | JG | LG | |
|--|--|--|--|---|
| Conductor Cross Sections and Terminal Types for Main Conductors <ul style="list-style-type: none"> ■ Solid or Stranded ■ Finely Stranded with End Sleeve ■ Bus Bar Tightening Torque for Box Terminals Tightening Torque for Bus Bar Connection Pieces | Box Terminals 2.5 to 95 mm ² 2.5 to 50/70 mm ² — | Box Terminals 50 to 150 mm ² 35 to 120 mm ² — | Box Terminals 95 to 240 mm ² 70 to 150 mm ² — | Flat Bar Terminals — — 600 A 31 Nm 6 Nm |
| Conductor Cross Sections for Auxiliary Circuits with Terminal Connection or Terminal Strip <ul style="list-style-type: none"> ■ Solid ■ Finely Stranded with End Sleeve ■ With Brought-out Cable Ends ■ Tightening Torque for Fitting Screws | 0.75 to 2.5 mm ² 0.75 to 2.5 mm ² | 0.75 to 2.5 mm ² 0.75 to 2.5 mm ² 0.82 (AWG 18) mm ² 0.8 to 1.4 Nm | 0.75 to 2.5 mm ² 0.75 to 2.5 mm ² 0.82 (AWG 18) mm ² 0.8 to 1.4 Nm | |
| Power Loss per Circuit Breaker at Maximum Rated Current I_n (The Power Losses of the Undervoltage Releases ("r" Releases) Must Be Observed if Necessary) at Three-Phase Symmetrical Load) <ul style="list-style-type: none"> ■ For Plant Protection ■ As Isolating Circuit Breaker ■ For Starter Combinations ■ For Motor Protection | 40 W 40 W 40 W — | 45 W 45 W 45 W 45 W | 400 A: 65 W 65 W 65 W 65 W | 600 A: |
| Permissible Mounting Position | | | | |
| Arc Spacing — Suitable for Reverse-Feed Applications | Yes (Except HMCPE) | Yes | Yes | |

Frame Sizes EG through LG

Table 45-3. EG through LG Electrical Characteristics (Continued)

| Technical Data | EG | JG | LG |
|--|--|--|--|
| Auxiliary Switches | | | |
| Rated Thermal Current I_{th} Rated Making Capacity | 6 A 20 A | 6 A 20 A | 6 A 20 A |
| ac (ac-15) ■ Rated Operational Voltage ■ Rated Operational Current | 230/400/600 V 6/3/0.25 A | 230/400/600 V 6/3/0.25 A | 230/400/600 V 6/3/0.25 A |
| dc (dc-13) ■ Rated Operational Voltage ■ Rated Operational Current | 125/250 V 0.5/0.25 A | 125/250 V 0.5/0.15 A | 125/250 V 0.5/0.15 A |
| Backup Fuse Miniature Circuit Breaker | 6/4/4 A 6/4 A | 4 6/4/4 A 6/4 A | 4 6/4/4 A 6/4 A |
| Releases | | | |
| Undervoltage Releases ("r" Releases) Response Voltage: ■ Drop (Breaker Tripped) U_S ■ Pickup (Breaker May Be Switched on) U_S | 35 – 70% 85 – 110% | 35 – 70% 85 – 110% | 35 – 70% 85 – 110% |
| Power Consumption in Continuous Operation at: ■ 50/60 Hz 12 Vac ■ 50/60 Hz 24 Vac ■ 50/60 Hz 48 – 60 Vac ■ 50/60 Hz 110 – 127 Vac ■ 50/60 Hz 208 – 240 Vac ■ 50/60 Hz 380 – 500 Vac ■ 50/60 Hz 525 – 600 Vac ■ 12 Vdc ■ 24 Vdc ■ 48 – 60 Vdc ■ 110 – 125 Vdc ■ 220 – 250 Vdc Maximum Opening Time | 0.95 VA 0.72 VA 1.15 – 1.78 VA 0.96 – 1.25 VA 1.28 – 1.68 VA 2.2 – 3.9 VA 3.4 – 4.3 VA 0.88 W 0.70 W 1.12 – 1.76 W 0.94 – 1.21 W 1.45 – 1.86 W 50 ms | 1.9 VA 3.9 VA 2.5 – 3.8 VA 1.8 – 2.4 VA 2.7 – 3.8 VA 3.4 – 5.8 VA 3.4 – 4.3 VA 1.6 W 3.1 W 2.0 – 3.1 W 1.6 – 2.2 W 3.1 – 4 W 50 ms | 1.9 VA 3.9 VA 2.5 – 3.8 VA 1.8 – 2.4 VA 2.7 – 3.8 VA 3.4 – 5.8 VA 3.4 – 4.3 VA 1.6 W 3.1 W 2.0 – 3.1 W 1.6 – 2.2 W 3.1 – 4 W 50 ms |
| Shunt Trips | | | |
| Shunt Trips ("f" Releases) Response Voltage: ■ Pickup (Breaker Tripped) U_S | 70 – 110% | 70 – 110% | 70 – 110% |
| Power Consumption in (Short Time) at: ■ 50/60 Hz 24 Vac ■ 50/60 Hz 48 – 60 Vac ■ 50/60 Hz 48 – 127 Vac ■ 50/60 Hz 110 – 240 Vac ■ 50/60 Hz 380 – 440 Vac ■ 50/60 Hz 380 – 600 Vac ■ 50/60 Hz 480 – 600 Vac ■ 12 – 24 Vdc ■ 48 – 60 Vdc ■ 110 – 125 Vdc ■ 220 – 250 Vdc | 10 – 41 VA 139 – 210 VA — 83 – 360 VA — 418 – 1080 VA — 29 – 120 W 475 – 720 W 99 – 121 W — | 87 – 405 VA 710 – 1105 VA — 66 – 432 VA 127 – 188 VA — 34 – 60 VA 164 – 631 W 830 – 1580 W 112 – 150 W 40 – 58 W | 87 – 405 VA 710 – 1105 VA — 66 – 432 VA 127 – 188 VA — 34 – 60 VA 164 – 631 W 830 – 1580 W 112 – 150 W 40 – 58 W |
| Maximum Load Duration | Interrupts Automatically | | |
| Maximum Opening Time | 50 ms | 50 ms | 50 ms |
| Molded Case Switch (with High Magnetic Trip) | | | |
| Unfused kAIC at 480 Vac (415 Vac) Self-Protected, Will Trip Above:  | 65 (70) 1250 for EG125; 1600 for EG160 | 65 (70) 2500 | 65 (70) 4000/6300 |

DC Switching Duty

The EG- to LG-Frame circuit breakers are also suitable for switching dc currents.

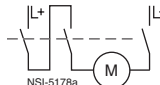
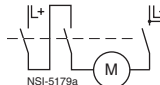
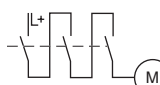
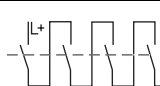
The NG- and RG-Frame circuit breakers are not suitable for dc currents due to the solid-state overcurrent release system.

For switching dc currents, however, the maximum permissible dc voltage per conducting path has to be considered.

For voltages higher than 250 volts, the series connection of two or three conducting paths is required.

As the current has to flow through all conducting paths so as to maintain the thermal tripping characteristics, the following circuit arrangements are recommended. With dc, the trip values of the instantaneous short circuit release (“n” release) are increased by 30 to 40%.

Table 45-4. For 3- and 4-Pole Circuit Breakers

| Proposed Circuit | Maximum Permissible Vdc U _e | Remarks |
|--|--|---|
|  <p>NSI-5178a</p> | 250 Vdc | Double-pole switching. If there is no risk of an earth fault, or if any earth fault which occurs is immediately eliminated (earth fault monitoring), the maximum permissible dc voltage can be 600 volts. |
|  <p>NSI-5179a</p> | 440 Vdc | Double-pole switching (earth system). The earthed pole must always be assigned to the individual conducting path, so that two paths are always in series in the event of an earth fault. |
|  <p>NSI-5180</p> | 600 Vdc | Single-pole switching (earthed system). Three conducting paths in series. The earthed pole must be assigned to the nonswitched conducting path. |
|  <p>NSI-5181</p> | 750 Vdc | Single-pole switching (earthed system). Four conducting paths in series. The earthed pole must be assigned to the nonswitched conducting path. |