

DC Miniature Circuit Breakers Ex9BP

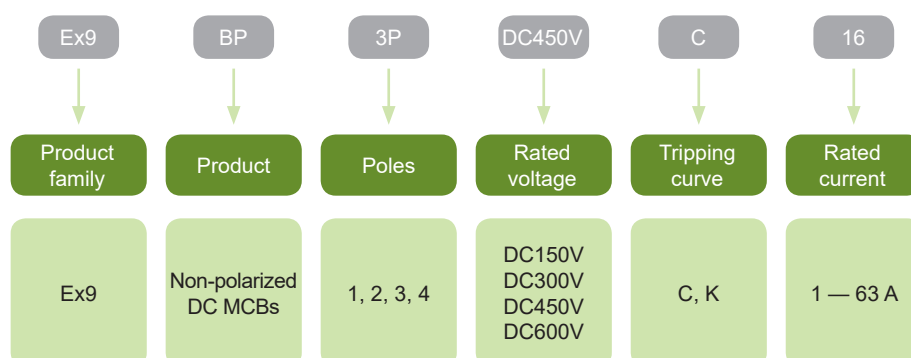


- DC Miniature Circuit Breakers
- Non-polarized, suitable for photovoltaic applications
- Tested according to IEC / EN 60947-2
- Rated short circuit breaking capacity I_{cu} 10 kA
- Rated operating voltage U_e of 150 V DC per pole
- Width 1 up to 4 modules
- Tripping characteristics C, K
- Rated current up to 63A
- Wide range of accessories

DC miniature circuit breakers Ex9BP are designed for direct current applications. Thanks to their polarity independency are suitable for photovoltaic applications.

It can be combined with wide range of accessories including auxiliary and signal contacts, shunt trip release and undervoltage release. It is possible to create diversified combination of accessories. These combinations are only limited by total number, not by the type of accessories - all components fit together. It can be used up to three units of auxiliary or alarm contacts plus up to two units for release units.

Type Key



Certification marks



DC Miniature Circuit Breakers Ex9BP

Accessories



Aux. or signal contacts
AX, AL, AXL
Up to 3 units

Voltage or trip releases
SHT, UVT
Up to 2 units

Miniature Circuit Breaker
Ex9BP
1, 2, 3, 4-module width

Auxiliary contacts AX31

Alarm contact AL3

Auxiliary and alarm contact AXL31

Shunt trip releases SHT31

Undervoltage releases UVT31

All accessories are mounted to the MCBs Ex9BP from the left. The undervoltage release UVT in PV system is intended e.g. for safe remote disconnection of DC part from installation.

DC Miniature Circuit Breakers Ex9BP

C-Characteristic, 1-pole, 150 V DC



| Rated current | Width | Char. | Article No. | Type | Packing |
|---------------|-------|-------|-------------|---------------------|----------|
| 1A | 1 MU | C | 109962 | Ex9BP 1P DC150V C1 | 1/12/144 |
| 2A | 1 MU | C | 109963 | Ex9BP 1P DC150V C2 | 1/12/144 |
| 3A | 1 MU | C | 109964 | Ex9BP 1P DC150V C3 | 1/12/144 |
| 4A | 1 MU | C | 109965 | Ex9BP 1P DC150V C4 | 1/12/144 |
| 6A | 1 MU | C | 109966 | Ex9BP 1P DC150V C6 | 1/12/144 |
| 10 A | 1 MU | C | 109967 | Ex9BP 1P DC150V C10 | 1/12/144 |
| 16 A | 1 MU | C | 109968 | Ex9BP 1P DC150V C16 | 1/12/144 |
| 20 A | 1 MU | C | 109969 | Ex9BP 1P DC150V C20 | 1/12/144 |
| 25 A | 1 MU | C | 109970 | Ex9BP 1P DC150V C25 | 1/12/144 |
| 32 A | 1 MU | C | 109971 | Ex9BP 1P DC150V C32 | 1/12/144 |
| 40 A | 1 MU | C | 109972 | Ex9BP 1P DC150V C40 | 1/12/144 |
| 50 A | 1 MU | C | 109973 | Ex9BP 1P DC150V C50 | 1/12/144 |
| 63 A | 1 MU | C | 109974 | Ex9BP 1P DC150V C63 | 1/12/144 |

C-Characteristic, 2-pole, 300 V DC



| Rated current | Width | Char. | Article No. | Type | Packing |
|---------------|-------|-------|-------------|---------------------|---------|
| 1A | 2 MU | C | 109975 | Ex9BP 2P DC300V C1 | 1/6/72 |
| 2A | 2 MU | C | 109976 | Ex9BP 2P DC300V C2 | 1/6/72 |
| 3A | 2 MU | C | 109977 | Ex9BP 2P DC300V C3 | 1/6/72 |
| 4A | 2 MU | C | 109978 | Ex9BP 2P DC300V C4 | 1/6/72 |
| 6A | 2 MU | C | 109979 | Ex9BP 2P DC300V C6 | 1/6/72 |
| 10 A | 2 MU | C | 109980 | Ex9BP 2P DC300V C10 | 1/6/72 |
| 16 A | 2 MU | C | 109981 | Ex9BP 2P DC300V C16 | 1/6/72 |
| 20 A | 2 MU | C | 109982 | Ex9BP 2P DC300V C20 | 1/6/72 |
| 25 A | 2 MU | C | 109983 | Ex9BP 2P DC300V C25 | 1/6/72 |
| 32 A | 2 MU | C | 109984 | Ex9BP 2P DC300V C32 | 1/6/72 |
| 40 A | 2 MU | C | 109985 | Ex9BP 2P DC300V C40 | 1/6/72 |
| 50 A | 2 MU | C | 109986 | Ex9BP 2P DC300V C50 | 1/6/72 |
| 63 A | 2 MU | C | 109987 | Ex9BP 2P DC300V C63 | 1/6/72 |

C-Characteristic, 3-module, 450 V DC



| Rated current | Width | Char. | Article No. | Type | Packing |
|---------------|-------|-------|-------------|---------------------|---------|
| 1A | 3 MU | C | 109988 | Ex9BP 3P DC450V C1 | 1/4/48 |
| 2A | 3 MU | C | 109989 | Ex9BP 3P DC450V C2 | 1/4/48 |
| 3A | 3 MU | C | 109990 | Ex9BP 3P DC450V C3 | 1/4/48 |
| 4A | 3 MU | C | 109991 | Ex9BP 3P DC450V C4 | 1/4/48 |
| 6A | 3 MU | C | 109992 | Ex9BP 3P DC450V C6 | 1/4/48 |
| 10 A | 3 MU | C | 109993 | Ex9BP 3P DC450V C10 | 1/4/48 |
| 16 A | 3 MU | C | 109994 | Ex9BP 3P DC450V C16 | 1/4/48 |
| 20 A | 3 MU | C | 109995 | Ex9BP 3P DC450V C20 | 1/4/48 |
| 25 A | 3 MU | C | 109996 | Ex9BP 3P DC450V C25 | 1/4/48 |
| 32 A | 3 MU | C | 109997 | Ex9BP 3P DC450V C32 | 1/4/48 |
| 40 A | 3 MU | C | 109998 | Ex9BP 3P DC450V C40 | 1/4/48 |
| 50 A | 3 MU | C | 109999 | Ex9BP 3P DC450V C50 | 1/4/48 |
| 63 A | 3 MU | C | 110000 | Ex9BP 3P DC450V C63 | 1/4/48 |

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C-Characteristic, 4-module, 600 V DC



| Rated current | Width | Char. | Article No. | Type | Packing |
|---------------|-------|-------|-------------|---------------------|---------|
| 1A | 4 MU | C | 110001 | Ex9BP 4P DC600V C1 | 1/3/36 |
| 2A | 4 MU | C | 110002 | Ex9BP 4P DC600V C2 | 1/3/36 |
| 3A | 4 MU | C | 110003 | Ex9BP 4P DC600V C3 | 1/3/36 |
| 4A | 4 MU | C | 110004 | Ex9BP 4P DC600V C4 | 1/3/36 |
| 6A | 4 MU | C | 110005 | Ex9BP 4P DC600V C6 | 1/3/36 |
| 10 A | 4 MU | C | 110006 | Ex9BP 4P DC600V C10 | 1/3/36 |
| 16 A | 4 MU | C | 110007 | Ex9BP 4P DC600V C16 | 1/3/36 |
| 20 A | 4 MU | C | 110008 | Ex9BP 4P DC600V C20 | 1/3/36 |
| 25 A | 4 MU | C | 110009 | Ex9BP 4P DC600V C25 | 1/3/36 |
| 32 A | 4 MU | C | 110010 | Ex9BP 4P DC600V C32 | 1/3/36 |
| 40 A | 4 MU | C | 110011 | Ex9BP 4P DC600V C40 | 1/3/36 |
| 50 A | 4 MU | C | 110012 | Ex9BP 4P DC600V C50 | 1/3/36 |
| 63 A | 4 MU | C | 110013 | Ex9BP 4P DC600V C63 | 1/3/36 |

DC Miniature Circuit Breakers Ex9BP

K-Characteristic, 1-pole, 150 V DC



| Rated current | Width | Char. | Article No. | Type | Packing |
|---------------|-------|-------|-------------|---------------------|----------|
| 1A | 1 MU | K | 110015 | Ex9BP 1P DC150V K1 | 1/12/144 |
| 2A | 1 MU | K | 110016 | Ex9BP 1P DC150V K2 | 1/12/144 |
| 3A | 1 MU | K | 110017 | Ex9BP 1P DC150V K3 | 1/12/144 |
| 4A | 1 MU | K | 110018 | Ex9BP 1P DC150V K4 | 1/12/144 |
| 6A | 1 MU | K | 110019 | Ex9BP 1P DC150V K6 | 1/12/144 |
| 10 A | 1 MU | K | 110020 | Ex9BP 1P DC150V K10 | 1/12/144 |
| 16 A | 1 MU | K | 110021 | Ex9BP 1P DC150V K16 | 1/12/144 |
| 20 A | 1 MU | K | 110022 | Ex9BP 1P DC150V K20 | 1/12/144 |
| 25 A | 1 MU | K | 110023 | Ex9BP 1P DC150V K25 | 1/12/144 |
| 32 A | 1 MU | K | 110024 | Ex9BP 1P DC150V K32 | 1/12/144 |
| 40 A | 1 MU | K | 110025 | Ex9BP 1P DC150V K40 | 1/12/144 |
| 50 A | 1 MU | K | 110026 | Ex9BP 1P DC150V K50 | 1/12/144 |
| 63 A | 1 MU | K | 110027 | Ex9BP 1P DC150V K63 | 1/12/144 |

K-Characteristic, 2-pole, 300 V DC



| Rated current | Width | Char. | Article No. | Type | Packing |
|---------------|-------|-------|-------------|---------------------|---------|
| 1A | 2 MU | K | 110028 | Ex9BP 2P DC300V K1 | 1/6/72 |
| 2A | 2 MU | K | 110029 | Ex9BP 2P DC300V K2 | 1/6/72 |
| 3A | 2 MU | K | 110030 | Ex9BP 2P DC300V K3 | 1/6/72 |
| 4A | 2 MU | K | 110031 | Ex9BP 2P DC300V K4 | 1/6/72 |
| 6A | 2 MU | K | 110032 | Ex9BP 2P DC300V K6 | 1/6/72 |
| 10 A | 2 MU | K | 110033 | Ex9BP 2P DC300V K10 | 1/6/72 |
| 16 A | 2 MU | K | 110034 | Ex9BP 2P DC300V K16 | 1/6/72 |
| 20 A | 2 MU | K | 110035 | Ex9BP 2P DC300V K20 | 1/6/72 |
| 25 A | 2 MU | K | 110036 | Ex9BP 2P DC300V K25 | 1/6/72 |
| 32 A | 2 MU | K | 110037 | Ex9BP 2P DC300V K32 | 1/6/72 |
| 40 A | 2 MU | K | 110038 | Ex9BP 2P DC300V K40 | 1/6/72 |
| 50 A | 2 MU | K | 110039 | Ex9BP 2P DC300V K50 | 1/6/72 |
| 63 A | 2 MU | K | 110040 | Ex9BP 2P DC300V K63 | 1/6/72 |

K-Characteristic, 3-module, 450 V DC



| Rated current | Width | Char. | Article No. | Type | Packing |
|---------------|-------|-------|-------------|---------------------|---------|
| 1A | 3 MU | K | 110041 | Ex9BP 3P DC450V K1 | 1/4/48 |
| 2A | 3 MU | K | 110042 | Ex9BP 3P DC450V K2 | 1/4/48 |
| 3A | 3 MU | K | 110043 | Ex9BP 3P DC450V K3 | 1/4/48 |
| 4A | 3 MU | K | 110044 | Ex9BP 3P DC450V K4 | 1/4/48 |
| 6A | 3 MU | K | 110045 | Ex9BP 3P DC450V K6 | 1/4/48 |
| 10 A | 3 MU | K | 110046 | Ex9BP 3P DC450V K10 | 1/4/48 |
| 16 A | 3 MU | K | 110047 | Ex9BP 3P DC450V K16 | 1/4/48 |
| 20 A | 3 MU | K | 110048 | Ex9BP 3P DC450V K20 | 1/4/48 |
| 25 A | 3 MU | K | 110049 | Ex9BP 3P DC450V K25 | 1/4/48 |
| 32 A | 3 MU | K | 110050 | Ex9BP 3P DC450V K32 | 1/4/48 |
| 40 A | 3 MU | K | 110051 | Ex9BP 3P DC450V K40 | 1/4/48 |
| 50 A | 3 MU | K | 110052 | Ex9BP 3P DC450V K50 | 1/4/48 |
| 63 A | 3 MU | K | 110053 | Ex9BP 3P DC450V K63 | 1/4/48 |

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K-Characteristic, 4-module, 600 V DC



| Rated current | Width | Char. | Article No. | Type | Packing |
|---------------|-------|-------|-------------|---------------------|---------|
| 1A | 4 MU | K | 110054 | Ex9BP 4P DC600V K1 | 1/3/36 |
| 2A | 4 MU | K | 110055 | Ex9BP 4P DC600V K2 | 1/3/36 |
| 3A | 4 MU | K | 110056 | Ex9BP 4P DC600V K3 | 1/3/36 |
| 4A | 4 MU | K | 110057 | Ex9BP 4P DC600V K4 | 1/3/36 |
| 6A | 4 MU | K | 110058 | Ex9BP 4P DC600V K6 | 1/3/36 |
| 10 A | 4 MU | K | 110059 | Ex9BP 4P DC600V K10 | 1/3/36 |
| 16 A | 4 MU | K | 110060 | Ex9BP 4P DC600V K16 | 1/3/36 |
| 20 A | 4 MU | K | 110061 | Ex9BP 4P DC600V K20 | 1/3/36 |
| 25 A | 4 MU | K | 110062 | Ex9BP 4P DC600V K25 | 1/3/36 |
| 32 A | 4 MU | K | 110063 | Ex9BP 4P DC600V K32 | 1/3/36 |
| 40 A | 4 MU | K | 110064 | Ex9BP 4P DC600V K40 | 1/3/36 |
| 50 A | 4 MU | K | 110065 | Ex9BP 4P DC600V K50 | 1/3/36 |
| 63 A | 4 MU | K | 110066 | Ex9BP 4P DC600V K63 | 1/3/36 |

Technical Data Ex9BP

DC Miniature Circuit Breakers up to 63 A

General parameters

Non-polarized, suitable for general DC as well as Photovoltaic applications

Accessories

| | | |
|--|-------------------------|---|
| Auxiliary contacts | AX3111, AX3122 | 100540, 100542 |
| Alarm contact | AL3111 | 100541 |
| Auxiliary and alarm contact | AXL31 | 100543 |
| Shunt trip releases | SHT31, SHT3111 | 100544-100546, 100547-100549 |
| Undervoltage releases | UVT31, UVT3101, UVT3110 | 100550-100551, 100552-100553, 100554-100555 |
| Max. number of installed accessories is 3 pcs of one contact units (AX3111, AL3111) or 2 pcs of two contact units (AX3122, AXL31) and 2 pcs of releases (SHT31, UVT31) | | |

Electrical parameters

| | |
|---|---|
| Tested according to | IEC / EN 60947-2 |
| Rated operating voltage U_e | 150 (1P), 300 (2P), 450 (3P), 600 (4P) V DC |
| Rated breaking capacity I_{cu} | 10 kA |
| Rated current I_n | 1 — 63 A |
| Tripping characteristics | C, K |
| Rated impulse withstand voltage U_{imp} | 4 kV |
| Rated insulation voltage U_i | 1 000 V DC |
| Mechanical service life | 20 000 operation cycles |
| Electrical service life | 2 500 operation cycles |
| Line voltage connection | arbitrary above or below |

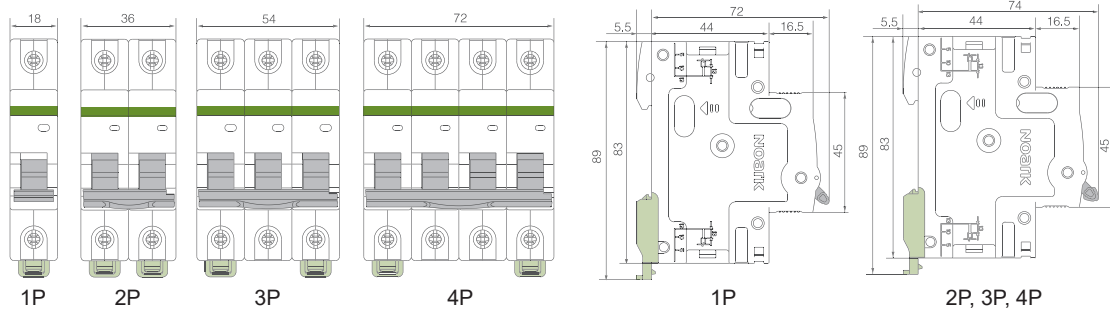
Mechanical parameters

| | |
|---------------------------------|---|
| Device width | 18 mm (per pole/module) |
| Device height | 83 mm (89 mm including rail clip) |
| Frame size | 45 mm |
| Mounting | easy fastening onto 35 mm device rail (DIN) |
| Degree of protection | IP40, IP20 terminals |
| Terminals | combined lift + open mouthed |
| Terminal capacity | 1 — 35 mm ² |
| Fastening torque of terminals | 3.5 Nm |
| Busbar thickness | 0.8 — 2 mm |
| Ambient temperature | -35 — +70 °C |
| Altitude | ≤ 2 000 m |
| Relative humidity | ≤ 95 % at 20°C, ≤ 50 % at 40°C |
| Resistance to humidity and heat | class 2 |
| Pollution degree | 3 |
| Installation class | III |
| Weight | 0.12 kg (per pole/module) |

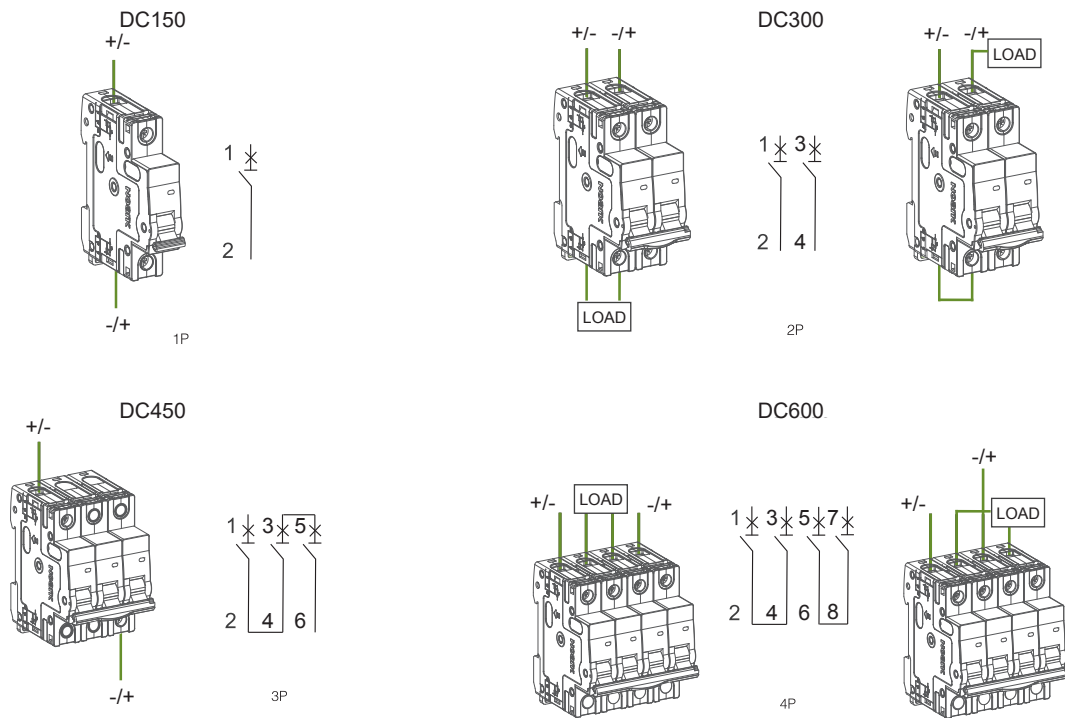
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DC Miniature Circuit Breakers up to 63 A

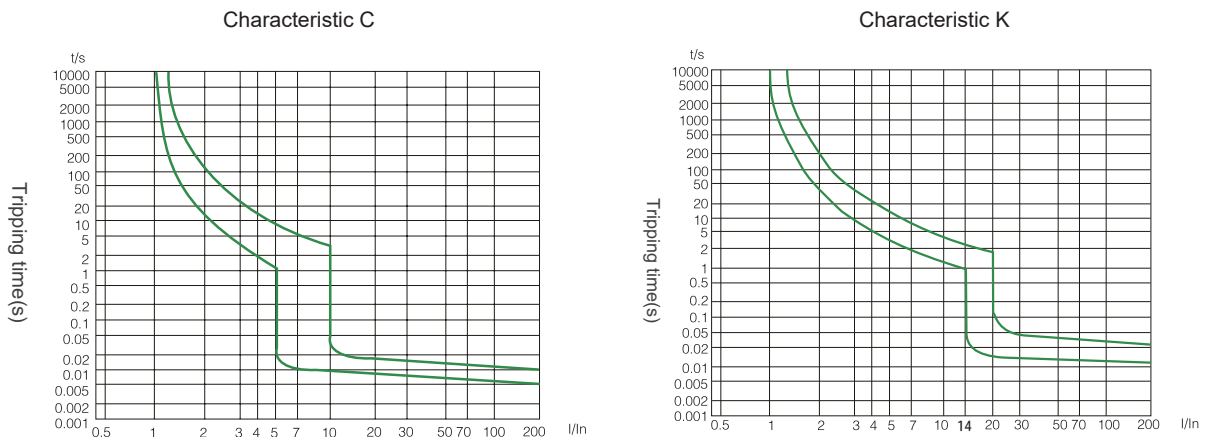
Dimensions



Wiring diagrams



Tripping characteristics



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DC Miniature Circuit Breakers up to 63 A

Dependence of tripping characteristics on ambient temperature

| T [°C] | I _n (T) [A] | | | | | | | | | | | | |
|-----------|------------------------|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| | 1A | 2A | 3A | 4A | 6A | 10 A | 16 A | 20 A | 25 A | 32 A | 40 A | 50 A | 63 A |
| -20 | 1.2 | 2.4 | 3.6 | 4.8 | 7.3 | 13.5 | 20.0 | 24.5 | 29.8 | 39.5 | 50.5 | 60.0 | 77.5 |
| -15 | 1.2 | 2.4 | 3.5 | 4.8 | 7.2 | 13.3 | 19.8 | 24.3 | 29.7 | 39.3 | 50.4 | 59.8 | 76.3 |
| -10 | 1.2 | 2.3 | 3.5 | 4.7 | 7.1 | 13.0 | 19.5 | 24.0 | 29.5 | 39.0 | 50.2 | 59.5 | 75.0 |
| -5 | 1.2 | 2.3 | 3.4 | 4.7 | 7 | 12.7 | 19.2 | 23.8 | 29.3 | 38.8 | 50.0 | 59.2 | 73.0 |
| 0 | 1.1 | 2.2 | 3.4 | 4.5 | 6.8 | 12.5 | 19.1 | 23.7 | 29.2 | 38.6 | 48.8 | 59.0 | 71.8 |
| 5 | 1.1 | 2.2 | 3.3 | 4.4 | 6.6 | 12.3 | 18.8 | 23.5 | 29.0 | 38.4 | 48.6 | 58.8 | 70.6 |
| 10 | 1.1 | 2.1 | 3.3 | 4.3 | 6.5 | 12.1 | 18.6 | 23.3 | 28.8 | 38.2 | 48.4 | 56.5 | 69.0 |
| 15 | 1.1 | 2.1 | 3.2 | 4.3 | 6.4 | 12.0 | 18.5 | 23.1 | 28.6 | 38.0 | 48.1 | 55.0 | 67.5 |
| 20 | 1 | 2.1 | 3.2 | 4.2 | 6.3 | 11.8 | 18.3 | 22.8 | 28.4 | 37.8 | 47.8 | 54.5 | 66.2 |
| 25 | 1 | 2 | 3 | 4.1 | 6.2 | 11.5 | 18.0 | 22.6 | 28.2 | 37.5 | 47.0 | 52.5 | 64.5 |
| 30 | 1 | 2 | 3 | 4 | 6 | 10 | 16 | 20 | 25 | 32 | 40 | 50 | 63 |
| 35 | 0.99 | 2 | 3 | 3.9 | 5.9 | 9.9 | 15.7 | 19.7 | 24.6 | 31.5 | 39.2 | 48.8 | 61.5 |
| 40 | 0.97 | 1.9 | 2.9 | 3.9 | 5.8 | 9.8 | 15.4 | 19.3 | 24.3 | 31.1 | 38.8 | 47.0 | 58.7 |
| 45 | 0.95 | 1.9 | 2.8 | 3.8 | 5.7 | 9.8 | 15.1 | 18.8 | 24.0 | 30.8 | 38.3 | 45.5 | 55.8 |
| 50 | 0.93 | 1.9 | 2.8 | 3.7 | 5.6 | 9.6 | 14.9 | 18.5 | 23.8 | 30.1 | 38.0 | 44.0 | 53.5 |
| 55 | 0.91 | 1.8 | 2.8 | 3.6 | 5.5 | 9.5 | 14.7 | 18.2 | 23.5 | 29.5 | 36.5 | 42.5 | 51.7 |
| 60 | 0.91 | 1.8 | 2.7 | 3.5 | 5.4 | 9.0 | 14.5 | 17.8 | 23.0 | 28.5 | 35.0 | 41.5 | 49.2 |
| 65 | 0.91 | 1.8 | 2.7 | 3.5 | 5.3 | 8.6 | 14.0 | 17.5 | 22.0 | 27.5 | 34.0 | 40.5 | 47.9 |
| 70 | 0.91 | 1.8 | 2.7 | 3.5 | 5.3 | 8.0 | 13.8 | 17.3 | 21.5 | 27.0 | 32.5 | 38.0 | 46.8 |

Power loss per pole

| I _n [A] | 1 A | 2 A | 3 A | 4 A | 6 A | 10 A | 16 A | 20 A | 25 A | 32 A | 40 A | 50 A | 63 A |
|--------------------|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| P [W] | 1.5 | 2.0 | 1.8 | 2.0 | 2.2 | 1.5 | 1.8 | 2.0 | 2.2 | 2.6 | 2.9 | 3.8 | 4.4 |