Technical Catalogue

# Heavy Duty Circuit Breakers S500

# Heavy Duty Circuit Breakers S500
## General

The ever increasing demand for energy is causing an ever increasing number of short-circuit currents across low voltage electrical networks. This places high demands on the protective switch-gear with regard to safety, reliability and switching capacity.

The Heavy Duty Circuit Breaker S500 satisfies these requirements by virtue of its special technical features.
It is provided with thermal and/or electromagnetic trip functions to protect circuits, motors, equipment and systems from the results of overload and short-circuit currents.

## Major features

- High rated breaking capacities, up to 30/50 kA
- High rated operating voltage 400/690 VAC, 750 VDC
- Energy and current limiting interruption
- Extremely short breaking time
- Optimum selectivity
- Reliable switching and contact position indication
- Numerous versions for special applications
- Compact dimensions, DIN cap size
- Wide range of accessories, including undervoltage and shunt trip, auxiliary and signal contacts

## Various fields of application

**Railway**

**Commercial building**

**Offshore**

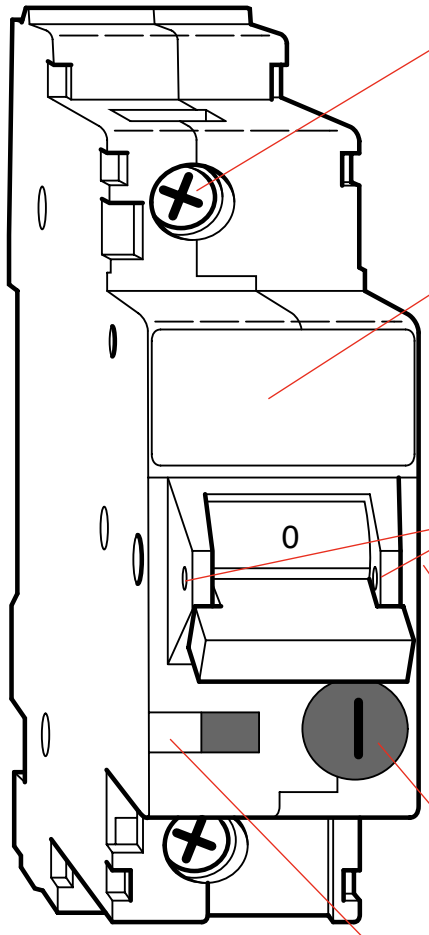
**Ships**

**Process industry**

**Rail, tram**

# Heavy Duty Circuit Breakers S500
## Contents

## Fixed version




**Connection**
All units are supplied with open terminals. The terminals have captive plus/minus screws. The terminals can be fitted with various, fully-proven wiring systems for power supply input. IP40 terminal covers to insulate the connection terminals are available as accessories.

**Nameplate**
Data for all important information at a glance on the front of the device.

| | |
|---|---|
| Type designation: | S500 |
| Rated voltage: | 400/690 VAC, 750V DC |
| Rated insulation voltage: | 690 VAC |
| Rated breaking capacity $I_{cu}$ per IEC 60947-2: | 50 kA |

**Sealing and locking devices**
A prepared retainer permits simple attachment of a lockout device or seal in the ON or OFF position.

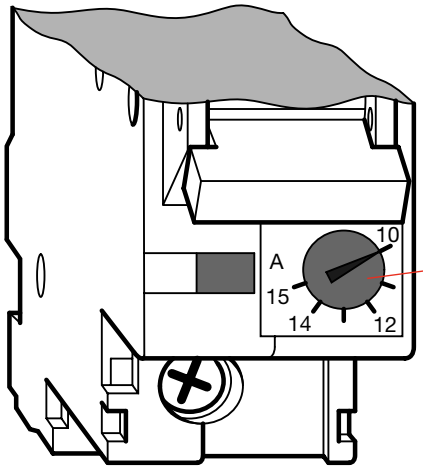
**Data plate (side mounted)**
The Heavy Duty Circuit Breakers have been subjected to many short-circuit, insulation, heating and endurance tests at independent test centres and at the ABB Schweiz AG, CMC Low Voltage Products internal test laboratory and have been approved by the authorities mentioned.

**Release knob**
(Not for adjustable types)
The breaker can be tripped locally by turning the grey release knob on the line and switched neutral poles. The knob must be reset before the breaker can be closed again.

**Position indicator**
The breaker has a reliable switching position and contact indicator in accordance with IEC 60947-2:
Position "ON"; "I" = red
Contacts closed

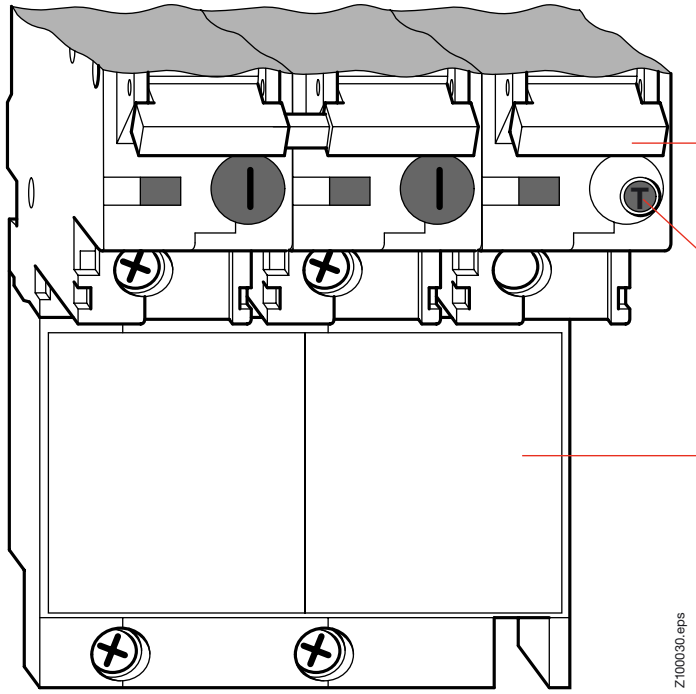
Position "OFF"; "0" = green
Contacts open
Contacts open after manual operation or trip by overload, short-circuit, residual current, shunt trip or undervoltage trip.

## Adjustable version




**Rated current setting**
The rated current is adjustable between 70 % and 100 % of the max. rated value.

## RCD protection version



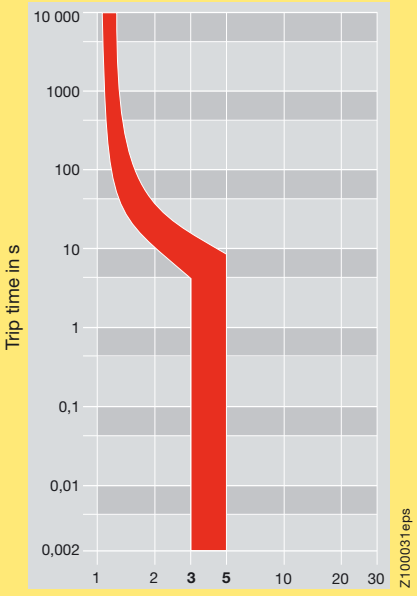
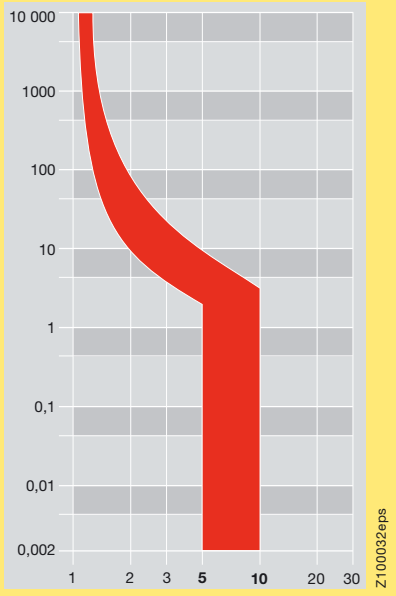

**RCD reset lever**
This lever moves down following a residual current trip. It being reclosed, it must be reset to the up position.

**Test button for RCD protection**
Test button T can be used to simulate a residual current for checking the function of the RCD protection. This check should be performed upon commissioning and regularly thereafter.

**RCD connection diagram and data plate**
Display of RCD-specific data.

**RC-signal contact T10**
See the Chapter on Accessories: Factory-fitted.

# Heavy Duty Circuit Breakers S500
## Application

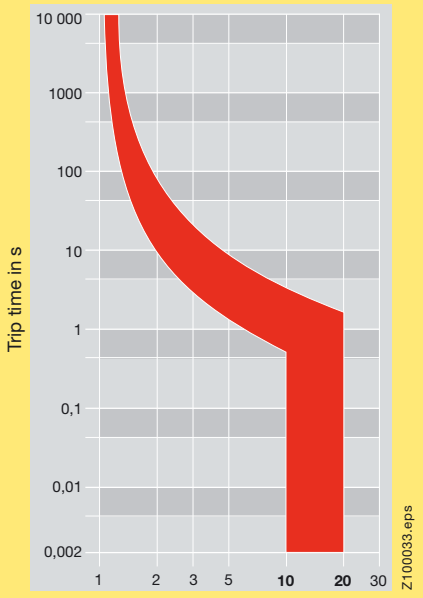
| Characteristic | Circuit protection S500-B | Circuit protection S500-C |
|---|---|---|
| | Miniature circuit breaker for circuits supplying electrical equipment which generates minimal or no inrush currents (boilers, electric heaters, stoves). | A "standard" miniature circuit breaker for circuits supplying electrical equipment that generate inrush currents such as inductive equipment (TV sets, fluorescent lights, gas discharge lamps) and socket outlets. |
| |  40037 |  40101 |
| Trip characteristic |   |   |
| Characteristic | **B** | **C** |
| Thermal trip | 1.13...1.45 x$I_n$ | 1.13...1.45 x$I_n$ |
| Electromagnetic trip | 3...5 x$I_n$ | 5...10 x$I_n$ |
| Ref. calibration temperature | 30 °C | 30 °C |

**On request**
General technical data and trip characteristics: 10134/B

# Heavy Duty Circuit Breakers S500
## Application

### Circuit protection S500-D

A miniature circuit breaker for circuits supplying electrical equipment generating very high inrush currents (transformers, capacitor banks).
A miniature circuit breaker for the protection of upstream breakers (input overcurrent breakers).
A miniature circuit breaker for the protection of upstream breakers with low breaking capacities (back-up protection).


Multiple of rated current $I_n$

**D**

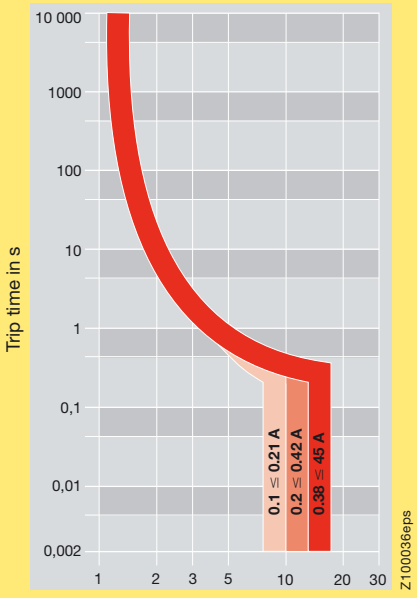
1.13...1.45 x$I_n$

10...20 x$I_n$

30 °C

### Motor protection S500-K

Circuit breaker for protection of single-phase and three-phase motors.
For installation in unfused Motor Control Centres (MCC).
As a circuit breaker with adjustable rated trip current, e.g. for transformers.


Multiple of rated current $I_n$

**K**

1.05...1.2 x$I_n$

< 0.21 A: 8...10 x$I_n$
< 0.42 A: 10...12 x$I_n$
> 0.38 A: 12...14 x$I_n$

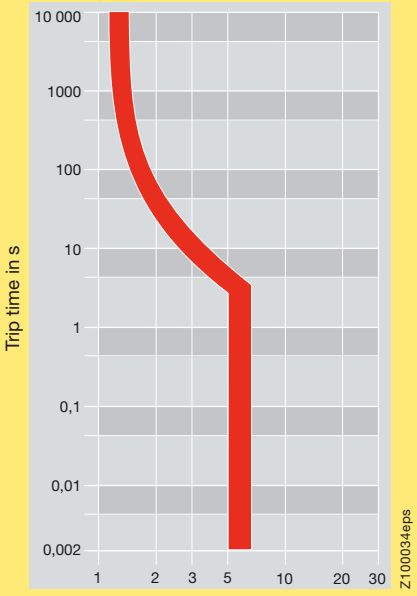
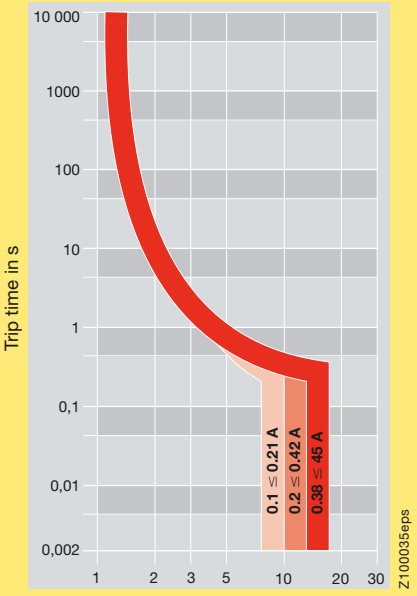
40 °C

### Special S500X

Circuit breaker with selectable characteristics based on customer-specific data, for AC and DC systems.
- Adapting the trip for optimised equipment protection
- High electromagnetic trip setting for large inrush currents
- Low electromagnetic trip setting for optimised generator protection
- Protection of semiconductors (thyristors, diodes)


Corresponding to a special application

# Heavy Duty Circuit Breakers S500
## Application

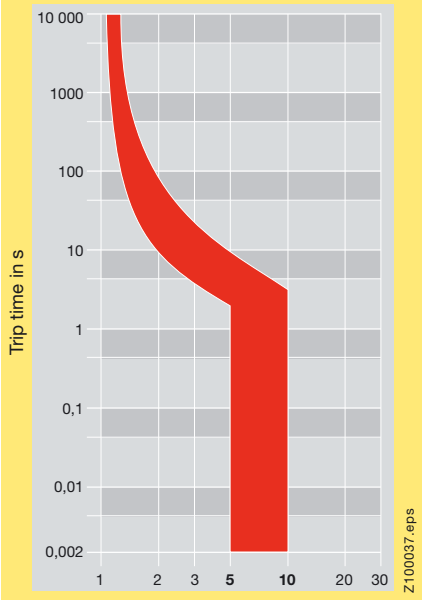
| Characteristic | DC circuit protection S500UC-B | DC circuit protection S500UC-K |
|---|---|---|
| | A miniature circuit breaker for circuits and electrical equipment in DC networks and DC powered vehicles. | A miniature circuit breaker for circuits and electrical equipment in DC networks and DC powered vehicles. |
| | Fixed rated current | Adjustable rated current |
| |  40042 |  40041 |
| Trip characteristic |   Multiple of rated current $I_n$ |   Multiple of rated current $I_n$ |
| Characteristic | **UC-B** | **UC-K** |
| Thermal trip | 1.13...1.45 x$I_n$ | 1.05...1.2 x$I_n$ |
| Electromagnetic trip | 5...7 x$I_n$ (DC) | < 0.21 A: 8...10 x$I_n$ (DC)<br>< 0.42 A: 10...12 x$I_n$ (DC)<br>> 0.38 A: 12...14 x$I_n$ (DC) |
| Ref. calibration temperature | 30° C | 40 °C |

**On request**
General technical data and trip characteristics: 10134/B

# Heavy Duty Circuit Breakers S500
## Application

### RCD protection F500-C

Combination circuit breaker with circuit protection characteristic and integral RCD protection
$I_{\Delta n}$ = 10 mA, 30 mA, 300 mA
Short delay version $I_{\Delta n}$ = 30 mA G
Selective version $I_{\Delta n}$ = 300 mA S
The Heavy Duty Circuit Breaker F500 protects against the consequences of
- overload and short-circuits
- dangerous residual currents
- direct contact with an active conductor


**C**

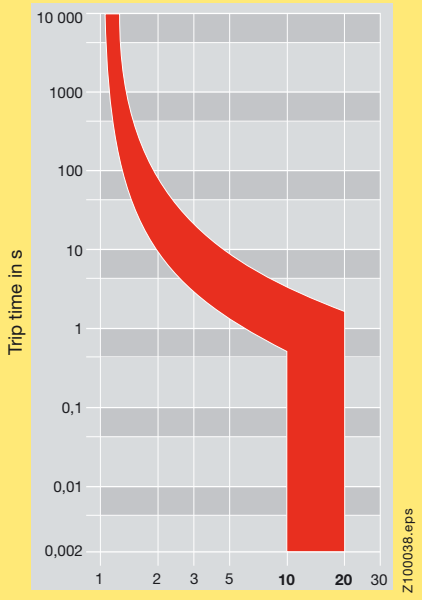
1.13...1.45 x$I_n$

5...10 x$I_n$

30 °C

### RCD protection F500-D

Combination circuit breaker with circuit protection characteristic and integral RCD protection
$I_{\Delta n}$ = 30 mA, 300 mA
Short delay version $I_{\Delta n}$ = 30 mA G
Selective version $I_{\Delta n}$ = 300 mA S
The Heavy Duty Circuit Breaker F500 protects against the consequences of
- overload and short-circuits
- dangerous residual currents
- direct contact with an active conductor


**D**

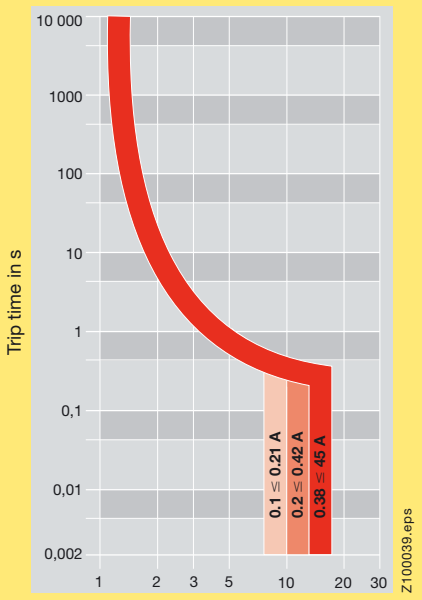
1.13...1.45 x$I_n$

10...20 x$I_n$

30 °C

### RCD protection F500-K

Combination circuit breaker with motor protection characteristic and integral RCD protection
$I_{\Delta n}$ = 10 mA, 30 mA, 300 mA
Short delay version $I_{\Delta n}$ = 30 mA G
The Heavy Duty Circuit Breakers F500 protect against the effects of
- overload and short-circuits
- dangerous residual currents
- direct contact with an active conductor


**K**

1.05...1.2 x$I_n$

< 0.21 A: 8...10 x$I_n$
< 0.42 A: 10...12 x$I_n$
> 0.38 A: 12...14 x$I_n$

40 °C

# Heavy Duty Circuit Breakers S500
## Technical Data

| | Circuit protection S500-B, S500-C, S500-D | | Motor protection S500-K | | | |
|---|---|---|---|---|---|---|
| Number of poles: | 1, 2, 3 + N[1], NA[2], 4 | | 1, 2, 3 + N[1], NA[2] | | | |
| Rated current $I_n$ | | | | | | |
| - fixed | 6...63 A | | - | | | |
| - adjustable: | - | | 0.1...45 A | | | |
| Rated residual current $I_{\Delta n}$: | - | | - | | | |
| Max. rated operating voltage $U_e$: | 400/690 VAC | | 400/690 VAC | | | |
| Rated insulation voltage $U_i$: | 690 VAC | | 690 VAC | | | |
| Rated impulse withstand voltage $U_{imp}$ (1, 2/50 µs): | 6 kV | | 6 kV | | | |
| Impulse current withstand (8/20 µs): | - | | - | | | |
| Rated breaking capacity according to EN 60898: | $I_{cn}$[3] | $I_{cs}$[4] | - | | | |
| 230/400 VAC: | 25 kA | 12.5 kA | | | | |
| Rated breaking capacity according to IEC60947-2: | | | 0.1…3 A : 100 kA $I_{cu} = I_{cs}$ | | | |
| | | | 2.8 …11 A: | | 10…45 A: | |
| single pole/multiple pole | $I_{cu}$[5] | $I_{cs}$ | $I_{cu}$ | $I_{cs}$ | $I_{cu}$ | $I_{cs}$ |
| 230/400 VAC: | 50 kA | 25 kA | 50 kA | 30 kA | 30 kA | 25 kA |
| 250/440 VAC: | 30 kA | 22 kA | 30 kA | 22 kA | 25 kA | 22 kA |
| 3 x 500 VAC: | 15 kA | 11 kA | 20 kA | 15 kA | 15 kA | 11 kA |
| 400/690 VAC: | 6 kA | 3 kA | 6 kA | 3 kA | 6 kA | 3 kA |
| Rated breaking capacity according to UL1077 and CSA: | ≤ 25 A | > 25 A...63 A | ≤ 25 A | > 25 A...45 A | | |
| single pole/multiple pole | $I_{cc}$[6] | $I_{cc}$ | $I_{cc}$ | $I_{cc}$ | | |
| 240/415 VAC: | 30 kA | 18 kA | 30 kA | 18 kA | | |
| 277/480 VAC: | 14 kA | 14 kA | 14 kA | 14 kA | | |
| 346/600 VAC: | 6 kA | 6 kA | 6 kA | 6 kA | | |
| 250 VDC L/R 15 ms (1-pole) | - | - | - | - | | |
| 500 VDC L/R 15 ms (2-pole) | - | - | - | - | | |
| 750 VDC L/R 15 ms (3-pole) | - | - | - | - | | |
| 750 VDC L/R 15 ms (4-pole) | - | - | - | - | | |
| Rated frequency: | 50/60 Hz<br>16⅔ Hz on request<br>> 60...400 Hz on request | | 50/60 Hz<br>16⅔ Hz on request | | | |
| Permissible ambient temperature: | – 25 °C… + 55 °C | | – 25 °C … + 55 °C | | | |
| Climatic resistance: | DIN 50016 | | DIN 50016 | | | |
| Current limitation at $I_K$ 30 kA: | Î < 8,000 A | | Î < 8,000 A | | | |
| Total short-circuit breaking time: | max. 2.5 ms at $I_K$ 30 kA | | max. 2.5 ms at $I_K$ 30 kA | | | |
| Mechanical endurance: | > 20,000 switching cycles | | > 20,000 switching cycles | | | |
| Protection class: | IP20 | | IP20 | | | |
| Isolator capability according to ICE 60947-3: | yes | | yes | | | |
| Mounting position: | any | | any | | | |
| Line connection: | Top/bottom | | Top/bottom | | | |
| Wire size range: | 1...25 mm² | | 1...25 mm² | | | |
| Screw tightening torque: | 2.5 Nm | | 2.5 Nm | | | |
| Approvals: | electrosuisse (SEV),<br>ÖVE, cUR, UR<br>Lloyd's Register of Shipping<br>RINA – Registro Italiano Navale,<br>DNV – Det Norske Veritas, CCC, GOST | | ÖVE, cUR, UR,<br>Lloyd's Register of Shipping,<br>DNV – Det Norske Veritas,<br>CCC, GOST | | | |
| Standards, regulations: | EN 60898, IEC 60947-2,<br>UL1077, CE-compliant | | UL1077, IEC 60947-2<br>CE compliant | | | |

[1] N: for separating neutral conductor, see page 34
[2] NA: for switched neutral conductor, see page 34
[3] $I_{cn}$: rated short-circuit breaking capacity
[4] $I_{cs}$: rated service short-circuit breaking capacity
[5] $I_{cu}$: rated critical short-circuit breaking capacity
[6] $I_{cc}$: short-circuit current

# Heavy Duty Circuit Breakers S500
## Technical Data

| Motor protection S500-KM | Motor protection S500X-AG0084 | CD circuit protection S500UC-B, S500UC-K | RCD protection F500-C, F500-D F500-K |
|---|---|---|---|
| 3 + N[1)] | 3 + N[1)] | 1, 2, 3, 4 | 2, 3, 4 |
| 1.6...75 A<br>- | 1.6...63 A<br>- | UC-B: 6...63 A<br>UC-K: 0.1...45 A | F500-C, -D: 10...63 A<br>F500-K: 0.28...45 A |
| - | - | - | 0.01/0.03/0.3 A<br>Short delay version: 0.03 A G<br>Selective version: 0.3 A S |
| 415 VAC | 690 VAC | per pole 250 VDC/three poles in series<br>max. 750 VDC + 20 % | 230 VAC, 400 VAC,<br>500 VAC, 690 VAC |
| 690 VAC | 690 VAC | 1000 VDC | 690 VAC |
| 6 kV | 6 kV | 6 kV | - |
| - | - | - | see page 16 |
| - | - | - | as S500-C, D or K |
| $I_{cu}$ $I_{cs}$<br>25 kA 12.5 kA | $I_{cu}$ $I_{cs}$<br>50 kA 25 kA<br>30 kA 22 kA<br>15 kA 11 kA<br>6 kA 3 kA | -<br>-<br>-<br>- | as S500-C, D or K |
| -<br>-<br>- | -<br>-<br>- | -<br>-<br>- | -<br>-<br>- |
| | | UL1077+CSA IEC 60497-2 | |
| -<br>-<br>-<br>- | -<br>-<br>-<br>- | 30 kA 30 kA<br>30 kA 30 kA<br>30 kA 30 kA<br>30 kA 30 kA | -<br>-<br>-<br>- |
| 50/60 Hz<br>16⅔ Hz on request | 50/60 Hz<br>16⅔ Hz on request | - | 50/60 Hz<br>16⅔ Hz on request<br>400 Hz on request |
| – 25 °C … + 55 °C | – 25 °C … + 55 °C | – 25 °C … + 55 °C | – 25 °C … + 40 °C |
| DIN 50016 | DIN 50016 | DIN 50016 | IEC68-2-30 |
| - | $\hat{I} < 8{,}000$ A | $\hat{I} < 3{,}500$ A | $\hat{I} < 8{,}000$ A |
| max. 3 ms at IK 25 kA | max. 2.5 ms at IK 30 kA | 4 ms at $I_K$ 30 kA | max. 2.5 ms at $I_K$ 30 kA |
| > 20,000 switching cycles | > 20,000 switching cycles | > 20,000 switching cycles | > 10,000 switching cycles |
| IP20 | IP20 | IP20 | IP20 |
| yes | yes | yes | yes |
| any | any | any | any |
| Top/bottom | Top/bottom | Top/bottom | Top/bottom |
| 1...25 mm² | 1...25 mm² | 1...25 mm² | 1...25 mm² |
| 2.5 Nm | 2.5 Nm | 2.5 Nm | 2.5 Nm |
| GOST | - | electrosuisse (SEV), CCC, GOST | - |
| IEC 60947-2<br>CE compliant | IEC 60947-2<br>CE compliant | UL1077, IEC 60947-2<br>CE compliant | IEC 60947-2, Annex<br>CE compliant |

## RCD protection
## DDA

| | | | DDA 560 | DDA 570 | DDA 590 |
|---|---|---|---|---|---|
| Standards | | IEC/EN | 61009 | 61009 | 61009 |
| | | IEC/EN | 60947-2 Annex B | 60947-2 Annex B | 60947-2 Annex B |
| Sensitivity | | | AC | A | A (selective) |
| Rated current $I_n$ | | A | 63 | 63 | 63 |
| Number of poles | | | 2P, 3P, 4P | 2P, 3P, 4P | 4P |
| Rated operating voltage $U_e$ | | V | 230/400 | 230/400 | 230/400 |
| Isolation voltage $U_i$ | | V | 690 | 690 | 690 |
| Max. rated operating voltage | | V | 440 | 440 | 440 |
| Min. rated operating voltage | | V | 195 | 195 | 195 |
| Rated breaking capacity according to IEC/EN 61009 | | A | dependent on rated breaking capacity of the MCB | | |
| Rated breaking capacity according to IEC/EN 60947-2 | | A | dependent on rated breaking capacity of the MCB | | |
| Rated breaking capacity $I_m$ with Q | | kA | 50 | 50 | 50 |
| Rated withstand voltage $U_{imp}$ | | kV | 5 | 5 | 5 |
| Rated frequency | | Hz | 50…60 | 50…60 | 50…60 |
| Rated residual current $I_n$ | | A | 0.03–0.3 | 0.03–0.3 | 0.03–0.5 – 1 |
| Characteristic | Characteristic AC | | 0.5…1 $I_n$ | 0.5…1 $I_n$ | 0.5…1 $I_n$ |
| | Characteristic A | | 0.11…1.4 $I_n$ | 0.11…1.4 $I_n$ | 0.11…1.4 $I_n$ |
| Trip time | at $I_n$ | ms | < 220 | < 220 | 130…500 |
| | 2 $I_n$ | ms | < 80 | < 80 | 60…200 |
| | 5 $I_n$ | ms | < 40 | < 40 | 50…150 |
| | 500 A | ms | < 40 | < 40 | 40…150 |
| Electrical endurance (switching cycles) | | | 10,000 | 10,000 | 10,000 |
| Mechanical endurance (switching cycles) | | | 20,000 | 20,000 | 20,000 |
| Protection class | Housing | | IP4X (without terminal area) | IP4X (without terminal area) | IP4X (without terminal area) |
| | Terminal | | IP2X | IP2X | IP2X |
| Permissible ambient temperature | | °C | – 25…+ 55 | – 25…+ 55 | – 25…+ 55 |
| Storage temperature | | °C | – 25…+ 70 | – 25…+ 70 | – 25…+ 70 |
| Connectable wire size | | $mm^2$ | 25 | 25 | 25 |
| Mounting | | | on DIN rails EN 50022 (35 mm) | | |
| Dimensions H | 2P | mm | 44 | 44 | 44 |
| 97.5 x D 80.5 x W | 3P/4P | mm | 79 | 79 | 79 |
| Weight | 2P | g | 250 | 250 | 250 |
| | 3P/4P | g | 325/390 | 325/390 | 325/390 |

*Other voltages and special versions are available on request

## Auxiliary and signal contact AUX/ALT

| | | |
|---|---|---|
| IEC 60947-5-1 | | |
| Rated current $I_{th}$: | | 6 A |
| Max. rated operating voltage $U_e$: | | 690 VAC |
| Rated breaking capacity | AC-15:[1] | 2 A, 230 VAC<br>1 A, 400 VAC |
| | DC-13:[2] | 0.5 A, 250 VDC |
| | AC-1[3] (IEC 60947-4): | 6 A, 400 VAC |
| Rated current $I_{th}$: | | 6 A |
| Max. rated operating voltage $U_e$: | | 480 VAC |
| Rated breaking capacity STD pilot duty: | | 3 A, 120 VAC<br>1.5 A, 240 VAC<br>0.75 A, 480 VAC |
| General use: | | 6 A, 480 VAC<br>0.5 A, 125 VDC |
| Minimum values: | | 10 mA /12 VDC |
| Wire size range: | | 2 x 2.5 mm² solid, 2 x 1.5 mm² flexible with core end sleeves, terminal screws Pozidrive size 2 |
| Screw tightening torque: | | 0.8 Nm |
| Approvals: | | electrosuisse (SEV), cUR, UR, CCC |
| Standards, regulations: | | IEC 60947, UL1077, CE-compliant |
| | | For terminal designations, see page 35 |

## RCD trip signal contact T10

| |
|---|
| IEC 60947-5-1 |
| 6 A |
| 690 VAC |
| 2 A, 230 VAC<br>1 A, 400 VAC |
| 0.5 A, 250 VDC |
| 6 A, 400 VAC |
| |
| |
| |
| |
| 10 mA /24 VDC |
| 1…25 mm² |
| 2.5 Nm |
| - |
| IEC 60947, CE-compliant |
| For terminal designations, see page 34 |

## Undervoltage trip UA

| | |
|---|---|
| Rated voltages $U_n$: | 24, 110, 230, 400 V AC<br>24, 110, 230, 400 V DC |
| Operating range: | |
| - dropout | 35–70 % $U_n$ |
| - pickup | 80 % $U_n$ |
| Power consumption (holding power): | max. 3.5 VA, 3.5 W |
| Wire size range: | 1…25 mm² |
| Screw tightening torque: | 2.5 Nm |
| Approvals: | electrosuisse (SEV), cUR, UR, CCC |
| Standards, regulations: | IEC 60947, UL1077, CE compliant |
| | For terminal designation, see page 34 |

## Shunt trip AL

| | |
|---|---|
| Rated voltages $U_n$: | 24, 110, 230, 400 V AC/DC |
| Operating range: | 50–110 % $U_n$ |
| Power consumption:<br>(transient pickup power; coil interrupted on trip) | max. 130 VA, 120 W |
| Wire size range: | 1…25 mm² |
| Screw tightening torque: | 2.5 Nm |
| Approvals: | electrosuisse (SEV), cUR, UR, CCC |
| Standards, regulations: | IEC 60947, UL1077, CE compliant |
| | For terminal designation, see page 34 |

[1] AC-15: control of electromagnetic load (higher than 72 VA)
[2] DC-13: control of resistive and semiconductor loads in input circuits
[3] AC-1: resistive 3-phase load

# Heavy Duty Circuit Breakers S500
# Technical Data
## power dissipation/internal resistance per pole

## Fixed version

| Rated current | S500-B S500-C S500UC-B | Power loss | S500-D | Power loss | Rated current | S500-KM | Power loss |
|---|---|---|---|---|---|---|---|
| $I_n$ (A) | $R_i$ (Ω) | $P_v$ (W) | $R_i$ (Ω) | $P_v$ (W) | $I_n$ (A) | $R_i$ (Ω) | $P_v$ (W) |
| 6 | 0.0550 | 1.98 | - | - | 1.6 | 0.018 | 0.05 |
| 10 | 0.0152 | 1.52 | 0.0200 | 2.00 | 2.5 | 0.018 | 0.11 |
| 13 | 0.0120 | 2.03 | 0.0100 | 1.69 | 4 | 0.009 | 0.14 |
| 16 | 0.0084 | 2.15 | 0.0071 | 1.82 | 6 | 0.009 | 0.32 |
| 20 | 0.0065 | 2.60 | 0.0050 | 2.00 | 9 | 0.009 | 0.65 |
| 25 | 0.0045 | 2.81 | 0.0035 | 2.19 | 20 | 0.0045 | 1.80 |
| 32 | 0.0035 | 3.58 | 0.0030 | 3.07 | 32 | 0.0018 | 1.84 |
| 40 | 0.0021 | 3.36 | 0.0019 | 3.04 | 52 | 0.0015 | 4.06 |
| 50 | 0.0017 | 4.25 | 0.0017 | 4.25 | 63 | 0.0014 | 5.56 |
| 63 | 0.0017 | 6.75 | 0.0017 | 6.75 | 75 | 0.0014 | 7.88 |

| Rated current | F500-C | Power loss | F500-D | Power loss | Rated current | S500X-AG0084 | Power loss |
|---|---|---|---|---|---|---|---|
| $I_n$ (A) | $R_i$ (Ω) | $P_v$ (W) | $R_i$ (Ω) | $P_v$ (W) | $I_n$ (A) | $R_i$ (Ω) | $P_v$ (W) |
| 10 | 0.0159 | 1.59 | - | - | 1.6 | 0.95 | 2.43 |
| 13 | 0.0127 | 2.15 | - | - | 2.5 | 0.50 | 3.13 |
| 16 | 0.0091 | 2.33 | - | - | 4 | 0.195 | 3.12 |
| 20 | 0.0072 | 2.88 | - | - | 6 | 0.090 | 3.24 |
| 25 | 0.0052 | 3.25 | 0.0042 | 2.63 | 9 | 0.045 | 3.65 |
| 40 | 0.0028 | 4.48 | 0.0026 | 4.16 | 20 | 0.012 | 4.80 |
| 50 | 0.0022 | 5.50 | - | - | 32 | 0.0055 | 5.63 |
| 63 | 0.0022 | 8.73 | 0.0022 | 8.73 | 52 | 0.0017 | 4.60 |
| | | | | | 63 | 0.0017 | 6.75 |

## Adjustable version

| Rated current | S500-K | Power loss | S500UC-K | Power loss | Rated current | F500-K | Power loss |
|---|---|---|---|---|---|---|---|
| $I_n$ (A) | $R_i$ (Ω) | $P_{vmax}$ (W) | $R_i$ (Ω) | $P_{vmax}$ (W) | $I_n$ (A) | $R_i$ (Ω) | $P_v$ (W) |
| 0.1 - 0.15 | 78 | 1.76 | 84 | 1.89 | 0.28 - 0.42 | 12.4 | 2.19 |
| 0.14 - 0.21 | 48 | 2.12 | 51 | 2.25 | 0.38 - 0.58 | 6.7 | 2.25 |
| 0.2 - 0.3 | 23.5 | 2.12 | 25.5 | 2.30 | 0.53 - 0.8 | 3.6 | 2.30 |
| 0.28 - 0.42 | 12.3 | 2.17 | 12.8 | 2.26 | 0.73 - 1.1 | 2.1 | 2.54 |
| 0.38 - 0.58 | 6.6 | 2.22 | 7.0 | 2.35 | 1 - 1.5 | 1.1 | 2.48 |
| 0.53 - 0.8 | 3.5 | 2.24 | 3.6 | 2.30 | 1.4 - 2.1 | 0.73 | 3.22 |
| 0.73 - 1.1 | 2.0 | 2.42 | 2.04 | 2.47 | 2 - 3 | 0.3507 | 3.16 |
| 1 - 1.5 | 1.05 | 2.36 | 1.08 | 2.43 | 2.8 - 4.2 | 0.1757 | 3.10 |
| 1.4 - 2.1 | 0.68 | 3.00 | 0.68 | 3.00 | 3.8 - 5.8 | 0.0957 | 3.22 |
| 2 - 3 | 0.35 | 3.15 | 0.35 | 3.15 | 5.3 - 8 | 0.0557 | 3.56 |
| 2.8 - 4.2 | 0.175 | 3.09 | 0.175 | 3.09 | 7.3 - 11 | 0.0357 | 4.32 |
| 3.8 - 5.8 | 0.095 | 3.20 | 0.095 | 3.20 | 10 - 15 | 0.0237 | 5.33 |
| 5.3 - 8 | 0.055 | 3.52 | 0.055 | 3.52 | 14 - 20 | 0.0127 | 5.08 |
| 7.3 - 11 | 0.035 | 4.24 | 0.035 | 4.24 | 18 - 26 | 0.0087 | 5.88 |
| 10 - 15 | 0.023 | 5.18 | 0.023 | 5.18 | 23 - 32 | 0.0062 | 6.35 |
| 14 - 20 | 0.012 | 4.80 | 0.012 | 4.80 | 29 - 37 | 0.0042 | 5.75 |
| 18 - 26 | 0.008 | 5.41 | 0.008 | 5.41 | 34 - 41 | 0.0032 | 5.38 |
| 23 - 32 | 0.0055 | 5.63 | 0.005 | 5.12 | 38 - 45 | 0.0024 | 4.86 |
| 29 - 37 | 0.0035 | 4.79 | 0.0035 | 4.79 | | | |
| 34 - 41 | 0.0025 | 4.20 | 0.0025 | 4.20 | | | |
| 38 - 45 | 0.0017 | 3.44 | 0.0017 | 3.44 | | | |

## Weights

| | Type | | |
|---|---|---|---|
| 1-pole, with/without separating neutral conductor N/ switched neutral NA | S501... | = | 250 g |
| | S501N... | = | 320 g |
| | S501NA... | = | 460 g |
| 2-pole, with/without separating neutral conductor N/ switched neutral NA | S502... | = | 500 g |
| | S502N... | = | 570 g |
| | S502NA... | = | 710 g |
| | F502… | = | 820 g |
| 3-pole, with/without separating neutral N conductor/ switched neutral NA | S503... | = | 710 g |
| | S503N... | = | 780 g |
| | S503NA... | = | 920 g |
| | F503… | = | 1070 g |
| 4-pole | S504… | = | 920 g |
| | F504… | = | 1400 g |
| Auxiliary contact H | S500-H… | = | 60 g |
| Signal contact S | S500-S… | = | 60 g |
| RCD + RCD-trip signal contact T10 | F504+T10 | = | 1650 g |
| Undervoltage trip UA | S500+UA | = | 160 g |
| Shunt trip AL | S500+AL | = | 170 g |

# Heavy Duty Circuit Breakers S500
# Selectivity 230 V/400 VAC

## Selectivity with S500 circuit breaker

In a low voltage distribution system, it is desirable that two or more overcurrent devices connected in series disconnect selectively in the event of a short-circuit to ensure continuity of the power supply. Selectivity is achieved when only that part of the facility which contains the fault is disconnected. Selectivity always exists between circuit breakers connected in series in the event of a short-circuit if the energy which the downstream circuit breaker lets through is insufficient to trip the upstream circuit breaker.

## Circuit breakers (MCCB's) upstream
## S500 Heavy Duty Circuit Breakers downstream


The S500 Heavy Duty Circuit Breaker has a very good selectivity behaviour with respect to the upstream circuit breaker owing to its low let-through energy and rapid breaking.
The following table shows the max. short-circuit currents ⚡ at which the S500 Heavy Duty Circuit Breaker functions selectively with the upstream SACE circuit breaker.

| **Upstream** | | | **Tmax T1** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Version | | | B, C, N | | | | | | | | | | |
| Trip | | | TM | | | | | | | | | | |
| Rated current (A) | | | 160 | | | | | | | | | | |
| Electromagnetic trip (A) | | | 16 | 20 | 25 | 32 | 40 | 50 | 63 | 80 | 100 | 125 | 160 |
| **Downstream** | $I_{cu}$ [kA] | Rated current (A) | Max. short-circuit (kA) | | | | | | | | | | |
| **S500-B, S500-C,** | 50 | 6 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 10.5 | 15 | 20 | 25 | T |
| **S500-D** | 50 | 10 | | | 4.5 | 4.5 | 4.5 | 4.5 | 8 | 10 | 20 | 25 | T |
| | 50 | 13 | | | | 4.5 | 4.5 | 4.5 | 7.5 | 10 | 15 | 25 | T |
| | 50 | 16 | | | | | 4.5 | 4.5 | 7.5 | 10 | 15 | 25 | T |
| | 50 | 20 | | | | | | 4.5 | 7.5 | 10 | 15 | 25 | T |
| | 50 | 25 | | | | | | | 6 | 10 | 15 | 20 | T |
| | 50 | 32 | | | | | | | | 7.5 | 10 | 20 | T |
| | 50 | 40 | | | | | | | | | 10 | 20 | T |
| | 50 | 50 | | | | | | | | | | 15 | T |
| | 50 | 63 | | | | | | | | | | | T |
| **S500-K** | 50 | ≤ 5.8 | 36 | 36 | T | T | T | T | T | T | T | T | T |
| | 50 | 5.3..8 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 10.5 | T | T | T | T |
| | 50 | 7.3..11 | | | 4.5 | 4.5 | 4.5 | 4.5 | 8 | T | T | T | T |
| | 30 | 10..15 | | | | 4.5 | 4.5 | 4.5 | 7.5 | 10 | 15 | T | T |
| | 30 | 14..20 | | | | | 4.5 | 4.5 | 7.5 | 10 | 15 | T | T |
| | 30 | 18..26 | | | | | | 4.5 | 7.5 | 10 | 15 | T | T |
| | 30 | 23..32 | | | | | | | 6 | 10 | 15 | 20 | T |
| | 30 | 29..37 | | | | | | | | 7.5 | 10 | 20 | T |
| | 30 | 34..41 | | | | | | | | | 10 | 20 | T |
| | 30 | 38..45 | | | | | | | | | | 15 | T |

| **Upstream** | | | **Tmax T2** | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Version | | | N, S, H, L | | | | | | | | | | | | | | | | |
| Trip | | | TM, M | | | | | | | | | | | | | | EL | | |
| Rated current (A) | | | 160 | | | | | | | | | | | | | | | | |
| Electromagnetic trip (A) | | | 12.5 | 16 | 20 | 25 | 32 | 40 | 50 | 63 | 80 | 100 | 125 | 160 | 10 | 25 | 63 | 100 | 160 |
| **Downstream** | $I_{cu}$ [kA] | Rated current (A) | Max. short-circuit (kA) | | | | | | | | | | | | | | | | |
| **S500-B, S500-C,** | 50 | 6 | 4.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 10.5 | 15 | 20 | 25 | 36 | | 36 | 36 | 36 | 36 |
| **S500-D** | 50 | 10 | | | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 8 | 10 | 20 | 25 | 36 | | 36 | 36 | 36 | 36 |
| | 50 | 13 | | | 4.5 | | 4.5 | 4.5 | 4.5 | 7.5 | 10 | 15 | 25 | 36 | | 36 | 36 | 36 | 36 |
| | 50 | 16 | | | | | 4.5 | 4.5 | 4.5 | 7.5 | 10 | 15 | 25 | 36 | | | 36 | 36 | 36 |
| | 50 | 20 | | | | | 4.5 | | 4.5 | 7.5 | 10 | 15 | 25 | 36 | | | 36 | 36 | 36 |
| | 50 | 25 | | | | | | | 4.5 | 6 | 10 | 15 | 20 | 36 | | | 36 | 36 | 36 |
| | 50 | 32 | | | | | | | 4.5 | | 7.5 | 10 | 20 | 36 | | | 36 | 36 | 36 |
| | 50 | 40 | | | | | | | | | 5 | 10 | 20 | 36 | | | | 36 | 36 |
| | 50 | 50 | | | | | | | | | 5 | 7.5 | 15 | 36 | | | | 36 | 36 |
| | 50 | 63 | | | | | | | | | | 5 | | 36 | | | | | 36 |
| **S500-K** | 50 | ≤ 5.8 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 50 | 50 | 50 | 50 | 50 | 50 |
| | 50 | 5.3..8 | 4.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 10.5 | 36 | 36 | 36 | 50 | | 50 | 50 | 50 | 50 |
| | 50 | 7.3..11 | | | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 8 | 36 | 36 | 36 | 50 | | 50 | 50 | 50 | 50 |
| | 30 | 10..15 | | | 4.5 | | 4.5 | 4.5 | 4.5 | 7.5 | 10 | 15 | T | T | | T | T | T | T |
| | 30 | 14..20 | | | | | 4.5 | 4.5 | 4.5 | 7.5 | 10 | 15 | T | T | | | T | T | T |
| | 30 | 18..26 | | | | | 4.5 | | 4.5 | 7.5 | 10 | 15 | T | T | | | T | T | T |
| | 30 | 23..32 | | | | | | | 4.5 | 6 | 10 | 15 | 20 | T | | | T | T | T |
| | 30 | 29..37 | | | | | | | 4.5 | | 7.5 | 10 | 20 | T | | | | T | T |
| | 30 | 34..41 | | | | | | | | | 5 | 10 | 20 | T | | | | T | T |
| | 30 | 38..45 | | | | | | | | | 5 | 7.5 | 15 | T | | | | T | T |

# Heavy Duty Circuit Breakers S500
## Selectivity 230 V/400 VAC

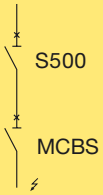
| **Upstream** | | | **Tmax T3** | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Version | | | N, S | | | | | | |
| Trip | | | TM, M EL | | | | | | |
| Rated current (A) | | | 250 | | | | | | |
| Electromagnetic trip (A) | | | 63 | 80 | 100 | 125 | 160 | 200 | 250 |
| **downstream** | $I_{cu}$ [kA] | Rated current (A) | Max. short-circuit (kA) | | | | | | |
| **S500-B, S500-C,** | 50 | 6 | 10.5 | 15 | 20 | 25 | 36 | 36 | 36 |
| **S500-D** | 50 | 10 | 8 | 10 | 20 | 25 | 36 | 36 | 36 |
| | 50 | 13 | 7.5 | 10 | 15 | 25 | 36 | 36 | 36 |
| | 50 | 16 | 7.5 | 10 | 15 | 25 | 36 | 36 | 36 |
| | 50 | 20 | 7.5 | 10 | 15 | 25 | 36 | 36 | 36 |
| | 50 | 25 | 6 | 10 | 15 | 20 | 36 | 36 | 36 |
| | 50 | 32 | | 7.5 | 10 | 20 | 36 | 36 | 36 |
| | 50 | 40 | | | 10 | 20 | 36 | 36 | 36 |
| | 50 | 50 | | | 7.5 | 15 | 36 | 36 | 36 |
| | 50 | 63 | | | 5 | 6 | 36 | 36 | 36 |
| **S500-K** | 50 | ≤ 5.8 | 36 | 36 | 36 | 36 | T | T | T |
| | 50 | 5.3..8 | 10.5 | 36 | 36 | 36 | T | T | T |
| | 50 | 7.3..11 | 8 | 36 | 36 | 36 | T | T | T |
| | 30 | 10..15 | 7.5 | 10 | 15 | T | T | T | T |
| | 30 | 14..20 | 7.5 | 10 | 15 | T | T | T | T |
| | 30 | 18..26 | 7.5 | 10 | 15 | T | T | T | T |
| | 30 | 23..32 | 6 | 10 | 15 | 20 | T | T | T |
| | 30 | 29..37 | | 7.5 | 10 | 20 | T | T | T |
| | 30 | 34..41 | | | 10 | 20 | T | T | T |
| | 30 | 38..45 | | | 7.5 | 15 | T | T | T |

## Backup fuses upstream
## S500 Heavy Duty Circuit Breakers downstream

| **Upstream** | | **Backup fuses gL/gG** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Electromagnetic trip (A) | | 25 | 40 | 50 | 63 | 80 | 100 | 125 | 160 |
| **downstream** | Rated current (A) | Max. short-circuit (kA) | | | | | | | |
| **S500-B, S500-C, S500-D** | ≤ 10 | 1.05 | 1.85 | 2.15 | 2.85 | 3.7 | 6.5 | 50 | 50 |
| | 13 | 1.1 | 1.90 | 2.2 | 2.9 | 3.8 | 6.7 | 50 | 50 |
| | 16 | 1.0 | 1.75 | 2 | 2.6 | 3.5 | 5.9 | 23 | 50 |
| | 20 | - | 1.6 | 1.8 | 2.3 | 3.1 | 4.8 | 17 | 50 |
| | 25 | - | 1.4 | 1.5 | 2.1 | 2.7 | 4.3 | 13 | 50 |
| | 32 | - | - | 1.35 | 1.9 | 2.5 | 4 | 12.5 | 50 |
| | 40 | - | - | - | 1.7 | 2.1 | 3.3 | 10 | 50 |
| | 50 | - | - | - | - | 2 | 3 | 8 | 50 |
| | 63 | - | - | - | - | - | - | 6.4 | 50 |
| **S500-K** | ≤ 3 | 9 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | 4.2 | 6 | 20 | 50 | 50 | 50 | 50 | 50 | 50 |
| | 5.8 | 1.3 | 13 | 23 | 50 | 50 | 50 | 50 | 50 |
| | 8.0 | 1.1 | 6 | 10 | 50 | 50 | 50 | 50 | 50 |
| | 11 | 0.82 | 1.05 | 1.2 | 2 | 2.8 | 5.8 | 50 | 50 |
| | 15 | 0.6 | 1 | 1.1 | 1.8 | 2.5 | 4.2 | 18 | 30 |
| | 20 | - | 0.9 | 1.05 | 1.7 | 2 | 3 | 9.9 | 30 |
| | 26 | - | 0.7 | 1 | 1.5 | 1.95 | 2.8 | 8.3 | 30 |
| | 32 | - | - | 0.96 | 1.4 | 1.9 | 2.7 | 7.4 | 30 |
| | 37 | - | - | 0.7 | 1.3 | 1.8 | 2.6 | 7 | 30 |
| | 41 | - | - | - | 1.2 | 1.75 | 2.5 | 6.6 | 30 |
| | 45 | - | - | - | - | 1.5 | 2 | 6.4 | 30 |

# Heavy Duty Circuit Breakers S500
# Selectivity 230 V/400 VAC

## S500 circuit breaker upstream
## Circuit breakers (MCBs) downstream




Should a short-circuit ⚡ occur, selective break action will be performed by the MCB up to the selectivity current values listed in the following table.

| **upstream** | | **S500-C, D** | | | | | |
|---|---|---|---|---|---|---|---|
| Rated current (A) | | C40 | D40 | C50 | D50 | C63 | D63 |
| **downstream** | Rated current (A) | Max. short-circuit current (kA) | | | | | |
| **B6 / C6** | 6 | 0.6 | 1.2 | 0.8 | 1.4 | 0.95 | 1.8 |
| **B10 / C10** | 10 | 0.55 | 1.1 | 0.7 | 1.3 | 0.85 | 1.7 |
| **B13 / C13** | 13 | 0.55 | 1.1 | 0.7 | 1.3 | 0.85 | 1.7 |
| **B16 / C16** | 16 | 0.55 | 1.1 | 0.7 | 1.3 | 0.85 | 1.7 |
| **B20 / C20** | 20 | 0.5 | 1 | 0.6 | 1.2 | 0.8 | 1.55 |
| **B25 / C25** | 25 | 0.45 | 0.9 | 0.55 | 1.1 | 0.75 | 1.4 |
| **B32 / C32** | 32 | - | 0.9 | 0.55 | 1.1 | 0.7 | 1.4 |
| **B40 / C40** | 40 | - | - | - | - | 0.7 | 1.4 |
| **B50 / C50** | 50 | - | - | - | - | 0.7 | 1.4 |

**On request**
S500 Selectivity and back-up protection, No. 10109/A

# Heavy Duty Circuit Breakers S500
# Back-up protection 230 V/400 VAC

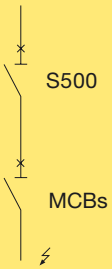
## S500 Heavy Duty Circuit Breakers without back-up protection

If the short circuit current in the **3 x 230/400 V** network at the point of installation does not exceed **50/30 kA**, then the S500 Heavy Duty Circuit Breaker may be installed with or without an upstream circuit breaker or backup fuse of any size. This condition is met if the power available to supply the transformer is not greater than **2,000/1,250 kVA** or if – in the case of a larger transformer – the cable between the transformer and the S500 Heavy Duty Circuit Breaker has a minimum length as listed in the table below.

**Minimum lengths**

| Cable cross-section ($mm^2$) | Transformer capacity (3 x 400 VAC) (m) | | | |
|---|---|---|---|---|
| | 1,600 kVA | 2,000 kVA | 2,500 kVA | > 2,500 kVA |
| 240 | 20 | 33 | 40 | 72 |
| 185 | 18 | 28 | 35 | 62 |
| 150 | 16 | 25 | 31 | 53 |
| 120 | 14 | 22 | 27 | 44 |
| 95 | 12 | 19 | 23 | 36 |
| 70 | 10 | 15 | 18 | 27 |
| 50 | 8 | 11 | 13 | 20 |
| 35 | 6 | 8 | 9.5 | 14 |
| 25 | 4 | 6 | 7 | 10 |
| 16 | 2.5 | 4 | 4.5 | 6.5 |
| 10 | 1.5 | 2.3 | 2.9 | 4.1 |
| 6 | 0.9 | 1.5 | 1.8 | 2.5 |
| 4 | 0.6 | 1 | 1.2 | 1.7 |
| 2.5 | 0.4 | 0.6 | 0.8 | 1 |
| 1.5 | 0.3 | 0.4 | 0.5 | 0.6 |

## S500 Heavy Duty Circuit Breaker upstream
## Miniature circuit breaker (MCBs) downstream




Due to its high breaking capacity, the short-circuit current seldom exceeds the capacity of the S500 circuit breaker, and thus it can be used in the majority of cases either with no upstream protection, with an upstream circuit breaker or with an upstream backup fuse of any size. Where in doubt, the short-circuit current, which could possibly occur at the location of the S500 circuit breaker, needs to be determined.
If the short-circuit current at the point of installation of the circuit breaker is greater than its breaking capacity, the rated currents of the upstream S500 circuit breaker must not exceed the values in the table (back-up protection for circuit breaker)

| **upstream** | | **S500-C, D** | | | | | |
|---|---|---|---|---|---|---|---|
| Rated current (A) | | C40 | D40 | C50 | D50 | C63 | D63 |
| **downstream** | Rated current (A) | Max. short-circuit (kA) | | | | | |
| **B6 / C6** | 6 | 50 | 50 | 50 | 50 | 50 | 50 |
| **B10 / C10** | 10 | 50 | 50 | 50 | 50 | 50 | 50 |
| **B13 / C13** | 13 | 50 | 50 | 50 | 50 | 50 | 50 |
| **B16 / C16** | 16 | 50 | 50 | 50 | 50 | 50 | 50 |
| **B20 / C20** | 20 | 50 | 50 | 50 | 50 | 50 | 50 |
| **B25 / C25** | 25 | 50 | 50 | 50 | 50 | 50 | 50 |
| **B32 / C32** | 32 | - | 50 | 50 | 50 | 50 | 50 |
| **B40 / C40** | 40 | - | - | - | - | 50 | 50 |
| **B50 / C50** | 50 | - | - | - | - | 50 | 50 |

**On request**
S500 Selectivity and back-up protection, No. 10109/A

# Heavy Duty Circuit Breakers S500
# Circuit protection S500-B, S500-C, S500-D




## General

S500 Heavy Duty Circuit Breakers are current and energy limiting devices with high breaking capacities. They are suitable for domestic installations with no or only very small inrush currents and for commercial and industrial applications with high inrush currents (fluorescent lights, transformers and capacitor banks). The high rated breaking capacity of 50 kA at 400 VAC and rapid breaking time $< 2$ ms ensure an excellent selectivity behaviour with respect to upstream overcurrent devices.

## Major features

- High rated breaking capacity of 50 kA at 230/400 VAC according to IEC 60947-2
- Outstanding current and energy limiting
- Clear contact position indication for all poles
- Back-up protection for downstream circuit breakers (MCBs)
- Wide range of accessories such as undervoltage and shunt trip devices, auxiliary and signal contacts

## Order data

Circuit protection

Characteristic B

| Rated current (A) | Type **1-pole** | Module (25 mm) | Type **2-pole** | Module (25 mm) | Type **3-pole** | Module (25 mm) | Type **4-pole** | Module (25 mm) |
|---|---|---|---|---|---|---|---|---|
| 6 | **S501-B6** | 1 | **S502-B6** | 2 | **S503-B6** | 3 | **S504-B6** | 4 |
| 10 | **S501-B10** | 1 | **S502-B10** | 2 | **S503-B10** | 3 | **S504-B10** | 4 |
| 13 | **S501-B13** | 1 | **S502-B13** | 2 | **S503-B13** | 3 | **S504-B13** | 4 |
| 16 | **S501-B16** | 1 | **S502-B16** | 2 | **S503-B16** | 3 | **S504-B16** | 4 |
| 20 | **S501-B20** | 1 | **S502-B20** | 2 | **S503-B20** | 3 | **S504-B20** | 4 |
| 25 | **S501-B25** | 1 | **S502-B25** | 2 | **S503-B25** | 3 | **S504-B25** | 4 |
| 32 | **S501-B32** | 1 | **S502-B32** | 2 | **S503-B32** | 3 | **S504-B32** | 4 |
| 40 | **S501-B40** | 1 | **S502-B40** | 2 | **S503-B40** | 3 | **S504-B40** | 4 |
| 50 | **S501-B50** | 1 | **S502-B50** | 2 | **S503-B50** | 3 | **S504-B50** | 4 |
| 63 | **S501-B63** | 1 | **S502-B63** | 2 | **S503-B63** | 3 | **S504-B63** | 4 |

Characteristic C

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6 | **S501-C6** | 1 | **S502-C6** | 2 | **S503-C6** | 3 | **S504-C6** | 4 |
| 10 | **S501-C10** | 1 | **S502-C10** | 2 | **S503-C10** | 3 | **S504-C10** | 4 |
| 13 | **S501-C13** | 1 | **S502-C13** | 2 | **S503-C13** | 3 | **S504-C13** | 4 |
| 16 | **S501-C16** | 1 | **S502-C16** | 2 | **S503-C16** | 3 | **S504-C16** | 4 |
| 20 | **S501-C20** | 1 | **S502-C20** | 2 | **S503-C20** | 3 | **S504-C20** | 4 |
| 25 | **S501-C25** | 1 | **S502-C25** | 2 | **S503-C25** | 3 | **S504-C25** | 4 |
| 32 | **S501-C32** | 1 | **S502-C32** | 2 | **S503-C32** | 3 | **S504-C32** | 4 |
| 40 | **S501-C40** | 1 | **S502-C40** | 2 | **S503-C40** | 3 | **S504-C40** | 4 |
| 50 | **S501-C50** | 1 | **S502-C50** | 2 | **S503-C50** | 3 | **S504-C50** | 4 |
| 63 | **S501-C63** | 1 | **S502-C63** | 2 | **S503-C63** | 3 | **S504-C63** | 4 |

Characteristic D

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10 | **S501-D10** | 1 | **S502-D10** | 2 | **S503-D10** | 3 | **S504-D10** | 4 |
| 13 | **S501-D13** | 1 | **S502-D13** | 2 | **S503-D13** | 3 | **S504-D13** | 4 |
| 16 | **S501-D16** | 1 | **S502-D16** | 2 | **S503-D16** | 3 | **S504-D16** | 4 |
| 20 | **S501-D20** | 1 | **S502-D20** | 2 | **S503-D20** | 3 | **S504-D20** | 4 |
| 25 | **S501-D25** | 1 | **S502-D25** | 2 | **S503-D25** | 3 | **S504-D25** | 4 |
| 32 | **S501-D32** | 1 | **S502-D32** | 2 | **S503-D32** | 3 | **S504-D32** | 4 |
| 40 | **S501-D40** | 1 | **S502-D40** | 2 | **S503-D40** | 3 | **S504-D40** | 4 |
| 50 | **S501-D50** | 1 | **S502-D50** | 2 | **S503-D50** | 3 | **S504-D50** | 4 |
| 63 | **S501-D63** | 1 | **S502-D63** | 2 | **S503-D63** | 3 | **S504-D63** | 4 |

Module ≙ width of a single pole device

# Heavy Duty Circuit Breakers S500
## Motor protection: S500-K

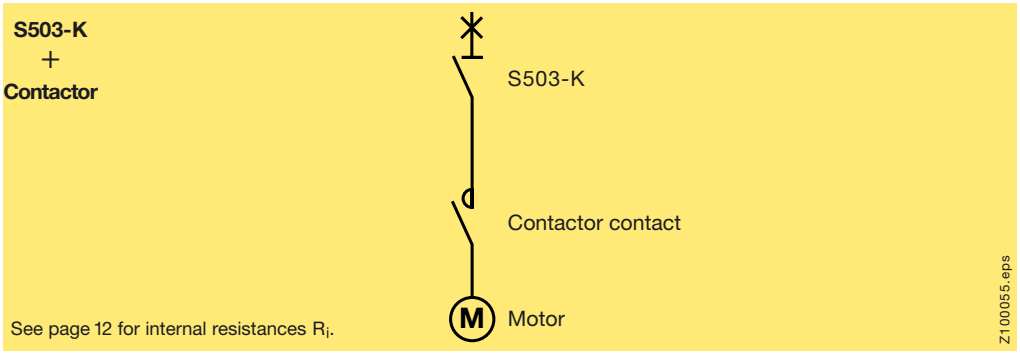

## General

The S500-K Heavy Duty Circuit Breaker ideally combines the functions of a circuit breaker and the functions of an overcurrent trip device into a single unit. The result is a compact and economical solution. Up to a short-circuit current of 30 kA or 50 kA respectively, no back-up overcurrent trip devices are needed at the point of installation. For example, these breakers can be installed as input circuit breakers for machine tools or motors, so that these can be connected to networks of unknown capacity, and/or unknown overcurrent release devices can be connected.

## Major features

- High rated operating voltage up to 400/690 VAC
- All poles disconnected in event of a fault
- Ready for reclosing immediately after a fault
- No need for thermal trip on contactor
- Space saving and economical
- Optimum coordination with A-contactors
- Wide range of accessories, including undervoltage and shunt trips, auxiliary and signal contacts

## Application connection diagram, motor protection




See page 12 for internal resistances $R_i$.


**Operational switching**
The S500-K Heavy Duty Circuit Breaker may be used up to a current rating of 11 A for direct operational switching of motors.

**Starting conditions**
The motor starting time should not be longer than 2.5 seconds to avoid nuisance tripping, which occurs when a motor is started repeatedly in quick succession.

## Order data

Motor protection

Characteristic K

| Range of adjustment (A) | Type **1-pole** | Module (25 mm) | Type **2-pole** | Module (25 mm) | Type **3-pole** | Module (25 mm) |
|---|---|---|---|---|---|---|
| 0.1 - 0.15 | **S501-K-0.15** | 1 | **S502-K-0.15** | 2 | **S503-K0.15** | 3 |
| 0.14 - 0.21 | **S501-K0.21** | 1 | **S502-K0.21** | 2 | **S503-K0.21** | 3 |
| 0.2 - 0.3 | **S501-K0.3** | 1 | **S502-K0.3** | 2 | **S503-K0.3** | 3 |
| 0.28 - 0.42 | **S501-K0.42** | 1 | **S502-K0.42** | 2 | **S503-K0.42** | 3 |
| 0.38 - 0.58 | **S501-K0.58** | 1 | **S502-K0.58** | 2 | **S503-K0.58** | 3 |
| 0.53 - 0.8 | **S501-K0.8** | 1 | **S502-K0.8** | 2 | **S503-K0.8** | 3 |
| 0.73 - 1.1 | **S501-K1.1** | 1 | **S502-K1.1** | 2 | **S503-K1.1** | 3 |
| 1 - 1.5 | **S501-K1.5** | 1 | **S502-K1.5** | 2 | **S503-K1.5** | 3 |
| 1.4 - 2.1 | **S501-K2.1** | 1 | **S502-K2.1** | 2 | **S503-K2.1** | 3 |
| 2 - 3 | **S501-K3** | 1 | **S502-K3** | 2 | **S503-K3** | 3 |
| 2.8 - 4.2 | **S501-K4.2** | 1 | **S502-K4.2** | 2 | **S503-K4.2** | 3 |
| 3.8 - 5.8 | **S501-K5.8** | 1 | **S502-K5.8** | 2 | **S503-K5.8** | 3 |
| 5.3 - 8 | **S501-K8** | 1 | **S502-K8** | 2 | **S503-K8** | 3 |
| 7.3 - 11 | **S501-K11** | 1 | **S502-K11** | 2 | **S503-K11** | 3 |
| 10 - 15 | **S501-K15** | 1 | **S502-K15** | 2 | **S503-K15** | 3 |
| 14 - 20 | **S501-K20** | 1 | **S502-K20** | 2 | **S503-K20** | 3 |
| 18 - 26 | **S501-K26** | 1 | **S502-K26** | 2 | **S503-K26** | 3 |
| 23 - 32 | **S501-K32** | 1 | **S502-K32** | 2 | **S503-K32** | 3 |
| 29 - 37 | **S501-K37** | 1 | **S502-K37** | 2 | **S503-K37** | 3 |
| 34 - 41 | **S501-K41** | 1 | **S502-K41** | 2 | **S503-K41** | 3 |
| 38 - 45 | **S501-K45** | 1 | **S502-K45** | 2 | **S503-K45** | 3 |

Module ≙ width of a single pole device

# Heavy Duty Circuit Breakers S500
# Motor protection: S500-K
## Coordination table

## Coordination table for S500-K motor starter according to IEC 60947-4-1, type 2, for 415 VAC, 50 kA

| **Motor** | | **Heavy duty circuit breaker** | | | **Contactor** | | **Thermal overload relay** | | **Cable** | **Starter group** |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated output | Rated current | Type | Range of adjustment | Magnetic trip | Type | Safety clearance | Type | Range of adjustment | Cross-section | |
| $P_e$ (kW) | $I_n$ (A) | | $I_n$ (A) | (± 10 %) $I_m$ (A) | | (mm) | | $I_n$ (A) | ($mm^2$) | I max. (A) |
| 0.12 | 0.44 | S503-K0.58 | 0.38–0.58 | 7 | A9-30-10 | 20 | – | – | 1.5 | 0.58 |
| 0.18 | 0.72 | S503-K0.80 | 0.53–0.80 | 10 | A9-30-10 | 20 | – | – | 1.5 | 0.8 |
| 0.25 | 0.83 | S503-K1.10 | 0.73–1.10 | 13 | A9-30-10 | 20 | – | – | 1.5 | 1.1 |
| 0.37 | 1.12 | S503-K1.50 | 1.00–1.50 | 18 | A9-30-10 | 20 | – | – | 1.5 | 1.5 |
| 0.5 | 1.45 | S503-K2.10 | 1.40–2.10 | 25 | A9-30-10 | 20 | – | – | 1.5 | 2.1 |
| 0.75 | 1.9 | S503-K2.10 | 1.40–2.10 | 25 | A9-30 10 | 20 | – | – | 1.5 | 2.1 |
| 1.1 | 2.59 | S503-K3.00 | 2.00–3.00 | 36 | A12-30-10 | 20 | – | – | 1.5 | 3 |
| 1.5 | 3.45 | S503-K4.20 | 2.80–4.20 | 50 | A12-30-10 | 20 | – | – | 1.5 | 4.2 |
| 1.85 | 4.4 | S503-K5.80 | 3.80–5.80 | 69 | A16-30-10 | 20 | – | – | 1.5 | 5.8 |
| 2.2 | 4.8 | S503-K5.80 | 3.80–5.80 | 69 | A16-30-10 | 20 | – | – | 1.5 | 5.8 |
| 3 | 6.48 | S503-K8.00 | 5.30–8.00 | 96 | A16-S0-10 | 20 | – | – | 1.5 | 8 |
| 4 | 8.6 | S503-K11.0 | 7.30–11.0 | 132 | A26-30-10 | 35 | – | – | 1.5 | 11 |
| 5.5 | 11.1 | S503-K15.0 | 10.0–15.0 | 180 | A26-30-10 | 35 | – | – | 1.5 | 15 |
| 7.5 | 14.8 | S503-K20.0 | 14.0–20.0 | 240 | A26-30-10 | 35 | – | – | 1.5 | 20 |
| 11 | 21.5 | S503-K26.0 | 18.0–26.0 | 312 | A26-30-10 | 35 | – | – | 2.5 | 26 |
| 15 | 28.5 | S503-K32.0 | 23.0–32.0 | 384 | A30-30-10 | 35 | – | – | 6 | 32 |
| 18.5 | 35 | S503-K37.0 | 29.0–37.0 | 444 | A40-30-10 | 35 | – | – | 6 | 37 |
| 22 | 41 | S503-K45.0 | 38.0–45.0 | 540 | A50-30-00 | 35 | – | – | 10 | 45 |

## Assignment categories, general

IEC standard 60947-4-1 defines two assignment categories, which depend on the continuity of service level to be reached by the operation. The maximum permissible limits for equipment damage are specified for both categories. Machine operators must never be exposed to danger.

## Assignment category type 1

Destruction of the contactor and overload relay is permitted. The contactor and/or overload relay should be replaced if necessary.

## Assignment category type 2

No damage must occur to the overload relay. Only a light welding of the contacts is permitted, so that they can be separated easily. All functions of the protection devices must remain operative.

**On request**
Coordination tables S500 with A-contactors, No. 10107/B

# Heavy Duty Circuit Breakers S500
## Motor protection with separate overload protection: S503-KM


## General

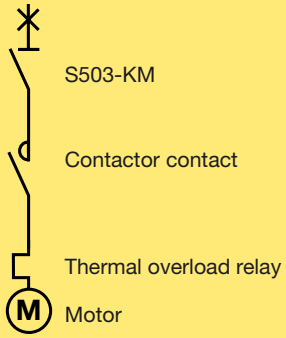
The S503-KM Heavy Duty Circuit Breaker provides short-circuit protection for motors, power supplies, provides a combination of contactor and thermal overload relay functions, and protects system installation and non-fused motor control centres (MCC). The S5503-KM possesses only an electromagnetic tripping function. The conductor cross-sections can be dimensioned to suit the max. rated current of the downstream thermal overload relay.
In combination with a separate overload protection, the S503-KM provides protection against difficult external starting.
Since the thermal overload relay trips on overload and the circuit breaker on short-circuit, the cause of the trip is apparent.
The high rated breaking capacity of 50 kA at 400 VAC based on coordination according to IEC 60947-4-1 as well as the short tripping time of < 2 ms ensure excellent protection and an optimum economical solution.

## Major features

- High rated operating voltage up to 400 VAC
- Special electromagnetic trip
- For motors up to a capacity of 30 kW
- Clear contact position indication for all poles
- Optimum coordination with A-contactors
- Space saving and economical
- Designed for the standard ABB rotary drive (tilting motion to rotary motion)
- Wide range of accessories

## Application connection diagram, motor protection

**S503-KM**
**+**
**Contactor**
**+**
**Overload protection**
**(Thermal overload relay)**

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See page 12 for internal resistances $R_i$


**Operational switching**
The S503-KM circuit breaker may be used up to a current rating of 9 A for direct, operational switching of motors.

## Order data

Motor protection

Characteristic KM

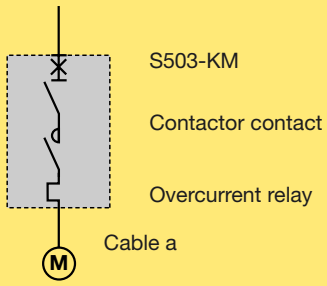
| Rated current (A) | Magnetic (A) (± 10 %) | Rated breaking trip capacity (kA) | type 3-pole | Module (25 mm) |
|---|---|---|---|---|
| 1.6 | 16 | 25 | **S503-KM1.6** | 3 |
| 2.5 | 25 | 25 | **S503-KM2.5** | 3 |
| 4 | 45 | 25 | **S503-KM4** | 3 |
| 6 | 55 | 25 | **S503-KM6** | 3 |
| 9 | 100 | 25 | **S503-KM9** | 3 |
| 20 | 200 | 25 | **S503-KM20** | 3 |
| 32 | 400 | 25 | **S503-KM32** | 3 |
| 52 | 580 | 25 | **S503-KM52** | 3 |
| 63 | 800 | 25 | **S503-KM63** | 3 |

Module ≙ width of a single pole device

# Heavy Duty Circuit Breakers S500
# Motor protection with separate overload protection: S503-KM

## Coordination table for S503-KM motor starter according to IEC 60947-4-1, type 2, for 415 VAC, 50 kA with A-contactor and thermal overload relay

**Combination starter**
The data in the table below are applicable if the protective device and the starter are fitted in the same compartment or enclosure, or when supplied in separate parts and assembled by the installation technician.



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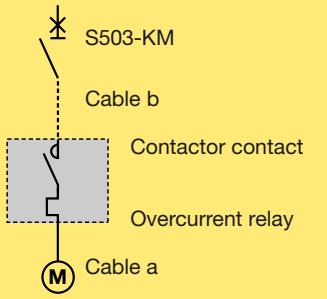
| Motor | | Heavy Duty Circuit Breaker | | | Contactor | | Thermal overload relay | | Cable | Starter group |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated output $P_e$ (kW) | Rated current $I_n$ (A) | Type | Range of adjustment $I_n$ (A) | Magnetic trip (± 10 %) $I_m$ (A) | Type | Safety clearance (mm) | Type | Range of adjustment $I_n$ (A) | Cross-section ($mm^2$) | I max. (A) |
| 0.12 | 0.44 | S503-KM1.6 | 1.6 | 16 | A9-30-10 | 20 | TA 25 DU 0.63 | 0.40–0.63 | 1.5 | 0.63 |
| 0.18 | 0.72 | S503-KM1.6 | 1.6 | 16 | A9-30-10 | 20 | TA 25 DU 1.00 | 0.63–1.00 | 1.5 | 1.0 |
| 0.25 | 0.83 | S503-KM1.6 | 1.6 | 16 | A9-30-10 | 20 | TA 25 DU 1.00 | 0.63–1.00 | 1.5 | 1 |
| 0.37 | 1.12 | S503-KM1.6 | 1.6 | 16 | A9-30-10 | 20 | TA 25 DU 1.40 | 1.00–1.40 | 1.5 | 1.4 |
| 0.55 | 1.45 | S503-KM2.5 | 2.5 | 25 | A9-30-10 | 20 | TA 25 DU 1.80 | 1.30–1.80 | 1.5 | 1.8 |
| 0.75 | 1.9 | S503-KM2.5 | 2.5 | 25 | A9-30-10 | 20 | TA 25 DU 2.40 | 1.70–2.40 | 1.5 | 2.4 |
| 1.1 | 2.59 | S503-KM4.0 | 4.0 | 45 | A12-30-10 | 20 | TA 25 DU 3.10 | 2.20–3.10 | 1.5 | 3.1 |
| 1.5 | 3.45 | S503-KM6.0 | 6.0 | 55 | A12-30-10 | 20 | TA 25 DU 4.00 | 2.80–4.00 | 1.5 | 4 |
| 1.65 | 4.4 | S503-KM6.0 | 6.0 | 55 | A16-30-10 | 20 | TA 25 DU 5.00 | 3.50–5.00 | 1.5 | 5 |
| 2.2 | 4.8 | S503-KM6.0 | 6.0 | 55 | A16-30-10 | 20 | TA 25 DU 6.50 | 4.50–6.50 | 1.5 | 6.5 |
| 3 | 6.48 | S503-KM9.0 | 9.0 | 100 | A16-30-10 | 20 | TA 25 DU 8.50 | 6.00–8.50 | 1.5 | 8.5 |
| 4 | 8.6 | S503-KM20 | 20.0 | 200 | A26-30-10 | 35 | TA 25 DU 11.0 | 7.50–11.0 | 1.5 | 11 |
| 5.5 | 11.1 | S503-KM20 | 20.0 | 200 | A26-30-10 | 35 | TA 25 DU 14.0 | 10.0–14.0 | 1.5 | 14 |
| 7.5 | 14.8 | S503-KM20 | 20.0 | 200 | A26-30-10 | 35 | TA 25 DU 19.0 | 13.0–19.0 | 1.5 | 19 |
| 11 | 21.5 | S503-KM32 | 32.0 | 400 | A26-30-10 | 35 | TA 25 DU 25.0 | 16.0–25.0 | 2.5 | 25 |
| 11 | 21.5 | S503-KM32 | 32.0 | 400 | A26-30-10 | 35 | TA 25 DU 25.0 | 18.0–25.0 | 4 | 25 |
| 15 | 28.5 | S503-KM32 | 32.0 | 400 | A30-30-10 | 35 | TA 25 DU 32.0 | 24.0–32.0 | 6 | 62 |
| 18.5 | 35 | S503-KM52 | 52.0 | 580 | A40-30-10 | 35 | TA 75 DU 42.0 | 29.0–42.0 | 6 | 42 |
| 22 | 41 | S503-KM63 | 63.0 | 800 | A50-30-00 | 35 | TA 75 DU 52.0 | 36.0–52.0 | 10 | 52 |

## Maximum cable lengths for protection against indirect contact (earth leakage current) to IEC 364-4-41

**Association**
An association is present when the short-circuit device (S503-KM) and the starter are fitted separately and connected by cable (see illustration). In this case, the rated breaking capacity of the short-circuit protection device must correspond at least with the short-circuit current occurring at the point of installation. For cable b, the maximum permissible cable lengths according to the table below must be taken into account.



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| Heavy Duty Circuit Breaker | | | Maximum permissible cable lengths and cross-sections | | | | |
|---|---|---|---|---|---|---|---|
| Type | Rated current $I_n$ (A) | Magnetic trip (± 10 %) $I_m$ (A) | 1.50 $mm^2$ L (m) | 2.50 $mm^2$ L (m) | 4.00 $mm^2$ L (m) | 6.00 $mm^2$ L (m) | 10.00 $mm^2$ L (m) |
| S503-KM1.6 | 1.6 | 16 | 1,120 | 1,850 | - | - | - |
| S503-KM2.5 | 2.5 | 25 | 700 | 1,200 | - | - | - |
| S503-KM4 | 4 | 45 | 400 | 660 | 1,050 | - | - |
| S503-KM6 | 6 | 55 | 325 | 540 | 870 | 1,300 | - |
| S503-KM9 | 9 | 100 | 180 | 300 | 480 | 720 | 1,200 |
| S503-KM20 | 20 | 200 | 90 | 150 | 240 | 360 | 600 |
| S503-KM32 | 32 | 400 | - | 75 | 120 | 180 | 300 |
| S503-KM52 | 52 | 580 | - | - | - | 120 | 200 |
| S503-KM63 | 63 | 800 | - | - | - | 90 | 150 |

If the line is longer than the specified length and a short-circuit to earth occurs, the magnetic trip no longer trips.

**On request**
Coordination tables S500 with A-contactors, No. 10107/B

# Heavy Duty Circuit Breakers S500
## Motor protection with separate overload protection: S503X-AG0084

## General

The S503X-AG0084 was developed as an alternative to the S503-KM. This high rated breaking capacity of 50 kA at 400 VAC simplifies application in installations with high short-circuit currents, for example, in substation distribution systems, the paper industry, etc. Additional overload protection is necessary for all applications. This can be a thermal overload relay or an electronic overload protection. Since the thermal overload relay trips on overload and the circuit breaker on short-circuit, the cause of the trip is apparent. The short-circuit is indicated via a signal contact in the S503X-AG0084. A motor overload is detected by the overload protection. The contactor provides operational switching of the motor.

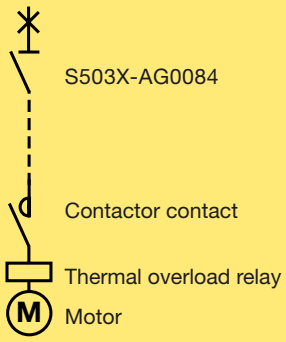
## Major features

- High rated operating voltage up to 690 VAC
- High rated breaking capacity of 65 kA at 400 VAC according to coordination type 2, page 23, per IEC 60947-4-1, with thermal overload relay
- High rated breaking capacity of 50 kA to 400 VAC per IEC 60947-4-1, with electronic overload protection, electronic INSUM
- Optimum coordination with A-contactors
- Compact and economical design
- Clear contact position indication for all poles
- Designed for the standard ABB rotary drive (tilting motion to rotary motion)
- Wide range of accessories

## Application connection diagram, motor protection

**S503X-AG0084**
**+**
**Contactor**
**+**
**Overload protection**
**e.g.**
**Thermal overload relay**
**Elec. overload protection**
**Elec. motor controller**

See page 12 for internal resistances $R_i$.




**Operational switching**
The S503X-AG0084 circuit breaker may be used up to a current rating of 9 A for a direct, operational switching of motors.

## Order data*

Motor protection

Characteristic AG0084

| Rated current (A) | Magnetic trip (A) (± 10 %) | Rated breaking capacity (kA) | type 3-pole | Module (25 mm) |
|---|---|---|---|---|
| 1.6 | 22 | 50 | **S503X-AG0084 1.6** | 3 |
| 2.5 | 34 | 50 | **S503X-AG0084 2.5** | 3 |
| 4 | 55 | 50 | **S503X-AG0084 4** | 3 |
| 6 | 83 | 50 | **S503X-AG0084 6** | 3 |
| 9 | 124 | 50 | **S503X-AG0084 9** | 3 |
| 20 | 275 | 50 | **S503X-AG0084 20** | 3 |
| 32 | 440 | 50 | **S503X-AG0084 32** | 3 |
| 52 | 715 | 50 | **S503X-AG0084 52** | 3 |
| 63 | 866 | 50 | **S503X-AG0084 63** | 3 |

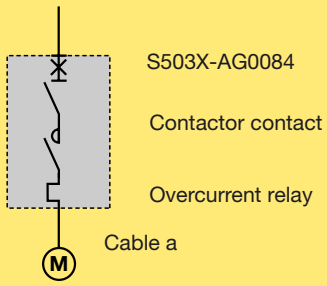
Module ≙ width of a single pole device

**On request**
*Delivery lead time

# Heavy Duty Circuit Breakers S500
# Motor protection with separate overload protection: S503X-AG0084

## Coordination table motor starter S503X-AG0084 according to IEC 60947-4-1, type 2, for 415 VAC, 65 kA with A-contactor and thermal overload relay

**Combination starter**
The data in the table below are applicable if the protective device and the starter are fitted in the same compartment or enclosure, or when supplied in separate parts and assembled by the installation technician.



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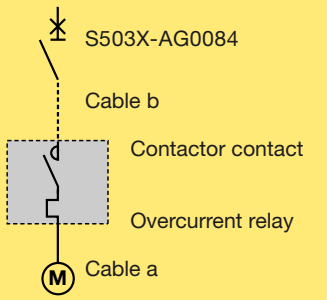
| Motor | | Heavy duty circuit breaker | | Contactor | | Thermal overload relay | | | Cable | Starter group |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated output $P_e$ (kW) | Rated current $I_n$ (A) | Type | Range of adjustment $I_n$ (A) | Magnetic trip (± 10 %) $I_m$ (A) | Type | Safety clearance (mm) | Type | Range of adjustment $I_n$ (A) | Cross-section ($mm^2$) | I max. (A) |
| 0.12 | 0.44 | S503X-AG0084 | 1.6 | 22 | A9-30-10 | 20 | TA 25 DU 0.63 | 0.40–0.63 | 1.5 | 0.63 |
| 0.18 | 0.72 | S503X-AG0084 | 1.6 | 22 | A9-30-10 | 20 | TA 25 DU 1.00 | 0.63–1.00 | 1.5 | 1.0 |
| 0.25 | 0.83 | S503X-AG0084 | 1.6 | 22 | A9-30-10 | 20 | TA 25 DU 1.00 | 0.63–1.00 | 1.5 | 1 |
| 0.37 | 1.12 | S503X-AG0084 | 1.6 | 22 | A9-30-10 | 20 | TA 25 DU 1.40 | 1.00–1.40 | 1.5 | 1.4 |
| 0.55 | 1.45 | S503X-AG0084 | 2.5 | 34 | A3 30 -10 | 20 | TA 25 DU 1.80 | 1.30–1.80 | 1.5 | 1.8 |
| 0.75 | 1.9 | S503X-AG0084 | 2.5 | 34 | A9-30-10 | 20 | TA 25 DU 2.40 | 1.70–2.40 | 1.5 | 2.4 |
| 1.1 | 2.59 | S503X-AG0084 | 4.0 | 55 | A9-30-10 | 20 | TA 25 DU 3.10 | 2.20–3.10 | 1.5 | 3.1 |
| 1.5 | 3.45 | S503X-AG0084 | 6.0 | 83 | A9-30-10 | 20 | TA 25 DU 4.00 | 2.80–4.00 | 1.5 | 4 |
| 1.85 | 4.4 | S503X-AG0084 | 6.0 | 83 | A12-30-10 | 20 | TA 25 DU 5.00 | 3.50–5.00 | 1.5 | 5 |
| 2.2 | 4.8 | S503X-AG0084 | 6.0 | 83 | A12-30-10 | 20 | TA 25 DU 6.50 | 4.50–6.50 | 1.5 | 6.5 |
| 3 | 6.48 | S503X-AG0084 | 9.0 | 124 | A12-30-10 | 20 | TA 25 DU 8.50 | 6.00–8.50 | 1.5 | 8.5 |
| 4 | 8.6 | S503X-AG0084 | 20.0 | 275 | A16-30-10 | 35 | TA 25 DU 11.0 | 7.50–11.0 | 1.5 | 11 |
| 5.5 | 11.1 | S503X-AG0084 | 20.0 | 275 | A16-30-10 | 35 | TA 25 DU 14.0 | 10.0–14.0 | 1.5 | 14 |
| 7.5 | 14.8 | S503X-AG0084 | 20.0 | 275 | A26-30-10 | 35 | TA 25 DU 19.0 | 13.0–19.0 | 1.5 | 19 |
| 11 | 21.5 | S503X-AG0084 | 32.0 | 440 | A20-30-10 | 85 | TA 25 DU 25.0 | 18.0–25.0 | 2.5 | 25 |
| 11 | 21.5 | S503X-AG0084 | 32.0 | 440 | A26-30-10 | 35 | TA 25 DU 25.0 | 18.0–25.0 | 4 | 25 |
| 15 | 28.5 | S503X-AG0084 | 32.0 | 440 | A30-30-10 | 35 | TA 25 DU 32.0 | 24.0–32.0 | 6 | 32 |
| 18.5 | 35 | S503X-AG0084 | 52.0 | 715 | A40-30-10 | 35 | TA 75 DU 42.0 | 29.0–42.0 | 6 | 42 |
| 22 | 41 | S503X-AG0084 | 63.0 | 866 | A50-30-00 | 35 | TA 75 DU 52.0 | 36.0–52.0 | 10 | 52 |

## Maximum cable lengths for protection against indirect contact (earth leakage current) to IEC 364-4-41

**Association**
An association is present when the short-circuit device (S503X-AG0084) and the starter are fitted separately and connected by cable (see illustration). In this case, the rated breaking capacity of the short-circuit protection device must correspond at least with the short-circuit current occurring at the point of installation. For cable b, the maximum permissible cable lengths according to the table below must be taken into account.



Z100062.eps

| Heavy Duty Circuit Breaker Type | | Rated current $I_n$ (A) | Magnetic trip (± 10 %) $I_m$ (A) | Maximum permissible cable lengths and cross-sections 1.50 $mm^2$ L (m) | 2.50 $mm^2$ L (m) | 4.00 $mm^2$ L (m) | 6.00 $mm^2$ L (m) | 10.00 $mm^2$ L (m) |
|---|---|---|---|---|---|---|---|---|
| S503X-AG0084 | 1.6 | 1.6 | 22 | 815 | 1,360 | - | - | - |
| S503X-AG0084 | 2.5 | 2.5 | 34 | 525 | 880 | - | - | - |
| S503X-AG0084 | 4 | 4 | 55 | 325 | 540 | 870 | - | - |
| S503X-AG0084 | 6 | 6 | 83 | 215 | 360 | 575 | 865 | - |
| S503X-AG0084 | 9 | 9 | 124 | 145 | 240 | 385 | 580 | 965 |
| S503X-AG0084 | 20 | 20 | 275 | 65 | 110 | 175 | 260 | 435 |
| S503X-AG0084 | 32 | 32 | 440 | - | 70 | 110 | 160 | 270 |
| S503X-AG0084 | 52 | 52 | 715 | - | - | - | 100 | 170 |
| S503X-AG0084 | 63 | 63 | 866 | - | - | - | 80 | 140 |

If the line is longer than the specified length and a short-circuit to earth occurs, the magnetic trip no longer trips.

**On request**
Coordination tables S500 with A-contactors, No. 10107/B

# Heavy Duty Circuit Breakers S500
## DC circuit protection: S500UC-B, S500UC-K



## General

The S500UC Heavy Duty Circuit Breaker is intended for DC applications such as railway systems, electroplating and DC networks.
Voltages up to 250 VDC per pole can be switched with time constants of ≤ 15 ms.
Higher voltages (up to 750 VDC + 20 %) are switched by series connection (polarity-independent), see page 25.

## Major features

- High rated operating voltage up to 750 VDC
- High rated breaking capacity 30 kA (250 VDC, 500 VDC, 750 VDC)
- Independent polarity connection
- Fixed and adjustable versions
- Compact dimensions, DIN cap size
- Clear contact position indication for all poles
- Wide range of accessories

## Order data

DC circuit protection

Characteristic **B**

| Rated Current (A) | Type **1-pole** | Module (25 mm) | Type **2-pole** | Module (25 mm) | Type **3-pole** | Module (25 mm) | Type **4-pole** | Module (25 mm) |
|---|---|---|---|---|---|---|---|---|
| 6 | **S501UC-B6** | 1 | **S502UC-B6** | 2 | **S503UC-B6** | 3 | **S504UC-B6** | 4 |
| 10 | **S501UC-B10** | 1 | **S502UC-B10** | 2 | **S503UC-B10** | 3 | **S504UC-B10** | 4 |
| 13 | **S501UC-B13** | 1 | **S502UC-B13** | 2 | **S503UC-B13** | 3 | **S504UC-B13** | 4 |
| 16 | **S501UC-B16** | 1 | **S502UC-B16** | 2 | **S503UC-B16** | 3 | **S504UC-B16** | 4 |
| 20 | **S501UC-B20** | 1 | **S502UC-B20** | 2 | **S503UC-B20** | 3 | **S504UC-B20** | 4 |
| 25 | **S501UC-B25** | 1 | **S502UC-B25** | 2 | **S503UC-B25** | 3 | **S504UC-B25** | 4 |
| 32 | **S501UC-B32** | 1 | **S502UC-B32** | 2 | **S503UC-B32** | 3 | **S504UC-B32** | 4 |
| 40 | **S501UC-B40** | 1 | **S502UC-B40** | 2 | **S503UC-B40** | 3 | **S504UC-B40** | 4 |
| 50 | **S501UC-B50** | 1 | **S502UC-B50** | 2 | **S503UC-B50** | 3 | **S504UC-B50** | 4 |
| 63 | **S501UC-B63** | 1 | **S502UC-B63** | 2 | **S503UC-B63** | 3 | **S504UC-B63** | 4 |

Characteristic **K**

| Range of adjustment (A) | Type **1-pole** | Module (25 mm) | Type **2-pole** | Module (25 mm) | Type **3-pole** | Module (25 mm) | Type **4-pole** | Module (25 mm) |
|---|---|---|---|---|---|---|---|---|
| 0.1 - 0.15 | **S501UC-K0.15** | 1 | **S502UC-K0.15** | 2 | **S503UC-K0.15** | 3 | **S504UC-K0.15** | 4 |
| 0.14 - 0.21 | **S501UC-K0.21** | 1 | **S502UC-K0.21** | 2 | **S503UC-K0.21** | 3 | **S504UC-K0.21** | 4 |
| 0.2 - 0.3 | **S501UC-K0.3** | 1 | **S502UC-K0.3** | 2 | **S503UC-K0.3** | 3 | **S504UC-K0.3** | 4 |
| 0.28 - 0.42 | **S501UC-K0.42** | 1 | **S502UC-K0.42** | 2 | **S503UC-K0.42** | 3 | **S504UC-K0.42** | 4 |
| 0.38 - 0.58 | **S501UC-K0.58** | 1 | **S502UC-K0.58** | 2 | **S503UC-K0.58** | 3 | **S504UC-K0.58** | 4 |
| 0.53 - 0.8 | **S501UC-K0.8** | 1 | **S502UC-K0.8** | 2 | **S503UC-K0.8** | 3 | **S504UC-K0.8** | 4 |
| 0.73 - 1.1 | **S501UC-K1.1** | 1 | **S502UC-K1.1** | 2 | **S503UC-K1.1** | 3 | **S504UC-K1.1** | 4 |
| 1 - 1.5 | **S501UC-K1.5** | 1 | **S502UC-K1.5** | 2 | **S503UC-K1.5** | 3 | **S504UC-K1.5** | 4 |
| 1.4 - 2.1 | **S501UC-K2.1** | 1 | **S502UC-K2.1** | 2 | **S503UC-K2.1** | 3 | **S504UC-K2.1** | 4 |
| 2 - 3 | **S501UC-K3** | 1 | **S502UC-K3** | 2 | **S503UC-K3** | 3 | **S504UC-K3** | 4 |
| 2.8 - 4.2 | **S501UC-K4.2** | 1 | **S502UC-K4.2** | 2 | **S503UC-K4.2** | 3 | **S504UC-K4.2** | 4 |
| 3.8 - 5.8 | **S501UC-K5.8** | 1 | **S502UC-K5.8** | 2 | **S503UC-K5.8** | 3 | **S504UC-K5.8** | 4 |
| 5.3 - 8 | **S501UC-K8** | 1 | **S502UC-K8** | 2 | **S503UC-K8** | 3 | **S504UC-K8** | 4 |
| 7.3 - 11 | **S501UC-K11** | 1 | **S502UC-K11** | 2 | **S503UC-K11** | 3 | **S504UC-K11** | 4 |
| 10 - 15 | **S501UC-K15** | 1 | **S502UC-K15** | 2 | **S503UC-K15** | 3 | **S504UC-K15** | 4 |
| 14 - 20 | **S501UC-K20** | 1 | **S502UC-K20** | 2 | **S503UC-K20** | 3 | **S504UC-K20** | 4 |
| 18 - 26 | **S501UC-K26** | 1 | **S502UC-K26** | 2 | **S503UC-K26** | 3 | **S504UC-K26** | 4 |
| 23 - 32 | **S501UC-K32** | 1 | **S502UC-K32** | 2 | **S503UC-K32** | 3 | **S504UC-K32** | 4 |
| 29 - 37 | **S501UC-K37** | 1 | **S502UC-K37** | 2 | **S503UC-K37** | 3 | **S504UC-K37** | 4 |
| 34 - 41 | **S501UC-K41** | 1 | **S502UC-K41** | 2 | **S503UC-K41** | 3 | **S504UC-K41** | 4 |
| 38 - 45 | **S501UC-K45** | 1 | **S502UC-K45** | 2 | **S503UC-K45** | 3 | **S504UC-K45** | 4 |

Module ≙ width of a single pole device

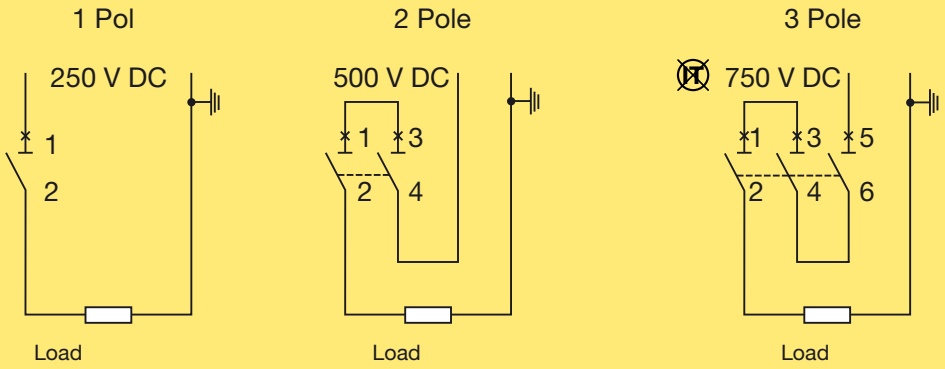
**On request**
*Delivery lead time

## DC applications

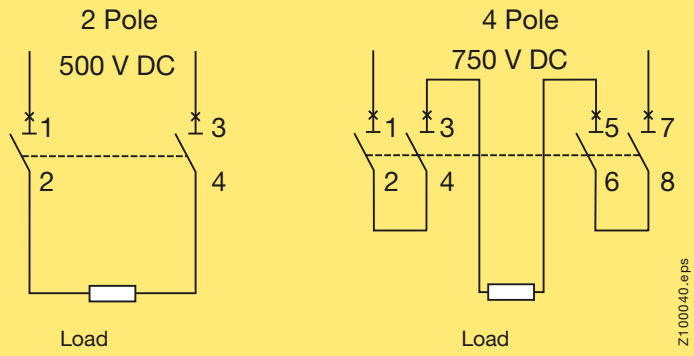
The product series S500UC-B (fixed rated current) and S500UC-K (adjustable rated current) are used in DC railway systems (locomotives, trams, underground railways etc.), DC motors, DC networks, solar installations, electroplating baths, emergency power supplies (UPS), lifts and elevators, door controllers and signalling.

## Connection diagrams

Earthed network

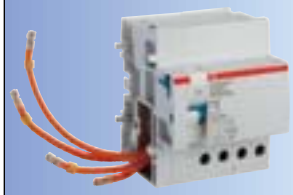



Unearthed network



# Heavy Duty Circuit Breakers S500
## Customer-fitted RCD protection with overload protection: DDA






## General

The DDA500 residual current protection family is a residual current circuit breaker that can be fitted by the customer and mounted on the S500 Heavy Duty Circuit Breaker. The DDA500 can be employed for sinusoidal AC residual currents as well as for impulse residual currents in DC circuits. Depending on the requirements, the DDA500 system can be classified into 2 categories.

- DDA560 and DDA 570
  - The DDA 560 is suitable for applications with sinusoidal AC residual currents (type AC)
  - The DDA 570 is suitable for applications with impulse residual currents in DC circuits (type A)
- DDA590
  - The DDA 590 is suitable for applications with impulse residual currents in DC circuits (type A) and operates selectively with respect to downstream, sensitive residual current circuit breakers

## Major features

- The DDA500 can be fitted by the customer to the S500 Heavy Duty Circuit Breakers
- Large range of residual currents at 30 mA, 300 mA, 500 mA, 1,000 mA
  (The S500-B6, S500-C6, S500-D6 and the S500-K series are excluded)

## Order data

RCD protection with overload protection

Sensitivity AC
DDA560

| Rated trip current $I_{\Delta n}$ | Rated current (A) | Type **2-pole 50…60 Hz)** | Type **3-pole 50…60 Hz)** | Type **4-pole 50…60 Hz)** |
|---|---|---|---|---|
| **30 mA** | 63 | **EY8302** | **EY8328** | **EY8344** |
| **300 mA** | 63 | **EY8310** | **EY8336** | **EY8351** |

Sensitivity A
DDA570

| | | | | |
|---|---|---|---|---|
| **30 mA** | 63 | **EY8369** | **EY8385** | **EY8401** |
| **300 mA** | 63 | **EY8377** | **EY8393** | **EY8419** |

Sensitivity A (selective)
DDA590

| | | | | |
|---|---|---|---|---|
| **300 mA** | 63 | | | **EY8427** |
| **500 mA** | 63 | | | **EY8435** |
| **1000 mA** | 63 | | | **EY8443** |

# Heavy Duty Circuit Breakers S500
# RCD protection with circuit protection F500-C, F500-D

## General

The Heavy Duty Circuit Breaker type F500 is suitable as a miniature circuit breaker in all types of applications. Furthermore the F500 is equipped with a residual current trip.
The residual current trip is effective with sinusoidal AC and pulsating DC residual currents (type A, according to EN 61009-1).
The F500 Heavy Duty Circuit Breaker ensures powerful protection in high power networks against:

- direct contact with an energised conductor
- dangerous residual currents from excessive shock hazard voltages by physical contact (protection from indirect contact with an operating circuit)
- electrical burns from partial earth contact
- overload and short circuit

## Major features

- High rated operating voltage up to 400/690 VAC
- High rated breaking capacity of 50 kA at 230/400 VAC
- Clear contact position indication for all poles
- Back-up protection of downstream miniature circuit breakers (MCBs)
- Wide range of accessories

2-pole


3-pole


4-pole


## Order data

RCD protection with circuit protection

Characteristic C

| Rated trip current $I_{\Delta n}$ | Rated current (A) | Type **2-pole (L+NA, 230 VAC, 45…60 Hz)** | PE (25 mm) | Type **3-pole (3L, 400 VAC, 45…60 Hz)** | PE (25 mm) | Type **4-pole (3L+NA, 230/400 VAC, 45…60 Hz)** | PE (25 mm) |
|---|---|---|---|---|---|---|---|
| **10 mA** | 10 | **F502-C10/0.01** | 3 | **F503-C10/0.01** | 4 | **F504-C10/0.01** | 5 |
| | 13 | **F502-C13/0.01** | 3 | **F503-C13/0.01** | 4 | **F504-C13/0.01** | 5 |
| | 16 | **F502-C16/0.01** | 3 | **F503-C16/0.01** | 4 | **F504-C16/0.01** | 5 |
| | 20 | **F502-C20/0.01** | 3 | | | | |
| | 25 | **F502-C25/0.01** | 3 | | | | |
| **30 mA** | 10 | **F502-C10/0.03** | 3 | **F503-C10/0.03** | 4 | **F504-C10/0.03** | 5 |
| | 13 | **F502-C13/0.03** | 3 | **F503-C13/0.03** | 4 | **F504-C13/0.03** | 5 |
| | 16 | **F502-C16/0.03** | 3 | **F503-C16/0.03** | 4 | **F504-C16/0.03** | 5 |
| | 20 | **F502-C20/0.03** | 3 | **F503-C20/0.03** | 4 | **F504-C20/0.03** | 5 |
| | 25 | **F502-C25/0.03** | 3 | **F503-C25/0.03** | 4 | **F504-C25/0.03** | 5 |
| | 40 | **F502-C40/0.03** | 3 | **F503-C40/0.03** | 4 | **F504-C40/0.03** | 5 |
| | 50 | **F502-C50/0.03** | 3 | **F503-C50/0.03** | 4 | **F504-C50/0.03** | 5 |
| | 63 | **F502-C63/0.03** | 3 | **F503-C63/0.03** | 4 | **F504-C63/0.03** | 5 |
| **300 mA** | 10 | **F502-C10/0.3** | 3 | **F503-C10/0.3** | 4 | **F504-C10/0.3** | 5 |
| | 13 | **F502-C13/0.3** | 3 | **F503-C13/0.3** | 4 | **F504-C13/0.3** | 5 |
| | 16 | **F502-C16/0.3** | 3 | **F503-C16/0.3** | 4 | **F504-C16/0.3** | 5 |
| | 20 | **F502-C20/0.3** | 3 | **F503-C20/0.3** | 4 | **F504-C20/0.3** | 5 |
| | 25 | **F502-C25/0.3** | 3 | **F503-C25/0.3** | 4 | **F504-C25/0.3** | 5 |
| | 40 | **F502-C40/0.3** | 3 | **F503-C40/0.3** | 4 | **F504-C40/0.3** | 5 |
| | 50 | **F502-C50/0.3** | 3 | **F503-C50/0.3** | 4 | **F504-C50/0.3** | 5 |
| | 63 | **F502-C63/0.3** | 3 | **F503-C63/0.3** | 4 | **F504-C63/0.3** | 5 |

Characteristic D

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **30 mA** | 25 | **F502-D25/0.03** | 3 | **F503-D25/0.03** | 4 | **F504-D25/0.03** | 5 |
| | 40 | **F502-D40/0.03** | 3 | **F503-D40/0.03** | 4 | **F504-D40/0.03** | 5 |
| | 63 | **F502-D63/0.03** | 3 | **F503-D63/0.03** | 4 | **F504-D63/0.03** | 5 |
| **300 mA** | 25 | **F502-D25/0.3** | 3 | **F503-D25/0.3** | 4 | **F504-D25/0.3** | 5 |
| | 40 | **F502-D40/0.3** | 3 | **F503-D40/0.3** | 4 | **F504-D40/0.3** | 5 |
| | 63 | **F502-D63/0.3** | 3 | **F503-D63/0.3** | 4 | **F504-D63/0.3** | 5 |

**On request**

Rated operating voltages: 110 VAC, 500 VAC, (10 mA, 30 mA types)
110 VAC, 500 VAC, 690 VAC (300 mA types)
Rated residual current $I_D n$: 500 mA, 1,000 mA (only type AC for 1,000 mA)
Rated frequencies: 16⅔ Hz, 400 Hz

Module ≙ width of a single pole device

# Heavy Duty Circuit Breakers S500
## Short-delay RCD protection with circuit protection: F500K…0.03 G
## Selective residual current protection with circuit protection: F500S…0.3 S


## General

The F500K…0.03 G short-delay residual current circuit breaker differs from the F500S…0.3 S selective residual current protection by its significantly shorter delay times.
The F500K…0.03 G should therefore be used to avoid undesired tripping, while the F500S…0.3 S ensures selectivity with respect to downstream, more sensitive RCD circuit breakers.

## F500K…0.03 G Short-delay RCD circuit breaker

The F500K…0.03 G Short-delay Heavy Duty Circuit Breaker is a residual current breaker that is specially suitable for unfavourable operating and network conditions. Without impairing the personal protection function, the electronic delay suppresses faulty tripping, which can occur as a result of capacitive discharge currents.

Capacitive discharge currents accompanied by high current peaks can be caused by:

- Long line capacitance
- Large number of fluorescent lamps (particularly when using electronic ballast units)
- Electronic equipment and components (PC terminals, PLCs, voltage converters etc.)
- Transient network overvoltages

## Major features

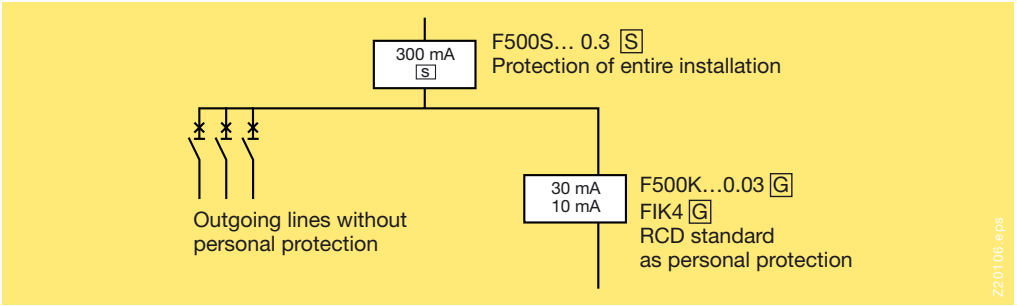
- High rated operating voltage up to 400/690 VAC
- High rated breaking capacity of 50 kA at 230/400 VAC
- RCD pulsating DC sensitivity ⏦ (type A, according to EN 61009-1)
- RCD short-delay G and selective S types

## Delayed, selective residual current circuit breaker F500S…0.3 S

The delayed RCD circuit breaker also bears the symbol S in addition to its type designation.
F500S…0.3 S selective residual current circuit breakers ensure selectivity with respect to downstream sensitive RCD circuit breakers. F500S…0.3 S selective residual current circuit breakers are only used for material protection and are therefore only available in a 300 mA version.
Subsequent short-delay G types also behave selectively if connected downstream of a F500S…0.3 S.

**Application example for selective residual current circuit breaker**

- Selective series connection of residual current circuit breakers, e.g. F500…0.3 S (fire protection, material protection) and RCD 10 mA (standard, personal protection).
- In areas subject to lightning strikes, the delay inhibits nuisance trip of the RC circuit breaker, which are caused by overvoltages arising from short-delay atmospheric discharges.
- Electrical equipment with long supply cables and floor heaters cause capacitive discharge currents when switched on. These relatively high inrush current peaks can trip undelayed RCD circuit breakers. The inbuilt delay prevents this from happening.




## Technical Data

| EN 61009 | F500 (Standard) | F500K…0.03 G | F500S…0.3 S |
|---|---|---|---|
| Impulse current withstand | 250 A, 8/20 µs | 3 kA, 8/20 µs | 5 kA, 8/20 µs |
| Standard according to regulation: | | | |
| - with $I_{\Delta n}$ | 300 ms | 10…300 ms | 130…500 ms |
| - with 5 $I_{\Delta n}$ | 40 ms | 10… 40 ms | 50…150 ms |
| Total breaking time (mean value) | | | |
| - with $I_{\Delta n}$ | 40 ms | 240 ms | 300 ms |
| - with 5 $I_{Dn}$ | 25 ms | 35 ms | 115 ms |
| Time delay for 5 $I_{\Delta n}$ | – | 10 ms | 90 ms |

# Heavy Duty Circuit Breakers S500
## Short-delay RCD protection with circuit protection: F500K…0.03 G
## Selective residual current protection with overload protection: F500S…0.3 S

2-pole


3-pole


4-pole


## Order data

Short-delay residual current circuit breaker with overload protection

Characteristic C

| Rated tripping current $I_{\Delta n}$ | Rated current (A) | Type G 2-pole (L+NA, 230 VAC, 45…60 Hz) | Module (25 mm) | Type G 3-pole (3L, 400 VAC, 45…60 Hz) | Module (25 mm) | Type G 4-pole (3L+NA, 230/400 VAC, 45…60 Hz) | Module (25 mm) |
|---|---|---|---|---|---|---|---|
| **30 mA** | 16 | **F502K-C16/0.03** | 3 | **F503K-C16/0.03** | 4 | **F504K-C16/0.03** | 5 |
| | 25 | **F502K-C25/0.03** | 3 | **F503K-C25/0.03** | 4 | **F504K-C25/0.03** | 5 |
| | 40 | **F502K-C40/0.03** | 3 | **F503K-C40/0.03** | 4 | **F504K-C40/0.03** | 5 |
| | 63 | **F502K-C63/0.03** | 3 | **F503K-C63/0.03** | 4 | **F504K-C63/0.03** | 5 |

Characteristic D

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **30 mA** | 16 | **F502K-D16/0.03** | 3 | **F503K-D16/0.03** | 4 | **F504K-D16/0.03** | 5 |
| | 25 | **F502K-D25/0.03** | 3 | **F503K-D25/0.03** | 4 | **F504K-D25/0.03** | 5 |
| | 40 | **F502K-D40/0.03** | 3 | **F503K-D40/0.03** | 4 | **F504K-D40/0.03** | 5 |
| | 63 | **F502K-D63/0.03** | 3 | **F503K-D63/0.03** | 4 | **F504K-D63/0.03** | 5 |

## Order data

Selective residual current circuit breaker with overload protection

| Rated tripping current $I_{\Delta n}$ | Rated current (A) | Type S 2-pole (L+NA, 230 VAC, 45…60 Hz) | Module (25 mm) | Type S 3-pole (3L, 400 VAC, 45…60 Hz) | Module (25 mm) | Type S 4-pole (3L+NA, 230/400 VAC, 45…60 Hz) | Module (25 mm) |
|---|---|---|---|---|---|---|---|

Characteristic C

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **300 mA** | 16 | **F502S-C16/0.3** | 3 | **F503S-C16/0.3** | 4 | **F504S-C16/0.3** | 5 |
| | 25 | **F502S-C25/0.3** | 3 | **F503S-C25/0.3** | 4 | **F504S-C25/0.3** | 5 |
| | 40 | **F502S-C40/0.3** | 3 | **F503S-C40/0.3** | 4 | **F504S-C40/0.3** | 5 |
| | 63 | **F502S-C63/0.3** | 3 | **F503S-C63/0.3** | 4 | **F504S-C63/0.3** | 5 |

Characteristic D

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **300 mA** | 16 | **F502S-D16/0.3** | 3 | **F503S-D16/0.3** | 4 | **F504S-D16/0.3** | 5 |
| | 25 | **F502S-D25/0.3** | 3 | **F503S-D25/0.3** | 4 | **F504S-D25/0.3** | 5 |
| | 40 | **F502S-D40/0.3** | 3 | **F503S-D40/0.3** | 4 | **F504S-D40/0.3** | 5 |
| | 63 | **F502S-D63/0.3** | 3 | **F503S-D63/0.3** | 4 | **F504S-D63/0.3** | 5 |

**On request**

Rated operating voltages: 110 VAC, 500 VAC, (30 mA types)
110 VAC, 500 VAC, 690 VAC (300 mA types)

Rated residual current $I_{\Delta}n$: 1000 mA S

Module ≙ width of a single pole device

# Heavy Duty Circuit Breakers S500
# RCD protection with motor protection F500-K


## General

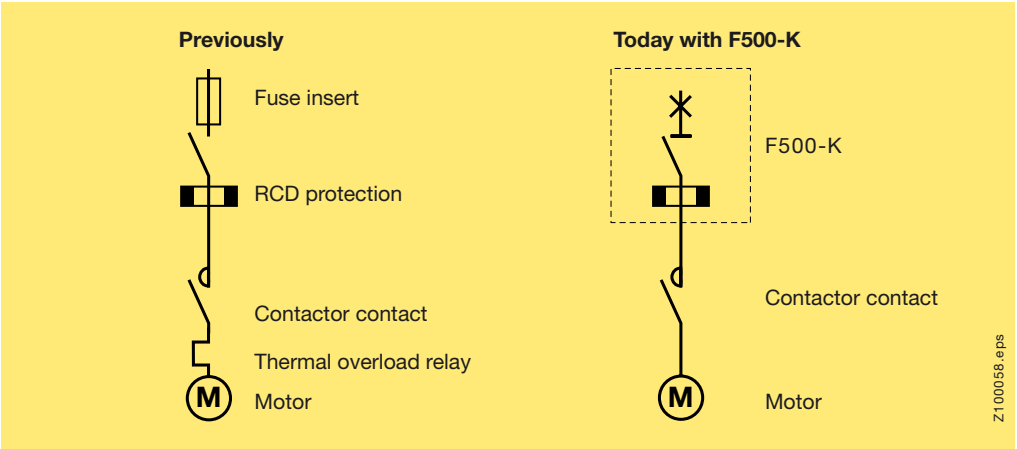
The F500-K circuit breaker is an overcurrent breaker with motor protection characteristic.
The residual current Trip is effective with sinusoidal AC and pulsating DC residual currents (type A, according to EN 61009-1).
The F500 Heavy Duty Circuit Breaker ensures powerful protection in high power networks against:

- dangerous residual currents from excessive shock hazard voltages by physical contact
- overheating of electrical operating equipment (motors) by overcurrent
- overload and short circuit

## Major features

- High rated operating voltage up to 690 VAC
- All poles disconnected in event of a fault
- No need for thermal trip on contactor
- The cable cross-sections from F500-K to the motor can be dimensioned for the rated current set on the S500-K
- Short-delay RCD protection switch 30 mA G types for special applications, such as frequency converter, soft-start, etc.

## Application connection diagram, residual current protection with motor protection





**Operational switching**
The F500-K Heavy Duty Circuit Breaker may be used up to a current rating of 11 A for direct, operational switching of motors.

**Starting conditions**
The motor starting time should not be longer than 2.5 seconds to avoid nuisance tripping, which occurs when a motor is started repeatedly in quick succession.

3-pole


4-pole


## Order data

RCD protection with motor protection

Characteristic K

| Rated tripping current $I_{\Delta n}$ | Range of adjustment (A) | Type **3-pole (3L, 400 VAC, 45…60 Hz)** | Module (25 mm) | Type **4-pole (3L+NA, 230/400 VAC, 45…60 Hz)** | Module (25 mm) |
|---|---|---|---|---|---|
| **10 mA** | 0.28 - 0.42 | **F503-K0.42/0.01** | 4 | **F504-K0.42/0.01** | 5 |
| | 0.38 - 0.58 | **F503-K0.58/0.01** | 4 | **F504-K0.58/0.01** | 5 |
| | 0.53 - 0.8 | **F503-K0.8/0.01** | 4 | **F504-K0.8/0.01** | 5 |
| | 0.73 - 1.1 | **F503-K1.1/0.01** | 4 | **F504-K1.1/0.01** | 5 |
| | 1 - 1.5 | **F503-K1.5/0.01** | 4 | **F504-K1.5/0.01** | 5 |
| | 1.4 - 2.1 | **F503-K2.1/0.01** | 4 | **F504-K2.1/0.01** | 5 |
| | 2 - 3 | **F503-K3/0.01** | 4 | **F504-K3/0.01** | 5 |
| | 2.8 - 4.2 | **F503-K4.2/0.01** | 4 | **F504-K4.2/0.01** | 5 |
| | 3.8 - 5.8 | **F503-K5.8/0.01** | 4 | **F504-K5.8/0.01** | 5 |
| | 5.3 - 8 | **F503-K8/0.01** | 4 | **F504-K8/0.01** | 5 |
| | 7.3 - 11 | **F503-K11/0.01** | 4 | **F504-K11/0.01** | 5 |
| | 10 - 15 | **F503-K15/0.01** | 4 | **F504-K15/0.01** | 5 |
| **30 mA** | 0.73 - 1.1 | **F503-K1.1/0.03** | 4 | **F504-K1.1/0.03** | 5 |
| | 1 - 1.5 | **F503-K1.5/0.03** | 4 | **F504-K1.5/0.03** | 5 |
| | 1.4 - 2.1 | **F503-K2.1/0.03** | 4 | **F504-K2.1/0.03** | 5 |
| | 2 - 3 | **F503-K3/0.03** | 4 | **F504-K3/0.03** | 5 |
| | 2.8 - 4.2 | **F503-K4.2/0.03** | 4 | **F504-K4.2/0.03** | 5 |
| | 3.8 - 5.8 | **F503-K5.8/0.03** | 4 | **F504-K5.8/0.03** | 5 |
| | 5.3 - 8 | **F503-K8/0.03** | 4 | **F504-K8/0.03** | 5 |
| | 7.3 - 11 | **F503-K11/0.03** | 4 | **F504-K11/0.03** | 5 |
| | 10 - 15 | **F503-K15/0.03** | 4 | **F504-K15/0.03** | 5 |
| | 14 - 20 | **F503-K20/0.03** | 4 | **F504-K20/0.03** | 5 |
| | 18 - 26 | **F503-K26/0.03** | 4 | **F504-K26/0.03** | 5 |
| | 23 - 32 | **F503-K32/0.03** | 4 | **F504-K32/0.03** | 5 |
| | 29 - 37 | **F503-K37/0.03** | 4 | **F504-K37/0.03** | 5 |
| | 34 - 41 | **F503-K41/0.03** | 4 | **F504-K41/0.03** | 5 |
| | 38 - 45 | **F503-K45/0.03** | 4 | **F504-K45/0.03** | 5 |

Short-delay RCD protection breaker, type G

| | | | | | |
|---|---|---|---|---|---|
| **30 mA G** | 10 - 15 | **F503K-K15/0.03** | 4 | **F504K-K15/0.03** | 5 |
| | 14 - 20 | **F503K-K20/0.03** | 4 | **F504K-K20/0.03** | 5 |
| | 18 - 26 | **F503K-K26/0.03** | 4 | **F504K-K26/0.03** | 5 |
| | 23 - 32 | **F503K-K32/0.03** | 4 | **F504K-K32/0.03** | 5 |
| | 29 - 37 | **F503K-K37/0.03** | 4 | **F504K-K37/0.03** | 5 |
| | 34 - 41 | **F503K-K41/0.03** | 4 | **F504K-K41/0.03** | 5 |
| | 38 - 45 | **F503K-K45/0.03** | 4 | **F504K-K45/0.03** | 5 |

See page 16 for RCD technical data

| | | | | | |
|---|---|---|---|---|---|
| **300 mA** | 2.8 - 4.2 | **F503-K4.2/0.3** | 4 | **F504-K4.2/0.3** | 5 |
| | 3.8 - 5.8 | **F503-K5.8/0.3** | 4 | **F504-K5.8/0.3** | 5 |
| | 5.3 - 8 | **F503-K8/0.3** | 4 | **F504-K8/0.3** | 5 |
| | 7.3 - 11 | **F503-K11/0.3** | 4 | **F504-K11/0.3** | 5 |
| | 10 - 15 | **F503-K15/0.3** | 4 | **F504-K15/0.3** | 5 |
| | 14 - 20 | **F503-K20/0.3** | 4 | **F504-K20/0.3** | 5 |
| | 18 - 26 | **F503-K26/0.3** | 4 | **F504-K26/0.3** | 5 |
| | 23 - 32 | **F503-K32/0.3** | 4 | **F504-K32/0.3** | 5 |
| | 29 - 37 | **F503-K37/0.3** | 4 | **F504-K37/0.3** | 5 |
| | 34 - 41 | **F503-K41/0.3** | 4 | **F504-K41/0.3** | 5 |
| | 38 - 45 | **F503-K45/0.3** | 4 | **F504-K45/0.3** | 5 |

**On request**

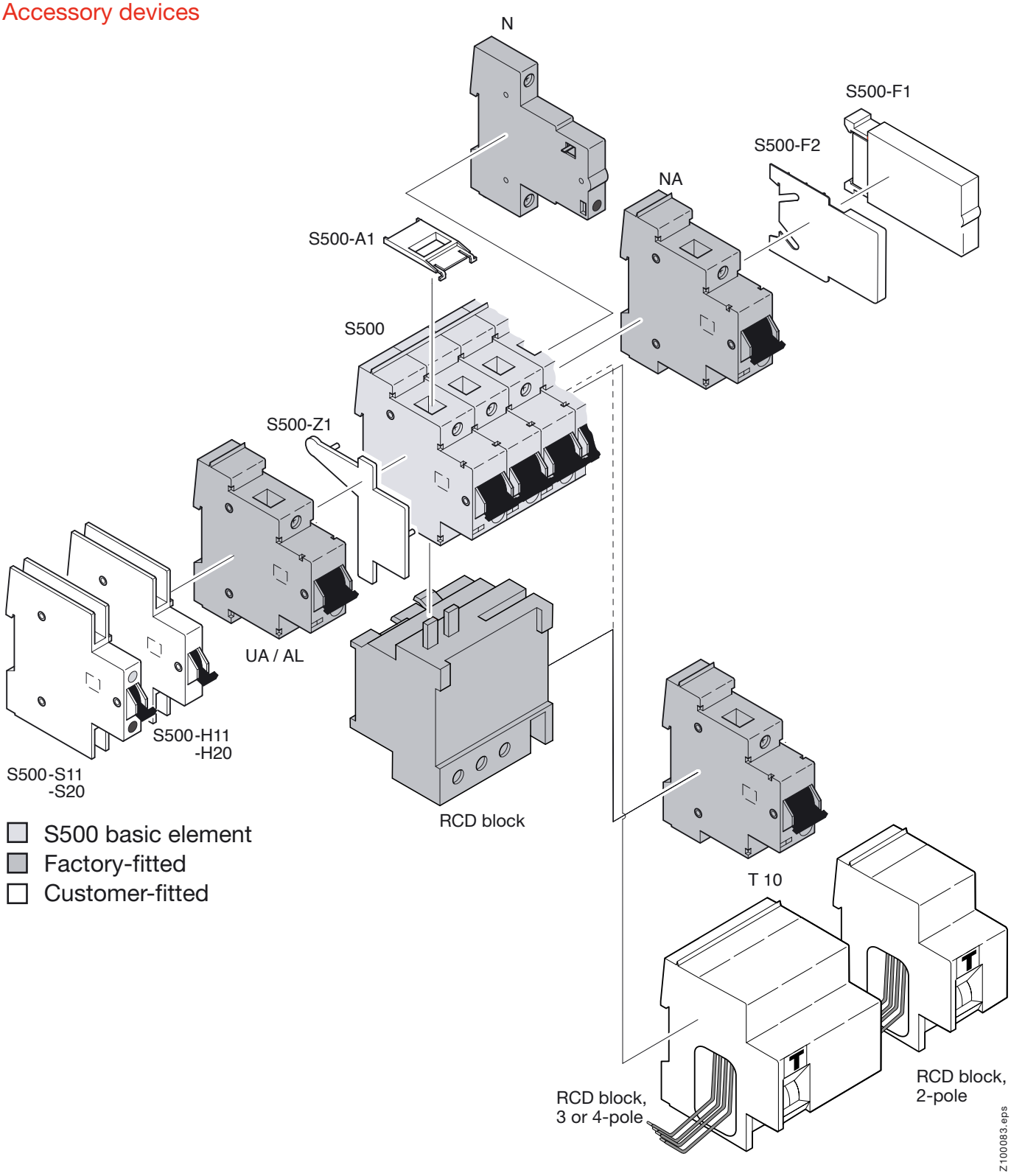
Rated operating voltages: 110 VAC, 500 VAC (10 mA, 30 mA types)
110 VAC, 500 VAC, 690 VAC (300 mA types)

Rated frequencies: 16⅔ Hz, 400 Hz (10 mA, 30 mA, 300 mA types, **non** G types)

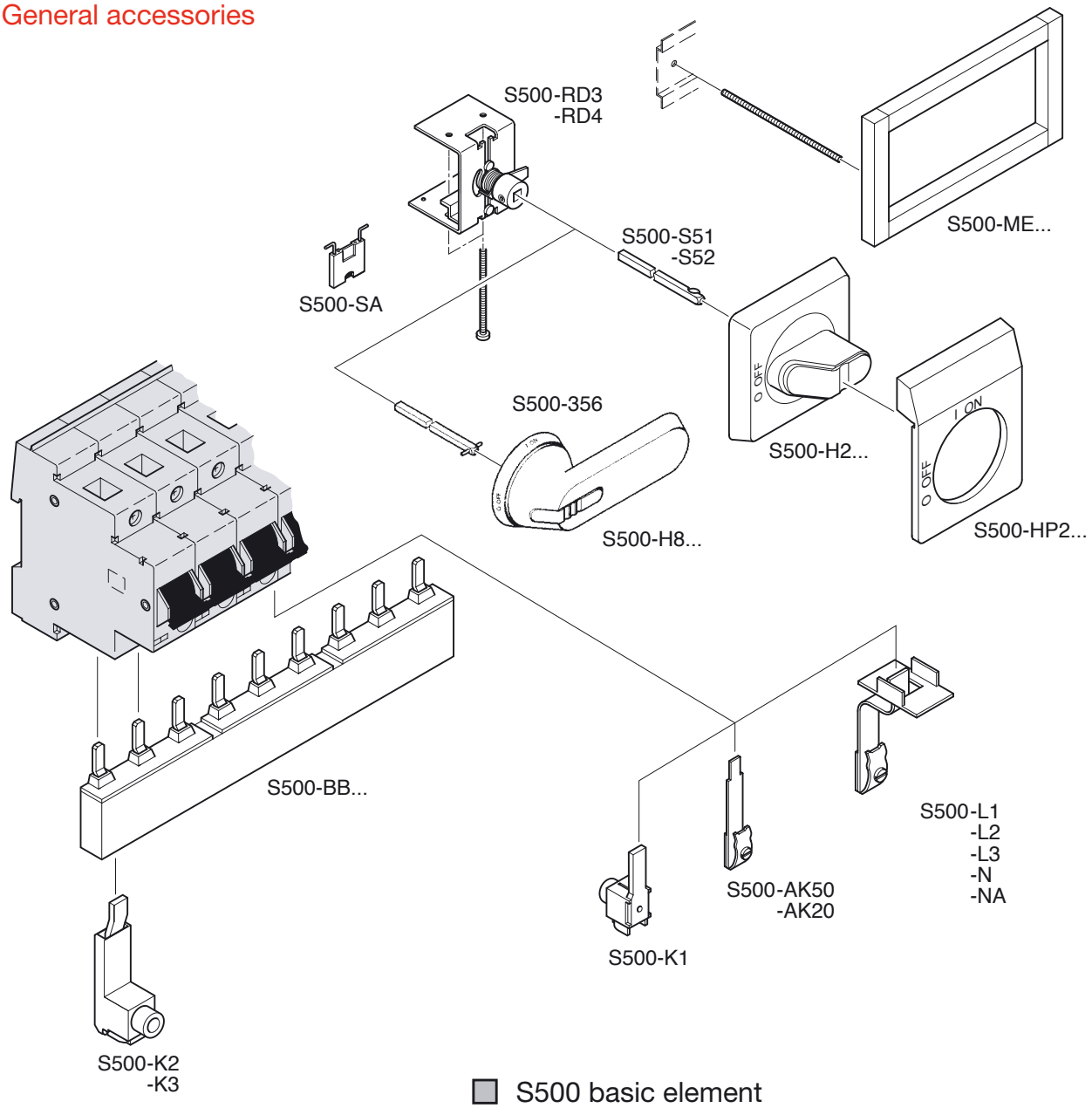
Module ≙ width of a single pole device

# Heavy Duty Circuit Breakers S500
## Overview of accessories

### Accessory devices



## General accessories




S500 basic element

Customer-fitted

Line connection from top or bottom

Z100083.eps

# Heavy Duty Circuit Breakers S500
## Accessories: Factory-fitted


| | Type | Module (25 mm) | Packing unit |
|---|---|---|---|
| **Switched neutral NA** | | | |
| located to the right of pole | **...NA** | 1 | 1 |
| **Separating neutral N** | | | |
| located to the right of the pole | **...N** | 0.5 | 1 |
| **Undervoltage trip UA** | | | |
| located to the left of pole | **...+UA 24 VAC** | 1 | 1 |
| | **...+UA 110 VAC** | 1 | 1 |
| | **...+UA 230 VAC** | 1 | 1 |
| | **...+UA 400 VAC** | 1 | 1 |
| | **...+UA 24 VDC** | 1 | 1 |
| | **...+UA 110 VDC** | 1 | 1 |
| | **...+UA 230 VDC** | 1 | 1 |
| | **...+UA 400 VDC** | 1 | 1 |

The S500 Heavy Duty Circuit Breaker can only be closed when the undervoltage trip is energised. If the control voltage decreases or fails, the S500 circuit breaker trips immediately. The undervoltage trip can be specially used as an EMERGENCY STOP switch in conjunction with a suitable EMERGENCY STOP button.

**On request:**
Other AC or DC coil voltages


| | Type | Module (25 mm) | Packing unit |
|---|---|---|---|
| **Shunt trip AL** | | | |
| located to the left of pole | **...+AA 24 VUC** | 1 | 1 |
| UC = Universal Current, AC/DC supply | **...+AA 110 VUC** | 1 | 1 |
| | **...+AA 230 VUC** | 1 | 1 |
| | **...+AA 400 VUC** | 1 | 1 |

The shunt trip serves for remote tripping of the S500 circuit breaker by means of an electrical pulse (no continuous command).

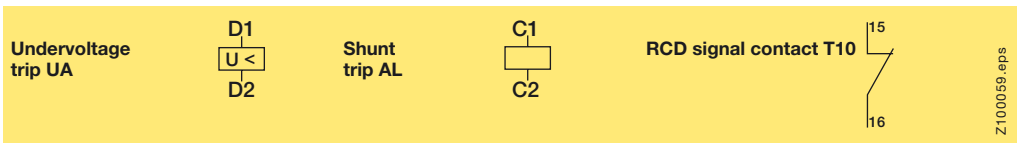
**On request:**
Other coil voltages


| | Type | Module (25 mm) | Packing unit |
|---|---|---|---|
| **RCD tripping signal contact T10** | | | |
| located to the right of pole | **T10** | 1 | 1 |
| - 1 normally closed contact | | | |

The T10 has a tripping signal contact, which opens on residual current trip. It is used to **indicate residual current trip operations**.
By pressing the test button "T", the breaker (main contact) trips, and the contact state can be checked on the RCD signal contact T10. The RCD signal contact does not indicate that it has tripped when manually operated (ON/OFF). Through the use of auxiliary and signal contacts, which the customer can fit on the left side of the equipment, the following trip events can be displayed: The auxiliary contact always switches simultaneously with the main contacts; the signal contact closes or opens only in the event of a thermal trip (overload), electromagnetic trip (short circuit) or undervoltage, shunt or residual current trip. The T10 RCD signal contact gives the user better ability to distinguish between fault sources.

**Applications with residual current signal contact T10**
Specific indication of residual current tripping in:
- Hospitals
- Industrial facilities
- Laboratories
- Telecommunication
- Facilities with high requirements for power availability

## Terminal designation




Module ≙ width of a single pole device

# Heavy Duty Circuit Breakers S500
## Accessories: Customer-fitted





| | Type | Module (25 mm) | Packing unit |
|---|---|---|---|
| **Auxiliary contact HK** | | | |
| located to the left of pole | | | |
| - 1 NO and 1 NC contact | **S500-H11** | 0.5 | 1 |
| - 2 NO contacts | **S500-H20** | 0.5 | 1 |

The auxiliary contacts always switch simultaneously with the main contacts

**The following can be fitted to each circuit breaker: (see below)**

| | | | |
|---|---|---|---|
| **Signal contact SK** | | | |
| located to the left of pole | | | |
| with orange indicator/acknowledgement button and grey test button | | | |
| - 1 NO and 1 NC contact | **S500-H11** | 0.5 | 1 |
| - 2 NO contacts | **S500-H20** | 0.5 | 1 |

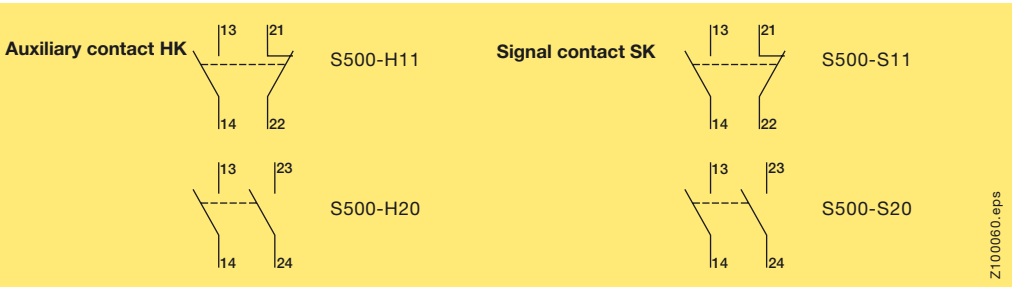
The signal contacts close or open only for
- thermal trip
- electromagnetic trip
- undervoltage (UA) and shunt (AL) trip
- residual current trip

**NO contacts: close on trip**
**NC contacts: open on trip**

- Auxiliary and signal contacts are fitted to a **closed** circuit breaker.
- When using auxiliary and signal contacts, the auxiliary contacts must first be snapped **directly** onto the circuit breaker.
- It is not possible to fit 2 signal contacts on the same circuit breaker.

**The following can be fitted to each circuit breaker:**
1 auxiliary contact
or 1 signal contact
or 2 auxiliary contacts
or 1 auxiliary and 1 signal contact

## Terminal designation




| | Type | Packing unit |
|---|---|---|
| **Locking device** | | |
| S500 circuit breakers are lockable in open or closed position | **S500-SA** | Set of 10 |

**Application**
To secure from being switched OFF inadvertently or from being switched ON and thus creating a hazard.
For padlock shackle diameter max. 4 mm
One locking device must be fitted per pole for 1 lock, i.e. for a 3-pole unit 3 locking devices must be used.

Lock from reclosing
- Lock from being switched ON inadvertently during maintenance
- Lock with start-up warning
- Lock to block power

Lock from switching off
- Prevent inadvertent manual disconnection, i.e. in warning systems, air-conditioning systems etc.
- Restart after trip only possible by authorised personnel

Module ≙ width of a single pole device

# Heavy Duty Circuit Breakers S500
## Accessories: Customer-fitted


40607


40622


40621


40613


40619


40610

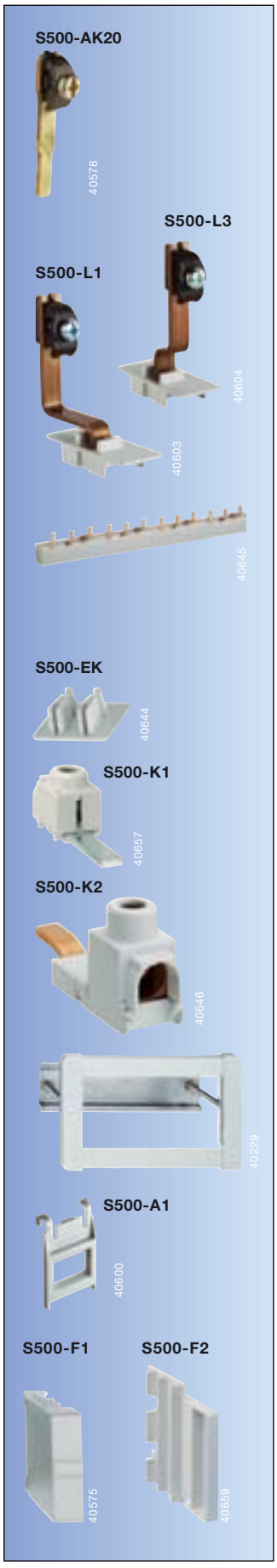

40611


40609

| | Type | Packing unit |
|---|---|---|
| **Rotary drive** | | |
| for 5 mm spindles | | |
| - for 1- to 3-pole circuit breaker, Module ≤ 3 | **S500-RD3** | 1 |
| - for 4- to 6-pole circuit breaker, Module ≤ 4 | **S500-RD3** | 1 |
| (3-pole circuit breaker plus NA, UA or AA = 4-pole breaker, rotary actuator fitted over centre pole) | | |
| **Rotary handle** | | |
| Protection class IP65 | | |
| lockable in OFF position, door interlock in ON position, **door opening possible in ON position** | | |
| - front plate and switch handle black | **S500-H2B2** | 1 |
| - front plate yellow and switch handle red | **S500-H2Y2** | 1 |
| lockable in OFF position, door interlock in ON position | | |
| - front plate and switch handle black | **S500-H2B1** | 1 |
| - front plate yellow and switch handle red | **S500-H2Y1** | 1 |
| **Name plate** | | |
| without text, engraved by customer | | |
| - black | **S500-HP2B** | 1 |
| - yellow | **S500-HP2Y** | 1 |
| **Spindle for rotary handle** | | |
| - length 85 mm / □ 5 mm | **S500-S51** | 1 |
| - length 180 mm / □ 5 mm | **S500-S51** | 1 |
| **Pistol grip** | | |
| lockable in OFF position | | |
| door interlock in ON position | | |
| **door opening possible in ON position** | | |
| - black handle | **S500-H8B** | 1 |
| - lower part of swich handle yellow and switch handle red | **S500-H8Y** | 1 |
| **Spindle for pistol grip** | | |
| - length 265 mm / □ 5 mm | **S500-S51** | 1 |

Module ≙ width of a single pole device

# Heavy Duty Circuit Breakers S500
## Accessories: Customer-fitted




| | Type | Packing unit |
|---|---|---|
| **Busbar terminal**[1] | | |
| for connecting conductors to **interconnected** poles | | |
| Max. connection cross-section: round 50 mm², | **S500-AK50** | Set of 10 |
| square 36 mm² or flat copper 6 x 20 mm | | |
| Max. connection cross-section: round 16 mm², | **S500-AK50** | Set of 10 |
| square 20 mm² or flat copper 5 x 20 mm | | |
| - for 4 to 6-pole circuit breaker | | |
| **Busbar terminal**[1] | | |
| with insulating cover for connecting conductors to **adjacent** poles | | |
| Max. connection cross-section: round 50 mm², ∅ 8 mm | | |
| square 36 mm² or flat copper 6 x 20 mm | | |
| - L1 | **S500-L1** | Set of 10 |
| - L2 | **S500-L2** | Set of 10 |
| - L3 | **S500-L3** | Set of 10 |
| - N | **S500-N** | Set of 10 |
| - NA | **S500-NA** | Set of 10 |

[1] Post-assembly exchange of individual units from system possible without disconnecting busbars.

**Busbar**
with insulating cover and end caps for connecting conductors to adjacent poles
Rated breaking capacity: analogue S500
Max. rated operating voltage $U_e$: 400/690 VAC
Conductor cross section: 35 mm²
Centre supply: 250 A
Side supply: 125 A

| | | |
|---|---|---|
| - 8 x 2-pole circuit breaker, length 390 mm | **S500-BB28** | 4 |
| - 8 x 3-pole circuit breaker, length 590 mm | **S500-BB28** | 4 |
| - 13 x 3-pole circuit breaker, length 965 mm (maximum) | **S500-BB313** | 4 |
| - 4 x 4-pole circuit breaker, length 390 mm | **S500-BB44** | 4 |

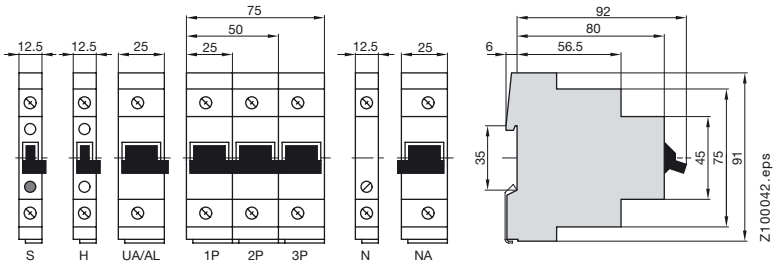
with separate neutral conductor rail
can also be used with 3-pole breakers with auxiliary contact HK and/or
signal contact SK instead of a neutral conductor rail, always leave 1 module open
In this case use supply terminal S500-K2

**On request**
- 1-pole busbar barrier strip
- other lengths/partitions

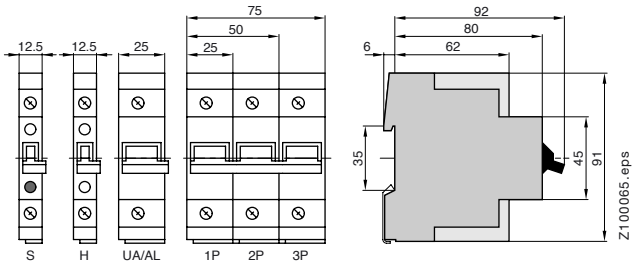
| | | |
|---|---|---|
| **End cap** | | |
| Attach to ends of busbar for protection after cutting to length | **S500-EK** | 10 pack |
| **Terminal, insulated** | | |
| for **rear** connection of main contacts | **S500-K1** | Set of 10 |
| connection cross-section max. 25 mm², Cu cable or strand | | |
| **Line terminal** | | |
| suitable for 2 and 3-pole busbars, insulated | **S500-K2** | 1 |
| connection cross-section max. 6–35 mm², Cu cable or strand | | |
| suitable for 4-pole busbar, insulated | **S500-K3** | 1 |
| connection cross-section max. 25–90 mm², Cu cable or strand | | |
| **Flush-mounting** | | |
| frame of grey plastic for fitting in front panel or door | | |
| Fitting widths: minimum 24 mm, maximum 184 mm | | |
| any intermediate values possible by cutting to length | | |
| - insertion width 38 mm | **S500-ME1** | 1 |
| - insertion width 88 mm | **S500-ME1** | 1 |
| - insertion width 184 mm | **S500-ME1** | 1 |
| **Terminal cover** | | |
| for insulation of connecting terminals (IP40) | **S500-A1** | Set of 10 |
| **Intermediate piece** | | |
| for balancing unit widths | | |
| - 12.5 mm | **S500-F1** | Set of 10 |
| - 6 mm | **S500-F1** | Set of 10 |

# Heavy Duty Circuit Breakers S500
# Dimensions in mm

## S500-B, S500-C, S500-D, S500-K, S500-KM, S500X



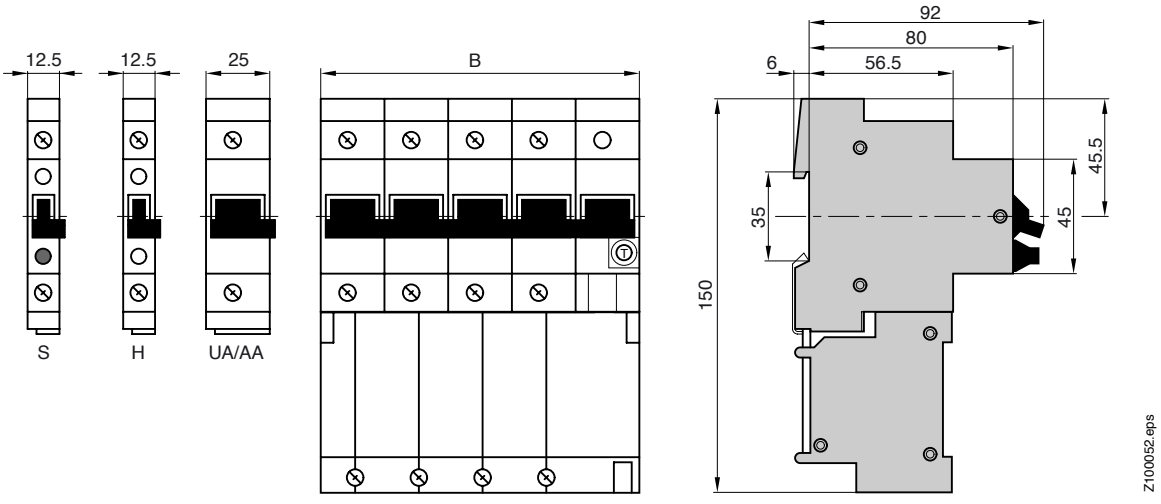

## S500UC




## DDA
## 2-pole


## 3-4-pole

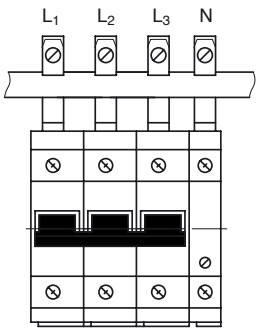

## F500-C, F500-D, F500-K



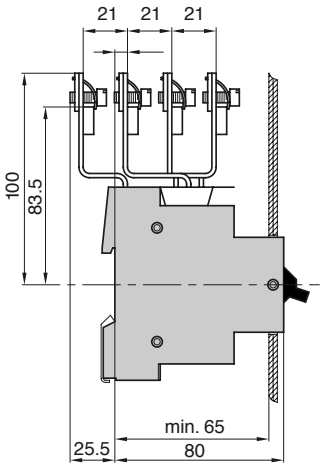

| Types | Number of poles | Dimensions in mm<br>B |
|---|---|---|
| F502… | 2P (3 Modules) | 75 |
| F503… | 3P (4 Modules) | 100 |
| F504… | 4P (5 Modules) | 125 |

## Heavy duty circuit breaker with busbar terminal

| Busbar terminal | |
|---|---|
| L1: | S500-L1 |
| L2: | S500-L2 |
| L3: | S500-L3 |
| N: | S500-N |
| NA: | S500-NA |




Insulating cover plate

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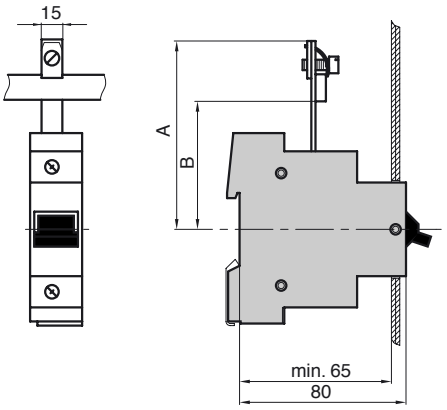
Insulating cover plate

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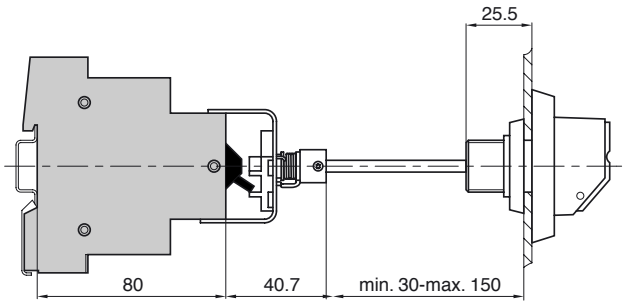
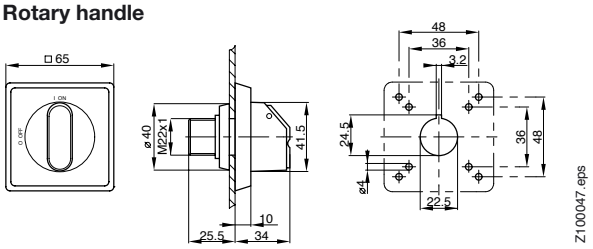
| Busbar terminal | Dimensions in mm A | B |
|---|---|---|
| S500-AK50 | 91 | 71.5 |
| S500-AK20 | 67 | 47.5 |

## External drive



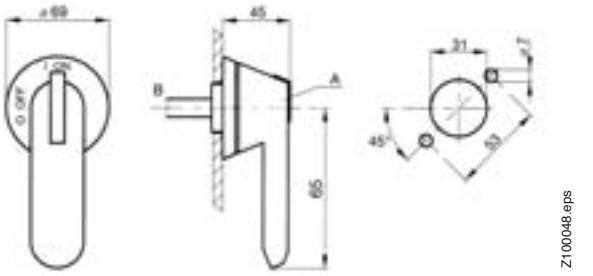

Z100046.eps

**Rotary handle**




Z100047.eps

**Pistol grip**

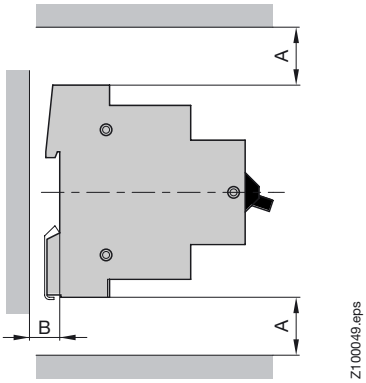



Z100048.eps

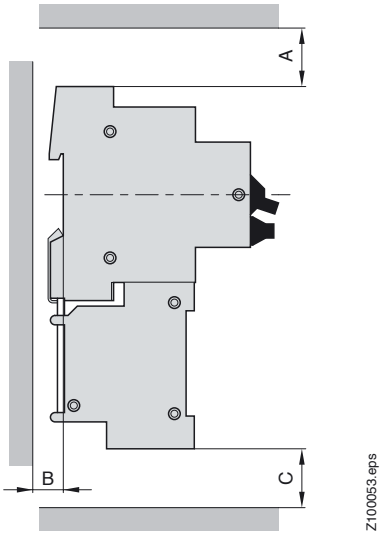
## Mounting

S500 circuit breakers are designed for snap-mounting on standard 35 mm rails.

### S500-B, S500-C, S500-D, S500UC, S500-K, S500-KM, S500X




### F500-C, F500-D, F500-K

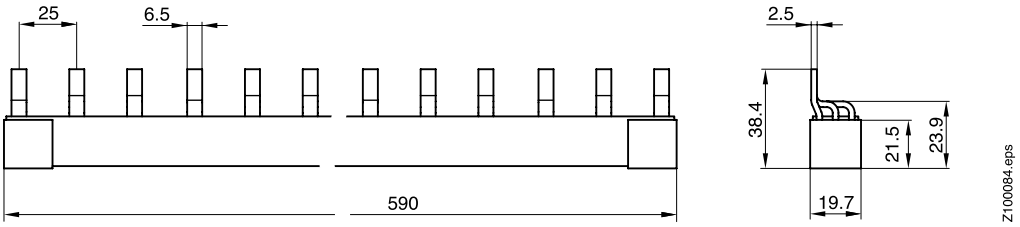



**Safety spacing in mm**

| Dimension | Spacing from earthed components, insulating covers or wiring ducting | from exposed live components [1] |
|---|---|---|
| A | 25 | 80 |
| B | 7 | 100 |
| C | 25 | 25 |

[1] For 10 mm busbar spacing.

## Busbar barrier strip (S500-BB38 for 8 x 3-pole circuit breaker)




## Cleaning of devices and accessories

The functionality of our devices can be impaired by inappropriate cleaning. Use a vacuum cleaner to clean all our devices. in extreme cases, wipe with a damp cloth (soap emulsion). Do not use compressed air or any cleaning agents under pressure.

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