Contactors

C300 series
1 pole
bi-directional DC
NO contactors
up to 500 amps
Catalogue C300.en
C300 – 1 pole bi-directional DC NO contactors

Compact single-pole NO contactors for AC and DC up to 1,500 volts rated insulation voltage. Making current up to 6,000 amps; conventional thermal current up to 500 amps; short-time current up to 6,000 amps.

The bi-directional DC contactors C300 switch high power in the smallest space. With a making capacity of up to 6,000 amperes, the extremely compact series is suitable for applications with high inrush currents or high capacitances. All versions can carry up to 500 amperes continuously in the event of a short circuit, even 6,000 amperes may flow for 20 milliseconds without the contacts welding.

This means that the contactor retains its full function to separate large powers when required: up to 500 amperes and up to 1,500 volts – regardless of the direction of the current. This full bi-directionality is important for systems with a charging and discharging process, such as in battery storage or electric vehicles. Other typical applications are the DC circuit in inverters, combiner boxes in photovoltaic systems or the management of battery storage systems.

Features

- **Super-compact dimensions – high rated insulation voltage** $U_i$, up to 1,500 volts
  Smallest dimensions – great performance! Nevertheless, all the air gaps in the contact area have been generously dimensioned. The rated insulation voltage is 1,500 volts. The arc chamber of the C300 is made of plastic. This is efficient and saves weight.

- **High thermal continuous current** $I_{th}$, of up to 500 amps
  All versions of the C300 can permanently carry up to 500 amps – provided a sufficiently dimensioned connection cross-section of 300 mm². The maximum ambient temperature for industrial applications is 85 °C. These excellent values are achieved through very high contact forces.

- **High making capacity** $I_{cm}$, of up to 6,000 amps
  The C300 can switch on a current of up to 6,000 amps. High contact forces and burn-off resistant silver contacts favour the excellent breaking capacity. An integrated PWM controller regulates the coil current for all operating states, ensures low-bounce switching on and optimises the holding power.

- **High short-time withstand current rating** $I_{cw}$, of up to 6,000 amps
  For 20 milliseconds, the C300 can carry a current of up to 6,000 amps without the contacts welding. This time is sufficient for the short-circuit protection to trip. The short-time current carrying capacity is supported by high contact forces and an optimised contact geometry.

- **Full bi-directionality – reliable disconnection of high performances**
  All versions of the C300 can reliably separate high currents and voltages when required, regardless of the direction of the current. These properties are achieved by the special arrangement of blowout magnets and arc chamber, burn-off resistant silver contacts, high contact forces and generously dimensioned air gaps in the contact area.

- **Auxiliary switch with mirror contact function**
  The C300 contactors have an integrated auxiliary contact with mirror contact function according to IEC 60947-4-1, annex F. Mirror contacts are required in feedback circuits of safety controls. The mirror contact function informs about the switching state and ensures that the NC contact of the auxiliary contact is not closed at the same time as the NO main contact.

Standards

- **IEC 60947-4-1**
  Low-voltage switchgear and controlgear – Part 4-1: Contactors and motor starters – Electromechanical contactors and motor starters.

- **ISO 16750-3**
  Road vehicles – Environmental conditions and testing for electrical and electronic equipment – Part 3: Mechanical loads

- **UL 60947-4-1**
  Low-Voltage Switchgear and Controlgear – Part 4-1: Contactors and Motor-Starters – Electromechanical Contactors and Motor-Starters.

- **GB/T 14048.4 (in preparation)**
  Low-Voltage Switchgear and Controlgear – Part 4-1: Contactors and Motor-Starters – Electromechanical Contactors and Motor-Starters.
Reliable, robust and economical

Contactors of the C300 series are designed for continuous currents of 500 amps. The switchgear has both high making and breaking capacities, and a high short-time withstand current. This ensures high operational safety. An integrated electronic coil control ensures a constant and reliable switching behaviour independent of the ambient temperature. In addition, the energy consumption and associated heat development of the monostable design is noticeably reduced when switched on.

Ordering key

<table>
<thead>
<tr>
<th>Series, configuration</th>
<th>Example: C300-500-G0P-24I-V1</th>
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<tr>
<td>C300</td>
<td>1 pole DC NO contactor,</td>
</tr>
<tr>
<td></td>
<td>Rated operational voltage 1,000 V DC</td>
</tr>
<tr>
<td>Conv. thermal current</td>
<td>500</td>
</tr>
<tr>
<td>Assembly</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>R</td>
</tr>
<tr>
<td>Terminal main contacts</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Connector coil and aux. switch</td>
<td>P</td>
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</table>

Auxiliary switches, configuration

<table>
<thead>
<tr>
<th>Coil design</th>
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<tr>
<td>1 Monostable with PWM module</td>
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Coil voltage

<table>
<thead>
<tr>
<th>Coil voltage</th>
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</thead>
<tbody>
<tr>
<td>24 U = 12 ... 24 V DC</td>
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</table>

Note:

Presented in this catalogue are only stock items which can be supplied in short delivery time. For some variants minimum quantities apply. Please do not hesitate to ask for the conditions.

Special variants:

If you need a special variant of the contactor, please do not hesitate to contact us. Maybe the type of contactor you are looking for is among our many special designs. If not, we can also supply customized designs. In this case, however, minimum order quantities apply.

Application

Due to many years of experience and expertise in the development of electromechanical switchgear and the control of DC arcs Schaltbau has developed an innovative solution with the new compact contactors that further simplify applications in DC switching technology. Charging stations or battery test benches. A further application for the use of bi-directional contactors of the C300 series are stationary energy storages. Batteries are charged and discharged regularly. For this purpose it is important that the contactors can switch off safely in both current directions.

E-mobility:
- DC fast charging stations
- Battery test benches for the automotive industry
- Battery management for zero-emission propulsion systems in maritime applications and DC charging on and off-shore

Stationary applications:
- Grid stabilization and battery energy storage
- Regenerative systems in industrial plants
- Battery management systems
- Photovoltaics and UPS

Subject to change
### Specifications

**C300 series**

<table>
<thead>
<tr>
<th>Series</th>
<th>C300-500</th>
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<tbody>
<tr>
<td>Type of voltage/Mains contacts, configuration</td>
<td>DC, bi-directional 1x, NO</td>
</tr>
</tbody>
</table>

#### Electrical data according to IEC/UL 60947-4-1

- Rated operational voltage $U_e$  
  - 1,000 V
- Rated insulation voltage $U_i$  
  - 1,000 V @ PD3 / 1,500 V @ PD2
- Rated impulse withstand voltage $U_{imp}$  
  - 8 kV
- Pollution degree/Overvoltage category  
  - PD2, PD3: see $U_e$ and $U_i$ / OV3

**Conventional free air thermal current $I_{th}$**

- IEC 60947-4-1 @ $T_a = 70° C$ (cross section)  
  - $500 A (300 mm^2)$
- UL 60947-4-1 @ $T_a = 40° C$ (cross section)  
  - $500 A (300 mm^2)$
- UL 60947-4-1 @ $T_a = 70° C$ (cross section)  
  - $400 A (300 mm^2)$

- Power dissipation per pole $I_{th}$  
  - @ $70° C$, typical  
    - $31 W$
- Pole impedance  
  - typical  
    - $130 \mu A$

**Utilization category**  
- DC-1:  
  - $10 A$

**Rated operational current $I_e$**  
- IEC/UL 60947-4-1  
  - $10 A$

**Frequency of operation (operations per hour) $I_e$**  
- DC-1  
  - $360 h^{-1}$

**Rated short-time withstand current $I_{cw}$**  
- L < 50 µH  
  - @ $t = 20$ ms, typical  
    - $6,000 A$
  - @ $t < 5$ ms, typical  
    - $< 8,000 A$ (no contact welding)
  - @ $t < 20$ ms, typical  
    - $< 25,000 A$ (contact welding – no explosion, no fire)

**Rated short-circuit making capacity $I_{cm}$**  
- L < 50 µH  
  - $6,000 A$

**Breaking capacity**  
- L < 50 µH, other values on request  
  - Single contact  
    - $U_e = 230 V / I_e = 3,000 A$
    - $U_e = 800 V / I_e = 350 A$
  - Double contact circuit  
    - $U_e = 460 V / I_e = 3,000 A$
    - $U_e = 800 V / I_e = 1,800 A$
    - $U_e = 1,500 V / I_e = 350 A$

**UL special use ratings**  
- Single contact  
  - $U_e = 400 V / I_e = 200 A$
  - $U_e = 400 V / I_e = 1,200 A$
  - $U_e = 450 V / I_e = 900 A$
  - $U_e = 800 V / I_e = 250 A$

**Magnetic drive (monostable)**

- Coil voltage $U_d$  
  - (Operating range)  
    - $12 ... 24 V$ DC (10.5 ... 36 V DC)

**Environmental conditions**

- Operating temperature / Storage temperature  
  - $-40° C ... +70° C$ (short-term up to $+85° C$) / $-40° C ... +85° C$
- Altitude / Humidity (EN 50125-1)  
  - $< 2,000$ m above sea level / $< 75 \%$ on an annual average

**Weight**  
- 0.75 kg

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*1 In the application, the terminal temperature must not exceed $130° C$ permanently.

*2 Corresponds to 50 switching operations 1.5 x $I_e$ and 6,000 switching operations 1.0 x $I_e$. 

**Subject to change**
- **C300-500-G1P-xxl-V1**: Version with PWM module, for screw mounting

  **Main contact terminals**
  - Version 1

  ![Diagram](image1)

  - **Material**: Copper
  - **Thickness**: 5 mm
  - **Version 0**: Hole Ø 8.75 mm
  - **Version 1**: Thread M6x1

  **Coil terminal**
  - Pin 1: Coil, terminal 1: +U_i
  - Pin 2: Coil, terminal 2: –U_i

  **Auxiliary switch**
  - V1: 1x NC with mirror contact function
  - Pin 3: NC contact, terminal 1
  - Pin 4: NC contact, terminal 2

  A connector FMC 1,5/4-STF-3,5 (Phoenix Part-No. 1966114) is required to connect the coil and the auxiliary switch.

- **C300-500-R0P-xxl-V1**: Version with PWM module, for top-hat rail mounting

  **Main contact terminals**
  - Version 2

  ![Diagram](image2)

  - **Material**: Copper
  - **Thickness**: 5 mm
  - **Version 0**: Hole Ø 8.75 mm
  - **Version 1**: Thread M6x1

  **Coil terminal**
  - Pin 1: Coil, terminal 1: +U_i
  - Pin 2: Coil, terminal 2: –U_i

  **Auxiliary switch**
  - V1: 1x NC with mirror contact function
  - Pin 3: NC contact, terminal 1
  - Pin 4: NC contact, terminal 2

  A connector FMC 1,5/4-STF-3,5 (Phoenix Part-No. 1966114) is required to connect the coil and the auxiliary switch.

**Arc chamber main contact system**
- Massive designed 1-pole contact system
- Highly efficient plastic arc chamber with permanent magnetic blowing

**Electronic coil controller**
Permanently reliable switching behaviour regardless of ambient temperature, reduced energy consumption and less heat generation.

**Top-hat rail mounting**
Mounting on mounting rail NS 35/15 according to IEC 60715

**Coil terminal**
- Pin 1: Coil, terminal 1: +U_i
- Pin 2: Coil, terminal 2: –U_i

**Auxiliary switch**
- V1: 1x NC with mirror contact function
- Pin 3: NC contact, terminal 1
- Pin 4: NC contact, terminal 2

Subject to change / Dimensions in mm
**Electrical endurance**

- Predicted electrical endurance as a function of the breaking current, 1x C300
- Predicted electrical endurance as a function of the breaking current, series connection 2x C300

![Graphs showing electrical endurance for different current values.](image)

**Circuit diagram, connection**

- Circuit diagram, version with PWM module
- 4-pole connector for connecting of coil and auxiliary switch

![Circuit diagram](image)

**Contact assignment**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Contact</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main contacts</td>
<td>1</td>
<td>Main contact 1</td>
</tr>
<tr>
<td>Main contacts</td>
<td>2</td>
<td>Main contact 2</td>
</tr>
<tr>
<td>Coil contacts</td>
<td>Pin 1</td>
<td>Coil A1+</td>
</tr>
<tr>
<td>Coil contacts</td>
<td>Pin 2</td>
<td>Coil A2-</td>
</tr>
<tr>
<td>Aux contacts</td>
<td>Pin 3</td>
<td>Contact 11</td>
</tr>
<tr>
<td>Aux contacts</td>
<td>Pin 4</td>
<td>Contact 12</td>
</tr>
</tbody>
</table>

- Fixed contact, solid copper
- Connector Phoenix Contact MCV 1,5/4-GF-3,5

**Minimum distances, mounting holes**

- Minimum distances
- Mounting holes

![Minimum distances diagram](image)

For the C300 series there is a minimum distance of 2 mm to magnetically active, live or earthed parts.

The contactors with mounting type "G" are mounted on a suitable mounting plate with two M5 screws. Tightening torque: 5 ... 6 Nm for screws with property class 8.8

Dimensions in mm / Subject to change
Permissible mounting orientations

- C300-500-G0P-xxI-V1: Screw mounting version
  - ±180°
  - Horizontal assembly
    - Table mounting
  - Vertical assembly
    - Wall mounting

- C300-500-R0P-xxI-V1: Version for top-hat rail mounting
  - ±180°
  - Horizontal assembly
    - Table mounting
  - Vertical assembly
    - Wall mounting

Maintenance and safety instructions

Maintenance:
- C300 series contactors are basically maintenance free.
- Make regular in-depth visual inspections once or twice a year.

Safety instructions:
- The device must be used according to the intended purpose as specified in the technical documentation. You are obliged to observe all specifications depending on operating temperature, degree of pollution etc. that are relevant to your application.
- Without further safety measures the contactors are not suited for use in potentially explosive atmospheres.
- In case of malfunction of the device or uncertainties stop using it any longer and contact the manufacturer instantly.
- Tampering with the device can seriously affect the safety of people and equipment. This is not permitted and leads to an exclusion of liability and warranty.
- Coil suppression for reducing surges when the coil is switched off is optimally attuned to the contactors switching behaviour. The existing opening characteristic must not be negatively influenced by parallel connection with an external diode.
- Contactors running permanently may heat up. So make sure that the contactor has sufficiently cooled down before you start any inspection or maintenance work.

- When installing contactors with magnetic blowout make sure to do it in such a way that no magnetizable parts can be attracted by the permanent magnets that are also capable of destroying all data of swipe cards.
- In general, strong electromagnetic fields can be generated in the area around the contactors. These can influence other components in the area of the contactors.
- Improper handling of the contactor, e.g. when hitting the floor with some impact, can result in breakage, visible cracks and deformation.

⚠️ Defective contactors must be replaced immediately!

For detailed maintenance, safety and mounting instructions please refer to our operating manuals

⚠️ For a detailed list of all safety instructions see here:

schaltbau.info/safety3en!
Connectors
- Connectors manufactured to industry standards
- Connectors to suit the special requirements of communications engineering (MIL connectors)
- Charging connectors for battery-powered machines and systems
- Connectors for railway engineering, including UIC connectors
- Special connectors to suit customer requirements

Snap-action switches
- Snap-action switches with positive opening operation
- Snap-action switches with self-cleaning contacts
- Snap-action switch made of robust polyetherimide (PEI)
- Snap-action switch with two galvanically isolated contact bridges
- Special switches to suit customer requirements

Contactor
Emergency disconnect switches
- Single and multi-pole DC contactors
- High-voltage AC/DC contactors
- Contactors for battery powered vehicles and power supplies
- Contactors for railway applications
- Terminal bolts and fuse holders
- DC emergency disconnect switches
- Special contactors to suit customer requirements

Electrics for rolling stock
- Equipment for driver's cab
- Equipment for passenger use
- High-voltage switchgear
- High-voltage heaters
- High-voltage roof equipment
- Equipment for electric brakes
- Design and engineering of train electrics to customer requirements