SCHALTBAU

DC Power Under Control

3

Contactors

C300 series

1 pole
bi-directional DC
NO contactors
up to 500 amps

Catalogue C300.en

More information
schaltbau.com

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

C300 series

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 mm^2. 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

C300 series

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

C300 series

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.

Dependent on the application, high requirements can be placed on electromechanical components. The new DC contactors are highly resistant to shock and vibration loads and meet the high requirements of ISO 16750.

Ordering key

C300 series

Example: **C300-500-G0P-24I-V1**

Series, configuration

C300	1 pole DC NO contactor, Rated operational voltage 1,000 V DC

Conv. thermal current

500	I_{th} = 500 A

Assembly

G	Mounting holes
R	Top-hat rail mounting

Terminal main contacts

0	Hole ⌀ 8.75 mm, fixed contacts solid copper
1	Thread M6, fixed contacts solid copper

Connector coil and aux. switch

P	Phoenix Contact MCV 1,5/4-GF-3,5

Auxiliary switches, configuration

1x Integrated aux. contact NC with mirror contact function to IEC 60947-4-1, annex F	V1

Coil design

Monostable with PWM module	I

Coil voltage

U_s = 12 ... 24 V DC	24

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.

Accessories

Connector for connecting coil and auxiliary switch

4-pole PCB connector FMC 1,5/4-STF-3,5
Phoenix Part-No. 1966114, can be ordered separately

Application

C300 series

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.

The compact switching device can be integrated especially in areas where there is no space for larger series. Since the C300 series can reliably switch in both directions of current, it is ideally suited for applications with energy recovery. Here, the C300 reliably ensures the galvanic isolation of both poles of the battery from the vehicle's powertrain in the event of a fault. Areas of application for the C300 series are regenerative systems and DC 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

Specifications

C300 series

Series			C300-500
Type of voltage			DC, bi-directional
Main contacts, configuration			1x, NO
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}*1	IEC 60947-4-1 @ T_a = 70° C (cross section) UL 60947-4-1 @ T_a = 40° C (cross section) UL 60947-4-1 @ T_a = 70° C (cross section)		500 A (300 mm²) 500 A (300 mm²) 400 A (300 mm²)
Power dissipation per pole I_{th}	@ 70 °C, typical		31 W
Pole impedance	typical		130 µΩ
Utilization category DC-1*2, U_e = 1,000 V 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 @ t < 5 ms, typical @ t < 20 ms, typical		6,000 A < 8,000 A (no contact welding) < 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		5 operations
	U_e = 400 V / I_e = 1,800 A		5 operations
	U_e = 800 V / I_e = 350 A		5 operations
Double contact circuit	U_e = 460 V / I_e = 3,000 A		5 operations
	U_e = 800 V / I_e = 1,800 A		5 operations
	U_e = 1,500 V / I_e = 350 A		5 operations
UL special use ratings	L < 250 µH, other values on request		
Single contact	U_e = 400 V / I_e = 200 A		50 operations
	U_e = 400 V / I_e = 1,200 A		5 operations
	U_e = 450 V / I_e = 900 A		5 operations
	U_e = 800 V / I_e = 250 A		5 operations
Double contact circuit	U_e = 450 V / I_e = 3,000 A		5 operations
	U_e = 850 V / I_e = 1,000 A		5 operations
	U_e = 850 V / I_e = 500 A		50 operations
Main contacts			
Contact material			$AgSnO_2$
Terminals			Hole ⌀ 8.75 mm (for M8) or thread M6x1
Torque			Hole: 10 ... 12 Nm / Thread: 8 ... 10 Nm for screws with property class 8.8
Auxiliary contacts			
Number, configuration			1 NC
Mirror contact function	IEC 60947-4-1, annex F		●
Rated operational voltage U_e		min. / max.	9 V / 24 V
Conventional free air thermal current I_{th}		min. / max.	10 mA / 1.5 A (4.5 A @ 50 ms)
Terminals			Connector, see ordering key
Magnetic drive (monostable)			
Coil voltage U_s (Operating range)			12 ... 24 V DC (10.5 ... 36 V DC)
Pollution degree / Overvoltage category			PD2 / OV2
Coil power dissipation, max. (T_a = 20 °C / U_s)	Pull-In power (0.2 s) Holding power		50 W @ 24 V 3.5 W
Frequency of operation (operations per hour, no load)	T_a = 20 °C / 85 °C		1,800 h^{-1} / 900 h^{-1}
Pull-in time (T_a = 20 °C / U_s) / Drop-off time (T_a = 20 °C / U_s)	typical		33 ms / 5 ms
Coil suppression			Integrated
Coil terminal			Connector, see ordering key
Mounting position			vertikal / horizontal
Degree of protection	IEC 60529		IP00
Mechanical endurance			200,000 operations
Shock / Vibration	IEC 61373 ISO16750-3		Categoty 1, Class B 50 g, 6 ms / Test VII
Environmental conditions	Operating temperature / Storage temperature Altitude / Humidity (EN 50125-1)		–40° C … +70° C (short-term up to +85° C) / –40° C … +85° C < 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

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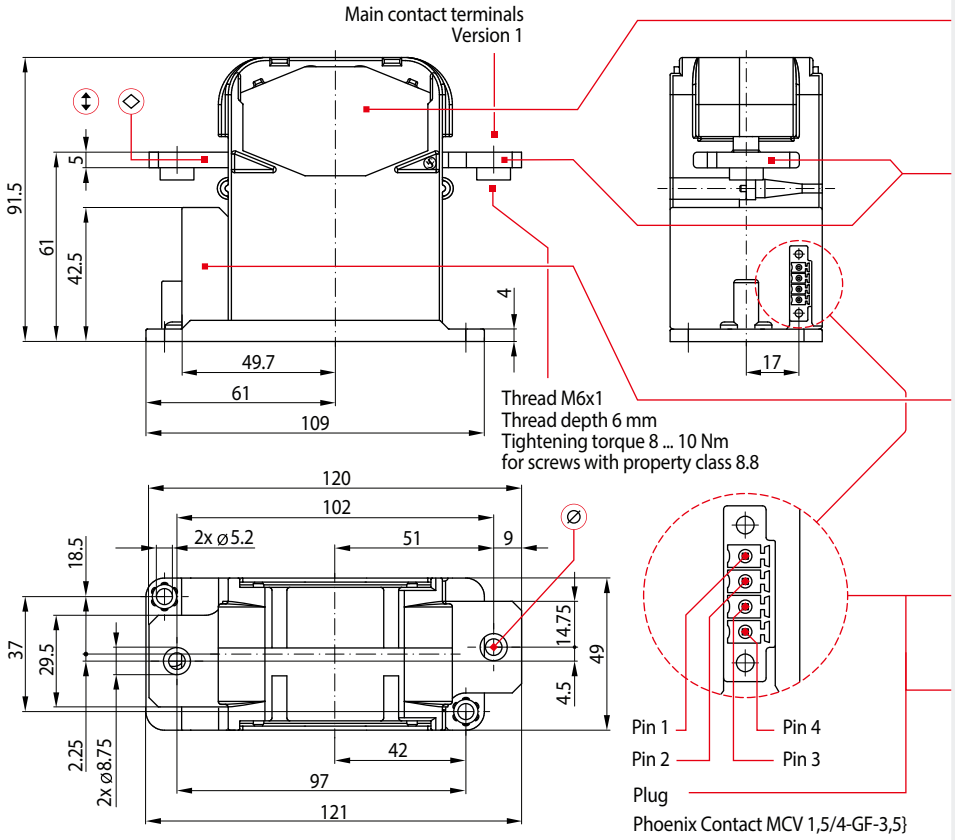
DC Power Under Control

Dimension diagram C300-500-G1P-xxI-V1, C300-500-R0P-xxI-V1

- **C300-500-G1P-xxI-V1: Version with PWM module, for screw mounting**



Arc chamber main contact system

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

Main contact terminals

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

Electronic coil controller

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

Coil terminal

Pin 1: Coil, terminal 1: $+U_s$
Pin 2: Coil, terminal 2: $-U_s$

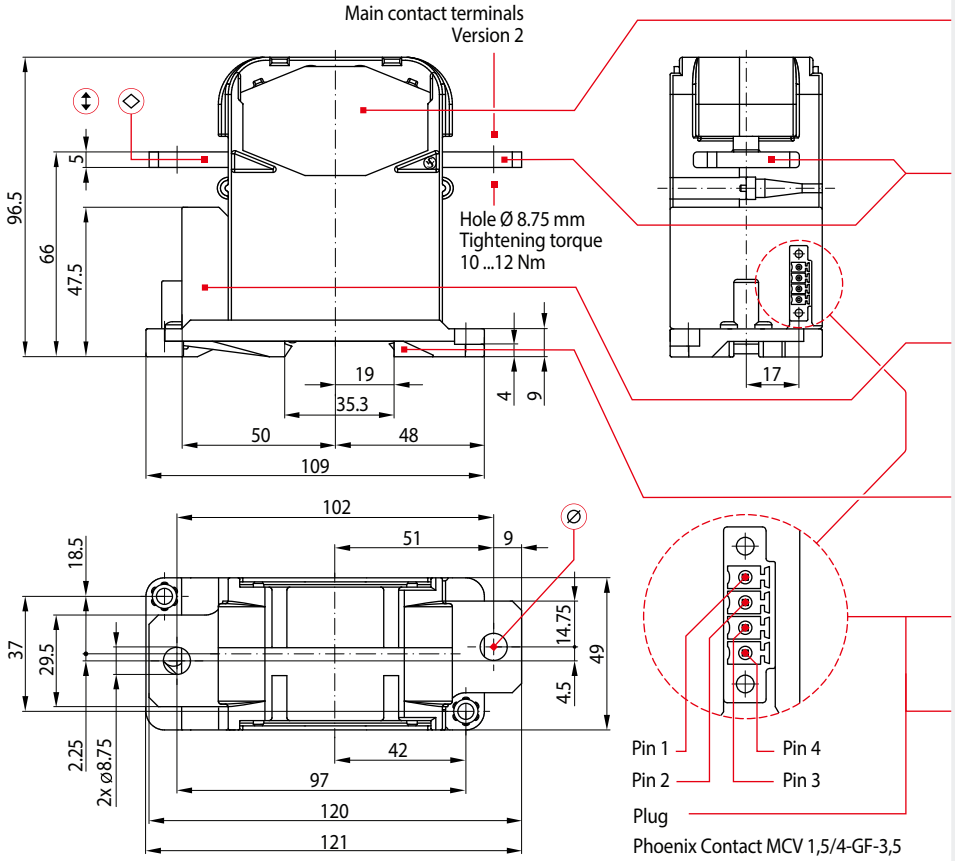
Auxiliary switch

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-xxI-V1: Version with PWM module, for top-hat rail mounting**



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Main contact terminals

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

Electronic coil controller

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Top-hat rail mounting

Mounting on mounting rail NS 35/15 according to IEC 60715

Coil terminal

Pin 1: Coil, terminal 1: $+U_s$
Pin 2: Coil, terminal 2: $-U_s$

Auxiliary switch

V1: 1x NC with mirror contact function

Pin 3: NC contact, terminal 1
Pin 4: NC contact, terminal 2

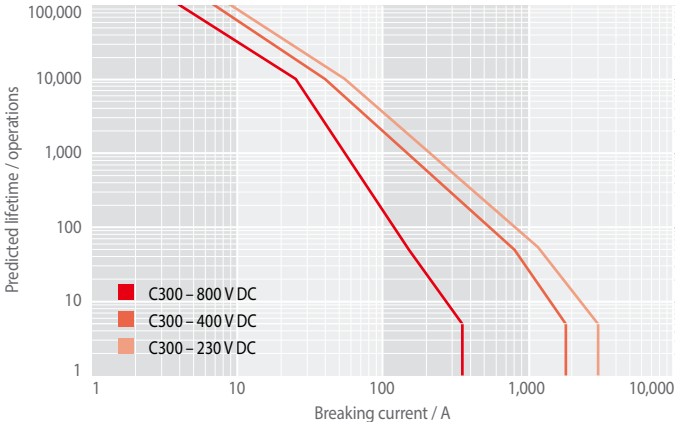
A connector FMC 1,5/4-STF-3,5 (Phoenix Part-No. 1966114) is required to connect the coil and the auxiliary switch.

Subject to change / Dimensions in mm

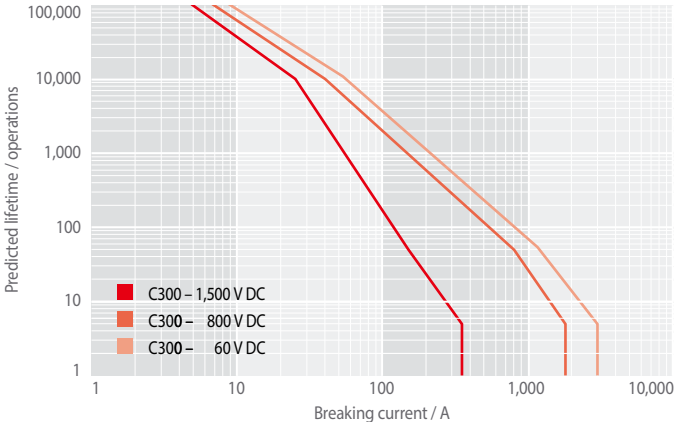
Electrical endurance

Baureihe C300

- **Predicted electrical endurance as a function of the breaking current, 1x C300**



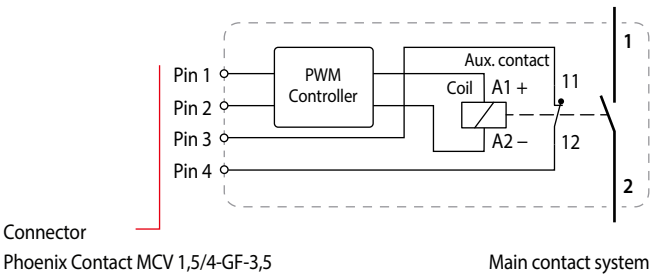
- **Predicted electrical endurance as a function of the breaking current, series connection 2x C300**



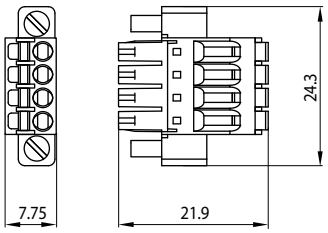
Circuit diagram, connection

C300 series

- **Circuit diagram, version with PWM module**



- **4-pole connector for connecting of coil and auxiliary switch**



4-pole PCB connector
FMC 1,5/4-STF-3,5

- *Cross-section: 1.5 mm² max.*
- *Connection: Push-in spring connection*
- *Locking: Screw locking*

- **Contact assignment**

Terminal	Contact	Description	
Main contacts	1 2	Main contact 1 Main contact 2	Fixed contact, solid copper
Coil contacts	Pin 1 Pin 2	Coil A1+ U_s+ Coil A2– U_s–	Connector Phoenix Contact MCV 1,5/4-GF-3,5
Aux contacts	Pin 3 Pin 4	Contact 11 Contact 12	

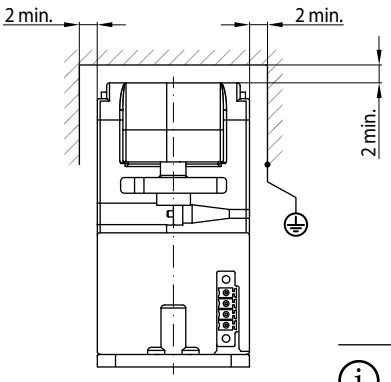
- **Contact assignment**

Terminal	Contact	Description	
Coil contacts	Pin 1 Pin 2	Coil A1+ U_s+ Coil A2– U_s–	Connector Phoenix Contact FMC 1,5/4-STF-3,5
Aux contacts	Pin 3 Pin 4	Contact 11 Contact 12	

Minimum distances, mounting holes

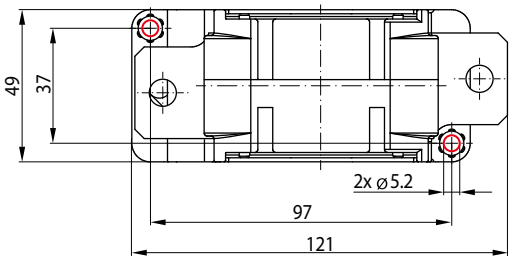
C300 series

- **Minimum distances**



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

- **Mounting holes**



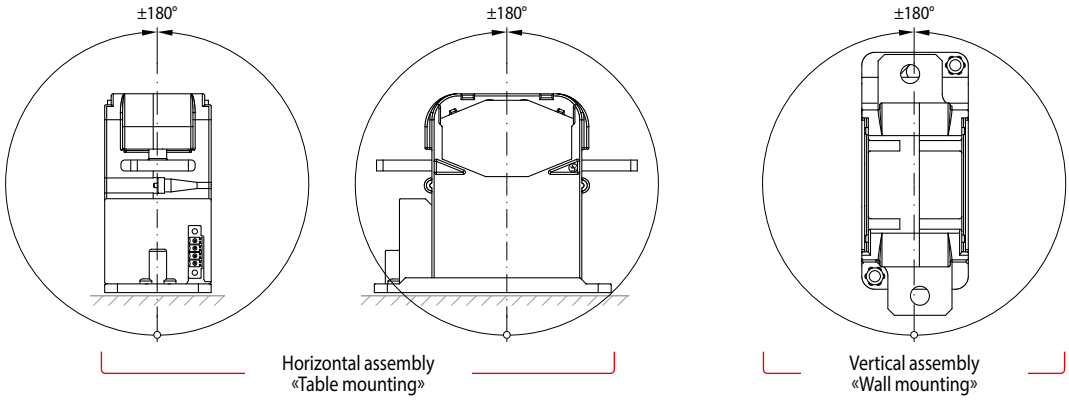
The contactors with mounting type "G" are mounted on a suitable mounting plate with two M5 screws.

Tightening torque:
5 ... 6 Nm for screws with property class 8.8

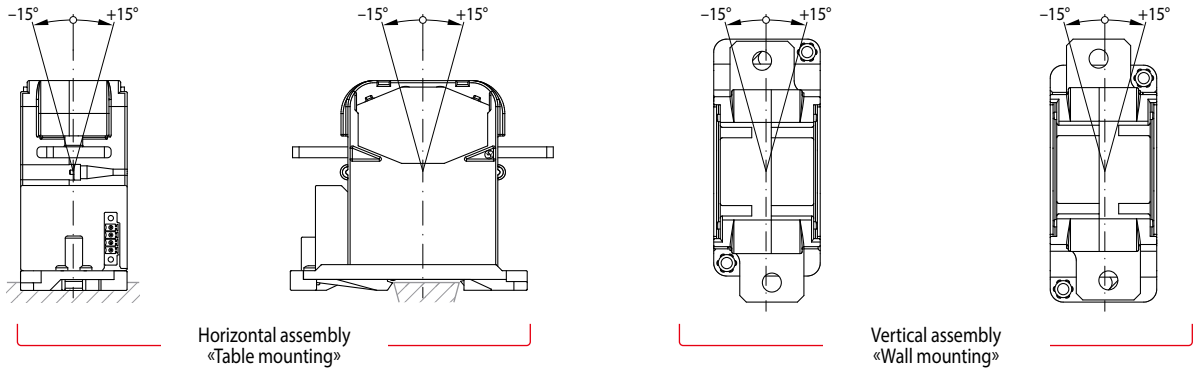
Permissible mounting orientations

C300 series

- **C300-500-G0P-xxI-V1: Screw mounting version**



- **C300-500-R0P-xxI-V1: Version for top-hat rail mounting**



Maintenance and safety instructions

C300 series

Maintenance:

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

For detailed maintenance, safety and mounting instructions please refer to our operating manuals ➔ C300-M.en!

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 a detailed list of all safety instructions see here: ➔ schaltbau.info/safety3en!

Schaltbau GmbH

For detailed information on our products and services visit our website – or give us a call!

Phone +49 89 9 30 05-0
Internet www.schaltbau.de
e-mail contact@schaltbau.de

Find your worldwide contact person. We are here for you, personally!

with compliments:

IRIS Certification

The production facilities of Schaltbau GmbH have been IRIS certified since 2008.

Schaltbau GmbH ISO 14001 certified since 2002

Certified to DIN EN ISO 14001 since 2002. For the most recent certificate visit our website.

Schaltbau GmbH ISO 9001 certified since 1994

Certified to DIN EN ISO 9001 since 1994. For the most recent certificate visit our website.

Electrical Components and Systems for Railway Engineering and Industrial Applications

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

Contactors
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

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