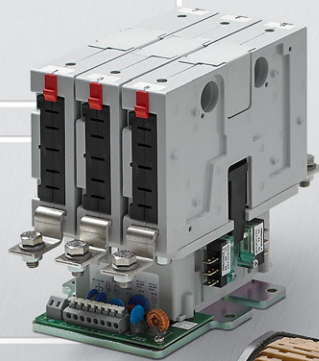
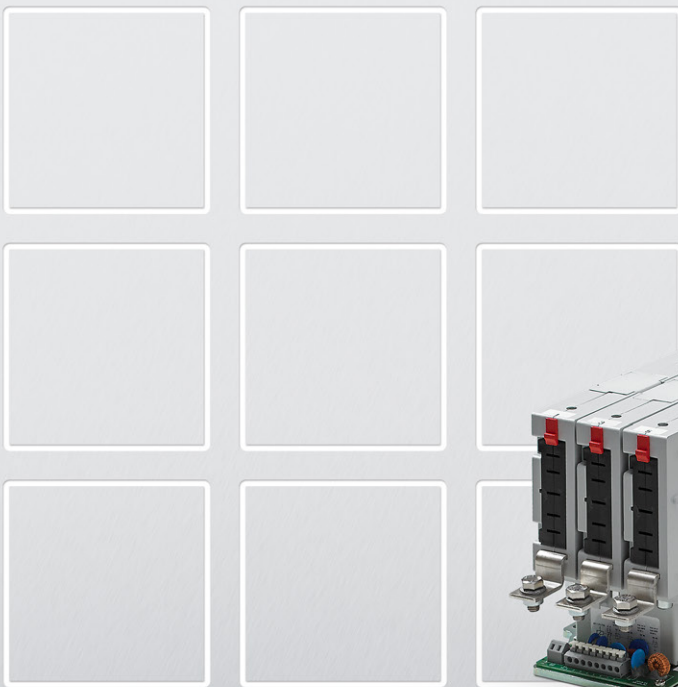


# 3

## Brochure | Contactors

DC and AC contactors  
for Industry, Rolling Stock  
and Electric Mobility



More information  
[schaltbau.com](http://schaltbau.com)

## AC and DC contactors for critical applications

With renewable energies and the introduction of DC networks in manufacturing, the switching of high DC loads is gaining in significance.

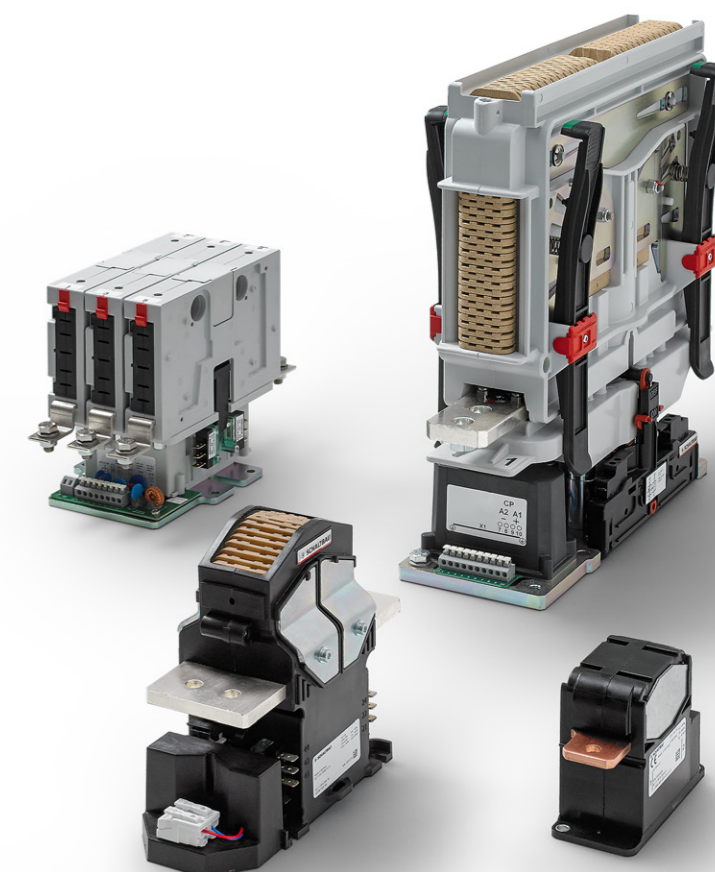
With our experiences from railway technology, we are developing reliable contactors for all fields of use in which load circuits have to be switched on and disconnected securely.

Our variety of DC and AC contactors extends from contactors for low-voltage to power contactors of 4,800 volts and 2,000 amps.

## WE CONTROL ELECTRIC ARCS RELIABLY

The quality of a contactor is best seen when switching off. Electric arcs are ignited between the contacts as they open – just like lightning bolts in a thundercloud. In order to extinguish these arcs we have developed a patented contactor concept by which the arc is driven into the arc chute and extinguished within a few milliseconds. Thus Schaltbau can offer real equipment safety. For the innovative contactor technology prevents the contacts from welding or burning and the equipment from being totally destroyed as a result of a component failure.

For more information visit  
[www.schaltbau.info/contactors](http://www.schaltbau.info/contactors)



**GLOSSARY**

**Switchgear** General term for any switchgear and its combinations with pertaining control, measuring, protection and regulating equipment, as well as for subassemblies from such equipment and devices and the respective connections, accessories, housings and support frames mainly used for generating, transmitting, distribution and conversion of electrical energy. [IEV 441-11-02]

**Contact** Mechanical switching device with one free position only, not actuated manually and capable of connecting, carrying and disconnecting currents in the circuit under operating conditions, overloads included. [IEV 441-14-33].

**Actuating system** The actuating system of a contactor operates electromagnetically.

**Main contact** Contact being located inside the main circuit of a mechanical switching device which is to carry the current of the main circuit when the contact is closed. [IEV 441-15-07]

**Auxiliary contact** Contact being located inside an auxiliary circuit and actuated mechanically by the switching device. [IEV 441-15-10]

**Normally open contact (make contact)**  
The contact closes when the switch is actuated.



**Normally closed contact (break contact)**  
The contact opens when the switch is actuated.



**SPDT (changeover contact)** In free position terminal COM is connected to terminal NC. When the switch is actuated the contact is interrupted between COM and NC and closed between COM and NO.



**Pollution degree** The pollution degree of the environment is a conventional characteristic depending on the quantity of conductive or humidity absorbing dust, ionized gas or salt, as well as on the relative humidity and the frequency of its occurrence, resulting in absorption or condensation of humidity leading to a decrease of withstand voltage and/or surface resistance. Note: Standard IEC 60947-1 states the pollution degree to be that of the micro-environment.

**Overvoltage category** The overvoltage category of a circuit or an electrical system is a conventional characteristic depending on the limitation (or control) of the amount of the prospective transient overvoltages occurring in a circuit or an electrical system of differing nominal voltages and on the equipment having an impact on these overvoltages. Note: In an electrical system the change to a lower overvoltage category is brought about by suitable devices meeting the requirements of the interface, such as overvoltage arresters or line filters blocking, absorbing or eliminating the overvoltage energy in order to lower the value of the transient overvoltages to the next lowest category.

**Nominal voltage** Approximated voltage value suitable for identification of a device which in contrast to the rated operating voltage is not determined for a given operating condition.

**Rated insulation voltage** The rated insulation voltage of a device is the very voltage which insulating tests and creepage distances refer to. The maximum rated operating voltage must by no means exceed the rated insulation voltage.

**Rated impulse withstand voltage** Peak value of an impulse withstand voltage of determined shape and polarity which the equipment can handle without failure under given test conditions and which clearance refers to. The rated impulse withstand voltage of a device must equal or exceed the transient overvoltages occurring in the system in which the device is used.

**Coil voltage** The standard term is rated control supply voltage. It is distinguished between actuating voltage  $U_c$  for control circuit entry and the control supply voltage  $U_s$ , the voltage which is supplied to the power supply terminals of the control device and which can differ from  $U_c$  due to built-in transformers, rectifiers, resistors, electronic circuits, etc.

**Conventional thermal current** The conventional free air thermal current (standard term) is the highest test current for temperature-rise tests of non-enclosed devices in open air. The conventional free air thermal current must equal at least the maximum rated operating current of the non-enclosed device at 8 hours duty. "Free air" means air of usual interior rooms almost free of draught and radiation. Note: A non-enclosed device is one supplied without enclosure by the manufacturer or a device with integrated housing which usually does not provide protection all alone.

**Contactors for railway applications** with extended coil tolerances according to railway standard EN 60077-1 requiring a voltage range of 0.7 up to 1.25  $U_s$  for equipment which is supplied from a battery on and off float charge.

**Breaking capacity** The breaking capacity of a switching device or a fuse is the prospective current a switching device or a fuse can break at a certain voltage under given conditions. [IEV 441-17-08]. Note: The voltage and the given conditions are determined in the applicable detail specification. For AC current the current is determined by the r.m.s.-value of the symmetrical current component

**Making capacity** The making capacity of a switching device is the prospective making current a switching device can make under given conditions for use and operation [IEV 441-17-09]. Note: The voltage and the given conditions are determined in the applicable detail specification.

*Excerpts from DIN EN 60947-1 (VDE 0660-100) and DIN EN 60947-4-1 (VDE 0660-102) respectively are reprinted with permission 072.008 of DIN Deutsches Institut für Normung e.V. and of VDE Verband der Elektrotechnik Elektronik Informationstechnik e.V. The applicable standard always refers to the latest up-dates available at VDE VERLAG GMBH, Bismarckstr. 33, 10625 Berlin, www.vde-verlag.de, and at Beuth Verlag GmbH, Burggrafenstr. 6, 10787 Berlin.*



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



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

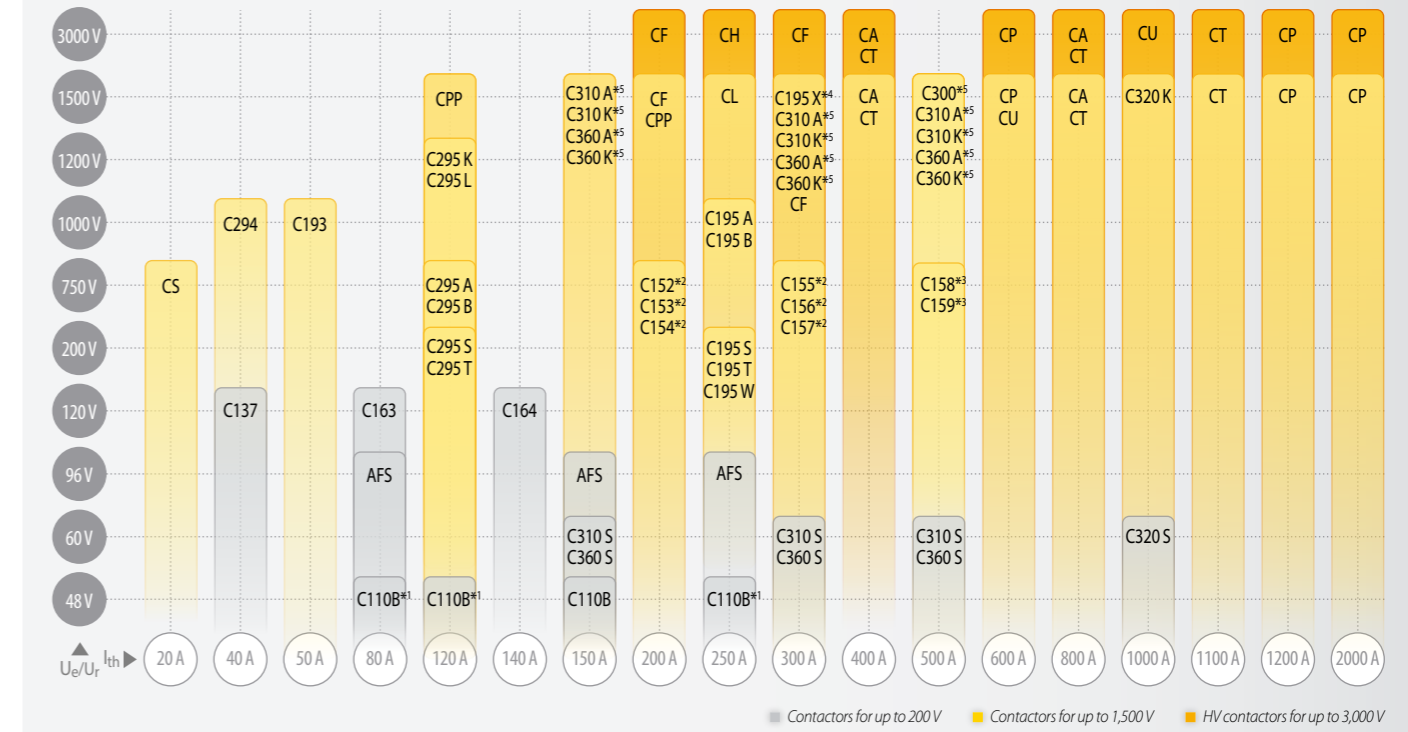


Certified to DIN EN ISO 9001 since 1994. For the most recent certificate visit our website.

**Variety of contactors for a wide range of applications.**

Thanks to many years of experience and expertise in the development of electromechanical switchgear and the mastery of DC arcs in particular, Schaltbau contactors are proven and the first choice in many applications.

**CONTACTORS :: OVERVIEW**



\*1  $I_{th}/80 I_{th} = 60 A$ ,  $C110B/120 I_{th} = 100 A$ ,  $C110B/300 I_{th} = 240 A$  \*2  $U_n = 450 V$ , special design  $U_n = 750 V$  \*3  $U_n = 300 V$ , special design  $U_n = 750 V$  \*4  $I_{th} = 320 A$  \*5  $U_i/U_c @ PD2$  (otherwise PD3)

**SPECIFICATIONS :: CONTACTORS**

Series	C300	C310	C320	C360	C193	C195	C294	C295	CL	CH1130/02
Type of voltage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DC bi-directional	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
AC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Main contacts										
Number of	1x	1x	1x	1x	1x	1x	2x	2x	1x ... 3x	1x
Configuration	NO	NO	NO	NO	NO	NO/CO	NO	NO	NO	NO
Rated operating voltage										
up to 200 V	---	---	---	---	---	✓	---	✓	---	---
up to 1.500 V	✓	✓	✓	✓	✓	✓	✓	✓	✓	---
up to 3.000 V	---	---	---	---	---	---	---	---	---	✓
Conv. thermal current	500A	500A max.	1,000A	500A max.	50 A	320 A max.	40 A	120 A	250 A	250 A
Aux. contacts										
Number of	1x	2x	1x...4x	2x	1x	2x	1x	2x	2x	2x
Configuration	NC	SPDT	SPDT	SPDT	SPDT	SPDT	SPDT	SPDT	SPDT	SPDT-DB
Application										
New Mobility	✓	✓	✓	---	---	---	---	---	---	---
New Energy	✓	✓	✓	---	✓	✓	✓	✓	---	---
Industry	✓	✓	✓	---	✓	✓	✓	✓	---	✓
Railway	---	---	---	✓	✓	✓	✓	✓	✓	✓
Page	6	6	7	7	8	8	9	9	10	10

**CONTACTORS :: SPECIFICATIONS**

Series	C152 ... C159	CF	CT	CA	CPP	CP	C110B	AFS	C137 ... C164	CS115
Type of voltage	✓	✓	✓	---	✓	✓	✓	✓	✓	✓
DC	---	---	✓	---	---	✓	✓	---	---	---
DC bi-directional	✓	✓ $f \leq 400 Hz$	✓	✓ $f \leq 400 Hz$	✓	✓	---	---	✓	✓
AC										
Main contacts										
Number of	1x ... 4x	1x ... 3x	1x / 2x	3x	1x	1x	1x	1x / 2x	1x	4x
Configuration	NO/NC	NO/NC	NO	NO	NO/NC	NO/NC/CO	NO	NO/NC/CO*1	NO	NO/NC*4
Rated operating voltage										
up to 200 V	---	---	---	---	---	---	✓	✓	✓	---
up to 1.500 V	✓	✓	✓	✓	✓	✓	---	---	---	✓
up to 3.000 V	---	✓	✓	✓	---	✓	---	---	---	---
Conv. thermal current	500 A max.	300 A max.	1,100 A max.	800 A max.	200 A max.	2,000 A max.	240 A max.	250 A max.	140 A max.	20 A
Aux. contacts										
Number of	4x max.	4x max.	4x	4x max.	2x	4x max.	1x optional	1x optional	1x optional	1...4x
Configuration	NO, NC, SPDT	SPDT	SPDT/SPDT-DB	SPDT/SPDT-DB	SPDT	SPDT/SPDT-DB	SPDT	SPDT	SPDT	NO/NC
Application										
New Mobility	---	✓	✓	---	✓	✓	✓	✓	---	---
New Energy	---	✓	✓	✓	✓	✓	✓	✓	---	---
Industry	✓	✓	✓	---	✓	✓	✓	✓	✓	✓
Railway	✓	✓	✓	✓	✓	✓	---	---	✓	✓
Page	11	11	12	12	13	13	14	14	15	15

\*1 NC/NO/changeover/reversing contactors available \*2 No load switching on the NC contact \*3 NC and/or NO contacts available \*4 NO/NC/SPDT/SPDT-DB \*5 SPDT/SPDT-DB



C300

C310

C320

C360

**Compact 1-pole bi-directional NO contactors for DC up to 1,500 volts rated insulation voltage – conv. thermal currents up to 500 amps**

The extremely compact bi-directional DC contactors C300 are designed for switching high powers. They ensure safe disconnection of high loads regardless of the direction of the current and provide reliable protection in the event of a system fault. Full bi-directionality is essential in battery storage systems and electric vehicles.

Typical applications include use as the main contactor in battery management systems for HV vehicle batteries, in charging stations for modern electromobility, in battery test benches or in combiner boxes for photovoltaic systems and inverters of all kinds.

**FEATURES**

- Power range:
  - Nominal voltage 1,000 volts
  - Thermal current 500 amps
- Efficient extinguishing chamber with permanent magnetic blowout
- High making and breaking capacity
- High rated short-time withstand current
- High resistance to shock and vibration
- 1 auxiliary switch with mirror contact function
- Low energy consumption, thanks to PWM controller
- Testing according to EN 60947-4-1, UL 60947-4-1, GB/T 14048.4 in progress

**1-pole AC and bi-directional DC NO contactors up to 1,500 volts rated insulation voltage – conventional thermal currents up to 500 amps**

The bi-directional DC contactors switch high power in a small space. They ensure safe disconnection of high loads regardless of the direction of the current and provide reliable protection in the event of a system fault. Full bi-directionality is indispensable in battery storage systems and electric vehicles.

Typical applications include use as the main contactor in battery management systems for HV vehicle batteries, in charging stations for modern electromobility, in battery test benches or in combiner boxes for photovoltaic systems and inverters of all kinds.

- Power range:
  - Nominal voltage 60 volts to 1,500 volts
  - Thermal current 150–300–500 amps
- Efficient extinguishing chamber with permanent magnetic blowout
- High making and breaking capacity
- High rated short-time withstand current
- High resistance to shock and vibration
- Max. 2 auxiliary switches with mirror contact function
- Low energy consumption, thanks to PWM controller
- Tested according to EN 60947-4-1, UL 60947-4-1, GB/T 14048.4

**1-pole AC and bi-directional DC NO contactors up to 1,800 volts rated insulation voltage – conventional thermal currents up to 1,000 amps**

Contactors of the C320 series are 1-pole bidirectional DC switching devices in the power class up to 1,000 amps. They ensure safe disconnection of high loads and provide reliable protection in the event of a system fault. Typical applications are the use as main contactor in battery management systems of high-voltage vehicle batteries, in charging stations for modern electric vehicles or in battery test benches.

The very efficient ceramic arc chamber, double contact interruption and high breaking capacity are important features of the new switchgear.

- Power range:
  - Nominal voltage 60 volts to 1,500 volts
  - Thermal current 1,000 amps
- Ceramic arc chamber with permanent magnetic blowout
- High making and breaking capacity
- High rated short-time withstand current
- High resistance to shock and vibration
- Max. 4 auxiliary switches, of them max. 2 with mirror contact function
- Low energy consumption, thanks to PWM controller
- Tested according to EN 60947-4-1, UL 60947-4-1, GB/T 14048.4

**1-pole AC and bi-directional DC NO contactors up to 1,500 volts rated insulation voltage – conventional thermal currents up to 500 amps**

Designed for use in railway vehicles, the bi-directional DC contactors switch high power in a small space. The compact switching devices of the C360 series ensure safe disconnection of high loads regardless of the direction of current and provide reliable protection in the event of a system malfunction.

Full bi-directionality is important for many applications in railway vehicles, e.g. as main contactor in traction and auxiliary converters of battery and hybrid vehicles or as isolating contactor in battery circuits with high currents.

**FEATURES**

- Power range:
  - Nominal voltage 60 volts to 1,500 volts
  - Thermal current 150–300–500 amps
- Efficient extinguishing chamber with permanent magnetic blowout
- High making and breaking capacity
- High rated short-time withstand current
- High resistance to shock and vibration
- Max. 2 auxiliary switches with mirror contact function
- Low energy consumption, thanks to PWM controller
- Tested according to EN 60077
- Ship register approval DNV-GL

➔ Web link **C300 contactors**

➔ Web link **C310 contactors**

➔ Web link **C320 contactors**

➔ Web link **C360 contactors**

**SPECIFICATIONS**

	C300-500	C310K – C310A – C310S
Type of voltage	DC, bi-directional	DC, bi-directional / AC, f ≤ 60 Hz
Main contacts	1x NO	1x NO
Number of, configuration	1,000 V@PD3 / 1,500 V@PD2	C310K/C310A: 1,000 V@PD3 / 1,500 V@PD2 / C310S: 60 V@PD3
Rated operational voltage $U_e/U_r$	1,000 V@PD3 / 1,500 V@PD2	1,000 V@PD3 / 1,500 V@PD2
Rated insulation voltage $U_i$	10 kV	10 kV
Rated impulse withstand voltage $U_{imp}$	PD2 / PD3	PD2 / PD3
Pollution degree	OV3	OV3
Overvoltage category	500 A	150 / 300 / 500 A
Conv. free air thermal current $I_{th}$	5,000 A @ 20 ms	3,000 A @ 1 s
Rated short-time withstand current $I_{cw}$	1 NC	2x Snap-action switches S880 max. (SPDT) with mirror contact function
Auxiliary contacts	Configuration with mirror contact function	
Magnetic drive	Monostable: 12 / 24 V DC*1	Monostable: 12 ... 24 / 48 V DC*1 / Bistable: 24 / 48 V DC*2
Rated control supply voltage $U_c$		

**SPECIFICATIONS**

	C320K – C320S	C360K – C360A – C360S
Type of voltage	DC, bi-directional / AC	DC, bi-directional / AC, f ≤ 60 Hz
Main contacts	1x NO	1x NO
Number of, configuration	C320K: 1,500 V / C320S: 60 V	C360K/C360A: 1,000 V@PD3 / 1,500 V@PD2 / C360S: 60 V@PD3
Rated operational voltage $U_e/U_r$	1,800 V	1,000 V@PD3 / 1,500 V@PD2
Rated insulation voltage $U_i/U_{Nm}$	10 kV	10 kV
Rated imp. withstand voltage $U_{imp}/U_{Ni}$	PD3	PD2 / PD3
Pollution degree	OV3	OV3
Overvoltage category	1,000 A	150 / 300 / 500 A
Conv. free air thermal current $I_{th}$	4,500 A @ 100 ms	3,000 A @ 1 s
Rated short-time withstand current $I_{cw}$	4x Snap-action switches S870 max. (SPDT) max. 2 with mirror contact function	2x Snap-action switches S880 max. (SPDT) with mirror contact function
Auxiliary contacts	Configuration max. 2 with mirror contact function	
Magnetic drive	Monostable: 24 V DC*1	Monostable: 24 / 72 ... 110 V DC*1 / Bistable: 24 / 110 V DC*2
Coil voltage/Rtd. contr. supply voltage $U_c$		

\*1 with integrated PWM module \*2 w/o PWM module, impulse 0.1 ... 0.5 s max.

\*1 with integrated PWM module \*2 w/o PWM module, impulse 0.1 ... 0.5 s max.



C193

C195

C294

C295

**Compact single pole NO contactors for voltages up to 1,000 volts**

Single pole high-voltage contactor of compact design: Notwithstanding its small size, the C193 series contactor features an extraordinary switching capacity for DC applications up to 1,000 volts. Best suited for the harsh environment of public transport, the C193 has proven to be a transportation system component of high reliability which has an electrical life that is above average.

**Compact single pole contactors for voltages up to 1,500 volts**

The modular contactors of the C195 series offer diverse configurations for AC or DC contactors up to 1,500 volts nominal voltage and 320 amps continuous current. The C195 X version can also switch DC voltage bi-directionally. The bistable versions require no energy in continuous operation. With small dimensions, the C195 has a high breaking capacity thanks to double contact interruption in a largely closed contact chamber.

**Compact double pole NO contactors for voltages up to 1,000 volts**

Double pole high-voltage contactor of compact design: Notwithstanding its small size, the C294 series contactor features an extraordinary switching capacity for DC applications up to 1,000 volts. Best suited for the harsh environment of public transport, the C294 has proven to be a transportation system component of high reliability which has an electrical life that is above average.

**Double pole NO contactors for voltages up to 1,200 volts**

With its compact size and efficient arc chute our C295 series contactor allows the handling of voltages up to 1,200 volts and currents of 120 amps max. Switching high amperage even at significant inductance can be achieved by series connection of the main contacts. Typical applications are to be found in traffic engineering equipment and conversion engineering of complex power supplies.

**FEATURES**

- Power range:
  - Nominal voltage up to 1,000 volts
  - Thermal current 50 amps
- Suitable for years of continuous duty
- Intended for high ambient temperatures
- Double-break contacts
- Versions for DC and AC operation
- DC versions with blowout magnets
- DIN rail mount option
- Tested to railway standard IEC 60077, GB/T 14048.4, UL/IEC 60947-4-1

- Power range:
  - Nominal voltage up to 1,500 volts
  - Thermal current 320 amps
- Suitable for years of continuous duty
- Intended for high ambient temperatures
- Double-break contacts
- Versions for AC and DC operation
- DC versions with magnetic blowout
- Tested to railway standard IEC 60077, GB/T 14048.4, UL/IEC 60947-4-1

- Power range:
  - Nominal voltage up to 1,000 volts
  - Thermal current 40 amps
- Very compact design
- Intended for high ambient temperatures
- Double-break contacts
- Arc extinguishing with blow magnets
- Higher switching capacity resulting from main contacts connected in series
- Parallel connection results in longer electrical life
- Tested to railway standard IEC 60077, GB/T 14048.4, UL/IEC 60947-4-1

- Power range:
  - Nominal voltage up to 1,200 volts
  - Thermal current 120 amps
- Compact, rugged design
- Double-break contacts
- DC versions with magnetic blowout
- Higher switching capacity resulting from main contacts connected in series
- Parallel connection results in longer electrical life
- Tested to railway standard IEC 60077, GB/T 14048.4

**FEATURES**

[Web link C193 contactors](#)

[Web link C195 contactors](#)

[Web link C294 contactors](#)

[Web link C295 contactors](#)

**SPECIFICATIONS**

	C193	C195
Type of voltage	DC, uni-directional / AC, f ≤ 60 Hz	DC, uni-directional (C195 X bi-directional) / AC, f ≤ 60 Hz
Main contacts		
Number of, configuration	1x NO	1x NO oder 1x CO
Nominal voltage U <sub>n</sub>	1,000 V	C195: NO: max. 1,000 V / CO: 200 V / C195 X: 1,500 V
Rated insulation voltage U <sub>Nm</sub>	1,200 V	C195: NO: 1,200 V / CO: 600 volts / C195 X: 1,800 V
Rated impulse withstand voltage U <sub>Ni</sub>	8 kV	NO: 8 kV / CO: 6 kV
Pollution degree	PD3	PD3
Overvoltage category	OV3	OV3
Conventional thermal current I <sub>th</sub>	50 A @ T <sub>a</sub> = 70° C	C195: 250 A @ T <sub>a</sub> = 70° C / C195 X: 320 A @ T <sub>a</sub> = 70° C
Rated short-time withstand current I <sub>cw</sub>	1,500 A @ T < 100 ms	2,300 A @ T < 100 ms
Auxiliary contacts		
Number of, Configuration	1x Snap-action switch S870 max. (SPDT)	2x Snap-action switches S870 max. (SPDT)
Magnetic drive		
Coil voltage U <sub>s</sub>	Monostable: 24 / 36 / 48 / 72 / 80 / 110V DC	Monostable: 24 / 36 / 48 / 72 / 80 / 110V DC

**SPECIFICATIONS**

	C294	C295 A / ...B - C295 K / ...L - C295 S / ...T
Type of voltage	DC, uni-directional	DC, uni-directional / AC, f ≤ 60 Hz
Main contacts		
Number of, configuration	2x NO	2x NO
Nominal voltage U <sub>n</sub>	1,000 V	750 V - 1,200 V - 200 V
Rated insulation voltage U <sub>Nm</sub>	1,200 V	1,000 V - 1,600 V - 1,000 V
Rated impulse withstand voltage U <sub>Ni</sub>	8 kV	8 kV - 10 kV - 8 kV
Pollution degree	PD3	PD3
Overvoltage category	OV3	OV3
Conventional thermal current I <sub>th</sub>	40 A @ T <sub>a</sub> = 70° C	120 A @ T <sub>a</sub> = 70° C
Rated short-time withstand current I <sub>cw</sub>	1,500 A @ T < 100 ms	---
Auxiliary contacts		
Number of, Configuration	1x Snap-action switch S870 max. (SPDT)	2x Snap-action switches S870 max. (SPDT)
Magnetic drive		
Coil voltage U <sub>s</sub>	Monostable: 24 / 36 / 72 / 110V DC	Monostable: 24 / 36 / 48 / 60 / 72 / 96 / 110V DC



CL1115 – CL1215 – CL1315

1, 2 and 3 pole NO contactors for voltages up to 1,500 volts

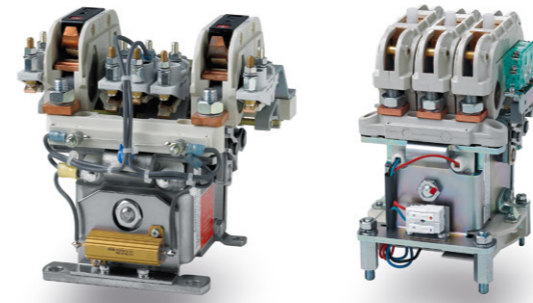
CL Series contactors are the economical solution for switching DC and AC currents in the medium power range. The compact contactors come with an arc chute that has proven itself many times over and are suitable for universal use in the harsh environmental conditions of industrial applications as well as in AC and DC railway networks. The switching devices guarantee reliable, low-wear switching of nominal voltages up to 1,500 volts.



CH1130

1-pole high-voltage contactors for voltages up to 3,000 volts

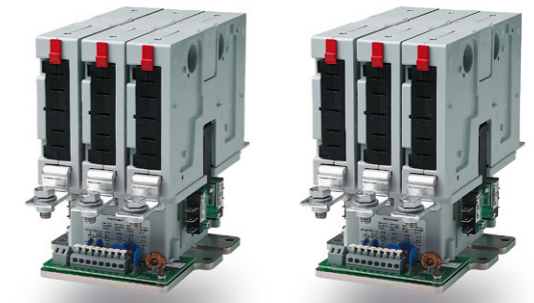
The CH1130 AC and DC contactor replaces the CH high-voltage contactors that have been tried and tested for decades. Following the CT series, the design has been completely revised. Accordingly, permanent magnets and ceramic elements are also used for arc extinguishing in the CH1130; but without the electromagnets of the CT series, the CH is significantly more compact. The contactor is used as a precharging contactor in power supply systems or as a main contactor in heating and air conditioning systems.



C152 – C153 – C154 – C155 – C156 – C157 – C158 – C159

Multi-pole cam contactors for voltages up to 750 volts or battery voltages

Long-proven contactors with S306, S307 or S310 cam-operated switching elements and main contact configurations as NC, NO or in combination. Permanentmagnetic blowout and arc chamber for DC operation. Versatile series. Well-proven as line contactor, changeover unit and reverser. Suitable for use in control circuits of electric equipment for rolling stock and industrial applications as well as for battery powered vehicles.



CFS3-15 – CF3-30

Multi-pole AC contactors for higher frequencies in the power class up to 3,000 volts

The start for Schaltbau's modern modular CF contactors is a compact 3-pole AC version in the power class up to 600 amps and 3,000 volts for inverter-fed AC drives with higher frequencies. A special feature are the newly developed switching chambers. These can be universally configured as normally open, normally closed or in combination as changeover contacts. An efficient electronic economy circuit reduces power consumption and heat loss and saves costs.

**FEATURES**

- Power range:
  - Nominal voltage up to 1.500 volts
  - Thermal current 200 amps
- 1, 2 and 3 pole versions
- Double break contacts
- Versions for AC and DC operation
- DC versions with magnetic blowout
- Drives with coil tolerances according to railway standard
- Low maintenance and long life
- Tested to railway standard IEC 60077, GB/T 14048.4

- Power range:
  - Nominal voltage up to 3,000 volts
  - Thermal current 200 amps
- Compact 3 kV contactor for AC and DC
- Semi-bi-directional DC version
- Compact, robust design
- Double break contacts
- Permanent magnets and ceramic elements for arc extinguishing
- Tool-free visual check of contact status
- Replaces the existing CH series
- Tested to railway standard IEC 60077

- Power range:
  - Nominal voltage up to 750 volts
  - Thermal current 500 amps
- Combination of 1 to max. 4 main contacts and max. 4 auxiliary contacts
- Easy to replace switching elements
- Double-break contacts
- Coil tolerance -30% ... +25%
- Electronic economy circuit available
- 1,200 amps max. by parallel connection of the main contacts
- Tested to railway standard IEC 60077, GB/T 14048.4

- Power range:
  - Nominal voltage 1,500–3,000 volts, frequencies up to 400 hertz
  - Thermal current 200–300–600 amps by parallel connection of two main contacts each
- Configurable as NO, NC or changeover switch
- Innovative application-dependent arc chamber design
- High short-circuit breaking capacity
- 4 auxiliary switches, optionally 1 NC contact b<sub>0</sub> and 1 NO contact a<sub>1</sub>
- Low energy consumption and low heating thanks to sophisticated coil saving circuit
- Tested to railway standard IEC 60077

**FEATURES**

[Web link CL contactors](#)

[Web link CH1130 contactors](#)

[Web link C152 ... C159 contactors](#)

[Web link CF contactors](#)

**SPECIFICATIONS**

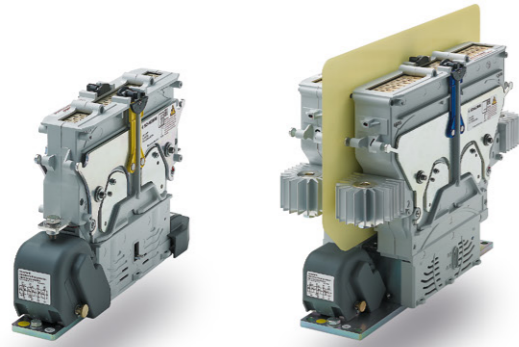
	CL1115 – CL1215 – CL1315	CH1130
Type of voltage	DC, uni-directional / AC, f ≤ 60 Hz	DC, semi-bi-directional / AC, f ≤ 60 Hz
Main contacts		
Number of, configuration	1x / 2x / 3x NO	1x NO
Nominal voltage U <sub>n</sub>	1,500 V	3,000 V
Rated insulation voltage U <sub>Nm</sub>	2,200 V	4,800 V
Rated impulse withstand voltage U <sub>Ni</sub>	12 kV	25 kV
Pollution degree	PD3	PD3
Overvoltage category	OV3	OV3
Conventional thermal current I <sub>th</sub>	250 A @ 40° C / 200 A @ 70° C	200 A @ 70° C
Rated short-time withstand current I <sub>cw</sub>	2,400 A @ T < 100 ms	3,000 A @ T < 100 ms
Auxiliary contacts		
Number of, Configuration	2x Snap-action switches S870 max. (SPDT)	2x Snap-action switches S826 (SPDT-DB)
Magnetic drive		
Coil voltage U <sub>s</sub>	Monostable: 24 / 72 / 110 V DC	Monostable: 24 / 36 / 72 / 110 V DC

**SPECIFICATIONS**

	C152 – C153 – C154 – C155 – C156 – C157 – C158 – C159	CFS3-15 – CF3-30
Type of voltage	DC, uni-directional / AC, f ≤ 60 Hz	AC (f ≤ 400 Hz) *2
Main contacts		
Number of, configuration	1x / 2x / 3x / 4x *1 NO or/and NC	1x / 2x / 3x NO or/and NC *2
Nominal voltage U <sub>n</sub>	450 V or 750 V	CFS3-15: 1,500 V – CFS3-30: 3,000 V
Rated insulation voltage U <sub>Nm</sub>	630 V or 1,000 V	3,000 volts @ PD3, OV3 – 3,600 volts @ PD3, OV2
Rated impulse withstand voltage U <sub>Ni</sub>	12 kV	CFS3-15: 12 kV – CFS3-30: 25 kV
Pollution degree	PD3	PD3
Overvoltage category	OV3	OV2 / OV3
Conventional thermal current I <sub>th</sub>	C152...C154: 200 A / C155...C157: 300 A / C158, C159: 500 A @ 70° C	200 A / 300 A @ 70° C
Rated short-time withstand current I <sub>cw</sub>	C152...C154: 900 A / C155...C157: 1.4 kA / C158, C159: 2.5 kA @ 100ms	4,000 A @ 100 ms
Auxiliary contacts		
Number of, Configuration	max. 4x Snap-action switches (S800, S826) and/or Cam switch elements (S007)	4x Snap-action switches S870 max. (SPDT)
Magnetic drive		
Coil voltage U <sub>s</sub>	Monostable: 24 / 72 / 110 V DC	Monostable: 24 / 110 V DC

\*1 C152...C157: 2x/3x/4x pole, C158: 1x pole, C159: 2x pole

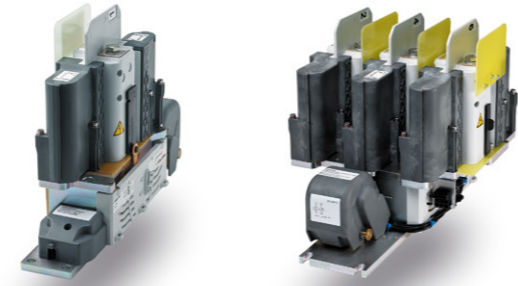
\*2 DC versions and variants with 4x/5x/6x NO or/and NC contacts on request



CT1115 – CT1215 – CT1130 – CT1230

1- and 2-pole AC and bi-directional DC NO contactors,  
Power class up to 3,000 volts / 1,100 amps

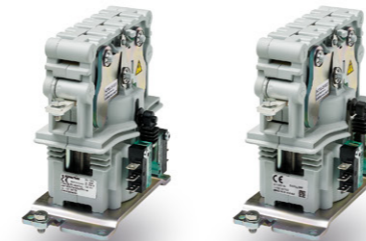
The innovative arc extinguishing technology enables almost unlimited use in industrial AC and DC applications as well as in worldwide rail traffic. CT contactors ensure very low-wear and safe switching behaviour over the entire application range, even under very difficult switching conditions. The switching devices are designed for switching and carrying large currents at high rated voltages. The use of additional permanent magnets also reliably extinguishes switching arcs even at very low currents. The CT does not have a critical current range.



CA1115 – CA1130 – CA1315 – CA1330

1- and 3-pole AC contactors for higher frequencies,  
Power class up to 3,000 volts / 800 amps

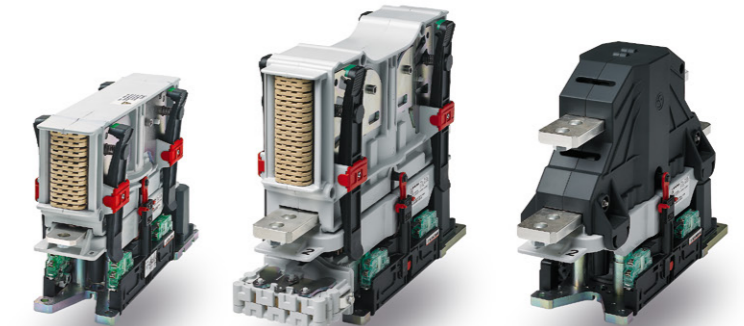
With the CA series contactors, Schaltbau provides an efficient switchgear concept for the safe disconnection of inverter-fed drive motors in electrically powered multiple units. However, the switchgear is equally suitable for disconnecting AC 3-phase inverters of wind power and photovoltaic systems from the mains and reconnecting them to the mains. The AC contactor can switch much higher frequencies than the 50 to 60 hertz that are usual in the mains: for example, up to 400 hertz for modern drive systems in electric multiple units.



CPP1115 – CPP2115

1-pole AC and DC NO and NC contactors,  
Power class up to 1,500 volts / 200 amps

The extremely compact DC contactors of the CPP series are the smallest switching devices in the power class up to 200 amps and suitable for nominal voltages up to 1,500 volts. The single-pole switching device is available as a universal NO or NC contactor. Among other things, it is used in battery test benches. There, the devices are ideally suited as integrated or separate precharging contactors for the large Schaltbau CP and CT contactors. Other applications for the NC contactor variant include discharging the capacitor in the DC link of converters in railway vehicles or in industrial test systems.



CP1115 – CP2115 – CP3115 – CP1130 – CP2130 – CP3130

1-pole AC and bi-directional DC power contactors,  
Power class up to 3,000 volts / 2,000 amps

With the CP contactor series, Schaltbau is once again bringing an extremely innovative switchgear concept to the market. The patented and exclusively permanent-magnetic arc treatment ensures full bidirectionality and is even more compact. This saves space and reduces weight. In addition, the universal devices can be configured as normally open or normally closed contacts, as disconnectors or changeover switches. In this way, different requirements can be flexibly realised. Thanks to its unique modularity, the new product family comprises a large number of different design variants, adapted to a wide range of applications.

**FEATURES**

- Power range:
  - Nominal voltage 1,500–3,000 volts
  - Thermal current 400–800–1,100 amps
- Combination of permanent magnetic and electromagnetic blowout
- Reliable disconnection of small currents at high voltages – no critical current range
- Compact and robust, 1 and 2 pole versions
- Double-break contacts
- Extended coil tolerances
- Tested to railway standard IEC 60077, GB/T 14048.4, UL/IEC 60947-4-1

- Power range:
  - Nominal voltage 1,500–3,000 volts
  - Thermal current 350–540–800 amps
- Innovative design: compact, robust, reliable
- High short-circuit switching capacity at frequencies up to 400 hertz
- Main contact system: 1 or 3 pole, double-break contacts
- Easy visual inspection and maintenance
- Extended coil tolerances
- Tested to railway standard IEC 60077

- Power range:
  - Nominal voltage 1,500 volts
  - Thermal current NO 200 amps or NC 120 amps
- Permanent magnetic blowout – no critical current range
- High making capacity  $I_{cm}$  up to 2,000 amps
- High short-time current carrying capacity  $I_{cw}$  up to 2,000 amps
- Double-break contacts
- Compact, robust, low total cost of ownership (TCO)
- Extended coil tolerances
- Tested to railway standard IEC 60077, GB/T 14048.4, UL/IEC 60947-4-1

- Power range:
  - Nominal voltage 1,500–3,000 volts
  - Thermal current 600–1,200W–2,000 amps
- Configurable as NO or NC and as disconnector or changeover switch
- Effective permanent magnetic blowout – no critical current range
- Double-break contacts
- Precharging contactor and earthing contact can be integrated optionally
- Modular, compact, low total cost of ownership (TCO)
- Extended coil tolerances
- Tested to railway standard IEC 60077

**FEATURES**

[Web link CT contactors](#)

[Web link CA contactors](#)

[Web link CPP contactors](#)

[Web link CP contactors](#)

**SPECIFICATIONS**

	CT1115 – CT1215	CT1130 – CT1230	CA1115/04 – CA1315/04	CA1130/08 – CA1330/08
Type of voltage	DC bi-directional / AC, $f \leq 60$ Hz		AC, $f \leq 400$ Hz	
Main contacts	1x / 2x NO		1x / 3x NO	
Number of, configuration	1x / 2x NO		1x / 3x NO	
Nominal voltage $U_n$	1,500 V		1,500 V	
Rated insulation voltage $U_{Nm}$	3,000 V		2,000 V	
Rated impulse withstand voltage $U_{Ni}$	15 kV		15 kV	
Pollution degree	PD3		PD3	
Overtoltage category	OV3		OV3	
Conventional thermal current $I_{th}$	400 A / 800 A / 1,100 A		350 A / 540 A*1	
Rated short-time withstand current $I_{cw}$	6 kA / 8 kA / 8 kA @ $T < 100$ ms		800 A*1	
Auxiliary contacts	1x S870 (a1) + 1x S870 (b0) + 2x S826 / 4x S826*2		1x S970 (a1) + 1x S970 (b0) / 2x S970 (a1) + 2x S970 (b0) / 1x S870 (a1) + 1x S870 (b0) + 2x S826 / 4x S826*2	
Number of, Configuration	1x S870 (a1) + 1x S870 (b0) + 2x S826 / 4x S826*2		1x S970 (a1) + 1x S970 (b0) / 2x S970 (a1) + 2x S970 (b0) / 1x S870 (a1) + 1x S870 (b0) + 2x S826 / 4x S826*2	
Magnetic drive	Monostable: 24 / 36 / 48 / 72 / 110V DC		Monostable: 24 / 36 / 72 / 110V DC	
Coil voltage $U_s$	Monostable: 24 / 36 / 48 / 72 / 110V DC		Monostable: 24 / 36 / 72 / 110V DC	

\*1 CA1315/04: 350 A with standard coil, 540 A with electronic coil control; CA1330/08: 800 A with electronic coil control

\*2 Snap-action switch, contacts a1 and b0 according to EN 60077-2 or b0 mirror contact for feedback circuits according to DIN EN 13849-1

**SPECIFICATIONS**

	CPP1115-02	CPP2115-01	CP1115 – CP2115 – CP3115 – CP1130 – CP2130 – CP3130
Type of voltage	DC bi-directional / AC, $f \leq 60$ Hz		DC bi-directional / AC, $f \leq 60$ Hz
Main contacts	1 NO		1x NO or 1x NC or 1x CO
Number of, configuration	1 NO		1x NO or 1x NC or 1x CO
Nominal voltage $U_n$	1,500 V		CPx115: 1,500 V – CPx130: 3,000 V
Rated insulation voltage $U_{Nm}$	3,000V @ PD3, OV3 / 3,600V @ PD2, OV2		CPx115: 1,800V – CPx130: 3,600V
Rated impulse withstand voltage $U_{Ni}$	15 kV		CPx115: 14 kV – CPx130: 25 kV
Pollution degree	PD2 / PD3		PD3
Overtoltage category	OV2 / OV3		OV3
Conventional thermal current $I_{th}$	CPP1115-02: 200 A		600 A / 1,200 A / 2,000 A
Rated short-time withstand current $I_{cw}$	CPP2115-01: 120 A		15 kA @ 100 ms
Auxiliary contacts	2 Snap-action switches S870 max. (SPDT)		1x S870 (a1) + 1x S870 (b0) + 2x S826 / 4x S826*1
Number of, Configuration	2 Snap-action switches S870 max. (SPDT)		1x S870 (a1) + 1x S870 (b0) + 2x S826 / 4x S826*1
Magnetic drive	Monostable: 24 / 36 / 48 / 60 / 72 / 84 / 96 / 110V DC		Monostable or bistable: 24 / 36 ... 48 / 72 ... 110V DC
Coil voltage $U_s$	Monostable: 24 / 36 / 48 / 60 / 72 / 84 / 96 / 110V DC		Monostable or bistable: 24 / 36 ... 48 / 72 ... 110V DC

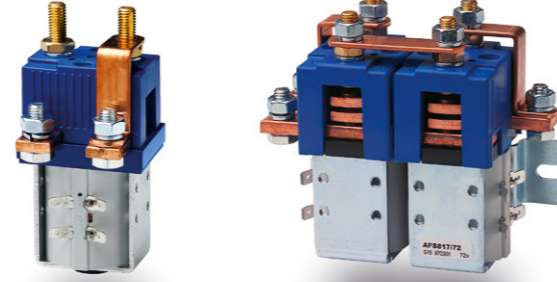
\*1 Snap-action switch, contacts a1 and b0 according to EN 60077-2 or b0 mirror contact for feedback circuits according to DIN EN 13849-1



C110B

**Single pole battery contactors to meet the requirements of battery-electric industrial trucks**

C110B series contactors offer an economical solution for carrying DC currents from 60 amps to 250 amps and for battery voltages up to 48 volts. The contactors are equipped with DC coils featuring coil tolerances as required for traction batteries of industrial trucks and other battery-powered vehicles.



AFS

**NO, NC, changeover and reversing contactors for battery-electric industrial trucks**

AFS series contactors are designed for use with all kinds of electric vehicles in material handling. Coming with double-break contacts, the DC changeover and reversing contactors are designed for switching resistive, capacitive and inductive loads. Especially in the after-sales market the contactors are in great demand as replacement contactors for most leading brands of trucks.



C137 - C163 - C164

**Single pole DC contactors for battery voltages up to 110 volts**

Contactors of the C137, C163 and C164 series are suitable for carrying direct currents in the range of 40 amps to 140 amps for all common battery voltages of up to 110 volts. The battery contactors are available as single-pole make contacts with magnetic blowout or as single-pole changeover contacts with an additional galvanically isolated break contact. The contactors are suitable for switching small or medium loads.



CS115

**4 pole universal contactors for battery voltages up to 800 volts**

The CS115 4-pole contactors complement the range with a universal contactor for battery voltages up to 800 volts. The control contactor is available in 3 main contact configurations and can optionally be combined with up to 4 snap-on auxiliary switches. They are especially suitable for control tasks of small and medium loads in battery networks, such as switching on/off, interlocking, signalling as well as control of power contactors.

**FEATURES**

- Power range:
  - Nominal voltage up to 48 volts
  - Thermal current 60–100–150–250 amps
- Compact, robust design: 4 sizes
- Double-break contacts
- Extra wide coil tolerance
- Mounting bracket optionally available
- Tested according to IEC 60947, EN 1175-1, GB/T 14048.4

- Power range:
  - Nominal voltage up to 48–80 volts
  - Thermal current 100–150–250 amps
- Compact, rugged design
- NC, NO, changeover contactors: single pole
- Reversing contactors: assembly of two SPDT or two DPST-NO
- Double-break contacts
- Magnetic blowouts and auxiliary switch, optional
- Tested according to IEC 60947, EN 1175-1, UL/IEC 60947-4-1

- Power range:
  - Nominal voltage up to 110 volts
  - Thermal current 40–80–140 amps
- Compact design
- Double-break contacts
- Easy to replace main contacts
- Blowout magnets
- 1 Auxiliary switch optional
- Tested to railway standard IEC 60077, GB/T 14048.4, UL/IEC 60947-4-1

- Power range:
  - Nominal voltage up to 800 volts
  - Thermal current 20 amps
- Compact, rugged design, DIN rail mounting
- Double-break contacts
- Blowout magnets
- Possible configuration of main contacts: 4 NO, 3 NO/1 NC or 2 NO/2 NC
- Max. 4 optional auxiliary switches as NC or NO contacts
- Tested to railway standard IEC 60077

**FEATURES**

[Web link C110B contactors](#)

[Web link AFS contactors](#)

[Web link C137 ... C164 contactors](#)

[Web link CS115 contactors](#)

**SPECIFICATIONS**

	C110B/80 - C110B/120 - C110B/200 - C110B/300	AFS11 - AFS15 - AFS17 - AFS19 - AFS7xx - AFS8xx
Type of voltage	DC bi-directional	DC, uni-directional
Main contacts		
Number of, configuration	1x NO	1x NO
Rated operational voltage $U_e$	48 V	48 V w/o magnetic blowout / 80 V with magnetic blowout
Rated insulation voltage $U_i$	80 V	48 V w/o magnetic blowout / 80 V with magnetic blowout
Rated impulse withstand voltage $U_{imp}$	1,5 kV	0,8 kV w/o magnetic blowout / 1,5 kV with magnetic blowout
Pollution degree	PD2 bzw. PD3	PD3
Overtoltage category	OV3	OV2
Conv. free air thermal current $I_{th}$	60 A - 100 A - 150 A - 240 A @ 40° C	100 A - 150 A - 250 A @ 40° C
Rated short-time withstand current $I_{cw}$	400 A - 800 A - 1,500 A - 1,800 A @ 100 ms	800 A - 1,500 A - 2,000 A @ 1 ms
Auxiliary contacts		
Configuration	1x SPDT, optional	1x SPDT, optional
Magnetic drive		
Rated control supply voltage $U_s$	Monostable: 24 / 48 V DC	Monostable: 6 ... 130 volts DC

**SPECIFICATIONS**

	C137 - C163 - C164	CS115
Type of voltage	DC, uni-directional / AC (f ≤ 60Hz)	DC, uni-directional / AC (f ≤ 60Hz)
Main contacts		
Number of, configuration	1x NO or 1x CO	4x NO - 3x NO/1x NC - 2x NO/2x NC
Rated operational voltage $U_r$	110 V	800 V
Rated insulation voltage $U_{Nm}$	150 V	800 V
Rated impulse withstand voltage $U_{Ni}$	2,5 kV	6 kV
Pollution degree	PD3	PD3
Overtoltage category	OV3	OV3
Conventional thermal current $I_{th}$	40 A - 80 A - 140 A	20 A
Rated short-time withstand current $I_{cw}$	800 A @ 100 ms - 1,000 A @ 100 ms - 1,500 A @ 100 ms	---
Auxiliary contacts		
Number of, configuration	1x SPDT, optional	1x ... 4x NO (AS115/10) and/or NC (AS115/01) optional
Magnetic drive		
Coil voltage $U_s$	Monostable: 24 / 36 / 48 / 72 / 80 / 110 V DC	Monostable: 24 / 36 / 48 / 72 / 96 / 110 V DC



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with compliments:

## 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

- 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