Brochure Contactors

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

More information schaltbau.com
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

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.
### Glossary

- **Switchgear** - General term for any switchgear and/or combinations of one or more switching and protective devices and the respective connections, accessories, housings and support frames mostly used for generating, transmitting, distributing and conversion of electrical energy.
- **Contactor** - Mechanical switching device with one free position only, not actuated automatically and capable of connecting and disconnecting currents to the circuits under operating conditions, overloads included (IEV 441-15-07). See also: [Conventional thermal current](#)

### Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Type of voltage</th>
<th>DCs</th>
<th>Main contacts</th>
<th>Rated operating voltage</th>
<th>Conv. thermal current</th>
<th>Aux. contacts</th>
<th>Application</th>
<th>Industry</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>C110</td>
<td>DC</td>
<td>NO/NC</td>
<td>up to 1,000 V</td>
<td>500 A max.</td>
<td>1,000 A max.</td>
<td>SPDT</td>
<td>2x</td>
<td>2x</td>
<td>9</td>
</tr>
<tr>
<td>C115</td>
<td>DC</td>
<td>NO/NC</td>
<td>up to 1,000 V</td>
<td>500 A max.</td>
<td>1,000 A max.</td>
<td>SPDT</td>
<td>2x</td>
<td>2x</td>
<td>10</td>
</tr>
</tbody>
</table>

### Conventional thermal current

The conventional thermal current is the highest short-circuit current for temperature rise tests of non-enclosed devices as per IEC 60947-4-1 and the conventional thermal current must equal or exceed the maximum rated operating current of the non-enclosed device at the time of its mass production. The means of an usual interior room occurs free of light and inaudible. A non-enclosed device is one supplied without a barrier by the manufacturer or a device with integrated housing which usually does not provide protection against atmospheric influences.

### Contactors for railway applications

- with extended coil acceptance: according to IEC 60947-4-1, requiring a voltage range of 4.5V to 12V for which the contactor 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 setting voltage at which the contactor or fuse can break at a certain voltage under given conditions. The breaking capacity is determined in the applicable detail specification. For AC current the breaking capacity is determined by the rms value of the symmetrical current component.

### Making capacity

The making capacity of a switching device or fuse is the prospective making current at which the contactor or fuse can operate under given conditions.

Variety of contactors for a wide range of applications. Thanks to many years of experience and expertise in the development of electrical switchgear and the mastery of DC arcs in particular Schaltbau contactors are grown and the first choice in many applications.

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**Schaltbau**

Contact Control Centre

The production facilities of Schaltbau GmbH are ISO 9001 certified since 1994. Certified to ENEC EN 50191-1 since 2006. For the most recent certificate visit our website.

**Contactors Overview**

<table>
<thead>
<tr>
<th>SPECIFICATIONS</th>
<th>CONTROLLERS</th>
<th>CONTACTORS</th>
<th>SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>C110</td>
<td>C115</td>
<td>C152 ... C159</td>
</tr>
<tr>
<td>Type of voltage</td>
<td>DC</td>
<td>DC</td>
<td>DC</td>
</tr>
<tr>
<td>DCs</td>
<td>NO/NC</td>
<td>NO/NC</td>
<td>NO/NC</td>
</tr>
<tr>
<td>Main contacts</td>
<td>up to 1,000 V</td>
<td>up to 1,000 V</td>
<td>up to 1,000 V</td>
</tr>
<tr>
<td>Rated operating voltage</td>
<td>500 A max.</td>
<td>1,000 A max.</td>
<td>1,000 A max.</td>
</tr>
<tr>
<td>Conv. thermal current</td>
<td>40 A</td>
<td>120 A</td>
<td>250 A</td>
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<tr>
<td>Aux. contacts</td>
<td>NO/NC</td>
<td>NO/NC</td>
<td>NO/NC</td>
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<tr>
<td>Application</td>
<td>Non Mobility</td>
<td>Non Mobility</td>
<td>Non Mobility</td>
</tr>
<tr>
<td>Industry</td>
<td>Railway</td>
<td>Railway</td>
<td>Railway</td>
</tr>
</tbody>
</table>

**Contactors**

- Contactors Overview
- Contactors Specifications
- Contactors DC
Compact 1-pole bi-directional NO contactors for DC up to 1,500 volts rated insulation voltage – conventional 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 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.

Features:
- Power range: Nominal voltage 60 volts to 1,500 volts
- Thermal current 100–300–500 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
- 1 auxiliary switch 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 in progress

Specifications:

**Type of voltage**
- DC, bi-directional
- AC, 1 x 60 Hz

**Main contacts**
- Number of configuration
- Rated operational voltage Ue/Ur
- Rated insulation voltage Ue/Ur
- Rated impulse withstand voltage Uimp/Unp

**Pollution degree**
- Overvoltage category
- Rated short-time withstand current Icw

**Auxiliary contacts**
- Number of configuration
- Rated auxiliary contact voltage Ua

**Magnetic drive**
- Rated control supply voltage Uc

- C300
- C310
- C320
- C360

**FEATURES**
- Power range:
  - Nominal voltage 60 volts to 1,500 volts
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- C300
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- AC, 1 x 60 Hz

**Main contacts**
- Number of configuration
- Rated operational voltage Ue/Ur
- Rated insulation voltage Ue/Ur
- Rated impulse withstand voltage Uimp/Unp

**Pollution degree**
- Overvoltage category
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**Auxiliary contacts**
- Number of configuration
- Rated auxiliary contact voltage Ua

**Magnetic drive**
- Rated control supply voltage Uc

- C300
- C310
- C320
- C360
Single pole high-voltage contactor of compact design. Notwithstanding its small size, the C195 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 C195 has proven to be a transportation system component of high reliability which has an electrical life that is above average.

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 bidirectionally. 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.

SPECIFICATIONS

Type of voltage Main contacts Nominal voltage U_n Nominal current I_n Rated impulse withstand voltage U_wi Pollution degree Overvoltage category Rated short-time withstand current I_s Auxiliary contacts Number of Configuration Magnetic drive Coil voltage U_m

C193

DC, uni-directional / AC, f = 60 Hz 1x NO 1,000 V 120 A 8 kV PD3 C195: 250 A / T = 70 °C C195 X: 320 A / T = 70 °C 2,300 A / t = 100 ms 1x Snap-action switch S870 max. (SPDT)

C195

DC, uni-directional / AC, f = 60 Hz 1x NO or 1x CD C195: NO max. 1,000 V / CD: 200 V / C195 X: 1,500 V C195 NO: 2,000 V / CD: 600 V / C195 X: 1,000 V 8 kV / CD: 6 kV PD3 C195: 250 A / T = 70 °C C195 X: 320 A / T = 70 °C 2,300 A / t = 100 ms 2x Snap-action switches S870 max. (SPDT)

C294

DC, uni-directional / AC, f = 60 Hz 2x NO 2,000 V 500 A 8 kV PD3 40 A / t = 70 °C 1,500 A / T = 100 ms 1x Snap-action switch S870 max. (SPDT)

C295

DC, uni-directional / AC, f = 60 Hz 2x NO 2,000 V 500 A 8 kV PD3 40 A / t = 70 °C 1,500 A / T = 100 ms 2x Snap-action switches S870 max. (SPDT)
The compact contactor comes with an arc chute that has proven itself many times over and is suitable for universal use in the harsh environmental conditions of industrial applications as well as for battery powered vehicles. The contactor is used as a precharging contactor in power supply systems or as a main contactor in heating and air conditioning systems.

**CL Series Contactors**
- 1, 2 and 3 pole NO contactors for voltages up to 1,500 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.

**Power Range**
- Tested to railway standard IEC 60077, GB/T 14048.4
- Low maintenance and long life
- Drives with coil tolerances according to railway standard
- DC versions with magnetic blowout
- Versions for AC and DC operation
- 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

**Rated Short-Time Withstand Current**
- Icw

**Nominal Voltage**
- Un

**Rated Insulation Voltage**
- Um

**Rated Impulse Withstand Voltage**
- Ur

**Conventional Thermal Current by**
- ib

**Permissible Short-Time Withstand Current by**
- Is

**Auxiliary Contacts**
- Number of Configuration

**Magnetic Drive**
- Coil Voltage Uc

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**FEATURES**
- Power range:
  - Nominal voltage up to 3,000 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% to +25%

- Low energy consumption and low heating thanks to sophisticated coil saving circuit
- Tested to railway standard IEC 60077

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**SPECIFICATIONS**

**CL1115 – CL1215 – CL1315**

**Type of Voltage**
- DC, uni-directional / AC, f ≤ 60 Hz

<table>
<thead>
<tr>
<th>Main contacts</th>
<th>Number of configuration</th>
<th>Nominal voltage Un</th>
<th>Rated insulation voltage Um</th>
<th>Rated impulse withstand voltage Ur</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x / 2x / 3x NO</td>
<td>1,500V</td>
<td>2,300V</td>
<td>12kV</td>
<td></td>
</tr>
<tr>
<td>1x NO</td>
<td>3,000V</td>
<td>4,000V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2x NO</td>
<td>4,000V</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Pollution degree</th>
<th>Overvoltage category</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD3</td>
<td>OV3</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Auxiliary contacts</th>
<th>Number of Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>2x Snap-action switches S870 max. (SPDT)</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Magnetic drive</th>
<th>Coil Voltage Uc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monostable 24 / 72 / 110 VDC</td>
<td></td>
</tr>
</tbody>
</table>

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**CH1130**

**Type of Voltage**
- DC, semi-bi-directional / AC, f ≤ 60 Hz

<table>
<thead>
<tr>
<th>Main contacts</th>
<th>Number of configuration</th>
<th>Nominal voltage Un</th>
<th>Rated insulation voltage Um</th>
<th>Rated impulse withstand voltage Ur</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x NO</td>
<td>3,000V</td>
<td>4,000V</td>
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<td></td>
</tr>
<tr>
<td>2x NO</td>
<td>4,000V</td>
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<table>
<thead>
<tr>
<th>Pollution degree</th>
<th>Overvoltage category</th>
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</thead>
<tbody>
<tr>
<td>PD3</td>
<td>OV3</td>
</tr>
</tbody>
</table>

<table>
<thead>
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</thead>
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</table>

<table>
<thead>
<tr>
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<th>Coil Voltage Uc</th>
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</thead>
<tbody>
<tr>
<td>Monostable 24 / 36 / 72 / 110 VDC</td>
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</tr>
</tbody>
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**C152 – C153 – C154 – C155 – C156 – C157 – C158 – C159**

**Type of Voltage**
- DC, uni-directional / AC, f ≤ 60 Hz

<table>
<thead>
<tr>
<th>Main contacts</th>
<th>Number of configuration</th>
<th>Nominal voltage Un</th>
<th>Rated insulation voltage Um</th>
<th>Rated impulse withstand voltage Ur</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x / 2x / 3x / 4x NO or/and NC</td>
<td></td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Pollution degree</th>
<th>Overvoltage category</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD3</td>
<td>OV3</td>
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</table>

<table>
<thead>
<tr>
<th>Auxiliary contacts</th>
<th>Number of Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x / 2x / 3x NO or/and NC</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Magnetic drive</th>
<th>Coil Voltage Uc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monostable 24 / 72 / 110 VDC</td>
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**CF3-15 – CF3-30**

**Type of Voltage**
- AC, f ≤ 400 Hz

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<th>Rated insulation voltage Um</th>
<th>Rated impulse withstand voltage Ur</th>
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</thead>
<tbody>
<tr>
<td>1x / 2x / 3x NO or/and NC</td>
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</table>

<table>
<thead>
<tr>
<th>Pollution degree</th>
<th>Overvoltage category</th>
</tr>
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<tbody>
<tr>
<td>PD3</td>
<td>OV3</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Auxiliary contacts</th>
<th>Number of Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1x / 2x / 3x NO or/and NC</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Magnetic drive</th>
<th>Coil Voltage Uc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monostable 24 / 72 / 110 VDC</td>
<td></td>
</tr>
</tbody>
</table>

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**Multi-pole contactors**
- For voltages up to 3,000 volts
- Rated short-time withstand current Icw
- 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% to +25%
- Low energy consumption and low heating thanks to sophisticated coil saving circuit
- Tested to railway standard IEC 60077

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**CONTACTORS**
- CL Series contactors are the economical solution for switching DC and AC currents in the medium power range.
- The contactor is used as a precharging contactor in power supply systems or as a main contactor in heating and air conditioning systems.
- 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.
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 behavior 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.

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 electrical multiple units.

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.

The AC 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 realized. 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 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
- Extended coil tolerances
- Tested to railway standard IEC 60077

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Type of voltage</th>
<th>CT1115 – CT1215</th>
<th>CT1130 – CT1230</th>
<th>CA1115 – CA1130 – CA1315 – CA1330</th>
<th>CPP1115 – CPP1215</th>
<th>CPP1130 – CPP1315 – CPP1330</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main contacts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of poles</td>
<td>1 – 3</td>
<td>1 – 3</td>
<td>1 – 3</td>
<td>1 – 3</td>
<td>1 – 3</td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>1,500 – 3,000</td>
<td>1,500 – 3,000</td>
<td>1,500 – 3,000</td>
<td>1,500</td>
<td>1,500</td>
</tr>
<tr>
<td>Rated insulating voltage Uci</td>
<td>2,000 – 2,000</td>
<td>2,000 – 2,000</td>
<td>2,000 – 2,000</td>
<td>2,000</td>
<td>2,000</td>
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<tr>
<td>Overvoltage category</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional thermal current Ith</td>
<td>1,500 – 2,000</td>
<td>1,500 – 2,000</td>
<td>1,500 – 2,000</td>
<td>1,500</td>
<td>1,500</td>
</tr>
<tr>
<td>Rated short-time withstand current Is</td>
<td>4,000 – 8,000</td>
<td>4,000 – 8,000</td>
<td>4,000 – 8,000</td>
<td>4,000</td>
<td>4,000</td>
</tr>
<tr>
<td>Auxiliary contacts</td>
<td>1 NO / 1 NC</td>
<td>1 NO / 1 NC</td>
<td>1 NO / 1 NC</td>
<td>1 NO / 1 NC / 2 NC</td>
<td>1 NO / 1 NC / 2 NC</td>
</tr>
</tbody>
</table>

* Coil voltage is Uc. Nominal voltage 1,500–3,000 volts. In the case of a 3-pole contactor, all three contactors will be used simultaneously. * Snap-action switches: contacts are interlocked according to EN 60077-2 and interlocked contactor feedback system according to DIN EN 50178-1.
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 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.

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

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.

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.

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### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Type of voltage</th>
<th>C110B</th>
<th>C137 – C163 – C164</th>
<th>CS115</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main contacts</td>
<td>DC bi-directional</td>
<td>DC uni-directional</td>
<td>DC uni-directional / AC f ≤ 69Hz</td>
</tr>
<tr>
<td>Number of configuration</td>
<td>1x NO</td>
<td>1x NO</td>
<td>4x NO, 3x NO/1x NC or 2x NO/2x NC</td>
</tr>
<tr>
<td>Rated operational voltage Uop</td>
<td>48 V</td>
<td>48 V</td>
<td>4x NO</td>
</tr>
<tr>
<td>Rated impulse withstand voltage Ust</td>
<td>1,5 kV</td>
<td>1,5 kV</td>
<td>20 A</td>
</tr>
<tr>
<td>Power range</td>
<td>Nominal voltage up to 48–80 volts</td>
<td>Thermal current 40–80–140 amps</td>
<td>Nominal voltage up to 800 volts</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>PD2 – PD3</td>
<td>OV3</td>
<td>Prescribed in standard</td>
</tr>
<tr>
<td>Rated thermal current Ith</td>
<td>40 A – 80 A – 140 A</td>
<td>800 A @ 100 ms – 1,500 A @ 100 ms</td>
<td>Conventional thermal current Ith</td>
</tr>
<tr>
<td>Nominal voltage up to 110 volts</td>
<td>48 V</td>
<td>800 V</td>
<td>Overvoltage category</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>OV3</td>
<td>PD3</td>
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<td>PD3</td>
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<tr>
<td>Rated operational voltage Uop</td>
<td>48 V</td>
<td>800 V</td>
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</tr>
<tr>
<td>Rated impulse withstand voltage Ust</td>
<td>1,5 kV</td>
<td>20 A</td>
<td>Overvoltage category</td>
</tr>
</tbody>
</table>

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### FEATURES

- Power range:
  - Nominal voltage up to 48 volts
  - Thermal current 60–100–150–250 amps
- Compact, rugged design
- Extra wide coil tolerance
- Mounting bracket optionally available
- Tested according to IEC 60947, EN 1175-1, GB/T 14048.4
- Extra wide coil tolerance
- Magnetic blowouts and auxiliary switch, optional
- Tested according to IEC 60947, EN 1175-1, UL/IEC 60947-4-1

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### SPECIFICATIONS

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<tr>
<th>Type of voltage</th>
<th>C110B/80 – C110B/120 – C110B/200 – C110B/300</th>
<th>AFS11 – AFS15 – AFS17 – AFS19 – AFS7xx – AFS8xx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main contacts</td>
<td>DC bi-directional</td>
<td>DC uni-directional</td>
</tr>
<tr>
<td>Number of configuration</td>
<td>1x NO</td>
<td>1x NO</td>
</tr>
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<td>Rated operational voltage Uop</td>
<td>48 V</td>
<td>48 V</td>
</tr>
<tr>
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<td>1,5 kV</td>
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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 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 manufactured to industry standards
Contactors 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

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