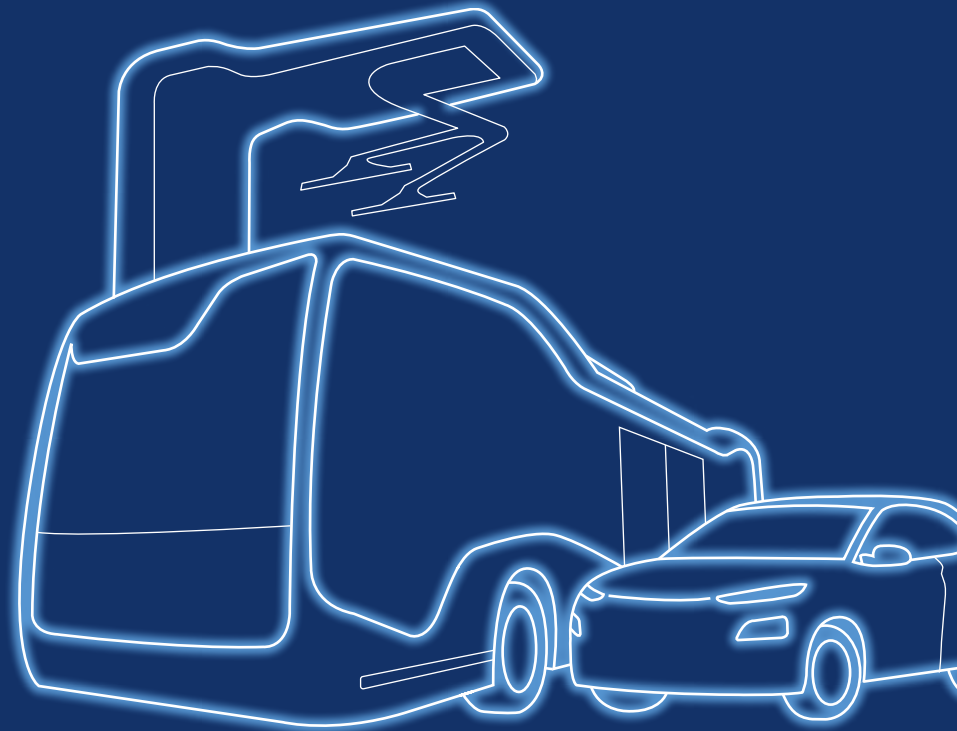


[www.schaltbau.com](http://www.schaltbau.com)

**SCHALTBAU**  
DC Power Under Control

NEW MOBILITY



# DC under control

Benefit from our expertise  
in the field of direct current switching

As a specialist for high-quality DC applications, Schaltbau GmbH has been developing electro-mechanical components for railway technology and industry since 1929 that meet all quality, reliability and service-life requirements.

This expertise in direct-current switching and control subject to challenging conditions qualifies Schaltbau for the mobility of the future.

**Utilize opportunities – keep risks under control!**



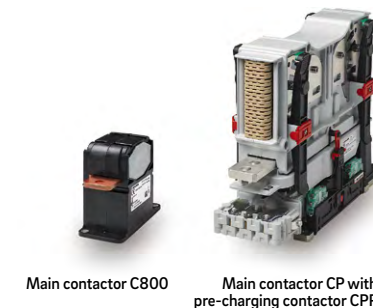
## New Mobility

Safe disconnection of high voltages in e-vehicles

Lithium-ion batteries are state of the art in the field of battery technology for electromobility. DC contactors by Schaltbau provide for safety and reliability in a wide variety of applications. In the case of battery charging, in the battery disconnect unit (BDU) and in the drive train of vehicles as well as in battery test stations. And in addition, robust charging connectors for modern fast chargers used in intralogistics vehicles.

### DC main and precharging contactors

Main contactors in e-mobility applications must keep high levels of current under control and safely and reliably switch off loads in extreme cases. Only in this way is a galvanic isolation between the energy source and the downstream system ensured. In addition, full bi-directionality is required – the main contactor must disconnect high levels of power independently of the current direction. Occurring control switching arcs are safely and reliably extinguished by highly efficient switching chambers – the disadvantages of gas-encapsulated arcing chambers commonly available on the market do not apply. Precharging contactors belonging to the CPP Series switch the precharging path. After successfully precharging, the main contactor is connected.



Main contactor C800

Main contactor CP with  
pre-charging contactor CPP



Traction contactor CF



Charging connector LV

### Traction contactors

Compact and modular three-pole AC power contactors belonging to the CF Series have been specially designed for use in inverter-fed alternating current drives with higher frequencies. The AC power contactors have a modular construction and are equipped with a new future-oriented switching chamber concept. They reliably ensure the disconnection of high switching loads.

### Charging connectors

High power charging connectors connect the vehicle, vehicle battery and the charger. The high-quality and robust contact systems of the LV charging connectors ensure a safe power transmission for high level of current up to 500 amps. In this way, batteries can be recharged at short intervals and vehicles can remain ready for use.



# Schaltbau 360° competence!

**Remarkable are those who can see into the future.  
Noteworthy are those who act prudently:**

Decades of experience and holistic process support in the fields of developing and manufacturing electromagnetic components make us a valuable development partner in finding the just the right solution.

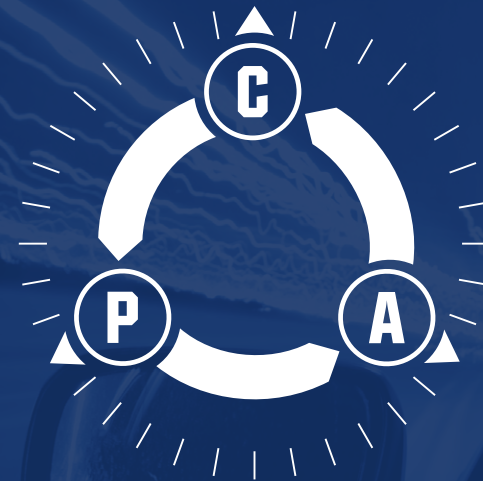
Our sales engineers are experienced professionals that collaborate closely with our developers and design engineers and are experts in the industrial branches relevant to electromobility. They form the bridge between customer requirements and development engineers. In this way, we provide our customers with expertise, competent consultation and always just the right solution for the application at hand.

How can we help you in the emerging e-mobility market?

Together we can find the best solution:

**Phone** +49 89 93005 - 0

**E-mail** [new.mobility@schaltbau.de](mailto:new.mobility@schaltbau.de)



## C Consulting

**Experts are the best consultants.**

Schaltbau is a specialist in electromechanical components and customer specific solutions with decades of experience in development and manufacture.

## A Application

**No need to reinvent the wheel!**

Schaltbau sales engineers have access to a treasure trove of knowledge and experience including a host of realized applications. Thus you will benefit from analogies and empirical data that may be of some value for your application.

## P Product

**The right solution** may eventually be an item from our product line, a special variant with little need for adaptation, or a completely new design – because customizing is standard with us!

**SCHALTBAU**  
DC Power Under Control

## Schaltbau DC switching solutions



Safe switching and controlling  
up to 2,000 amps

Requirements for the switch voltage and the switch current differ depending on the power class of the vehicle. Schaltbau DC products are customized according to customer requirements and are suitable for a multitude of applications.

- e-Busses
- e-Cars
- e-Light- / e-Medium- / e-Heavy Commercial Vehicles
- Electric vehicles for intralogistics (Material Handling Equipment & AGV's)
- Contactors for drive motors (also AC)
- Battery charging stations
- Battery test stations
- Maritime charging and propulsion systems

## Certified safety

Safety and reliability are our greatest assets. We've been producing snap-action switches with positive opening operation for four decades and also offer the greatest variety. Every series is built, tested and certified according to VDE, UL and when necessary even CCC.



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.



# DC contactor in the HV-BDU

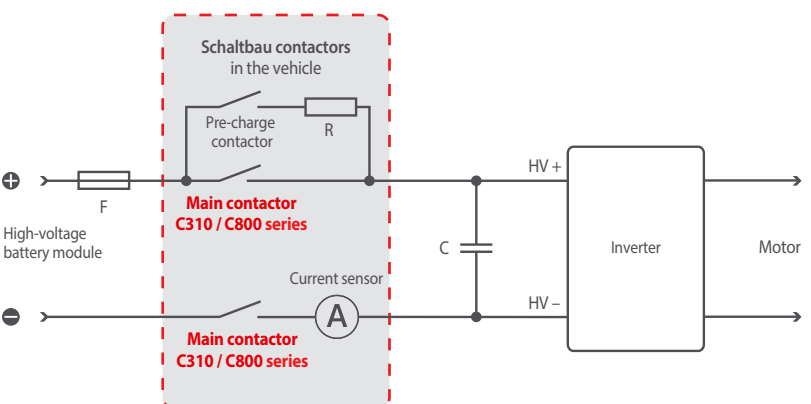
In the 'smart cities' of tomorrow: fewer emissions – better quality of life. Electric drives in all vehicle classes are an important prerequisite for this.

In high-performance battery systems up to 1,000 volts DC, the High-Voltage Battery Disconnect Unit (HV-BDU) establishes a connection between all electrical components in vehicles that are powered by the battery.

**In the event of danger, the HV-BDU disconnects the battery from the high-voltage network and thus, all connections.**

Main contactors can be used both in the positive and negative cable of the drive battery. In this way, occurring faults are reliably kept under control and the battery is disconnected from the electric drive train.

## High-voltage battery disconnect unit (HV-BDU) and battery junction box



- Full bi-directionality
- Power classes from 150 to 1,000 amps can be covered
- High short-time current-carrying capacity up to 3,000 amps
- High rated insulation voltage up to 1,500 volts
- high thermal continuous currents – high breaking capacity



# DC contactors for battery charging



To charge the increasing number of electric buses in local public transport, intermediate stations and depots are being equipped with high-capacity charging stations.

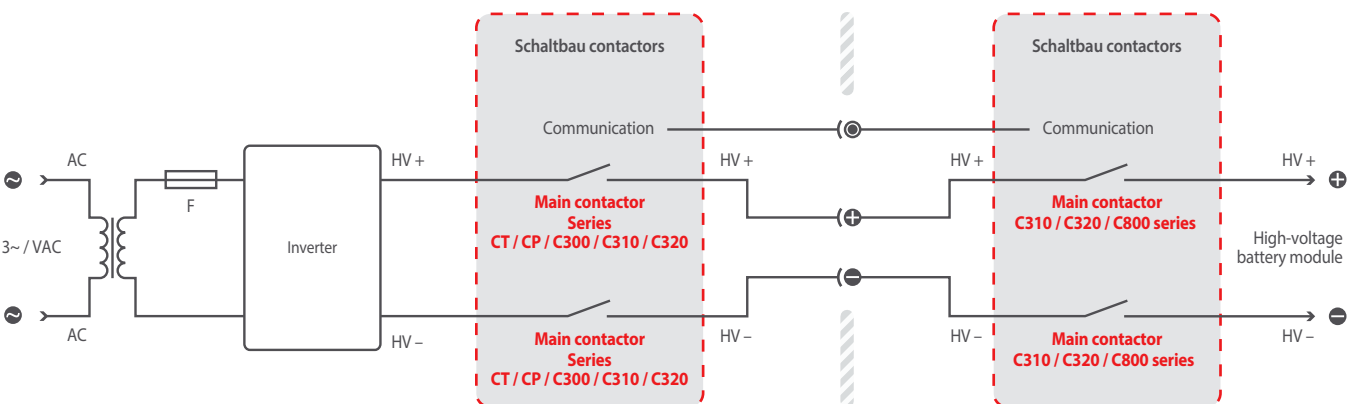
The charging takes place either via mast charging stations or cable-based solutions and takes just a few minutes. Compact DC contactors from Schaltbau form two independent switching elements in the positive and negative paths of the circuit. They ensure safe galvanic isolation between vehicle and charging point.

Safely and reliably keep critical situations under control:  
**Schaltbau contactors also switch when subjected to a full load in the event of danger.**

- Safe disconnection of high power ranges: If necessary, the contactor can reliably disconnect high currents and voltages, irrespective of the current direction
- Thermal continuous current up to 2,000 amps at temperatures up to 85° C
- Continuously low contact resistances
- Low control power levels
- Compact design

## DC charging station

## Vehicle



## Contactors for drive motors

Electromobility in public transport and the transport of goods is an important component in achieving climate protection objectives with relation to transport. Electric commercial vehicles and buses are an important step towards emission-free cities.

It is frequently driven by permanent magnet synchronous motors (PMSM), which have a higher degree of efficiency and are more compact with a lower level of wear.

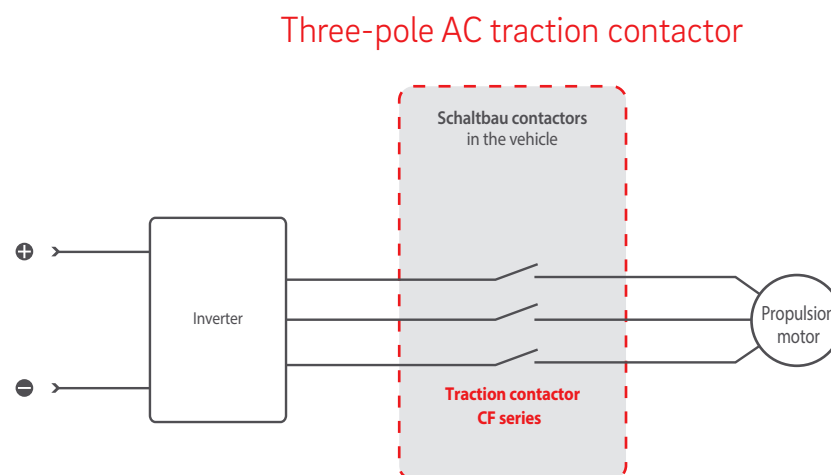
A drive converter connected to the stator of the motor controls the speed via the operational frequency – up to 400 hertz is customary. Safe and reliable disconnection of the converter-motor connection is crucial in the event of a fault. Otherwise, the motor would work as a generator and feed the power back.



### The new CF Series AC contactors

reliably carry and switch high nominal currents even in the case of higher frequencies.

- compact three-pole AC power contactor
- sovereign disconnection performance 3,000 volts, 600 amps and up to 400 hertz
- modular construction, many variants available



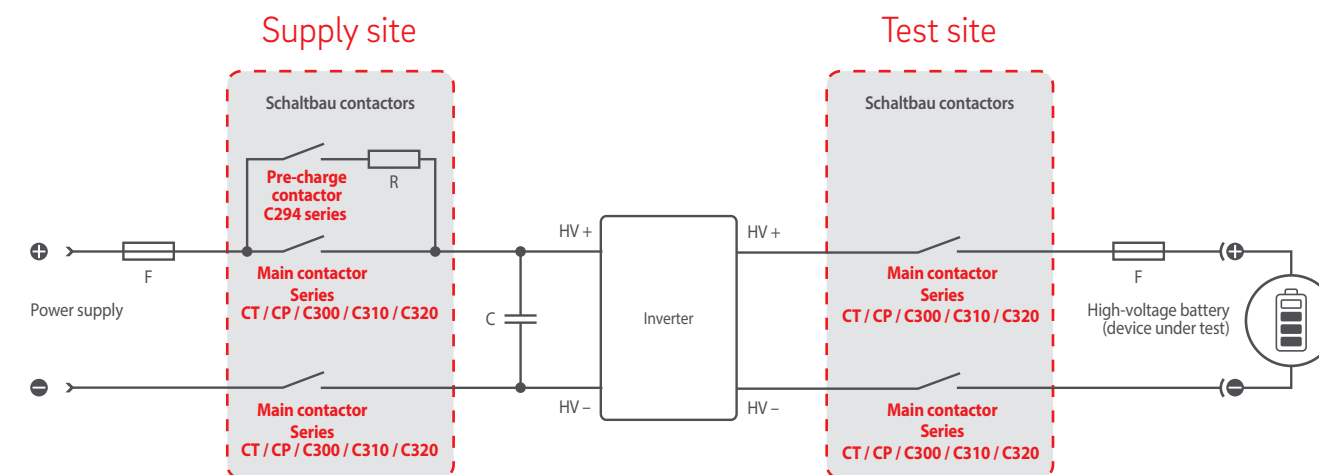
## DC contactors in battery test stations

Alternative drives shape the future of automobiles. They require high-power energy storage systems with high capacity levels and short charging times. Here, lithium-ion batteries now dominate, which are remarkably efficient where discharging and charging capabilities are concerned.

**For the increasingly complex requirements placed on batteries and battery management systems in the automotive environment, battery test systems are required.**

These can be individually configured, scaled up or down, and can be flexibly adjusted to match the respective test requirement. High-voltage contactors by Schaltbau are best suited for the special requirements that prevail in test and simulation environments.

- Ideal for applications with energy recovery  
Bi-directional for both current directions
- Switching of currents up to 4,000 amps at operating voltages up to 1,500 volts
- High isolation-voltage withstand
- Status indication via mirror contact function
- Compact design





# Contactors for DC

Perfectly equipped for the mobility of tomorrow

The electric drive train requires high DC voltages in order to achieve performance comparable to combustion engines. However, these cause switching arcs when they are switched off, which strongly wear the contact surfaces.

Our main goal as DC specialists is to minimise the combustion period of the switching arc. Schaltbau high-voltage contactors meet precisely these requirements and rendering this technology safe and controllable using an air system. In contrast to conventional solutions, an encapsulated switching encapsulated switching chamber with gas filling can be dispensed with.

Switching in the limit load range is thus clearly better controlled.



## Single pole bi-directional DC NO contactors C300, C800 series

The super-compact 1-pole bi-directional DC contactors ensure safe disconnection of high loads regardless of the current direction. Full bidirectionality is essential in battery storage and electric vehicles. The C300 has an integrated PWM controller, the automotive variant C800 is prepared for external control of the coil. Typical applications include use as the main contactor in the battery management of HV vehicle batteries, in charging columns for modern electromobility, in battery test benches or in inverters.

- Power range
  - Nominal voltage up to 1,500 volts, DC bi-direktional / AC f <60 Hz
  - Thermal current up to 500 amps
- Efficient extinguishing chamber with permanent magnetic blowout
- High making and breaking capacity
- Very high rated short-time withstand current
- 1 auxiliary switch with mirror contact function
- C300 with PWM controller; C800 for automotive applications
- Compact and lightweight design

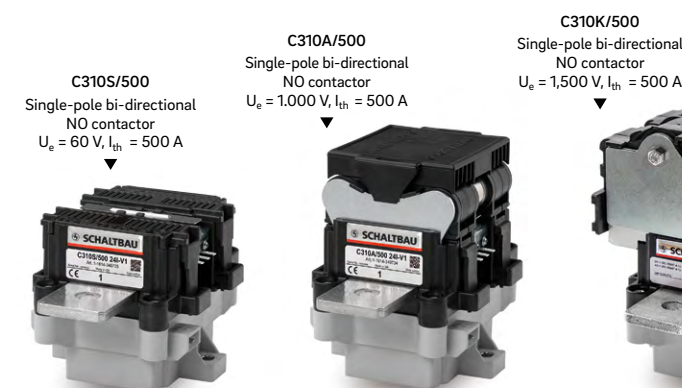


# Contactors for DC

## Single-pole bi-directional DC NO contactors C310 series

The C310 is a single-pole bi-directional DC contactor. It ensures safe disconnection of high loads and reliably protects in the case of a system fault. Typical applications include use as a main contactor in battery management systems of HV vehicle batteries, in charging stations for modern electric vehicles or in battery test stations. The compact design, the double contact interruption, a newly developed very efficient arc chamber as well as the high level of breaking capacity are characteristic.

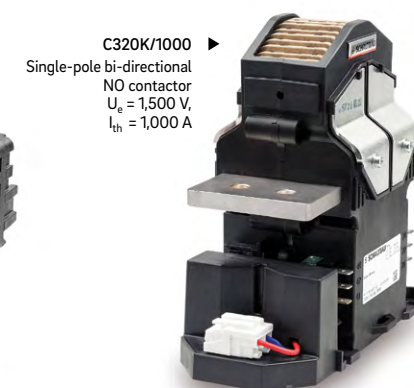
- Power range
  - Nominal voltage 60 volts up to 1,500 volts, DC bi-direktional / AC f <60 Hz
  - Thermal current up to 150–300–500 amps
- Efficient extinguishing chamber with permanent magnetic blowout
- High making and breaking capacity
- High rated short-time withstand current
- Max. 2 auxiliary switches with mirror contact function
- Low energy consumption, thanks to PWM controller



## Single-pole bi-directional DC NO contactors C320 series

The C320 is a single-pole bi-directional DC contactor in the power class up to 1,000 A. It ensures safe disconnection of high loads and reliably protects in the case of a system fault. Typical applications include use as a main contactor in battery management systems of HV vehicle batteries, in charging stations for modern electric vehicles or in battery test stations. The very efficient ceramic arc chamber, a double break contact interruption as well as the high breaking capacity are important features of the new switchgear.

- Power range
  - Nominal voltage 60 volts up to 1,500 volts, DC bi-direktional / AC f <60 Hz
  - Thermal current up to 1,000 amps
- Efficient extinguishing chamber with permanent magnetic blowout
- Very high making and breaking capacity
- High rated short-time withstand current
- Max. 4 auxiliary switches, of them max. 2 with mirror contact function
- Low energy consumption, thanks to PWM controller

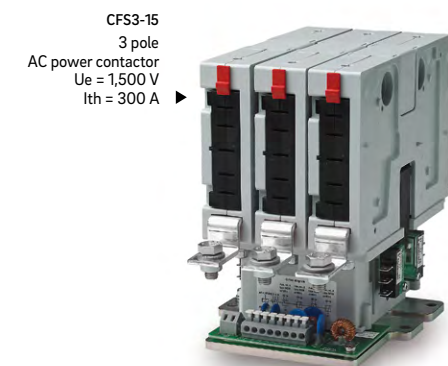


# Power contactors for DC and AC

## 3 pole AC contactors CF series

Schaltbau's highly modular CF series begins with a compact 3-pole AC power contactor for loads up to 600 amps and 3,000 volts for inverter-fed alternating current drives with higher frequencies. One special feature is the newly developed switching chambers. This can be universally configured as NO, NC or in combination as a change-over. An efficient electronic autotransformer circuit reduces input power as well as thermal losses and cuts costs.

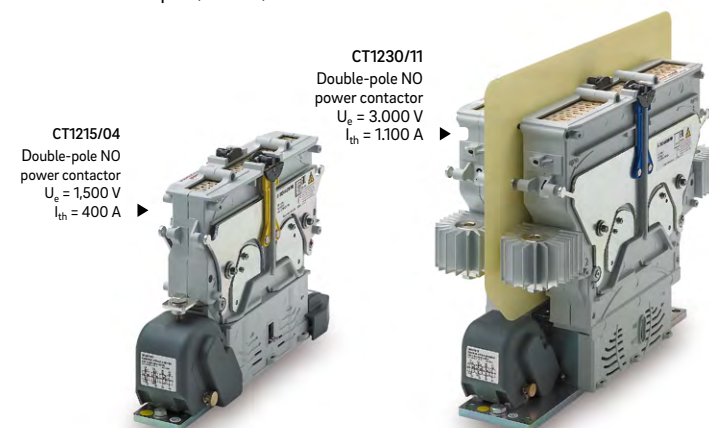
- Power range
  - Nominal voltage 1,500–3,000 volts, frequencies up to 400 hertz
  - Thermal current 200–300–600 amps by parallel connection
- Configurable as NO, NC or changeover switch
- High short-circuit breaking capacity
- 4 auxiliary switches, optionally 1 NC contact  $b_0$  and 1 NO contact  $a_1$
- Low energy consumption and low heating thanks to sophisticated coil saving circuit



## Single and double pole power NO contactors CT series

The 1-pole and 2-pole CT contactors are both capable of switching DC bi-directionally and AC and have a patented arc extinguishing technology. This enables low-wear and safe switching of extremely small but also very high loads. The switching devices can be used on both the DC and AC ends in converters of wind power and PV systems for various switching requirements. They have a double coil drive for lower holding power and effective reduction of power consumption in continuous operation.

- Power range
  - Nominal voltage 1,500–3,000 volts, DC bi-direktional / AC  $f < 60\text{ Hz}$
  - Thermal current 400–800–1,100 amps
- No critical current range: combination of electromagnetic and permanent magnetic blowout
- Double winding coil and electronic coil controller, except 400 A
- 4 aux. switches, incl. 1 mirror contact NC contact  $b_0$  and 1 NO contact  $a_1$
- Compact, robust, reliable

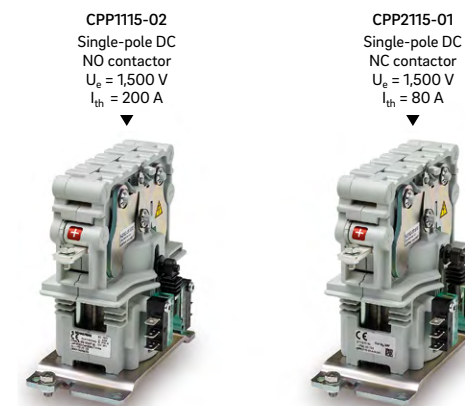


# Power contactors for DC and AC

## Single pole contactors for DC or AC CPP series

The new super-compact DC contactors from the CPP series are the smallest contactors for handling loads up to 200 A and are suitable for nominal operating voltages of up to 3,000 V. The single-pole contactor is available as an NO or NC contactor. This is intended for use in converters and inverters in photovoltaic or wind power plants. These devices are ideally suited as integrated or separate pre-charging contactors for the large Schaltbau models CP and CT.

- Power range
  - Nominal voltage 1,500 volts, DC uni-direktional / AC  $f < 60\text{ Hz}$
  - Thermal current NO 200 amps or NC 120 amps
- High making and breaking capacity
- 2 auxiliary switches with mirror contact function
- Super-compact, robust, reliable



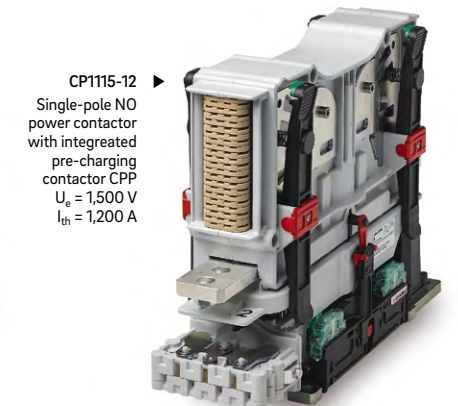
CP1115-06  
Single-pole NO  
power contactor  
 $U_e = 1,500\text{ V}$   
 $I_{th} = 600\text{ A}$



## Single pole power contactors for DC or AC CP series

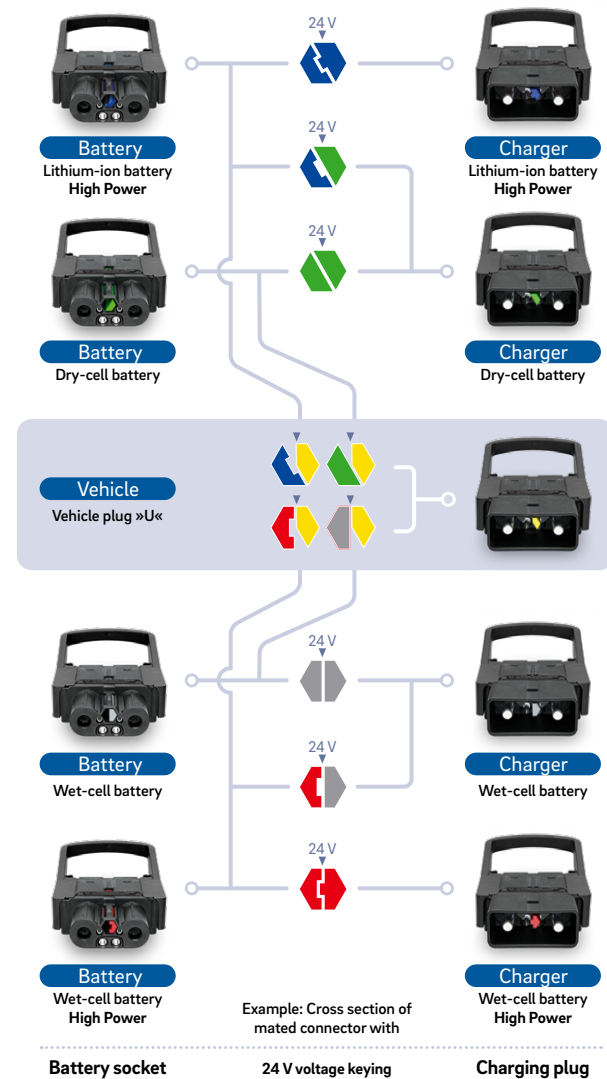
With the CP series, Schaltbau now offers contactors for renewable energies and DC networks in industrial environments in the 600 A, 1,200 A and 2,000 A power classes! This patented technology ensures fully bi-directional breaking capability and a more compact design. By reducing dimensions and weight, we can save you valuable space. Thanks to its unique modular design, the new product family includes a variety of possible configurations catering to a wide range of applications.

- Power range
  - Nominal voltage 1,500–3,000 volts, DC bi-direktional / AC  $f < 60\text{ Hz}$
  - Thermal current 600–1,200–2,000 amps
- Configurable as NO/NC contactor, disconnecter or changeover switch
- High making capacity, also as disconnecter and changeover switch
- 4 aux. switches, max. 2 mirror contacts NC contact  $b_0$  and 2 NO contacts  $a_1$
- Low total cost of ownership, modular and compact






## Charging connectors



### High power connectors LV320/400, LV160/250, LV80/120 series

High Power charging connectors of the LV series meet the requirements of DIN VDE 0623-589 as well as DIN EN 1175 for a higher current carrying capacity. They are perfectly suited for fast-charging lithium-ion batteries with high capacities, such as those used in modern forklift trucks and other intralogistics vehicles. Especially since shorter and shorter charging times are being sought for charging vehicle batteries. This reduces down-times and saves costs.

- Keying to DIN VDE 0623-589 for 120–250–400 amps
- High-quality, solid power contacts
- High resistance to acids and extremes of temperature
- Optional air supply adapter for electrolyte circulation systems
- Modular design, integrated interlocking
- Intermateable with other connectors to DIN VDE 0623-589
- UL-listed  (File No. E242089)

LV320/400, LV160/250, LV80/120  
Charging connectors



## DC contactors for vehicles in intralogistics

### Changeover and reversing contactors AFS series

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.

- Changeover contactors: single pole or  
Reversing contactors: assembly of two SPDT or two DPST-NO
- 3 different sizes
  - Nominal voltage 96 volts DC max.
  - Thermal current 80–150–250 amps
- Double-break contacts
- Magnetic blowouts and auxiliary switch, optional
- Standards IEC 60947, EN 1175-1



### DC NO contactors C100, C110B series

C100 and C110 B Series contactors are the environmentally friendly and cost-effective solution to switching DC currents of 60 amps up to 250 amps as well as battery voltages up to 80 volts.

The contactors are equipped with DC coils featuring a coil tolerance as required for traction batteries of industrial trucks and other material handling vehicles.

- Compact, rugged design
- 4 different sizes
  - Nominal voltage C100: 80 volts DC / C110B: 48 volts DC
  - Thermal current 60–100–150–250 amps
- Closed contact housing, standard
- Double-break cadmium-free contacts
- Standards IEC 60947, EN 1175-1





## Markets and Applications

We develop our connectors, snap-action switches and contactors in line with the safety standards of railway engineering. Electromechanical components from Schaltbau are used in all branches of industry in which electrical systems have to be connected, contacted and controlled reliably under the harshest conditions.

### RAILWAY

Safely on track. Switching and controlling features which meet the highest requirements.  
For goods and passengers.

### INDUSTRY

Reliable in production.  
Certified variations on safety-relevant solutions.  
For man and machine.

### NEW ENERGY

More power for electricity.  
Top-notch safety for stationary energy supply systems.  
For renewable energies.

### NEW MOBILITY

Safe either way. Safely disconnecting high voltages in electric vehicles. For tomorrow's mobility solutions.

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