NEW MOBILITY
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. Or robust charging connectors for modern quick chargers, as they are used in the case of industrial trucks.

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 bidirectionalism is promoted – 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.

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 A. In this way, batteries can be re-charged at short intervals and vehicles can remain ready for use.

As a specialist for high-quality DC applications, Schaltbau GmbH has been developing electromagnetic 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!
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.

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.

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!

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

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.

Schaltbau DC switching solutions

Safe switching and controlling up to 2000 A

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
- e-Fork lift trucks / e-Pedestrian trucks
- AGVs
- Battery test stations
- Battery charging stations
- Contactors for drive motors (also AC)
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-power battery systems required for this up to 1,000 V DC, the high-voltage battery dis- connect unit (HV-BDU) establishes a connection between all electrical components in vehicles, which are supplied with energy by the battery. It has an important safety function: 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

Main contactor Series C310
Current sensor
Pre-charge contactor R

High-voltage battery module
Inverter
Motor

**DC contactor in the HV-BDU**

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

To charge the increasing number of electric buses in local public transport, intermediate stations and depots are being equipped with a high-capacity charging station. The charging takes place either via mast charging stations or cable-based solutions and takes just a few minutes. DC contactors belonging to the compact C310 series in the positive and negative paths form two independent switching elements in the current 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 A at temperatures up to 85°C
- Continuously low contact resistances
- Low control power levels
- Compact design

**DC contactors for battery charging**

**Application**

**Consulting**

**Product**

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

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

**Consulting**

**Application**

**Product**

DC charging station

Vehicle
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 Hz is customary. Safe and reliably 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.

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.

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 V and 600 A
- modular construction, many variants available

The new CF Series AC contactors are ideal for applications with energy recovery. Bidirectional for both current directions. Switching of currents up to 4,000 A at operating voltages up to 1,500 V. High isolation-voltage withstand. Status indication via mirror contact function. Compact design.

The new CF Series AC contactors

- Three-pole AC traction contactor
- Compact design
- High isolation-voltage withstand
- Status indication via mirror contact function
- Compact design

Three-pole AC traction contactor

The new CF Series AC contactors

- Three-pole AC traction contactor
- Compact design
- High isolation-voltage withstand
- Status indication via mirror contact function
- Compact design

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
- Bidirectional for both current directions
- Switching of currents up to 4,000 A at operating voltages up to 1,500 V
- High isolation-voltage withstand
- Status indication via mirror contact function
- Compact design

Three-pole AC traction contactor

The new CF Series AC contactors

- Three-pole AC traction contactor
- Compact design
- High isolation-voltage withstand
- Status indication via mirror contact function
- Compact design

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
- Bidirectional for both current directions
- Switching of currents up to 4,000 A at operating voltages up to 1,500 V
- High isolation-voltage withstand
- Status indication via mirror contact function
- Compact design

Three-pole AC traction contactor

The new CF Series AC contactors

- Three-pole AC traction contactor
- Compact design
- High isolation-voltage withstand
- Status indication via mirror contact function
- Compact design

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
- Bidirectional for both current directions
- Switching of currents up to 4,000 A at operating voltages up to 1,500 V
- High isolation-voltage withstand
- Status indication via mirror contact function
- Compact design

Three-pole AC traction contactor

The new CF Series AC contactors

- Three-pole AC traction contactor
- Compact design
- High isolation-voltage withstand
- Status indication via mirror contact function
- Compact design

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
- Bidirectional for both current directions
- Switching of currents up to 4,000 A at operating voltages up to 1,500 V
- High isolation-voltage withstand
- Status indication via mirror contact function
- Compact design
Charging connectors

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

Schaltbau LV-HPC Series connectors meet the requirements of the DIN VDE 0623-589 standard for charging connectors featuring a higher current-carrying capacity. The connectors are, therefore, ideally suited for modern fast chargers as used for industrial trucks, thus catering to interests of the material handling industry that aims at shortening the times for charging the vehicle battery. Charging faster means reducing downtime and saving costs.

- Keying to DIN VDE 0623-589 for 120 A, 250 A and 400 A
- 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

Cross section of mated connector with 24 V voltage keying

Charging connectors

Contactors for DC

Single-pole bidirectional DC NO contactors
C310 series

The C310 is a single-pole bidirectional 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: 60 V / 150 A bis 1,500 V / 500 A
- DC bidirectional with permanent magnetic blowout
- Conventional thermal current: 150 A, 300 A or 500 A
- High making and breaking capacity
- High rated short-time withstand current
- High resistance to shock and vibration
- Up to 2 auxiliary switches with mirror contact function
- Low energy consumption

The C320 is a single-pole bidirectional 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: 60 V / 1,000 A bis 1,500 V / 1,000 A
- DC bidirectional with permanent magnetic blowout
- High making and breaking capacity
- High rated short-time withstand current
- High resistance to shock and vibration
- Up to 4 auxiliary switches with mirror contact function
- Low energy consumption

The C390 is a single-pole bidirectional NO 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: 60 V / 1,000 A bis 1,500 V / 1,000 A
- DC bidirectional with permanent magnetic blowout
- High making and breaking capacity
- High rated short-time withstand current
- High resistance to shock and vibration
- Up to 4 auxiliary switches with mirror contact function
- Low energy consumption

The C390/500 is a single-pole bidirectional NO 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: 60 V / 1,000 A bis 1,500 V / 1,000 A
- DC bidirectional with permanent magnetic blowout
- High making and breaking capacity
- High rated short-time withstand current
- High resistance to shock and vibration
- Up to 4 auxiliary switches with mirror contact function
- Low energy consumption
Power contactors for DC and AC

Single-pole power contactors for DC or AC

CT series

- CT110/11 Single-pole NO power contactor: Ue = 1,500 V, In = 200 A
- CT110/11 Single-pole NO power contactor: Ue = 3,000 V, In = 200 A
- CT110/11 Double-pole NO power contactor: Ue = 1,500 V, In = 400 A
- CT110/11 Double-pole NO power contactor: Ue = 3,000 V, In = 400 A

Double-pole power contactors for DC or AC

CT series

- CT1230/11 Double-pole NO power contactor: Ue = 3,000 V, In = 1,100 A
- CT1230/11 Double-pole NO power contactor: Ue = 1,500 V, In = 2,000 A

CTP series

- CTP1115-02 Single-pole NO power contactor: Ue = 1,500 V, In = 200 A
- CTP1115-01 Single-pole NO power contactor: Ue = 1,500 V, In = 80 A
- CP1115-12 Single-pole NO power contactor: Ue = 1,500 V, In = 1,200 A
- CTP1130-20 Double-pole NO power contactor: Ue = 3,000 V, In = 2,000 A

Power contactors for DC and AC

Single-pole power contactors for DC or AC

CPP series

- CPP1115-02 Single-pole NO power contactor: Ue = 1,500 V, In = 200 A
- CPP2115-01 Single-pole NO power contactor: Ue = 1,500 V, In = 80 A
- CP1115-12 Single-pole NO power contactor: Ue = 1,500 V, In = 1,200 A
- CPP1130-20 Double-pole NO power contactor: Ue = 3,000 V, In = 2,000 A

Power contactors for DC and AC

Single-pole power contactors for DC or AC

CP series

- CP1115-20 Single-pole NO power contactor: Ue = 1,500 V, In = 200 A
- CP1130-12 Single-pole NO power contactor: Ue = 1,500 V, In = 200 A
- CP1130-20 Double-pole NO power contactor: Ue = 3,000 V, In = 2,000 A
Combi contactors, contactors for industrial trucks

3 pole AC contactors
CF series
Schaltbau’s new, highly modular CF series begins with a compact 3-pole AC power contactor for loads up to 600 A and 3000 V 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: up to 3,000 V / 600 A, AC (f < 400 Hz)
Configurable as NO, NC or changeover switch
Conventional thermal current: 300 A or 600 A through parallel connection of two main contacts each
Different extinguishing chambers are available depending on application
High short-circuit breaking capacity
4 auxiliary switches, including 2 mirror contacts

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 A up to 250 A as well as battery voltages up to 80 V. 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: Ith = 60 A – 100 A – 150 A – 250 A
Closed contact housing, standard
Double-break cadmium-free contacts
Standards: IEC 60947, EN 1175-1
Changeover contactors: single pole
Reversing contactors: assembly of two SPDT or two DPST-NO
3 different sizes: Ith = 80 A – 150 A – 250 A
Double-break contacts
Magnetic blowouts and auxiliary switch, optional
Standards: IEC 60947, EN 1175-1

Contactors for industrial trucks, Contactors for AC

Combi contactors for battery voltages
C130 series
Schaltbau’s competitively-priced all-in-one device is a combination of line contactor, main fuse and manual cut-off switch in which additional devices as well as an optional horn can be integrated. The exact design of your combination contactor depends on the requirements of your industrial truck. Main fields of application are battery powered warehouse machines, such as forklift and reach trucks as well as walk behind trucks and stackers.

Emergency disconnect switch with rugged, spring-loaded snap mechanism
2 sizes: Ith = 180 A – 250 A
Battery contactor with main fuse
Permanent magnetic blowout
Double-break contacts, cadmium-free
Optional horn and fuses

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.

Compact, rugged design
4 different sizes: Ith = 60 A – 100 A – 150 A – 250 A
Closed contact housing, standard
Double-break cadmium-free contacts
Standards: IEC 60947, EN 1175-1
Changeover contactors: single pole
Reversing contactors: assembly of two SPDT or two DPST-NO
3 different sizes: Ith = 80 A – 150 A – 250 A
Double-break contacts
Magnetic blowouts and auxiliary switch, optional
Standards: IEC 60947, EN 1175-1

Contactors for AC
DC NO contactors
C100, C110B series

Contactors for industrial trucks
Combi contactors
C130/180
Battery contactor Ith = 150 A

C130/250
Battery contactor Ith = 150 A

AFS717D
Battery contactor Ith = 150 A

C100/320
Battery contactor Ue = 80 V, Ith = 250 A

C110B/80
Battery contactor Ue = 48 V, Ith = 60 A

C130/180
Combi contactor
Ue = 1,500 V, Ith = 300 A
**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.

<table>
<thead>
<tr>
<th>RAILWAY</th>
<th>INDUSTRY</th>
<th>NEW ENERGY</th>
<th>NEW MOBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safely on track. Switching and controlling features which meet the highest requirements. For goods and passengers.</td>
<td>Reliable in production. Certified variations on safety-relevant solutions. For man and machine.</td>
<td>More power for electricity. Top-notch safety for stationary energy supply systems. For renewable energies.</td>
<td>Safe either way. Safely disconnecting high voltages in electric vehicles. For tomorrow’s mobility solutions.</td>
</tr>
</tbody>
</table>

Schaltbau GmbH
Hollerithstr. 5
81829 Munich
Germany

Phone +49 (89) 93005 - 0
Fax +49 (89) 93005 - 350
Internet www.schaltbau.com
e-Mail marketing@schaltbau.de