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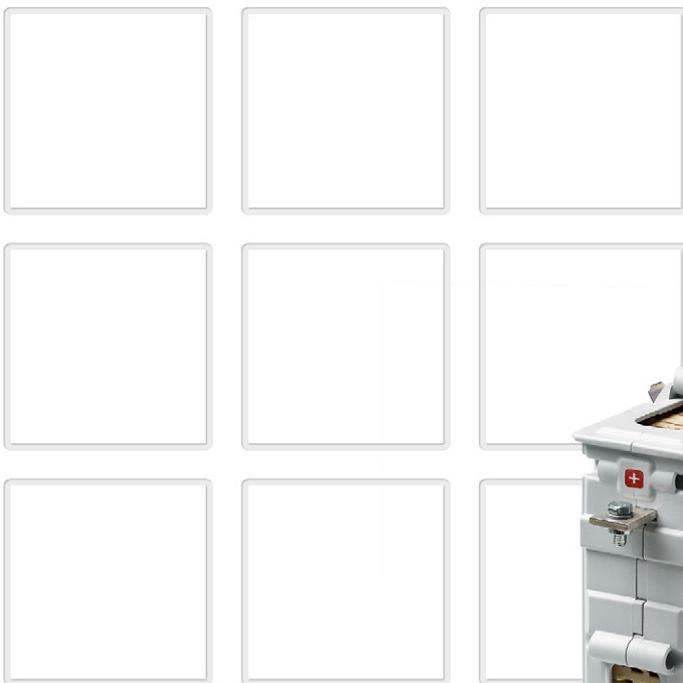
## Contactors

**CH1130/02**

**1-pole medium-power  
and pre-charge contactors  
for AC and DC**

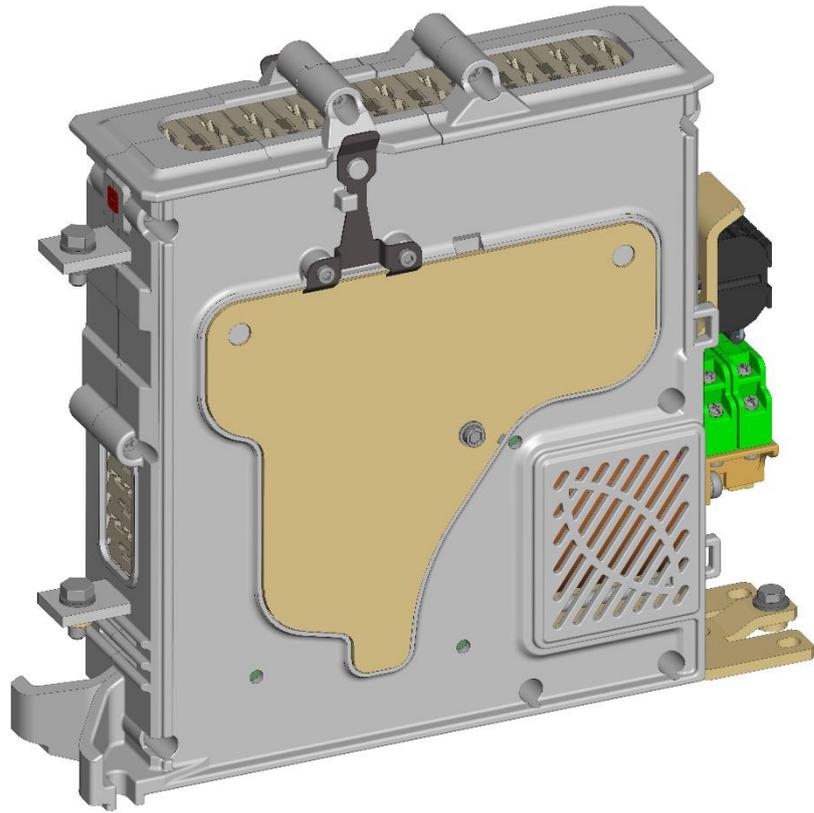
**Installation and  
maintenance instructions**

**Manual C170-M.en**

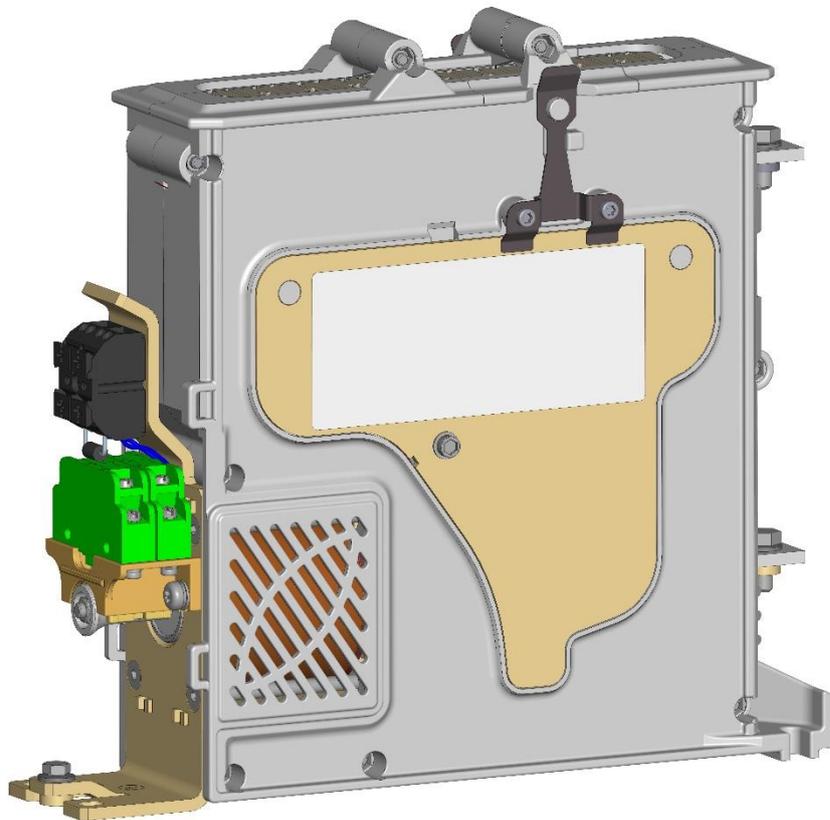


**Revision History:**

Rev.Level	Date	Page	Description	Name
1.0	2016.11		New release	Junck



CH1130/02



CH1130/02

## Conventions for this Manual

To highlight particularly important instructions, the following symbols are used in this handbook.



**NOTICE** refers to technical features and methods aimed at facilitating work or to particularly important information.



**DANGER** refers to processes/operations which have to be followed exactly in order to avoid personal injuries.



**CAUTION** refers to processes/operations which must be followed to avoid damaging structural components, the system or other user materials.



**WARNING** refers to hazardous electrical voltages.

## General legal notice

- CH1030 contactors must only be used under operating conditions according to the technical specification and the instructions in this manual.
- CH1030 contactors must only be used when all protective devices are present, have been installed properly and are fully operational.
- CH1030 contactors must not be converted or otherwise modified without prior consent of SCHALTBAU GmbH. Violations against this will result in the exclusion of liability on the part of the manufacturer.
- We reserve the right to make technical alterations without prior notice.
- For updated product information visit [www.schaltbau-gmbh.com](http://www.schaltbau-gmbh.com).
- Furthermore, we refer to our “General Terms and Conditions of Sale (GCS) for Goods and Services”.

## Copyright notice

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## Introduction

CH1130/02 contactors are air switching components with arc quenching in ceramic. They are medium power contactors for high voltage applications. They can especially be used in railway coaches switching high voltage loads such as heating, air conditioning and air pressure converters.

Most European coaches are being supplied alternating with either DC or AC voltages depending on the country they are running in. CH1130/02 contactors use the magnetic blow-out technique which gives maximum performance for uni-directional DC applications. However, due to a special design CH1130/02 contactors can also switch the AC loads required by this application.

- CH1130/02 contactors are designed for nominal voltages of 3,000 V. Due to the very high rated insulation voltage they can be used for peak voltages up to 5,000 V
- CH1130/02 contactors are designed for conventional thermal currents of 200 A.
- CH1130/02 contactors are currently available in 1-pole versions.
- CH1130/02 contactors can be mounted horizontally and vertically.

CH1130/02 contactors have been designed and tested per National and International Railway Standards. Due to their unique features, they can also be used in a variety of industrial applications.

CH1130/02 contactors offer the following design-related advantages:

- Compact, rugged design
- Double-break contacts, cadmium-free contact tips
- 1-pole versions
- Easy inspection of main contact tips
- Magnetic drive system suitable for standard railway supply voltages and tolerances. No economy circuit required. Magnetic drive systems for industrial applications on demand.
- Insulation coordination:
  - Functional insulation for main circuit
  - Basic insulation between main circuit and protective earth
  - Reinforced insulation between main circuit and control circuit / main circuit and auxiliary circuits
- Long mechanical and electrical life
- No regular maintenance required. Inspection intervals depending on specific application.

## Safety information

### Electrical hazards



CH1030/02 contactors are high-voltage switches. Getting into contact with conductive parts of the contactors can result in serious injury or even death!

Active parts are all piece parts associated with the main circuit. All metal parts visible may potentially become active under fault conditions. A respective label is attached to the contactor. This label must not be removed.

For safety reasons the contactors must be connected to earth. An earth terminal is provided for that purpose. The wire gauge must be observed according to the specific short-circuit conditions.



Before carrying out any inspection and maintenance work on CH1030/02 contactors, the contactors must be de-energized and in addition life wires made safe by earthing. If the environment has no disconnecting and earthing device, other suitable measures must be used to ensure that no voltage is present. Please make sure that any capacitors in the main circuit are discharged before touching main wires. We recommend securing the supply lines to prevent switching back on.

### Safety notices



All inspections and the replacement of components may only be performed by qualified personnel and must be done according to Schaltbau specification.

All components which have to be replaced must be original components defined by Schaltbau.



During continuous operation the contactors will warm up. It is recommended to wait an appropriate time before starting any service and touch the contactors.

### General application notes



CH1030/02 contactors are designed to be mounted in environments defined by pollution degree PD3 according to EN60077-1:

#### **Pollution degree PD3**

*Conductive pollution or dry non-conductive pollution occurs which becomes conductive due to condensation which is to be expected.*

*Example: Indoor location not directly exposed to rain, snow and heavy dust.*

CH1030/02 contactors for DC operation contain magnets for the permanent-magnetic blow-out. Make sure that these magnets do not attract any ferromagnetic particles into the contactors, either opened or closed.

These magnets may destroy data on credit cards or such.

During the short time of the switching-off operation strong magnetic fields are generated near the pole plates. They may affect other components close to the contactor.

## Technical data

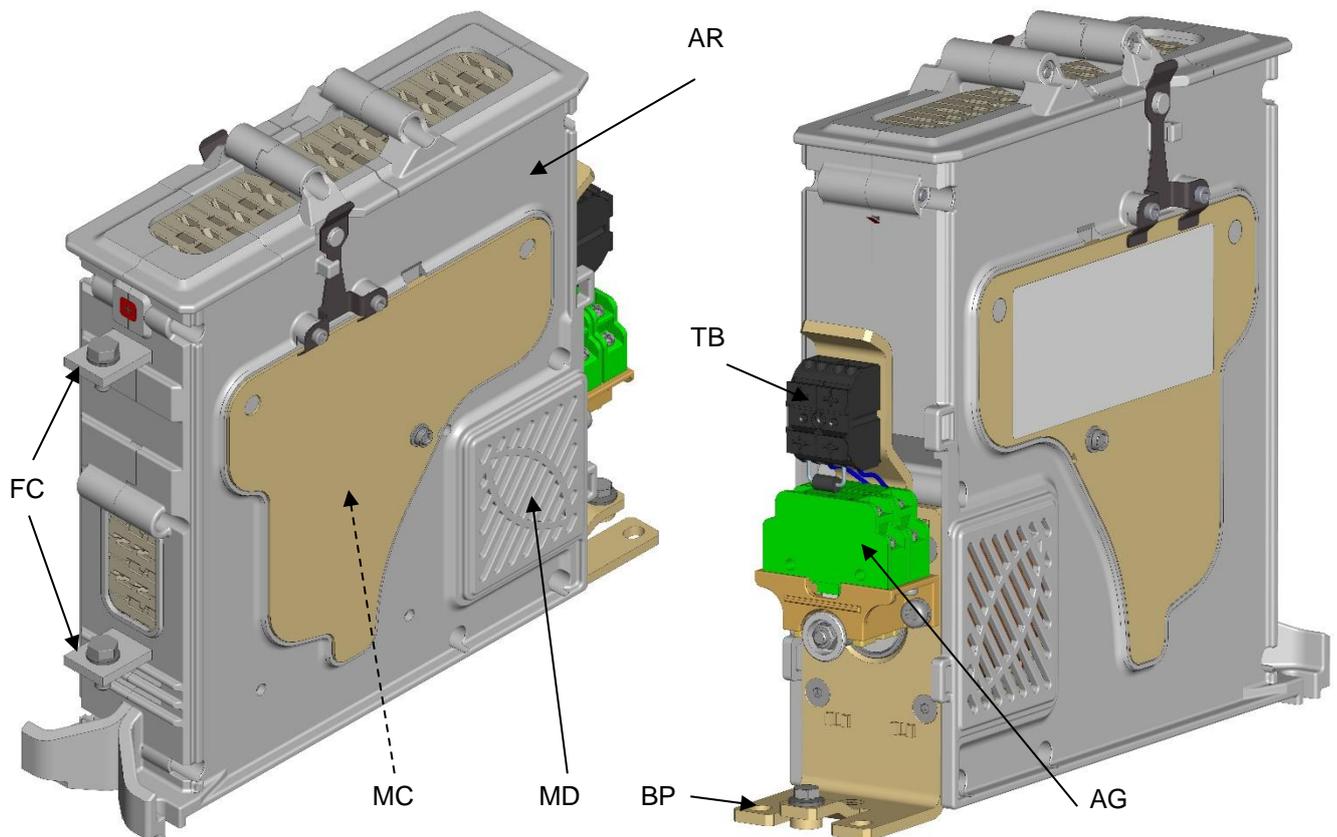
Refer to catalogue C170, data sheets and measured drawings.

## Applied standards

Refer to catalogue C170.

EN 60077-1: 2003-04	Railway applications - Electric equipment for rolling stock Part 1: General service conditions and general rules (IEC 60077-1:1999, modified)
EN 60077-2: 2003-04	Railway applications - Electric equipment for rolling stock Part 2: Electrotechnical components; General rules (IEC 60077-2:1999, modified)
EN 50124-1: 2010-11	Railway applications - Insulation coordination Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment
EN 61373: 2011-04	Railway applications - Rolling stock equipment Shock and vibration tests
EN 50125-1: 2014-11	Railway applications – Environmental conditions for equipment Part 1: Equipment on board rolling stock

## Description



CH1130/02 contactors consist of two main functions:

- Drive:  
Magnetic drive (MD) with base plate (BP); coil terminal block (TB) and auxiliary contacts (AG)
- Arc chamber:  
Arc chamber (AR) with fixed contacts / main terminals (FC) and ceramic inserts; not visible: moving contact bridge (MC).

### Magnetic drive

- Magnetic drive (MD) with moving armature
  - Compact magnetic drive system for DC voltages.
  - Designed for standard railway supply voltages and tolerances. Standard nominal supply voltages are  $U_s = 24 \text{ V}$ ;  $U_s = 36 \text{ V}$ ;  $U_s = 72 \text{ V}$  and  $U_s = 110 \text{ V}$ , tolerances from 70% up to 125% of  $U_s$ . Other nominal supply voltages are available on request.
  - Double-break moving contact bridge
- Coil terminal block (TB)
  - Cage clamp terminals
  - Polarity independent overvoltage protection device (Suppressor diode).



The value of the overvoltage limitation is part of the magnetic system and must not be changed or short-circuited by external means. It is explicitly stated that the use of diodes is prohibited for that purpose. Take care there is no such diode in the external control circuit.

- Base plate (BP)
  - 2 fixation holes
  - Earthing terminal
 The contactor should be mounted on a metal mounting plate to provide a secure mounting.

**Arc chamber**

- Arc chamber (AR)
  - Permanent-magnetic blow-out system with magnets and pole plates for DC and AC applications
  - Ceramic inserts (top and front). Part of the top can be removed for the inspection of the main contacts
- Fixed contacts with main terminals (FC)
  - Screws M6 with SKS washer and press-in nut
  - Minimum wire gauges for connecting cables or current bars must be observed.
- Auxiliary contacts (AG)
  - 1 or 2 switches S826/S926

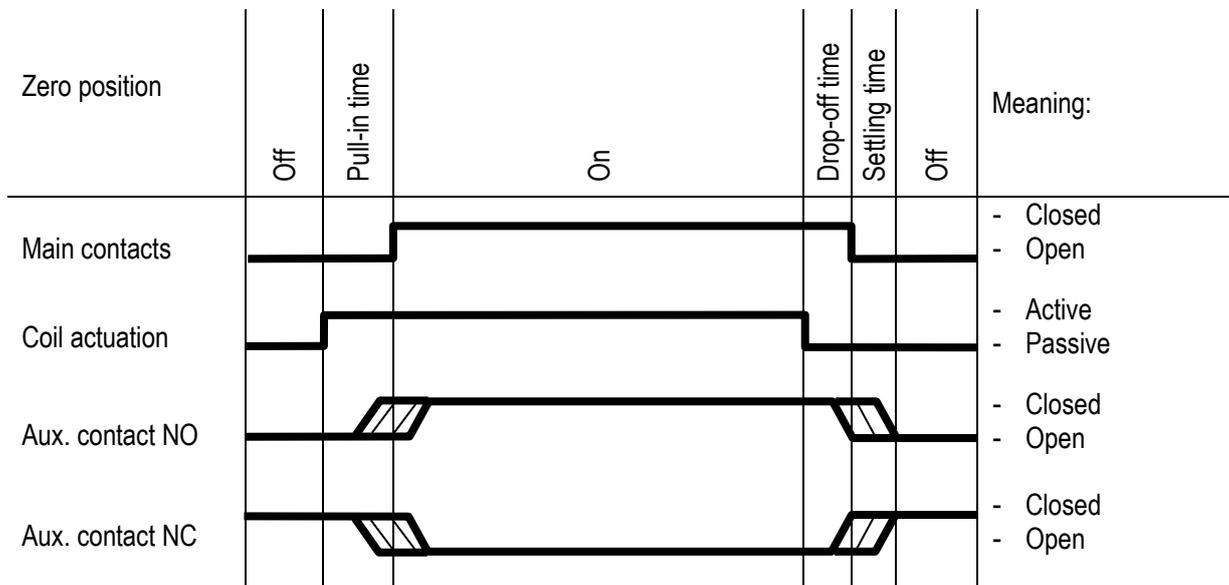
**Functional description**

The diagram below shows the switching states of the CH1130/02 contactors.

Typical values:

- Pull-in time: 60 ms
- Drop-off time: 30 ms

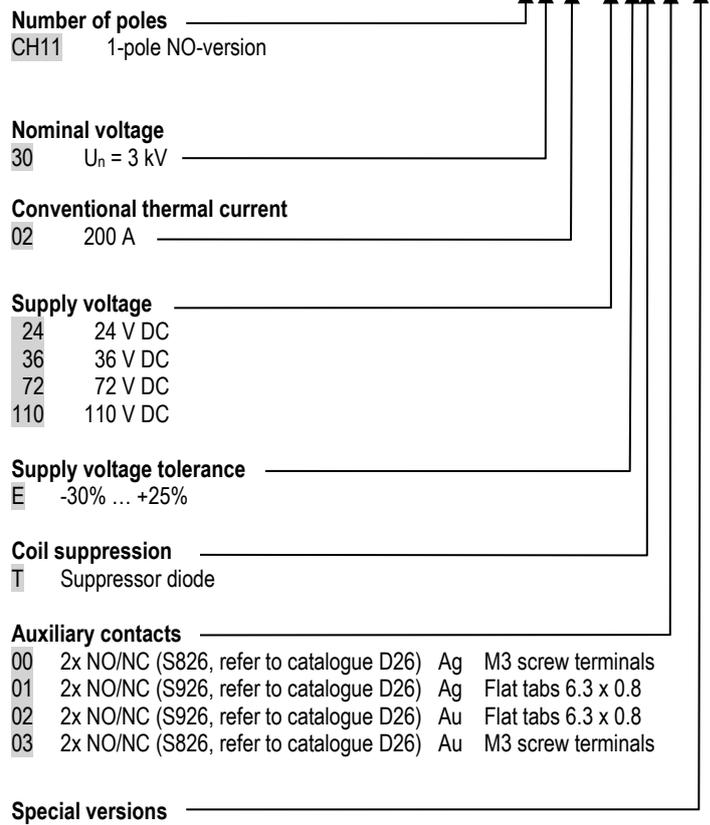
Note: The exact On/Off transition of the auxiliary contacts is not specified.



**Order code**

Example:

CH1130/02 110ET-02 001



## Storage

### Storage

Schaltbau recommends storing the contactors in the original packing box. The contactors should be stored in a dry and suitable place.

### Return shipments

Schaltbau recommends using the original packing box for any return shipments. If no original packing box is available care should be taken to pack the contactor in a way that prevents damage during the shipment.

### Recycling

Contactors which are damaged beyond repair or which have passed their lifetime may be returned to Schaltbau for recycling.

## Installation

### Unpacking and handling

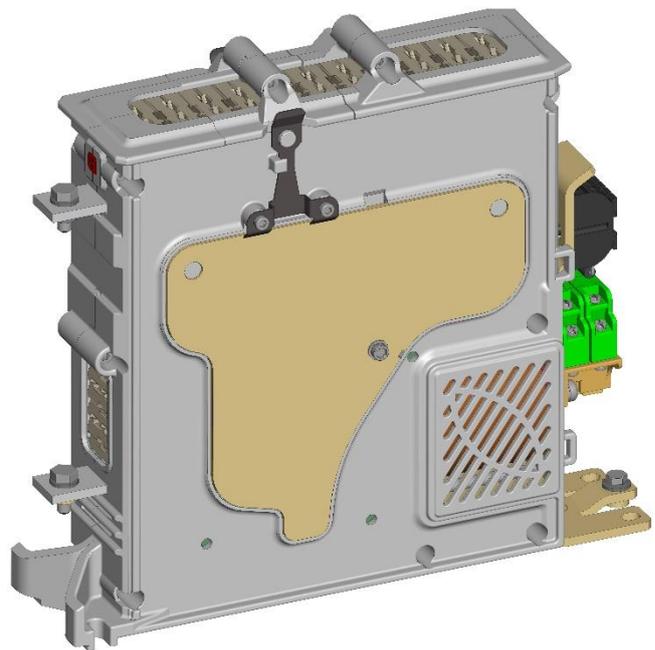
Before opening the packaging, perform a visual inspection for any signs that could indicate damage having occurred during transport (impacts, bumps, falling etc.).

Unpack the contactor and put it on the table in an upright position. Check the contactor for damage.

Make sure that you have received the correct contactors according to your order.



If the contactor has been subject to excessive shock influence (e.g. during transport) do not install the contactor.



CH1130/02

## Operating position

CH1130/02 contactors can be mounted in horizontal and vertical mounting positions.

In most cases, the contactors are mounted on mounting plates or mounting frames. They must be solid enough to carry the weight of the contactors under the shock and vibration conditions of the railway environment.

The contactors are fixed with 4 mounting screws. The screws (and if applicable the nuts) must be steel grade 8.8. Schaltbau strongly recommends SKS-Washers (or similar) to secure the screws. The screws must be tightened with the rated torque permissible for the screws and the nuts (refer to the label).



Horizontal mounting position 1

Horizontal mounting position 2

Vertical mounting position

## Mechanical requirements

### Device dimensions

Refer to the dimensional drawings of the contactors.

### Installation dimensions

Refer to the dimensional drawings of the contactors.

## Electrical requirements

The minimum clearances to earth or other components must be observed. Refer to the dimensional drawings for details.

Switching electrical currents at high voltages will produce arcing and plasma might exit out of the arc chamber. It is essential to observe the minimum clearance to earth to avoid the risk of a flash-over. The minimum clearance has been tested and specified in relation to the switching capacity of the contactors.

Ensure sufficient ventilation, especially in the case of heavy arc switching. Allow the exchange of surrounding atmosphere to avoid the risk of flashovers and excessive corrosion.

The minimum wire gauges for the main terminals and the earth terminal must be observed. Smaller gauges for the main terminals will reduce the rated thermal current. Smaller gauges for the earth terminal may produce a safety hazard.

Refer to catalogues for the power consumption of the magnetic drive system and the electrical data of the auxiliary switches.

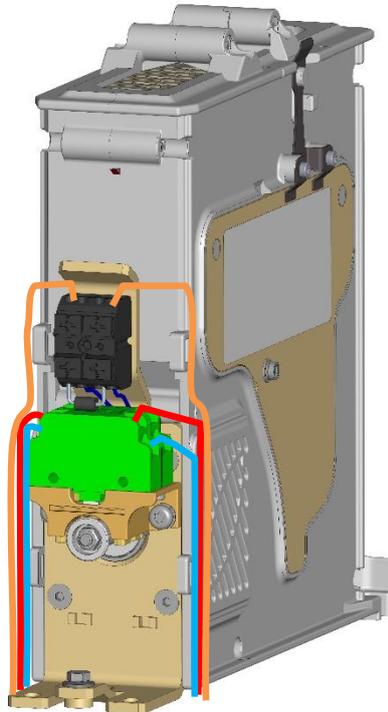
- C170 (Catalogue for Contactors CH1130/02)
- D26 (Catalogue for Snap Action Switches S826/S926)

## Mechanical installation

- Clean the surface of the mounting plate and the base-plate of the contactor.
- Put the contactor on the mounting plate and secure with the appropriate screws using the correct tightening torque (refer to the label). Schaltbau strongly recommends SKS-Washers (or similar) to secure the screws.

## Electrical installation of the auxiliary switches

- Connect the wires for the auxiliary contacts as shown below (for 1 switch). For switches S826/S926 the polarity must be observed. Bundle the wires as shown in the schematic drawing below.



## Electrical installation of the magnetic drive

- Connect the coil control wires to the coil terminal block (cage clamps). No polarity must be observed. Bundle and fix all wires with tie wraps using the 4 fixing hooks.
- The coil is protected against excessive overvoltages (which will occur when the coil is switched off) by a bi-directional suppressor diode.



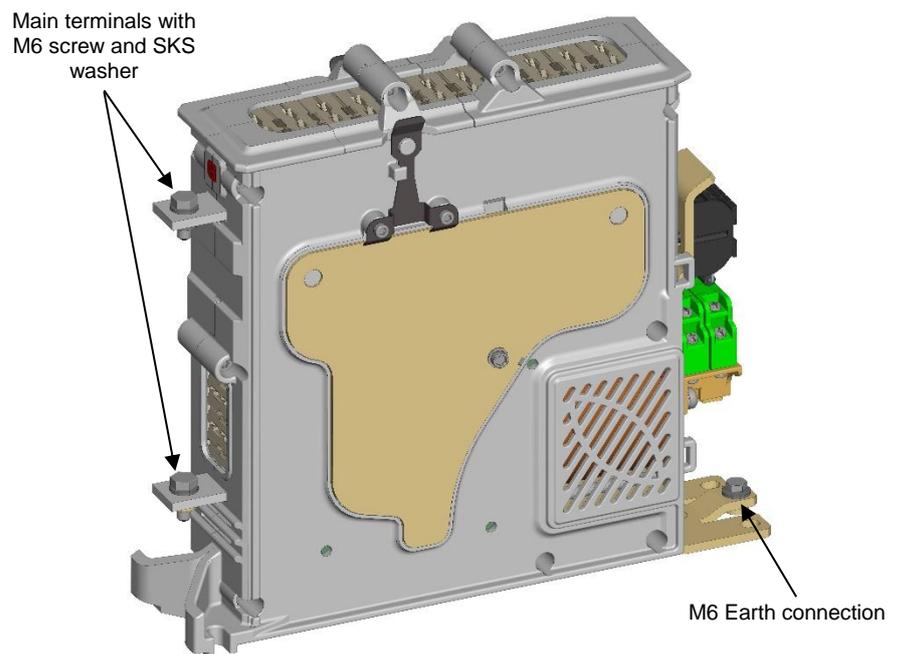
**The value of the overvoltage limitation is part of the magnetic system and must not be changed or short-circuited by external means. It is explicitly stated that the use of diodes is prohibited for that purpose. Take care there is no such diode in the external control circuit.**

## Electrical installation of the main circuit

- Connect the main cables with the screws and washers provided. The screws must be tightened with the rated torque permissible (refer to the label).
- For DC operations the main polarity must be observed (Plus sign for the upper fixed terminal)
- Connect the earthing cable to the earth terminal with the screw/washer provided. The screw must be tightened with the rated torque permissible.



Make sure the connection areas are free of corrosion.



## Commissioning

After installation the following checks are recommended:

- a) Check the protective earth
- b) Check the main connections including polarity
- c) Check the control connections
- d) Several activation and deactivation operations of the contactor without the main circuit active
- e) Check the function of the auxiliary contacts

## Maintenance

CH1130/02 contactors are maintenance-free within the rated mechanical life time data. The electrical life data depend on the number of switchings under heavy load conditions and vary for different applications. In normal use this corresponds to a decade-long operating period.

### Recommended regular service intervals

Checking activity designation	Checking interval
Optical inspection from outside	2x annually
Inspection of the main contacts	2x annually
Inspection of the auxiliary contacts	Every 2 years

### Unscheduled service intervals



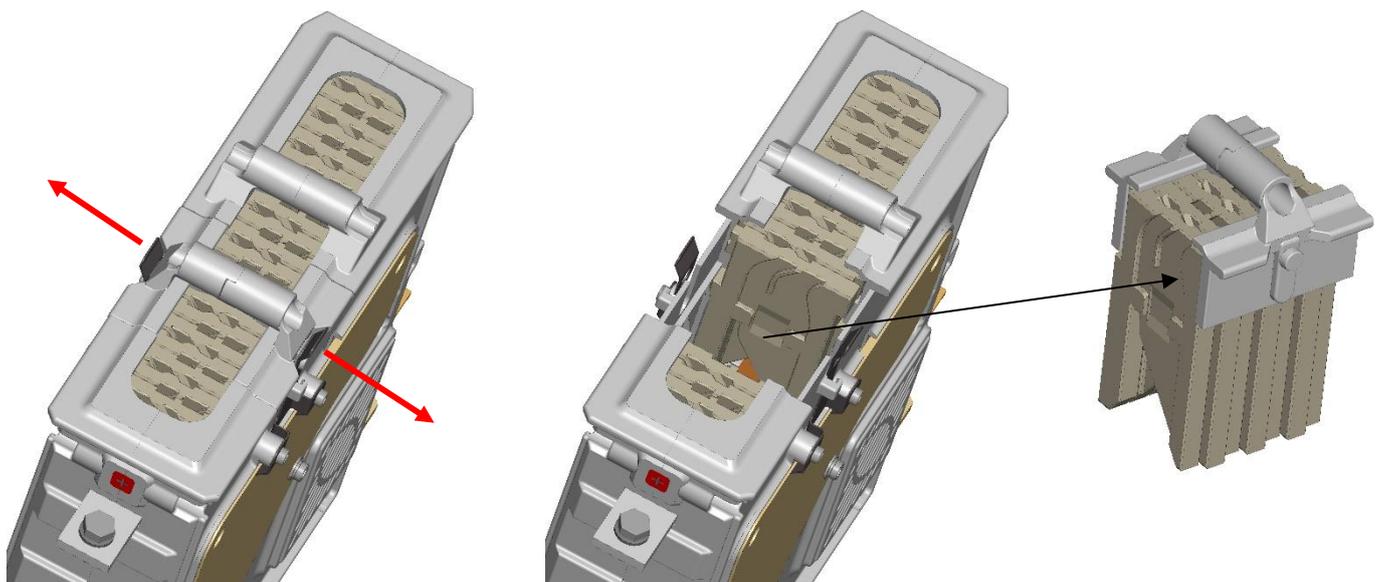
Extraordinary services need only be carried out if there has been a significant and extraordinary recorded number of switchings under fault conditions.



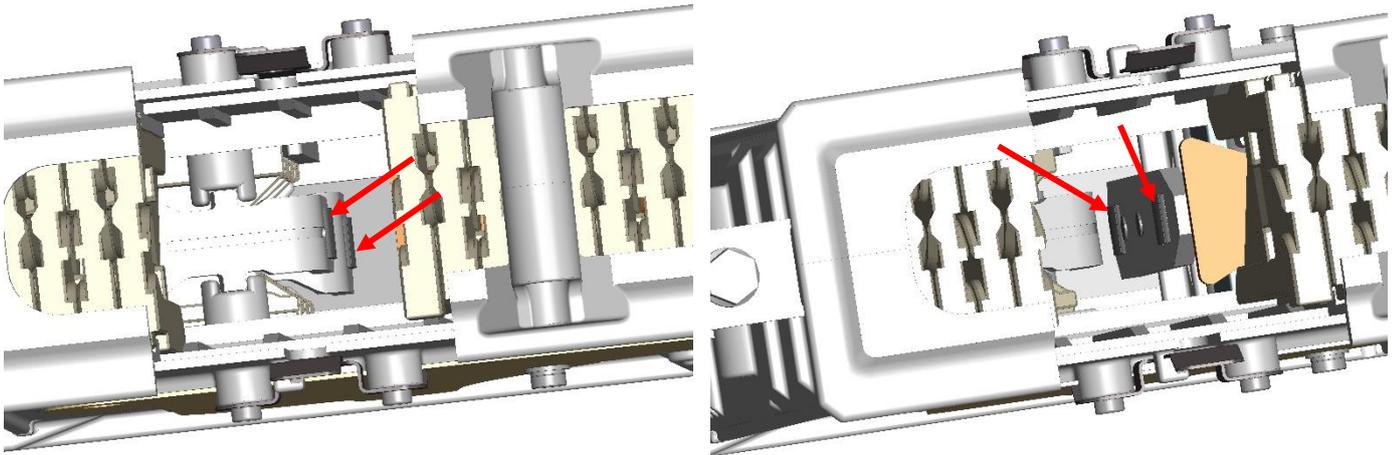
If the contactors are being used in particularly dirty environments, the checking intervals for the optical inspection should be shortened, because dirt can impair the insulation clearances and there is therefore the possibility of a shorter service life or an operational fault.

### Inspection activities

- High voltage supply cables**  
 Checking of the high voltage supply cables and the tightening torques of the fastening screws.
- Earthing**  
 Checking of the earth cable and the tightening torque of the fastening screw.
- Cleaning**  
 In case of excessive dirt the surface of the contactors should be cleaned.
- Inspection of the main contacts**  
 Push the springs outwards (red arrows) to release the service part of the ceramic inserts

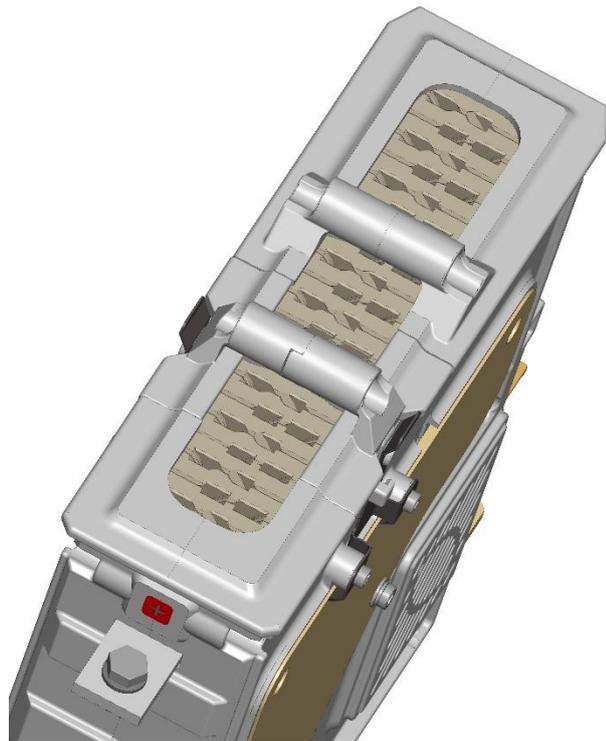


You can now check the status of the main contact tips



It requires some experience to evaluate the state of the contacts. Even after only a few switchings under load the contacts look used and “dirty” for the inexperienced eye. Contacts need only to be replaced if the wear of the contact tips is more than 70% (less than 0.3 mm remaining).

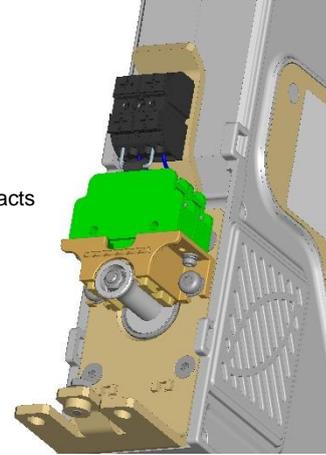
Replace the service part of ceramic inserts and snap it in safely (springs must be fully back to the relieved position).



- **Inspection of the auxiliary contacts**

The auxiliary switches are mounted on the back side and are visible for a simple optical inspection from the outside ( housings are clean and do not show signs of short-circuits etc.). Under normal working conditions (no short circuit switching) the life time of the auxiliary switches exceeds those of the contactors.

Auxiliary contacts



## Spare parts, replacement of parts

The contactors are maintenance-free. There is therefore no general provision for replacing components during its service life.

However, in case of permanent heavy load switchings, of failures, of short-circuit switchings or in similar cases spare parts are offered by Schaltbau.



**If the contactor cannot be activated anymore or if the main contacts need to be replaced, Schaltbau recommends returning the contactor for repair.**

### Auxiliary contacts

If the auxiliary switches have to be replaced both switches should be replaced.



**Only original spare parts are to be used as a replacement**



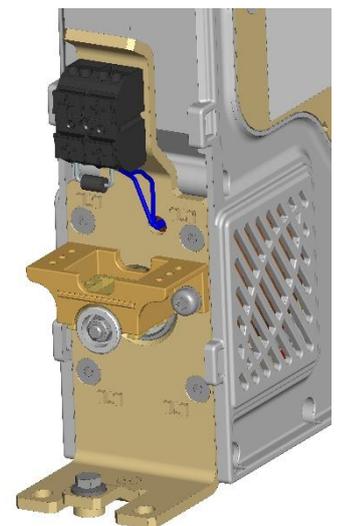
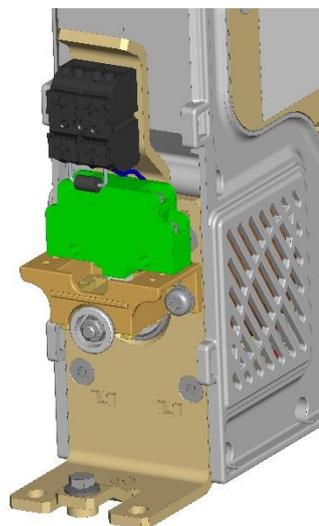
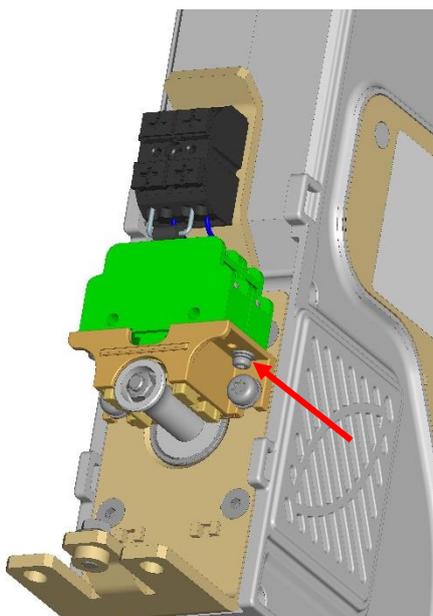
AS00 CH1130/02  
Auxiliary switch S826 b 30 L, set (M3 screws)  
(2 pieces, incl. appropriate labels)

AS01 CH1130/02  
Auxiliary switch S926 b 20 L, set (flat tabs)  
(2 pieces, incl. appropriate labels)

AS02 CH1130/02  
Auxiliary switch S926 b10 20, set (flat tabs)  
(2 pieces, incl. appropriate labels)

AS03 CH1130/02  
Auxiliary switch S826 b10 30, set (M3 screws)  
(2 pieces, incl. appropriate labels)

- Disconnect the control wires from the auxiliary switches.
- Remove the auxiliary switches (M3 screws, see below). Note the terminal numbers prior to removal.



- Replace with new auxiliary switches using the same position as before. Torque for M3 screws: 0.7 Nm.
- Reconnect the control wires to the auxiliary switches correctly

# Schaltbau GmbH

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

Schaltbau GmbH  
Hollerithstrasse 5  
81829 Munich  
Germany



Phone +49 89 9 30 05-0  
Fax +49 89 9 30 05-350  
Internet [www.schaltbau.com](http://www.schaltbau.com)  
e-Mail [contact@schaltbau.de](mailto:contact@schaltbau.de)

with compliments:



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.

## 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
- Enabling switches
- 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