SCHALTBAU
Connect Contact Control

3

# Contactors

## C195 series

Single pole
compact universal
NO and CO contactors

Installation and maintenance
instructions

**Manual B195-M.en**

Document Revision History

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# Content


1. Important basic information ..... 4
   - 1.1 Legal notes ..... 4
   - 1.2 Conventions for this manual ..... 4
2. General and safety information ..... 4
   - 2.1 Observing the manual ..... 4
   - 2.2 Duties of the operating company ..... 5
   - 2.3 Intended use ..... 5
   - 2.4 Ambient conditions ..... 5
3. Hazards and safety precautions ..... 6
   - 3.1 Electrical hazards ..... 6
   - 3.2 Other hazards ..... 6
   - 3.3 Measures for avoiding damage and malfunctions ..... 7
4. Product information ..... 8
   - 4.1 C195 Series – Single pole NO and changeover contactors plus bidirectional variants ..... 8
   - 4.2 Features ..... 8
   - 4.3 Applications ..... 8
   - 4.4 Technical information and material properties ..... 8
   - 4.5 Overview (stock items) ..... 9
5. Storage ..... 17
6. Unpacking ..... 17
   - 6.1 Unpacking the device ..... 17
   - 6.2 Check parts for transport damage ..... 17
7. Installation ..... 18
   - 7.1 Mounting ..... 18
   - 7.1.1 Dimensions/interfaces and further technical speci cations ..... 18
   - 7.1.2 Preparatory measures ..... 18
   - 7.1.3 Mounting positions ..... 19
   - 7.1.4 Required minimum clearances ..... 19
   - 7.1.5 Ventilation requirements ..... 19
   - 7.1.6 Safety ..... 19
   - 7.1.7 Tools required ..... 19
   - 7.1.8 Installing the contactor ..... 20

7.2 Electrical connection ..... 21
7.2.1 Electrical data and other technical speci cations ..... 21
7.2.2 Preparatory measures ..... 21
7.2.3 Safety ..... 22
7.2.4 Tools required ..... 22
7.2.5 Connecting the auxiliary switches ..... 23
7.2.6 Connecting the coil ..... 25
7.2.7 Connecting the main contacts ..... 27
7.3 Connecting the earth terminal (only for C195 X/) ..... 31
7.4 Checks ..... 31
8. Maintenance ..... 32
8.1 Safety ..... 32
8.2 Preventive maintenance ..... 32
8.2.1 Intervals for regular tests/checks ..... 32
8.2.2 Regular tests/checks ..... 33
8.3 Corrective maintenance measures – type C195 X/ ..... 35
8.3.1 Preparatory disassembly/assembly steps – type C195 X ..... 35
8.3.2 Disassembling/assembling the pole packs – Typ C195 X/ ..... 35
8.3.3 Removing/attaching the pole plates – type C195 X/ ..... 36
8.3.4 Disassembling/Assembling the auxiliary switches – type C195 X/ ..... 37
8.3.5 Disassembling/assembling the contact unit – type C195 X/ ..... 38
8.3.6 Disassembling/assembling the armature – Typ C195 X/ ..... 39
8.3.7 Removing/attaching the cover – type C195 X/ ..... 40
8.3.8 Disassembling/assembling the magnetic drive – type C195 X/ ..... 42
8.3.9 Disassembling/assembling the arcing chambers – type C195 X/ ..... 43
8.3.10 Replacing the auxiliary switches – type C195 X/ ..... 45
8.3.11 Replacing the complete contact unit – type C195 X/ ..... 45
8.3.12 Replacing the armature – type C195 X/ ..... 45
8.3.13 Replacing the magnetic drive – type C195 X/ ..... 45
8.3.14 Replacing the arcing chambers – type C195 X/ ..... 45
8.4 Corrective maintenance measures – type C195 A/, B/, S/, T/, W/ ..... 46
8.4.1 Preparatory disassembly/assembly steps – type C195 A/, B/, S/, T/, W/ ..... 46
8.4.2 Disassembling/Assembling the auxiliary switches – type C195 A/, B/, S/, T/ ..... 46
8.4.3 Disassembling/assembling the contact unit – type C195 A/, B/, S/, T/, W/ ..... 49
8.4.4 Disassembling/assembling the armature – type C195 A/, B/, S/, T/, W/ ..... 51
8.4.5 Removing/attaching the cover – type C195 A/, B/, S/, T/, W/ ..... 53
8.4.6 Disassembling/assembling the magnetic drive – type C195 A/, B/, S/, T/, W/ ..... 54
8.4.7 Disassembling/assembling the arcing chamber – type C195 A/ and C195 B/ ..... 56
8.4.8 Replacing the auxiliary switches – type C195 A/, B/, S/, T/ ..... 57
8.4.9 Replacing the complete contact unit – type C195 A/, B/, S/, T/, W/ ..... 57
8.4.10 Replacing the armature – type C195 A/, B/, S/, T/, W/ ..... 57
8.4.11 Replacing the magnetic drive – type C195 A/, B/, S/, T/, W/ ..... 57
8.4.12 Replacing the arcing chambers – type C195 A/and C195 B/ ..... 57
9. Spare parts ..... 58
10. Technical data ..... 59
11. Disposal ..... 59

# 1. Important basic information

## 1.1 Legal notes

Without prior written consent of SCHALTBAU GmbH, this manual is not allowed to be electronically or mechanically reproduced – as a whole or in parts – be distributed, changed, transmitted, translated into another language or used in any other way.
SCHALTBAU GmbH cannot be held liable for damage caused by non- or only partial observation of the manual.

## 1.2 Conventions for this manual

This manual describes the installation and maintenance of the contactors.
Cross references are presented in bold italics.
To highlight particularly important safety instructions and other information, the following symbols are used in this manual:

**DANGER**

Indicates a directly threatening dangerous situation. Death or severe injuries will result if it is not prevented.

**WARNING**

Indicates a possibly dangerous situation. Death or severe injuries may result if it is not prevented.

**CAUTION**

Indicates a possibly dangerous situation. Medium or minor injuries may result if it is not prevented.

**ATTENTION**

Indicates a possibly detrimental situation. If it is not prevented, assemblies, the system or property in its surroundings could be damaged.

Indicates technical features and methods to simplify working or indicates information of particular importance.

This manual describes single pole NO and changeover contactors of the C195 series.

This manual describes only stock items of the above mentioned contactor types. If you need a special variant feel free to contact us.

# 2. General and safety information

The contactors dealt with in this document are intended for use with electrical systems for special applications. They are designed and tested in compliance with generally accepted codes of practice. However, improper use, operation, handling, maintenance of or tampering with electric equipment can cause serious or fatal injury to the user or others, and the appliance or other property can be damaged. Consequently, the operation, maintenance and installation instructions for the contactors must be strictly followed.
If anything is not clear, clari cation must be sought with any queries stating the device type and the serial number.
Only authorised and trained personnel are allowed to plan and carry out all mechanical and electrical installations, transport, commissioning, as well as maintenance and repair work.
This applies to the observation of the general installation and safety regulations for electrical systems as well as the proper use of tools approved for this purpose.
Electrical equipment requires protection from moisture and dust during installation, operation and storage.

## 2.1 Observing the manual

- All personnel must read and understand the instructions in this manual and adhere to them when working with the device.
- Always adhere strictly to all safety instructions!

## 2.2 Duties of the operating company

- Observe all applicable national regulations, all safety, accident prevention and environmental protection regulations as well as the recognised technical rules for safe and correct working.
- Regularly check all tted protection and safety equipment for correct function.
- Work on electrical equipment must only be carried out by a quali ed electrician or by instructed persons under the supervision and control of a quali ed electrician in accordance with electrical regulations.
- A specialist is someone who, on the basis of their technical training, knowledge and experience as well as knowledge of the relevant regulations, is able to assess the work assigned to them and identify possible dangers.
- Work on the contactors must only be carried out by personnel who meet the requirements set out in this manual.
- Personnel must be clearly informed about who is responsible for the maintenance of the contactors.
- Always perform complete checks after any installation work and/or after any other conversions, alterations or maintenance, in accordance with the following standards:
  - EN/IEC 60077-2
  - EN/IEC 60947-4-1

## 2.3 Intended use

- The contactors have been designed and tested according to national and international standards. Due to their unique features they can also be used in a wide range of industrial applications.
- The contactors must only be used under operating conditions according to the technical speci cations and the instructions in this manual.
- None of the conditions of use, such as voltages, currents or ambient conditions, de ned in the corresponding technical data sheets or in our B195 catalogue may be overridden. The catalogue is available under: https://www.schaltbau.com/en/media-library/
- The contactors may only be used when all protective devices are present, have been correctly installed and are fully operational.
- Contactors may not be used without other safety precautions in potentially explosive atmospheres and/or in aggressive media.
- The switching device meets the requirements of basic insulation. Make sure the frame or plate onto which the drive of the contactor is mounted is earthed in a shock and vibration resistant way.
- Coil suppression for reducing surges when the coil is switched o is optimally attuned to the contactor's switching behaviour. The existing opening characteristic must not be negatively in uenced by parallel connection with an external diode.
- The device contains unprotected live parts.
- The prescribed clearances relative to other live parts or earth and other parts must be complied with as well as the safety regulations of the applicable standards.
- Switching at close to the maximum breaking capacity may require increased minimum clearances! Do not hesitate to ask our advice in respect of any dimensioning.
- Improper handling of the contactors, e.g. impacts on the oor, may result in breakage, cracks or deformation. Always handle the device with care.
- Only use the contactors for the speci ed application and only with original parts. Any other usage of or tampering with the contactors is considered contrary to their intended use. No liability is assumed for damages and accidents caused due to non-compliance with the instructions in this manual or improper use of the contactors.

## 2.4 Ambient conditions

**ATTENTION**

The contactors have been designed for speci c ambient conditions.

- Only operate the contactors in ambient conditions, such as temperature ranges, degree of soiling, etc., as de ned in the corresponding data sheets and in our catalogue B195. The catalogue is available under: https://www.schaltbau.com/en/media-library/

# 3. Hazards and safety precautions

## 3.1 Electrical hazards

**DANGER**

The contactors are used for high voltage switching. Contact with live electrical parts can result in serious injuries or even death!
Live parts are all metal parts belonging directly to one of the circuits or wires connecting to them. All other visible metal parts and wiring may also be live if a fault exists.
Before starting any work on the contactors, always comply with the following safety rules:

- Disconnect on all sides
- Secure to prevent switching back on
- Clearly identify the working area
- Check that a voltage-free state exists
- Earth and short circuit; this includes discharging any capacitors in the main circuit
- Besides the main power circuits, also disconnect additional and auxiliary circuits
- Cover or insulate adjacent live parts
- The presence of a voltage-free state can only be clearly identi ed by a quali ed electrician.
- When the work has been concluded, follow the procedure in reverse.

## 3.2 Other hazards

**WARNING**

Contactors must only be used for the purposes speci ed in the speci cations and data sheets.-Incor rect use can cause accidents and severe personal injury.

- The manufacturer will not be responsible for accidents arising from improper use of the product.

**CAUTION**

During continuous operation the contactors may become hot. Risk of burns!

- Before beginning any checks or maintenance on the contactors ensure that the heated components have cooled down.

**CAUTION**

The contactors contain sharp-edged parts. Risk of injuries!

- Use appropriate tools for installation and maintenance work on the contactors.
- Wear safety gloves when handling sharp-edged components.

## 3.3 Measures for avoiding damage and malfunctions

**ATTENTION**

Aggressive liquids may damage the contactors.

- Ensure the contactors do not come into contact with aggressive liquids.

**ATTENTION**

Improper handling of the contactors, e.g. dropping on the  oor, can result in breaks, cracks and deformation.

- Ensure the contactors are always handled correctly.
- Do not throw the contactors on the  oor.
- At regular intervals perform a visual check of the contactors for possible damage.
- Immediately replace any damaged parts.

**ATTENTION**

Depending on the product type, contactors can contain permanent magnets. Such magnets can attract ferro magnetic parts resulting in damage to the contactors.

- Ensure that the contactors are installed in a location where it is not possible for them to attract any ferro magnetic parts.

**ATTENTION**

Depending on the product type, contactors can contain permanent magnets. These permanent magnets can destroy the data on the magnetic strips of credit or similar cards.

- Keep credit or similar cards away from the contactors.

**ATTENTION**

During switching o , strong electromagnetic  elds are generated in the vicinity of the contactors. These may in uence other components close to the contactors.

- Make sure that the contactors are installed in a location where no other components are a ected.

**ATTENTION**

In the case of damage, wear and/or soiling of the contactors - in the form of a partial break, sharp edges and discoloured surfaces - the functional reliability of the contactors is no longer ensured.

- Visually inspect the contactors regularly to detect wear and soiling.
- Replace damaged parts immediately.
- Immediately remove any soiling without leaving any residues.
- Immediately replace any parts with persistent soiling.

**ATTENTION**

Detent-edged rings and detent-edged washers have a limited life time. After screws secured with detent-edged rings or detent-edged washers have been undone three times, the rings or washers must be replaced by new ones.

- Record the frequency of undoing of the screws in the work log.
- Replace detent-edged rings or detent-edged washers with new ones after the screws have been undone three times.

# 4. Product information

## 4.1 C195 Series – Single pole NO and changeover contactors plus bidirectional variants

Compact universal contactors for battery voltages up to 220 V and high voltages up to 1,500 V

Being of compact size and featuring double-break contacts that are covered for the most part, the C195 Series contactors provide highperformance current breaking.

Depending on the version you choose C195 series contactors come with blowouts and/or arc chutes.

The coils are fitted as standard with varistors for limiting surge voltages. For coil terminal connections you do not need to observe polarity.

With the C195 X there is also a bidirectional version, for which the direction of the current is irrelevant, as required for battery storage systems of public utilities. And with 320 A, the C195 X is also characterised by a higher current-carrying capacity.

In addition to that, there is the option of a SPDT version of the C195 series contactor which has an added galvanically isolated NC contact.

## 4.2 Features

- Compact universal contactors up to 1,500 V
- Unidirectional, bidirectional and latching contactor variants
- Broad range of possible applications
- Suitable for years of continuous operation
- Intended for high ambient temperatures
- Double-break contacts that are covered for the most part
- Versions for AC and DC operation available
- DC versions coming with magnetic blowout
- Extended coil tolerance according to railway standard

## 4.3 Applications

The contactors are typically used:

- for traction engineering equipment, particularly in heating circuits and for air conditioning (HVAC equipment)
- as line contactor in mainline AC and DC rail networks – or in combination with a precharging contactor for a host of applications in trains, multiple units, rail cars and light rail vehicles
- for central inverters of complex power supplies
- for battery storage systems of utilities, specifically in grid stabilisation where bidirectional switching is a requirement

## 4.4 Technical information and material properties

For technical information and material properties, refer to the corresponding data sheets and to our B195 catalogue. The catalogue is available under: https://www.schaltbau.com/en/media-library/

## 4.5 Overview (stock items)

### 4.5.1 C195 X/ (Single pole NO AC / DC contactor, bidirectional)

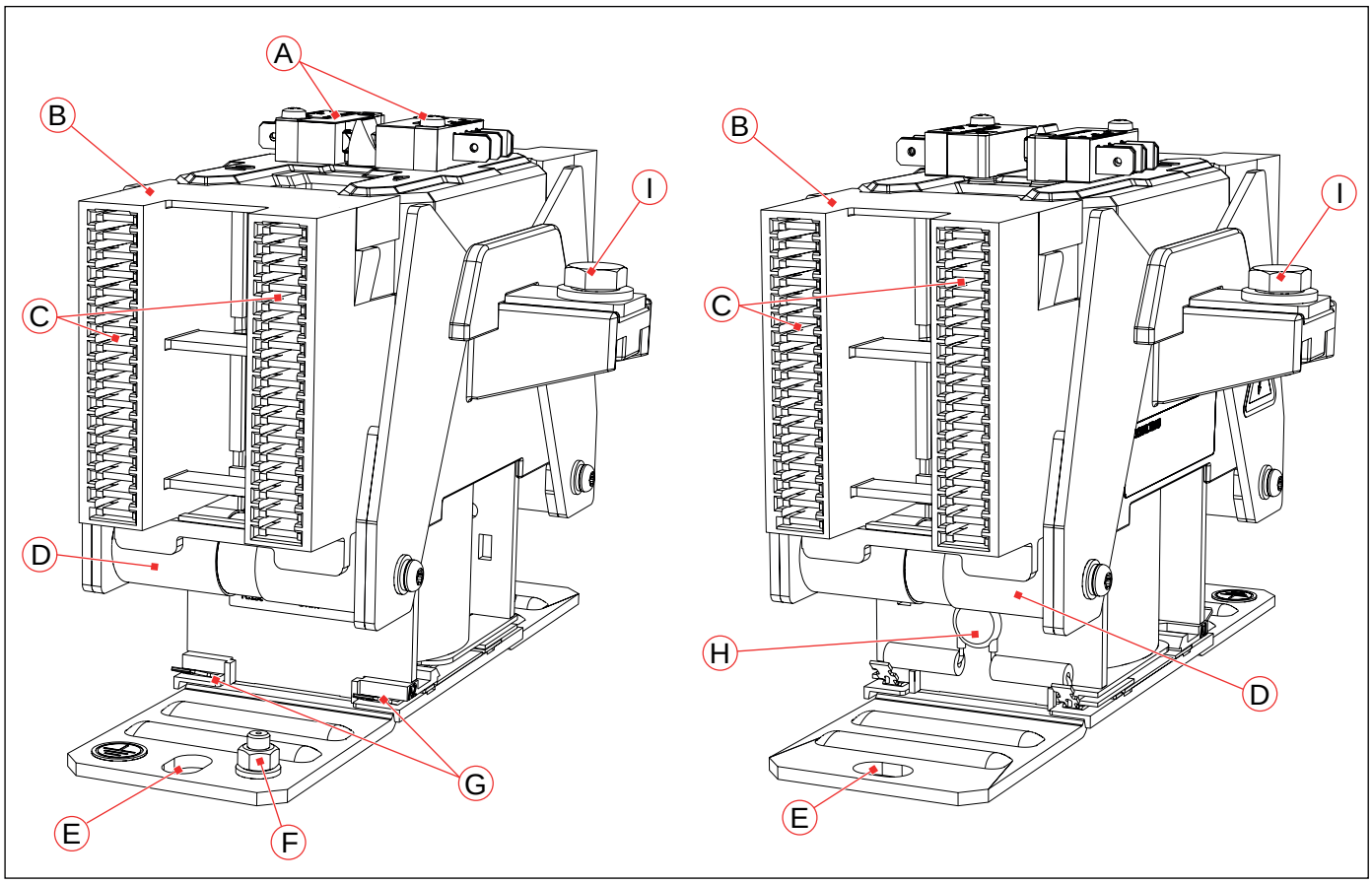


Fig. 1: C195 X/ (left: view from front, right: view from behind)

A Auxiliary switches (2x S870): at plug connections 6.3 x 0.8 mm
B Arch chambers
C Plasma-exits
D Permanent magnets
E Fastening holes for M8 screws
F Earthing connection M5, torque: 2.4-3 Nm
G Coil terminals A1 and A2, at plug connections 6.3 x 0.8 mm
H Coil suppression: Varistor
I Main contacts, connection M8, torque: 8-10 Nm

## 4.5.2 C195 A/ (Single pole NO contactor, unidirectional DC)

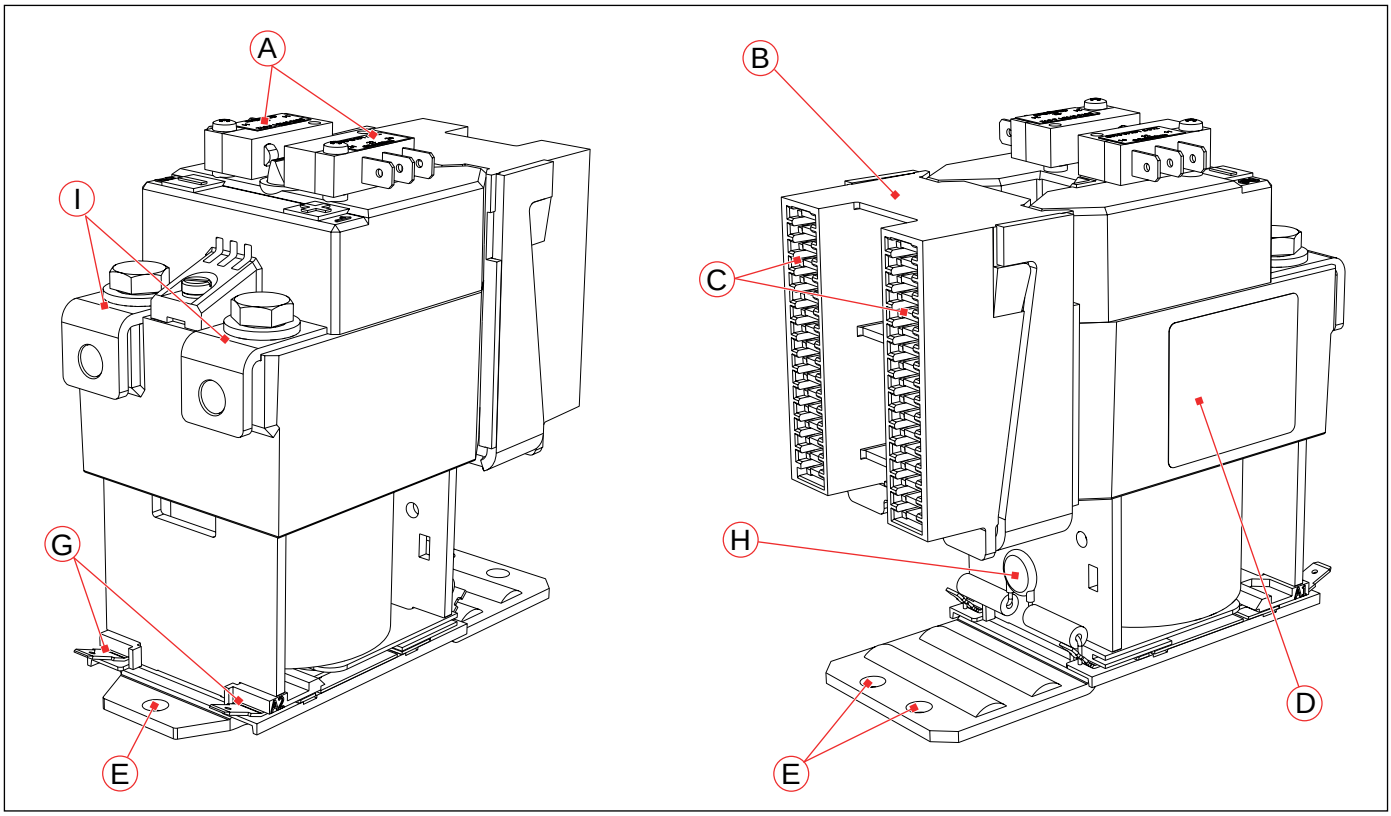


Fig. 2: C195 A/ (left: view from front, right: view from behind)

A Auxiliary switches (2x S870): at plug connections 6.3 x 0.8 mm
B Arch chamber
C Plasma-exits
D Permanent magnet (inside the housing)
E Fastening holes for M6 screws
G Coil terminals A1 and A2, at plug connections 6.3 x 0.8 mm
H Coil suppression: Varistor
I Main contacts, connection M8, torque: 9.5-12 Nm

## 4.5.3 C195 A/ ...BD (Single pole NO latching contactor, unidirectional DC)

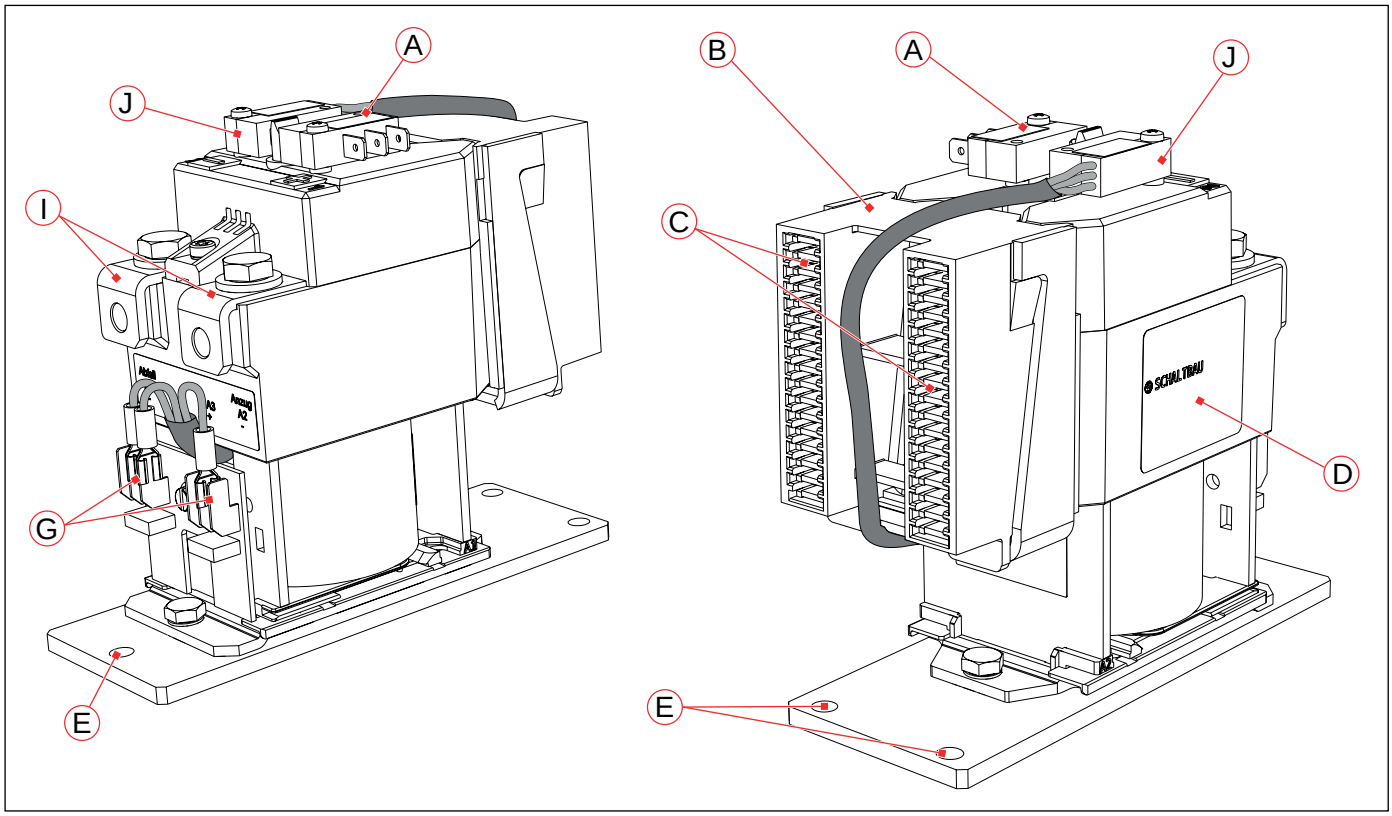


Fig. 3: C195 A/ ...BD (left: view from front, right: view from behind)

A Auxiliary switch (1x S870) for customer use: at plug connections 6.3 x 0.8 mm
B Arch chamber
C Plasma-exits
D Permanent magnet (inside the housing)
E Fastening holes for M6 screws
G Coil terminals A1 and A2, at plug connections 6.3 x 0.8 mm
I Main contacts, connection M8, torque: 9.5-12 Nm
J Auxiliary switch (1x S870 W1B1 a 065) for board switching (hard-wired)

## 4.5.4 C195 B/ (Single pole NO contactor AC)

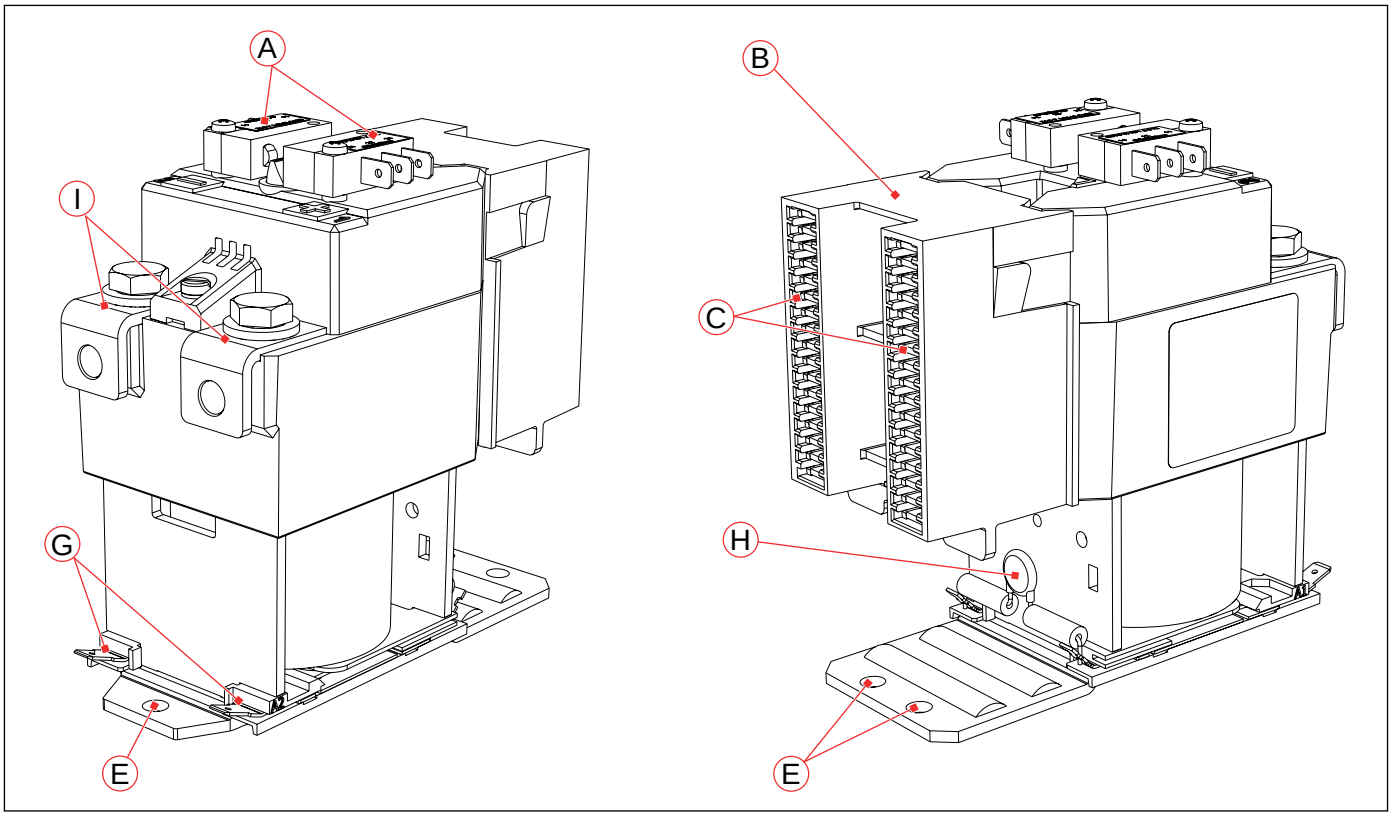


Fig. 4: C195 B/ (left: view from front, right: view from behind)

A Auxiliary switches (2x S870), at plug connections 6.3 x 0.8 mm
B Arch chamber
C Plasma-exits
E Fastening holes for M6 screws
G Coil terminals A1 and A2, at plug connections 6.3 x 0.8 mm
H Coil suppression: Varistor
I Main contacts, connection M8, torque: 9.5-12 Nm

## 4.5.5 C195 S/ (Single pole NO contactor DC, unidirectional)

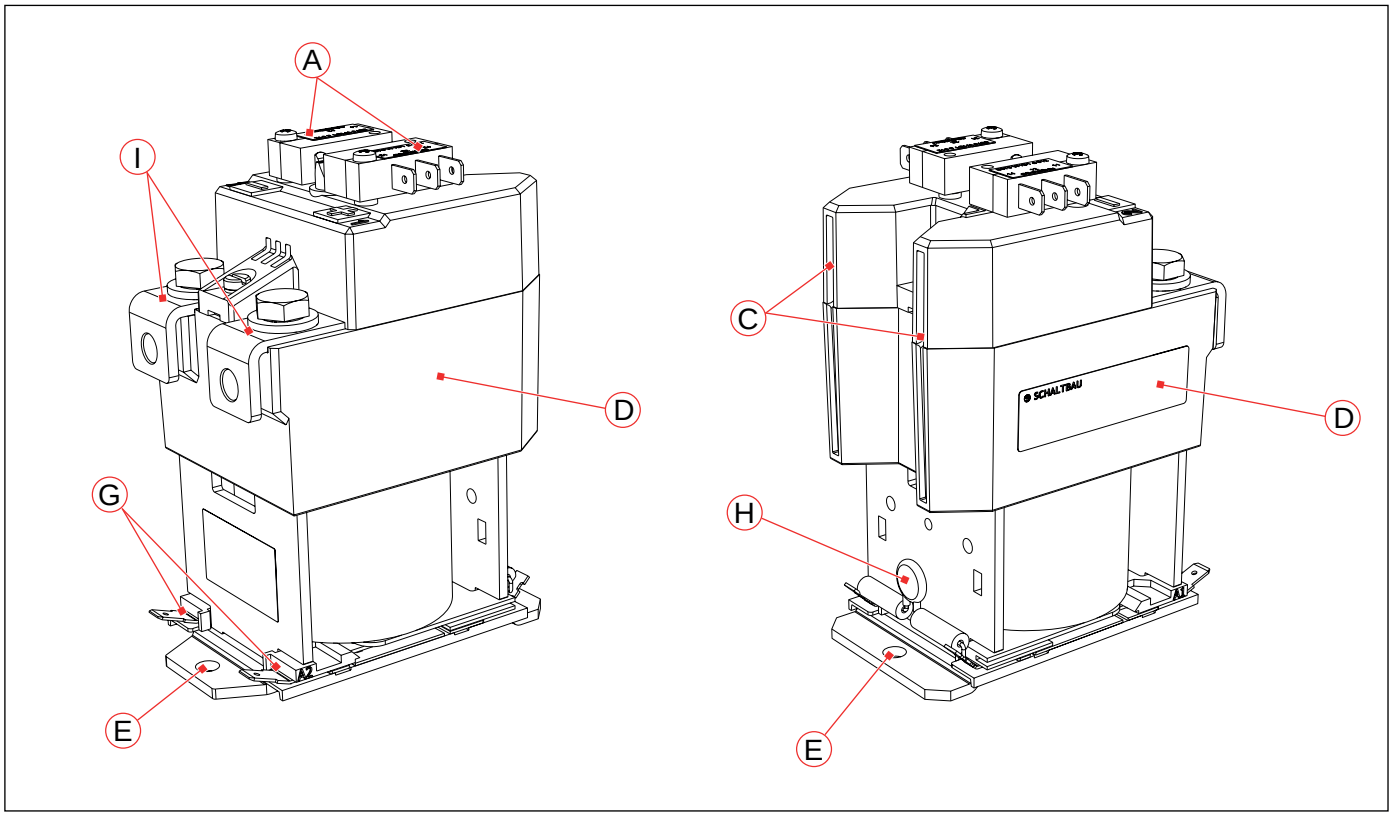


Fig. 5: C195 S/ (left: view from front, right: view from behind)

A Auxiliary switches (2x S870), at plug connections 6.3 x 0.8 mm
C Plasma-exits
D Permanent magnets (inside the housing)
E Fastening holes for M6 screws
G Coil terminals A1 and A2, at plug connections 6.3 x 0.8 mm
H Coil suppression: Varistor
I Main contacts, connection M8, torque: 9.5-12 Nm

## 4.5.6 C195 S/ ...BD (Single pole NO latching contactor, unidirectional DC

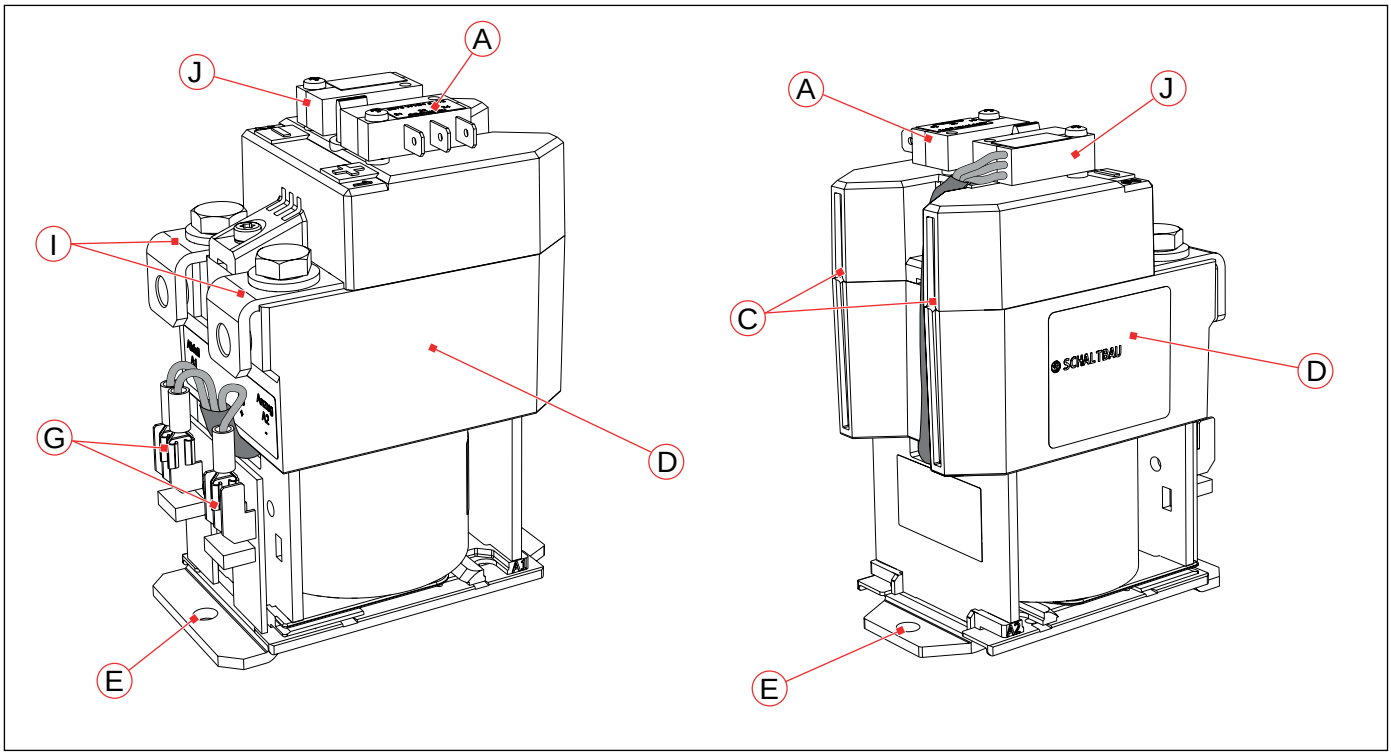


Fig. 6: C195 S/ ...BD (left: view from front, right: view from behind)

A Auxiliary switch (1x S870) for customer use: at plug connections 6.3 x 0.8 mm
C Plasma-exits
D Permanent magnet (inside the housing)
E Fastening holes for M6 screws
G Coil terminals A1 and A2, at plug connections 6.3 x 0.8 mm
I Main contacts, connection M8, torque: 9.5-12 Nm
J Auxiliary switch (1x S870 W1B1 a 065) for board switching (hard-wired)

## 4.5.7 C195 T/ (Single pole NO contactor AC)

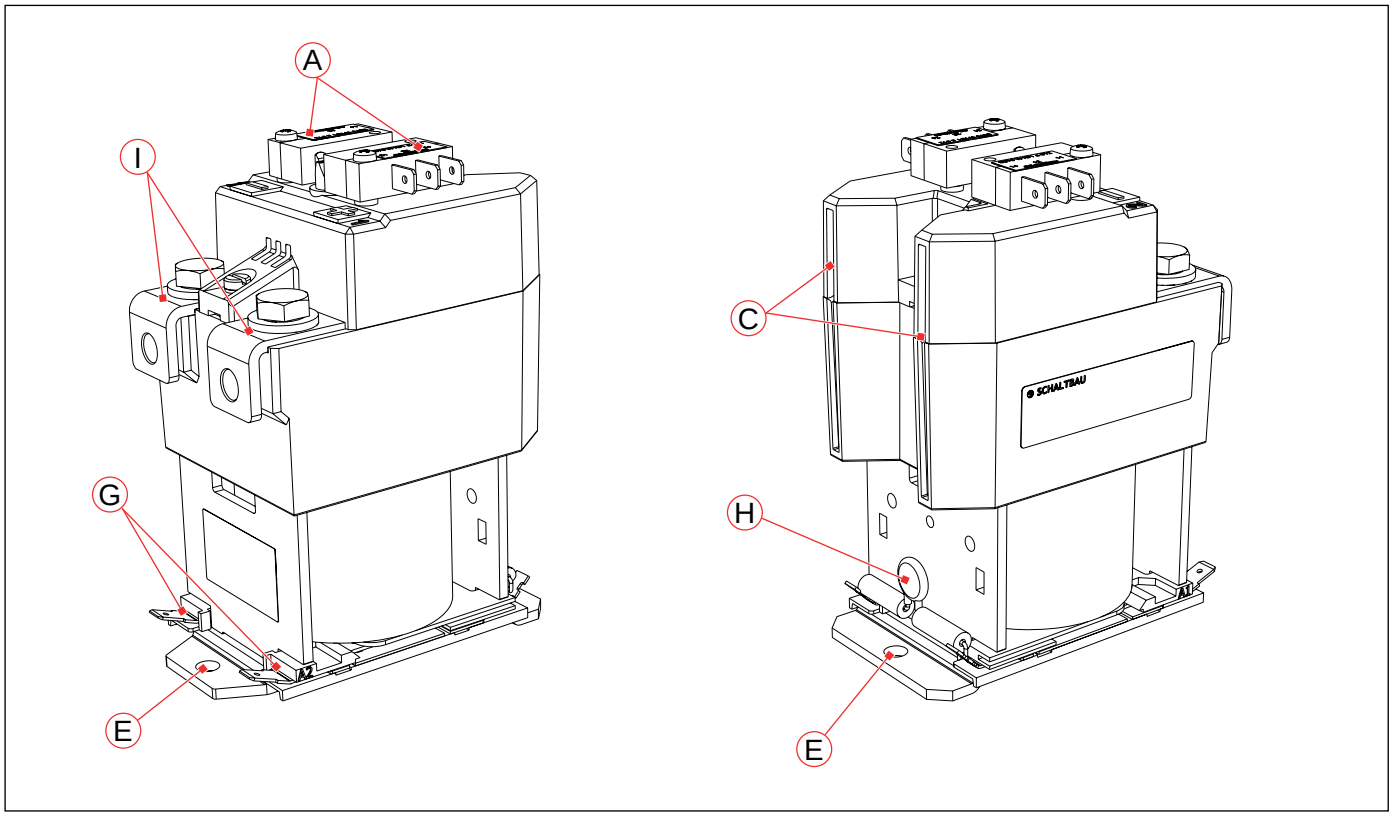


Fig. 7: C195 T/ (left: view from front, right: view from behind)

A Auxiliary switches (2x S870): at plug connections 6.3 x 0.8 mm
C Plasma-exits
E Fastening holes for M6 screws
G Coil terminals A1 and A2, at plug connections 6.3 x 0.8 mm
H Coil suppression: Varistor
I Main contacts, connection M8, torque: 9.5-12 Nm

## 4.5.8 C195 W/ (Single pole changeover (SPDT) contactor, unidirectional DC)

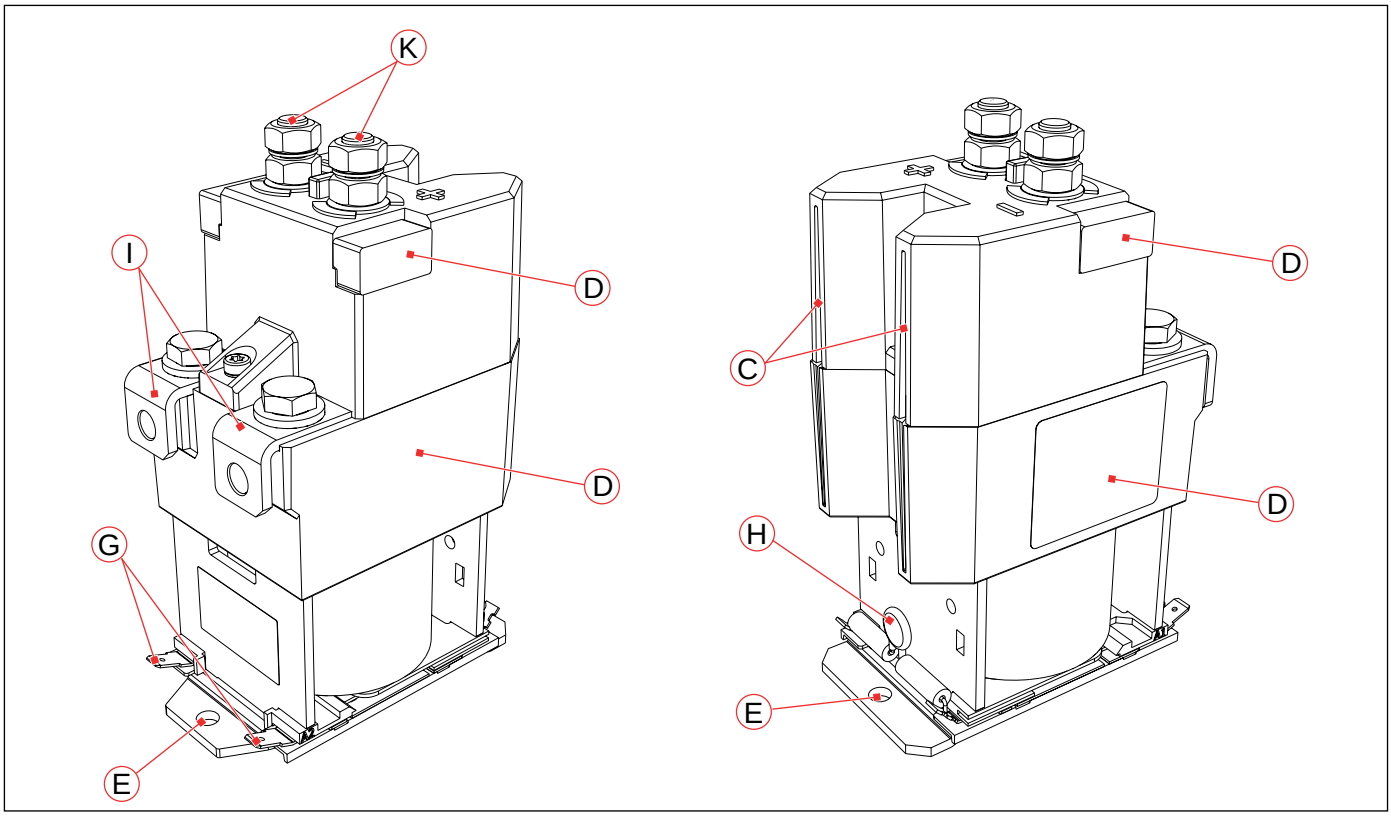


Fig. 8: C195 W/ (left: view from front, right: view from behind)

C Plasma-exits
D Permanent magnets (partly inside the housing)
E Fastening holes for M6 screws
G Coil terminals A1 and A2, at plug connections 6.3 x 0.8 mm
H Coil suppression: Varistor
I Main contacts NO (normally opened), connection M8, torque: 9.5-12 Nm
K Main contacts NC (normally closed), connection M8, torque: 4.8-6 Nm

# 5. Storage

**ATTENTION**

Moisture and dust can damage the contactors. If the device is to be stored for a prolonged period of time:

- Store the device in its original packaging,
- Store the device in a dry and dust-free location

Return shipments

Schaltbau recommends retaining the original packaging for any return shipments.
If the original packaging is not available, care must be taken to pack the contactor in a way that prevents damage during shipment.

# 6. Unpacking

## 6.1 Unpacking the device

- Before opening the packaging, perform a visual inspection for any signs that could indicate damage having occurred during transport (impacts, bumps, dropping, etc.).
- If any signs indicate that the contactor has been subject to excessive impacts do not install it.

## 6.2 Check parts for transport damage

**ATTENTION**

If parts are damaged, functional reliability of the contactor has been lost.

- Before installing, check all parts for possible transport damage.
- Do not install damaged parts.

# 7. Installation

## 7.1 Mounting

### 7.1.1 Dimensions/interfaces and further technical speci cations

The dimensions and other technical speci cations are given in the respective data sheets or can be found in our B195 catalogue. The catalogue is available under: https://www.schaltbau.com/en/media-library/

### 7.1.2 Preparatory measures

- A suitable mounting plate or frame must be provided for fastening of the contactors. These must be su ciently stable to support the weight of the contactors under the expected vibration and shock conditions.
- Mounting holes must be prepared on the mounting plate or frame according to the following dimensional drawings (Fig. 9 to Fig. 11).

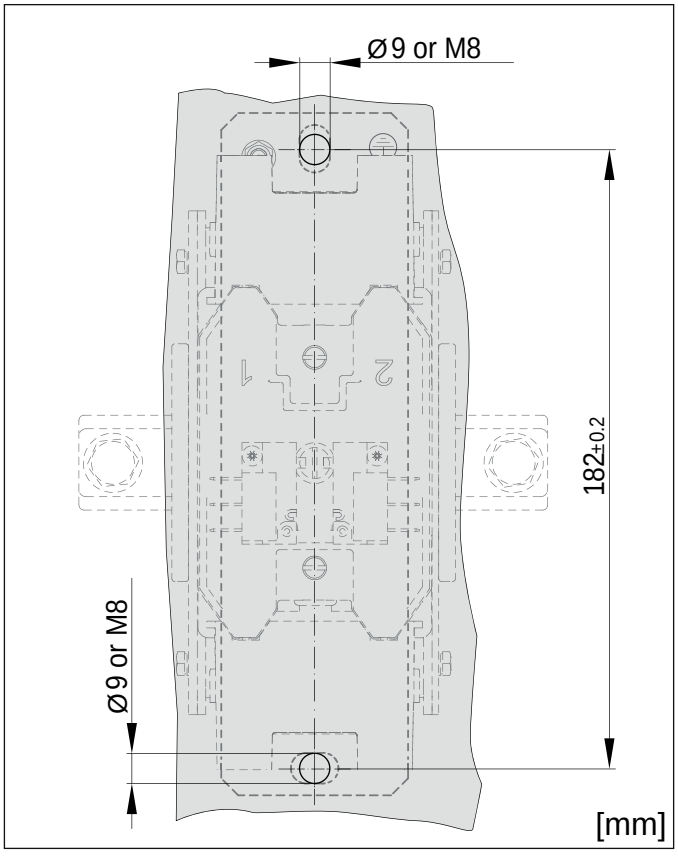


Fig. 9: C195 X:/ Dimensions and layout of mounting holes

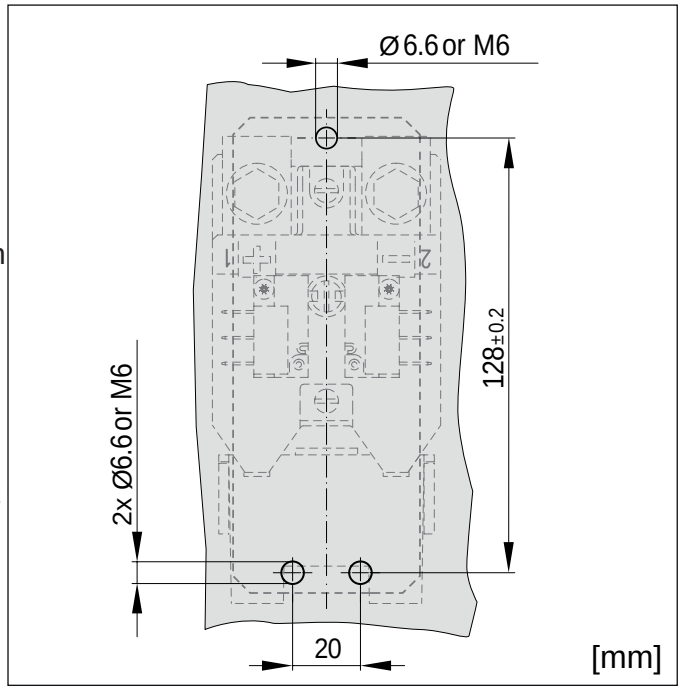


Fig. 10: C195 A/, C195 B/: Dimensions and layout of mounting holes

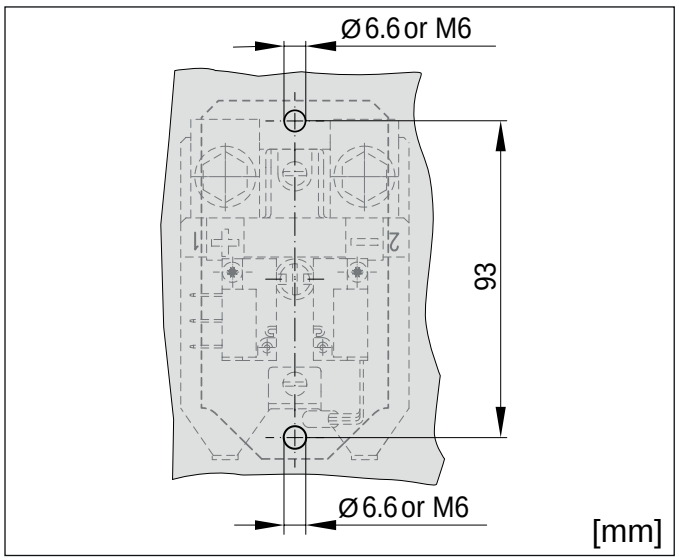


Fig. 11: C195 S/, C195 T/, C195 W/: Dimensions and layout of mounting holes

- The mounting holes can be either:
  - threaded holes (for threaded screws)
  - or through holes (for threaded screws and nuts)
- The size and number of mounting screws depending on the type of contactor can be found in the table under “7.1.8 Installing the contactor” on page 20.
- The length of the mounting screws must be determined dependent on the structural circumstances.

- To secure the mounting screws so that they do not come loose, appropriate screw locking elements must be provided. Schaltbau recommends using Schnorr washers (or similar).
- The mounting screws must be tightened to the speci ed torque, which depends on the strength class (min. 8.8) of the screws/nuts used.

## 7.1.3 Mounting positions

The contactors can be mounted in almost any position on the prepared mounting plate or on the mounting frame.
Examples of intended installation positions are shown in Fig. 12.
Installation positions hanging, with mounting plate/ frame on top, as shown in Fig. 13, are not permissible.

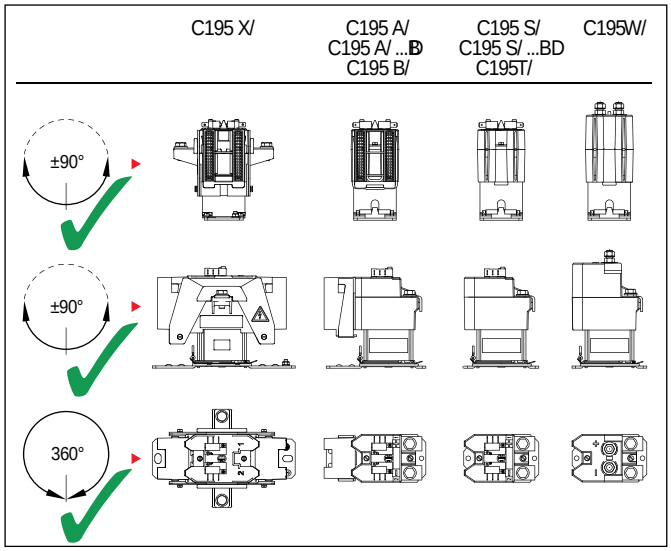


Fig. 12: Examples of intended mounting positions

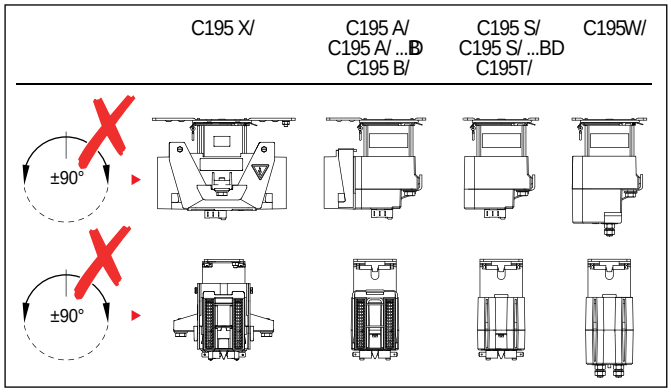


Fig. 13: Examples of non-permissible mounting positions

## 7.1.4 Required minimum clearances

**ATTENTION**

Switching of high voltage currents produces electric arcs and it is possible that plasma will escape from the openings of the arc chambers.
Therefore, it is extremely important to maintain the minimum clearances to ground/earth and the bus-bars to avoid ashovers.

- The required minimum clearances to all sides and above the contactor can be found in our B195 catalogue. Thecatalogue is available under: https://www.schaltbau.com/en/media-library/

## 7.1.5 Ventilation requirements

- Ensure su cient ventilation in the installation area, especially when switching heavy loads. This allows the plasma to be dissipated more quickly and-re duces the risk of ashover and corrosion.

## 7.1.6 Safety

- Installation must be performed by quali ed trained personnel.

**ATTENTION**

When installing, ensure that no dirt can get into the contactor as a result of surrounding building activi-ties.

**ATTENTION**

Detent-edged rings and detent-edged washers have a limited life time. After screws secured with detent-edged rings or detent-edged washers have been undone three times, the rings or washers must be replaced by new ones.

- Record the frequency of undoing of the screws in the work log.
- Replace detent-edged rings or detent-edged washers with new ones after the screws have been undone three times.

## 7.1.7 Tools required

- Socket spanner set, hexagon nuts, set of hexagon socket spanners
- Torque spanner

## 7.1.8 Installing the contactor

- Ensure that the contact surfaces on the mounting plate (3) or frame and the bottom of the contac tor are free from dirt and other contamination (e.g. metal chips).
- Position the contactor (1) on the mounting plate/ frame (3) which is provided with mounting holes.
- Screw the contactor (1) on the mounting ange to the mounting plate/frame (3) using mounting screws (2) according to the table below.
  - In designs with the mounting holes imple mented as threaded holes, screw the mounting screws into the holes directly, not forgetting the suitable screw locking elements.
  - In designs with through holes, t the mounting screws and suitable screw locking elements (on both sides) and tighten the screws using nuts.
- Tighten the mounting screws to the speci ed torque, which depends on the strength class (min. 8.8) of the screws/nuts used.

| Type | Mounting screws | No. of screws |
|---|---|---|
| C195 X/ | M8 | 2 |
| C195 A/ | M6 | 3 |
| C195 B/ | M6 | 3 |
| C195 S/ | M6 | 2 |
| C195 T/ | M6 | 2 |
| C195 W/ | M6 | 2 |

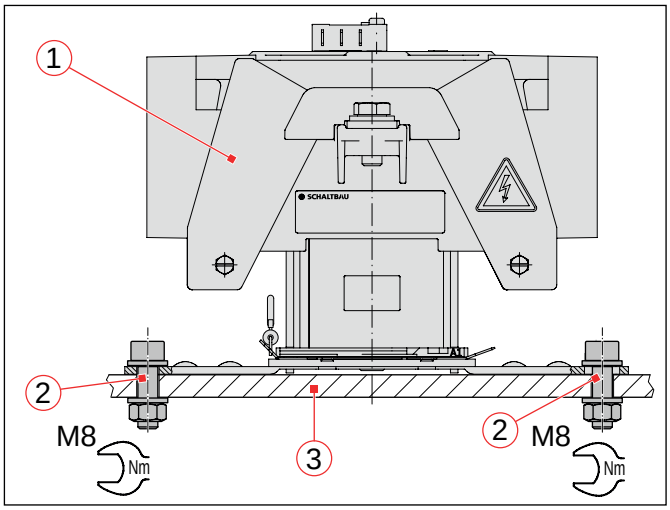


Fig. 14: C195 X/: Installing the contactor on the mounting plate or frame

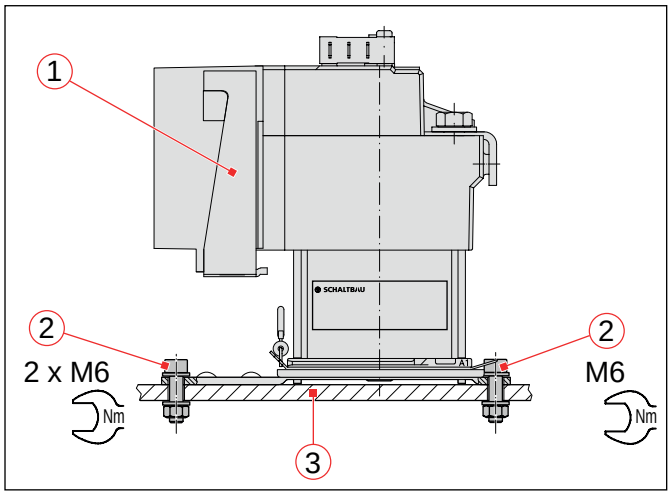


Fig. 15: C195 A/: Installing the contactor on the mounting plate or frame (the gure shows C195 A, the proce dure is identical for C195 B/)

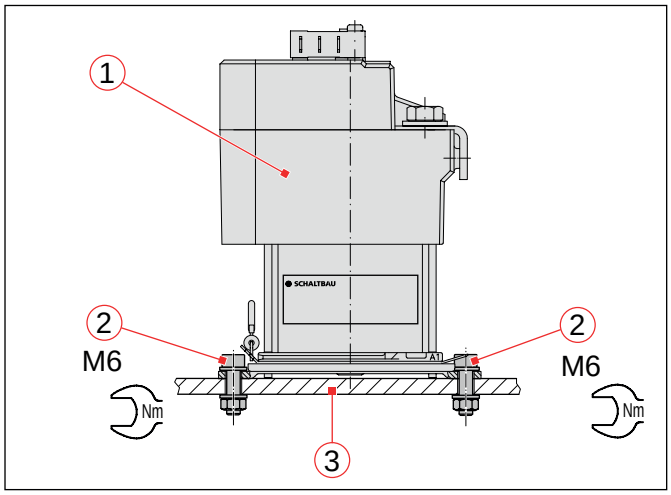


Fig. 16: C195 T/: Installing the contactor on the mounting plate or frame (the gure shows C195 T, the procedure is identical for C195 S/)

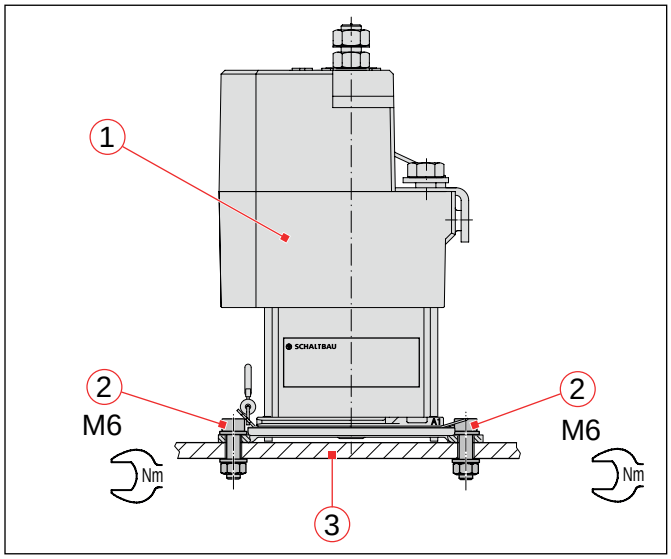


Fig. 17: C195 W/: Installing the contactor on the mounting plate or frame

## 7.2 Electrical connection

### 7.2.1 Electrical data and other technical speci cations

For the power consumption of the magnetic drive system and electrical data of the auxiliary switches as well as other technical speci cations, refer to the respective data sheets and to our B195 catalogue. The catalogue is available under:
https://www.schaltbau.com/en/media-library/

### 7.2.2 Preparatory measures

- The minimum conductor cross-sections for the main terminal connection and the earth/ground connection must be observed. Schaltbau recommends busbars for connecting the main contacts.
- If connecting cables are used, they must be selected taking into consideration the insulation class and ambient conditions..
- The connecting cables of the main power circuit must be tted with appropriate ring terminals (for M8 terminal screws).
- To secure the main terminal screws so that they do not come loose, appropriate screw locking elements must be provided. Schaltbau recommends using Schnorr washers (or similar).
- The terminal screws must be tightened with the speci ed torque.
- Undersized conductor cross-sections for the earth connection may produce a safety hazard.
- The connections for the coil drive and auxiliary switches are made with at plugs. Consequently, the control wires must be equipped with corresponding at receptacles (6.3 x 0.8 mm).
- The maximum permissible conductor cross-section of the auxiliary switch control wires is 1 mm² / AWG 18 stranded wire.

### 7.2.3 Safety

**DANGER**

The contactors are used for high voltage switching. Contact with live electrical parts can result in serious injuries or even death!
Live parts are all metal parts belonging directly to one of the circuits or wires connecting to them. All other visible metal parts and wiring may also be live if a fault exists.
Before starting any work on the contactors, always comply with the following safety rules:

- Disconnect on all sides
- Secure to prevent switching back on
- Clearly identify the working area
- Check that a voltage-free state exists
- Earth and short circuit; this includes discharging any capacitors in the main circuit
- Besides the main power circuits, also disconnect additional and auxiliary circuits
- Cover or insulate adjacent live parts
- The presence of a voltage-free state can only be clearly identi ed by a quali ed electrician.
- When the work has been concluded, follow the procedure in reverse.

**ATTENTION**

Detent-edged rings and detent-edged washers have a limited life time. After screws secured with detent-edged rings or detent-edged washers have been undone three times, the rings or washers must be replaced by new ones.

- Record the frequency of undoing of the screws in the work log.
- Replace detent-edged rings or detent-edged washers with new ones after the screws have been undone three times.

### 7.2.4 Tools required

- Socket spanner set, hexagon nuts
- Open-ended spanner set
- Torque spanner
- Continuity tester
- Cable ties

## 7.2.5 Connecting the auxiliary switches

The control wires for the auxiliary switches must be t ted with at receptacles (6.3 x 0.8 mm).

**ATTENTION**

Make sure that according to the insulation coordination there is su cient clearance between the wires of the control voltage and the main connections.

**ATTENTION**

The maximum permissible conductor cross-section of the auxiliary switch control wires is 1 mm² / AWG 18 stranded wire.

- Bending of the connection terminals on the auxiliary switches is not permitted!
- Move and route the control wires and recep tacles only in the direction of plugging, see Fig. 18 to Fig. 20.
- Mechanically secure the control wires to minimise feedback e ects of forces caused by the wires (e. g. shock, vibrations) acting on the-ter minals.

- Plug the pre-assembled control wires with the-re ceptacles (1) to the terminals (2) of the auxiliary switches.
- If applicable bundle and secure the wires using cable ties.

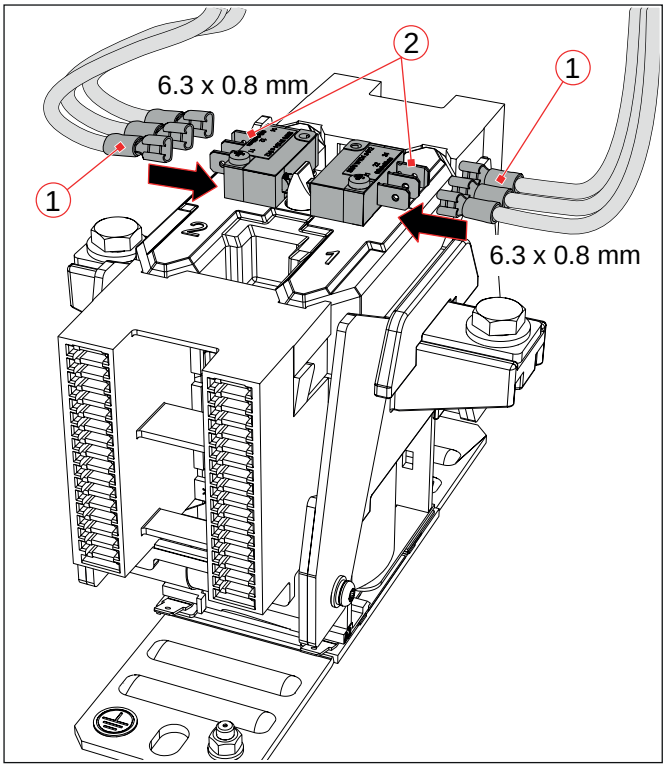


Fig. 18: C195 X/: Connecting the S870 auxiliary switches

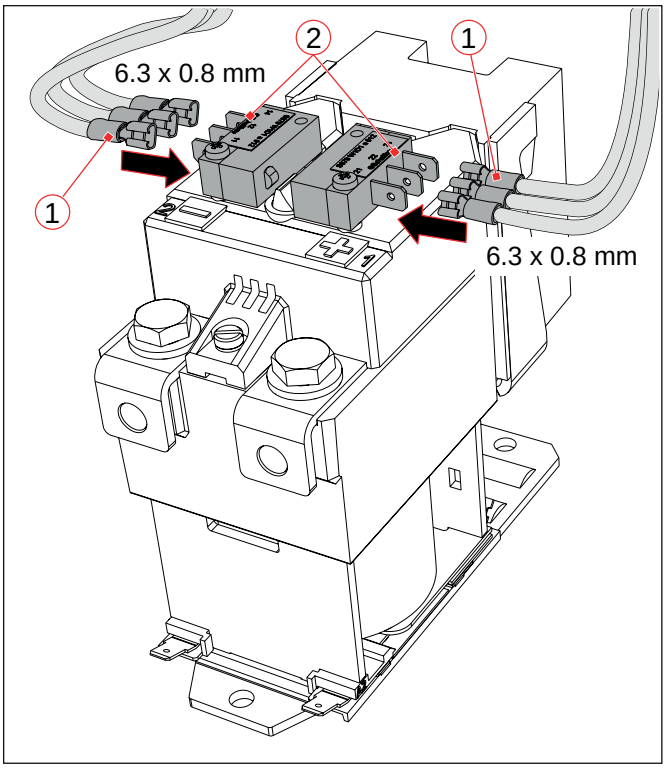


Fig. 19: C195 A/, C195 B/: Connecting the S870 auxiliary switches (the gure shows C195 A/, the procedure is identical for C195 B/)

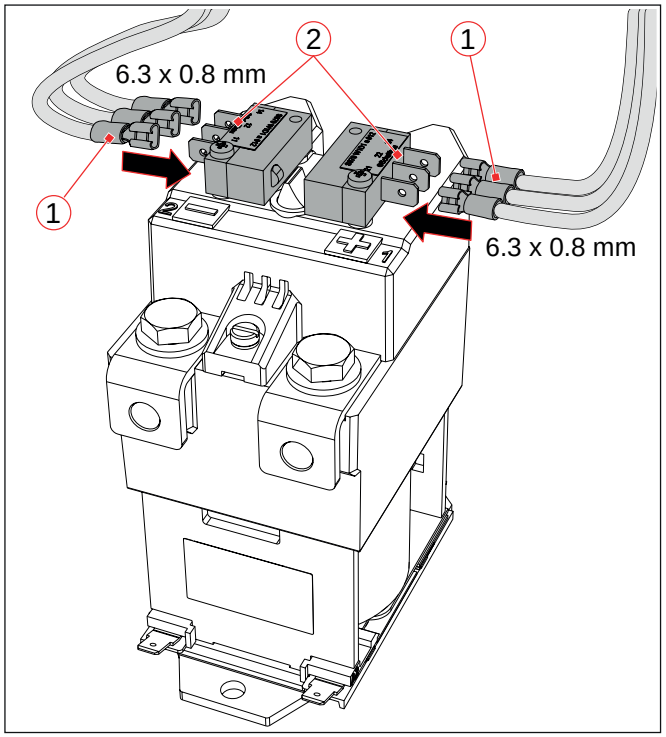


Fig. 20: C195 S/, C195 T/: Connecting the S870 auxiliary switches (the gure shows C195 S/, the procedure is identical for C195 T/)

## Auxiliary switches at latching contactor variants

The latching contactor variants (type C195 A/ ...BD and C195 S/ ...BD) have a hard-wired auxiliary switch (3), which is required to switch over the board for the bi-stable drive. This auxiliary switch (3) is already connected on delivery.
A further S870 auxiliary switch (2) is available for customer use and must be connected if applicable.

- Plug the pre-assembled control wires with the receptacles (1) to the terminals of the auxiliary switch (2).
- If applicable bundle and secure the wires using cable ties.

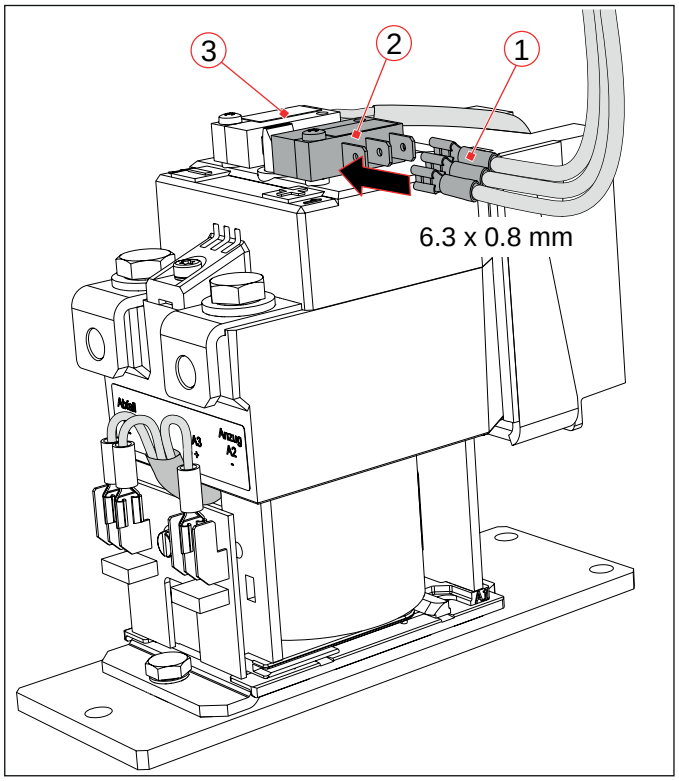


Fig. 21: C195 A/ ...BD latching contactor: Connecting the S870 auxiliary switch

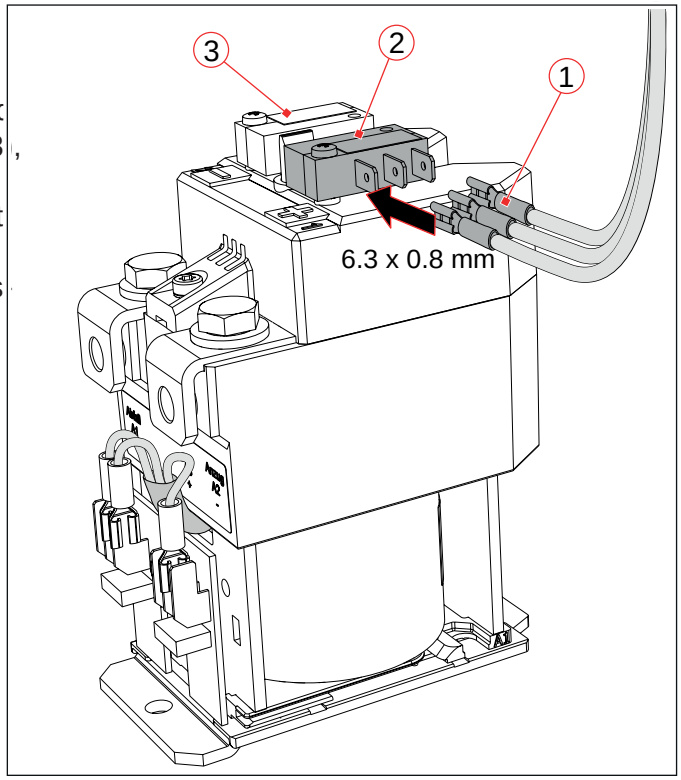


Fig. 22: C195 S/ ...BD, latching contactor: Connecting the S870 auxiliary switch

## 7.2.6 Connecting the coil

**ATTENTION**

The value of the overvoltage limitation is part of the magnetic system and must not be modi ed and in particular not be short-circuited (e.g. by an external diode).

- Make sure that no such diode is used in your control circuit.

**ATTENTION**

Bending of the coil terminals is not permitted!

- Move and route the control wires and recep tacles only in the direction of plugging, see Fig. 23 to Fig. 28.
- Mechanically secure the control wires to mini- mise feedback e ects of forces caused by the wires (e. g. shock, vibrations) acting on the-ter minals.

The control wires for the coil terminals must be tted with at receptacles (6.3 x 0.8 mm).

- Plug the pre-assembled control wires with the-re ceptacles (4) to the both coil terminals A1 and A2.
- If applicable bundle and secure the wires using cable ties.

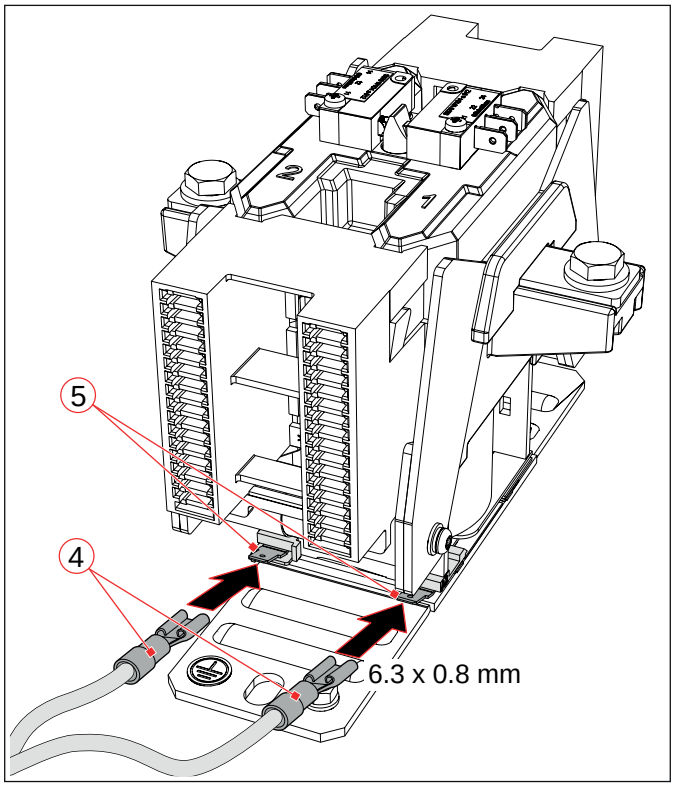


Fig. 23: C195 X/: Connecting the coil

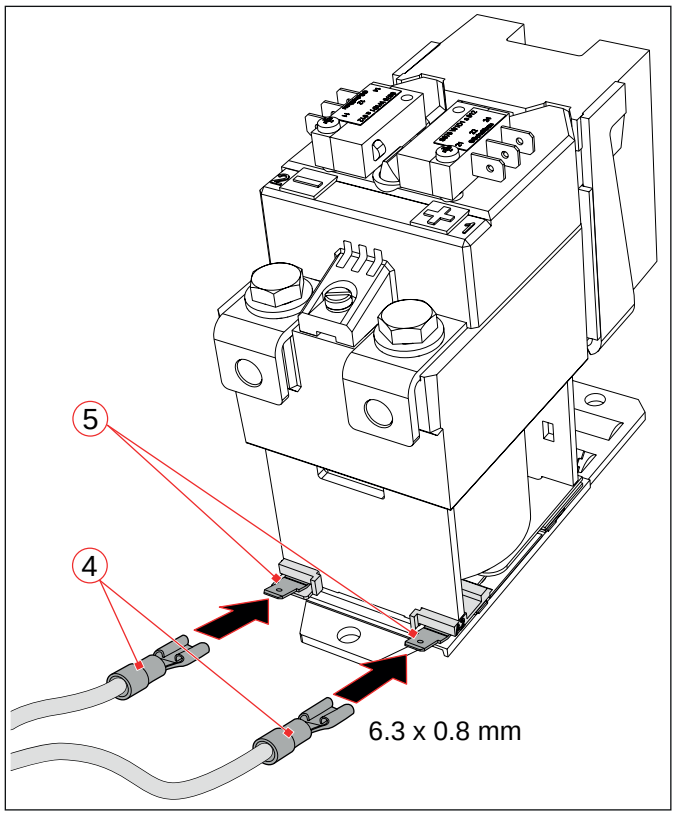


Fig. 24: C195 A/, C195 B/: Connecting the coil (the gure shows C195 A, the procedure is identical for C195 B/)

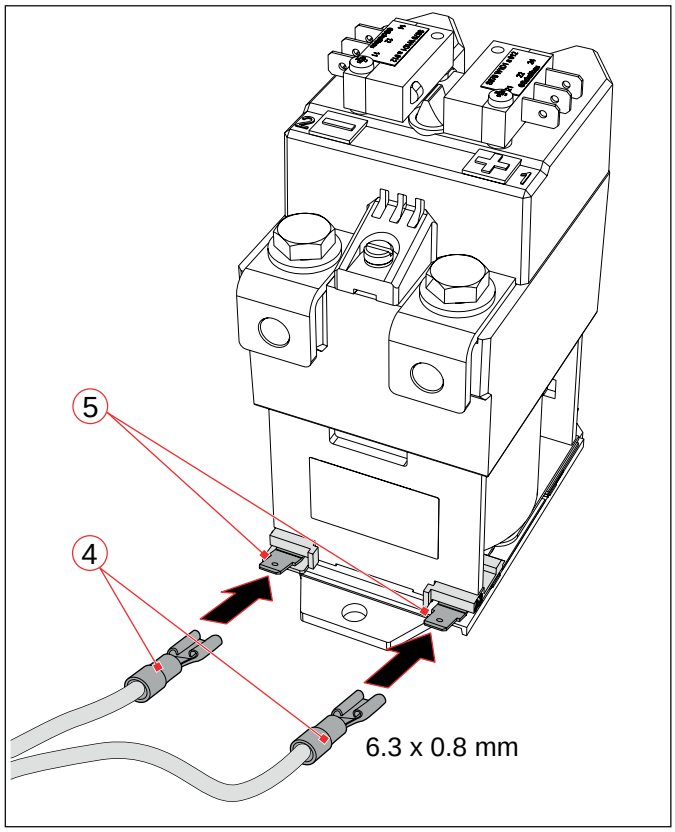


Fig. 25: C195 S/, C195 T/: Connecting the coil (the gure shows C195 S/, the procedure is identical for C195 T/)

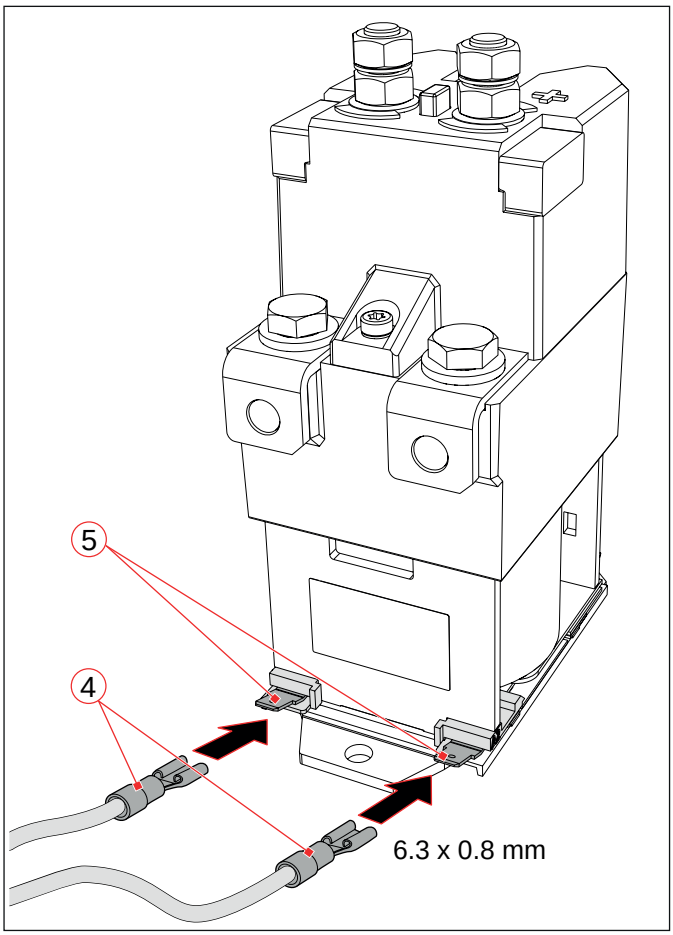


Fig. 26: C195 W/: Connecting the coil

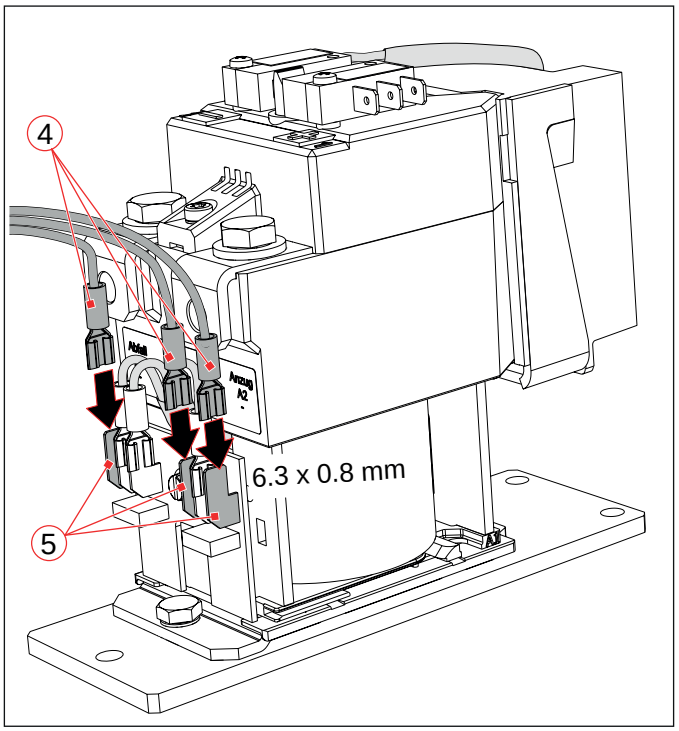


Fig. 27: C195 A/ ...BD latching contactor: Connecting the coil

## Coil connections at latching contactor variants

The latching contactor variants (type C195 A/ ...BD and C195 S/ ...BD) have a hard-wired auxiliary switch, which is required to switch over the board for the bistable drive. This auxiliary switch is already connected to the coil terminals A1 and A2 on delivery.
The remaining coil terminals A1, A2 and A3 (5) are available for customer use and must be connected if applicable.

- Plug the pre-assembled control wires with the receptacles (4) to the coil terminals A1, A2 and A3 (5).
- If applicable bundle and secure the wires using cable ties.

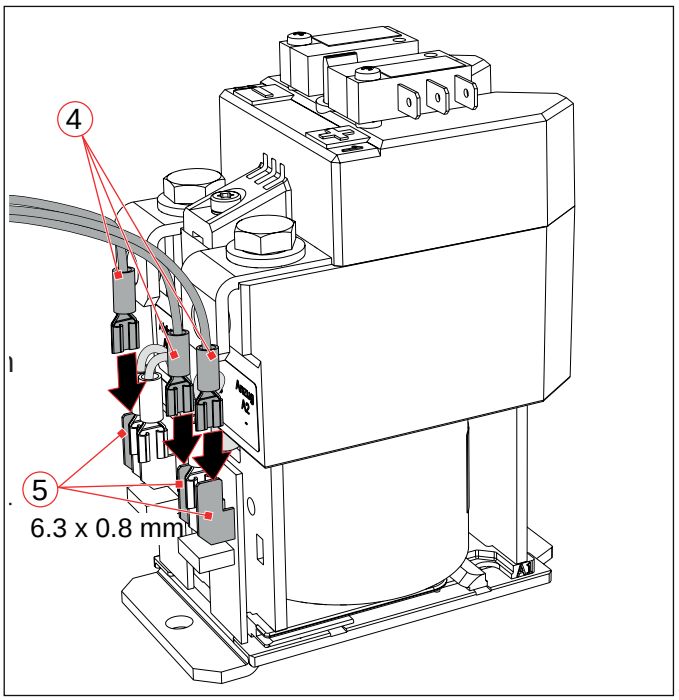


Fig. 28: C195 S/ ...BD latching contactor: Connecting the coil

## 7.2.7 Connecting the main contacts

**ATTENTION**

Ensure that the connection points for the main contacts are free from corrosion.

### Main contact connection with cables

The connecting cables of the main power circuit must be  tted with appropriate ring terminals (for M8 terminal screws).
Examples for the connection with cables are shown in in Fig. 29 to Fig. 32.

- Route the pre-assembled connecting cables (3) to the main contacts (1).
- Place the ring terminals (2) on the main contacts (1).

**ATTENTION**

Make sure that according to the insulation class there is su cient clearance between the main connections and the pole plates.

- Screw the ring terminals (2) to the main contacts (1) using the terminal screws (4) and washers (5).
  - Schaltbau recommends using Schnorr washers (or similar).
- Depending on the contactor type, tighten the ter minal screws (4) with the prescribed torque aceor ding to the table below.

| Type | Terminal screws | Torque |
|---|---|---|
| C195 X/ | M8 | 8-10 Nm |
| C195 A/ | | 9.5-12 Nm |
| C195 B/ | | 9.5-12 Nm |
| C195 S/ | | 9.5-12 Nm |
| C195 T/ | | 9.5-12 Nm |
| C195 W/ | | 9.5-12 Nm (NO contacts)<br>4.8-6 Nm (NC contacts) |

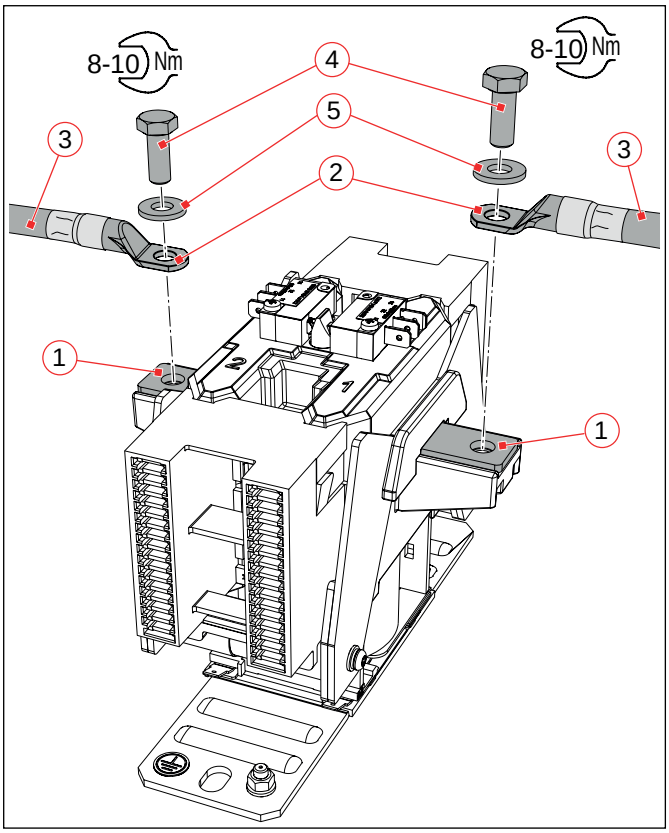


Fig. 29: C195 X/: Connecting the main contacts: Example of a connection with cables

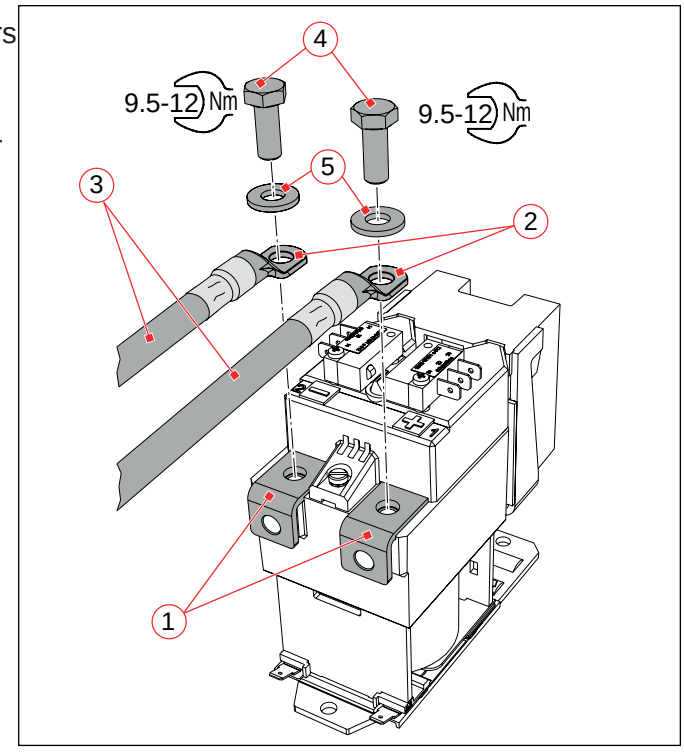


Fig. 30: C195 A/, C195 B/: Connecting the main contacts: Example of a connection with cables (the  gure shows C195 A, the procedure is identical for C195 B/)

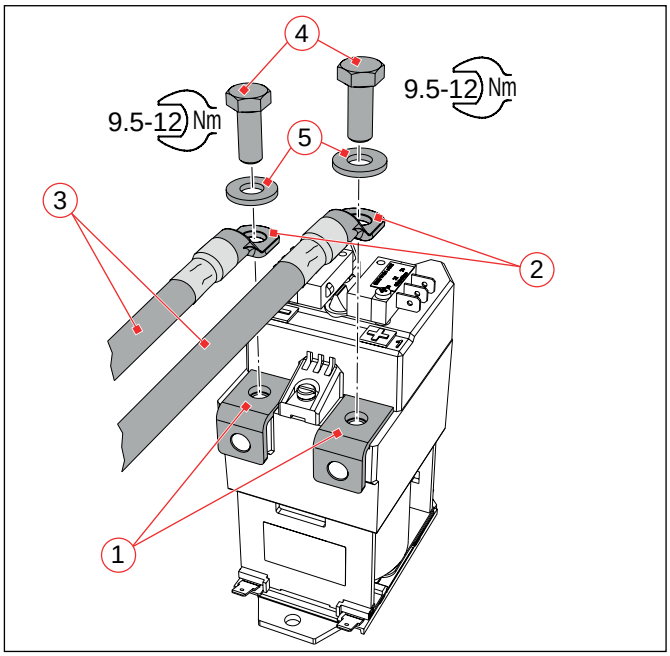


Fig. 31: C195 S/, C195 T/: Connecting the main contacts: Example of a connection with cables (the figure shows C195 S/, the procedure is identical for C195 T/ )

Main contact connection with cables (Changeover contactor, only type C195 W/)

Contactors of type C195 W/ (changeover contactor) have 2 upper main contacts (NC) (6) in addition to the lower main contacts (NO) (1).

**ATTENTION**

Make sure that according to the insulation class there is sufficient clearance between the main connections and the pole plates.

- Route the pre-assembled connecting cables (7) to the upper main contacts (6).
- Place the ring terminals (8) on the upper main contacts (6).
- Screw the ring terminals (8) to the upper main contacts (6) using the terminal nuts (10) and washers (9).
  - Schaltbau recommends using Schnorr washers (or similar).
- Route the pre-assembled connecting cables (3) to the lower main contacts (1).
- Place the ring terminals (2) on the lower main contacts (1).
- Screw the ring terminals (2) to the lower main contacts (1) using the terminal screws (4) and washers (5).
  - Schaltbau recommends using Schnorr washers (or similar).
- Tighten the upper terminal nuts (10) to a torque of 4.8-6 Nm.
- Tighten the lower terminal screws (4) to a torque of 9.5-12 Nm.

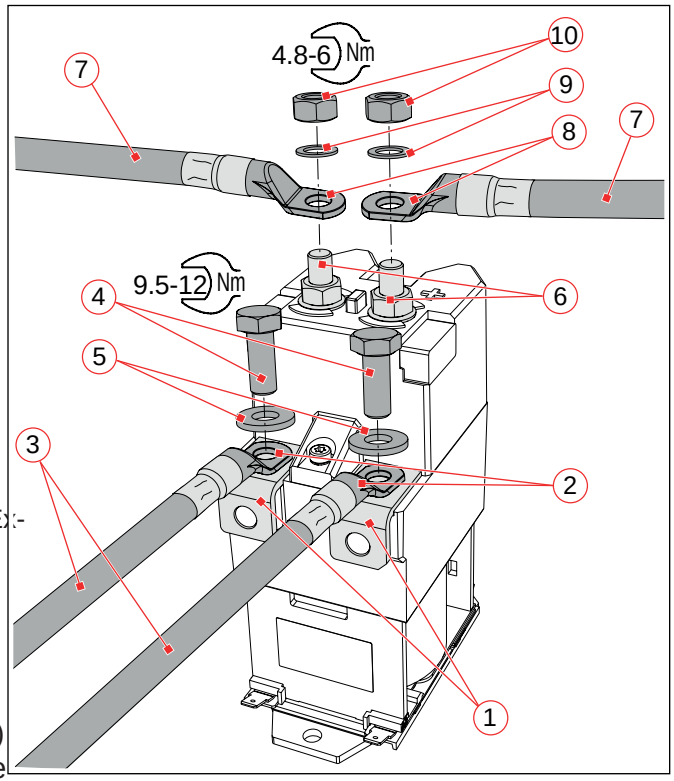


Fig. 32: C195 W/: Connecting the main contacts: Example of a connection with cables to NO and NC contacts

## Main contact connection with busbars

As an alternative to connection using wires, the main power circuit can also be connected with busbars. Examples for the connection with busbars are shown in Fig. 33 to Fig. 37.

**ATTENTION**

Make sure that according to the insulation class there is su cient clearance between the main connections and the pole plates.

- Route the busbars (7) to the main contacts (1).
- Depending on the installation situation, use additional connecting bars (6) or compensating angled connecting bars (8) if necessary.
- Connect the busbars (7) to the connecting bars (6) or angled connecting bars (8) using approriate screws, nuts and washers.
  - Schaltbau recommends using Schnorr washers (or similar).
- Connect the connecting bars (6) or angled connecting bars (8) to the main terminals (1) using the terminal screws (4) and washers (5).
  - Schaltbau recommends using Schnorr washers (or similar).
- Depending on the contactor type, tighten the ter minal screws (4) with the prescribed torque aceor ding to the table below.

| Type | Terminal screws | Torque |
|---|---|---|
| C195 X/ | M8 | 8-10 Nm |
| C195 A/ | | 9.5-12 Nm |
| C195 B/ | | 9.5-12 Nm |
| C195 S/ | | 9.5-12 Nm |
| C195 T/ | | 9.5-12 Nm |
| C195 W/ | | 9.5-12 Nm (NO contacts)<br>4.8-6 Nm (NC contacts) |

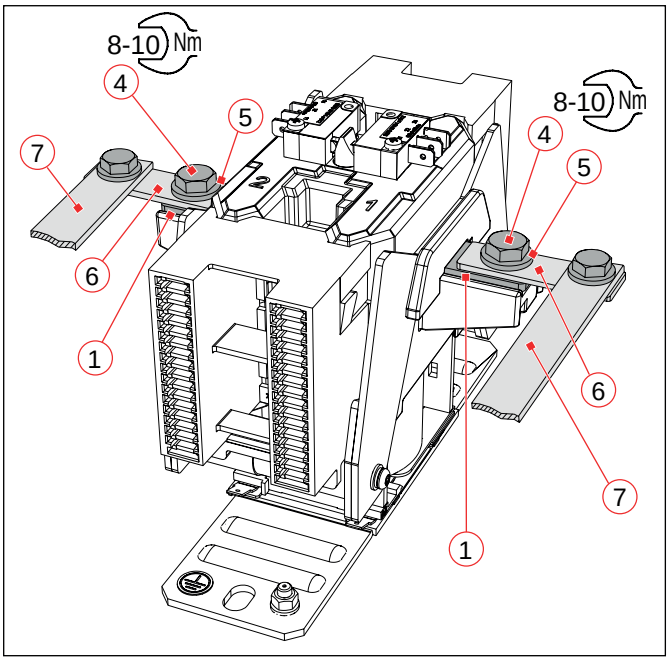


Fig. 33: C195 X/: Connecting the main contacts: Example of a connection with busbars (7) and connecting bars (6)

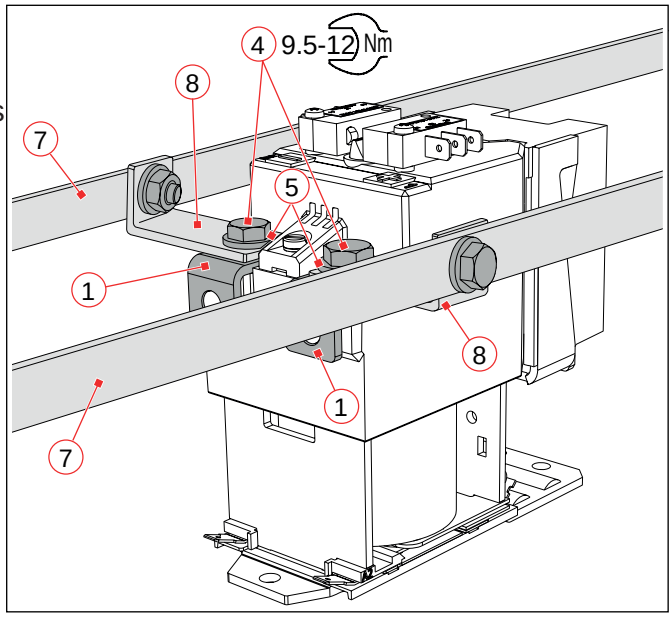


Fig. 34: C195 A/, C195 B/: Connecting the main contacts: Example of a connection with busbars (7) and angled connecting bars (8)

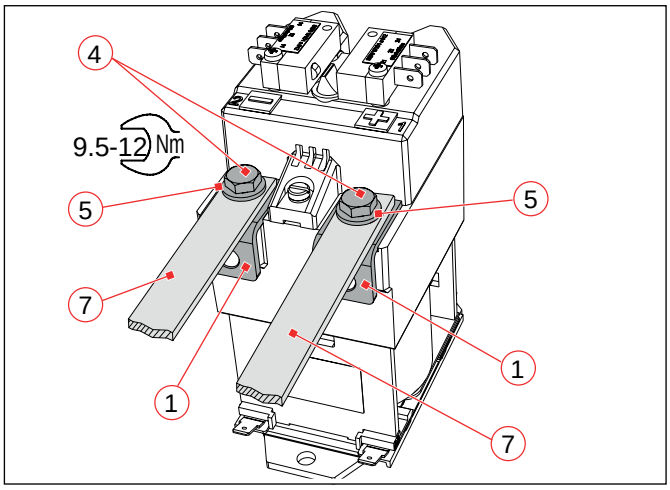


Fig. 35: C195 S/, C195 T/: Connecting the main contacts: Example of a connection with busbars (7)

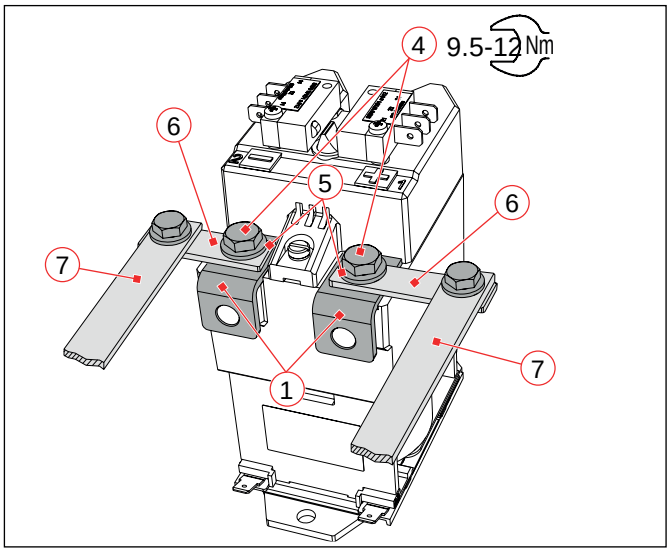


Fig. 36: C195 S/, C195 T/: Connecting the main contacts: Example of a connection with busbars (7) and connecting bars (6)

Main contact connection with busbars (Changeover contactor, only type C195 W/)

Contactors of type C195 W/ (changeover contactor) have 2 upper main contacts (NC) (9) in addition to the lower main contacts (NO) (1).

**ATTENTION**

Make sure that according to the insulation class there is su cient clearance between the main connections and the pole plates.

- Route the busbars (7) to the upper main contacts (9).
- Depending on the installation situation, use additional connecting bars (6) or compensating angled connecting bars if necessary.
- Connect the busbars (7) to the connecting bars (6) or angled connecting bars using approriate screws, nuts and washers.
  - Schaltbau recommends using Schnorr washers (or similar).
- Connect the connecting bars (6) or angled connecting bars to the upper main terminals (9) using the terminal nuts (10) and washers.
  - Schaltbau recommends using Schnorr washers (or similar).
- Route the busbars (7) to the lower main contacts (1).
- Depending on the installation situation, use additional connecting bars (6) or compensating angled connecting bars if necessary.
- Connect the busbars (7) to the connecting bars (6) or angled connecting bars using approriate screws, nuts and washers.
  - Schaltbau recommends using Schnorr washers (or similar).
- Connect the connecting bars (6) or angled connecting bars to the lower main terminals (1) using the terminal screws (4) and washers (5).
  - Schaltbau recommends using Schnorr washers (or similar).
- Tighten the upper terminal nuts (10) to a torque of 4.8-6 Nm.
- Tighten the lower terminal screws (4) to a torque of 9.5-12 Nm.

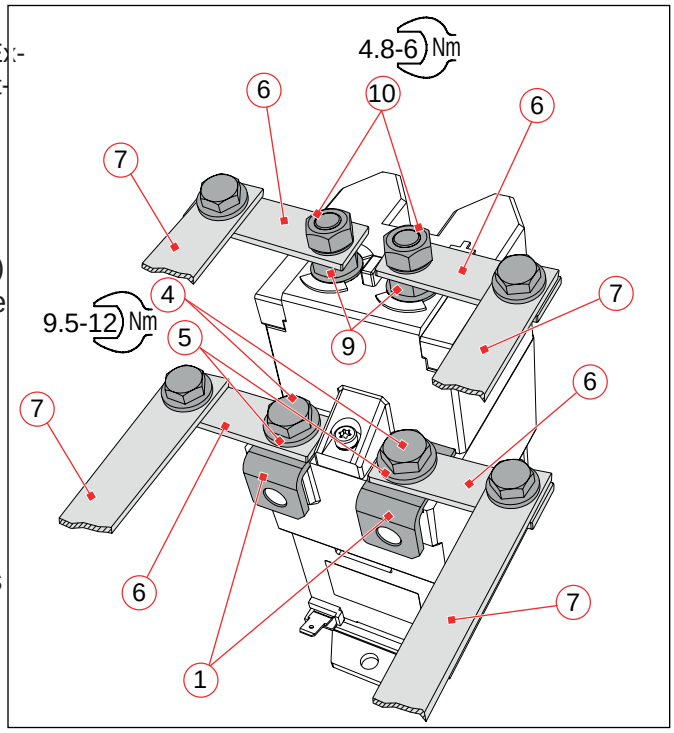


Fig. 37: C195 W/: Connecting the main contacts: Example of a connection with busbars (7) and connecting bars (6) to NO and NC contacts

## 7.3 Connecting the earth terminal (only for C195 X/)

**ATTENTION**

Undersized conductor cross-sections for the earth connection may produce a safety hazard.

- Make sure that the prescribed minimum cross-section for the earth connection is observed.

The earth connecting cable must be tted with an ap propriate ring terminal (for M5 earthing bolt).

- Route the earth cable (1) to the earthing bolt (2) on the base plate of the contactor.
- Place the ring terminal (3) on the earthing bolt (2) and screw it on with the M5 terminal nut (5) and washer (4).
  - Schaltbau recommends using Schnorr washers (or similar).
- Tighten the terminal nut (5) to the prescribed torque of 2.4-3 Nm.

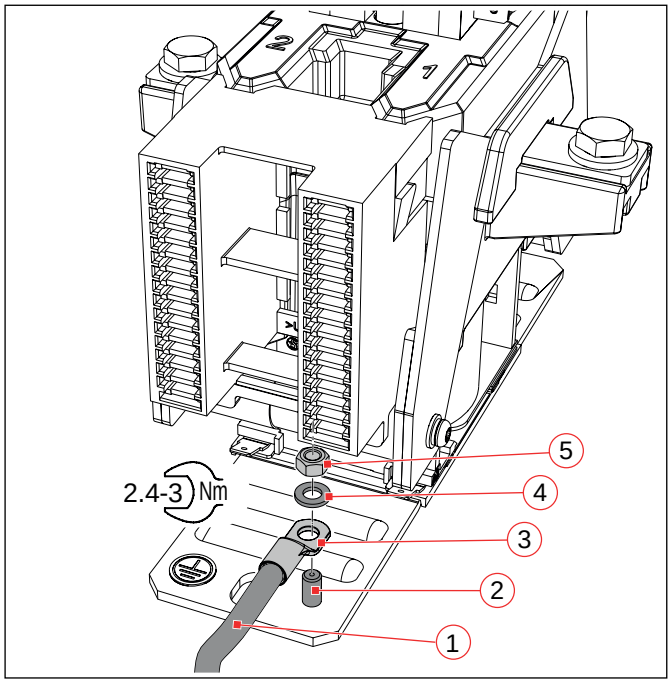


Fig. 38: Connecting the earth terminal (only for C195 X/)

## 7.4 Checks

After the installation, perform the following checks:

- Check that the contactors are correctly installed on the mounting plate or mounting frame and tightly screwed in place.
- Check that the main circuit cables or busbars are correctly installed and t tightly at the main contacts.
- Check correct connection and tight t of the earth cable (only for C195 X/).
- Check that the control wires of the coil terminals are correctly installed and have the correct polarity.
- Check that the control wires are correctly connected to the auxiliary switches.
  Check the correct assignment and function of the auxiliary switch using a continuity tester.
- Switch the contactor several times without voltage.
- Check the pull-in and drop-o voltage based on the Schaltbau speci cations. See B195 catalogue.
- Check the insulation voltage between earth, coil, main and auxiliary switch contacts.
- Check the routing of the wiring. Wires must not be squeezed or bent. If applicable bundle and secure wires using cable ties.
- After every installation or after maintenance, check the contactor for correct operation in accordance with the following standards:
  - EN/IEC 60077-2
  - EN/IEC 60947-4-1

# 8. Maintenance

Note the expert knowledge which is essential for carrying out maintenance work, referred to in chapter “2. General and safety information”.

## 8.1 Safety

**DANGER**

The contactors are used for voltage switching. Contact with live electrical parts can result in serious injuries or even death!
Live parts are all metal parts belonging directly to one of the circuits or wires connecting to them. All other visible metal parts and wiring may also be live if a fault exists.
Before starting any work on the contactors, always comply with the following safety rules:

- Disconnect on all sides
- Secure to prevent switching back on
- Clearly identify the working area
- Check that a voltage-free state exists
- Earth and short circuit; this includes discharging any capacitors in the main circuit
- Besides the main power circuits, also disconnect additional and auxiliary circuits
- Cover or insulate adjacent live parts
- The presence of a voltage-free state can only be clearly identified by a qualified electrician.
- When the work has been concluded, follow the procedure in reverse.

## 8.2 Preventive maintenance

Contactors of the C195 series are maintenance-free within the rated mechanical life time. The electrical life time depends on the number of switching cycles under heavy load conditions and may vary for different applications. In normal use, this corresponds to a decade-long operating period.

If the contactors are operated in a particularly dirty environment, the visual checks should be performed at shorter intervals. Dirt can impair the clearance and creepage distances, which can result in a shorter service life or to a malfunction.
Unscheduled checks are only required if there have been a significant number of switching operations under short-circuit conditions.

### 8.2.1 Intervals for regular tests/checks

To ensure the correct function and a prolonged operational life span of the contactors, the following tests and checks must be regularly performed.

| Test/check | Interval |
|---|---|
| External visual inspection of the contactor | 1x per year |
| Check of the main contacts | Every 3 years |
| Check of the auxiliary switches | Every 3 years |

**DANGER**

If damage to the contactor, cables or busbars is visible during the check, the safety of the contactor is no longer guaranteed.

- Immediately submit any damaged contactors or components for maintenance.

**ATTENTION**

Detent-edged rings and detent-edged washers have a limited life time. After screws secured with detent-edged rings or detent-edged washers have been undone three times, the rings or washers must be replaced by new ones.

- Record the frequency of undoing of the screws in the work log.
- Replace detent-edged rings or detent-edged washers with new ones after the screws have been undone three times

**ATTENTION**

When reassembling the old contact unit with the old screws, the operator himself must ensure that the old screws are professionally cleaned and secured.

## 8.2.2 Regular tests/checks

All of the maintenance activities that may be carried out on the contactors by skilled personnel are listed below.

| Component | Tests/checks | Measures |
|---|---|---|
| Cables/busbars | Check for:<br>- damaged cables, cable lugs<br>- damaged insulation<br>- corrosion<br>- damaged busbars<br>- kinked or crushed cables<br>- loose or missing fastening elements<br>- correct tightening torque of the terminal screw | In case of faults:<br>- immediately replace damaged wires or cable lugs<br>- remove corrosion and replace corroded parts<br>- immediately replace damaged busbars<br>- tighten loose fastening elements immediately, replace missing fastening elements<br>- tighten the terminal screws to the rated torque |
| Earth terminal (only for C195 X/) | Check for:<br>- damaged cable, cable lug<br>- damaged insulation<br>- kinked or crushed cable<br>- loose or missing fastening elements<br>- correct tightening torque of the earth terminal nut<br>- corrosion in the area of the earth connection | In case of faults:<br>- immediately replace damaged wires or cable lugs<br>- tighten loose fastening elements immediately, replace missing fastening elements<br>- tighten the earth terminal nut to the rated torque<br>- remove corrosion in the area of the earth connection |
| Auxiliary switches | Check for:<br>- dirt<br>- damage or wear on the housing<br>- signs of short circuits<br>The auxiliary switches can be accessed from the outside for a simple visual inspection.<br>Under normal working condition (there have been no short circuits in the control circuit) the life time of the auxiliary switches exceeds those of the contactor. | In case of faults:<br>- replace the auxiliary switches, see section “8.3.10 Replacing the auxiliary switches – type C195 X/” or “8.4.8 Replacing the auxiliary switches – type C195 A/, B/, S/, T/” |

| Component | Tests/checks | Measures |
|---|---|---|
| Contactor housing | Check for:<br>✕ dirt<br>✕ damage or heavy wear<br>✕ penetrations, holes in housing walls<br>✕ loose or missing fastening elements | In case of faults:<br>✕ remove any dirt that may be present<br>✕ in case of damage or heavy wear on the housing, replace the complete contact unit, see “8.3.11 Replacing the complete contact unit – type C195 X/” or “8.4.9 Replacing the complete contact unit – type C195 A/, B/, S/, T/, W/”<br>✕ if there are holes in the housing walls, replace the complete contact unit, see see “8.3.11 Replacing the complete contact unit – type C195 X/” or “8.4.9 Replacing the complete contact unit – type C195 A/, B/, S/, T/, W/”<br>✕ tighten loose fastening elements immediately replace missing fastening elements<br>✕ tighten a loose contactor immediately |
| Magnetic drive | Check for:<br>✕ damage or heavy wear<br>✕ damage due to operation with impermissible, too high coil voltage | In case of faults:<br>✕ if damaged or heavily worn, replace the complete magnetic drive unit, see “8.3.13 Replacing the magnetic drive – type C195 X/” or “8.4.11 Replacing the magnetic drive – type C195 A/, B/, S/, T/, W/” on page 57 |
| Arcing chambers (only for C195 X/ C195 A/, C195 A/...BD, C195 B) | Check for:<br>✕ damage or heavy wear<br>✕ traces of combustion residue (slight soot deposits permitted) | In case of faults:<br>✕ in case of damage or heavy wear , replace the arcing chambers, see “8.3.14 Replacing the arcing chambers – type C195 X/” or “8.4.12 Replacing the arcing chambers – type C195 A/and C195 B/” on page 57 |
| Complete contact unit<br><br>Main contacts (both stationary contacts and movable contact bridge) | Prior to checking the main contacts, the cover of the contact unit must first be removed, see section “8.3.7 Removing/attaching the cover – type C195 X/” on page 40 or “8.4.5 Removing/attaching the cover – type C195 A/, B/, S/, T/, W/” on page 53. Thereafter, the main contacts are accessible and can be checked for:<br>✕ damage or wear<br>✕ traces of combustion residue (slight soot deposits permitted)<br>A certain level of experience is required to assess the state of the contacts. Even after a few load switching cycles, to a lay user the contacts appear worn and the surroundings fouled. Replacement of the complete contact unit is only necessary after more than 70% of the contact material is burnt through (minimum coating height: 0.3 mm, in new condition: 1.2 mm). | In case of faults:<br>✕ if more than 70% of the contact material is burnt through, replace the complete contact unit, see “8.3.11 Replacing the complete contact unit – type C195 X/” or “8.4.9 Replacing the complete contact unit – type C195 A/, B/, S/, T/, W/”<br>✕ also in case of heavy wear on the housing, replace the complete contact unit, see “8.3.11 Replacing the complete contact unit – type C195 X/” or “8.4.9 Replacing the complete contact unit – type C195 A/, B/, S/, T/, W/” |

## 8.3 Corrective maintenance measures – type C195 X/

The contactors are largely maintenance-free. Therefore there is no general requirement to replace parts during its service life.
However, if an excessive number of emergency shut downs or damage has occurred during operation, Schaltbau o ers original spare parts.

**WARNING**

The use of non-approved parts can lead to accidents and serious personal injury due to malfunction.

- Only use original spare parts.
- Do not combine individual parts from di erent contactors!

### 8.3.1 Preparatory disassembly/assembly steps – type C195 X

**DANGER**

Before beginning any work on the contactors, make sure that

- there is no voltage present,
- all safety regulations are fully ob served.
- Be sure to observe section “8.1 Safety” on page 32.

To check the main contacts (stationary and movable contact bridge) and to replace the arcing chambers in the contactors of type C195 X/, the cover of the contactor must be opened. For this purpose, the following preparatory disassembly/assembly steps must be car ried out:

- Disassemble/assemble pole packs
- Remove/insert pole plates
- Remove/insert cover
- Remove/insert connecting plate
- Remove/insert contact bridge unit

For easier assembly, the connecting plate and contact bridge unit are removed from the contact unit and later mounted together with the cover.

### 8.3.2 Disassembling/assembling the pole packs – Typ C195 X/

Tools required

- Set of Torx bits or Torx screwdriver set
- Torque spanner

**DANGER**

Before beginning any work on the contactors, make sure that

- there is no voltage present,
- all safety regulations are fully ob served.
- Be sure to observe section “8.1 Safety” on page 32.

#### Disassembling the pole packs – Typ C195 X/

**ATTENTION**

Installing the pole packs with wrong magnetic polarity (north pole, south pole) will lead to malfunctions and destruction of the contactor.

- Before disassembling, note the mounting direc tion of the pole packs (13) so that they can be re-installed with the correct polarity.

- Unscrew the 4 screws (14) on the side of the two pole plates (15).
- Pull the two pole packs (13) o the pole plates (15).

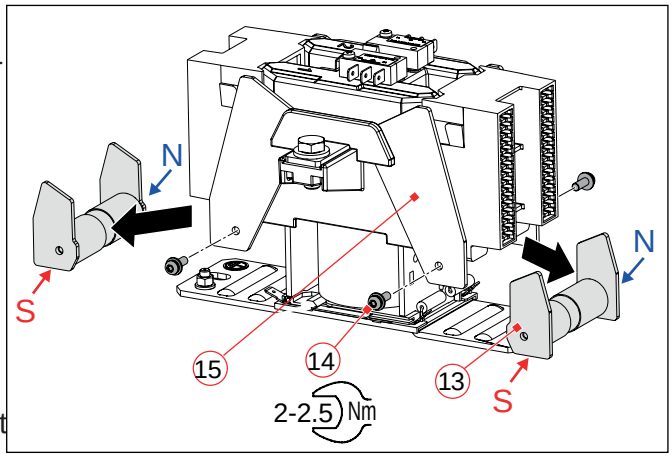


Fig. 39: C195 X/: Disassembling the pole packs

**ATTENTION**

Do not disassemble the pole packs (13) (pole plate extension/core/permanent magnet) any further be cause there is a very high risk of positioning the magnetic cores incorrectly.