

3

Contactors

Series
C137, C163, C164, C165

Single pole contactors
for battery voltages

Installation and
Maintenance Instructions

Manual B60-m.en



Document Revision History

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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 not observing (or only partly observing) 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 instructions:

⚠ DANGER
Indicates a hazardous situation with a high level of risk which, if not avoided, will result in death or serious injury.

⚠ WARNING
Indicates a hazardous situation with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠ CAUTION
Indicates a hazardous situation with a low level of risk which, if not avoided, may result in minor or moderate injury.

NOTICE
Indicates a hazardous situation which, if not avoided, may result in property damage, such as service interruption or damage to equipment or other materials.

i	Refers to technical features and methods aimed at facilitating work or to particularly important information.
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This manual refers to single pole NO contactors and single pole change over contactors of the types: C137 C/H, C163 C/H, C164 C/H, C165 C/H

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 security information

The contactors dealt with in this document are intended for use with high-voltage systems for special installations. They are designed and tested in compliance with the generally recognised state of the art. However, improper use, operation, handling, maintenance 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.

The operation, maintenance and installation instructions for the contactors must therefore be strictly followed.

Any uncertainties must be clarified and all queries must include details of the type of device and the serial number.

Only authorized 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 high-voltage systems as well as the proper use of tools approved for this purpose. Electric equipment requires protection from moisture and dust during installation and storage.

2.1 Observing the instructions

- ▶ All staff must read and understand the instructions in this manual and adhere to them when working with the device.
- ▶ **Always carefully observe all safety warnings!**

2.2 User obligations

- ▶ Observe all applicable national provisions, all safety, accident prevention and environmental regulations as well as the recognized technical rules for safe and proper working.
- ▶ Carry out regular inspections of all protection and safety devices to see if they work properly.
- ▶ Work on electric equipment may only be performed by an expert or trained personnel working under the direction and supervision of an expert according to the applicable rules of electrical engineering.
- ▶ An expert is a person who can judge and recognise the possible dangers of the jobs commended to him based on his training, knowledge and experience and by knowledge of the appropriate regulations.
- ▶ Work on the contactors must only be carried out by staff who meets the requirements set out in this manual.
- ▶ Staff must be informed clearly about who is responsible for the maintenance of the contactors.
- ▶ After each installation work and/or after any other modifications, alterations or maintenance works, always perform complete checks according to these standards:
 - IEC 60077-2
 - 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 variety of applications.
- ▶ The contactors must only be used under operating conditions according to the technical specification and the instructions in this manual.
- ▶ None of the operating conditions defined in the corresponding data sheets and in our *catalogue B60* in section "**Specifications**", such as voltages, currents, ambient conditions, etc. may be changed. The *catalogue B60* is available under: <https://www.schaltbau.com/en/media-library/>
- ▶ The contactors may only be used when all protective devices are present, have been installed properly and are fully operational.
- ▶ Contactors may not be used without further protective measures in potentially explosive atmospheres and/or in aggressive media.

- ▶ Do not use the contactor without properly mounted arc chute cover.
- ▶ The contactor has unprotected live parts
- ▶ The required clearance of live parts to earth and other parts of the contactor is to be observed as well as the safety regulations of the applicable standards.
- ▶ Switching at maximum breaking capacity might require larger clearance! Do not hesitate to ask our advice for dimensioning.
- ▶ Improper handling of the contactors, e.g. when hitting the floor with some impact, can result in breakage, cracks and deformation. Always handle the contactors with care.
- ▶ Use the contactor only according to its intended use. Replace or repair damaged parts exclusively with original parts. Any other usage of or tampering with the contactors is considered contrary to its 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


NOTICE

The contactors are constructed for specific ambient conditions.


- ▶ Operate the contactors only according to the ambient conditions, like temperature ranges, pollution degree, etc., as defined in the corresponding data sheets and in our *catalogue B60*. The *catalogue B60* is available under: <https://www.schaltbau.com/en/media-library/>


3. Dangers and security measures


3.1 Electrical dangers

	<p>⚠ DANGER</p>
	<p>The contactors are used to switch voltage. The touching of electrically conducting parts may result in serious injuries or even death!</p> <p>Energized parts are all metal parts belonging directly to one of the circuits or wires leading there. All other visible metal parts and wires may also be energized in the case of a failure.</p> <p>Before beginning any work on the contactors, always observe the following safety regulations:</p> <ul style="list-style-type: none"> ▶ Disconnect on all sides ▶ Ensure that it is not possible to reconnect unintentionally ▶ Clearly mark your work area ▶ Make sure that there is no voltage present ▶ Earth and short circuit the installation; this also includes the discharging of any capacitors in the main circuit ▶ Besides the main electric circuit, also disconnect additional and auxiliary circuits ▶ Cover or insulate adjacent energized parts ▶ Only an electrically skilled person may determine if there is no voltage present ▶ When the work has been concluded, proceed the other way round.

3.2 Other dangers

	<p>⚠ WARNING</p>
	<p>Exclusively use the contactors for purposes as indicated in the specifications and data sheets. A wrong application can cause accidents and severe damages to persons!</p> <ul style="list-style-type: none"> ▶ The manufacturer doesn't take the responsibility for accidents which were caused by improper use of the product.

	<p>⚠ CAUTION</p>
	<p>During continuous operation the contactors may become hot. Risk of burns!</p> <ul style="list-style-type: none"> ▶ Before beginning any checks or maintenance work on the contactors make sure that the heated components have cooled down.

	<p>⚠ CAUTION</p>
	<p>The contactors contain sharp-edged parts. Risk of injury!</p> <ul style="list-style-type: none"> ▶ Use appropriate tools for installation and maintenance works on the contactors. ▶ Wear protective gloves when working with sharp-edged components.

3.3 Measures for avoiding damages and malfunctions

NOTICE

Aggressive fluids may damage the contactors.

- ▶ Make sure that the contactors are not exposed to aggressive fluids.

NOTICE

Improper handling of the contactors, e.g. when hitting the floor with some impact, can result in breakage, cracks and deformation.

- ▶ Make sure that the contactors are always used properly.
- ▶ Do not throw the contactors to the floor.
- ▶ Regularly sight-check the contactors for potential damages.
- ▶ Immediately replace damaged components.

NOTICE

Depending on the product type, contactors can contain strong (permanent) magnets. These magnets can attract ferromagnetic particles and may damage the contactors.

- ▶ Make sure that the contactors are installed at a location, where no ferromagnetic particles can be attracted.

NOTICE

Depending on the product type, contactors can contain strong (permanent) magnets. These magnets can destroy data on credit cards or similar cards.

- ▶ Keep credit cards or similar cards away from the contactors..

NOTICE

During the switching off, strong electromagnetic fields are generated in the surroundings of the contactors. These may influence other components close to the contactors.

- ▶ Make sure that the contactors are installed at a location, where no other components can be affected.

NOTICE

In the case of damage, wear and tear and/or soiling of the contactor components - in the form of a partial break, sharp edges and discoloured surfaces - the functional safety of the contactors is no longer guaranteed.

- ▶ Carry out regular visual checks to detect wear and tear and dirt.
- ▶ Immediately replace damaged parts.
- ▶ Immediately remove dirt without leaving any residues.
- ▶ Immediately replace parts with stubborn dirt.

NOTICE

Detent-edged rings and detent-edged washers have a limited life time. After 3 times opening of screws secured with detent-edged rings or detent-edged washers, the rings or washers must be replaced by new ones.

- ▶ Record the frequency of screw opening in the work log.
- ▶ After 3 times opening of screws, replace detent-edged rings or detent-edged washers by new ones..

4. Product information

4.1 Contactors of the C137, C163, C164, C165 series

With its proven line of C137 through C165 Series contactors Schaltbau offers a scalable solution for handling direct current loads in the range of 40 A to 220 A for the most common battery voltages up to 110 V.

When utilizing a contactor its coil is powered by a battery and a magnetic field is generated around its armature by the direct current voltage coming from the battery. That is why Schaltbau battery contactors feature extra wide coil tolerance.

The contactors have double-break contacts, are compact in size and known for their reliability.

Version »C« are single-pole NO contactors with magnetic blowout, whereas version »H« are single-pole changeover contactors which feature an additional, electrically separated contact element. This extra normally closed contact is, however, without blowout magnets and not designed to make and break current.

Bistable versions: C163 Series contactors are also available with magnetic latching. The change towards one of the two bistable positions of the main contact is operated by a pulse of 100 msec. duration. The coil consumes no power except for the short pulse necessary to close and reopen the main contact, see also *catalogue B164*.

4.2 Special features

- ▶ Compact design
- ▶ Four different sizes
- ▶ Double breaking main contacts
- ▶ Extra wide coil tolerance for industrial and railway applications in accordance with VDE and UIC standards

4.3 Applications

- ▶ Main contactor for industrial trucks
- ▶ Starting lift/lower control as well as speed and directional controls of industrial trucks
- ▶ Heater and air conditioning control of electric locomotives and multiple units
- ▶ Contactor for battery powered electric functions in passenger coaches
- ▶ Deep discharge protection for batteries of uninterruptible power supplies (UPS)

4.4 Technical information and material specification

For technical information and material specifications, refer to the corresponding data sheets and to our *catalogue B60*. The catalogue is available under:

<https://www.schaltbau.com/en/media-library/>

4.5 Survey of the C137, C163, C164, C165 series (stock items)

SPST-NO contactor C137 C

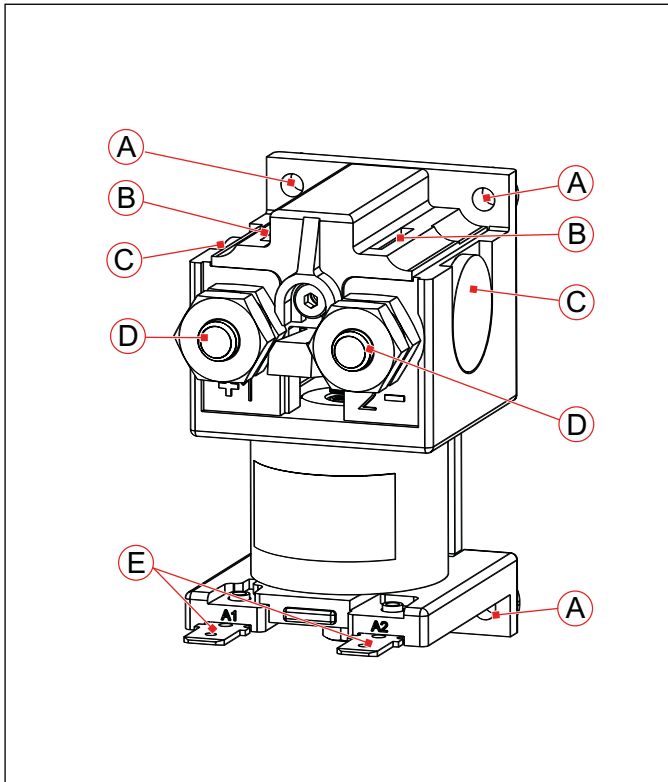


Fig. 1: SPST-NO Contactor C137 C, standard version

- A Mounting holes for screws M3, Tightening torque 0.6 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M6, Tightening torque: max. 3 Nm (Countering the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm

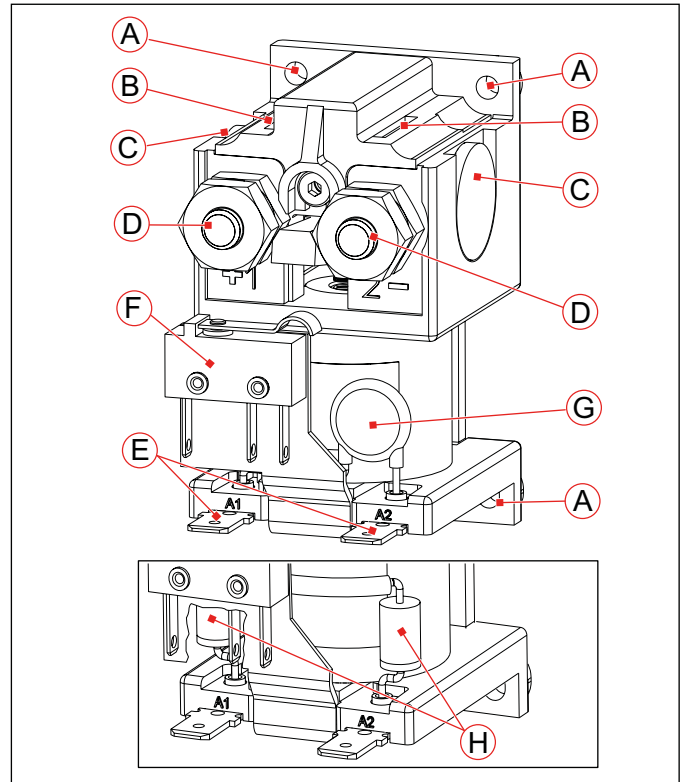


Fig. 2: SPST-NO Contactor C137 C, fitted with auxiliary contact (F) and varistor (G) or diodes (H)

- A Mounting holes for screws M3, Tightening torque: 0.6 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M6, Tightening torque: max. 3 Nm (Countering the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm
- F Auxiliary contact (1x microswitch, SPDT), Terminals: Flat tabs 2.8 x 0.5 mm
- G Coil suppression with varistor
- H Coil suppression with diodes

Changeover (SPDT) contactor C137 H

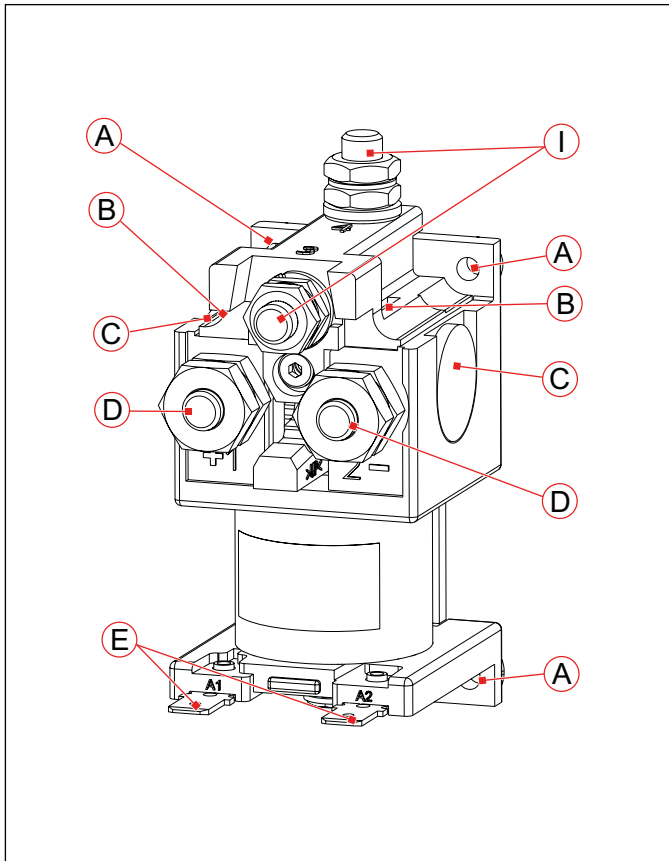


Fig. 3: Changeover (SPDT) contactor C137 H, standard version

- A Mounting holes for screws M3, Tightening torque: 0.6 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M6, Tightening torque: max. 3 Nm (Countering the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm
- I Normally closed contacts (break), without magnetic blow-out, designed to carry current only but not to make and break current, Terminals: M6, Tightening torque: max. 3 Nm (Countering the lower nut)

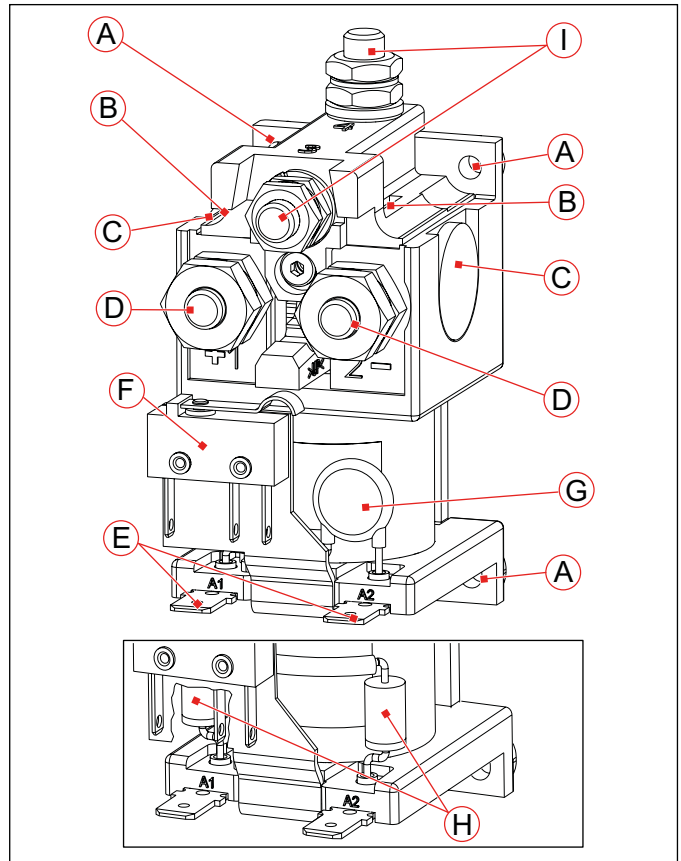


Fig. 4: Changeover (SPDT) contactor C137 H, fitted with auxiliary contact (F) an varistor (G) or diodes (H)

- A Mounting holes for screws M3, Tightening torque: 0.6 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M6, Tightening torque: max. 3 Nm (Countering the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm
- F Auxiliary contact (1x microswitch, SPDT), Terminals: Flat tabs 2.8 x 0.5 mm
- G Coil suppression with varistor
- H Coil suppression with diodes
- I Normally closed contacts (break), without magnetic blow-out, designed to carry current only but not to make and break current, Terminals: M6, Tightening torque: max. 3 Nm (Countering the lower nut)

SPST-NO contactor C163 C

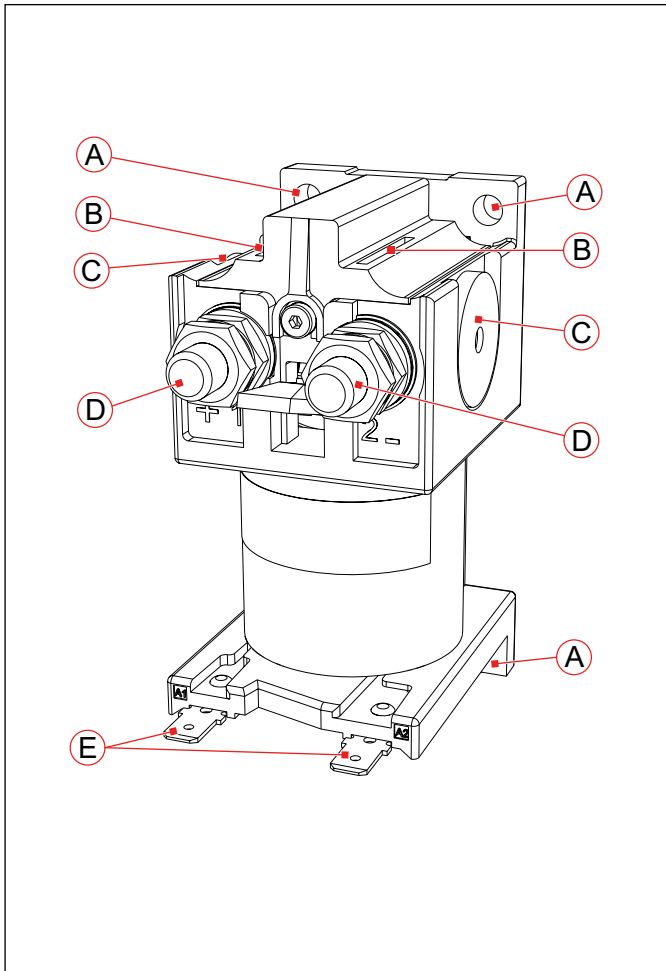


Fig. 5: SPST-NO contactor C163 C, standard version

- A Mounting holes for screws M5, Tightening torque: 3.5 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M8, Tightening torque: max. 6 Nm (Countering the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm

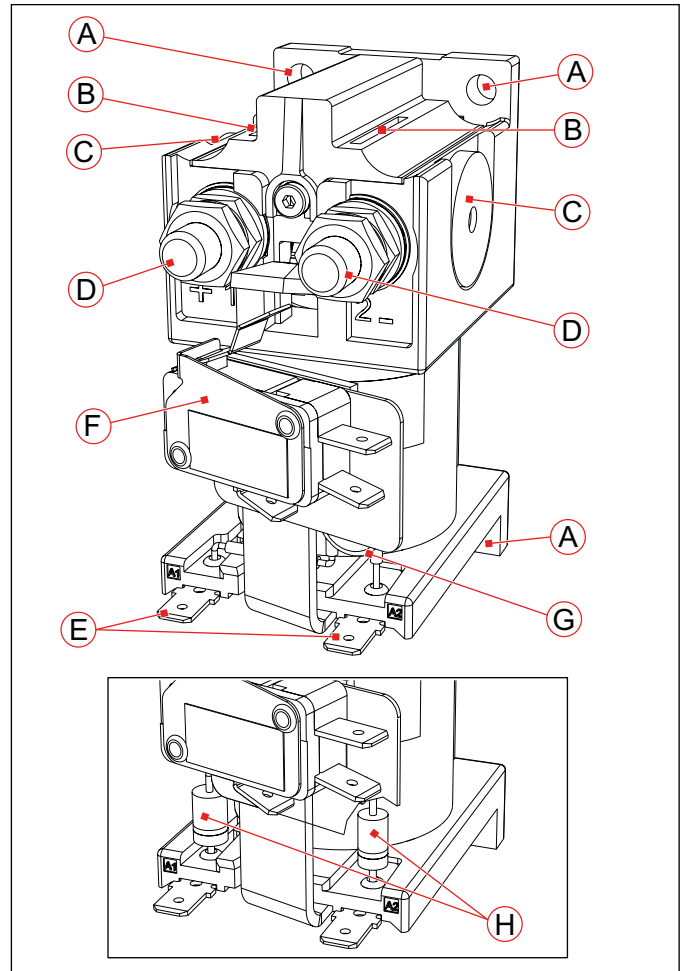


Fig. 6: SPST-NO Contactor C163 C, fitted with auxiliary contact (F) and varistor (G) or diodes (H)

- A Mounting holes for screws M5, Tightening torque: 3.5 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M8, Tightening torque: max. 6 Nm (Countering the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm
- F Auxiliary contact (1x microswitch, S840), Terminals: Flat tabs 6.3 x 0.8 mm
- G Coil suppression with varistor
- H Coil suppression with diodes

Changeover (SPDT) contactor C163 H

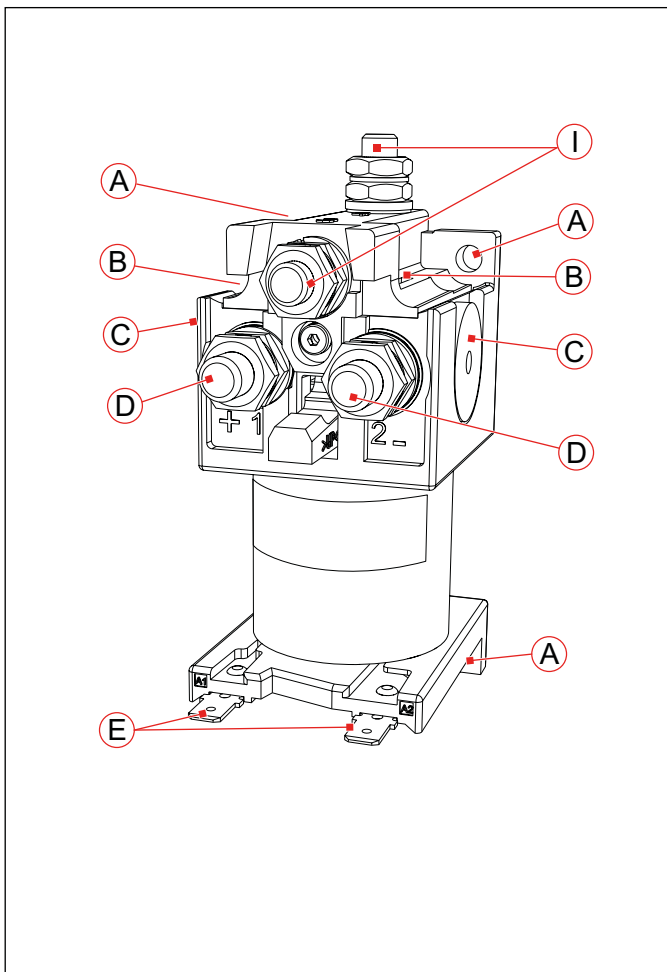


Fig. 7: Changeover (SPDT) contactor C163 H, standard version

- A Mounting holes for screws M5, Tightening torque: 3.5 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M8, Tightening torque: max. 6 Nm (Countering the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm
- I Normally closed contacts (break), without magnetic blow-out, designed to carry current only but not to make and break current, Terminals: M8, Tightening torque: max. 6 Nm (Countering the lower nut)

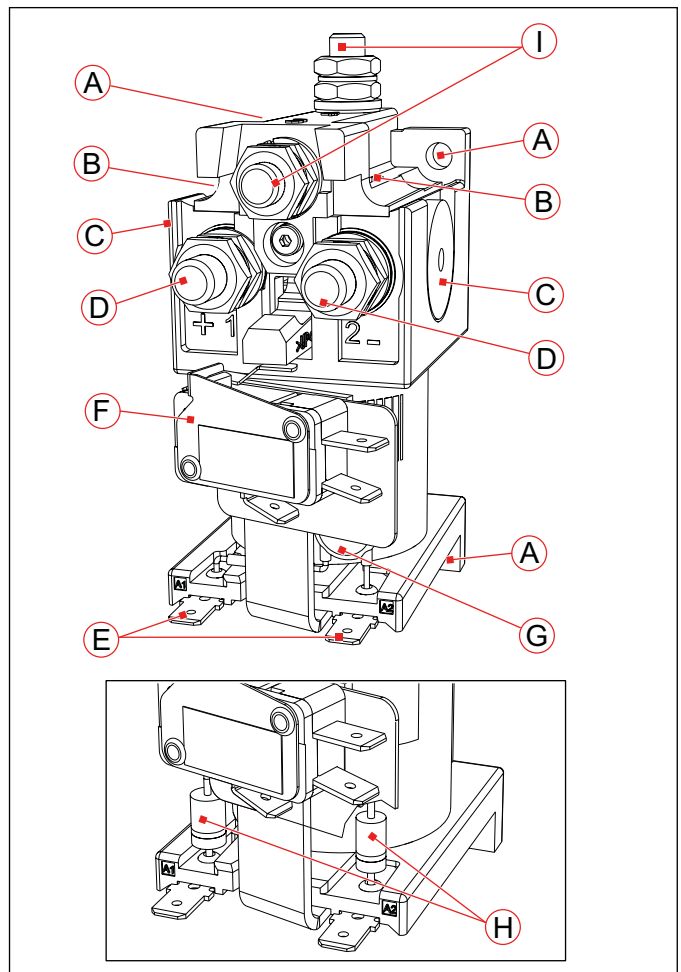


Fig. 8: Changeover (SPDT) contactor C163 H, fitted with auxiliary contact (F) and varistor (G) or diodes (H)

- A Mounting holes for screws M5, Tightening torque: 3.5 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M8, Tightening torque: max. 6 Nm (Countering the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm
- F Auxiliary contact (1x microswitch, S840), Terminals: Flat tabs 6.3 x 0.8 mm
- G Coil suppression with varistor
- H Coil suppression with diodes
- I Normally closed contacts (break), without magnetic blow-out, designed to carry current only but not to make and break current, Terminals: M8, Tightening torque: max. 6 Nm (Countering the lower nut)

SPST-NO contactor C164 C

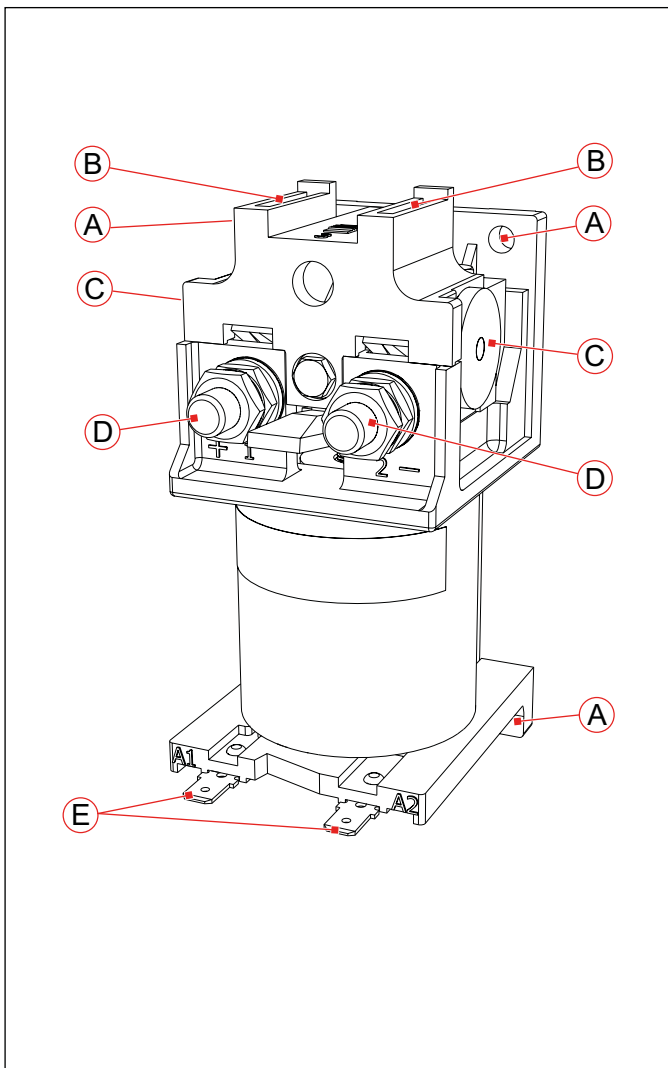


Fig. 9: SPST-NO contactor C164 C, standard version

- A Mounting holes for screws M5, Tightening torque: 3.5 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M8, Tightening torque: max. 6 Nm (Countering the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm

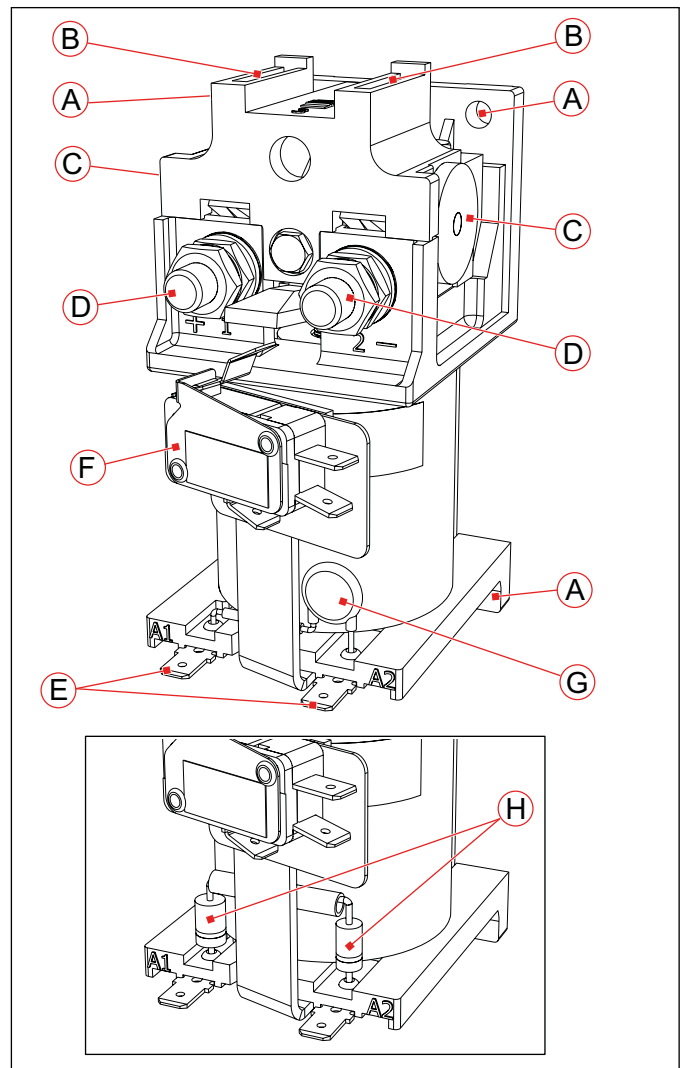


Fig. 10: SPST-NO Contactor C164 C, fitted with auxiliary contact (F) and varistor (G) or diodes (H)

- A Mounting holes for screws M5, Tightening torque: 3.5 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M8, Tightening torque: max. 6 Nm (Countering the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm
- F Auxiliary contact (1x microswitch, S840), Terminals: Flat tabs 6.3 x 0.8 mm
- G Coil suppression with varistor
- H Coil suppression with diodes

Changeover (SPDT) contactor C164 H

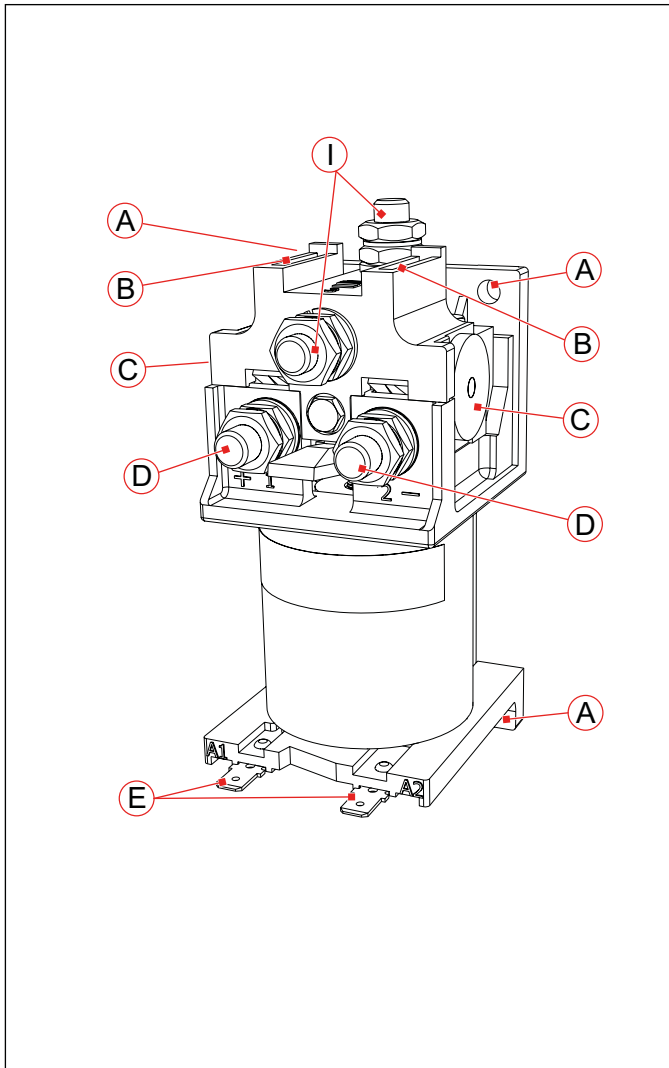


Fig. 11: Changeover (SPDT) contactor C164 H, standard version

- A Mounting holes for screws M5, Tightening torque: 3.5 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M8, Tightening torque: max. 6 Nm (Countering the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm
- I Normally closed contacts (break), without magnetic blow-out, designed to carry current only but not to make and break current, Terminals: M8, Tightening torque: max. 6 Nm (Countering the lower nut)

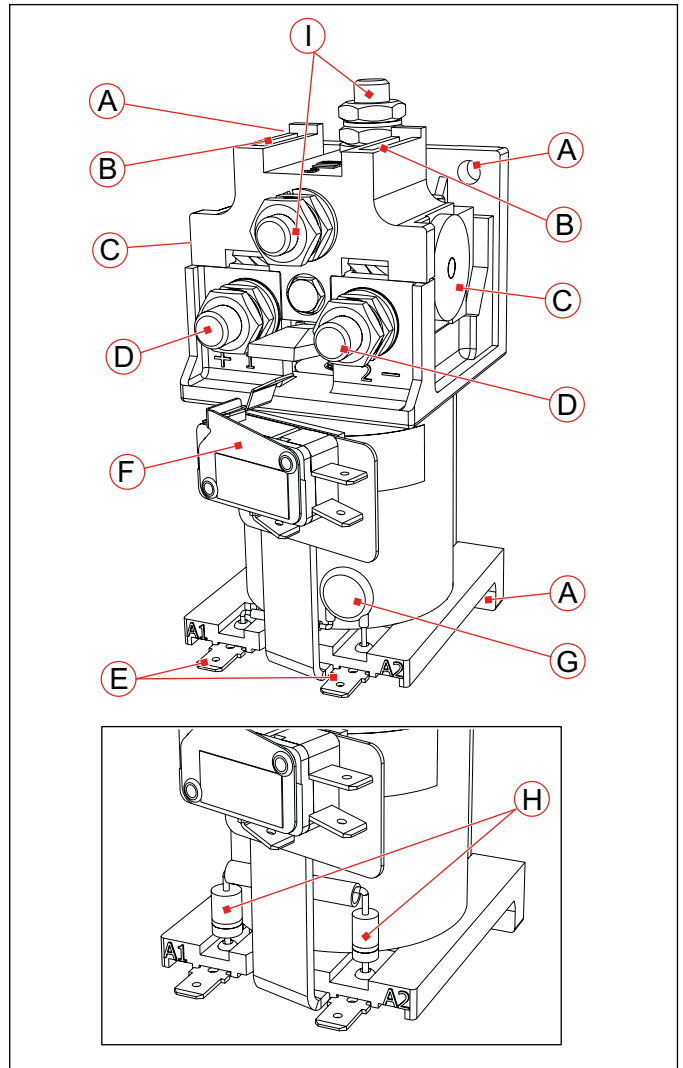


Fig. 12: Changeover (SPDT) contactor C164 H, fitted with auxiliary contact (F) and varistor (G) or diodes (H)

- A Mounting holes for screws M5, Tightening torque: 3.5 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M8, Tightening torque: max. 6 Nm (Countering the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm
- F Auxiliary contact (1x microswitch, S840), Terminals: Flat tabs 6.3 x 0.8 mm
- G Coil suppression with varistor
- H Coil suppression with diodes
- I Normally closed contacts (break), without magnetic blow-out, designed to carry current only but not to make and break current, Terminals: M8, Tightening torque: max. 6 Nm (Countering the lower nut)

SPST-NO contactor C165 C

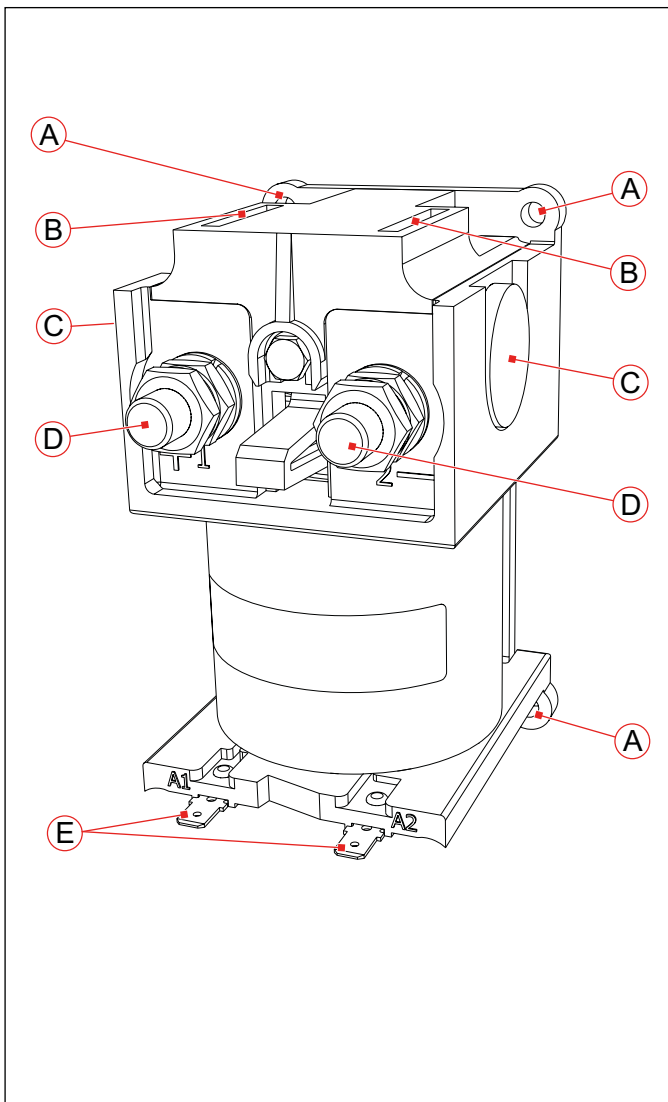


Fig. 13: SPST-NO contactor C165 C, standard version

- A Mounting holes for screws M5, Tightening torque: 3.5 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M10, Tightening torque: max. 10 Nm (Countering the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm

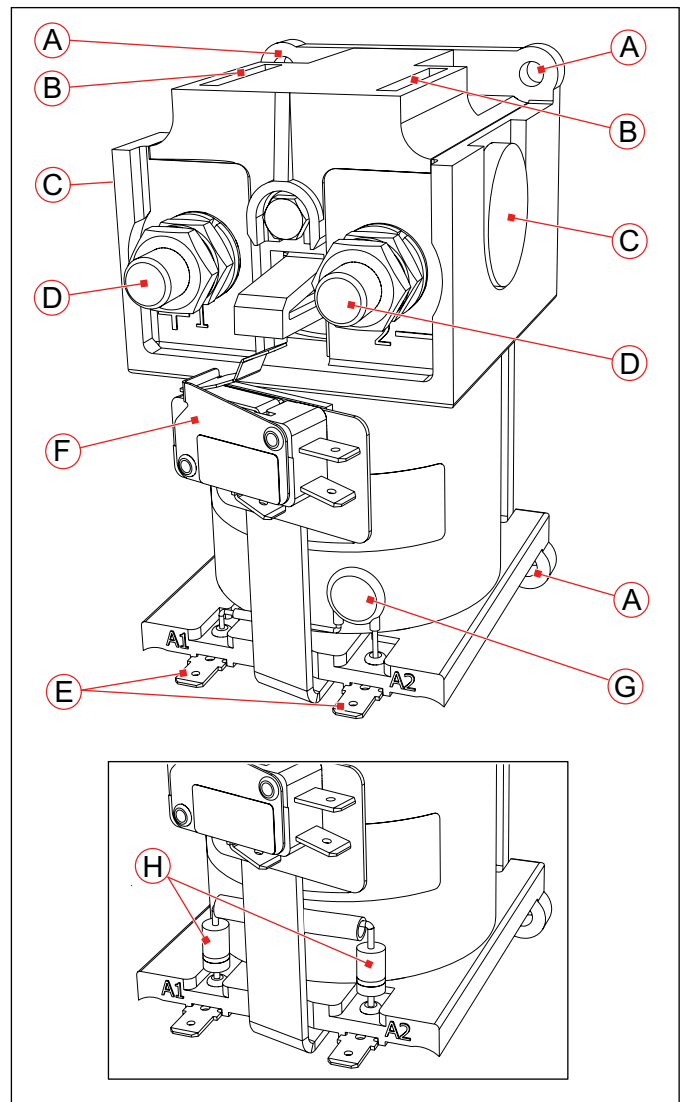


Fig. 14: SPST-NO Contactor C165 C, fitted with auxiliary contact (F) and varistor (G) or diodes (H)

- A Mounting holes for screws M5, Tightening torque: 3.5 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M10, Tightening torque: max. 10 Nm (Countering the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm
- F Auxiliary contact (1x microswitch, S840), Terminals: Flat tabs 6.3 x 0.8 mm
- G Coil suppression with varistor
- H Coil suppression with diodes

Changeover (SPDT) contactor C165 H

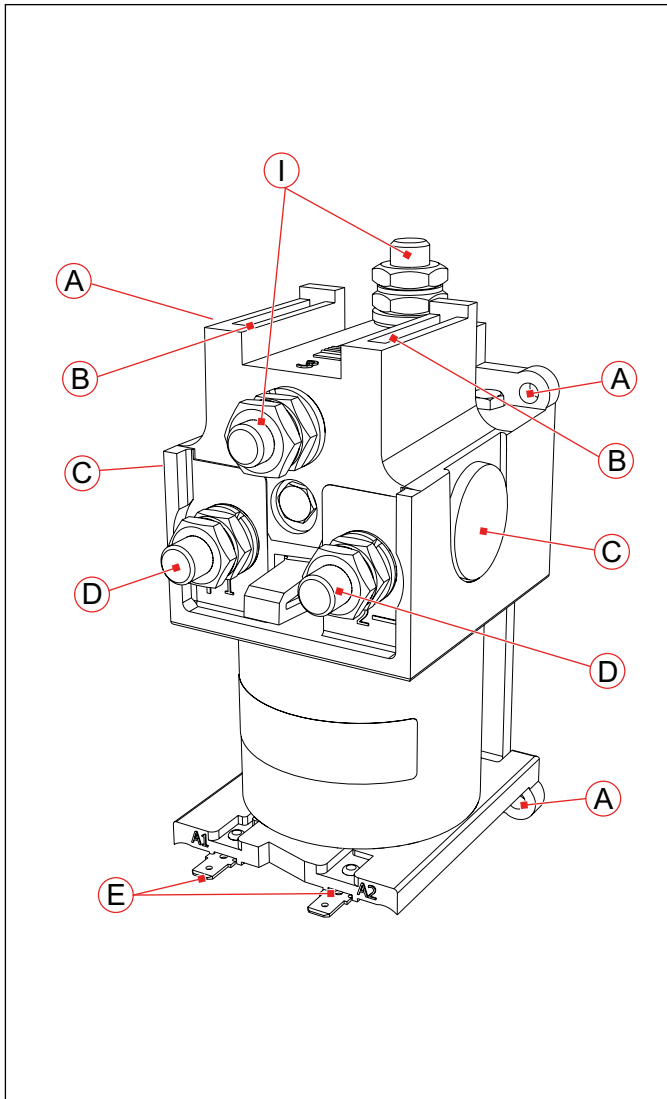


Fig. 15: Changeover (SPDT) contactor C165 H, standard version

- A Mounting holes for screws M5, Tightening torque: 3.5 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M10, Tightening torque: max. 10 Nm (Counter-acting the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm
- I Normally closed contacts (break), without magnetic blow-out, designed to carry current only but not to make and break current, Terminals: M10, Tightening torque: max. 10 Nm (Counter-acting the lower nut)

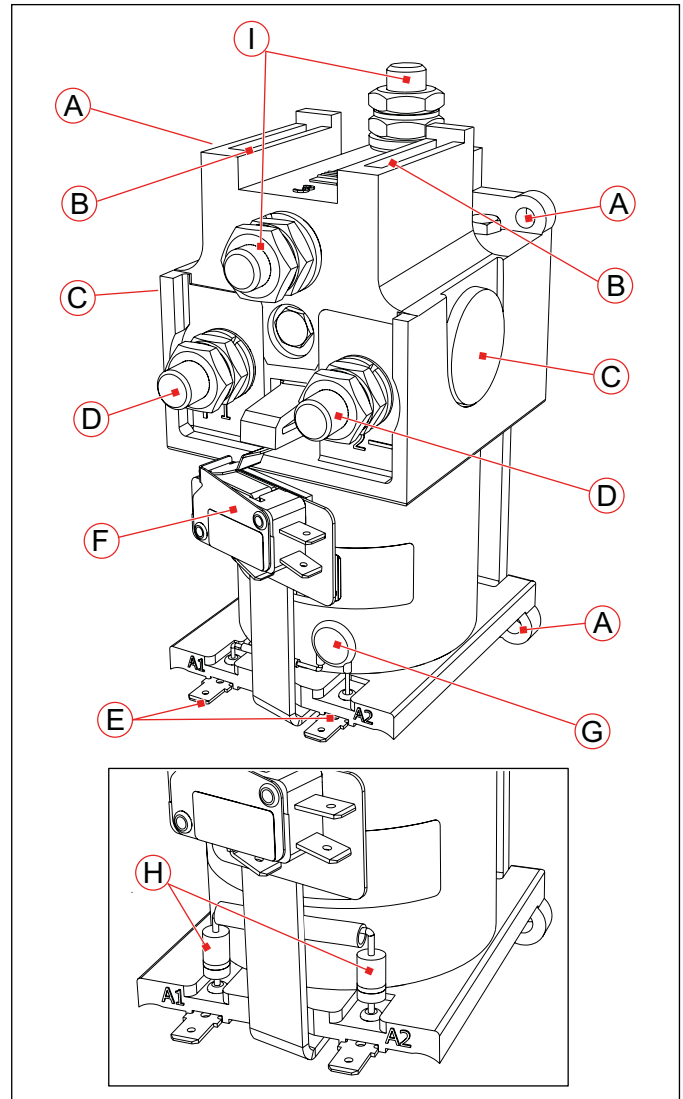


Fig. 16: Changeover (SPDT) contactor C165 H, fitted with auxiliary contact (F) and varistor (G) or diodes (H)

- A Mounting holes for screws M5, Tightening torque: 3.5 Nm
- B Plasma exits
- C Permanent magnets
- D Main contacts, normally open contact (make), designed to make and break current like an open style power relay, Terminals: M10, Tightening torque: max. 10 Nm (Counter-acting the lower nut)
- E Coil terminals A1 and A2, Flat tabs 6.3 x 0.8 mm
- F Auxiliary contact (1x microswitch, S840), Terminals: Flat tabs 6.3 x 0.8 mm
- G Coil suppression with varistor
- H Coil suppression with diodes
- I Normally closed contacts (break), without magnetic blow-out, designed to carry current only but not to make and break current, Terminals: M10, Tightening torque: max. 10 Nm (Counter-acting the lower nut)

5. Storage

NOTICE

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

- ▶ store it in its original packaging,
- ▶ store it in a dry and dust-free location.

Return shipments

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

6. Unpacking

6.1 Unpack the device

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

6.2 Check parts for transport damage

NOTICE

If parts are damaged, the functional reliability of the contactor is no longer given.

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

7. Installation

7.1 Mechanical installation

Dimensions and further technical specifications

The dimensions and further technical specifications are given in the respective data sheets or in our catalogue. Refer to our catalogue **B60**.

The catalogue is available under:

<https://www.schaltbau.com/en/media-library/>

Preliminaries

- ▶ For the fastening of the contactor an appropriate mounting plate with 4 mounting holes (c) according to **Fig. 17** has to be provided.

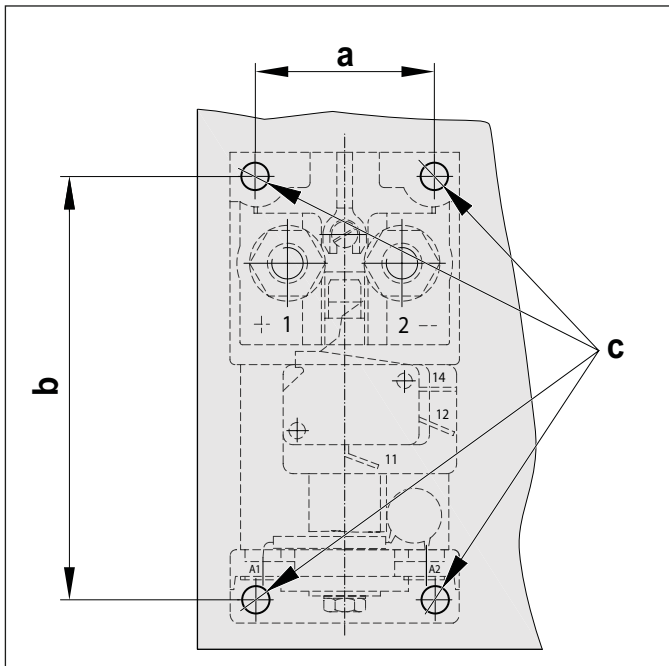


Fig. 17: Dimensions and arrangement of the mounting holes

- ▶ Depending on the contactor type, the table below shows measurements (a/b) for the mounting holes, the screw size (c) and the required tightening torque:

Series	C137	C163	C164	C165
Dimension a [mm]	30 ± 0.2	35 ± 0.2	40 ± 0.2	60 ± 0.2
Dimension b [mm]	62 ± 0.2	85 ± 0.2	105 ± 0.2	120 ± 0.2
Screw size c	M3	M5		
Torque	0.6 Nm	3.5 Nm		

- ▶ The mounting holes can either be
 - threaded holes (for threaded screws)
 - or through holes (for threaded screws and nuts).
- ▶ The length of the fixing screws has to be determined according to the constructional conditions.
- ▶ In order to secure the mounting screws against self-loosening, appropriate screw locking elements have to be provided. Schaltbau strongly recommends Schnorr-Washers (or similar) to secure the screws.

Correct mounting positions

The contactors are designed for horizontal or vertical mounting positions

- horizontal: main contacts (1) must point upwards
- vertical: plasma exits (2) must point upwards

Examples for intended mounting positions are shown in **Fig. 18/(A)**

Not permissible are suspended or inverted mounting position as shown in **Fig. 18/(B)**.

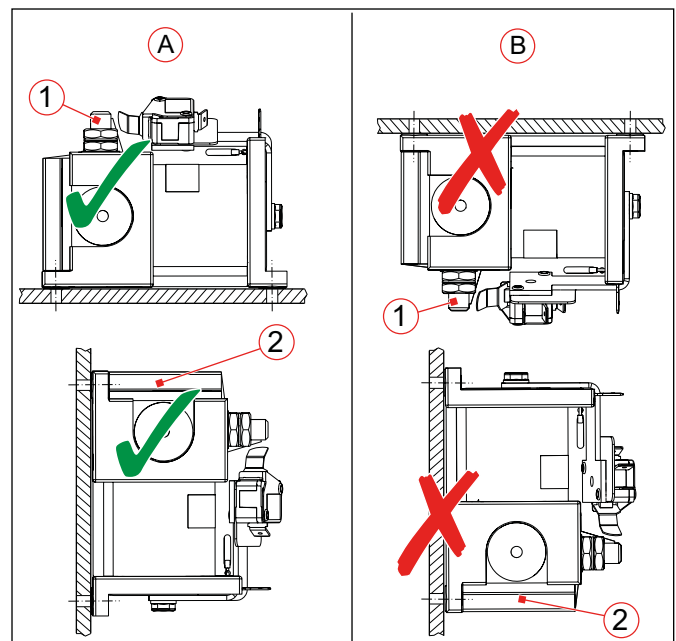


Fig. 18: Examples for intended mounting positions (A) and not permissible mounting positions (B)

Required minimum clearance

NOTICE

Switching electrical currents at high voltages will produce arcing and plasma may exit out of the arc chambers. It is essential to observe the minimum clearance to earth and to the connecting bus bars to avoid the risk of a flash-over.

Depending on the contactor type, the table below shows the required minimum clearance measurements:

Series	Minimum clearance
C137	15 mm
C163	15 mm
C164	20 mm
C165	50 mm

Ventilation requirements

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

Safety

- ▶ The installation has to be carried out by qualified trained personnel.

NOTICE

During installation, ensure that dirt caused by surrounding construction activities does not get into the contactor.

NOTICE

Detent-edged rings and detent-edged washers have a limited life time. After 3 times opening of screws secured with detent-edged rings or detent-edged washers, the rings or washers must be replaced by new ones.

- ▶ Record the frequency of screw opening in the work log.
- ▶ After 3 times opening of screws, replace detent-edged rings or detent-edged washers by new ones.

Required tools and auxiliaries

- Socket wrench set
- Hexagon socket wrench set
- Torque wrench

Install the contactor

- ▶ Make sure, that the mounting surfaces of mounting plate (5) and contactor are free from dirt and other contamination (e. g. metal cuttings).
- ▶ Place the contactor (3) on the mounting plate (5) with the prepared mounting holes.
- ▶ Screw the contactor with 4 screws (4) on the mounting plate (5).
 - When using threaded holes: Screw the screws with appropriate screw locking elements directly in the threaded holes.
 - When using through holes: Fasten the screws with appropriate screw locking elements and nuts.
- ▶ Depending on the contactor type, tighten the screws with the torque as stated in the table.

Series	C137	C163	C164	C165
Screw size	M3	M5		
Torque	0.6 Nm	3.5 Nm		

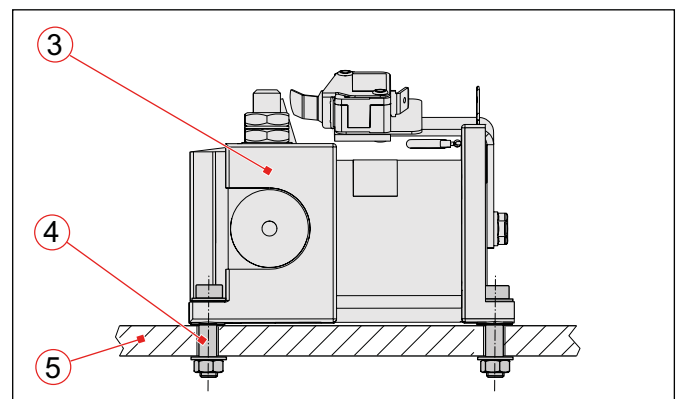


Fig. 19: Install the contactor to the mounting plate

DIN rail mounting

The contactor can also be installed by means of DIN rail mounting. DIN rail mounting sets can be ordered from Schaltbau GmbH.

The installation is possible either at the rear side or at the bottom side of the contactor.

Installation on the rear side

- ▶ Fix the DIN rail adapter (4) with 4 cylinder screws M3 x 5 (6) and 4 washers (5) on the mounting plate (3). Torque for the cylinder screws: 0.6 Nm
- ▶ Place the mounting plate (3) at the rear side of the contactor and fix it from the front side with 4 cylinder screws (1) and 4 washers (2).
- ▶ Tighten the cylinder screws (1) with the determined torque according to the table:

Series	Cylinder screws (1)	Torque
C137	M3 x 8	0.6 Nm
C163	M5 x 10	1.4 Nm
C164		
C165		

- ▶ Attach the installed contactor with the DIN rail adapter (4) to the DIN rail (7).

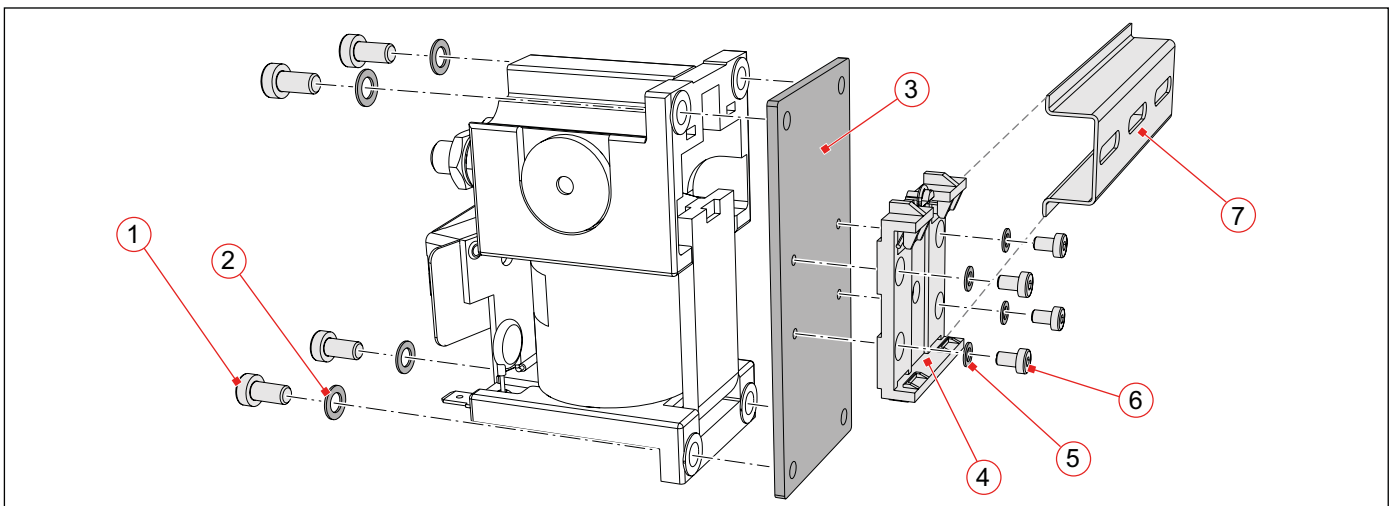


Fig. 20: DIN rail mounting: Installation on the rear side (the figure shows C163, the procedure for C137, C164 and C165 is the same)

Installation on the bottom side

- ▶ Loosen the hexagon screw (9) at the bottom side of the contactor.
- ▶ Place the spacer sleeve (10) between the angled mounting bracket (11) of the auxiliary contact and the DIN rail adapter (4).
- ▶ Slightly fasten the DIN rail adapter (4) with the hexagon screw (9) and washer (8).
- ▶ Adjust the angled mounting bracket (11) of the auxiliary contact.
 - Ensure safe switching of the auxiliary contact!
- ▶ Tighten the hexagon screw (9) with a torque of 2 Nm.
- ▶ Attach the installed contactor with the DIN rail adapter (4) to the DIN rail (7).

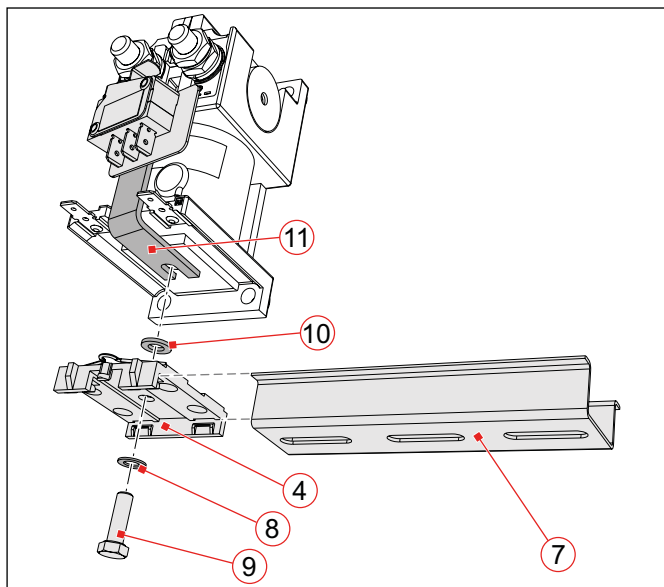


Fig. 21: DIN rail mounting: Installation on the bottom side (the figure shows C163, the procedure for C137, C164 and C165 is the same)

7.2 Electrical installation

Electrical data and further technical specifications

For the power consumption of the magnetic drive system and electrical data of the auxiliary switches refer to the respective data sheets and to our catalogue **B60**. The catalogue is available under: <https://www.schaltbau.com/en/media-library/>

Preliminaries

- ▶ The connection of the main current circuit can be done with wires or busbars.
- ▶ The minimum gauges of the wires/busbars must be observed. For the required cross sections of wires/busbars refer to our catalogue **B60**. The catalogue is available under: <https://www.schaltbau.com/en/media-library/>
- ▶ If wires are used, the wire gauges must be selected in coordination with their insulation class and the operating conditions.
- ▶ Depending on the contactor type the wires of the main current circuit must be fitted with appropriate cable lugs (for terminal nuts M6, M8 or M10)
- ▶ The terminal nuts for the main contacts and the maximum permissible torque for the different contactor series are determined as follows:

Series	Terminal nuts	Torque
C137	M6	max. 3 Nm*
C163	M8	max. 6 Nm*
C164	M8	max. 6 Nm*
C165	M10	max. 10 Nm*


* Countering the lower nut

- ▶ In order to secure the terminal nuts against self-loosening, appropriate screw locking elements have to be provided. Schaltbau recommends Schnorr-Washers (or similar) to secure the nuts. The terminal nuts against must be tightened with the determined torque (refer to the table above).
- ▶ The terminals of the coil and the auxiliary contact are designed as flat tabs. Therefore the control wires must be fitted with appropriate flat receptacles for tabs. Depending on the series, the table shows the type of flat receptacles.

Series	Auxiliary contact terminals: flat receptacles for tabs	Coil terminals: flat receptacles for tabs
C137	A 2.8 x 0.5 mm	A 6.3 x 0.8 mm
C163	A 6.3 x 0.8 mm	A 6.3 x 0.8 mm
C164		
C165		

- ▶ The maximum permissible cross section of the auxiliary contact control cables is 1 mm²/AWG 18 stranded wire.

Safety

	<p>⚠ DANGER</p>
	<p>The contactors are used to switch voltage. The touching of electrically conducting parts may result in serious injuries or even death!</p> <p>Energized parts are all metal parts belonging directly to one of the circuits or wires leading there. All other visible metal parts and wires may also be energized in the case of a failure.</p> <p>Before beginning any work on the contactors, always observe the following safety regulations:</p> <ul style="list-style-type: none"> ▶ Disconnect on all sides ▶ Ensure that it is not possible to reconnect unintentionally ▶ Clearly mark your work area ▶ Make sure that there is no voltage present ▶ Earth and short circuit the installation; this also includes the discharging of any capacitors in the main circuit ▶ Besides the main electric circuit, also disconnect additional and auxiliary circuits ▶ Cover or insulate adjacent energized parts ▶ Only an electrically skilled person may determine if there is no voltage present ▶ When the work has been concluded, proceed the other way round.

<p>NOTICE</p>
<p>Detent-edged rings and detent-edged washers have a limited life time. After 3 times opening of screws secured with detent-edged rings or detent-edged washers, the rings or washers must be replaced by new ones.</p> <ul style="list-style-type: none"> ▶ Record the frequency of screw opening in the work log. ▶ After 3 times opening of screws, replace detent-edged rings or detent-edged washers by new ones.

Required tools and auxiliaries

- ▶ Socket wrench set
- ▶ Open-end wrench set
- ▶ Torque wrench
- ▶ Continuity tester
- ▶ Cable ties

Connect the auxiliary contact

Depending on the series, the control wires for the auxiliary contact must be fitted with appropriate flat receptacles for tabs:

Series	Flat receptacles for tabs
C137	A 2.8 x 0.5 mm
C163, C164, C165	A 6.3 x 0.8 mm

<p>NOTICE</p>
<ul style="list-style-type: none"> ▶ The maximum permissible cross section of the auxiliary contact control cables is 1 mm²/AWG 18 stranded wire. ▶ Bending of the auxiliary contact terminals is not permissible! ▶ Move and lay the control wires and flat receptacles for tabs only in plugging direction, see Fig. 22 und Fig. 23. ▶ Attach the control wires mechanically, in order to minimize retroactivities (e. g. shock, vibrations) from the wires to the terminals.

- ▶ Plug the prepared control wires with the flat receptacles (1) to the terminals (2) of the auxiliary contact.

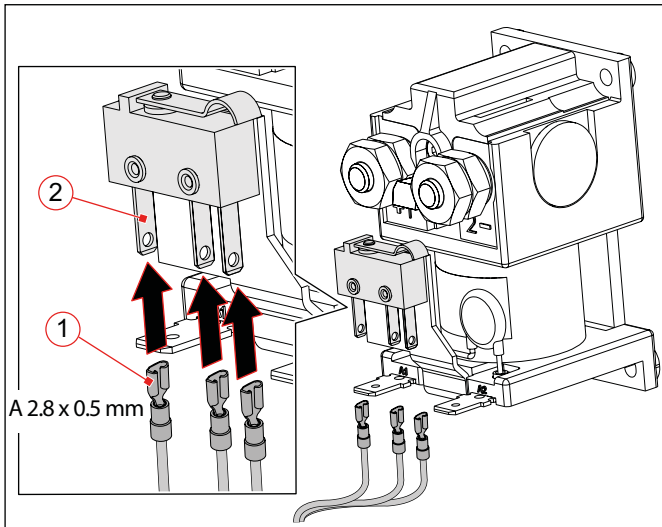


Fig. 22: C137 Series: Connect the auxiliary contact (SPDT)

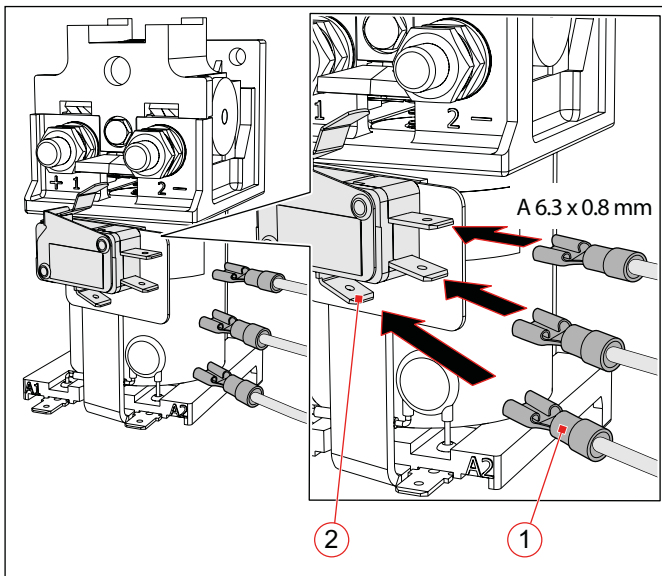


Fig. 23: C163, C164, C165 Series: Connect the auxiliary contact (S840)
(the figure shows C164, the procedure for C163 and C165 is the same)

Connect the coil terminals

The control wires for the coil connection must be fitted with flat receptacles for tabs (A 6.3 x 0.8 mm).

NOTICE

- ▶ Bending of the coil terminals is not permissible!
- ▶ Move and lay the control wires and flat receptacles for tabs only in plugging direction, see Fig. 24 und Fig. 25.
- ▶ Attach the control wires mechanically, in order to minimize retroactivities (e. g. shock, vibrations) from the wires to the terminals.

▶ Plug the prepared control wires with the flat receptacles (3) to both coil terminals A1 and A2 (4).

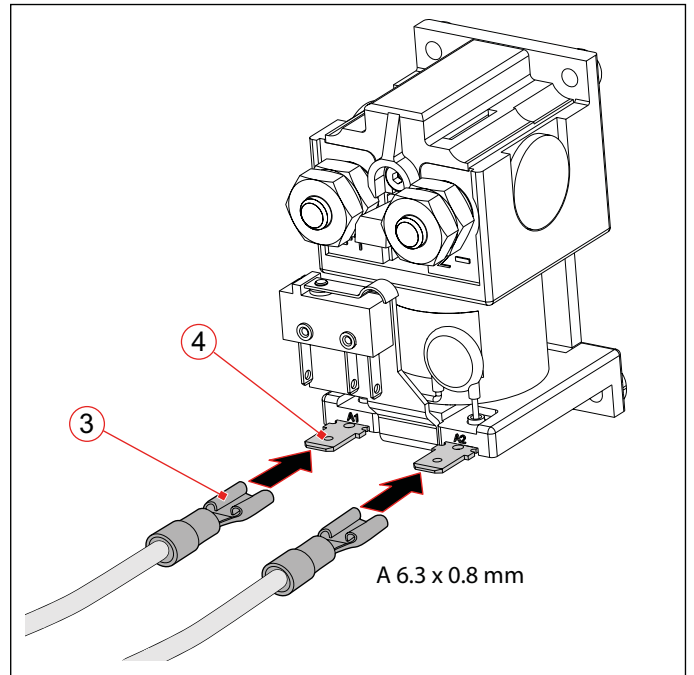


Fig. 24: C137 Series: Connect the coil terminals

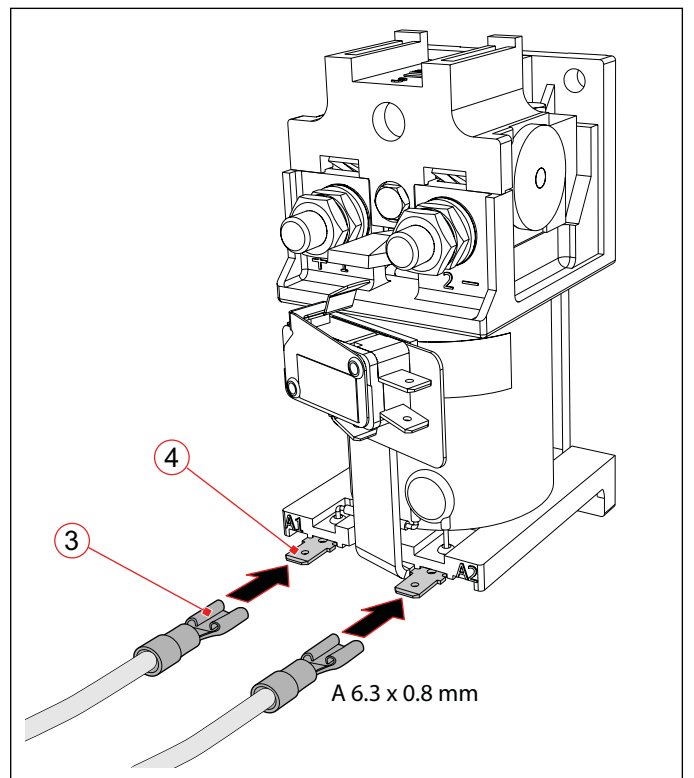


Fig. 25: C163, C164, C165 Series: Connect the coil terminals
(the figure shows C164, the procedure for C163 and C165 is the same)

Connect the main contacts

NOTICE

Make sure, that the connection points of the main contacts are free from corrosion.

Main contact connection with wires

Depending on the contactor type the wires of the main current circuit must be fitted with appropriate cable lugs (for terminal nuts M6, M8 or M10)

- ▶ Lay the prepared wires (3) to both main contacts (1).
- ▶ Make sure, that both contact bolts (1) are equipped with washers and counter nuts (6).
- ▶ Put the cable lugs (2) on the contact bolts (1).
- ▶ Put the washers (4) on the contact bolts (1).
 - Schaltbau recommends Schnorr-Washers (or similar) to secure the nuts.
- ▶ Screw the terminal nuts (5) on the contact bolts (1).
- ▶ Hold the counter nuts (6) using an open-end wrench.
- ▶ Tighten the terminal nuts (5) with the determined torque according to the table:

Series	Terminal nuts	Torque
C137	M6	max. 3 Nm*
C163	M8	max. 6 Nm*
C164	M8	max. 6 Nm*
C165	M10	max. 10 Nm*

* Countering the lower nut

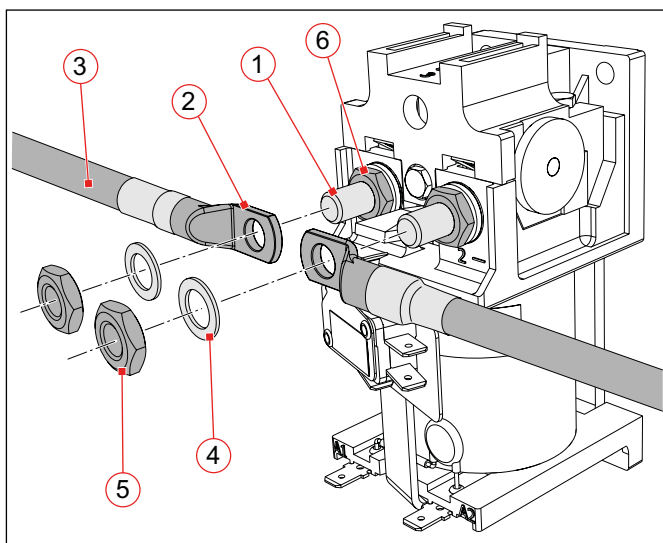


Fig. 26: Connect the main contacts: Example for the connection with wires (the figure shows C164, the procedure for C137, C163 and C165 is the same)

Main contact connection with busbars

As an alternative to the connection with wires, the main current circuit can also be connected with busbars.

Examples for the connection with busbars are shown in Fig. 27 and Fig. 28.

- ▶ Lay the busbars (7) to both main contacts (1).
- ▶ Depending on the installation situation, use additional angled connecting bars (8/9) if necessary.
- ▶ Make sure, that both contact bolts (1) are equipped with washers and counter nuts (6).
- ▶ Put the angled connecting bars (8/9) on the contact bolts (1).
- ▶ Put the washers (4) on the contact bolts (1).
 - Schaltbau recommends Schnorr-Washers (or similar) to secure the nuts.
- ▶ Screw the terminal nuts (5) on the contact bolts (1).
- ▶ Hold the counter nuts (6) using an open-end wrench.
- ▶ Tighten the terminal nuts (5) with the determined torque according to the table:

Series	Terminal nuts	Torque
C137	M6	max. 3 Nm*
C163	M8	max. 6 Nm*
C164	M8	max. 6 Nm*
C165	M10	max. 10 Nm*

* Countering the lower nut

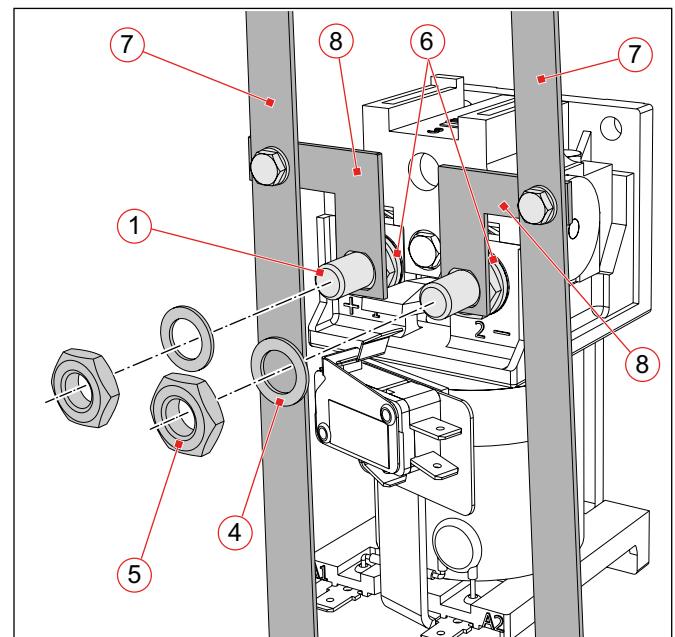


Fig. 27: Connect the main contacts: Example for the connection with busbars (7) and additional angled connecting bar (8)(the figure shows C164, the procedure for C137, C163 and C165 is the same)

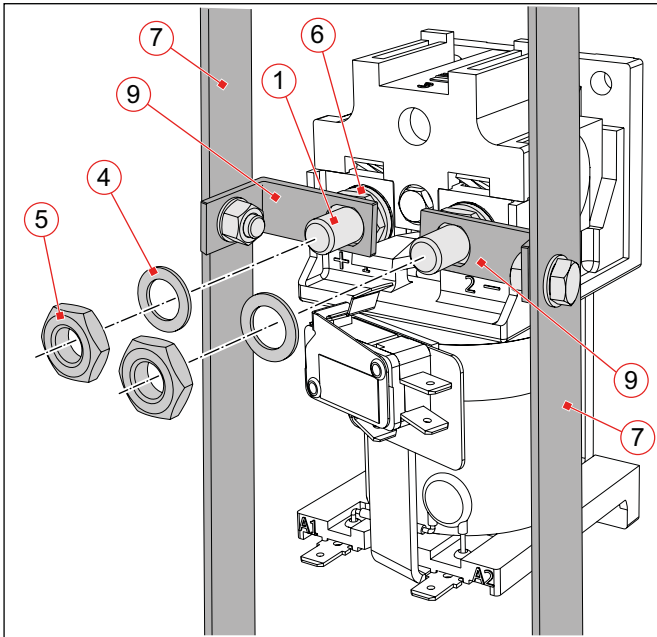


Fig. 28: Connect the main contacts: Example for the connection with busbars (7) and additional angled connecting bars (9) (the figure shows C164, the procedure for C137, C163 and C165 is the same)

- ▶ Screw the terminal nuts (5) on the contact bolts (1).
- ▶ Hold the counter nuts (6) using an open-end wrench.
- ▶ Tighten the terminal nuts (5) with the determined torque according to the table:

Series	Terminal nuts	Torque
C137	M6	max. 3 Nm*
C163	M8	max. 6 Nm*
C164	M8	max. 6 Nm*
C165	M10	max. 10 Nm*

* Countering the lower nut

Connect the normally closed contacts (changeover (SPDT) contactors only)

NOTICE

Changeover contactors of the C137 through C165 Series have an additional electrically separated contact element. This extra normally closed contact is, however, without blowout magnets and not designed to make and break current.

- ▶ Never try to use the normally closed contacts for switching current loads!

NOTICE

Make sure, that the connection points of the normally closed contacts are free from corrosion.

Normally closed contact connection with cables

Depending on the contactor type the wires for the normally closed contacts must be fitted with appropriate cable lugs (for terminal nuts M6, M8 or M10)

- ▶ Lay the prepared wires (3) to both normally closed contacts (1).
- ▶ Make sure, that both contact bolts (1) are equipped with washers and counter nuts (6).
- ▶ Put the cable lugs (2) on the contact bolts (1).
- ▶ Put the washers (4) on the contact bolts (1).
 - Schaltbau recommends Schnorr-Washers (or similar) to secure the nuts.

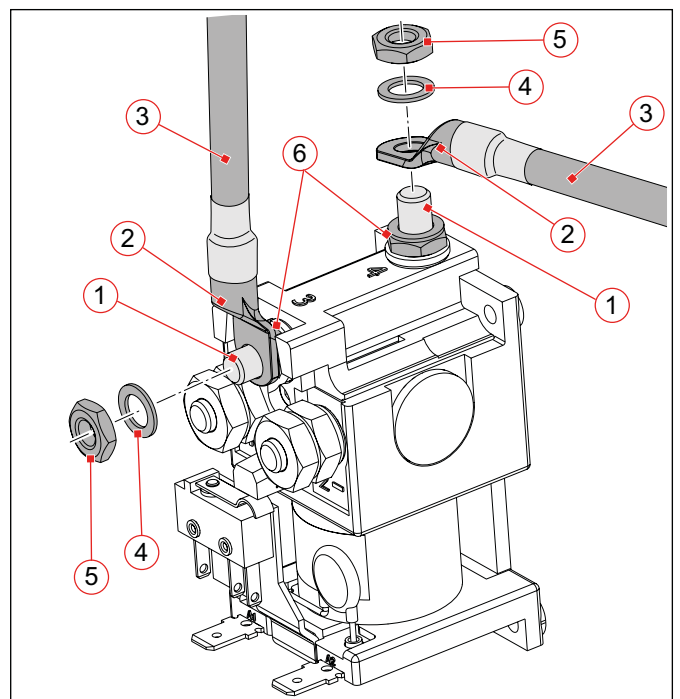


Fig. 29: Connect the normally closed contacts (changeover (SPDT) contactors only): Example for the connection with wires (the figure shows C137, the procedure for C163, C164 and C165 is the same)

Normally closed contact connection with busbars

As an alternative to the connection with wires, the normally closed contacts can also be connected with busbars.

An example for the connection with busbars is shown in Fig. 30.

- ▶ Lay the busbars (7) to both normally closed contacts (1).
- ▶ Depending on the installation situation, use additional connecting bars (10) or angled connecting bars (9) if necessary.
- ▶ Make sure, that both contact bolts (1) are equipped with washers and counter nuts (6).

- ▶ Put the connecting bars (10) or angled connecting bars (9) on the contact bolts (1).
- ▶ Put the washers (4) on the contact bolts (1).
 - Schaltbau recommends Schnorr-Washers (or similar) to secure the nuts.
- ▶ Screw the terminal nuts (5) on the contact bolts (1).
- ▶ Hold the counter nuts (6) using an open-end wrench.
- ▶ Tighten the terminal nuts (5) with the determined torque according to the table:

Series	Terminal nuts	Torque
C137	M6	max. 3 Nm*
C163	M8	max. 6 Nm*
C164	M8	max. 6 Nm*
C165	M10	max. 10 Nm*

* Countering the lower nut

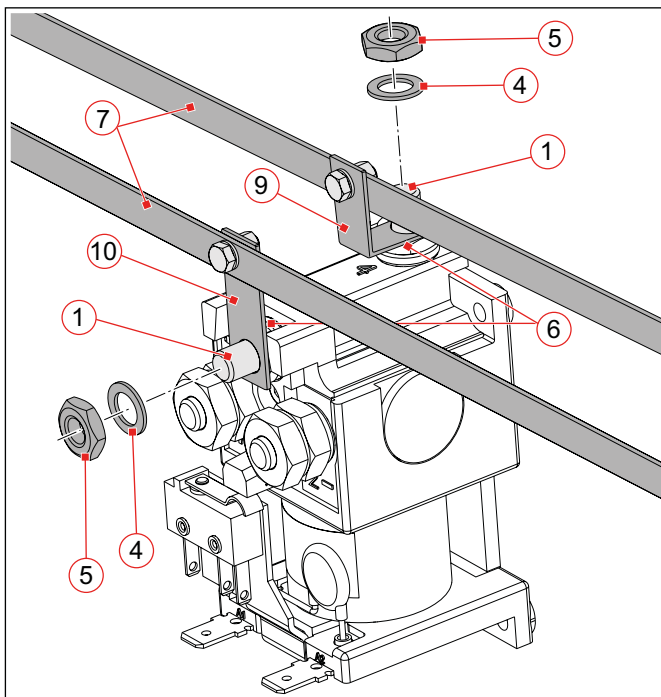


Fig. 30: Connect the normally closed contacts (changeover (SPDT) contactors only): Example for the connection with busbars (7), connecting bars (10) or angled connecting bars (9) (the figure shows C137, the procedure for C163, C164 and C165 is the same)

7.3 Checks


After the installation is completed, do the following checks:

- ▶ Check that the contactors are correctly installed on the base plate and fit tightly.
- ▶ Check that the wires or busbars are correctly installed and fit tightly at the main contacts and normally closed contacts.
- ▶ Check that the control wires of the coil terminals are correctly installed and in correct polarity.
- ▶ Check the function of the auxiliary switches:
Use a continuity tester to check that the wiring is correct and the auxiliary switches are functioning correctly.
- ▶ Check the pull-in voltage and drop-off voltage according to the requirements of Schaltbau. Refer to *catalogue B60*.
- ▶ Check the laying of cables. Cables must not be squeezed or bent. If applicable bundle the cables and secure them with cable ties.
- ▶ Perform several activation and deactivation operations of the contactor without the main circuit active.
- ▶ After each installation and after maintenance works, always perform complete checks according to these standards:
 - IEC 60077-2
 - IEC 60947-4-1

8. Maintenance

Note the expert knowledge which is essential for carrying out maintenance work, mentioned in chapter "2. General and security information".

8.1 Safety

	⚠ DANGER
	<p>The contactors are used to switch voltage. The touching of electrically conducting parts may result in serious injuries or even death!</p> <p>Energized parts are all metal parts belonging directly to one of the circuits or wires leading there. All other visible metal parts and wires may also be energized in the case of a failure.</p> <p>Before beginning any work on the contactors, always observe the following safety regulations:</p> <ul style="list-style-type: none"> ▶ Disconnect on all sides ▶ Ensure that it is not possible to reconnect unintentionally ▶ Clearly mark your work area ▶ Make sure that there is no voltage present ▶ Earth and short circuit the installation; this also includes the discharging of any capacitors in the main circuit ▶ Besides the main electric circuit, also disconnect additional and auxiliary circuits ▶ Cover or insulate adjacent energized parts ▶ Only an electrically skilled person may determine if there is no voltage present ▶ When the work has been concluded, proceed the other way round.

8.2 Preventive maintenance

Contactors of C137, C163, C164, C165 Series are maintenance-free within the rated mechanical life time. The electrical life time depends on the number of switchings under heavy load conditions and may vary for different applications. In normal use, this corresponds to a decade-long operating period.


Intervals for regular checks

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

Checks	Interval
Visual inspection of the contactor from outside	▶ 1x per year
Inspection of the main contacts (both fixed and movable contacts)	▶ 1x to 2x per year
Inspection of the auxiliary switch	▶ Every 2 years

If the contactors are operated in particularly dirty environments, the checking intervals for visible inspections 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.

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

	⚠ DANGER
	<p>When damages on the contactor, cables, or busbars are visible, the safety of the contactor is no longer guaranteed.</p> <ul style="list-style-type: none"> ▶ Immediately give damaged contactors to corrective maintenance.

NOTICE

Detent-edged rings and detent-edged washers have a limited life time. After 3 times opening of screws secured with detent-edged rings or detent-edged washers, the rings or washers must be replaced by new ones.

- ▶ Record the frequency of screw opening in the work log.
- ▶ After 3 times opening of screws, replace detent-edged rings or detent-edged washers by new ones.

Regular check activities

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

Component	Visual inspection	Measures
Cables/busbars	Check for: <ul style="list-style-type: none"> ▶ broken cables, cable lugs ▶ damaged insulation ▶ kinks or crushing points ▶ damaged busbars ▶ loose or missing fastening elements ▶ correct tightening torque of the terminal nuts 	In case of faults: <ul style="list-style-type: none"> ▶ immediately replace damaged cables or cable lugs ▶ immediately replace damaged busbars ▶ tighten loose fastening elements immediately replace missing fastening elements ▶ tighten the terminal nuts with the rated torque
Contactors housing	Check for: <ul style="list-style-type: none"> ▶ dirt ▶ damage or wear and tear ▶ loose or missing fastening elements 	In case of faults: <ul style="list-style-type: none"> ▶ remove existent dirt ▶ if the contactor housing is damaged replace the entire contactor ▶ tighten a loose contactor housing ▶ immediately replace missing fastening elements
Arc chamber	Check for: <ul style="list-style-type: none"> ▶ damage or wear and tear ▶ traces of burn-off (slightly sooting is acceptable) 	In case of faults: <ul style="list-style-type: none"> ▶ if the arc chamber is damaged or heavily worn replace the entire contactor
Main contacts (both fixed and movable contacts)	The arc chamber cover has to be removed prior to check the main contacts, see "8.2 Preventive maintenance"/ "Check the main contacts" . Thereafter the main contacts are accessible and can be checked for: <ul style="list-style-type: none"> ▶ damage or wear and tear ▶ traces of burn-off (slightly sooting is acceptable) It requires some experience to evaluate the state of the contacts. Even after only a few switchings under load the contacts look used and "polluted" for the inexperienced eye. The contactor needs only be replaced if the loss of contact material is more than 70%.	In case of faults: <ul style="list-style-type: none"> ▶ if the loss of contact material is more than 70%, replace the entire contactor (minimum coating: 0.3 mm, in new condition: 1.2 mm)


Component	Visual inspection	Measures
Auxiliary contact	<p>Check for:</p> <ul style="list-style-type: none"> ▶ damage or wear and tear <p>The auxiliary contact is visible for a simple optical inspection from the outside.</p> <p>Under normal working conditions (if there were no short circuits in the control circuit) the life time of the auxiliary contact exceeds those of the contactors.</p>	<p>In case of faults:</p> <ul style="list-style-type: none"> ▶ replace auxiliary contact, refer to section "8.3 Corrective maintenance"/ "Replace the auxiliary contact".

Check the main contacts

Required tools

- ▶ Socket wrench set
- ▶ Hexagon socket wrench set
- ▶ Set of flat-head screwdrivers
- ▶ Torque wrench

Remove the arc chamber cover



⚠ DANGER

Before removing the arc chamber make sure that

- ▶ there is no voltage present,
- ▶ all safety regulations are fully observed.
- ▶ Refer also to section **"8.1 Safety"** on page 28.

- ▶ Uninstall wires or busbars if necessary.

Contactor types C137 and C163

- ▶ Unscrew the screw (1) and remove it together with the washer.
- ▶ Lift the arc chamber (2) upwards and remove it.
 - The main contacts are now accessible and can be checked. See **"Check the main contacts for wear and tear"** further on in this manual.
- ▶ After the main contacts have been checked, re-install the arc chamber in reverse order.

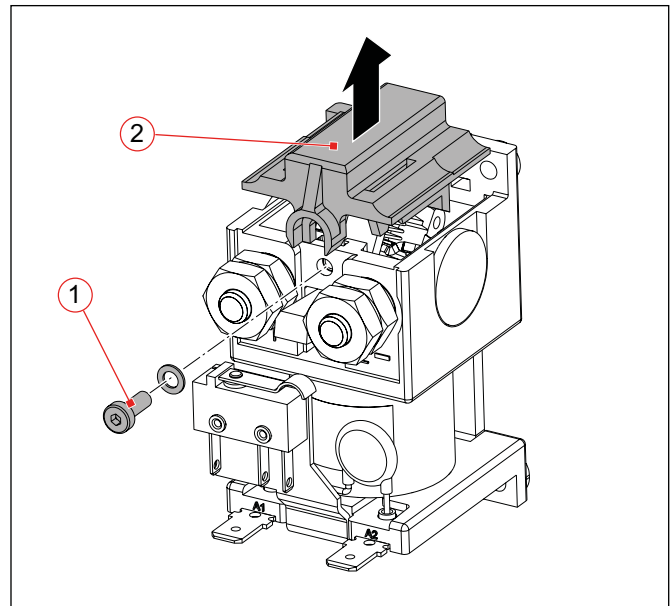


Fig. 31: Remove the arc chamber (the figure shows C137 C, the procedure for C163 C is the same)

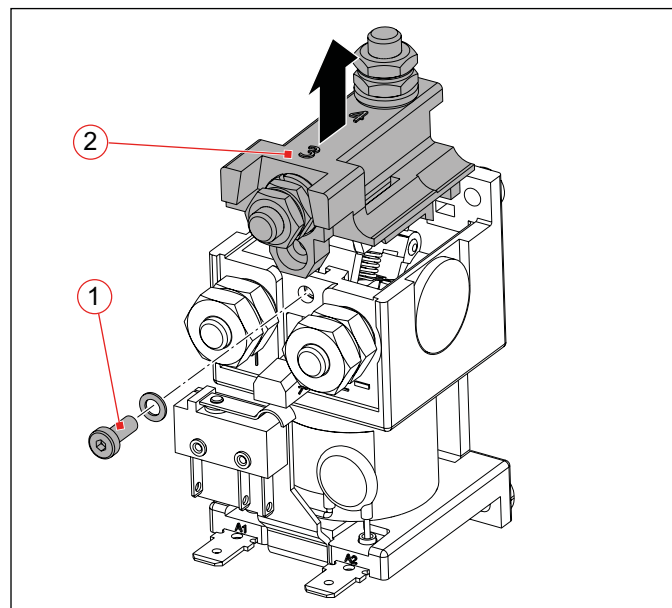


Fig. 32: Remove the arc chamber (the figure shows C137 H, the procedure for C163 H is the same)

Contactors types C164 and C165

- ▶ Unscrew the 3 screws (3) and remove them.
- ▶ Lift the arc chamber (2) upwards and remove it.
 - The main contacts are now accessible and can be checked. See **“Check the main contacts for wear and tear”** further on in this manual.
- ▶ After the main contacts have been checked, re-install the arc chamber in reverse order.

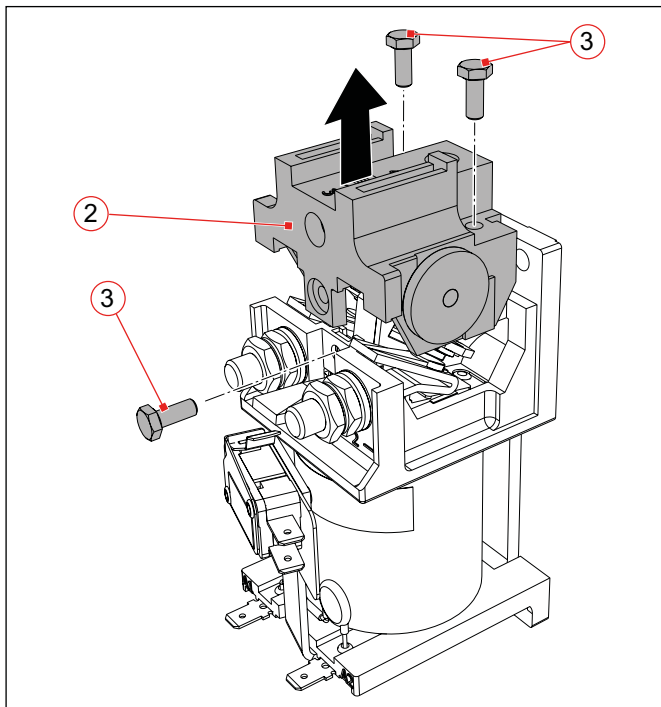


Fig. 33: Remove the arc chamber (the figure shows C164 C, the procedure for C165 C is the same)

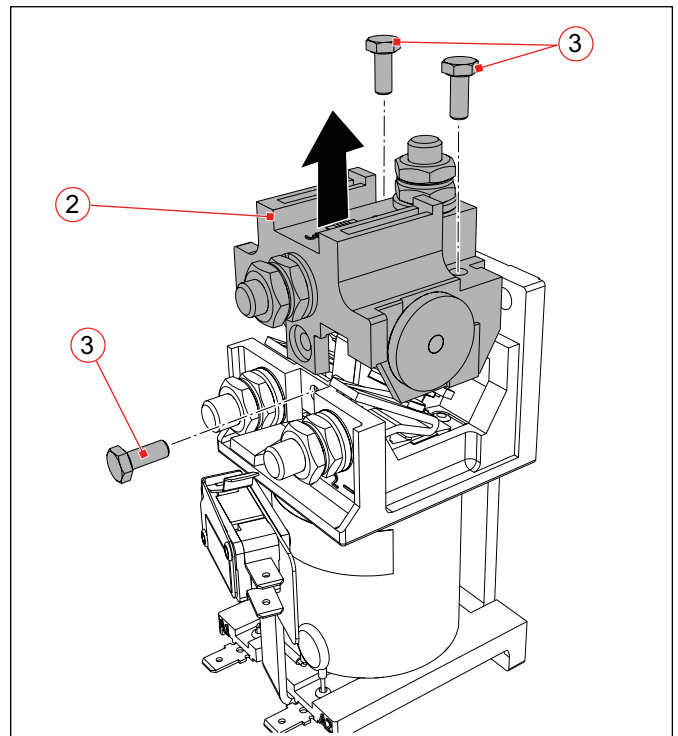


Fig. 34: Remove the arc chamber (the figure shows C164 H, the procedure for C165 H is the same)

Check the main contacts for wear and tear

SPST-NO contactor types C 137 C, C163 C, C164 C and C165 C

- ▶ Check the main contacts for damage, wear and tear, as well as traces of burn-off (slightly sooting is acceptable).
In doing so check both,
 - the fixed contacts (4)
 - and the contacts (5) at the lower side of the moving bridge.
- ▶ If the loss of contact material is more than 70%, replace the entire contactor.
 - Minimum coating: 0.3 mm contact material
 - In new condition: 1.2 mm contact material
- ▶ If the main contacts are not damaged and not heavily worn, then re-install the arc chamber cover.

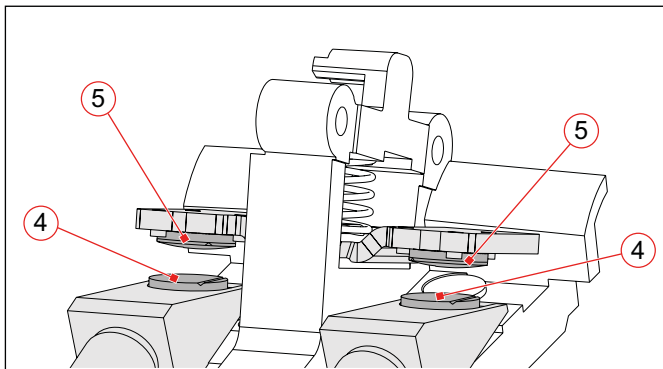


Fig. 35: Check the main contacts for wear and tear (the figure shows C137 C, the procedure for C163 C, C164 C and C165 C is the same)

Changeover (SPDT) contactor types C 137 H, C163 H, C164 H and C165 H

- ▶ Check the main contacts for damage, wear and tear, as well as traces of burn-off (slightly sooting is acceptable).
In doing so check both,
 - the fixed contacts (4)
 - and the contacts (5) at the lower side of the moving bridge.
- ▶ If the loss of contact material is more than 70%, replace the entire contactor.
 - Minimum coating: 0.3 mm contact material
 - In new condition: 1.2 mm contact material
- ▶ For changeover (SPDT) contactors in addition check the normally closed contacts.
In doing so check both,
 - the contacts (6) on the movable lever
 - and the fixed contacts (7) at the inside of the arc chamber cover.

- ▶ If the main contacts and the normally closed contacts are not damaged and not heavily worn, then re-install the arc chamber cover.

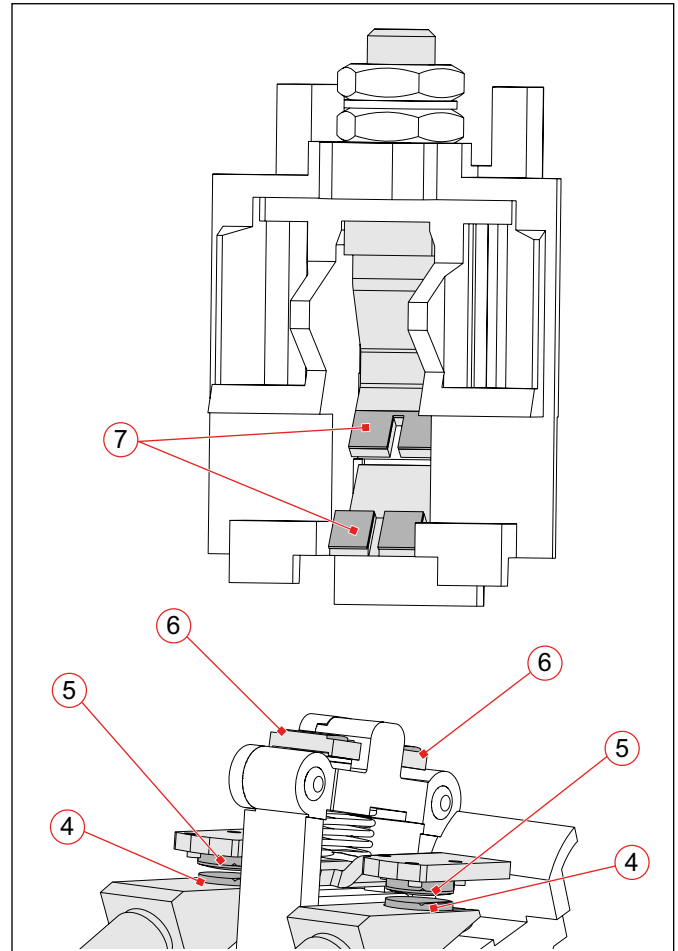


Fig. 36: Check the main contacts for wear and tear (the figure shows C137 H, the procedure for C163 H, C164 H and C165 H is the same)

8.3 Corrective maintenance

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


Replace the auxiliary contact

Under normal working conditions (if there were no short circuits in the control circuit) the life time of the auxiliary contact exceeds those of the contactors. However, in case of a short circuit in the control circuit it can happen that an auxiliary contact has been damaged and must be replaced.

Required tools

- ▶ Socket wrench set
- ▶ Torque wrench

Procedure

	⚠ DANGER
<p>Before removing the auxiliary contact make sure that</p> <ul style="list-style-type: none"> ▶ there is no voltage present, ▶ all safety regulations are fully observed. ▶ Refer also to section "8.1 Safety" on page 28.. 	

- ▶ Disconnect the wires from the auxiliary contact.
- ▶ Loosen the hexagon screw (1) a little that connects the magnet yoke with the magnet core and screw out a few millimeters. (Do not unscrew completely!)
- ▶ Pull out the angled mounting bracket of the auxiliary contact assembly (2).
- ▶ Slide the new auxiliary contact assembly (2) with the angled mounting bracket underneath the washer at the screw head (1).
- ▶ Press the magnet yoke against the housing and screw in the hexagon screw (1).
- ▶ Adjust the angled mounting bracket of the auxiliary contact assembly (2).
 - The auxiliary contact must switch safely!
- ▶ Tighten the hexagon screw (1) with a torque of 2 Nm.
- ▶ Connect the wires to the new auxiliary contact, see section **"7.2 Electrical installation" / "Connect the auxiliary contact"**.

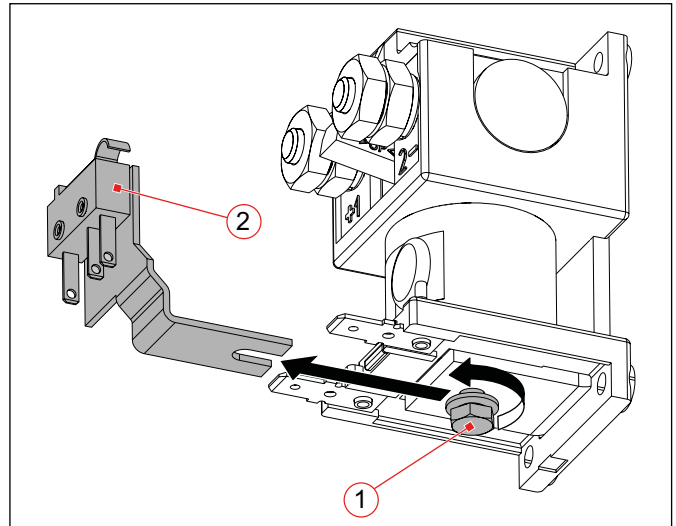


Fig. 37: Replace the auxiliary contact (the figure shows C137 C, the procedure for C137 H is the same)

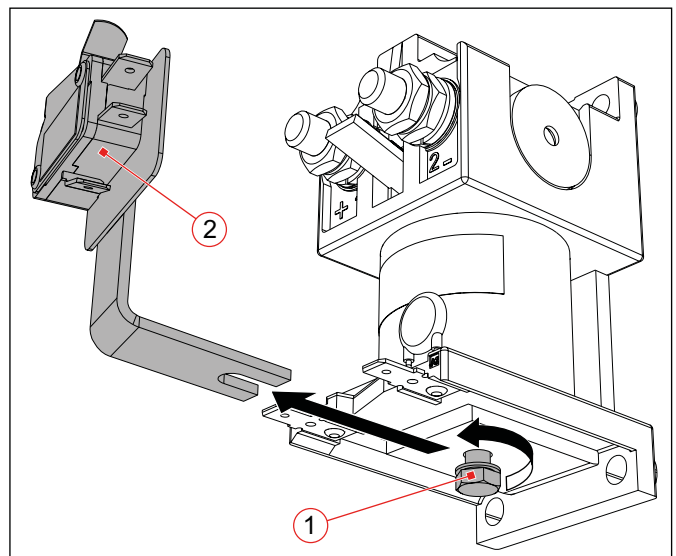


Fig. 38: Replace the auxiliary contact (the figure shows C163 C, the procedure for C163 H, C164 C/H and C165 C/H is the same)

Checks

After the maintenance work is completed, do the following checks:

- ▶ Check the control connections.
- ▶ Check the function of the auxiliary contact: Use a continuity tester to check that the wiring is correct and the auxiliary contact is functioning correctly.
- ▶ After each maintenance work, always perform complete checks according to these standards:
 - IEC 60077-2
 - IEC 60947-4-1

9. Spare parts



Important!

When ordering spare parts, always inform Schaltbau about the exact type and the article number of the contactor. You can find these data on the rating plate.

Designation	Article-No.	Type of contactor
Auxiliary contact assembly	HK-C137	C137 C/H
	HK-C163	C163 C/H
	HK-C164	C164 C/H
	HK-C165	C165 C/H

10. Technical data

Specifications and information on the material characteristics for the contactors in the C137 through C165 series are given in our our catalogue **B60**.

Due to our continuous improvement programme, the design of our products can be modified at any time. So some features may differ from the descriptions, specifications and drawings in the catalogues. You can download the latest update of the catalogue at: <https://www.schaltbau.com/en/media-library/>

The updated catalogues render the previous issues invalid.

11. Disposal

This product is designed for exclusive professional use by commercial companies. The owner is responsible for ensuring an environmentally sound disposal of this product at the end of its working life.

This product or parts of it may not be disposed with other household wastes.

To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this product or parts of it from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources.

Please observe all local regulations and recommendations for the disposal, recycling or environmentally friendly processing of the parts and materials that have been used or replaced during installation, operation, and maintenance tasks. In the end-of life ensure an environmentally sound disposal of the product according to the legal regulations and requirements for electric and electronic waste equipment in your country.

Notes

A large grid area for taking notes, consisting of a 20x30 grid of small squares. The grid is empty and occupies the majority of the page.

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

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Schaltbau GmbH manufactures in compliance with RoHS.



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 connectors 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
- Single terminal clamps and fuse holders
- DC emergency break 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 suit customer requirements