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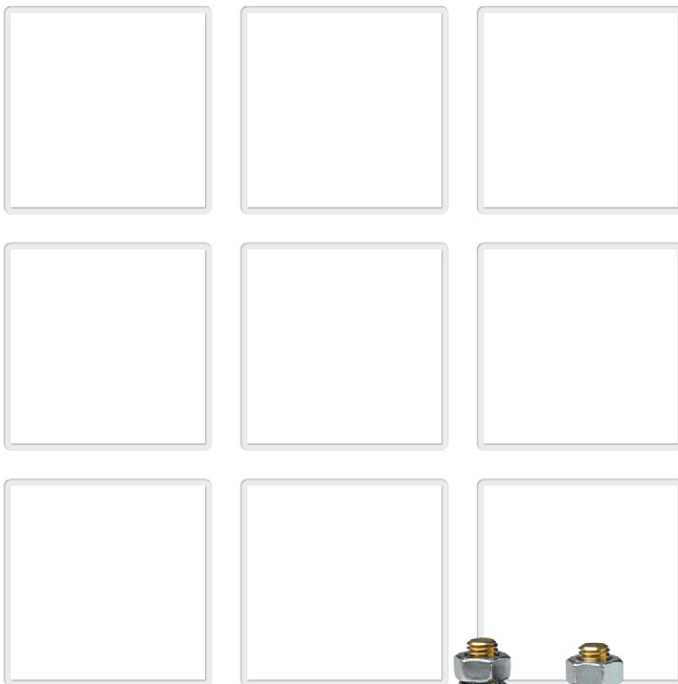
## Contactors

**AFS19, AFS799, AFS819 series**

Single Pole DC NO contactors for  
Industrial truck, AGV, EV, UPS,  
New energy &  
Fixed industrial applications

Installation and Maintenance  
Instructions

**Manual C81-M.en**



## Document Revision History

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# 1 Important basic information

## 1.1 Legal notes

Without prior written consent of SCHALTBAU Machine Electrics, 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 Machine Electrics 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.

### DANGER

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

### DANGER

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 single throw contactors of the AFS range:

- AFS19
- AFS819
- AFS799

# 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, clarification 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 fitted protection and safety equipment for correct function.
- Work on electrical equipment must only be carried out by a qualified electrician or by instructed persons under the supervision and control of a qualified 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 EN/IEC 60947-4-1.

## 2.3 Intended use

- AFS 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 specifications and the instructions in this manual.
- Contactors are sold as a standalone component, as such it is the responsibility of the system designer to ensure protective devices are present, have been correctly installed and are fully operational.
- AFS contactors may not be used in potentially explosive atmospheres and should be protected from aggressive and/or conductive media.
- The device contains unprotected live parts that operate at higher current and as such are hot in service.
- 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 floor, may result in breakage, cracks or deformation. Always handle the device with care.
- Only use the contactors for the specified application and only with original parts. Any other usage 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 specific ambient conditions.


- Only operate the contactors in ambient conditions, such as temperature ranges, degree of pollution, etc., as defined in the corresponding data sheets and in the *AFS SPST catalogue*.


## 3 Hazards and safety precautions


### 3.1 Electrical hazards

	<b>DANGER</b>
	<p>The contactors are used for voltage switching. Contact with live electrical parts can result in serious injuries or even death!</p> <p>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.</p> <p>Before starting any work on the contactors, always comply with the following safety rules:</p> <ul style="list-style-type: none"> <li>➤ Disconnect on all sides</li> <li>➤ Secure to prevent switching back on</li> <li>➤ Clearly identify the working area</li> <li>➤ Check that a voltage-free state exists</li> <li>➤ Earth and short circuit; this includes discharging any capacitors in the main circuit</li> <li>➤ Besides the main power circuits, also disconnect additional and auxiliary circuits</li> <li>➤ Cover or insulate adjacent live parts</li> <li>➤ The presence of a voltage-free state can only be clearly identified by a qualified electrician.</li> <li>➤ When the work has been concluded, follow the procedure in reverse.</li> </ul>

### 3.2 Other hazards

	<b>WARNING</b>
	<p>Contactors must only be used for the purposes specified in the specifications and data sheets. Incorrect use can cause accidents and severe personal injury.</p> <ul style="list-style-type: none"> <li>➤ The manufacturer will not be responsible for accidents arising from improper use of the product.</li> </ul>

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

	<b>CAUTION</b>
	<p>The contactors contain sharp-edged parts. Risk of injuries!</p> <ul style="list-style-type: none"> <li>➤ Use appropriate tools for installation and maintenance work on the contactors.</li> <li>➤ Wear safety gloves when handling sharp-edged components.</li> </ul>

### 3.3 Measures for avoiding damage and malfunctions

#### ATTENTION

Aggressive fluids may damage the contactors.

- Ensure the contactors do not come into contact with aggressive/corrosive liquids or gases.

#### ATTENTION

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

- Ensure the contactors are always handled correctly.
- Do not allow the contactor to drop from any height.
- Keep the contactor in its original packaging until installation.
- 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 ferromagnetic parts resulting in damage to the contactors and can destroy the data on the magnetic strips of credit or similar cards.

- Ensure that the contactors are installed in a location where it is not possible for them to attract any ferromagnetic parts.
- Keep credit or similar cards away from the contactors.

#### ATTENTION

During switching off, strong electromagnetic fields are generated in the vicinity of the contactors which can create high voltage reverse transients of up to 10-20x nominal coil voltages.

- Make sure that AFS contactors are installed in a location away from sensitive components affected by strong electromagnetic fields.
- Ensure sufficient protection to your control system against reverse transient voltages.

#### ATTENTION

AFS contactors are largely maintenance free but some preventative maintenance can prolong the life of the product.

- Visually inspect the contactors regularly to detect wear.
  - Blackening of contact tips is expected and does not affect voltage drop
- Replace damaged parts immediately.

#### ATTENTION

Split washers have a limited life time. After screws secured with split washers have been undone three times, the washers must be replaced by new ones.

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

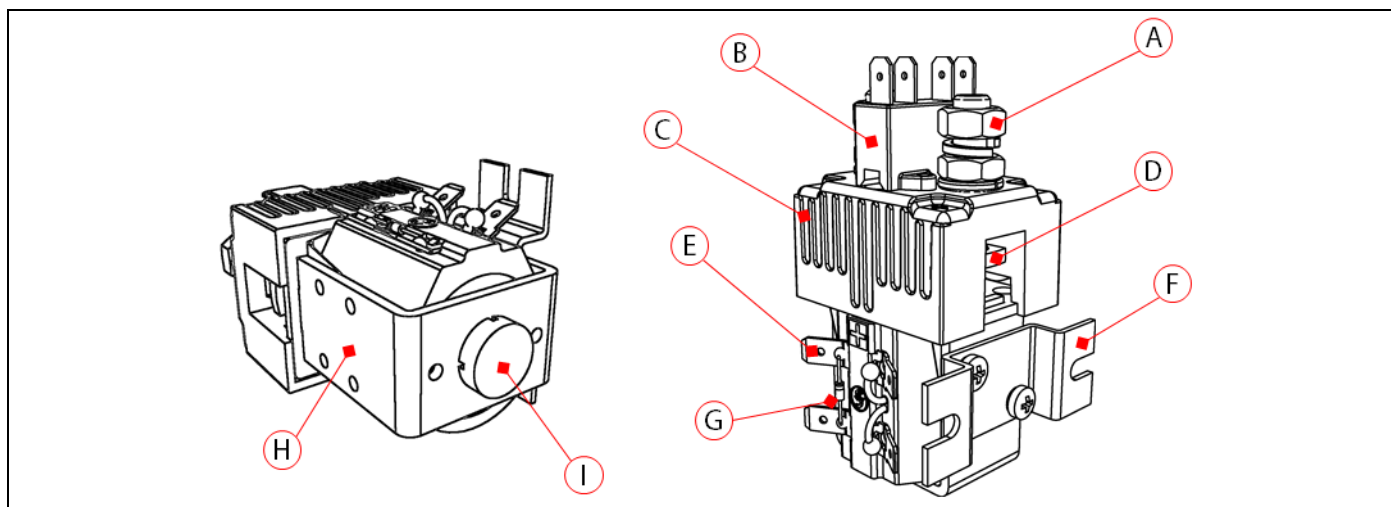
## 4 Product information

### 4.1 Technical information and material properties

For technical information and material properties, refer to the corresponding data sheets and to our **AFS SPST catalogue** which is available upon request.

### 4.2 Product overview

The AFS range is modular and customisable. The image below shows the common components of an AFS SPST contactor.



A Main contacts, connection:

- M8 (7 Nm) for AFS19 / AFS819
- M10 (10 Nm) for AFS799

B (Optional) Auxiliary switch: DPST NC  
4x 6.3 x 0.8 mm blade terminals

C Top cover (open shown, enclosed available)

D Moving contact assembly

E Coil terminals (2x 6.3 x 0.8 mm blade terminals  
shown, other options available)

F (Optional) Mounting bracket (top hat bracket  
shown, other options available)

G (Optional) Coil suppression (diode shown, other  
options available)

H Magnet frame with mounting holes

I (Optional) Dust cap



For more information about different configurations and options, refer to our **AFS SPST catalogue**.



## 5 Storage

### ATTENTION

Always refer to the relevant contactor datasheet or the *AFS SPST catalogue* for limits on storage conditions.

### 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 specifications

Dimensions and other technical specifications are given in the respective data sheets or can be found in our **AFS SPST catalogue** which is available upon request.

#### 7.1.2 Preparatory measures

A suitable means of mounting must be established.

- Contactors can be supplied with a mounting bracket, or they may be installed directly from the magnet frame.
- Fastening of the contactors is performed using a minimum of two mounting screws. Mounting brackets have positions for two fasteners.
- The length of the mounting screws must be determined dependent on the structural circumstance.

#### ATTENTION

If the contactor is installed directly from the magnet frame:

- Install the fasteners in two opposing corners as illustrated in **Fig. 1**.
- Consider the protrusion of the fasteners through the frame which can damage the coil.

- Mounting screws must be equipped with washers when installed using a mounting bracket.
- Appropriate screw locking elements must be used when secure the mounting screws so that they do not come loose. Schaltbau recommends using Schnorr washers (or similar). Thread locking adhesive is not recommended due to the temperatures achieved in service.

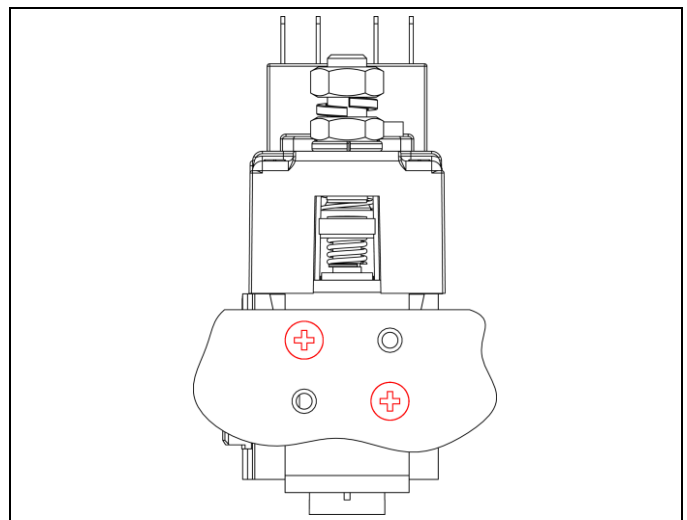


Fig. 1: Recommended installation if mounting direct to magnet frame

#### 7.1.3 Mounting positions

The contactors are designed for horizontal or vertical mounting as illustrated in **Fig. 2 (under A, B & C)**. Contactors must not be suspended over head as shown in **Fig. 2 (under D)**.

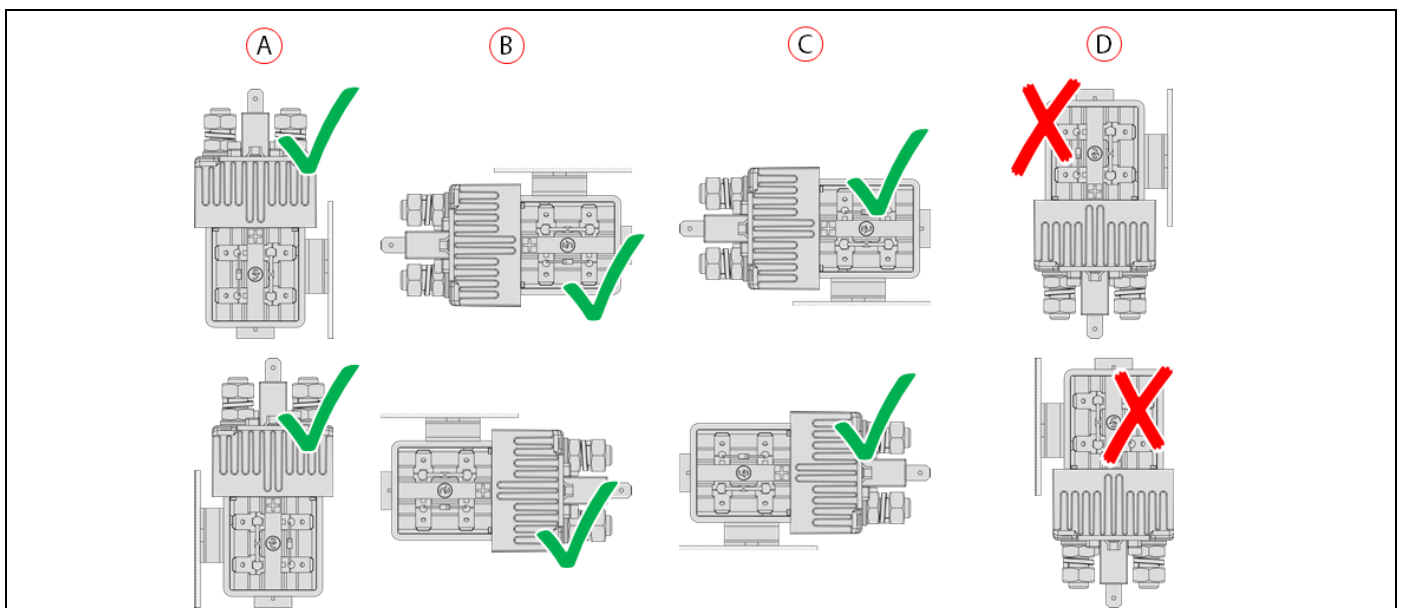


Fig. 2: Examples of correct installation positions (A, B & C) and incorrect installation positions (D)

### 7.1.4 Required minimum clearances

#### DANGER

Switching of high currents at voltages above 24V produces electric arcs and plasma will be ejected from the openings of an open top cover. It is extremely important to maintain minimum clearances between positive load contacts and surrounding components or grounded chassis.

#### ATTENTION

- The distance a plasma arc is ejected increases with the use of blowout magnets or inductive loads.
- In assemblies where load switching is not expected, consider application fault conditions and E-Stop consequences on linked safety circuits.
- For contactors mounted against a surface, including horizontally mounted contactors, always consider the minimum distance to ground or use an enclosed top cover.

- It is recommended to leave **60 mm** between the contactor and a grounded surface where the arc exits the top cover as shown in **Fig. 3**.
  - An enclosed top cover only requires **5 mm** clearance.

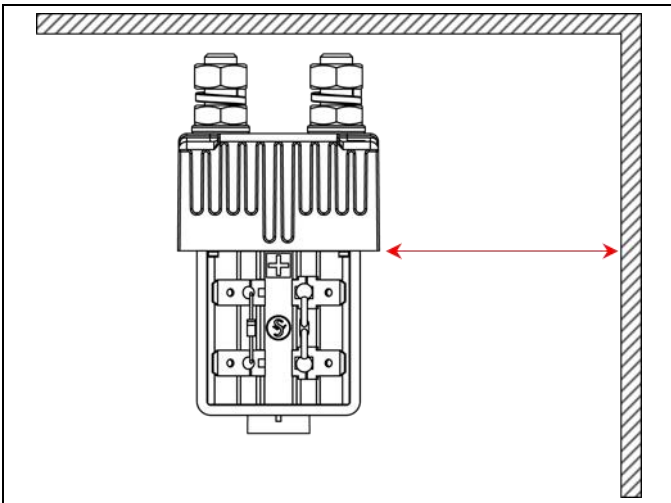


Fig. 3: Clearance to ground for AFS SPST

### 7.1.5 Ventilation requirements

- Ensure sufficient ventilation in the installation area, especially when disconnecting heavy loads and/or lead acid batteries are charging nearby. This allows the plasma to be dissipated more quickly to reduce the risk of flash-overs, corrosion or explosions.

### 7.1.6 Safety

- Installation must be performed by qualified trained personnel.

#### ATTENTION

When installing, ensure that no dirt can get into the contactor as a result of surrounding activities.

#### CAUTION

Consider tooling access using metallic tools which pose a risk of short circuit against live contacts.

#### ATTENTION

- Detent-edged rings and detent-edged washers have a limited life time. After screws secured with split washers have been undone three times, the washers must be replaced by new ones.
- Record the frequency of undoing of the screws in the work log.
  - Replace split washers with new ones after the screws have been undone three times.

## 7.2 Electrical connection

### 7.2.1 Electrical data and other technical specifications

For the power consumption of the magnetic drive system and electrical data of the auxiliary switches as well as other technical specifications, refer to the respective data sheets and to the **AFS SPST catalogue**.

### 7.2.2 Preparatory measures

- Connection of the main power circuit can be implemented with wires or busbars.



If busbars are used, Schaltbau recommend HDHC copper in a natural condition as the preferred approach.

- If connecting wires are used, they must be selected taking into consideration the insulation class and the ambient conditions.
- The minimum conductor cross-sections given in the **AFS SPST catalogue** are mandatory for continuous use at the contactor thermal current rating ( $I_{th}$ ). Smaller conductor cross-sections may be used for lower rated systems and/or systems with a limited duty cycle.

#### ATTENTION

It is the system designer's responsibility to select the appropriate size conductor for the system giving consideration to voltage drop and temperature effects.

- The connecting wires of the main power circuit must be fitted with appropriate ring terminals busbars with close clearance holes (for M8 or M10 terminals).

- The main contact connections and the maximum permissible torque are specified for the various contactors as follows:

Type	Main contacts size	Torque
AFS19 AFS819	M8	7 Nm
AFS799	M10	10 Nm

#### ATTENTION


Higher torques provide negligible benefit in voltage drop under load, and risk cracking the contactors top cover.

- Schaltbau recommends the split washers supplied with AFS contactors to prevent the terminal screws from coming loose. Schnorr washers (or similar) are recommended where higher shock and vibration is expected in service. The terminal screws must be tightened with the specified torque (see table).
- The connections for the coil are typically made with blade terminals although different options are available. The control harness must therefore be equipped with the appropriate termination.
  - For standard blade terminals: blade receptacle 6.3 x 0.8 mm
  - Refer to the relevant datasheet/drawing for non-standard configurations.
- The connections for the auxiliary switch are made with blade terminals. Consequently, the control wires must be equipped with blade receptacles 6.3 x 0.8 mm



Schaltbau recommend the use of insulated crimps in control harnesses.

## 7.2.3 Safety

	<b>DANGER</b>
	<p>The contactors are used for voltage switching. Contact with live electrical parts can result in serious injuries or even death!</p> <p>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.</p> <p>Before starting any work on the contactors, always comply with the following safety rules:</p> <ul style="list-style-type: none"><li>➤ Disconnect on all sides</li><li>➤ Secure to prevent switching back on</li><li>➤ Clearly identify the working area</li><li>➤ Check that a voltage-free state exists</li><li>➤ Earth and short circuit; this includes discharging any capacitors in the main circuit</li><li>➤ Besides the main power circuits, also disconnect additional and auxiliary circuits</li><li>➤ Cover or insulate adjacent live parts</li><li>➤ The presence of a voltage-free state can only be clearly identified by a qualified electrician.</li><li>➤ When the work has been concluded, follow the procedure in reverse.</li></ul>

<b>ATTENTION</b>
<p>Detent-edged rings and detent-edged washers have a limited life time. After screws secured with split washers have been undone three times, the washers must be replaced by new ones.</p> <ul style="list-style-type: none"><li>➤ Record the frequency of undoing of the screws in the work log.</li><li>➤ Replace split washers with new ones after the screws have been undone three times.</li></ul>

### 7.2.4 Connecting the auxiliary switch

The control wires for the auxiliary contact must be fitted with blade receptacles (6.3 x 0.8 mm).

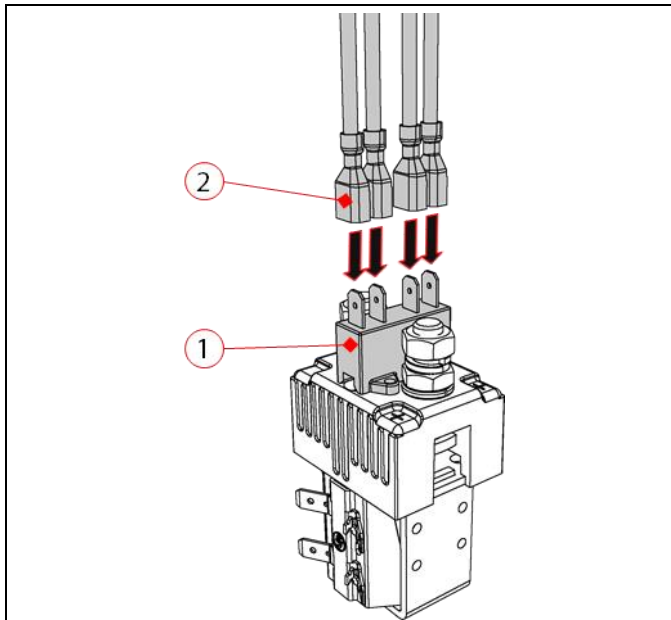


Refer to the electrical diagram of the auxiliary switch in the **AFS SPST catalogue** or relevant drawing during installation.

#### ATTENTION

- Bending of the auxiliary terminals can cause damage and is not permitted unless agreed with Schaltbau.
- Move and route the control wires and receptacles only in the direction of plugging, see **Fig. 4**. Avoid sharp edges and surfaces which can get hot such as the magnet frame.
- Mechanically secure the control wires to minimise feedback effects of forces caused by the wires (e. g. shock, vibrations) acting on the terminals.

- Plug the prepared receptacles of the control harness to the terminals of the auxiliary switch, paying attention to the circuit diagram on the relevant datasheet/drawing or in the **AFS SPST catalogue**.



- 1 Control harness receptacles
- 2 Auxiliary switch

Fig. 4: Connecting the auxiliary switch

### 7.2.5 Creating coil connections

The control wires for the coil terminal must be fitted with appropriate receptacles for the contactor as specified on the relevant drawing/datasheet.

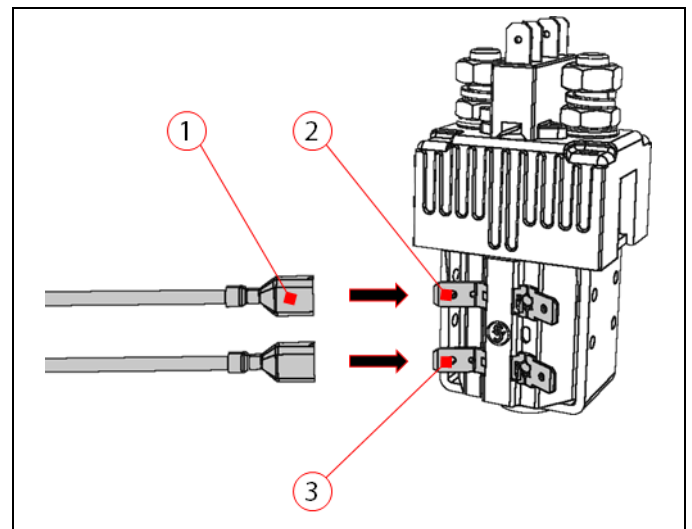


Refer to the electrical diagram of the contactor on the relevant drawing during installation. Contact the Sales team if a drawing is required.

#### ATTENTION

- Bending of coil terminals is not permissible and can cause damage. Alternative coil terminals are available.
- Move and route the control wires and receptacles only in the direction of plugging, see **Fig. 5**.
- Mechanically secure the control wires to minimise feedback effects of forces caused by the wires (e. g. shock, vibrations) acting on the terminals.
- If coil suppression is installed, pay particular attention to the polarity of the coil (indicated by a +VE sticker) when connecting the control harness to avoid damaging the coil suppression.

- Plug the prepared receptacles of the control harness to both coil terminals, paying attention to the circuit diagram on the relevant datasheet/drawing.



- 1 Control harness receptacles
- 2, 3 Coil terminals (blade terminals shown, others options available)

Fig. 5: Creating the coil connections

## 7.2.6 Connecting the main contacts

### ATTENTION

- Ensure that the connection points for the main contacts are free from corrosion.
- The minimum conductor cross-sections given in the **AFS SPST catalogue** are mandatory for continuous use at the contactor thermal current rating ( $I_{th}$ ). Smaller conductor cross-sections may be used for lower rated systems and/or systems with a limited duty cycle.
- When terminating main connections, ensure there is a clear air gap between the cable lugs / busbars and the auxiliary housing. Insufficient clearance can damage the auxiliary housing as the connections reach high temperatures in service.

### Connecting using wires

The connecting wires of the main power circuit must be fitted with appropriate ring terminals (for M8 or M10 terminal screws).

- Route the pre-assembled connecting wires to both main contacts (4).
- Screw the ring terminals (3) in place from above using the supplied nuts (1) and suitable screw locking elements (2) to the main contact (4).
  - Split washers are supplied as standard.
- Tighten the nuts (1) to the prescribed torque:

Type	Main contacts size	Torque
AFS19 AFS819	M8	7 Nm
AFS799	M10	10 Nm

### Connecting using busbars

The process for connecting using wires can be followed when connecting busbars.

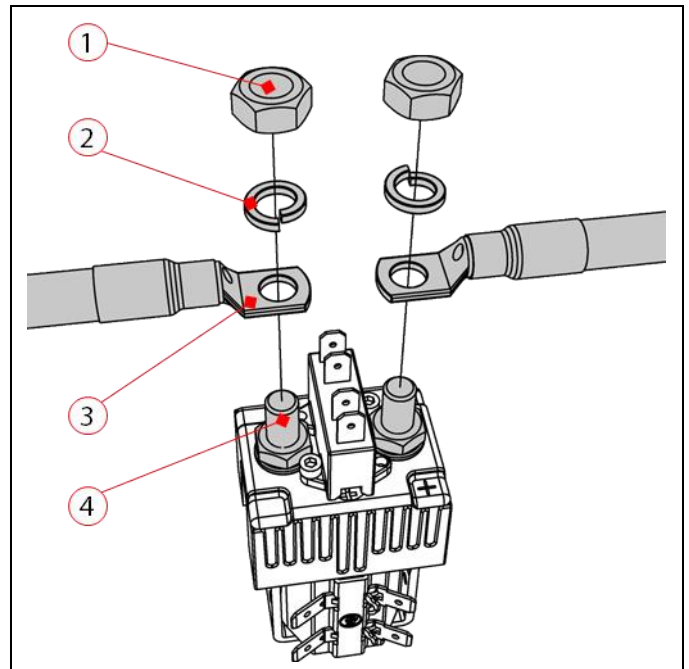


Fig. 6: Connecting the main contacts using wires

## 7.3 Checks

After the installation, perform the following checks:

- Check that the contactors are correctly installed on the mounting plate and tightly screwed in place.
- Check that the connecting wires or busbars are correctly installed and fit tightly at the main contacts.
- 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 switch. Check the correct assignment and function of the auxiliary switch using a continuity tester.
- Switch the contactor several times without activating the main power circuit.
- 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 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"**.

AFS SPST contactors are essentially 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. However, to prolong the lifespan of the contactor and guarantee stable switching, preventive maintenance is recommended.

### 8.1 Safety

<b>DANGER</b>	
	<p>The contactors are used for voltage switching. Contact with live electrical parts can result in serious injuries or even death!</p> <p>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.</p> <p>Before starting any work on the contactors, always comply with the following safety rules:</p> <ul style="list-style-type: none"> <li>➤ Disconnect on all sides</li> <li>➤ Secure to prevent switching back on</li> <li>➤ Clearly identify the working area</li> <li>➤ Check that a voltage-free state exists</li> <li>➤ Earth and short circuit; this includes discharging any capacitors in the main circuit</li> <li>➤ Besides the main power circuits, also disconnect additional and auxiliary circuits</li> <li>➤ Cover or insulate adjacent live parts</li> <li>➤ The presence of a voltage-free state can only be clearly identified by a qualified electrician.</li> <li>➤ When the work has been concluded, follow the procedure in reverse.</li> </ul>

### 8.2 Preventive maintenance


#### 8.2.1 Intervals for regular tests/checks

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

Test/check	Interval
Visual inspection of the contactor connections (cables or busbars).	➤ 1x per year
Check of the main contacts where open top covers are installed.	➤ 1x to 2x per year
Visual inspection of the auxiliary switch for signs of thermal damage	➤ 1x per year
Auxiliary switch replacement	➤ After 500k cycles

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. Also consider the effect of high humidity which can turn dust contamination into conductive material.

Extraordinary checks need only be carried out if there has been a significantly high recorded number of switching cycles under load, closing on capacitive loads, breaking inductive loads or unplanned short circuit events.

<b>DANGER</b>	
	<p>If damage to the contactor, wires or busbars is visible, the safety of the contactor is no longer guaranteed.</p> <ul style="list-style-type: none"> <li>➤ Immediately submit any damaged contactors or components for maintenance.</li> <li>➤ Visibly damaged cables, lugs, busbars or contactors should be replaced immediately guarantee safe function.</li> </ul>



### ATTENTION

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

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

## 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	Test/checks	Measures
Wires/busbars (main connections)	Check for: <ul style="list-style-type: none"> <li>➤ damaged wires, cable lugs</li> <li>➤ damaged insulation</li> <li>➤ damaged busbars</li> <li>➤ kinked or crushed wires</li> <li>➤ loose or missing fastening elements</li> <li>➤ correct tightening torque of the terminal screws</li> </ul>	In case of faults: <ul style="list-style-type: none"> <li>➤ immediately replace damaged wires or cable lugs</li> <li>➤ immediately replace damaged busbars</li> <li>➤ tighten loose fastening elements</li> <li>➤ immediately replace missing fastening elements</li> <li>➤ attempt to locate missing fasteners in confined assemblies as they pose a short circuit risk</li> <li>➤ tighten the terminal screws to the rated torque</li> </ul>
Top cover	Check for: <ul style="list-style-type: none"> <li>➤ dirt</li> <li>➤ damage or wear</li> <li>➤ loose or missing fastening elements</li> <li>➤ ferromagnetic contamination (especially when blowout magnets are installed that will attract ferrous particles)</li> </ul>	In case of faults: <ul style="list-style-type: none"> <li>➤ remove any dirt that may be present</li> <li>➤ remove any ferromagnetic contamination that can reduce creepage distances and risk short circuit</li> <li>➤ if the contactor housing is damaged or heavily worn replace the entire contactor</li> <li>➤ tighten loose fastening elements</li> <li>➤ immediately replace missing fastening elements</li> <li>➤ tighten a loose contactor immediately</li> </ul>
Contacts	On contactors with an open top cover, check for: <ul style="list-style-type: none"> <li>➤ contamination</li> <li>➤ damage or wear</li> <li>➤ evidence of excessive combustion residue (blackening of tips is expected in service)</li> </ul> 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.	In case of faults: <ul style="list-style-type: none"> <li>➤ remove any contamination that may be present</li> <li>➤ replace damaged components and check the polarity of the main connections if excessive combustion is present with blowout magnets installed</li> <li>➤ lightly clean blackened silver tips using Scotchbrite and blow off dust after cleaning</li> <li>➤ if less than 15% of the silver contacts remaining, replace the contacts</li> </ul>
Coil	Check for: <ul style="list-style-type: none"> <li>➤ damage to casings or terminations</li> <li>➤ evidence of short-circuit faults</li> </ul> Some discoloration of the casing is expected in service as high temperatures are achieved.	In case of faults: <ul style="list-style-type: none"> <li>➤ replace damaged contactors as there is a risk of flash-over or short-circuit faults</li> </ul>

Component	Test/checks	Measures
Auxiliary switch	<p>Check for:</p> <ul style="list-style-type: none"> <li>➤ dirt</li> <li>➤ signs of thermal damage on the housing</li> <li>➤ signs of short circuits</li> </ul> <p>Under normal working condition (there have been no short circuits in the control circuit) the auxiliary switch must be replaced in line with section <b>"8.2.1 Intervals for regular tests/checks"</b></p>	<p>If faults exist or after 500k actuations:</p> <ul style="list-style-type: none"> <li>➤ replace the auxiliary switch, see section <b>"8.2.3 Removing the auxiliary switch"</b></li> <li>➤ if thermal damage is present on the auxiliary housing, check the installation of the main connections in line with <b>"7.2.6 Connecting the main contacts"</b></li> </ul>

### 8.2.3 Removing the auxiliary switch

The auxiliary switch is secured to the top cover using 2x M3 cap head socket screws.

As per **Fig. 7**:


- Pull off the receptacles of the control wires from the auxiliary switch (2).
- Using a hex tool (2.5 mm) screw out the two M3 fasteners (1) for the auxiliary switch (2).
- The auxiliary switch (2) will lift off.
- Remove the spring & plunger (3) if further disassembly is required.

### 8.2.4 Reinstalling the auxiliary switch

As per **Fig. 7**:

- Follow section **"8.2.3 Removing the auxiliary switch"** in reverse to reinstall the auxiliary switch ensuring that the plunger & spring are installed.
- Observe the maximum torque listed in the table below when tightening the fasteners.

Type	Fastener size	Torque
AFS19 AFS819 AFS799	M3	0.4 Nm

	<p>Check the function of the auxiliary by removing the dust cap and pushing up the armature by hand.</p> <p>After initial continuity across the load contacts, there should be additional over travel where the auxiliary is then actuated. Continuity should switch from the middle contacts (NC) to the outer contacts before reaching full travel.</p>
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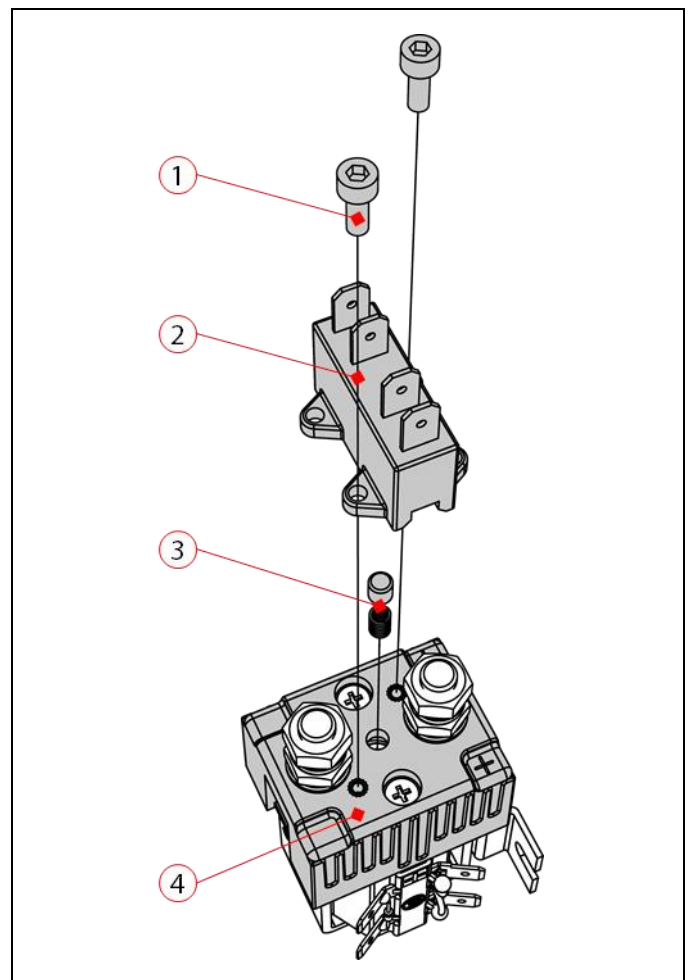


Fig. 7: Removing the auxiliary switch

### 8.2.5 Removing the top cover and moving contact

The top cover is secured to the top plate using the following fasteners:

AFS	Top cover fasteners
AFS19	➤ 2x M4 countersink screws
AFS819	➤ 2x M5 countersink screws
AFS799	➤ 2x M5 pan head screws

As per **Fig. 8**:

- Using a pozi drive tool (PZ2), screw out the two top cover fasteners (1).
- Lift off the top cover assembly (2).
- Remove the return spring (3) and moving contact assembly (4).

**ATTENTION**

Top cover fasteners may have thread locking adhesive applied where a high vibration environment was specified. This is typically indicated with blue paint on the head of the fastener.

- Take care when unscrewing fasteners to prevent damaging the pozi drive.

**i** Make a note of the top cover orientation with respect to the +VE emboss and coil terminals.

### 8.2.6 Reinstalling the top cover and moving contact

As per **Fig. 8**:

- Follow section **"8.2.5 Removing the top cover and moving contact"** in reverse to reinstall the top cover and moving contact ensuring that the return spring is mounted correctly.
- Ensure the top cover is installed in the correct orientation, especially if blowout magnets are installed.
- Observe the maximum torque listed in the table below when tightening the fasteners.

Type	Fastener size	Torque
AFS19	M4	3 Nm
AFS819	M5	
AFS799		

**ATTENTION**

Where thread locking adhesive has been used, all threads must be cleaned and the adhesive must be replaced with a medium strength non drip adhesive.

- When replacing fasteners, ensure the specification is identical. A longer fastener will damage the coil.

**i**

- When re-installing the top cover, speed is required to keep the return spring seated during fitment. If you suspect the spring isn't seated correctly remove and refit.
- Remove the dust cap and push up the armature by hand. The movement should feel smooth as the return spring is loaded. After initial continuity across the load contacts, there should be additional over travel.

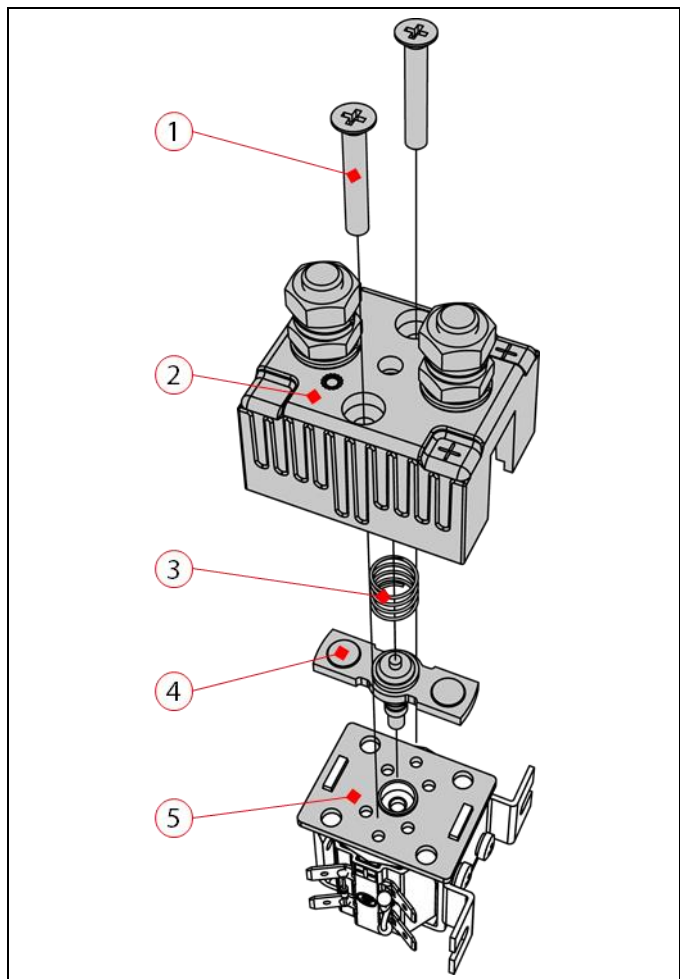


Fig. 8: Removing the top cover and moving contact

## 9 Spare parts

If, during the checks outlined in chapter “**8.2.2 Regular tests/checks**”, it is determined that parts require replacing, contact the Sales team at Schaltbau Machine Electrics.

The following are typical service items:

- Auxiliary switch
- Top cover assembly
- Moving contact assembly
- Coil assembly

It is also possible to purchase optional extras such as:

- Auxiliary switch (where not already supplied)
- Brackets

See “**AFS SPST catalogue**” for more information on optional extras or contact the sales team.

## 10 Technical data

Technical data and information on the material properties for the contactors of the C310 series are given in our **AFS SPST catalogue** (available on request).

Schaltbau products are subject to continual improvement. Therefore, the product information in catalogues, data sheets, etc. may change at any time. Therefore, only the latest version of a catalogue is valid at any time.

## 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 of with other household waste.

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.

At the end of the product's useful life ensure environmentally sound disposal of the product according to the legal regulations and requirements for electrical and electronic waste equipment in your country.

For detailed information on the material used in the construction of the contactors and for disposal consideration, please contact the Sales team.

# Notes

# Schaltbau Machine Electrics

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

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with compliments:



Schaltbau Machine Electrics manufactures in compliance with RoHS.



Certified to 14001 since 2010. For the most recent certificate visit our website.



Certified to ISO 9001 since 1996. For the most recent certificate visit our website.

## Electrical Components and Systems for Railway Engineering and Industrial Applications

### Connectors

- Connectors manufactured to industry standards
- Connectors to suit the special requirements of communications engineering (MIL connectors)
- Charging connectors for battery-powered machines and systems
- Connectors for railway engineering, including UIC connectors
- Special connectors to suit customer requirements

### Snap-action switches

- Snap-action switches with positive opening operation
- Snap-action switches with self-cleaning contacts
- Enabling switches
- Special switches to suit customer requirements

### Contactors

- Single and multi-pole DC contactors
- High-voltage AC/DC contactors
- Contactors for battery powered vehicles and power supplies
- Contactors for railway applications
- Terminal bolts and fuse holders
- DC emergency disconnect switches
- Special contactors to suit customer requirements

### Electrics for rolling stock

- Equipment for driver's cab
- Equipment for passenger use
- High-voltage switchgear
- High-voltage heaters
- High-voltage roof equipment
- Equipment for electric brakes
- Design and engineering of train electrics to customer requirements