

AQuench

Arc Quenching Device

Instruction manual

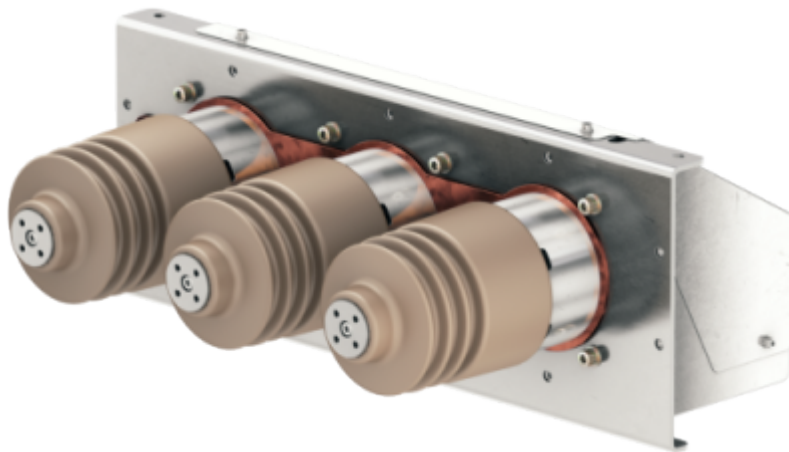


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Disclaimer

Please read these instructions carefully before using the equipment or taking any other actions with respect to the equipment. Only trained and qualified persons are allowed to perform installation, operation, service or maintenance of the equipment. Such qualified persons have the responsibility to take all appropriate measures, including e.g. use of authentication, encryption, anti-virus programs, safe switching programs etc. necessary to ensure a safe and secure environment and usability of the equipment. The warranty granted to the equipment remains in force only provided that the instructions contained in this document have been strictly complied with.

Nothing contained in this document shall increase the liability or extend the warranty obligations of the manufacturer Arcteq Relays Ltd. The manufacturer expressly disclaims any and all liability for any damages and/or losses caused due to a failure to comply with the instructions contained herein or caused by persons who do not fulfil the aforementioned requirements. Furthermore, the manufacturer shall not be liable for possible errors in this document.

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1 Document information

Table. 1 - 1. History of Revision 1.

Revision	1.00
Date	July 2026
Changes	- The first revision of the manual.

2 Safety information

This document contains important instructions that should be saved for future use. Read the document carefully before installing, operating, servicing, or maintaining this equipment. Please read and follow all the instructions carefully to prevent accidents, injury and damage to property.

Additionally, this document may contain four (4) types of special messages to call the reader's attention to useful information as follows:

**NOTICE!**

"Notice" messages indicate relevant factors and conditions to the concept discussed in the text, as well as to other relevant advice.

**CAUTION!**

"Caution" messages indicate a potentially hazardous situation which, if not avoided, could result in minor or moderate personal injury, in equipment/property damage, or software corruption.

**WARNING!**

"Warning" messages indicate a potentially hazardous situation which, if not avoided, could result in death or serious personal injury as well as serious damage to equipment/property.

**DANGER!**

"Danger" messages indicate an imminently hazardous situation which, if not avoided, will result in death or serious personal injury.

These symbols are added throughout the document to ensure all users' personal safety and to avoid unintentional damage to the equipment or connected devices.

Please note that although these warnings relate to direct damage to personnel and/or equipment, it should be understood that operating damaged equipment may also lead to further, indirect damage to personnel and/or equipment. Therefore, we expect any user to fully comply with these special messages.

3 Abbreviations

CLP

Regulation on the Classification, Labelling and Packaging of Substances and Mixtures (EC Regulation 1272/2008)

CrVI

hexavalent chromium

EMC

electromagnetic compatibility

EN

European standard

IEC

International Electrotechnical Commission

LED

light-emitting diode

ops

operating cycles

PCD

pole center distance

POPs

Regulation on Persistent Organic Pollutants (EU Regulation 2019/1021)

PVC

polyvinyl chloride

REACH

Regulation on the Registration, Evaluation, Authorisation and Restriction of Chemicals (EC Regulation 1907/2006)

4 General

NOTICE!



- The AQuench Arc Quenching Device is referred to with its full name ("AQuench Arc Quenching Device") or with the abbreviations "the AQuench quenching device", "the quenching device", "the AQuench AQD", or "the AQD". These terms all refer to both the AQ-17500 and the AQ-24000 variant of the quenching device, unless specified otherwise.
- The AQuench Controller Unit is referred to with its full name ("the AQuench Controller Unit") or with the abbreviations "the AQuench controller", "the controller unit" or "the controller".

AQuench Arc Quenching Devices are three-pole switching devices and have a rated voltage range of 12 kV to 24 kV. AQuench quenching devices comply with the protection class IP00 (stationary, weather-protected operation) as per EN 60529 and can be used...

- ...with circuit breakers and fuses,
- ...for ambient temperatures from -25 °C to $+70\text{ °C}$ (up to $+55\text{ °C}$ outside the switchgear), and
- ...at different altitudes:
 - from 0 m to 1,000 m above sea level without reduced lightning impulse withstand voltage,
 - over 1,000 m with reduced lightning impulse withstand voltage with devaluation of the external dielectric strength.

The technical data are affected by ambient conditions and the installation position.

Open arcing faults are detected by the corresponding protective device. The AQuench controller detects the tripping command and unlocks the associated switching device. The switching device generates a metallic, three-pole, earthed short-circuit and thus extinguishes the arcing fault. AQuench quenching devices are mounted as fixed mounting (with conductor bars, flexible connectors or power cable with cable lug). Alternatively, AQuench AQDs can be mounted as a withdrawable part.

The AQuench quenching device complies with the following standards:

- IEC 62271-1: High-voltage switching devices and switchgear – Part 1: Common specifications
- IEC 62271-102: High-voltage switching devices and switchgear – Part 102: Alternating current disconnectors and earthing switches
- IEC 62271-200: High-voltage switching devices and switchgear – Part 200: Metal-encapsulated AC switchgear for rated voltages above 1 kV up to and including 52 kV
- IEC 61000-4: Electromagnetic compatibility (EMC)
- IEC 61000-6: Parasitic x-ray emittance and interference voltage
- IEC 60068: Environmental test procedures

5 Handling

Smooth and safe operation of this switching device requires proper transport and storage, professional installation and assembly, as well as careful operation and maintenance. The operating instructions are an integral part of the switching device and contain all information for commissioning and use.

5.1 Receipt and unpacking

WARNING!

Using unsuitable lifting gear, such as incorrectly dimensioned slings and incorrectly adjusted lifting gear, may cause the transport unit to fall down!



- Do not stand below suspended loads.
- Select lifting gear, transportation equipment, and slinging equipment according to the weight of the transport unit (including any packaging such as transport pallets).
- Observe transport symbols.

Determining the transport weight

Refer to the delivery documents for the weight of the transport unit.

CAUTION!

Exceeding the maximum stacking height can cause damage to the bottom transport unit!



- For transport, no more identical transport units may be stacked on top of each other than what is indicated on the transport unit.
- Observe loads specified on the transport unit.



WARNING!

Unsecured transport cargo may slip or fall down! Secure the load for transportation so that the transport unit cannot slip or fall.

Place the transport unit on a level, non-slip and pressure-resistant surface for intermediate storage. Transport the vacuum circuit breaker to the installation site or storage location in its original transport unit.

Checking the transport unit

After receipt of delivery please do the following:

- Check the transport unit for damage.
- Document any major damage photographically.
- Ensure that any damage to the transport unit is confirmed by the transport company in writing.
- Return a damaged transport unit to the manufacturer.

Additionally, ensure that the delivery includes all the following components:

- One (1) AQuench Arc Quenching Device (AQ-17500 for 17.5 kV, or AQ-24000 for 24 kV),
- One (1) AQuench Controller Unit,
- One (1) quencher reset tool, and

- One (1) quencher connection fiber.

Opening the transport unit

Place the transport unit on a level, non-slip and pressure-resistant surface and open the box with a knife or a pair of scissors.

WARNING!

There is a possibility of oil leakage if the switching device is defective! Spilled oil may be fatal if it is swallowed and it enters the respiratory tract. Oil is classed as Category 1 aspiration toxicity hazard according to the [CLP legislation](#) by the European Union.

Prolonged or repeated contact with the skin without proper cleansing can clog skin pores and lead to disorders, such as oil acne and folliculitis. Oil is also slightly irritating to the skin.



- Do not inhale or ingest.
- Avoid touching without protective gloves.
- Using protective gloves (EN 374, Europe; F 739, USA) of the following materials provides adequate protection: PVC, neoprene, or nitrile rubber.

Send a defective switching device back in its original transport unit.

CAUTION!

Damage to components (such as breaks, cracks, flaking, bent metal parts, damaged plug-in contacts, or tears in bare cables) can cause voltage breakdowns!



If damage has occurred, do the following:

- Do not use the quenching device anymore.
- Send the quenching device back in its original transport unit to Arcteq.

5.2 Transport

Transport to the mounting location

AQuench quenching devices can be transported unpacked or in the transport unit. Transportation requires the following aids:

- M10 ring bolts or eyebolts with M10 nuts,
- version with 64-pole plug, only M10 ring bolts or eyebolts, &
- fixing gear.

WARNING!

Incorrect fastening of the fixing gear can cause property damage! If the ring bolts or the eyebolts are screwed into the connections, the connections will be damaged during transport.



Only screw in the ring bolts or eyebolts where indicated by the crane symbols!

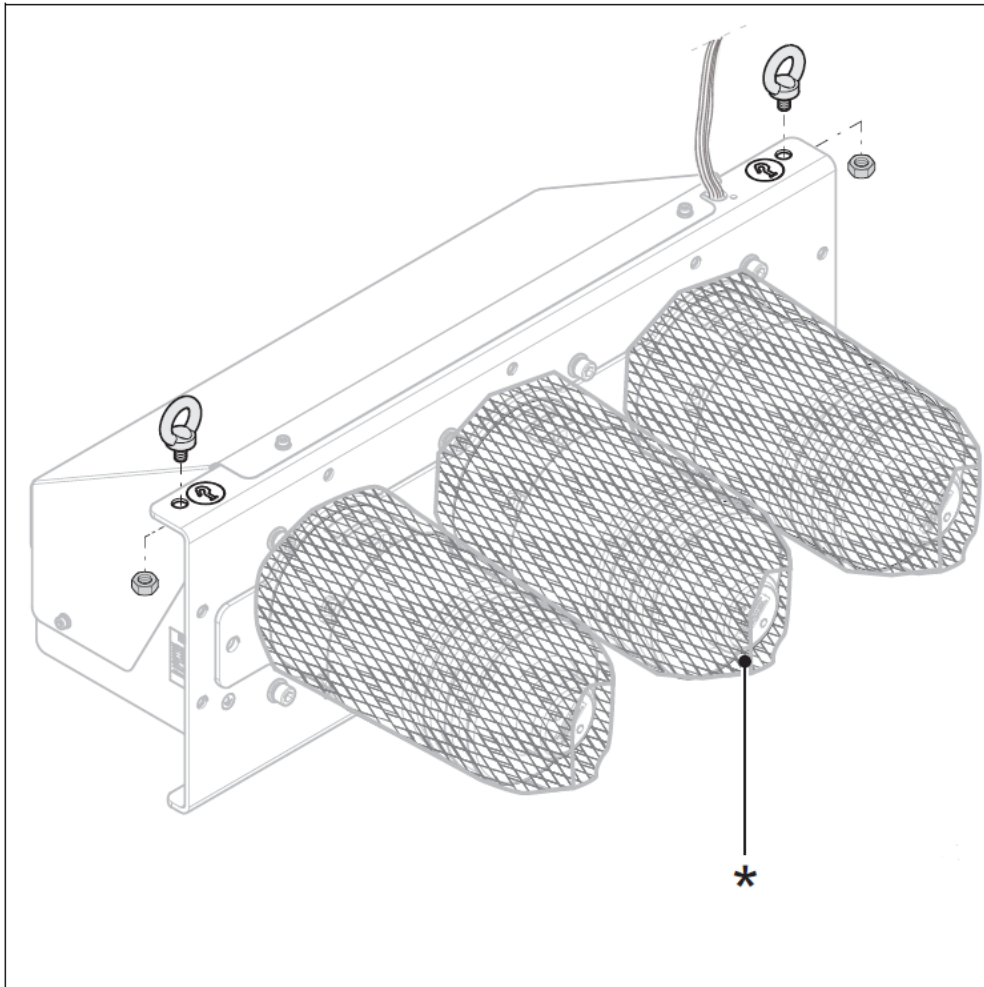
Do not remove the protective net of the poles to avoid damage!

Transport in the unpacked condition

Figure. 5.2 - 1. The crane symbol.

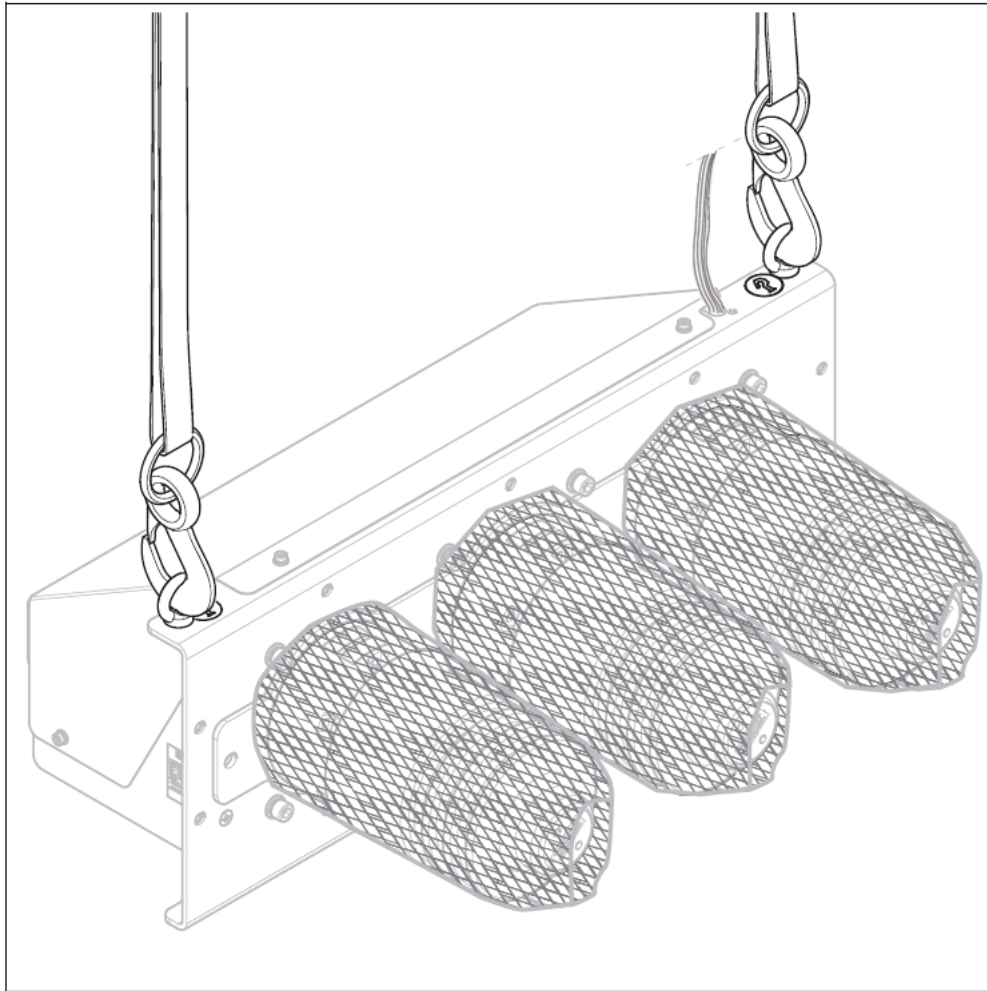


Figure. 5.2 - 2. Mounting crane eyes.



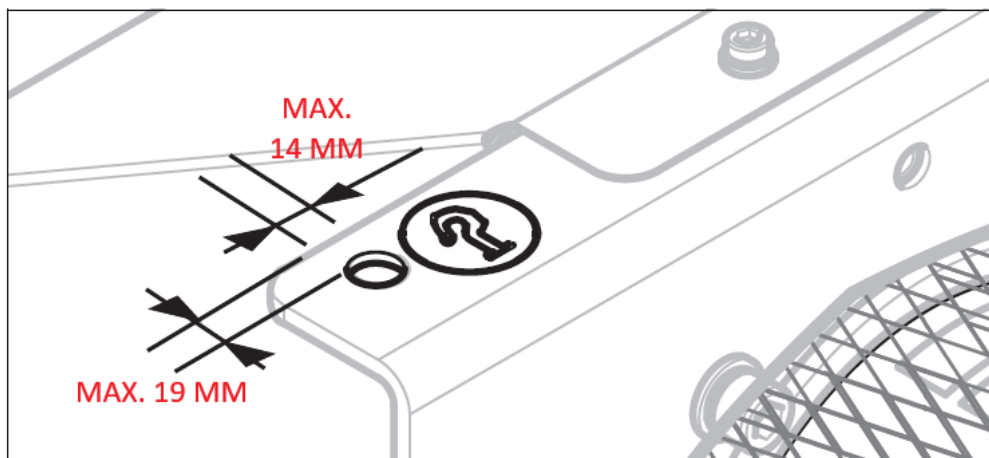
*) Safety net for the poles.

Figure. 5.2 - 3. Transporting on ring bolts or eyebolts.



When using hooks, please note the dimensions of the mounting hole. The cross-section of the hook can be max. 14 mm (labelled no. 1 in the figure below), while the opening width of the hook can be max. 19 mm (no. 2).

Figure. 5.2 - 4. Dimensions for the use of hooks.



Transport with a crane

1. Mount the M10 ring bolts (or eyebolts with M10 nuts) in the places marked with the crane symbol.
2. Attach the fixing gear into the ring bolts (or eyebolts).
3. Transport the quenching device to the mounting location or leave it suspended from the crane for further work steps.
4. Remove the fixing gear and disassemble the ring bolts (or eyebolts).

Reuse of the transport unit

The box and the filler material of the transport unit can be reused if the quenching device needs to be transported again. Pack the device into the box and close the box.

5.3 Storage

CAUTION!

There is risk of corrosion damage if the AQuench quenching device is stored improperly! A failure to observe proper storage conditions shortens the device's storage life; it may also damage the device.



- If the storage conditions listed in the table below are met, AQuench quenching devices can be stored for up to a year in its transport unit.
- If the storage conditions are not met, AQuench quenching devices cannot be stored in the transport unit for longer than six months.
- If storage of longer than one year is planned, unpack the AQuench quenching device from its transport unit.

Table. 5.3 - 2. Storage conditions.

Storage room	Transport unit	Storage time	Temperature range	Class (IEC 60721, part 3-2 (2018))
Enclosed, dry, well ventilated, and as free from dust as possible, with a relative air humidity below 95 %.	Unopened	Up to 6 months	+5...+40 °C (+41...+104 °F)	2K11
Enclosed, dry, well ventilated and as free from dust as possible, with a maximum relative humidity of up to 90 % per month.	None	Over 6 months up to max. 10 years	+5...+40 °C (+41...+104 °F)	2K11

WARNING!



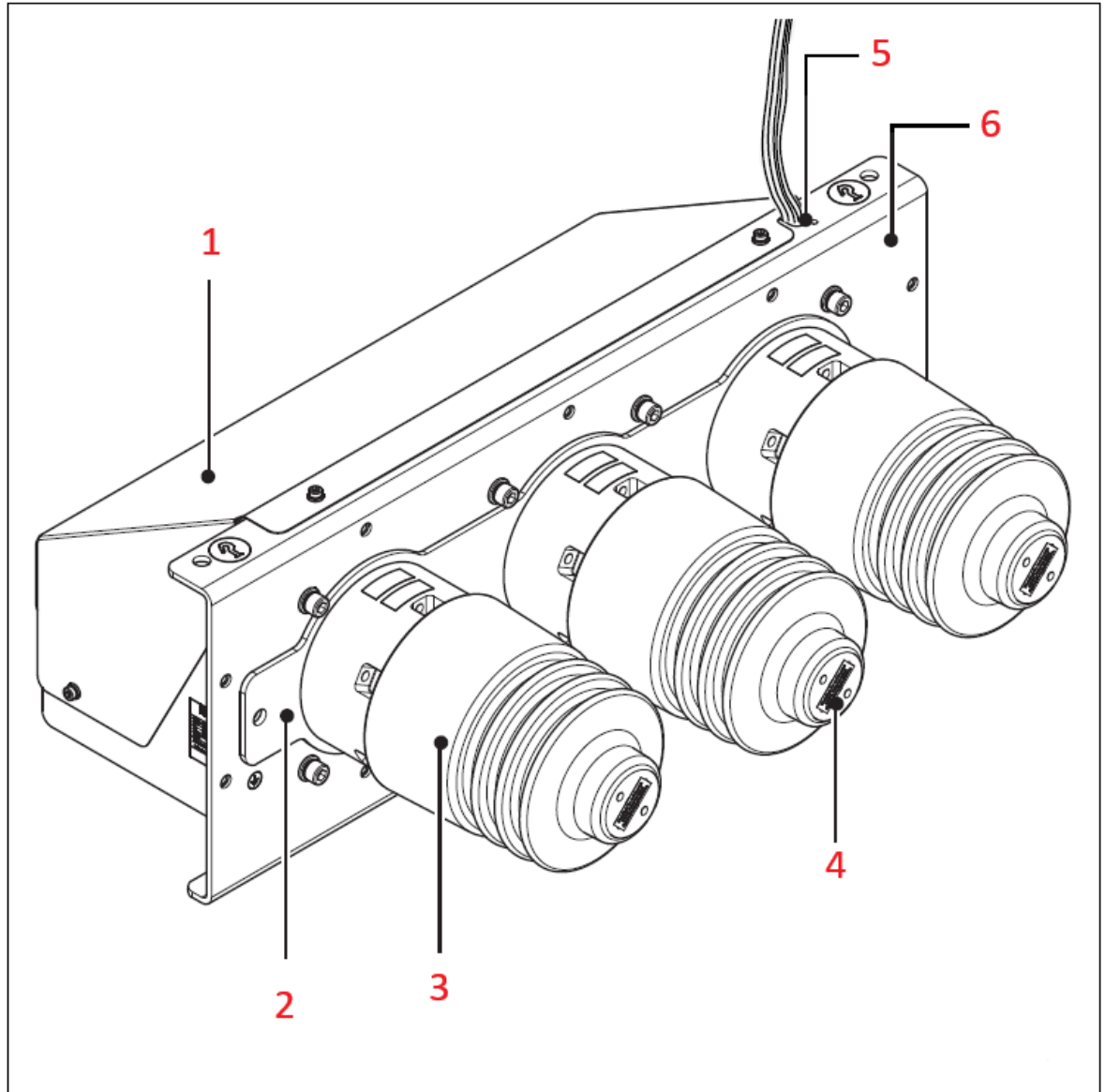
Loss of oil can cause damage! After transport or storage, the AQuench quenching device must be checked for possible oil loss and oil stains. The used mineral insulating oil is colorless and odorless. If damage occurs due to oil loss, do not use the quenching device and send it back to Arcmaq.

6 Description

6.1 Design

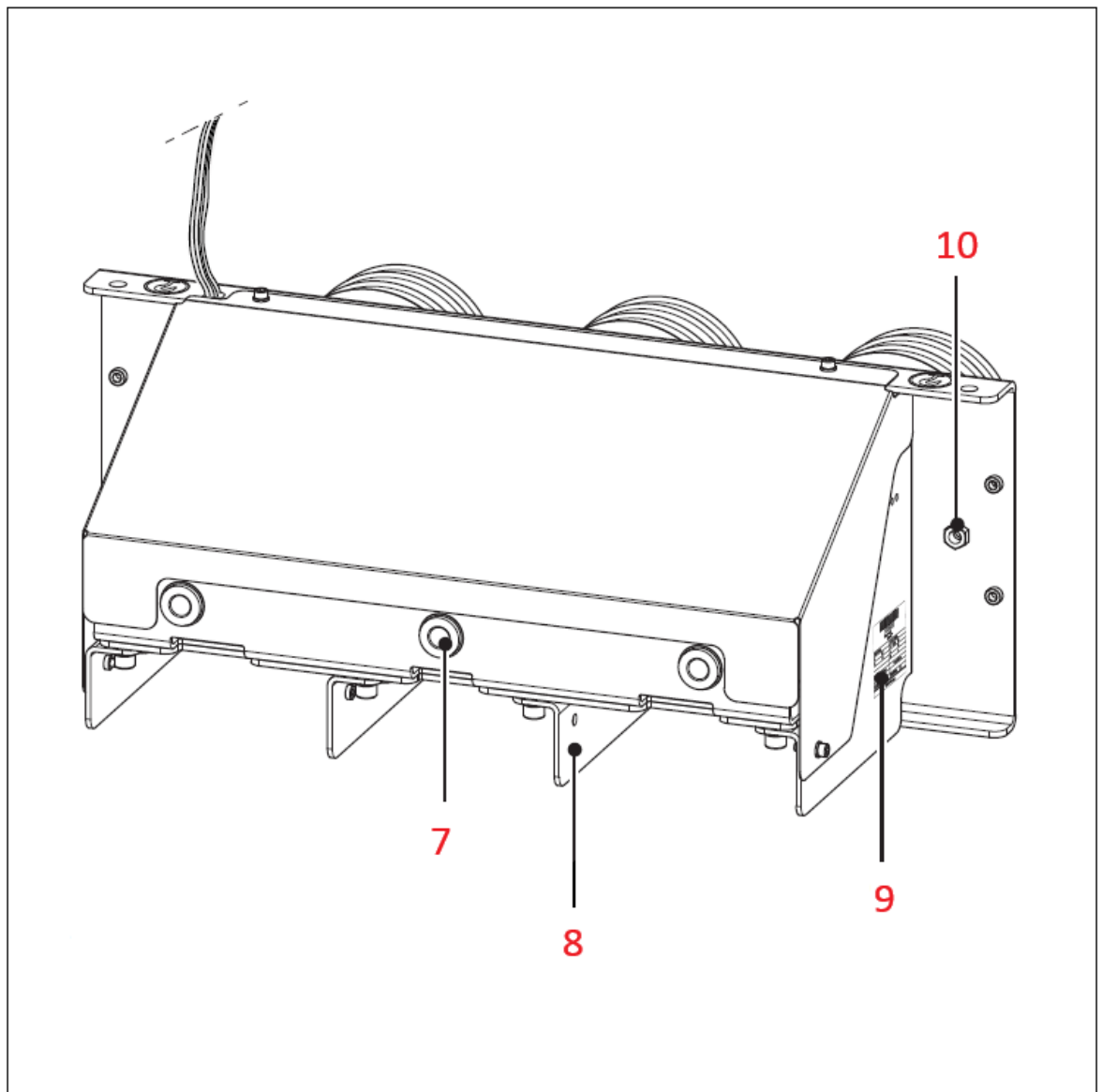
The AQuench quenching device is a three-pole switching device that consists of a high-voltage section and a charging part.

Figure. 6.1 - 5. View of the high-voltage section.



- 1) Cover
- 2) Earthing plate, short-circuit connection
- 3) Moulded epoxy housing
- 4) High-voltage connection
- 5) Control cable outlet
- 6) Base plate

Figure. 6.1 - 6. View of the charging part.



- 7) Charging part
- 8) Earthing terminal
- 9) Nameplate
- 10) Guide for the reset tool

High-voltage section

The high-voltage section consists of three poles with molded epoxy housings (no. 3 in the first diagram above) with short-circuit connection for connecting the conductor bars. The inner mechatronics for a pole consists of, for example, a position switch for the signal "Quencher ready", switching mechanism, contact and solenoid coil. The high-voltage part is connected to the charging part via the short-circuit connection, earth plate, and base plate.

Switching part

The components of the charging part (such as the position switch for oil leakage, contact rods, and charging mechanism) are protected by a cover. The guides for the reset tool for resetting the individual movable contacts are located on the rear of the quenching device.

Operation

The AQuench quenching device eliminates arcing faults in medium-voltage switchgear by producing a low-impedance current path that diverts the arc current to the new current path. The new current path is retained until the short-circuit breaking current has been interrupted by a higher-level circuit breaker.

Installation position

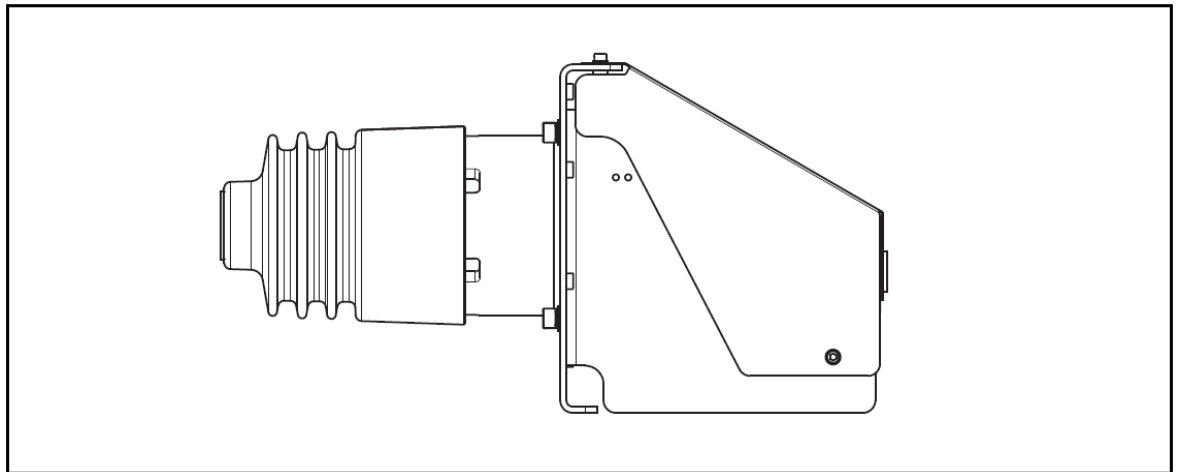


NOTICE!

Observe distances according to IEC 60071 insulation co-ordination or comply with the required air distances depending on the national operational requirements.

The AQuench quenching device can be installed either vertically or horizontally for the high-voltage connection.

Figure. 6.1 - 7. Installation position.



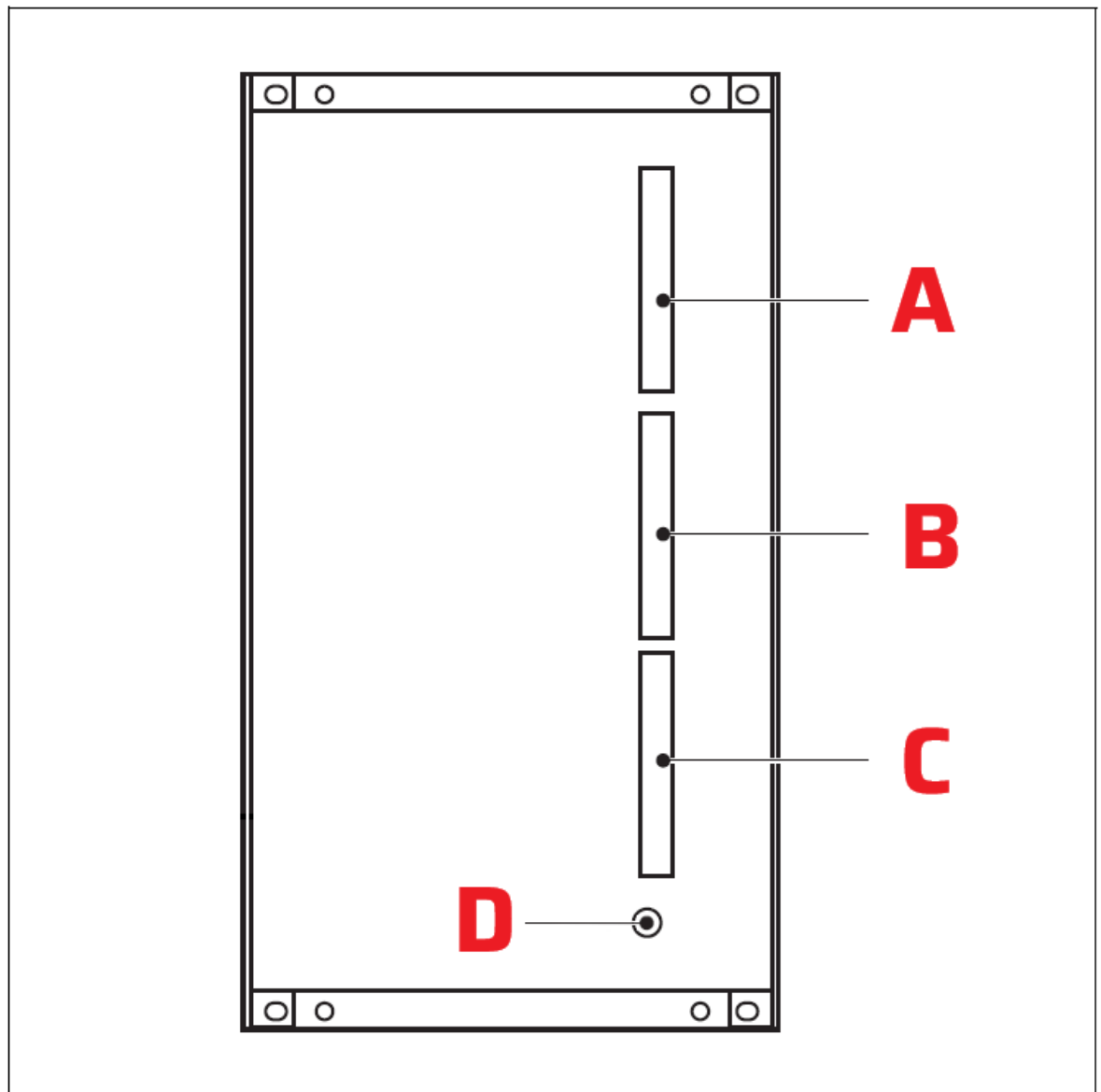
6.2 AQuench Controller Unit

The AQuench Controller Unit controls the three pole assemblies of the AQuench quenching device. The LEDs located in the controller's front panel indicate the status of the pole assemblies and their functions. The controller contains four notable terminals, as described in the table below.

Table. 6.2 - 3. Descriptions for the terminals in the controller unit.

Terminal designation	Description
A	An 8-pole socket for the AQD's 8-pole plug. It is used for the controller's power supply and AQD trip outputs (see the figure below).
B	An 8-pole socket with an 8-pole plug. It has the digital outputs.
C	An 8-pole socket for the AQD's 8-pole plug. It has the digital inputs and is used for the controller (see the figure below).
D	The fiber port which is used to connect the controller to AQ-110P or another arc protection device.

Figure. 6.2 - 8. Connections of the AQuench controller.



Please contact your Arcteq representative for access to the controller's instruction manual for further details. See the [Contact and reference information](#) chapter for how to contact Arcteq.

6.3 Technical data

Table. 6.3 - 4. Technical data for AQuench AQ-17500.

Electrical data	
Rated voltage (U_r)	17.5 kV
Rated frequency (R_f)	50–60 Hz
Rated lightning impulse withstand voltage (U_p)	95 kV
Rated short-duration power-frequency withstand voltage (U_d)	42 kV
Rated short-circuit current (I_k)	31.5 kA

Rated short-circuit duration (t_k)	3 s
Pole center distance (PCD)	170 mm
Mechanical data	
Maximum mechanical operating cycles	30 operating cycles
Maximum electrical operating cycles with short-circuit current	5 operating cycles
Weight	Appr. 60 kg

Table. 6.3 - 5. Technical data for AQuench AQ-24000.

Electrical data	
Rated voltage (U_r)	24 kV
Rated frequency (R_f)	50–60 Hz
Rated lightning impulse withstand voltage (U_p)	125 kV
Rated short-duration power-frequency withstand voltage (U_d)	50 kV
Rated short-circuit current (I_k)	50 kA
Rated short-circuit duration (t_k)	3 s
Pole center distance (PCD)	210 mm
Mechanical data	
Maximum mechanical operating cycles	30 operating cycles
Maximum electrical operating cycles with short-circuit current	5 operating cycles
Weight	Appr. 60 kg

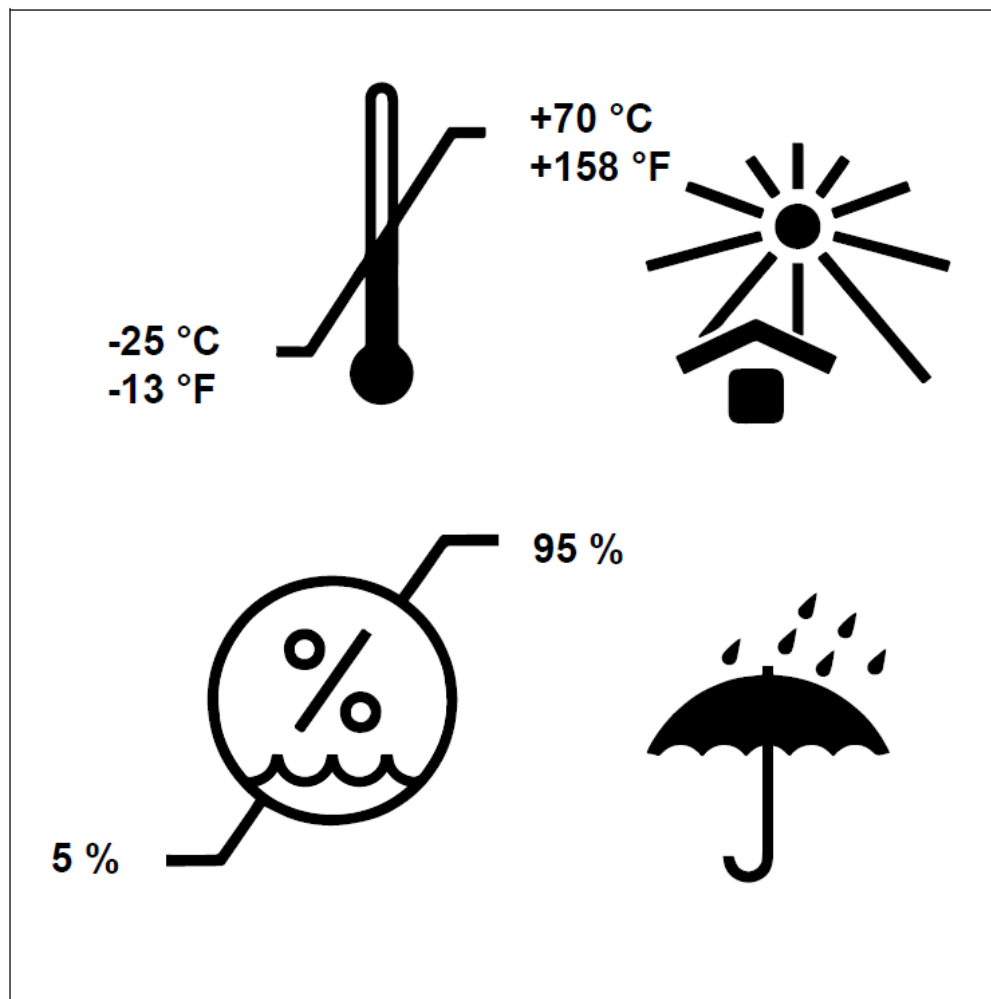
6.4 Ambient conditions

AQuench quenching devices are suitable for use in the following climate classes according to IEC 60721-3-3, as shown in the table below:

Table. 6.4 - 6. Suitable climate classes.

Climatic ambient conditions	3K22
Biological ambient conditions	3B1
Mechanically active substances	3S6 (clean insulation parts)
Mechanical ambient conditions	3M12

Figure. 6.4 - 9. Suitable ambient conditions.



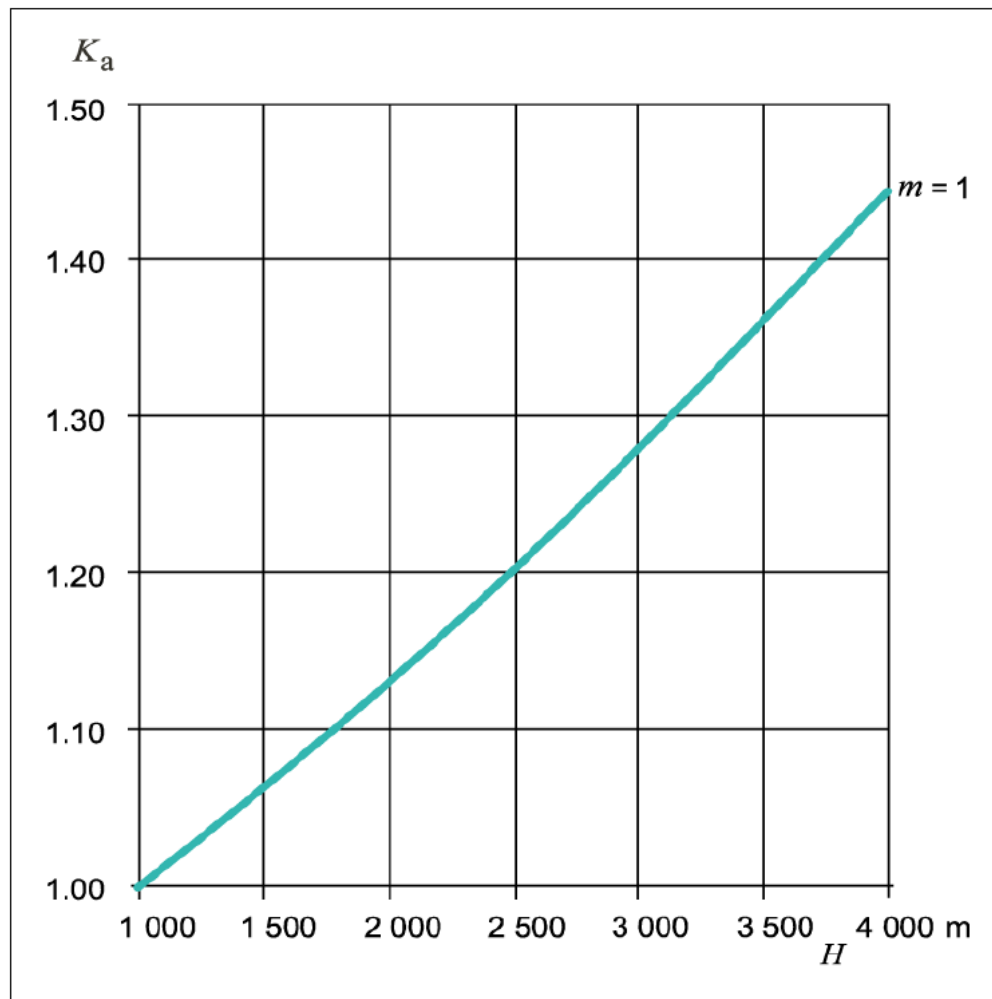
CAUTION!

Please note that humidity can reach 95 % max. per day and max. per month!

6.5 Dielectric strength

The dielectric strength of insulation in air declines with increasing altitude due to the lower air density. The values given the [Technical data](#) chapter for the rated lightning impulse voltage and the rated short-duration power-frequency withstand voltage are valid according to IEC 62271-1 up to an installation altitude of 1,000 m above sea level. Above an altitude of 1,000 m the insulation level must be corrected as shown in the figure below:

Figure. 6.5 - 10. Altitude correction factor.



The correction is calculated with the following equation:

$$U \geq U_0 \times K_a$$

, where:

- U = rated withstand voltage U under standard reference atmosphere
- U_0 = required rated withstand voltage for the installation location
- K_a = altitude correction factor (see the second equation below)
- e = e-factor ≈ 2.718

The altitude correction factor is calculated with the following equation:

$$K_a = e^{m \times (H - 1000)/8150}$$

, where:

- H = installation altitude in meters above sea level
- $m = 1$ for AC voltage, lightning impulse voltage (between phases, phase-to-earth, applied longitudinally)

Example calculation

The required rated withstand voltage is 75 kV at an altitude 2,500 meter. With the equation shown above we can calculate that an insulation level of at least 90 kV is required under standard reference atmosphere conditions:

$$U \geq U_0 \times K_a$$

$$U \geq U_0 \times e^{m \times (H-1000)/8150}$$

$$U \geq 75 \times 2.718^{1 \times (2500-1000)/8150}$$

$$\underline{U \geq 90.1538... \text{ kV}}$$

6.6 Dimension drawings

Figure. 6.6 - 11. Dimensions of AQ-17500.

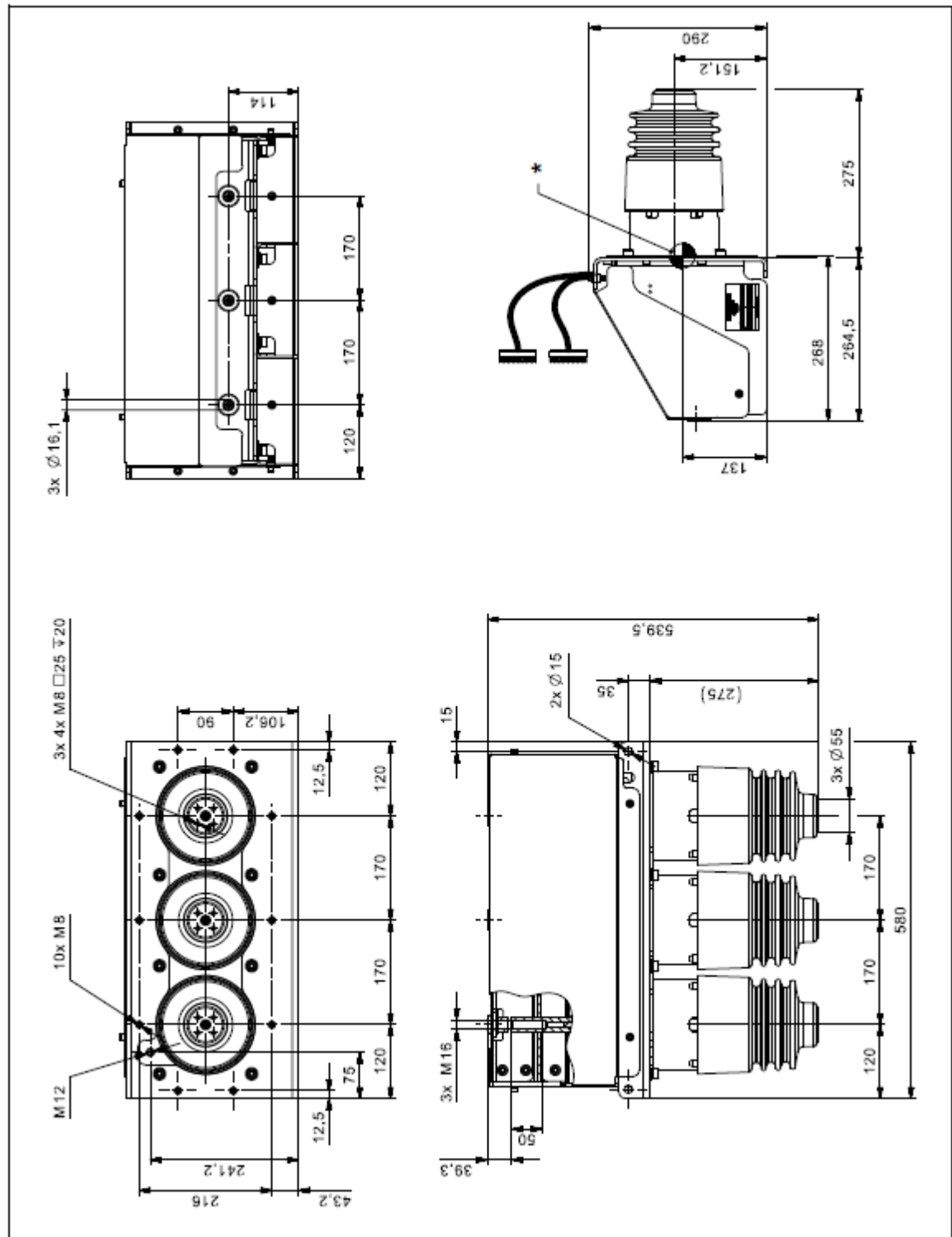
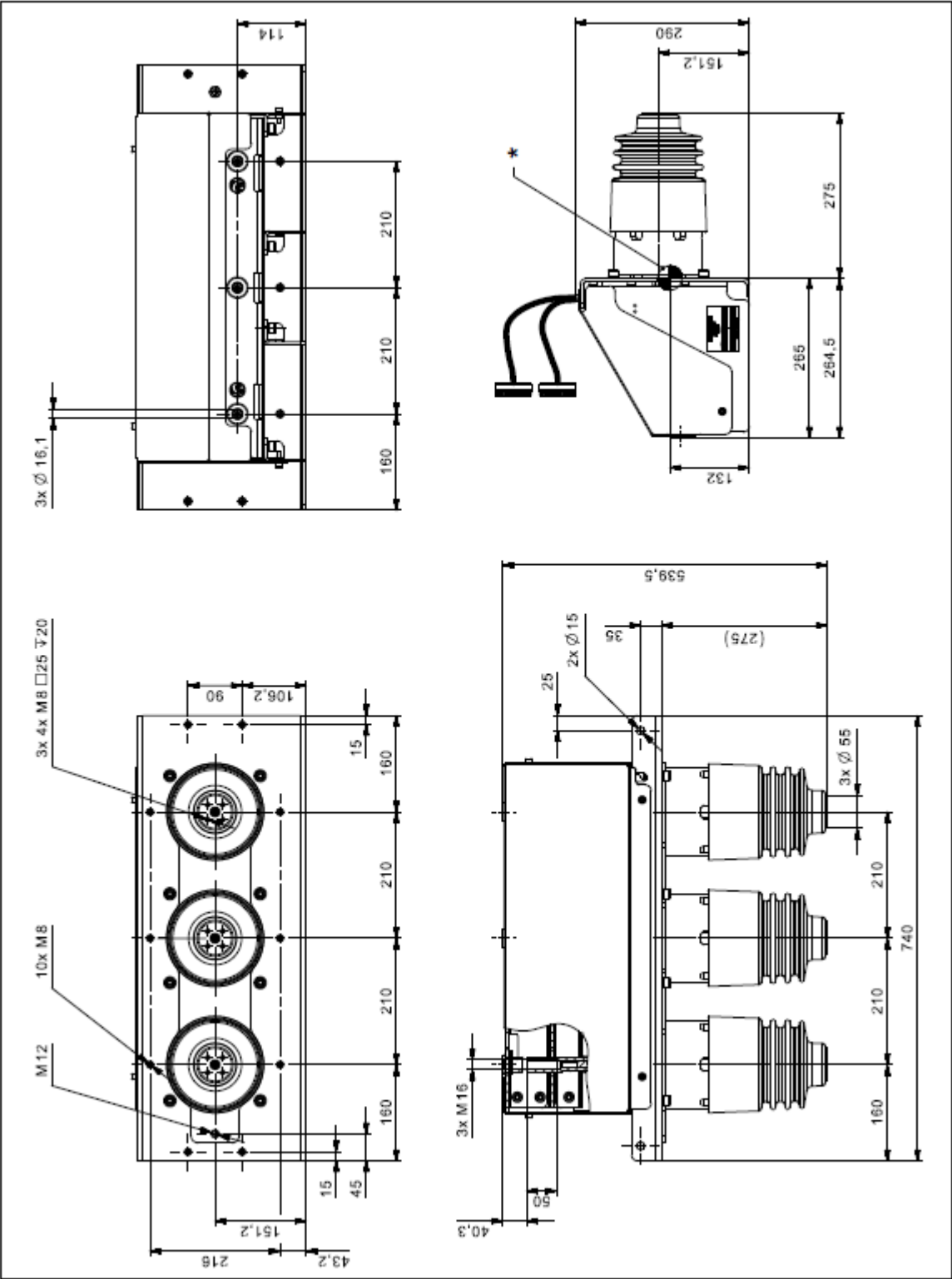
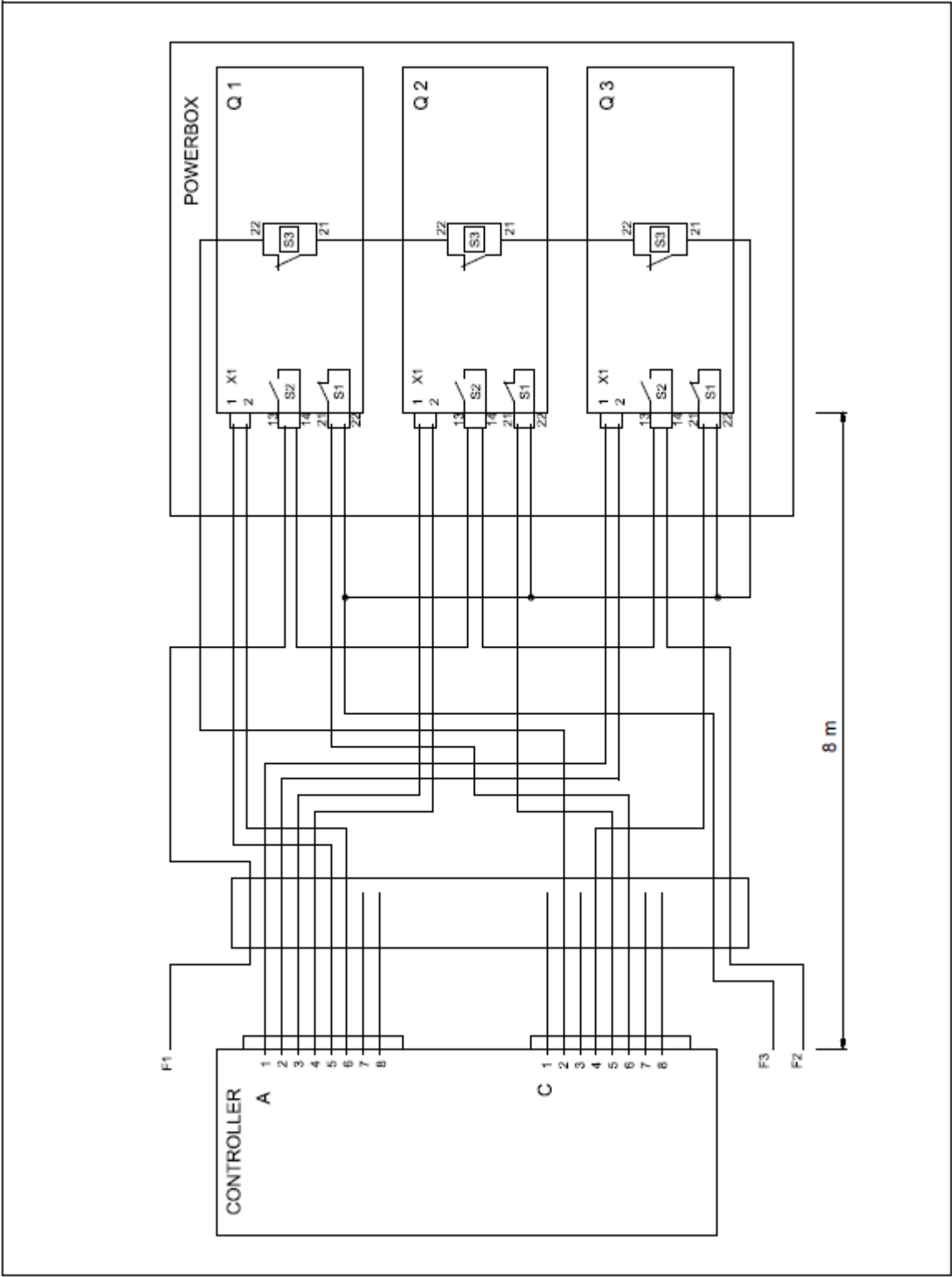


Figure. 6.6 - 12. Dimensions of AQ-24000.



6.7 Circuit diagram

Figure. 6.7 - 13. Cable connection of an AQuench quenching device and its controller.



7 Installation

7.1 Mounting and earthing



NOTICE!

Do not remove the warning sticker until right before conductor bar installation!



CAUTION!

Property damage can occur due to oil loss! If the oil screw (see the second figure below) of the moulded epoxy housing (see the figure below) is actuated, oil may leak. If oil escapes, the AQuench quenching device can no longer be used! Do not loosen or tighten the oil screw and do not damage the locking varnish.

Figure. 7.1 - 14. Insulated housing with warning sticker.

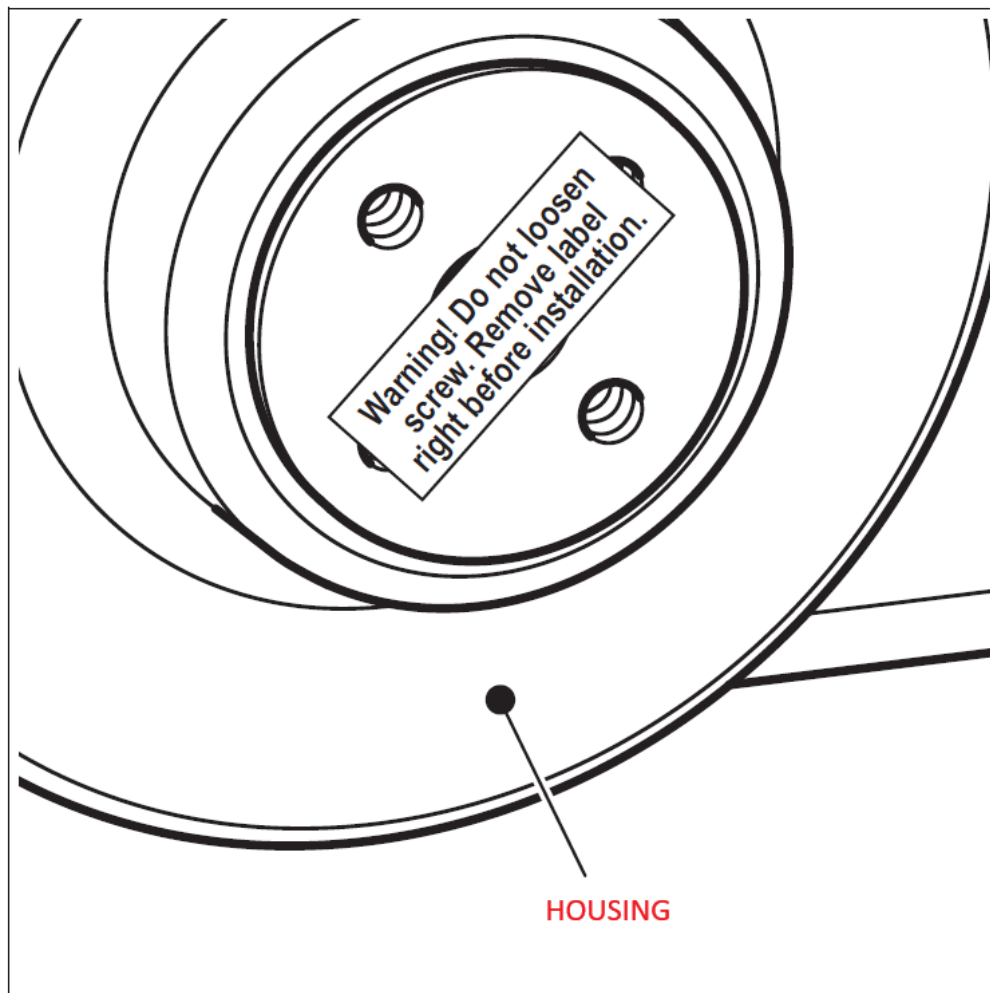
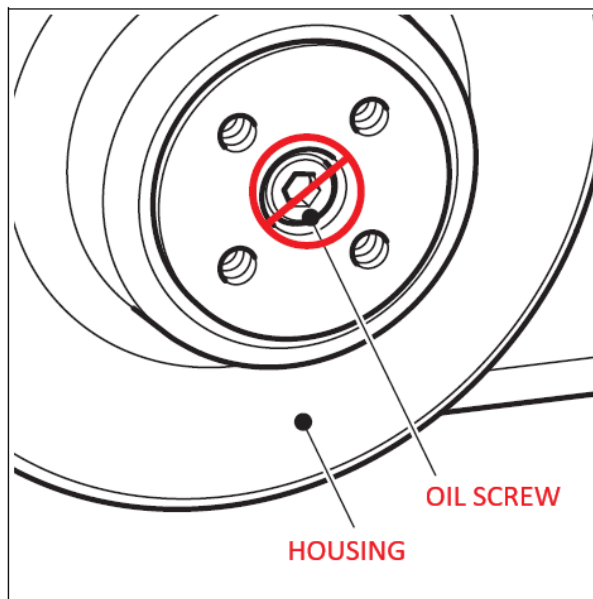


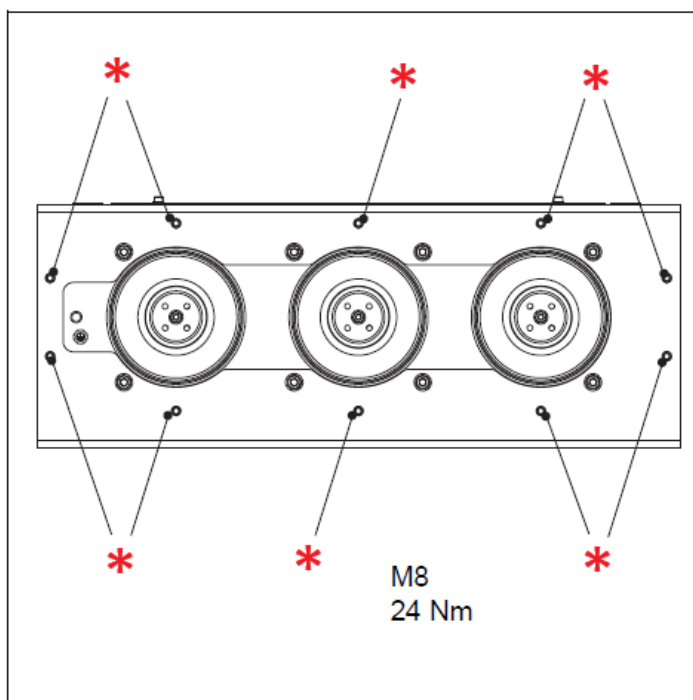
Figure. 7.1 - 15. Oil screw secured with locking varnish.



Mounting

The condition of the contacts can be determined with a continuity tester before installing the quenching device. Mount the quenching device tension-free and torsion-free at the ten (10) specified mounting points (marked with * in the following figure) on a frame, wall, or withdrawable module. Use mounting screws M8 with fastening elements, resistance 8.8, and tightening torque 24 Nm.

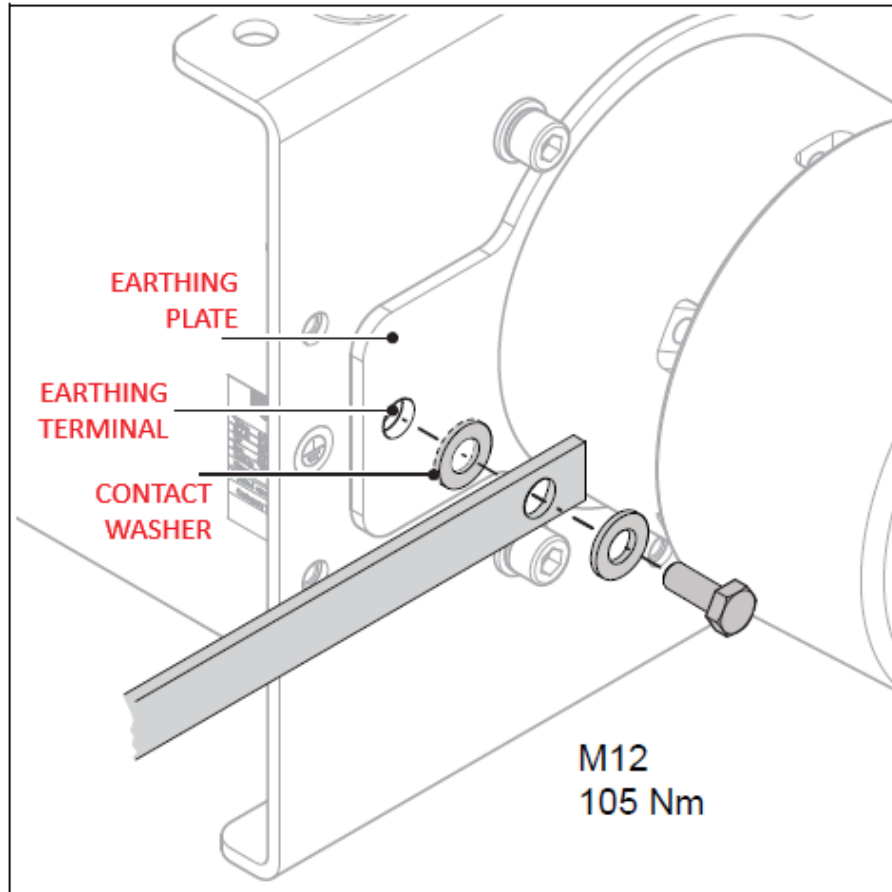
Figure. 7.1 - 16. Locations for the mounting points.



Earthing

The AQuench quenching device has an earthing plate (see the figure below) that can be connected to an earthing rail via the earthing terminal. Two contact washers (SN 70093) surround the rail, while an M12 screw (with a tightening torque of 105 Nm) fastens the rail to the plate.

Figure. 7.1 - 17. Earthing terminal with earthing rail.

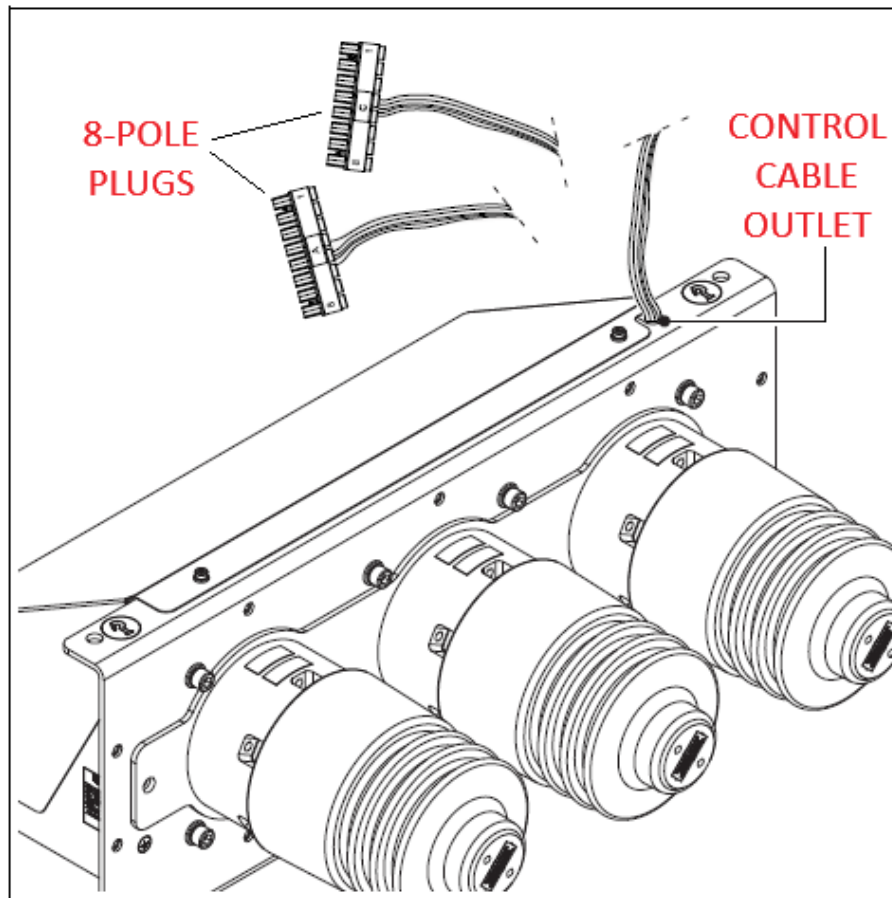


1. Dimension earthing for the complete short-circuit current.
2. Select the cross-section of the earth rail so that the rated short-circuit current, with a maximum voltage drop of 3 V, can be conducted to the provided earthing point (see IEC 62271-200).
3. Observe the order of the fixing elements: Place the washer, ring-main cable of the earthing rail and contact washer (SN 70093) with the teeth facing the operating mechanism box under the bolt head. Fix M12 hexagonal bolt with the fixing elements to the earthing terminal with 105 Nm.

7.2 Connecting low voltage

Connect the quenching device's connecting leads to the controller in such a way that safe operation (as per the supplied circuit diagram) is guaranteed. The figure below shows an example of an AQuench quenching device with a low-voltage harness with two 8-pole plugs for the controller. The plugs are connected to the quenching device via the control cable outlet.

Figure. 7.2 - 18. Low-voltage connection example.



When low voltage is applied, the release, closing, and opening of an AQuench quenching device can be checked using the controller. There are three ways to test the device tripping:

1. If the system will be tested without a protection device or a commissioning test switch, test the tripping with the AQuench software.
2. If the system has an AQ-110P or AQ-110F arc protection device, test the tripping with the protection device.
3. If your system has a protection device other than an Arcteq protection device, use the digital input to test correct tripping.

For more details on the test procedure, please contact your Arcteq representative for access to the controller's instruction manual for further details. See the [Contact and reference information](#) chapter for how to contact Arcteq.

**NOTICE!**

Remember to observe the maximum number of operating cycles. These operating cycles are recorded and counted by the controller.

7.3 Electrical connection of the main conductor

**CAUTION!**

Do not damage the contact surfaces of the connections! Do not actuate the oil screws at the connections!

Preparing the connecting surfaces

Before connections can be made, the surfaces of the AQuench quenching device need to be prepared:

1. Remove the stickers from the contact surfaces of the poles.
2. Use a steel brush to carefully brush (cross-wise) the contact surfaces of the cable lugs or conductor bars until they are metallic bright; additionally, wipe off any residue using a clean cloth.
3. After cleaning, very lightly grease the bright contact surfaces with acid-free Vaseline (for example, Shell-Vaseline 8420) and screw together immediately.

Figure. 7.3 - 19. Cleaning the contact surfaces of the poles.

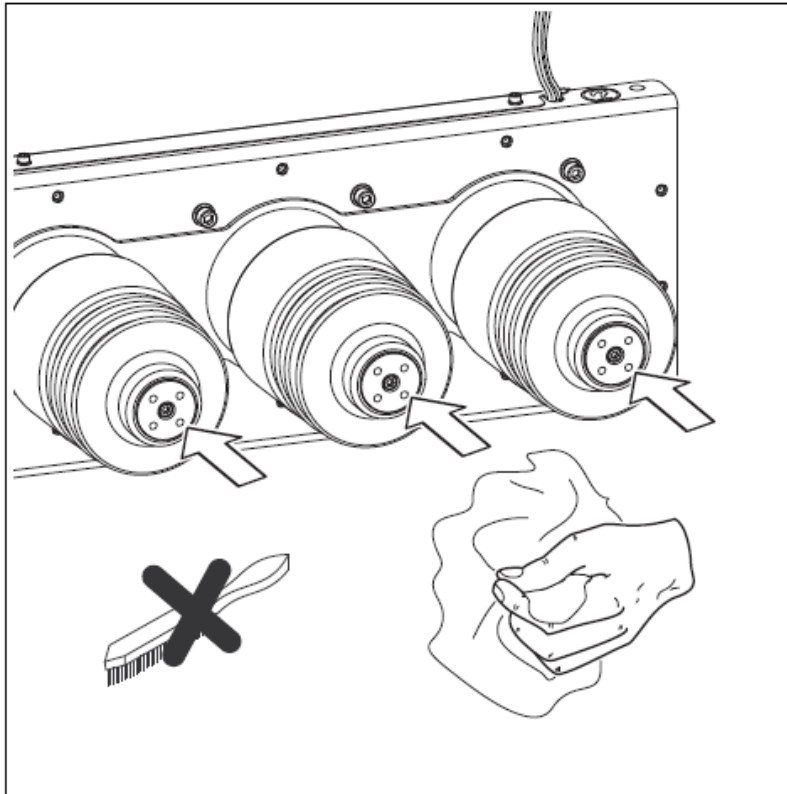
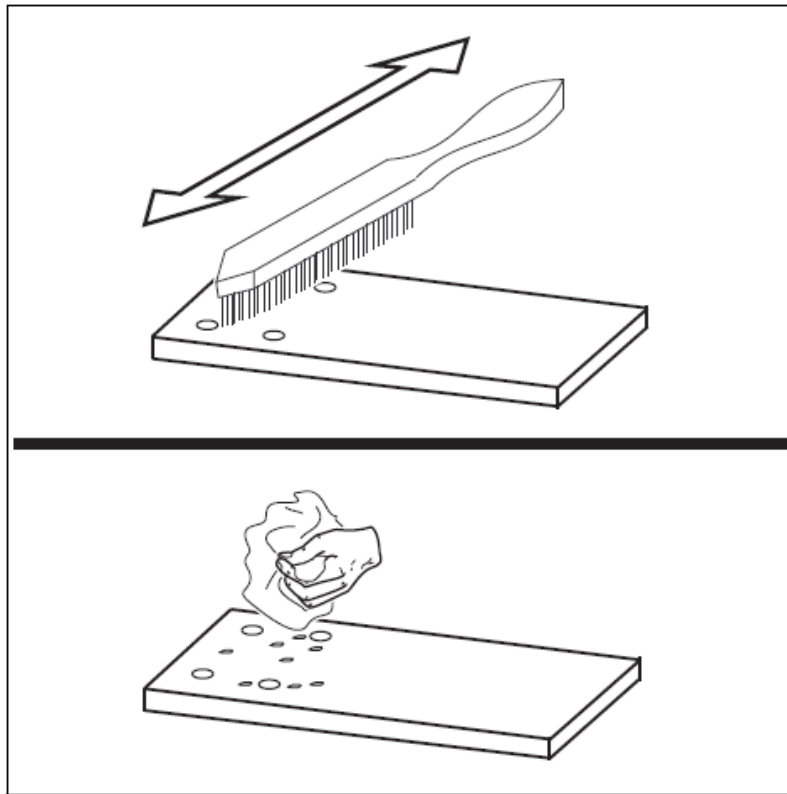


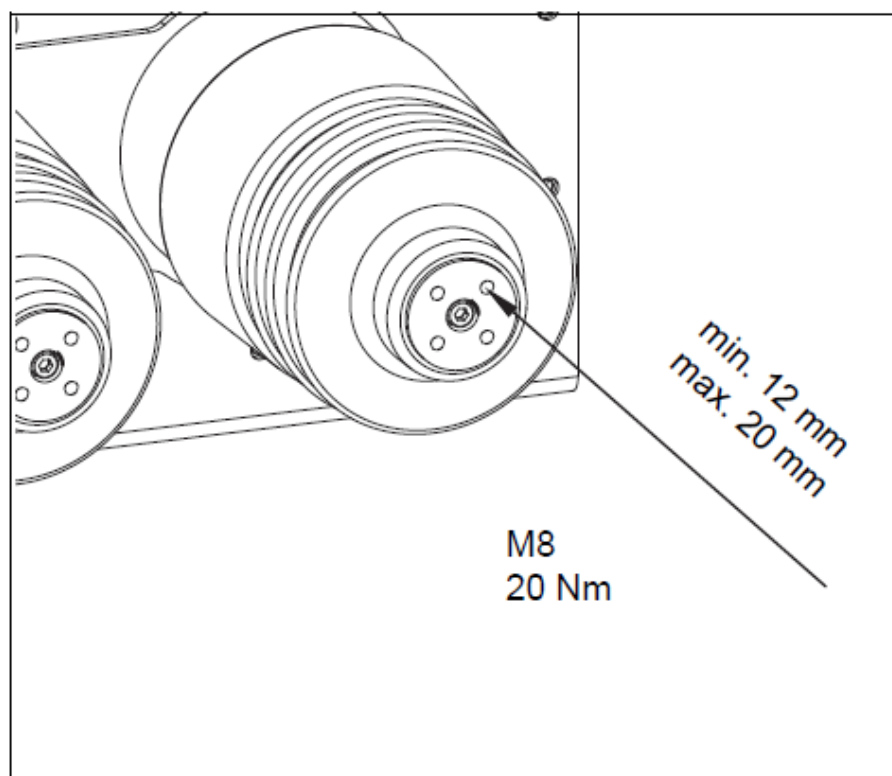
Figure. 7.3 - 20. Cleaning the connecting surfaces of the conductor bars.



Screw-in depths

Ensure the use of M8 threads and their screw-in depths: the depth must be at least 12 mm but no more than 20 mm (see the figure below). Their tightening torque is 20 Nm. For further installation dimensions, see the [Dimension drawings](#) chapter.

Figure. 7.3 - 21. Screw-in depths.



Permissible shear and tensile forces

CAUTION!

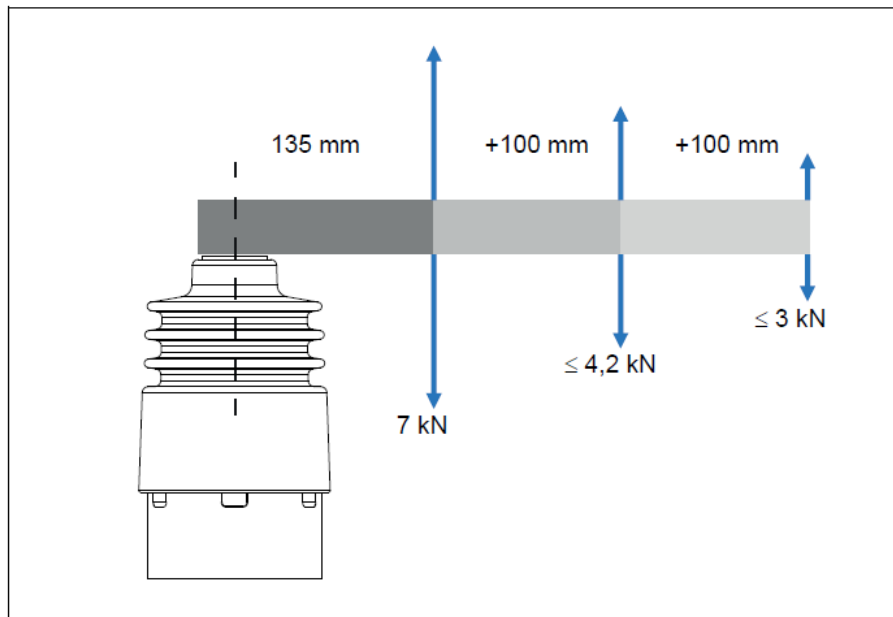
There is risk of damage if shear and tensile forces exceed 7 kN! During installation and operation, please ensure that the moulded-plastic housing of the switching devices is not subjected to shear forces exceeding 7 kN if the length of the arm is 135 mm.



If the arm length is 235 mm, the permissible shear force is reduced to 4.2 kN. For a lever arm of 353 mm, in turn, the permissible shear force is down to 3 kN. Please refer to the figure below for an illustration of the arm lengths and their permissible shear forces.

The conductor bars must be positioned so that no significant forces need to be absorbed by the moulded-plastic housing during installation. Suitable measures must be taken to ensure that the current forces that occur in the connection bars in the event of a short circuit do not exceed the maximum permissible shear forces.

Figure. 7.3 - 22. Permissible shear forces for three arm lengths.



Mounting conductor bars

Adjust the conductor bars so that, before fastening, they lie flat easily and fit the holes on the connecting surfaces of the poles. Corresponding to the rated current strength, use M8 screws (strength class 8.8) and the appropriate spring elements and washers for connection of the conductor bars. The tightening torque for M8 screws is 20 Nm. Please note that tightening torques only apply to greased threads! Attach the conductor bars tension-free and torsion-free to the contact surfaces of the poles. Further steps for connecting the prime conductors are not described here and are performed by the customer.

In the figures below are presented the two positions for the conductor bars: angled (first figure) and straight (second figure).

Figure. 7.3 - 23. Cconductor bars angled position.

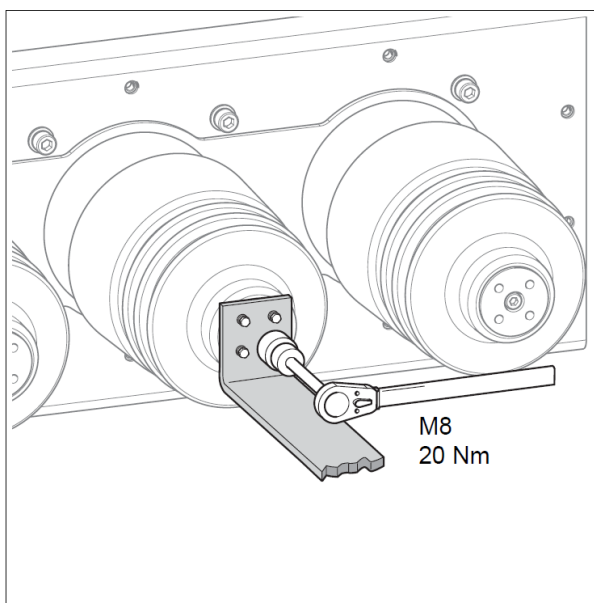
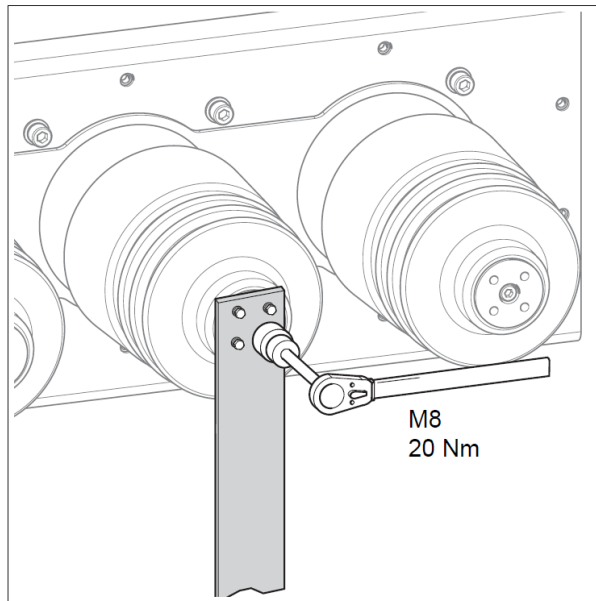


Figure. 7.3 - 24. Conductor bars straight position.



8 Operation

8.1 Commissioning


DANGER!

High voltages are a danger to life! Do not touch live parts – touching live parts causes an electric shock!

The AQuench quenching device is designed for 30 mechanical switch operations without loads.

All test switching operations are recorded with the operations counter in the controller.

Before testing, please ensure that the following actions have been completed:

- The control cables must be connected to the corresponding controller in accordance with the circuit diagram.
- The AQuench controller must have been commissioned according to the instructions (please contact your Arcteq representative as presented in the [Contact and reference information](#) chapter to acquire the controller's separate instruction manual for details).
- The high-voltage side of the quenching device must be connected to the conductor bars of the system.

Before commencing with commissioning, all the items in the following testing checklist must be verified to ensure that the quenching device is functioning faultlessly.


NOTICE!

Operating can only be done by qualified personnel!

The AQuench Arc Quenching Device can only be operated by qualified personnel who are familiar with the operating instructions detailed in this instruction manual and who observe all the warning notices contained within it.

Checklist


WARNING!

There is a risk of injury if the quenching device malfunctions or is otherwise faulty or damaged!

- Immediately take the quenching device out of operation.
- Do not put the quenching device back into operation.
- If the malfunctions or damage cannot be remedied, contact your Arcteq sales representative or Arcteq technical support ([Contact and reference information](#)).
- If necessary, send the quenching device back to Arcteq in its original packaging.

Table. 8.1 - 7. Checklist for commissioning an AQuench quenching device.

	Check item	Checked?	Notes
1.	Does the information on the nameplate match the order data?		
2.	Ensure correct operating voltage.		

3.	Is the ambient temperature in the supported temperature range of -25 °C...+70 °C (-13 °F...+158 °F)?		
4.	Check that the control supply voltage and the performance data of the low-voltage network are correct.		
5.	If necessary, clean the quenching device of any impurities (see the Electrical connection of the main conductor chapter for further details).		
6.	Check that the bolted joints are properly torqued.		
7.	Check that the plug connections are seated firmly.		
8.	Make sure that all three contacts of the quenching device are open before the switchgear is supplied with voltage on the primary side.		
9.	If test switching operations are carried out: • Ensure that the controller is in operation. • The controller must display the message "Quencher Ready" for all three phases with a green LED which indicate that their contacts are open. If all of the three LEDs are not green (meaning that the contacts are not open), begin troubleshooting. • Ensure that the "Power ON" command was generated via the controller and that the quenching device switched.		
10.	Test the electric switching before the quenching device is put into operation in the network.		

NOTICE!



The commissioning procedure may require additional knowledge regarding the controller unit's inner working. In such a case please contact your Arcteq representative to gain access to the controller's separate instruction manual.

Refer to the [Contact and reference information](#) chapter for how to contact Arcteq.

8.2 Troubleshooting

Table. 8.2 - 8. Troubleshooting guide for the AQuench quenching device.

Incident	Troubleshooting
The contacts of the quenching device are not in the open position.	1. Ensure that the controller is in operation. Observe the display. 2. Use the charging mechanism to move the contacts in all three poles to the open position. To do this, turn the reset tool to the right up to the noticeable end stop. The maximum tightening torque is 100 Nm. 3. Unscrew the reset tool to the left and remove it. 4. The controller must display the message "Quencher Ready" ("Contacts open") for all three phases with the three green LEDs.
There is a failure of the control voltage U_a .	• Check that the plugs on the controller are firmly seated. • Check the cable connection to the plugs.
The quenching device does not respond.	• Check whether the plugs of the position switches are inserted. To do so, remove the cover as shown in the Maintenance and servicing chapter.
Oil loss	• Return the complete quenching device to Arcteq (see the Contact and reference information chapter for details).

8.3 Ready for operation

If all functions have been checked and are OK, switch on the high voltage while observing all of the safety regulations and operational requirements.

8.4 Restoring operational readiness after tripping



DANGER!

High voltages are a danger to life! Do not touch live parts – touching live parts causes an electric shock!

After the quenching device has been tripped by a short circuit, the charging mechanism must be reset in all poles.

Before beginning work, note the five safety rules for high-voltage equipment specified in EN 50110-1:

- Isolate from the power supply.
- Secure against reclosing.
- Verify safe isolation from the power supply.
- Earth and short-circuit.
- Cover or cordon off neighbouring live parts.



NOTICE!

This step requires an AQuench reset tool and an open-end spanner or a socket spanner, size 24.

Actuating the charging mechanism (all poles tripped)

If all three poles have been tripped, the LEDs on the controller's top LED group signal the LED statuses shown in the first table below. Please note that the other lines in the LED group can show different statuses and are therefore not shown here! The second table shows the LED statuses in the controller's bottom LED group when the three poles have been tripped.

Table. 8.4 - 9. LED status in the controller's top LED group when all three poles have tripped.

LED 1	LED 2	LED 3	Function	Status of the LEDs
Phase 1	Phase 2	Phase 3	Tripped	All three LEDs are red
Phase 1	Phase 2	Phase 3	Quencher ready	All three LEDs are off
Unblocked	–	Blocked	Trip output	First LED is green, others are off

Table. 8.4 - 10. LED status in the controller's bottom LED group when all three poles have tripped.

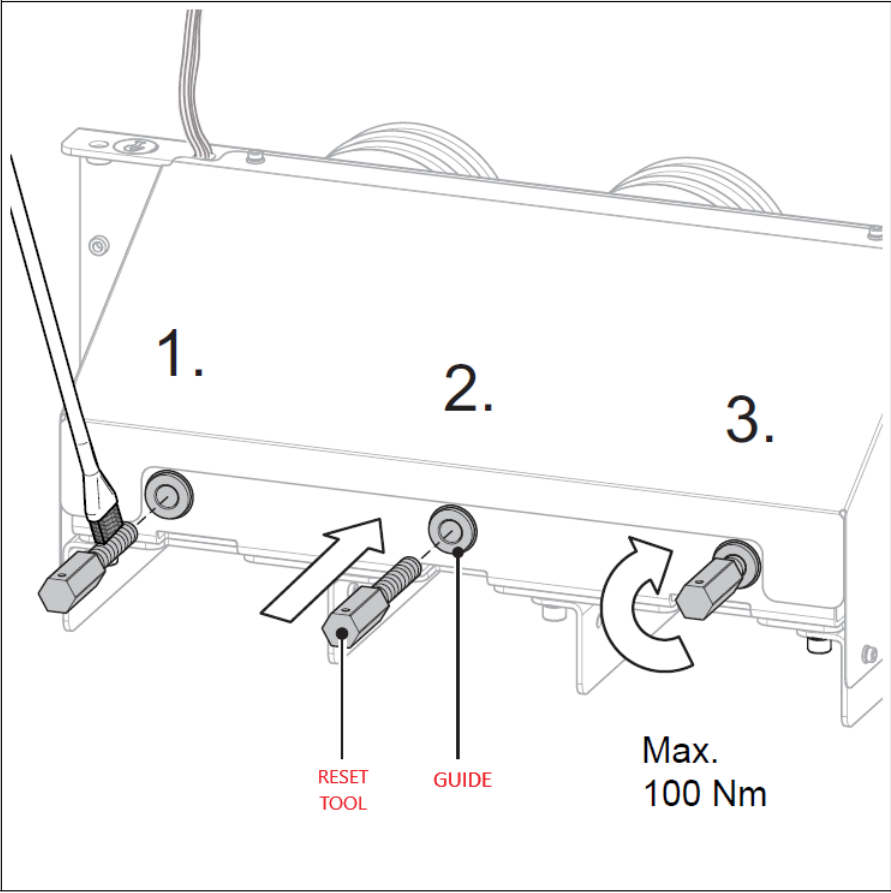
Function	Status of the LED
Error	Off
Diagnosis	Yellow LED flashes (= action required)
Ready	Green

Actuating the charging mechanism (establishing operational readiness)

Establish operational readiness by following these steps (see also the figure below):

1. Lubricate the thread of the reset tool with Isoflex Topas L32 or another suitable grease.
2. Insert the reset tool into the provided guides and screw it in. Please note that the actuating torque is relatively low at the beginning and then increases significantly.
3. Screw in the reset tool up to a noticeable end stop (their maximum tightening torque is 100 Nm).
4. Unscrew the reset tool (turn it to the left) and remove it.
5. Perform this process (steps 1–4) for all three poles.

Figure. 8.4 - 25. Steps to establish operational readiness.



Actuating the charging mechanism (operational readiness established)

When all three poles are ready for operation (meaning that operational readiness has been successfully established), the top LED group on the controller signals the LED statuses shown in the first table below. The second table shows the LED statuses of the bottom LED group when operational readiness has been established.

Table. 8.4 - 11. LED status in the controller's top LED group when all three poles are ready for operation.

LED 1	LED 2	LED 3	Function	Status of the LEDs
Phase 1	Phase 2	Phase 3	Tripped	All three LEDs are off
Phase 1	Phase 2	Phase 3	Quencher ready	All three LEDs are green
Unblocked	–	Blocked	Trip output	First LED is green, others are off

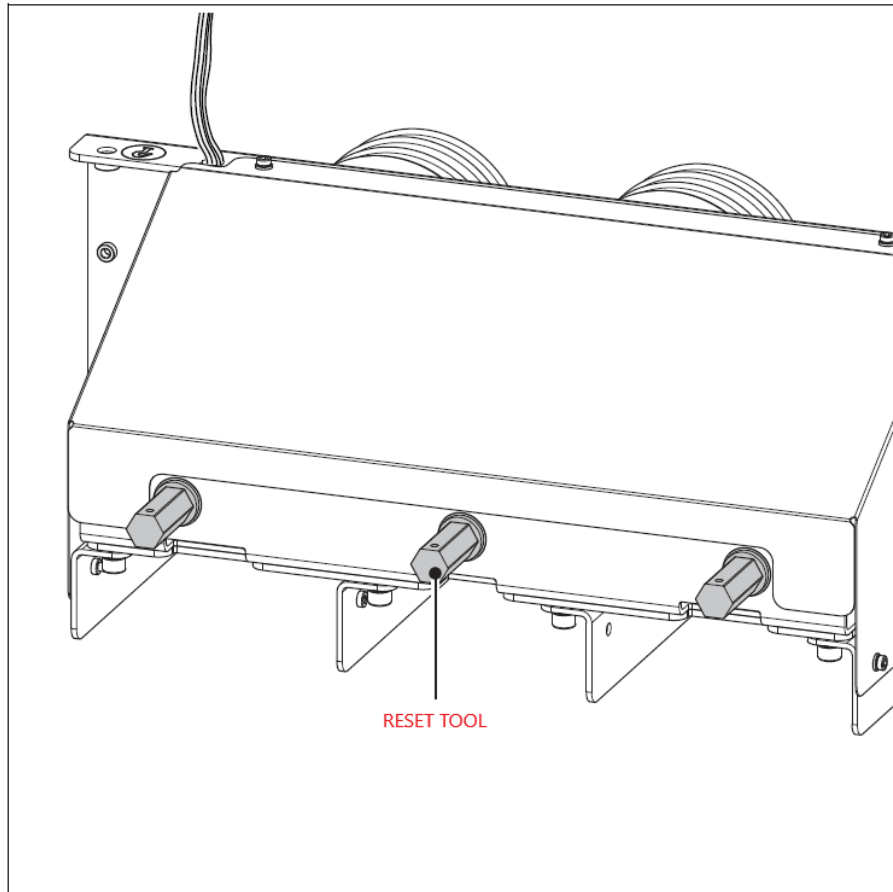
Table. 8.4 - 12. LED status in the controller's bottom LED group when all three poles are ready for operation.

Function	Status of the LED
Error	Off
Diagnosis	Off
Ready	Green

Mechanical interlock

If charging tools are completely screwed into the provided guides of the quenching device as far as they will go, a mechanical interlock is active in the respective pole. As long as the reset tools have not been turned back and removed, the quenching device is mechanically locked (as shown in the figure below). This means that closing is not possible.

Figure. 8.4 - 26. Mechanical interlock in all three poles.



WARNING!

Incorrect operation will cause material damage! If the AQuench quenching device is manually released when the reset tool is partially screwed in, the charging mechanism of the quenching device is irreparably damaged. Warranty claims will be invalidated by such incorrect operation!



- If the reset tool is partly screwed in, secure the quenching device against release using suitable means.
- Completely screw in (or unscrew and remove) the partially screwed-in reset tool.

When all three poles are ready for operation but at least one or more reset tools are still plugged in, the top LED group on the controller signals the LED statuses shown in the first table below. The second table shows the LED statuses in the controller's bottom LED group when all three poles are ready for operation but one or more reset tools are still plugged in.

Table. 8.4 - 13. LED status in the controller's top LED group when all three poles are ready for operation but one or more reset tools are still plugged in.

LED 1	LED 2	LED 3	Function	Status of the LEDs
Phase 1	Phase 2	Phase 3	Tripped	All three LEDs are off
Phase 1	Phase 2	Phase 3	Quencher ready	All three LEDs are green
Unblocked	–	Blocked	Trip output	Last LED is red, others are off

Table. 8.4 - 14. LED status in the controller's bottom LED group when all three poles are ready for operation but one or more reset tools are still plugged in.

Function	Status of the LED
Error	Off
Diagnosis	Off
Ready	Green

The mechanical interlock can be released by completely unscrewing and removing the reset tools in all poles.

9 Maintenance

CAUTION!

The manufacturer's product liability shall be excluded if at least one of the following criteria applies:



1. The spare parts used with the AQuench quenching device have not been obtained via Arcteq.
2. Fitters carrying out replacements have not been trained and certified by Arcteq.
3. Parts have been incorrectly mounted or adjusted.
4. Settings are not made in accordance with Arcteq specifications.

9.1 Maintenance and servicing



CAUTION!

The AQuench quenching device must be taken out of the system or the switch cabinet for maintenance work!

AQuench quenching devices can be operated maintenance-free in the switchgear for 20 years, and regular visual checks are recommended (see the "Visual checks" section below). In case of frequent temperature fluctuations, lubrication of the sliding surfaces of tongues and springs is recommended (see the "Maintenance" section below).

Visual checks

Visual checks are recommended to be carried out during operation. Please ensure that all markings have good legibility and that there are no oil stains as those may indicate oil loss.

Cleaning

The insulating parts must be clean if their dielectric strength is to be guaranteed. Rub insulating parts with a moist cloth. As a cleaning agent, use only warm water with a mild, liquid household cleaner added into it and leave to dry.

Maintenance

The following work is recommended in case of frequent temperature fluctuations (a size 5 spanner for the hexagon socket screws is required):

1. Unscrew the hexagon socket screws of the cover with the size 5 spanner to remove the cover and lift the cover off (see the first figure below).
2. Apply Isoflex Topas L 32 to the sliding surfaces of the tongues and springs in all poles (the lubrication points are marked with a red asterisks * in the second figure below).
3. Mount the cover with the M6 hexagon socket screws and washers (tightening torque: 10 Nm).

Figure. 9.1 - 27. Detaching and mounting the cover.

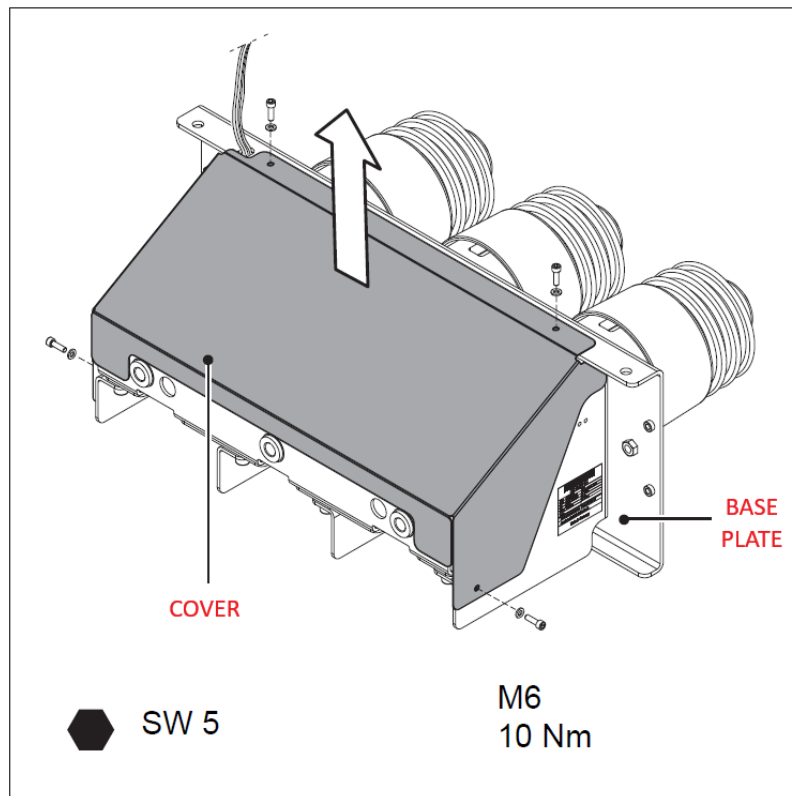
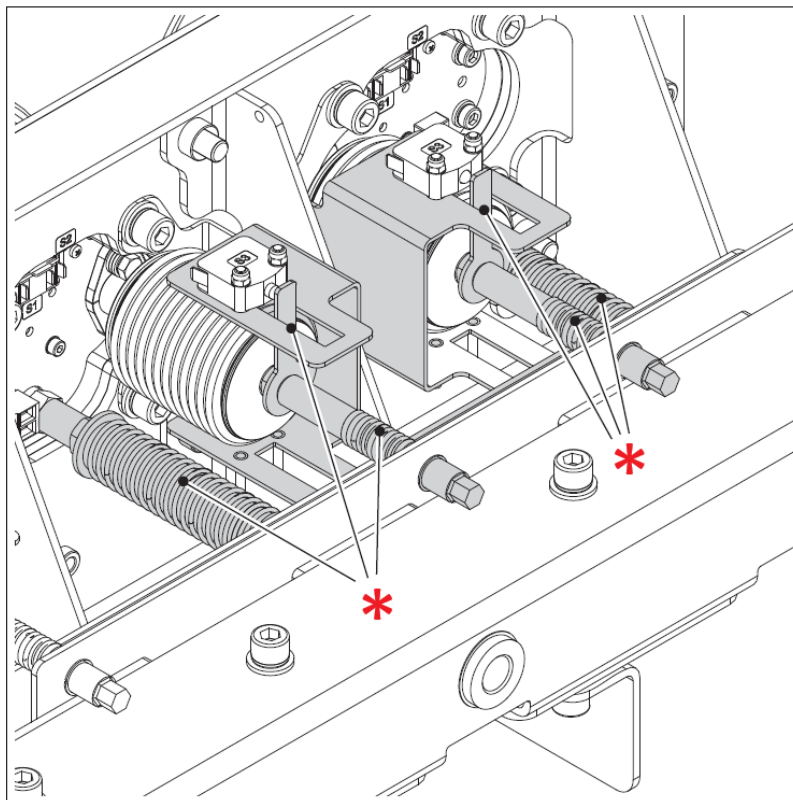


Figure. 9.1 - 28. Lubrication points.



9.2 Accessories and spare parts

To ensure that the device operates reliably, spare parts must be replaced only by trained and certified personnel (please refer to the [Maintenance](#) chapter). Disconnect the AQuench quenching device from the control feed voltage or switch it off, and release the low-voltage connector or terminal connection. Remove the quenching device from the system or the switch cabinet for maintenance work.

Table. 9.2 - 15. Available AQuench accessories and spare parts.

Accessory / Spare part	Order code (if applicable)	Notes
Instruction manual for the AQuench Arc Quenching Device	–	Available for download on the Arcteq website (arcteq.com).
Instruction manual for the AQuench Controller Unit	–	Please contact your Arcteq representative for access to the controller's instruction manual. See the Contact and reference information chapter for the contact details.
AQuench Controller Unit	SP-CTRL	
AQuench reset tool	SP-AQUENCH-RST	
Quencher connection fiber	AX001-3 AX001-5 AX001-10 AX001-20	Available lengths are 3 meters, 5 meter, 10 meters, and 20 meters (indicated by the last number in the order code).



NOTICE!

For spare part orders, always indicate the order code and the serial number of the AQuench quenching device in accordance with the nameplate!

9.3 Disposal

The materials of the AQuench quenching device should be recycled when possible. Disposal of the quenching device with minimum environmental impact is possible on the basis of existing legal regulations. The switching device's metal components can be recycled as mixed scrap, although it is more environmentally sustainable to dismantle the device as thoroughly as possible into sorted scrap and residual mixed scrap. Electronic scrap must be disposed of in accordance with applicable regulations.

Materials

An AQuench quenching device consists of the following materials:

- Steel (partly phosphatised, galvanised and CrVI-free passivated)
- Copper or aluminium
- Brass bushings with max. 3 % lead
- Insulating material (cycloaliphatic epoxy resin)
- Rubber materials
- Cable harness: halogen-free insulated cables
- Insulating fluid: mineral insulating oil

- Lubricant

For more information regarding declared or restricted substances in this product, contact Arcteq by email (see the [Contact and reference information](#) chapter).

Packaging

If the packing is no longer needed, it can be fully recycled.

Hazardous substances

When delivered by Arcteq, the product does not contain any hazardous substances within the scope of [REACH](#) (Registration, Evaluation, Authorisation and Restriction of Chemicals) by the European Union. The AQuench Arc Quenching Device is free from asbestos, halogens, and lead. All applicable local laws and regulations must always be complied with!

10 Ordering information

Figure. 10 - 29. Order code for AQ-17500.

AQuench quenching device (17.5 kV)	AQ - 17500
Standard features	
Arc quenching device (17.5 kV)	
31.5 kA (3 s)	
BIL: 95 kV	
Resettable	
Mechanical life: 30 operations	
Electrical life: 5 operations	
Auxiliary supply: 110...250 V AC/DC	
Phase conductor displacement: 170 mm (total width 580 mm)	
Included:	
* AQuench controller unit	
* reset tool for the quenching device	
* connection cables	
Accessories	
Connection fiber (3 meters)	AX001 - 3
Connection fiber (5 meters)	AX001 - 5
Connection fiber (10 meters)	AX001 - 10
Connection fiber (20 meters)	AX001 - 20

Figure. 10 - 30. Order code for AQ-24000.

AQuench quenching device (24.0 kV)	AQ - 24000
Standard features	
Arc quenching device (24 kV)	
50 kA (3 s)	
BIL: 125 kV	
Resettable	
Mechanical life: 30 operations	
Electrical life: 5 operations	
Auxiliary supply: 110...250 V AC/DC	
Phase conductor displacement: 210 mm (total width 740 mm)	
Included:	
* AQuench controller unit	
* reset tool for the quenching device	
* connection cables	
Accessories	
Connection fiber (3 meters)	AX001 - 3
Connection fiber (5 meters)	AX001 - 5
Connection fiber (10 meters)	AX001 - 10
Connection fiber (20 meters)	AX001 - 20

NOTICE!

All AQuench deliveries include the following components:



- One (1) AQuench quenching device (AQ-17500 or AQ-24000) with a copper connection cable,
- One (1) AQuench controller unit, and
- One (1) Reset tool for the quenching device.

If you require any single individual component, please contact your Arcteq representative (see the [Contact and reference information](#) page at the end of this manual).

NOTICE!

Please note that the connection cable that comes with the AQuench device can only be used to connect the quenching device to the controller unit. You also need to order a connection fiber in the length required by your application. These can be found in the "Accessories" list in the images above.

Table. 10 - 16. AQuench components and their manufacturer codes.

Arcteq code	Manufacturer code	Description
AX175	3AM4832-1DA12-0AB3	AQuench three-phase quenching device: • Rated voltage: up to 17.5 kV • Short-circuit withstand: 31.5 kA • Pole center displacement (PCD): 170 mm
AX240	3AM4843-3DA12-0AB3	AQuench three-phase quenching device: • Rated voltage: up to 24.0 kV • Short-circuit withstand: 50.0 kA • Pole center displacement (PCD): 210 mm
SP-CTRL	3AX6211-1B	AQuench controller unit
SP-AQUENCH-RST	3AX6210-1A	Reset tool for the quenching device

11 Contact and reference information

Manufacturer

Arcteq Relays Ltd.

Visiting and postal address

Kvartsikatu 2 A 1
65300 Vaasa, Finland

Contacts

Phone:	+358 10 3221 370
Website:	arcteq.com
Technical support:	arcteq.com/support-login +358 10 3221 388 (EET 9:00 – 17.00)
E-mail (sales):	sales@arcteq.com