



INSTRUCTION FOR USE

GA169GB-05.19



Short Circuiter for Underground Railways

with Lateral Current Rail for Power Supply from the Bottom Side and
Short Circuit Currents Above 30 kA

All rights reserved on this instruction for use, also for reproduction in any form, if photo mechanic, printed, on any kind of data carrier or in translated form. Reproduction of this instruction for use, even in excerpts, only with written permission of ARCUS Schiffmann. Valid are the „General Conditions for the supply of Products and Services of the Electrical and Electronics Industry“.

Subject to change without notice.

CONTENTS

1. CORRECT USE	5
2. SAFETY INFORMATION	6
2.1 Instruction for use: special remarks	6
2.2 Short circuiter: special remarks	6
2.3 Required qualification of operating personnel	7
2.4 Prevention of dangers.....	7
3. CONSTRUCTION.....	8
4. UNPACKING AND EXAMINATION	10
5. STORAGE, TRANSPORT, INSPECTION AND MAINTENANCE.....	10
5.1 Storage and transport.....	10
5.2 Inspection	11
5.3 Maintenance	18
6. EXCLUSION FROM REUSAGE	18
7. OPERATIONAL PRINCIPLE	18
8. INSTALLATION AND REMOVAL	20
9. WASTE DISPOSAL	23
10. TECHNICAL DATA AND TYPE OVERVIEW	23
11. PRODUCT LIABILITY AND GUARANTEE	25



Please completely read this instruction for use before usage of this short circuiter, especially the safety information !

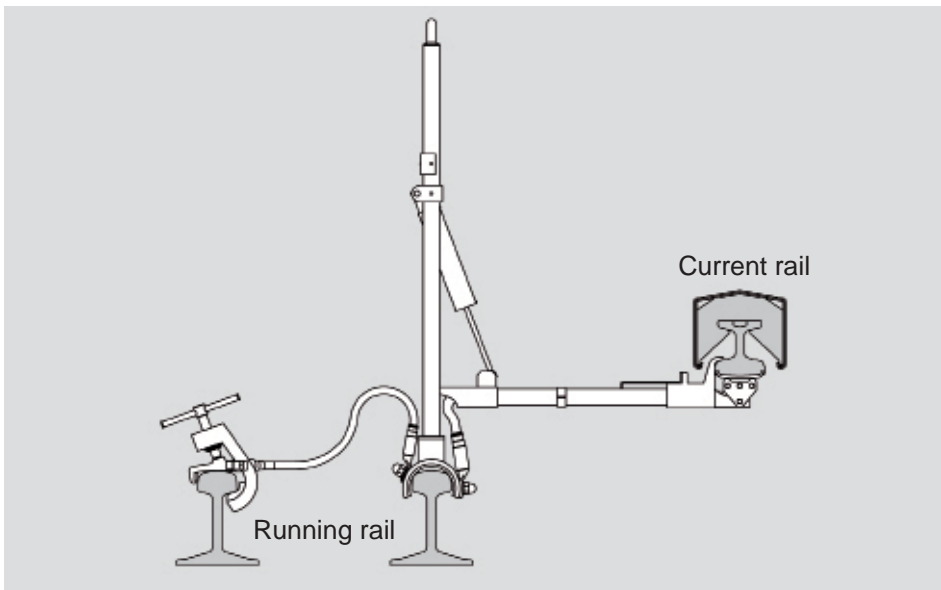
Keep this instruction for use at hand for consultation, when necessary.
In case the short circuiter is passed on to another person, also forward the instruction for use !

Your short circuiter may vary from the following pictures due to the multitude of models. An overview table of our short circuiters above 30 kA can be found on page 23..

1. Correct Use

This type of short circuiter for underground railways is designed for earthing and short circuiting of running rails with lateral current rail (power supply from the bottom side). Reasons for use are numerous, for instance:

- In case of maintenance and repair work at the underground railway network the short circuiter prevents an unintended energisation of the current rail.
- In case of breakdown of service the short circuiter will earth the current rail by compulsory short circuiting with the running rail, among others to rescue persons from the rail track in the area of the accident



2. SAFETY INFORMATION

2.1 Instruction for use: special remarks

Warning !



All warnings are marked with this symbol. Do not ignore any warning ! Failure in observance may lead to injuries or death.

Attention !



All safety hints are marked with this symbol. Do not ignore any safety hint! Failure in observance may lead to damage of devices or longterm health damages.

Information !



All information is marked with this symbol. Do not ignore any information ! It contains important details to facilitate working and improve apprehension.

Recommendation !



All recommendations are marked with this symbol. They will contain details for optimum usage of the device.

2.2 Short circuiter: special remarks

Information !



Please note the brief instructions on the label of your short circuiter!

SHORT CIRCUITER FOR ELECTRICAL RAILWAYS

Type 597 772

Brief instruction for earthing and short circuiting:

1. Take the handle and fold out short-circuit lever.
2. Place the device onto the running rail and position the contact arm underneath the conductor rail.
3. Create a short circuit by exerting a pulling movement of the handle towards the middle of the track.

Turn away body and face as protection against sparks !

Follow enclosed instruction for use !

2018 2019 2020
 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4

ARCUS

2.3 Required qualification of operating personnel

Operation, control and maintenance of this short circuiter is to be carried out only by electricians or specially trained personnel following EN 50110-1 or the standardised safety rules of the respective country.

Further it needs to be secured that before start of work the operating personnel was trained for this operation.



2.4 Prevention of dangers - general

Observe all safety regulations for work on the rail track!

Be sure that all steps specified for your safety have been carried out, before you take up work!

Work on the rail track requires permanent attention and full concentration!

During work on the rail track, the available personal protection equipment must be used, for instance consisting of head protection, hand protection, foot protection, and reflective clothing!

The short circuiter must only be used on rail tracks of electric trains in the low voltage area, with rail distances and maximum short circuit currents according to the table on page 23.



Prevention of dangers - before usage

Read the label on the short circuiter before usage to verify its suitability for the intended application.

Inspect the short circuiter before each use for its faultless condition
(see chapter 5.2: *Inspection*).

Pay attention that the short circuiter must not be used in the area of rail connections
(see chapter 8: *Installation and removal*)!

Prevention of dangers - before usage (continued)

Usage is recommended on bare rail sections, otherwise extensive burning marks on the rail and sparking are to be expected ! (see *chapter 8: Installation and removal*)!

Under bad environmental and weather conditions work must not be begun or continued. If necessary work is to be restricted (also see EN 50110-1)!



Prevention of dangers - during usage

Exclude short circuiter from re-usage after it was charged by a short circuit !

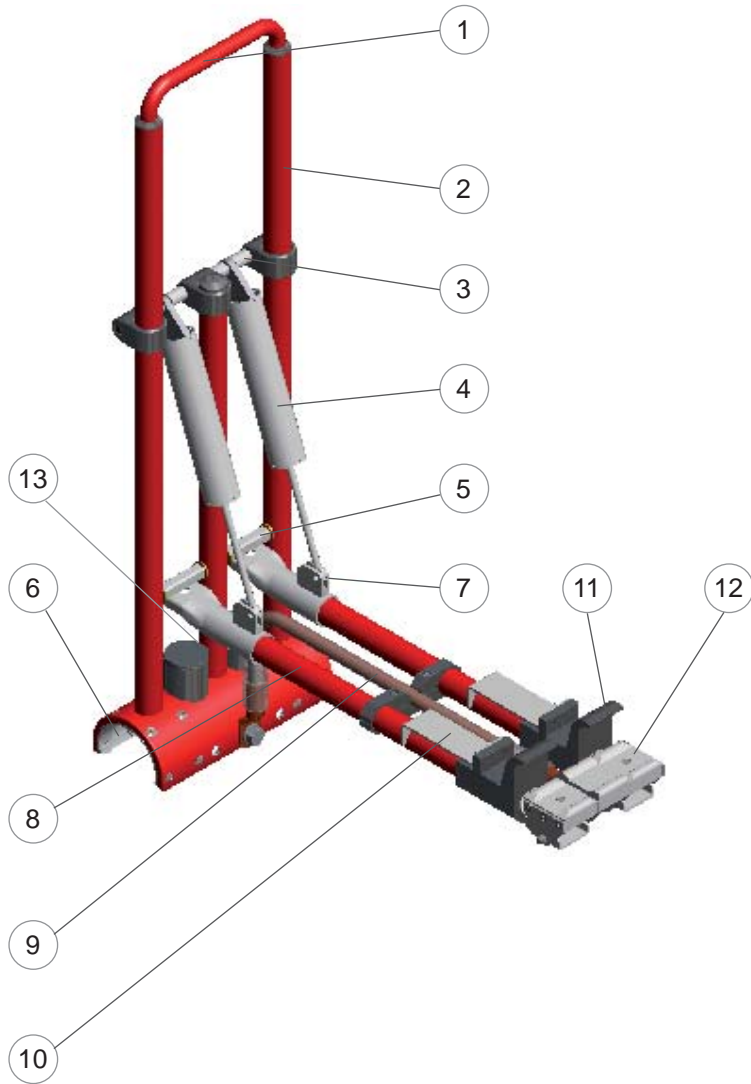
As protection against eventual sparking turn body and face away from short circuiter and, if necessary, wear protective clothing !

Use a suitable hearing protection against a possible explosion-like bang during short-circuit !

3. Construction

Please note that diverse short circuiter parts may be different from your model as there is a multitude of specific variations.

1	Handle	8	Contact arm of glassfibre-reinforced insulating tube
2	Frame of glassfibre-reinforced insulating tube	9	Earthing cable (95 mm ²) of highly flexible copper lead with transparent PVC-Insulation
3	Joint for tension spring	10	Step plate
4	Tension spring	11	Contact guidance
5	Joint for contact arm	12	E-Cu contact block, silver plated
6	Aluminium contact foot	13	Holding magnet
7	Joint for tension spring		



4. UNPACKING AND EXAMINATION

The short circuter is packed to protect it against normal impact and transport stress.

Unpack and examine short circuter as follows:

- Unpack short circuter and examine if all parts on the despatch note have been received.
- Examine short circuter for transport damage. In case packing has been damaged during transport so that possibly supplied parts are damaged or missing, make a note on the receipt documents. Otherwise insurance will not carry the cost for replacement ! If package is undamaged but supplied parts are damaged or missing, please contact ARCUS Schiffmann immediately.

5. STORAGE, TRANSPORT, INSPECTION AND MAINTENANCE

5.1 Storage and transport

Handle the short circuter carefully.

Protect the short circuter against surface damages and impacts during transport.

The short circuter is to be stored clean, dry and in folded condition.

In case the short circuter is wet, dry it with a clean and lint-free cloth before storage.

Climatic conditions for usage and storage:

Relative humidity %: 20 up to 96 (during use)

Air temperature °C: -25 up to +70

No exposure to direct sunlight during storage.

5.2 INSPECTION

Short circuiters have to be inspected immediately before use, as any other earthing and short circuiting device. The inspection has the purpose of identifying unsafe and malfunctioning devices, and to withdraw them from further use.

This is mainly a visual inspection, and to some extent a function check. In case damages or functional limitations are found, first of all the short circuiter has to be withdrawn from further use.

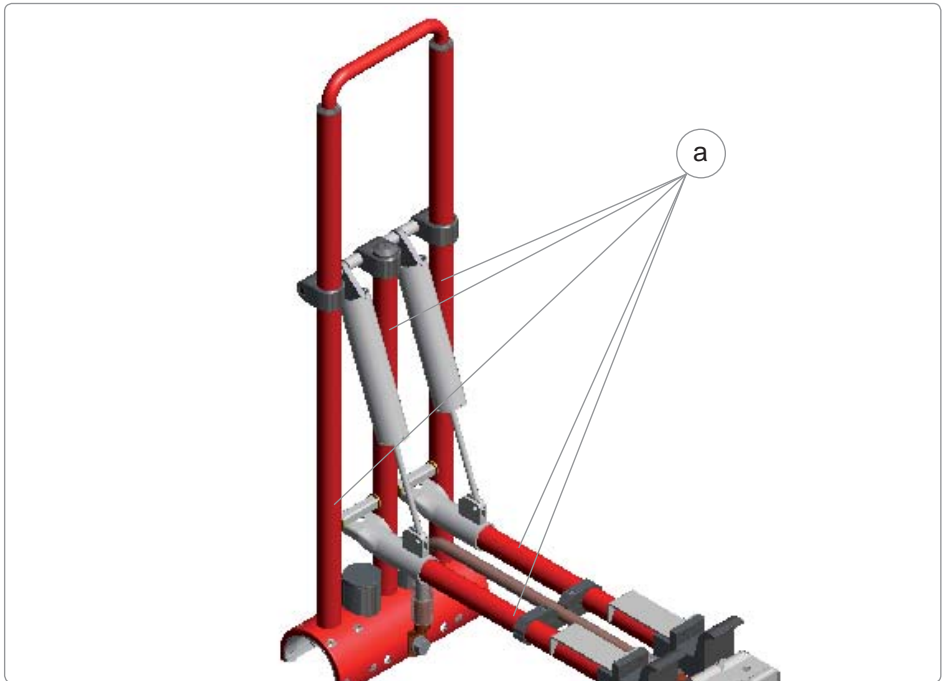
Carry out the following inspections:

General:

Test characteristics	Type of examination	Hints
Is the short circuiter classified for the respective earthing point?	Visual inspection	Important in particular when different short circuiters are available at the location!
Is the instruction for use attached or is it available on site?	Visual inspection	With lack of knowledge about correct use, function and safety are jeopardised!
Are type label and other markings clearly legible?	Visual inspection	Required for clear identification of the short circuiter!
Is the short circuiter complete – as far as recognisable?	Visual inspection	Required for clear identification of the short circuiter!
Are all detachable connections (bolted connections) tight – as far as recognisable?	Visual inspection	Loose connections may jeopardise the faultless function!

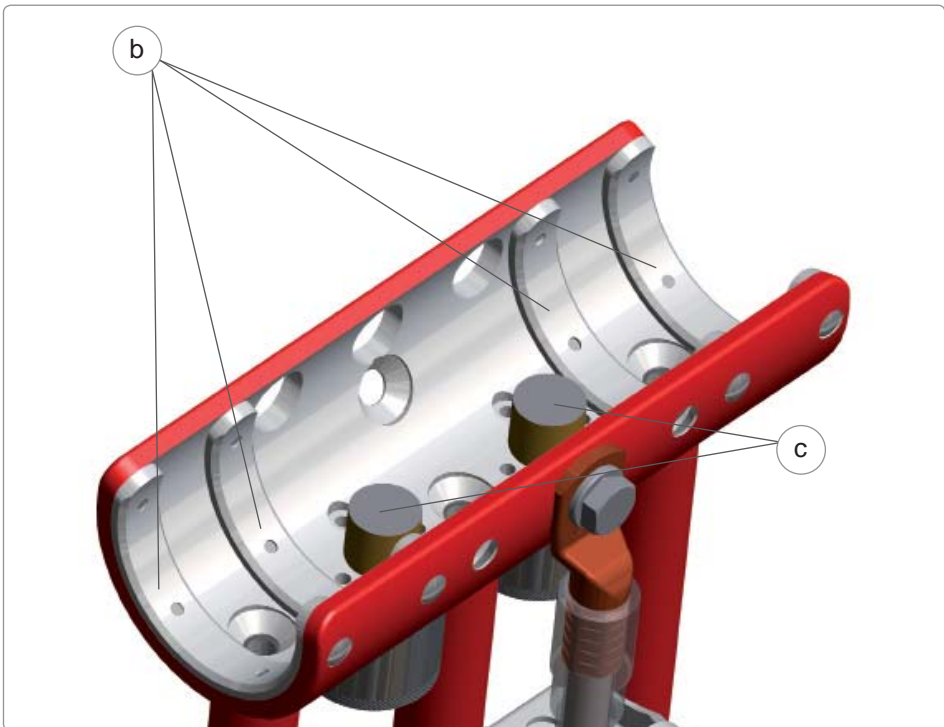
Insulating tubes:

Test characteristics	Type of examination	Hints
Is the varnish of the insulating tubes (a) still in good order?	Visual inspection	In case of defective varnish water may enter and reduce the insulating properties. Furthermore, free glassfibres may cause hand injuries!
Are the insulating tubes (a) free of fissures, cracks, or other distortions?	Visual inspection	Fissures, cracks, etc., reduce mechanic stability and may cause accidents when the short circuiter is handled!



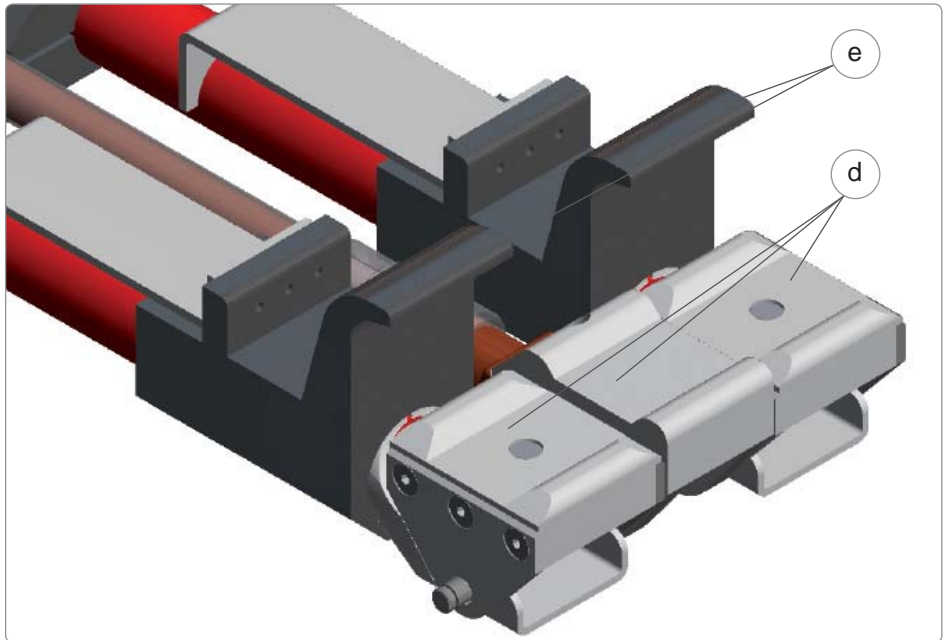
Running rail contact:

Test characteristics	Type of examination	Hints
Are the four contact shells (b) complete?	Visual inspection	Missing contact shells may jeopardise faultless function!
Is the surface of the contact shells (b) metallic bright and free of roughness, burnings, fissures or cracks?	Visual inspection	This area needs to be free of damage, otherwise a safe electric contact towards the head of the running rail is not given!
Are both magnets (c) movable within the foot shell, and is the spring force perceptible?	Function check	Missing or unmovable magnets may jeopardise a safe mechanic contact towards the head of the running rail!



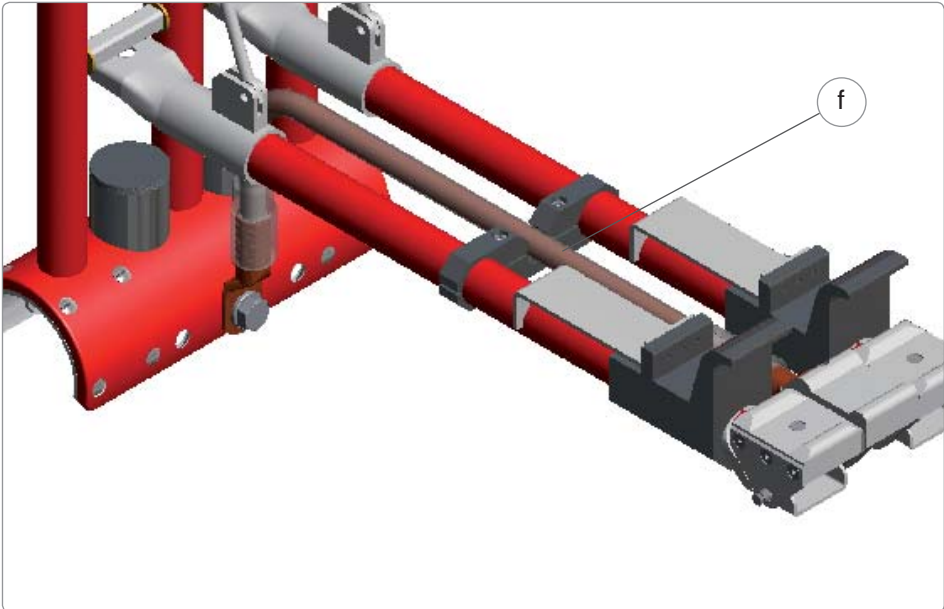
Current rail contact:

Test characteristics	Type of examination	Hints
Is the surface of the contact pieces (d) metallic bright and free of roughness, burnings, fissures or cracks?	Visual inspection	This area needs to be free of damage, otherwise a safe electric contact towards the head of the running rail is not given!
Is the centre contact piece (on models with three contacts) movable and is the spring force perceptible?	Function check	An unmovable contact piece may jeopardise a safe electric contact towards the current rail head!
Is the limit stop (e) for the rail head free of fissures or cracks?	Visual inspection	A damaged limit stop may jeopardise the faultless function!



Earthing cables:

Test characteristics	Type of examination	Hints
Is the insulation of the cables (f) sufficiently transparent to be able to inspect the copper strands?	Visual inspection	Colour change or haze of the insulation prevent evaluation of copper strands in the cables!
Is the insulation of the cables (f) free of damages (abrasion, fissures, holes, bare copper strands)?	Visual inspection	Damaged insulation will not sufficiently protect the copper strands against outside influences!
Is the insulation of the cables (f) free of damages from heat (heat penetration, discolouring, burning)?	Visual inspection	Damage from heat may be an indication of high current load caused by a short circuit!
Are the copper strands of the cable (f) free from discolouring?	Visual inspection	Discolouring may be an indication of corrosion!



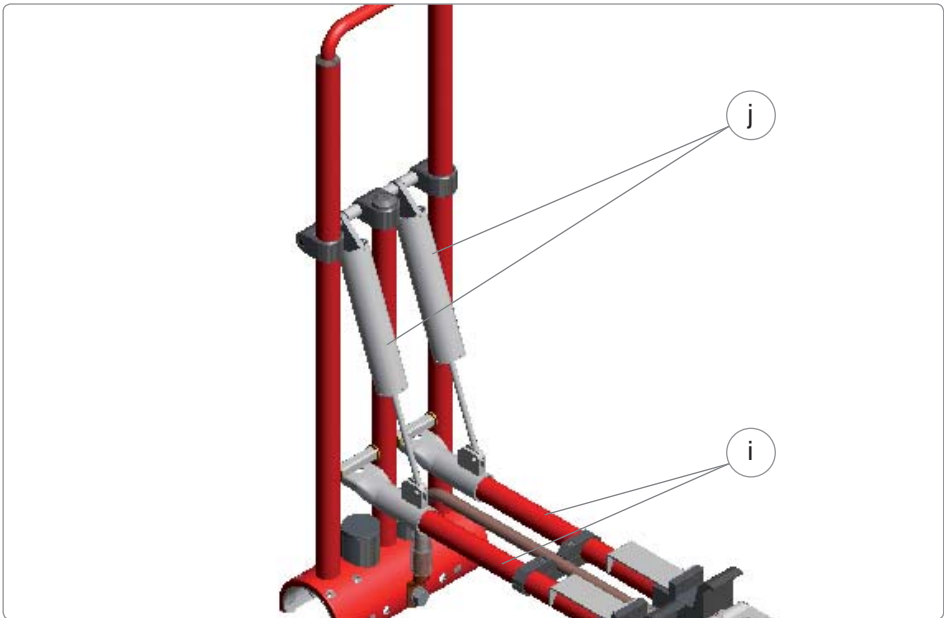
Rail head clamp (not on all models):

Test characteristics	Type of examination	Hints
Is the clamp complete – as far as recognisable?	Visual inspection	Missing parts may jeopardise the faultless function!
Is the spindle (g) easy-moving and movable in full range?	Function check	With a rough-running spindle the necessary contact forces may not be reached which jeopardises safety!
Is the contact area (h) metallic bright and free of roughness, heat penetration or burnings?	Visual inspection	The contact areas need to be free of damage, otherwise a safe electric and mechanic contact is not given!
Are all other clamp parts free of fissures or deformations which may influence stability?	Visual inspection	Fissures, breakages, etc., reduce mechanic stability and may lead to accidents!



Folding mechanism::

Test characteristics	Type of examination	Hints
Is it easy to open or fold the contact arm (i)?	Function check	A rough-running contact arm may jeopardise a faultless function!
Is it easy to safely secure the contact arm (i) in transport position?	Function check	An unsecured contact arm may lead to accidents during transport of the short circuiting device!
Is the effect of the tension spring (j) clearly perceptible even before the contact arm (i) is in rectangular position towards the frame?	Function check	With an ineffective tension spring a safe electric and mechanic contact is not given!
Is it possible to press the contact arm (i) downwards over the rectangular position, against the spring force?	Function check	With a blocked contact arm it is not possible to fit the short-circuiting device between the rails!



5.3 Maintenance

5.3.1 Cleaning:

Minor soiling may be removed by a clean and lint-free cloth moistened with water. Afterwards dry the device with a clean and lint-free cloth.

5.3.2 Damaged short circuiter:



Attention:

A damaged short circuiter with limited functionality must be removed from further use!

6. EXCLUSION FROM REUSAGE

Short circuiters charged with a short circuit must be excluded from further use. Depending on the general condition of the short circuiter it may be worthwhile to exchange components involved in the current transfer.

The design of our short circuiters generally enables exchange of contact pieces and contact feet, earthing cables and their assembly elements. (see chapter 3: Construction).

We are ready to support you in these steps or to carry out the required repairs for you..

7. OPERATIONAL PRINCIPLE

As all devices for earthing and short-circuiting, also the short circuiter requires an electrically and mechanically reliable connection between connection parts (contact pieces, contact feet) and contact points (current and running rails).

The first step is to clamp the rail head clamp (1) hand-tight onto the running rail (3) farthest away from the current rail (2). This way the short circuiter already has earth contact, without the final earth connection between running rail (4) and current rail (2).

Afterwards the short circuiter is placed onto the running rail (4) next to the current rail (2).

By pulling the handle (5), two spring stores which are integrated in the device are pre-stressed and release their energy in a sudden.

This way, the contact elements (6) positioned underneath the current rail (2) hit the current rail (2) in high speed.

The earth connection between current and running rail closes in few milliseconds.

The earth connection within the short circuiter is made by three highly-flexible, PVC-coated copper leads (7).

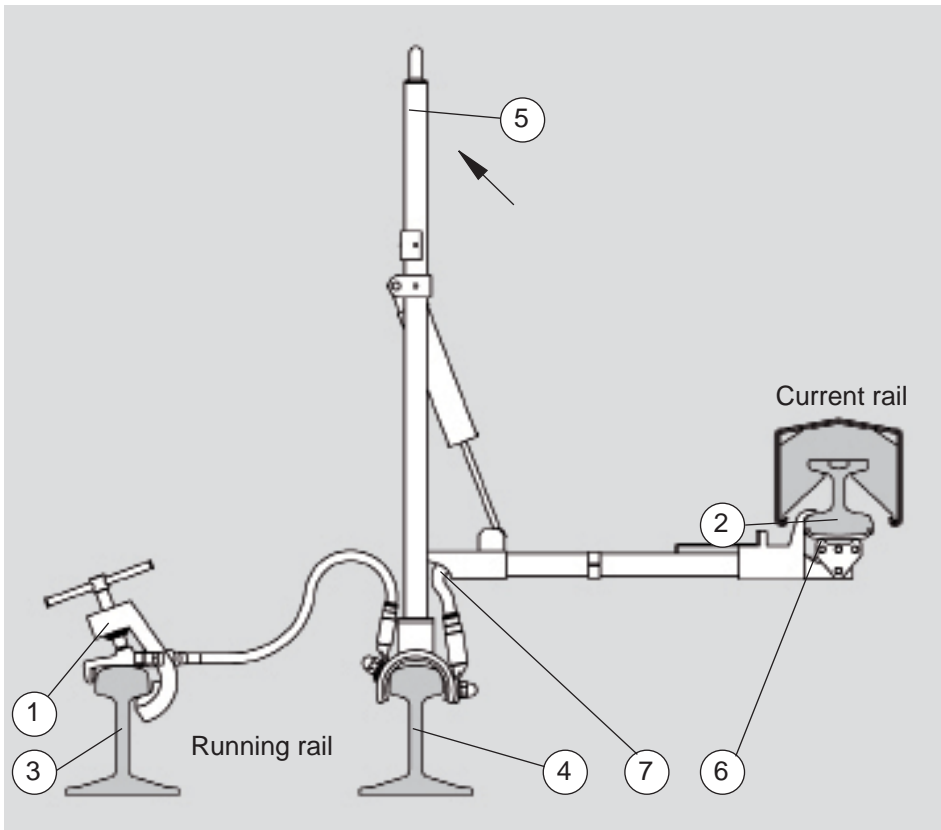


Abb. 7.1 Operational principle

8. INSTALLATION AND REMOVAL

Use on rippled, rough, soiled or corroded rail surfaces:

Particularly in emergency situations the short circuiter may need to be placed in a rail section with unfavourable conditions, possibly rippled, rough, soiled, or corroded rail surfaces.

In such case, increased sparking and arcing must be expected, as well as traces of burning on the rails.

For this reason the rail section must be briefly inspected before the short circuiter is set onto it. To offset the short circuiter a little may already improve the contact conditions considerably.

Use in the area of rail connection pieces:



Attention:

Make sure that the short circuiter is not installed in the area of rail connection pieces!

In this area, the short circuiter does not have an electrically and mechanically safe connection.

Therefore, before each use, examine the rail section on which the short circuiter is to be set.

If applicable, offset the short circuiter in order to improve the contact conditions considerably.

Observe in general:

At the instance of contacting the current rail, sparking must always be expected (even a dead current rail carries residual voltage). For this reason it is recommended to turn away face and upper part of the body during contacting of the current rail.

If possible, wear personal protection equipment and in addition a suitable hearing protection against a possible explosion-like bang (caused by the short circuit).

Installation



Carry short circuiter to place of operation.



First clamp the rail head clamp onto a bare section of the running rail farthest from the current rail.



Unfold short circuiter.



Set short circuiter onto running rail as shown in the picture. The contact foot and holding magnets are to contact the rail properly.



Make sure that the distance between current rail and contact blocks or other conductive parts is as large as possible ! (also see page 22 /picture 5.)!

5



Description of this installation section can be found on page 21 / picture 4.

6



Pull handle backwards. This way the contact blocks will snap to the current rail for full contact.

Wear personal protection equipment against possible sparking and avert your face from the short circuiter !
Use a suitable hearing protection against possible explosion-like bang (during short-circuit) !

Removal of short circuiter

7



Pull lever slightly backwards to suspend formfit at the current rail.

Press contact arm downwards with your foot on the step plate and unfold the short circuiter.

8



Afterwards remove short circuiter from running and current rail.

Remove rail head clamp.

Fold short circuiter.

9. WASTE DISPOSAL

Dispose of short circuiter and packing following the local regulations. If uncertain about the materials used, ARCUS Schiffmann will be pleased to answer your query.

10. TECHNICAL DATA AND TYPE OVERVIEW

Usage: Rail-tracks with lateral current rail (underground train systems) in the low voltage range

Application: Rail-track of electric underground trains with the following rail distances:

Type number	A [mm]	B [mm]	C [mm]	max. short circuit current [kA]
597 056	981	170	668	52 kA
597 067	1040	170	731	80 kA
597 519	876	170	564	80 kA
597 662	928	192	594	80 kA
597 693	1066	200	723	80 kA
597 701	1013	148	725	80 kA
597 770	1008	220	649	85 kA
597 772	1051	195	715	80 kA
597 773	1105	220	747	75 kA
597 777	973	170	664	80 kA
515 001 001	800	200	449	60 kA

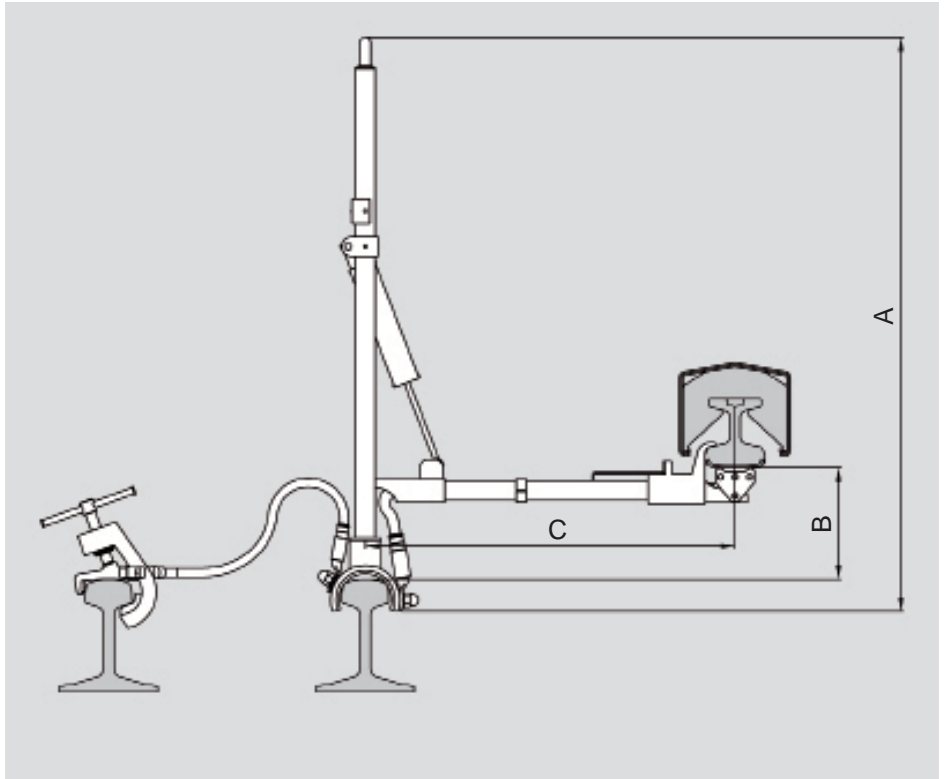


Abb. 10.1 Technical data and type overview - relation of A, B and C

11. PRODUCT LIABILITY AND GUARANTEE

This instruction for use was written with greatest care and examined before publishing.

Basis for guarantee is the proven observation of this instruction for use for storage, transport, inspection, operation and maintenance.

Attention:

Please note that incorrect changes and modifications on the product will lead to safety hazards and to extinction of product liability.

Valid are the „General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry“.

Phone

General

+49 (0) 89 / 436 04-0

Fax

General

+49 (0) 89 / 431 68 88

Fax

Sales Department

+49 (0) 89 / 436 04 73

Internet

www.ARCUS-Schiffmann.com

info@ARCUS-Schiffmann.com

Seat of the Company

Truderinger Str.199

D-81673 Munich



ARCUS ELEKTROTECHNIK
ALOIS SCHIFFMANN GMBH