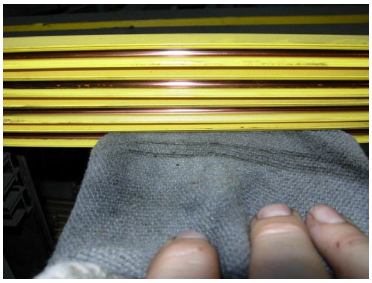
Maintenance Instructions

Cleaning of Conductor Rails
Program 0800



Contents

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1 General information

These instructions are for conductor rail installations with nominal voltage < 1000 V.
Conductor rails are available as insulated conductor rails or as non insulated conductor rails.

This document shall
- explain, why conductor rails must be cleaned,
- advise about risks, that must be considered when cleaning and show how these can be avoided;
- point out important aspects when measuring the insulation resistance,
- show which types of pollution exist and by which means and methods these can be removed.

1.1 Cleaning objective

Cleaning prevents both, hazard to operational safety as well as hazard to the contact prevention. Cleaning is a part of the maintenance of conductor rail installations; it shall therefore increase the lifetime and the availability of the installation and reduce faults.

In detail the following measures will help to maintain operational security, contact prevention and functional efficiency of the installation:
- remove abraded material on the collector brushes,
- remove abraded conductor rail insulation particles,
- remove all particles with insulating properties from the conductor surface (oxidation of the conductor surface, condensation and film formation),
- remove any gross pollution coming from the environment (dusts, liquids, such as oils and syrup, etc.).

1.2 Preconditions for cleaning

Inspection by Conductix-Wampfler
Prior to cleaning we recommend an inspection by a specialist or a service employee of Conductix-Wampfler.

Electrotechnically instructed persons
Only electrotechnically instructed persons are authorized to do the cleaning.
Electrotechnically instructed persons must be trained by a qualified electrician,
- who trains them with respect to their tasks,
- who instructs them about potential dangers arising from improper actions,
- who teaches them about the required protection measures and protection devices,
- who is always available for any questions and who supervises the electrotechnically instructed person.

Off-circuit condition and protective equipment
Any works at the conductor rail system are only permissible under off-circuit conditions and with protective equipment.

2 Safety instructions

2.1 Observe safety rules

Observe the following safety regulations when cleaning the conductor rails:

- Safety regulations for working on electrical systems listed in the applicable rules directories
- Safety regulations for entering and working on the systems defined by the system operator

2.2 Safety measures for working on electrical equipment

For all works on conductor rails observe the safety regulations for works on electrical equipment.

DANGER!

Danger of life due to electric shock!

These components of the conductor rail are under voltage: Conductor rail, current collectors, power feed, cables and plug connectors.

When working on these components, death or injury may result from electrical shock, burns, or electrical arc.

Before working on these components:

→ disconnect the conductor rail from the power supply using the main switch,

→ secure device against reactivation,

→ confirm that power has been disconnected,

→ ground and short-circuit the conductor rail,

→ cover or block off neighboring parts still carrying electrical current.

→ If there is no main switch in an electric circuit, disconnect the energy source from the conductor rail according to the instructions of the manufacturer.

→ Prior to each restart, test the insulation resistance according to the locally applicable technical standards, directives, and laws.

2.3 Personal protective equipment and protective measures

Dust accumulated in the conductor rail and the cleaning agents used are irritating and harmful when inhaled or swallowed. Therefore it is required to wear protective equipment in order to avoid any direct or indirect contact with mucous membranes and the respiratory tract.

WARNING!

Risk of mucous membrane irritation and respiratory disease caused by dust!

Abrasion of collector brushes is accumulated in the conductor rails and the track profile. This dust is very fine and is categorized as a health risk.

→ When working on the conductor rail system, particularly during cleaning, it is required to wear personal protective gear.

- Safety goggles
- Dust mask
- Protective gloves
- Disposable overall

→ Protect the environment during cleaning work, e.g. by covering or removing stock items and blocking of areas, where dust might fall down on persons.

→ Do not blow off dust with compressed air, suck if off with a vacuum cleaner instead. The vacuum cleaner should be equipped with a fine filter of class H.

→ Do not eat, drink or smoke during these works!

2.4 Safe handling of cleaning agents

Please observe the following advice when handling cleaning agents:

- Read and observe the processing rules and safety data sheets for cleaning agents (see Safety data sheet in Chapter 6.1).
- Instruct your personnel according to the processing rules and safety data sheets for cleaning agents.
- Ensure that there is enough water and hand wash soap for hand washing.
- For emergency provide eye wash bottles and the safety data sheets of the used products.

3 Measurement of insulation resistance

The works described hereunder have to be carried out by an **electrical specialist**.

To find out if cleaning is required, the insulation resistance must be measured and logged prior to cleaning. Compare the measured value with the below listed reference value, that is applicable for the installation mounted on site.
Cleaning is required, if the measured value falls short of the permissible reference value.

After cleaning, the insulation resistance must be measured again. Comparing the measurement results you can find out if the properties of the conductor rail system have been improved by the cleaning. Do not restart the system before the locally applicable reference value has been achieved.

Prior to carrying out any works at the conductor rail system,

→ disconnect the conductor rail from the power supply using the main switch
→ secure device against reactivation
→ confirm that power has been disconnected
→ ground and short-circuit the conductor rail
→ cover or block off neighboring parts still carrying electrical current.

In order to avoid incorrect measurements, it is required to insulate the conductor rail system.
Insulation means to disconnect the conductor rail system at these spots:
- Power feed
- Current collectors
- Terminal boxes

The current collectors shall be in the engagement slot, that means in operational position.

Any deviations from these specifications that are caused by the respective system, the respective installation or the chosen measurement method must be logged.
The log shall contain a sketch of the measuring section with the included system components.

For setting the measuring section, consider entrances and traverses and insulating sectioning points. If required, split up the conductor rail system into individual measuring sections.

Determine the following insulation resistances:
- between neighboring poles
- between each pole and earth

The arrangement of the poles and the designation of the poles must be logged (sketch).
In case of unstable insulation resistances, the fluctuation range must be determined by repeated measurement.

3.1 Setpoints for insulation resistance

Limits and measuring methods have been determined locally. The stated values are guide values. The relevant regulations are the local ones.

Satisfactory insulation resistance are precondition when restarting the operation of the system.

For **low-voltage installations (nominal voltage < 1000 V)** the following is applicable:

- The insulation resistance has to be measured with the respective ohmmeters working with direct voltage.
- For systems with **nominal voltage ≤ 500 V** the **insulation resistance** must be **≥ 0.5 MΩ**.
- The **measured DC voltage** must be **500 V**.

- For systems with **nominal voltage > 500 V** the **insulation resistance** ≥ must be **1.0 MΩ**.
- The **measuring DC voltage must be 1000 V**.

For **high-voltage installations (nominal voltage > 1000 V)** special local regulations will be applied. The information in this document is not applicable.

4 Positive surface change or pollution?

The quality of the running surface is important for the proper function of the conductor rail. Accumulation of dust, foreign objects as well as oxidation and foreign materials on the running surface might affect the current and signal transmission or result in system failure.
If and how the conductor rail must be cleaned depends on the fact if it is really polluted or if a surface change might even have a positive effect.

4.1 Patina and oxidation of the running surface

On copper conductor rails it must be observed that a patina will be formed on the running surface during operation that supports the proper function of the conductor rail. This patina can be recognized as a steel blue iridescent to black running track of the carbon. The patina is made up of the natural oxidation from atmospheric oxygen and graphite intercalation of the collector brush and allows a largely constant electric transition. **This layer should not be removed or destroyed.**
In no case should large areas of conductor rails be ground or polished with polishing fleece.

4.2 Types of pollution

1. Patina is not pollution and must not be removed (see Chapter 4.1).
2. Verdigris (disturbing oxidation) differs clearly from the desired patina and is considered as pollution.
3. Loose and slightly adherent dusts and deposits are considered as pollution.
4. Strong pollution (greases, oils, leaked stock goods, ...).

5 Cleaning conductor rails

5.1 Recommendation: Inspection of the installation by Conductix-Wampfler

Prior to cleaning we recommend an inspection by a specialist or a service employee of Conductix-Wampfler.

Electrotechnically instructed persons

Only electrotechnically instructed persons are authorized to do the cleaning (see Chapter 1.2).

Off-circuit condition and protective equipment

Works at the conductor rail system are only permissible under off-circuit conditions and with protective equipment.

5.2 Method and means to be arranged with Conductix-Wampfler

Arrangements have to be made with the “technical division” of Conductix-Wampfler about how (cleaning method) and with the help of which items (cleaning agents) cleaning shall be done, prior to starting the cleaning process.

Assembly and disassembly: If the conductor rail shall be dismounted completely or partly for the cleaning process, shall it be remounted and adjusted, it is required that the “technical division” of Conductix-Wampfler agrees to this procedure beforehand.

The applicable documentation is the product documentation belonging to the conductor rail system mounted on site, in particular the regulations for disassembly, reassembly and adjustment.

5.3 Do not remove the patina!

This patina can be recognized as a steel blue iridescent to black running track of the carbon. For further information see Chapter 4.1.

5.4 Formation of verdigris (disturbing oxidation) and scorch marks

These coatings clearly differ from the desired patina. Remove scorch marks or verdigris by means of sand paper. For **rough grinding** do not use sand paper rougher than grain size 180, for **fine grinding** use sand paper of grain size 400 or finer. Do not use grinding fleece with abrasive polish.

5.5 Removing loose and slightly adherent dusts and deposits

Brush off loose and slightly adherent dusts and deposits with a soft brush, e.g. a **nylon brush**.
Suck off stirred-up dust directly with a **vacuum cleaner**.
Suck off dust even from spots which you cannot reach with the brush. The vacuum cleaner should be equipped with a **fine filter class H** or higher.

5.6 Removing strong pollution

Remove strong pollution such as greases, oils, leaked stock goods, etc. **with cleaning agents**.

Insulating profiles

In case of strong pollution dismount the conductor rail and push away the insulation profiles from the conductors. Clean the insulation profile with a mixture of water and B.W.R. 210 (see Chapter 6.1).
Wipe off with clear water.
Dry insulating profiles with a cloth, blow off remaining moisture with compressed air. Allow insulating profiles to dry completely prior to installation.

WARNING!

Risk of injury due to electrical shock!

By capillary action water might spread into the spaces, e.g. between the insulating profile and the conductors, if the insulation is not completely dry during the assembly. When touching the humid conductor rail there is a risk of electrical shock.

→ Apply liquid cleaning agents economically
→ Clean the opening areas with a moistened cloth only (see illustrations in chapter 7.3)
→ **after cleaning** wipe insulation profiles dry and blow out with compressed air.

NOTE!

Caution! Damage on metal and plastic parts!

The mixture of water and cleaning agent might cause damage on metal and plastic parts if it acts for a longer time.

→ Apply liquid cleaning agents economically
→ Clean the opening areas with a moistened cloth only (see illustrations in chapter 7.3)
→ wipe off with clear water
→ **after cleaning** blow out interspaces with compressed air.

Rails and collector brushes

Clean rails and collector brushes with S.L.X. Top (see chapter6.1).

6 Cleaning agents

6.1 Approved cleaning agents

We recommend starting with the weakest cleaning agent for treating the pollution (see table left column). Only if no satisfactory result is obtained with this medium, use the cleaning agent of subsequent column.

Cleaning agent / pollution	B.W.R. 210	S.L.X.-Top	O.C.X. Oxide detacher
Dust, carbon dust, or light pollution	Insulation (dismounted)		
Greasy, oily, sooty or other strong pollution	Insulation (dismounted)	Conductors / collector brushes	
Corrosion			Power terminal / connector / conductor
Processing	Mix with water at a ratio 1:5 to 1:50. Spray on with an auxiliary tool. Caution: Do not switch on the system before it is ensured that the water has evaporated completely (⇨ risk of short-circuit!).	Spray on undiluted with an auxiliary aid and remove with a cloth or apply directly with a cloth.	Spray on from an aerosol can. **Caution:** Always clean off with S.L.X.-Top. Only suitable for cleaning metallic components and plastics that are resistant to mineral oils and solvents.
Particularities		Plastics will not be affected. Approved for food industries; only cold processing! NFS labeling.	Affects plastics after a longer exposure time! Only suitable for cleaning metallic components and plastics that are resistant to mineral oils and solvents. NFS labeling.
Biodegradable	Up to 97%	-	-
Flash point	Nonflammable	> 55°C - class A III	> 65°C - class A III
Identification acc. to "GefStoffV"	See safety data sheet	Not required	Not required
Safety data sheet	Current safety data sheets and further product documents are available with your personal customer access on the homepage www.bremer-leguil.de. For the installation of your personal customer access all you need is a one-time registration (www.bremer-leguil.de/component/comprofiler/registers.html).		

6.1.1 Purchasing and storing cleaning agents

	B. W. R. 210	S.L.X.-Top	O.C.X. Oxide detacher
Packaging	Loose items / canister	Loose items / spray can	Loose items / spray can
Storage	At ambient temperature in plastic containers	In sufficiently ventilated rooms at room temperature; close containers tightly!	In sufficiently ventilated rooms at room temperature; close containers tightly!
Source	Bremer & Leguil GmbH; Am Burgacker 30 - 42; 47051 Duisburg / Germany Tel.:+ 49 (0) 203 99 230 Fax:+ 49 (0) 203 25 901 www.bremer-leguil.de		

6.2 Unsuited cleaning agents

Only use cleaning agents that have been approved by Conductix-Wampfler!

NOTE!

Never use:

- contact cleaner,
- contact sprays,
- moisture-suppressing cleaning agents,
- solvents,
- grinding fleece with or without polishing agents.

The reason: These materials build up an insulating film (functional loss, e.g. in data transmission systems) and might damage the running surface if they contain silicone oil. Residues of the silicone oil will be accumulated by the collector brush and will be converted to silicon carbide in the spark plasma of the carbon shoes. This hard substance is a basic material for grinding mediums and produces abrasive wear and consequently fast abrasion of the running surface.
Grinding fleece often contains polishing additives, which also can build up an insulating layer.

Solvents

Solvents include the following risks:

- danger of burning,
- damage of plastic components,
- dissolving of gliding lubricants in the carbon shoes.

“Washing out” the gliding lubricants results in a loss of the gliding properties and causes extremely high abrasion at the carbon shoe and the conductor rail.

7 Standard cleaning procedure

7.1 Pre-cleaning: Vacuuming

Current collector engagement slot sideways
On installations where the current collector engages from the side, abrasion and foreign dusts will be accumulated. Vacuuming off the accumulated dusts makes the predominant part of the cleaning.

Current collector engagement slot underneath
On installations where the current collector engages from underneath, the running surface must not be cleaned. Only remove deposits that have been accumulated on the surface and that have been produced from the surrounding of the installation.

7.2 Removal of adhering deposits

Solid pollutions, that are adherent or not loose
Solid pollutions, that are adherent or not loose will be detached and vacuumed off with a nylon hand brush.

Collector shoes with cleaning brushes are available for some systems. These can be used in the installation temporary and under supervision. Collector shoes with cleaning brush are not strongly resistant. These may only be used for a short time, since otherwise the running surface might be damaged. Application during a longer time and without supervision may destroy the patina, the conductor rail will be strongly worn and plastic components (e.g. traverses and end caps) will be damaged. Cleaning brushes are not suitable for current or data transmission!

Removal of other residues
Remove adhering foreign matters, such as oils, greases, food residues or similar substances with a cleaner.
Only use cleaners that have been approved by Conductix-Wampfler! Leave on cleaner on plastics as short as possible.
Read the advice about improper contact cleaners, contact sprays and solvent in Chapter 6.2.

Cleaning of the insulation
Cleaners can be sprayed partially onto the outside contours from a spraying can or compressed spraying bottle and pollutions can be taken off with a cloth. Avoid, wherever possible, that cleaners penetrate into the cavities.
In case of more extensive pollutions dismount the respective section in order to clean the components individually, see Chapters 5.6 and 6.1.

7.3 Cleaning the contact surface of the conductor rail using the example of program 0815

For the cleaning of the running surface and the contact surface from adhering residues we recommend the following procedure.

Required tools:

- Absorbent cloth
- Cleaner (see advice in Chapter 6),
- Plastic spatula with rounded corners. So you will not get stuck on transitions or track joints.

Figure 1: Tools (cloth, spatula and cleaner)

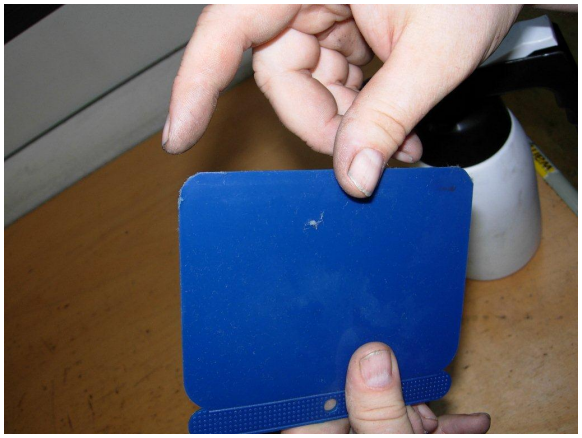

Figure 2: Spatula with rounded corners

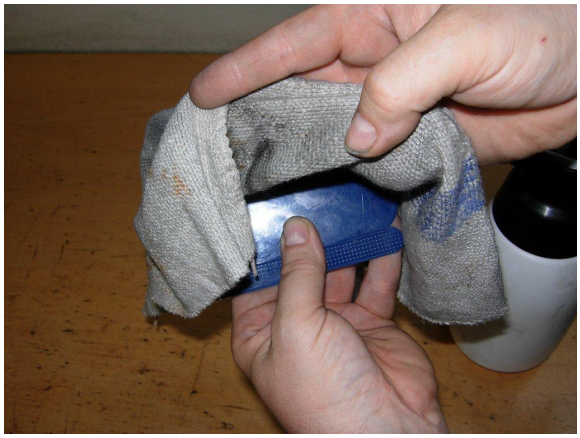

Figure 3: Put cloth over the spatula

Figure 4: Cleaning tool

Figure 5: Moisten cloth

Wipe through the engagement slot of the conductor rail. This will loosen and absorb the dirt.

Figure 6: Wipe through the engagement slot of the conductor rail.

Figure 7: Absorbed dirt

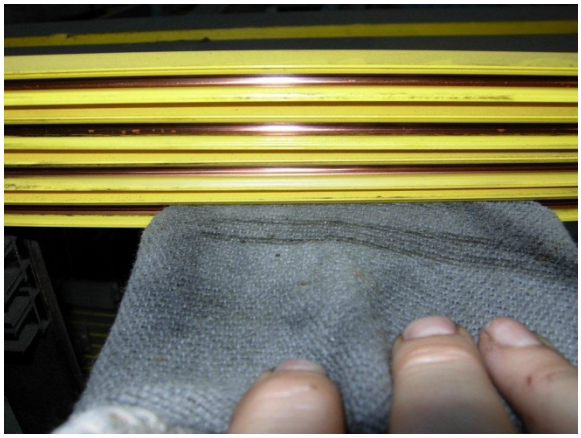

Figure 8: Clean all poles one after the other

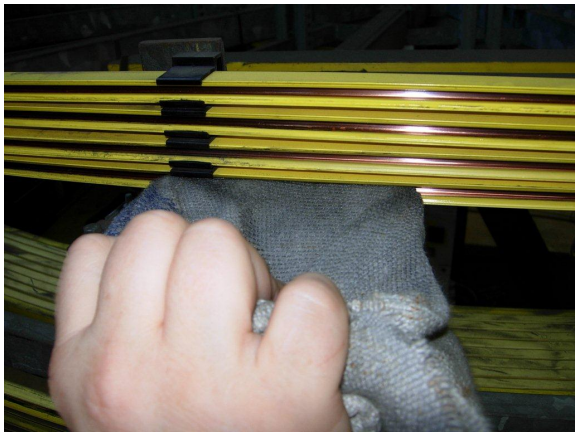

Figure 9: Also remove dirt from the hanger clamps

Figure 10: Change the angle of the cleaning tool in order to clean various areas

Figure 11: Angle for cleaning the lower area

NOTE!

Plywood instead of spatula

On conductor rails with different geometry you can use a stronger material instead of the spatula, e.g. a piece of hard foam plate, solid cardboard or plywood.

This method avoids that the cleaner accumulates in the conductor rail; dirt is absorbed efficiently and dust is not produced. In this way you can remove oil, grease and other film-forming substances with the cleaner SLX Top.