

TECHNICAL INFORMATION

T106

Contact interruptions

Causes / Avoidance / Remedial Measures

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1. General information

Powerails and conductor lines have for many years been used as secure transmission systems for electricity.

However, various situations, such as sensitive transmission voltage possibly combined with heavy soiling, can still cause contact interruptions.

The main causes in detail:

- a) Insufficient contact force of the current collectors
- b) Insufficient transmission voltage
- c) Soiling of the powerails and carbon brushes
- d) Oxidation on the powerails.

Contact interruptions can be prevented if, amongst other things,

- assembly instructions are observed and
- maintenance regulations and intervals are followed!

The following instructions are designed to **prevent** or **remedy contact interruptions**.

2. Safety instructions

Ensure that the following safety instructions are followed for all cleaning tasks:

- ATTENTION:

Powerails, conductor lines and current collectors are live !

Therefore, always follow "**the five golden safety rules**" in accordance with DIN VDE 0105 T. 100:

1. Disconnect completely;
2. Secure against reconnection;
3. Verify that it is disconnected;
4. Carry out earthing and short circuiting;
5. Protect against adjacent live parts.

- Only reconnect the installation once:

- All required tools and equipment have been removed
- Correct re-installation of the current collectors / collector trolleys and all other components has occurred

3. Contact force of the current collectors

The current collectors or collector trolleys are equipped with carbon brushes which are pressed onto the powerails by spring force. The amount of force is determined by the respective specific power transmission of the carbon quality and the powerail.

Insufficient contact force would negatively influence the contact reliability.

| Cause | Avoidance* / Remedy* |
|--|---|
| Worn out carbon brushes | Observe specified maintenance intervals. --> Replace carbon brushes |
| Installation dimension of the current collectors too great | Observe the specified installation dimension of the current collectors and the specified hanging clearance of the powerail during assembly |
| Offset between the powerail / conductor line and current collector / collector trolley too great | Observe the specified maximum lateral tolerance between the powerail / conductor line and the current collector / collector trolley. The towing arms of the collector trolley should not be too stiff to avoid pressure being applied to the conductor line via the collector trolley. |
| The carbon brushes in the insulated powerails are not straight and thus twisted and stuck. | Current collector defective --> replace. Attachment surface with towing arm (holder) for current collectors must be parallel to the longitudinal direction of the powerails and at right angles with the conductor surface. |
| Misshapen powerail / conductor line | Current collector / Collector trolley should not get stuck in the powerail / conductor line slot. --> Straighten or replace the powerail / conductor line. |
| The carbon brushes jump on the misshapen powerails or between excessively large offsets at fixed points. | -> Straighten or replace the powerails. --> Align the fixed points. |
| Connection cable of the current collector prevents sufficient contact force | --> Change the length, layout method and cable type to avoid interference. |
| Defective springs at the current collector | --> Check the contact pressure / Replace springs, if necessary |
| Vibrations at the current collectors | --> If possible, remedy separate source of interference --> Possibly increase the contact force via strengthened springs |

*** For details see the assembly instructions of the respective product!**

To detect the cause of possible contact interruptions resulting from deformation or foreign objects inside powerail enclosed conductor systems, an inspection camera can be used:

--> Inspection camera for powerail enclosed conductor systems

see Technical Information TI 03

4. Transmission voltage (< 100 Volt)

Even though both contact partners (powerail and carbon brush) provide excellent conductivity (depending on the respective materials), a certain contact resistance, which is determined by various factors, does exist between the two.

These factors are, e.g.:

- Thickness of the oxidation layer on the conductor surfaces of the powerail and the carbon brush
- Contact force of the current collector
- Dust deposits, etc.

Since these factors do not occur equally the corresponding contact resistance is irregular or fluctuating.

This fluctuating contact resistance generates contact interruptions at low voltages which may last just a few milliseconds.

Voltages below 100 Volt can, with unfavourable ambient conditions, produce contact interruptions.

Transmission voltages below 50 Volt can also result in contact interruptions, even without particularly poor ambient conditions.

Generally speaking, the lower the transmission voltage or the transmission capacity, the more likely it is to cause contact interruptions.

In these cases you should check whether the transmission voltage can be increased.

5. Soiling of the powerails and carbon brushes

Deposits can form on the powerails in dusty, oily, and/or harsh ambient conditions, especially when the powerails / conductor lines are positioned unfavourably. The carbon brushes can then distribute and "affix" the deposits, ensuring a layer of dirt along the powerails. This layer of dirt can cause contact problems at lower voltages.

Basically, a hanging position (conductor surface facing downwards) is always recommended, since deposits cannot stick so easily.

There are various cleaning methods that allow you to eliminate soiling which will result in contact interruptions.

--> **Wet cleaning (general)**

--> **Dry cleaning (product-specific)**

| Technical Information no. | Title |
|----------------------------------|--|
| TI 02 | Wet cleaning of powerails |
| TI 07 | Cleaning: Powerails U 10 |
| TI 08 | Cleaning: Powerails / Conductor line U 15 / VKS Cleaning: Powerails U 20, U 30, U 40, U 25, U 35 |
| TI 09 | Cleaning: Conductor line VKS 10 |
| TI 10 | Cleaning: Powerails U 20, U 30, U 40, U 25, U 35 |
| TI 11 | Cleaning: Enclosed safety conductor lines |
| TI 12 | Cleaning: Open powerails |

**6. Oxidation on the powerails**

Light oxidation (copper oxide) occurs automatically on the powerails when operating with carbon brushes and is initially positive. The so-called patina forms a smooth "conductor bed" which has a positive effect on the service life of the carbon brush due to the low frictional resistance between the powerail and the said carbon brush.

In contrast, strong oxidation on the powerails, caused by harsh environmental conditions and infrequent brightening with the current collectors, increases frictional resistance considerably and can lead to rapid wear of the carbon brush and contact interruptions. The contact interruptions are caused either by the oxidation layer or/and by incorrect sliding (juddering) on the uneven surface.

Suitable oxide cleaning elements are available for certain powerails / conductor lines:

(See Technical Information above)