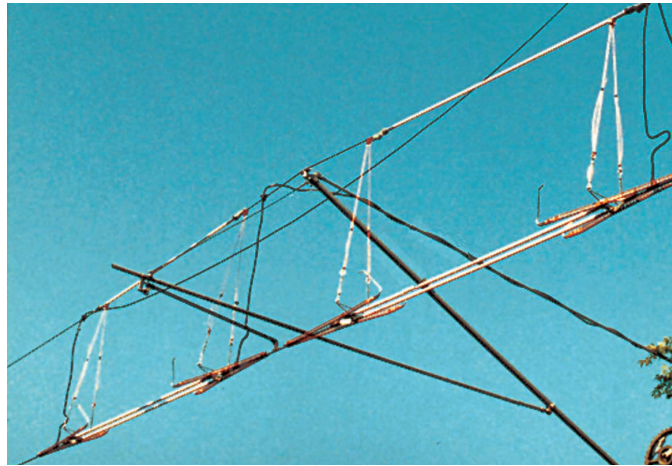


INSTALLATION INSTRUCTIONS



NEUTRAL SECTION INSULATOR (WITH 2x2 TENSION INSULATORS)

Issue 2002/1

Accessories for installation of the FLURY Insulator

- 1 Open-end spanner 20 mm
- 1 Ring spanner 16/17 mm
- 1 Torque wrench 16 and 17 mm (50 Nm)
(poss. ratchet wrench with 16 and 17 mm hexagon socket)
- 1 Hexagon socket screw key 14 mm
- 1 Spirit level (if possible with adjustable level;
Flury article no 655.141.000)
- 1 Metal cutter (+ possibly 1 metal cutting saw)
- 1 Hammer approx. 2 kg
- 1 Flat nose pliers or universal pliers
- 1 Straightening wood
- 1 Measuring scale

possibly

- 1 Spring balance 0-200 N

Additionally for mounting the messenger wire insulator:

- 1 Pulley block with 2 cable sockets (mounting dead end clamps)

Check List for Installation of the Insulator (brief description)

First locate the messenger wire insulators and the hangers centrally above the intended position of the section insulators.

1. Measure the inclination of the track.
2. Place the contact wire in the middle of the track.
3. Straighten the contact wire if necessary (kinks, twists).
4. Measure the height of the contact wire at the guide arm clamps before and after the installation location. Calculate the average value. Use a spring balance to measure the possible excess height (value x).
5. Remove runners, counternuts and locking wires, open contact wire clamps and turnbuckles completely.
6. Mount the section insulator on the contact wire without runners, lead the teeth of the contact wire clamps into the contact wire grooves. Tighten screw bolts by applying 50 Nm and retighten 3 times.
7. Cut through the contact wire on both sides leaving approx. 100 mm within the contact wire clamps.
8. Remove the pieces of contact wire.
9. Tighten the screws of the contact wire clamps applying 50 Nm. Mount counternuts again and tighten them up applying 20-50 Nm while holding up the screws.
10. Straighten possible contact wire kinks with hammer and straightening wood. Turn up the tips of the contact wire by approx. 30-45° by using a hammer or pliers.
11. Mount runners temporarily, mount suspension vertically $\pm 5^\circ$ and adjust the insulator height by value x (if not known 70 mm) higher than determined at point 4. Set the insulator body parallel to the track by using a spirit level and mount the locking wires of turnbuckles temporarily.
12. Adjust the runners parallel to the track by using a spirit level. At the 1-screw-clamps at the height of the lower side of the contact wire, at the insulators at the height of the lower side of the insulators. Tighten up all nuts (40-50 Nm).
13. If available: mount and tighten in the strengthening rods.
14. Check adjustment of the runners by using a spirit level or a current collector.
15. Check if all screws and nuts are tightened correctly.
16. Lock turnbuckles with locking wires.
17. Readjust hangers before and after the insulator up to the next guide arm clamps.



DANGER !

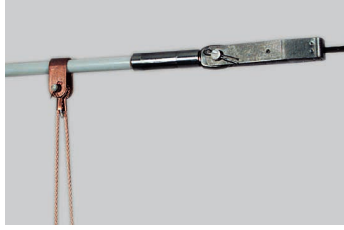
**Do not begin to work on the overhead line before
you have ensured that it is switched off and correctly grounded!**

Otherwise: LIFE DANGER!

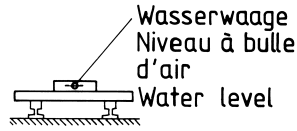


Detailed Installation Instruction

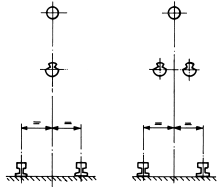
First mount the messenger wire insulators and the hangers according to the drawing above the installation locations of the section insulators.



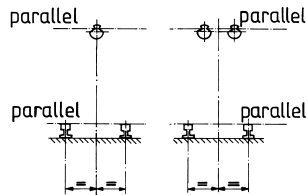
1. Measure the inclination of the track by using a spirit level (Flury article no 655.141.000).



2. Place the contact wires and the messenger wire in the middle of the track ± 50 mm. Contact wires and the messenger wire must be positioned vertically within 50 mm on each other.



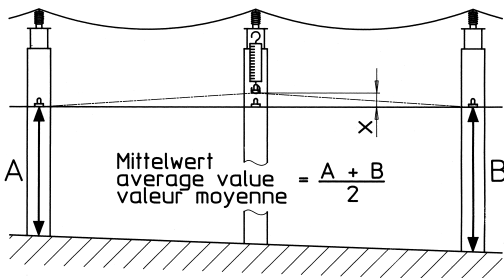
3. Straighten possible kinks or twists of the contact wire.



4. Measure the height of the contact wire from a mounting platform, at the guide arm clamps before and after the positioning place in no-load condition. Calculate and note down the average. The height of the platform must not be altered afterwards.



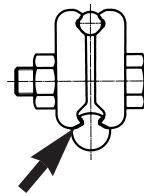
Notice: The contact wire can be raised at the installation location by using a spring balance and applying 120-150 N to enable exact determination of the excess height value (value x) at the installation location. This elevation of the contact wire is equal to the optimal excess height of the section insulator (value x).



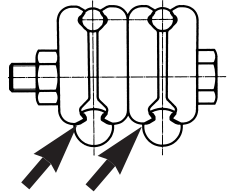
5. Remove runners, all counternuts and turnbuckles locking wires. Loosen contact wire clamps and open turnbuckles completely.



6. Mount the section insulators on the contact wire without runners. Tighten the screw bolts of the contact wire clamps applying 50 Nm and retighten 3 times so that the teeth grip the contact wire.



WARNING!
The teeth of the contact wire clamps must grip the contact wire groove over the full length!
Otherwise: DANGER OF SLIPPING!



7. Cut through the contact wires on both sides leaving approx. 100 mm within the contact wire clamps.

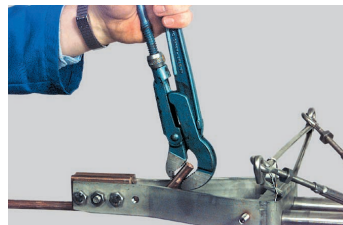


8. Remove the pieces of contact wire.

9. Tighten the screws of the contact wire clamps once more applying 50 Nm. Mount counternuts again and tighten them up applying 20-50 Nm. The corresponding screw must be held up by a ring wrench!

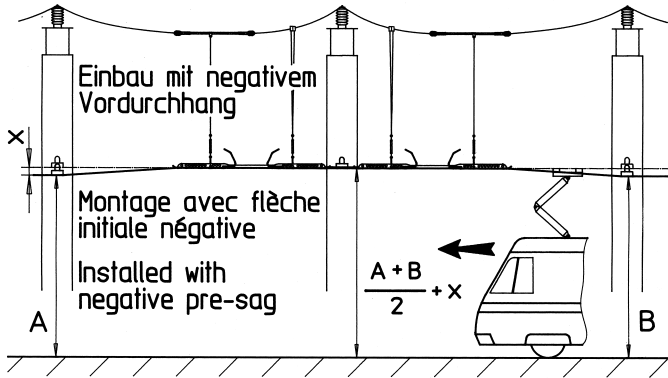


10. Flatten contact wire kinks by using a hammer and straightening wood and turn up the tips of contact wire by approx. 30-45° by using a hammer or pliers.

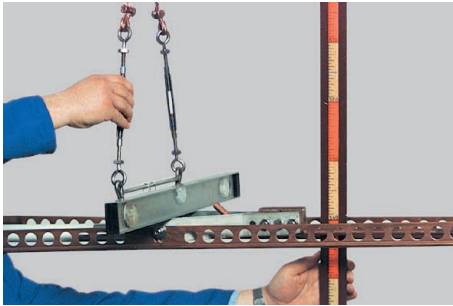


11. Mount runners temporarily to achieve the entire section insulator weight. Do not tighten flange nuts. Assemble the suspension. Loop the cables around the thimbles of the turnbuckles and fix it with the split-bolt clamps. The hangers must be positioned vertically $\pm 5^\circ$ to the direction of traffic. Adjust the insulator height by value x (if not known 70 mm) higher than determined at point 4. First lift the insulator and roughly adjust the height using the hangers.

Adjustment of Section Insulator height

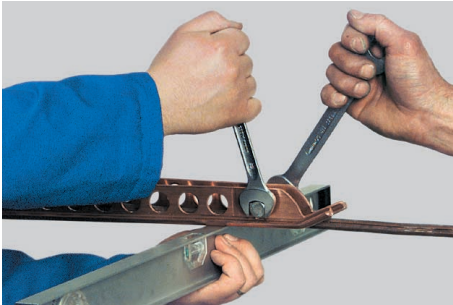


Then adjust precisely. Set the insulator body parallel to the track by using a spirit level. Mount locking wires of turnbuckles temporarily.

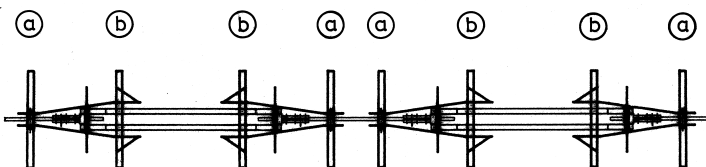
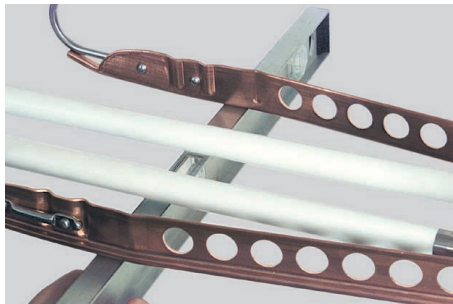


12. Adjust the runners parallel to the track by using a spirit level as follows:

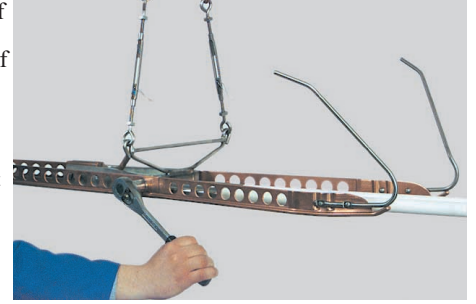
- a) At the 1-screw-clamps (4 positions a) mount the lower side of the runners at the same height as the lower side of the contact wire, tighten the screw bolts with 50 Nm and fix it by a locknut. Tighten the locknut with 50 Nm.



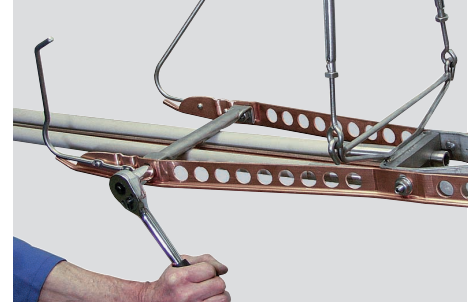
- b) At the insulators (4 positions b) adjust the lower side of the runners behind the kink at the lower side of the insulators. Tighten flange nuts slightly only.



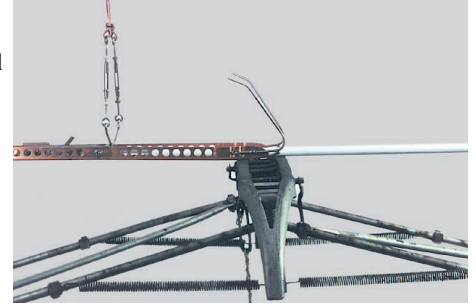
Check adjustment of the runners with a spirit level, correct if necessary and tighten the flange nuts firmly with two wrenches (40–50 Nm) so that the teeth grip the runners completely (for securing).



13. If available: install and tighten the strengthening rods.



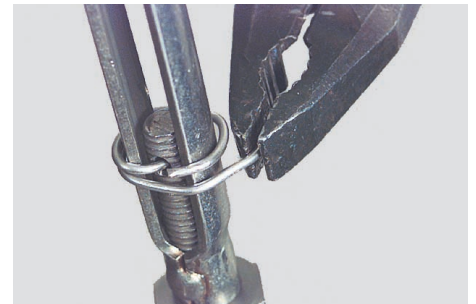
14. Check with spirit level or current collector for optimal gliding.



15. **Important!** Tighten all screws once more, block turnbuckles with counternuts and loop the tips of the hanging cables.



16. Lock turnbuckles with a locking wire through the screw hole.



17. Readjust hangers before and after the insulator up to the guide arm clamps without affecting the adjustment of the section insulator height.

Maintenance and Service

A well adjusted section insulator of Arthur Flury AG does not require any maintenance for a long period of time.

Insulator

In case of possible wear (max. 2 mm) the insulator rod can be turned by 2 marks at full mechanical load as follows:

Use a cylinder wrench to turn the steel sleeves, first on one side and then on the other side, each by 2 marks in the same direction.

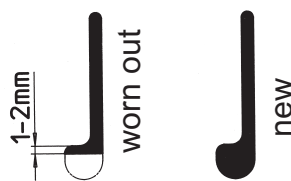
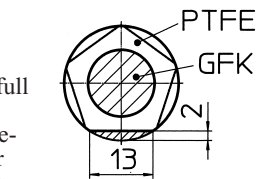
Tighten screws if they have been loosened by the turning process.

The insulator can be used in 5 positions at most. After that it must be replaced. The insulator must be replaced if the GRP rod becomes visible through damage of the PTFE cover.

The PTFE cover of the insulating rod is cleaned well enough by rain water under normal circumstances. In case of exceptionally strong dirt accumulation (for instance from frequent diesel traffic) we suggest cleaning the insulator every 2-3 years with our Special Cleaner for High Voltage Insulators (order no 655.168.000).

Runners

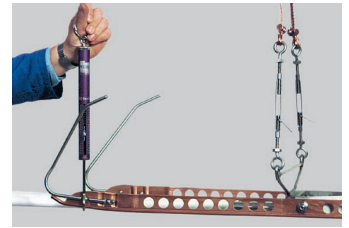
Well adjusted runners need to be checked first after approximately 200'000 to 300'000 passages of current collectors and to be readjusted in case of wear >3 mm. Should the wear have reached the maximum value (bulb only 1-2 mm thick) the runners must be replaced.



Recommendations and Trouble Shooting of AF Insulators

a) Notice:

A well adjusted section insulator can be raised by a spring balance at any extreme point of the runners (tips of runners at the arcing horns) applying 120 N without releasing the hanger load. If hangers get loose, the insulator must be hung higher step by step (each 10 mm) until it remains straight.



b) Performance:

The AF section insulator must provide a constant performance for passing current collectors and remain stable. Observe the suspension while passing current collectors. If it swings strongly or gets loose, the pantograph presses the section insulator too much and tries to lift it.

In this case the section insulator must be positioned higher so that the suspension remains stable when being passed.

c) Excessive wear of runners:

It is a sign of inaccurate adjustment if the runners show excessive wear at the intake point. They must be readjusted according to the detailed installation instructions.

Well adjusted runners show a constant wear from the beginning till the end of the section insulator.

Caution! Danger of accident if these points are not observed:

- The contact wire and messenger wire must lay vertically on each other at the installation location. Otherwise the hangers are not under continuous tension and optimal functioning is impossible. In extreme cases it may even occur that the current collector hooks into the runners at the spark gap which leads to damage.
- The screws at the contact wire clamps must be retightened three times. Otherwise the teeth do not grip the contact wire material completely. The contact wire could therefore slide out later and falling parts could cause damage of material or even injure people.
- The screws must be restrained with a ring wrench when tightening the counternuts at the contact wire clamps. The screws could otherwise get loosened when tightening the counternuts and this could cause the contact wire to slide out, damage material and injure people.
- The runners of the section insulator must be correctly adjusted as described. Otherwise shocks might damage the section insulator or the carbon sliders.
- Turnbuckles must be locked with counternuts and secured with locking wires. These could otherwise open and the resulting incorrect position of the section insulator could cause malfunction of the overhead line.
- All screws and nuts must be tightened correctly according to the description. They could otherwise become loosened by vibration and cause malfunction of the overhead line.
- Should the protective plastic finish of PTFE or EPDM of one of our insulators be so severely damaged, either that the glass fiber inside is visible or that humidity and dirt can obviously penetrate, the insulator must be replaced immediately. Otherwise a high-voltage flash-over could damage the insulator and the overhead line.
- Arthur Flury AG rejects responsibility for any damage caused by not observing this installation instruction.

**Arthur Flury AG,
Your Safe Connection**