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1 About this Document

This document makes possible the safe and efficient installation of the installation plate and end caps for SingleFlexLine section transitions.

This document is a part of the device, and must be kept accessible to personnel at all times in its immediate vicinity. Personnel must read this document carefully and understand it before starting any work. The basic prerequisite for safe work is compliance with all safety and operating guidelines in this document.

Local accident protection regulations and general safety guidelines for the area of use of the device also apply.

Illustrations in this document are provided for basic understanding and may deviate from the actual implementation of the system.

In addition to these installation instructions, the instructions listed in the appendix for the installed components also apply.
2 Safety Note

2.1 Explanation of Symbols

Safety and hazard information is identified in this installation manual by symbols. Safety instructions are introduced by signal words that indicate the extent of the hazard. Always observe safety and hazard instructions, and work carefully to avoid accidents, bodily injury and damage to property!

![DANGER!] indicates an immediately hazardous situation that will result in death or serious injury if not avoided.

![DANGER!] indicates an immediately hazardous situation due to electricity that may result in death or serious injury if not avoided.

![WARNING!] indicates a potentially hazardous situation that may result in death or serious injury if not avoided.

![WARNING!] indicates a potentially hazardous situation due to electricity that may result in death or serious injury if not avoided.

![CAUTION!] indicates a potentially hazardous situation that may result in minor or moderate injury if not avoided.

**Tips and recommendations:**

… highlights useful tips and recommendations as well as information for efficient and trouble-free operation.

… indicates actions that will help you prevent material damage.
2.2 Personal Protective Equipment

Always to be used

Safety helmet
For protection against falling or flying parts and materials.

Protective gloves
For the protection of hands against friction, scrapes, puncture or deeper wounds, as well as against contact with hot surfaces.

Protective work clothing
Primarily for protection against entrapment by moving machine parts. Work clothing must be close fitting with a low resistance to tearing; it must have close-fitting sleeves and no protruding parts.

Protective footwear
For protection against heavy falling parts and slipping on slippery floors.

To be worn for special tasks

Specific protective equipment is required when performing certain tasks. Separate reference to this is made in the individual sections.

Safety eyewear
For eye protection against harmful influences such as strong light, chemicals, dust, splinters or weather effects.

Hearing protection
For protection against loud noises and to prevent acoustic trauma.

Breathing mask (FFP-3 – according to country-specific requirements)
For protection against materials, particles, and organisms. In this case: protection against dust arising from the abrasion of carbon brushes and the PVC insulation of the conductor rail.
2.3 Special Hazards

The following section lists residual risks determined on the basis of a risk assessment.

→ Follow the safety instructions and warnings in these installation instructions to reduce health hazards and to avoid dangerous situations.

2.3.1 Electrical Hazards and Sources of Danger

Risk of death by electrocution!

Contact with energized components can lead to death by electrocution or severe injury. There is also a risk of injury from shock reactions, falling or being thrown across the room as a result of an electrical shock.

Work on the following components is dangerous:

- Main power supply
- Electrically live components: Power feed, cables, connections, conductor rail, connectors, current collectors, devices and connections within switching cabinets, control systems, etc.
- Parts that have become live due to a fault

Before working on the parts listed above:

→ Disconnect the conductor-rail system from the power supply in accordance with the 5 safety rules and secure it against being switched back on

During work:

→ Use insulated tools

Before switching on:

→ Every time before the device or system is started, test the insulation resistance according to locally applicable technical standards, directives and legal regulations.

→ Carry out locally required electrical tests

Maintain electrical safety!

→ Regularly test and maintain electrical equipment.

→ If dangerous deficiencies are identified, take measures to correct the deficiencies without delay. Inform the system operator immediately.

→ If it is not possible to correct a dangerous deficiency, block off the area in question or turn off the equipment and secure it against being switched back on. Inform the system operator immediately.

→ Immediately secure loose cables and replace damaged cables.

→ Always replace blown fuses with fuses of the same rating
DANGER!

Fire hazard due to overload or sparking!
Fire hazards occur due to overloaded cables, electrical arcs, short circuits, or sparking. Sparking can occur in poorly serviced, contaminated conductor rails or if installation does not comply with the required tolerances.

→ Permissible current values must be observed.
→ Comply with tolerances during installation
→ Install electrical fuses according to specifications
→ Do not store easily ignited materials in the vicinity of conductor rails
→ Check, service, and clean conductor rails regularly and as prescribed

2.3.2 Mechanical Hazards and Sources of Danger

Risk of injury due to grasping or impact!
Grasping and/or impact with moving conductor rails (slip ring) or current collectors connected to the machine and other components must be prevented.

→ Cordon off the work area
→ Caution when working in the vicinity of the danger zone, in particular if protective devices (covers, enclosures, control devices) have been removed or disabled
→ Caution when working in the vicinity of the danger zone, in particular below the conductor rail
→ Use personal protective equipment!

WARNING!

Secure conductor rails against falling
→ In application areas with personnel traffic and at installation height of 3 m or more, conductor rails must be secured against falling.

CAUTION!

Risk of puncture wounds and cuts!
The packaging material can contain sharp objects such as nails and wood splinters that can cause injury to limbs.

→ Use personal protective equipment!
→ Cordon off the work area!
→ Caution when working in the vicinity, in particular below the conductor rail
2.3.3 Danger due to Dust and Vapors

**WARNING!**

Danger of sensitization, irritation of the mucous membranes, and respiratory diseases due to dust!

Dust from the contact brushes collects in the conductor rails and the guide profile. This dust is very fine and is categorized as a health risk. Frequent handling can result in sensitization. People who frequently spend longer periods of time in a heavily used plant without protective equipment must expect the following consequences:

- Irritations of the mucous membranes
- Respiratory diseases
- Cancer

These consequences must also be reckoned with if there is a lack of caution in handling accumulated dust (by blowing out the dust with compressed air, for example).

→ In workplaces with long-term exposure and frequently visited systems, take effective measures to protect employees from the dust.

→ During all work on the conductor rail system in which collected dust can be stirred up, wear personal protective equipment. Personal protective equipment must be worn especially during cleaning operations.
  - Safety eyewear
  - Class-FFP3 dust mask
  - Gloves
  - Disposable coverall

→ Before starting work, clean the conductor rail in accordance with regulations. There is a specific maintenance instruction for this (WV0800-0001)

→ Protect the surroundings during cleaning works, for instance by covering or removing warehouse goods and blocking access to those areas, in which dust could fall down on persons.

→ **Do not blow out dust with compressed air.** Instead, vacuum it up. The vacuum cleaner must be equipped with a Class H fine filter.

→ Do not eat, drink or smoke during work!

**DANGER!**

Poisonous gases in case of fire!

In case of fire in the facility, the plastic parts (PVC) of the conductor-rail system emit poisonous gases (HCL).

→ The building must be evacuated immediately.

→ The fire brigade must be informed.
2.3.4 Hazards related to the Operating Environment

The following conductor-rail properties can give rise to hazards when the conductor rail is installed in its operating environment:

- Electrical power
- Sparking
- Dust due to abrasion
- Material composition of the insulating profiles, which releases toxic vapors on combustion

The most important action for protection from these dangers is only to install the conductor-rail system in locations where suitable operating conditions prevail.

**DANGER!**

Do not energize the surroundings of the conductor rail!

The conductor rail must not be energized under the following conditions:

- If the conductor rail gets severely contaminated or wet
- If live components are exposed (insulating profile or the insulation of the connecting cable are damaged)
- If hanger clamps or the insulating profile fail, or if the electric rail falls down and touches a conductive material

→ Secure the electric system in accordance with regulations
→ Install the conductor rail according to the manual; take environmental conditions into account; regularly inspect it and maintain and clean it according to regulations.
→ The conductor rail must be regularly inspected and, if necessary, repaired.

**DANGER!**

Danger of sensitization, irritation of the mucous membranes, and respiratory diseases due to dust!

Dust from the contact brushes collects in the conductor rails and the guide profile. This dust is very fine and is categorized as a health risk. Possible consequences:

- Irritations of the mucous membranes
- Respiratory diseases
- Cancer
3 Installation

The conductor-rail system has to be interrupted at switches and lifting stations. These places are called transitions. The ends of the conductor rail at transitions are fitted with insulated end caps (3). The opposing end caps allow the current-collector head to pass over transitions.

The ends caps must be precisely aligned to ensure a low-wear crossing.

The end caps are fixed to the EMS profile (guideway profile) (1). They are not attached to the EMS profile (1) individually, but via an installation plate (4), or an end-cap bar in older systems.

The installation plate or end-cap bar is fastened to the EMS profile (1) with two screws (5). The end caps are then only hung or snapped into place.

The holes for the installation plate must be precisely positioned and machined to ensure the accurate alignment of the end caps!

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EMS profile (guideway profile)</td>
</tr>
<tr>
<td>2</td>
<td>Conductor rail</td>
</tr>
<tr>
<td>3</td>
<td>End cap</td>
</tr>
<tr>
<td>4</td>
<td>Installation plate</td>
</tr>
<tr>
<td>5</td>
<td>Self-tapping screws DIN 7500-1 M4, length ( \triangleq ) profile bar width</td>
</tr>
</tbody>
</table>

Fig. 1: Individual components for new systems

There are suitable drilling jigs (drilling diameter \( \varnothing \) 3.6) to position the holes quickly and easily.
The drilling jig is only designed for bar widths up to 8 mm!

There are 2 versions:

- Version 1: For EM profiles with dimensions 180x60 and 180x80 (material no. 2: 08-V015-0474-001)
- Version 2: For heavy-duty profiles with dimensions 240x80 (material no. 2: 08-V015-0474-002)
3.1 Installing the Installation Plate

The installation plate is available in 4-pole, 6-pole, and 8-pole versions:

![Fig. 4: Installation plate, 4 pole](image)

![Fig. 5: Installation plate, 6 pole](image)

![Fig. 6: Installation plate, 8 pole](image)

**NOTE!** Always try to use the outer holes (x) so that the fixing screws are always accessible!
3.1.1 Description of the Drilling Jig

The function and use of the drilling jig are described based on version 1 (for EMS profiles, material no. 2: 08-V015-0474-001):

![Drilling jig diagram]

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L-shaped bracket</td>
</tr>
<tr>
<td>2</td>
<td>Star knob BN5906-M6x29</td>
</tr>
<tr>
<td>3</td>
<td>Buffer</td>
</tr>
<tr>
<td>4</td>
<td>Drill bushing block</td>
</tr>
<tr>
<td>5</td>
<td>Square profiles</td>
</tr>
<tr>
<td>6</td>
<td>Stop plates</td>
</tr>
<tr>
<td>7</td>
<td>Row of bushings for the installation plate for transition caps</td>
</tr>
</tbody>
</table>

The drilling jig is placed on the EMS profile from above over the stop buffers (3) on the EHB profile. Using the L-brackets (1), the drilling jig can be pushed up to the stop in the Z direction. The stop in the X direction is formed by the two sliding stop plates (6). The sliding stop plates allow quick changes from the left to the right side.

The drill bushing block (4) must be aligned with the elongated holes in the square profiles (5) to the desired position of the conductor rails (fastening with 2 hexagon bolts DIN 933 M5x20 SW8). The drill bushing block (4) has a total of 5 rows of drill bushings. The rows of bushings (7) are for the holes of the installation plate for the transition caps.

The following illustration shows the distances between the rows and the stop plates. Different rows must be used depending on the joint (90°, 45°).
There are various options for aligning the drilling jig. Basically, you can proceed as follows:

1.) Determine the center of the conductor rail poles starting from the hanger clamps
2.) Measure the distance from height (h2) to the center of the conductor-rail poles
3.) Set distance A, B, or C on the drilling jig
4.) Adjust the height (h2) on the drilling jig: The drilling block (4) is adjusted to the desired position by means of the elongated holes.

Fig. 8: Installation plate on a guideway profile

![Diagram showing installation plate on a guideway profile]

Fig. 9: Installation plate on a guideway profile, side elevation

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, C</td>
<td>Hole spacing of the installation plate</td>
</tr>
<tr>
<td>h1</td>
<td>Center of the guideway profile</td>
</tr>
<tr>
<td>h2</td>
<td>Center of the conductor-rail poles to the upper edge of the guideway profile</td>
</tr>
</tbody>
</table>
In the middle of the drill bushing block (4) there are engraved markers (9,10), which illustrate which bushing row must be used (Detail A).

There are also markers (11) on the drill bushing block (4) and the rectangular profiles (5), which indicate the center position of drilling bushing block (Detail B).

3 different profile joints are possible: 90° rail joint, 45° rail joint direction 1, and 45° rail joint direction 2. Different rows on the drilling jig must be used depending on the joint. Specifications of “left” and “right” are as when looking at the
conductor rails from the front.
Fig. 14: Dimensioning of the drilling jig (hole pattern)

3.1.2 Case 1: 90° Rail Joint

No difference between left and right sides

Fig. 15: 90° rail joint

1 = Left side / left profile
2 = Right side / right profile
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Fig. 16: Straight-cut transitions

NOTE!
See Section 3.2 for more details on dimensioning!

1 = Stop is the complete facing edge
2 = 90° row is used

Fig. 17: Left side / left profile, 90°

1 = Stop is the complete facing edge
2 = 90° row is used

Fig. 18: Right side / right profile, 90°
3.1.3  Case 2: 45° Rail Joint

Direction 1: There is a difference between the right and left sides

1 = Left side / left profile
2 = Right side / right profile

Fig. 19: 45° rail joint, direction 1

Fig. 20: Transitions diagonally cut

NOTE!

See Section 3.2 for more details on dimensioning!
3.1.4 Case 2: 45° Rail Joint

Direction 2: There is a difference between the right and left sides

Fig. 23: 45° rail joint, direction 2
1 = Left side / left profile
2 = Right side / right profile
1 = Stop is the front cut edge
2 = Vertical row “LK” (left short) is used

1 = Stop is the rear cut edge
2 = Vertical row “RL” (right long) is used

3.1.5 Dependence on the number of poles

For installation, it is not necessary to drill the entire row (90°, LL, LK, RL, RK). There are always only two holes set, and these depend on the number of poles:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 poles:</td>
<td>Only position the 2 inner holes</td>
<td>3 poles:</td>
<td>Only position the 2 middle holes</td>
</tr>
</tbody>
</table>

Fig. 24: Left side / left profile

Fig. 25: Right side / right profile

Fig. 26: Holes depend on the number of poles
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Fig. 27: Drilling jig spacing “A”

Fig. 28: Drilling jig spacing “B”

Fig. 29: Drilling jig spacing “C”

Item | Name
--- | ---
A, B, C | Hole spacing of the installation plate
h2 | Adjustable height. Dimensions depend on the respective customer application

Use the QR code (“click” or “scan”), to watch our animation
Mounting Installation Plate.
3.2 Installing ProEMS End Caps for Transitions

End caps for transitions are used for mechanical and electrical breaks at switches and lifting stations. They are available with or without infeed, whereby the crimping cable lug delivered is for max. 6 mm².

After installation of the installation plate for the transition caps, the end caps (with or without infeed) are installed.

→ Put the clamping unit onto the end of the rail. Possibly loosen the clamping screw somewhat, push the end cap onto the clamping part, push the conductor rail up to the stop and tighten to 2 Nm.

**CAUTION!**
Ensure the correct positioning of the clamping unit!
Push the clamping unit of the end cap into the conductor rail such the contact part sits in the interior of the conductor rail and the clamping part engages between the conductor rail and the rear insulation (see Fig. 31 and Fig. 32).
→ Hook the end cap into the installation plate and repeat the procedure for the other poles. It is recommended that the conductor rail not yet be engaged in the adjacent hanger clamp.

Fig. 33: Hooking the conductor rail in place

→ After fitting both sides of the transition, check the functioning of the transition in all end positions of the switches or lifters.

→ When checking switches and lifters, the end caps must not collide and the specified gap dimensions must not be exceeded. Manually pass a current collector through the end cap and conductor rail of each pole. The current collector must slide through the end caps into the conductor rails without jamming.

Make sure that switches and lifters are correctly adjusted!

Make sure that switches and lifters are correctly adjusted (end position and no vertical or lateral offset between guide profiles). If the guideway profile is offset, have the switch/lifter adjusted by the system engineer and repeat the test.

During commissioning, this test must be repeated under load (hanger with payload) to rule out the settling of switches under load.

For the inner arcs of switches, the installation plate must first be snapped onto the end caps and then bolted to the guideway profile!
To ensure the proper passage of current collectors, make sure that the spacing (A) of the opposing end caps in use is not greater than 5 mm, and the maximum lateral offset (B) of ±5 mm and vertical offset (C) of ±3 mm are not exceeded.

Fig. 34: Maximum offset for a transition

A    max. 5 mm
B    ±5 mm
C    ±3 mm
3.3 Transitions in Existing Systems (old Version with Plastic End-Cap Bar)

For existing systems (old version with plastic end-cap bar), the drilling position is scored by hand without a drilling jig. See the following diagrams for dimensions and distances:

![Transition situation](image)

![Rail joint, 90°](image)

<table>
<thead>
<tr>
<th>Installation dimensions</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>End-cap bar, 8 pole</td>
<td>48.8</td>
<td>61</td>
<td>24</td>
<td>70</td>
<td>22</td>
<td>114</td>
</tr>
<tr>
<td>End-cap bar, 10 pole</td>
<td>48.5</td>
<td>74</td>
<td>24</td>
<td>71.5</td>
<td>30</td>
<td>120</td>
</tr>
</tbody>
</table>
The funnel side of the end cap fixed in the end-cap bar must be flush with the rail end of the guide profile and must never protrude. The end-cap bar is secured in the rail base with 2 self-tapping screws, M4x8 DIN7516.

- Hole diameter in Al rail: Diam. 3.6 mm
- Hole diameter in St rail: Diam. 3.6 mm

b) Rail joint, 45°:

![Diagram of Rail Joint, 45°](image)

Fig. 37: Rail joint, 45°
## Further Documents

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Document number</th>
<th>Document name</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>WV0800-0001</td>
<td>Cleaning of conductor rails</td>
</tr>
<tr>
<td>02</td>
<td>WV0800-0002</td>
<td>Conductor rail maintenance plan</td>
</tr>
<tr>
<td>03</td>
<td>MV0815-0005</td>
<td>Expansion module and expansion element</td>
</tr>
<tr>
<td>05</td>
<td>BAL0800-0004</td>
<td>Bending device for product ranges 0811 and 0815</td>
</tr>
<tr>
<td>06</td>
<td>BAL0815-0001</td>
<td>Carbon-brush sensor unit</td>
</tr>
<tr>
<td>07</td>
<td>BAL0815-0002</td>
<td>SingleFlexLine</td>
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</tbody>
</table>