## Contents

1. **Terminology** ............................................................................................................................................................ 3

2. **Function and Use** ................................................................................................................................................... 3

3. **Technical Specifications** ........................................................................................................................................ 4

4. **Structure of an Expansion Module** ....................................................................................................................... 5

5. **Determining the Number and Position of Expansion Modules** .................................................................................. 6
   5.1 Expansion Modules in Sections ≥ 20 m ..................................................................................................................... 7
   5.2 Calculating the Number of Expansion Elements at Building/Load Profile Expansion Joints ............................ 8

6. **Installation** ............................................................................................................................................................... 9
   6.1 Safety ................................................................................................................................................................. 9
   6.2 Installing Expansion Modules: Segment .................................................................................................................. 12
   6.3 Installing Expansion Modules: Building/Load Profile Expansion Joints .............................................................. 17
   6.4 Installing Media Feeds and Expansion Modules ................................................................................................. 21
   6.5 Installing Expansion Elements in Existing Systems .......................................................................................... 21

7. **Adjusting the Gap Dimension** ............................................................................................................................. 23
   7.1 Expansion Module .............................................................................................................................................. 23
   7.2 Adjusting Expansion Elements .......................................................................................................................... 24
   7.2.1 Case 1: Copper Conductor Rail on Steel Load Profile .................................................................................. 24
   7.2.2 Case 2: Copper conductor rail on aluminum load profile ................................................................................ 24
### Installation Instructions

**Expansion Module and Expansion Element**

Program 0815

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2.3</td>
<td>Case 3: Steel Conductor Rail on Steel Load Profile</td>
<td>25</td>
</tr>
<tr>
<td>7.2.4</td>
<td>Case 4: Steel Conductor Rail on Aluminum Load Profile</td>
<td>25</td>
</tr>
<tr>
<td>7.3</td>
<td>Installing an Air Gap</td>
<td>25</td>
</tr>
</tbody>
</table>
1 Terminology

Expansion element: Component to compensate for changes in length of a pole in a conductor rail.

Expansion module: The module contains multiple expansion elements for multiple poles and contains conductor rails for a specific segment length.

Load profile: Customer-provided rail or carrier rail.

Expansion distance: Maximum expansion for which the expansion element can compensate.

Expansion joint: Construction-provided joint in the load profile.

Adjustment aid: Spacer part to adjust the expansion element during installation.

2 Function and Use

The expansion element compensates for temperature-dependent changes in length between the conductor rail and the load profile. It is necessary if expansion takes place between two fastening points that cannot be compensated or absorbed by the individual components of the conductor rail system. Short lengths of < 20 m and small temperature changes < 40 K can be compensated for by the individual components in the conductor rail system.

Expansion elements are also used when the load profile has an expansion joint, for example at building transitions. The expansion distance of the load profile must be compensated for by an expansion element or an expansion module.

Fastening points in the sense of thermal expansion are end caps or rail fastening points in the conductor rail system. This is where the conductor rail is fastened rigidly to the load profile. Curves and bends in the path of the load profile can also prevent thermal expansion in a conductor rail and are therefore also considered fastening points (natural fixed points).

Fig. 1: Expansion module in load profile
### 3 Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of poles</td>
<td>4-, 6-, and 8-pole</td>
</tr>
<tr>
<td>Length of expansion module</td>
<td>max. 1250 mm</td>
</tr>
<tr>
<td>PE position</td>
<td>In fourth place after L1, L2, and L3 (counting from the top)</td>
</tr>
<tr>
<td>PE system</td>
<td>PE_{plus} error prevention</td>
</tr>
<tr>
<td>Conductor cross-section</td>
<td>Rail 25 mm², expansion point 6 mm² with conductor loop</td>
</tr>
<tr>
<td>Current load</td>
<td>max. 54 A</td>
</tr>
<tr>
<td>Cable type</td>
<td>Double-insulated line (UL)</td>
</tr>
</tbody>
</table>

---

**Danger of overloading!**

Feeds must be designed and provided in such a way that the maximum current load for the expansion module of 54 A is not exceeded.
4 Structure of an Expansion Module

The expansion elements (1) are preassembled at the factory as multipole expansion modules. They are preferred for use in new systems. The expansion module includes two expansion elements per pole, each with an expansion distance of 8 mm. This means that each expansion module has a total expansion distance of 2x8 mm = 16 mm.

The expansion module includes hanger clamps (3) and the wiring for the expansion elements. The wiring (cable loop) is placed on the back of the expansion module. The adjustment aid (2) (not included in delivery) is used to adjust the expansion elements during installation. The roughly 1.25 m long assemblies are engaged in hanger clamps on the structure and connected with the segment using rail connectors.

NOTICE!

The adjustment aids are separately available as an adjustment aid set (material no.: 08-Z009-0014P).

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<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Expansion element</td>
</tr>
<tr>
<td>2</td>
<td>Adjustment aid</td>
</tr>
<tr>
<td>3</td>
<td>Hanger clamp</td>
</tr>
</tbody>
</table>

Fig. 2: Expansion module
5 Determining the Number and Position of Expansion Modules

The number and position of expansion modules depends on the system layout, the temperature range during use, and any existing expansion joints in the building/load profile.

Procedure:

1. Calculate the required expansion modules at building/load profile expansion points.
2. Calculate the required expansion modules on straight load profile sections over 20 m.

NOTE!

If the system is operated at a constant temperature (including the installation temperature), it can be assumed that no changes in length will result. In this case, no expansion modules are needed. Any temperature fluctuations of ± 2.5 K or less can be considered constant! The temperature range specified for the system must be noted.

Fig. 3: Example system layout
5.1 Expansion Modules in Sections ≥ 20 m

The calculation of the number of expansion modules required is based on a temperature spread of 40 K. This covers the usual operating temperature of +5 °C to +45 °C.

Procedure:

From the layout, take all the relevant track segments between physical and/or natural fixed points, that is, all straight track segments that lie between:

- Two curves/bends
- Two end caps
- A curve/bend and an end cap
- A curve/bend and an anchor clamp

For track segments, the number of expansion modules is determined according to the following table:

<table>
<thead>
<tr>
<th>Length</th>
<th>Temperature spread</th>
<th>Number of expansion modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 m - 20 m</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>20 m – 36 m</td>
<td>40 K</td>
<td>1</td>
</tr>
<tr>
<td>n x 36 m</td>
<td>-</td>
<td>n</td>
</tr>
</tbody>
</table>

Fig. 4: Determining the number of expansion modules

When using multiple expansion modules within a straight track segment, fastening points must be provided between them (see section 6.3.3.5 in BAL0815-0002). A fastening point must be located in the middle between two expansion modules.

![Diagram showing expansion modules and fastening points](image)

Fig. 5: Determining the number of expansion points needed

Expansion elements are not designed for use in bends or curves, and may only be installed in straight sections!
5.2 Calculating the Number of Expansion Elements at Building/Load Profile Expansion Joints

Use the layout or the position of load profile expansion joints observed on-site to determine the appropriate expansion distance. The number of expansion modules needed per load profile expansion joint is determined by the basic formula:

Expansion distance of load profile expansion joints (mm) / 16 mm = number of expansion modules (round up to the nearest whole number)

**Example from Fig. 3:**

Load profile expansion joints with 20 mm expansion distance at one position:

20 mm / 16mm = 1.25 \(\Rightarrow\) 2 expansion modules next to one another, with 32 mm max. expansion distance

Fig. 6: Expansion joint and expansion element

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Expansion joint</td>
</tr>
<tr>
<td>2</td>
<td>Expansion element</td>
</tr>
</tbody>
</table>
6 Installation

6.1 Safety

Installation and initial commissioning may only be carried out by specially trained technicians.

Required protective equipment:

- Injury due to improper installation and initial commissioning!
  Improper installation and initial commissioning can result in serious injury to persons and/or material damage.
  → Before starting work, make sure there is sufficient space for assembly.
  → Handle open, sharp-edged components carefully.
  → Make sure the installation area is tidy and clean! Loosely stacked or scattered components and tools are a source of hazards.
  → Install components properly. Comply with the specified screw tightening torques.

- 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 system operator must take this into account accordingly when planning and take the appropriate protective measures.
  → The building must be evacuated immediately.
  → The fire brigade must be informed.

- Risk of injury by crushing skin and limbs!
  There is a danger of crushing of skin and limbs!
  → Wear safety gloves when working on the expansion module.
  → Only install conductor rail systems where suitable operation conditions pertain (see section 3.3 in BAL0815-0002-EN).
Risk of injury from cuts and cutting!

Cuts and amputations can occur:
- on sharp edges of the general components
- on sharp edges of the conductor rails
- on cut edges when trimming the conductor rails
- on packaging materials (cartons, tapes, etc.)

→ Use personal protective equipment!

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

Risk of injury due to conductor rails sliding out!

Risk of injury due to conductor rails sliding out when the packaging units are held at an angle or carelessness with long loads.

→ Use personal protective equipment!
→ Cordon off the work area!
Installation Instructions

Expansion Module and Expansion Element
Program 0815

DANGER!

Risk of death by electrocution!
Contact with components carrying electrical power can lead to death by electrocution or severe injury. Danger of injury due to shock reactions, falling, or being thrown across the room due to electrical shock.

→ The main power supply (from the building) must be disconnected in the installation area and secured against switching on again
→ Disconnect all electricity-supply infeeds
→ Check whether a voltage is still present in the components and take measures where necessary
→ Install the conductor rail out of manual reach
→ Attach a sign saying "Risk of death by electrocution" with the relevant hazard symbol in all areas with live components
→ The customer must ground metallic components
→ The customer must provide protective devices
→ Make sure there is sufficient stability in the area

The system must be designed and operated in accordance with the prevailing ambient conditions!

WARNING!

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

ATTENTION!

To the side of the conductor rail there must, a clearance of at least 4 mm from metal components must be maintained (see Fig. 7) to prevent mechanical collisions and guarantee sufficient electrical insulation distances!

Fig. 7: Side clearance of at least 4 mm
6.2 Installing Expansion Modules: Segment

Prerequisites:

- Hanger clamps are preinstalled in the rail at 500 mm intervals.

Fig. 8: Preinstalled hanger clamps on the load profile

- The expansion module is designed with a length of about 1.25 m for direct installation in 3 hanger clamps.
- It is connected to the existing installation using screw connectors.
- The 4 hanger clamps used to install the expansion module (see Fig. 9) may not be removed for installation. These hanger clamps are installed for fastening of the expansion module and are not permanently connected to the load profile. This means they will not hinder the expansion of the system.

Fig. 9: Hanger clamps on the expansion module

After determining the installation position of the expansion module (see above), install the conductor rails up to the installation position of the expansion element. The conductor rails for all poles must be the same length (end flush).
Fig. 11: Load profile with hanger clamps and mounted rails (segment)

The expansion module, including the preinstalled hanger clamps, clips into the hanger clamps permanently mounted on the load profile. The hanger clamps preinstalled on the expansion module remain on the expansion module and are not connected to the load profiles (floating installation).

![NOTE!]

The hanger clamps fastened to the load profile must have enough distance from the middle of the hanger clamp to the middle of the expansion element of the expansion module (at least 100 mm)!

Fig. 12: Insert expansion module with hanger clamp into existing hanger clamp

- If overlaps are possible with the mounted conductor rail and/or any hanger clamps already installed, proceed as follows:
  - If necessary, the hanger clamps must be offset before installing the expansion module (Warning: the distance between the individual hanger clamps may not be > 500 mm. Install any additional hanger clamps before or after the installed expansion module!)
The additional hanger clamps must be placed so that collisions with other components cannot occur during expansion of the system (see section 2.3.3.1 in MV0185-0007). When installing expansion modules, a different permitted minimum distance of 100 mm applies between the hanger clamp and other system components, which can be appropriately reduced due to the concept of expansion modules with interdivisional cable guides.

Fig. 13: Example of potential overlap of the conductor rail
A = Additional hanger clamp is required
B = Hanger clamps are offset in the direction of installation

Fig. 14: System after offsetting the hanger clamps
If there is an appropriate gap in the system, the hanger clamps used for installation of the expansion module can be offset to the front.
In this case, an additional hanger clamp must be placed after the expansion module for additional installation, so that the maximum spacing between two hanger clamps of 500 mm is not exceeded.

Fig. 15: Potential gap between expansion module and end of the conductor rail already installed
If the expansion module should specifically be installed at a fastening point in the system, it is always possible to leave all hanger clamps and to cut off the conductor rail to the correct dimension.
Damage to the conductor rail due to nonfunctional expansion module!
The adjustment aid remains in the expansion modules during conductor rail installation and prevents the expansion module from closing during installation.

→ After completion of installation, of the section, be absolutely sure to remove the adjustment aid!

Fig. 16: Expansion module with adjustment aid
The conductor rail ends of the expansion module are connected to the preinstalled conductor rail using rail connectors (see section 6.3.3.2 in BAL0185-0002-EN):

Fig. 17: Push the rails onto the connector

Fig. 18: Correct position of the clamp

Fig. 19: Incorrect position of the clamp

Fig. 20: Tighten the connector with a 3-mm hex screwdriver to 2 Nm.

Fig. 21: Slide the connector cap over the rail connection
6.3 Installing Expansion Modules: Building/Load Profile Expansion Joints

The expansion modules are loaded in the middle of the range of the building load profile expansion joint. Fastening points are located to their right and left (see section 6.3.3.5 in BAL0815-0002-EN). Depending on the further path of the segment, it may be possible to omit the fastening points (e.g. if a curve is next; see instructions in chapter 5.1).

After determining the installation position of the expansion modules (see above), install the conductor rails up to the installation position of the expansion element. The conductor rails for all poles must be the same length (end flush).

The expansion module, including the preinstalled hanger clamps, clips into the hanger clamps permanently mounted on the load profile. The hanger clamps preinstalled on the expansion module remain on the expansion module and are not connected to the load profiles (floating installation).

NOTE!

The hanger clamps fastened to the load profile must have enough distance from the middle of the hanger clamp to the middle of the expansion element of the expansion module (at least 100 mm)!

![Fig. 22: Installed expansion module with expansion joint](image)

![Fig. 23: Load profile with hanger clamp, installed rails, and expansion joint](image)
Installation Instructions

Expansion Module and Expansion Element
Program 0815

Fig. 24: Insert expansion module with hanger clamp into existing hanger clamp

Fig. 25: Overview of the expansion module with hanger clamp

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Expansion module</td>
</tr>
<tr>
<td>2</td>
<td>Fastening point</td>
</tr>
<tr>
<td>3</td>
<td>Connectors</td>
</tr>
</tbody>
</table>
NOTE!

Do not position the connection elements over the building/load profile expansion joint!

DANGER!

Damage to the conductor rail due to nonfunctional expansion module!

The adjustment aid remains in the expansion modules during conductor rail installation and prevents the expansion module from closing during installation.

→ After completion of installation, of the section, be absolutely sure to remove the adjustment aid.
The conductor rail ends of the expansion module are connected to the preinstalled conductor rail using rail connectors (see section 6.3.3.2 in BAL0185-0002-EN):

Fig. 27: Push the rails onto the connector

Fig. 28: Correct position of the clamp

Fig. 29: Incorrect position of the clamp

Tighten the connector with a 3-mm hex screwdriver to 2 Nm.

Fig. 30: Tighten the connector

Fig. 31: Slide the connector cap over the rail connection
6.4 Installing Media Feeds and Expansion Modules

Always install feed next to a fastening point, so that expansion movements cannot be transmitted to the connection lines.

6.5 Installing Expansion Elements in Existing Systems

For existing systems, single-pole expansion elements are used that are installed at each pole in the segment like a connection point.

→ During installation, fasten the expansion elements into the expansion points using the adjustment aids (see chapter 7)

The adjustment aid prevents pushing together during installation of the next section and must be removed after installation.

Fig. 32: Clamp inserted into rail

Fig. 33: Correct position of the clamp

Fig. 34: Incorrect position of the clamp

Fig. 35: End cap pushed onto clamp unit
Installation Instructions

Expansion Module and Expansion Element
Program 0815

Fig. 36: Installing installation part

Fig. 37: Expansion element without electrical bypass

Fig. 38: Expansion element with electrical bypass
7 Adjusting the Gap Dimension

7.1 Expansion Module

The expansion gap is adjusted on the expansion modules during installation of the system. A plastic adjustment aid is installed and clipped between the end caps to prevent loss (see Fig. 40). After installation of the entire system, the adjustment aids on each expansion module installed must be removed during final inspection. This permits the expansion of the different components.

The adjustment at the factory later permits a possible expansion of +/- 8 mm per expansion module at each individual pole of the conductor rail.

ATTENTION!

The expansion modules can be adjusted with the separately available adjustment aid for an installation temperature range between +10° and +25° C. After installation is complete, the adjustment aids must absolutely be removed.

If the installation temperature is significantly different, the individual expansion elements must be adjusted as described in chapter 7.2.

NOTICE!

The adjustment aids are separately available as an adjustment aid set (material no.: 08-Z009-0014P).
7.2 Adjusting Expansion Elements

Adjust the expansion gap during installation depending on the actual expansion temperature.
The required expansion gap can be read off the following diagrams (see sections 7.2.1 to 7.2.4). The expansion gap must be adjusted on each expansion element in the expansion module.

The diagrams below were prepared based on a full temperature span of 40 K and guarantee simplicity of adjustment.

7.2.1 Case 1: Copper Conductor Rail on Steel Load Profile

The copper conductor rail expands more during changes in temperature than does the steel load profile.

![Diagram 41: Copper conductor rail on steel load profile](image)

7.2.2 Case 2: Copper conductor rail on aluminum load profile

The aluminum load profile expands more during changes in temperature than does the copper conductor rail.

![Diagram 42: Copper conductor rail on aluminum load profile](image)
7.2.3 Case 3: Steel Conductor Rail on Steel Load Profile

No expansion module needed, since there is no differential expansion. Except for building expansion joints: see chapter 5.1

7.2.4 Case 4: Steel Conductor Rail on Aluminum Load Profile

The aluminum load profile expands more during changes in temperature than does the steel conductor rail.

After adjusting the gap, be sure that it cannot slip more during later installation.

7.3 Installing an Air Gap

Air gaps without expansion distance and without electrical bypass

Air gaps can be used anywhere. When used in a curve, two additional hanger clamps are required. Gaps can also be retrofitted.

→ To do this, cut a 46 mm piece out of the rail at the desired point

→ Deburr the rail ends cleanly (see BAL0815-0002-EN)
Fig. 45: Correct position of the clamp

Fig. 46: Incorrect position of the clamp

Fig. 47: End cap pushed onto clamp unit

Fig. 48: Installing an air gap

Use the QR code ("click" or "scan"), to watch our animation Mounting an Air Gap.