Canalis KR

Cast Resin Busbar Trunking System

Installation Manual

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Safety Information

Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.



WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Essential Safety Instructions

HAZARD OF CRUSHING, FRACTURES AND CHEMICAL EXPOSURE

- Wear personal protective equipment when handling and installing the products (long sleeved jacket, trousers, gloves, safety shoes, helmet, and safety glasses).
- Only personnel who have been trained in safety regulations may work on construction sites to install cast resin busbar trunking systems.
- Work with extreme caution and follow the instructions provided in the manual.
- Follow all the safety instructions described in the material safety data sheets while working with chemicals.

Failure to follow these instructions can result in death, serious injury, or equipment damage.



About the Book

Document Scope

This manual provides instructions for the installation of the Canalis KR Cast Resin Busbar Trunking System.

It is intended for trained personnel.

Validity Note

For product compliance and environmental information (RoHS, REACH, PEP, EOLI, etc.), go to www.se.com/ww/en/work/support/green-premium/.

The technical characteristics of the devices described in the present document also appear online. To access the information online, go to the Schneider Electric home page www.se.com/ww/en/download/.

The characteristics that are described in the present document should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the document and online information, use the online information as your reference.

Online Information

The information contained in this guide is likely to be updated at any time. Schneider Electric strongly recommends that you have the most recent and up-todate version available on www.se.com/ww/en/download.

The technical characteristics of the devices described in this guide also appear online. To access the information online, go to the Schneider Electric home page at www.se.com.

Related Documents

Title of documentation	Reference number
Canalis KR Catalogue	DEBU031EN

You can download these technical publications and other technical information from our website at www.se.com/ww/en/download.

Preparation and Organization

Equipment and Tools

Overview

This chapter lists the necessary tools, equipment, and supplies that you must have available before you can begin the installation of the Canalis KR.

Lifting and Handling Tools



Crane or forklift truck with minimum fork length of 2 m, capable of lifting 4.5 tons (minimum)



Two slings for handling the elements





Drilling machine capable of drilling through concrete



Set of flat or ring spanners (10...22 mm)



Socket wrench with sockets (10...22 mm)



Set of screwdrivers





Measuring tape (metric)



Metal hammer

Carpenters square



Levelling instrument (spirit level)

Equipment for Establishing and Testing Electrical Connections



Industrial hot air blower gun

Insulation tester (Megohmmeter

(1000 V))



Nylon cleaning pads (Scotch Brite red or similar)

Torque wrench (10...22 mm)

Equipment for Casting



Moulds (Supplied with Canalis KR)



Spray bottle for demoulding agent

Empty bucket (10 litres)



Clamping tools

Industrial mixer (rated 750 W or above)



Spatula



Rubber hammer



Cleaning agent



Grinding stone

Chemicals and Casting Equipment Supplied with Canalis KR

Mineral filler, resin, and hardener

Materials	Minimum quantity supplied	Catalogue number
Mineral filler	1 bucket of 12 kg sand	KRB0000MF1
Resin and Hardener	One box of resin (component A) 1.9 kg	KRB0000RH1
	One box of hardener (component B) 0.6 kg	

Quantity of casting moulds

Rating of the trunking (A)		Quantity	Number of junctions
KRA	KRC		
0800 to 5000	1000 to 6300	One mould	4 ¹
¹ The minimum quantity of moulds per line is 4, in order to be able to mould all junctions of short runs at the same time.			

Quantity of resin per junction

Rating of the trunking (A)		Number of Quantity of resin and	Quantity of	
KRA	KRC		the box of resin/ hardener) (Cat.no:KRB0000RH1)	(Fraction of the bucket of sand) (Cat.no: KRB00000MF1)
0800	1000	3 or 4	0.70	0.70
		5	0.70	0.70
1000	1350	3 or 4	0.80	0.80
		5	0.90	0.90
1250	1600	3 or 4	0.80	0.80
		5	1.00	1.00
1600	2000	3 or 4	1.00	1.00
		5	1.20	1.20
2000	2500	3 or 4	1.20	1.20
		5	1.40	1.40
2500	3200	3 or 4	1.30	1.30
		5	1.50	1.50
3200	4000	3 or 4	2.00	2.00
		5	2.20	2.20
4000	5000	3 or 4	2.10	2.10
		5	2.30	2.30
5000	6300	3 or 4	2.30	2.30
		5	2.70	2.70

Preparing the mixture:

- Proportions of the components in the mixture: 1 box of resin + 1 box of hardener + 1 bucket of mineral filler (or the equivalent ratio).
- The quantity of resin mix needed for one junction depends on the size of the busway, as shown in the table above.
- Example: Quantity to order for 1 line of KRC1600 3L+N with 9 junctions and 1 line of KRC2500 3L+N with 20 junctions: Resin + hardener: 0.8 x 9 + 1.2 x 20 = 31.2 -> 32; Mineral filler: 0.8 x 9 + 1.2 x 20 = 31.2 -> 32.

 The quantity proposed takes into account that all junctions may not be cast using the same batch of mixture and that some of it may have to be discarded.

Amount of demoulding agent for connections:

Rating of the trunking (A)		Connections	Quantity of demoulding agent	
KRA	KRC			
0800 to 1250	1000 to 1600	1 to 20	1 box	
1600 to 2500	2000 to 3200	1 to 15	1 box	
3200 to 5000	4000 to 6300	1 to 10	1 box	

Reception and Handling

Scope of Delivery

All materials are packaged and sent with a delivery note, a packing list, and short installation instructions.

Receiving the Goods

After the goods are received, do the following:

- 1. Take note of the information symbols and labels on the packaging. Pay attention to safety labels.
- 2. Check that the documentation and material correspond with your installation project.
- 3. Make sure that the material is in proper condition and without transport damage.
- 4. Make sure that all components are supplied and they function as intended and indicated in the documentation.
- 5. The item number on the packaging, the element number on the elements and the project manual helps you to identify where the parts/elements have to be installed in the layout.

Proper Handling of Materials

NOTICE

HAZARD OF BREAKAGE

- Proceed with caution and pay attention to personnel safety. Use equipment necessary for correct handling.
- Do not use abrasive or metal slings for lifting the elements.
- Do not use steel cables or hooks for lifting the elements.
- Do not remove the protective foil over the conductors during handling.

Failure to follow these instructions can result in equipment damage.

The cast resin busbar is a piece of electrical equipment and should be handled with care by following the instructions below.





Keep the boxes in an upright position at all times. Do not stack more than two pallets.

Lifting with forklift trucks:

- For proper loading and unloading of containers, the forklift must be able to lift a minimum of 4.5 tons.
- To lift the pallets properly at the narrow side (0.8 m), the forklift must have a minimum fork length of 2 m.
- Use rubber covers on the fork so that it does not scratch the surface of elements.
- Ensure that the elements do not get damaged when you transport them with a forklift.

Lifting the elements with slings

- Use fabric slings to suspend the cast resin busbar elements.
- Always use straps with double noose to lift the elements. Ensure that the straps can handle the weight.
- Ensure that the lifting slings are wrapped around all the conductors, as shown in the figure on the left.

Storage of Hardware and Chemical Components

Storage Area for Chemicals and Equipment

You must ensure that the material storage area meets the following requirements:

- It must be stable and level.
- It must be protected against extreme temperature, water penetration, and dampness.
- It must be protected against fire, dust, water, direct sunlight, and welding sparks.
- It must not serve as a gangway or be used to assemble other equipment.

General Rules for Storage of Equipment and Chemicals



HAZARD OF DEGENERATION DURING STORAGE

- Do not remove the special protective foil before the elements are in their final place and ready to be connected. If the protective packing is damaged, check the contact surfaces and clean them if necessary. Clean the ground resin area with sandpaper.
- Do not store the cast resin mix in direct sunlight, below 5 °C or above 35 °C.

Failure to follow these instructions can result in equipment damage.



Storage of equipment

- It is recommended to store the material in the original transport packing.
- Up to 2 pallets of straight elements can be stacked on top of each other.
- The elements of the double system (aluminium conductor with more than 2500 A and copper conductor with more than 3200 A) are better stored flat on top of each other
- Secure elements with a strap retainer.
- Other elements like end-feed units, form parts, boxes, frames, cable connections and so on, should not be stacked.



Stacking (top) and storage (bottom) of elements



Storage of chemicals

Storage of chemicals

The cast resin, hardener, and demoulding agent must not be stored below 5 °C, or above 35 °C.

Layout and Supports

Rules To Be Followed

You must follow these rules before installation:

· Check the layout plan and note the locations and type of supports required.

In designing supports, consider the following:

- · Feasibility of fixed points in regard to horizontal run layouts.
- Fixing points on the structure and suitable accessories (plugs, etc.).
- Ensure sufficient carrying capacity of the supports. They should be able to support the weight of the cast resin busbar trunking system plus 90 kg, in accordance with IEC/EN 61439-6.
- The elements are comprised of three to five conductors in the following possible configurations: 3L, 3L + N, 3L + PE, 3L + PEN, and 3L + N + PE, as shown in the figure below.



3L + PEN

- The conductors are insulated using cast epoxy resin RAL 7030.
 - Degree of protection is IP68.
 - Insulation voltage: 1000 V.
- The weight of the elements depends on their rating. Nine ratings are available, from 800 to 5000 A for aluminum and from 1000 to 6300 A for copper conductors. The cross sectional areas and weights of the different ratings are shown in the table below.

Trunking cross sections



Cast Resin

Rules For Working With Cast Resin

You must follow these rules while working with cast resin:

- Check that the resin is clear and liquid. Do not use the resin if it is milky or crystallized.
- Check the best-before date on the label. If it is out of date, order fresh resin. Never exceed the permissible best-before date.
- Check that the filler material/sand is dry.

Handling and Safety Precautions

You must observe these precautions while handling the resin and other chemicals:

- Ventilate the work site well.
- Do not eat, drink, or smoke at the work site.
- Use protective goggles, gloves and overalls.
- Avoid inhaling any vapor or fumes. Wear a safety mask to prevent accidental inhalation.
- · Apply protective cream over unprotected areas of skin to avoid sensitization.
- In the event of unintentional spillage, clean with inert absorbent material (sand) and store the contaminated material in a suitable container before disposal.
- Filled containers of resin and hardener must be incinerated or stored according to local regulations.
- Wash your hands with warm water and soap after work.

Material Safety Data Sheets

The material safety data sheets for the chemical products are listed here:

- Aqua Release 1026S, Safety data sheet.
- BKS1, Safety data sheet.
- BKS2, Safety data sheet.
- Quartz Sand, Safety data sheet.

Installation

Installation of Supports

Introduction

The cast resin busbar trunking system must be attached using the supporting structures of the building, for example, wall beams or stands, the system-specific supports, threaded rods, and C-profiles.

HAZARD OF IMPROPER INSTALLATION

- Study and understand the layout plan before mounting the supports.
- Take into account the recommended separation distance between the supports during mounting.
- The supports must be levelled, so that the busbar elements are level after installation.
- The supports must be able to bear the weight of the busbar elements.

Failure to follow these instructions can result in injury or equipment damage.

Mounting Material and Supports

Types of Supports

The types of supports are:

- · Horizontal:
 - Type ZA1 and ZA2, to support the busbar trunking widthwise (flat) or edgewise respectively. These consist of a single angle bracket. The recommended distance between these types of support is 1.5 m.
- Vertical:
 - Vertical supports are used to fix sections of a vertical run to the structure of the building. These can be used to fix busbar trunking elements to a wall, to a wall bracket and to the floor.
 - These provide height and depth adjustment, and spring adjustment to ensure distribution of the load at each floor.
 - These also help to avoid the transmission of building forces to the busbar trunking (expansion and vibration).



ZA1 - Horizontal flat support



ZA5 - Vertical wall spring support



ZA2 - Horizontal edgewise support



ZA6 - Vertical floor spring support



ZA7 - Vertical wall fix point support

ZA9 - Vertical wall guiding support



ZA8 - Vertical floor fix point support

The dimensions of the supports to be used for elements with different ratings and polarities are described in the *Canalis KR Catalogue*.

Supports that are not available in the catalog or price list (for example, plugs, beams, and suspension struts) must be provided by installation experts.

Mounting the Supports

Rules for Mounting the Supports

Follow these general rules for mounting the supports:



Figure showing the use of a transverse stay for a fixed point

- Before mounting the supports, note their types and intended locations.
- No element must be left unsupported.
- For easier levelling, always use two supports for each element.
- A support must never coincide with a joint block.
- Always maintain a distance of at least 250 mm between the center of the joint block and the support.
- The maximum distance between horizontal supports is 1.5 m for straight busbar runs.
- When using fixed-point supports, the use of supporting structures with transverse stays is recommended, as shown in the figure on the left.
- The minimum distances between the installed elements, walls, and ceilings must be taken into account while installing the supports, as shown in the following figures.





Figure showing recommended distances between a joint block and a support, and between two supports. The orientations shown are widthwise (left) and edgewise (right).





Figure showing minimum distances between the elements and walls in a vertical installation (left), and between the elements, walls and the ceiling in a horizontal installation (right)

For horizontal installation the minimum gap between ceiling and busway should be 150 mm, however the recommended gap should be 500 mm to ease assembly of junctions.

Terminal Elements, Vertical Branches, Elbows, and Z Shaped Elements (Zeds)

Follow these rules for mounting supports intended for terminal elements, vertical branches, elbows, and zeds:



- Terminals (1) must be fixed by their own supports and not be supported by transformers or switchboards.
- Vertical branches (2) must be always supported as close as possible to the elbow angle.
- Elbows and zeds (3) must be supported individually.
- Supports must be installed close to junctions (4).

Mounting the Supports

This table explains how to mount the supports:

Step	Action
1	First check that the installation plan and all the rules regarding support installation described in Layout and Supports , page 14have been followed.
2	Mount the supports on to the support structures of the building. Fix supports with bolts and anchors.
3	Level and align the supports using the levelling instrument.

NOTE: These instructions only apply to accessories supplied by Schneider Electric. For further information, refer to the relevant catalogue or extra technical specifications.

It is beyond the scope of this manual to document the number of different onsite conditions that may exist. Therefore, it is recommended that installation experts evaluate the site conditions.

Ceiling, Wall, and Floor Support Attachment

Mounting the Supports on the Ceiling

Follow these rules to mount the supports on the ceiling:

Ceiling mounting examples: suspended installation



- 1 Threaded rods suspension
- 2 C-profiles
- 3 Anchor bolts



- Attach the supports to the ceiling.
- The C-profile can be used for horizontal element installation, element in widthwise or edgewise position.

The mounting set consists of the following components:

- Two threaded rods M10 for connecting the C-profile.
- Two C-profiles.
- Four lock nuts with securing washers
- Once the ceiling supports are installed, the elements can be placed on them and secured, as described later , page 24



Elements with supports attached

Mounting the Wall Supports

Follow these rules to attach the wall supports:



Fixed wall supports (left). The elements must be installed on the wall supports using terminal clamps (right).





Examples of wall supports.

Mounting the Floor Supports



Example of a floor mounted element: elevated installation

- A wall support consists of a wall beam and a set of terminal clamps. The wall beams must be provided by the customer, if they have not been designed, confirmed and ordered separately from Schneider Electric
- Attach the suspension support (wall beam) to the wall or another suitable structural support.
- You must insert additional transverse stays when implementing fixed point supports.
- The figures on the left show examples of wall supports. You must check that the minimum distances indicated in the figures are implemented.

- The rules for mounting the floor supports are the same as those for the ceiling and wall supports.
- The figure on the left shows an example of a floor support installation, with the minimum dimensions that must be used during installation.

Supports for Vertical Installation on Walls

Mounting the Supports for Vertical Installations

Follow these rules for mounting vertical supports



Mounting the spring support ZA6 on the floor



- Vertical runs must be supported by dedicated supports supplied by Schneider Electric
- Depending on the building configuration, supports can be mounted on the floor or on the wall.
- Supports must be mounted at distances of 3 m (maximum).
- The first support of the run must be a fixed point, others must be with springs.
- Intermediary guides can be used to avoid lateral displacements.
- Mount all supports in the corresponding locations before installing the cast resin busbar trunking system.
- Mark the anchorage holes on the wall, using the support as a template.
- Use the appropriate anchor bolts for the weight to be supported.
- Extract the mounting studs held by nuts that hold the cast resin busbar trunking system.

Mounting a fixed-point support ZA7 on the wall



Mounting a fixed-point support ZA8 on the floor.

Installing a Raising Main



KR Busway Trunking Support

The trunking supports fix sections of a vertical run to the building structure. This type of fixing support has the following advantages:

- Assembly:
 - ∘ to a wall,
 - to a wall bracket,
 - to the floor.
- Height and depth adjustment;
- · Spring adjustment to ensure distribution of the load at each floor;
- Avoids the transmission of building forces to the busbar trunking (expansion and vibration).

Installation Principles

While installing KR rising mains, specific supports mentioned in the table below can be used along with expansion unit in vertical raising mains. There is no height limitation for rising mains with KR cast resin busway, but the following guidelines for the design of support system must be followed.

Height of	Support type			
busway	Fixed	Springs	Guides	
	ZA7 / ZA8 (every 1.5 m)	ZA5 / ZA6 (every 3 m)	ZA9 (between ZA5 / ZA6)	Expansion unit (every 25 m)
0 m to 6 m	1	-	-	-
6 m to 12 m	✓ Only 2 at bottom	1	1	-
12 m to maximum	✓ 2 at bottom and after every 25 m	1	1	1

General guidelines:

- In any riser, two fixed supports type ZA7/ZA8 are required at the bottom of a riser.
- In any riser, a support is required every 1.5 meters. It can be fixed supports, just guides or guides with springs.

NOTE: In special cases, the maximum of 2 meters distance is accepted between the supports locally but need to adjust on other places to keep an average of 1.5 meters.

- For small risers up to 6 meters, only fixed support ZA7/ZA8 is required.
- For medium risers beyond 6 meters, spring supports ZA5/ZA6 is required with a distance of 3 meters, and guiding supports ZA9 is required in between two spring supports.

NOTE: For risers 6 to 12 meters maximum, only 1 section (at the bottom) must be equipped with 2 fixed supports and other sections must be extended freely across the guides and spring supports.

 For large risers higher than 12 meters, previous guidelines must be followed and in the middle of each 25 meters sections, install an expansion unit to compensate the extension, and install 2 units of ZA7/ ZA8 after every 25 meters.



Installation of Busbar Elements

Introduction

Once the supports are in place, you can begin the installation of the busbar elements.

Preparing and Installing the Cast Resin Busbar Elements

Overview

This section explains how the cast resin busbar elements should be installed on the supports. At this stage, the supports have been installed in accordance with the installation plan.

General Instructions for Installation

Follow these instructions during the installation process:

- Start the installation by connecting the switchboard.
- Continue toward the transformer, sub distribution board, and loads.
- Install the elements in accordance with the planned layout as indicated in the installation drawings supplied.
- Connect the sections of up to a maximum of six units to facilitate the insulation test.
- For handling reasons, keep a straight element as the last connected unit.

Installing the Cast Resin Busbar Elements

Follow these instructions for installing the cast resin busbar elements

- Position elements at the desired location using slings or other lifting lugs.
- Ensure that elements are correctly positioned in relation to the adjoining elements.
- Secure the cast resin busbar trunking system by tightening the threaded rods on the supports. Use the nuts and fixing screws provided with the supports.
- When installing adjoining elements, make sure that the spacing between their end conductors is 30 +/-5 mm.

Install the entire vertical run on the

After installing the entire vertical run, tighten the screws on the threaded rods with the springs on the ZA5 supports and set the desired height of the element.

mounted supports.

Installing the Cast Resin Busbar Elements Vertically on Wall-Mounted Brackets

Follow these instructions for vertical installations mounted on walls.



Completing the installation of a cast resin busbar element on ZA5, ZA9 and ZA7 (top to bottom) supports



 Install the vertical runs on spring supports mounted on the floor as shown in the figure on the left.

Installing the vertical elements on ZA6 spring supports mounted on the floor.



Installing a vertical element on a ZA8 fixed-point support mounted on the floor.

 Install the vertical runs on fixed-point supports mounted on the floor as shown in the figure on the left.

Expansion Unit

Mounting the Expansion Unit

HAZARD OF IMPROPER INSTALLATION

- · Do not install supports in the expansion areas.
- Do not attach the expansion elements to the supports, as this results in the temperature-dependent expansion of the run not fully compensated.
- Attach one support in front of the expansion area and one behind it to ensure that the element is fixed correctly. Two support points are provided for each expansion unit.
- Do not remove the screws without having first installed the two elements adjoining the expansion unit in their final position.

Failure to follow these instructions can result in injury or equipment damage.

Follow these instructions for mounting the expansion unit.

Step	Action
1	Before mounting, ensure that the expansion unit is blocked by the screws marked in red (delivery condition).
2	Install the expansion unit in the same way as any other cast resin busbar trunking system element in the position indicated in the installation drawing. Follow the assembly instructions for connecting elements.
3	Place the expansion unit on tow beams.
4	Without releasing the expansion unit, install the following busbar trunking system element and attach it in to the corresponding flanges.



Mounting the expansion unit.

Releasing the Expansion Unit

Remove the screws from the expansion unit to enable it to move freely.

Junction Block Installation and Testing

Establishing and Testing the Electrical Connection

Safety Instructions

NOTICE

HAZARD OF IMPROPER CONNECTION

- **1.** Plan the installation of the connections in advance to avoid subsequent problems.
- 2. Ensure that all contact surfaces are clean and free of impurities.
- **3.** Ensure that the junction block is exactly in-between two elements to be joined.
- **4.** Do not knock or hit the junction block hard when you insert it. Instead, insert it carefully to avoid damaging the elements. A rubber hammer can be used as an aid.
- 5. Double check phase sequence on all terminal elements using a voltmeter.
- 6. Before casting, check the insulation resistance using an insulation tester with 1000 V rating. The insulation resistance must be ≥ 1 MΩ.s

Failure to follow these instructions can result in equipment damage.

Preparing the Elements for Connection



elements (junction) should be 30 +/- 5 mm.
The cast resin busbar elements to be connected must be aligned and level.

The distance between the conductor ends of two cast resin busbar

Distance between busbar elements to enable proper connection



The ends of the elements must be cleaned and dried

- Clean the conductor ends with a polishing fleece and dry them with an industrial drier before inserting the junction block if:
 - The elements have been stored for long.
 - The conductor-end protective packing is damaged.
 - The conductors have become contaminated, wet, or corroded.
- Check the insulation resistance of each element. The insulation resistance must be $\ge 1 \text{ M}\Omega$.

Insert the junction block between the copper or aluminum conductors from above or below. Align it such that it extends equally on all sides. If necessary, gently knock the junction block into place using a

rubber hammer.

Establishing the Electrical Connection



Inserting the junction block between two elements



 When the junction block is aligned, tighten the connecting bolt. Tighten to 54 N.m using a torque wrench for junction blocks with bolt size 17 mm or to 84 N.m for junction blocks with bolt size 19 mm.

Tightening the connections between the junction block and the elements

Testing the Electrical Connection

HAZARD OF ELECTRIC SHOCK

The testing of electrical connections must be done by trained and qualified personnel only.

Failure to follow these instructions will result in death or serious injury.

After connecting a subsection (maximum of 6 elements), carry out the following tests:

- Insulation testing: Using a megohmmeter, check the insulation resistance between each phase or neutral¹ and earth (the casing, if it is connected to earth). According to IEC 60364-6 (and 61.3.3) standard, the insulation values must be:
 - Rated voltage < 500 V Utest DC = 500 V Ri \ge 1 M Ω .
 - Rated voltage > 500 V Utest DC = 1000 V Ri ≥ 1 MΩ.
- PE protective circuit equipotential (According to ref: IEC 61439-1): Using an ohmmeter, check the PE protective circuit continuity by visual inspection and random continuity testing.
- ¹: No neutral insulation if the neutral is connected to or used as the earth.

Casting

Casting Procedure

Safety Instructions

HAZARD OF TOXICITY AND POISONING

You must follow these safety instructions while working with the chemicals:

- Ventilate the area well.
- Do not eat, drink, or smoke on the work site.
- Use protective overalls, gloves, glasses, and masks.
- · Apply protective cream over unprotected areas of the skin.
- In the event of unintentional spillage, clean with inert absorbent material (sand) and store the contaminated material in an appropriate container before disposal.
- Boxes of resin and hardener should be stored or disposed of according to local regulations.
- · Wash hands thoroughly with soap and warm water after work.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Applying the Demoulding Agent

ACAUTION

HAZARD OF IMPROPER CONNECTION

Make sure that the ground resin part (2 cm) on the busbar ends is not contaminated with demoulding agent. In case of such contamination, the joint resin cannot connect properly with the cast resin busbar elements, and IP68 of the system is not achieved.

Failure to follow these instructions can result in injury or equipment damage.

Follow these instructions for applying the demoulding agent to the moulds.

Step	Action	
1		Apply the neoprene seals to both sides of the mould (tongue and groove).
2		Brush the demoulding agent onto the inside of the casting moulds and the seals. Allow the demoulding agent to dry.
3	After ten minutes, remove any excess liquid from the mould and rubber seals.	



Preparing and Filling the Casting Mixture

Follow these instructions to prepare the casting mixture and fill the moulds.

Step	Action	
1	COMP.A	Pour the resin (component A) into an empty bucket.
2	2 Сомр.в	Pour the hardener (component B) into the bucket with the resin.

Step	Action	
3	COMP.A+ COMP.B 30 Sec.	Mix using an industrial mixer (rated 750 W or higher) for approximately 30 seconds.
4	A SAND 3 Min.	Pour the filler material (sand) into the mixture of resin and hardener, and mix until the cast resin mix becomes homogeneous. The mixing time should be approximately 3 minutes.
5		Pour the cast resin mix slowly and steadily up to the upper edge of the installed casting mould. Tap the mould gently with a rubber hammer to allow the bubbles caused when pouring to escape. Do not overfill the casting mould and smooth the surface with a putty knife. Check after 20 mins if the resin has settled and pour again up to the brim. NOTE: Avoid drafts and ambient temperature below 5 °C.
6	Allow the cast resin mix to harden. NOTE: The hardening time is usually around 5 to 14 hours. See table below for the required hardening times at various ambient temperatures.	
7	Remove the reusable steel casting	mould after hardening.
8	Use a grinding stone to clean the edges and remove any uneven spots on the joint casting. Like the overall system, the joint meets the requirements of IP68.	
9	Clean all tools immediately after use and allow them to dry thoroughly. Suitable solvents are methylene chloride or acetone. Follow local regulations when using acetone.	

Table with the maximum time before which the mix must be used and the hardening time depending on the ambient temperature

Ambient temperature (°C)	Maximum time before which the mix must be used (Mins)	Hardening time (Hours)
25	20 25	5
15	25 30	7
10	30 35	10
5	35 40	14

Checking the Electrical Connection

After casting a sub-section, perform tests on the electrical connection as described earlier, page 28.

Specific Components

Connection to Switchboards and Transformers

Feed Units

These are of two types: type ER and type EL

- Type ER feed units allow the busbar trunking to be connected to a switchboard busbar, or to the terminals of an oil-immersed transformer or generator.
- Type EL feed units allow optimal connection to the busbar trunking.

These units can be connected:

- Either directly to the busbar.
- By flexible bars and connection plates.
- By braids.
- By cables.

Feed units can either be standard or made to measure. Consult the *Canalis KR Catalogue* for more information about feed units.

Transformer / Switchboard Connection Unit

Transformer / Switchboard Connection Unit

End feed units connect lines to transformers, switchboards, and generators, both mechanically and electrically.

The mechanical connection is possible with an assembly flange using boxes, adapter flanges, sealings, and/or bellows in accordance with the project design.

NOTE: The dimensions of the terminal elements, protective flanges, and covers should be calculated prior to ordering, by using the methods specified in the *Canalis KR Catalogue*.





Terminal element (top) and adapter box (bottom) (left). Transformer/switchboard connection unit (right)

Preparing the Connection to the Terminal Element

Follow these rules for preparing the terminal element for connection:

- 1. Ensure that the switchboard/transformer mounting surface is flat.
- 2. Prepare the cut outs.
- 3. Reinforce the switchboard/transformer mounting surface in accordance with the weight of the terminal element.
- 4. The switchboard/transformer must contain fixtures for mechanically securing the terminal element. The weight of the terminal element must not be allowed to fall on the electrical connections (copper connection, flexibles and so on).

Installation in the Transformer / Switchboard

After storage and transport to the installation location, first mechanically secure the terminal element in the transformer/switchboard. Following this, electrically connect the terminal element to the busbar or circuit breaker.

Fixing the Terminal Element Mechanically

Follow these rules while fixing the terminal elements mechanically:

- 1. The power cables of the terminal element must be mechanically fixed in the transformer/switchboard. No mechanical load must fall on the electrical cables.
- 2. Attach the cover plate to the transformer/switchboard enclosure. Observe the distribution board specifications relating to the degree of protection. It may be necessary to use additional sealant to achieve degree of protection higher than IP55.

Connecting the Terminal Element Electrically

Follow these rules while connecting the terminal element electrically:

- 1. Remove the protective transportation devices.
- 2. Carry out the electrical connection in accordance with the terminal specifications and the information provided by the distribution board manufacturer. Take into account the dimension of the connecting material in accordance with these specifications.

Fire-resistance Barrier

Fire-resistance Barrier Regulations

If the cast resin busbar run passes through a wall or a shaft, a fire-resistance barrier may be required. The regular busway provides 60 minutes of fire resistance time. For greater protection levels of up to 120 minutes, a fire kit has to be installed on busway through the wall. The gap between the busbar trunking and the concrete should be filled with the appropriate product (not supplied by Schneider Electric).

You must not install the fire-resistance barrier through any junction (Mono-block).

Canalis KR complies with busbar trunking standard IEC 61439-6 with respect to resistance to flame propagation and fire resistance in building penetrations.





Standard product (S60) (left) and fire barrier kit (S120) (right)

KR / KT Adapter

The Canalis KR / KT Adapter

Canalis KR is made of copper or aluminum conductors encapsulated in epoxy resin IP68.

Canalis KT is made of copper or aluminum conductors isolated by polyester films and protected by a metallic enclosure IP55.

The KR / KT adapters enable the interconnection of the two systems. Both ranges, including adapters, are certified under the IEC 61439-1/6 standard.



The KR/KT adapter



The KR / KT adapter in use.

The design of the PE conductor is different in Canalis KR and in Canalis KT. For this reason, carefully select the correct reference as shown in the table below:

Canalis KR							Canalis K
Cond. config.	Cross sections	Nb o cond	of d.		Nb of cond.	Cross sections	Cond. config.
3L	No PE	3		KR•••••RT33	3	PE = casing	3L+PE
3L+PE	PE = 100%L	4		KR•••••RT43	3	PE = casing	3L+PE
3L+N / 3L+PEN	N = 100%L PEN = 100%L	4		KR•••••RT44	4	N = 100%L PE = casing	3L+N+PE / 3L+PEN
3L+N+PE	N = 100% PE = 100%L	5		KReeeeeRT54	4	N = 100%L PE = casing	3L+N+PE
3L+N+PE	N = 100%L PE = 100%L	5		KR+++++RT55	5	N = 100%L PER = 50%L + casing	3L+N+PER

NOTE: The KR / KT adapter is not provided with Canalis KR and must be ordered separately with Canalis KT products.

Commissioning

Commissioning

Safety Instructions

HAZARDOUS VOLTAGE

Proceed with extreme caution and follow these instructions carefully.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

AWARNING

HAZARDOUS VOLTAGE

Only authorized persons trained in electrical installation practices must carry out the following actions:

- Establish zero potential.
- Prevent the system from being switched on again.
- Document the switching operations.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Commissioning Instructions

Follow these instructions before the electrification of the line.

Step	Action
1	Insulate the cast resin busbar trunking system from the connections to transformers, switches, meters, and so on.
2	Check that all connections are fully tightened. Follow the instructions relating to tightening torques (visual inspection with record of results).
3	Check all suspensions and supports. All the fixing studs and screws of the supports must be tightened.
4	Make sure that all tap-off units and tapping equipment are disconnected (Off position).
5	Carry out an insulation resistance test to make sure that there are no short circuits or earth failures in the system (phase-earth, phase-neutral, and phase-phase). NOTE: You will observe that the readings vary depending on the length of the run, the number, and size of conductors and the level of moisture in the atmosphere.
6	Record the measured values in an insulation test report.
7	Contact technical support if the readings are lower than 1 M Ω per 100 m (1 M Ω x 100/ length of the run in meters).
	NOTE: As a rule, you must comply with the relevant country-specific regulations (in Germany and Switzerland, the minimum value is $0.5 \text{ M}\Omega$).

NOTE: Check that the poles on the cast resin busbar trunking system and those on the transformers, switches, meters, and so on, correspond correctly on electrification.

Electrifying the Line

HAZARDOUS VOLTAGE

Exercise these precautions during electrification of the line:

- Qualified personnel must be present the first time the line is electrified.
- Hazardous situations can be encountered when the cast resin busbar trunking system conductors are electrified for the first time. Therefore, follow the relevant instructions along with the country-specific regulations valid in each case.
- Short circuit or earth failures caused by incorrect installation that have not been previously detected can lead to serious consequences after voltage is applied.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Follow these rules to electrify the line:

- There must be no electrical load in the cast resin busbar trunking system when it is being electrified for the first time. Check the entire system to ensure that none of the electrical loads connected to the system are switched on.
- You must electrify the line step by step, starting at the power supply and moving towards the loads. The principal elements must be electrified first, followed by the feed equipment and finally, the secondary element circuits.
- After the line has been electrified, equipment such as lights, contactors, heaters, and motors can be switched on.
- Faults caused by short circuits must trigger the protective device for the feeder unit in the manner prescribed by the official regulations. Ensure that the system is de-energized before you eliminate the cause of the fault.

Observe the five safety rules:

- 1. Disconnect from the mains.
- 2. Ensure that the system is de-energized.
- 3. Secure against re-connection.
- 4. Carry out earthing and short circuiting.
- 5. Provide protection from adjacent live parts.

ATEX Recommendations

ATEX Recommendations

General Rules

Resin encapsulated products of the busbar trunking system Canalis KRA and Canalis KRC are considered as devices of group II category 3G, according to Directive 2014/34/EU Appendix I.

According to Directive 99/92/EG (ATEX 137) busbar trunking system can be used in Zone 2, as well as gas groups II A, II B, and II C, which are potentially explosive atmospheres due to flammable substances in temperature ranges of T1 to T5.

During operation or installation, the requirements of EN 60079-14:2014 have to be followed.

Resin encapsulated products of the busbar trunking system Canalis KRA and Canalis KRC, produced according to Directive 2014/34/EU Appendix I, are devices of the group II category 3D and can be used in Zone 22 according to Directive 99/92/EG (ATEX 137) and in areas of dust groups III A, III B, and III C (flammable dusts).

During operation or installation, the requirements of EN 60079-14:2014 have to be followed.

Eligible Resin Encapsulated Elements

KR•••••ET••• straight feeder lengths	KR•••••LP•• flat elbow	KR•••••LC•• edgewise

KR•••••ZP•• flat zed unit	KR•••••CP•1 edgewise and flat zed	KR•••••CP•2 edgewise and flat zed

KRC•••••TD• flatwise tee	KR•••••ZC•• edgewise zed unit	KRC•••••TC• edgewise elbow

ATEX Markings on the Labels of Busbar Trunking Elements

Busbar trunking elements suitable for installation in explosion hazard (EX) environments have a label that includes all the necessary ATEX markings:

- Allowable temperature range
- · Allowable EX environments and EX symbol
- SEV registration number
- Short circuit currents
- Rated voltage
- Rated current
- · Note to read the manual



Special Instructions and Conditions for EX Environments

We recommend a yearly inspection of the following system components, as applicable to each individual project.

Electrostatic charging of the insulation is to be prevented in the following manner. Maintenance and cleaning work is only to be carried out after ensuring that the atmosphere is free of explosion hazard substances.

The insulation material of the entire busbar trunking system in an EX environment is to be thoroughly checked for damage and cracks.

Elements suitable for installation in EX environments have the following label:





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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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