Technical Handbook

Schlüter®-LIPROTEC

Schlüter® Systems

PROFILE OF INNOVATION

For detailed drawings refer....

Symbols

Light Guidance System	LED Strips
	warm-white 3300 K neutral white 4500 K
	white adjustable from 3000 K – 7000 K
	coloured RGB adjustable

Content

Areas of Application and Use

Schlüter®-LIPROTEC Light Profile Technology is an easy-to-install LED system that allows for the creation of a number of mostly indirect light effects based on the use of various profile geometries and diffusers. The system, which is installed in the wall and ceiling area, is used to generate decorative or accent lighting effects in interior spaces. All profiles of the Schlüter®-LIPROTEC series are designed to enable the replacement of the corresponding diffusers and luminaires, including after installation.

Schlüter®-LIPROTEC has a wide range of application areas. In residential settings, the profiles can not only be installed in bathrooms, but also generate a pleasant atmosphere in kitchens or living rooms. Offices, commercial properties and tradeshows as well as hotels and medical practices are just some of the areas where the system can be used. The relevant standards and building codes - especially the regulations on low-voltage electrical installations (DIN VDE 0100) - must be observed.

Country-specific standards and regulations may have to be taken into account.

Quality Requirements

The consistently high quality requirements for each electronic component of the Schlüter®-LIPROTEC system have resulted in a durable, robust product portfolio that fully meets the requirements of the relevant standards. Furthermore, the LED strips are manufactured in accordance with a particularly high standard of quality to withstand the usual stresses associated with installation. Our guarantee of consistently high quality is based on continuous quality control at the production facility and prior to shipping.

Areas Affected by Moisture

The Schlüter®-LIPROTEC system is fully suited for use in bathrooms and other spaces where the LED technology may be exposed to moist environments. It is not approved for use in swimming pool or areas of high humidity, such as saunas and steam rooms. The installation guide listed in the descriptions must be observed.

Installation must comply with the applicable regulations and standards. Additional requirements in accordance with DIN VDE 0100-701 (Low-voltage electrical installations) apply to bathrooms.

Schlüter®-LIPROTEC-WS /-WSQ /-WSK

Schlüter®-LIPROTEC-WS /-WSQ and -WSK are high-quality support profiles for the attachment of various **Schlüter®-LIPROTEC-ES** LED strips.
In combination with Schlüter®-KERDI-BOARD panels, the recessed indirect or direct illumination of Increase spacing as words to cramped.

Aluminium natural, matt anodised – Schlüter®-LIPROTEC-WSQ

This can be implemented, for example, on the following construction elements:

- Bathtub with indirect illumination in the base area
- WC wall curtain element with indirect illumination to the wall
- WC wall curtain element with indirect or direct illumination at the outside edge
- Fixture elements as indirect or direct illumination, with light distribution over an non-tiled wall
- Fixture elements as indirect or direct illumination, with light distribution over adjacent ceramic tiles
- Luminaires with opal covers as wall curtain with an indirect illumination effect to the ceiling; back lighting of decorative elements (e. g. mirror).

Schlüter®-LIPROTEC-WSQ

Schlüter®-LIPROTEC-WSQ has an additional integrated finishing edge in QUADEC design. Schlüter®-LIPROTEC-WSK is a high-quality wall panel profile with integrated cable duct. Schlüter®-LIPROTEC-WS /-WSQ and -WSK profiles are available in the following material versions:
AE = Aluminium natural, matt anodised

The LED strips listed below can be used in the profiles Schlüter®-LIPROTEC-WS, -WSQ and -WSK:

LT ES 1 – Colour temperature 3300 Kelvin (warm-white), width 12 mm
LT ES 2 – Colour temperature 4500 Kelvin (neutral-white), width 12 mm
LT ES 7 – Colour temperature is adjustable from 3000 to 7000 Kelvin, width 12 mm
LT ES 8 – Colour tones adjustable from red, green, blue, width 12 mm

The LED strips are fully enclosed in a silicone coating and feature an end cap at each end. They must be protected against mechanical stresses (see also installation guide for “LED strips”). The profiles Schlüter®-LIPROTEC-WS, -WSQ and -WSK offer the option of creating various light effects by attaching two different diffusers:
The diffuser **Schlüter®-LIPROTEC-WSI** is flush with the short anchoring leg of the attachment profiles Schlüter®-LIPROTEC-WS/-WSQ or -WSK. This allows for indirect light radiation.
The diffuser **Schlüter®-LIPROTEC-WSD** is flush with the long anchoring leg of the corresponding attachment profiles Schlüter®-LIPROTEC-WS/-WSQ /-WSK. The profile can now be positioned in such a way that the illuminated areas of the diffuser are directly visible.
When used in areas with direct water exposure such as showers, the profiles Schlüter®-LIPROTEC-WS, -WSQ or -WSK must be positioned in such a way that no water can accumulate in them. The profile may only be installed vertically in showers. It must be ensured during the installation of the profile that any water ingress can safely drain.

Installation and cable routing

1. The cable ends of the LED strip are to be inserted into the cable conduit via a hole drilled on the back of the holder profile. The drilled cable conduit through the profile must be deburred on both sides to avoid damaging the cable when feeding it through.
2. A sufficient amount of cable length should be fed as a reserve length, into the cavity of the cable conduit, if possible, as a loop. This will allow for access later to the LED strips. (Fig. 1).
3. Schlüter®-LIPROTEC-WS is mounted using the installation adhesive Schlüter®-KERDI-FIX. The drying times of the adhesive must be taken into consideration before undertaking any further work. Where applicable, the profile must also be attached with adhesive.
4. The integrated cable duct as well as the transition to the tile installation substrate must be covered with adhesive fleece in the corresponding width after the lighting test (Fig. 2, page 6).

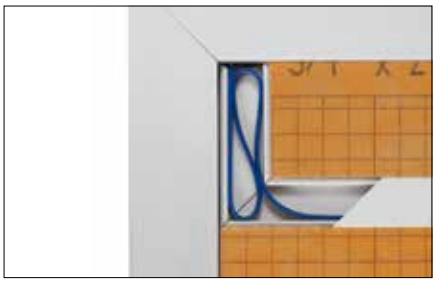


Fig. 1

5. If the Schlüter®-LIPROTEC-WS is used as an edging, then the corners must be mitre-cut. The use of a speed-adjustable cross-cut and mitre saw with a suitable saw blade is recommended (see also product data sheet and Schlüter®-LIPROTEC-VB installation instructions).

5a. If the Schlüter®-LIPROTEC-WSK profile is installed at the perimeter of a covering, the corner formations must be created with mitre cuts. We recommend the use of a mitre saw with adjustable speed and suitable saw blade (see also product data sheet and installation guide for Schlüter®-LIPROTEC-VB). The corner connectors Schlüter®-LIPROTEC-D/V are available for the mechanical connection of the mitre cuts. One corner connector must be planned for each mitre connection (see also product data sheet 15.2 and installation guide LT-MA 3).

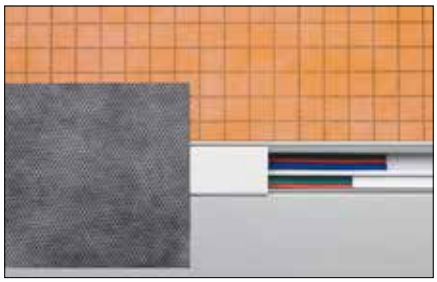


Fig. 2

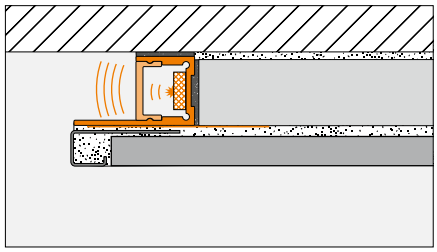
Installation recommendations for Light Profile Technology

Using the example of: **Schlüter®-LIPROTEC-WS**

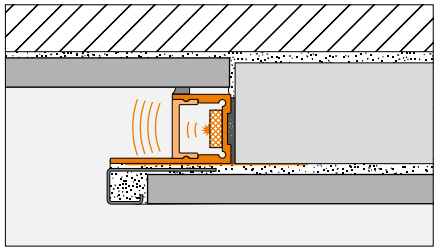
Wall feature illuminated from three sides
Dimensions: 150 cm x 210 cm
Substrate: 19 mm Schlüter®-KERDI-BOARD +
Schlüter®-KERDI-BOARD-K Module 19 mm
Light colour: adjustable from 3000 Kelvin to 7000 Kelvin

This installation guide shows the possibilities for installing the respective profile. Other installation situations may occur, depending on the conditions at the building site. The installation recommendation is only one of the possibilities to install the LIPROTEC system.
This manual specifies the maximum configuration of the Schlüter®-LIPROTEC system as well as the selection of the power supply, LED strips, receiver, and cables.

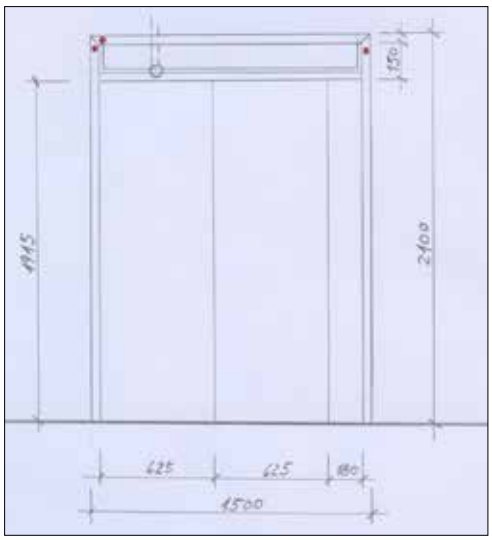
It is recommended to sketch the positioning of the individual profiles and their cable routing for every room situation or every application area of the Schlüter®-LIPROTEC system.



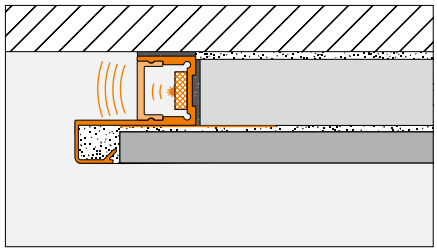
Schlüter®-LIPROTEC-WS
Substrate panel: Schlüter®-KERDI-BOARD 19 mm



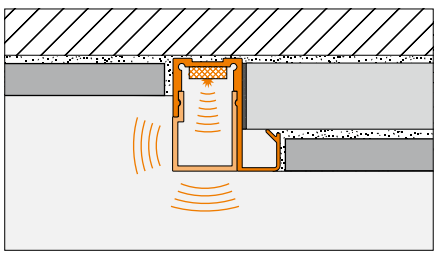
Schlüter®-LIPROTEC-WS
Substrate panel: Schlüter®-KERDI-BOARD 28 mm



Installation sketch



Alternative: Schlüter®-LIPROTEC-WSQ
Substrate panel: Schlüter®-KERDI-BOARD 19 mm



Alternative: Schlüter®-LIPROTEC-WSQ
Substrate panel: Schlüter®-KERDI-BOARD 19 mm

Preparing the Schlüter®-KERDI-BOARD Tile Substrate

Depending on the flatness and condition of the existing wall surface, the Schlüter®-KERDI-BOARD can be mounted over the full area or spot-bonded in accordance with Product Data Sheet 12.1.

Step 1: Preparation of the junction boxes

After the **Schlüter®-KERDI-BOARD-K** panels are mounted, the junction boxes are installed at the intended junction points. The Schlüter®-KERDI-BOARD panel can be drilled with a conventional circle cutter without carbide tip. Please take note of the fact that the junction box must be positioned no more than 2 metres from the LED strip (cable length at the LED strip: 2.3 m).

4 different junction boxes are available.

This installation example shows the **LT Z 5HD 47** flush-mounted box, installed with a circle cutter (Ø 68 mm). Sufficient space must be made behind the Schlüter®-KERDI-BOARD level to feed the cables from behind into the junction box.

The routed groove for the cable conduit ends about 2 cm from the junction box. The cable conduit cover is run up to the junction box. The groove of the Schlüter®-KERDI-BOARD-K module is extended to the cable conduit, using a utility knife (Fig. 1). The cables can now be fed through the junction box from the rear. The junction box can now be set into the mounting hole and screwed in (Fig. 2). The cable is then routed to the cavity in the ceiling through the previously installed **Schlüter®-LIPROTEC-ZLR** cable conduit under the wall plaster.

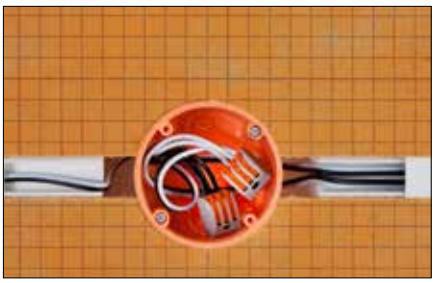


Fig. 1

Fig. 2

Step 2: Cable routing

The cable conduits are glued into all the grooves of the Schlüter®-KERDI-BOARD-K module. 90°connections are cut to a mitre of 45°. Subsequently, the inside edge must be smoothed out such that the cables cannot be damaged. The sharp-edged mitre-cut will be covered with insulating adhesive tape (Fig. 3). If the cables of the cable conduits are crossed in a T-shaped fashion, the conduit must be notched at the desired location (Fig. 4).

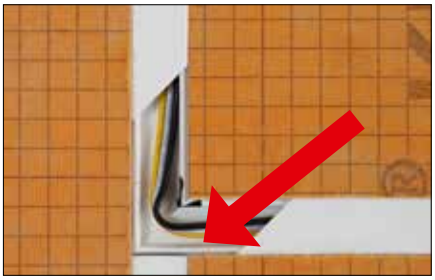


Fig. 3

The Schlüter®-KERDI-FIX installation adhesive must be applied to the centre of the installation groove of the Schlüter®-KERDI-BOARD-K. Then press the cable conduit into the adhesive. Only use enough adhesive so that it cannot ooze out at the sides.

Fig. 4

Step 3: Prepare the profile and diffuser
Cut the attachment profile incl. diffuser to size, if applicable with a mitre cut. We recommend the use of a mitre saw with adjustable speed and suitable saw blade (see also product data sheet and installation guide for Schlüter®-LIPROTEC-WS).

The LED strip must be cut to size in the designated location and closed with the enclosed end cap (see also installation guide “LED strips”).
Drill an opening at the end of the LED attachment profiles Schlüter®-LIPROTEC-WS, -WSQ and -WSK. This cable opening must be deburred on both sides to avoid damage when the cable is inserted. Attach piece of double-sided adhesive tape on the back of the LED strip. Remove the protective foil and adhere the LED strip in the centre of the profile. Thread the cable ends of the LED strip through the hole in the attachment profile (Fig. 1).


Fig. 1

Step 4: Attaching the profile with the LED strip in it
The Schlüter®-KERDI-FIX installation adhesive must be applied to the centre of the outside edge of the Schlüter®-KERDI-BOARD. Then press the profile into the adhesive. Only use enough adhesive so that it cannot ooze out at the sides. Guide the cable into the cavity of the cable conduit.
A sufficient amount of cable length should be fed as a reserve length, into the cable conduit, if possible, as a loop. This will allow for a later access to the LED strips. (Fig. 2).

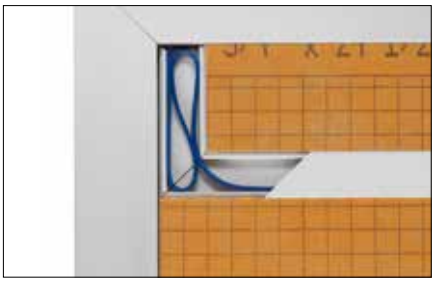
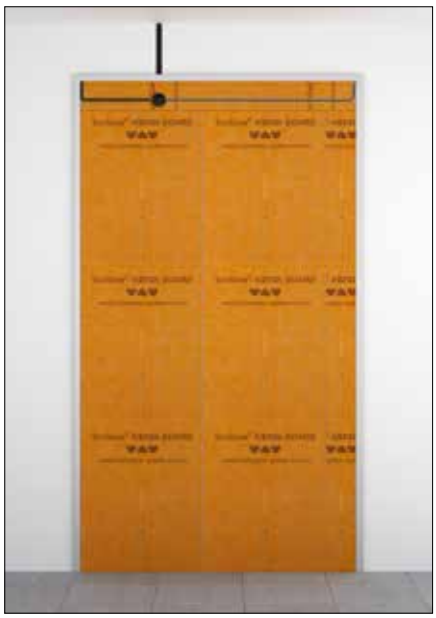


Fig. 2

Step 5: Connecting the LED strips
After the last profiles have been attached, the cables can be connected in the junction boxes. The cable lengths must be shortened accordingly. The ends of the cables must be stripped properly with cable stripper pliers. The 3-wire and 5-wire Schlüter®-LIPROTEC-ZKL clamps are to be used for connection clamps.

Function check: On / Off / Dimming

Prior to closing the junction boxes, check the function of the lighting installation. In the case of coloured LED strips, check the function of the basic colours red, green and blue.



Step 6: Cable covers
The cable channel conduit covers must be clipped on up to the junction box.
The cover for the junction box must be fastened with screws.

Step 7a: Attach the adhesive fleece
The adhesive fleece **Schlüter®-DESIGNBASE-HVL 38** is now adhered over the covered cable ducts, the junction box, and the anchoring legs of the Schlüter®-LIPROTEC-WS or -WSQ profiles as a bonding bridge for the tile covering. The fleece has a self-adhesive backside and is applied with even pressure. The adhesive tape should be positioned approx. 5 mm from the attachment profiles Schlüter®-LIPROTEC-WS or -WSQ (Fig.1).

The adhesive fleece **Schlüter®-DESIGNBASE-HVL 75** is adhered on the anchoring legs of the Schlüter®-LIPROTEC-WSK profile as a bonding bridge for the tile covering. The fleece has a self-adhesive backside and is applied with even pressure. The adhesive tape should be positioned approx. 5 mm from the exterior edge of the attachment profile Schlüter®-LIPROTEC-WSK (Fig.2).

Step 7b: Applying the seal
If a waterproof seal is required, the Schlüter®-KERDI-KEBA sealing band can be used as an alternative to the anchoring fleece, using the Schlüter®-KERDI-COLL-L sealing adhesive; see also Product Data Sheet 8.1 Schlüter®-KERDI and Product Data Sheet 8.4 Schlüter®-KERDI-COLL-L.

Step 8: Laying the tiles
A Schlüter finishing profile should be used for edging the ceramic tiles.
It is possible to lay tile over junction boxes. The final tile should be glued at selected points using the Schlüter®-KERDI-FIX elastic installation adhesive and the joints of the tile should be grouted with silicone. This would make it possible to access the junction boxes, if required.

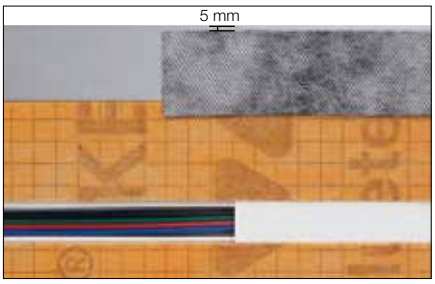


Fig. 1 – Sample application: DESIGNBASE-HVL 38

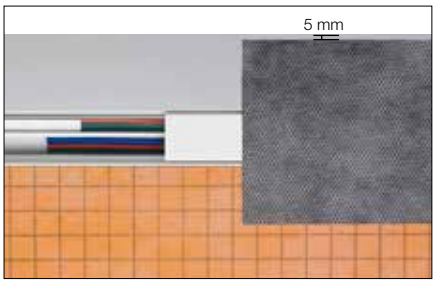


Fig. 2 – Sample application: DESIGNBASE-HVL 75

Schlüter®-DESIGNBASE-HVL		
Self-adhesive fleece		
B = mm	L = m	Art.-No.
38	20	HVL 38 / 20M
75	20	HVL 75 / 20M

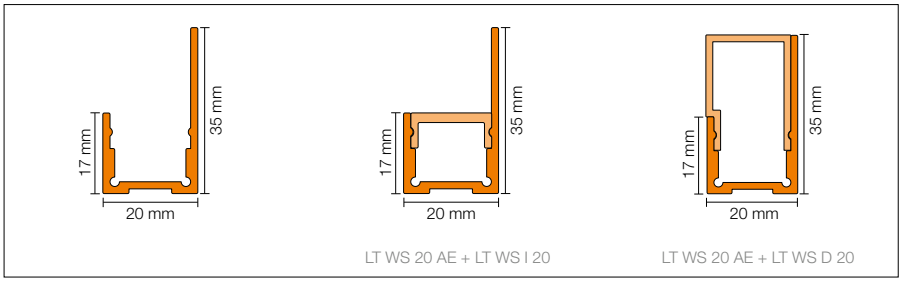

HVL 38 / 20M


HVL 75 / 20M

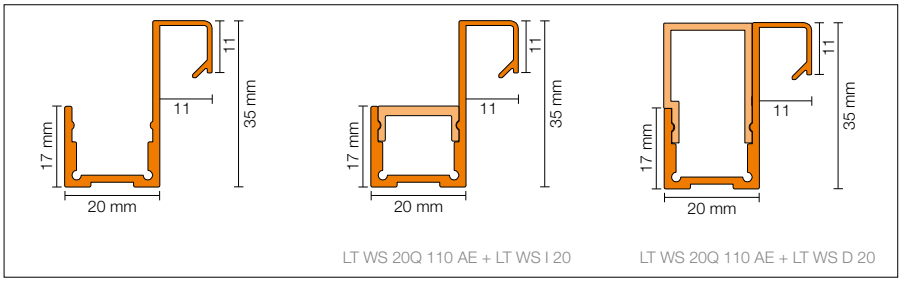
Step 9: Clipping on the diffusers
The diffusers are snapped into the profiles. For additional technical information please see Product Data Sheet 15.2 Schlüter®-LIPROTEC-WS / -WSQ / -WSK.

Recommendation:
We recommend you take pictures of the cable layout and the location of the junction boxes, so that it is possible to locate the junction boxes and cable conduits later.

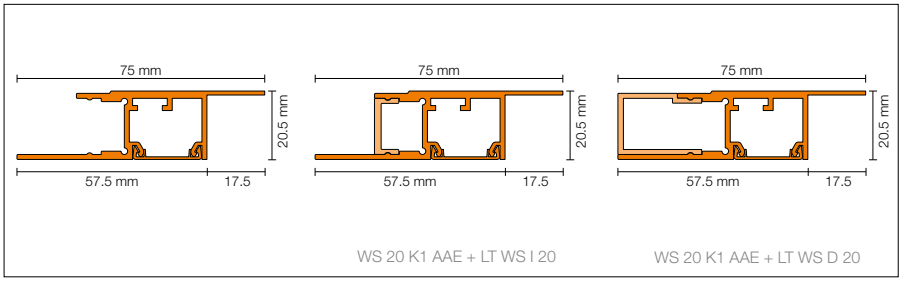
Schlüter®-LIPROTEC-WS		
Natural aluminium, matt anodised		
L = m	H = mm	Art.-No.
2.50	20	LT WS 20 AE
1.50	20	LT WS 20 AE/150
1.00	20	LT WS 20 AE/100



Schlüter®-LIPROTEC-WSQ		
Aluminium natural, matt anodised		
L = m	H = mm	Art.-No.
2.50	20 + 11	LT WS 20Q 110 AE

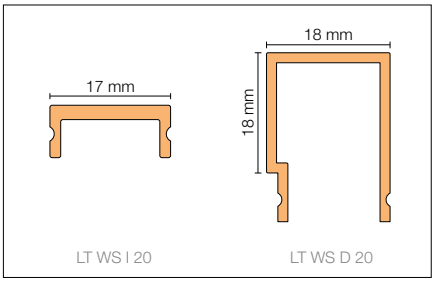


Schlüter®-LIPROTEC-WSK		
Aluminium natural, matt anodised		
L = m	H = mm	Art.-No.
2.50	20.5	WS 20 K1 AAE



Schlüter®-LIPROTEC-WSI	
Diffuser, indirect illumination	
L = m	Art.-No.
2.50	LT WS I 20
1.50	LT WS I 20/150
1.00	LT WS I 20/100

Schlüter®-LIPROTEC-WSD	
Diffuser, direct illumination	
L = m	Art.-No.
2.50	LT WS D 20
1.50	LT WS D 20/150
1.00	LT WS D 20/100



Schlüter®-LIPROTEC-WSI/EK	
End cap, indirect illumination	
H = mm	Art.-No.
17	EK / LT WS I AE 20

Schlüter®-LIPROTEC-WSD/EK	
End cap, direct illumination	
H = mm	Art.-No.
35	EK / LT WS D AE 20

Schlüter®-LIPROTEC-PB

Schlüter®-LIPROTEC-PB is a high-quality tile finishing profile with a visible area of 25 mm. It can be used in combination with Schlüter stair-nosing profiles (except Schlüter®-TREP-T) to create visually appealing lighting for the edges of platforms. The assembly should not be higher than four steps, and the step length should not exceed 2.5 m. The profile can take up the cable routing of the LED strip and is available in the finishes “Aluminium natural, matt anodised” and “Stainless steel effect anodised aluminium”.

The profile can house the cable feed-in of the LED strip. The LED strips listed below can be mounted in the Schlüter®-LIPROTEC-PB profile:

- **LT ES 5** – Colour temperature 3300 Kelvin (warm-white), LED strip with lateral radiation
- **LT ES 6** – Colour temperature 4500 Kelvin (neutral-white), LED strip with lateral radiation

The LED strips are protected by a top coating and are equipped with end caps. They must be protected against mechanical stresses (see also installation guide for “LED strips”). The profile Schlüter®-LIPROTEC-PB offers the option of creating various light effects by attaching two different diffusers.
The **Schlüter®-LIPROTEC-VBI** diffuser is recessed, using the Schlüter®-LIPROTEC-PB profile. An indirect illumination from the edge of the profile across the setting step to the step below is therefore possible. The application is recommended when there is no requirement for direct illumination. When the **Schlüter®-LIPROTEC-PBD** diffuser is used, a strip of direct light of 3 mm width can be seen in addition to the indirect illumination. Its use is recommended when an additional direct illumination is required. In addition, the radiating light is also being dispersed more evenly; see also Product Data Sheet 15.4 and installation instructions for Schlüter®-LIPROTEC-PB.

Anodised aluminium

Stainless steel effect anodised aluminium

Fig. 1

Installation/cable routing

1. Thread the cable via the profile end through the profile cavity. If several LED strips are connected, the junction boxes Schlüter®-LIPROTEC-Z must be used for this step. The previously defined positions have to be observed in planning.

Insert the diffuser and the LED strip into the attachment profile such that the cable is fed in from the right. Viewing point: in front of the step, looking up (Fig. 1).

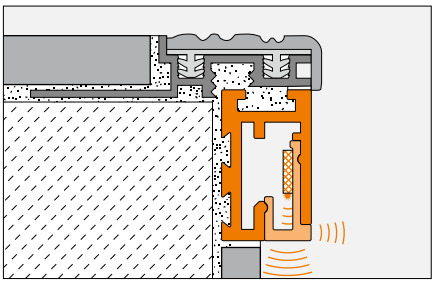
2. Keep a sufficient cable length in reserve, if possible as a loop, within the junction box. This facilitates subsequent access to the LED strips.
3. Adhere Schlüter®-LIPROTEC-PB with conventional tile adhesive.
4. If the Schlüter®-LIPROTEC-PB profile is installed at the exterior or interior corners of the platform, the corner formations must be created with mitre cuts. We recommend the use of a mitre saw with adjustable speed and suitable saw blade (see also product data sheet 15.4 and the installation guide for Schlüter®-LIPROTEC-PB).

Installation Recommendations for Light Profile Technology

Using the example of: **Schlüter®-LIPROTEC-PB**

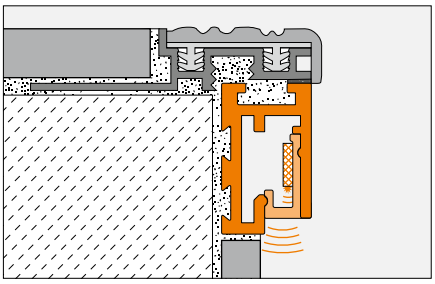
Two step edges that are illuminated indirectly
Length: 2 x 2.5 m
Light colour: 4500 Kelvin

Showing an example, this installation guide shows one possibility for installing the respective profile. Other installation situations may occur, depending on the conditions at the building site. The installation recommendation is only one of the possibilities to install the LIPROTEC system. An attractive illumination of the edge of the step or platform can be implemented in combination with the Schlüter stair-nosing profiles.



Diffuser **Schlüter®-LIPROTEC-PBD**

Preparing the tile sub-floor
The conventional preparations for laying the tile must be carried out when laying tiles on steps. The cable is fed via the open end of the profile.



Diffuser **Schlüter®-LIPROTEC-VBI**

Step 1: Preparation of the junction boxes
The cable feed for Schlüter®-LIPROTEC-PB profiles is carried out through cable conduit and junction boxes in the wall. For this, the **LT Z 5UD 46** recessed sockets and the cable conduit **LT ZLR 20 50M** are to be plastered over at the designated locations.

Step 2: Prepare the light profile
Cut the profile incl. diffuser to the corresponding size. Corner formations must be created with mitre cuts. The corner connectors **Schlüter®-LIPROTEC-D/V** are available for the mechanical connection of the mitre cuts.
We recommend the use of a mitre saw with adjustable speed and suitable saw blade. The end caps **Schlüter®-LIPROTEC-PB/EK** are available as accessories. The end cap is adhered with Schlüter®-KERDI-FIX or an equivalent installation adhesive.

Should a tile upstand be installed along the steps, then the illumination profile must be shortened by the tile thickness.

Step 1

Step 2

Step 3: Tiling the stair riser, mounting the illumination profile
The stair risers are tiled first, so as to ensure an uncomplicated cabling with the subsequent testing of the LED illumination.
First, set the tiling material to match the height (minus the height Schlüter®-LIPROTEC-PB) to the riser of the stair. The tile adhesive is applied to the entire riser, ensuring suitable notch depth. The cavities and/or matched joints of Schlüter®-LIPROTEC-PB are to be filled up with a suitable tile adhesive and are then to be pressed into the adhesive bed above the riser and then aligned.
Schlüter®-LIPROTEC-PB should be pressed into the adhesive bed only deep enough that the inset diffuser remains accessible (Fig. 2 and 3 on the next page). The space between the lower edge of the Schlüter®-LIPROTEC-PB and the tile of the riser must be grouted. A silicone joint is not recommended.

Step 3

Step 4: Placement of the diffusers using LED technology

The diffusers of the Schlüter®-LIPROTEC-PB illumination profiles are able to accept the LED strips **LT ES 5 and LT ES 6** with their lateral radiation of light.

The LED strip with lateral radiation of light is to be shortened at the location indicated and to be capped with the enclosed end cap (see also installation instructions „LED Strip“).

A double-sided adhesive tape is on the back of the LED strip. Remove the protective foil and glue the LED strip into the diffuser. The diffuser has an edge guide. Press the LED strip lightly and evenly against the attachment edge (Fig. 1).

The cable ends of the LED strip are to be fed through the cavity of the profile up to and into the junction box. Now press the diffuser with its LED strip and the cable into the profile. A sufficient amount of cable length should be fed as a reserve length into the cavity of the profile or the junction box, preferably as a loop. This will allow for later access to the LED strips.

After the last profiles have been attached, the cables can be connected in the junction boxes. The cable lengths must be shortened accordingly. The ends of the cables must be stripped properly with cable stripper pliers. The 3-wire and 5-wire **LT ZKL 3A** and **LT ZKL 5A** clamps are to be used for connection clamps.

Function check: On / Off / Dimming

Before the junction boxes are closed, the lighting system must be checked for correct operation.

Step 5: Adhere the platform edge profile

Install the selected Schlüter®-TREP profile according to the corresponding product data sheet and solidly embed it into the setting material. Completely fill the upper cavities of Schlüter®-LIPROTEC-PB with a suitable adhesive.

The tiles for the steps can now be embedded in the tile adhesive. Follow the instructions of the corresponding product data sheet for the further installation of the selected Schlüter®-TREP profile (Fig. 4).

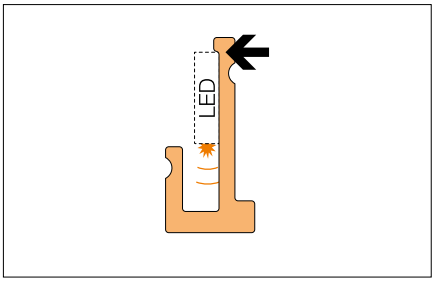


Fig. 1

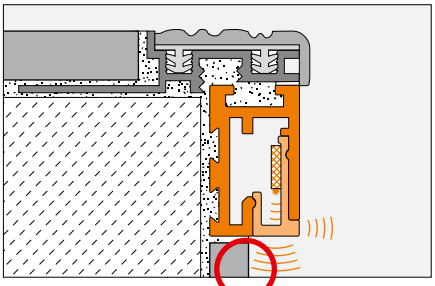


Fig. 2

Fig. 3

Fig. 4

Step 6: Closing the junction boxes

The junction box may be closed using the enclosed cover after the function check of the LED illumination and the laying of the tile on the riser and the stair step. Before this, a notch for the cable has to be cut into the cover of the junction box (Fig. 1).

The junction boxes can be plastered over. It is possible to lay tile over junction boxes.

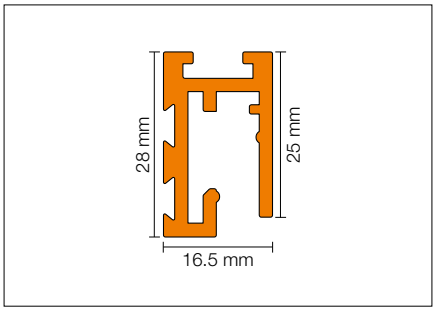
Here, the final tile should be glued at selected points using the Schlüter®-KERDI-FIX elastic installation adhesive and the joints of the tile should be grouted with silicone. This would make it possible to access the junction boxes, if required.

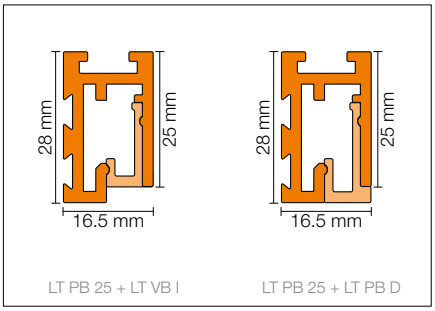
Fig. 1

Recommendation:

We recommend you take pictures of the cable layout and the location of the junction boxes, so that it is possible to locate the junction boxes and cable conduits later.

Schlüter®-LIPROTEC-PB	
Anodised aluminium	
L = m	Art.-No.
2.50	LT PB 25 AE
1.50	LT PB 25 AE/150
1.00	LT PB 25 AE/100
Stainless steel effect anodised aluminium	
2.50	LT PB 25 AEEB
1.50	LT PB 25 AEEB/150
1.00	LT PB 25 AEEB/100



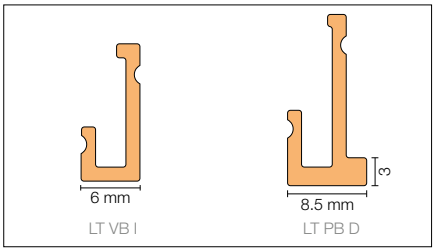


LT PB 25 + LT VB I

LT PB 25 + LT PB D

Schlüter®-LIPROTEC-VBI	
Diffuser, indirect illumination	
L = m	Art.-No.
2.50	LT VB I
1.50	LT VB I/150
1.00	LT VB I/100

Schlüter®-LIPROTEC-PBD	
Diffuser, indirect + direct illumination	
L = m	Art.-No.
2.50	LT PB D
1.50	LT PB D/150
1.00	LT PB D/100



LT VB I

LT PB D

Schlüter®-LIPROTEC-D/V
Corner connector set, 4 pcs.
Art.-No.
V 90 LT 10/4

V 90 LT 10/4

Schlüter®-LIPROTEC-PB/EK
End cap, Stainless steel effect anodised aluminium
Art.-No.
EK / LT PB AE
End cap, Stainless steel effect anodised aluminium
EK / LT PB AEEB

EK / LT PB AE

EK / LT PB AEEB

Schlüter®-LIPROTEC-VB

Schlüter®-LIPROTEC-VB is a high-quality tile finishing profile with a visible area of 25 mm. It offers the option of illuminating adjoining wall surfaces from the “within the tiles”. The profile can take up the cable routing of the LED strip and is available in the finishes “Aluminium natural, matt anodised” and “Stainless steel effect anodised aluminium”.

The LED strips listed below can be mounted in the Schlüter®-LIPROTEC-VB profile:

- **LT ES 5** – Colour temperature 3300 Kelvin (warm-white), LED strips with lateral radiation
- **LT ES 6** – Colour temperature 4500 Kelvin (neutral-white), LED strips with lateral radiation

The LED strips are protected by a top coating and are equipped with end caps. They must be protected against mechanical stresses (see also installation guide for “LED strips”).

By having two different diffuser options, the Schlüter®-LIPROTEC-VB profile makes it possible to create two different lighting effects:
The **Schlüter®-LIPROTEC-VBI** diffuser is recessed flush with the Schlüter®-LIPROTEC-VB profile. This makes it therefore possible to have the indirect illumination radiating from the edge of the profile across adjoining material as a luminaire with opal covers to the ceiling or to make it a plinth lighting. The application is recommended when direct lighting is not required.
When the **Schlüter®-LIPROTEC-VBD** diffuser is used, a strip of direct light of 3mm width can be seen in addition to the indirect illumination. In addition, the radiating light is also being dispersed more evenly; see also Product Data Sheet 15.1 and installation instructions for Schlüter®-LIPROTEC-VB.

Anodised aluminium

Stainless steel effect anodised aluminium

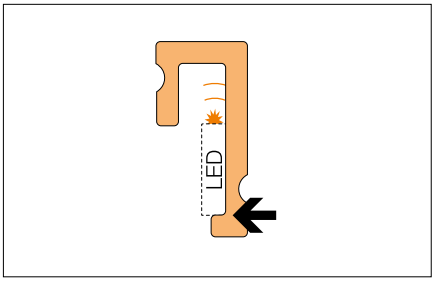


Fig. 1

Fig. 2

Installation/cable routing

1. Select Schlüter®-LIPROTEC-VB according to the thickness of the tile.
2. Cut the receptacle profile and the diffuser to the proper length.
3. The LED strip is glued to the attachment edge in the long leg of the diffuser.
4. Feed the cable ends of the LED strip through the cavity of the profile into the cable conduit in the wall through a hole that has been drilled. The drilled cable hole must be deburred on both sides to prevent the cable from being damaged when being fed through. Should an additional sealing of the profile be required then the hole must be sealed off at the back of the profile with Schlüter®-KERDI-FIX.

The cable feed of the laterally radiating LED strips always comes unidirectionally from the right. The light is directed upwards (Fig. 1).

5. A sufficient amount of cable length should be fed as a reserve length into the cavity of the profile, preferably as a loop. This will allow for a later access to the LED strips. (Fig. 2). If several LED strips are being connected, this must be done using Schlüter®-LIPROTEC-Z junction boxes. The positions determined beforehand must be included in the plan.
6. Schlüter®-LIPROTEC-VB is installed with regular tile adhesive during the laying of the tile.
7. If the Schlüter®-LIPROTEC-VB profile is installed at exterior wall corners, the corner formations must be created with mitre cuts, while inside corners may be abutted. We recommend the use of a mitre saw with adjustable speed (Fig. 4; see also product data sheet 15.1 and the installation guide for Schlüter®-LIPROTEC-VB).

Fig. 3

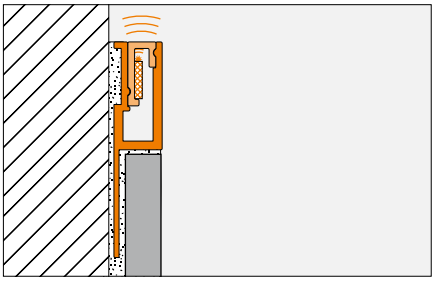
Fig. 4

Installation Recommendations for Light Profile Technology

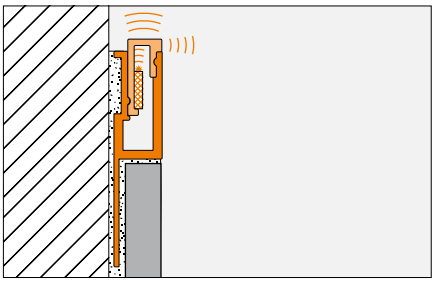
Using the example of: **Schlüter®-LIPROTEC-VB**

Tile area illuminated from all sides „from the thickness of the tile“
Dimensions: 180 cm x 160 cm
Substrate: 19 mm Schlüter®-KERDI-BOARD +
Schlüter®-KERDI-BOARD-K Module 19 mm
Light colour: 4500 Kelvin, neutral-white

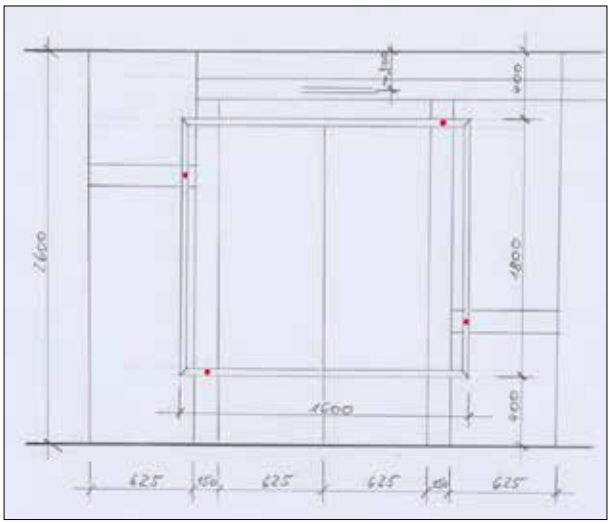
Showing an example, this installation guide shows one possibility for installing the respective profile. Other installation situations may occur, depending on the conditions at the building site. The installation recommendation is only one of the possibilities to install the LIPROTEC system.
This handbook provides information on the maximum system requirements for the LIPROTEC system as well as the selection of the power unit, the LED strip, the receiver and the wiring.
It is recommended to sketch the positioning of the individual profiles and their cable routing for every room situation or every application area of the Schlüter®-LIPROTEC system.



Diffuser **Schlüter®-LIPROTEC-VBI**



Diffuser **Schlüter®-LIPROTEC-VBD**



Installation sketch

Preparing the Schlüter®-KERDI-BOARD Tile Substrate

Depending on the evenness and condition of the existing wall surface, the Schlüter®-KERDI-BOARD can be mounted over the full area or spot-bonded in accordance with Product Data Sheet 12.1.

When planning the cable feed layout it must be taken into consideration that the cable feed for the laterally illuminating LED strips **LT ES 5** and **LT ES 6** must always be unidirectionally from the right. The light is directed upwards (Fig. 1).

Fig. 1

Step 1: Preparation of the junction boxes

After the **Schlüter®-KERDI-BOARD-K** panels have been mounted, the junction boxes are installed at the intended crossing points. The Schlüter®-KERDI-BOARD-K panel can be drilled with a conventional circular cutter without carbide tip. Please take note of the fact that the junction box must be positioned no more than 2 metres from the LED strip (cable length at the LED strip: 2.3 m).

There are four different **Schlüter®-LIPROTEC-Z** junction boxes to choose from.

This installation example shows the LT Z 5HD 47 flush-mounted box, installed with a circle cutter (Ø 68 mm). Before the installation, sufficient space must be created behind the KERDI-BOARD level to feed the cables from behind into the junction box.

The routed groove for the cable conduit ends about 2 cm from the junction box. The covering of the cable channel is run up to the junction box. The groove of the Schlüter®-KERDI-BOARD-K module is extended to the cable conduit, using a utility knife (Fig. 2). The cables can now be fed from behind into the junction box, the junction box can be installed and screwed in (Fig. 3).

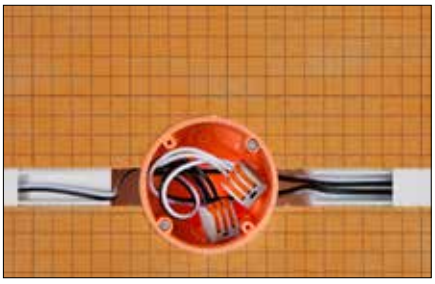


Fig. 2

Fig. 3

Step 2: Cable routing

The cable conduit are glued into all the grooves of the Schlüter®-KERDI-BOARD-K module. 90°connections are cut to a mitre of 45°. Subsequently, the inside edge must be smoothed out such that the cables cannot be damaged. The sharp-edged mitre-cut will be covered with insulating adhesive tape (Fig. 4). If the cables in the channel are crossed in a T-shape, then the conduit must be notched at the desired location (Fig.5).

The Schlüter®-KERDI-FIX installation adhesive must be applied to the centre of the installation module groove of the Schlüter®-KERDI-BOARD-K. Then press the cable channel into the adhesive. Only use enough adhesive so that it cannot ooze out at the sides.

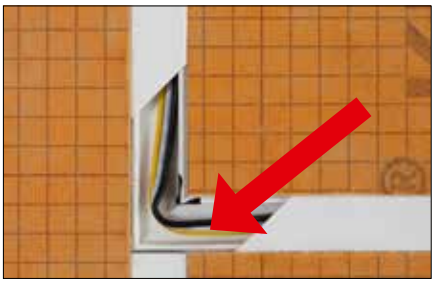


Fig. 4

Fig. 5

Step 3: Covering the cable channel
The covers for the cable conduit must be snapped on where the finishing profiles will be later (Fig. 1).

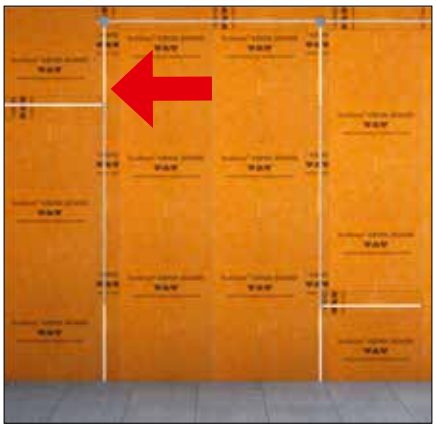


Fig. 1

Fig. 2

Step 4a: Applying the seal
Using the Schlüter®-KERDI-COLL-L sealing adhesive, the Schlüter®-KERDI-KEBA sealing band is applied over the covered cable conduits (Fig. 2), see also Product Data Sheet 8.1 Schlüter®-KERDI and Product Data Sheet 8.4 Schlüter®-KERDI-COLL-L.

Step 4b:
Should no waterproofing seal be required, then the Schlüter®-DESIGNBASE-HVL anchoring fleece with a self-adhesive back may be glued on. The adhesive tape covers the cable channel and creates a bonding agent for the adjoining KERDI-BOARD material (Fig. 3).

Fig. 3

Step 5: Prepare the profile and diffuser
Cut the attachment profile incl. diffuser to size This may also be a mitre cut. We recommend the use of a mitre saw with adjustable speed and suitable saw blade (see also product data sheet 15.1 and installation guide for Schlüter®-LIPROTEC-VB).

The diffusers of the illumination profile Schlüter®-LIPROTEC-VB offer the option to insert the LED strips LT ES 5 and LT ES 6 with lateral light radiation.

The LED strip with laterally radiating light is to be shortened at the designated location and to be capped with the enclosed end cap; see also installation instructions „LED Strip“.
A double-sided adhesive tape is on the back of the LED strip. Remove the protective foil and glue the LED strip into the diffuser. The diffuser has an edge guide. Press the LED strip lightly and evenly against the attachment edge (Fig. 4).

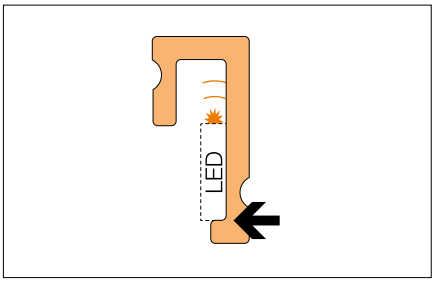


Fig. 4

The Schlüter®-LIPROTEC-VB profile is drilled through at the designated location (Fig. 5). This cable feed-through in the profile must be deburred on both sides to prevent the cable from being damaged when being fed through. The cable ends of the LED strip must be fed through the cavity of the receptacle profile and through the hole. Now press the diffuser with its LED strip and the cable into the profile.
A sufficient amount of cable length should be fed as a „reserve length“ into the cavity of the profile, preferably as a loop. This will allow for a later access to the LED strips. (Fig. 6).

Fig. 5

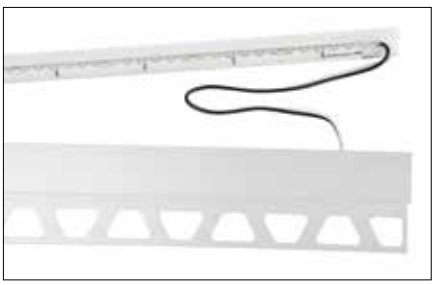


Fig. 6

Step 6: Attaching the first profile
At the required location of the cable conduit in the wall a hole is drilled with a diameter of 10 mm.
If the profile is to be installed on a sealing level it is recommended to apply a sealant ring of Schlüter®-KERDI-FIX around the cable hole. It must be ensured that no adhesive gets into the cavity of the profile (Fig. 1).


Fig. 1

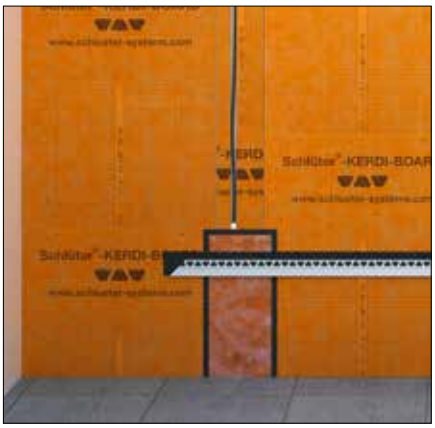


Fig. 2

A suitable tile adhesive is applied in the area where the profile is to be installed, the cable is fed through the hole of the cable conduit and the profile, with the diffuser and the LED strip is pressed into the tile adhesive (Fig. 2).

The additional profiles are attached according to the same principle and the cables are routed to the junction boxes (Fig. 3).

After the cables have been run, the cable channel covers can be snapped on (Fig. 4).

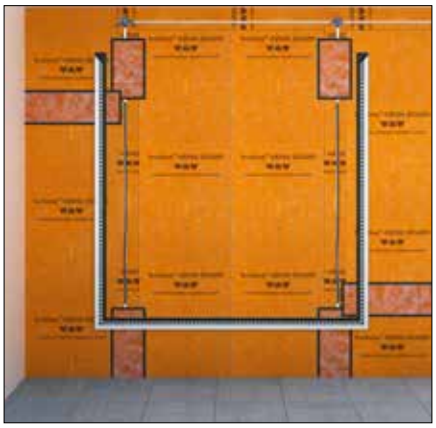


Fig. 3

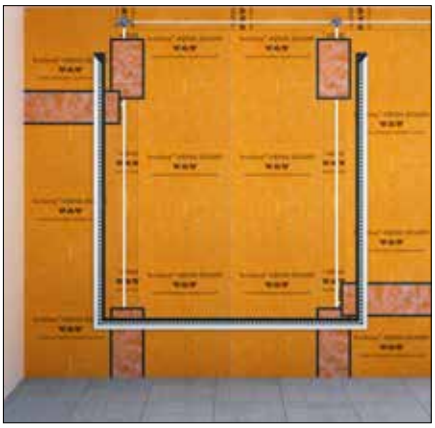


Fig. 4

After the cables have been run, the cable channel covers can be snapped on (Fig. 4).

Subsequently, the Schlüter®-KERDI-KEBA sealant and/or the self-adhesive Schlüter®-DESIGNBASE-HVL anchoring fleece is applied (Fig. 5).

After the last profiles have been attached, the cables can be connected in the junction boxes.
The cable lengths must be shortened accordingly. The ends of the cables must be stripped properly with cable stripper pliers. The 3 wire and 5 wire **Schlüter®-LIPROTEC-ZKL** clamps are to be used as connection clamps (Fig. 6).


Fig. 5


Fig. 6

Function check: On / Off / Dimming

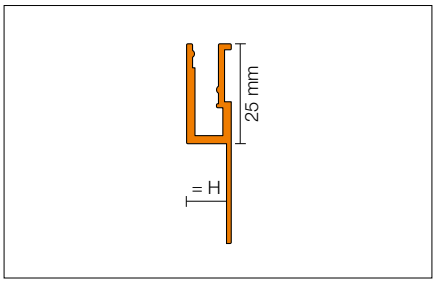
Before the junction boxes are closed, the lighting system must be checked for correct operation.

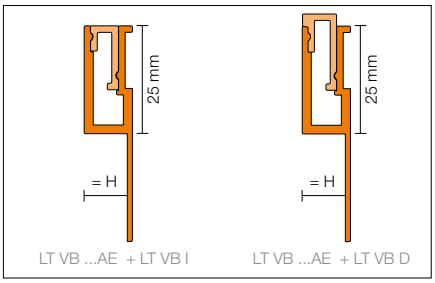
Adhere the Schlüter®-KERDI-KEBA seaming tape over the exposed covered cable ducts and junction boxes, using the sealing adhesive Schlüter®-KERDI-COLL-L (see page 18, steps 4a and 4b).
If no waterproofing is required, it is sufficient to attach the adhesive fleece Schlüter®-DESIGNBASE-HVL with self-adhesive back.

Step 7: Laying the tiles
The junction boxes can be plastered over. It is possible to lay tile over junction boxes.
Here, the final tile should be glued at selected points using the Schlüter®-KERDI-FIX elastic installation adhesive and the joints of the tile should be grouted with silicone. This would make it possible to access the junction boxes, if required.

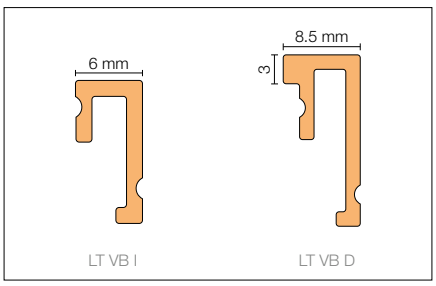
Recommendation:
We recommend you take pictures of the cable layout and the location of the junction boxes, so that it is possible to locate the junction boxes and cable channels later.

Schlüter®-LIPROTEC-VB		
Anodised aluminium		
L = m	H = mm	Art.-No.
2.50	8	LT VB 80 AE
2.50	10	LT VB 100 AE
2.50	11	LT VB 110 AE
2.50	12.5	LT VB 125 AE
Stainless steel effect anodised aluminium		
2.50	8	LT VB 80 AEEB
2.50	10	LT VB 100 AEEB
2.50	11	LT VB 110 AEEB
2.50	12.5	LT VB 125 AEEB





Schlüter®-LIPROTEC-VBI	
Diffuser, indirect illumination	
L = m	Art.-No.
2.50	LT VB I



Schlüter®-LIPROTEC-VBD	
Diffuser, indirect + direct illumination	
L = m	Art.-No.
2,50	LT VB D

Schlüter®-LIPROTEC-D

Schlüter®-LIPROTEC-D is a high-quality decorative attachment profile for wall areas with a visible area of 6 mm. It allows for the insertion of various decorative materials such as glass, mirrors or other materials to adjoin ceramic tile coverings. As an alternative, the decorative materials can be backlit in the edge area. The profile can also be installed flush in a double-planked plasterboard wall for the attachment of decorative materials and is available in the finish “Aluminium natural, matt anodised:

The LED strips listed below can be mounted in the Schlüter®-LIPROTEC-D profile:

LT ES 5 – Colour temperature 3300 Kelvin (warm-white), LED strip with lateral radiation
LT ES 6 – Colour temperature 4500 Kelvin (neutral-white), LED strip with lateral radiation

The LED strips are fully encased in a shrink tube and capped off at the ends with end caps. The LED strips are to be protected against mechanical stress; see installation instructions: “LED Strips”.

Aluminium natural, matt anodised

Fig. 1

Installation and cable routing

1. The cable is routed behind the decoration material (Fig. 1). The cable feed of the laterally radiating LED strips always comes unidirectionally from the right. The light is directed upwards. A depth of at least 5 mm must be planned for the installation height of the LED strip. The shadow joint should not be made wider than 12 mm for the illuminated version (Fig. 2).
2. If several LED strips are connected to each other, then this connection must be done in Schlüter®-LIPROTEC-Z junction boxes. The positions determined beforehand must be included in the plan. Decorative material should always be mounted from the reverse side.
3. Conventional tile adhesive is used to install Schlüter®-LIPROTEC-D.
4. If the Schlüter®-LIPROTEC-D profile is installed as the frame of a decorative material, the corner formations must be created with mitre cuts. We recommend the use of a mitre saw with adjustable speed and suitable saw blade. The corner connectors **Schlüter®-LIPROTEC-D/V** are available for the mechanical connection of the mitre cuts (Fig. 3). Two corner connectors must be planned for each mitre connection (see also product data sheet 15.3 and installation guide Schlüter®-LIPROTEC-D).

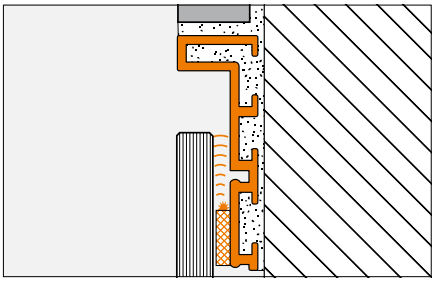


Fig. 2

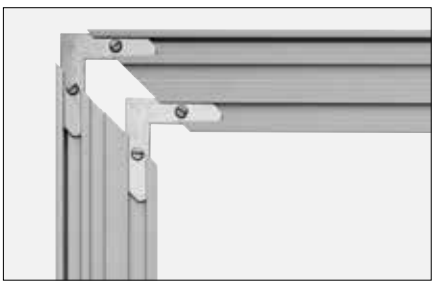


Fig. 3

5. When using a mirror, the individual LED points can be easily visible on the viewer side. We recommend attaching an approx. 4 cm wide light-impermeable adhesive tape (aluminium tape) on the back.

Selection of the height of the profile

5 mm must be taken into account for the height of the LT ES 5 and/or LT ES 6 LED strip.
The LT D 45 AE profile, with a receptacle height of 4.5 mm is ideal for mounting unlit decorative materials.

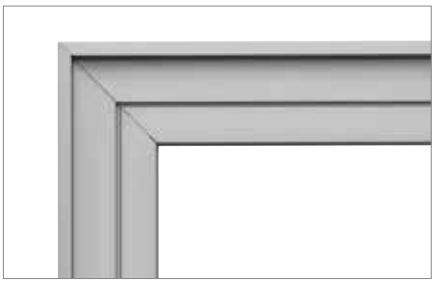
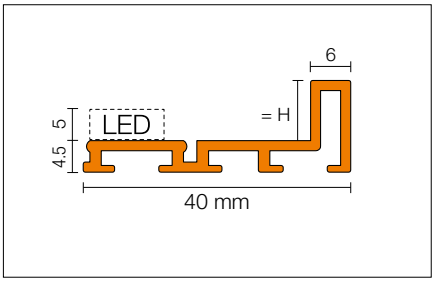


Fig. 4

Fig. 5

Schlüter®-LIPROTEC-D		
Anodised aluminium		
L = m	H = mm	Art.-No.
2.50	4.5	LT D 45 AE
2.50	7.5	LT D 75 AE
2.50	9	LT D 90 AE
2.50	16.5	LT D 165 AE



Schlüter®-LIPROTEC-D/V
Corner connector set, 4 pcs.
Art.-No.
V 90 LT 10/4

Schlüter®-DESIGNBASE-QD

Schlüter®-DESIGNBASE-QD is a high-quality skirting profile for versatile applications. The profile can either be installed with the open or closed side as the visible area. It is available in the finishes “Anodised aluminium” and “Stainless steel effect anodised aluminium”.

Use as an illuminated skirting profile or border profile:
In the wall areas the profile offers the potential to accept a diffuser that is 39 mm wide between the two visible areas that are approximately 10 mm wide. Therefore, by using different **Schlüter®-LIPROTEC-ES** LED strips, a direct lighting can be achieved.

Use as an unlit skirting profile or border profile:
The 39 mm wide free space of the profile provides the option to accept other decorative materials, such as tiles or decorative wood. The self-adhesive **Schlüter®-DESIGNBASE-HVL** anchoring fleece can be applied to provide adhesion between the slick surface of the aluminium and the wall and/or the tile. In addition, the Schlüter®-DESIGNBASE-QD with its visible area of 60 mm can be used as a closed skirting profile of a border profile.

The LED strips listed below can be mounted in the Schlüter®-DESIGNBASE-QD profile:

- **LT ES 3** – Colour temperature 3300 Kelvin (warm-white), width 7 mm
- **LT ES 4** – Colour temperature 4500 Kelvin (neutral-white), width 7 mm

The LED strips are fully encased in a silicone coating and capped off at the ends with end caps. The LED strips are to be protected against mechanical stress; see installation instructions: “LED Strips”.
The **Schlüter®-LIPROTEC-QDD** diffusing panel used is set such that it is flush with the profile.

When using in areas subject to direct water contact, such as in the shower area, the Schlüter®-DESIGNBASE-QD must be positioned such that no water can accumulate inside. In the shower, the profile should only be used vertically. When installing the profile, it must be ensured that any water that enters can drain away.

Anodised aluminium

Stainless steel effect anodised aluminium

QD

Working with Schlüter®-DESIGNBASE-QD, Illuminated

1. The cable ends of the LED strip are inserted into the cable channel via a hole drilled on the back of the profile. The cable holes through the profile must be deburred on both sides to avoid damaging the cable when feeding it through. If the profile is installed in a horizontal fashion, the LED strip should always be positioned at the top of the profile.
2. The lowest section of the profile can be used as the cable run. The cable is to be attached with the white **Schlüter®-LIPROTEC-RKB** reflector band such that it cannot slide against the diffuser. The cable feed of the LED strips should be done at the end of the Schlüter®-DESIGNBASE-QD profile. When the cables are fed into the profile surface area, the transitions to the individual LED strips can cause slight shadows to form in the viewing area of the diffuser. If several LED strips are being connected, this must be done using Schlüter®-LIPROTEC-Z junction boxes. The positions determined beforehand must be included in the plan.

3. Schlüter®-DESIGNBASE-QD can be installed in several different ways.

a. It can be glued with the Schlüter®-KERDI-FIX installation adhesive
The drying times of the adhesive must be taken into consideration before undertaking any further work.

b. Mechanical fastening with screws
For the illuminated version, the screws and the screw holes must be covered over with the white Schlüter®-LIPROTEC-RKB reflecting band.

c. Gluing using traditional tile adhesive
The self-adhesive Schlüter®-DESIGNBASE-HVL anchoring fleece is to be used to provide adhesion to the aluminium surface.

4. To achieve a simple and elegant connection of Schlüter®-DESIGNBASE-QD on internal and external corners as well as end caps, the fitting **Schlüter®-DESIGNBASE-QD/E** must be glued in. If the Schlüter®-DESIGNBASE-QD profile is run around external corners, the corner may also be created using mitre cuts. The use of a speed-adjustable cross-cut and mitre saw with a suitable saw blade is recommended; see also Product Data Sheet 16.1 Schlüter®-DESIGNBASE-QD.

5. The diffuser Schlüter®-DESIGNBASE-QDD is placed in the bottom of the aluminium profile (Fig. 1) and clipped into the attachment profile with the use of a block at the top and light tapping with a hammer (see Fig. 1, next page). The disassembly of the diffuser occurs in the reverse order. For this purpose, the diffuser is dislodged at the end with a thin tool placed above.

Schlüter®-LIPROTEC-RKB

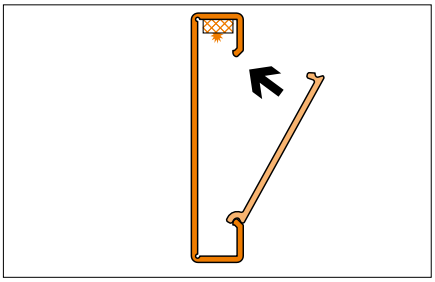
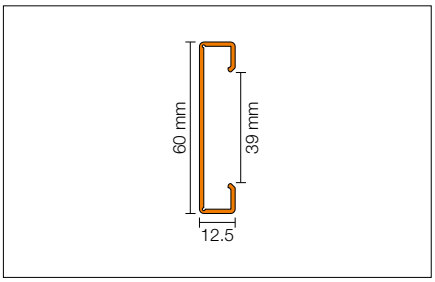
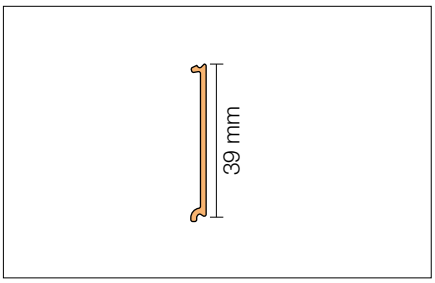


Fig. 1

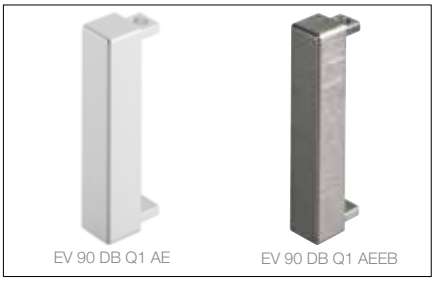
Schlüter®-DESIGNBASE-QD	
Anodised aluminium	
L = m	**Art.-No.**
2.50	DB Q1 AE
Stainless steel effect anodised aluminium	
2.50	DB Q1 AEEB



Schlüter®-DESIGNBASE-QDD		
Diffuser, direct illumination		
L = m	**B = m**	**Art.-No.**
2.50	39	LT FSS 39



Schlüter®-DESIGNBASE-QD/E
External corner anodised aluminium
Art.-No.
EV 90 DB Q1 AE
external corner, brushed stainless steel anodised aluminium
EV 90 DB Q1 AEEB



EV 90 DB Q1 AE

EV 90 DB Q1 AEEB

Schlüter®-LIPROTEC-LL

Schlüter®-LIPROTEC-LL is a high-quality support profile made of anodised aluminium for the attachment of various Schlüter®-LIPROTEC-ES LED strips.
The profile is designed to implement accent lighting in wall coverings as a straight line of light. Schlüter®-LIPROTEC-LL is particularly well suited to highlight niches or shelf structures and elements. The placement of the profile creates direct or indirect lighting effects.
These light effects are particularly suitable for the following installation situations:

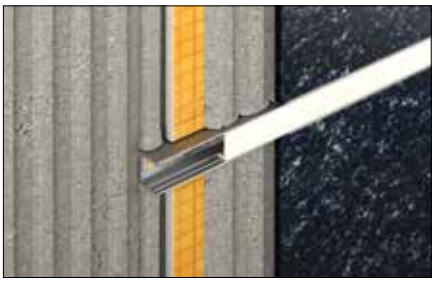
- Linear lines of light
- Illuminated borders in wall coverings
- Illuminated wall niches
- Inserts in furniture components

The LED strips listed below can be inserted into the Schlüter®-LIPROTEC-LL profile:

LT ES 1 – colour temperature 3300 Kelvin (warm white), width 12 mm
LT ES 2 – colour temperature 4500 Kelvin (neutral white), width 12 mm
LT ES 7 – colour temperature adjustable from 3000 to 7000 Kelvin, width 12 mm
LT ES 8 – adjustable shades of red, green, blue, width 12 mm

The LED strips are fully enclosed in a silicone coating and feature an end cap at each end. The LED strips must be protected against mechanical stresses; see also installation guide for “LED strips”. The Schlüter®-LIPROTEC-LL profile offers the option of creating an attractive line of light by inserting the diffuser Schlüter®-LIPROTEC-WSI. The diffuser Schlüter®-LIPROTEC-WSI is designed to be flush with the anchoring legs of the attachment profile Schlüter®-LIPROTEC-LL. The profile can be positioned such that the illuminated areas of the diffuser are directly visible.
LIPROTEC profiles in wet zones must be positioned in such a way that no water can accumulate in their interior or that water ingress can fully drain (vertical position only!).

Aluminium natural, matt anodised



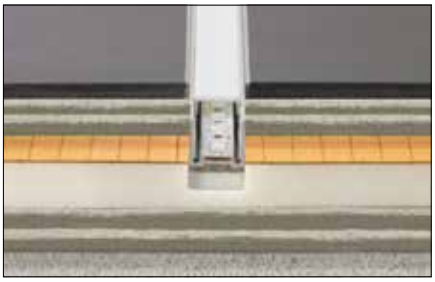


Fig. 1: Schlüter®-LIPROTEC-LL with Schlüter®-KERDI-BOARD-K in a thickness of 19 mm

Installation and cable routing

1. Drill and deburr a cable opening in the profile.

2a. The installation module Schlüter®-KERDI-BOARD-K with pre-cut grooves to attach the profiles or the Schlüter®-LIPROTEC-ZKK cable ducts are available for easy installation in areas without direct water exposure (Fig. 1).

2b. Installation in wet zones (Fig. 2, page 26): To ensure that the profile is flush with the wall covering, double up the substrate with Schlüter®-KERDI-BOARD in the corresponding thickness (see product data sheet 12.1). A larger opening (approx. 4 cm) needs to be left in the double layer in the area where the LL profile is to be positioned. Fully cover the resulting groove, the abutting panels in the areas, and the corners with the seaming tape Schlüter®-KERDI-KEBA in a width of at least 15 cm, by embedding it in the sealing adhesive Schlüter®-KERDI-COLL-L. The seaming tapes should have a coverage of at least 5 cm.

3. Adhere Schlüter®-LIPROTEC-LL with the installation adhesive Schlüter®-KERDI-FIX or an equivalent product. Apply a line of the adhesive on the backward-facing outer surface of the profile and set it in place. Remove all substances such as lubricants etc. that may weaken the bond from the adhesive areas prior to applying the sealant.
4. Completely fill the cavity between the LL profile and the KERDI-BOARD surface with tile adhesive.
5. Bring the tile covering to the Schlüter®-LIPROTEC-LL profile. If necessary, adjust the -LL profile.

6. Install the next adjoining row of tiles.
7. Leave a joint of approximately 1.5 mm to the profile. Completely fill the space between the tile and the profile with grout.
8. Use suitable materials and tools for the sensitive surfaces to avoid scratches or other damage. Residue of mortar and tile adhesive should be removed immediately.
9. If the profiles are installed over exterior corners, the corner formations must be created with mitre cuts.

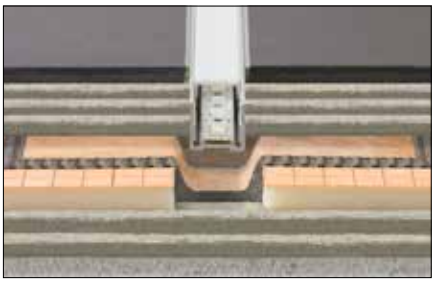
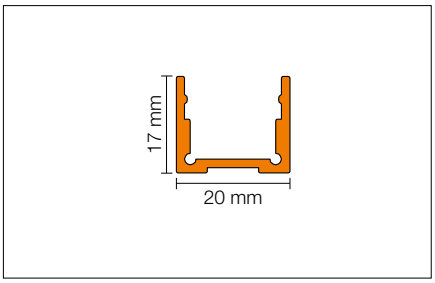
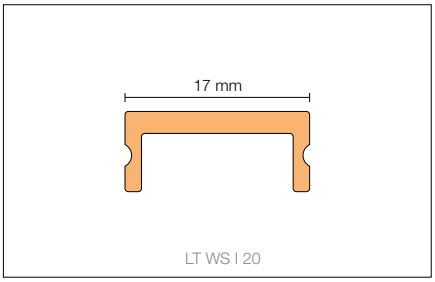


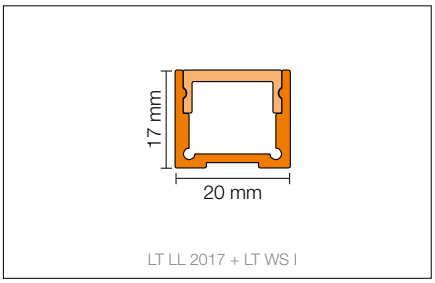
Fig. 2: Schlüter®-LIPROTEC-LL with Schlüter®-KERDI-BOARD-K in a thickness of 10 mm

Schlüter®-LIPROTEC-LL	
Anodised aluminium	
L = m	**Art.-No.**
2.50	LT LL 2017 AE



Schlüter®-LIPROTEC-WSI	
Diffuser lens	
L = m	**Art.-No.**
2.50	LT WS I 20





Schlüter®-LIPROTEC-WS/EK	
End cap anodised aluminium, indirect illumination	
H = m	**Art.-No.**
17	EK / LT WS I AE 20

Schlüter®-KERDI-BOARD-K	
installation module with cable groove, 15 x 250 cm	
H = m	**Art.-No.**
19	KB 19 150 2500 K1
28	KB 28 150 2500 K1

Instructions for installing the diffusers

1. The installation of the diffusers is easier with the use of a block. Lightly tap the diffusers with a hammer to clip them into the attachment profiles (Fig. 1)
2. A room temperature over 10°C is required to cut the diffusers length-wide.
3. Because of minor heat development of the LED strips used in the profile, the thermal expansion of the profile and the utilized diffuser may differ.

Fig. 1

Tips for dismantling the diffusers

The removal of the diffuser Schlüter®-DESIGNBASE-QDD occurs in reverse order. Insert a small screwdriver into the top edge of the diffuser (see also page 24, Fig. 1) and slide it along the profile edge to dislodge the diffuser (Fig. 2). For the Schlüter®-profiles -PB or -VB, the indirect diffuser can be cut approx. 5 mm shorter. The diffuser is easy to dislodge with a tensile aid. Cutting the diffuser is only recommended if the viewer cannot directly look at the diffuser (for indirect light radiation – see Fig.3).

Fig. 2

Instructions for finding the optimum installation length for profiles and diffusers

The optimum installation length of the profiles is based on the separation points of the LED strips. The LED strip LT ES 8 has a separation spacing of 7.1 cm. All other LED strips can be cut every 5 cm. A length of 1.5 to 2 cm must be taken into account for the cable infeed at the LED strip. With a profile length of 2.5 m, it may be beneficial to shorten the LED strip by the last segment to make the cable routing easier.
The LED strips should not cover the abutting joints of the diffuser for the installation of Schlüter®-LIPROTEC-VB and -PB. The LED strips are attached to the diffuser and snapped into the attachment profile

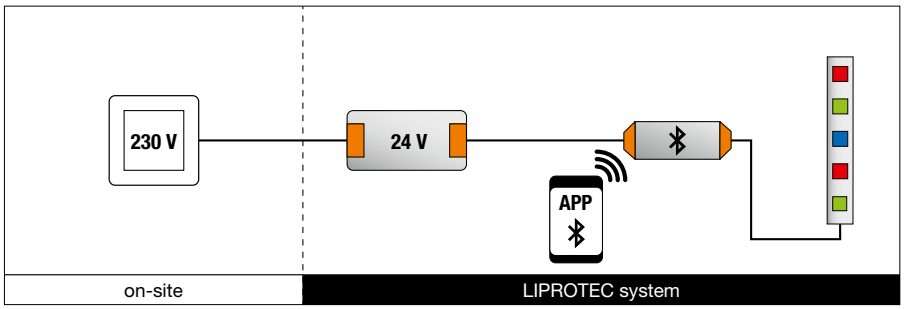
Fig. 3

Information on cable routing to the LED strips

1. The cables attached to the LED strips and the connecting cables must be installed in a conduit. Covering the cables with plaster is not permissible.
2. The LED strips are connected in junction boxes, which are available in different versions. The junction boxes for installation in a cavity can be connected with the cable duct **Schlüter®-LIPROTEC-ZKK**. For this purpose, an installation plane must be created with the installation module Schlüter®-KERDI-BOARD-K (19 mm or 28 mm material thickness) to attach the cable duct. For flush mounting in walls, the junction boxes LT Z 5UD 46 or LT Z 5UK 60 are recommended. The junction boxes for flush mounting in walls are connected to the conduit LT ZLR 20 50M. It is recommended to position a pulling string in the conduit to make it easier to thread the cable through the profile and the conduits.
3. The tile installation substrate with the mounting grooves for cables can be created with the Schlüter®-KERDI-BOARD system. It is recommended to use the grooved KERDI-BOARD installation module KB 19 150 2500 K1 in a thickness of 19 mm or the installation module KB 28 150 2500 K1 in a thickness of 28 mm. These KERDI-BOARD installation modules have a groove to attach the cable duct LT ZKK 2010. For further explanations on the cable connection of the LIPROTEC system, please refer to the “Cabling accessories” section or the installation guide.

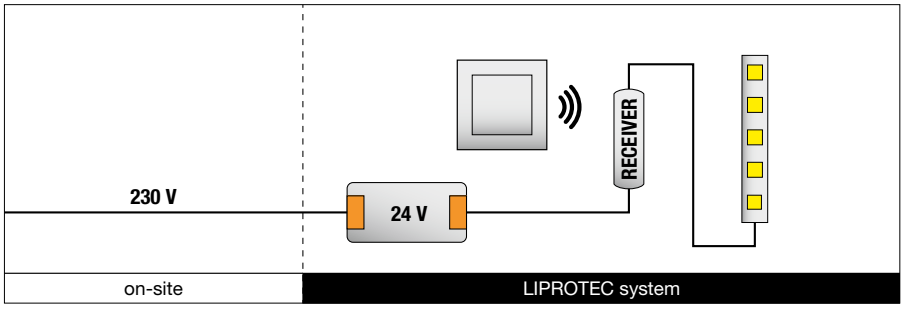
Control options for LED strips with LIPROTEC receivers

Bluetooth control (smartphone/tablet)



Coloured RGB controllable

Wireless control (transmitter/receiver)



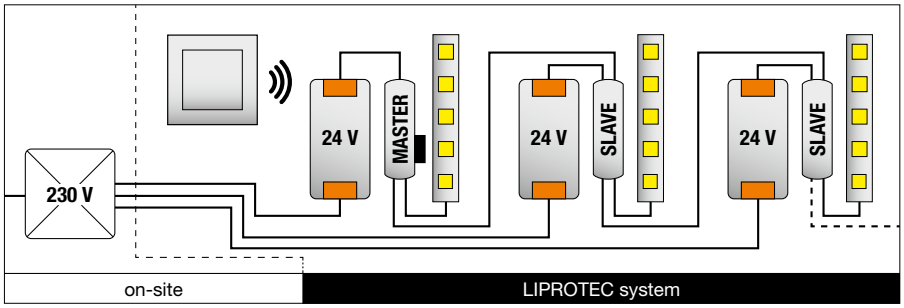
warm white 3300 K

neutral white 4500 K

white, controllable from 3000K - 7000K

Coloured RGB controllable

Wireless control for building structures (transmitter and master/slave receiver)



warm white 3300 K

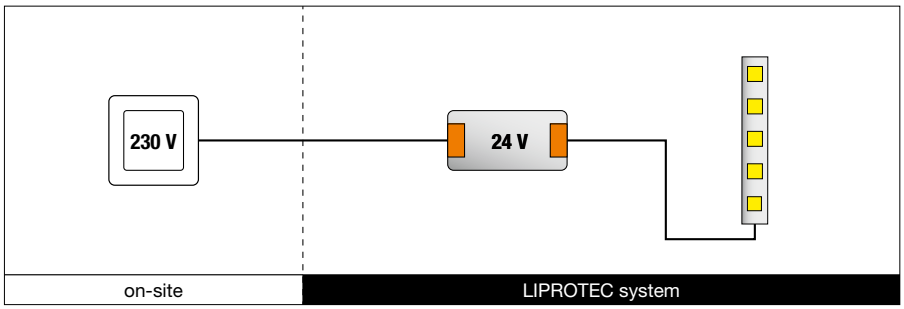
neutral white 4500 K

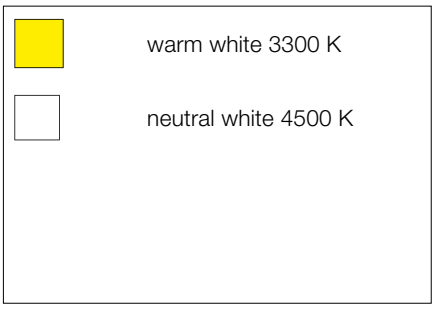
white, controllable from 3000K - 7000K

Coloured RGB controllable

Control options for LED strips via building technology

On/off control

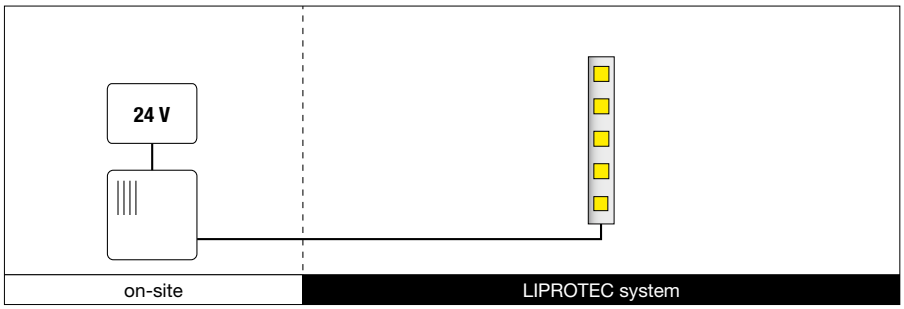


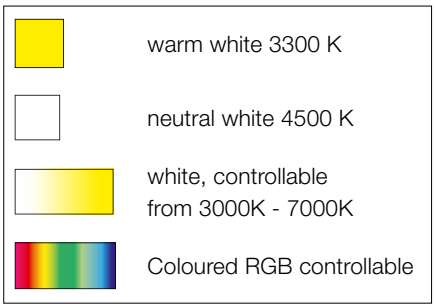


Combining the LIPROTEC system with a light switch

To switch the LIPROTEC system via a simple on/off function, unicolour LED strips (LT ES 1 up to LT ES 6) and the power supply can be operated with an existing light switch.
Starting up the power supply and the connection of the existing light switch must be performed by a qualified electrician!

Alternative control





Combining the LED strips of the LIPROTEC system with the building automation

All LED strips of the LIPROTEC system can be controlled with commercially available systems for building automation via an existing control unit.
The design of such a system, the selection of the electrical components as well as the start-up must be performed by a qualified electrician!

Technical information for the electrician

- Plus-driven LED strip (common anode)
- Watt/metre
- 24V system

Selection of the Type of Illumination

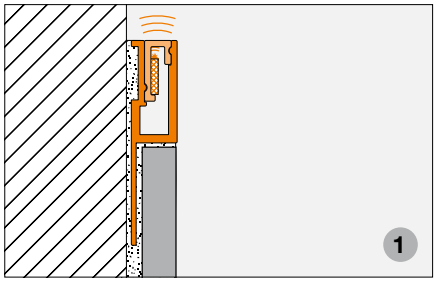
The following selection criteria determine the type of illumination.

Desired type of illumination:
- Lighting with single-colour white light
- Lighting with coloured light
  Only the Schlüter®-LIPROTEC-WS / -WSK / -WSQ und -LL profile offers the opportunity to insert coloured LED strips as well as LED strips with adjustable colour temperature.

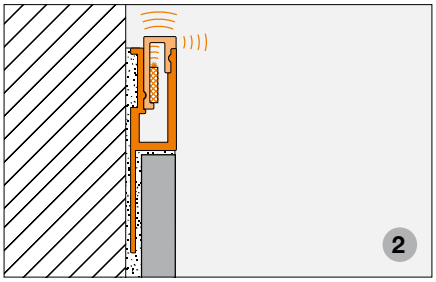
Desired installation situation:
- „From the tile thickness“ – the LED illumination technology is within the thickness of the tile.

Schlüter®-LIPROTEC-VB

The Schlüter®-LIPROTEC-VB profile allows for creating indirect as well as visible lines of light from within the tile covering. An additional cavity enables easy wiring.



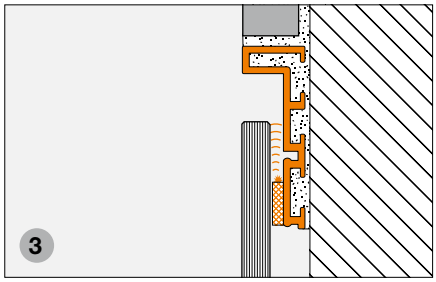
Diffuser **Schlüter®-LIPROTEC-VBI**



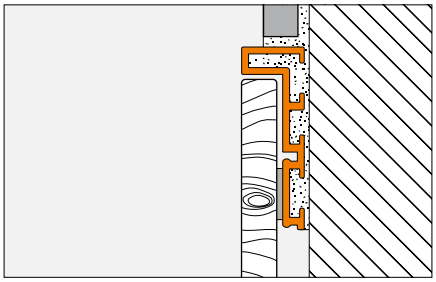
Diffuser **Schlüter®-LIPROTEC-VBD**

Schlüter®-LIPROTEC-D

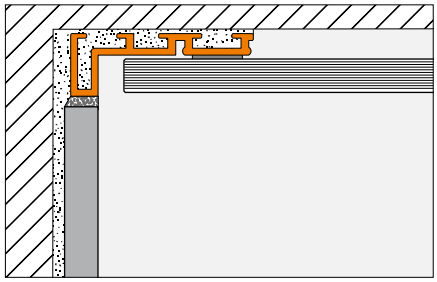
The Schlüter®-LIPROTEC-D profile is suitable for mounting decorative materials such as glass, mirrors or decorative wood elements. This decorative material can also be backlit.



Schlüter®-LIPROTEC-D recess lit



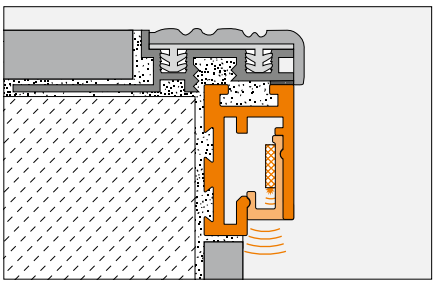
Schlüter®-LIPROTEC-D unlit



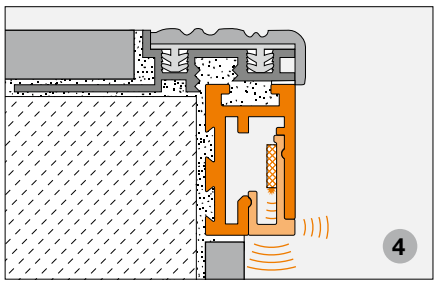
Schlüter®-LIPROTEC-D unlit, installation option “wall niche”

Schlüter®-LIPROTEC-PB

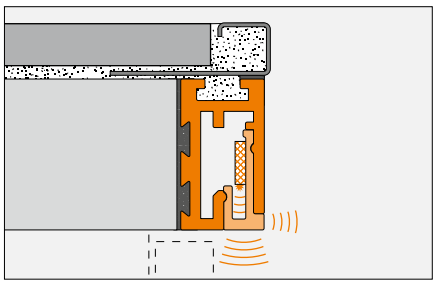
The Schlüter®-LIPROTEC-PB platform step illumination makes it feasible to illuminate steps above the stair-nosing or the edge of a kitchen countertop. The profile can be combined with Schlüter®-TREP stair-nosing profiles.



Diffuser **Schlüter®-LIPROTEC-VBI**



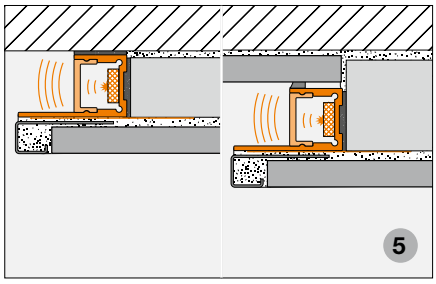
Diffuser **Schlüter®-LIPROTEC-PBD**



Schlüter®-LIPROTEC-PB
Design option for a kitchen countertop with 28 mm **KERDI-BOARD**

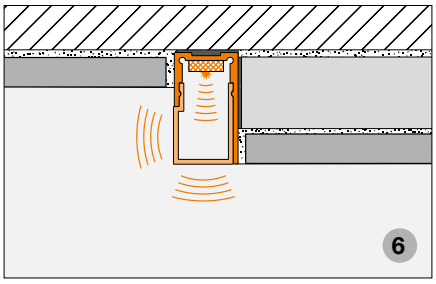
Schlüter®-LIPROTEC-WS

"From within the wall panel" - the combination of Schlüter®-KERDI-BOARD and Schlüter®-LIPROTEC-WS results in a "floating" appearance of wall elements.

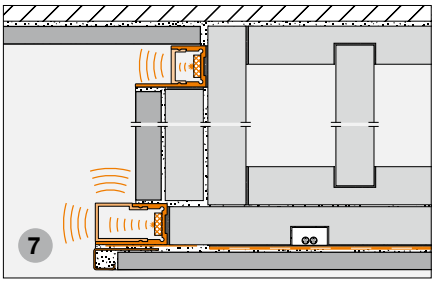


Left: Diffuser **Schlüter®-LIPROTEC-WSI**
Light radiation over untiled wall area
with 19 mm **KERDI-BOARD**

Right: Diffuser **Schlüter®-LIPROTEC-WSI**
Light radiation over tiled wall area
with 28 mm **KERDI-BOARD**



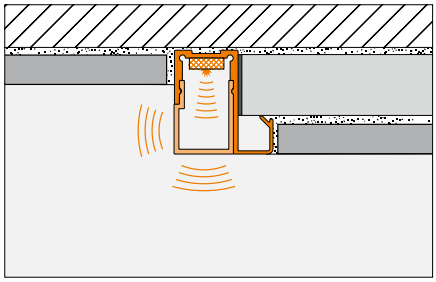
Diffuser **Schlüter®-LIPROTEC-WSD**
Direct light radiation on covering edge, substrate
doubled with 19 mm **KERDI-BOARD**



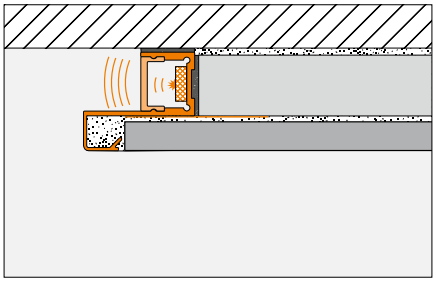
Installation option **Schlüter®-LIPROTEC-WS**
as an on-wall installation with 19 mm KERDI-BOARD
and installation module **KB 19 150 2500 K1**

Schlüter®-LIPROTEC-WSQ

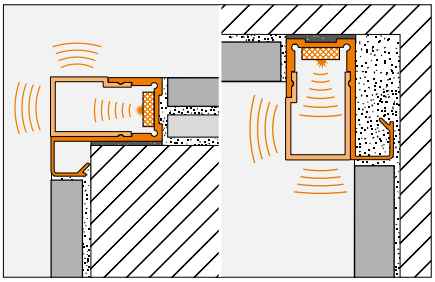
"From within the wall panel" - Schlüter®-LIPROTEC-WSQ offers an integrated covering finish in QUADEC design.



Diffuser **Schlüter®-LIPROTEC-WSD**
Light radiation over tiled wall area with
19 mm **KERDI-BOARD**



Diffuser **Schlüter®-LIPROTEC-WSI**
Light radiation over untiled wall area
with 19 mm **KERDI-BOARD**

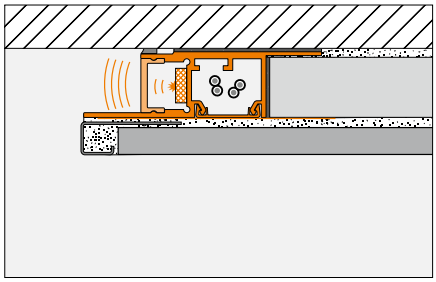


Left: Diffuser **Schlüter®-LIPROTEC-WSD**
Exterior corner formation with 9 mm **KERDI-BOARD**

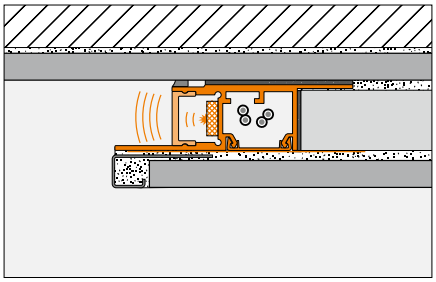
Right: Diffuser **Schlüter®-LIPROTEC-WSD**
interior corner formation

Schlüter®-LIPROTEC-WSK

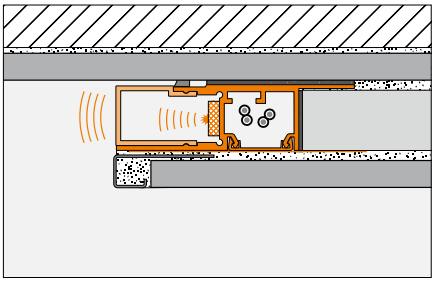
"From within the wall panel" - Schlüter®-LIPROTEC-WSK features an integrated cable duct.



Diffuser **Schlüter®-LIPROTEC-WSI**
Light radiation over untiled wall area
with 19 mm **KERDI-BOARD**



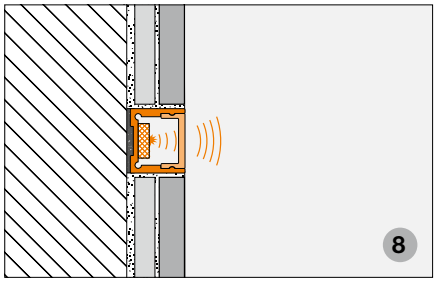
Diffuser **Schlüter®-LIPROTEC-WSI**
Light radiation over tiled wall area
with 19 mm **KERDI-BOARD**



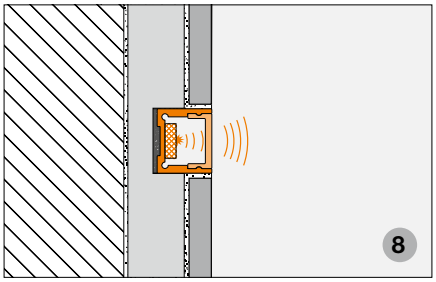
Diffuser **Schlüter®-LIPROTEC-WSD**
Light radiation over tiled wall area with
19 mm **KERDI-BOARD**

Schlüter®-LIPROTEC-LL

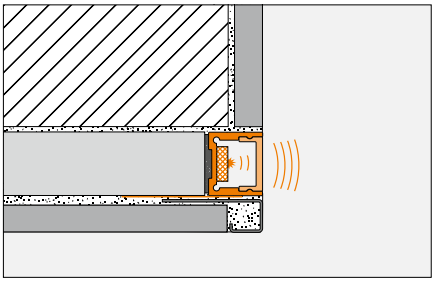
The Schlüter®-LIPROTEC-LL profile can be used to generate linear accent illumination with homogeneous light radiation.



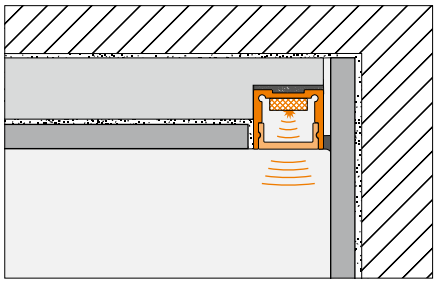
Diffuser **Schlüter®-LIPROTEC-WSI**
Installation in tiled wall area
with 9 mm **KERDI-BOARD**



Diffuser **Schlüter®-LIPROTEC-WSI**
Installation in tiled wall area
with installation module **KB 19 150 2500 K1**



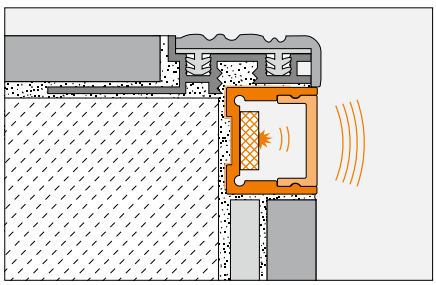
Diffuser **Schlüter®-LIPROTEC-WSI**
Room corner formation with 19 mm **KERDI-BOARD**



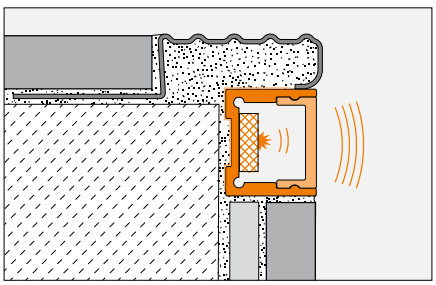
Installation option **Schlüter®-LIPROTEC-LL**
as niche illumination
with 19 mm KERDI-BOARD and
installation module **KB 19 150 2500 K1**

The Schlüter®-LIPROTEC-LL profile can be used for high-quality illumination of stairs nosings. It can be combined with the stair nosing profiles Schlüter®-TREP-S/-B or Schlüter®-TREP-E to create visually appealing stair illumination. The use of the diffuser Schlüter®-LIPROTEC-WSI generates direct light radiation from the stair nosing. To improve the adhesion on the anodized surface profile, apply the adhesive fleece Schlüter®-DESIGNBASE-HVL 38 with even pressure on the top and backside of Schlüter®-LIPROTEC-LL. The excess adhesive tape is then removed with a knife.

The subsequent work steps are similar to those of installing the profile Schlüter®-LIPROTEC-PB (see page 12).



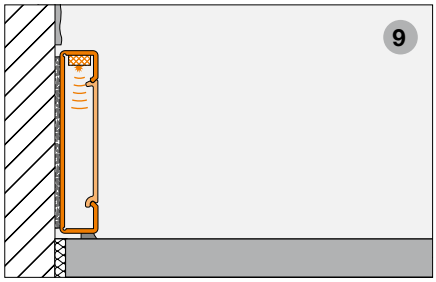
Diffuser **Schlüter®-LIPROTEC-WSI**
Installation in tiled riser below stair nosing profile
TREP-S, -B or -SE with 9 mm **KERDI-BOARD**



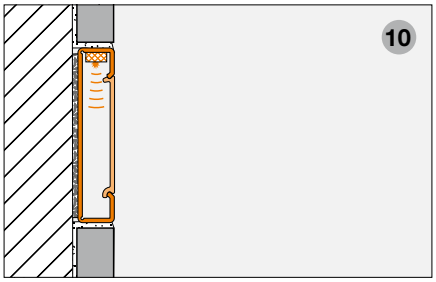
Diffuser **Schlüter®-LIPROTEC-WSI**
Installation in tiled riser below stair nosing profile
TREP-E with 9 mm **KERDI-BOARD**

Schlüter®-DESIGNBASE-QD

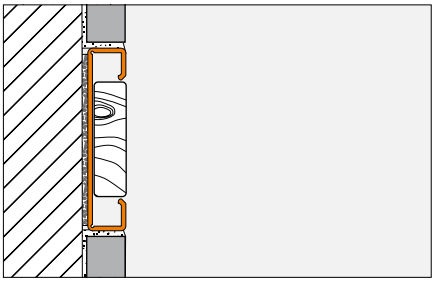
The Schlüter®-DESIGNBASE-QD profile makes it possible, to set accents with one light strip.
The profile can be installed horizontally, vertically, as a skirting board, baseboard or for a countertop. A lit or unlit variant is possible.



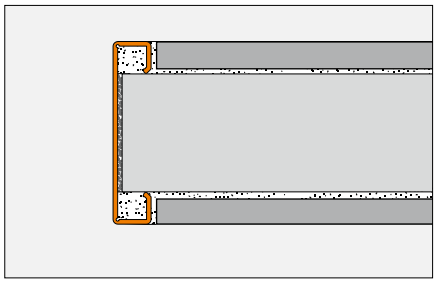
Schlüter®-DESIGNBASE-QD, illuminated
Installation option as a skirting



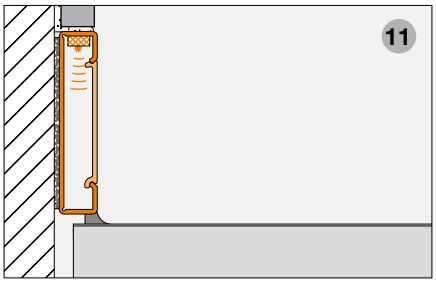
Schlüter®-DESIGNBASE-QD, illuminated
Installation option as a line of light in the tile covering



Schlüter®-DESIGNBASE-QD unlit, to accept decorative materials



Schlüter®-DESIGNBASE-QD, non-illuminated
Installation option as a finishing edge
with 38 mm **KERDI-BOARD**



Schlüter®-DESIGNBASE-QD, illuminated
Installation option as the wall connection of a kitchen countertop

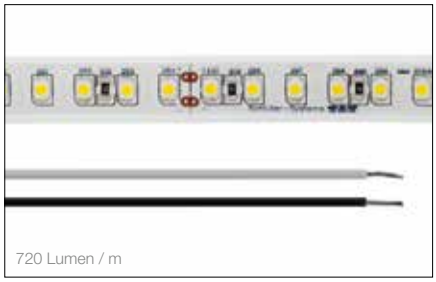
LED strips

The LED strip **Schlüter®-LIPROTEC-ES** is available in lengths of 0.5 m, 1.0 m, 1.5 m, 2.0 m and 2.5 m.
The LED strips come with a pre-attached cable in a length of 2.3 m. The individual wires are coloured. The positive wire is black. The cable transition to the LED strip is covered with a shrink-on sleeve. Depending on the profile type, some shading of the light radiation is to be expected in the area where the cable enters the LED strip. The LED strips are designed for connection to safety extra-low voltage of 24 V DC. A variety of light effects can be generated by using different LED strips.

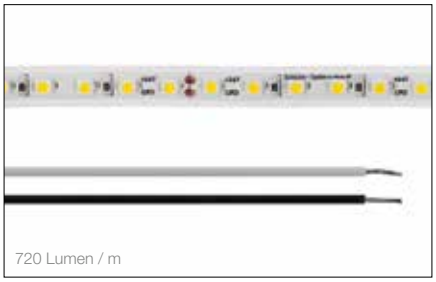
The LED strips series **LT ES 1** to **LT ES 6** differ in their dimensions and application area. This LED strips are available in two different colour temperatures:

3300 Kelvin - warm white
4500 Kelvin - neutral white

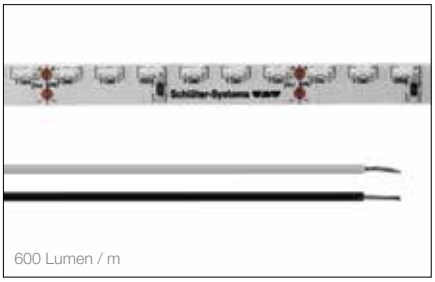
Criteria for use: well-being, relaxation, Mediterranean style
Criteria for use: modern, focus, bright



LT ES 1 / LT ES 2

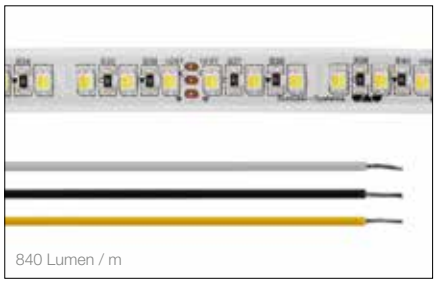


LT ES 3 / LT ES 4

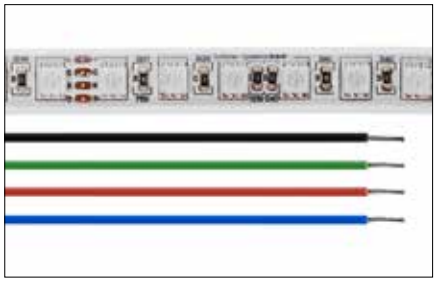


LT ES 5 / LT ES 6

The LED strip **LT ES 7** enables the individual adjustment of the colour temperature from 3000 to 7000 Kelvin. This LED strip can only be used with the profiles **Schlüter®-LIPROTEC-WS /-WSQ /-WSK** and **-LL**.



The LED strip **LT ES 8** enables the setting of over 16 million different colour shades. This LED strip can only be used with the profiles **Schlüter®-LIPROTEC-WS /-WSQ /-WSK** and **-LL**.



During operation, colour temperature deviations of up to 600 Kelvin from the above-listed values may occur. This colour tolerance range does not mean the item is faulty.

The LED strips listed here correspond to energy labelling classes A+ to A. The LED strips of the LT ES 8 series do not fall within the scope of EU Regulation 874/2012. Further information about the energy efficiency class of our products can be found on pages 86 - 87.

Diffuser Combinations		
Diffuser	**Degree of transmission**	**Can be combined with profile**
LIPROTEC-VBI	43%	LIPROTEC-VB /-PB
LIPROTEC-VBD	43% / 5%	LIPROTEC-VB
LIPROTEC-PBD	43% / 5%	LIPROTEC-PB
LIPROTEC-WSI	43%	LIPROTEC-WS /-WSQ /-WSK /-LL
LIPROTEC-WSD	64%	LIPROTEC-WS /-WSQ /-WSK
DESIGNBASE-QDD	45%	DESIGNBASE-QD

Degree of transmission

The degree of transmission is defined as that share of the radiation of light that a transparent construction element allows through - meaning that amount of light that is entering the room after it penetrates the diffuser.

System Limitations, Maximum Lengths of the LED Strips

The system capacity of Schlüter®-LIPROTEC is limited to the factors listed below.

Power supply: max. 150 W (LT EK 24 V 150 W) x 0.9 safety factor = 135 watts maximum load for the LED strips LT ES 1 up to LT ES 8.

For the receivers, the respective individual Ampere and/or watt loads of the individual outputs must be taken into consideration.

The LED strips must be assigned to the connections accordingly. This provides the following maximum lengths for the LED strips that can be installed in the LIPROTEC system:

LED strip	Art.-No.	Watt/m	Max. LED per metre
LED strip 3300 K, width:12 mm, 120 LED/m	LT ES 1	9.60	14.00
LED strip 4500 K, width:12 mm, 120 LED/m	LT ES 2	9.60	14.00
LED strip 3300 K, width:7 mm, 120 LED/m	LT ES 3	9.60	14.00
LED strip 4500 K, width:7 mm, 120 LED/m	LT ES 4	9.60	14.00
LED strip, lateral radiation 3300 K, 120 LED/m	LT ES 5	9.60	14.00
LED strip, lateral radiation 4500 K, 120 LED/m	LT ES 6	9.60	14.00
LED strip, adjustable colour temperature, 120 LED/m	LT ES 7	14.40	9.30
LED strip, coloured, adjustable, 84 LED/m	LT ES 8	15.00	9.00

The Schlüter®-LIPROTEC system is limited where the length of the cabling between the individual electro-components is concerned. Exceeding the recommended cable lengths may result in disruptions in the Schlüter®-LIPROTEC system or other electronic components (no electromagnetic compatibility).

The maximum cable lengths and cable diameters between the power supply and the receiver and between receiver and LED mains cable are specified. The specified cable diameter of AWG 16 (1.31 mm²) must not be less than specified.

Maximum cable length between power supply unit and receiver: 2 m
Maximum cable length between receiver and LED power cord (junction box): 10 m

The drawing on page 38 explains the connection principle.

Note regarding LED strips

Our LED strips are protected against moisture according to the requirements of IP65 (protection against water sprays from all directions). The LED strips of series LT ES 5 and LT ES 6 have a top coating. All other LED strips are protected against exterior mechanical impact with a full coating. The LED strips may be cut to size with scissors at the designated markings. Use the supplied end caps and sealing adhesive to close the cut LED strips in compliance with IP65 (see also installation guide for LED strips).

Schlüter®-LIPROTEC LED strips have a service life of 30,000 to 40,000 hours.

Installation

- When laying the cables, pay attention to the correct assigning of the cables (+/-/R/G/B)! The polarity must not be switched.
- Cables are soldered to the LED strips. The connection is protected with shrink tubing and a sealing compound. This cable connection must not be separated.
- Exceeding the maximum operating voltage results in the LED module being overloaded and reduced service life.
- The leads on the printed circuit boards must not be damaged or modified during installation.
- IP65 LED strips are protected against moisture or dust (protection against jet water from all directions). As delivered, the LED strips are furnished with shrink tubing and a silicone cap at the end of the LED strip.
- The LED module can be shortened by cutting them at the marked locations.
- The LED strips may only be done at the end (no cable feed). The cutting location must be closed off using the enclosed end cap and the sealing adhesive so that it conforms to IP.
- Extending the LED strips by, for example, soldering, is not permitted.

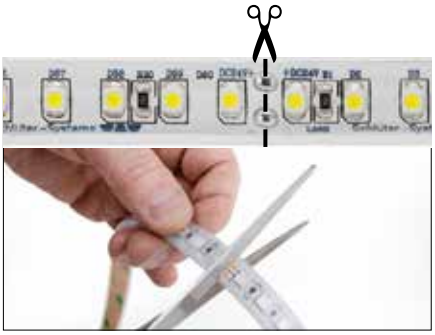


Fig. 1

Fig. 2

Fig. 3

1. Cut the IP-protected LED strip at the marked locations (Fig. 1).
2. A watertight end connection is made using the silicone end cap and sealing adhesive. (Fig. 2).
3. Close off the end of the LED strip so that it is watertight. First, apply a sufficient amount of sealing adhesive into the end cap and then push the end cap over the LED strip (Fig. 3).
4. Check if the end cap and the LED strip are connected to each other cleanly.
5. Remove the excess adhesive with a cloth.

Information on bonding the LED strips

The LED strips are bonded with a temperature of at least 15°C.
The surface to be bonded must be cleaned free of adhesion-resistant materials. Suitable cleaning agents should be used.
The LED strip must be bonded into the aluminium profile or diffusion panel by pressing firmly and uniformly.

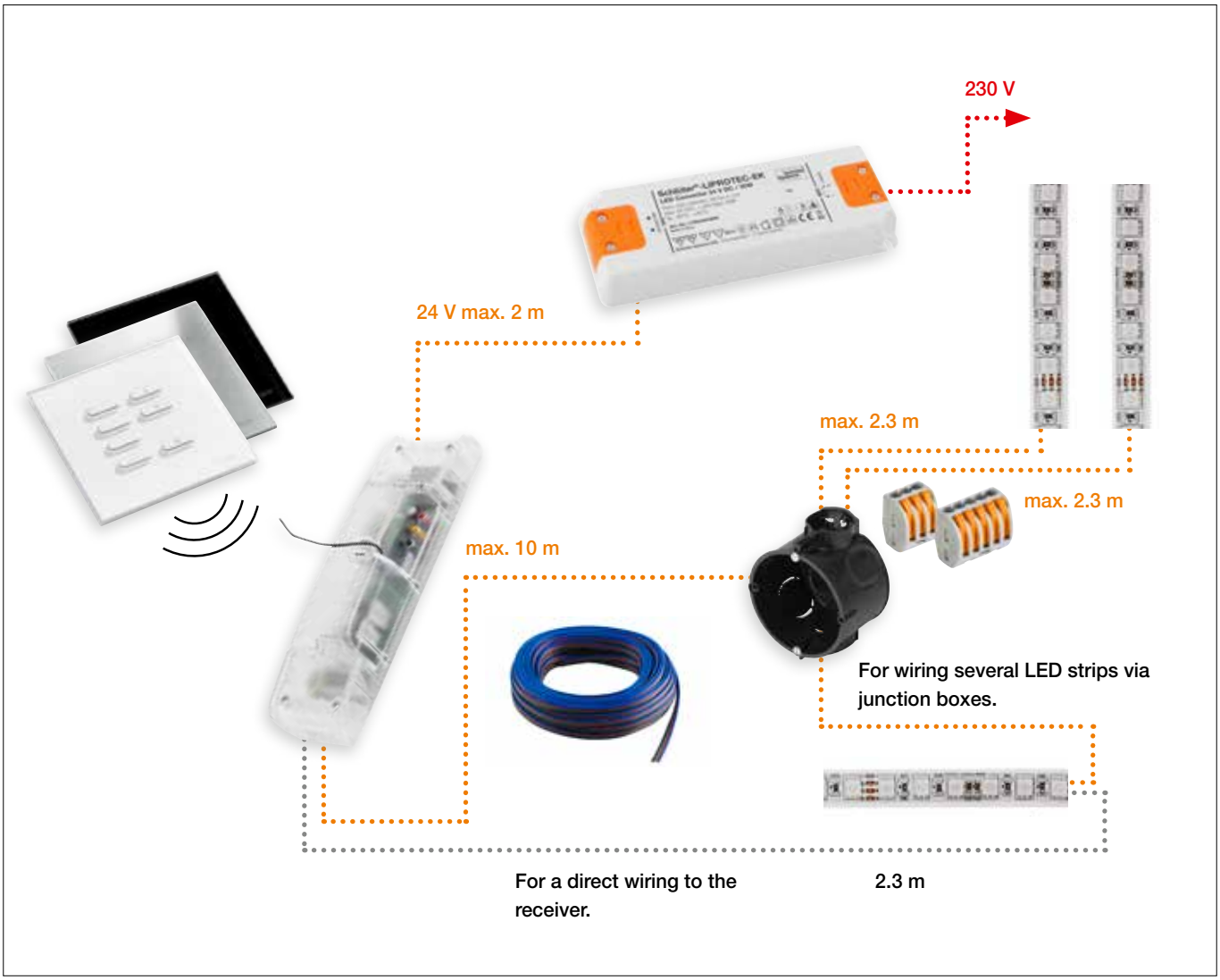
Combination options of the desired lighting mode with profile systems and controls.

LED Strips (all LED strips can be dimmed)			Profile					
			LIPROTEC-VB from within the tile, LED placement at the diffuser	**LIPROTEC-WS / -WSQ / -WSK** from the thickness of the wall	**LIPROTEC-D** Mounting of decorative material	**LIPROTEC-PB** Illumination of landing Placement of the LED at the diffuser	**DESIGNBASE -QD** skirting illumination	**LIPROTEC-LL** line of light
			Receiver					
	LED strips 3300 K, 120 LED/m, 9.6 W/m width: 12 mm, height: 5 mm divisible every 50 mm	**LT ES 1**	**LT ER 1**	**LT ER 1**	–	–	–	**LT ER 1**
	LED strips 4500 K, 120 LED/m, 9.6 W/m width: 12 mm, height: 5 mm divisible every 50 mm	**LT ES 2**	–	**LT ER 1**	–	–	–	**LT ER 1**
	LED strips, narrow 3300 K 120 LED/m, 9.6 W/m width: 8 mm, height: 5 mm divisible every 50 mm	**LT ES 3**	–	–	–	–	**LT ER 1**	–
	LED strips, narrow 4500 K 120 LED/m, 9.6 W/m width: 8 mm, height: 5 mm divisible every 50 mm	**LT ES 4**	–	–	–	–	**LT ER 1**	–
	LED strips lateral radiation 3300 K 120 LED/m, 9.6 W/m width: 9 mm, height: 3.5 mm divisible every 50 mm	**LT ES 5**	**LT ER 1**	–	**LT ER 1**	**LT ER 1**	–	–
	LED strips lateral radiation 4500 K 120 LED/m, 9.6 W/m width: 9 mm, height: 3.5 mm divisible every 50 mm	**LT ES 6**	**LT ER 1**	–	**LT ER 1**	**LT ER 1**	–	–
	LED strips adjustable colour temperature 120 LED/m, 14.4 W/m width: 12 mm, height: 5 mm divisible every 50 mm	**LT ES 7**	–	**LT ER 2**	–	–	–	**LT ER 2**
	LED strips, coloured 84 LED/m, 15 W/m width: 12 mm, height: 5 mm divisible every 71 mm	**LT ES 8**	–	**LT ER 3** **LT EBR 3**	–	–	–	**LT ER 3** **LT EBR 3**

LT ER 1 – Receiver to control single-colour LED strips (white)
LT ER 2 – Receiver to control the colour temperature of white LED strips
LT ER 3 – Receiver to control coloured LED strips (RGB)
LT EBR 3 – Receiver for controlling coloured LED strips (RGB), operation via Bluetooth (cannot be combined with receiver LT ER 3).

The receivers LT ER 1, LT ER 2, LT ER 3 are also available as a **master/slave system**. This allows for the central control of large setups with spatially separated receivers with only one transmitter (see pages 28 and 42 - 47).

Connection principle - wireless control (transmitter/receiver)



Selection of the power supply unit

Selecting the correct power supply unit depends on the type and amount of the LED strips desired.

Example:

1. **LED selection**
   LED strips 3300 K, 120 LED/m (LT ES 1) = 9.6 watts / metre

2. **Determine LED lengths**
   When determining the power (watts) the actual lengths of the LED strips to be run at the construction site are required.

> The maximum load must be taken into account when selecting the power supply (see Dimensions table)!

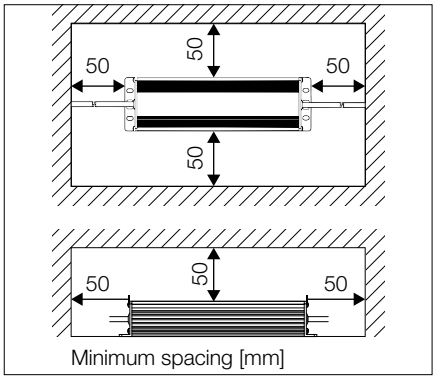
	Actual LED lengths	Ordering lengths	Art.-No.
	1.15 m	1.5 m	LT ES 1/150
	0.35 m	0.5 m	LT ES 1/50
	2.35 m	2.5 m	LT ES 1
	0.90 m	1.0 m	LT ES 1/100
	0.25 m	0.5 m	LT ES 1/50
	2.15 m	2.5 m	LT ES 1
Amount	7.15 m		

3. **Calculating the required power:**
   7.15 m length of LED strip (LT ES 1) x 9.6 watts / metre = 68.64 watts.

4. **Power supply selection**
   Control calculation: Power supply LT EK 24 V 75 W = 75 W * 0.9 safety factor = 67.5 watt.
   In this case, the recommended maximum load of the power supply unit has been exceeded.
   The next larger power supply unit with a wattage of 100 watts (LT EK 24 V 100 W) must be used.

Positioning of the power supply units

The start-up of the power supply must be performed by a qualified electrician. In bathrooms, the power supply must be located outside of protection zones 0, 1 and 2. The minimum clearances to adjacent components must be observed (see also item “Protection zones in the bathroom”).



Minimum spacing [mm]

Dimensions of power supply units (L x W x H)		
LT EK	24 V 30 W (27 W)	159 mm x 59 mm x 18 mm
LT EK	24 V 50 W (45 W)	185 mm x 64 mm x 22 mm
LT EK	24 V 75 W (67,5 W)	200 mm x 63 mm x 30 mm
LT EK	24 V 100 W (90 W)	217 mm x 67 mm x 34 mm
LT EK	24 V 150 W (135 W)	217 mm x 67 mm x 42 mm

Values in brackets = maximum loads

Connection diagram - wireless control (transmitter/receiver)

The receiver ensures that the LED strips can be operated easily, the functions ON, OFF, Dim, Colour Control, Colour Temperatures and Colour Scenarios are controlled by the various control programs.

There are 3 different systems

Receiver LT ER 1

To control single-colour LED strips with a set colour temperature.
For the direct connection of the LED strips to the receiver, in conjunction with the LED strips of the LT ES 1 to LT ES 6 series.

Option 1:
A maximum of 3 LED strips can be connected per connection. The maximum LED output at a connection is thus at 2.5 m x 9.6 watts/m = 24 watts in the Schlüter®-LIPROTEC system Therefore, in this version of the connection, a maximum of 3 lengths if 24 watts = 72 watts can be connected to the receiver (Fig. 1).

Option 2:
Should additional LED strips be connected, they may be connected up to a maximum output (watts) of the respective power supply unit and the maximum load of the respective connections at the receiver according to the following connection diagram (Fig. 2):
Here, the LED strips are connected via one or more junction boxes.

Depending on the connection, 4 amps (at 24 V = 96 watt), a total of 288 watts, are feasible. The Schlüter®-LIPROTEC system is limited to 150 watt through its power supply unit. With consideration for the safety factor of 0.9, this equals a maximum load of 135 watt (Fig. 3). That results in the following maximum loads on the connections:
Connection 1: max. 96 watts, max. LED length at 9.6 W/m = 10 m
Connection 2: max. 39 watts, max. LED length at 9.6 W/m = 4.0 m
Connection 3: not assigned

The maximum length of an LED strip of 14 m can also be distributed among all 3 connections.
Example:
Connection 1: max. 48 watts, max. LED length at 9.6 W/m = 5 m
Connection 2: max. 67.2 watts, max. LED length at 9.6 W/m = 7 m
Connection 3: max. 19.2 watts, max. LED length at 9.6 W/m = 2 m

See also operating instructions LT ER 1.

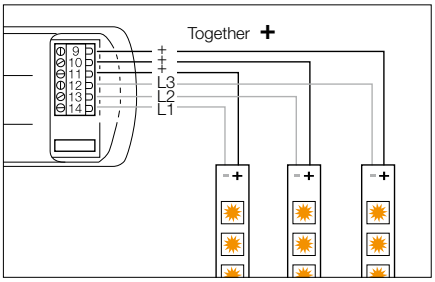


Fig. 1

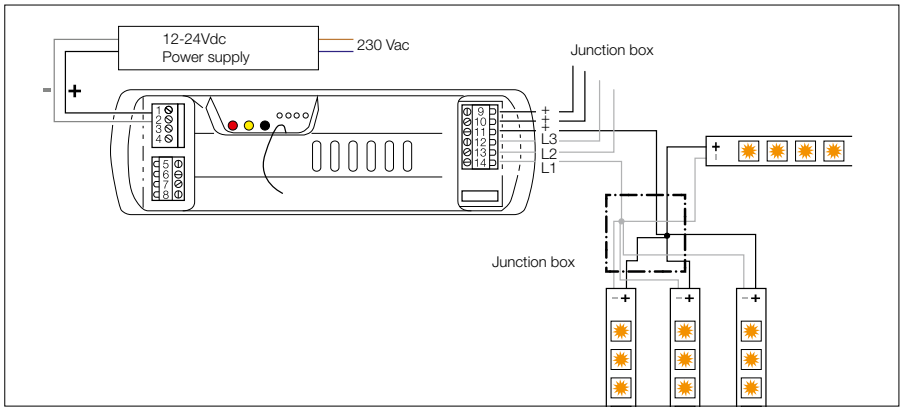


Fig. 2

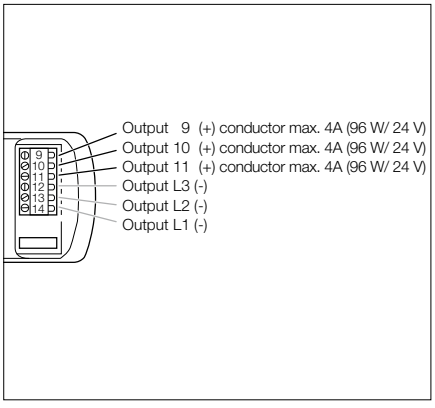


Fig. 3

Receiver LT ER 2

To control the colour temperature of white LED strips.
What's special is that the two LED points can be controlled on the LED chips (warm white and neutral white). These LED chips can be controlled via the C 1 / C 3 and C 2 / C 4 connections (parallel load). The connected **LT ES 7** LED strip has two minus connection cables that are put separately on the connection C 1 / C 3 and C 2 / C 4 (Fig. 1).
C 1 / C 3 = warm white
C 2 / C 4 = neutral white

The Schlüter®-LIPROTEC system is limited to 150 watts through its power supply unit. With consideration for the safety factor of 0.9, this equals a maximum load of 135 watts.
This results in the following maximum loads on the connections:
Connection C 1 to C 4: max. 2.5 Ampere (60 Watt) on each.
The assumed wattage of 14.4 W/m is divided to equal parts on to the warm-white chip and the neutral-white chip. This results in a consumption of 7.2 W/m each at the C 1 to C 4 outputs. The + outputs must then absorb each the full 14.4 W/m LED.
The maximum load per + output is at 8 amperes (Fig. 2); see also operating instructions LT ER 2.

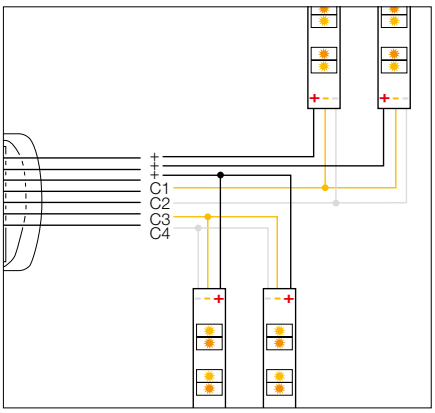


Fig. 1

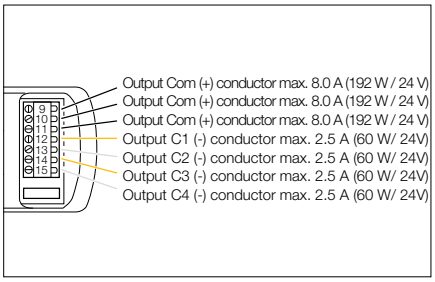


Fig. 2

Receiver LT ER 3

To control coloured LED strips (RGB).
The coloured **LT ER 8** LED strip has four connection wires with the colour coding:
R = Red, G = Green, B = Blue, + = black.

Option 1:
A maximum of 3 LED strips can be connected per connection.
The maximum LED output at one connection is at 2.5 m x 15.0 W/m = 37.5 watts. This means that a maximum of 3 lengths of 37.5 watts each = 112.5 watts can be connected to the receiver (Fig. 3).

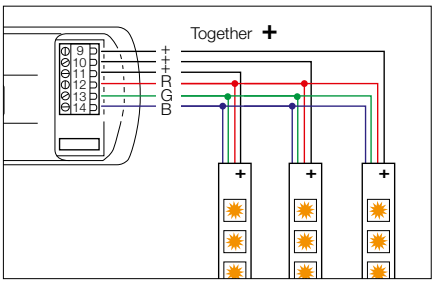


Fig. 3

Option 2:
Should additional LED strips be connected, they may be connected up to a maximum output (watts) of the respective power supply unit and the maximum load of the respective connections at the receiver according to the following connection diagram (Fig. 4) At the receiver, 4 amperes (at 24 V = 96 watts) are possible per connection, therefore, a total of 288 watts is possible.
The Schlüter®-LIPROTEC system is limited to 150 watts through its power supply unit.
Taking into consideration the power factor of 0.9, this results in a maximum load of 135 watts.
This results in the following maximum loads on the connections:

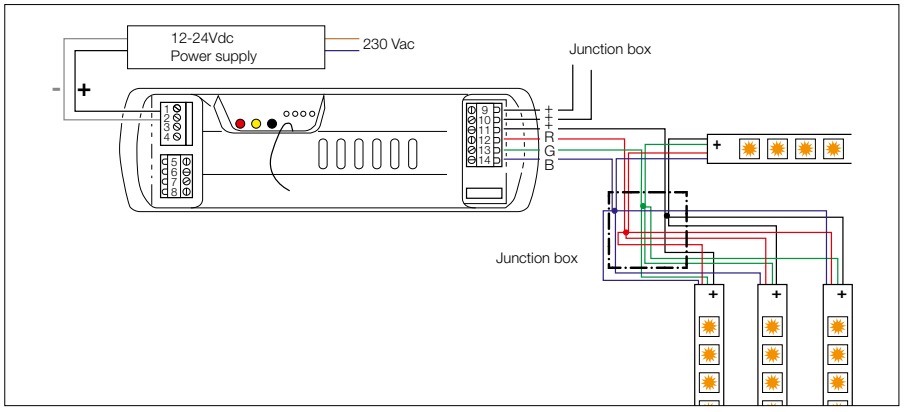


Fig. 4

+ Connection 1: max. 96 watts max. LED length at 15.0 W/m = 6.4 m
+ Connection 2: max. 39 watts max. LED length at 15.0 W/m = 2.6 m
+ Connection 3: not assigned

The maximum length of an LED strip of 9 m can also be distributed among all 3 connections.
Example:
+ Connection 1: max. 60.0 watts max. LED length at 15.0 W/m = 4 m
+ Connection 2: max. 45.0 watts max. LED length at 15.0 W/m = 3 m
+ Connection 3: max. 30.0 watts max. LED length at 15.0 W/m = 2 m

The assumed wattage of 15.0 W/m are split equally between the coloured connections (R,G,B). This results in a consumption of 5.0 W/m each at the R, G, B outputs. The + outputs must absorb the full 15.0 watts/m LED, respectively (Fig. 1).

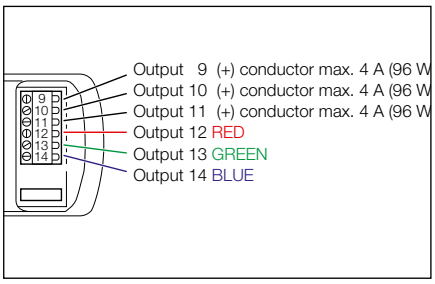


Fig. 1

Master/slave system

The master/slave system enables the simultaneous control of multiple interconnected receivers over long distances. The master receiver is taught together with the transmitter, and the function of the slave receiver follows the master.
The system limit of 135 W refers to a master or slave with the associated power supply. The so-called “system islands” allow for the installation of 24 V LED strips up to a length of 574 m with control by a single central wireless transmitter. Up to 40 slave receivers can be connected to a master receiver. The cable length of the connection between two receivers must not exceed 50 m. Up to 200 m are supported as the distance between the master receiver and the last slave receiver. The connection between master and slave receivers and slave and slave receivers is established with an additional two-core cable AWG 16 Schlüter® LIPROTEC manufactured-ZK 2A.

1 Schlüter®-LIPROTEC-EK – power supply units

Power supply units convert the actual line supply voltage to the 24 volts required by the LED strips. They are easy to install and come in different wattages of 30 - 150 watts (see LIPROTEC price list).

2 Schlüter®-LIPROTEC-ERM – master receivers

The master receivers convert the wireless signals received from the transmitters to commands for the LED strips. They are the first component in a lighting system. The master receivers are available in the following versions:

LT ERM 1 (on-off-dimming) for control of white LED strips with fixed colour temperature (LT ES 1 - LT ES 6).

LT ERM 2 (on-off-dimming colour temperature) for the control of white LED strips with adjustable colour temperature (LT ES 7). By factory default, four colour temperatures are pre-programmed as fixed values. These can be adjusted individually as required.

LT ERM 3 (on-off-dimming colour change) for the control of coloured LEDs (LT ES 8) in RGB mode. Users can either call up eight pre-programmed base colours or 4 colour scenes. The base colours can be individually overwritten.

3 Schlüter®-LIPROTEC-ERS – slave receivers

Slave receivers convert the signals received from the master to commands for the LED strips. They are downstream components of the master and are connected in series. Slave receivers can only be controlled by the corresponding master receiver.
The slave receivers are available in the following versions:

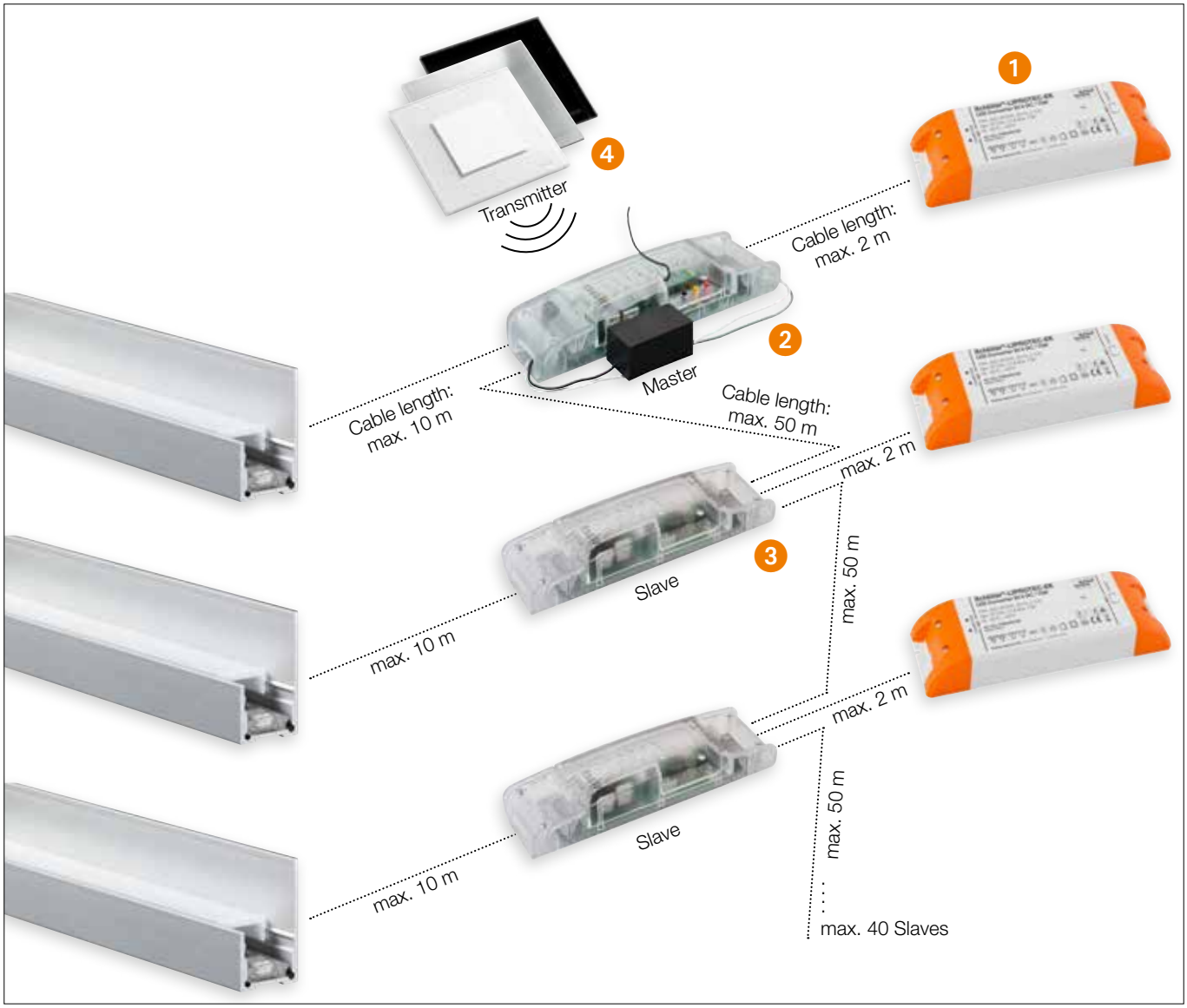
LT ERS 1/3 (on-off-dimming/colour change) for simultaneous control of white (LT ES 1 - LT ES 6) and coloured LED strips (LT ES 8).

LT ERS 2 (on-off-dimming colour temperature) for simultaneous control of white LED strips with adjustable colour temperature (LT 7).

4 Schlüter®-LIPROTEC-E – transmitters

The transmitters enable user control of the Light Profile Technology. Thanks to the wireless control, their installation is particularly easy. All transmitters are available in three different frame design options, real glass, painted, brilliant white, or black or brushed stainless steel V4A. The transmitters are available in the following variants:

- 1-channel (on-off-dimming) for controlling white LED strips with a fixed colour temperature in conjunction with receiver LT ER 1.
- 2 channel (on-off-dimming) for simultaneous control of two receivers LT ER 1 with white LED strips and fixed colour temperature.
- 7-channel (on-off-dimming colour change) for the control of coloured LEDs (LT ES 8) in RGB mode via receiver LT ER 3, white LEDs with adjustable colour temperature via receiver LT ER 2 or white LEDs with fixed colour temperature in four dimming levels via receiver LT ER 1 (see LIPROTEC price list).



Combination options of the desired LED strips with master and slave receivers

LED strips (all LED strips are dimmable)			Receiver	
			Master	Slave
	LED strips 3300 K, length of each receiver: 14 m, max. length: 574 m	**LT ES 1**	LT ERM 1	LT ERS 1/3
	LED strips 4500 K, length of each receiver: 14 m, max. length: 574 m	**LT ES 2**	LT ERM 1	LT ERS 1/3
	LED-Streifen 3300 K, length of each receiver: 14 m, max. length: 574 m	**LT ES 3**	LT ERM 1	LT ERS 1/3
	LED strips 4500 K, length of each receiver: 14 m, max. length: 574 m	**LT ES 4**	LT ERM 1	LT ERS 1/3
	LED strips 3300 K, length of each receiver: 14 m, max. length: 574 m	**LT ES 5**	LT ERM 1	LT ERS 1/3
	LED strips 4500 K, length of each receiver: 14 m, max. length: 574 m	**LT ES 6**	LT ERM 1	LT ERS 1/3
	LED strips, adjustable colour temperature, length of each receiver: 9.3 m max. length: 381 m	**LT ES 7**	LT ERM 2	LT ERS 2
	LED strips, coloured, length of each receiver: 9 m, max. length: 369 m	**LT ES 8**	LT ERM 3	LT ERS 1/3

See also operating instructions master/slave receiver.

Connection diagram for master/slave system

The receivers are connected to each other with a two-wire AWG 16 cable. The “slave out” socket of the master receiver is connected to the “slave in” socket of the following slave receiver. The subsequent slave receivers are connected in the same manner. Note the labels B1 (black) and B2 (white) for the proper allocation of the wires when connecting the receivers.
The connections between the receivers must be established prior to activating the voltage supply!

i

If the cable connection to a slave receiver is interrupted, a buzzer will sound for three seconds and LEDs 1 – 4 in the housing will light up.

Sample installation

The selection of the right receiver and power supply units depends on the type and quantity of the desired LED strips.

Example:

1. **LED selection “coloured light image“**
   LED strips RGB, 84 LED/m (LT ES 8) = 15 watts/m

2. **Determination of LED lengths**
   The actual LED lengths to be installed at the construction site are needed for the calculation of the output (watts).

Sample calculation

	Actual LED lengths	Order lengths	Art.-No.
	8.35 m	8.5 m	3 x LT ES 8 1 x LT ES 8 / 100
	2.35 m	2.5 m	1 x LT ES 8
	7.00 m	7.0 m	2 x LT ES 8 1 x LT ES 8 / 200
	2.90 m	3.0 m	1 x LT ES 8 1 x LT ES 8 / 50
Total	20.60 m		

3. **Calculation of the necessary output**
   20.6 m LED length (LT ES 8) x 15 watt/metre = 309 watt

4. **Selection of power supply**
   Calculated output 309 watt/maximum power supply output 135 watt = 2.3

   The calculated value 2.3 is rounded up to the next whole number. Accordingly, three power supply units are needed. To simplify the installation, we recommend using power supply units with 150 watt output (LT EK 24V 150W). This allows for greater flexibility of design depending on the construction site situation

5. **Selection of receiver**
   LED strips of the LT ES 8 series are paired with master receivers LT ERM 3 and slave receivers LT ERS 1/3 in the master-slave system as shown in the table on page 44. The number of receivers corresponds to the number of power supply units. The system always uses a single master receiver, which can be combined with up to 40 slave receivers. This results in the following material list.

6. **Material list for control system**

Number	Art.-No.	Note
1	LT ERM 3	Master receiver for LT ES 8
2	LT ERS 1/3	Slave receiver for LT ES 8
1	LT ZK 2A 10 50M	Two-wire cable for connecting the receivers
3	LT EK 24V 150W	Power supply units 24 volt, 150 watt
1	LT E 7 KSBW	Transmitter, 7-channel, real glass brilliant white

7. Distribution of the LED strips

The “system island” of receiver, power supply unit and LED strips is limited to 150 watt through the power supply unit. With consideration for the safety factor of 0.9, this equals a maximum load of 135 watts per receiver and power supply.

Receiver:	**LT ERM 3** (Master receiver)		**LT ERS 1/3** (Slave receiver)		**LT ERS 1/3** (Slave receiver)	
	7,00 m	2 x LT ES 8	2,35 m	1 x LT ES 8	8,35 m	3 x LT ES 8
		1 x LT ES 8 / 200	2,90 m	1 x LT ES 8		1 x LT ES 8/100
				1 x LT ES 8/50		
Output	7.00 m * 15 watt/metre = 105 watt		5,25 m * 15 watt/metre = 79watt		8,35 m * 15 watt/metre = 126 watt	

Accordingly, all receivers and power supply units are operated within the permissible maximum load of 135 watt.

Figure 1 shows a sample installation connection:

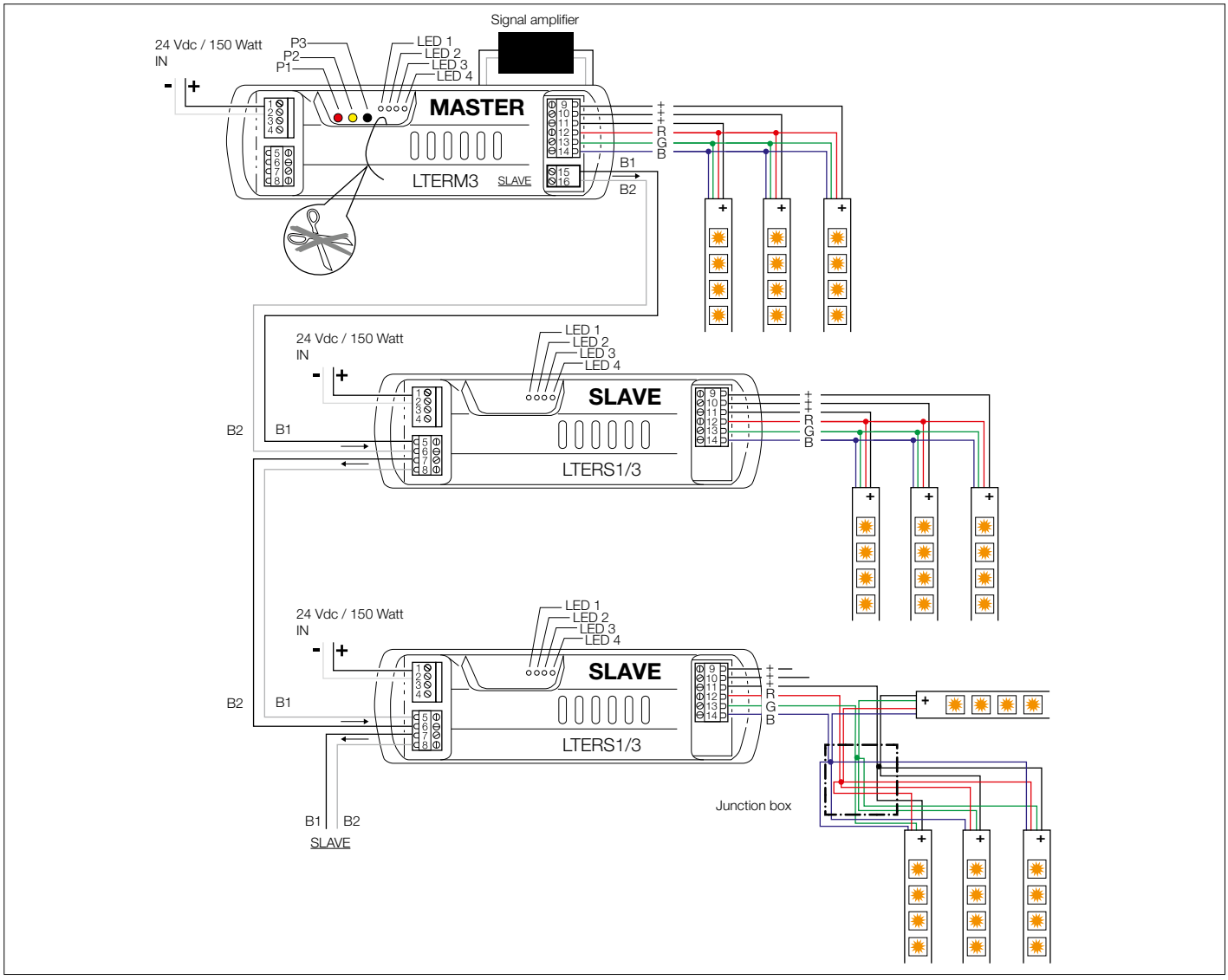


Fig. 1

Technical data

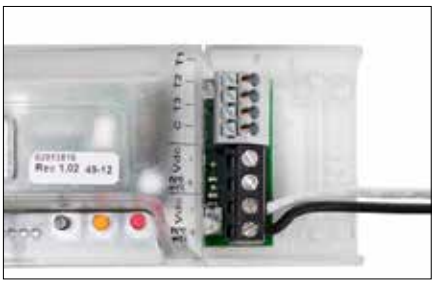
	LT ERM 1	LT ERM 2	LT ERM 3	LT ERS 1/3	LT ERS 2
Receiver frequency:	868,3 Mhz				
Max. permissible ambient temperature during operation:	-20 °C to +60 °C				
Max. total load per output	4 A = 96 W	2,5 A = 60 W	4 A = 96 W	4 A = 96 W	2,5 A = 60 W
Max. permissible ambient temperature in operation:	-20 °C to +60 °C				
Max. LED strip length in the master-slave system:	14 m	9 m	9 m	14 m / 9 m	9,3 m
PWM:	200 Hz				
Protection rating:	IP20				
Dimensions:	165 x 68 x 35 mm			165 x 47 x 35 mm	
Max. number of slaves:	40 units				
Max. distance between two receivers:	50 m				
Max. total distance between the master and all slaves:	200 m				
Cable cross-section for receiver connection (“bus”):	2 x 1.31 mm² (AWG 16)				

The connection, positioning and calculation of the LED lengths are similar to the Schlüter®-LIPROTEC receivers LT ER 1 / LT ER 2 / LT ER 3 as described on page 40. The selection of the transmitter - depending on the type of lighting - also requires the same steps as a standard receiver system and is described on pages 49 and 51.

Connection of the receiver to the power supply unit

Mains power must be provided via the designated connection.
Mains power = 24 volts

Cable run: black +
white –



Connection of the LED strips to the receiver

It must be ensured that the polarity is correct.
The stripping length of the cable is 9 mm.
The clamping contacts are pressed down with a small screwdriver, the stripped cable is inserted into the receptacle for the cable. Check the secure seat of the cable.

Suppression of radio interference

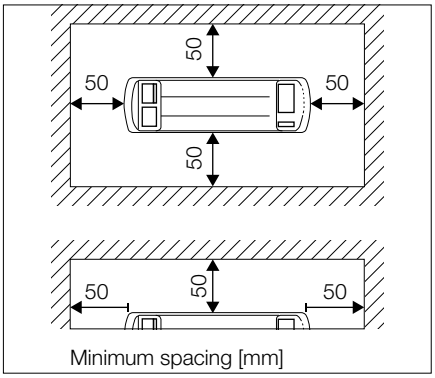
To achieve good radio interference suppression and maximum operational safety, the following points should be observed with correct cable routing:

- The power supply unit/units should be mounted at a distance of at least 30 cm from the LED-leading aluminium profiles. Minimum distances to adjacent components should be observed.
- Output lines must be correctly routed (reduced capacitive interference) at corresponding distances to grounded metal surfaces.
- The distance between the mains cable and output line must be as large as possible (at least 5 cm, avoiding interference between mains cables and lamp cables). Mains cables and LED module cables must not be routed in parallel.

The crossing of mains cables and LED modules must be generally avoided; if this cannot be avoided then crossings (if technically feasible and possible with regard to safety) must be at right angles (avoidance of HF interference on mains cables).

Positioning of the receiver

In the bathroom the receiver can only be positioned outside of protection zone 2.
The minimum distance requirements to adjoining components must be complied with.
Sufficient ventilation must be ensured. Should the receiver be encased in a housing, the functioning of the wireless connection to the transmitter must be tested (see also Receiver operating instructions).



Minimum spacing [mm]

Dimensions - Receiver (L x W x H)		
LT ER 1	24 V	165 mm x 47 mm x 35 mm
LT ER 2	24 V	165 mm x 47 mm x 35 mm
LT ER 3	24 V	165 mm x 47 mm x 35 mm
LT ERM 1	24 V	165 mm x 68 mm x 35 mm
LT ERM 2	24 V	165 mm x 68 mm x 35 mm
LT ERM 3	24 V	165 mm x 68 mm x 35 mm
LT ERS 1/3	24 V	165 mm x 47 mm x 35 mm
LT ERS 2	24 V	165 mm x 47 mm x 35 mm

Selection of receiver

The transmitter (button) is used for operating the receivers LT ER 1 / LT ER 2 / LT ER 3 as well as the master receivers LT ERM 1 / LT ERM 2 / LT ERM 3, which in turn control the LED strips.
The transmitter is connected wirelessly by radio with the receiver. The transmitter should not be set further from the receiver than 50 metres. In addition, the range may be negatively affected by walls and ceilings. Functionality must be checked before the transmitter is installed.
The selection of the transmitter depends on the kind of LED strips used and/or the receiver.

1 channel transmitter **LT E1 KS ...** (one button): Functions - On/Off/Dimming (with LT ER 1 / LT ERM 1 receiver).

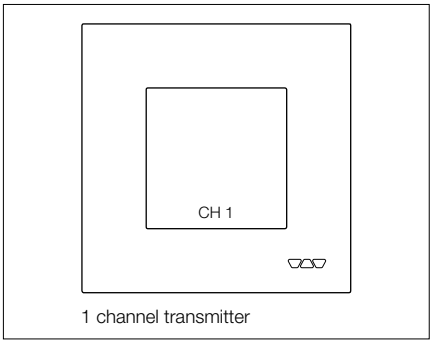
2 channel transmitter LT E2 KS ... (two buttons): Functions - On/Off/Dimming (with LT ER 1 / LT ERM 1 receiver). A second receiver with the respective LED strips, also with the ON/Off/Dimming functions can be controlled via the second switch.

The **LT E7 KS ...** seven channel transmitter can be used for both the single-colour (white) LED strips, for the LED strips to control the colour temperature and the coloured LED strips..

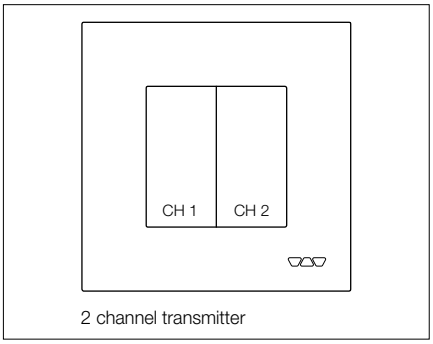
Functions of the 7 channel transmitter with fixed colour temperature (with LT ER 1 / LT ERM 1 receiver): On/Off/Dimming, with 4 dimming levels.

Functions of the 7 channel transmitter with white LED strips with adjustable colour temperature (with LT ER 2 / LT ERM 2 receiver): On/Off/Dimming, with 4 dimming levels.

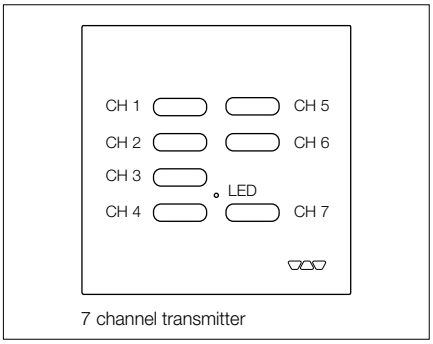
Functions of the 7 channel transmitter with coloured LED strips (with LT ER 3 / LT ERM 3 receiver):
On/Off/Dimming, with 8 dimming levels – each of the 8 colours (factory setting) can be programmed individually anew with one preferred colour.
Automatic colour transition of the 8 colours with a 3 fold speed control.
Four of the seven channel buttons can have colour scenarios allocated to them.
The four scenarios have been combined with select colours and a slow colour transition to create a feeling of well-being and relaxation in the viewer.
The exact colour application and/or combination of scenarios can be found in the operating manual of the receiver.



1 channel transmitter



2 channel transmitter



7 channel transmitter

Dimensions - Transmitter (L x W x H)	
LT E1 KS ...	87 mm x 87 mm x 10 mm
LT E2 KS ...	87 mm x 87 mm x 10 mm
LT E7 KS ...	87 mm x 87 mm x 10 mm

Transmitter installation

Variant 1: Installation with double-sided adhesive pad
The installation uses the supplied double-sided adhesive pad. Remove the release paper on one side, and place the adhesive pad on the backside of the transmitter (Fig. 1). Now remove the remaining release paper from the back of the adhesive pad and attach the transmitter to the designated, load-bearing installation surface (e.g. wall, furniture) with light pressure. Protect the transmitter from moisture and position it outside of protection zones 0, 1 and 2 in bathrooms.

The substrate must be free of substances that may weaken the bond, such as grease, oil, silicone, dust, and dirt. No subsequent correction of the transmitter position and alignment is possible. Transmitters attached with the double-sided adhesive pad reach their maximum adhesive bond after 24 hours. Application temperature must be at least +10 °C.


Fig. 1

Variant 2: Installation with screws
To remove the cover, insert a screwdriver with a width of 5-6 mm into the designated openings on the underside of the transmitter. The cover can be removed with a slight twist of the screwdriver (Fig. 2).

The transmitter can then be screwed into the labelled recesses (Fig. 3). The number and type of bolts and plugs depend on the respective substrate. Depending on the recesses used, the alignment of the transmitter can be minimally corrected after installation.


Fig. 2

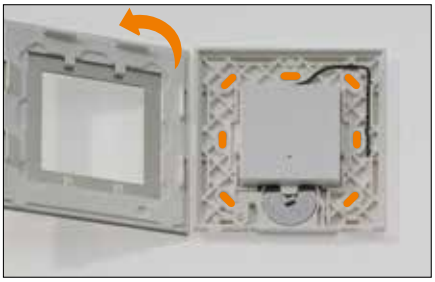


Fig. 3

Transmitter battery exchange

Always keep batteries out of the reach of children. Immediately seek medical assistance if a battery is swallowed. Only use batteries of type CR 2430. Batteries must always be packed for storage or disposal. Otherwise, they may discharge in contact with metal parts, ignite, or be damaged.

1. Open the cover as shown in Fig. 4.
2. Insert the battery in exactly the same way as the old battery, **ensuring proper polarity (+/-)!**


Fig. 4

Proper disposal of batteries

The disposal of empty or damaged batteries always must comply with the applicable laws. In case of doubt, please contact the competent environmental authority or waste disposal offices. Never dispose of batteries in the household waste.

Selection of Transmitter Depending on the Type of Illumination

LED Strips (all LED strips can be dimmed)			Transmitter 87 x 87 x 10 mm (L x W x H)			For combination with **receiver**:
			1 channel transmitter LIPROTEC-E1 KS...	**2 channel transmitter** LIPROTEC-E2 KS...	**7 channel transmitter** LIPROTEC-E7 KS...	
	LED strip 3300 K 120 LED/m, 9.6 W/m Width: 12 mm, height: 5 mm	**LT ES 1**	**X**	**X**	**X**	**LT ER 1**
	LED strip 4500 K 120 LED/m, 9.6 W/m Width: 12 mm, height: 5 mm	**LT ES 2**	**X**	**X**	**X**	**LT ER 1**
	LED strip, narrow 3300 K 120 LED/m, 9.6 W/m Width: 8 mm, height: 5 mm	**LT ES 3**	**X**	**X**	**X**	**LT ER 1**
	LED strip, narrow 4500 K 120 LED/m, 9.6 W/m Width: 8 mm, height: 5 mm	**LT ES 4**	**X**	**X**	**X**	**LT ER 1**
	LED strip, lateral illumination 3300 K 120 LED/m, 9.6 W/m Width: 9 mm, height: 3.5 mm	**LT ES 5**	**X**	**X**	**X**	**LT ER 1**
	LED strip, lateral illumination 4500 K 120 LED/m, 9.6 W/m LED strip, Width: 9 mm, height: 3.5 mm	**LT ES 6**	**X**	**X**	**X**	**LT ER 1**
	LED strip adjustable colour temperature 120 LED/m, 14.4 W/m Width: 12 mm, height: 5 mm	**LT ES 7**	**–**	**–**	**X**	**LT ER 2**
	LED strip, coloured 84 LED/m, 15 W/m Width: 12 mm, height: 5 mm	**LT ES 8**	**–**	**–**	**X**	**LT ER 3**

1 channel transmitter	LT E1 KS BW	Glass cover white, similar to RAL 9010
	LT E1 KS GS	Glass cover black, similar to RAL 9005
	LT E1 KS EB	Stainless steel cover brushed, V4A
2 channel transmitter	LT E2 KS BW	Glass cover white, similar to RAL 9010
	LT E2 KS GS	Glass cover black, similar to RAL 9005
	LT E2 KS EB	Stainless steel cover brushed, V4A
7 channel transmitter	LT E7 KS BW	Glass cover white, similar to RAL 9010
	LT E7 KS GS	Glass cover black, similar to RAL 9005
	LT E7 KS EB	Stainless steel cover brushed, V4A

See also transmitter and receiver operating instructions.

Programming instructions for LT ER 1 / LT ERM 1

Basic programming

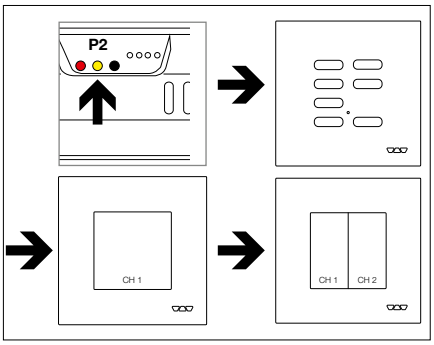
Saving of single channels - with on/off/dimming function

With saving via this method, each single channel of the transmitter is saved with the dimming function. Short pulses switch the light on or off. Long pulses dim or brighten.

a) Press the P2 button twice, and press and hold with the second press. The device acknowledges each press with a tone and then changes to a continuous tone.

b) Continue to press and hold the P2 button, and press the channel to be programmed during the continuous tone. Successful saving is indicated by rapid tones.

CH 1 to CH 7 can be assigned.



Saving of 7-channel transmitter

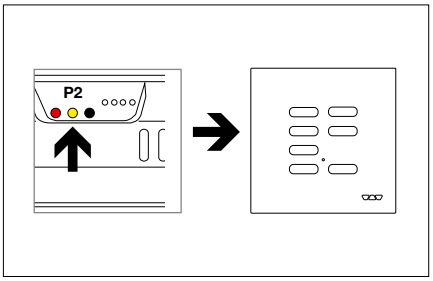
All 7 channels are programmed at once.

You can program 4 light intensities for channels CH 1 - CH 4.

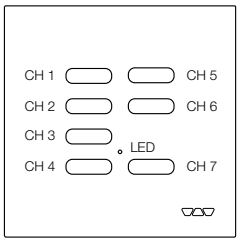
a) Press the P2 button once on the receiver and then keep it pressed. Buzzing is heard, becoming a continuous tone.

b) Continue to press and hold the P2 button, and press the CH 1 channel on the transmitter to be taught in during the continuous tone. Successful saving is indicated by rapid tones.

All other transmitter channels are automatically saved.



Lighting intensity 100 %
Lighting intensity 75 %
Lighting intensity 50 %
Lighting intensity min.



Dimming +
Dimming -

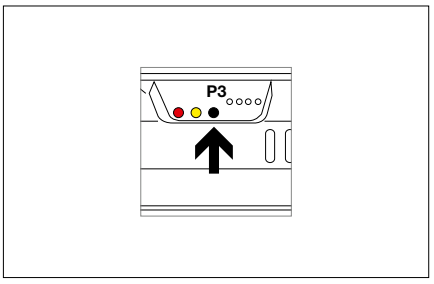
switches the light off

In the event of a malfunction, restore the default settings as described in the section below, and repeat the programming.

Deleting all channels and all transmitters: “Transmitter factory state”

a) Press the P3 button twice, and press and hold with the second press. The device acknowledges each press with a tone and then changes to a rapid interrupted tone.

b) Continue to press the P3 button. After 10 seconds the buzzer emits a continuous tone, indicating that the memory has been completely deleted.



Further programming options can be found in the respective section of the installation guide for the receiver.

Programming instructions for LT ER 2 / LT ERM 2

Saving of 7-channel transmitters with on/off/dimming function and modification of colour temperature

All 7 channels are programmed simultaneously.

a) Press the P2 button once on the receiver and then keep it pressed. Buzzing is heard, becoming a continuous tone.

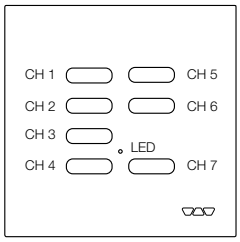
b) Continue to press and hold the P2 button, and press the CH 1 channel on the transmitter to be programmed during the continuous tone.Successful saving is indicated by rapid tones.

All other transmitter channels are automatically saved.

Functionality

Buttons of preset colour temperatures:

3900 Kelvin
4400 Kelvin
5400 Kelvin
6000 Kelvin



Dimming +
Dimming -

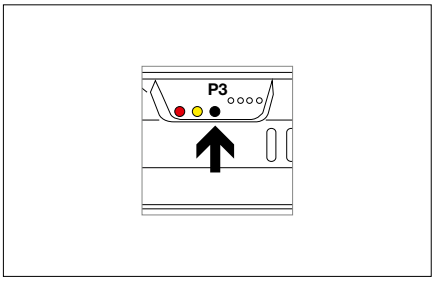
switches the light off

In the event of a malfunction, restore the default settings as described in the section below, and repeat the programming..

Deleting all transmitters

a) Press the P3 button twice, and press and hold with the second press. The device acknowledges each press with a tone and then changes to a rapid interrupted tone.

b) Continue to press the P3 button. After 10 seconds the buzzer emits a continuous tone, indicating that the memory has been completely deleted.



Resetting white tones (colour temperature)

This procedure enables the white tones to be reset to factory settings.

Press the P3 button three times, and press and hold it for 10 seconds with the third press. The light switches on with warm white light, and flashes once after 10 seconds. The light switches off after the button is released.

This procedure does not delete transmitters!

Further programming options can be found in the respective section of the installation guide for the receiver.

Programming instructions for LT ER 3 / LT ERM 3

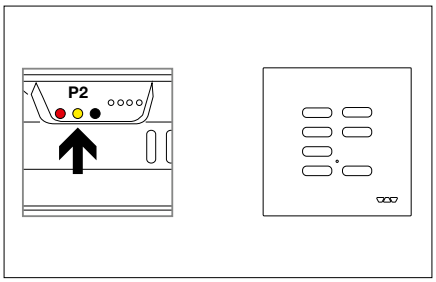
Saving of 7-channel transmitters with on/off/dimming function of colours

All 7 channels are programmed simultaneously.

a) Press the P2 button once on the receiver and then keep it pressed. Buzzing is heard, becoming a continuous tone.

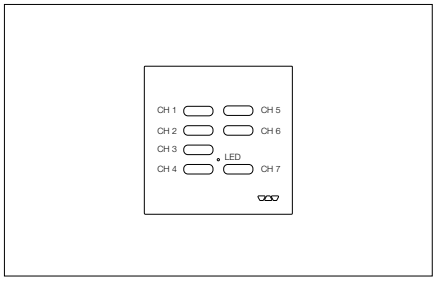
b) Continue to press and hold the P2 button, and press the CH1 channel on the transmitter to be programmed during the continuous tone. Successful saving is indicated by rapid tones.

All other transmitter channels are automatically saved.



Functionality

Buttons of preset colours:	Press **CH 5** for the following colours:
CH 1: orange	CH 1: warm white
CH 2: cyan	CH 2: red
CH 3: bright green	CH 3: green
CH 4: bright magenta	CH 4: blue



Press the CH 5 button again to operate the first 4 colours again. Dim the single light colours by pressing and holding the button.

Press button CH 6 to activate the automatic colour change. Press again to modify the direction. The colour change is controlled via the 8 saved colours. The speed can be modified during the colour change.

CH 1 = 4 sec. change, 1 sec. constant
CH 2 = 16 sec. change, 6 sec. constant
CH 3 = 28 sec. change, 10 sec. constant
CH 4 = stops / starts the movement

To exit colour change, press the off-button CH 7.

In the event of a malfunction, restore the default settings as described in the section below, and repeat the programming..

Deleting all channels and all transmitters: “Transmitter factory state”

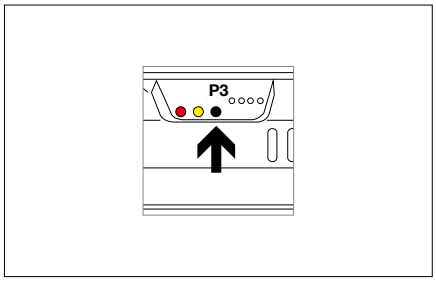
a) Press the P3 button three times, and press and hold with the third press. The device acknowledges each press with a tone and then changes to a rapid interrupted tone.

b) Continue to press the P3 button. After 10 seconds the buzzer emits a continuous tone, indicating that the memory has been completely deleted.

Resetting the colours

This procedure re-establishes factory settings for the colours.

Press the P3 button once and then keep it pressed for 10 seconds. The light switches on with warm white light, and flashes once after 10 seconds. The light switches off after the button is released.



Further programming options can be found in the respective section of the installation guide for the receiver.

Bluetooth control for smartphone/tablet

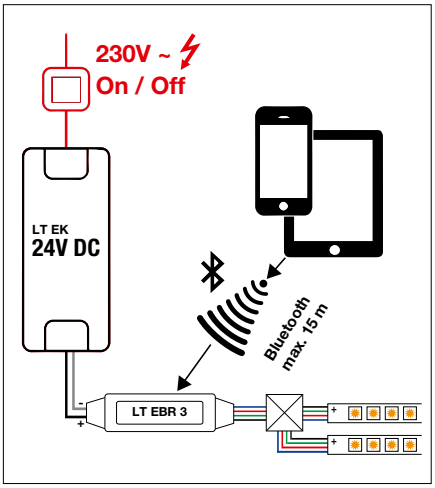
Schlüter®-LIPROTEC-EBR is a Bluetooth receiver for controlling up to 9 metres of RGB LED strips of the LT ES 8 series via Bluetooth-enabled smartphones or tablets. The receiver is operated via the Schlüter®-LED Colour Control app, which is available both for Android and iOS devices and can be downloaded free of charge from the corresponding app stores. Up to two devices can be paired with the receiver at the same time. Some 16.7 million colour shades can be set in conjunction with the RGB LED strip LT ES 8. Up to 16 colours can be saved for quick selection in the app. Some 42 different colour scenes are pre-programmed and can be individually saved at variable speeds.
We recommend the use of an existing light switch to optimize the ease of operation. When the power supply is disconnected (e.g. with an existing light switch), the current colour scene/colour is saved and will again be displayed once the power supply is restored.

To install the LED Colour Control app on a tablet, the search criteria in the store may need to be expanded to include smartphone applications.
Bluetooth® is a global standard that is found in various versions on today's mobile devices. In rare cases, its performance and compatibility may be affected by (future) software adaptations of device manufacturers or cannot be guaranteed. For more information, please refer to the operating instructions of your device. The device is not included in the scope of delivery.

Connecting the LED strips to the Bluetooth receiver

Proper polarity must be ensured. Use the supplied terminals Schlüter®-LIPROTEC-ZKL for connecting the Bluetooth receiver to the LED strips. Plug the stripped end of the cable into the cable holder. The stripped cable length is 9 mm. Check that the cable is firmly held in place.

The coloured LED strip LT ERS 8 has four connection wires analog to the Bluetooth receiver with the following colour codes:
R = red, **G** = green, **B** = blue, **+** = black.
The LED strips LT ES 8 (RGB) are connected with the terminals Schlüter®-LIPROTEC-ZKL, based on the colour coding.



If more LED strips are to be connected than the terminals Schlüter®-LIPROTEC-ZKL 3A allow, additional junction boxes must be installed. A maximum total load of 2 amperes per connection (with 24 V = 48 W) must be observed. The total load of 144 watts must not be exceeded for a Bluetooth receiver.
The presumed wattage of 15.0 W/m is divided in equal parts on the coloured connectors (R, G, B). The result is a consumption of 5,0 W/m at the outputs R, G, B. The + output must be able to absorb the entire 15.0 watts/m of LED. The Schlüter®-LIPROTEC is limited via the 150 watt power supply. With consideration for the safety factor of 0.9, this equals a maximum load of 135 watts for the Bluetooth receiver

Connecting the receiver to the power supply

The power supply must be wired to the designated connection. The cable ends of the Bluetooth receiver can be directly connected to the power supply.

The maximum cable length between the power supply unit and the receiver is 2 m. Supply voltage = 24 volts.

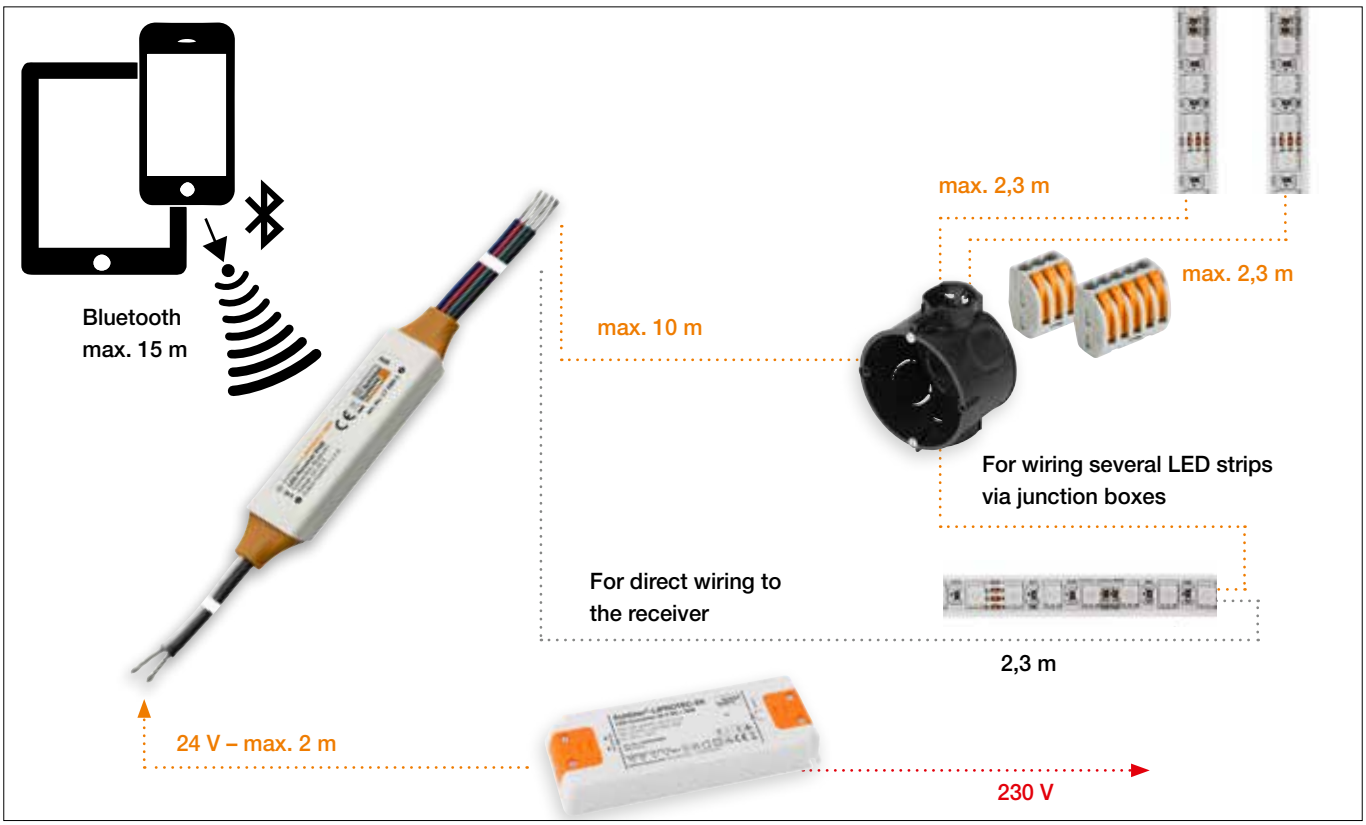
Cable routing: black +
white –

We recommend the use of an existing light switch to optimize the ease of operation.

Technical data

LT EBR 3	
Receiver frequency:	2,402 to 2,480 GHz
Input voltage:	24 V
Connection:	Bluetooth
Range of Bluetooth connection:	Max. 15 m
Max. permissible ambient temperature in operation:	-20 °C to +60 °C
Total load per output:	2 A = 48 W
Max. total load at 3 outputs:	144 W
Max. total load in the LIPROTEC system:	135 W
Max. LED strip length in the master-slave system:	9 m
PWM:	1000 Hz
Protection rating:	IP63
Dimensions (L x W x H):	87 x 21 x 8,5 mm
Connection cable (input)	300 mm, 2 x 1,31 mm² (AWG 16)
Connection cable (output)	300 mm, 4 x 0,82 mm² (AWG 18)

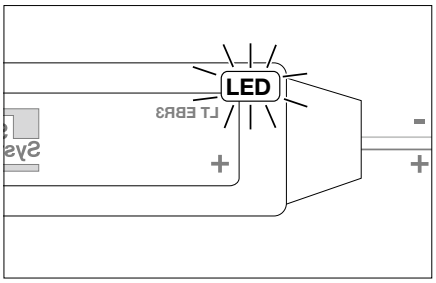
Connection example



Bluetooth connection

The receiver establishes the connection to the smartphone or tablet via Bluetooth. Before the receiver can be operated by the Schlüter app, the devices must be paired up. For this reason, the receiver is in connection mode during the first 90 seconds after switching on the power supply, which is indicated by fast blue/yellow flashing of the status LED. During this time, the receiver is detected as a device “LED-xxx” (where “xxx” stands for an individual device number) by a Bluetooth-enabled smartphone or tablet and a connection is established. Smartphones and tablets that have not yet been paired with the receiver can only find the receiver in the first 90 seconds.

In the event of overload, short-circuit or overheating, the output is disabled and the fault is indicated by the status LED



Re-establishing the connection

After disconnecting (e.g. leaving the reception area, deactivating the Bluetooth module in the smartphone/tablet or operating the existing light switch), the Bluetooth connection has to be manually re-established. If the devices are already linked, the connection can be re-activated by selecting the Bluetooth receiver “LED-xxx” in the smartphone or tablet. The receiver can only establish one active connection to an device. If a connection is to be made to another device, the existing connection must first be disconnected (max. two devices can be paired with a recipient).

Schlüter®-LED-Colour-Control

Status display

The Bluetooth receiver has a status LED on the backside to indicate various operating states.

- Rapid flashing, blue: Start-up
- Rapid flashing, blue/yellow: Device is waiting for connection
- Blue with short flashes in yellow: Connection established
- Solid light, blue: No Bluetooth connection-
- Flashing, red: overload protection
- Flashing, yellow: overheating protection
- Flashing, white: Data reception

Short description

- Bluetooth operation via Schlüter app for Android and IOS devices
- Download app from http://app.schlueter.de
- Multiple receivers separately controllable with one device
- Max. two end-user terminals can be paired with a receiver
- Only one active connection
- 16.7 million adjustable colours
- 16 colours can be saved
- All colours are dimmable
- Automatically changing colour scene
- Adjustable time settings for scenes
- 42 different colour scenes can be selected

Radio interference suppression

The following points should be noted during professional cable installation for effective radio interference suppression and maximum operating safety:

- The power supply / power supply units should be mounted at a distance of at least 30 cm from the aluminium profiles containing LEDs. Minimum clearances to adjacent construction elements must be observed.
- Output lines must be professionally installed at the corresponding distance from grounded metal surfaces (reduces electrostatic coupling).
- The distance between the power cable and the output line should be as large as possible (at least 5 cm - avoids the decoupling of interference between power and light lines), and power cables and LED module cables should not be installed in parallel under any circumstances.

Crossing power lines and LED modules should generally be avoided. If crossing cannot be avoided, such crossings should be at right angles if at all technically feasible and safe (avoidance of RF interference on the power supply cables).

Positioning of the Bluetooth receiver

In bathrooms, the receiver must be located outside of protection zones 0, 1 and 2. The Bluetooth receiver can be connected directly to the 24 V output of the power supply. Care must be taken to provide sufficient ventilation. If the receiver is kept in an enclosure, the function of the Bluetooth connection to the mobile device must be tested (see also operating instructions of the receiver).

Protection zones in the bathroom

Bathrooms are categorized as wet zones. Certain protective measures therefore have to be observed for lighting design. These are specified in DIN VDE 0100-701 for bathrooms. This standard distinguishes three different protection zones:

Zone 0
Includes the interior of the bathtub or shower tray.

Zone 1
Is defined by the vertical areas around the bathtub or shower tray or - if there is no shower tray - by the vertical areas in a distance of 120 centimetres around the shower head in its resting position (for example at a guide rod). If a fixed separation is installed, the radius is defined as 120 cm around the fixed water outlet. In both cases, the limitation applies from the finished floor up to a height of 225 cm. If the shower head or the water outlet is above the horizontal line of 225 cm, this height serves as the limit. The hollow space behind a tub surround also belongs to Zone 1.

Example: Division of protection zones in bathrooms based on DIN VDE 0100-701

Zone 2
adjoins Zone 1 at a depth of 60 cm.
In Zones 1 and 2, lights must at least correspond to protection class IPX4 (protection against water spraying from all directions). If there are any water jets, for example massage jets, the lights must comply with protection class IPX5 (protection against water jets from all directions).
The Schlüter®-LIPROTEC LED strips have the protection rating IP65 and may therefore be installed in Zones 1 and 2. Power sources (for example, power supply units) must be positioned outside of Zones 1 and 2.

No special IP protection is needed outside of Zones 0, 1 and 2 unless they are cleaned with direct water jets

Note
The Schlüter®-LIPROTEC system including wiring is designed for installation in wall or ceiling areas. It is not approved for installation in Zone 0 and in the floor. Country-specific discrepancies may have to be taken into account.

Effect of bathroom protection zones on the LIPROTEC system

- Power supply units, receivers, transmitters (button) must be positioned outside the protection zones 0, 1 and 2.
- The LIPROTEC LED strips may lead through zone 1.
- The LIPROTEC profiles must be positioned in such a way that no water can accumulate in their interior or that water ingress can fully drain (vertical position).
- The use of the LIPROTEC system is not permissible in bathroom floor areas.

Use of Schlüter®-LIPROTEC profiles in wet zones with direct water exposure (e.g. in showers).

The LED strips of our Schlüter®-LIPROTEC-ES series have the protection rating IP65 (protected against water spray from all directions) and can therefore withstand temporary exposure to water (spray nozzles). The following profiles and diffusers of the Schlüter®-LIPROTEC series are suitable for use in wet zones (e.g. in showers):

Attachment profiles	Diffuser
LT WS 20 AE	LT WS I 20
LT WS 20Q 110 AE	LT WS I 20
WS 20 K1 AAE	LT WS I 20
DB Q1 AE/AEEB	LT FSS 39
LT LL 2017 AE	LT WS I 20

The use of LED strips of the series Schlüter®-LIPROTEC-ES series is not permitted in sauna areas. However, Schlüter®-LIPROTEC-ES may be installed in resting areas and in the pool area without direct water exposure with temperatures below 40 °C.

Installation note

LIPROTEC profiles in wet zones must be positioned in such a way that no water can accumulate in their interior or that water ingress can fully drain (vertical position only!). For this purpose, the diffuser must be approx. 2 mm shorter than the attachment profile at the bottom; the resulting gap may not be closed. Apply the seaming tape Schlüter®-KERDI-KEBA, using the sealant adhesive Schlüter®-KERDI-COLL-L, to waterproof Schlüter®-KERDI-BOARD (see also product data sheet 8.1, Schlüter®-KERDI, as well as product data sheet 8.4, Schlüter®-KERDI-COLL-L). Cable conduits through the waterproofing layer must have waterproof sealing. Junction boxes must be placed behind the waterproofing layer or outside of the wet zones.

Cabling Accessories

When laying the cables, a differentiation is made between installation under plaster or installation in cavities. Both systems can be cabled with a standard ductwork system. In addition, there is the possibility to create a second wall level with the Schlüter®-KERDI-BOARD system. The cable layout can be organised with the help of the installation-friendly Schlüter®-KERDI-BOARD-K module with the pre-fab receptacle groove.

Connection sets

The practical connection sets Schlüter®-LIPROTEC-ZS are designed for the simple and safe connection of Schlüter®-LIPROTEC installations to the appropriate power supply units and / or receivers.

Contents:
- 1 x cable (800 cm), 2 x 1.31 mm² (AWG16)
- 1 x cavity wall connection socket with cover
- 1 x recessed connection socket with cover
- 2 x Wago terminals, 32 A, 5 wires

Schlüter®-LIPROTEC-ZS	
connection set, 2-core	
P = Set	**Art.-No.**
10	LT ZS 2A

Connection set for LED strip LT ES 1 – LT ES 6, and for power supply unit and receiver connection.

Contents:
- 800 cm cable, 3 x 1.31 mm² (AWG16)
- 1 x cavity wall connection socket with cover
- 1 x recessed connection socket with cover
- 3 Wago terminals, 32 A, 3 wires

Schlüter®-LIPROTEC-ZS	
connection set, 3-core	
P = Set	**Art.-No.**
10	LT ZS 3A

Connection set for LED strip LT ES 7.

Contents:
- 800 cm cable, 4 x 1.31 mm² (AWG16)
- 1 x cavity wall connection socket with cover
- 1 x recessed connection socket with cover
- 4 Wago terminals, 32 A, 3 wires

Schlüter®-LIPROTEC-ZS	
connection set, 4-core	
P = Set	**Art.-No.**
10	LT ZS 4A

Connection set for LED strip LT ES 8.

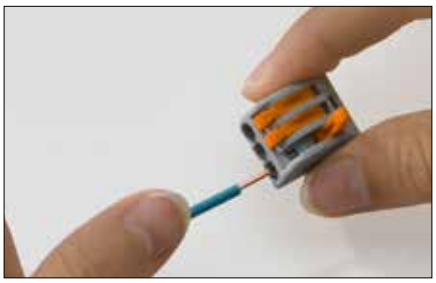
Terminals

The terminal Schlüter®-LIPROTEC-ZKL is available in a 3-wire and 5-wire version and enables fast and secure connection. The installation requires no tools and is therefore particularly easy. The wires in a terminal are connected to each other. The 3- and 5-wire terminals connect stranded conductors from 0.14 to 4 mm². Rated up to 32 A/450 V, as well as for a high continuous use temperature of up to 105°C, the terminals are suitable for 24 V low voltage and 230 V supply voltage. ENEC or UL certifications enable worldwide use.

	LT ZKL 3A	LT ZKL 5A
Number of conductors	3 wires	5 wires
Rated current	32 A	
Rated voltage	450 V	
Continuous use temperature	Max. 105 °C	
conductor cross-section	Max. 0.08 - 4 mm², finely stranded	
	Max. 0.08 - 2.5 mm² solid and stranded	

Application

Stripping length
Strip conductor by 9 mm



Connect
terminal by opening the actuating lever and introducing the conductor

… then return the lever to its normal position

Low voltage cable

The low-voltage cable **Schlüter®-LIPROTEC-ZK** is available in 2-, 3- and 4-wire versions with the respective colour codes and is particularly suitable for connecting the LED strips Schlüter® LIPROTEC-ES. We recommend the use of Schlüter®-LIPROTEC-ZKL terminals for connection. The maximum cable lengths for the LIPROTEC system must be observed.

Length 25 m roll	LT ZK 2A 10 25M	LT ZK 3A 10 25M	LT ZK 4A 10 25M
Length 50 m roll	LT ZK 2A 10 50M	LT ZK 3A 10 50M	LT ZK 4A 10 50M
Cable cross-section	1,31 mm² (AWG 16)	1,31 mm² (AWG 16)	1,31 mm² (AWG 16)
Cable designation	white – black +	white - (neutral white) yellow - (warm white) black +	reg - (R) green - (G) blue - (B) black +

Schlüter®-LIPROTEC-ZK
Low voltage cable, 2 x 1,31 mm² (AWG 16)

Cable for LED strips LT ES 1 - LT ES 6 and for connecting power supply and receiver.

Schlüter®-LIPROTEC-ZK
Low voltage cable, 3 x 1,31 mm² (AWG 16)

Cable for LED strip LT ES 7.

Schlüter®-LIPROTEC-ZK
Low voltage cable, 4 x 1,31 mm² (AWG 16)

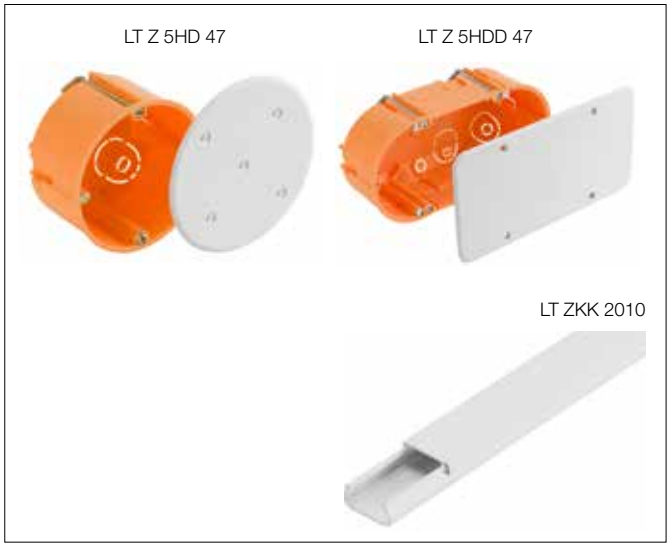
Cable for LED strip LT ES 8.

Accessories

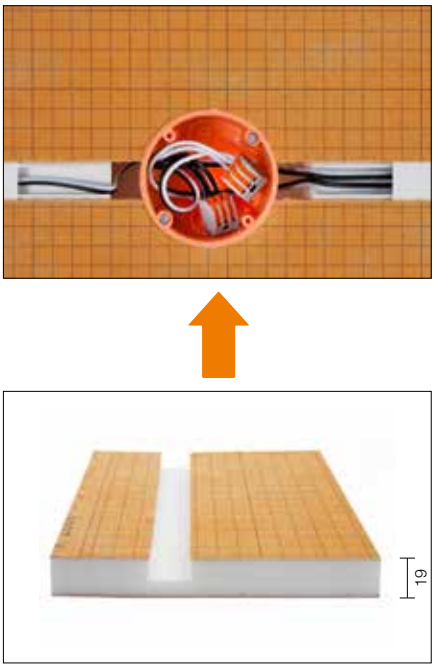
Schlüter®-DESIGNBASE-HVL 38
Self-adhesive fleece, B = 38 mm

Schlüter®-DESIGNBASE-HVL 75
Self-adhesive fleece, B = 75 mm

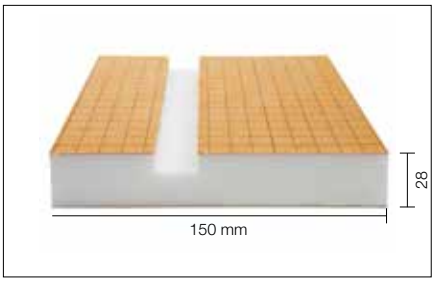
For installation under plaster



For installation in cavities



KB 19 150 2500 K1

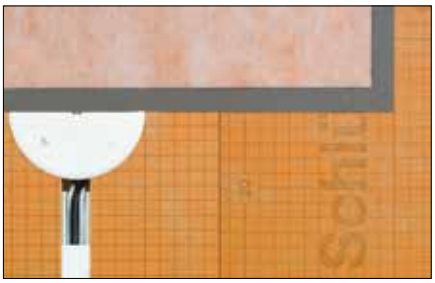


KB 28 150 2500 K1

The installation module **Schlüter®-KERDI-BOARD-K**, with thicknesses of 19 mm and 28 mm with cable groove offers the option to accept the LT ZKK 2010 cable channel. The cable channel is furnished with a separate cover. This makes it possible to run the cables from the front. The cables must not be inserted from the respective ends.
The cover of the cable channel is drilled in at the locations and the cable can be pulled into the cable channel. After the cable channel is closed it must be covered with the self-adhesive **Schlüter®-DESIGNBASE-HVL** anchoring fleece. Should sealing be required, then the **Schlüter®-KERDI-KEBA** sealing band can be used with the **Schlüter®-KERDI-COLL-L** sealing adhesive.
Installation recommendation:
A sufficient amount of **Schlüter®-KERD-FIX** must be filled into the groove. Remove the cover from the cable channel. The cable channel must be pressed into the groove. Make sure that none of the Schlüter®-KERDI-FIX oozes out at the front.

The installation module Schlüter®-KERDI-BOARD-K can also be used for self-made curtain walls or claddings. A construction module can be created in H-Form for this that is variable in its depth. The cavity thus crated can accept cables and the control technology. The minimum distances of the electronic components to the adjoining components must be complied with.
A 19 mm thick Schlüter®-KERDI-BOARD can be put between two Schlüter®-KERDI-BOARD-K modules.

Installation recommendation:
A sufficient amount of Schlüter®-KERDI-FIX [installation adhesive] must be filled into the groove. Then press the 19 mm thick Schlüter®-KERDI-BOARD into the groove. The excess adhesive does not have to be removed. The element thus created can be processed further only after a sufficient drying time; see also Product Data Sheet 12.1 Schlüter®-KERDI-BOARD.



Sealing of the Cable Channels and Junction Boxes

For use in moisture-rich rooms we recommend that the Schlüter®-LIPROTEC-ZK junction box be protected from the effects of moisture with the Schlüter®-KERDI-KEBA sealing band. The Schlüter®-LIPROTEC-Z junction boxes are protected in accordance with IP2X (protection against solid objects > Ø 12 mm). By applying the Schlüter®-KERDI-KEBA sealing band together with the sealing adhesive Schlüter®-KERDI-COLL-L, the junction box or the cable channel (up to 24 V) behind there will be protected in accordance with IP65.
The sealing band Schlüter®-KERDI-KEBA with the use of the sealing adhesive Schlüter®-KERDI-COLL-L has been examined and authorised in accordance with DIN EN 60529 as being a sealing level that is in conformance with IP65; see also Product Data Sheet 8.1 Schlüter®-KERDI and Product Data Sheet 8.4 Schlüter®-KERDI-COLL-L.

IP65

Recommendations regarding tools

We recommend that special tools be used when working with Schlüter®-LIPROTEC materials:
To strip the cable ends, use cable stripper pliers (Fig. 1).
Stripping the cable ends with pliers or a cutter is not allowed, since the cable diameter could be diminished accidentally.

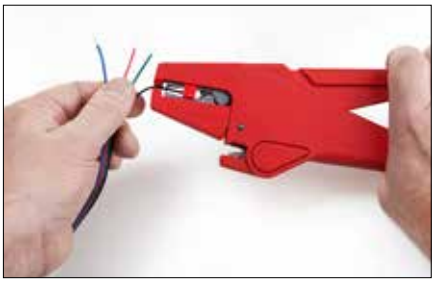


Fig. 1

The exterior corners of the profiles should be mitre-cut to enable continuous lighting without interruptions. We recommend the use of a mitre saw with adjustable speed and suitable saw blade. The saw blade should be suitable for cutting aluminium and PMMA plastic materials. The cut should be so clean that no deburring is necessary (Fig. 2).

Fig. 2

You will find recommendations regarding the installation of the profiles in the installation instructions of the respective profiles.

Schlüter®-LIPROTEC sets

Schlüter®-LIPROTEC-WSK set

The **Schlüter®-LIPROTEC-WSK** set includes a high-quality wall panel profile with integrated cable duct and indirect diffuser. It allows for the attachment of ceramic wall coverings and decorative materials (e.g. mirrors). In combination with the accessories set Schlüter®-LIPROTEC-WSK, this results in an attractively backlit wall panel.
The accessories set, together with the profile set, makes it easy to install a pre-fabricated wall panel. Individual components such as the KERDI-BOARD installation substrate are connected with the profile set with adhesive methods and plug-in mechanisms. The power supply, the LED strips in the selection of the desired light colour, and the supplied connection set simplify the installation of an illuminated wall panel. The sets are particularly suitable for the following installation situations:

- On-wall element with indirect lighting, with light distribution over an untiled wall
- On-wall elements with indirect lighting , with light distribution over adjacent ceramic tiles
- Cove lighting as an on-wall structure with indirect light effect for the ceiling
- Backlighting of decorative elements (e.g. mirrors)
- On-wall element with indirect lighting for use in a shower (Schlüter®-LIPROTEC-WSK set 700 or 1200A - vertical mounting only) –
- Ceiling sail with indirect lighting and gypsum board/fibre panel covering

Bilaterally backlit wall panel

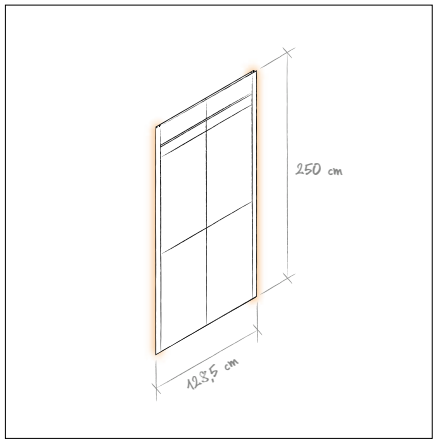
Schlüter®-LIPROTEC-WSK sets for bilaterally backlit wall panels are available in various versions. A bilaterally backlit wall panel can be created by combining the profile set in 250 cm length and the accessories set. You can choose between an assembly width of 70 cm or 128.5 cm. Both sets can be cut to size in length and width.

Fully backlit wall panel

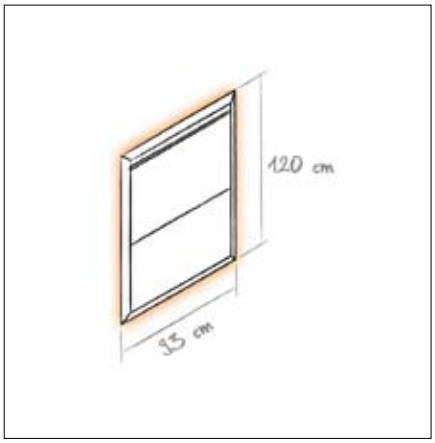
A profile set and accessories set in the dimensions 120 x 93 cm are available to create a fully backlit wall panel. The desired light type is determined by the selection of the accessories set.

Lighting type

Accessories set WSK 700
250 cm x 70 cm



Accessories set WSK 1285
250 cm x 128,5 cm



Accessories set WSK 1200A
120 cm x 93 cm

Lighting type			Accessories set WSK 700 250 cm x 70 cm	Accessories set WSK 1285 250 cm x 128,5 cm	Accessories set WSK 1200A 120 cm x 93 cm
	Warm white	**LT ES 1**	WS 20 ZS2 LT ES1	WS 20 ZS3 LT ES1	WS 20 ZS1 LT ES1
	Neutral white	**LT ES 2**	WS 20 ZS2 LT ES2	WS 20 ZS3 LT ES2	WS 20 ZS1 LT ES2
	RGB	**LT ES 8**	WS 20 ZS2 LT ES8	WS 20 ZS3 LT ES8	WS 20 ZS1 LT ES8
			+	+	+
Profile set			WS 20 K1 S2 AE	WS 20 K1 S2 AE	WS 20 K1 S1 AE

LED control systems

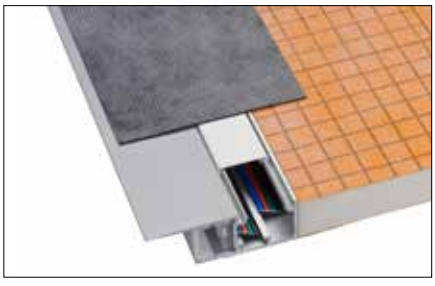
The Schlüter®-LIPROTEC sets can be combined with the following LED control systems (see also page 37):

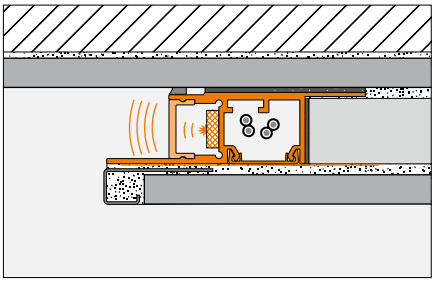
Function	LED strips	Recommended control	Alternative control	Note
On/off + dimming	LT ES 1 – LT ES 2 (white)	LT ER 1 + LT E1 KS ... Receiver + transmitter	–	–
On/off without dimming	LT ES 1 – LT ES 2 (white)	–	Existing light switch	Existing light switch to be installed by qualified electricians only (230 V)
On/off + dimming + colour selection + scene selection	LT ES 8	LT ER 3 + LT E7 KS ... Receiver + transmitter	LT EBR 3 Bluetooth receiver	For the use of the Bluetooth receiver, we recommend the use of an existing light switch

The table describes the control options for a light system or set.

Installation of Schlüter®-LIPROTEC-WSK sets

1. **Wall panel installation**
   The supplied Schlüter®-KERDI-BOARD is adhered to the wall depending on the existing substrate. After a sufficient curing time, the Schlüter®-LIPROTEC-WSK profiles are adhered to the edge of the panel, using Schlüter®-KERDI-FIX. For further information on the application of the installation substrate Schlüter®-KERDI BOARD, please refer to product data sheet 12.1.
2. **Connecting the LED strips**
   The LED strips are installed with the double-sided adhesive tape on the backside. The substrate must be free of substances that may weaken the bond, such as grease, oil, silicone, dust, and dirt. Adhere the LED strips to the wall panel profile as shown. The LED strips can be replaced if necessary.
   - To allow for a subsequent replacement of the LED strips plan on keeping a spare cable loop when installing the cable.
   - The LED strips are already cut to the dimensions of the set. If additional cutting of the LED strips is required, make the cuts at the marked points. Adhere the supplied end cap to the open cutting edge (see also installation guide “LED strips”).
   - Observe the correct allocation of the wires when installing the cables! The polarity must not be changed.
   - LED strips may not be damaged or extended during assembly.
   - Mechanical stresses of the LED strip are to be avoided.
   - The LED strips with rating IP65 are protected against moisture and dust (protection against water jets from all directions). They are lead-free/RoHS compliant.





3. **Cable installation**
   The connecting holes required for cabling are pre-drilled. The cable duct integrated in the profile as well as the cable groove in the installation module Schlüter®-KERDI-BOARD enable the attachment and routing of the cables. Since the cable to the LED strips has a length of 2.3 m, the junction box can be positioned outside of the set module.

   Check the function of the lighting installation prior to closing the junction box!

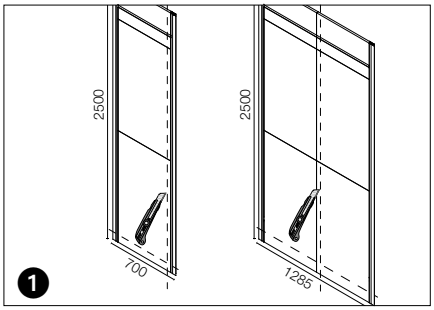
4. **Installation of wall covering/decorative material**
   - Wall covering: Adhere the Schlüter®-DESIGNBASE-HVL 75 adhesive fleece over the covered cable ducts, the junction box, and the anchoring legs of the Schlüter®-LIPROTEC-WSK profile as a bonding bridge for the tile covering. In a next step, the tiles can now be installed in the thin-set method, using a dry-setting mortar that meets the requirements of the covering
   - Decorative materials (e.g. mirrors): Please note the installation guide of the manufacturer for the attachment of special materials!

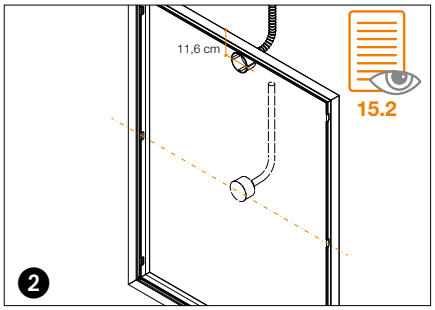
5. **Colour tolerances**
   Colour temperatures may vary -/+ 600 Kelvin from the listed Kelvin values. These colour variations do not mean the item is faulty.

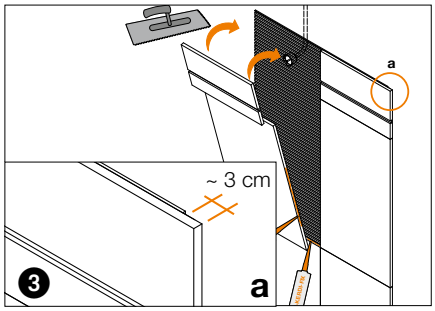
6. **Important notes**
   - The Schlüter®-LIPROTEC-WSK set is exclusively intended for installation in protected indoor areas.
   - Preferably, the LED strips should be controlled with Schlüter system components. Other control systems must be checked for their technical compatibility.
   - The technical data and resulting calculated energy efficiency of the LED strips are partly dependent on ambient conditions during the application. Technical specifications are based on unprocessed LED strips.
   - Exceeding the specified operating voltage results in overloading of the LED strips, reduces their service life, and may lead to their destruction.
   - Please note the temperature data for the LED-strips in their respective installation situation.
   - Power and LED cables must never be laid in parallel; the distance between the output and the power supply line should be as large as possible (> 5 cm).
   - Avoid running power cables too closely to the operating device.
   - When used with direct water exposure, e.g. in shower areas, position the Schlüter®-LIPROTEC-WSK set in such a way that no water can accumulate in the profile interior or that water ingress can fully drain (vertical position only!). The Schlüter®-LIPROTEC-WSK 1200A set is not suitable for use with direct water exposure.

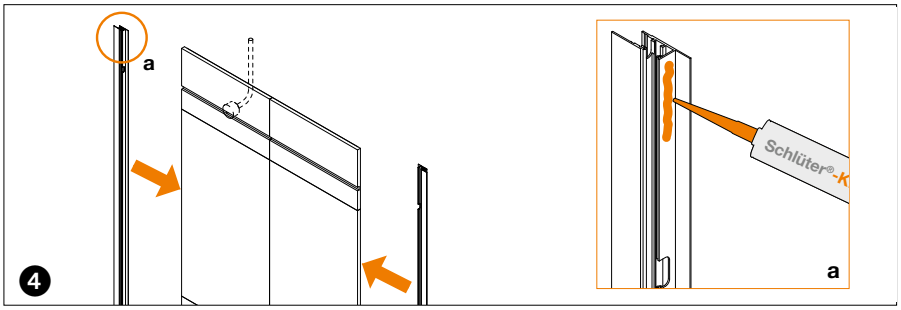
7. **Installation steps**
   The individual installation steps are also listed in the respective installation guide and in product data sheet 15.2 This installation guide shows a sample option for installing the corresponding profile. Other installation situations may occur, depending on the circumstances at the construction site. The following installation recommendation shows only one way to install the LIPROTEC-WSK system.

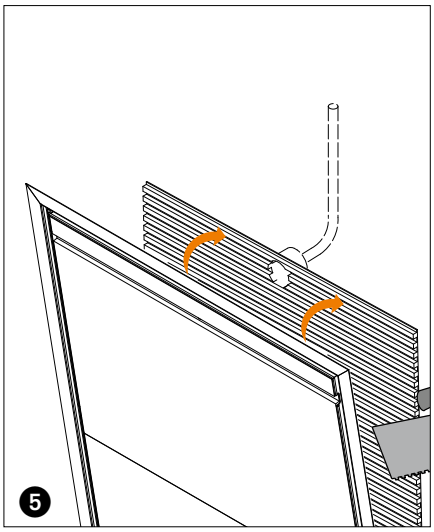
Installation of WSK set 700/1285

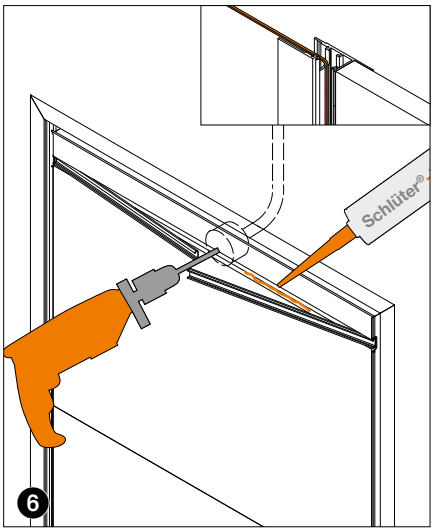


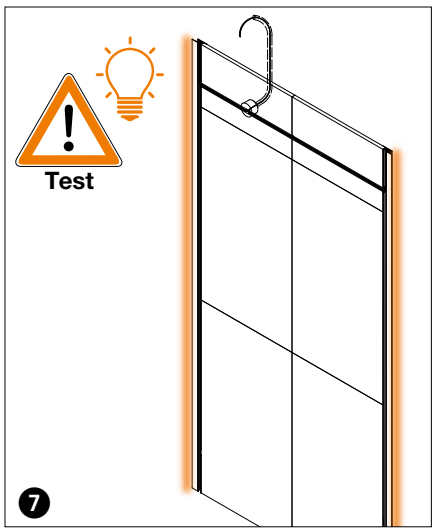


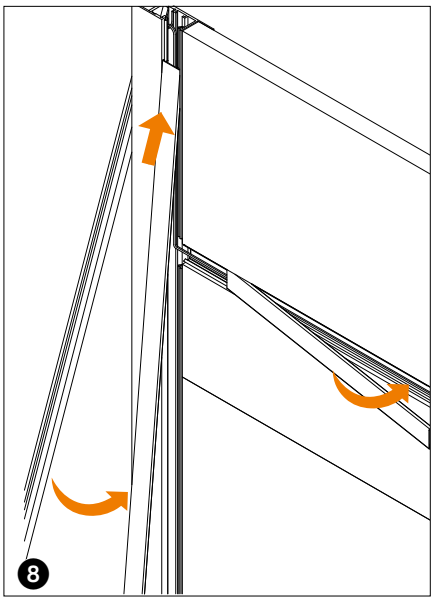


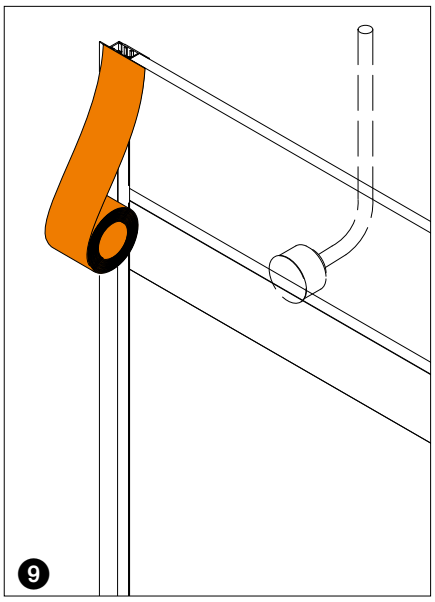


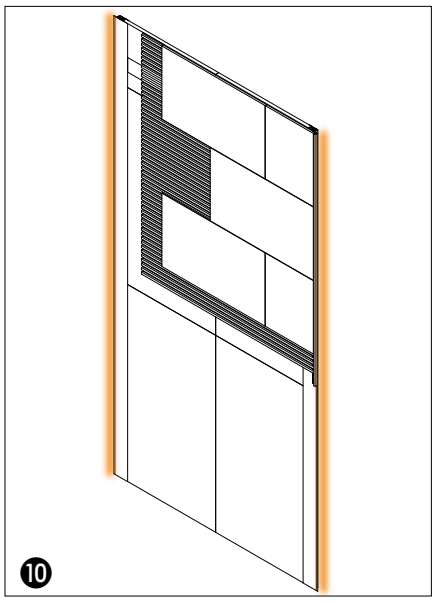




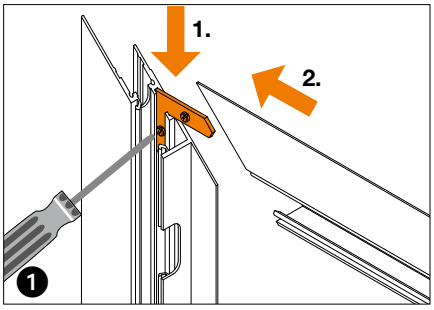


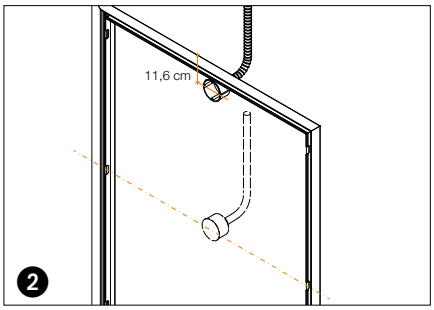


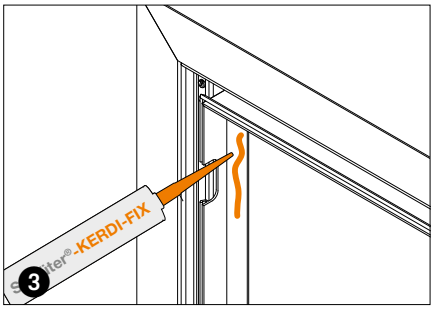


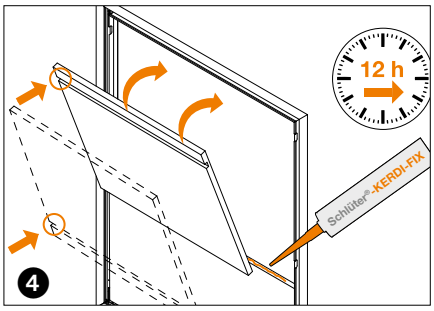


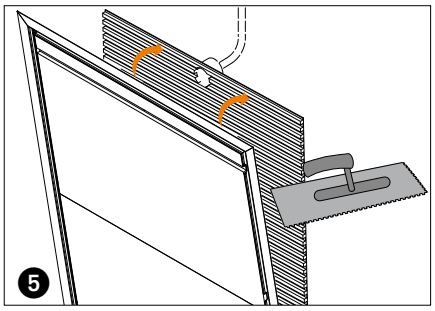
Installation of WSK set 1200A

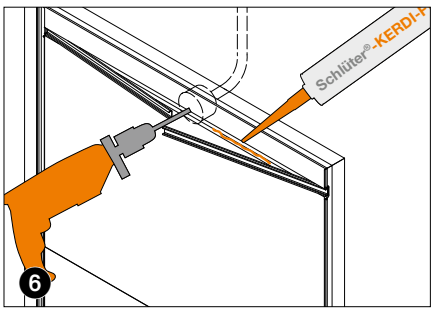


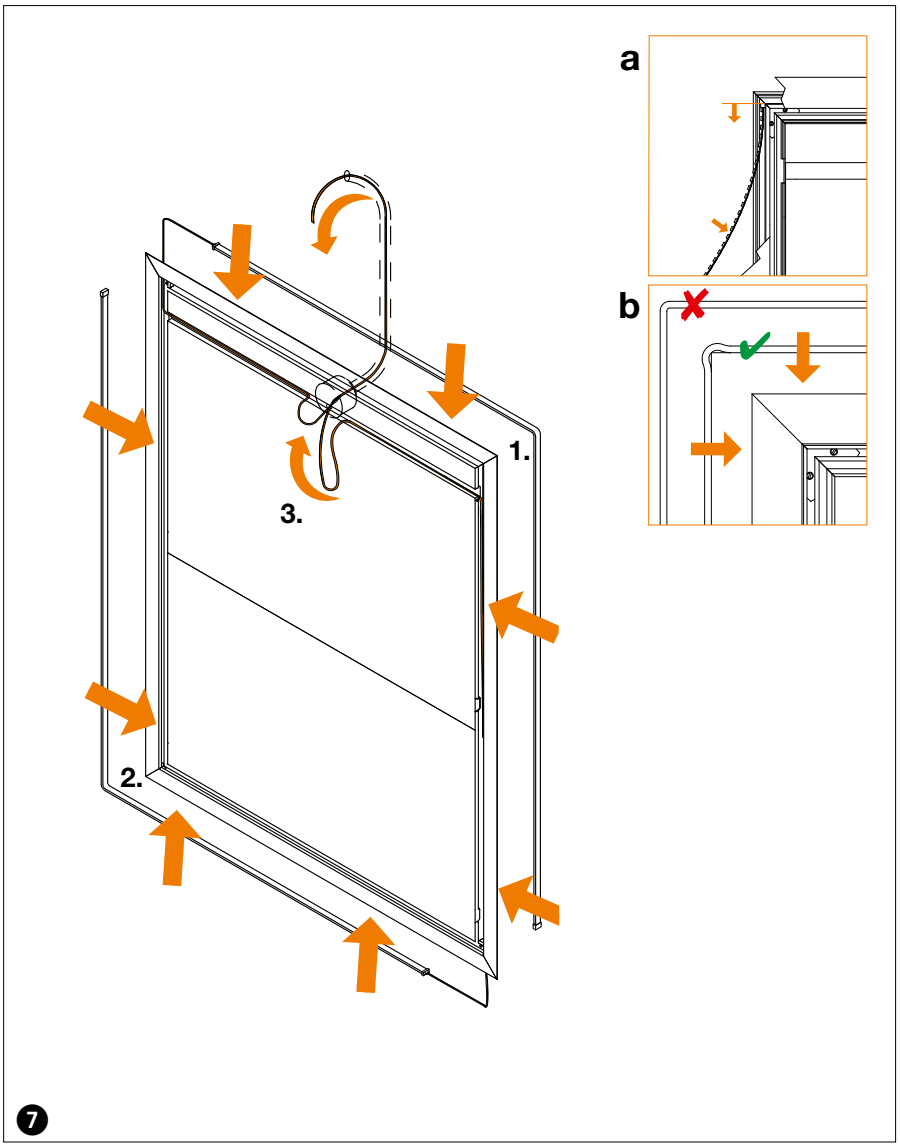


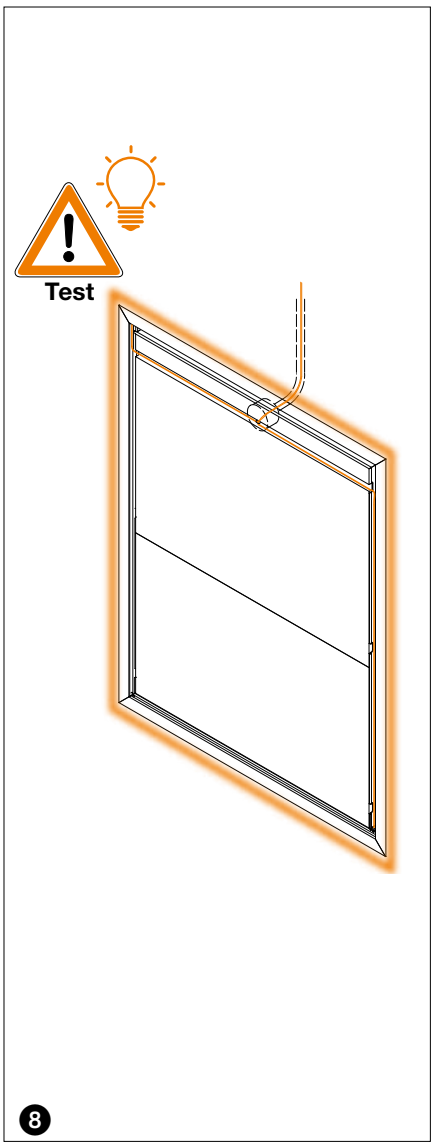












Technical data for Schlüter®-LIPROTEC-WSK sets

Mechanical properties / ambient conditions				Electrical properties			
WS 20 ZS1/ … S2/ … S3	… LT ES 1	… LT ES 2	… LT ES 8	WS 20 ZS1/ ... ZS2/ ... ZS3	… LT ES 1	… LT ES 2	… LT ES 8
LED count per metre	120		84	Input voltage of LED strips	24 V direct current (DC)		
IP protection rating	IP65			Current consumption/ 1.0 m	Min. 300 mA Max 400 mA	Min. 300 mA Max 400 mA	Min. 546 mA Max. 650 mA
Operating temperature (Tp)	-10 °C to +40 °C			Output/ 1.0 m	Min. 7.2 W Max. 9.6 W	Min. 7.2 W Max. 9.6 W	Min. 13.1 W Max. 15.6 W
Storage temperature (Ts)	-10 °C to +40 °C			Dimmable	Yes, 24 V PWM dimmer		

Light technology properties All information refers to condition prior to installation!				Information on energy consumption labelling				
WS 20 ZS1/ … S2/ … S3	… LT ES 1	… LT ES 2	… LT ES 8	WS 20 Z …	… S1 …		... S2 .../… S3 ...	
					… LT ES 1/ … LTES2	… LT ES 8	… LT ES 1/ … LT ES 2	… LT ES 8
Colour temperature	Warm white 3300 K	Neutral white 4500 K	RGB	Energy efficiency class	A	–	A	–
Light current/1.0 m	720 lm		360 lm	Weighted set energy consumption in kWh / 1000	37 kWh	60 kWh	46 kWh	75 kWh
Light yield (white, max.)	75 lm/W		24 lm/W	Input voltage, set	230 V			
Colour rendering index CRI	60							
Rated service life	40000 h		40000 h					

Content of Schlüter®-LIPROTEC-WSK sets

Profile set	Profiles and diffusers
WS 20 K1 S1 AE	**Schlüter®-LIPROTEC-WSK 1200A** 2 profiles Schlüter®-LIPROTEC-WSK, 120 cm x 93 cm, pre-assembled for frame connection (disassembled), with mitre cut and groove for cable installation incl. diffuser Schlüter®-LIPROTEC-WSI incl. corner connector Schlüter®-LIPROTEC-D/V
WS 20 K1 S2 AE	**Schlüter®-LIPROTEC-WSK 700/1285** 2 profiles Schlüter®-LIPROTEC-WSK, length: 250 cm with groove for cable installation incl. diffuser Schlüter®-LIPROTEC-WSI

Accessories set	LED strip	Converter	Installation accessories
WS 20 ZS1 LT ES1	2 strips Schlüter®-LIPROTEC-ES, length 200 cm light colour warm white (3300 K)	Schlüter®-LIPROTEC-EK 24 V, 50 W	**Schlüter®-LIPROTEC-WSK 1200A** • 1 set Schlüter®-KERDI-BOARD, 19 mm, final dimensions: 120 cm x 93 cm, pre-assembled, with groove for one cable channel • 1 adhesive fleece Schlüter®-DESIGNBASE-HVL, width: 7.5 cm, length: 800 cm • 1 Schlüter®-LIPROTEC-ZS 2A/4A (connection set) • 1 Schlüter®-KERDI-FIX, 100 ml, grey • 1 conduit, 200 cm, Ø 20 mm • 1 installation guide
WS 20 ZS1 LT ES2	2 strips Schlüter®-LIPROTEC-ES, length 200 cm light colour neutral white (4500 K)	Schlüter®-LIPROTEC-EK 24 V, 50 W	
WS 20 ZS1 LT ES8	2 strips Schlüter®-LIPROTEC-ES, length 200 cm light colour coloured (RGB)	Schlüter®-LIPROTEC-EK 24 V, 75 W	
WS 20 ZS2 LT ES1	2 strips Schlüter®-LIPROTEC-ES, length 250 cm light colour warm white (3300 K)	Schlüter®-LIPROTEC-EK 24 V, 75 W	**Schlüter®-LIPROTEC-WSK 700** • 1 set Schlüter®-KERDI-BOARD, 19 mm, final dimensions: 250 cm x 70 cm, pre-assembled, with groove for cable channel • 1 adhesive fleece Schlüter®-DESIGNBASE-HVL, width: 7.5 cm, length: 800 cm • 1 Schlüter®-LIPROTEC-ZS 2A/4A (connection set) • 1 Schlüter®-KERDI-FIX, 100 ml, grey • 1 conduit, 200 cm, Ø 20 mm • 1 installation guide
WS 20 ZS2 LT ES2	2 strips Schlüter®-LIPROTEC-ES, length: 250 cm light colour neutral white (4500 K)	Schlüter®-LIPROTEC-EK 24 V, 75 W	
WS 20 ZS2 LT ES8	2 strips Schlüter®-LIPROTEC-ES, length: 250 cm light colour coloured (RGB)	Schlüter®-LIPROTEC-EK 24 V, 100 W	
WS 20 ZS3 LT ES1	2 strips Schlüter®-LIPROTEC-ES, length 250 cm light colour warm white (3300 K)	Schlüter®-LIPROTEC-EK 24 V, 75 W	**Schlüter®-LIPROTEC-WSK 1285** • 1 set Schlüter®-KERDI-BOARD, 19 mm, final dimensions: 250 cm x 128.5 cm, pre-assembled, with groove for cable channel • adhesive fleece Schlüter®-DESIGNBASE-HVL, width: 7.5 cm, length: 800 cm • 1 Schlüter®-LIPROTEC-ZS 2A/4A (connection set) • 1 Schlüter®-KERDI-FIX, 100 ml, grey • 1 conduit, 200 cm, Ø 20 mm • 1 installation guide
WS 20 ZS3 LT ES2	2 strips Schlüter®-LIPROTEC-ES, length: 250 cm light colour neutral white (4500 K)	Schlüter®-LIPROTEC-EK 24 V, 75 W	
WS 20 ZS3 LT ES8	2 strips Schlüter®-LIPROTEC-ES, length: 250 cm light colour coloured (RGB)	Schlüter®-LIPROTEC-EK 24 V, 100 W	

Schlüter®-LIPROTEC-PB 15 Set

Set **Schlüter®-LIPROTEC-PB** is a high-quality stair nosing profile with a visible area of 2.5 cm. It offers the option of illuminating the centre of a staircase (60 cm) with a built-in LED module. The product can be used to create attractive and safe stair lighting in combination with Schlüter®-TREP profiles. The reversible diffuser produces increased downward light radiation while also projecting a reduced line of light toward the front.
The Schlüter®-LIPROTEC-PB set allows for the easy installation of illuminated stairs over several steps. The connection of the individual stair nosing profiles uses a supply line and individual connection cables with a plug/ coupling system. The cables are embedded in the tile adhesive. The set enables a reversible access to the LED technology. The individual installation steps are listed in the respective installation guide and in product data sheet 15.4.

Schlüter®-LIPROTEC-PB 15 are complete sets for straight flights of stairs with up to 15 steps with centrally pre-assembled, 60 cm wide LED modules. The diffusers provide indirect illumination, while a discrete line of light is visible from the front. The LED modules have the colour temperature neutral white 4500 Kelvin. The cabling uses a simple coupling system; set includes a 500 cm power cable, 70 cm connection cables, and a converter Schlüter®-LIPROTEC-EK (24 V, 75 W) (Fig. 1).

The Schlüter®-LIPROTEC-PB set is available in the following profile lengths:
- 100 cm
- 150 cm

In addition, combined sets Schlüter®-LIPROTEC-PB 1 can be ordered to expand the Schlüter®-LIPROTEC-PB 15 sets to up to 18 steps. These can also be used for individual stair steps and consist of an aluminium profile with a pre-assembled 60 cm wide LED module, a diffuser and a connection cable of 70 cm with plug connector (Fig. 2). If used as a single step, the 500 cm power cable Schlüter®-LIPROTEC-ZZK is also required for connection to the power source (Fig. 3).

Fig. 1

Fig. 2

Fig. 3

AE
Aluminium natural, matt anodised

AEEB
Stainless steel effect anodised aluminium

Installation of the Schlüter®-LIPROTEC-PB 15 set

1. **Supply cable installation**
   - Observe the correct allocation of the wires when installing the cables (black + white -)! The polarity must not be changed.
   - A maximum of 18 LED modules can be connected with a unilateral voltage supply. The supplied power cable (5 m) and connection cable (0.7 m) must be used exclusively.
   - Check the function of each individual step light during or after embedding in the tile adhesive.
   - If necessary, cut the profile to size at both ends in equal proportions. Don't cut further than the marker labels of the profile. The diffuser and the attachment profile are cut in the same work step. We recommend the use of a mitre saw with adjustable speed and suitable saw blade.
   - Install the PB stair nosing illumination profile is in accordance with product data sheet 15.4 and the installation guide. Fully embed the selected Schlüter®-TREP profile into the adhesive.
   - The installation sequence suggested in the installation guide describes the assembly of the stair nosing illumination profiles from top to bottom.
   - The profile Schlüter®-LIPROTEC-PB is designed for straight staircases. No end caps solution is available for the profile in case of spiral staircases with an open well hole.
   - To remove the plug, the diffuser is taken out of the attachment profile
2. **Description of LED module / diffuser**

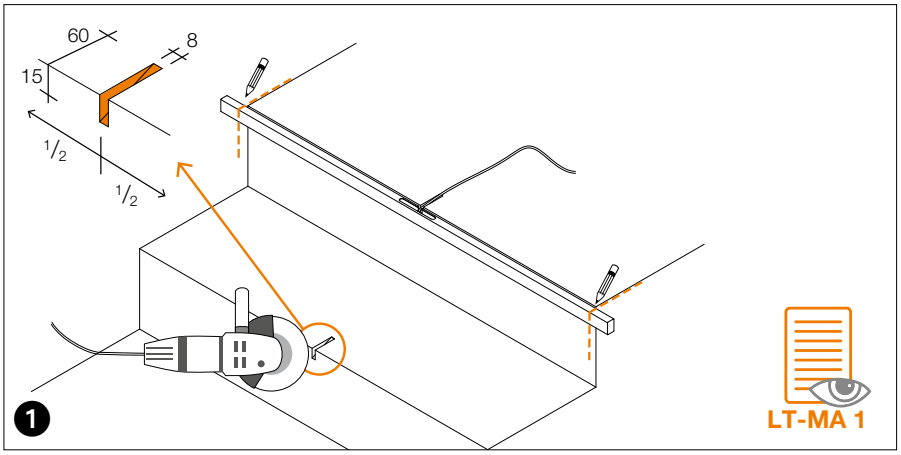
   The LED module is firmly attached to the diffuser with double-sided adhesive tape. The lighting unit - consisting of the LED module and the diffuser - is reversible and can be replaced if necessary. The conductor tracks on the modules must not be damaged, extended or interrupted during assembly. The LED module can therefore not be shortened. The LED module with protection rating IP20 offers no protection against moisture. It is lead-free/RoHS-compliant.
3. **Description of power cable/connection cable**

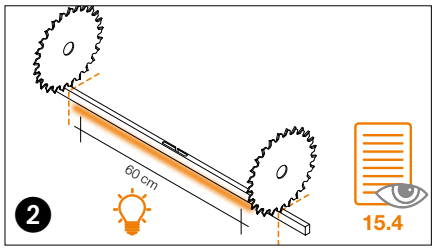
   The LED modules may only be connected with the designated plug-in systems. The plug has a latching function for connecting. Push the lateral clips together to release the plug. To allow for a subsequent replacement of the LED strips, plan on keeping a spare cable loop when installing the cable in the attachment profile.
4. **Colour tolerances**

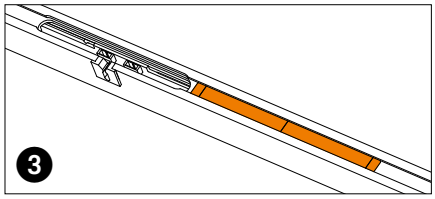
   Colour temperatures may vary -/+ 600 Kelvin from the listed Kelvin values. These colour variations do not mean the item is faulty.
5. **Important notes**
   - The Schlüter®-LIPROTEC-WSK set is exclusively intended for installation in protected indoor areas.
   - Preferably, the LED modules should be controlled with Schlüter system components. Other control systems must be checked for their technical compatibility.
   - The technical data and resulting calculated energy efficiency of the LED strips are partly dependent on ambient conditions during the application. Technical specifications are based on unprocessed LED strips.
   - Exceeding the specified operating voltage results in overloading of the LED modules, reduces their service life, and may lead to their destruction.
   - Please note the temperature data for the LED modules in their respective installation situation. Power and LED cables must never be laid in parallel; the distance between the output and the power supply line should be as large as possible (> 5 cm).
   - Avoid running power cables too closely to the operating device.
6. **Installation steps**

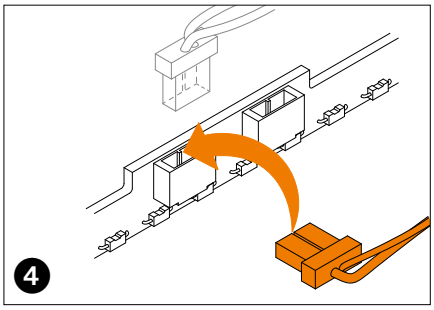
   DThese installation guide show a sample option for installing the corresponding profile. Other installation situations may occur, depending on the circumstances at the construction site.

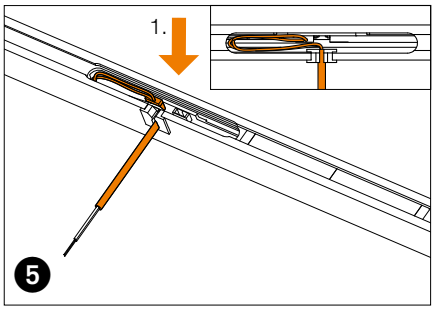
Installation of the Schlüter®-LIPROTEC-PB 15 set

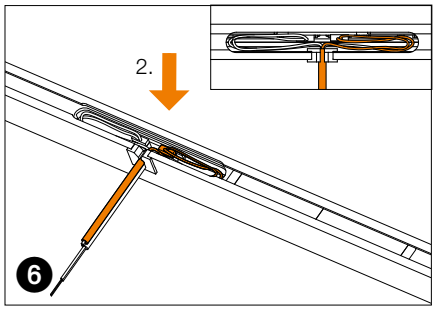


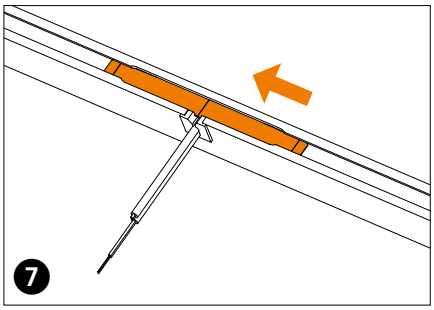


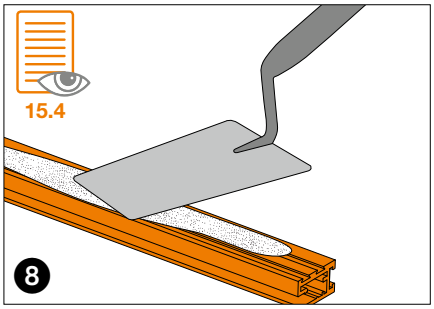


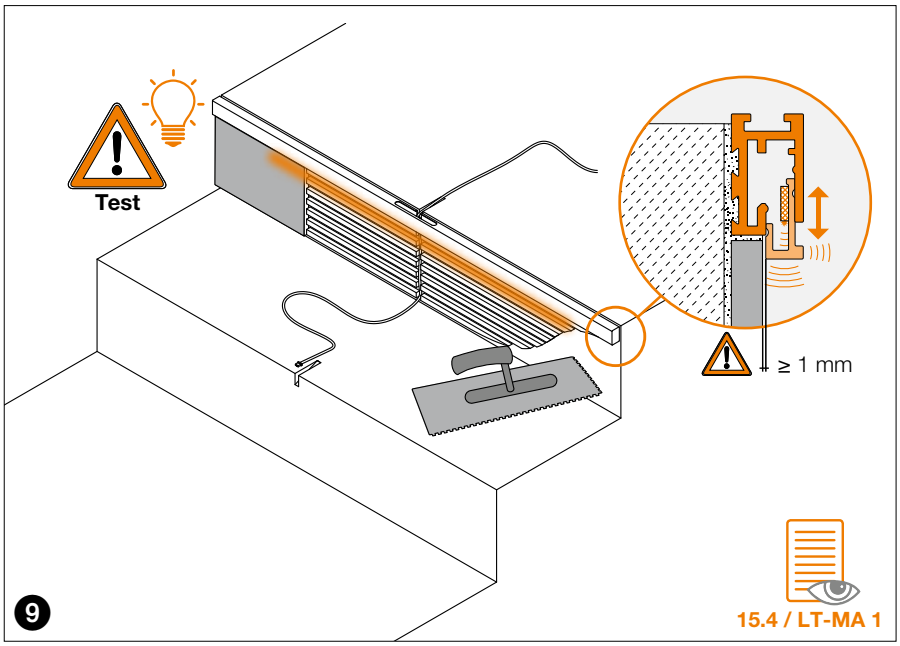


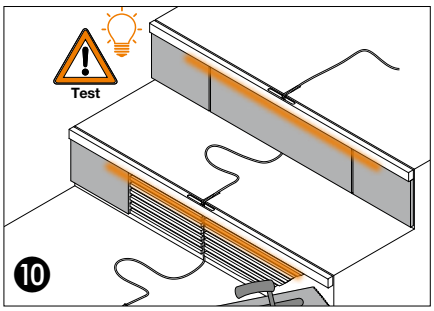


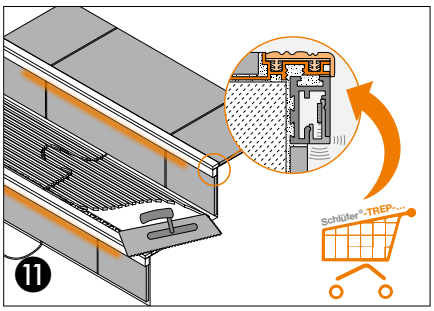








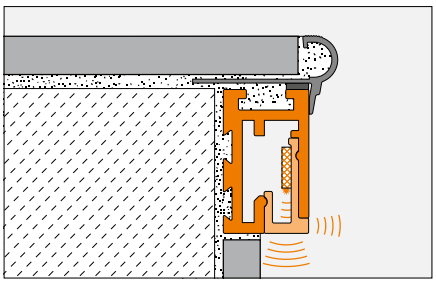


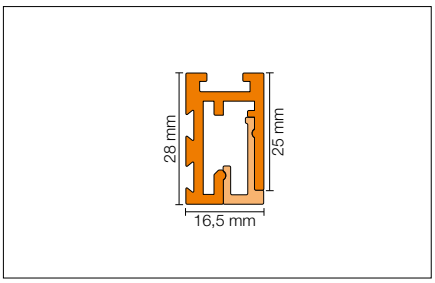


Technical data Schlüter®-LIPROTEC-PB 15 / -PB 1 sets

Mechanical properties		Electrical properties		
IP protection rating:	IP20	Input voltage of LED modules	24 V Direct current (DC)	
PCB:	Certified according to UL94-V0	Power consumption /module	Min. 140 mA	Max. 208 mA
Number of LEDs/ module:	72	Output / module	Min. 3.36	Max. 4.0 W
Length of LED module:	60 cm, centred	Dimmable	Yes - 24 V PWM dimmer	
Profile lengths:	100 cm / 150 cm			

Light technology properties All information refers to condition prior to installation!		Ambient conditions		Information on energy consumption labelling	
Colour temperature	4500 K	Operating temperature (Tp)	-20 °C to +60 °C	Energy efficiency class module	A+
Light current / module	225 lm	Ambient temperature (Ta)	-20 °C to +45 °C	Weighted energy consumption / module	3,85 kWh/ 1000 h
Light yield / module	64 lm/W	Storage temperature (Ts)	-20 °C to +60 °C	Energy efficiency class of sets	A
Colour rendering index CRI	> 80	Relative humidity	max. 90%, non-condensing	Weighted energy consumption / sets	58 kWh/ 1000 h
Rated life	50.000 h			Input voltage of the sets	230 V (AC)





Complete set LT PB 15/100
Complete set for staircases Anodised aluminium
Art.-No.
PB 15 S1 AE/100
Complete set for staircases, brushed stainless steel effect anodised aluminium
Art.-No.
PB 15 S1 AEEB/100

Complete set LT PB 15/150
Complete set for staircases Anodised aluminium
Art.-No.
PB 15 S1 AE/150
Complete set for staircases, brushed stainless steel effect anodised aluminium
Art.-No.
PB 15 S1 AEEB/150

Combined set LT PB 1
Combined set for one step Anodised aluminium
Art.-No.
PB S1 AE/100
PB S1 AE/150
Combination set for one step brushed stainless steel effect anodised aluminium
PB S1 AEEB/100
PB S1 AEEB/150

Content Schlüter®-LIPROTEC-PB 15 / -PB 1 sets

Art.-No.	Designation	Profiles	Finish	Installation accessories
PB 15 S1 AE / 100	Complete set for illuminated staircase up to 15 steps	• 15 profiles LT PB of 100 cm each, incl. • 15 diffusers LT PB D of 100 cm each incl. LED module, neutral white (4500 K)	anodised aluminium	• 115 closure panels, cable gland, end cap • 14 connection cables 70 cm, plug/socket system 0.2 x 0.32 mm² (AWG 22) • 1 power cable 500 cm, unilateral plug system 2 x 0.32 mm² (AWG 22) • 1 power supply 24 Volt, 75 watt • 1 installation guide
PB 15 S1 AE / 150		• 15 profiles LT PB of 150 cm each incl. • 15 diffusers LT PB D of 150 cm each incl. LED module, neutral white (4500 K)	anodised aluminium	
PB 15 S1 AEEB / 100		• 15 profiles LT PB of 100 cm each incl. • 15 diffusers LT PB D of 100 cm each incl. LED module, neutral white (4500 K)	brushed stainless steel effect anodised aluminium	
PB 15 S1 AEEB / 150		• 15 profiles LT PB of 150 cm each incl. • 15 diffusers LT PB D of 150 cm each incl. LED module, neutral white (4500 K)	brushed stainless steel effect anodised aluminium	

Art.-No.	Designation	Profiles	Finish	Installation accessories
PB S1 AE / 100	Combined set for one stair step	• 1 profile LT PB of 100 cm, incl. • 1 diffuser LT PB D of 100 cm incl. LED module, neutral white (4500 K)	anodised aluminium	• 1 closure panel, cable gland, end cap • 1 connection cable 70 cm, plug/socket system 2 x 0.32 mm² (AWG 22) • 1 installation guide
PB S1 AE / 150		• 1 profile LT PB of 150 cm incl. • 1 diffuser LT PB D of 150 cm incl. LED module, neutral white (4500 K)	anodised aluminium	
PB S1 AEEB / 100		• 1 profile LT PB of 100 cm incl. • 1 diffuser LT PB D of 100 cm incl. LED module, neutral white (4500 K)	brushed stainless steel effect anodised aluminium	
PB S1 AEEB / 150		• 1 profile LT PB of 150 cm incl. • 1 diffusers LT PB D of 150 cm incl. LED module, neutral white (4500 K)	brushed stainless steel effect anodised aluminium	

Schlüter®-LIPROTEC-D decorative frame set

Schlüter®-LIPROTEC-D is a high-quality attachment profile with a visible area of 6 mm. It allows for the insertion of various decorative materials such as glass or mirrors. In combination with the LED strip Schlüter®-LIPROTEC-ES, it creates appealing indirect shadow joint illumination. The Schlüter®-LIPROTEC-D set allows for the easy installation of a pre-fabricated decorative frame. Individual components such as decorative frames, corner connectors and decorative material holders are joined with plugs and screws, which enables reversible access to the LED technology. The individual installation steps are listed in the respective installation guide and in product data sheet 15.3. The sets are particularly suitable for the following installation situations:

- Backlighting of mirrors
- Backlighting of decorative elements (e.g. wood panels)
- Backlighting of back-printed glass surfaces
- Presentation of billboards
- Tradeshows and retail
- Architecture
- Furniture lighting

Type of lighting

Schlüter®-LIPROTEC-D 90 sets are available in different versions. The support profiles Schlüter®-LIPROTEC-D are mitre-cut for a frame format of 118.5 x 93.5 cm. Four matching LED strips Schlüter®-LIPROTEC-ES with a light temperature of 3300 Kelvin (warm white) or 4500 Kelvin (neutral white) are included in the set, along with complete hardware for mounting a mirror/decorative element, cables, and a power supply.

	Set Art.-No.
Warm white LT ES 5	LT D 90 S1 AE
Neutral white LT ES 6	LT D 90 S2 AE

Control systems

The set systems can be combined with the following LED control systems (see page 37).

Function	LED strips	Recommended control	Alternative control	Note
On/off + dimming	LT ES 5 – LT ES 6 (white)	LT ER 1 + LT E7 KS ...	–	–
On/off without dimming	LT ES 5 – LT ES 6 (white)	–	Existing light switch	Existing light switch to be installed qualified electricians only (230 V)

The table describes the control options for one light system or set.

Installing the Schlüter®-LIPROTEC-D decorative frame set

1. **Assembly of decorative frame**
   After the assembly of the profile frame, install the tile covering to the place where Schlüter®-LIPROTEC-D is to be set. Embed the profile frame fully in a sufficient amount of tile adhesive in this place. Attach the decorative material holders with screws.
2. **Connecting the LED strips**
   The LED strips are installed with the double-sided adhesive tape on the backside. The substrate must be free of substances that may weaken the bond, such as grease, oil, silicone, dust, and dirt. Adhere the LED strips to the decorative profile as shown. The LED strips can be replaced if necessary.
   - To allow for a subsequent replacement of the LED strips, plan on keeping a spare cable loop when installing the cable.
   - Observe the correct allocation of the wires when installing the cables (black + white -)! The polarity must not be changed.
   - LED strips may not be damaged or extended during assembly .
   - Mechanical stresses of the LED strips are to be avoided.
   - The LED strips with protection rating IP65 are protected against moisture and dust (protection against water jets from all directions). It is lead-free/RoHS-compliant.
3. **Assembly of the decorative material**
   The decorative frame includes two decorative material holders with hook panels in the upper edge, which are height adjustable, see Fig 1. The upper mirror panel has an eyelet to connect with the hanger panel and is adhered to the decorative material with double-sided foam tape. The maximum load per mirror panel, including the eyelet, must be taken into account. The lower mirror panel, without eyelet, holds the decorative material in place using a magnet, see position 2. The installation of the mirror panels uses the double-sided adhesive tape on the backside. The rear side of the decorative material must be free of substances that may weaken the bond, such as grease, oil, silicone, dust, and dirt. Push the mirror panels against the decorative material with sufficient manual pressure. The maximum load-carrying capacity is reached after 12 hours.

3b. **Installing a mirror**
   When using a mirror, the individual LED points may be easily visible on the viewer side. We recommend attaching an approx. 4 cm wide light-impermeable adhesive tape (aluminium tape) on the back (see Fig. 3).

4. **Colour tolerances**
   Colour temperatures may vary -/+ 600 Kelvin from the listed Kelvin values. These colour variations do not mean the item is faulty.
5. **Important notes**
   - The Schlüter®-LIPROTEC-D set is exclusively intended for installation in protected indoor areas
   - Preferably, the LED strips should be controlled with Schlüter system components. Other control systems must be checked for their technical compatibility.
   - The technical data and resulting calculated energy efficiency of the LED strips are partly dependent on ambient conditions during the application. Technical specifications are based on unprocessed LED strips.
   - Exceeding the specified operating voltage results in overloading of the LED strips, reduces their service life, and may lead to their destruction.
   - Please note the temperature data for the LED strips in their respective installation situation. Power and LED cables must never be laid in parallel; the distance between the output and the power supply line should be as large as possible (> 5 cm).
   - Avoid running power cables too closely to the operating device.
   - The national safety regulations for the installation, operation and replacement of the LED strips must be observed. The applicable provisions and guidelines of VDE 0100 have to be followed. Country-specific discrepancies may have to be taken into account.

Fig. 1 - Montage oben

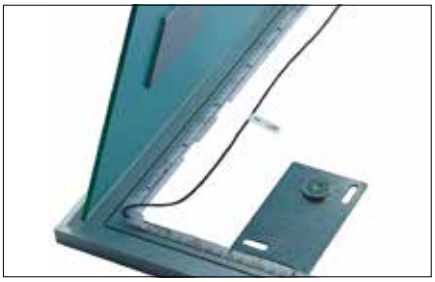


Fig. 2 - Montage unten

Fig. 3

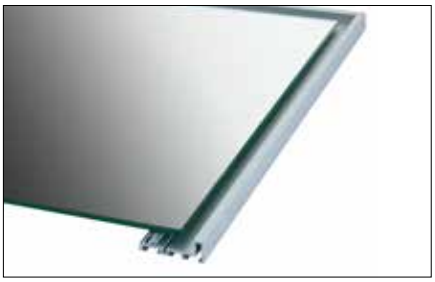
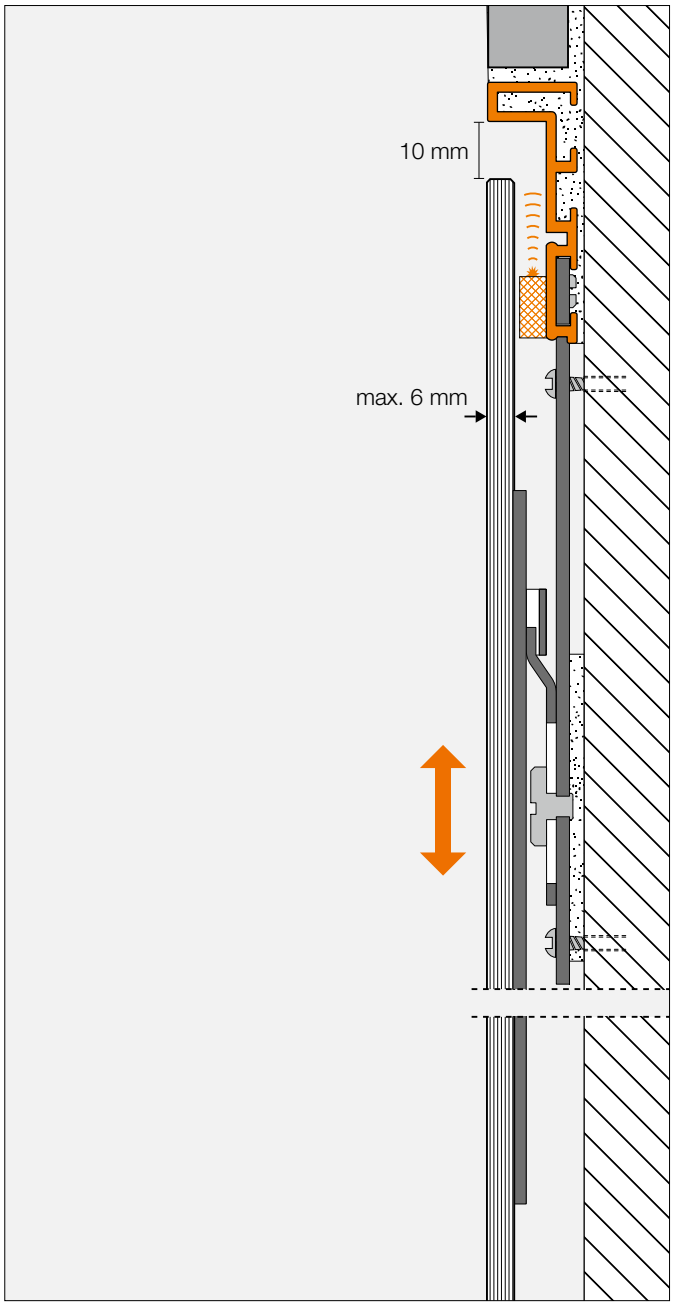
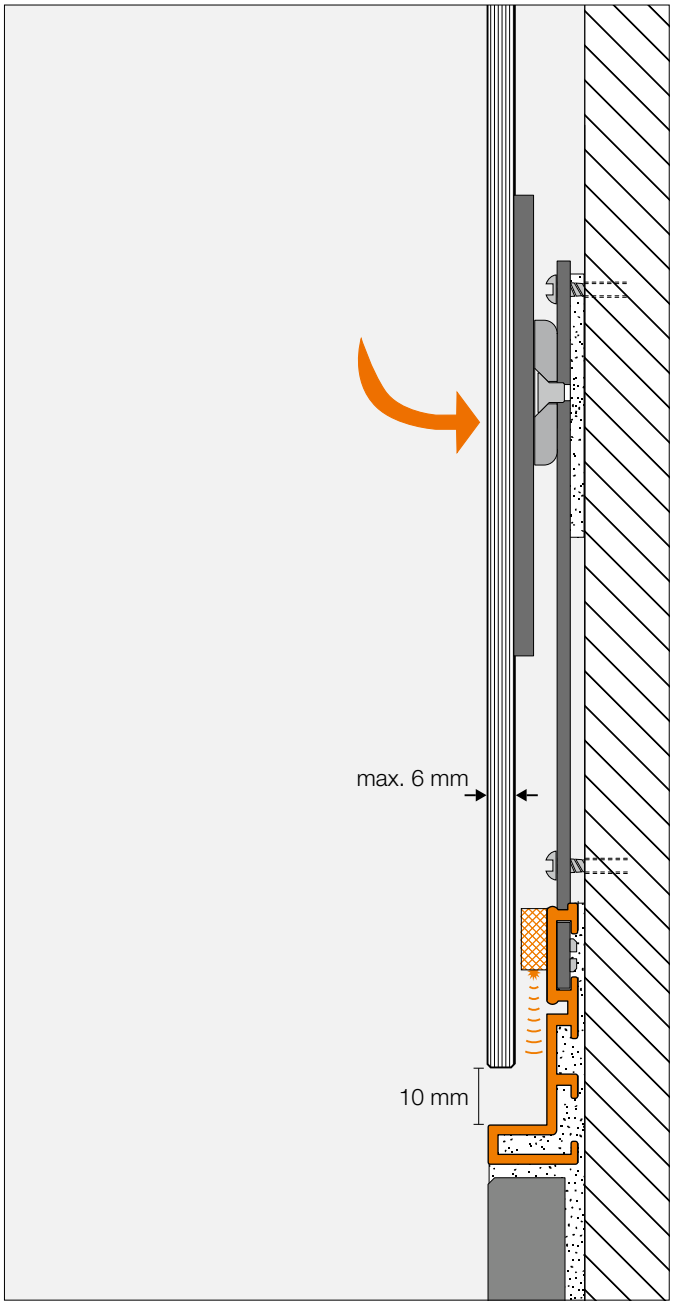


Fig. 4

6. **Installation steps**
   The individual installation steps are also listed in the respective installation guide and in product data sheet 15.3.
7. This installation guide shows a sample option for installing the corresponding profile. Other installation situations may occur, depending on the circumstances at the construction site.

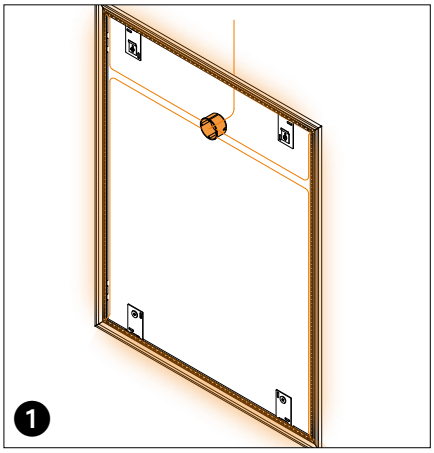


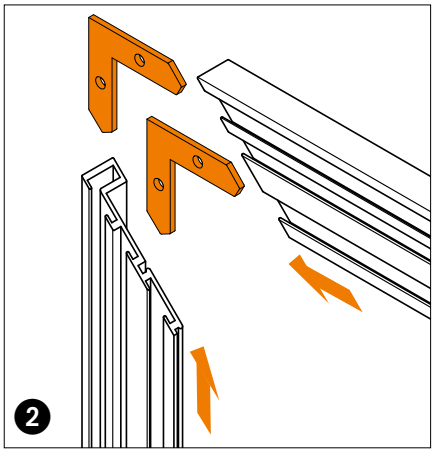
Detail cut top

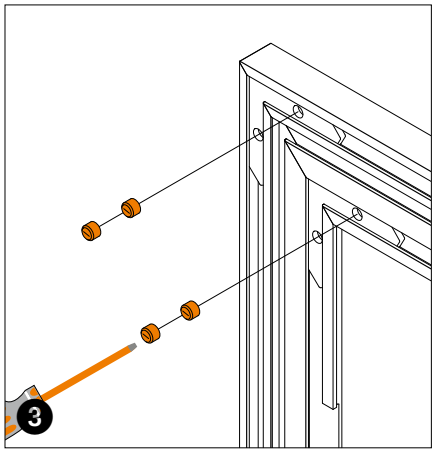


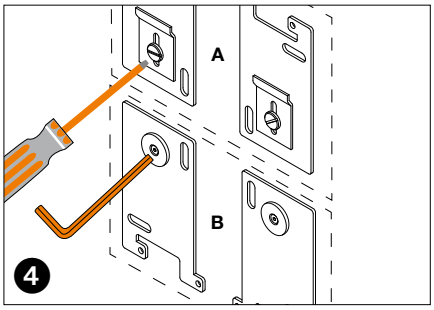
Detail cut bottom

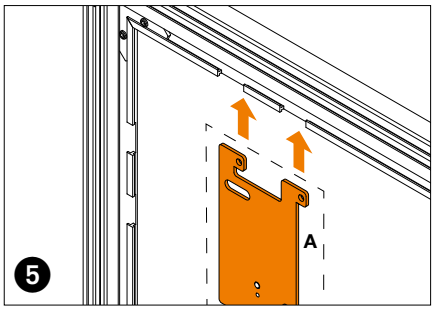
Installation Schlüter®-LIPROTEC-D 90 set

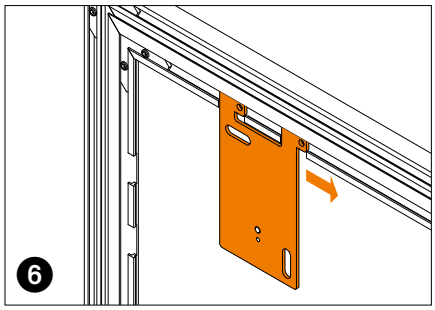


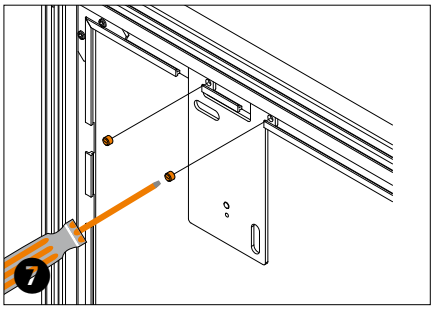


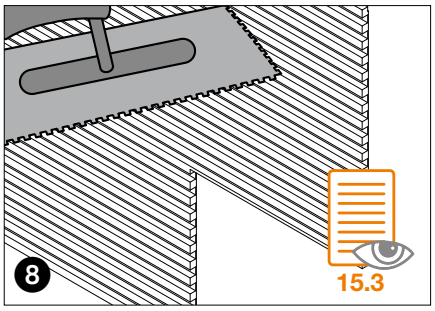


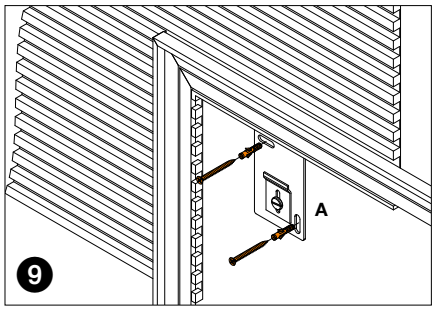


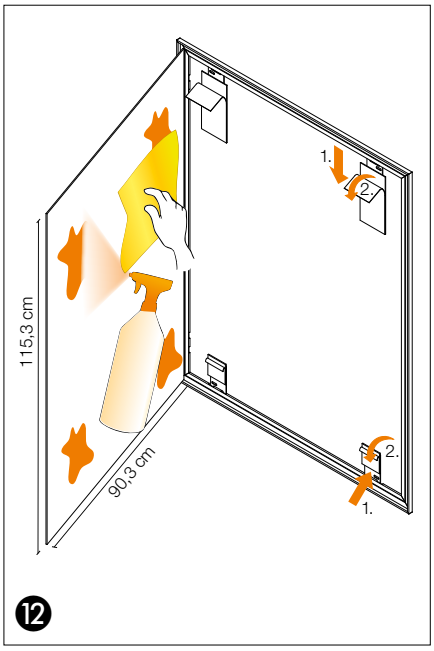


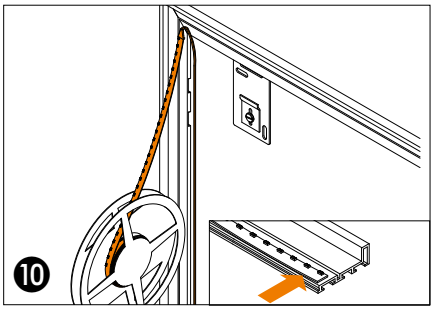


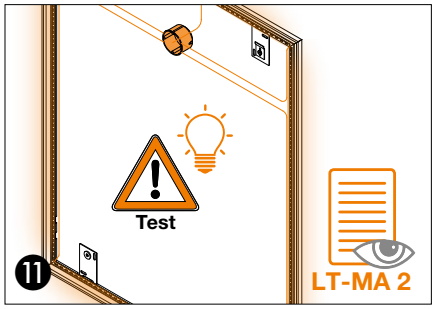


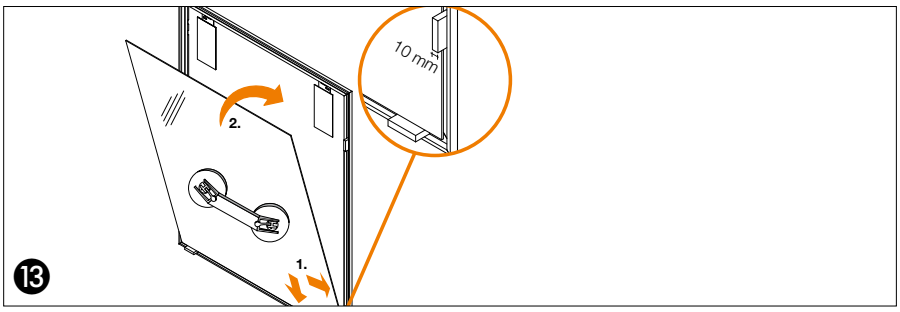


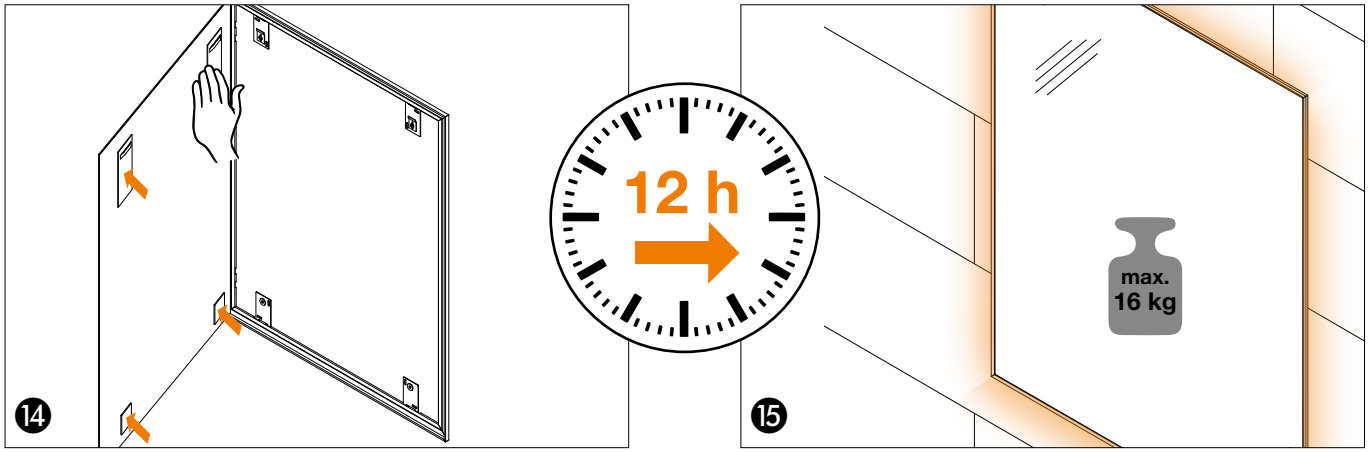






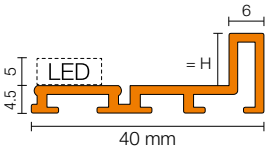






Technical data Schlüter®-LIPROTEC-D 90 set

Technical values for the set	
Dimensions of profile frame	118.5 cm x 93.5 cm
Dimensions of decorative material	115.3 cm x 90.3 cm
Illuminated joint width	10 mm
Profile height	13,5 mm
Height of decorative material including LED strip (H)	9 mm
Max. weight of decorative material	16 kg



Mechanical properties		Electrical properties		
IP protection rating	65	Input voltage	24 V Direct current (DC)	
LED count per metre	120	Power consumption / 1.0 m	min. 300 mA	max 400 mA
		Output / 1.0 m	min. 7.2 Watt	max 9.6 Watt
		Dimmable	Yes - 24 V PWM dimmer	

Light technology properties All information refers to condition prior to installation!		Ambient conditions		Information on energy consumption labelling	
Colour temperature	Warm white 3300 K Neutral white 4500 K	Operating temperature (Tp)	-10 °C to +40 °C	Energy efficiency class	A
Light current / 1.0 m	600 lm	Storage temperature (Ts)	-10 °C to +40 °C	Weighted energy consumption / set	36 kWh/1000 h
Light yield	70 lm/Watt			Input voltage of set	230 V
Colour rendering index CRI	> 80				
Rated life	40,000 h				

Contents Schlüter®-LIPROTEC-D 90 sets

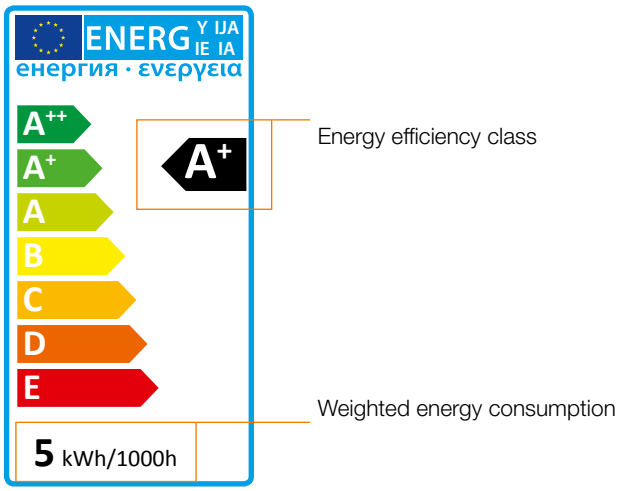
Art.-No.	Description	LED strip	Material
LT D90 S1 AE	Complete set for decorative frame with indirect lighting	• 2 strips Schlüter® LIPROTEC-ES Length: 110 cm Light colour warm white (3300 K) • 2 strips Schlüter®-LIPROTEC-ES Length: 85 cm Light colour warm white (3300 K)	• 1 profile frame Schlüter®-LIPROTEC-D 90, 118.5 cm x 93.5 cm incl. mitre cuts and grooves for decorative material holder incl. Schlüter®-LIPROTEC-D/V corner connectors • 1 set of decorative material holders top/bottom (4 pc.) • 1 set mirror panels at top/bottom (4 pc.) • 1 Schlüter®-LIPROTEC-ZS connection set • 1 conduit, 200 cm, Ø 20 mm • 1 power supply 24 Volt, 50 watt-1 installation guide • 1 tool assembly tool/mounting aid LT D90 S2 AE
LT D90 S2 AE		• 2 strips Schlüter® LIPROTEC-ES Length: 110 cm Light colour neutral white (4500 K) • 2 strips Schlüter®-LIPROTEC-ES Length: 85 cm Light colour neutral white (4500 K)	

Energy efficiency classes of Schlüter®-LIPROTEC LED strips

Art.-No.	Energy efficiency class	kWh / 1000h
PB 15 S1 AE/100	A	58
PB 15 S1 AE/150	A	58
PB 15 S1 AEEB/100	A	58
PB 15 S1 AEEB/150	A	58
PB S1 AE/100	A+	4
PB S1 AE/150	A+	4
PB S1 AEEB/100	A+	4
PB S1 AEEB/150	A+	4
LT D90 S1 AE	A	36
LT D90 S2 AE	A	36
WS 20 ZS1 LT ES1	A	37
WS 20 ZS1 LT ES2	A	37
WS 20 ZS1 LT ES8	-	-
WS 20 ZS2 LT ES1	A	46
WS 20 ZS2 LT ES2	A	46
WS 20 ZS2 LT ES8	-	-
WS 20 ZS3 LT ES1	A	46
WS 20 ZS3 LT ES2	A	46
WS 20 ZS3 LT ES8	-	-
LT PB	A	22
LT WS	A	37
LT ES 1	A+	23
LT ES 1/200	A+	19
LT ES 1/150	A+	15
LT ES 1/100	A+	10
LT ES 1/50	A+	5
LT ES 2	A+	23
LT ES 2/200	A+	19

Art.-No.	Energy efficiency class	kWh / 1000h
LT ES 2/150	A+	15
LT ES 2/100	A+	10
LT ES 2/50	A+	5
LT ES 3	A+	23
LT ES 3/200	A+	19
LT ES 3/150	A+	15
LT ES 3/100	A+	10
LT ES 3/50	A+	5
LT ES 4	A+	23
LT ES 4/200	A+	19
LT ES 4/150	A+	15
LT ES 4/100	A+	10
LT ES 4/50	A+	5
LT ES 5	A	22
LT ES 5/200	A	19
LT ES 5/150	A	14
LT ES 5/100	A	10
LT ES 5/50	A+	5
LT ES 6	A	22
LT ES 6/200	A	19
LT ES 6/150	A	14
LT ES 6/100	A	10
LT ES 6/50	A+	5
LT ES 7	A	40
LT ES 7/200	A	32
LT ES 7/150	A	24
LT ES 7/100	A	16
LT ES 7/50	A	8
LT ES 8	-	-
LT ES 8/200	-	-
LT ES 8/150	-	-
LT ES 8/100	-	-
LT ES 8/50	-	-

Sample energy efficiency label



Note!
Products without indication of energy efficiency class do not fall within the scope of EU Regulation 874/2012

Error message

Error	Cause of problem	Troubleshooting
No illumination	Connections have been transposed	Check all cable connection that they are connected correctly.
	No power	Check the power supply for the correct connection.
	Power supply overloaded	Select a more powerful power supply unit (up to max. 150 W).
	Receiver overloaded	Maximum Check the load on the respective connections at the receiver. It might be that the LED strips will have to be distributed differently to the respective connections (pay attention to the max. loads on the respective connections).
Illumination blinks or flickers	Receiver overloaded	Maximum Check the load on the respective connections at the receiver. It might be that the LED strips will have to be distributed differently to the respective connections (pay attention to the max. loads on the respective connections).
	Cable connections are not tight	Check the cable connections for friction-locked connection.
Deviating light colours	The connections for the various light colours were switched	Check all cable connections for the correct connection. Test the colours red, green, blue. Test the colour temperature of warm-white to cold-white.
Circuit-breaker trips	Power supply unit was connected incorrectly	Connect the power supply unit correctly (to be carried out only by an electrician).
No reaction when pressing the button at the transmitter	The transmitter battery is empty	Change the transmitter's battery (Follow the operating instructions for the transmitter).
	The receiver is too far away from the transmitter	In an open room the transmitter must be set no more than 50 m from the receiver.
	The receiver has other items around it	The materials surrounding the receivers must allow for wireless transmission.
	The receiver is positioned too low	The receiver must be set higher.
	Transmitter is not properly taught	Transmitter must be taught again (observe operating instructions for receiver).
No connection to smartphone "Please connect Bluetooth A2DP for proper operation" "No Bluetooth receiver connected"	Transmitter is not properly taught	Check the power supply for proper connection.
	The Bluetooth receiver is too far removed from the end-device.	In open space, the transmitter should be positioned max. 50 m from the receiver.
	Bluetooth receiver is surrounded.	The materials surrounding the receivers must allow for wireless transmission.
	Sources of interference in the reception area.	Change the positioning of the receiver and, if necessary, eliminate the source of interference.
	The end-device is not paired with the Bluetooth receiver.	Pair the device with the receiver.
	The Bluetooth receiver is already connected with another device.	Disconnect the other device.
No response to operation of the app "Please increase volume for proper operation"	The volume of the end-device is set too low.	Increase the volume.
Pairing not possible	Time window after switching on the power supply has been exceeded.	Disconnect the Bluetooth receiver for a few seconds from the power supply.
	Bluetooth receiver is already connected with another end-device.	Disconnect the other end-device and disable the power supply for a few seconds.

Notice

Notice

Notice

Informative.

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