

LIGHTTOOLS
Modular lighting system



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A new building in the very heart of a major international city. Interior fittings and fixtures for a large branch of a leading fashion designer. The shop concept is only a broad brushstroke plan at this stage, the precise requirements to be placed on the lighting have not yet been defined in detail. Despite this, LIGHTTOOLS lighting channels can already be flush-mounted in the ceiling and electrically connected. Regardless whether spotlights, linear luminaires or wallwashers are used, lighting modules can be used in any way required; they can be removed and replaced in any location at any time without the use of tools and with no installation effort. LIGHTTOOLS can also be fitted with innovative lamp reflector technologies to perform an extremely wide range of lighting tasks precisely and to maximum effect, as is apparent from just one look at the finished shop ...



Smaller, more complex, better

More than just a lighting channel



LIGHTTOOLS

DESIGN JEAN-MICHEL WILMOTTE

“What is most important is the light, not the luminaire. The trend towards leaving ceilings optically clean and untouched, so that the luminaires installed blend unobtrusively into the architecture, is more than mere chance. The more “invisible” the luminaire is, the better. In the final analysis, it is the light which is decisive.”

The LIGHTTOOLS lighting system is dedicated to this tenet of Paris-based architect and designer Jean-Michel Wilmotte. In many ways. The system has an extremely compact look, is elegant yet completely inconspicuous, functional and extremely versatile in practical use, and trend-setting in using innovative

lighting and lamp technologies: LIGHTTOOLS makes it possible to set the scene effectively with a creative interplay between light, space and architecture – in shops, museums, presentation and exhibition areas and, last but not least, in office environments.

But LIGHTTOOLS is much more than just a miniaturised lighting channel. In practical use, LIGHTTOOLS turns out to be an innovative, powerful tool for interior and architectural design and is also extremely versatile. This is ensured not only by an extremely narrow system width of around 100 mm which allows straightforward edgeless, unobtrusive flush-mounting in flat ceil-

ings. LIGHTTOOLS also features an integrated pivoting mechanism and can be fitted with the latest lamp technologies, enabling it to accomplish an extremely wide range of lighting tasks.

The fact that prefabricated channels can be cut to the required length on site easily, and that the various lighting inserts can be fitted without using tools, makes LIGHTTOOLS a modular system which is child's play to handle. With LIGHTTOOLS, the customized solution to any requirement is on hand – thanks to fast off-the-shelf delivery.



design award
winner
2003

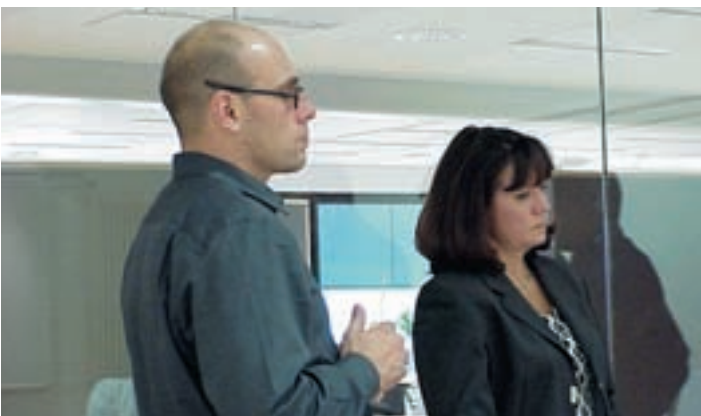
www.zumtobelstaff.com/lighttools

“What is most important is the light, not the luminaire”. LIGHTTOOLS allows edgeless, inconspicuous flush-mounting in flat ceilings.

“The basic idea with LIGHTTOOLS was to create a product with a timeless shape which would also meet extremely exacting demands in terms of design, wide range of applications, functionality, flush ceiling-mounting and ease of installation. The highly creative and productive, not to mention very ambitious, cooperation between the Wilmotte Agency and

Zumtobel Staff has produced a completely innovative lighting channel system which is markedly different from other systems – LIGHTTOOLS.”

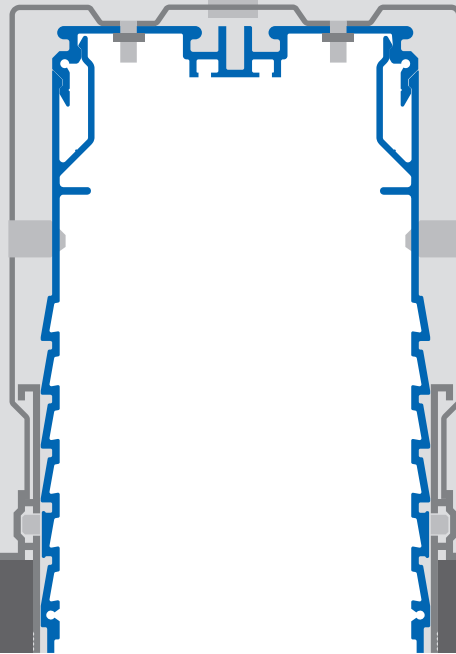
Viktor-Hugo Ciotti
(Wilmotte Agency)
and **Katharina Götz-Schäfer**
(Zumtobel Staff)



Visibly invisible

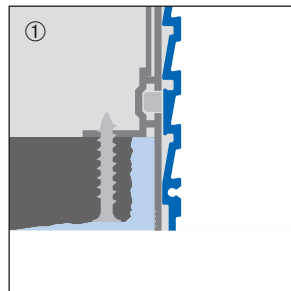
Edgeless flush ceiling-mounting

Tasteful discretion – this is the watchword of the LIGHTTOOLS lighting system. In adopting this approach it meets many architects' wishes for lighting solutions which combine effective lighting with a visually discreet appearance: LIGHTTOOLS somehow conjures up light out of the ceiling. It can do so because it blends into flat ceilings thanks to its edgeless flush mounting capability.



Edgeless section – flush ceiling-mounted continuous-row structure

① The edgeless channel section is suitable for flat, homogeneous ceiling structures (e.g. plasterboard or wooden ceilings).

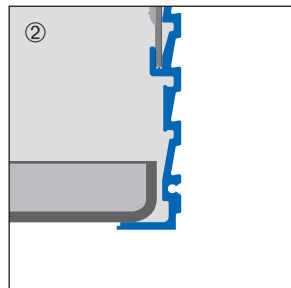


Installation ①: First place the mounting frame in the ceiling cut-out and screw-fasten it at the sides to the plasterboard panels. Its smooth surrounding metal edge also acts as a plastering edge trim. It ensures an accurate, straight, clean ceiling cut-out. Do not insert the channel section into the mounting frame and fix it flush with

the ceiling surface until the mounting frame has been plastered in and the ceiling has been given its final coat of paint, if applicable. The gap between the “plaster frame” and the actual channel section ensures clean fitting as well as perfect physical and thermal separation.

Section with supporting edge – ceiling-bearing continuous-row structure

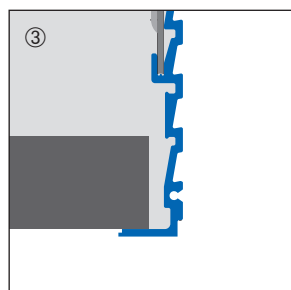
② In the case of structured, less homogeneous ceilings (e.g. ceiling panels or coffered ceilings), the channel section is a self-supporting element for the suspended ceiling. With its lateral supporting edges it supports the adjacent ceiling elements.



Installation ②: Suspend the channel section with supporting edge, adjust it and level it at the same time as the ceiling carriers (e.g. T-bars). Horizontal levelling and

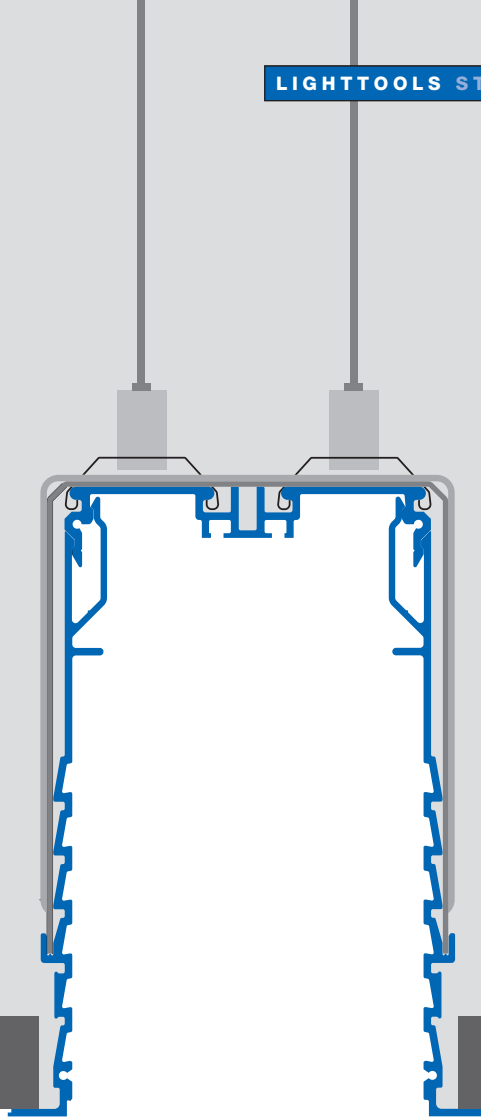
height adjustment are obtained by means of two attached adjacent steel cords which transfer the load to the static load-bearing ceiling.

③ A channel section with supporting edge can of course also be installed in ceilings, with flat elements.

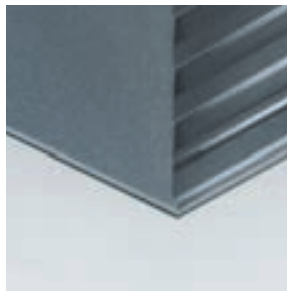
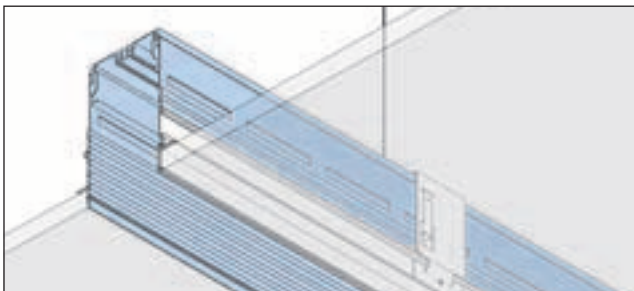


Installation ③: The first step is to temporarily suspend the channel section with supporting edge from steel cords which hang down from the load-bearing ceiling through the cut-out in the plasterboard or wooden ceiling. Then raise the

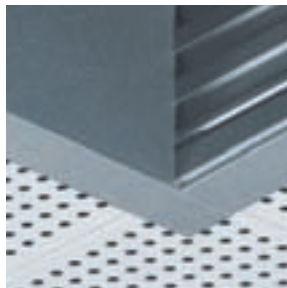
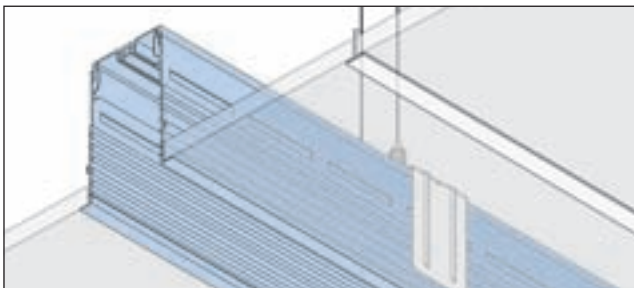
section and insert it into the cut-out from below. Integral “patented suspension devices” ensure that channel sections can be securely fixed in the ceiling without the ceiling being subjected to any additional load due to their weight.



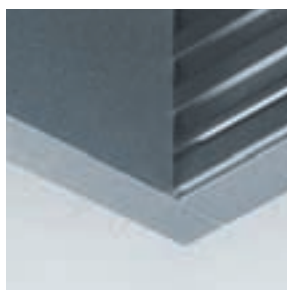
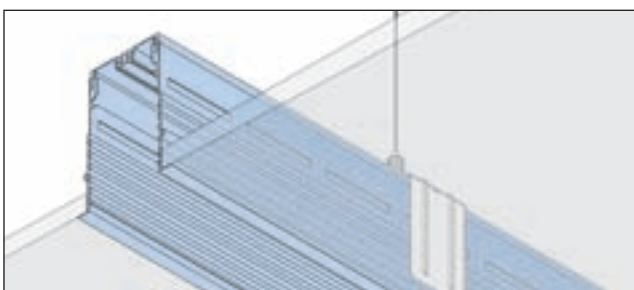
Even in situations where ceilings and ceiling systems do not have a uniform visible surface and only fitting with a supporting edge is possible, LIGHTTOOLS blends unobtrusively and discreetly into the ceiling architecture.



In **plasterboard or wooden ceilings**, place the mounting frame in the ceiling cut-out and screw-fasten its sides to the bare ceiling. Mounting brackets act as spacers and supports for the section.



The important point in the case of **ceilings with an exposed supporting structure**: the supporting edges of the channel section also support the adjacent ceiling panels. They also conceal the edges. Stabiliser brackets above the channel section guarantee the latter has a uniform beam width.



In **flat homogeneous ceilings**, the channel section with supporting edge acts as a self-supporting element. It is inserted into the ceiling cut-out from below and is securely fixed using "patented suspension devices".

The Power of Light

Four lighting inserts – many lighting effects

Spotlight or downlight

Spotlight inserts can be used in a variety of ways. The spotlight head has two joints which allow it to be rotated and pivoted (approx. 220°/70°), which makes it possible to align the spotlight flexibly. If the element is recessed

Flood or downlight

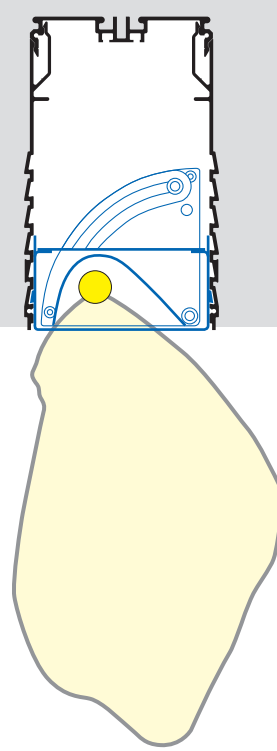
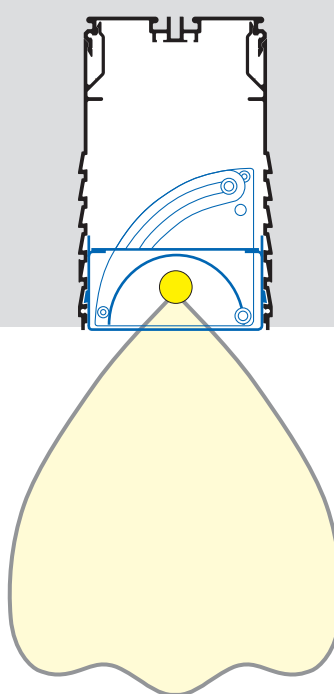
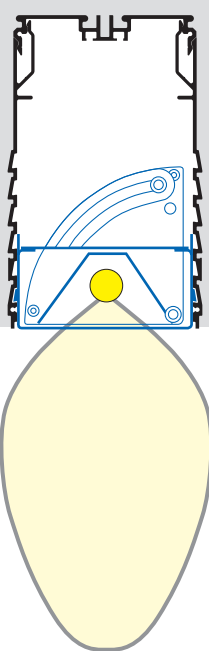
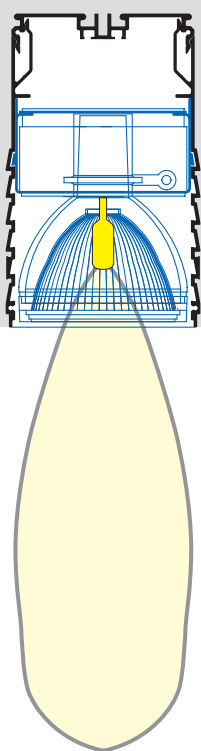
Because of their pivoting reflector housing, HIT/HST lighting inserts can either be used as floods or as downlights. The lighting insert pivots horizontally through 75° and, with its wide-angle fluted specular reflector,

Linear luminaire or flood

Thanks to its integral pivoting mechanism, lighting inserts with a T16 lamp can be used for various lighting tasks. When pivoted down, they provide excellent general lighting. In addition, the symmetrical reflector is optimi-

Wallwasher

The special pivoting mechanism enables lighting inserts with T16 lamps to pivot through approx. 75°. This explains why they are excellent for providing uniform, wide-area illumination of walls. The asymmetrical reflector gua-



sed deep into the channel section, it acts as a stationary downlight and emits light downwards from the opening in the ceiling. The range of lighting accents which can be obtained as desired and as necessary is correspondingly wide. The inserts are fitted with a single lamp using various versions of CDM-TC/HIT-CRI G 8.5 (20–70 W) metal halide lamps, or QT-12 or QR-70 lamps.

becomes a wallwasher capable of illuminating any object and any wall, right from the top of the ceiling if necessary. When pivoted downwards, the insert becomes a perfect downlight which is excellent for illuminating details. Versions fitted with HIT-CRI G 12 (70 W) or alternatively HST/SDW-TG (100 W) are available.

sed for use with various additional reflector optics (specular louvre and vane louvre, prismatic optic, etc.), thereby providing appropriate general lighting and even efficient office lighting. T16 high-output lamps up to 54 W can be used.

rantees perfect, uniform wall illumination which can begin from the joint between wall and ceiling. Here, too, T16 high-output lamps up to 54 W can be used.



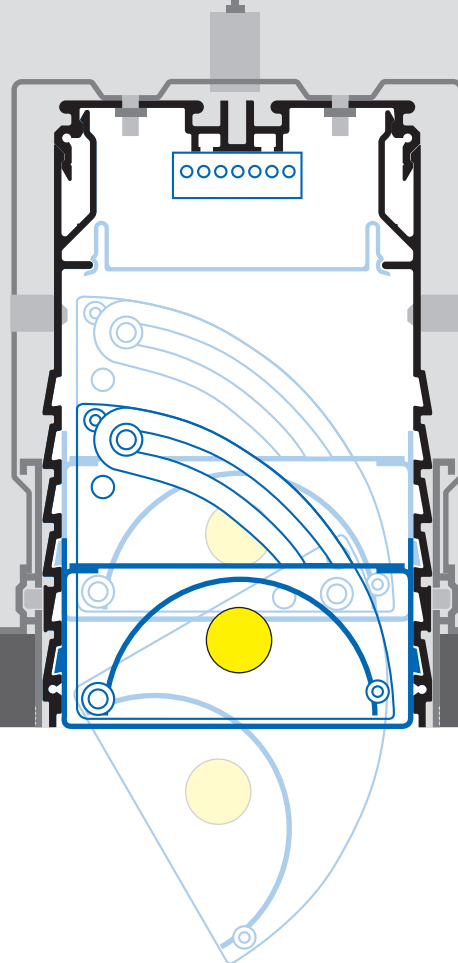
Until now, lighting channel systems have suffered from the disadvantage that, because of their dimensions, they were unable to really satisfy all lighting requirements. They were either too narrow (70–80 mm) to accommodate powerful spotlights (usually QR-CBC 35) offering sufficient luminous flux for effective accent lighting, or lighting channels wide enough (145 mm or more) to accommodate spotlights with effective lamps (QR 111) dominated a room to such an extent that they were unsuitable for unobtrusive recessing into the ceiling.

Plenty of power in a small package

In contrast, LIGHTTOOLS offers plenty of power in a small package. Its compact system width of only approx. 100 mm guarantees the sought-after discreet look in ceilings. Sophisticated, specially developed reflector technology enables the use of CDM-TC/HIT-CRI G 8.5 lamps. These miniature metal halide lamps can be fitted in a spotlight housing which has a diameter of just 95 mm without any problem. They combine compact size with astonishingly high luminous efficiency and a long service life. When it comes to accent lighting, LIGHTTOOLS sets new standards and the efficiency of LIGHTTOOLS does not depend on conventional light sources.

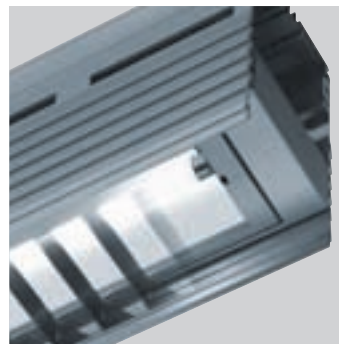
Lighting inserts

No-tool installation



Wiring and installing lighting inserts

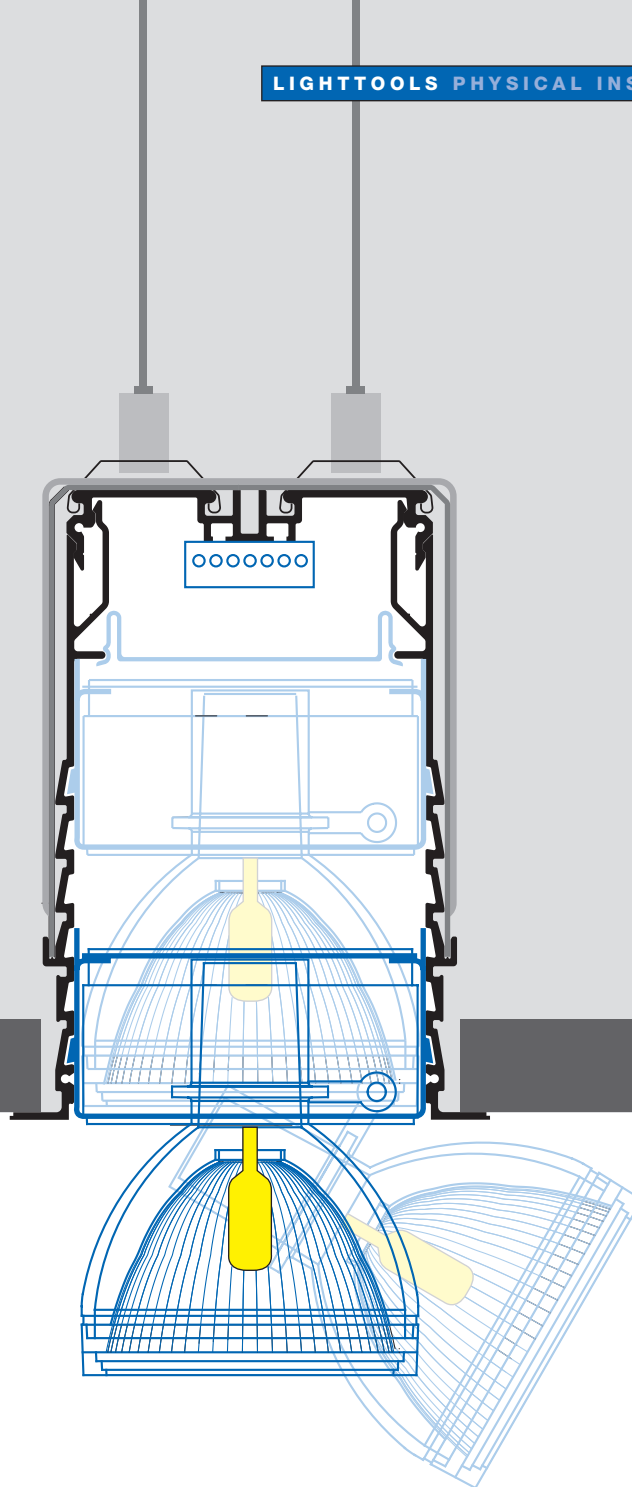
Once the channel section has been installed in the ceiling, the through-wiring is simply clicked into the channel section and connected without the use of tools. The lighting inserts are then snapped into the channel sections also without using tools and connected to the power supply by using plug-in contacts. Another asset is the fact that two parallel bus lines for lighting management or Active Light solutions are also available. If necessary, previously cut-to-length plastic covers can be inserted into the channel section in order to conceal terminals and wires from view.



By pivoting a T16 lighting insert, a linear luminaire can be used as a downlight. Clicked deep into the channel section, it can be covered by various louvres. The vane louvre ensures perfect longitudinal glare control and the specular louvre makes LIGHT-TOOLS even suitable for high-end office lighting.



When pivoted upwards, the T16 lighting insert becomes a linear-luminaire wallwasher. Its "asymmetrical" light distribution produces a perfect wallwashing effect – to the left or to the right – depending on how the T16 module is positioned.



The spotlight module can be inserted and locked in different positions in the channel section. When fully recessed, the insert becomes a fixed, virtually invisible downlight which appears to emit light down from the ceiling. At the same time, the channel section also ensures thermal protection.



Flush-mounted in the lowest position in the channel section, the spotlight insert becomes a fully versatile spot. Two joints ensure maximum flexibility: their vertical axis, in the form of two horizontally rotatable discs, allows rotation through an angle of up to 220° , whilst their horizontal axis in an off-centre articulated arm enables the spotlight head to pivot through as much as 70° .

Active Light scenarios

People are strongly influenced by natural changes in daylight. The Active Light concept turns the dream of reproducing daily and seasonal light variations by controlling changes in the intensity, direction and colour of light into reality. And it does so with unique ingenuity in order to create deliberately selected scenes, whether calming, motivating or stimulating, to make interiors appear lively, to attract attention, to direct interest and in order to transform the interaction between light, space and interior decor into a lasting experience. LIGHT-TOOLS is the ideal lighting system to enhance the creative power of Active Light. Accent lighting from LIGHT-TOOLS downlight and spotlight inserts against a background of Active Light walls, for instance, creates an interesting, exciting contrast which gives the scenario a greater impression of depth and grabs extra attention.



Lighttools & Active Light







Sophisticated details



Clicking lighting inserts into the channel section The various LIGHTTOOLS lighting inserts are not just impressive because of their clear lines. The fact that it is child's play to fit them into the channel section and remove them again is just as important. This is made possible by a spe-

cially developed key-switch mechanism which enables the lighting module to be fixed at any position on the channel section and locked. The insert can be moved to any position in a longitudinal direction and – thanks to a special grooved section inside the channel – can be

fixed in different vertical steps. This ensures that spotlights, floods, linear luminaires and wallwashers can always be precisely positioned to make sure that they always effectively fulfil their intended lighting task.



Vertical steps The special grooved section inside the channel enables lighting inserts to be snapped into different vertical levels – quickly, easily and reliably, without the use of tools.

The titanium-coloured **channel** consists of three separate aluminium extrusions assembled to form a U-shaped unit. There are elongated ventilation slots on the top and at the sides.

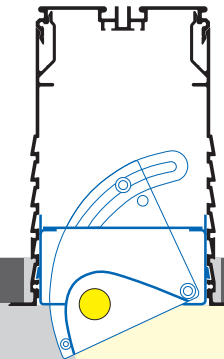


Out of sight: The continuous 7-pole cable tray clicks into place without the use of tools and can be hidden, if required, by an optional cover trim.

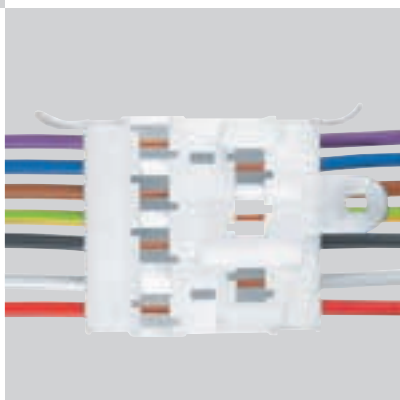
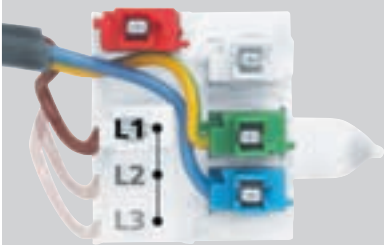
The spotlight inserts can accommodate various **filter attachments** and protective glass panels. These are simply placed in a ring – which also supports the reflector –, which is fixed to the lighting head by means of a twist and lock mechanism



Whether used in a **flood** or a **wallwasher**, the special pivoting mechanism makes it possible to illuminate any wall uniformly right from the edge of the ceiling.



LIGHTTOOLS can utilise three circuits. **Phase selection** is obtained simply by using a sliding contact which is part of the 5-pole connector on every lighting insert. Two of these contacts (red and white) are connected to a parallel bus line.



LIGHTTOOLS are powered through a **7-pole through-wiring cable loom** (7 x 1.5 mm). Five wires are used to supply power, and two are used for the bus line. Every 320 mm, there is a 7-pole plug-in connector into which the 5-pole male connector of the lighting insert is plugged in.



Design

Total flexibility

How to determine the number of channel sections and/or mounting frames required (The number and lengths of the channels is always equal to that of the frames)

Divide the total length of the channel run (in mm) by 1,600 – this gives the **quantity factor**. The number (before the decimal point) denotes the number of 1,600 mm long section units required. Depending on the number after the decimal point, there are four possible configurations:

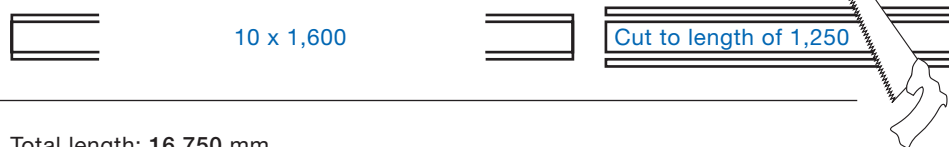
Typical calculation examples:

1.) Number after the decimal point >5:

Order one extra 1,600 mm blank section

Total length: 17,250 mm

Divide by 1,600 mm = **10.78125** Thus, order quantity: 10 x 1,600 mm channel sections and 1 x 1,600 mm blank channel section (cut it to length) (if applicable, same number of mounting frames in the case of flush-mounted version)

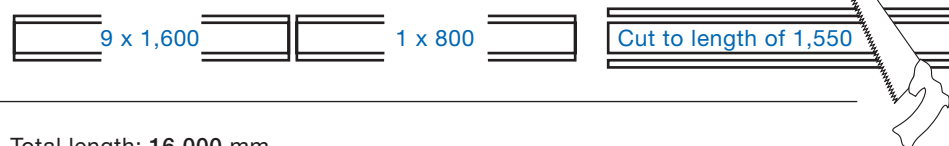


2.) Number after the decimal point <5:

Instead of a 1,600 mm section, order one 800 mm section and one 1,600 mm blank section

Total length: 16,750 mm

Divide by 1,600 mm = **10.46875** Thus, order quantity: 9 x 1,600 mm channel sections, 1 x 800 mm channel section and 1 x 1,600 mm blank channel section (cut it to length) (if applicable, same number of mounting frames in the case of flush-mounted version)

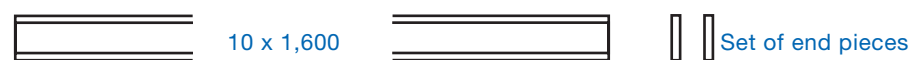


3.) Number after the decimal point =0:

No blank section, but order an additional set of end pieces!

Total length: 16,000 mm

Divide by 1,600 mm = **10.0** Thus, order quantity: 10 x 1,600 mm channel sections and 1 x set of end pieces (if applicable, same number of mounting frames in the case of flush-mounted version)

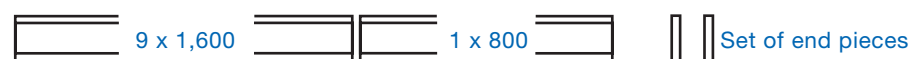


4.) Number after the decimal point =5:

No blank section, but order one 800 mm section (instead of a 1,600 mm section) and an extra set of end pieces

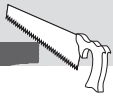
Total length: 15,200 mm

Divide by 1,600 mm = **9.5** Thus, order quantity: 9 x 1,600 mm channel sections, 1 x 800 mm channel section and 1 x set of end pieces (if applicable, same number of mounting frames as in the case of flush-mounted version)



The blank section is cut to length on site. It must not be shorter than 800 mm, otherwise proper fixing might be compromised (hence the need to order an 800 mm section instead of a 1,600 mm section in certain cases).

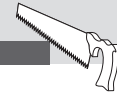
Ceiling cut-out:
Approx. 121 mm wide
Length – length of section + 26 mm



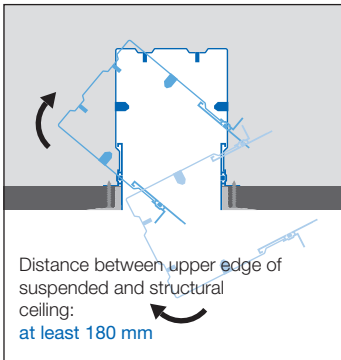
... flush-mounted

First measure up and prepare the **ceiling cut-out**. The exact dimensions and details depend on the way the section is fitted (“flush-mounted” or “ceiling-bearing”). When flush-mounted, the **supporting edges** of the plasterboard panels in the ceiling cut-out must be unobstructed over a width of approx. 20 mm, so that the mounting frame rests cleanly on them to ensure a straight, flush fit.

Ceiling cut-out:
Approx. 124 mm wide
Length – length of section + 14 mm

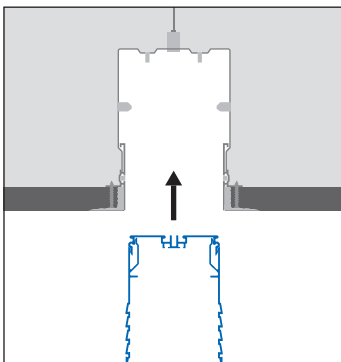
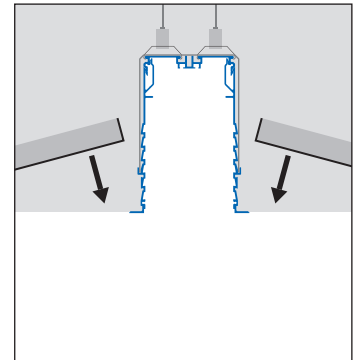


... ceiling-bearing



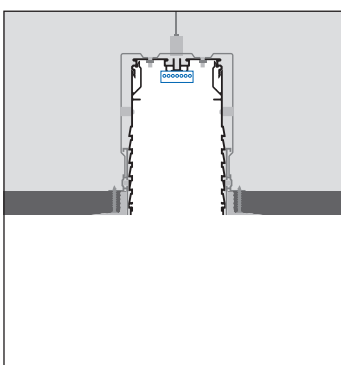
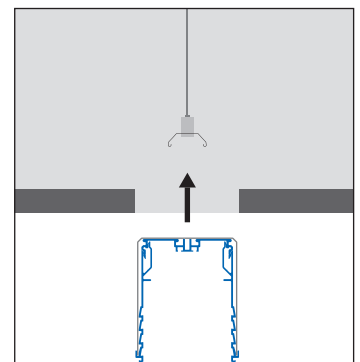
Insert the **mounting frame** complete with end plate into the cut-out and rest it on the ceiling panels. Attach steel cords to brackets, tension slightly and later pull upwards to precise height. Screw-fasten the supporting fins roughly every 10 cm from below through the ceiling panels. Insert further frames, connect the joints and tighten the screws. Fit the second end plate. Plaster the joints and finish off the ceiling.

METHOD 1: Suspend the **channel section** from two steel cords and use them to level it. Place the ceiling panels at the sides over the edges of the channel section.

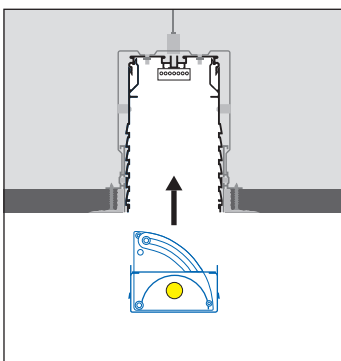
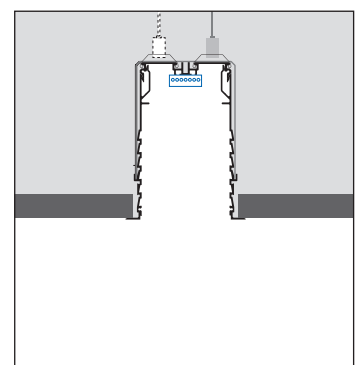


Push the first **channel section** fitted with an endplate into the ceiling cut-out and snap it into the mounting frame. Tighten the bolts of the brackets. Offer up the next section and connect the joint with two springs, finally insert the second end plate.

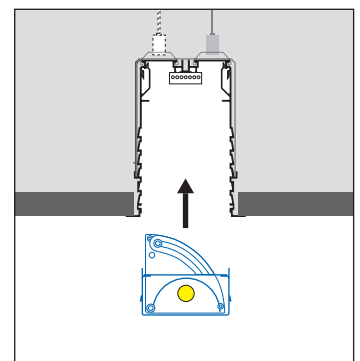
METHOD 2: Insert the **channel section** into the ceiling cut-out already attached to the cord and use the cord to pull it upwards.



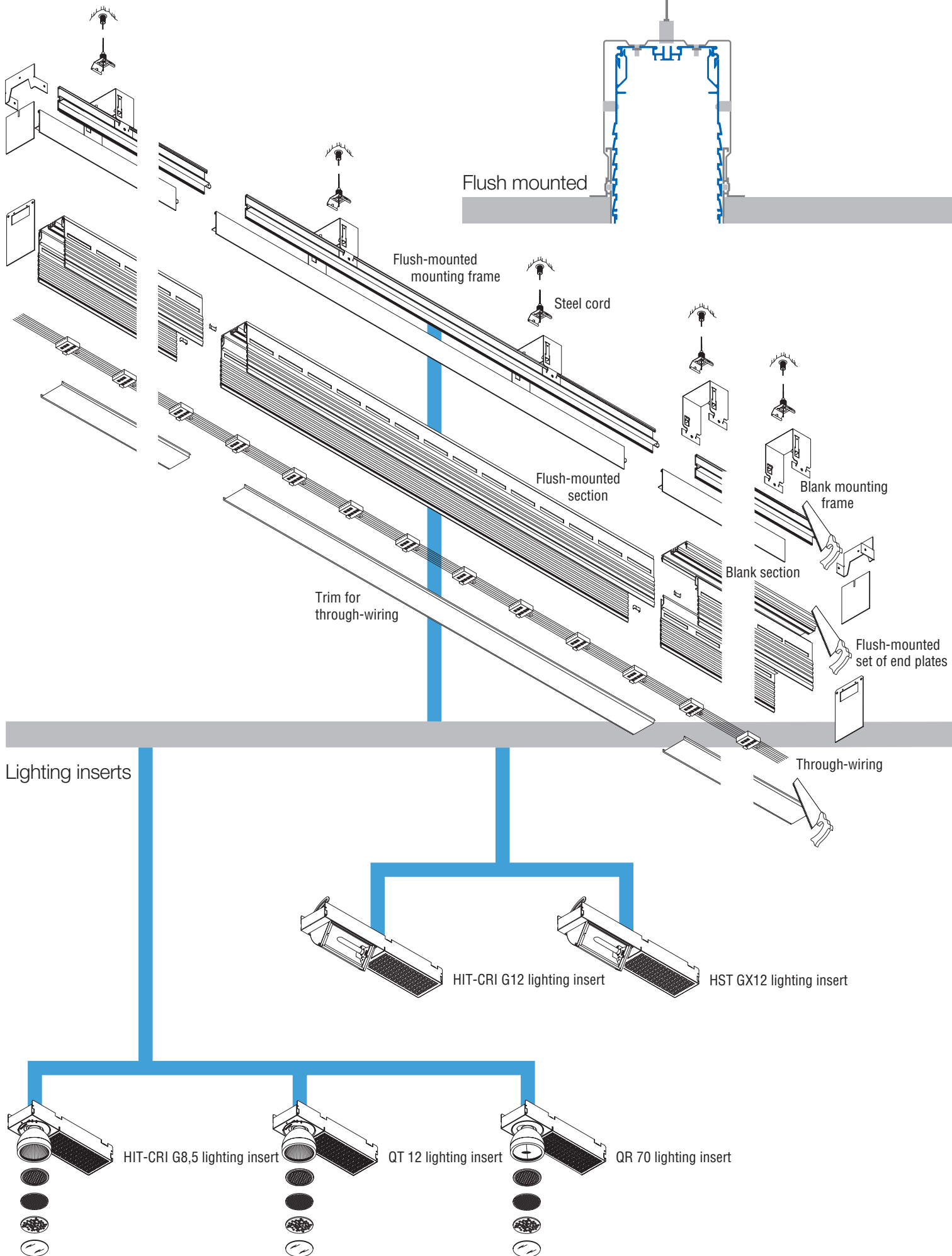
Run the **through-wiring** directly into the channel section, click it into place and connect to the feeder. If required, insert plastic trims into the channel section in order to conceal the wiring. Connect the lighting inserts to the **phase selector plug** as required.

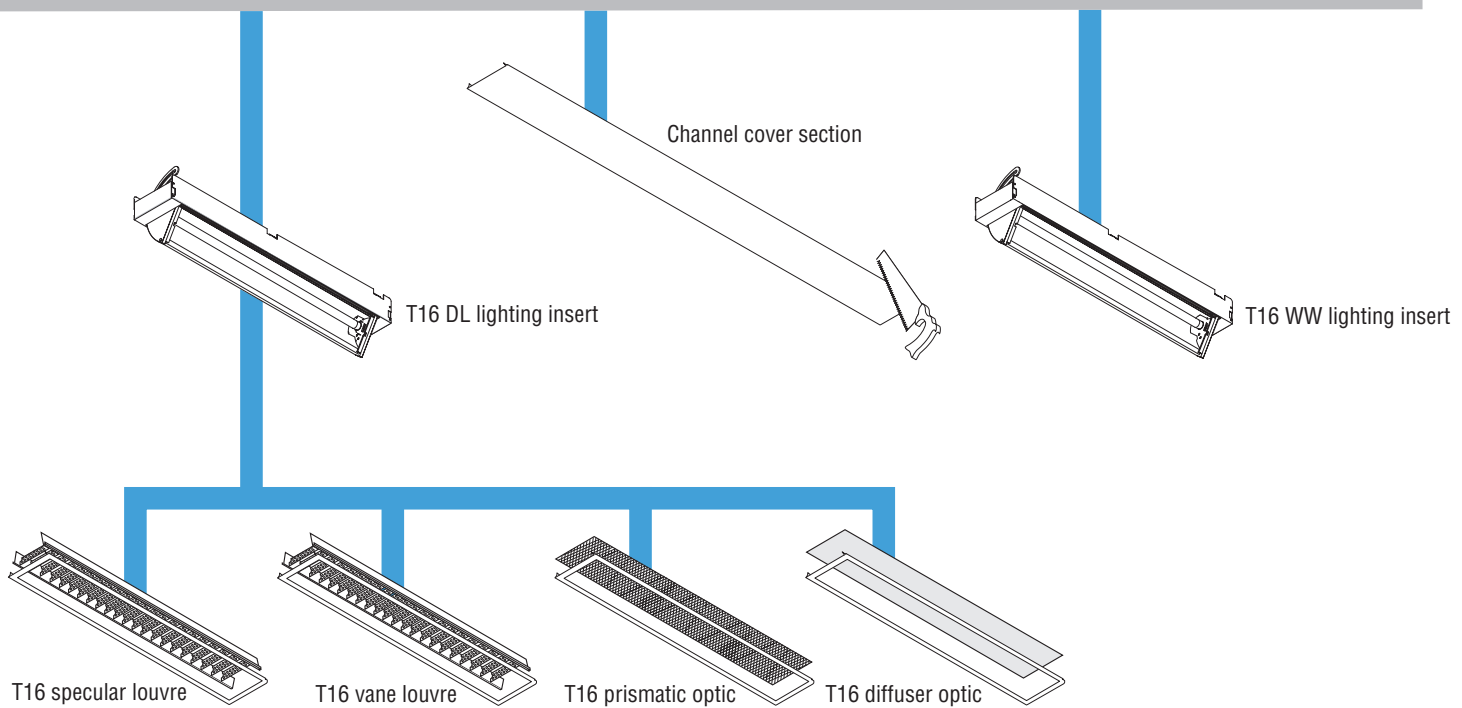
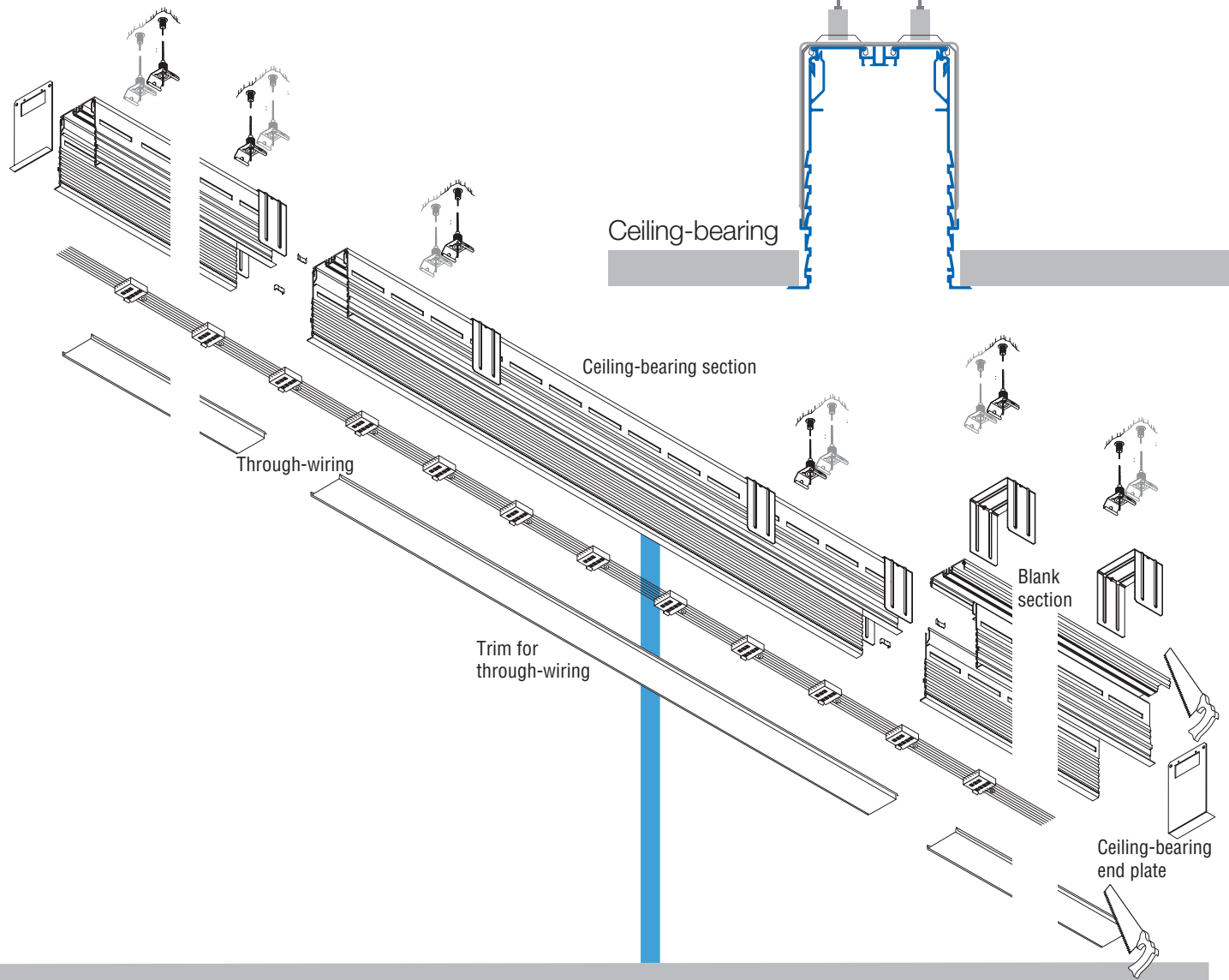


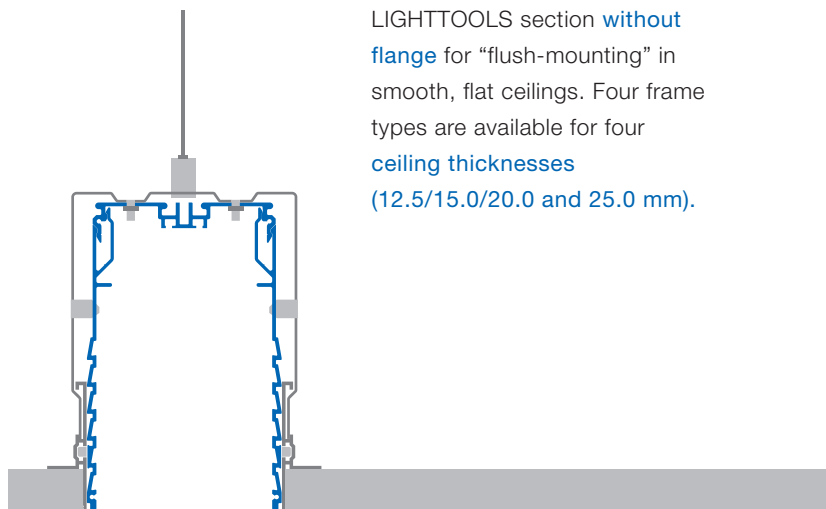
Click the connected **lighting inserts** into the channel section in the required position. “Empty” channel lengths can be blanked off by using an aluminium cover section. This creates a clean, flush, unobtrusive look with attractive lines. In order to obtain additional lighting effects, it is possible, if required, to provide the cover plate with light slits or, for example round openings which can be backed by coloured strips and backlit by lighting inserts fitted with T16 lamps.



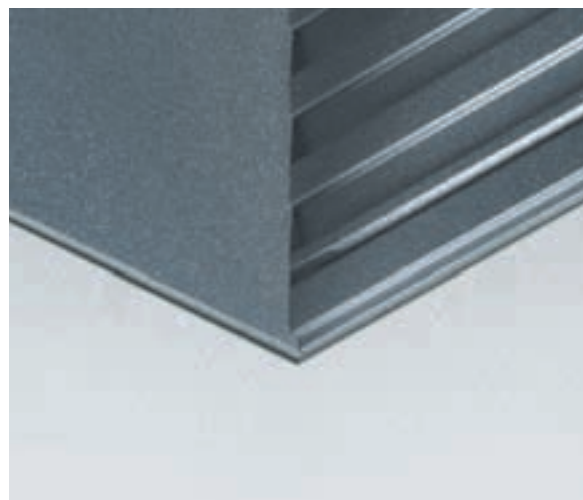
LIGHTTOOLS system overview







LIGHTTOOLS section **without flange** for “flush-mounting” in smooth, flat ceilings. Four frame types are available for four **ceiling thicknesses** (12.5/15.0/20.0 and 25.0 mm).



L-TOOLS section, flush mounting



Section unit, without flange

- 3 extruded aluminium sections assembled to form a U-shaped unit, side sections without flange
- For recessing into flat plaster ceilings or similar
- Only in combination with mounting frame run-in with plaster
- No-tool fitting of through-wiring
- Incl. snap-on clips, for fixing butt joint to next channel section
- Colour: titanium
- Width of ceiling cut-out 121 mm, resulting aperture 100 mm

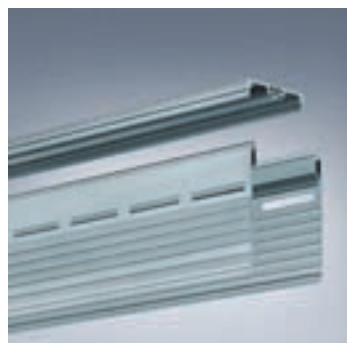
Cat. no.	W/H	kg	Order no.
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Channel section, flush mounting

Length 1,600 mm	108/175	5.9	60 210 001
Length 800 mm	108/175	3.0	60 210 002

See formula for determining number of channel sections required on page 16.

L-TOOLS blank section, flush mounting



Blank section unit, without flange (unassembled)

- For cutting to suit on site (minimum length 800 mm!) and subsequent assembly to a shortened U-section
- Design otherwise as in L-TOOLS section, flush mounting
- Incl. 2 end plates, for closure of entire channel length
- 1 end plate with fixed 7-pole terminal for feed-in
- Colour: titanium
- Width of ceiling cut-out 121 mm, resulting aperture 100 mm

Cat. no.	W/H	kg	Order no.
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Blank channel section, flush mounting

Length 1,600 mm	108/175	5.9	60 210 003
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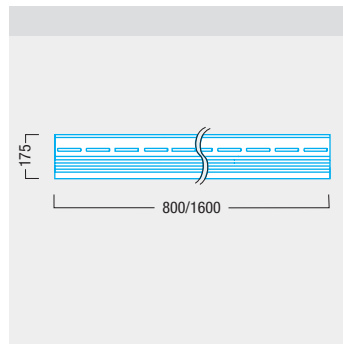
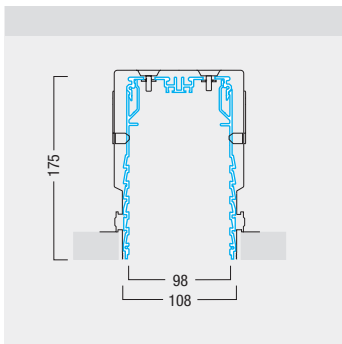
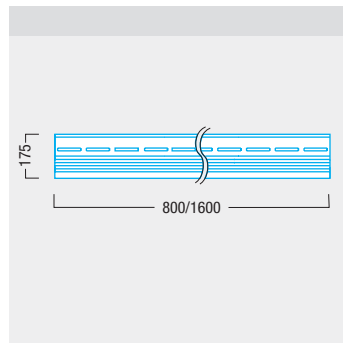
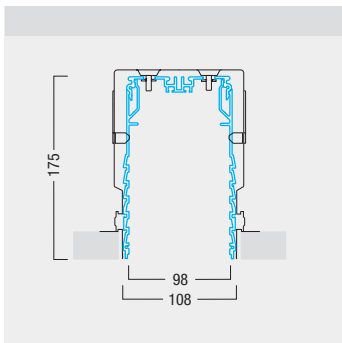
Generally, one blank section is needed at the end of a length of channel and is cut to suit on site.

See formula for determining number of channel sections required on page 16.

To specify e.g.: *L-TOOLS section, flush mounting*
Length 1,600 mm 60 210 001

The flangeless channel section is used for **flush-mounting** in plasterboard ceilings. This version requires a mounting frame as a sub-base in addition to the actual channel section: the mounting frames are first placed in the prepared ceiling cut-out and fixed to the ceiling. The weight of the LIGHTTOOLS unit is transferred to the structural (load-bearing) ceiling by steel cords. The channel sections are not fitted in the ceiling opening and locked in the mounting frame until the assembly joints have been plastered over. The through-wiring is then fitted, and the power supply (if applicable, a building management system as well) is then connected.

The channel structure (channel section and mounting frame) is cut to the desired length on site. The appropriate number of standard lengths (1,600 mm) is calculated according to site requirements. Finally, they are blanked off by a 3-part blank section and a blank mounting frame which are cut to length on site. In some cases a shorter 800 mm section is required instead of a single 1,600 mm standard section (see page 16). The connectors for the channel sections and mounting frames are included in the scope of supply with the sections and do not have to be ordered separately. The same applies to the end plates. They need only be ordered as an extra set if no blank sections are used.



L-TOOLS flush mounting frame



Mounting frame for section without flange

- For adjusting and fixing a channel section within a suspended plaster-board ceiling or similar
- Used as sharp edged trim on plaster-board, gypsum ceilings
- Snap-in mechanism for fixing channel section
- Frame is inserted into ceiling cut-out (prepared on site) and fastened with screws
- Incl. spacing brackets fitted for exact observance of width of opening, and for accommodating steel cord suspensions for transferring weight to load-bearing ceiling
- Material: extruded aluminium section/ galvanised sheet steel
- Incl. butt-joint connector modules for linking with next mounting frame

Cat. no.	kg	Order no.
Mounting frame length 1,600 mm, for		
Panel thickness 12.5 mm	4.0	60 210 014
Panel thickness 15 mm	4.0	60 210 015
Panel thickness 20 mm	4.0	60 210 016
Panel thickness 25 mm	4.0	60 210 017
Mounting frame length 800 mm, for		
Panel thickness 12.5 mm	2.5	60 210 018
Panel thickness 15 mm	2.5	60 210 019
Panel thickness 20 mm	2.5	60 210 020
Panel thickness 25 mm	2.5	60 210 021

Order same no. of mounting frames (1,600 or 800 mm) as channel sections.

L-TOOLS blank flush mounting frame



Blank mounting frame for section without flange (unassembled)

- For cutting to suit on site (minimum length 800 mm!) and subsequent assembly to a shortened frame
- Design otherwise as in L-TOOLS mounting frame, flush mounting
- Incl. distance brackets (to be fitted after frame has been cut to suit) enclosed for exact observance of width of opening, and for accommodating steel cord susp. for transferring weight to load-bearing ceiling
- Incl. 2 end-plate modules, for closure of entire mounting frame length and which also serve as plastering edge trims at front end

Cat. no.	kg	Order no.
Blank mounting frame length 1,600 mm, for		
Panel thickness 12.5 mm	4.0	60 210 022
Panel thickness 15 mm	4.0	60 210 023
Panel thickness 20 mm	4.0	60 210 024
Panel thickness 25 mm	4.0	60 210 025

Same number and length to be fitted as blank channel sections.

After being cut to length on site, both distance brackets have to be fitted.

See formula for determining number of channel sections required on page 16.

L-TOOLS end-plate set, flush mounting



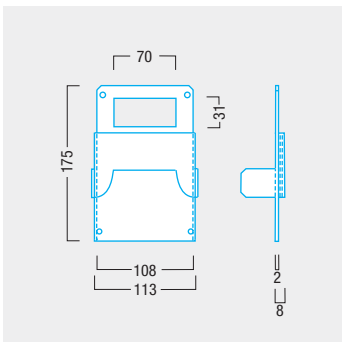
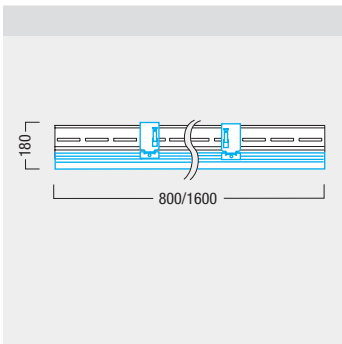
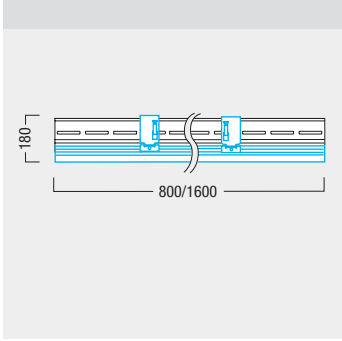
End-cap set, flush mounting

- Closure of both ends of a channel length flush with ceiling (for both channel section and mounting frame)
- To be fitted in on site and screw-fastened to ends of channel
- Also serve as plastering edge trims at front end
- 1 end plate with integrated 7-pole terminal for feed-in
- Material: extruded aluminium section/ galvanised sheet steel
- Colour: titanium

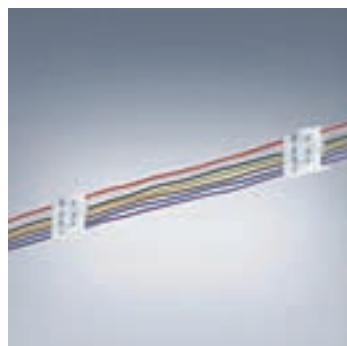
Cat. no.	kg	Order no.
End-cap set		
2 off, flush mounting	0.8	60 210 026

Only to be ordered if no blank modules (channel sections and mounting frames) are used. Therefore required if channel length is made up only of standard lengths 1,600/800.

To specify e.g.: **L-TOOLS flush mounting frame**
Panel thickness 12.5 mm 60 210 014



L-TOOLS through-wiring with sockets



Through-wiring

- 5 x 1.5 mm² für 3-circuit mains supply
- 2 x 1.5 mm² for bus supply
- Incl. 7-pole plug-in sockets every 320 mm
- Fitted in channel section without use of tools
- Through-wiring has to be cut to length on site

Cat. no.	kg	Order no.
----------	----	-----------

7 x 1.5 mm² through-wiring

Section with total length of approx. 1.6 m	0.4	60 210 010
Loom with total length of approx. 10 m	2.0	60 210 009
Loom with total length of approx. 25 m	5.0	60 210 008

One additional feed-in/feed-out unit (also as closure) required per end of cut.

L-TOOLS feed-in/feed-out unit for through-wiring



Feed-in/feed-out unit for through-wiring

- Connected on site to ends of through-wiring
- For terminating continuous through-wiring or for safe closure of cable end
- Plug-in contacts with push-button release
- Feeder cable inserted through opening in end-plate

Cat. no.	Order no.
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Feed-in/feed-out units (pair)

7-pole	60 210 011
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L-TOOLS cover for through-wiring



Cover section for through-wiring

- For optional closure of through-wiring on site
- Material: grey plastic (titanium colour)
- Can be cut to size as required on site and snapped into the supporting fins in the base of the channel section

Cat. no.	kg	Order no.
----------	----	-----------

Cover section

1,600 mm	0.4	60 210 012
----------	-----	------------

L-TOOLS steel cord (pair)



Pair of steel cords

- For continuous height adjustment and balancing of channel lengths
- For reducing load on suspended ceiling, and for directly shifting weight to load-bearing ceiling structure
- Load carrying capacity per steel cord: 30 kg
- Insert into both spacing brackets of mounting frames, or snap onto mounting tracks in base of channels sections with flange
- Each with ceiling rose and spring clip with patented adjusting device

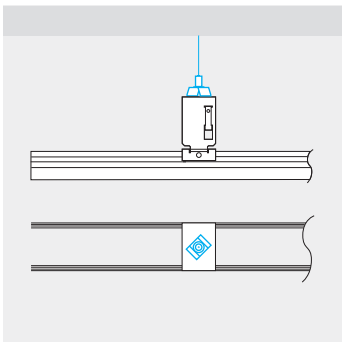
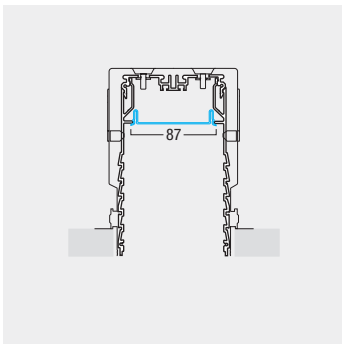
Cat. no.	Order no.
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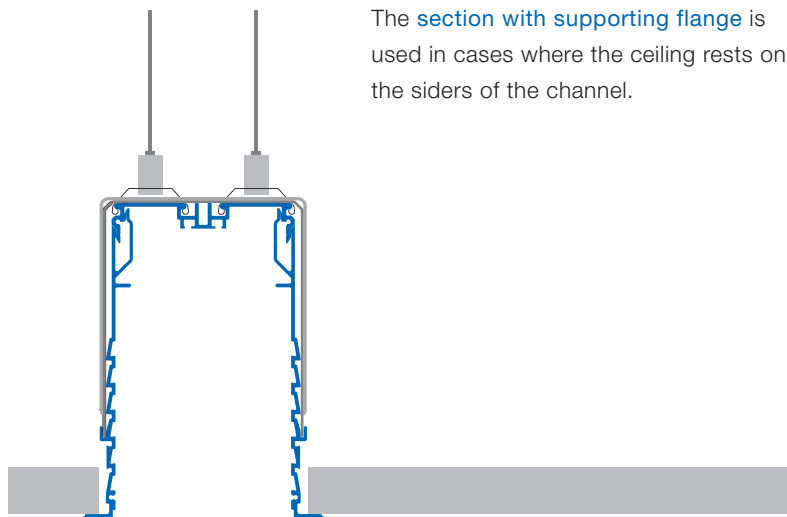
Pair of steel cords

Length 1,000 mm	60 210 027
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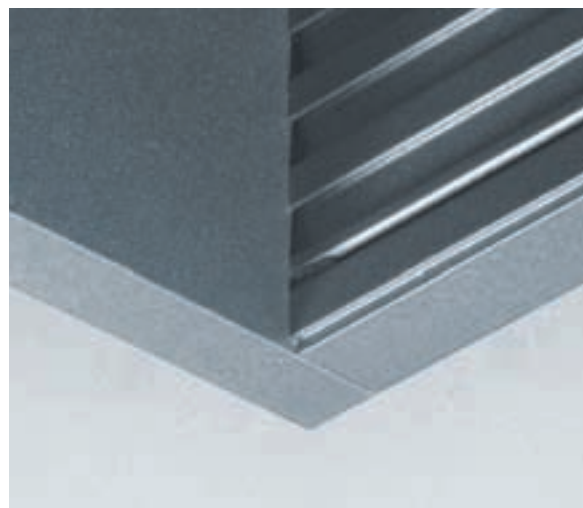
One pair of steel cords required per mounting frame.

To specify e.g.: *L-TOOLS through-wiring with sockets*
Reel with total length of approx. 10 m 60 210 009

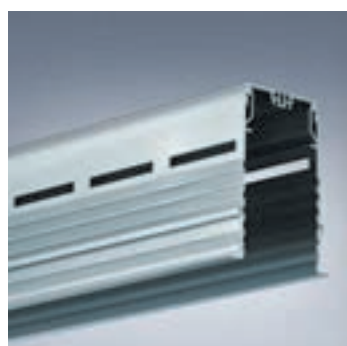




The **section with supporting flange** is used in cases where the ceiling rests on the sides of the channel.



L-TOOLS section, ceiling-bearing



Section unit with flange

- 3 extruded aluminium sections assembled to form a U-shaped unit, side sections with flange serving as support for ceiling panels
- As supporting component in suspended ceilings
- No-tool fitting of through-wiring
- Base section for no-tool fitting of steel cord suspensions
- Incl. stabilising bracket, externally pushed on channel section and screw-fastened
- For continuous fixing of opening width (one bracket also serves as butt joint connector to next channel section)
- Incl. snap-on clips, for fixing butt joint to next channel section
- Colour: titanium
- Width of ceiling cut-out 124 mm, resulting aperture 100 mm

Cat. no.	W/H	kg	Order no.
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Channel section, ceiling-bearing

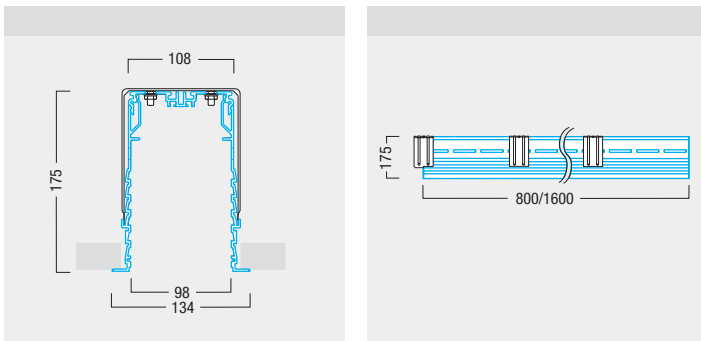
Length 1,600 mm	134/175	7.7	60 210 004
Length 800 mm	134/175	4.8	60 210 005

See formula for determining number of channel sections required on page 16.

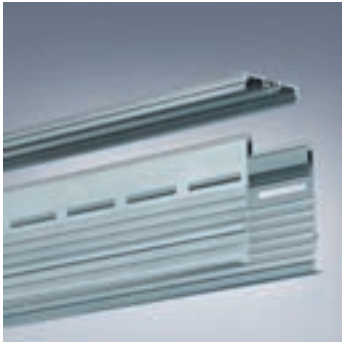
To specify e.g.: **L-TOOLS section, ceiling-bearing**
Length 1,600 mm 60 210 004

The channel section with supporting flange is **ceiling-bearing**. The channel section is suspended directly from the structural (load-bearing) ceiling by steel cords and performs a load-bearing function for the ceiling modules which are laid onto the flanges. After adjustment, the through-wiring is fitted, and the power supply (if applicable, also a building management system) is connected.

The channel sections are cut to the desired length on site. The appropriate number of standard lengths (1,600 mm) is calculated according to site requirements. Finally, they are blanked off by a 3-part **blank section** which is cut to length on site. In some cases a shorter 800 mm section is required instead of a single 1,600 mm standard section (see page 16). The **connectors** for the channel sections are included in the scope of supply with the sections and do not have to be ordered separately. The same applies to the end plates. They need only be ordered as an extra set if no blank sections are used.



L-TOOLS blank section, ceiling-bearing



Blank section unit, with flange (unassembled)

- For cutting to suit on site (minimum length 800 mm!) and subsequent assembly to a shortened U-section
- Design otherwise as in L-TOOLS section, with flange
- Incl. 2 end plates with flange, for closure of entire channel end
- 1 end plate with fixed 7-pole terminal for feed-in
- Colour: titanium
- Width of ceiling cut-out 124 mm, resulting aperture 100 mm

Cat. no.	W/H	kg	Order no.
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Blank channel section, ceiling-bearing

Length 1,600 mm	134/175	7.7	60 210 006
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Generally, one blank section is needed at the end of a length of channel and is cut to suit on site.

See formula for determining number of channel sections required on page 16.

L-TOOLS end-plate set, ceiling-bearing



End caps with flange

- For closing both front ends of a ceiling-bearing channel length
- 1 end plate with fixed 7-pole terminal for feed-in
- Material: extruded aluminium section
- Colour: titanium

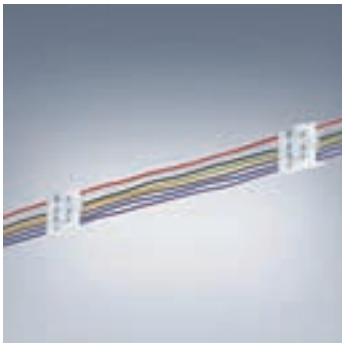
Cat. no.	kg	Order no.
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End-cap set

2 off, with flange	0.3	60 210 007
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Only to be ordered if no blank channel sections are used. Therefore required if channel length is made up only of standard lengths 1,600 / 800.

L-TOOLS through-wiring with sockets



Through-wiring

- 5 x 1.5 mm² für 3-circuit mains supply
- 2 x 1.5 mm² for bus supply
- Incl. 7-pole plug-in sockets every 320 mm
- Fitted in channel section without use of tools
- Through-wiring has to be cut to length on site

Cat. no.	kg	Order no.
----------	----	-----------

7 x 1.5 mm² through-wiring

Section with total length of approx. 1.6 m	0.4	60 210 010
Loom with total length of approx. 10 m	2.0	60 210 009
Loom with total length of approx. 25 m	5.0	60 210 008

One additional feed-in/feed-out unit (also as closure) required per end of cut.

L-TOOLS feed-in/feed-out unit for through-wiring



Feed-in/feed-out unit for through-wiring

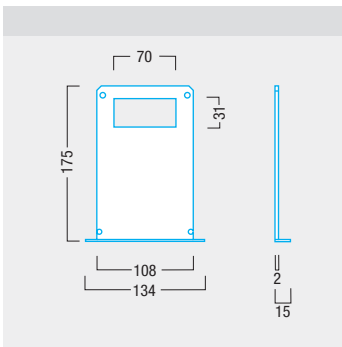
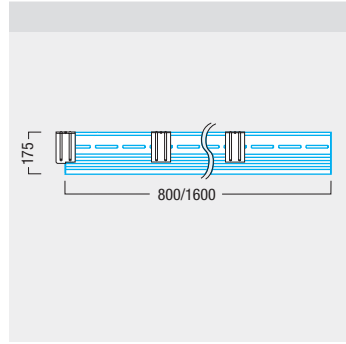
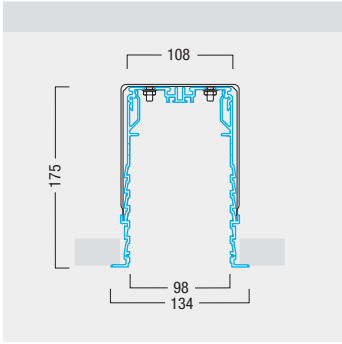
- Connected on site to ends of through-wiring
- For terminating continuous through-wiring or for safe closure of cable end
- Plug-in contacts with push-button release
- Feeder cable inserted through opening in end-plate

Cat. no.	Order no.
----------	-----------

Feed-in/feed-out units (pair)

7-pole	60 210 011
--------	------------

To specify e.g.: *L-TOOLS cut-to-length section, ceiling-bearing*
Length 1,600 mm 60 210 006



L-TOOLS cover for through-wiring



Cover section for through-wiring

- For optional closure of through-wiring on site
- Material: grey plastic (titanium colour)
- Can be cut to size as required on site and snapped into the supporting fins in the base of the channel section

Cat. no.

kg

Order no.

Cover section

1,600 mm	0.4	60 210 012
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L-TOOLS steel cord (pair)



Pair of steel cords

- For continuous height adjustment and balancing of channel lengths
- For reducing load on suspended ceiling, and for directly shifting weight to load-bearing ceiling structure
- Load carrying capacity per steel cord: 30 kg
- Insert into both spacing brackets of mounting frames, or snap onto mounting tracks in base of channels sections with flange
- Each with ceiling rose and spring clip with patented adjusting device

Cat. no.

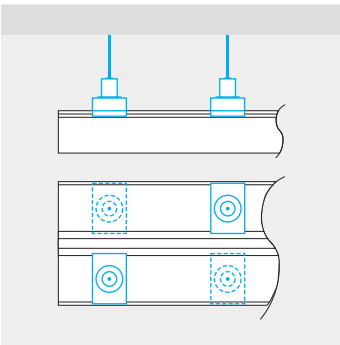
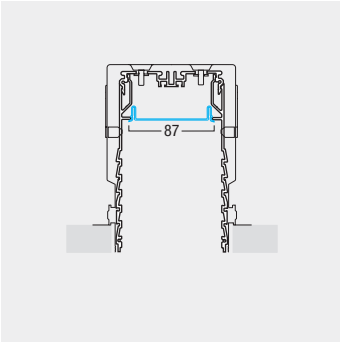
Order no.

Pair of steel cords

Length 1,000 mm		60 210 027
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Depending on channel section, one pair of steel cords is required; for improved balancing, however, we recommend the use of two pairs of steel cords (see also drawing).

To specify e.g.: *L-TOOLS cover for through-wiring*
1,600 mm 60 210 012

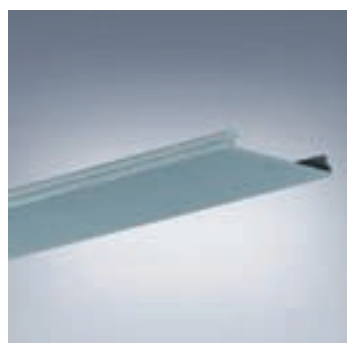


LIGHTTOOLS

LIGHTTOOLS lighting inserts are characterised by their clear design and by the fact that they are child's play to handle: they can be fitted into the channel sections at any point and be locked into them at any level with the aid of two key switches, mounted at the ends without the use of tools. They can be moved freely over the entire length of the channel run without any restriction.



L-TOOLS channel cover section



Channel cover section

- For optional closure of channel section opening (for flush with ceiling/ceiling-bearing) by customer
- Material: extruded aluminium section
- Colour: titanium
- Incl. clamping springs enclosed for push-on
- If required, to be cut on site according to local requirements, and to be snapped flush into channel section opening

Cat. no.	kg	Order no.
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Cover section

1,600 mm	1.1	60 210 013
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Do not arrange above lighting heads.

L-TOOLS HIT-CRI G8.5 lighting insert



HIT-CRI G8.5

Ø0,6m

Lighting module with rotating and pivoting reflector head

- Reflector head made of die-cast aluminium
- Rotates through approx. 220°, pivots through approx. 70°
- Specular reflector made of anodised highest-grade aluminium, silver colour, incl. protective glass panel
- Protective glass panel in front ring can be replaced by colour/blocking filter
- Housing made of sheet steel
- Colour: titanium
- Special key switches at the ends for fitting without tools
- Lighting inserts can be positioned variably in the channel, both longitudinally and vertically
- With electronic ballast (non-dimmable)
- Mains voltage: 220–240 V/50/60 Hz
- 3 x 1.5 mm² connecting cable, including 5-pole plug-in contact with phase selection (3 phases)

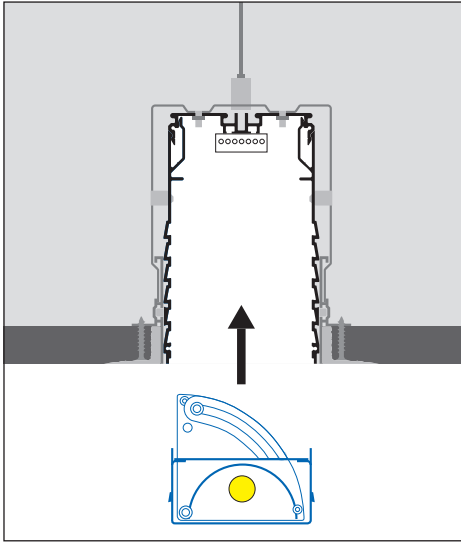
Cat. no.	L/W/H	kg	Order no.
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Spot lighting insert (1x module)

1/20 W HIT-CRI G8,5 flood	315/95/51	1.7	60 210 029
1/20 W HIT-CRI G8,5 spot	315/95/51	1.7	60 210 028
1/35 W HIT-CRI G8,5 flood	315/95/51	1.7	60 210 031
1/35 W HIT-CRI G8,5 spot	315/95/51	1.7	60 210 030
1/70 W HIT-CRI G8,5 flood	315/95/51	1.7	60 210 033
1/70 W HIT-CRI G8,5 spot	315/95/51	1.7	60 210 032

electronic

To specify e.g.: **L-TOOLS channel cover section**
1,600 mm 60 210 013



Lighting inserts can be fitted, moved or removed at any time. They can be fitted and electrically connected (including optional connection to the integral bus line) at any

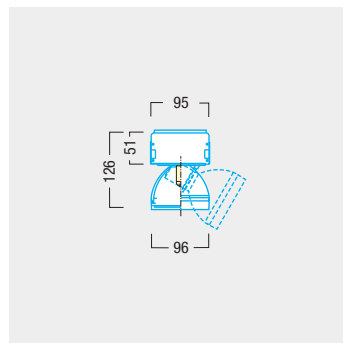
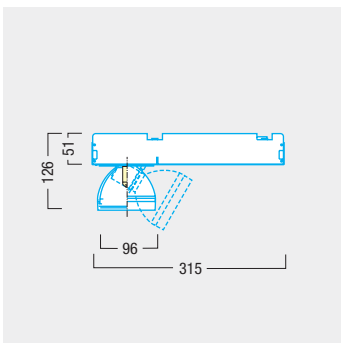
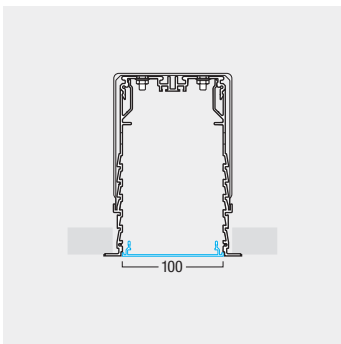
point along the channel run without the use of tools. Thanks to a special snap-in mechanism, it is child's play to click them into the channel section by hand and even vary their recessed depth, e.g. flush-mounting ensures that all lighting inserts can be moved freely and directed towards walls (from the ceiling down to the floor); semi-recessed, especially if T16 lighting inserts fitted with various reflector optics are to be used, or fully recessed in the section, particularly if spotlight inserts are to be used as stationary downlights.

All the lighting inserts are marked with their modular length (e.g. single module, 1.5 module etc.). The modular unit is 320 mm. This means, for instance, that a double lighting insert (T16 24 W) should be fitted in a 640 mm channel run (the actual insert it-

self is slightly shorter in order to leave sufficient space for handling). Dividing the relevant channel run into modular units makes it easy to determine the maximum number of lighting inserts which can be fitted.

The various reflector optics (specular louvre, prismatic optic etc.) are inserted into a lighting frame which is then subsequently clicked in flush with the channel opening. In this case, the relevant T16 lighting inserts are recessed slightly deeper, but in the same position.

If required, gaps between lighting inserts (only in the case of flush ceiling-mounting) or reflector optics can be blanked off at the same level with cut-to-length cover plates.



1/70 W HIT-CRI G8,5, FLOOD (St5223)		
Mounting height	Average luminance	Beam Diameter
1 m	7015 lx	0.70 m
2 m	1754 lx	1.41 m
3 m	779 lx	2.11 m
4 m	438 lx	2.82 m
Φ = 6600 lm Half beam angle = 2 x 19° LOR = 76%		

1/70 W HIT-CRI G8,5, SPOT (St5222)		
Mounting height	Average luminance	Beam Diameter
2 m	7708 lx	0.38 m
4 m	1927 lx	0.76 m
6 m	856 lx	1.13 m
8 m	482 lx	1.51 m
Φ = 6600 lm Half beam angle = 2 x 5° LOR = 74%		

L-TOOLS QT 12 lighting insert



Lighting module with rotating and pivoting reflector head

- Reflector head made of die-cast aluminium
- Rotates through approx. 220°, pivots through approx. 70°
- Specular reflector made of anodised highest-grade aluminium, silver colour
- Front ring accommodates colour/blocking filters
- Housing made of sheet steel
- Colour: titanium
- Design otherwise as with L-TOOLS HIT-CRI G8.5 lighting insert
- Electronic safety transformer 35 W to 105 W
- Mains voltage: 230 V/50/60 Hz
- Lamp voltage: 12 V
- Special versions available for dimming via LUXMATE: 5 x 1.5 mm² (3 x mains, 2 x bus)

Cat. no.	L/W/H	kg	Order no.
Spot lighting insert (1x module)			
1/90 W QT-LP 12 flood	315/95/51	1.5	60 210 035
1/90 W QT-LP 12 spot	315/95/51	1.5	60 210 034

Dimmable LUXMATE version available on request.

L-TOOLS QR 70 lighting insert



Lighting module with rotating and pivoting lighting head

- Reflector head made of die-cast aluminium for accommodating lamp
- Rotates through approx. 220°, pivots through approx. 70°
- Front ring accommodates colour/blocking filters
- Housing made of sheet steel
- Colour: titanium
- Design otherwise as with L-TOOLS HIT-CRI G8.5 lighting insert
- Electronic safety transformer 35 W to 105 W
- Mains voltage: 230 V/50/60 Hz
- Lamp voltage: 12 V
- Special versions available for dimming via LUXMATE: 5 x 1.5 mm² (3 x mains, 2 x bus)

Cat. no.	L/W/H	kg	Order no.
Spot lighting insert (1x module)			
1/50 W QR-LP 70	315/95/51	1.4	60 210 036

Dimmable LUXMATE version available on request.

L-TOOLS Filters for use on spotlight inserts

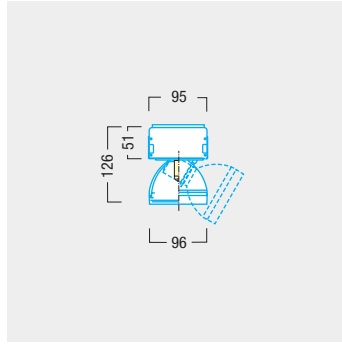
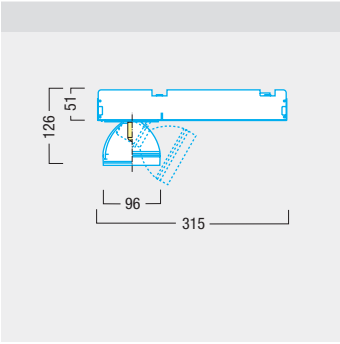


Filters

- To be used in bayonet ring on spotlight head
- To be used between specular reflector and bayonet ring on QT 12 and HIT-CRI versions
- Interference colour filters

Cat. no.	Ø	Order no.
Colour filter		
yellow	87	S0 529 820
green	87	S0 526 830
red	87	S0 526 840
Protective filter		
Protective glass (incl. in HIT-CRI)	87	S0 526 420
UVA Blocking filter	87	S0 526 430

To specify e.g.: **L-TOOLS QT 12 lighting insert**
1/90 W QT-LP 12 flood 60 210 035



1/90 W QT-LP 12, FLOOD (St5225)

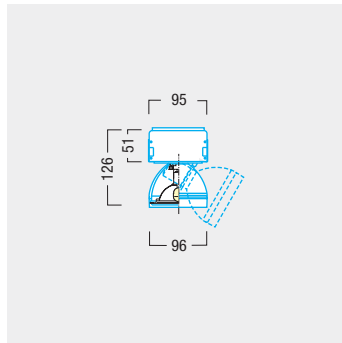
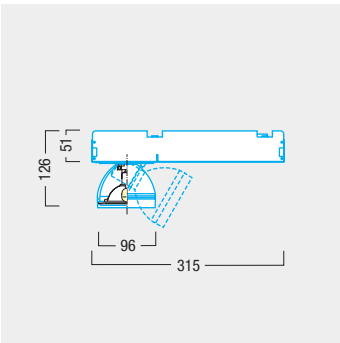
Mounting height	Average illuminance	Beam Diameter
1 m	2713 lx	0.50 m
2 m	678 lx	1.00 m
3 m	301 lx	1.51 m
4 m	170 lx	2.01 m

Φ = 1800 lm Half beam angle = 2 x 14° LOR = 63%

1/90 W QT-LP 12, SPOT (St5224)

Mounting height	Average illuminance	Beam Diameter
2 m	4861 lx	0.28 m
4 m	1215 lx	0.57 m
6 m	540 lx	0.85 m
8 m	304 lx	1.13 m

Φ = 1800 lm Half beam angle = 2 x 4° LOR = 62%



1/50 W QR-LP70, FLOOD (St5229)

Mounting height	Average illuminance	Beam Diameter
1 m	1920 lx	0.46 m
2 m	480 lx	0.92 m
3 m	213 lx	1.38 m
4 m	120 lx	1.85 m

Φ = 630 lm Half beam angle = 2 x 13° LOR = 100%

1/50 W QR-LP70, SPOT (St5228)

Mounting height	Average illuminance	Beam Diameter
1 m	8011 lx	0.12 m
2 m	2003 lx	0.25 m
3 m	890 lx	0.37 m
4 m	501 lx	0.50 m

Φ = 354 lm Half beam angle = 2 x 4° LOR = 100%

L-TOOLS HIT-CRI G12 lighting insert



Lighting module with pivoting reflector housing (can also be used as wall-washer)

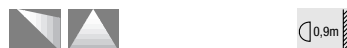
- Reflector housing made of extruded aluminium section
- Pivots through approx. 75°
- Specular reflector, silver colours, wide-angle distribution
- With protective glass
- Housing made of sheet steel
- Colour: titanium
- Special key switches at the ends for fitting without tools
- Lighting inserts can be positioned variably in the channel, both longitudinally and vertically
- With electronic ballast (non-dimmable)
- Mains voltage: 230 V/50/60 Hz
- 3 x 1.5 mm² connecting cable, including 5-pole plug-in contact with phase selection (3 phases)



Cat. no.	L/W/H	kg	Order no.
Flood lighting insert (1.5x module)			
1/70 W HIT-CRI G12	460/95/51	2.1	60 210 038

electronic

L-TOOLS HST GX12 lighting insert



Lighting module with pivoting reflector housing (can also be used as wall-washer)

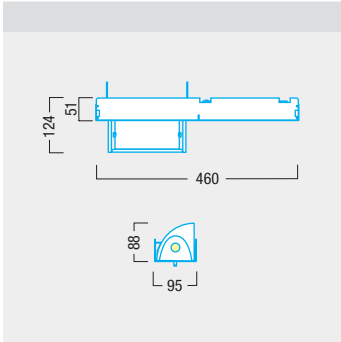
- Reflector housing made of extruded aluminium section
- Pivots through approx. 75°
- Specular reflector, silver colours, wide-angle distribution
- Housing made of sheet steel
- Colour: titanium
- Design otherwise as with L-TOOLS HIT-CRI G12 lighting insert
- With electronic ballast (non-dimmable)
- Mains voltage: 220–240 V/50–60 Hz
- For use with HST 100 W (PHILIPS SDW-TG)



Cat. no.	L/W/H	kg	Order no.
Flood lighting insert (1.5x module)			
1/100 W HST GX12	460/95/51	2.1	60 210 039

electronic

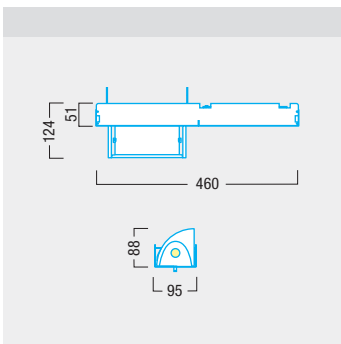
To specify e.g.: **L-TOOLS HIT-CRI G12 lighting insert**
1/70 W HIT-CRI G12 60 210 038



1/70 W HIT-CRI G12 (St5233)

Mounting height	Average luminance	Beam Diameter
1 m	1470 lx	1.48 m
2 m	368 lx	2.95 m
3 m	163 lx	4.43 m
4 m	92 lx	5.90 m

$\Phi = 6600 \text{ lm}$ Half beam angle = $2 \times 36^\circ$ LOR = 71%



1/100 W HST GX12 (ST5234)

Mounting height	Average luminance	Beam Diameter
1 m	995 lx	1.87 m
2 m	249 lx	3.74 m
3 m	111 lx	5.61 m
4 m	62 lx	7.48 m

$\Phi = 4800 \text{ lm}$ Half beam angle = $2 \times 43^\circ$ LOR = 85%

L-TOOLS T16 DL lighting insert



Lighting module with pivoting reflector housing (can also be used as wall-washer)

- Reflector housing made of extruded aluminium section
- Pivots through approx. 75°
- Symmetrical specular reflector, silver colour
- Housing made of sheet steel
- Colour: titanium
- Special key switches at the ends for fitting without tools
- Lighting inserts can be positioned variably in the channel, both longitudinally and vertically
- With electronic ballast (non-dimmable)
- Mains voltage: 230 V/50/60 Hz
- 3 x 1.5 mm² connecting cable, including 5-pole plug-in contact with phase selection (3 phases)
- Special versions available with dimmable DALI ballasts: 5 x 1.5 mm² (3 x mains, 2 x bus)

Cat. no.

L/W/H

kg

Order no.

Flood lighting insert

	Cat. no.	L/W/H	kg	Order no.
1/24 W T16 (double module)	640/95/51	2.7		60 210 043
1/39 W T16 (triple module)	940/95/51	3.9		60 210 044
1/54 W T16 (quadruple module)	1240/95/51	5.2		60 210 045

LDE version (dimmable DALI) available on request.

electronic

L-TOOLS T16 WW lighting insert



Lighting module with pivoting wall-washer reflector housing

- Reflector housing made of extruded aluminium section
- Pivots through approx. 75°
- Asymmetrical specular reflector, silver colour
- Housing made of sheet steel
- Colour: titanium
- Design otherwise as with L-TOOLS T16 DL lighting insert

Cat. no.

L/W/H

kg

Order no.

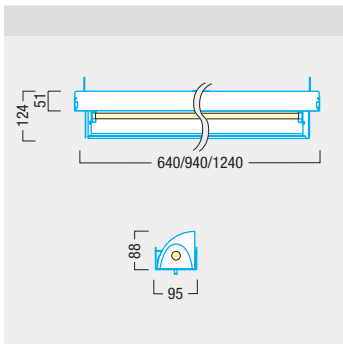
Wallwasher lighting insert

	Cat. no.	L/W/H	kg	Order no.
1/24 W T16 (double module)	640/95/51	2.7		60 210 046
1/39 W T16 (triple module)	940/95/51	3.9		60 210 047
1/54 W T16 (quadruple module)	1240/95/51	5.2		60 210 048

LDE version (dimmable DALI) available on request.

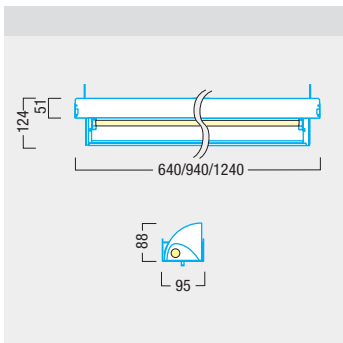
electronic

To specify e.g.: **L-TOOLS T16 DL lighting insert**
1/24 W T16 60 210 043



1/24 W T16 (St5235)		
Mounting height	Average luminance	Beam Diameter
1 m	371 lx	1.83 m
2 m	93 lx	3.66 m
3 m	41 lx	5.49 m
4 m	23 lx	7.32 m
Φ = 1750 lm Half beam angle = 2 x 42° LOR = 89%		

1/54 W T16 (ST5245)		
Mounting height	Average luminance	Beam Diameter
1 m	868 lx	1.83 m
2 m	217 lx	3.66 m
3 m	96 lx	5.49 m
4 m	54 lx	7.32 m
Φ = 4400 lm Half beam angle = 2 x 42° LOR = 83%		



1/24 W T16 (St5250)		
Mounting height	Average luminance	Beam Diameter
1 m	312 lx	2.08 m
2 m	78 lx	4.16 m
3 m	35 lx	6.24 m
4 m	19 lx	8.32 m
Φ = 1750 lm Half beam angle = 2 x 46° LOR = 87%		

1/54 W T16 (ST5252)		
Mounting height	Average luminance	Beam Diameter
1 m	728 lx	2.08 m
2 m	182 lx	4.16 m
3 m	81 lx	6.24 m
4 m	46 lx	8.32 m
Φ = 4400 lm Half beam angle = 2 x 46° LOR = 81%		

L-TOOLS T16 specular reflector optic



- Semi-specular louvre**
- 1-lamp specular louvre DSE
 - Material: aluminium anodised in a highly specular finish, silver colour
 - Incl. lighting frame (for inserting reflector optic), to be snapped in flush with channel section opening
 - Colour: titanium

Cat. no.	kg	Order no.
Semi-specular louvre for		
1/24 W T16	0.4	60 210 049
1/39 W T16	0.6	60 210 050
1/54 W T16	0.7	60 210 051

*Associated lighting insert positioned in snap-in position 3 inside channel section.
Not suitable for use in wallwasher.*

L-TOOLS T16 vane louvre



- Vane louvre**
- Vane-louvre optic
 - For longitudinal glare control in down-light applications
 - Material: aluminium
 - Incl. lighting frame (for inserting reflector optic), to be snapped in flush with channel section opening
 - Colour: titanium

Cat. no.	kg	Order no.
Vane louvre for		
1/24 W T16	0.4	60 210 052
1/39 W T16	0.6	60 210 053
1/54 W T16	0.7	60 210 054

*Associated lighting insert positioned in snap-in position 3 inside channel section.
Not suitable for use in wallwasher.*

L-TOOLS T16 prismatic optic



- Prismatic optic**
- For glare control and soft light distribution
 - Material: clear PMMA, pyramid structure
 - Incl. lighting frame (for inserting reflector optic), to be snapped in flush with channel section opening
 - Colour: titanium

Cat. no.	kg	Order no.
Prismatic optic for		
1/24 W T16	0.3	60 210 055
1/39 W T16	0.5	60 210 056
1/54 W T16	0.6	60 210 057

*Associated lighting insert positioned in snap-in position 2 inside channel section.
Not suitable for use in wallwasher.*

L-TOOLS T16 diffuser optic

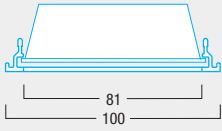


- Diffuser optic**
- White diffusing panel
 - For uniformly diffuse light distribution
 - Material: PMMA diffuser pearl material, white
 - Incl. lighting frame (for inserting reflector optic), to be snapped in flush with channel section opening
 - Colour: titanium

Cat. no.	kg	Order no.
Diffuser panel for		
1/24 W T16	0.4	60 210 058
1/39 W T16	0.6	60 210 059
1/54 W T16	0.7	60 210 060

*Associated lighting insert positioned in snap-in position 2 inside channel section.
Not suitable for use in wallwasher.*

To specify e.g.: **L-TOOLS T16 specular reflector optic**
1/24 W T16 60 210 049

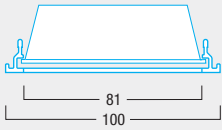


1/24 W T 16 (ST5236)		
Mounting height	Average Illuminance	Beam Diameter
1 m	537 lx	1.15 m
2 m	134 lx	2.30 m
3 m	60 lx	3.45 m
4 m	34 lx	4.60 m

$\Phi = 1750 \text{ lm}$ Half beam angle = $2 \times 30^\circ$ LOR = 57%

1/54 W T 16 (ST5246)		
Mounting height	Average Illuminance	Beam Diameter
1 m	1270 lx	1.15 m
2 m	318 lx	2.30 m
3 m	141 lx	3.45 m
4 m	79 lx	4.60 m

$\Phi = 4400 \text{ lm}$ Half beam angle = $2 \times 30^\circ$ LOR = 54%

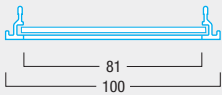


1/24 W T 16 (ST5237)		
Mounting height	Average Illuminance	Beam Diameter
1 m	531 lx	1.11 m
2 m	133 lx	2.21 m
3 m	59 lx	3.32 m
4 m	33 lx	4.43 m

$\Phi = 1750 \text{ lm}$ Half beam angle = $2 \times 29^\circ$ LOR = 53%

1/54 W T 16 (ST5247)		
Mounting height	Average Illuminance	Beam Diameter
1 m	1262 lx	1.11 m
2 m	316 lx	2.21 m
3 m	140 lx	3.32 m
4 m	79 lx	4.43 m

$\Phi = 4400 \text{ lm}$ Half beam angle = $2 \times 29^\circ$ LOR = 50%

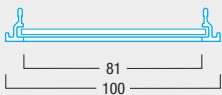


1/24 W T 16 (ST5238)		
Mounting height	Average Illuminance	Beam Diameter
1 m	530 lx	1.23 m
2 m	133 lx	2.46 m
3 m	59 lx	3.69 m
4 m	33 lx	4.92 m

$\Phi = 1750 \text{ lm}$ Half beam angle = $2 \times 32^\circ$ LOR = 74%

1/54 W T 16 (ST5248)		
Mounting height	Average Illuminance	Beam Diameter
1 m	1277 lx	1.23 m
2 m	319 lx	2.46 m
3 m	142 lx	3.69 m
4 m	80 lx	4.92 m

$\Phi = 4400 \text{ lm}$ Half beam angle = $2 \times 32^\circ$ LOR = 71%



1/24 W T 16 (ST5239)		
Mounting height	Average Illuminance	Beam Diameter
1 m	107 lx	2.82 m
2 m	27 lx	5.64 m
3 m	12 lx	8.46 m
4 m	7 lx	11.3 m

$\Phi = 1750 \text{ lm}$ Half beam angle = $2 \times 55^\circ$ LOR = 54%

1/54 W T 16 (ST5249)		
Mounting height	Average Illuminance	Beam Diameter
1 m	250 lx	2.82 m
2 m	62 lx	5.64 m
3 m	28 lx	8.46 m
4 m	16 lx	11.3 m

$\Phi = 4400 \text{ lm}$ Half beam angle = $2 \times 55^\circ$ LOR = 50%

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Art.-No. 04 571 974-UK 07/02 © Zumtobel Staff
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 Printed on environmentally-friendly chlorine-free paper. Printed on Luxosamt Offset.