TRILUX
SIMPLIFY YOUR LIGHT.

LIVELINK APPLICATIONS

FOR EACH REQUEST THE RIGHT SOLUTION

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Contents

TRILUX

SIMPLIFY YOUR LIGHT

TRILUX SIMPLIFY YOUR LIGHT represents the simplest and most reliable path to customised, energy-efficient and future-proof lighting solutions. In the dynamic and ever increasingly complex lighting market, customers are provided with optimal advice, ideal orientation and perfect light. To ensure this, TRILUX offers a wide portfolio of technologies and services as well as high-performance partners and companies in the TRILUX Group. The lighting specialist combines single components to create custom-designed complete solutions – always perfectly tailored to the customer's requirements and specific applications.

In this way, complex and extensive projects can be simply and rapidly implemented from a single supplier. In the spirit of SIMPLIFY YOUR LIGHT, simple planning, installation and ease of use is focused on for customers in addition to quality and efficiency.

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SMART SOLUTIONS

LIGHTING NETWORKS
AS INFRASTRUCTURE

Digitalisation starts with lighting

You want to advance digitalisation in your company by a huge step, with minimum effort and risk? Start with lighting! Networked lighting not only provides enormous improvements regarding energy efficiency, comfort and intelligence. The light points' power supply can also be used for non-lighting applications. This way, the lighting network creates the perfect infrastructure for innovative applications.

TRILUX supports companies in their digital transformation with a three-step approach. The degree of networking and lighting intelligence can be adapted precisely to individual requirements and framework conditions. Each step brings more opportunities – and larger improvements.

FUTURE-SAFE
HEAT MAPPING
DIGITAL TRANSFORMATION
SMART SOLUTIONS

Simple LED transformation – but with DALI, please

Simply converting to LED lighting already improves energy efficiency and quality of light significantly. In terms of technology, companies can choose between switchable LEDs and dimmable, DALI-based LEDs. TRILUX recommends DALI luminaires, since the DALI protocol has become established as the standard for controlling luminaires and lighting networks. This provides maximum future-safety. DALI luminaires can also be networked and functionally upgraded at a later time without difficulty – and thus form the basis for all further transformation steps.

Networking – individual light points form an intelligent lighting network

With the LiveLink light management system, DALI luminaires can be connected quickly and simply to form an intelligent network. This opens up entirely new possibilities regarding luminaire control, analysis and optimisation. Sensors for presence detection and constant light control on request minimise energy consumption, and sophisticated, automated light scenes like Human Centric Lighting bring daylight into buildings. The next step leads to the cloud: with TRILUX Monitoring Services, companies can e.g. monitor, analyse and optimise operating data for any individual luminaire in real time via the LiveLink Cloud. This way, maintenance cycles can be adapted to actual requirements. This reduces costs as well as the risk of surprising lighting maintenance needs (predictive maintenance).

ASSET TRACKING

CONNECTIVITY

INTERNET OF THINGS

2

3

AUTONOMOUS VALUE CHAIN

More than just light – lighting networks as infrastructure

Lighting networks across entire buildings create the perfect infrastructure for innovative applications and networking processes. TRILUX DALI luminaires are IoT-ready and can be flexibly connected with Smart Solution components (even retroactively). This also facilitates location-based services such as asset tracking and heat mapping. And there is more: multi-sensor systems, which can be integrated into the lighting network, can seamlessly transfer their data to superordinate building automation systems. Light points become data nodes for building management and Smart Solution applications and thus accelerate digitalisation in companies.

SERVICES

FULL SERVICE
FOR YOUR PROJECT

TECHNICAL SERVICES

Technical Services from TRILUX – We'll take care of that for you!

Things have never been simpler. With Technical Services from TRILUX, you can put all the tasks regarding your new lighting installation in the hands of TRILUX and our partner network – starting with disassembly and correct disposal of the obsolete system all the way to the installation of the new system in cooperation with our partners. On request, our experts will also take care of networking as well as programming and commissioning of the LiveLink light management system for you.

PROJECT MANAGEMENT

Coordination of large projects to help lighten the customer's workload

Today's modern buildings must be intelligent, sustainable and flexibly usable – and perfectly adaptable to individual customer requirements and conditions.

- Full-service principle for the customer:
  TRILUX acts as a general contractor with all lighting issues.

- Implementation of all coordination tasks by TRILUX Project Management:
  ranging from consulting and lighting design, the integration of various lighting-related systems such as indoor, outdoor and emergency lighting, light management including sensor technology, distribution, supply, mounting, installation and maintenance.

FINANCING

Various possibilities, extensive advice

LED renting or purchase, hire purchase or leasing?
Together with you we draw up your ideal financing solution.

- Balance-neutral realisation of lighting projects without own investments:
  greater scope for action by protecting the equity capital.

- Cost-covering for a new lighting solution often from the first day by reducing operating costs.

- Pay per Use – the all-round carefree package
  Everything from a single source: TRILUX plans and installs a custom, state-of-the-art lighting solution. You only pay a monthly rate for using the installation, which consists of a fixed portion as well as a consumption-based service fee. In addition to installation and financing, the price also includes system monitoring with the Monitoring Services.

DIGITAL SERVICES

Lots of added value with minimal effort

Digitalisation opens up numerous possibilities regarding your lighting solution, from high-performance data monitoring all the way to IoT services. Ideal conditions for reducing costs and significantly increasing transparency as well as convenience. With TRILUX Digital Services, you can exploit the potential of a modern lighting solution – quickly, securely and without effort and risk. Networking and connecting the luminaires to the cloud is achieved simply via plug & play via the LiveLink light management system. The option to integrate further sensor systems turns the lighting network into a technology carrier with great potential and benefit.

Energy and Light Monitoring: full control of the entire lighting system

With the monitoring services, you gain access to all relevant operating data of the lighting solution via LiveLink. In addition to the optimisation of energy consumption, maintenance cycles can also be adapted to genuine requirements because the system detects the need for maintenance in advance. This predictive maintenance is significantly less complex and therefore also more economical than fixed maintenance intervals.

Monitoring services supply data on:
- Dimming and operating status (on or off)
- Energy consumption and operating duration
- Error notifications and temperature of the ECG
- Predictive maintenance

Location Based Services: the next level for your business

Determining the position of persons or objects offers you optimisation potential which leads to cost reductions and increases in sales. Location-based services enable new relevant customer benefits by integrating Bluetooth transmitters into the luminaires:

- Reduced search and setup times through asset tracking
- More targeted positioning of merchandise through knowledge of customer movements in the retail sector
- Opening up of new communication channels via push messages directly to your customers' smartphone

PAY PER USE – THE COMBINED SERVICE MODEL

The simplest way to your luminaire upgrade
With the Pay per use financing model, TRILUX offers a flexible option for obtaining an energy-efficient LED lighting solution without tying up capital. This approach makes it possible for companies to finance the new lighting installation through a monthly, consumption-based rate: this way, they remain flexible and preserve investment leeway for their core business. The usage-based portion of the monthly costs is only due if the system is actually being used. If the installation is switched off, e.g. on bank holidays or weekends, only the base rate becomes due.

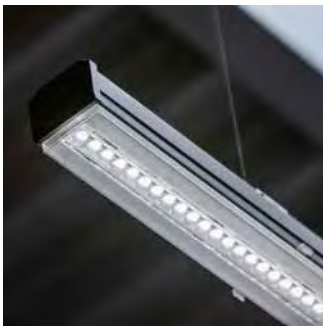
Furthermore, the new LED lighting systems generate significant savings in terms of energy and maintenance costs. From the very first month, savings of up to 80% compared to the obsolete system are possible. Subtracting the expenses for the monthly base rate, there is still an overall cost reduction of up to 20%.

In addition, the installation of the new lighting system as well as the disassembly and correct disposal of the obsolete system are included in the TRILUX Pay per use scope of services. Via predictive maintenance, systems can be monitored and corresponding maintenance intervals can be planned without difficulty. This prevents disruptions in operation and expensive downtimes.

QUALITY

MADE BY TRILUX

German engineering, customised solutions and innovative design – this all indicates "Made by TRILUX".
The German market leader for technical light traditionally places great importance on high-class workmanship and products with maximum quality that can be flexibly adapted to individual user needs and conditions. TRILUX offers not only standard solutions, but in close cooperation with customers also develops tailored lighting concepts. These solutions comply with all standard requirements and score points in terms of function as well as ambiance. High-quality materials, optics developed in-house, pioneering lighting technology and a research and development department which continuously and consistently seeks optimisation potential at all levels – "Made by TRILUX" is the guarantee for the highest level of quality across the board.



Product quality
TRILUX stands for customer-specific configurations and develops products with and for its customers oriented precisely to their needs. TRILUX offers market-compliant and future-proof lighting solutions matched to the specific requirements of the various applications.

Design quality
TRILUX lighting concepts adapt to the overall architectural concept of a building. It is a matter of complementing the architecture with good lighting. We develop our products in close cooperation with renowned lighting designers, and such products are regularly awarded design prizes.

Light quality
TRILUX lighting solutions offer much more than just standard compliant lighting. They can be adapted individually to very different needs, supporting users in their daily work tasks.

Data quality
TRILUX accompanies and drives forward this transformation in the planning of building constructions with BIM by providing extensive product documentation. Such documentation leads the way in the industry.

2 INTRODUCTION

Quality of light, energy efficiency and ease of use are key requirements that must be met by modern lighting systems. Application-oriented light management can significantly support the fulfilment of all three requirements. In particular, the requirement of the updated EN 12464-1 European lighting standard for the availability of a higher lighting level for individual requirements and the simultaneous reduction in energy needs can be optimally coordinated by means of electronic control. Ease of use essentially implies the sensible limitation to intuitively understandable modifications of the preset basic functions.

On the following pages, the use of light management is presented via exemplary solutions for different requirements. The compact form of presentation with use of keywords is intended to provide orientation in the respective situations and also comparative observations with the examples. For a detailed impression of the technical correlations, reference is made to the corresponding sections of the following chapters.

The solution proposals presented refer to a wide variation of the particular task.

- Standard applications can be met with a highly standardised light management system (see "BASIC OFFICE WITH HCL" on page 16 or "CLASSROOM" on page 34).
- Specific applications can be met with specific overall solutions (see "TWO-PERSON OFFICE" on page 14, "NEW WORK OFFICE"' on page 28 or "TRIPLE SPORTS HALL" on page 38).
- Nuanced applications can be met with a flexible light management system. In many cases, LiveLink WiFi is suitable for this purpose using the "Universal" Use Case. The quality of the result can be determined by individual configuration of the system, which is why in the appropriate examples commissioning occupies a large part of the description.

All solutions described are local single-room solutions not requiring system-specific certified qualifications for their implementation.

In cases where e.g. structural conditions prevent the luminaires from being connected with control lines, the LiveLink WiFi + RC system can be used as an alternative to the LiveLink WiFi system in many cases. It enables the transmission of control signals between the components by means of a radio network.

TRILUX offers the LiveLink Premium System, supported by its own technical personnel, for control systems across several rooms.

Overview of the systems used

	LiveLink Basic	**LiveLink Basic HCL**	**LiveLink WiFi**	**LiveLink WiFi + RC**	**LiveLink Premium**	**HFSB/X**
Page	14	16	12, 18 bis 38[1], 42	as an alternative to LiveLink WiFi		40
One-room system	X	X	X[1]	X	-	X
Multi-room system	-	-	-	-	X	-
Presence detection	X	X	X	X	X	X
Basic light	-	-	X	X	X	X
Zoning	-	-	X	X	X	-
Leading light	-	-	-	-	-	X
Daylight-dependent control	X	X	X	X	X	-
Other functions						
Circadian control (HCL)	-	X	X	-	X	-
Monitoring	-	-	X	-	X	-
Building interface (KNX, BACnet)	-	-	-	-	X	-
Installation						
Plug & play	X	X	-	-	-	X
Luminaires connected via control line	X	X	X	-	X	X
Luminaires with radio communication	-	-	-	X	-	-
Sensors integrated in luminaires	-	X	X	X	X	X
Control unit integrated in luminaires	-	X	X	X	-	X
Control unit for cap rail installation	-	-	X	X	X	-

[1] In the triple sports hall on page 38 LiveLink Connect is used. This is a special form of LiveLink WiFi specified for this application, in which 3 control units can be networked together.

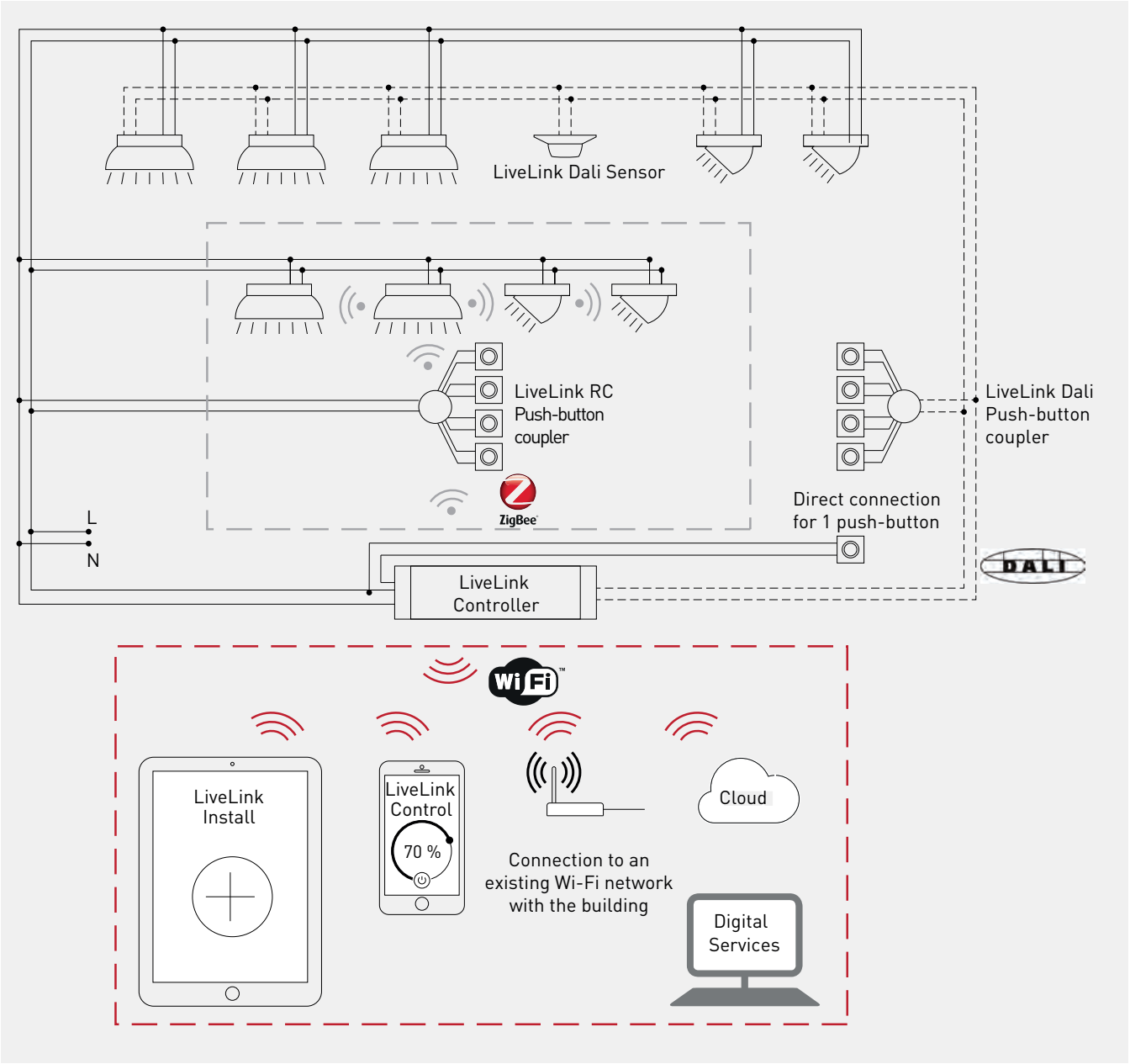


Figure 1: Overview of the components of the one-room systems **LiveLink WiFi** and **LiveLink WiFi + RC**

- Wide application due to flexible configuration with up to 9 luminaire groups
- Operation with freely configurable buttons and the LiveLink App "Control"
- Commissioning with the LiveLink App "Install"
  - Convenient with predefined use cases in standard situations
  - Flexible with the use case "Universal" in the specific individual case
- Monitoring functions with the TRILUX Cloud (see chapter 9 on page 59)
- System size: **LiveLink WiFi**: max. 64 DALI participants on the DALI control line
  LiveLink WiFi + RC: max. 20 radio participants + 32 DALI participants on the DALI control line

All technical data including dimensional and weight specifications have been checked carefully. Errors excepted. Possible colour deviations are due to printing processes. We reserve the right to modify in the interest of progress. Luminaires are partly shown with accessories that must be ordered separately. Images of installations may show custom manufactured luminaires.

Application:

Office oriented to daylight with a suspended workzone luminaire at the workstation (as Master luminaire, optionally also as Active luminaire with HCL function, see page 59) and supplementary lighting in the depth of the room. Balanced luminance conditions at high level ensure good spatial vision and a pleasant lighting atmosphere. The LiveLink light management integrated in the master luminaire provides high energy efficiency with reliable lighting quality.

The workzone lighting ("Work" group) can be switched on/off and dimmed with push-button T1. The additional lighting ("Additional" group) can be switched and dimmed with push-button T2. [2] Semi-automatic switching without automatic switch-on upon entering the room is recommended due to increased energy savings (see Chapter 4.2 "Switch-on behaviour"). The lighting system can also be operated with the smartphone and LiveLink "Control" app. If required, preset light scenes can be called up (see Chapter 4.4 Livelink App Control).

Installation:

With integration of the LiveLink system in the master luminaire, external placement of the control units and sensor is not necessary (see Chapter 5 "Installation"). The master luminaire must be aligned so that the integrated sensor points into the room depth (away from the window, see Figure 2).

Connection of the other DALI luminaires and push-button coupler is on the DALI line (see Figure 2).

Two push-buttons are potential-free connected to the push-button coupler. If required, up to 4 push-buttons can be connected to one push-button coupler (see Chapter 5 on page 47).

[2] According to the room situation it may be advisable to commonly operate groups 1 and 2 with push-button T1. An additional push-button T2 for separate switching and dimming of the additional lighting can be optionally set up.

Commissioning:

The public "Small office" Use Case offers a configuration with up to three luminaire groups and the assigned functions of a sensor (see page 51).

Luminaire assignment:

The luminaires are assigned according to Figure 2 to the "Work" and "Additional" areas.

Setting the control functions (see from page 53):

The default scene "Automatic" is preset. The following modifications must be made:

- Set presence detection to semi-automatic (automatic is preset).
- Set the setpoint of constant light control of the "Work" group (see Chapter 6.3.1 "Setpoint adjustment").
- Set the switch-on value (dimming value) of the "Additional" group to the desired value (0% = off, preset, see Chapter 4.2 "Switch-on behaviour").

Push-button assignment (see page 44):

- T1: "Work" luminaire group
- T2: "Additional" luminaire group

If required, light scenes can be called up with additional push-buttons or with the "LiveLink Control" smartphone app. (see Chapter 6.2 "Light scenes").

Other :

Modify the administrator password and define the user password (for the LiveLink "Control" app). Both can be changed at any time using the "LiveLink Install" app (see Chapter 7 "Wi-Fi access").

Parameter	Group	preset	**adapt**
Light level	Work	daylight regulated	-
	Additional	0%	**Start value**
Presence detection	Work / Additional	Automatic	**Semi-automatic.**
Switch-off delay	Work / Additional	5 min.	-

Table 1: Default scene: "Automatic"
Further light scenes can be defined (e.g. for central functions, see Chapter 6.2).

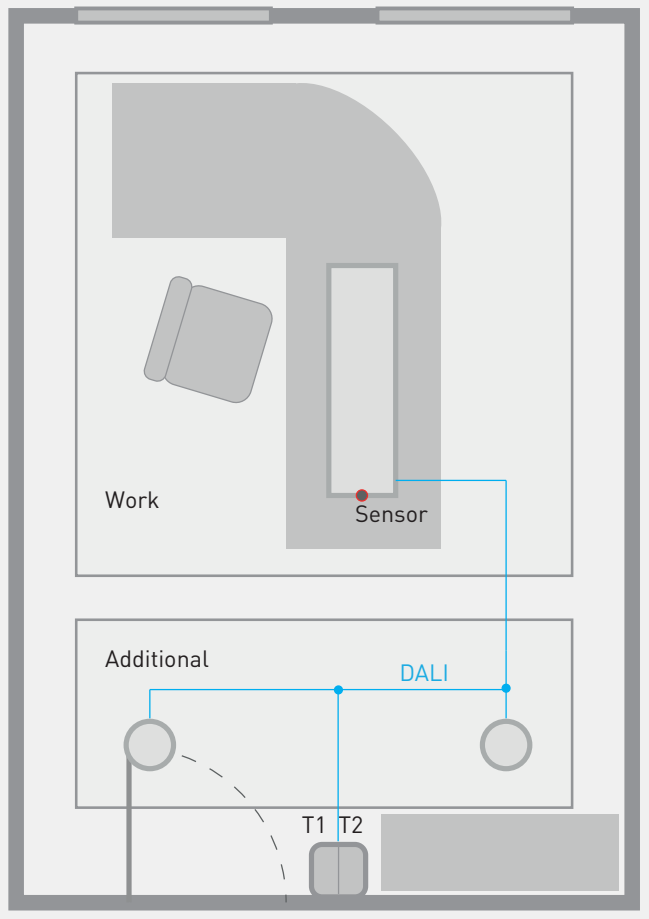


Figure 2: Single-person office:
General lighting, work-zonal (Work) with additional lighting of the visual task area in the shelf (Additional)
- LateraloP H2 BLGS 7500-840 ETDD 03 + LLWM 01 with integrated LiveLink system
  - Align the sensor away from the window (also see Chapter 5.4, page 50)
- 4-way push-button coupler LiveLink DALI PB4
  - connect 2 push buttons
- 2 x Onplana D07 CDP19 1000-840 ETDD 01

"Small office" Use Case with up to three luminaire groups and one sensor.
With constant light control of the "Work" luminaire group and presence detection with all luminaire groups.

Push-button functions:
- T1: group push-button (Work)
  - Adjust the setpoint
- T2: group push-button (Additional)
  - Set the start value in the default scene
- Set semi-automatic mode for the presence detection.

TWO-PERSON OFFICE

Application:

Office oriented to daylight with four recessed luminaires for general lighting. The basic equipment for office lighting compliant to standards creates an even distribution of illuminance in the working plane and sufficient luminance conditions for a pleasant lighting atmosphere. The LiveLink Basic control unit with integrated sensor unit installed in the ceiling, thanks to its daylight-dependent control and presence detection (default setting: fully automatic, see Chapter 4.2 "Switch-on behaviour"), achieves energy-efficient operation of the lighting with reliable quality of light.

Semi-automatic switching without automatic switch-on when a person enters the room can be set with the "LiveLink Basic Install" app, and is recommended due to increased energy savings.

The lighting can be switched on and off and dimmed with the T push-button.

The lighting can be controlled with a smartphone via the "LiveLink Basic Control" app.

Installation:

By integrating the LiveLink Basic control unit into the sensor unit, external positioning is not required.

- Positioning of the sensor unit in the part of the visual task area least supplied by daylight.
- Closing push-button on intended direct connection (230 V) on control device.

Commissioning:

Daylight-dependent control:
After mounting, LiveLink Basic automatically calibrates the illuminance setpoint when the power supply is switched on. This must be carried out in darkness without the incidence of extraneous light, and can be repeated later if necessary using a reset button on the sensor unit.

During calibration, artificial lighting is set to 80 % of maximum luminous flux. The value of the light incidence occurring at the sensor is measured and saved as the setpoint value. This gives constant illuminance over the entire service life of the lighting installation if its degradation has been taken into account in planning using a maintenance factor of 0.8.

If a deviating setpoint value is to be reached, manual calibration of the setpoint can be made via a rotary control on the sensor unit or by using the app "LiveLink Basic Install" (Android 4.x / IOS 8.4).

Presence detection:
For fully automatic presence detection, a holding time for the switch-off delay can be set seamlessly between 30 seconds and one hour using a selection switch. To determine the range of presence detection, a test function with a holding time of one second can be set. By using the app "LiveLink Basic Install", a semi-automatic mode of presence detection can be set.

For manual operation, presence detection can be deactivated.

The push-button function (single-button operation, see Chapter 4.1 on page 44) is preset. It can be modified with the "LiveLink Basic install" app so that the push-button can only be used for switching or dimming.

Manual operation is also possible with the "LiveLink Basic Control" app.

The Bluetooth function of the smartphone must be activated to use the app.

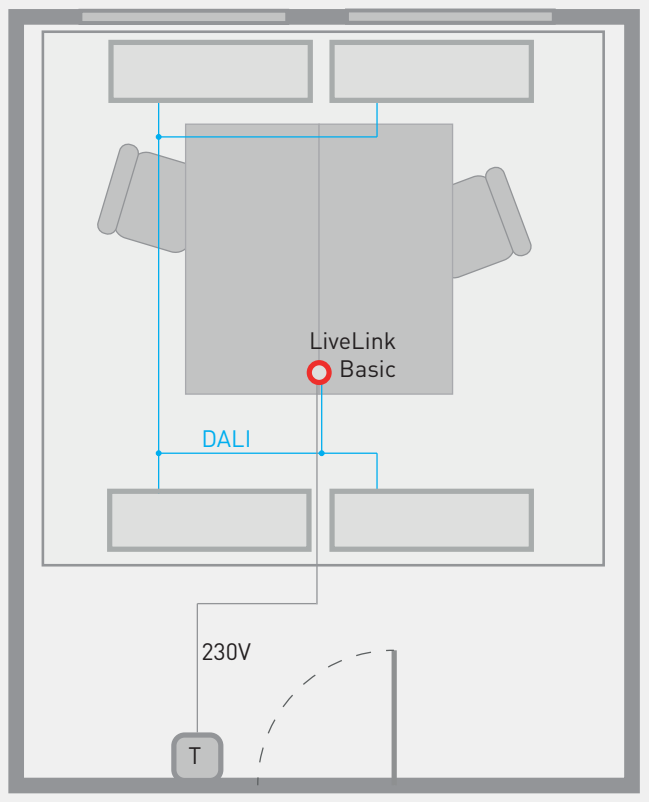


Figure 3: Two-person office (4 DALI devices):
General lighting with 4 recessed luminaires as one group.
- ArimoS M57 CDP LED3600-840 ETDD
- LiveLink Basic sensor unit for presence detection and light control for ceiling recessing. With integrated control unit.
- in the area of the visual task
- away from the window.
- Closing button on direct connection

Automatic commissioning when the mains voltage is switched on.
Optional: individual commissioning with Smartphone app.

Push-button function:
- T: group button (single-button operation)

Manual control via app:
- activate Bluetooth.

Application:

Office with four to eight square Active recessed luminaires for general lighting in a suspended system ceiling.

The basic configuration for standard-compliant office lighting with circadian colour temperature curve can be realised for standard situations using a package solution including basic light management. All luminaires are controlled together.

When the lighting is switched on, the presence detection, the daylight-dependent control (according to EnEV, see page **??**) and an automatic circadian luminous colour control are active (see Chapter "HCL" on page 59). The lighting can be switched on and off and dimmed with a push-button.

Semi-automatic switching without automatic switch-on upon presence is recommended due to increased energy savings (see Chapter 4.2 "Switch-on behaviour").

Installation:

Three kits of the LiveLink Basic HCL plug-and-play system are available:

- the "HCL Basic Starter Kit Arimo M .. Master" with the control unit, one master sensor and four recessed luminaires,
- an extension kit "HCL Basic Starter Kit Arimo M .. Slave2" with one slave sensor and 2 luminaires, or alternatively
- an extension kit "HCL Basic Starter Kit Arimo M .. Slave4" with one slave sensor and 4 luminaires.

A maximum of 8 Active recessed luminaires can be operated. Also, up to 4 Active downlights can be operated in the room depth.

To be considered during installation (see System instructions):

- Only one master sensor and one slave sensor can be operated.
- Positioning of both sensors for sufficient presence detection in the entire room.
- Positioning of the master sensor for light control in the part of the visual task area least supplied by daylight.
- Closing button to push-button connection (230 V) on control device.
- Connection of the sensor(s) by means of a system cable with RJ10 jack.
- Set presence detection to semi-automatic (automatic is preset).
- Set the time zone (CET preset) if necessary

Commissioning:

Luminaire assignment:

All luminaires form a jointly switched and dimmed group. It is not necessary to assign the light colours for the kit luminaires. For additional DALI downlights, the warm white channels (DALI group 0) and the daylight white channels (DALI group 1) should be addressed if necessary. [3]

Setting the control functions (see System instructions):

- Adjust the setpoint.
- Presence detection and time zone, see above.

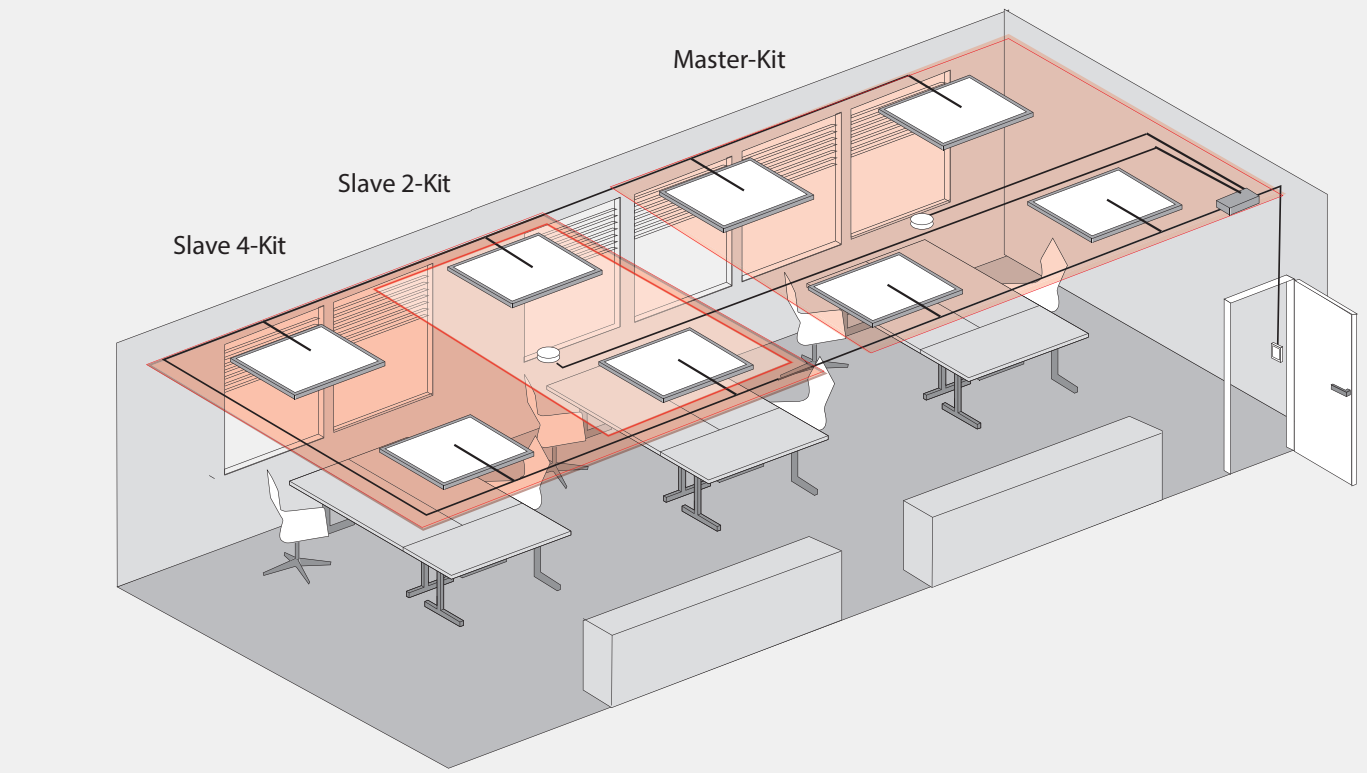
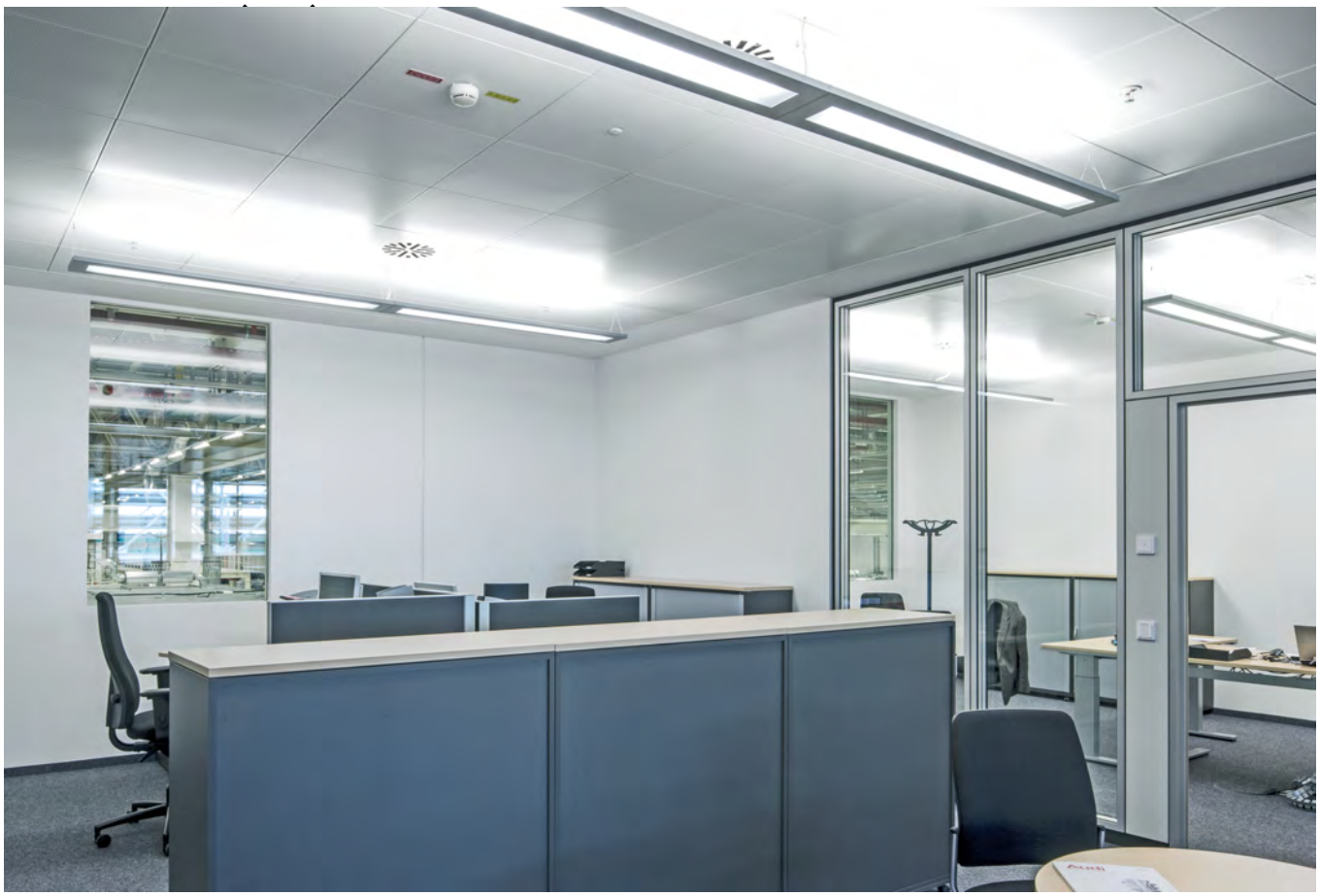


Figure 4: Standard situations in office with square system ceiling: General lighting with 4 to 8 recessed luminaires as one group. Plug-and-play solution with HCL Basic kits:
- HCL Basic Starter Kit Arimo M.. Master, consisting of control unit, master sensor, four luminaires,
- HCL Basic Starter Kit Arimo M .. Slave2, consisting of slave sensor and two luminaires,
- HCL Basic Starter Kit Arimo M .. Slave4, consisting of slave sensor and four luminaires,
- Set semi-automatic and time zone (if required) via DIP switch.
- No addressing required.
- One luminaire group.
- Max. of two sensor units, of which:
  - Two presence sensors, consider detection ranges when positioning.
  - One sensor for daylight-dependent control.
- Manually dimmable by pressing and holding the push-button.
- Automatic control operation after switching on again.

Push-button functions:
- PushDim button (230 V)
- Adjust the setpoint
- Demo mode (daytime sequence in 24 seconds)

[3] A DALI addressing may have to be realised with equipment available on site.



Application:

Group office with three work areas and twelve direct-indirect "Active" pendant luminaires with variable colour temperature for general lighting.

With their indirect component, the suspended luminaires create a communicative lighting atmosphere with uniform, comfortable vertical illuminance and high circadian effectiveness (see Chapter "HCL" on page 59).

The work areas are independently equipped with constant light control and fully automatic presence detection.

By switching off to the general light function, (see Chapter "General light" on page 46) pleasant luminance conditions in the entire field of view are maintained even if not all work areas need to be fully illuminated due to partial occupation. Outside the main working hours (e.g. 8 pm to 6 am) the general light is deactivated.

If required, all luminaires can be switched together by the group push-button (T1) and manually dimmed to a desired luminous flux level.

The lighting is completely switched off by the last employee leaving the room with the "All off" light scene push-button (T2). If this is forgotten, the lighting switches itself off automatically at a set time (time function of the general light, see below).

Installation:

The LiveLink control unit and a sensor are already integrated into the master luminaire, thereby providing minimum installation effort. The other sensor luminaires and optionally a push-button coupler are connected to the DALI line (see Chapter 5 "Installation").

- Positioning of the sensor luminaires in the continuous line away from the window.
- One sensor luminaire (or master luminaire) per work area (see Fig. 5).
- Up to four closing push-buttuns are potential-free connected to the push-button coupler (T1 to T4).
- Connection of sensor luminaires and push-button coupler to the DALI line.
- A further closing push-buttun if required for direct connection (T5, 230 V) to the master luminaire.

One LiveLink system is installed per office (single-room system).

Commissioning:

Luminaire- and sensor assignment:

"Active" luminaires must be configured if necessary (see Chapter "Commissioning" on page 51).

Based on the "Universal" Use Case, three groups of four luminaires each are configured at a double workstation. For convenient operation with the "LiveLink Control" app, the luminaire groups are renamed (see e.g. Table 2 and Figure 5).

The sensors are each assigned to their luminaire group with regard to presence detection and daylight-dependent regulation.

Setting the control functions (see from page 53):

An "Automatic" default scene is configured as follows:

- Activate the HCL function.
- For all three groups, set cdaylight regulated operation to the desired setpoint (see Chapter 6.3.1 "Setpoint adjustment").
- Set fully automatic operation for each presence detection range (identical to luminaire groups).
- Set switch-off delay to 5 min.

In the "All off" light scene, activate presence detection. [4]

Assign all luminaire groups to a group push-button T1.

Assign the"All off" light scene to push-button T2. [4]

Central functions can be realised using light scenes. (see Chapter 6.2 "Light scenes").

After completing the room creation, the general light for each sensor area must be set to 20 % via the menu item "Room management". Select the automatic switch-off time with the "Time" function (see Chapter 4.3, General light).

A user password can be set for the "LiveLink Control" app (see Chapter 7 "Wi-Fi access").

Parameter	Group	Setting
Light level	Left group	**daylight regulated**
	Central group	**daylight regulated**
	Right group	**daylight regulated**
Presence detection	Group left	**Fully automatic**
	Central group	**Fully automatic**
	Right group	**Fully automatic**
Switch-off delay	all	**5 min.** (also see page 54, Footnote [26])
General light (time function)	all	**20 %**, e.g. from 6 am to 8 pm

Table 2: Default scene: "Automatic"

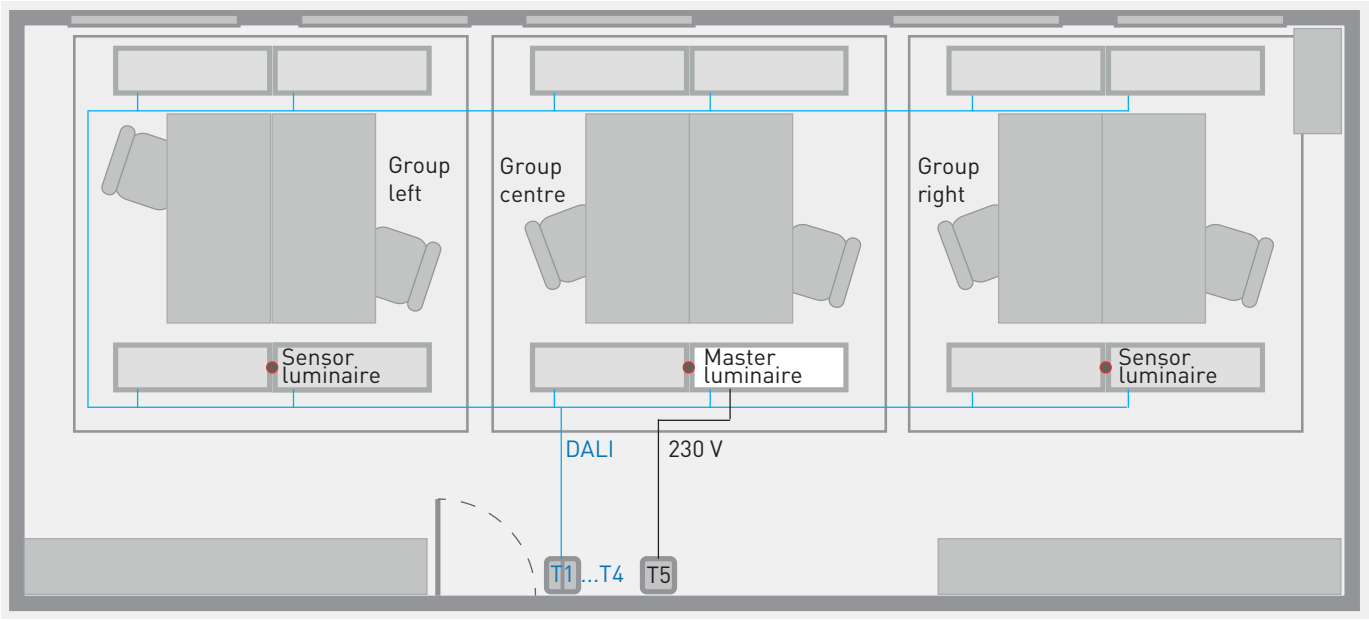


Figure 5: Group office: Lighting in three areas (left group, central group, right group), separate light detection and presence detection. Fully automatic, switch-off delay 5 min., general light with time function.
- 1 master luminaire (Luceos Act H1-L CDP 4000 ETDD 01 LLM) with integrated LiveLink control unit and sensor
- 2 sensor-luminaires with integrated LiveLink sensor

[4] For returning to the default light scene: activate presence detection for all luminaire groups (see page 51).

Application:

Open-plan office with interrupted continuous line arrangement of luminaires for general lighting. The suspended luminaires, through their indirect components, provide a communicative light atmosphere with simultaneously pleasant vertical illuminance. High circadian effectiveness is also achieved with use of Active luminaires. Daylight-dependent control is realised in control areas independent of each other in order to achieve high savings potential independently of the sun's position and shadowing, with simultaneously reliable quality of light. The presence detection is deactivated.

A group push-button enables the switching on and off of the lighting in daylight-dependent mode and manual dimming to a desired lighting level.

Additional operating options for the lighting can be implemented by calling up light scenes via push-buttons and with the smartphone and LiveLink "Control" app .

Installation:

The LiveLink control unit and one sensor are already integrated in the master luminaire. The other luminaires and push-button couplers are connected to the DALI line (see Chapter 5 "Installation").

For daylight-dependent control, sensor luminaires are positioned so that they occupy a position away from the window within the area of the luminaire group to be controlled (see Figure 6). Disruptive influences should be avoided (see Chapter "Constant light control", page 54).

Commissioning:

"Active" luminaires must be configured if necessary (see Chapter "Commissioning" on page 51).

The public "Large office" Use Case offers a configuration with up to five luminaire groups and the assigned functions of four sensors (see page 51).

Luminaire- and sensor assignment:

The luminaires and sensors are assigned to groups "Work 1" to "Work 4" .

Setting the control functions

A light scene with daylight-dependent regulation is already set up and declared as the default light scene:

- Activate the HCL function if necessary.
- Presence detection is deactivated for the four sensors.
- Set the setpoints (see Chapter 6.3.1 "Setpoint adjustment").

Assignment of all luminaire groups to one group push-button, see Figure 6.

Central functions can be realised using light scenes. (see Chapter 6.2 "Light scenes").

Define a user password for the "LiveLink Control" app (see Chapter 7 "Wi-Fi access").

Parameter	Group	preset	**adapt**
Light level	Work 1	daylight regulated	**-**
	Work 2	daylight regulated	**-**
	Work 3	daylight regulated	**-**
	Work 4	daylight regulated	**-**
Presence detection	Work 1	Automatic	**manual (deactivated)**
	Work 2	Automatic	**manual (deactivated)**
	Work 3	Automatic	**manual (deactivated)**
	Work 4	Automatic	**manual (deactivated)**

Table 3: Adapt the "Automatic" default scene

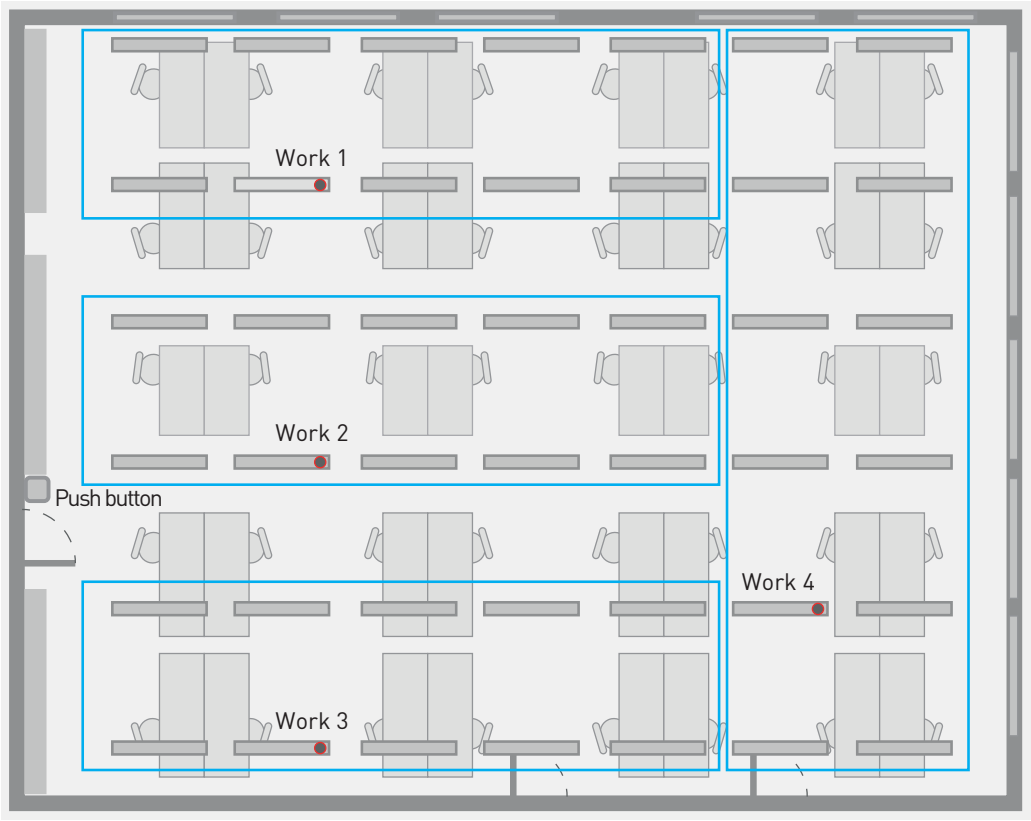


Figure 6: General lighting in an open-plan office with 4 control groups
- One LiveLink control unit in area Work 1, integrated in master luminaire (Luceos Act H1-L CDP 4000 ETDD 03 +LLWM 03).
- Three sensor luminaires (Luceos Act H1-L CDP 4000 ETDD +LLWS 03) with integrated LiveLink sensor.

Use Case: Large office
Push-button function:
- Push button: Group push-button (Work 1 to 4)
- Other push-buttons if required: light colour (Work 1 to 4)

Application:

Open-plan office with workzone "Active" luminaires with variable colour temperature at 20 double workstations.

With their indirect component, the suspended luminaires create a communicative lighting atmosphere with uniform, comfortable vertical illuminance and high circadian effectiveness (see Chapter "HCL" on page 59).

For this light component, presence detection is therefore wide-area in automatic mode (see Chapter 4.2 "Switch-on behaviour") without daylight-dependent constant light control. A Basic Lighting function dependent on time, even with complete absence in the area of a light management system, (see page 46) ensures balanced luminance conditions in the complete room during the main work period.

For the direct light component, presence detection is active across two or four double workstations (see Figure 7) and is also set up in fully automatic mode. Furthermore, the direct light component for each sensor luminaire (pair of luminaires or single luminaire) is controlled according to daylight and can be set individually with the LiveLink "Control" app in terms of light colour and brightness.

Three group push-buttons (one 3-way push-button) at the door still allow manual switching of the complete lighting if required.

Installation: [6]

Three independent LiveLink installations, each set up with 8 or 4 luminaires see Figure 7). per LiveLink control unit and one sensor are already integrated into the master luminaires. Further luminaires are implemented as sensor luminaires (see Figure 9). One push-button coupler is installed per LiveLink system (see Chapter 5 "Installation").

- The sensor luminaires must be aligned so that the available daylight and presence at both assigned double workstations can be efficiently detected (see Figure 7).
- Connection of sensor luminaires and push-button coupler to the DALI line (see Figure 5).
- One closing push-button at each push-button coupler (potential free, see Figure 21 on page 44).[5]

[5] The 230 V push-button input on the control unit can also be used (see Chapter 6, "Commissioning" on page 51).

Commissioning (see page 51):[6]

The network names of the LiveLink systems must be modified to support sensible assignment - e.g. in "Window side", "Door side" and "Centre" (see Figure 7 and Chapter "Wi-Fi access and apps" on page 58).

Luminaire assignment :

Firstly, the warm white and cool white light components must be assigned to the Active luminaires (see Chapter "Commissioning" on page 51).

Based on the "Universal" Use Case, the systems (per master luminaire) are set up individually. [7]

- Five luminaire groups are set up per system. [8]
  - The direct light component of each luminaire pair (Figure 7, areas in dashed lines) is assigned to an own luminaire group.
  - The indirect components are combined to one luminaire group per master luminaire.
- The sensors in Figure 7 are assigned the following functions:
  - **Constant light regulation** of the direct light components of the specific luminaire pair,
  - **Presence detection**
    - for the direct light components of the specific luminaire pair and
    - for the indirect component per system with Basic Lighting and time function (areas marked with non-dotted line, also see Chapter 4.3 "Basic Lighting" on page 46).[8]

Setting the control functions

Detailed settings of the control functions are described for each system on the following double page.

Central functions can be realised using light scenes. (see Chapter 6.2 "Light scenes").

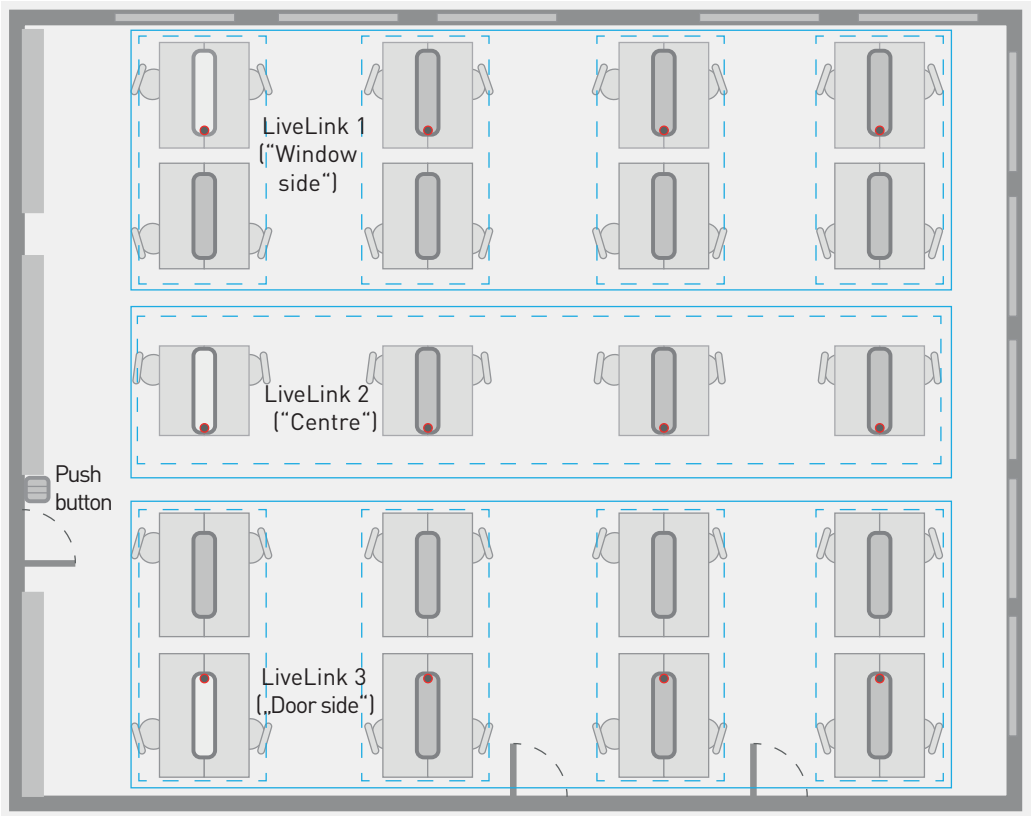


Figure 7: Circadian workplace lighting in open-plan office with 20 double workstations
- Three master luminaires (LunexoAct H2 CDP-I 8800 ETDD +LLWM 01)
- 17 sensor luminaires (LunexoAct H2 CDP-I 8800 ETDD +LLWS 01)

Use Case: Universal:
- Presence detection and constant light regulation for the direct light component in 9 (4|1|4) areas (dotted line).
- 3-way closing button for single push-button operation per system.

For details see page 25.

[6] Identical functionality can also be achieved using a **LiveLink Premium system** . Instead of the master luminaires, additional sensor luminaires and a LiveLink Premium Server Kit with 2 DALI gateways must be installed in this case. The areas "window side", "centre" and "door side" must each be connected to a DALI output of a gateway. Commissioning is carried out by TRILUX specialists (see also chapter 8 "LiveLink Premium" on page 58).

[7] With use of "Active" luminaires with 2 DALI addresses, a maximum of only 8 luminaire groups can be set up in the "Universal" Use Case.

[8] Alternatively, 8 (or 4) luminaire groups – direct and indirect light components together on each luminaire – can be operated with constant light regulation, presence detection and Basic Lighting function.

(a) Establish Wi-Fi connection to the "Window side" LiveLink system (see Figure 7)

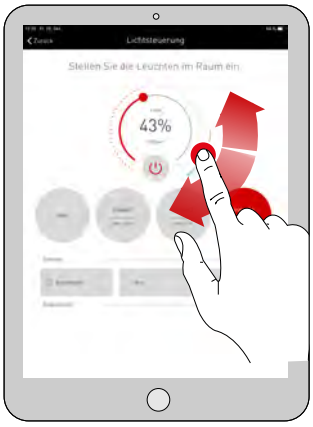
(b) Calling up the Control app

(c) Calling up a connected system

(d) Enter password for authorised access.

(e) Calling up a light scene

(f) Calling up a luminaire group



(g) Setting the colour temperature for a luminaire group

Operation:

The LiveLink app **"Control"** is opened with a password and enables the authorised user free access to luminaire groups and light scenes

Figure 8: Operation with the "Control" LiveLink app.

Operation with the "Control" app.

The "Control" app is designed for individual on-location operation of the LiveLink lighting control. All controllable lighting components should be in the field of view of the operator (see Chapter 5 "Installation (single-room light management)" on page 47). Particularly in large rooms, it offers maximum flexibility and a high level of operating convenience, independently of the electrical installation.

The app enables access to all luminaire groups and light scenes that were set up during commissioning based on the selected Use Case. Operation is implemented in the following steps:

- Connection is established to the LiveLink system or router (see Figure 8a)
- Calling up of the "Control" app (see Figure 8b)
- Calling up a connected system (e.g. "Door side", see Figure 8c, or possibly several systems in the case of connection with infrastructure).
- Entry of the password assigned during commissioning for authorised access (see Figure 8d).
- Calling up a light scene (see Figure 8e): The dimming values of luminous flux or setpoints of illuminance and the switching behaviour of all luminaire groups are defined for each light scene during commissioning.
- Calling up a luminaire group (e.g. "direct 7/8", see Figure 9): Switch-on/off and setting of a dimming value, see Figure 8f. An existing constant light control is deactivated when the group is called up. Switching behaviour of the current light scene.
- The colour temperature can also be set for Active luminaires with each luminaire group (see Figure 8g).

Detailed commissioning:

Setting the control functions

After assigning the components (see previous double page), it is advisable to give the luminaire groups sensible designations for later operation with the "Control" app. For the system shown in Figure 9 possible designations are shown in the table 4 .

In the "All off" light scene, activate presence detection. [9]

The default light scene of this system is given the name "Automatic all (door side)". This is also named accordingly for the two other systems. The control functions must also be defined by setting up the default light scene and the push-button assignment for each system (see Chapter 4.1 on page 45). The following settings must also be made for all three systems:

- For each luminaire pair, the illuminance setpoint must be set (see Chapter 6.3.1 "Setpoint adjustment").
- If necessary, the circadian daytime curve for colour temperature should be adapted identically for all systems.
- All luminaire groups in a system are assigned to a group push-button, see figure 9.

The parameters to be set for the default light scene are specified in the table 4 .

After completing the room creation, the Basic Lighting for each sensor area must be set to 20 % via the menu item "Room management". Select the automatic switch-off time with the "Time" function (see Chapter 4.3, General light).

Parameter	Group	Setting
Light level	direct 1/2	**daylight regulated**
	direct 3/4	**daylight regulated**
	direct 5/6	**daylight regulated**
	direct 7/8	**daylight regulated**
	indirect all	**100 %**
Presence detection	direct 1/2	**Fully automatic**
	direct 3/4	**Fully automatic**
	direct 5/6	**Fully automatic**
	direct 7/8	**Fully automatic**
	indirect all	**Fully automatic**
Switch-off delay	all	**10 min.** (also see page 54, Footnote [26])
Basic Lighting (time function)	all	**20 %**, e.g. from 6 am to 8 pm

Table 4: Setting the "Automatic (...)" default scene
Name of the appropriate LiveLink system in brackets for better orientation (see Chapter 7 "Wi-Fi access and apps" on page 58).

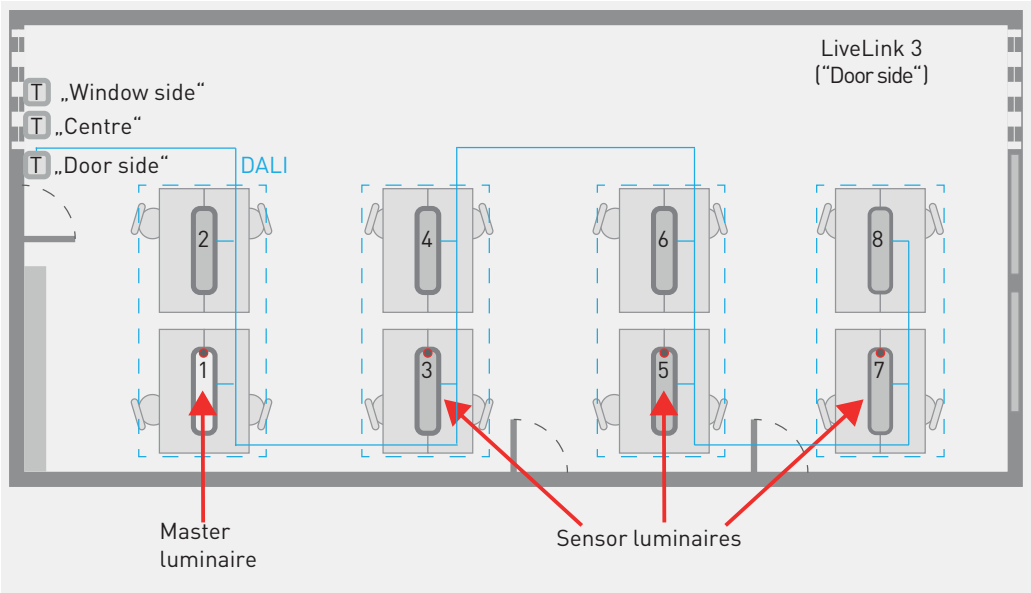


Figure 9: LiveLink system in HCL open-plan office:
- Constant light control + presence detection, direct light component, per luminaire pair
- Presence detection, indirect light component, total

Push-button function:
- Group push-button for entire lighting.
- Optional: group push-button for colour temperature, indirect.

[9] For returning to the default light scene: activate presence detection for all luminaire groups (see page 51).

CORNER OFFICE WITH PARELIA (HCL)

Application:

Group office with six work zone "Active" luminaires with variable colour temperature at double workstations in three work areas.

With their indirect component, the suspended luminaires create a communicative lighting atmosphere with uniform, comfortable vertical illuminance and high circadian effectiveness (see Chapter "HCL" on page 59).

Group push-buttons (T1, T3 and T2 / T4) allow the switching and dimming of three independent work areas. The presence detection extends, overlapping, over two areas (see figure 10). Uniform luminance ratios in the entire field of view with high circadian effectiveness are maintained even if the working areas are only partially occupied.

Semi-automatic switching (see Chapter 4.2 "Switch-on behaviour") avoids unnecessary switching in the case of peripheral motion detection. This is recommended due to increased energy savings.

Further optional push-buttons (T5 / T6) enable manual setting of the colour temperature with all luminaire groups. The next time the lighting is switched off and on again, the automatic colour temperature control becomes active again.

Additional operating options for the lighting can be implemented with the LiveLink "Control" app (see Chapter 4.4, page 46). In the present configuration, this app allows, among other factors, the direct light component of the luminaires to be individually set. Calling up light scenes that were defined for the complete office during commissioning is also possible with the app.

Installation:

The LiveLink control unit is accommodated in the cavity of the suspended ceiling using the LiveLink ZZE accessory.

The sensors required for daylight-dependent control and presence detection are integrated in the sensor luminaires. All luminaires in this application are designed as sensor luminaires. A push-button coupler must be installed in a deep flush-mounted box at each door.

- The sensor luminaires must be aligned so that the integrated sensor points into the room depth (away from the window (see figure 5).
- Sensors luminaires and the push-button coupler are connected to the DALI line (see Chapter 5 "Installation").
- The closing buttons are potential-free connected to the respective push-button coupler.

Commissioning (see page 51)**:**

Luminaire- and sensor assignment:

For "Active" luminaires with separately controlled warm and cool white light components, these are initially assigned to the luminaires (see Chapter "Commissioning" on page 51).

Based on the "Universal" Use Case, 8 groups are set up.

- The indirect components of 2 luminaires each in one area are combined (see Fig. 10),
- the direct components of luminaires a, b, e and f are each assigned individually to one group,
- those of c and d are combined.
- Sensors a, c and f are assigned as light sensors for the groups per area.
- The presence sensors a/b are assigned to groups "Work 1..." and "Work 2...",
- the presence sensors e/f are assigned to groups "Work 2..." and "Work 3...",
- the presence sensors c/d are assigned to all groups.

Setting the control functions (see from page 53):

The default light scene with daylight-dependent regulation of all three areas (8 groups) must be created:

- Set the setpoints (see footnote [30], page 55).
- Set presence detection to semi-automatic in each case (automatic is preset).
- For assignment of the group push-buttons see figure 10.

Parameter	Group	**Setting**
Light level	Work 1.1 ; 1.2 ; 1.3	**regulated together**
	Work 2.1 ; 2.2	**regulated together**
	Work 3.1 ; 3.2 ; 3.3	**regulated together**
Presence detection	Work 1... / Work 2...	**Semi-automatic**
	Work 2.../ Work 3...	**Semi-automatic**
Switch-off delay	all	**5 min.**

Table 5: Default scene: create (also see page 54, Footnote [26])

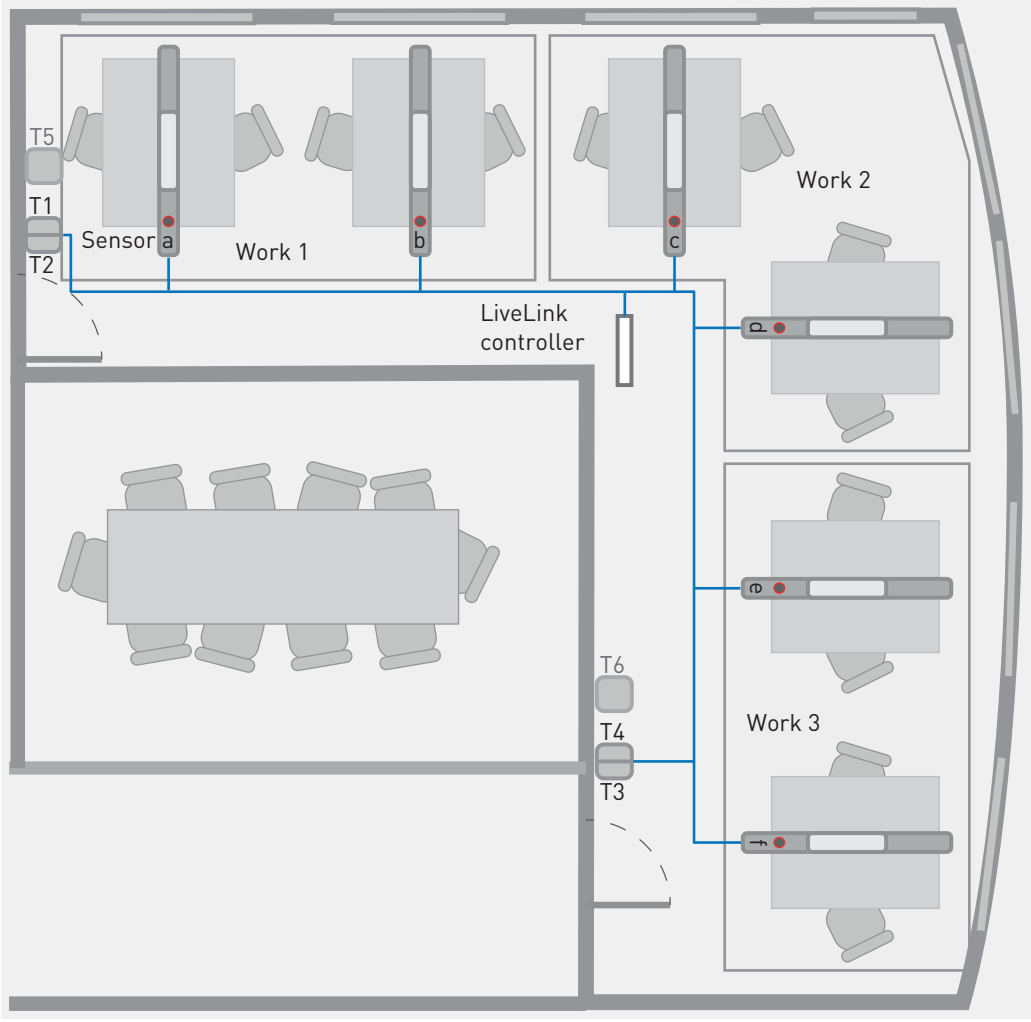


Figure 10:
Work zone lighting at six double workstations in three groups
- One LiveLink control unit (external).
- Six sensor luminaires (Parelia H-L 13000-840 ETDD +LLWS 01) with integrated LiveLink sensor.

Use Case: Universal
Push-button functions:
- T1: Group push-button (Work 1.1 ; 1.2 ; 1.3)
- T2 / T4: Group push-button (Work 2.1 ; 2.2)
- T3: Group push-button (Work 3.1 ; 3.2 ; 3.3)
- T5 / T6: optional, group push-button for colour temperature (Work 1.1 ... 3.3))

Via Control app:
- Control of indirect light per area.
- Control of direct light per luminaire (except c and d).
- Calling up of light scenes.

Application:

Open-plan office with 25 flexibly occupied workstations with work-zone "Active" desktop luminaires with variable colour temperature. The lighting is supported with suspended luminaires in the meeting area and corridor transit area. The corridor luminaires and the indirect light component of the meeting area luminaire are switched with the push-button at the door. The indirect components of the desktop luminaires are switched in fully automatic mode according to presence for each area (1 and 2, see Figure 11). Suspended luminaires and desktop luminaires are controlled according to daylight. Three push-buttons at the base of each desktop luminaire – and alternatively the "LiveLink Workplace" app – enable the individual switching, dimming and manual colour temperature adjustment of the direct light component of the workstation lighting. This combination creates a communicative lighting atmosphere with uniform, comfortable vertical illuminance and high circadian effectiveness (see Chapter "HCL" on page 59). The circadian colour temperature change of the desktop luminaires' indirect components is synchronised with the suspended luminaires. The daylight-dependent control of the desktop- and ceiling luminaires enables high energy efficiency with uniform lighting quality, also in the depth of the room. The direct light component in the "meeting" area has single push-button operation with semi-automatic switching (see Chapter 4.2).

Installation:

All desktop luminaires (Bicult Act T SMC TGCS 5500 ETDI) are ready-for-connection and equipped with the required light management components. The LiveLink WiFi control unit for the suspended luminaires is integrated in the master luminaire.

The sensor luminaire for constant light control must be installed in the depth of the room.

The other suspended luminaires and one push-button coupler for push-buttons T1 and T2 (see Figure 11) are connected to the DALI line (see Chapter 5 "Installation").

Commissioning:

Luminaire assignment (see page 53f):

Based on the public "Large office" Use Case, the corridor luminaires and the indirect component of the meeting area are assigned to luminaire group "Work 1". The direct light component of the luminaire in the meeting area is assigned to the "Additional" luminaire group.

Sensor 1 is assigned to the luminaire group "Work 1". Sensor 2 is assigned to the luminaire group "Additional".

Setting the control functions (see page 53f):

The default scene "Automatic" is preset. The following modifications must be made:

- Constant light regulation group "Work", adjust the setpoint (see Chapter 6.3.1 "Setpoint adjustment").
- Deactivate presence detection for the "Work" group (automatic is preset).
- Presence detection for the "Additional" group to semi-automatic (manual is preset).
- Set switch-on value (dimming value) of "Additional" group to 30 % (0%/off, preset, see Chapter 4.2 "Switch-on behaviour").

Push-button assignment (see page **??**):

- T1: "Work" luminaire group
- T2: "Additional" luminaire group

Commissioning of the desktop luminaires is carried out with the "LiveLink Workplace" app (see System instructions). For controlling the indirect light components, in areas 1 and 2 according to Figure 11 two independent networks are established.

The preset circadian colour temperature curves of the light management systems used here are identical. This ensures synchronous behaviour. Individual adaptations of the colour temperature curve must be carried out individually for each system if necessary.

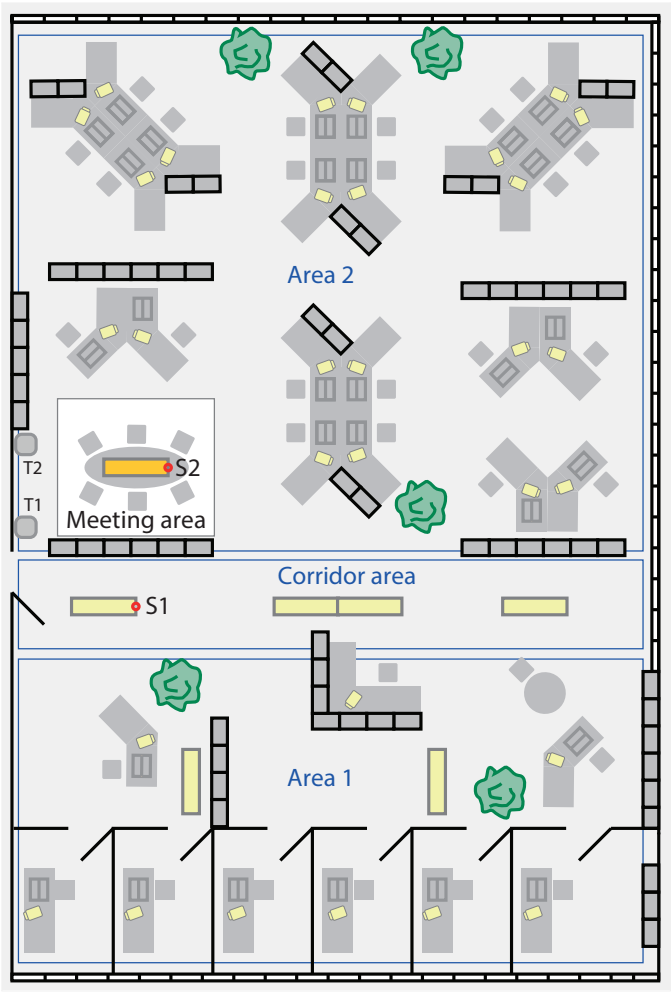


Figure 11:
New Work Office – general lighting and workzone lighting with 2-component desktop luminaire (Bicult Act T SMC TGCS 5500 ETDI):
In the New Work Office, single- and group work stations as well as work cabins are available that according to the current task can be booked for single work, a work meeting or for telephone/online conferences. There is a total of 31 workstations, each equipped with one desktop luminaire.

- The indirect light emission of the luminaires supplies the general lighting for the room, and for all luminaires with synchronous colour temperature curve is controlled in two groups with fully automatic presence detection.
- The daytime sequence of the light colour, via its circadian effectiveness, supports the natural biorhythm.
- The general lighting is controlled according to daylight per luminaire.
- The direct component is settable with operating push-buttons at the base of the luminaire.
- The smartphone app belonging to the luminaire enables the "taking along" of individual lighting settings to any workstation.

In the corridor area (six Active luminaires from the Luceos range, one of these being a sensor luminaire) and the meeting area (Lunexo Act H1 CDP-I 6500 ETDD +LLWM 01, LiveLink master luminaire), general lighting is also supplemented with circadian controlled suspended luminaires.
The direct light component in the meeting area is set with single push-button operation in semi-automatic mode.

CORRIDOR IN ADMINISTRATION BUILDING

Application:

Corridors and stairwells form large areas in every building, which, as circulation paths, should not be illuminated with high illuminance but should be safely lit at all times. In administration buildings the use of light management on such circulation paths opens up a high potential for energy saving. The reason for this is the high relative absence of persons in these areas (80 % according to DIN V 18599-10, see TRILUX Lighting Practice)

On this office floor, a division of the overall circulation path into individual areas with separate presence detection has been made (see figure 12), to avoid unnecessary lighting. The fully automatic switch-on behaviour can be realised with a short switch-off time of 3 minutes (see Chapter 4.2 "Switch-on behaviour"). A Basic Lighting function with 10 % luminous flux with absence avoids dark zones that cannot be seen into and increases the subjective feeling of safety.

A daylight-dependent control is also set up for area 1. Due to the high level of daylight, the Basic Lighting function is limited to the period from 4 pm to 8 am.

Installation:[10]

Two LiveLink control units are installed (see Chapter "Installation" on page 47).

First system:

- For area 1, the 3 sensors (with 8 DALI devices each) are connected to the DALI line of the control unit.
- The repeater (1 DALI device) is connected to the DALI line of the control unit. 26 luminaires are connected to the DALI output of the repeater (see figure 24 in Chapter "DALI interface" on page 48).
- The 3 sensors (8 DALI devices each) and 9 luminaires (1 DALI device each) of areas 2 to 4 are connected to the DALI line of the control unit.
- As a result, 58 D ALI devices are operated on the control unit.

Second system:

Sensors 5 to 8 and the 16 luminaires in areas 5 to 8 (48 DALI devices) are connected to the control unit.

[10] Identical functionality can also be realised with a LiveLink Premium system. A LiveLink Premium Server Kit with two DALI gateways can then be installed instead of the LiveLink WiFi control units. Luminaires and sensors can be distributed to the DALI outputs of the gateways as required. A repeater is not required. The free assignment of all components of the overall system is carried out during commissioning. Commissioning is carried out by TRILUX specialists (see also chapter 8 "LiveLink Premium" on page 58).

Commissioning (see page 51)**:**[10]

Luminaire- and sensor assignment:

Based on the "Universal" Use Case, the two systems are set up individually.

System 1:

- The repeater is assigned to luminaire group 1.
- The luminaires in areas 2 to 4 are assigned to luminaire groups 2 to 4.
- Sensors 1.1 to 1.3 are assigned to the presence detection of luminaire group 1.
- Sensor 1.2 is assigned to the constant light regulation of group 1.
- Sensors 2 to 4 are each assigned to the presence detection of luminaire group 2 to 4.

System 2:

- The luminaires in areas 5 to 8 are assigned to luminaire groups 5 to 8.
- Sensors 5 to 8 are each assigned to the presence detection of luminaire group 5 to 8.

Setting the control functions

System 1 and 2:

In the "All off" light scene, activate presence detection. [11]

System 1:

A light scene with daylight-dependent regulation must be set up as the default light scene:

- For all areas, presence detection is set to automatic with a switch-off delay of 3 minutes.
- A general light level of 20% is set for all areas.
- For area 1, the setpoint value of illuminance is set (see Chapter 6.3.1 "Setpoint setting").

System 2:

A light scene with daylight-dependent regulation must be set up as the default light scene:

- For all areas, presence detection is set to automatic with a switch-off delay of 3 minutes.
- A general light level of 20% is set for all areas.

Parameter	Group	**Setting**
Light level	Group 1	**daylight regulated**
	Groups 2 to 8	**100%**
Presence detection	Groups 1 to 8	**Fully automatic**
Switch-off delay	all	**3 min.** (also see page 54, Footnote [26])

Table 6: Create default scene for both systems

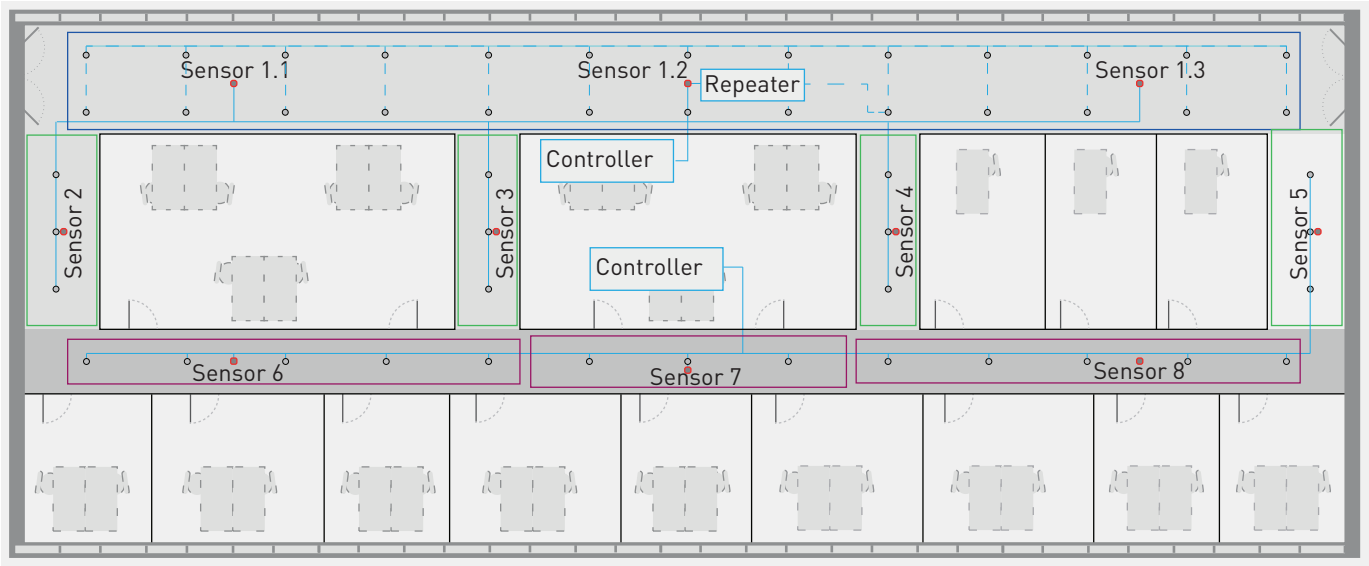


Figure 12:
Corridor in administration building:
Connected corridor area with 10 Dual HF sensors for presence detection and daylight-dependent regulation and 51 luminaires of type InperlaL G2 C07 BR19 1000-840 ETDD 01 in 8 areas, controlled by 2 LiveLink control units.

[11] For returning to the default light scene: activate presence detection for all luminaire groups (see page 51).

Application:

Corridors in hospitals are rarely just circulation paths. They are welfare and relaxation areas and are often have seating zones, waiting areas, reading areas and even computer workstations.

Due to 24-hour operation, long individual durations of residence and the often low level of daylight, staff and patients are largely cut off from the natural course of the day. These factors lay the way for circadian control of the colour temperature of lighting in these areas. The use of an efficient and flexible light management system is indispensable here.

In the present case, a corridor with multi-purpose use (at least 200 lx, in this case 300 lx) on a ward is considered, in which a patient information system (500 lx) with a waiting area is integrated. Square "Active" lay-in luminaires with uniform surface luminance are used in the main circulation area where patients are transported in a lying down state. In the peripheral area, five downlights – also with variable colour temperature – provide a lighting accent.

The control of the installed luminaires simulates the circadian colour temperature curve of daylight and is regulated according to daylight in two independent areas. The daytime lighting is activated in the morning by pressing a push-button (T1). Presence detection is deactivated to avoid unnecessary switching with only low saving potential.

In the evening the night-time lighting is reduced to 50 lx via a push-button (T2). With absence, the entire corridor is illuminated with the Basic Lighting level of 20 % of the setpoint illuminance. The light level of the day lighting and night lighting can be activated manually at any time using the T1 and T2 push-buttons on the information counter.

Installation:[12]

A LiveLink control unit is integrated into a "controller luminaire" (see Chapter "Installation" on page 47):

- One "LiveLink Sensor Dual HF" sensor is installed in each of the areas 1 and 2.
- In the area of the information counter, 2 push-buttons are installed on one push-button coupler.
- Sensors and push-button couplers are connected to the DALI line.
- A total of 45 DALI devices (90 mA control current) are occupied in this constellation.

Commissioning (see page 51)**:**[12]

Luminaire- and sensor assignment:

Based on the "Universal" Use Case, the luminaires and sensors are assigned to the groups "Group 1" and "Group 2".

- Sensor 1 is assigned to group 1 (see figure 13) for the daylight-dependent control and to groups 1 and 2 for presence detection.
- Sensor 2 is assigned to groups 1 and 2 for the presence detection.

Setting the control functions

A "day" light scene with daylight-dependent regulation must be set up:

- Presence detection is deactivated for both areas.
- For area 1, the setpoint value of illuminance (500 lx) is set (see Chapter 6.3.1 "Setpoint setting").
- For area 2, without daylight, luminous flux is set to 100 %.

A further "night" light scene without daylight-dependent regulation must be set up as the default light scene:

- For both areas, presence detection is set to automatic with a switch-off delay of 3 minutes.
- For both areas 1, luminous flux is set for an illuminance of 50 lx (in the information counter area it stays correspondingly brighter).
- A general light level of 20% is set for both areas.

The

- push-button T1 is assigned to the day light scene and
- push-button T2 to the night light scene

.

A push-button T3 is recommended as the group push-button for both luminaire groups. This enables the common switching and dimming of all luminaires. It is preferable to a push-button for an "Off" scene.

Table 7: Creating default scene

Parameter	Group	**Setting**
Light level	Group 1	**Calibrate luminous flux uncontrolled to 50 lx**
	Group 2	**Calibrate luminous flux uncontrolled to 50 lx**
Presence detection	Group 1 / Group 2	**Fully automatic**
Switch-off delay	Group 1 / Group 2	**3 min.** (also see page 54, Footnote [26])

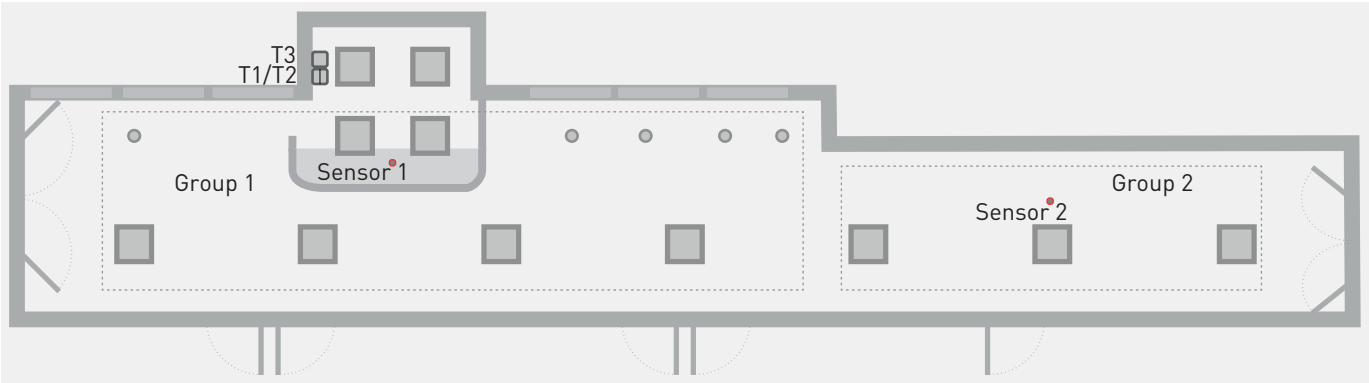


Figure 13:
Healthcare corridor:
Corridor with 2 Dual HF sensors for presence detection (group 1 + 2 together) and daylight-dependent regulation (group 1 only). With 18 "Active" luminaires with variable light colour from the Belviso and Inperla Ligra ranges, controlled by a LiveLink system with HCL function. The daytime sequence of the light colour, via its circadian effectiveness, supports the natural biorhythm. Push-buttons T1 and T2 enable selection between day and night operation. With a further optional T3 push-button, the lighting can be switched off or dimmed down to any level.

[12] Identical functionality can also be realised with a LiveLink Premium system. A LiveLink Premium Server Kit with two DALI gateways can then be installed instead of the LiveLink WiFi control units. Luminaires and sensors can be distributed to the DALI outputs of the gateways as required. A repeater is not required. The free assignment of all components of the overall system is carried out during commissioning. Commissioning is carried out by TRILUX specialists (see also chapter 8 "LiveLink Premium" on page 58).

Application:

The classroom is a very specific application for which LiveLink provides a Use Case that usually requires hardly any modification.

A general lighting system, consisting here of 6 surface-mounted luminaires, is supplemented by asymmetric blackboard lighting.

The general lighting itself must ensure adequate illuminance at all times at all workplaces.

In many classrooms, good daylight supply enables high savings potential via constant light control. However, a circadian colour temperature control with Active luminaires is recommended to support the internal clock also with low daylight ingress in winter (see Chapter "Human Centric Lighting (HCL)" on page 59).

As in all places of work, the light control in classrooms should be related to the workplace supplied with the lowest daylight. A sensor in the depth of the room is therefore required. A further light sensor near the window significantly increases the savings potential (see also TRILUX Lighting Practice).

The sensor technology is designed so that even when working in a concentrated manner with low occupancy of the classroom, the detection of presence still functions reliably. Detection close to the door is not necessary, as the light is switched on with a push-button when a person enters the room (semi-automatic, see Chapter "Switch-on and switch-off behaviour" on page 45).

The push-button at the door switches the general lighting on in daylight-controlled state and can also dim it. Further push-buttons for the blackboard lighting, for possible light scenes and, if necessary, for manual modification of the light colour, are located next to the blackboard and near the teacher's desk.

Installation:[13]

A LiveLink control unit is integrated into a "controller luminaire" (see Chapter "Installation" on page 47):

- A "LiveLink Sensor IR Quattro HD" sensor is installed in the window area near the teacher's desk.
- Another such sensor is installed diagonally opposite in the corridor area.
- A push-button is installed on a push-button coupler near the door.
- A further push-button coupler with up to four push-buttons (a double rocker) is installed in the area of the blackboard near the teacher's desk.
- Sensors and push-button couplers are connected to the DALI line.

Commissioning (see page 51)**:**[13]

Luminaire- and sensor assignment:

Based on the "Classroom" Use Case, the luminaires and sensors are assigned to the groups "Window", "Corridor" and "Blackboard".

- Sensor 1 is assigned to "Window" (see figure 29) for daylight-dependent regulation and to all groups for presence detection.
- Sensor 2 is assigned to the "Corridor" group for daylight-dependent regulation and to all groups for presence detection.

Setting the control functions

The default scene "Automatic" is preset and remains unchanged.

For the "Window" and "Corridor" areas the setpoint value of illuminance (300 lx) is set in each case (see Chapter 6.3.1 "Setpoint setting").

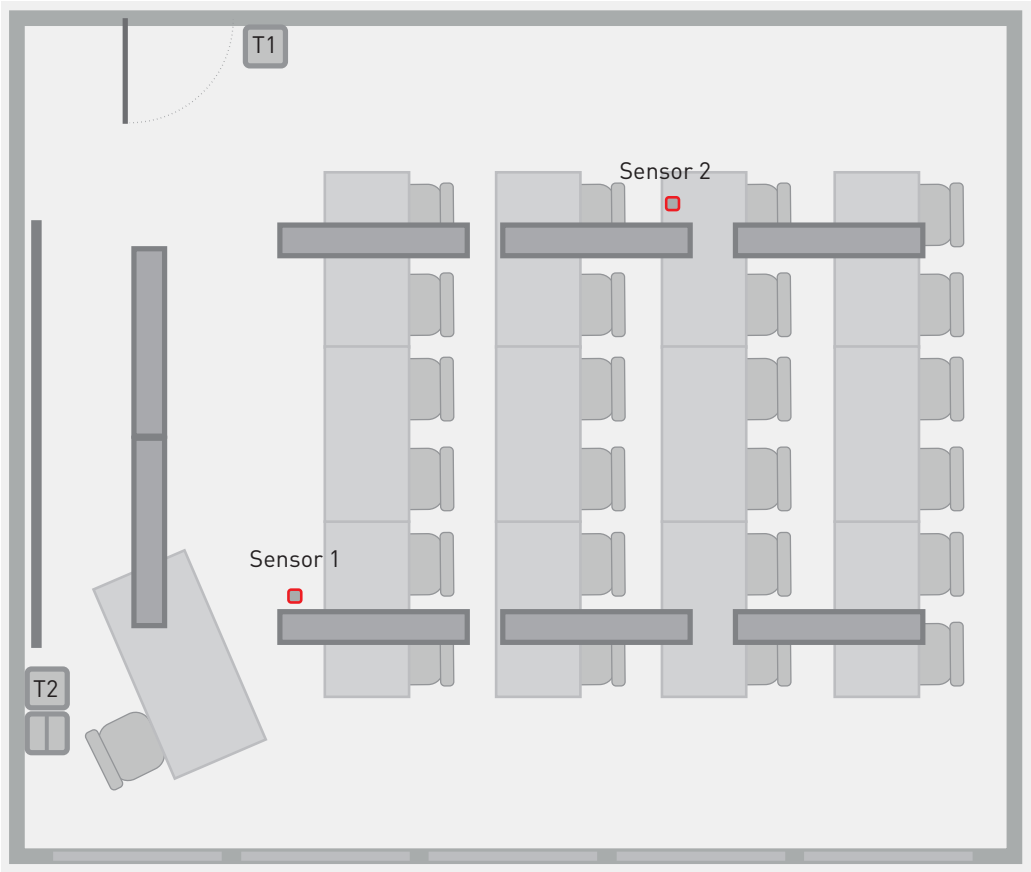


Figure 14:
Classroom:
"Classroom" Use Case
Push-button functions:
- T1
  - Group push-button for general lighting, two control groups.
  - Semi-automatic presence detection (sensor 1 and 2).
- T2
  - Group push-button for the blackboard lighting.
  - Semi-automatic presence detection (sensor 1 and 2).
- If necessary, additional push-buttons for light scenes or colour temperature.

[13] The radio-based LiveLink WiFi + RC light management system can be used if DALI wiring to the luminaires and push-buttons is not possible for structural reasons (see also chapter 5 Installation from page 47). The commissioning of the system is identical after the luminaires have been registered (see chapter 6 Commissioning on page 51).

Application:

The sports hall is an application in which good light management results in high energy savings and large increases in comfort.

When a person enters the hall, the lighting is automatically switched on to the level for general school sports (300 lx) with daylight-dependent control. Higher lighting levels can be activated by authorised persons using a key-operated switch.

Calling up an uncontrolled 100% level, an "Off" scene and the possibility of manually dimming all luminaires to a desired, uncontrolled light level creates maximum flexibility, especially when the hall is used for multiple purposes.

After 15 minutes absence of all persons the lighting installation returns to the standby mode of automatic switching on with 300 lx.

Installation:

A LiveLink control unit is fitted into the sub-distribution of the sports hall.

- Three sensors must be installed so that that reliable presence detection and daylight-dependent control in two independent groups (close to the window and in the depth of the room) is ensured (see Chapter "Sensors", page 50).
- For operation, a control console with at least 6 key-operated buttons (alternatively a lockable cabinet with push-buttons) must be installed near the door.
- Two push-button couplers are installed in the control console or the lockable cabinet.
- A total of 6 closing push-buttons (up to 8 push-buttons if required) are connected to the push-button couplers.
- The DALI terminals of the luminaires, sensors and push-button couplers are connected to the control unit via the DALI line.
- The maximum number of DALI devices on the control unit must be observed. [14]

[14] Luminaires with high luminous fluxes often contain several control gear units, each of which may need to be considered as a DALI device (see Chapter "DALI interface", page 48). A repeater can be used to combine several luminaires of a luminaire group if required.

Commissioning (see page 51)**:**

LiveLink provides a preset Use Case for sports halls for the operation of a luminaire group with 2 sensors (see page 39 and page 57). The switching and control behaviour of this can be extensively adapted to the local conditions (see page 53). If, as in the present example, non-uniform distribution of the incident daylight is required – and also a different configuration of the groups or sensors is required – this can be created individually with help of the "Universal" Use Case.

Luminaire- and sensor assignment:

Based on the "Universal" Use Case, "Sensor 1" is assigned to "Group 1" and "Sensor 2" and "Sensor 3" to "Group 2".

- Sensor 1 is assigned to group 1 (see figure 15) for daylight-dependent regulation and to both groups for presence detection.
- Sensor 2 is assigned to Group 2 for daylight-dependent regulation and to both groups for presence detection.
- Sensor 3 is assigned to both groups for presence detection.

Setting the control functions

Three light scenes ("300lx", "500 lx", "100 lx") with daylight-dependent regulation must be set up:

- For the light scenes, the illuminance setpoint of 300 lx, 500 lx or 100 lx is set in both areas (see Chapter 6.3.1 "Setpoint adjustment").
- The "300 lx" scene is defined as the default scene.

Two further light scenes must be set up:

- "Full" with 100% luminous flux without daylight-dependent regulation
- "Off", with 0 % luminous flux.

For all light scenes – including the "Off" scene – fully automatic presence detection with a 15-minute switch-off delay or inverse time must be set in both areas (see Chapter 6, "Commissioning" on page 51) .

The (closing) push-buttons are assigned as follows:

- T1 / T2 / T3: "300 lx", "500 lx", "100 lx"
- T4: "Full"
- T5: "Off"
- T6: Group push-button "manual", groups 1 and 2

.

Parameter	Group	**Setting**
Light level	Group 1	**regulated, 300 lx**
	Group 2	**regulated, 300 lx**
Presence detection	Group 1 / Group 2	**Fully automatic**
Switch-off delay	Group 1 / Group 2	**15 min.**

Table 8:
Default scene "300 lx" for general school sports

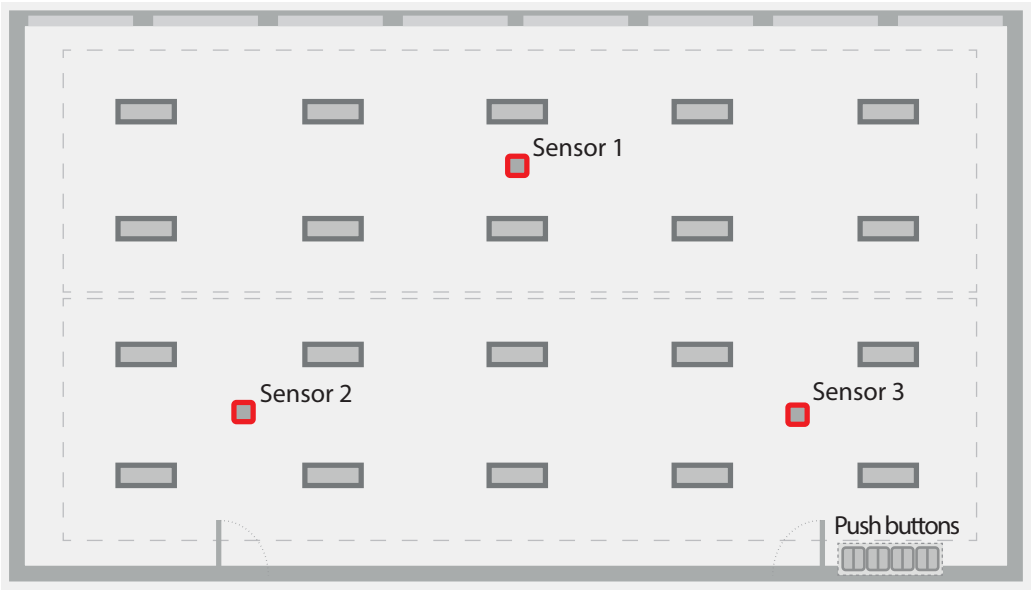


Figure 15:
Single sports hall with one-sided window arrangement and low lintel.

Installation:
- 20 luminaires Actison Fit D1 CDP 16000
- One LiveLink control unit in the sub-distribution
- 3 sensors LiveLink Sensor IR Quattro HD
- 2 LiveLink push-button couplers

Push-button functions:
- T1 .. T3: controlled levels
- T4: "Full"
- T5: "Off"
- T6: "manual"

Application:

In triple sports halls as well, good light management results in high energy savings and increased comfort.

When a person enters a section of the hall in this area, the lighting is switched on to the lighting level required for general school sports (300 lx). For each field, authorised persons can use key-operated switches to call up higher lighting levels of e.g. 500 lx or 750 lx in semi-automatic mode. If no presence is detected for 15 minutes, the lighting in the relevant field is switched off and returns to standby mode. 300 lx is switched on again the next time a person enters the field. [17]

If the partition walls are opened and the complete hall is used, the presence detection extends over all three areas. The lighting level adjusts to the value called up in the central hall.

Calling up an uncontrolled 100% level in the entire hall ensures uniform luminance conditions for competition purposes as well as balanced shadowing [15] .

Installation:

Three LiveLink Connect control units are installed in the sub-distribution of the tennis hall.

- A control console with key-operated push-buttons/switches must be installed near the entrance (or lockable cabinet with push-buttons/switches).
- For each system, one push-button coupler is installed on the relevant DALI line.
- In the control console or lockable cabinet, five push-buttons (T1 ... T4) for callable lighting levels are connected to the push-button couplers for each system (see Figure 16). [17]
- A switch (S2) and a double switch (S1 / S3) are also located there (see Chapter "Plug and Play" on page 47 and Figure 16).
- Two sensors per playing field must be installed (see Figure 16).
- The maximum number of DALI devices on the control unit must be observed. [14]

For multi-sports halls for special sports, analogously designed installations can be implemented.

[15] vertical illuminances without any pronounced preferred direction

Commissioning (see page 51)**:**

For multi-sports halls for specific sports, a similar configuration with modified control functions can usually be used.

Master-slave assignment (see page 47):

The control unit of the central hall is set up as master and the outer units as slaves.

Luminaire assignment :

Three identical systems are configured based on the "Sports hall" Use Case.

All luminaires and the 2 sensors are assigned to one group (see Figure 16). The sensor in the room depth is defined as Sensor 1 for the daylight-dependent regulation. [16]

Setting the control functions

Two additional light scenes with lighting levels (500 lx, 750 lx) with daylight-dependent regulation must be set up:

- For all systems, illuminance setpoints of 300 lx (default light scene), 500 lx or 750 lx are set for the light scenes (see Chapter 6.3.1 "Setpoint adjustment").
- Semi-automatic presence detection is set for the two new light scenes.

The push-buttons are assigned per system as follows:

- T1 / T2: "300 lx", "500 lx"
- T3 / T4: "750 lx", "Off" [17]

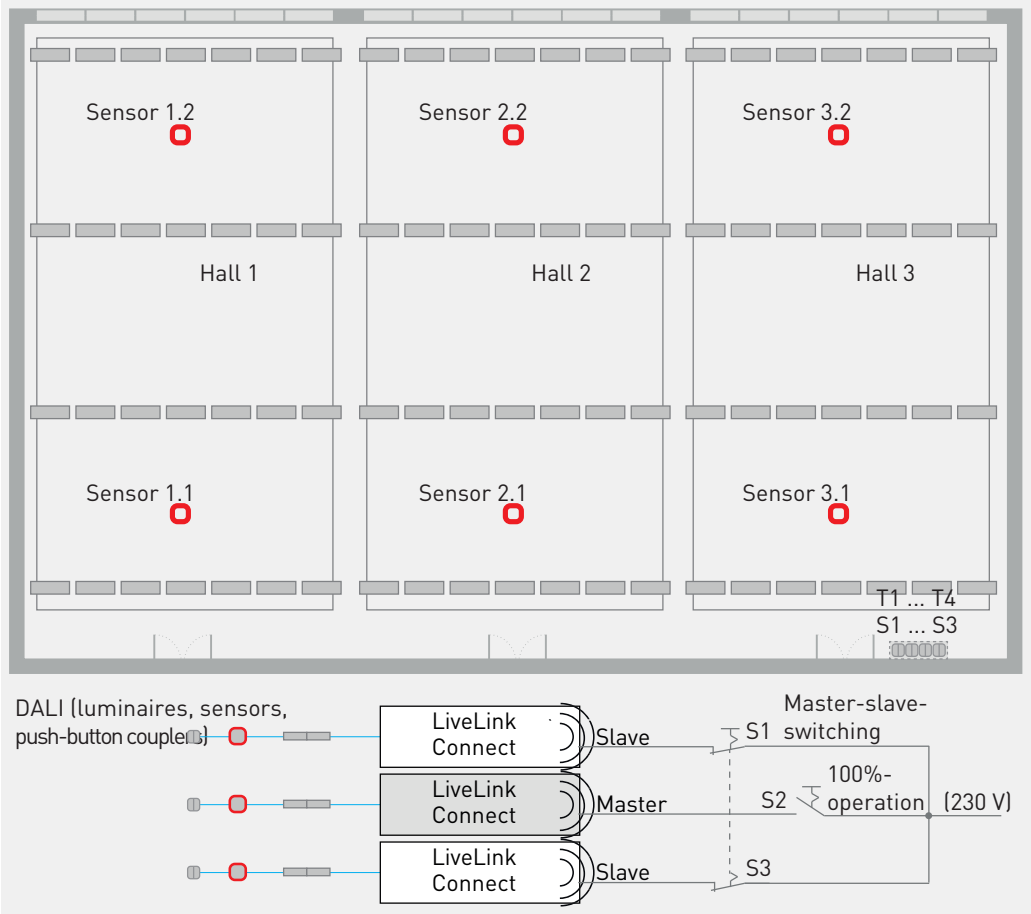


Figure 16:
Triple tennis hall:
- 3 · 28 Luminaires Actison Fit D1 CDP 16000
- Three LiveLink Connect control units in the sub-distribution
- 3 · 2 sensors LiveLink Sensor IR Quattro HD (3 DALI devices each)
- 3 (· 2) [17] LiveLink push-button coupler (1 DALI device each)

Push-button functions:
- T1: 300 lx (default)
- T2 / T3: 500 lx, 750 lx
- T4: Off [17]

Master-slave switching:
- Central hall set up as master.
- Switch of the outer control units (S1 and S3, NC contact) for slave mode.
- Switch of the master (S2, NO contact) for 100% operation without sensor function.

[16] If required, the "Universal" Use Case can be used to set up two areas for daylight-dependent regulation: close to the window and in the depth of the room.

[17] One group push-button per system is also recommended to be able to dim and switch the playing fields as desired. Depending on the use of the hall, additional push-buttons may also be useful for calling up further light scenes. An additional push-button coupler is required for this.

Application:[18]

With the HFSB/X system used here, the parking areas are only illuminated when someone is present and also only in a limited field. Switching is carried out fully automatically in the course of the driveway. The illuminated field extends around the motion-detecting sensor to the next sensor in both directions of the luminaire row (leading light). The travel paths can be switched as an overall group if required (see figures 18 and 19). The return to basic light takes place after the delay time settable during commissioning.

The sensor technology is fully integrated into the luminaires and is not visible to the users of the parking garage.

In addition to energy savings, reduced lighting operation also leads to a significant increase in the service life of the LED luminaires.

Installation:

For the controlled operation of a luminaire arrangement, a sensor luminaire ...HFSB and further sensor luminaires ...HFSX are required (see also product information).

The HFSB luminaire is installed as the first sensor luminaire in the row arrangement. The respective spacing of the subsequent HFSX luminaires must be set up in such a way that complete presence detection is ensured. Up to 14 DALI luminaires can be placed between two sensor luminaires as required.

All luminaires in the arrangement are connected with a 5-core line for power supply and control. The HFSB and HFSX sensor luminaires are equipped with system connections on both sides for this purpose. The following should be taken into account.

- **HFSB luminaires**:
  - Equipped with plug socket (output) on both sides.
  - Sensor luminaire forms a DALI system with max. 15 DALI devices with DALI luminaires connected at both ends.
- **HFSX luminaires**:
  - Equipped with plug (input) and socket (output).
  - The plug (input) points to the HFSB luminaire at the beginning of the luminaire row.
  - The control unit input receives a signal from the previous sensor luminaire's output.
  - The control unit sends control signals at the output (plug socket).
  - The sensor luminaire forms a DALI system with max. 15 DALI devices with DALI luminaires connected at the output.
  - The row arrangement is continued only in one direction (at one output of the HFSB luminaires).
  - An HFSX luminaire (input) may only be connected to the output (DALI control) of one previous sensor luminaire (splitting of the luminaire row).
  - The number of sensor luminaires in an arrangement is limited to max. 40.

A possible constellation for the implementation of the light management functionality described under "Application" on the given parking deck is shown in figures 17 to 19 .

Commissioning

The commissioning of the light management systems of the parking deck can be carried out in a few minutes with the help of the IR remote control (see also product information).

- Commissioning is carried out for each row of luminaires. The settings are made at any sensor luminaire in the arrangement.
- The light level for presence (depending on the design, generally 100%) and the basic light level (20%) are set.
- For the arrangements in the parking bay aisles, the group behaviour "swarm" is set for the leading light with a 5-minute switch-off delay.
- If necessary, "all" can be set for switching the entire system with a switch-off delay of 2 minutes for the luminaires of the crossways and the entry/exit (see also figure 18).
- With "send all", the settings are transmitted to all sensor luminaires in an arrangement.

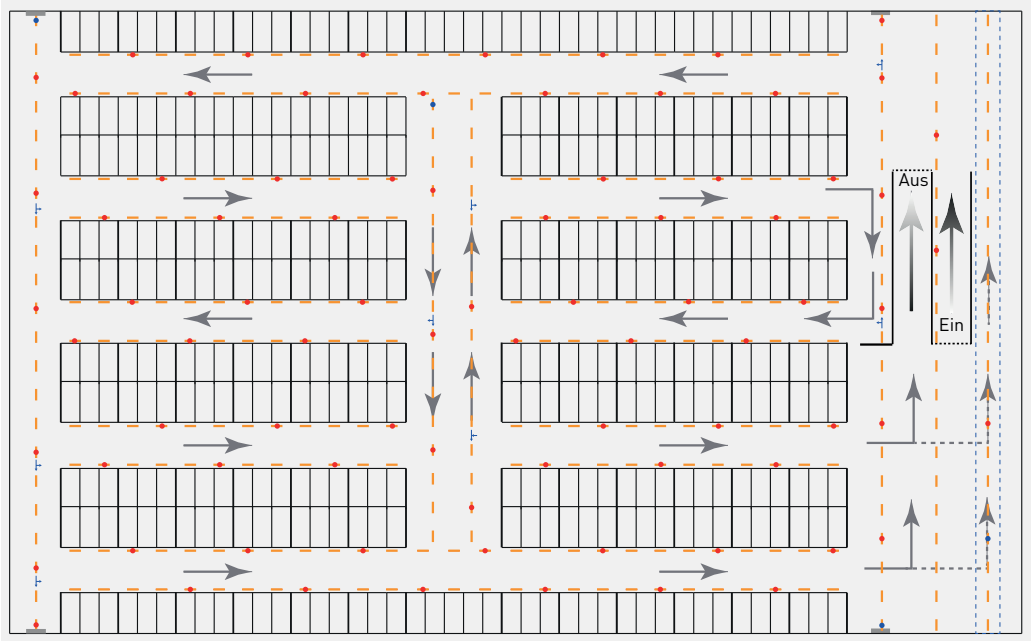


Figure 17:
Parking deck with 86 HFS-B/X sensor luminaires and another 286 DALI luminaires in parking bay aisles and crossways:
- Sensors close to stairwell doors.
- HFSB sensor luminaire at the beginning of a possibly branched continuous line.
- Parking bay aisles in the direction of travel:
  - Control at the entrance by branching from the crossway (⊦).
  - Control ends at the next crossway.
- Arrangement of sensors with (almost) overlapping detection areas.
- Leading light ("swarm") in the parking bay areas.

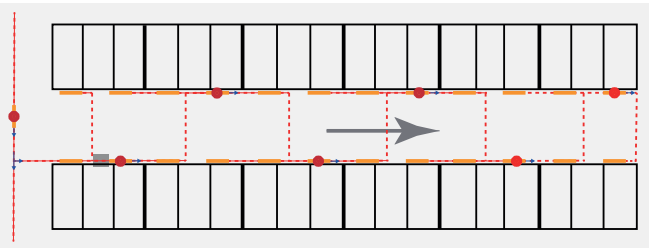


Figure 18:
Wiring for leading light in a parking bay aisle. Two (four) luminaires at the beginning of the row are connected to the output (→) of the upstream sensor luminaire in the approaching crossway (⊦). A sensor luminaire forms the end of a luminaire row.
If crossways or parking bay aisles are to be operated as groups ("all"), the connection from the crossway to the first sensor luminaire of the parking bay aisle must be interrupted.
HFSXSensor luminaire

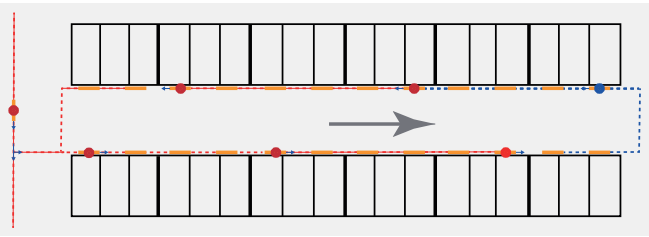


Figure 19:
Alternative wiring for leading light on a driveway when routing the cable across the driveway is difficult for structural reasons. A sensor displayed in blue indicates the HFSB sensor luminaire at the end of the parking bay aisle. A row of luminaires connected in the opposite direction begins here.
HFSB-Sensorleuchte
HFSX-Sensorleuchte

The two inner rows of luminaires in the entrance and exit area are wired as a coherent arrangement like a parking bay aisle (see figure 18). The outer row of luminaires (far right, framed in dashed lines) forms a separate arrangement.[18]

[18]Similar functionalities can also be realised with the LiveLink systems (LiveLink WiFi and LiveLink Premium), which additionally enable monitoring (see chapter 9 Monitoring on page 59). The LiveLink WiFi + RC system enables an installation without additional control lines where required.

Application:

In a logistics hall, gear trays of the E-Line continuous line with suitable lighting technology provide appropriate lighting for the various visual tasks in storage and dispatch areas.

Long operating times, often requiring lighting ready for use throughout the year (8760 h/a), provide high energy-saving potential for light management by illuminating the racking aisles only if occupied by people. With absence only Basic Light is maintained. The lighting is switched fully automatically with presence and can be subdivided into several zones in the case of long shelf aisles.

An emergency switch enables permanent 100% operation.

Installation:

The LiveLink control units are installed in the sub-distribution for controlled operation of the continuous lines. An emergency switch, which interrupts all DALI lines, takes the form of a multiple circuit breaker and is installed at an accessible location. [19]

- Each control unit generates a DALI system.
- All further continuous line components (DALI luminaires and sensors) are operated in parallel on the DALI cable in the continuous line.
- A maximum of 9 sensors can be put into operation in one system.
- The maximum number of DALI devices on the control unit must be observed. [14]

If necessary, several shelf racking areas can be operated with one LiveLink system. The presence detection of the areas should overlap (see figure 20 below).

If a repeater is used, all DALI components downstream in the continuous line are operated at the DALI output of the repeater (see page 49). Addressing (grouping of luminaires and the operation of sensors) is not possible. For the dispatch area a repeater can be used if necessary (1 DALI device).

[19] It must be ensured that the DALI parameter "System Failure Level" is set to the desired luminous flux – usually 100 % .

Commissioning (see page 51)**:**

Luminaire- and sensor assignment:

The installed systems are configured based on the "Universal" Use Case.

- The luminaires are assigned to the control areas according to the luminaire groups.
- The sensors in the control area are assigned to the luminaire group for the presence detection (see figure 20).

Setting the control functions

A light scene must be set up:

- For all systems, luminous flux is set to 100% for the light scene.
- For the light scene, fully automatic presence detection is set with a 5-minute switch-off delay.
- The scene is defined as the default scene.
- A Basic Light level of 20% is set for the scene.

Parameter	Group	Setting
Light level	Group 1...	**100%**
Presence detection	Group 1...	**Fully automatic**
Switch-off delay	Group 1...	**5 min.** (also see page 54, Footnote [26])
Basic Light	Group 1...	**20 %**

Table 9: Logistics default scene:

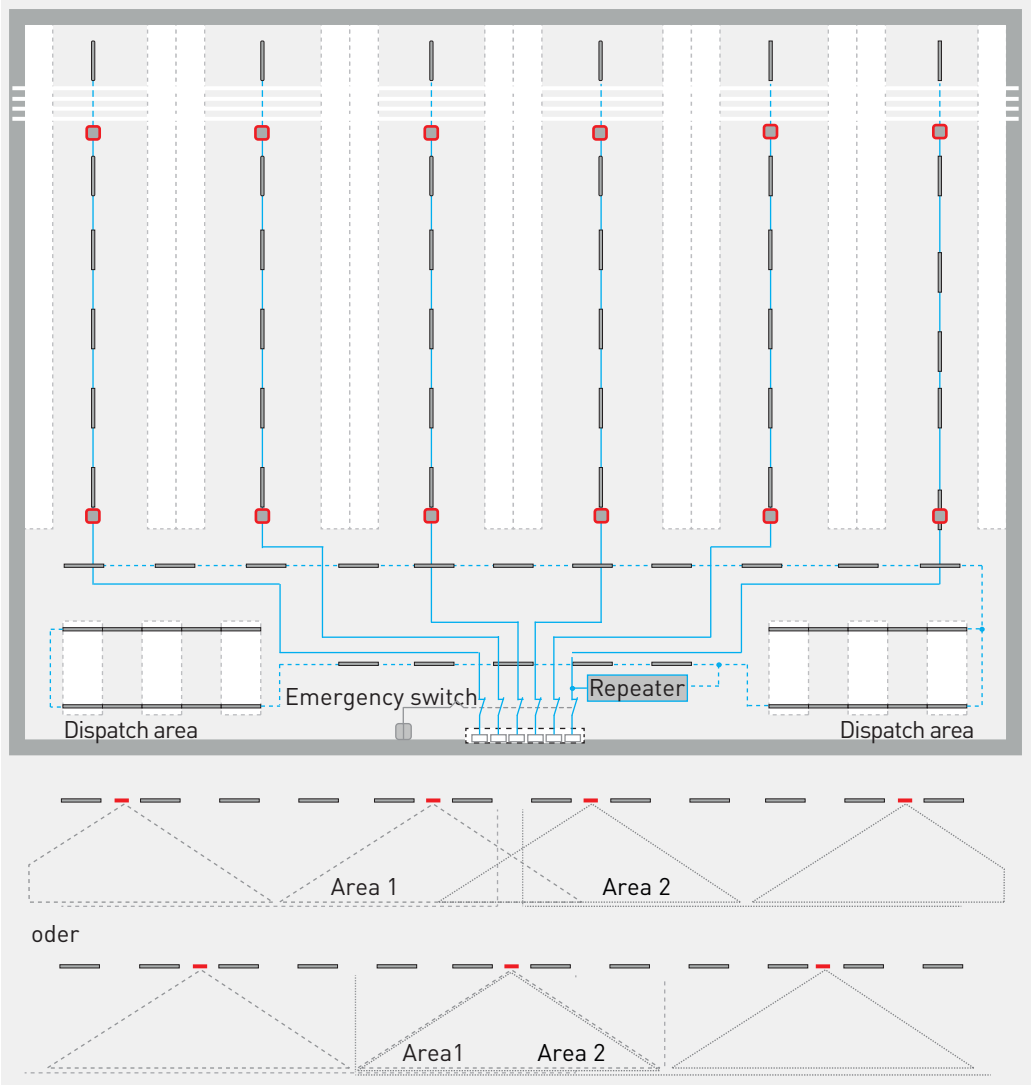


Figure 20:
Logistics hall:
- Continuous operation in the dispatch area,
- Presence detection with Basic Light in the single racking aisles.
- Sensor IS 345 MX Highbay in the gear tray. Blanking of the detection at the start of the racking with a cover shield.
- LiveLink control units in the sub-distribution.
- If required, several aisles on one control unit (max. 9 sensors, max. 64 DALI devices).
- Luminaires of the dispatch area together on repeater (1 DALI address).
- Emergency switch: circuit breaker for calling "System Failure Level" (100 %).

If an aisle is divided, overlapping of detection ranges. [20]

[20] The assignment of a sensor to two effective ranges (see figure 26 on page 50) is possible.

4 OPERATION

The aim of the **installation** of a lighting system is to provide the user with a high quality of light in harmony with the spatial surroundings. The aim of the **commissioning** is to then provide the user with convenient and intuitive operation. At the same time it should be flexible and fully support the expected applications.

However, the scope of possible functions is partly predetermined with the installation. It is therefore important to carefully plan the arrangement and functions of the components and operating elements. A familiar behaviour of the lighting system in accordance with the expectations of the user should be aimed for.

The main aspects are the functions of wall push-buttons and the behaviour of automatic functions such as switching on and off, dynamic changes in colour temperature and daylight-dependent control of illuminance.

With the flexible LiveLink Wi-Fi system on which most of the applications described above are based, these applications are freely configurable and are defined during commissioning with the "default light scene" (see Chapter 6.2 Light scenes).

4.1 Push-button functions

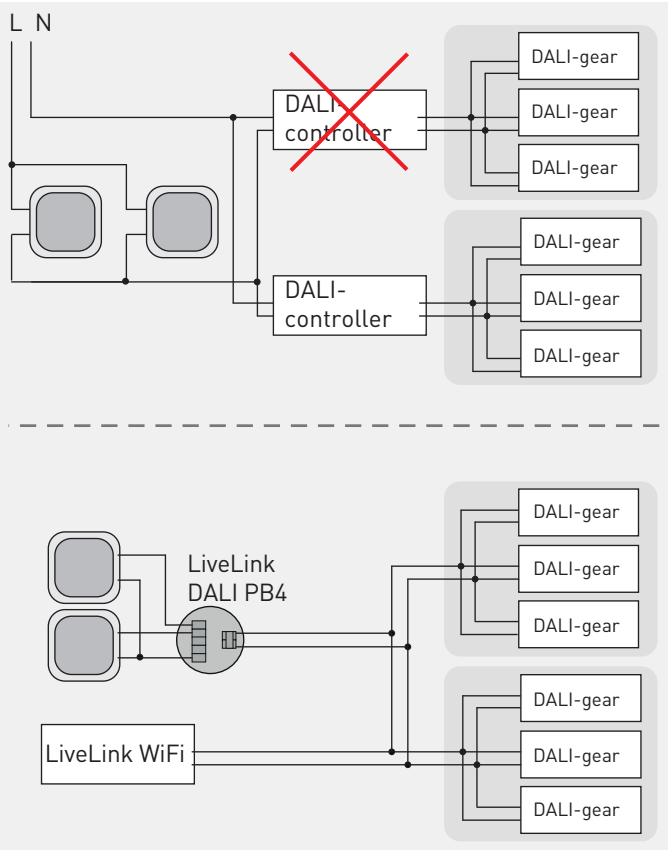


Figure 21: Schematic diagram:
a) Push-buttons on control units with one-button operation (Push-Dim function).
- Avoid parallel control of several control units on one common push-button.
- Asynchronous behaviour may occur if, for example, due to product tolerances, one control unit detects a short touch pulse and another does not detect it.
- Synchronisation problematic.

b) Push-button to LiveLink push-button coupler.
- The operating concept is parallel control of several luminaire groups with a common push-button.
- Asynchronous behaviour cannot occur.
- Synchronisation not required.

The widespread expectation when seeing a wall push-button is undeniably that it will be used to switch luminaires on and off. From double push-buttons with the symbols ∧ and ∨ on the other hand, the user expects blinds or partitions to open and close, or the "up" or "down" direction of a dimming sequence. Equally matter-of-fact today is that a single wall push-button enables the lighting to be switched on and off and dimmed in alternating directions, i.e. "single-button operation".

In fact, single push-button operation has long become the norm for many users. It enables maximum flexibility through

- switching the light on and off and
- setting any dimming level.

In most applications it is therefore the preferred solution.

However, care should be taken to ensure that several separate systems should not be operated on one button (see figure 21). In this case, non-synchronous behaviour ("toggle operation") might occur in which one part of the luminaires is always switched on and another part of the luminaires is switched off. A synchronisation of such a malfunction may be possible, depending on the individual systems involved, but in no case can it be achieved intuitively.

Push-button functions of the LiveLink Wi-Fi system

LiveLink systems based on the LiveLink WiFi or LiveLink WiFi + RC control unit provide push-buttons for one-button operation and calling up light scenes in the application. There are no separate "Up" and "Down" push-buttons.

During commissioning, single-button operation also allows several luminaire groups to be assigned to one "group push-button", which are then controlled together. The luminaire groups to be operated are part of an overall system. Their synchronised behaviour (see above) is part of the operating concept.

In addition to the "group push-buttons", "light scene push-buttons" can be set up to fulfil recurring lighting requirements via direct call. When setting up installation push-buttons for light scenes, it should be considered that these are limited to a single function (calling up the light scene) and always control all luminaire groups. Light scenes are therefore particularly suitable for central functions (see Chapter 6.2 "Light scenes").

After calling up a light scene, single push-button operation with group push-buttons is still possible. The behaviour of the luminaire groups defined in the light scene called up (switch-on level, switch-off delay etc.) is retained as long as this light scene is active. When the lighting is switched on again after long absence, the default light scene is usually called up (see Chapter 6.2 "Light scenes"). The luminaire groups then behave as defined in the default light scene.

It usually makes sense to label light scene push-buttons installed in a room, because the assignment of push-button functions to light scenes cannot be intuitively comprehended (see also Chapter 6.2).

4.2 Switching on and off behaviour (LiveLink WiFi, LiveLink WiFi + RC)

The lighting installation can be switched on and off automatically via the presence detection and manually via wall push-buttons. Irrespective of this, in areas with daylight-dependent control, the light is switched off if there is sufficient daylight at all times.

A basic distinction is made between three different types of switching behaviour:

- Automatic: automatic switch-on and automatic switch-off.
- Semi-automatic: manual switch-on and automatic switch-off.
- Manual mode: without presence detection.

Another important factor is the switch-off delay.

When commissioning a LiveLink Wi-Fi system, different switching characteristics can be freely assigned to the installed luminaire groups. Which form of operation makes most sense depends on the application in the specific room.

The **automatic mode** is recommended in e.g. circulation paths (corridors, staircases). Short switch-off delays – typically 5 minutes – enable energy-efficient operation. If necessary, pay attention to the switching sensitivity of the lamps used [21]. The arrangement of the sensors should ensure overall good detection. In some cases, difficult detection, e.g. due to geometrical reasons, can be counteracted by increasing the switch-off delay. Wall push-buttons are usually not required.

In addition, in automatic mode, **Basic Lighting** can be set up which remains switched on either for the duration of a further delay or permanently (see LiveLink System Manual).

The **semi-automatic operation** is recommended in almost all areas where the continuous occupancy of persons can be expected. The detection and effective range can be defined by linking sensors and luminaire groups. Wall push-buttons can be assigned to luminaire groups or light scenes (see above).

The advantages of semi-automatic mode are:

- Increased energy savings by avoiding unnecessary switching on during daylight which is individually judged to be sufficient, as well as when a person enters the room briefly to fetch or bring things (see also TRILUX Lighting Practice).
- Increased energy savings through selective switching on of lighting groups in the room using a wall push-button and common, automatic switching off (see example in Chapter 3.1).
- Avoidance of unintentional switching on of the lighting if the automatic mode is reactivated after a manual switch-off.

Even in applications with semi-automatic operation, reliable presence detection is of great importance. This is particularly the case because after automatic switch-off in the dark, a safety risk might exist on the way to the wall push-button.

LiveLink does not switch off abruptly when presence is not detected after the switch-off delay has expired, but dims down slowly. The lighting is not switched off and dimmed up again as soon as a movement is detected during this process.

Luminaire groups in **manual mode** are only automatically switched off in daylight-dependently controlled areas with continuously sufficient daylight. Switching on again must be done manually.

The **switch-on level** of the lighting is determined per luminaire group via the LiveLink Wi-Fi system. It is determined during commissioning by configuration of the light scenes (see Chapter 6.2 "Light scenes"). The values stored here apply both to presence-dependent switching in automatic mode and to switching with group push-buttons (one-button operation). A switch-on level of a 0% value in the default light scene means that the specific group can be switched on by push-button. In this case, an assigned group push-button switches the luminaire group on at 20

In addition to the wall push-buttons, manual operation is also possible with the LiveLink "Control" app. All defined light scenes are available in the app. Alternatively, the luminaire groups are displayed on the graphic interface and can be activated individually.

[21] Compact fluorescent lamps in particular are sensitive to short operating times. Quality luminaires with LED technology are usually insensitive to high switching frequencies and short operating times.

4.3 Basic Lighting (LiveLink WiFi, LiveLink WiFi + RC and LiveLink Premium)

As part of commissioning with the Install app, a Basic Lighting function can be set up in the areas with automatic operation after a system has been set up. In the event of absence, the lighting is then not switched off after expiry of the switch-off delay but set to a definable level. Selection can be made between the functions

- Permanent (continuous general light with absence),
- Time interval (further delay until complete switch-off) and
- Time of day (permanent general light upon absence at specific times of day on selected week days).

(see LiveLink System Manual).

The Basic Lighting function is assigned to the presence sensors. If several luminaire groups are controlled by one sensor, the function can be retroactively modified or deactivated for each luminaire group [22]. The effective ranges of the presence detection may overlap (see figure 26 or example from page 22).

4.4 LiveLink "Control" app

In addition to setting up installation push-buttons, the application of the LiveLink "Control" app opens up convenient and flexible options for operating the installed LiveLink Wi-Fi light management system.

Especially in open-plan offices and other applications with separate and individual visual tasks where installing an accessible push-button nearby is not feasible, the app can be a helpful tool for adjusting the light locally to the actual requirements.

To use the app, the user must know the network name of the appropriate system (see Chapter "Wi-Fi access and apps" on page 58). He must also have the password for access to the specific LiveLink system.

Once the connection has been successfully established, the user of the app has access to all defined light scenes and the luminaire groups that have been set up. The prerequisite for this is that the user is located in the reception range of the Wi-Fi network.

It is also advisable to have visual contact with the luminaires to be operated so that any operating errors can immediately be recognised and understood (one-room concept, see Chapter "Installation", page 47).

Using the app is largely intuitive. The designations of the components and the appearance of the user interface are defined when the system is configured as part of the commissioning process.

[22] For luminaire groups in semi-automatic mode, the Basic Lighting function must be deactivated due to possible malfunctions.

5 INSTALLATION (Single-room light management with LiveLink WiFi [+ RC])

This chapter provides general instructions for the installation of light management systems based on the flexibly usable LiveLink WiFi (or LiveLink-WiFi + RC) control unit on which most of the application examples shown are based. Both control units are available in a housing for installation in luminaires and in a row installation housing (6TE).

For further details on the commissioning of this system and other LiveLink systems, please see the corresponding instructions or system manuals.

Despite the theoretically large number of components that can be operated with it, LiveLink WiFi is designed as a room-related light management system. In particular, the straightforwardness of the system is one of its essential features. Light scenes always relate to the overall system and to the luminaire groups defined during commissioning (see Chapter 'Light scenes' on page 53). The DALI standard would allow freer definitions, but this could lead to very complex behaviour of the complete system.

The restriction to on-location commissioning (sensor and push-button assignment, setpoint adjustment) within the radius of the Wi-Fi connection between the tablet and the control unit is also part of the concept, and this should be taken into account during the installation.

Within the framework of the one-room concept, however, LiveLink provides very extensive, flexible and convenient configuration options (see examples on pages 12 to 42). In large sports halls, the use of several networked control units (LiveLink Connect) can be useful (see example on page 38).

For this purpose there is an extensive selection of IR and HF sensors available. Up to four closing buttons can be connected per push-button coupler for freely programmable operating functions (see LiveLink System Manual).

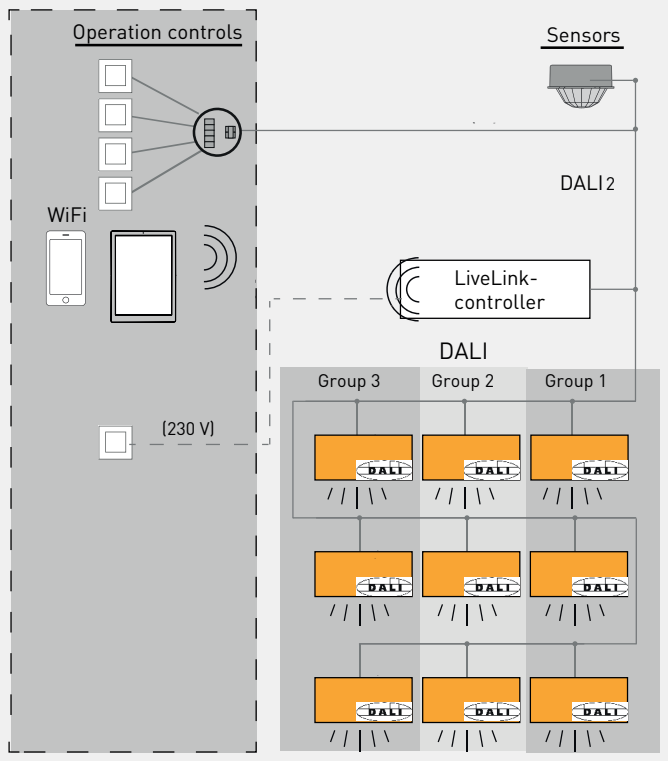


Figure 22: Schematic diagram of a light management system with LiveLink:
- Luminaires with group addresses.
- Integration of (DALI2-) push-button couplers and sensors by connecting to the DALI control line.
- Integration of system-specific operating elements
  - WI-FI,
  - 230V push-button: assignment of a function during commissioning. With the "LiveLink Connect" control unit for switching between master and slave operation.

5.1 Plug and Play

The installation of a LiveLink WiFi system is very simple (see figure 22). A mains-side closing button (230 V) can be connected to the control unit as a control element. All further components are supplied and operated at the LiveLink WiFi control unit via the two-core control line of the DALI interface or connected via Wi-Fi.

Controller luminaires (with integrated control unit) and master luminaires (with integrated control unit and sensor) have connection terminals for the DALI connection and for connecting the 230-V push-button. They enable a comfortable setup of the LiveLink system without additional installation effort (see figure 23).

Note: With the special "LiveLink Connect" control unit in the triple sports hall application on page 38 the interface of the 230-V push-button is used for switching from individual to slave operation and 100% continuous operation (see LiveLink System Manual).

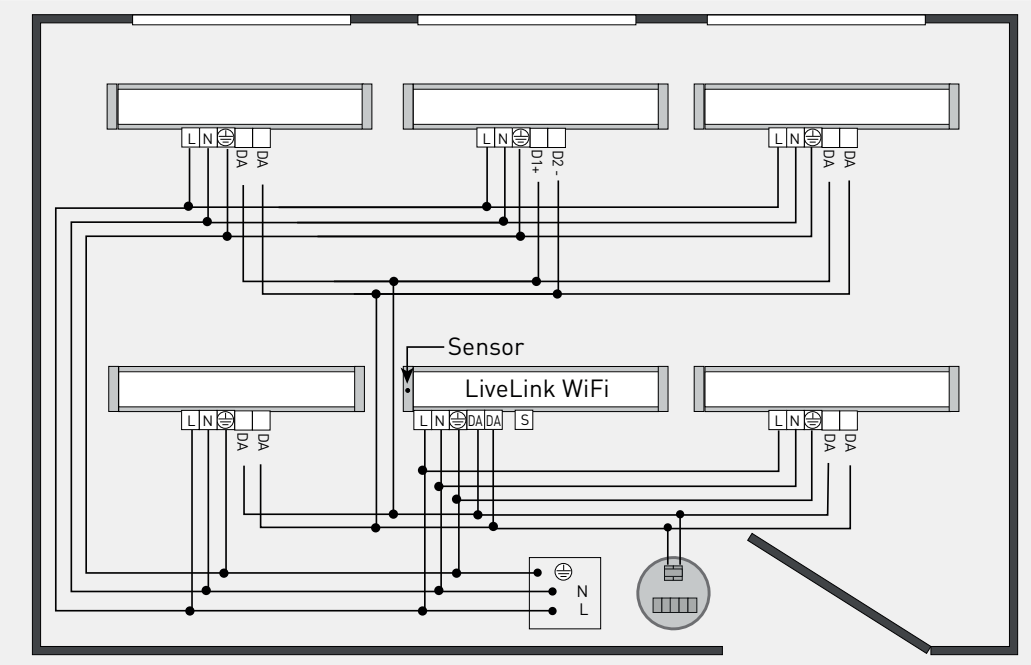


Figure 23: Schematic diagram: Master luminaire in room installation.

5.2 DALI interface

The following boundary conditions must be considered with regard to the DALI interface:

- The control current required for signal transmission is provided by the control unit and is limited.
- The maximum control current available at the DALI interface of the LiveLink WiFi controller is 128 mA. The control current at the DALI interface of the LiveLink WiFi + RC is 64 mA (32 DALI devices).
- Control gear units in luminaires consume 2 mA control current per DALI device.
- With multi-channel control gear units, each DALI address must be considered as one DALI device.
- DT8 control gear units occupy one DALI address so they must be considered as one DALI device.[23]
- Sensors and push-button couplers of the LiveLink system are also supplied via the interface. They must be considered as one or more DALI devices, depending on the power requirement (see LiveLink System Manual).
- If the interface is overloaded by too many DALI devices, malfunctions will occur.
- The maximum permissible cable length (at 1.5 mm²) is 300 m from the DALI power supply to the remotest DALI device.
- A DALI repeater can be integrated as a DALI device (DALI control gear unit with a DALI address, see figure 24) into the installation (see also TRILUX Lighting Practice). The repeater requires a mains connection in order to provide the control current for another 64 DALI devices in broadcast mode.

[23] No operation of DT8 control units on LiveLink WiFi + RC control units.

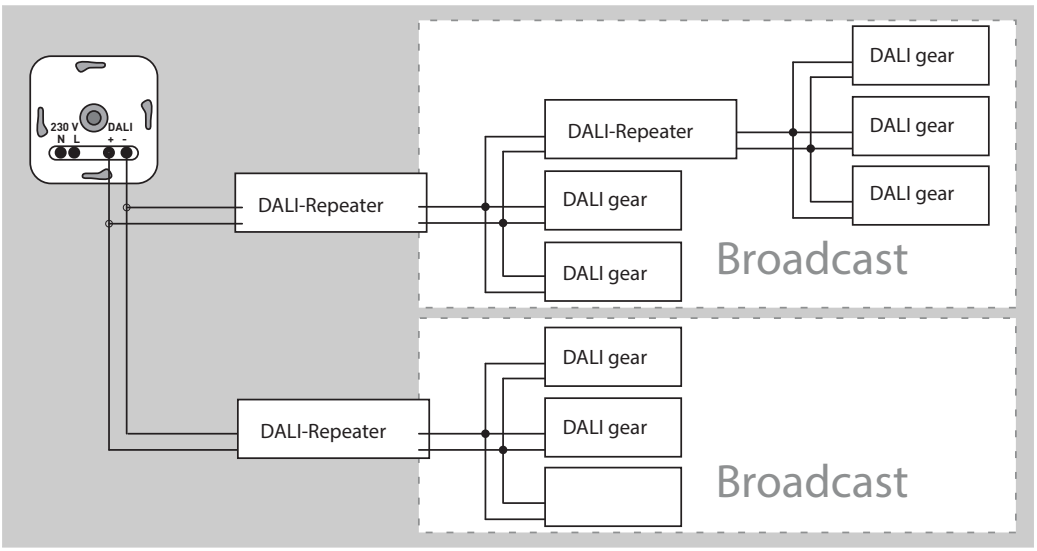


Figure 24:
Schematic diagram: DALI expansion with repeaters.
- One DALI control unit can control several repeaters in broadcast mode or addressing mode.
- A repeater counts as one DALI device.
- Repeaters can be cascaded.

5.3 Sensors for presence detection

As an alternative or in addition to operating push-buttons, a lighting system can also be switched by automatic functions, e.g. by presence detection.

The presence detection is mainly characterised by the following characteristics:

- Detection range
- Effective range
- Switch-on behaviour
- Switch-off behaviour

The **detection range** of a sensor is determined by the type and position of the specific sensor. These can be PIR (passive infrared) or HF (high frequency) sensors (see also TRILUX Lighting Practice). During commissioning, the sensor is assigned to one or several luminaire groups and its switching functions are defined.

To extend the detection range, several sensors can be assigned to common luminaire groups. When selecting and positioning the sensors care must be taken to ensure that sufficiently good detection reliably ensures the desired switch-on and switch-off behaviour. For the available sensors for the LiveLink WiFi control unit, the detection ranges are specified in an overview in the technical documentation of the overall system (see LiveLink System Manual).

In the application chapters in this publication on pages 12 to 42 examples are shown. The selection and positioning of the specified sensors is closely linked to the given room geometry.

The **effective range** of a sensor is given by the luminaire groups assigned to the sensor during commissioning. The LiveLink WiFi system enables overlapping effective ranges (see figure 26 on page 50).

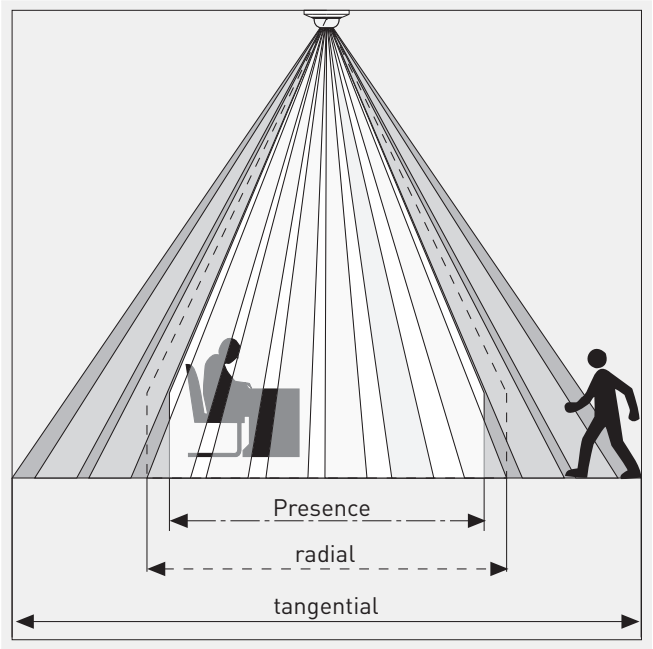


Figure 25: Example of the detection range of a passive infrared sensor for presence and motion detection.
- Movements can be detected over a wide detection range if they take place tangentially (i.e. transversely to the "viewing direction" of the sensor) in a comparable form to a walking movement.
- In a somewhat narrower detection range, radial movements of the type of walking movement towards the sensor are also detected.
- Within the detection range of presence, even small movements (e.g. writing activity) are detected.

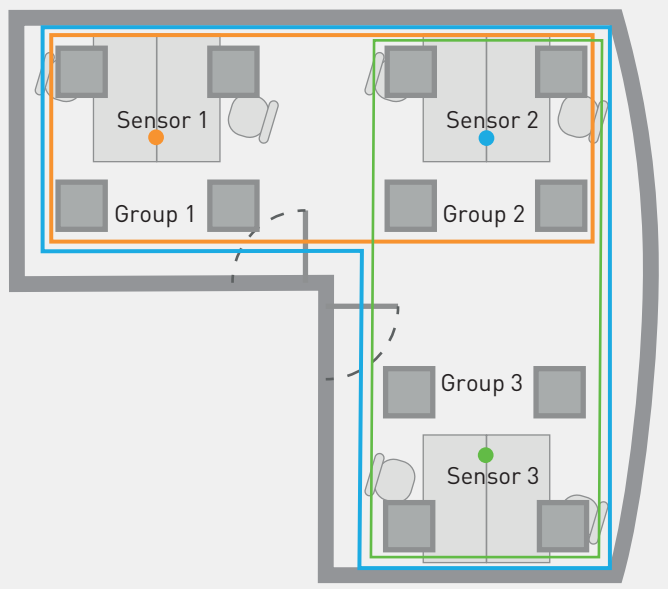


Figure 26: Overlapping effective ranges in a room with a LiveLink WiFi system.
- The assignment of the luminaire groups is implemented per sensor (coloured frame).
- Resulting effective ranges may overlap.
- With presence, the perceived area of the room is illuminated.
- The daylight-dependent control is implemented per luminaire group (see Chapter 6.3).

5.4 Sensors for light regulation

Further boundary conditions must be considered with regard to the sensor functions:

- With daylight-dependent regulation, the sensor should always be installed in the area of the visual task at the position with the lowest daylight supply.
- Separate regulation zones should be set up for areas with widely differing daylight supply or differing nominal illuminances (different visual tasks) (see also Chapter "Constant light regulation", page 54).
- The light sensor should be positioned in such a way that no increased influence of extraneous light occurs in its detection range (e.g. direct daylight or indirect light component of a suspended luminaire, see figure 27).
- The light sensor measures the amount of light reflected in the direction of the sensor from the surfaces in the detection range.
- The surfaces detected by the light sensor should reflect diffusely (not specularly).
- The reflection factor of the surfaces detected by the light sensor should be sufficiently high (>20%).
- The reflection factor of the surface should not vary greatly (example: paper tray on dark desk surface).
- In the examples on pages 12 to 42, suitable components are named for each individual situation. In case of deviating constellations and geometries, the direct transferability must be checked.
- The positioning of the components in the examples is exemplary and must be carefully determined in each individual case (see LiveLink System Manual).

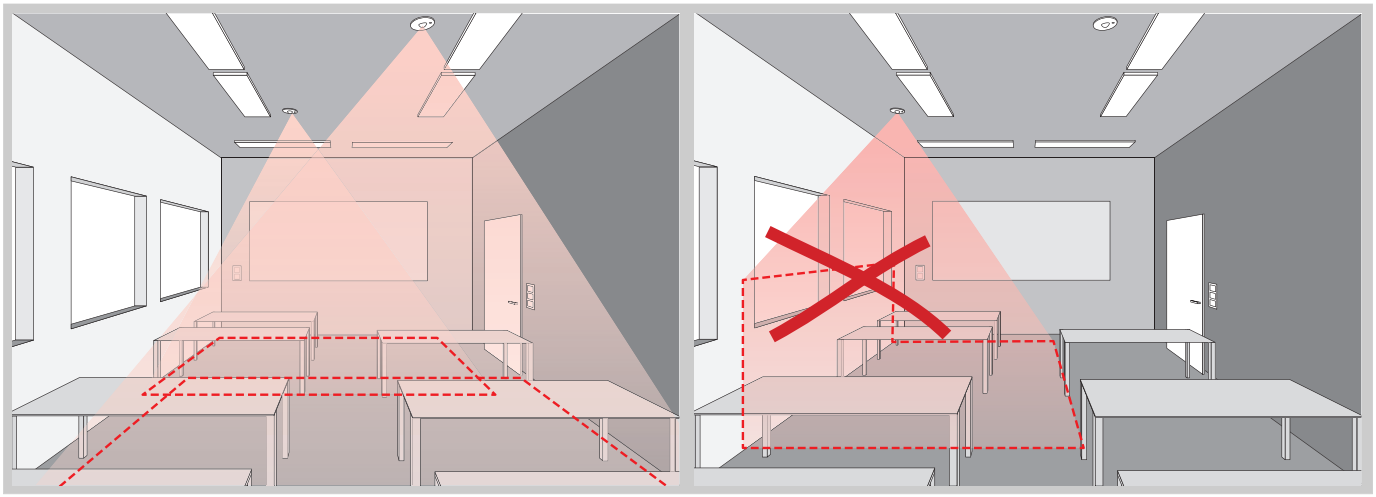


Figure 27: The detection range of a light sensor for daylight-dependent control. Interference caused by surfaces in the detection range that are brightly illuminated by extraneous light should be avoided.

6 COMMISSIONING AND USE CASES (LiveLink WiFi [+ RC])

LiveLink WiFi enables individual configuration of the installed light management system with use of the LiveLink "Install" app. It is assumed here that a separate light management system is generally used for each room (see "Installation" chapter, page 47).

To set up or modify the configuration, an existing Wi-Fi connection between the tablet used and the control unit is always required (see "Wi-Fi access and apps" on page 58). A configuration is set up after opening the "Install" app and successfully entering the password under the "Set up room" menu item.

Under the menu item "Device management", the connected DALI components for setting up the room must be entered. Here it is possible to activate a routine for recording all connected components or newly added components (see LiveLink System Manual). Radio participants in the LiveLink WiFi + RC system are registered separately.

If "Active" luminaires with separate DALI addresses (DALI DT6) are used for mixing the light colours, e.g. in an HCL application (see Chapter 10.1 on page 59), the warm white and cool white components of the light must be assigned to each other for each luminaire (see figure 28). This step is not required for luminaires with DT8 control gear units. They are displayed directly as Active luminaires.

A so-called "Use Case" must now be selected as the basis for commissioning a "room". This provides a pre-configuration of the lighting installation. Luminaire groups and sensors are displayed as icons on the graphic interface of the app (see example "Classroom" in figure 29). Their designations and geometrical arrangement are based on typical application situations (see tables 11 to 13).

The assignment of the connected luminaires and sensors to the icons is carried out during commissioning. Not all icons of the Use Case must be used. Assignment of the sensor functions (constant light control and presence detection) to the luminaire groups is preset in the Use Case, but can also be extensively modified according to individual situations.

The Use Cases also contain different, application-specific light scenes (see page 53).

- The default scene is always a light scene with automatic functions of light regulation or presence detection.
- The "all off" scene is defined in each case so that after a sufficiently long period of time without detected presence (inverse time) the system returns to the default light scene.

There are no default settings in the Use Cases for calling functions with installation push-buttons. Suggestions for assignment are provided in the application examples at the beginning of this brochure. The functions can be freely assigned to the 230 V push-button and other push-buttons on push-button couplers.

The Use Cases freely available in the app (public Use Cases) are:

- Small office,
- Large office,
- Conference room,
- Production hall,
- Expanded production hall,
- Classroom,
- Sports hall,
- Patient room,
- Corridor, and one
- Universal Use Case.

The "Universal" Use Case is intended for individual configurations of the system, and contains nine luminaire group icons and nine corresponding sensor icons to which the installed luminaires and sensors can be assigned. [24] (see example "Universal" in figure 30). The sensor functions can be linked to the luminaire groups (icons) as required. Not all of the icons have to be assigned to the luminaires or sensors.

Two light scenes are set up in the "Universal" Use Case.

- All on: The complete lighting is operated without control at 100 % luminous flux without presence detection. This scene is set up as the default scene.
- All off: The lighting is switched off. This scene remains active until another scene is called up. In particular, there is **no falling back into the default scene** , because presence detection is deactivated (see Chapter "Light scenes" on page 54). Presence detection can be activated for each luminaire group and any value for switch-off delay or inverse time can be set.
  If, as in the predefined use cases, a return to the default scene is intended,
  - presence detection must have been activated for all luminaire groups, and
  - the duration of the switch-off delay set there must have elapsed once for all groups without any detection of movement.

[24] Each luminaire can be assigned to exactly one luminaire group. The DALI standard allows assignment to several groups; this though is not used with the LiveLink system.

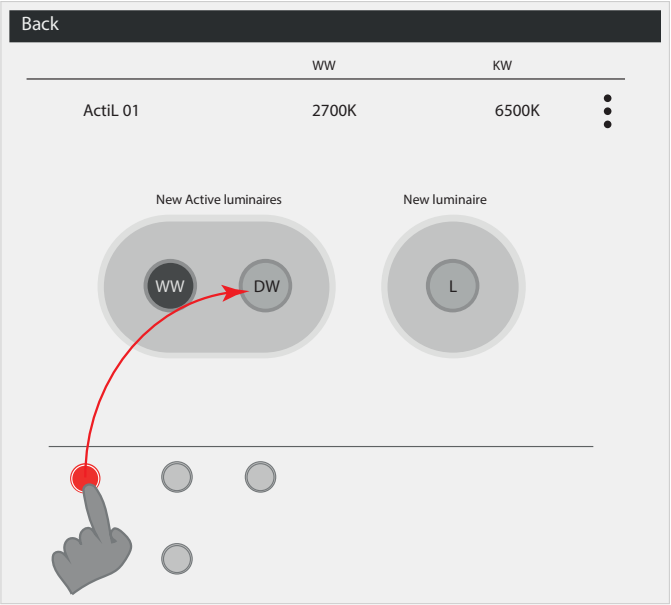


Figure 28: Schematic diagram: Assignment of warm white and daylight white light components to Active luminaires with separate DALI addresses for the light components (DALI Device Type 6).
This assignment is not necessary for 2-channel control gear units with internal colour mixing function (DALI Device Type 8).

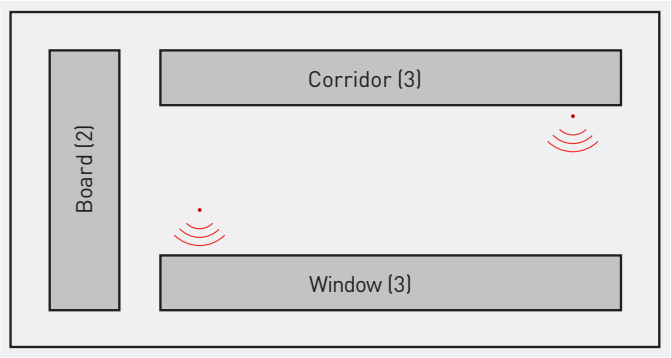


Figure 29: Schematic diagram: Classroom Use Case
- Three luminaire groups.
- Two sensors, assigned to the luminaire groups, light control per group, total presence detection (presetting can be modified).
- Light scenes are also preset.

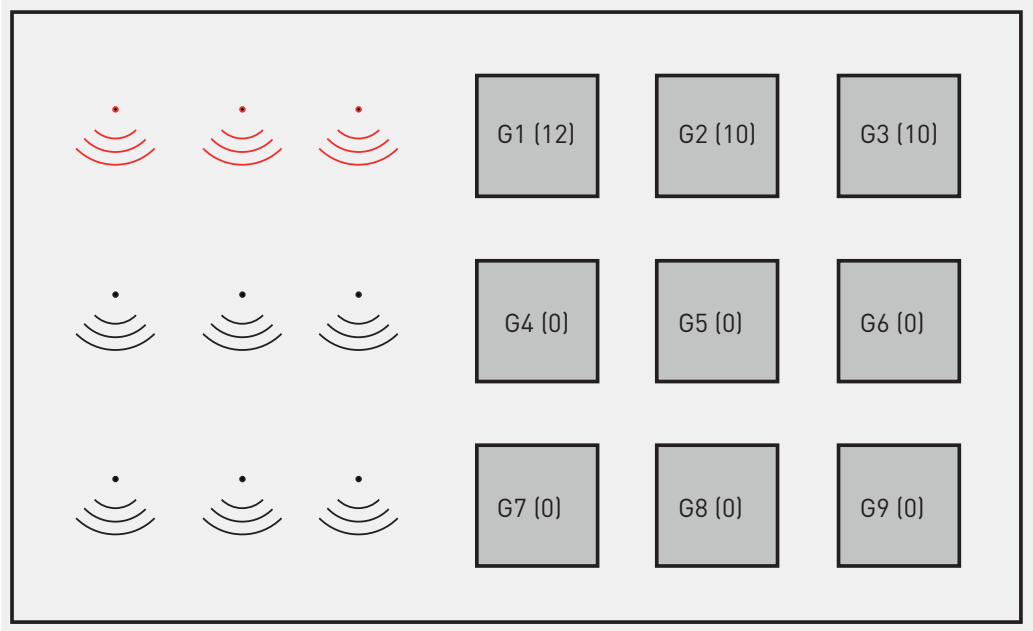


Figure 30: Schematic diagram: Universal Use Case (example configuration)
- A total of 32 luminaires are assigned to three luminaire group icons, six icons are unassigned.
- Three sensors are assigned sensor icons and their functions "presence" and "constant light" are assigned to the luminaire groups (no default setting).
- "All on" (100 %) and "All off" light scenes are not preset.

6.1 Luminaire groups and sensor functions

For a light management system to function properly, correct positioning of the presence and light sensors and their assignment to the luminaire groups is very important. It must therefore be carefully planned. During commissioning, the components are configured according to the planning. This must be carried out on site. The process for commissioning a LiveLink WiFi system is as follows:

- To create a room, all connected DALI devices must have been registered by the system (see above). As part of this, DALI addresses (maximum of 64 short addresses) are assigned to them randomly.
- For each DALI device (DALI short address) a symbol appears on the app interface.
- The symbol of the DALI device is highlighted on the app interface when touched with the finger. The physical DALI device flashes.
- In the schematic representation of the app interface, the symbol of the DALI device can be moved with the finger and assigned to the luminaire group or sensor position (see figure 31).
- For applications with "Active" luminaires and colour temperature control (e.g. HCL applications), the light colour must be considered in advance when creating groups (see above).

Once all components have been assigned, the sensor functions (presence and, if applicable, constant light control) must be assigned to the luminaire groups for the "Universal" Use Case. In all other Use Cases the sensor functions are preset and can be modified if required. Finally, the room can be completed with the "Next" command and the app switches to definition of the light scenes.

If required, an assignment can be cancelled and reassigned for each individual component. A complete reassignment of all components is not necessary.

Note: An application-oriented configuration of the system and the assignment of instructive designations for luminaire groups, sensors, light scenes and group push-button functions form the basis for convenient operation of the system. This applies in particular to intended operation with the "Control" app (see Chapter 7 "Wi-Fi access and apps" on page 58).

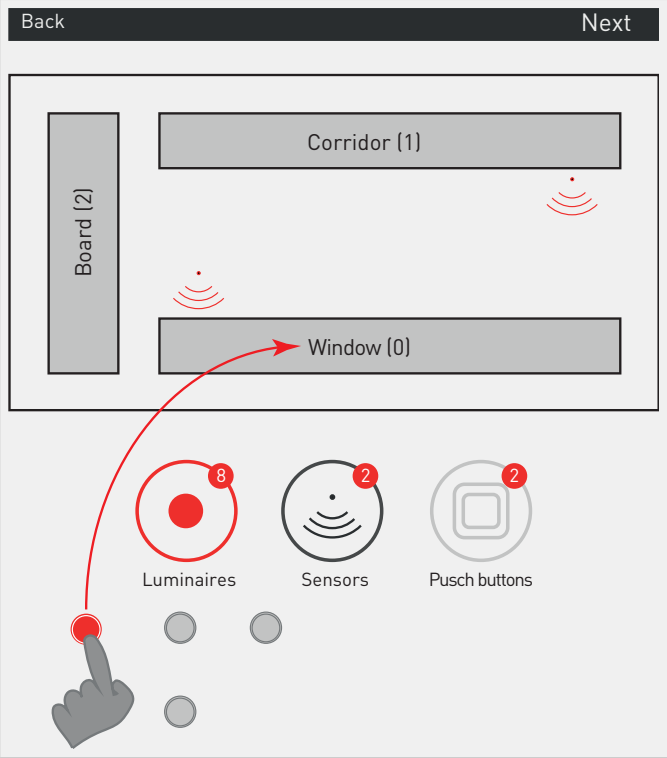


Figure 31: Schematic diagram: Assignment of DALI devices

6.2 Light scenes

Light scenes are callable presettings of a lighting system that can be configured or edited during the commissioning process.

With the LiveLink WiFi system, the relevant presettings can be defined both by values of luminous flux (dimming level) and by the locally detected illuminance (setpoint value of the light control). For each light scene, an individual setpoint or dimming level can be determined for each area[25]. However, the switch-on and switch-off behaviour is also defined individually for each luminaire group in the light scenes, which also has an effect on the operation with group push-buttons (see also Chapter 4.1 Push-button functions).

The application-specific Use Cases already contain common light scenes for the specific use. In the "Universal" Use Case, the light scenes that need to be set up for later use of the system must be defined individually.

With the LiveLink WiFi system, a light scene fundamentally extends over all luminaire groups. It is not intended that one or more luminaire groups continue to operate unaffected after a new light scene is called up.

Each light scene can be assigned to an installation push-button during commissioning. However, the light scene push-buttons of the LiveLink system are fundamentally only used to call up a light scene and have no other function (e.g. "Off"). In many cases it makes sense to label light scene push-buttons in the installation.

In many applications, no or only a few light scenes are required for manually operating the lighting (see classroom example on page 34). In general, the more flexible control with group push-buttons is preferable to controlling with scene push-buttons.

For central functions on the other hand, the definition of light scenes can often be useful, e.g. switching off all lighting or call up a uniform lighting level.

[25] LiveLink does not need to define and call up DALI light scenes with individual dimming levels for each DALI short address.

Light scenes can also be called up with the LiveLink "Control" app (see Chapter 4.4 LiveLink Control app).

Of particular importance is the **default light scene**. This always becomes active when the complete lighting system has been switched off due to absence (see also footnote[26]), or when it is called. In this way, it determines the recurring switch-on and switch-off behaviour and other presettings of the luminaire groups. It is marked with a dot in the screen view of the app.

The default light scene is preset in the application-specific Use Cases. For the efficient saving of energy in offices it is e.g. important that the electronic control functions – presence detection and constant light control – are activated after switching on. This also meets the requirements of the Energy Saving Regulation, which defines such behaviour with office lighting as a reference technology (see Chapter **??**).

A further example is a classroom in which the blackboard lighting should not be switched on automatically with the general lighting but should still be switched off together with this if necessary.

The default light scene, like all light scenes, can be configured if required.

The "All off" light scene also has a special function in the application-specific Use Cases. If this is called up, it remains active until no movement is detected for the duration of the adjustable inverse time. Only then does the default scene become active. This ensures that the light does not unintentionally switch on automatically again but only after an absence (if the default scene has fully automatic presence detection – for details see LiveLink System Manual).

The following basically applies: a called-up light scene remains active until another light scene is called up or until the switch-off time for all luminaire groups has expired without a movement being detected, thereby causing activation of the default light scene[26].

Note: In the "Universal" Use Case, presence detection of the "All off" light scene is deactivated and no return to the default light scene is preset (see page 51).

6.3 Constant light regulation

The automatic adjustment of illuminance to a required light level enables energy savings. The use of this savings potential is required by law in many workplace lighting applications (see Chapter **??** "Energy Saving Regulation (EnEV)"). The level of expected energy savings is determined with the help of the standard DIN V 18599 .

A distinction is made between the technical possibilities of the control and the regulation (see also TRILUX Lighting Practice).

LiveLink enables the setting of setpoints for constant light regulation. The regulation takes into account the sum of daylight and artificial light occurring at the sensor. In this respect, it fulfils both "control types" defined in the standard DIN V 18599-4, "daylight control" and "constant light control" (see also TRILUX Lighting Practice).

The savings potential thus results from the compensation of any surplus of available artificial light and the consideration of additional daylight.

A combination of control and regulation takes place with the so-called "offset control". With this method, in one area the illuminance is regulated to a setpoint value and an area outside the sensor's detection range is also controlled. The luminous flux "offset" can be set during setpoint adjustment for the relevant luminaire group (see below). [27] [28]

Correct positioning of the sensors relative to the luminaires to be controlled as well as to any extraneous light sources occurring in the application is a prerequisite for error-free operation of the control. If required, refer to the application examples on pages 12 to 42. Detailed, general criteria are specified in the technical documentation of the LiveLink WiFi system (see LiveLink System Manual).

The assignment of the light sensors in an installation to the luminaire groups to be controlled is independent of the assignment of presence detection (see figure 26 in Chapter 5.3).

[26] This means that in the active light scene, presence detection must be set up for all luminaire groups so that a return to the default light scene can occur. In the application-specific public Use Cases, this is fulfilled for all light scenes except the "night light" scene.

[27] Generally, such control of luminaire groups only makes sense for areas with largely identical lighting conditions and requirements. The definition of a luminous flux ratio (offset) for areas with deviating conditions leads usually to an unsatisfactory result.

[28] Manual adjustment of the lighting – meaning deactivation of the light regulation – in the light sensor's detection range has an indirect effect on the other luminaire groups controlled by the sensor.

6.3.1 Setpoint adjustment

The setpoint value of the illuminance must be set in each area on-site. This is the only way to ensure reliable provision of the required illuminance[29]. A suitable illumination meter must be used for setpoint adjustment (see also TRILUX Lighting Practice) and the influence of extraneous light must be avoided as far as possible.

With the LiveLink WiFi system the setpoint of the light control is adjusted during editing of the light scenes. The following must be observed:

Control ranges:

- Each light sensor is assigned a control range (see above).
- In the preset Use Cases, a control range always consists of one luminaire group.
- In the free "Universal" Use Case, several luminaire groups can be assigned to one sensor.

Setpoint assignment:

- The setpoint setting must be made separately for each light scene.
- The luminaire groups are to be included in the control individually – and not together in the sensor's control range (activating or deactivating the control). [30]
- The setpoint of the lighting must be set for each luminaire group.

Special features in the "Universal" Use Case:

- If (in the "Universal" Use Case) several luminaire groups are activated in one control range, these are controlled together with the luminous flux ratio set when the setpoint is defined. [31]
- If luminaire groups of a control range are outside the detection range of the assigned sensor, so-called "offset control" results (see above [27] [28]).

Measurement of the setpoint (or setpoints) is implemented at the time the light scene is completed via the "Save" command.

6.4 Push-button assignment

With the LiveLink WiFi system, the functions are assigned to the installed push-buttons during commissioning after the light scenes have been defined (see LiveLink System Manual).

When setting up group push-buttons, any combination of luminaire groups can be assigned to the buttons. Their switching behaviour is defined in the default light scene or in the currently active light scene (see above).

If required, light scenes can also be assigned to the push-buttons. When controlling several independent areas with one LiveLink system, it must be observed however that light scenes always extend over all areas (see for example the application on page 32).

LiveLink WiFi offers the user very individual options for application-specific configurations of the operation. The functions of the push-buttons in the room should always be easy to understand and as intuitive as possible for the user. It may be useful to label the push-buttons.

6.5 Overview of Use Cases

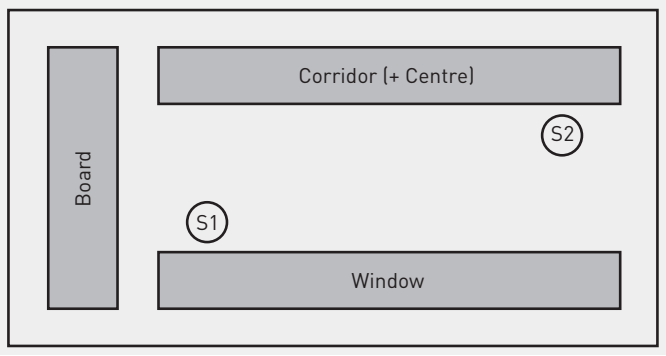


Table 10:

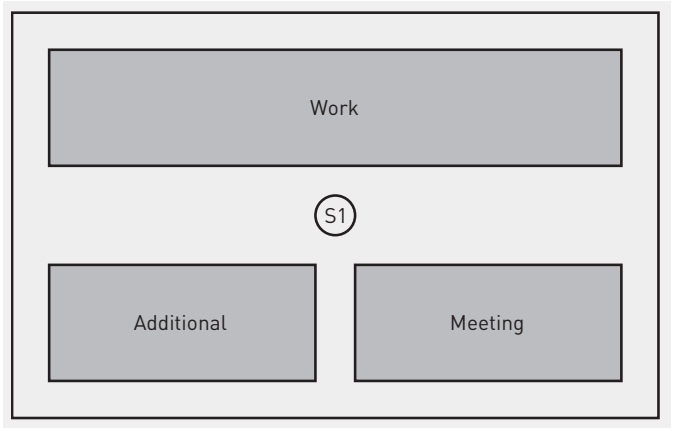
	Group	**Value**
Light level	Window	regulated
	Corridor	regulated
	Panel	100 %
Presence detection	all	Semi-automatic
	2	Semi-automatic
Switch-off delay		10 min.

Graphic representation of the Use Cases in the software interface and associated table of default setting of the control functions, the switch-on behaviour and the switch-off delay (default light scene).

[29] The sensor does not measure an illuminance but detects reflected spill light. The brightness detected by the light sensor depends on the reflection factor of the detected surfaces.

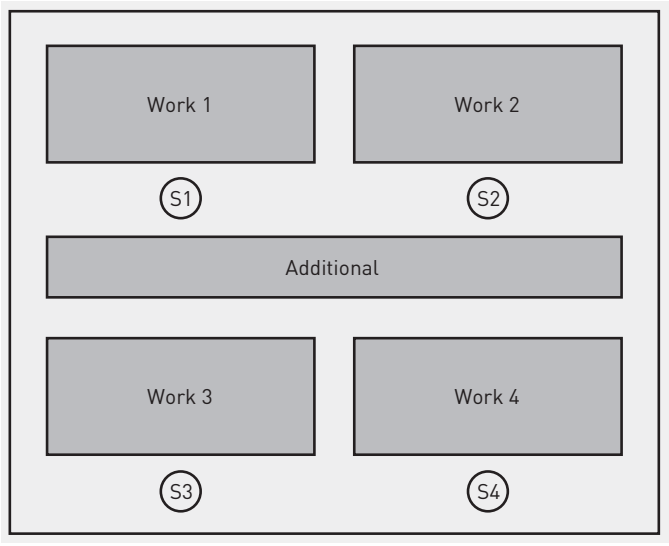
[30] Luminaire groups within a control range should usually be jointly activated or deactivated. This applies in particular to luminaire groups whose luminous flux contributes significantly to the lighting in the detection range of a sensor.

[31] Generally, identical values are recommended for a uniform dimming behaviour of the control.



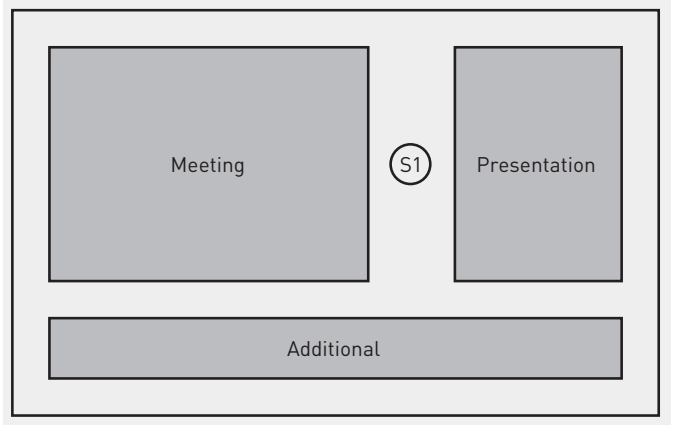
	Group	**Value**
Light level	Work	regulated
	Additional	0 %
	Meeting	0 %
Presence detection	Work/ Additional/ Meeting	Fully automatic (not switching on, because set to 0)
Switch-off delay		5 min.

(a) Small office



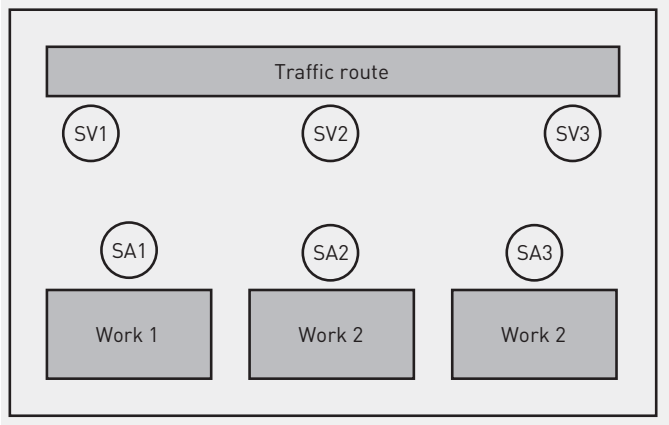
	Group	**Value**
Light level	Work 1	regulated
	Work 2	regulated
	Work 3	regulated
	Work 4	regulated
	Additional	0 %
Presence detection	Work 1 ... 4	Fully automatic (all groups common)
	Additional	(not switching on, because set to 0)
Switch-off delay		5 min.

(b) Large office



	Group	**Value**
Light level	Meeting	regulated
	Presentation	0 %
	Additional	0 %
Presence detection	all	Fully automatic
Switch-off delay		10 min.

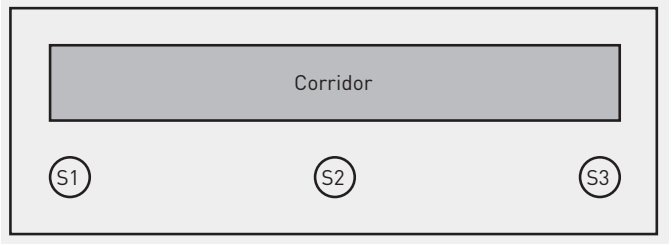
(c) Konferenzraum



	Group	**Value**
Light level	Work 1 ... 3	regulated
	Circulation path	100 %
Presence detection	Work 1 ... 3	Semi-automatic
	Circulation path	Fully automatic
Switch-off delay		10 min.

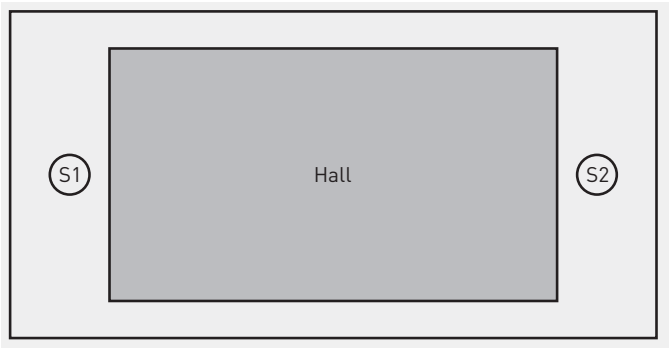
(d) Production hall

Table 11: Graphic representation of the Use Cases in the software interface and associated table of default setting of the control functions, the switch-on behaviour and the switch-off delay (default light scene).



	Group	**Value**
Light level	Corridor	regulated
Presence detection	Corridor	Fully automatic
Switch-off delay		5 min.

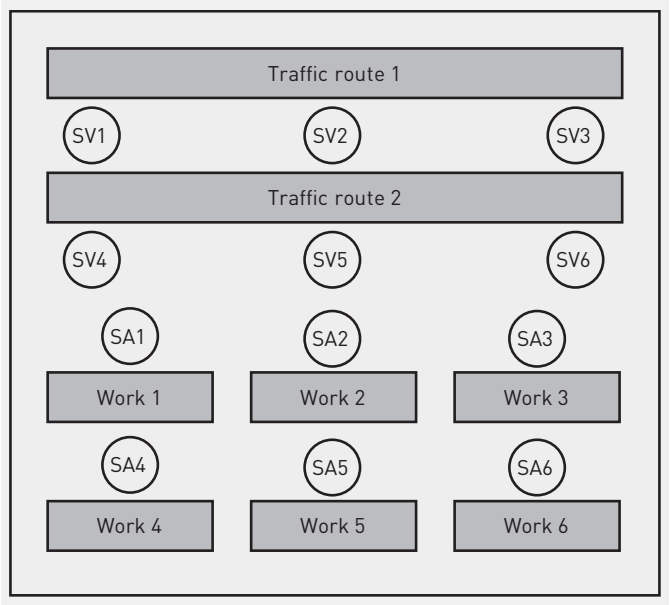
(a) Corridor



	Group	**Value**
Light level	Hall	regulated
Presence detection	Hall	Fully automatic
Switch-off delay		15 min.

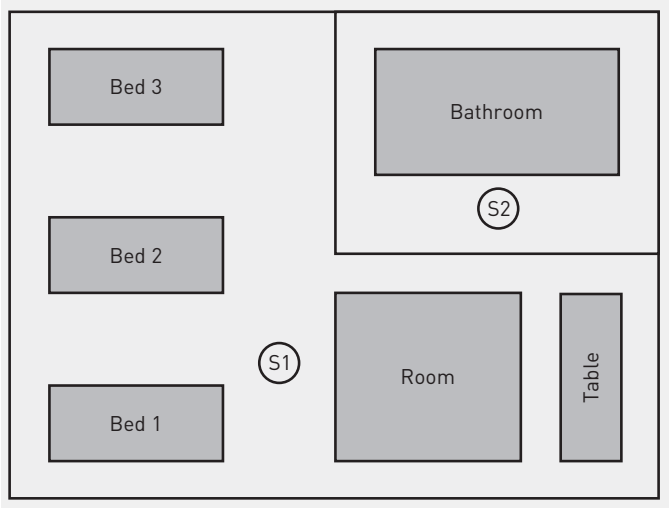
(b) Sports hall

Table 12: Graphic representation of the Use Cases in the software interface and associated table of default setting of the control functions, the switch-on behaviour and the switch-off delay (default light scene).



	Group	**Value**
Light level	Work 1	regulated
	:	:
	Work 6	regulated
	Circulation path 1	100 %
	Circulation path 2	100 %
Presence detection	Work 1 ... 6	-
	Circulation path 1	Fully automatic
	Circulation path 2	Fully automatic
Switch-off delay		10 min.

(a) Manufacturing hall, expanded



	Group	**Value**
Light level	Bed 1 ... 3 + Room	regulated
	Table	0 %
	Bathroom	100 %
Presence detection	Bed 1	Semi-automatic
	:	:
	Bed 3	Semi-automatic
	Room	Semi-automatic
	Table	Semi-automatic
	Bathroom	Fully automatic
Switch-off delay		5 min.

(b) Patient room

Table 13: Graphic representation of the Use Cases in the software interface and associated table of default setting of the control functions, the switch-on behaviour and the switch-off delay (default light scene).

7 WI-FI ACCESS AND APPS

The LiveLink WiFi system includes not only the electrical installation components with catalogue numbers, but also software components for commissioning and operating of the system. These software components are available free of charge as apps for the iOS and Android operating systems in the familiar App Stores (link to access).

The **"Control"** app serves the user of the lighting system for convenient and flexible operation of the set-up luminaire groups and for the calling up of light scenes, independent of the electrical installation. The app can be used with a smartphone or a tablet.

The **"Install"** app enables not only operation but also commissioning and administration of the LiveLink installation. This app requires use of a tablet.

Sensible and instructive configuration of the system during commissioning is the basis for convenient operation (see Chapter "LiveLink Control app" on page 46). Preconfigured Use Cases are available for standard applications, the "Universal" Use Case however requires individual configuration (see Chapter 6 "Commissioning and Use Cases" from page 51).

To access a LiveLink system, the Wi-Fi connection between the tablet or smartphone and the control unit must be established before the LiveLink app used is called. The control unit can provide an own network or be integrated into an existing network.

During initial setup, the LiveLink network is selected using the smartphone or tablet under the name printed on the housing of the control unit. With the "Install" app, the name can be changed or LiveLink can be integrated into an existing network (see LiveLink System Manual). If several LiveLink systems are installed, meaningful renaming is recommended. This applies in particular to intended operation with the "Control" app.

Both LiveLink "Control" and "Install" apps require a password to be entered to access a LiveLink system connected via Wi-Fi to prevent unauthorised access. The default password for both apps is "livelink".

The password for the "Control" app can be set randomly during commissioning or at a later stage using the "Install" app. Knowledge of the previous password is not required for this.

To change the password of the "Install" app, the required password is requested again during commissioning. Only then can the password be replaced.

Use of the app is largely intuitive. It is also explained in the LiveLink System Manual in detail (see references in the text).

8 LIVELINK PREMIUM

The TRILUX LiveLink Premium light management system is based on the combination of a network server with one or more DALI/Ethernet gateways. The server functions as a central control device that combines the DALI devices at the DALI lines of all gateways into a superordinate system.

One gateway features connections for 2 DALI lines, each of which can be used to connect 64 DALI devices. Up to 8 gateways connect to the server via an Ethernet switch (see figure 32). Further Ethernet switches can be connected in cascade. In addition to the DALI luminaires, control and operating elements such as LiveLink DALI PB4 push-button couplers and LiveLink DALI sensors can also be connected to the DALI lines.

Depending on the capacity of the server, an almost unlimited number of luminaires can be controlled.

All control components of the LiveLink Premium system are designed for cap rail installation in the sub-distribution. The system is also optionally offered in the form of prefabricated packages – Server Kits as the basic system and Extension Kits for extending the system.

Customer-specific design and conception of LiveLink Premium systems is carried out in cooperation with TRILUX specialists who also carry out commissioning.

The system can be controlled with push-buttons and alternatively with a tablet or smartphone (iOS $\geq$ 10 or Android $\geq$ 5.0) using a graphical user interface, which has been created in consultation with the customer on the basis of a project sketch, e.g. floor plan or schematic diagram.

For integration into a superordinate building infrastructure, the LiveLink Premium system supports the API software interface.

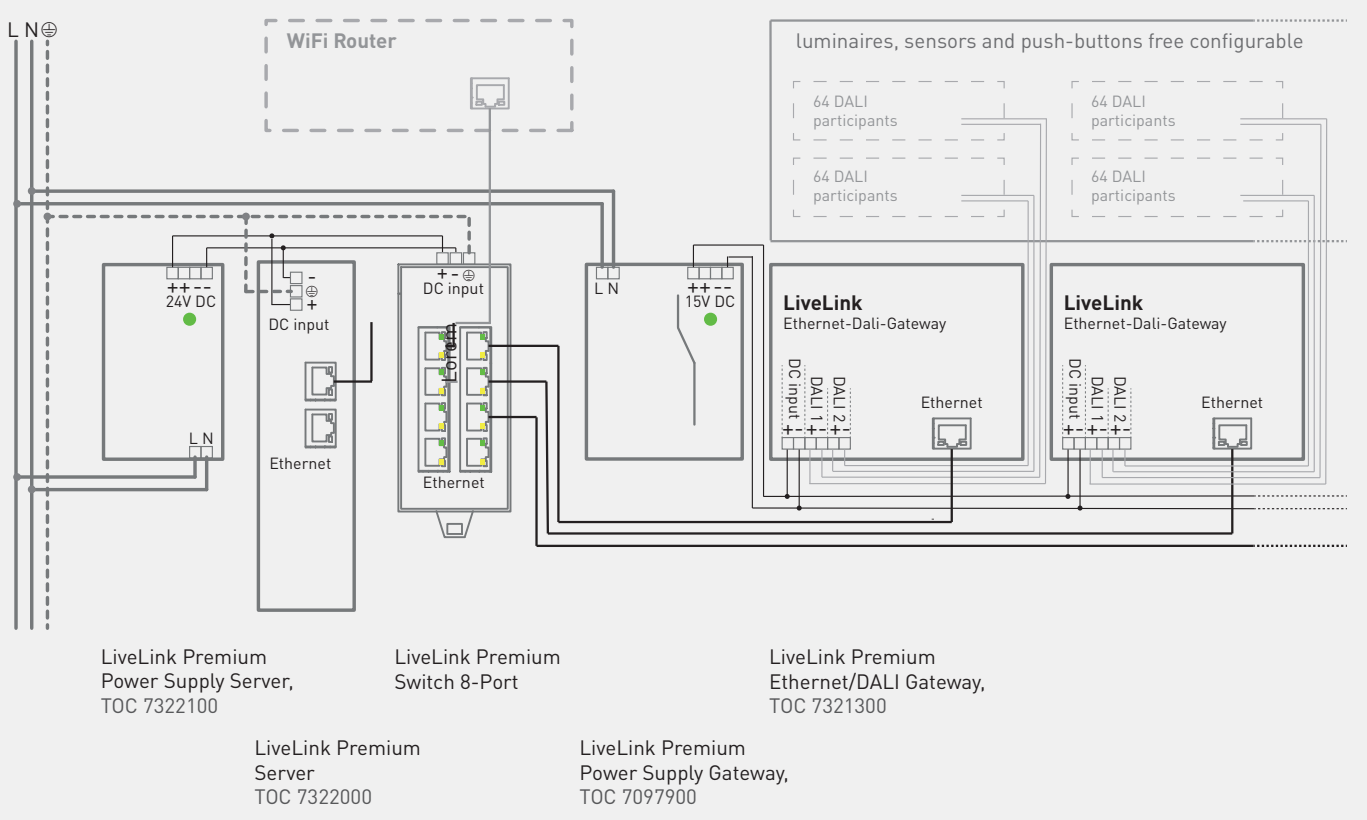


Figure 32: Overview of LiveLink Premium system components

9 MONITORING

For the LiveLink Premium and LiveLink WiFi systems, which have network interfaces, extensive monitoring functions are offered with the help of the TRILUX Cloud. Logging of the operating times as well as the switching and dimming states of the system enable recording and analysis of the energy requirements of the lighting system. For further functions, such as monitoring the operating temperature and the ageing status of individual luminaires, the luminaires used must be equipped with special suitable control gear. Appropriately equipped TRILUX luminaires contain the letter sequence ...MOR... in their reference.

Access to the data and its evaluation is granted through a dashboard provided by TRILUX.

10 INFORMATION

10.1 Human Centric Lighting (HCL)

With HCL, TRILUX brings sunlight into the room. In technical jargon the term "Human Centric Lighting" (HCL) refers to lighting applications in which, in addition to creating good visual conditions and the spatial effect of light, the spectral composition over the course of the day is also taken into account. Artificial lighting should be oriented to daylight to support the natural day-night rhythm. The blue component of the light spectrum in particular influences the circadian effectiveness of light and therefore also the influence on our "inner clock" (see also TRILUX Lighting Practice).

With TRILUX "Active" luminaires, the blue component corresponds directly to the set colour temperature of the light. This comes from the mixing of light from cool white (e.g. 6500 K) and warm white (e.g. 2700 K) LEDs.

LiveLink offers comprehensive functions for controlling the daytime sequence. If necessary this can also be modified and adapted during commissioning.

Manual intervention can be carried out by means of group push-buttons, the operation of which causes a change in colour temperature in alternating directions (with luminous flux remaining constant), or by calling up light scenes.

In the application examples on pages 22, 26 and 28 it is also taken into account that a high level of circadian influence is to be expected in particular due to large-area light spill from the upper hemisphere, similar to the scattered light of a blue sky. This is why the indirect light component is also provided in the extended surroundings of the immediate working area of the persons present.

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