

lichtwerk

inspired by light

lichtwerk



SRAM, Schweinfurt @ lichtwerk



Flexible

The all-round inclusive package is our standard when it comes to defining our range of services. lichtwerk reacts flexibly to individual customer requirements.

Emotional

Light creates emotions and only when these satisfy the client's requirements does the lighting achieve the enthusiasm, which we set as our goal.

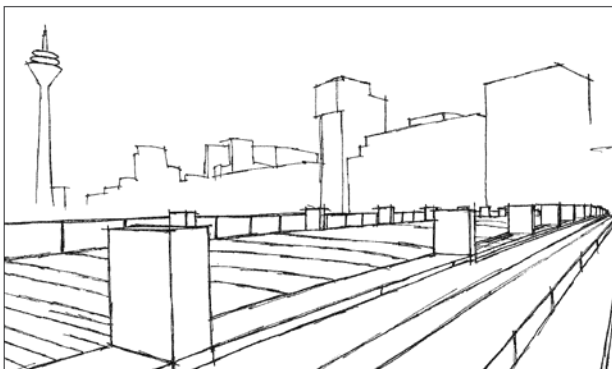
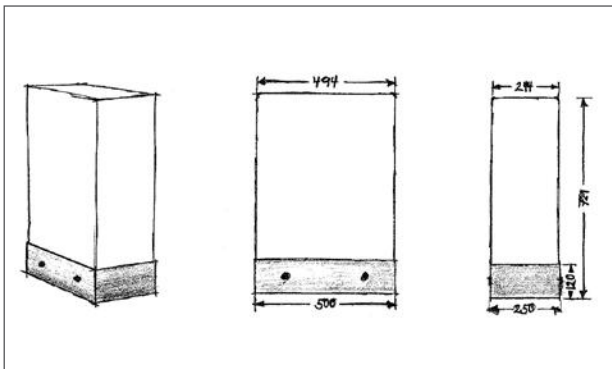
Creative

Due to the heterogeneous customer structure and changing challenges, lichtwerk is accustomed to always thinking new, innovatively and creatively.



Individual luminaires for attractive project solutions

Away from standard luminaires, we develop individual project luminaires, specifically for your lighting needs. In addition to our standard colours, a wide range of RAL colours is available for our high-quality matt textured paint. No wishes remain unfulfilled in the colour selection for your luminaires.



Medienhafen, Düsseldorf @ Tom Reindel, Düsseldorf

From the idea to the product

Inspired by light - Light is the passion, which inspires us over and over again. This enthusiasm makes us creative, lets us go outside the box and exploit the freedom given to its limits.

The flexibility in thinking, which characterizes our corporate philosophy, gives us the pragmatism for which we are appreciated. The key to solving these challenging tasks are flexibility and pragmatism.

Sophisticated projects often can't be realized with standard catalogue products, therefore custom-made solutions are needed.

To meet the requirements of these projects, creativity, high technical competence and an uncompromising customer orientation in consulting, planning and production is necessary - Therefore we have a company orientation, which makes it necessary to examine our own thinking and acting over and over again.

Artisan of light

We are such an artisan of light, able to act with flexibility, sense of lighting by intuition and conceptual thinking of projects, that clearly stand out from the mass market.



Sustainability - lighting for the future



With our efficient technologies, we set a clear signal on the subject of sustainability.

While sustainability used to mean primarily environmental protection, sustainable action today also takes economic and social aspects into account. Modern lighting technology makes a valuable contribution to this:

- efficient light sources,
- optimized luminaires and
- electronic control.

Our luminaire components conserve natural resources and are largely recyclable. At the same time, modern lighting technology makes visual tasks easier and promotes people's sense of well-being, for example with Human Centric Lighting concepts (HCL). A lighting control system ensures that light only switches on in sufficient quantity when it is required.

We are there for you

CONTACT Lighting planning



It all starts with the consultation during the project planning phase. Requirements are defined, framework conditions are established, and a selection is made.

Only when everything is perfectly coordinated the planned effect will be achieved. lichtwerk deals with the subject of lighting in a very emotional way and cultivates a similar relationship with its customers.

Together with you, we develop your individual project solution, so that the lighting achieves the enthusiasm that we set ourselves as our goal.

From planning to implementation, we focus on close cooperation with the client and the executing companies on site.





Table structure

The tabular structure enables an overview of the essential features.

Type	LED Specification	Item-number	the last digit of the article number indicates the housing colour					Luminaire net weight (without packaging)
Designation of the luminaire	Luminous flux lumen (lm) Colour rendering index RA Colour temperature Kelvin (K)	543 3044 10...	→	→	→	→	→	→
Type	LED Specification	P _{sys} (W)	Driver	Item-number	Colour	Colour	Colour	kg
Sample luminaire	LED 2400lm 840 LB	20	ET	543 3044 10...	■ ...5	□ ...1	■ ...4	3
	LED 4500lm 840 LB	41	DALI	543 3144 10...	■ ...5	□ ...1	■ ...4	3

P_{sys} | Lighting system performance

Driver

ET | Electronic Driver,
non dimmable

DALI | Electronic Driver,
DALI, dimmable

DALI DT8 | Electronic Driver,
DALI, dimmable,
Change of light colour

Tast dim | dimmable via push button

NL-B | Emergency light single
battery

Colour code/colour

■ | aluminium natural anodized

□ | traffic white (similar RAL 9016)

■ | withe-aluminium (similar RAL 9006)

■ | deep black (similar RAL 9017)

■ | silver grey

■ | stainless steel

■ | grit grey

cr | chrome

si | silver matt

sig | silver gloss

tc | translucent

cl | clear

NEW

Please refer to the current data and prices for LED luminaires at www.lichtwerk.de



Because of the dynamics in the technical development especially in the field of LED modules and their drivers, the information in this paper can only be a snapshot of the current state and are therefore legally not binding. Please refer to our web site for current product specifications.

The QR code on our product pages leads you directly to the respective product family.

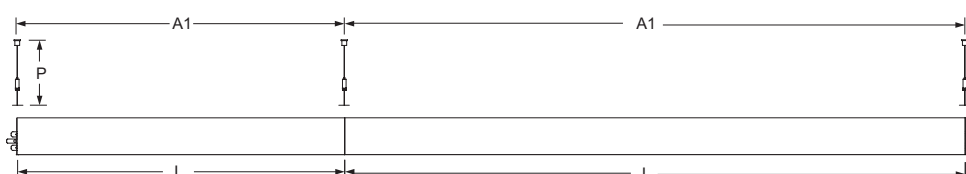
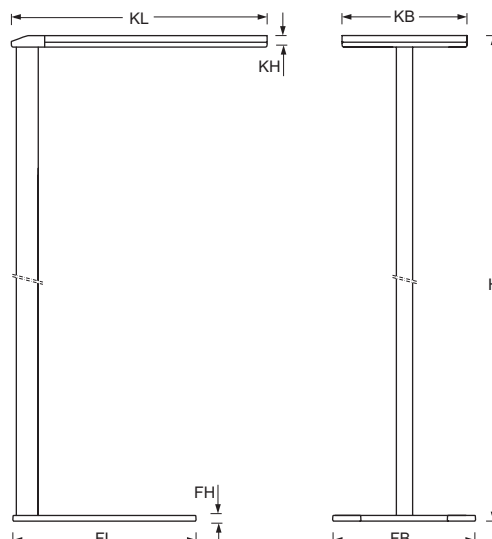
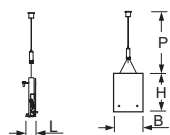
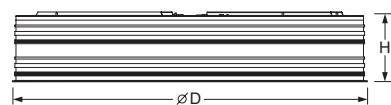
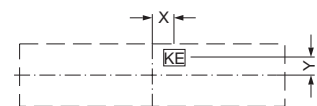
EXCLUSION OF LIABILITY

Illustrations, dimensions and weights in our catalogues, price lists and quotations are non-binding. Subject to technical changes, errors and color deviations. All luminaires have been designed for 230V 50Hz mains connection and ambient conditions according to DIN EN 60598 unless otherwise stated, and are supplied without lamps unless otherwise stated.

Most of the indications with regard to certifications are presented in our catalogue in a general form. Verification with regard to products can be easily carried out on our website.

We point out that the orderer recognises our delivery and payment conditions unless he/she objects in writing when sending his/her order.

Registration number: DE 40859830



Definition of measurement table variants

L | Length

□L | Length/Width for square luminaires

L2 | Additional length

B | Width

H | Height

ØD | Diameter

FL | Length of luminaire base

FB | Width of luminaire base

FD | Diameter of luminaire base

T | Depth

KE | Electrical feed in

KL | Length of luminaire head or ballast box

KB | Width of luminaire head or ballast box

KH | Height of luminaire head or ballast box

KD | Diameter of luminaire head or ballast box

A1 | Fixing distance in case of single mounting

A2 | Fixing distance between the luminaires in case of light run mounting

X | Distance from centre of the luminaire to the electrical feed in (x direction = length)

Y | Distance from centre of the luminaire to the electrical feed in (y direction = width)

SL | Length of cut out for recessed luminaires

SB | Width of cut out for recessed luminaires

SD | Diameter of cut out for recessed luminaires

e | Minimum necessary depth for luminaire mounting

ML | Modul (axis) Length

MB | Modul (axis) Width

P | Wire suspension

P min/max | Min./Max. length wire suspension

DS min/max | Min./Max. ceiling thickness in case of cut out ceilings



for ceilings with visible T-rails



for cut-out ceilings

Recessed luminaires

Surface mounted luminaires

Pendant luminaires

Phase-track and luminaires

Lighting systems

Downlights

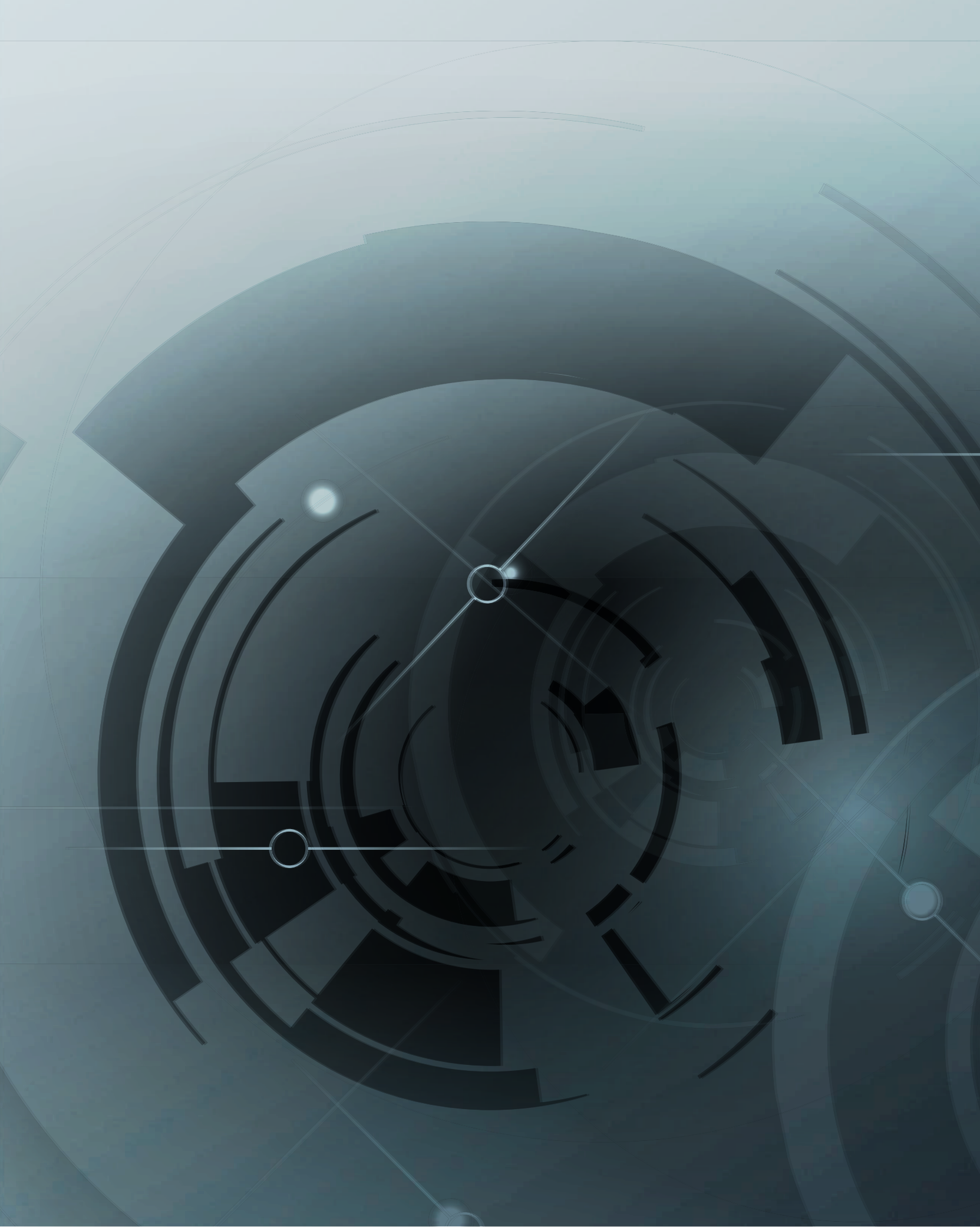
Wall luminaires
Standing luminaires

Light furniture

Glass luminaires

Licht control

Information



Light control

P. 482 Light control I **CASAMBI**

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P. 486 Light control components product overview


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- Contacts





Intuitive light management system

Almost all of our DALI lights can be equipped with a control module that enables wireless control and networking with the help of a smartphone or tablet. Setting up is very easy and intuitive thanks to bluetooth and an app. The lights can be operated either classically with a switch or by a smart device. Even from anywhere in the world if you want to!

We would be happy to support you in choosing the right components for your project.

CASAMBI



With the Casambi components integrated in our luminaires, you have the total control over your lighting system. From switching or dimming to complex light scenes, everything can be implemented in the simplest possible way.

• APP

The free Casambi app is the central administration of your lighting. Simply set up your lighting using the app.

• Switch

Define which luminaires or luminaire groups are assigned to which switch for a classical manual control.

• Light colour/HCL

RGBW or tunable white lights can also be addressed and controlled by Casambi. Thus, an intuitive automated control for Human Centric Lighting is no problem.

• Luminaire groups

Using Casambi, lights can be controlled individually in different groups or as a whole. This makes your lighting more flexible than ever.

• Scenes

A wide variety of lighting moods can be implemented in light scenes. These scenes can be recalled by the push of a button or automatically.

• Timer

The timer function can be used to time-control your lighting installation.

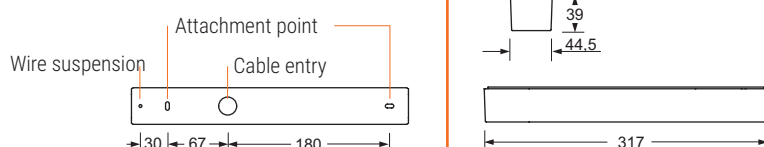


LC-canopies for pendant luminaires

LC-canopy SA-PS-FLEX

Bluetooth 4.0 canopy SA-PS-Flex 10x with integrated casambi module and power supply for controlling max. 32 DALI luminaires. Different presets e.g. DT6 or DT8 selectable. Operation via free casambi app and other system components such as switches or pushbutton couplers.

Top view of canopy mounting plate



□ DPSNA-PS-FLEX



■ SA-PS-FLEX



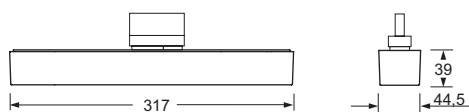
■ SA-PS-FLEX

System components	Type	Details	Item-Number	Colour	Colour	Colour	kg
LC-canopy	SA-PS-FLEX	SA-PS-FLEX 10x; 2000mm	910 1120 10...	WB ...1	□ ...5	■ ...4	0,6

LC-canopies for phase-track-luminaires

LC-canopy DPSN-PS-FLEX

Bluetooth 4.0 canopy with phase track adapter DPSN-PS-Flex 10x with integrated casambi module and power supply to control max. 32 DALI luminaires. Different presets e.g. DT6 or DT8 selectable. Operation via free casambi app and other system components such as switches or pushbutton couplers.



□ DPSN-PS-FLEX on DPSNA-phase-track



■ DPSN-PS-FLEX



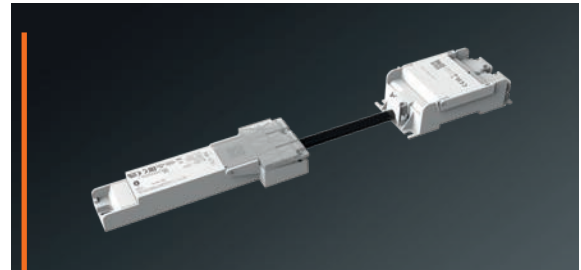
■ DPSN-PS-FLEX

System components	Type	Details	Item-Number	Colour	Colour	Colour	kg
LC-canopy	DPSN-PS-FLEX	DPSN-PS-FLEX 10x, for DPSN-phase-track	324 4500 10...	WB ...1	□ ...5	■ ...4	0,6

LC-controller box for recessed luminaires and downlights

LC-LW Controller Box FLEX10M

Bluetooth 4.0 Casambi controller module, for wireless dimming and control. Perfectly suitable for refurbishments with only 3-pole feeds; incl. DALI power supply for max. 25 DALI control gear, DT6 or DT8; operation via free Casambi app and other system components such as switches or pushbutton couplers.



☐ LC-LW Controller Box FLEX10M

Through-wiring box

DV box 3-pol. L-N-PE in & out suitable from 3x1,5mm² to 2,5mm². Including 150mm connection cable.

DV box 5-pol. L-N-PE-DA+DA- in & out suitable from 5x1,5mm² to 2,5mm². Including 150mm connection cable.



☒ DV-Box 3pol.



☐ DV-Box 5pol.

System components	Type	Details	Item-Number	Colour	kg
LC-Controller Box	FLEX10L	Controller box with casambi module for recessed luminaires	840 0000 525	<input type="checkbox"/>	1,8
Through-wiring box	DV-Box 3-pol.	Through-wiring 3-pol.	840 0000 400	<input checked="" type="checkbox"/>	1,8
	DV-Box 5-pol.	Through-wiring 5-pol.	840 0000 401	<input type="checkbox"/>	1,8

LC-sensor

LC-sensor LC-LW FLEX10 5DP 38rc

Recessed motion and daylight sensor, white. Including bezels to optimize sensor detection area. Setup via free casambi APP, 230V 50Hz power supply required, compatible with all Casambi modules.

Optional housing
LC-LW FLEX10 5DP 38rc Box
for surface mounting.



☐ LC-LW FLEX10 5DP 38rc



☐ LC-LW FLEX10 5DP 38rc
+ LC-LW FLEX10 5DP 38rc Box

System components	Type	Details	Item-Number	Colour	kg
Sensor	LC-LW FLEX10 5DP 38rc	Bluetooth recessed sensor including bezels	840 0000 510	<input type="checkbox"/>	0,1
Surface mounted housing	LC-LW FLEX10 5DP 38rc Box	Housing for surface mounting (without sensor)	840 0000 520	<input type="checkbox"/>	0,1





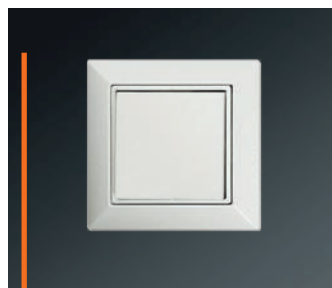
LC-Wall push button

Single push button LC-LW FLEX BT PB 2W

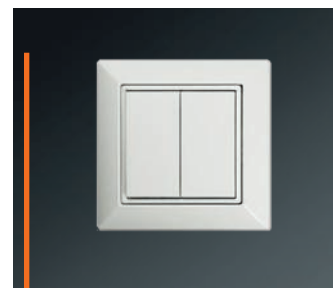
Bluetooth wireless push button, with two switching points, white. One rocker, battery-free, with frame, wall mounting possible, compatible with all Casambi modules.

Double push button LC-LW FLEX BT PB 4W

Bluetooth wireless button, with four switching points, white. Two rockers, battery-free, with frame, wall mounting possible, compatible with all Casambi modules.



□ LC-LW FLEX BT PB 2W



□ LC-LW FLEX BT PB 4W

System components	Type	Details	Item-Number	Colour	kg
Wall push button	LC-LW FLEX BT PB 2W	Bluetooth, 2-channel, 1 rocker, battery-free, with frame	850 1020 110	□	0,05
	LC-LW FLEX BT PB 4W	Bluetooth, 4-channel, 2 rockers, battery-free, with frame	850 1020 100	□	0,05

LC-Push button coupler

Bluetooth push button coupler

Four button inputs, for switch box installation, for connecting separate push buttons, 230V 50Hz mains supply required, compatible with all Casambi modules.



LC-LW FLEX10 PBU 4

System components	Type	Details	Item-Number	Colour	kg
Push button coupler	LC-LW FLEX10 PBU 4	Bluetooth push button coupler, switch box installation, 4-channel, 230V 50Hz	850 1020 120	□	0,05





Test symbols, protection classes and degrees of protection

Test symbols and protection classes


All lichtwerk luminaires are manufactured according to approved technical standards and 100% electrically tested. The luminaires are designed as standard for 230 V, 50 Hz and an ambient temperature

of 25° C, and satisfy European norms and directives in relation to safety, electromagnetic compatibility and energy efficiency.

Test symbols	Description
	The -symbol is the European safety symbol for luminaires. The test regulations are determined by the European standard DIN EN 6598. The -symbol is issued in combination with the identification number of a European test center (VDE = 10). This documents that the luminaires have been built and tested „in conformity with the standards“ as per the Low-voltage Directive 2006/95/ EG.
	All luminaires meet the -conditions. In the event of faulty luminaire the fastening surfaces will not be hotter than 180° C. They may be mounted on inflammable building materials as described in DIN 4102 with an ignition point of at least 200°C (e.g. wood). Observe the installation instructions in order to avoid incorrect installation.
	Identification for thermally insulated ceilings. Luminaires may be directly covered with insulating material.
	EN 60598-2-24 requires that luminaires with the -symbol and at least with degree of protection IP 50 must be installed in areas where dust and/or fibers pose a fire hazard. Observe the installation instructions when installing.
	Luminaires with the -symbol are intended for surface-mounted and recessed installation in furniture. They have been designed so that inflammable materials as defined in VDE 0710 section 14 cannot be ignited in the event of a faulty luminaire. Observe the installation instructions in order to avoid incorrect installation.
	Luminaires with the -symbol are intended for surface-mounted and recessed installation in furniture. They are constructed so that in the case of luminaire failure, materials with inflammability characteristics not recognised by VDE 0710 section 14 cannot be ignited. Observe the installation instructions in order to avoid incorrect installation.
	Luminaires with this symbol correspond to EN 60598-1 standard conditions for the temperature specified by this symbol. Testing is carried out according to IEC 60695-11-5 (needle-flame test) or IEC 60695-2-10 (glow-wire flammability index).
	The IK-Impact resistance degree describes the resistance of the housings of electric operating equipment to mechanical loads, particularly impact. The IK-classes correspond to a respective minimum impact energy in Joules, that the housing must be able to withstand. The given value in Nm/J corresponds to the mechanical resistance.
	The -marking is performed by the manufacturer at his own responsibility. The manufacturer declares conformity with the respective EC or EU directives. Conformity in accordance with the „Low-voltage Directive“ and the „EMC directive“ (interference immunity, emitted interference) is the precondition for the -marking of the products.
	With this symbol, the suitability of luminaires for computer workstations according to DIN EN 12464-1 is specified. The degree number means that the luminance in all luminaires planes beyond that angle does not exceed certain limitation values. Depending on screen quality and screen visualisation, the norm specifies different limitation values.
	Generally, the luminaires are suitable to be used in companies of the food and beverage industry certified according to IFS version 6 and /or BRC Global Standard Food version 6.
	The luminaires meet the limit value ≤ 19 in accordance with the unified glare rating method UGR. This rating is based on conditions in the so-called standard room with lines of vision crosswise and lengthwise to the luminaire.
	Luminaires texture painted mat, dirt resistant in classic-Colours traffic white (similar to RAL 9016), white aluminium (similar to RAL 9006) and deep black (similar to RAL 9005). Further individual RAL-Colours on request - RAL-Colour palette P. 496.

Protection classes	Description
	Luminaires with the indoor symbol are only suitable and approved for the use in buildings.
	Luminaires of protection class I must be connected to a protective conductor.
	Luminaires of protection class II are double insulated and therefore a PE terminal is not authorized.
	Luminaires of protection class III are intended for operation at safety extra low voltage < 50V (effective)

Protection classes

degrees of protection	RN	IP degrees of protection according to the first reference number	RN	IP degrees of protection according to the second reference number
	0	Unprotected	0	Unprotected
	1	Protected against the ingress of foreign solid bodies with a diameter greater than 50 mm	1	Protected against dripping water
	2	Protected against the ingress of foreign solid bodies with a diameter greater than 12 mm	2	Protected against dripping water up to 15°
	3	Protected against the ingress of foreign solid bodies with a diameter greater than 2.5 mm	3	Protected against spraying water
	4	Protected against the ingress of foreign solid bodies with a diameter greater than 1 mm	4	Protected against splashing water
	5	Dustproof	5	Protected against water jets
	6	Dusttight	6	Protected against heavy seas
			7	Protected against the effects of immersion
		8	Protected against immersion	



Service life analysis for LED

L-value

LED lose their luminosity over time.

This decline can occur in different ways. The light itself may simply become darker, individual LED or even entire LED modules or sections may fail.

The L-value describes this decline as an average value calculated for all LED in use. It states the percentage of luminous flux that can still be expected after expiration of the stated service life.

B-value

The B-value serves as additional information to the L-value. It describes the percentage of LED that are lower than the L-value stated as an average after expiration of the specified service life.

If no B-value is stated, a value of B50 is assumed. This predicts that 50% of used LED will exhibit a higher and 50% will exhibit a lower decline in luminous flux than the stated L-value after expiration of the stated service life.

L + B-value Combination makes the difference

The L-value with its stated service life and the B-value must always be considered in combination with one another.

The following diagram shows a typical graph for the decline of an LED over time:

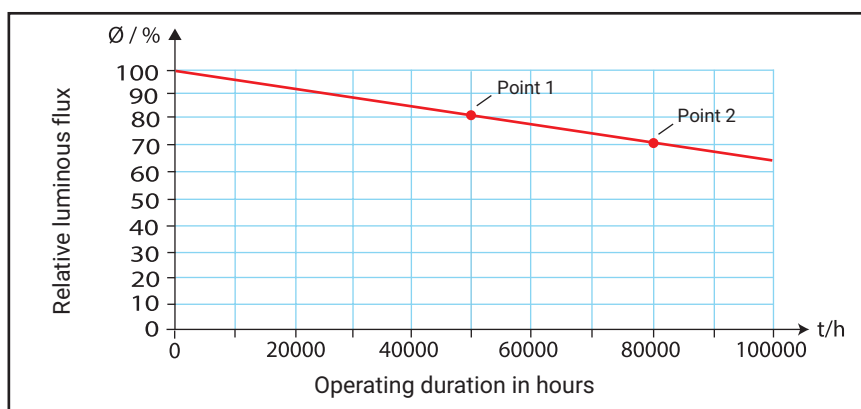
This LED can be described with different statements using the characteristics values cited above:

Point 1 of this graph would be indicated with L80 50,000h:

This means that the luminous flux would decrease by 20% on average after 50.000h.

The statement L70 80,000h would, however, also be correct (see table point 2):

This means that the luminous flux would decrease by 30% on average after 80.000h.



LED-luminaires by lichtwerk

It is important to know that these are calculated forecast models due to the rapid innovation cycles in the LED sector and that these values are based on data provided by LED manufacturers. As a manufacturer of luminaires, we provide these prognostic values for the service lives of our products based on this data and our own measurements, for example of the temperature (TP) of the luminaire when installed.

Using this measurement and design measures undertaken by us, for example in regard to proper heat dissipation of the installed LED, we are able to claim a very good service life prognosis of L80 50,000h B10 for the majority of our products.

Thanks to our own laboratory measurements, we are also able to cite service life values for increased ambient temperatures, for example. Please ask us if your application is subject to such requirements.

A typical table of values for an LED module that is representative of the modules used in our luminaires is presented here as an example. The influence of temperature on the service life analysis is clearly apparent:

		Statements L+B-value					
		70		80		90	
		L					
B		10	50	10	50	10	50
Temperature	[mA]	Service life [h]					
Tp = 50°C	225	50.000	50.000	41.000	50.000	22.000	28.000
Tp = 65°C	225	50.000	50.000	35.000	50.000	18.000	24.000
Tp = 75°C	225	49.000	50.000	32.000	43.000	16.000	21.000





Light for Living

Importance of Daylight for people

The life of most living beings on the planet Earth has been determined by the day-night cycle for millions of years. The biological clock is deeply rooted in our subconscious. Even if humans were already able to create artificial light with fire 300,000 years ago, it did not become possible turning night into day with the distribution of electricity at the end of the 19th century. This period of time is far too short to be reflected in human genes.

Witnessing these facts, it becomes apparent how straining our way of living must be for us - mainly in enclosed rooms - with only little or even no daylight. It is assumed that at least 20% to 30% of the people working in industrial countries suffer from recurring sleep disorders. The body's inner clock gets out of step.

With today's technologies and knowledge it is possible to compensate for this handicap of static light in our surroundings. The lack of natural daylight can be compensated for by convergence of the artificial light to the course of daylight. Thus, the human biological clock will be synchronised again.

Biological Clock

Life on Earth is also determined by the alternation of day and night. Many types of cells from species have developed some type of inner clock in the course of evolution. The brain synchronises this clock with the environment. Light is the pulse generator for this process.



Artificial Light

Consequences of the use of artificial light

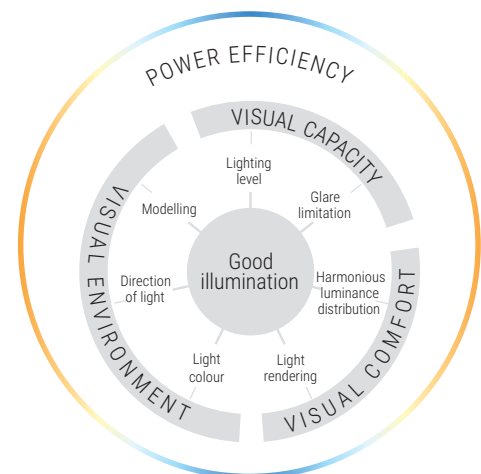
The year 1879 is the start of the era of electric lighting. Thomas Alva Edison files a patent for his light bulb. This modern invention has radically changed our lives. Now men were able to extend their day, change their rhythm of time or turn the night into day. Artificial light was introduced in manufacturing plants and it became possible to also work without daylight. Initial approaches for light planning developed, when it became obvious that good light does not only depend on the illumination level.

As well as the illumination level, other criteria are in the focus of today's state-of-the-art light planning, such as harmonic distribution of brightness, limitation of glare effects, light colour, colour rendering, light direction and shade. If all these points, known as quality characteristics of lighting, are met a „good“ lighting system will certainly be achieved. So far so good. But why not make something good better?

New Approach

The classic quality characteristics are lacking one approach: dynamics. The level of illumination is designed for a specific minimum value according to standard; this so-called target value is kept constant for light control. The light colour is specified in the planning phase and is not subject to any change during operation.

However, people are conditioned differently, people live with and by changes, also in matters of light. During evolution, homo sapiens started around 300,000 years ago to adapt to the cycle of natural sunlight. Daylight is characterised by different levels of light and different light colours. No wonder that people also orient themselves to such parameters of the light and are clocked by them in their rhythm of life.



Chemical Messengers

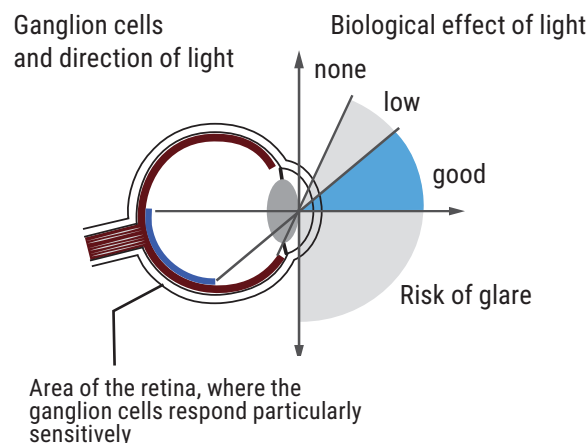


It was not clear for a long time how these light stimuli are exactly processed. It was known that the so-called cones in the eye are responsible for colour vision and the rods for mesopic vision. A third receptor, the ganglion cells, was discovered in the year 2002. However, these light-sensitive cells are not used for vision but regulate biological processes in the body when in contact with light. The retinal ganglion cells are directly connected to a specific area of the brain for this purpose. The body's rhythms are clocked from this central control point - the „Master Clock“. It controls the production of hormones and the activation of enzymes. Increasing exposure to light thus ensures, that the production of the sleep hormone melatonin is suppressed. Instead, serotonin is released, which has a mood-enhancing and motivating effect.

The task expands for light planning which is geared to the biological rhythm of men. The objective must be to create a lighting solution beyond the standard quality characteristics for illumination. It is not only a matter of meeting applicable standards. Light, and therefore also good illumination, can do more. Good light does not only illuminate, but has a biological effect.

Retinal Ganglion Cells

Photoreceptors in the retina of the eye. These cells are sensitive to light, however, they are not used for vision. Instead, they assume a role for the synchronisation of the internal clock of the person.



Biologically effective Light

Light which is characterised by dynamics with regard to luminance, light colour and direction of arrival. This light is able to initiate biological processes for living creatures.

For the artificial illumination, a simulation of daylight means starting in the morning with warm-white light. Derived from sunrise, this light has more red content in the spectrum and thus has a relatively low colour temperature of e.g. 2700 Kelvin. A gradual transition to daylight-white light colour (e.g. 6500 Kelvin) is performed in the course of the day. The now increased blue portion in the spectrum results in an activating effect which stimulates the concentration. This change of the light colour at noontime should also involve an increase in the level of illumination to exceed a specific threshold value for the biological effectiveness of the light.

As the eye is adapted to the natural environment and thus at noontime to the light of the sky, this should also be taken into consideration for the selection of luminaires and light distribution. The most sensitive ganglion cells are mainly distributed in the rear and lower part of the eye. Large-surface luminaires or luminous ceilings are better suited than point light sources to reach as many of these receptors in the eye as possible.

In the later afternoon and evening, the dynamic process of the morning hours will be reversed, e.g. the level of illumination will be gradually reduced and the colour temperature changes to warm-white light.

Using simulation of daylight, artificial light can assume a biologically effective function. This makes sense as people are spending more and more time in enclosed rooms. Modern dynamic light concepts will replace the static light solutions. The focus is on the person and the increase of his/her well-being.

Circadian Rhythm

The term is derived from Latin (circa = around, dies = day) for a cyclic biological process with a period of approx. 24 hours.

HCL Human Centric Lighting

The characteristics of the HCL illumination consider more than just vision. The focus is on the person. Human Centric Lighting stimulates the well-being and supports stable health of the person.

HCL

Human Centric Lighting - Simulation of daylight

The focus is on the person, also regarding to illumination. A contemporary lighting system must be able to enhance the well-being of the person more than ever before. Knowing that the human organism has been and will be characterised by daylight, the objective must be integrating the positive aspects of daylight into modern light planning. It was not without reason, that the issue of daylight was included in the revision of the European standard EN 12464-1 „Illumination for workplaces in interior rooms“. But what should be done, if sufficient daylight is not available? In this case, artificial light can assume specific daylight functions and provides „the right light at the right time“. Based on the natural light, the artificial light is given a dynamic structure in the course of the day. Thereby, the changes in the level of illumination and in the light colour are of particular importance. Such lighting is able to support the circadian rhythm of the person. Our cells and organs and thus the body's functions are linked to this rhythm, with the human body clock being the pulse generator. It controls sleep and waking phases, but also heart beat, blood pressure and mood. This cyclic process is also characterised by the fact that all biochemical functions have individual high and low points in the course of the day. The circadian rhythm is regularly synchronised with the outside world whereby humans are primarily influenced by the brightness of the day and the darkness of the night.

Maria Ward school

The Maria-Ward-School, located in the middle of Bamberg old town, was extended. The new Construction is convincing with its modern, energy efficient an environment friendly design.



3000K

Actual project



To fit always the right illumination the hall is equipped with recessed LED luminaires "lopia Q". The fixtures obtain with their tunable-white-technology always the right mood. They are capable of a color temperature bandwidth from 3000K to 6500K. Starting at warm white through neutral white to cool white. This gives the responsible the opportunity to choose the right light colour needed for each individual event.

The smaller type of the luminaire "lopia Q 330-EG" was also used in the hallways, staircases and locker rooms. The luminaire family connects the different areas with its unified visual appearance. Through its homogeneous appearance it significantly contributes to a harmonic room atmosphere.

Products:

lopia Q LED

Building owner:

Erzbischöfliches Ordinariat,
Bamberg

Architect:

PECK.DAAM Architekten GmbH,
München
Architekturbüro Dietz, Bamberg

Planning:

Ingenieurbüro Förner,
Memmelsdorf

Installation:

Elektro Kramer, Burgebrach





Classic textured paints:

traffic white



RAL 9016

white aluminium



RAL 9006

deep black



RAL 9005

Individual textured paints:



RAL 1001



RAL 1003



RAL 1013



RAL 1015



RAL 1018



RAL 1021



RAL 1028



RAL 2002



RAL 2003



RAL 2004



RAL 2009



RAL 2011



RAL 3000



RAL 3001



RAL 3003



RAL 3004



RAL 3012



RAL 3015



RAL 3020



RAL 3002



RAL 4005



RAL 5002



RAL 5003



RAL 5005



RAL 5010



RAL 5012



RAL 5015



RAL 5017



RAL 5021



RAL 5024



RAL 6005



RAL 6009



RAL 6016



RAL 6018



RAL 6021



RAL 6024



RAL 6026



RAL 6028



RAL 6034



RAL 7001



RAL 7005



RAL 7011



RAL 7012



RAL 7015



RAL 7016



RAL 7021



RAL 7024



RAL 7030



RAL 7035



RAL 7037



RAL 7039



RAL 8001



RAL 8002



RAL 8012



RAL 8017



RAL 8019



RAL 9001



RAL 9002



RAL 9007



RAL 9010



RAL 9017



1. General

1.1 These conditions of sale apply exclusively to companies, legal persons under public law or public-law special assets in the sense of § 310 paragraph 1 BGB (German Civil Code). The following conditions of sale apply exclusively for all offers and contracts regarding the delivery of goods by lichtwerk GmbH. They also apply for all future transactions with the Orderer when dealing with legal transactions of the related kind. The Orderer recognises the conditions as binding for him for all of the business relations. Modifications and amendments must be in written form. Conflicting or deviating terms and conditions of the Orderer are not terms of the contract, even if we do not expressly object to them. This will only be content of the respective contract in cases where we expressly approve the conflicting or deviating terms and conditions in writing.

1.2 We reserve our own rights of ownership, copyright and other intellectual property rights for all cost estimates, drawings and documents that are handed over to the Orderer during the contract negotiations. They may only be disclosed to third parties with our prior written permission. If an order is not issued, all transferred documents shall be returned immediately at our request. The Orderer does not have the right to use, retain or disseminate these documents.

2. Conclusion of the contract and scope of services

2.1 Our offers are not-binding and without obligation. In terms of the nature and scope of delivery, they will first be binding upon our written order confirmation. If an order is to be regarded as an offer according to § 145 BGB, we can accept this within two weeks by sending an order confirmation.

2.2 Verbal agreements, in particular supplementary agreements and commitments made by our employees, require our written confirmation to be effective.

2.3 For the delivery, we reserve the right to deviations of goods compared to the documents belonging to the offers, such as catalogues, illustrations, descriptions, drawings as well as weight and dimension information, provided they are commercial and reasonable for the Orderer and in particular do not impair quality and function.

3. Prices, deliveries and terms of payment

3.1 Prices and delivery

3.1.1 The prices are calculated in Euro exclusive of the legal VAT, which is invoiced separately according to the valid rate. The prices are calculated according to the prices valid at date of contract conclusion; if the delivery is made more than 4 months after contract conclusion, the prices valid at date of delivery can be invoiced.

3.1.2 Principally, prices shall be ex works excluding VAT, packaging, freight costs and insurance.

3.1.3 For a net order value of €1,500.00 or more, we deliver to the delivery location free of charge within Germany, whereby we provide the goods at the delivery location ready for unloading. Starting at € 750.00, we charge half of the transportation charges for a delivery location within Germany. For a net order value below € 250.00, we charge an additional small-volume surcharge of €25.00.

3.2 Terms of payment

3.2.1 Our invoices are to be paid within 30 days from the date of the invoice. For payment within eight days from the invoice date, we grant a 2 % discount. A payment is considered effected if we are able to access the funds. In the case of payment by cheque, payment is only considered effected when the cheque is redeemed by us.

3.2.2 The acceptance of cheques shall only be accepted on account of performance.

3.2.3 The Orderer's right of retention, as far as it is not based on the same contractual relationship, and the offsetting with contested or not legally determined claims is excluded.

3.2.4 If the Orderer is in default of payment as a whole or a part, he is bound - notwithstanding all other rights of the supplier - to pay from that point of time on default interests to the amount of 8 % annually above the base lending rate.

3.2.5 If the Orderer ceases payments or if bankruptcy is filed or mature checks or bills of exchange are not redeemed, all claims made by the supplier are immediately due.

4. Delivery times and acceptance obligations

4.1 The delivery period begins with the date of written agreement about the order between Orderer and supplier.

4.2 Hindrances beyond our responsibility, in particular acts of God, war, insurrection, strikes, transport disruptions, business disruptions, lack of material, official orders and other inevitable events that delay the delivery in whole or in part automatically lengthen the delivery period by the duration of such conditions. In such cases the parties have the right to withdraw from the contract in whole or in part.

4.3 In the event of a delayed delivery for which we are responsible, the Orderer can only assert his rights arising from the delay if the grace period he granted us has passed without result. If the Orderer proves in this case that he has incurred damages caused by the delay, he can claim a delay compensation for each completed week of the delay in the amount of 0.5% for the entire duration of the delay, but not to exceed 5% of the value of the goods not delivered on time. The right of the Orderer for exercising the right of withdrawal shall remain unaffected. Further-reaching claims shall only apply in cases of intent or gross negligence where liability is mandatory.

4.4 We are entitled to make reasonable installment deliveries.

4.5 If the Orderer causes a delay of dispatch or delivery of the goods or if the Orderer is otherwise in default in accepting the delivery of goods or should the Orderer intentionally violate other obligations to co-operate, we then have the right to claim compensation for any incurred damages in this respect, including any possible additional expenditure. Rights remain reserved for more extensive claims. Insofar as such aforesaid conditions apply, the risk of accidental loss or accidental deterioration of the purchased goods passes over to the Orderer at the precise point of time in which he is in default of acceptance or payment.

5. Dispatch, transfer of risk, returns

5.1 The risk is passed on to the Orderer when the goods leave the factory or a warehouse. Shipping takes place uninsured at the Orderer's risk. This also applies even if free delivery is agreed and also for deliveries by our transport staff. If the shipment is delayed as a result of circumstances for which the Orderer is responsible, the risk is transferred with our notification of readiness for shipment. If the shipment is delayed at the Orderer's request or at the fault of the Orderer, then we will store the goods at the Orderer's expense. The Orderer is required to check without delay whether the goods have been damaged during transportation and to immediately inform the carrier and deliverer of any damage or loss. Shipping takes place on behalf of the Orderer.

5.2 If the supplier has no statutory obligation to accept returned goods, the Orderer may only return goods with our express written consent and provided that they are undamaged and re-

turned in the original packaging. 30% of the invoiced amount will be deducted from the credit note to cover processing costs. All reproprocessing, freight, insurance and packaging costs are charged to the Orderer. Principally, it is not possible to return custom-made products.

6. Retention of Title

6.1 The goods remain our property until the fulfilment of all our entitled claims against the Orderer (goods subject to retention of title), even if the individual goods have been paid for. A pledge or chattel mortgage of the reserved goods is not permissible.

6.2 In the case of the permissible resale of the reserved goods within the ordinary course of business, the Orderer assigns us already now, until payment of all our claims, as collateral for its future claims towards his customers resulting of such resale without requiring any specific further explanations. This assignment also covers balance claims resulting from existing current account relationships or at their termination of the Orderer with his customers. If the reserved goods are sold together with other goods without agreeing upon an individual price for the reserved goods, the Orderer assigns us the priority over the other claims for such part of the total price claimed which corresponds to the value invoiced by us. Until revoked, the Orderer is authorized to collect the assigned demands from the resale, he is not entitled to dispose of them otherwise, e.g. by assignment. Upon our request, the Orderer must inform his customer about the assignment and to furnish us the necessary documents for the assertion of his rights towards the customer, e.g. to deliver invoices and to provide the required details.

6.3 If the purchaser does not meet all or a part of his payment obligations within 10 days after due date, if he does not cash due checks or if an application for insolvency is filed, we have the right to withdraw from the contract and to require the return of the goods. The purchaser is obliged to procure us with the possession of the goods. The Orderer grants us or any of our authorized representatives the access to all business premises during business hours. We are entitled to use the reserved goods with the diligence of a prudent businessman and to satisfy ourselves with the offsetting of open claims with their proceeds.

6.4 As long as the ownership has not been transferred, the Orderer is to inform us in writing immediately if the supplied item is seized or is exposed to other interventions by third parties. If the third party is unable to indemnify us for the costs of legal or out-of-court costs of a claim according to par.

771 ZPO (German Code of Civil Procedure), the Orderer is liable for our amount outstanding.

7. Warranty

7.1 The supplier shall initially provide warranty for defects in the goods within a reasonable period of time at his discretion by repair or replacement delivery.

7.2 If the repair or replacement is not successful at the second attempt, the purchaser can always demand a discount on the price (reduction) or a cancellation of the contract (withdrawal) at their discretion. In the event of only a minor breach of contract, particularly in the case of insignificant defects, the purchaser shall not be entitled to a right of withdrawal.

7.3 The purchaser must notify the supplier in writing about any defects within two weeks of receipt of goods or discovery of the defects, otherwise no warranty claims can be asserted. The duty to give notice of defects shall also apply to the purchaser's rights of recourse pursuant to § 478 of the German Civil Code (BGB) from the time when the defect notified by the purchaser's customers becomes known. § 377 of the German Commercial Code (HGB) remains unaffected.

7.4 If the purchaser chooses to withdraw from the contract after subsequent performance has failed, they shall not be entitled to any additional claim for damages on account of the defect.

7.5 The warranty period is one year from the date of the transfer of risk of the goods.

7.6 The purchaser may only claim reimbursement of the costs of subsequent performance if they can prove that they were legally obliged to take back or repair the goods via-à-vis their contractual partner and claimant. The purchaser's right of recourse against the supplier pursuant to § 445a of the German Civil Code (BGB) is limited to cases where the purchaser has not concluded any agreement with their customer exceeding the scope of the statutory provisions governing claims based on defects.

In the event of a justified subsequent performance due to defects, the supplier shall only be obliged to bear the necessary expenses, in particular transport, travel, labour and material costs, if these have not increased due to the fact that the goods were taken to a place other than the registered office or the commercial branch of the purchaser to which delivery was made.

Claims based on new commissioning, new software installations or software updates required for the purpose of subsequent performance are excluded unless the last contract in the supply chain is a consumer goods purchase. Including this exception, the supplier is also not obliged to make advance payments to the purchaser for transport costs or damage assessment costs.

7.7 Any manipulation of the supplier's products and their packaging, such as modification, re-working, re-stamping, is not permitted and violates, among other things, the supplier's registered trademark rights. Such modifications may have a negative effect on the technical properties of the supplier's products, damage them and possibly cause consequential damage to other objects. The supplier cannot under any circumstances be held responsible for damage caused by such modifications.

8 Liability

8.1 Claims for damages, whether these are due to defects in the goods or due to other damages including consequential damages incurred by the purchaser or a third party, in particular also those arising from culpa in contrahendo, culpable breach of contract and tort, are excluded.

8.2 This shall not apply in the event of fraudulent intent, liability under the Product Liability Act, injury to life, limb or health and in the event of a wilful and grossly negligent breach of duty.

The supplier shall only be liable for property damage and financial loss caused by slight and ordinary negligence in the event of a breach of material contractual obligations and insofar limited to the damage foreseeable at the time of conclusion of the contract and typical for the contract.

8.3 The purchaser's claims for damages, whether for defects in the goods or for other damage, shall become statute-barred one year from the transfer of risk of the goods. This shall not apply in the event of fraudulent conduct, non-compliance with a quality guarantee and in cases where the law prescribes longer periods.

8.4 Insofar as the liability of the supplier is limited, this shall also apply to the personal liability of the employees, legal representatives and vicarious agents of the supplier.

9. Final provisions

The laws of the Federal Republic of Germany shall apply. The exclusive place of jurisdiction for all disputes is Hassfurt.

The invalidity of any term of these conditions shall not affect any part of the remaining conditions and the contract itself.

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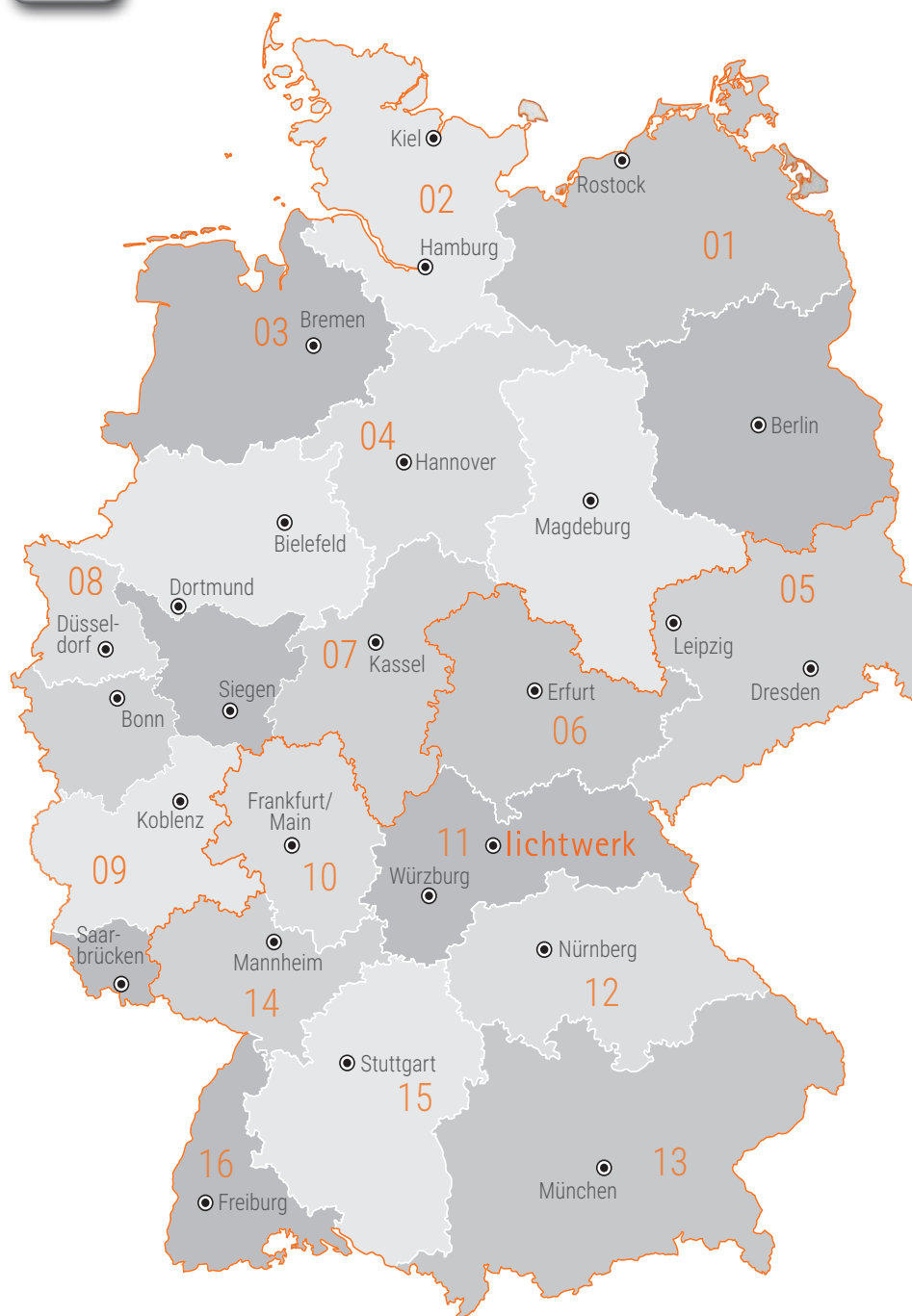
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