LED System by Vossloh-Schwabe
Light as a Marketing Tool

The products we buy have long included much more than just the bare essentials: cosmetics promise beauty, clothes reflect lifestyle and a preference for organic foods is an expression of an individual’s outlook on life. In today’s world, shopping is an emotional experience.

Lighting plays a major role in shaping this affective experience; getting it right will enhance the wellbeing of both customers and staff. Good lighting does far more than just ensure good product visibility and let customers get their bearings when they enter a retail environment. It also helps to create a limitless array of retail settings, each of which has the power to positively shape a customer’s personal shopping experience.

Harnessing the sales-promoting effect of light can therefore yield decisive competitive advantages for any kind of retail environment, whether large department store or exclusive designer boutique.

Well-lit shop façades and attractive window displays are like magnets to passersby. In fact, the more such displays set themselves apart from their surroundings, the more likely they are to draw public interest. Studies into the subject have returned conclusive evidence that shop windows send a powerful marketing message. The brighter the window display is, the more appealing it will be to passers-by. For example, while only five out of 100 people will stop to look at a window with a lighting level of only 180 lux, this figure increases considerably to 25 out of 100 people if the window is brightly illuminated at 2000 lux.

Furthermore, an attractive and well-lit entrance area sends out a welcoming invitation to window shoppers to enter into the retail experience and become in-store browsers. An appealing display of merchandise is naturally equally important. Apart from showcasing quality, a successful product presentation will ideally define the store’s image and trigger a positive emotional response in customers. Light is an excellent means of communicating this kind of intangible marketing message.

From the shop front and entrance area to product displays and changing rooms, light is an omniscient feature of retail environments – which is why it is so crucial to choose the right kind for each retail setting.
Light for Every Retail Area

A shop window is like a store’s business card and as such must be eye-catching and appealing with dynamic lighting that brings the display to life. Lighting technology that combines a high degree of luminous efficiency with excellent CRI values is perfect for this purpose.

Ideally, it should be possible to integrate basic in-store lighting into the architecture of the building, with brightness levels adjusted to suit the type of shop. In discount and DIY stores, for instance, lighting is generally bright and cost-efficiency key, but exclusive stores tend to go for a more muted lighting effect. This basic level of lighting must ensure good visibility and enable in-shop orientation.

Brighter accent and effect lighting is used to create the desired retail ambience and focus shoppers’ attention on special campaign areas. It serves to emphasise the structure, texture and colours of product displays.

Illuminated with brilliant high-CRI light, glass showcases are great for presenting high-end products and underscoring the exclusive nature of displayed merchandise.

Providing suitable lighting for fitting rooms in fashion stores is particularly important as this is where a customer will decide whether or not to buy a product. Good all-around lighting with superior CRI values is therefore vital for this important shop area.
The specific photometric properties typical of today’s high-pressure discharge and compact fluorescent lamps are particularly suitable for the purpose of creating successful product presentations. The newer generation of LED lighting technology delivers the same properties and many additional advantages that help to optimise in-shop lighting.

For instance, given identical colour temperatures and CRI values to those provided by other lighting options, LEDs both ensure greater visual comfort and more faithfully portray the colours of illuminated products. An appropriate LED module is available for every application.

Whereas neutral white light ranging between 3700 and 4000 K is particularly good for presenting fashion items, light with a chromaticity that tends towards the red end of the spectrum and a colour temperature of 4000 K is best for making food-stuffs like meat and fish look more appetizing. Bakery products, however, are at their most enticing if illuminated at a colour temperature of 2700 K.

LED lighting is free from any harmful UV or IR radiation that could impair fresh produce or cause it to spoil more quickly. UV light, for instance, makes colours in textiles fade and IR radiation causes unwanted heating in refrigerated display counters. The IR-free light produced by the LED module can therefore considerably lower energy consumption and enable savings of up to 30%.

In addition to this, maintenance costs are reduced due to the long 50,000-hour service life of LED lighting. Along with the reduced energy consumption, this ensures any lighting system will deliver a fast ROI.

Furthermore, LEDs are resistant to vibrations, provide instantaneous light without a warm-up phase and are easy to dim – all of which open up additional options for creating exciting, well-lit sales areas.

The compact dimensions of the LED modules facilitate the design of smaller and more stylish luminaires.
LED modules are used for the most diverse applications in the field of retail lighting, e.g. shop windows, refrigerated display counters or vending trucks at weekly markets. The rapid pace of technological progress is giving rise to new application options on a daily basis.

The table below details the many advantages that LEDs offer in comparison to conventional lighting solutions:

<table>
<thead>
<tr>
<th>Quality Feature</th>
<th>Metal Halide Lamps e.g. Ceramic metal halide</th>
<th>Compact Fluorescent Lamps e.g. TC-Telix</th>
<th>LEDs e.g. VS LED series</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luminous flux, lamp (lm)</td>
<td>2800</td>
<td>2400</td>
<td>3000</td>
<td>Comparable</td>
</tr>
<tr>
<td>Luminous flux, luminaire (lm)</td>
<td>2390</td>
<td>2290</td>
<td>3000</td>
<td>* Losses caused in luminaires with metal halide lamps by front luminaire covers (~10%) and rearward light radiation of the lamp (~5%)</td>
</tr>
<tr>
<td>Lamp output (W)</td>
<td>39</td>
<td>32</td>
<td>30</td>
<td>+ Lower energy costs</td>
</tr>
<tr>
<td>Service life (h)</td>
<td>15,000</td>
<td>10,000</td>
<td>30,000</td>
<td>** Reduction of maintenance costs</td>
</tr>
<tr>
<td>Luminous efficiency (lm/W)</td>
<td>61</td>
<td>65</td>
<td>100</td>
<td>++ Lower energy costs; LED efficiency will continue to increase in the future</td>
</tr>
<tr>
<td>CRI (Ra)</td>
<td>80–95</td>
<td>82 (Ra 8)</td>
<td>80–95</td>
<td>Comparable</td>
</tr>
<tr>
<td>Requires closed luminaire casing for operation</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>* More freedom for luminaire design; a glass cover at the front of a luminaire reduces light output by up to 10%</td>
</tr>
<tr>
<td>IR radiation (heat radiation)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>+ No heat radiation to impair products, especially important for refrigerated display counters</td>
</tr>
<tr>
<td>UV radiation (if yes, requires UV-absorbing glass panel)</td>
<td>Yes</td>
<td>Yes (low)</td>
<td>No</td>
<td>** No UV radiation to impair products, especially important for textiles</td>
</tr>
<tr>
<td>Lamp ignition required (direct start impossible)</td>
<td>Yes</td>
<td>Yes (short start-up phase)</td>
<td>No</td>
<td>** No dark phase when light is switched on; important when it comes to brief fluctuations in mains supply which can cause a lamp to switch off</td>
</tr>
<tr>
<td>Lamp replacement (careful handling of the lamp required, use of gloves)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>+ Simpler handling of the luminaire lowers maintenance costs</td>
</tr>
<tr>
<td>Safety Extra-Low Voltage (SELV luminaire)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>** In accordance with the relevant standards, fewer measures needed to ensure protection against accidental contact</td>
</tr>
<tr>
<td>Low self-heating of the lamp</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>* During standard operation, LED luminaires generate temperatures of typ. 65 °C</td>
</tr>
<tr>
<td>Easy to dim</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>* Electronic dimming via the operating current</td>
</tr>
<tr>
<td>Shock- and vibration-resistant</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>* Lamps can be damaged due to mechanical impact (or vibrations), e.g. in vending trucks or suspended ceilings</td>
</tr>
<tr>
<td>Suitable for DC operation</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>** Permits quick changeover to central battery operation</td>
</tr>
<tr>
<td>Suitable for low ambient temperatures</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>** Ambient temperature affects the brightness of the lamp; The efficiency of LEDs increases at low ambient temperatures</td>
</tr>
</tbody>
</table>
Vossloh-Schwabe’s new built-in LED system for retail lighting

LED technology delivers many advantages:

- Instantaneous light: no delay on being switched on nor a warm-up phase following disconnection from the mains
- Gentle on products: UV- and IR-free
- Longer lamp service life: up to 50,000 hours
- Easily dimmable for fast changes of lighting scenes
- Colour temperatures to suit every product group: clothing, meat, sausages, cold cuts, fish, vegetables, etc.
- True-colour displays: excellent CRI values to suit the product type
- Negligible drop in luminous flux during the lamp’s service life, removing the need to replace lamps
- Extremely energy-efficient

LED module’s performance is not just restricted to retail lighting. For instance, the system is equally suitable for use in reflector luminaires, flat downlights, façade lighting and pendant luminaires in which the LED driver is not integrated into the LED module, but is installed in a separate unit. This makes the LED module suitable for the most diverse applications, including domestic lighting.

HIGHLY VERSATILE TO SUIT ANY APPLICATION

Powered by constant current, the LED module at the heart of the LED module system is available in different luminous flux packages (2000 to 5500 lm) and various colour temperatures (2700 to 4000 K). In addition, the compact module is very flat and measures only 50 mm in diameter or 46.2 x 44.8 mm.

Simple installation and slim-line luminaire designs

The lamp’s low installation depth and flat geometry enable very slim-line luminaire designs since the module can be mounted directly on top of heat-dissipating surfaces.

One luminaire design to suit various lighting needs

Featuring a single internal structure and identical dimensions for easy module exchange within the luminaire, LED module is available in various colour temperatures. As a result, lighting can be easily tailored to suit the respective application (food/non-food).

Independent control gear for luminaires with remote technology

Independent control gear makes it possible to use greater cable lengths between the driver and the LED module, thus enabling smaller, slimmer luminaire designs with remote technology.

HIGHEST OPERATING SAFETY

LED module is operated using safety extra-low voltage (SELV). Fewer measures are therefore required to ensure protection against accidental contact and compliance with relevant standards.

For simpler luminaire construction
HIGHEST DEGREE OF THERMAL SAFETY
Thermal protection circuitry ensures the operating current is reduced should the temperature at the tc point attain a critical value.

Reduction of Failure Rate
Optimised heat dissipation and thermal protection circuitry ensure components are subjected to less thermal stress, which minimises the failure rate and prolongs the service life of the module.

SUPERIOR MECHANICAL STABILITY
LED module is shock- and vibration-resistant. Three mounting points in the form of metal bushings permit safe and reliable mounting of the module, with the components ideally protected by the plastic casing. In addition, the metal bushings enable optimum connection of a heat sink.

MADE FOR EASE OF USE
LED module is fitted with push-in terminals for releasable connecting cables.

Installation- and user-friendly
Push-in terminals make installing and exchanging modules considerably faster and easier.

TESTED FOR SAFETY
LED modules will be VDE-approved in accordance with EN 62031, the relevant safety standard.

Simplification of the luminaire approval process
Considerably easier luminaire approval in accordance with EN 60598.

SAFE OPERATION THANKS TO ELECTRONIC DRIVERS MADE BY VOSSLOH-SCHWABE
Provided with either a compact plastic or metal casing, VS’ electronic LED drivers ensure the respective LED module is supplied with the correct operating current of either 700 or 1050 mA. These LED drivers feature high-quality components and are available in standard and dimmable (DALI) versions.

VS’ LED control gear is suitable for emergency power operation
In addition, the control gear units can also be powered using direct current. In the event of an electricity cut, a battery can therefore be used to temporarily power the lighting system.

FURTHER INFORMATION
On request we can put you in contact with manufacturers of reflectors, heat sinks and fans that are suitable for use with the LED module system.

Further recommendations on dimensioning heat sinks and other technical specifications can be found at our website:
www.vs-optoelectronic.com
**Technical notes of LED modules**

- Dimensions WU-M-431/432: Ø 50 mm
  Dimensions WU-M-437: 46.2 x 44.8 mm
- Use of external LED constant current driver
- Temperature fail-safe circuit (activation temperature: \( t_C = 105 \degree C \))
- Onboard push-in connector

**Mechanical Dimensions**

- **WU-M-431**
- **WU-M-432**
- **WU-M-437**

**Typical light distribution curve**

![Typical light distribution curve](image)
Electrical characteristics
at PCB temperature \( t_c = 65 \, ^\circ\text{C} \)

<table>
<thead>
<tr>
<th>Type</th>
<th>Ref. No.</th>
<th>Colour</th>
<th>Number of LEDs</th>
<th>Max. current per module mA</th>
<th>Typ. voltage DC* V</th>
<th>Typ. power consumption* W</th>
</tr>
</thead>
<tbody>
<tr>
<td>WUM431</td>
<td>Alle Typen</td>
<td>warm white/ neutral white</td>
<td>120</td>
<td>1030</td>
<td>41.7</td>
<td>44.6</td>
</tr>
<tr>
<td>WUM432</td>
<td>Alle Typen</td>
<td>warm white/ neutral white</td>
<td>60</td>
<td>700</td>
<td>28</td>
<td>29.6</td>
</tr>
<tr>
<td>WUM437</td>
<td>Alle Typen</td>
<td>warm white/ neutral white</td>
<td>216</td>
<td>1030</td>
<td></td>
<td>50.4</td>
</tr>
</tbody>
</table>

Use of external LED constant current driver with max. 750 mA or with max. 1050 mA required.

Optical Characteristics
at \( t_c = 65 \, ^\circ\text{C} \)

<table>
<thead>
<tr>
<th>Type</th>
<th>Ref. No.</th>
<th>Colour</th>
<th>Correlated colour temperature ( ^\circ\text{K} )</th>
<th>Luminous flux* at 350 mA ( \text{cd} )</th>
<th>700 mA ( \text{cd} )</th>
<th>1050 mA ( \text{cd} )</th>
<th>Typ. radiation angle ( ^\circ )</th>
<th>CRI Ra &gt; 90 on request</th>
</tr>
</thead>
<tbody>
<tr>
<td>WUM431-2700K</td>
<td>548381</td>
<td>warm white</td>
<td>2700 –75/+112</td>
<td>1468</td>
<td>1600</td>
<td>2066</td>
<td>2908</td>
<td>3510</td>
</tr>
<tr>
<td>WUM431-3000K</td>
<td>548382</td>
<td>warm white</td>
<td>3000 –75/+160</td>
<td>1509</td>
<td>1681</td>
<td>2276</td>
<td>3070</td>
<td>3605</td>
</tr>
<tr>
<td>WUM431-4000K</td>
<td>548383</td>
<td>neutral white</td>
<td>4000 –215/+185</td>
<td>1559</td>
<td>1732</td>
<td>2934</td>
<td>3715</td>
<td>4195</td>
</tr>
<tr>
<td>WUM432-2700K</td>
<td>548384</td>
<td>warm white</td>
<td>2700 –75/+112</td>
<td>927</td>
<td>1018</td>
<td>1648</td>
<td>1793</td>
<td>988</td>
</tr>
<tr>
<td>WUM432-3000K</td>
<td>548385</td>
<td>warm white</td>
<td>3000 –75/+160</td>
<td>958</td>
<td>1079</td>
<td>1884</td>
<td>2078</td>
<td>998</td>
</tr>
<tr>
<td>WUM432-4000K</td>
<td>548386</td>
<td>neutral white</td>
<td>4000 –215/+185</td>
<td>998</td>
<td>1109</td>
<td>1745</td>
<td>1947</td>
<td>998</td>
</tr>
<tr>
<td>WUM437-2700K</td>
<td>548826</td>
<td>warm white</td>
<td>2700 –75/+112</td>
<td>3524</td>
<td>3838</td>
<td>4809</td>
<td>5234</td>
<td>3524</td>
</tr>
<tr>
<td>WUM437-3000K</td>
<td>548827</td>
<td>warm white</td>
<td>3000 –75/+160</td>
<td>3615</td>
<td>4020</td>
<td>4928</td>
<td>5481</td>
<td>3615</td>
</tr>
<tr>
<td>WUM437-4000K</td>
<td>548828</td>
<td>neutral white</td>
<td>4000 –215/+185</td>
<td>3737</td>
<td>4152</td>
<td>5096</td>
<td>5669</td>
<td>3737</td>
</tr>
</tbody>
</table>

Preliminary data
* Measurement tolerance of luminous flux ±7% | Emission data at \( t_c = 65 \, ^\circ\text{C} \)
** CRI Ra > 90 on request

Minimum order quantity: 100 pcs. per LED module

Maximum ratings
Exceeding the maximum ratings can lead to reduction of lifetime or destruction of the modules.

<table>
<thead>
<tr>
<th>Type</th>
<th>Operation temperature range at ( t_c )-point °C</th>
<th>Storage temperature range °C</th>
<th>Max. permitted output voltage of operating device V</th>
</tr>
</thead>
<tbody>
<tr>
<td>All types</td>
<td>0 – +85</td>
<td>-40 – +85</td>
<td>60</td>
</tr>
</tbody>
</table>

Operating life
\( t_c = 65 \, ^\circ\text{C} \)

<table>
<thead>
<tr>
<th>Luminous maintenance</th>
<th>WU-M-431 ≤ 700 mA</th>
<th>WU-M-432 ≤ 700 mA</th>
<th>WU-M-437 ≤ 700 mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>L90/B10</td>
<td>50,000 h</td>
<td>40,000 h</td>
<td>50,000 h</td>
</tr>
<tr>
<td>L180/B10</td>
<td>60,000 h</td>
<td>50,000 h</td>
<td>60,000 h</td>
</tr>
</tbody>
</table>

This value does not refer to the colour temperature.
Operating Devices for LED Module System

Mains voltage: 220–240 V ±10%
Mains frequency: 0 Hz, 50–60 Hz
SELV equivalent

Constant current drivers
700 mA and 1050 mA
Type: ECXe 700.022
Current output: 700 mA
Voltage output: 20–57 V
Power: 40 W
Ref. No.: 186200
Type: ECXe 1050.021
Current output: 1050 mA
Voltage output: 20–57 V
Power: 60 W
Ref. No.: 186198

Dimmable constant current drivers
700 mA and 1050 mA – DALI
Type: ECXd 700.017
Current output: 700 mA
Voltage output: 9–48 V
Power: 34 W
Ref. No.: 186177
Type: ECXd 1050.020
Current output: 1050 mA
Voltage output: 20–57 V
Power: 60 W
Ref. No.: 186196
Accessories for LED Module System

Thermal conductive graphite tape
Thermal resistance: $R_t \leq 0.04 \, \text{K/W}$
Type: Thermal tape $\varnothing$ 47.2 mm Graphite
Ref. No.: 549501 for WU-M-431/432
Type: Thermal tape 42x40.7 mm Graphite
Ref. No.: 549502 for WU-M-437

Manufacturers of reflectors
for the LED module system
ACL-Lichttechnik GmbH
www.reflektor.com
Alux-Luxar GmbH & Co. KG
www.alux.de
JORDAN REFLEKTOREN GmbH & Co. KG
www.jordanreflektoren.de

Heat sinks with active cooling
for the LED module system
Nuventix, Inc.
www.nuventix.com
Sunon
www.sunon.com
AVC
www.avc-europe.eu

Heat sinks with passive cooling
for the LED module system
ALPHA-Numerics GmbH
www.alpha-numerics.de
Fischer Elektronik GmbH & Co. KG
www.fischerelektronik.de
Frigo Dynamics
www.frigodynamics.com

Fans
for the LED module system
ebn-papst Mültingen GmbH & Co. KG
www.ebmpapst.com
Sunon
www.sunon.com
AVC
www.avc-europe.eu
Whenever an electric light goes on around the world, Vossloh-Schwabe is likely to have made a key contribution to ensuring that everything works at the flick of a switch.

Headquartered in Germany, Vossloh-Schwabe has been a member of the global Panasonic group since 2002 and counts as a technology leader within the lighting sector. Top-quality, high-performance products form the basis of the company’s success.

Whether cost-effective standard components or tailor-made product developments are needed, Vossloh-Schwabe can satisfy even the most diverse market and customer requirements. Vossloh-Schwabe’s extensive productportfolio covers all lighting components: electronic and magnetic ballasts, lampholders, state-of-the-art control systems (LiCS), LED systems with matching control gear units as well as OLEDs.