Technical application guide
LINEARlight Flex Diffuse (LFD)

Light is OSRAM
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Please note:  
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1 Product overview

1.1 General features
- Highly uniform flexible light
- Continuous light without shadows
- Excellent mechanical stability
- Extremely good optical stability over time, no yellowing effect
- Fine white binning (3 SDCM)
- Dimmable (PWM)
- Lifetime of up to 50 000 h
- Flammability: glow wire test at 650 °C – EN 60598-1
- Mixed gas corrosion test – IEC 60068-2-60
- IP67 or IP66 protection with high-performance silicone
  - Encapsulated electronics
  - UV-resistant
  - Salt-mist-proof
- Easy installation
  - Adhesive tape for easy mounting
  - Connectors and channel system available
- Scalable system
  - Cuttable to required length
  - 24 V system with matching OPTOTRONIC LED driver and light management system
- Top-emitting and side-emitting versions: TOP (T) and SIDE (S)

1.2 Application areas
LINEARlight Flex Diffuse (LFD) are suitable for various applications that require a nice-looking, uniform light line with no dots, e.g. indoor and outdoor decoration. Together with polished architectural materials, LFD can also be effectively used for cove or high-class furniture lighting, where the indirect light is reflected by the surfaces.

Applications at a glance:
- General and cove lighting
- Marine lighting, wall integration
- Path illumination, illuminated signs
- Spa lighting
- Outdoor facade decoration

1.3 LINEARlight Flex Diffuse White
Light output: up to 490 lm/m
Luminous efficacy: up to 68 lm/W
LEDs/m: 140 invisible dots
Available white tones: 2 700K, 3 000K, 4 000K, 6 500K

1.4 LINEARlight Flex Diffuse Monochrome
Light output: up to 320 lm/m
Luminous efficacy: up to 48 lm/W
LEDs/m: 150 invisible dots
Available colors: blue, green, red, orange, yellow

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1) Please refer to the technical application guide “IP codes in accordance with IEC 60529”, which can be downloaded at www.osram.com/oem-downloads (see “General”).
1.5 Nomenclature

Family designation LINEARlight Flex Diffuse
Im/m
Emitting surface to the adhesive surface
T = TOP or S = SIDE and MT= Monochrome
TOP or MS = Monochrome SIDE
Generation 1
830: CRI + CCT: CRI 80 + 3 000 K;
color for Monochrome, e.g. BL = Blue
Length in m

LFD-400-T-G1-830-06

1.6 OPTOTRONIC LED drivers

OPTOTRONIC LED drivers

1.7 Flexessories

CONNECTsystem Diffuse
Diffuse Mounting System (mounting brackets)
2 Installation

2.1 Precautionary measures
Before installing LINEARlight Flex Diffuse, attention should always be paid to the following important issues:

ESD
Be aware that the products can be damaged by electrostatic discharge (ESD). Earthing is a very effective measure to avoid damaging effects due to electrostatic discharge. Therefore, use a personal earthing system (ESD field kit) during mounting to prevent the build-up of static charge.

Cleaning
Depending on the surface, use a multi-purpose cleaner, such as isopropyl alcohol, to provide a clean and dry mounting surface, which is free of oils, silicone coatings and dirt particles.

Mechanical forces
Avoid mechanical forces on the connector and the LEDs; try to connect the connector as the last step of the installation. A relief on the cable is recommended. In addition, mechanical stress must not be applied to the LED strip itself (e.g. no twisting or bending in excess of the allowed radius).

IP rating
The IP rating specifies the degree of protection against the intrusion of solid objects (including body parts such as hands and fingers), dust and water into electrical enclosures. While the first digit of the IP rating indicates the protection against foreign bodies, the second digit indicates the protection against water. The following IP ratings apply to LINEARlight Flex Diffuse LED strips:

IP67:
[6] Full protection against contact and penetration of dust
[7] Protection against ingress of water in case of temporary flooding

Note: Permanent submersion is not allowed.

Cutting
Ensure that the LED strips are cut properly at an angle of 90° before attaching the connector!
2.2 Connection with CONNECTsystem Diffuse

2.2.1 Connection of LINEARlight Flex Diffuse TOP

<table>
<thead>
<tr>
<th>TOP</th>
<th>LINEARlight Flex Diffuse TOP White</th>
<th>LINEARlight Flex Diffuse TOP Monochrome</th>
</tr>
</thead>
<tbody>
<tr>
<td>FX-DCS-G1-CM2PF-IP67-0500-X5</td>
<td>FX-DCS-G1-CM2PF-IP67-TOPKIT5</td>
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</tr>
<tr>
<td>EAN 4052899451971</td>
<td>EAN 4052899451995</td>
<td></td>
</tr>
</tbody>
</table>

| 5x | 5x |
| 20x | 20x |
| 1x | 1x |

| FX-DCS-G1-ECT-KIT20 | FX-DCS-G1-EHT-KIT20 |
| EAN 4052899452107 | EAN 4052899452176 |

| FX-DCS-G1-CM2PF-IP67-TOPKIT5 | FX-DCS-G1-CM2PJ-IP67-TOPKIT5 |
| EAN 4052899451995 | EAN 4052899452053 |

| 10x | 10x | 1x |
| 5x | 5x | 1x |

| FX-DCS-G1-GL-25 |
| EAN 4052899452244 |

| 1x |
2.2.2 Connection of LINEARlight Flex Diffuse SIDE

SIDE

LINEARlight Flex Diffuse SIDE
White

LINEARlight Flex Diffuse SIDE
Monochrome

FX-DCS-G1-CM2PF-IP67-0500-X5
EAN 4052899451971

FX-DCS-G1-CM2PJ-IP67-0190-X5
EAN 4052899452039

FX-DCS-G1-ECS-KIT20
EAN 4052899452121

FX-DCS-G1-EHS-KIT20
EAN 4052899452206

FX-DCS-G1-CM2PF-IP67-SIDEKIT5
EAN 4052899452015

FX-DCS-G1-CM2PJ-IP67-SIDEKIT5
EAN 4052899452077

FX-DCS-G1-GL-25
EAN 4052899452244
2.2.3 Assembly

1. Components for assembly:
   - LINEARlight Flex Diffuse (LFD)
   - Connector (FX-DCS-G1-CM2PF-IP67-0500-X5)
   - End cap (FX-DCS-G1-ECT for TOP version, FX-DCS-G1-ECS for SIDE version)

2. Cut at the "scissors" mark.

3a. Apply the connector.

3b. Observe the correct polarity.

4. Ensure that the "hourglass" mark is still visible but not completely visible.

5. Gently press both sides down until you feel both sides close with a click.

6. After the LED strip has been cut, an end cap has to be applied with a dedicated silicone glue to ensure IP protection. For assembly, apply the glue on the exposed copper part of the end cap. The silicone glue has a maximum working time of 10 minutes.

7a. Remove the protection tape from the end of the LED strip. Fully insert the silicone part of the LED strip into the end cap. Wait 20 minutes after insertion.

7b. In case of a double-sided end cap, the process is the same for both parts of the LED strip.

8. Connect the LFD to the LED driver. Observe the correct polarity (red+/black-). Perform final operating test.

Note: When connecting two LINEARlight Flex Diffuse LED strips with the connector, ensure that the same polarities are always properly connected to each other.
2.2.4 Electrical connection with jumper
The jumper is an accessory necessary to create a bridge between two parts of the LED strip. Align the polarity on the cable of the jumper with the polarity of the LED strips. To connect the jumper, follow the instructions in chapter 2.2.3. After installation, ensure that the “hourglass” mark is still visible but not completely visible.

**Note:** When connecting multiple LFD strips in series, always consider the allowed power per single LED driver (see page 14).
2.2.5 Installation with Diffuse Mounting System
(mounting brackets)

LINEARlight Flex Diffuse TOP

LINEARlight Flex Diffuse SIDE

FX-LFDM-G1-BT-17H11
EAN 4052899452497

50x

FX-LFDM-G1-BTL-17H11E9
EAN 4052899452527

50x

FX-LFDM-G1-BS-12H13
EAN 4052899452558

50x

FX-LFDM-G1-BSL-12H13E9
EAN 4052899452589

50x
3 OPTOTRONIC LED drivers

3.1 General
Several OPTOTRONIC LED drivers are not designed for unprotected use in outdoor applications and are rated as IP20 products (not protected against moisture). Exceptions are products marked with the additional letter E (“Exterior”) or P (“Protected”), which are designed for outdoor applications and are available with a higher IP rating. The IP rating of each product is also specified in the respective datasheets.

OPTOTRONIC LED drivers with an IP rating of IP64 and IP65 are VDE-approved and protected against dust and splashing water (IP64) or water jets (IP65). For indoor applications with LINEARlight Flex Diffuse LED strips, every OPTOTRONIC with an output voltage of 24 V can be used. Attention should be paid to the length of the LED strip: Adjust the length to the output power of the applied OPTOTRONIC.

3.2 Standard connection
Use a multi-purpose cleaner, such as isopropyl alcohol, to provide a clean and dry mounting surface, which is free of oils, silicone coatings and dirt particles.

Apply a clamp with appropriate IP rating!

The electrical connection between the secondary side of the OPTOTRONIC LED driver and the LINEARlight Flex Diffuse LED strip must be IP-protected. Therefore, a clamp with appropriate IP rating has to be applied when indicated.

3.3 Dimming connection

Notes:
- Ensure that unconnected wires are insulated properly
- Required type of potentiometer: 47 kΩ
- For further information, see the datasheets of the OPTOTRONIC LED drivers
4 Important notes

4.1 Basic steps of system planning

1. Select the suitable LINEARlight Flex Diffuse with regard to your application and its requirements (bending direction, light color, level of light output etc.).

2. Determine the required level of control for the application (dimming, control interface etc.).

3. Determine the length of the LINEARlight Flex Diffuse and the total wattage to be installed.

4. Consider all possible limitations of the setup: cable lengths, thermal load, mechanical forces, ambient conditions and all other factors that may occur in a certain application.

4.2 Parallel connection

If multiple LINEARlight Flex Diffuse are connected to one LED driver, they have to be connected in parallel. It is not allowed to connect complete units (total length) in series.

4.3 Cable length

The cable length L between the output side of the LED driver (secondary side) and the LINEARlight Flex Diffuse is limited by EMI and the voltage drop that occurs along the cables.

\[ L = \text{max. } 10 \text{ m} \]

4.4 Temperature

The maximum allowed temperature at the \( T_c \) point is 65 °C. In applications where the temperature rises above \( T_c = 40 \degree C \), the adhesive tape loses its adhesive properties. Therefore, additional mounting aids may be required and are generally recommended.

Not permitted:

Series connection of complete LINEARlight Flex Diffuse units. Length of single strip (or series operation) must not exceed maximum operable length (6 m; except for LFD400MT-G1-GR-03 and LFD-400MS-G1-GR-03: 4 m).
5 Technical data

LINEARlight Flex Diffuse – the new, integration-ready diffused light

<table>
<thead>
<tr>
<th>Product reference</th>
<th>Product number (EAN)</th>
<th>Colour</th>
<th>K</th>
<th>V</th>
<th>W</th>
<th>lm</th>
<th>Kcd</th>
<th>Icd</th>
<th>lm/W</th>
<th>Kcd/W</th>
<th>Icd/W</th>
<th>Ic</th>
<th>A+</th>
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<td>White</td>
<td>2700</td>
<td>24</td>
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<td>490</td>
<td>68</td>
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<td>6000</td>
<td>50</td>
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<td>10</td>
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</table>

*Based on measurements of a 500 mm long LED strip.
## LED drivers

<table>
<thead>
<tr>
<th>Recommended LED driver</th>
<th>Product number (EAN)</th>
<th>Interface for dimming</th>
<th>IP</th>
<th>LINEARlight Flex Diffuse Maximum lengths for the connection to one LED driver</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>T(_{ambient}) = 25 °C</td>
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<td>827/830/840/865</td>
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<td>OPTOTRONIC OT 6/200-240/24 CE</td>
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<td>12.5</td>
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</table>

Maximum length of LED strip must be 6 m (4 m for monochrome GR).
6 Flexessories

To support the installation of Flex LED strips, a whole range of Flexessories – dedicated accessories for Flex LED strips – are available. Our new extended range of Flexessories facilitates a quick and easy installation.

### CONNECTsystem Diffuse for LINEARlight Flex Diffuse TOP

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>EAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>FX-DCS-G1-CM2PF-IP67-0500-X5</td>
<td>Middle power feeder</td>
<td>4052899451971</td>
</tr>
<tr>
<td>FX-DCS-G1-CM2PJ-IP67-0190-X5</td>
<td>Strip-to-strip middle jumper</td>
<td>4052899452039</td>
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<tr>
<td>FX-DCS-G1-CM2PF-IP67-TOPKIT5</td>
<td>Feeder kit with end caps &amp; glue</td>
<td>4052899451995</td>
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<td>Jumper kit with end caps &amp; glue</td>
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<td>Silicone glue 25 g</td>
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### CONNECTsystem Diffuse for LINEARlight Flex Diffuse SIDE

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<td>Middle power feeder</td>
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<td>Strip-to-strip middle jumper</td>
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<tr>
<td>FX-DCS-G1-CM2PF-IP67-SIDEKIT5</td>
<td>Feeder kit with end caps &amp; glue</td>
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<td>FX-DCS-G1-CM2PJ-IP67-SIDEKIT5</td>
<td>Jumper kit with end caps &amp; glue</td>
<td>4052899452077</td>
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<tr>
<td>FX-DCS-G1-ECS-KIT20</td>
<td>End caps &amp; glue</td>
<td>4052899452121</td>
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<tr>
<td>FX-DCS-G1-EHS-KIT20</td>
<td>Double-sided end caps &amp; glue</td>
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<td>FX-DCS-G1-GL-25</td>
<td>Silicone glue 25 g</td>
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### Diffuse Mounting System

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>FX-LFDM-G1-BT-17H11</td>
<td>Mounting bracket</td>
<td>4052899452480</td>
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<tr>
<td>FX-LFDM-G1-BTL-17H11E9</td>
<td>Mounting bracket with additional wing</td>
<td>4052899452510</td>
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<tr>
<td>FX-LFDM-G1-BS-12H13</td>
<td>Mounting bracket</td>
<td>4052899452541</td>
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<tr>
<td>FX-LFDM-G1-BSL-12H13E9</td>
<td>Mounting bracket with additional wing</td>
<td>4052899452572</td>
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</tbody>
</table>

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### Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
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<tbody>
<tr>
<td>K</td>
<td>Color temperature in K</td>
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<tr>
<td>V</td>
<td>Voltage in V</td>
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<tr>
<td>d, u</td>
<td>Color</td>
</tr>
<tr>
<td>i</td>
<td>Wavelength</td>
</tr>
<tr>
<td>W</td>
<td>Nominal wattage per meter in W</td>
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<tr>
<td>Lm</td>
<td>Luminous flux per meter</td>
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<td>a</td>
<td>Energy efficiency class</td>
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<tr>
<td>lm</td>
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<td>n</td>
<td>No. of LEDs per meter</td>
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<tr>
<td>l</td>
<td>Length l in mm</td>
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<tr>
<td>l_min</td>
<td>Minimal length l in mm</td>
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<tr>
<td>w</td>
<td>Width w in mm</td>
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<tr>
<td>h</td>
<td>Heigth h in mm</td>
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</table>

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