VS Lighting Solutions for Household Appliances

**UPDATE!**
Edition 2020.1

For Household Appliances

- LED Solutions and Lampholders for Ovens, Steam Ovens, Pyrolytic Ovens and Microwaves
- LED Solutions and Lampholders for Cooker Hoods
- LED Solution for Dishwasher Applications
- LED Lamp and Lampholders for Refrigerators
- LED Constant-voltage and Constant-current Drivers

08/2020 | www.vossloh-schwabe.com
Vossloh-Schwabe

Vossloh-Schwabe is not merely a provider of top-quality system solutions for the lighting industry, but above all makes a competent and innovative contribution to setting market trends in the field of lighting for household appliances.

Employing approximately 1000 people in more than 20 countries, Vossloh-Schwabe is represented all over the world. VS can draw on extensive resources for R&D as well as for international expansion activities. A highly motivated workforce, comprehensive market knowledge, profound industry expertise as well as eco-awareness and environmental responsibility show Vossloh-Schwabe to be a reliable partner for the provision of optimum and cost-effective lighting solutions. Vossloh-Schwabe’s dedication to delivering superior quality is reflected in its ISO 9001 certification.

CUSTOMISED SOLUTIONS

Your project, our solution
We collaborate with our customers and pay attention to their needs in order to develop customised lighting solutions. Whether the task involves the realisation of a single LED module or the creation of a turnkey system, our advanced R&D departments ensure the wishes of our customers come true.

R&D – ideas take shape
Our R&D departments are constantly engaged in testing new materials and innovative technologies in order to offer cutting-edge solutions to create optimum lighting conditions. Using product ideas provided by our customers as a basis, our R&D teams design bespoke solutions that suit the given requirements, that can later be finessed into detailed features and ultimately guide the implementation process to create the customised product.

One stop, one shop – In-house creation of complete products
We offer complete solutions that are made entirely within the Vossloh-Schwabe Group using perfectly matched components with very high efficiency ratings.

In-house photometric testing
All necessary photometric test can be carried out at VS. Cutting-edge equipment is used to measure all optical, chromatic and radiometric values as well as to carry out thermal simulations. These kinds of thermal and optical simulations can help to gear the development of a lighting solution to suit the respective customer specific applications at a very early stage in the planning process. The continuous monitoring process during every single project development step allows us to ensure top quality standards.

Know-how and global presence at your disposal
Using our experience and expertise, we carefully assist our customers – from first prototype production straight through to the final product. In addition, our consolidated production processes make for a highly flexible manufacturing service, enabling anything from just a few pieces right up to a mass production. Moreover, our widespread global presence reflects the importance we attach to staying close to both our customers and the market, which allows us to provide first-class customer and highly efficient logistics services.

www.vossloh-schwabe.com
LED Solutions and Lampholders for Ovens, Steam Ovens, Pyrolytic Ovens and Microwaves 4-15

LED Solutions for Ovens
- Extreme O 5
- Extreme RL 6
- LED Engine for Extreme RL 7

Lampholders for Ovens
For cut-out 35.5 mm / 1.398 in
- G9 lampholders 8

Lampholders for Steam Ovens
For cut-out 35.5 mm / 1.398 in
- G9 lampholders 9
- G4 lampholders 9

Lampholders for Ovens
For cut-out 48 mm / 1.890 in
- E14 Lampholders 10
- G9 lampholders 10

Lampholders for Ovens
For cut-out 55x70 mm / 2.165x2.756 in
- G9 lampholders 11-12
- G4 lampholders 12

Lampholders for Steam Ovens
For cut-out 55x70 mm / 2.165x2.756 in
- G9 lampholders 13
- G4 lampholders 13

Lampholders for Pyrolytic Ovens
For cut-out 55x70 mm / 2.165x2.756 in
- G9 lampholders 14
- G4 lampholders 14

Lampholders for Microwaves
For cut-out 55x70 mm / 2.165x2.756 in
- G9 lampholders 15
- G4 lampholders 15

LED Solutions and Lampholders for Cooker Hoods 16-27

LED Solutions for Cooker Hoods
- Revo 17
- Revo G 18
- Revo P 19
- Revo TW 20
- Revo G TW 21
- Revo S 22
- FlatLine 23
- FlatLine TW 23
- FlatLine AC 24
- Tiny 24
- StartLine 25
- IPLine 25

Lampholders for Cooker Hoods
- E14 Lampholders 26
- GZ10/GU10 Lampholders 27

LED Solution for Dishwasher Applications 28-29
- LEDSpot DW 29

LED Lamp and Lampholders for Refrigerators 30-33
- E14 LED Lamp 31
- E14 lampholders 32-33

LED Constant-voltage and Constant-current Drivers 34-36
- LED Converters 12 V 35
- LED Drivers 36

Technical Details 37-39
- Service life of an LED in extreme conditions 37
- Conductors for installations 38
- Wiring Diagrams for LED 38
- Tuneable White (Common Anode) 39
LED Solutions and Lampholders

For Ovens, Steam Ovens, Pyrolytic Ovens and Microwaves

- **Application field**
  - For ovens, steam ovens, pyrolytic ovens
  - For microwaves

- **Assembly information**
  - Cut-out Ø 35.5 mm / 1.398 in
  - Cut-out Ø 48 mm / 1.890 in
  - Cut-out 55x70 mm / 2.165x2.756 in

- **Approvals**
  - CE conformity
  - ENEC approved
  - UL recognized

- **Beam angle types**
  - Narrow
    - Beams up to 30°
  - Medium
    - Beams up to 60°
  - Wide
    - Beams up to 90°
  - Extra Wide
    - Beams starting from 91°
  - ASYM
    - Asymmetrical beam

**OVERVIEW OF PICTOGRAMS**

The following overview of all used pictograms in this chapter should support you to find the right meaning:
LEDSpots for Ovens

For cut-out 35.5 mm / 1.398 in
Colour rendering: $R_a > 80$
Fixing: click-in

Extreme O

For cavity lighting
Lens material: frosted borosilicate glass
Beam angle: $90^\circ$
Colour temperatures
- LO 004: 3000 K or 4000 K
- LO 001/LO 012: 3000 K or 4500 K
$t_c$ max.: 120 °C / 248 °F
Lumen maintenance: L70/B50 5,000 hrs.
($t_p = 110 °C / 230 °F$)
Leads: FEP 0.50 mm² / AWG21
Packaging unit: 45 pcs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Input supply</th>
<th>Typ. luminous flux (lm)</th>
<th>Typ. current (mA)</th>
<th>Typ. voltage (V)</th>
<th>Power consumption (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO 004*</td>
<td>12 V</td>
<td>85</td>
<td>175</td>
<td>—</td>
<td>2.1</td>
</tr>
<tr>
<td>LO 012</td>
<td>5 V</td>
<td>105</td>
<td>700</td>
<td>—</td>
<td>3.4</td>
</tr>
<tr>
<td>LO 001</td>
<td>700 mA</td>
<td>105</td>
<td>—</td>
<td>3.0</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Tolerances of electrical and optical data: ±10%
Emission data at $t_p = 85 °C / 185 °F$ (4000/4500 K)
The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.

Mounting instructions
1. Push the LED oven lamp into position until it clicks.
2. With that firmly in place, connect the leads.
3. Make sure that the LED oven lamp’s heat sink is skimmed by the air flow at proper temperature.
**LEDspots for Ovens**

*For cut-out 55x70 mm / 2.165x2.756 in*

- Colour rendering: $R_D > 80$
- Fixing: click-in

---

**Extreme RL**

*For cavity lighting*

- Lens material: frosted borosilicate glass (clear glass on request)
- Beam angle: 60°
- Colour temperatures:
  - LO 010: 3000 K or 4000 K
  - LO 011: 3000 K or 4500 K
- $t_c$ max.: 120 °C / 248 °F
- Lumen maintenance: L70/B50 5,000 hrs.
  - $t_p = 110 °C / 230 °F$
- Leads: FEP 0.50 mm² / AWG21
- Packaging unit: 32 pcs. (H195) / 16 pcs. (H318)

---

**OVENS**

<table>
<thead>
<tr>
<th>Type</th>
<th>Input supply</th>
<th>Typ. luminous flux (lm)</th>
<th>Typ. current mA</th>
<th>Typ. voltage V</th>
<th>Power consumption W</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO 010 (H195)</td>
<td>12 V</td>
<td>115</td>
<td>367</td>
<td>—</td>
<td>4.3</td>
</tr>
<tr>
<td>LO 010 (H318)</td>
<td>12 V</td>
<td>110</td>
<td>367</td>
<td>—</td>
<td>4.3</td>
</tr>
<tr>
<td>LO 011 (H195)</td>
<td>700 mA</td>
<td>160</td>
<td>—</td>
<td>5.9</td>
<td>4.2</td>
</tr>
<tr>
<td>LO 011 (H318)</td>
<td>700 mA</td>
<td>150</td>
<td>—</td>
<td>5.9</td>
<td>4.2</td>
</tr>
</tbody>
</table>

Tolerances of electrical and optical data: ±10%

Emission data at $t_p = 85 °C / 185 °F$ (4000/4500 K)

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.

---

**Mounting instructions**

1. Push the LED oven lamp into position until it clicks.
2. With that firmly in place, connect the leads.
3. Make sure that the LED oven lamp's heat sink is skimmed by the air flow at a proper temperature.
Accessories for LED Solutions

For replacement
Colour rendering:  \( R_a > 80 \)
Fixing:  click-in

LED Engine Replacement

For Extreme RL
Colour temperatures
LO 017:  3000 K or 4000 K
LO 018:  3000 K or 4500 K
\( t_c \) max.:  120 °C / 248 °F
Lumen maintenance:  please refer to Extreme RL (p. 6)
Leads:  FEP 0.50 mm² / AWG21
Packaging unit:  72 pcs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Input supply</th>
<th>Power consumption (W)</th>
<th>Only compatible with</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO 017</td>
<td>12 V</td>
<td>4.3</td>
<td>LO 010</td>
</tr>
<tr>
<td>LO 018</td>
<td>700 mA</td>
<td>4.2</td>
<td>LO 011</td>
</tr>
</tbody>
</table>

Tolerances of electrical data:  ±10%
The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.

Mounting instructions
In case of replacement, follow these steps to use Extreme RL again:
1. Disconnect the leads
2. Bend or break the little four wings and then pull the old engine
3. Push the new engine into position until it clicks. With that firmly in place, connect the leads.
Lampholders for Ovens

For cut-out 35.5 mm / 1.398 in
Nominal rating G9: 2/250
Contacts: earth spade connector 6.3x0.8
Fixing: click-in

G9 Lampholders

Temperature rating: T300 (572 °F)
Housing material: steatite
Lamp: 25 W/40 W
Lens: soda-lime glass
Connection: spade connectors
Packaging unit: 200 pcs.
Type: 34400

Temperature rating: T350 (662 °F)
Housing material: steatite
Lamp: 25 W/40 W
Lens: soda-lime glass
Connection: spade connectors
Packaging unit: 96 pcs.
Type: 33850

Temperature rating: T350 (662 °F)
Housing material: steatite
Lamp: 25 W/40 W
Lens: soda-lime glass
Connection: spade connectors
Packaging unit: 96 pcs.
Type: 33855

Temperature rating: T350 (662 °F)
Housing material: steatite
Lamp: 25 W/40 W
Lens: soda-lime glass
Connection: spade connectors
Packaging unit: 96 pcs.
Type: 33860
Lampholders for Steam Ovens

For cut-out 35.5 mm / 1.398 in
Nominal rating G9: 2/250
Nominal rating G4: 10/24
Contacts: earth spade connector 6.3x0.8
Fixing: click-in

Compatible Lampholders

<table>
<thead>
<tr>
<th>Suitable for lampholders</th>
<th>Type</th>
<th>Base</th>
<th>Material</th>
<th>Rating</th>
<th>Connection</th>
<th>Lamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>34400</td>
<td>G9</td>
<td>steatite</td>
<td>T300 (572 °F) spade connectors</td>
<td>25 W / 40 W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33850</td>
<td>G9</td>
<td>steatite</td>
<td>T350 (662 °F) spade connectors</td>
<td>25 W / 40 W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33855</td>
<td>G9</td>
<td>steatite</td>
<td>T350 (662 °F) spade connectors</td>
<td>25 W / 40 W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33860</td>
<td>G9</td>
<td>steatite</td>
<td>T350 (662 °F) spade connectors</td>
<td>25 W / 40 W</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mounting instructions
1. Push the lampholder into position until it clicks.
2. Push the o-ring gasket into the o-ring housing’s groove. Fit this assembly together with the pagoda glass and screw in.
3. With that firmly in place, connect the leads.

Accessories

Pagoda glass
Material: borosilicate glass
Fixing: screw
Type: 94052

O-ring housing
Material: PTFE
Type: 98092

O-ring gasket
Material: high-temperature silicone
Type: 98093
Lampholders for Ovens

For cut-out 48 mm / 1.890 in
Nominal rating E14, G9: 2/250
Contacts: earth spade connector 6.3x0.8
Fixing: click-in

E14 Lampholders
Temperature rating: T270 (518 °F)
Housing material: LCP
Lamp: 25 W
Lens: soda-lime glass
Connection: spade connectors
Packaging unit: 180 pcs.
Type: 64336

G9 Lampholders
Temperature rating: T350 (662 °F)
Housing material: steatite
Lamp: 25 W/40 W
Lens: soda-lime glass
Connection: spade connectors
Packaging unit: 150 pcs.
Type: 33865
Lampholders for Ovens

For cut-out 55x70 mm / 2.165x2.756 in
Nominal rating G9: 2/250
Contacts: earth spade connector 6.3x0.8
Reflector: aluminium plated steel
Fixing: click-in

G9 Lampholders

Temperature rating: T350 (662 °F)
Housing material: steatite
Lamp: 25 W/40 W
Lens: borosilicate glass
Connection: spade connectors
Packaging unit: 70 pcs.
Type: 33840

Temperature rating: T350 (662 °F)
Housing material: steatite
Lamp: 25 W/40 W
Lens: borosilicate glass
Leads: PTFE 0.75 mm² / AWG20
Packaging unit: 70 pcs.
Type: 33940

Temperature rating: T350 (662 °F)
Housing material: steatite
Lamp: 25 W/40 W
Lens: borosilicate glass
Connection: spade connectors
Packaging unit: 75 pcs.
Type: 33885
Lampholders for Ovens
For cut-out 55x70 mm / 2.165x2.756 in
Nominal rating G9: 2/250
Nominal rating G4: 10/24
Contacts: earth spade connector 6.3x0.8
Reflector: aluminium plated steel
Fixing: click-in

G9 Lampholders
Temperature rating: T350 (662 °F)
Housing material: steatite
Lamp: 25 W/40 W
Lens: borosilicate glass
Leads: PTFE 0.75 mm² / AWG20
Packaging unit: 75 pcs.
Type: 33980

G4 Lampholders
Temperature rating: T300 (572 °F)
Housing material: porcelain
Lamp: 20 W
Lens: borosilicate glass
Leads: PTFE 0.75 mm² / AWG20
Packaging unit: 36 pcs.
Type: 32777
Lampholders and Accessories for Steam Ovens

For cut-out 55x70 mm / 2.165x2.756 in
Nominal rating G9: 2/250
Nominal rating G4: 10/24
Contacts: earth spade connector 6.3x0.8
Fixing: click-in

Compatible Lampholders

<table>
<thead>
<tr>
<th>Suitable for lampholders</th>
<th>Type Base Material</th>
<th>T-rating</th>
<th>Connection</th>
<th>Lamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>33840 G9 steatite T350 (662 °F) spade connectors</td>
<td>25 W / 40 W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33940 G9 steatite T350 (662 °F) leads</td>
<td>25 W / 40 W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33880 G9 steatite T350 (662 °F) spade connectors</td>
<td>25 W / 40 W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33885 G9 steatite T350 (662 °F) spade connectors</td>
<td>25 W / 40 W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33980 G9 steatite T350 (662 °F) leads</td>
<td>25 W / 40 W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32777 G4 porcelain T300 (572 °F) leads</td>
<td>20 W</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Accessories

- Metal frame
  - Material: CrNi
  - Type: 93195

- Flat glass
  - Material: tempered glass
  - Type: 94090

- Silicone gasket
  - Material: high-temperature silicone
  - Type: 98090

Mounting instructions
1. Push the lampholder into position until it clicks.
2. Fit the flat glass and the silicone gasket together into the metal frame’s slot with the four screws, and fasten the assembly at the oven wall.
3. With that firmly in place, connect the leads.
Lampholders and Accessories for Pyrolytic Ovens

For cut-out 55x70 mm / 2.165x2.756 in
Nominal rating G9: 2/250
Nominal rating G4: 10/24
Contacts: earth spade connector 6.3x0.8
Fixing: click-in

Compatible Lampholders

<table>
<thead>
<tr>
<th>Suitable for lampholders</th>
<th>Type</th>
<th>Base</th>
<th>Material</th>
<th>T-rating</th>
<th>Connection</th>
<th>Lamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>33840 G9 steatite</td>
<td>T350</td>
<td>spade connectors</td>
<td>25 W / 40 W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33940 G9 steatite</td>
<td>T350</td>
<td>leads</td>
<td>25 W / 40 W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33880 G9 steatite</td>
<td>T350</td>
<td>spade connectors</td>
<td>25 W / 40 W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33885 G9 steatite</td>
<td>T350</td>
<td>spade connectors</td>
<td>25 W / 40 W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33980 G9 steatite</td>
<td>T350</td>
<td>leads</td>
<td>25 W / 40 W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32777 G4 porcelain</td>
<td>T300</td>
<td>leads</td>
<td>20 W</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Accessories

Metal frame
Material: CrNi
Type: 93195

Flat glass
Material: tempered glass
Type: 94090

Lytherm gasket
Material: lytherm
Type: 98096

Mounting instructions
1. Push the lampholder into position until it clicks.
2. Fit the flat glass and the lytherm gasket together into the metal frame’s slot with the four screws, and fasten the assembly at the oven wall.
3. With that firmly in place, connect the leads.
Microwaves

Lampholders and Accessories for Microwaves

For cut-out 55x70 mm / 2.165x2.756 in
Nominal rating G9: 2/250
Nominal rating G4: 10/24
Contacts: earth spade connector 6.3x0.8
Fixing: click-in

Compatible Lampholders

<table>
<thead>
<tr>
<th>Type</th>
<th>Base</th>
<th>Material</th>
<th>Rating</th>
<th>Connection</th>
<th>Lamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>33840</td>
<td>G9</td>
<td>steatite</td>
<td>T350 (662 °F)</td>
<td>spade connectors</td>
<td>25 W / 40 W</td>
</tr>
<tr>
<td>33940</td>
<td>G9</td>
<td>steatite</td>
<td>T350 (662 °F)</td>
<td>leads</td>
<td>25 W / 40 W</td>
</tr>
<tr>
<td>33880</td>
<td>G9</td>
<td>steatite</td>
<td>T350 (662 °F)</td>
<td>spade connectors</td>
<td>25 W / 40 W</td>
</tr>
<tr>
<td>33885</td>
<td>G9</td>
<td>steatite</td>
<td>T350 (662 °F)</td>
<td>spade connectors</td>
<td>25 W / 40 W</td>
</tr>
<tr>
<td>33980</td>
<td>G9</td>
<td>steatite</td>
<td>T350 (662 °F)</td>
<td>leads</td>
<td>25 W / 40 W</td>
</tr>
<tr>
<td>32777</td>
<td>G4</td>
<td>porcelain</td>
<td>T300 (572 °F)</td>
<td>leads</td>
<td>20 W</td>
</tr>
</tbody>
</table>

Accessories

Metal frame
Material: CrNi
Type: 93195

Metal grid
Material: inox
Type: 93198

Flat glass
Material: tempered glass
Type: 94090

Silicone gasket
Material: high-temperature silicone
Type: 98090

Mounting instructions
1. Push the lampholder into position until it clicks.
2. Fit the metal grid, the flat glass and the silicone gasket together into the metal frame’s slot with the four screws, and fasten the assembly at the oven wall.
3. With that firmly in place, connect the leads.
LED Solutions and Lampholders

For Cooker Hoods

- **Application field**
  - For cooker hoods
  - Common anode technology

- **Safety information**
  - IP20 protection
  - IP40 protection
  - IP54 protection

- **Approvals**
  - CE conformity
  - ENEC approved
  - UL recognized

- **Beam angle types**
  - Narrow
    - Beams up to 30°
  - Medium
    - Beams up to 60°
  - Wide
    - Beams up to 90°
  - Extra Wide
    - Beams starting from 91°
**LEDSpots for Cooker Hoods**

For cut-out 67.5x25.5 mm / 2.657x1.004 in

- Colour rendering: $R_a > 80$
- Fixing: snap-in clips

**Revo**

- Lens material: PC
- Beam angle: 100°
- Colour temperatures: 3000 K or 4000 K
- $t_c$ max.: 100 °C / 212 °F
- Lumen maintenance: L70/B50 50,000 hrs.
- $t_p = 85 °C / 185 °F$
- Leads on request: PVC 0.35 mm² / AWG22
- Packaging unit: 162 pcs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Input supply</th>
<th>Typ. luminous flux (lm)</th>
<th>Typ. current (mA)</th>
<th>Typ. voltage (V)</th>
<th>Power consumption (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCH035</td>
<td>12 V</td>
<td>120</td>
<td>114</td>
<td>—</td>
<td>1.4</td>
</tr>
<tr>
<td>LCH053</td>
<td>350 mA</td>
<td>110</td>
<td>—</td>
<td>3.2</td>
<td>1.1</td>
</tr>
<tr>
<td>LCH041</td>
<td>700 mA</td>
<td>210</td>
<td>—</td>
<td>3.2</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Tolerances of electrical and optical data: ±10%

Emission data at $t_p = 85 °C / 185 °F$ (4000 K)

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.
LEDSpots for Cooker Hoods

For cut-out 63.5x20.5 mm / 2.500x0.807 in

Colour rendering: $R_a > 80$
Fixing: stick-on

**Revo G**

- Lens material: PC
- Beam angle: 100°
- Colour temperatures: 3000 K or 4000 K
- $t_c$ max.: 100 °C / 212 °F
- Lumen maintenance: L70/B50 50,000 hrs.
  - $t_p = 85 \, ^\circ \text{C} / 185 \, ^\circ \text{F}$
- Leads on request: PVC 0.35 mm² / AWG22
- Packaging unit: 162 pcs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Input supply</th>
<th>Typ. luminous flux (lm)</th>
<th>Typ. current (mA)</th>
<th>Typ. voltage (V)</th>
<th>Power consumption (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCH036</td>
<td>12 V</td>
<td>120</td>
<td>114</td>
<td>—</td>
<td>1.4</td>
</tr>
<tr>
<td>LCH042</td>
<td>350 mA</td>
<td>110</td>
<td>—</td>
<td>3.2</td>
<td>1.1</td>
</tr>
<tr>
<td>LCH054</td>
<td>700 mA</td>
<td>210</td>
<td>—</td>
<td>3.2</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Tolerances of electrical and optical data: ±10%
Emission data at $t_p = 85 \, ^\circ \text{C} / 185 \, ^\circ \text{F}$ (4000 K)
The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.

**Mounting instructions**

1. Peel off the cover tape
2. Stick the tape on the cooker hood’s metal surface and press down.
3. With that firmly in place, connect the leads.
**COOKER HOODS**

**LEDSpots for Cooker Hoods**

For cut-out 67.5x25.5 mm / 2.657x1.004 in

Colour rendering: \( R_0 > 80 \)

Fixing: snap-in clips

---

**Revo P**

- **Lens material:** PC
- **Beam angle:** 100°
- **Colour temperatures:** 3000 K or 4000 K
- **tc max.:** 100 °C / 212 °F
- **Lumen maintenance:** L70/B50 50,000 hrs. \( (t_p = 85 °C / 185 °F) \)
- **Leads on request:** PVC 0.35 mm² / AWG22
- **Packaging unit:** 162 pcs.

---

**LCH034 / LCH058 (350 mA)**

**LCH040 (700 mA)**

---

**Type** | **Input supply** | **Typ. luminous flux (lm)** | **Typ. current (mA)** | **Typ. voltage (V)** | **Power consumption (W)**
---|---|---|---|---|---
LCH034 | 12 V | 120 | 114 | — | 1.4
LCH058 | 350 mA | 110 | — | 3.2 | 1.1
LCH040 | 700 mA | 210 | — | 3.2 | 2.3

Tolerances of electrical and optical data: ±10%

Emission data at \( t_p = 85 °C / 185 °F \) (4000 K)

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.
LEDSpots for Cooker Hoods
For cut-out 67.5x25.5 mm / 2.657x1.004 in
Colour rendering: Rg > 80
Fixing: snap-in clips

Revo TW
Lens material: PC
Beam angle: 100°
Colour temperatures: tuneable white 2700–4000 K
tc max.: 100 °C / 212 °F
Lumen maintenance: L70/B50 50,000 hrs.
|tp| 85 °C / 185 °F|
Leads on request: PVC 0.35 mm² / AWG22
Packaging unit: 162 pcs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Input supply</th>
<th>Typ. luminous flux (lm)</th>
<th>Typ. current (mA)</th>
<th>Typ. voltage (V)</th>
<th>Power consumption (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCH046</td>
<td>12 V</td>
<td>120/135</td>
<td>185/191</td>
<td>—</td>
<td>2.2/2.3</td>
</tr>
</tbody>
</table>

Tolerances of electrical and optical data: ±10%
Emission data at |tp| 85 °C / 185 °F (4000 K)
The values contained in this data sheet can change due to technical innovations.
Any such changes will be made without separate notification.
For further technical information for TW technology see page 42.
LEDSpots for Cooker Hoods

**For cut-out 63.5x20.5 mm / 2.500x0.807 in**

Colour rendering: \( R_a > 80 \)
Fixing: stick-on

**Revo G TW**

- Lens material: PC
- Beam angle: 100°
- Colour temperatures: tuneable white 2700–4000 K
- \( t_c \) max.: 100 °C / 212 °F
- Lumen maintenance: L70/B50 50,000 hrs.
- \( t_p = 85 °C / 185 °F \)
- Leads on request: PVC 0.35 mm² / AWG22
- Packaging unit: 162 pcs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Input supply</th>
<th>Typ. luminous flux (lm)</th>
<th>Typ. current (mA)</th>
<th>Typ. voltage (V)</th>
<th>Power consumption (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCH047</td>
<td>12 V</td>
<td>120/135</td>
<td>185/191</td>
<td>—</td>
<td>2.2/2.3</td>
</tr>
</tbody>
</table>

Tolerances of electrical and optical data: ±10%

Emission data at \( t_p = 85 °C / 185 °F \) (4000 K)

The values contained in this data sheet can change due to technical innovations.

Any such changes will be made without separate notification.

For further technical information for TW technology, see page 42

**Mounting instructions**

1. Peel off the cover tape
2. Stick the tape on the cooker hood’s metal surface and press down.
3. With that firmly in place, connect the leads.
LEDSpots for Cooker Hoods

For cut-out 67.5x25.5 mm / 2.657x1.004 in
Colour rendering: $R_\text{a} > 80$
Fixing: snap-in clips

Revo S
Lens material: PC
Beam angle: 100°
Colour temperatures: 3000 K or 4000 K
tc max.: 100 °C / 212 °F
Lumen maintenance: L70/B50 50,000 hrs.
$|t_p| = 85 °C / 185 °F$
Leads on request: PVC 0.35 mm² / AWG22
Packaging unit: 162 pcs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Input supply</th>
<th>Typ. luminous flux (lm)</th>
<th>Typ. current (mA)</th>
<th>Typ. voltage (V)</th>
<th>Power consumption (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCH048</td>
<td>12 V</td>
<td>215</td>
<td>210</td>
<td>—</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Tolerances of electrical and optical data ±10%
Emission data at $t_p = 85 °C / 185 °F$ (4000 K)
The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.
For further technical information for TW technology see page 42.
LEDSpots for Cooker Hoods

For cut-out Ø 56 mm / 2.204 in
Colour rendering: $R_0 > 80$
Fixing: snap-in clips

**FlatLine**

- **Lens material:** PC
- **Beam angle:** 120°
- **Colour temperatures:** 3000 K or 4000 K
- **tc max.:** 100 °C / 212 °F
- **Lumen maintenance:** L70/B50 50,000 hrs.
  
  $I_p = 85 °C / 185 °F$
- **Leads on request:** PVC 0.35 mm² / AWG22
- **Packaging unit:** 90 pcs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Input supply</th>
<th>Typ. luminous flux (lm)</th>
<th>Typ. current (mA)</th>
<th>Typ. voltage (V)</th>
<th>Power consumption (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCH028</td>
<td>12 V</td>
<td>105</td>
<td>—</td>
<td>—</td>
<td>1.4</td>
</tr>
<tr>
<td>LCH027</td>
<td>350 mA</td>
<td>125</td>
<td>118</td>
<td>3.0</td>
<td>1.1</td>
</tr>
<tr>
<td>LCH027</td>
<td>700 mA</td>
<td>235</td>
<td>—</td>
<td>3.1</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Tolerances of electrical and optical data ±10%

Emission data at $I_p = 85 °C / 185 °F$ (4000 K)

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.

**FlatLine TW**

- **Lens material:** PC
- **Beam angle:** 120°
- **Colour temperatures:** 2700–4000 K
- **tc max.:** 100 °C / 212 °F
- **Lumen maintenance:** L70/B50 50,000 hrs.
  
  $I_p = 85 °C / 185 °F$
- **Leads:** PVC 0.35 mm² / AWG22
- **Packaging unit:** 90 pcs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Input supply</th>
<th>Typ. luminous flux (lm)</th>
<th>Typ. current (mA)</th>
<th>Typ. voltage (V)</th>
<th>Power consumption (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCH049</td>
<td>12 V</td>
<td>160/170</td>
<td>99/101</td>
<td>—</td>
<td>2.4/2.4</td>
</tr>
</tbody>
</table>

Tolerances of electrical and optical data ±10%

Emission data at $I_p = 85 °C / 185 °F$

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.
**LEDSpots for Cooker Hoods**

**For cut-out Ø 56 mm / 2.204 in (FlatLine)**  
For cut-out Ø 26 mm / 1.024 in (Tiny)

- Colour rendering: $R_0 > 80$
- Fixing: snap-in clips

**FlatLine AC**

- Lens material: PC
- Beam angle: 120°
- Colour temperatures: 3000 K or 4000 K
- tc max.: 100 °C / 212 °F
- Lumen maintenance: L70/B50 50,000 hrs.
- [tp = 70 °C / 158 °F]
- Leads: FEP/FEP double-insulation
- Beam angle: 120°
- Colour temperatures: 3000 K or 4000 K
- tc max.: 100 °C / 212 °F
- Lumen maintenance: L70/B50 50,000 hrs.
- [tp = 70 °C / 158 °F]
- Leads: FEP/FEP double-insulation
- Fixing: snap-in clips

**Tiny**

- Lens material: PC
- Beam angle: 45°
- Colour temperatures: 3000 K or 4000 K
- LCH050: 3000 K, 4500 K or 5000 K
- LCH044: 3000 K
- tc max.: 100 °C / 212 °F
- Lumen maintenance: L70/B50 50,000 hrs.
- [tp = 85 °C / 185 °F]
- Leads on request: PVC 0.35 mm² / AWG22
- Packaging unit: 40 pcs.

**Type** | Input supply | Typ. luminous flux (lm) | Typ. current (mA) | Typ. voltage (V) | Power consumption (W)  
--- | --- | --- | --- | --- | ---
LCH029 | 230 V | 125 | — | — | 1.5

**Type** | Input supply | Typ. luminous flux (lm) | Typ. current (mA) | Typ. voltage (V) | Power consumption (W)  
--- | --- | --- | --- | --- | ---
LCH050 | 12 V | 100 | 100 | — | 1.2
LCH044 | 350 mA | 125 | — | 2.8 | 1

Tolerances of electrical and optical data: ±10%

Emission data at $t_p = 85 °C / 185 °F$ (4000 K)

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.
**LEDSpots for Cooker Hoods**

For cut-out Ø 56 mm / 2.204 in

- Colour rendering: \( R_a > 80 \)
- Fixing: snap-in clips

**StartLine**

Lens material: PC

- Beam angle: 45°
- Colour temperatures:
  - LCH052: 3000 K or 4000 K
  - LCH016: 3000 K or 4500 K
- \( T_c \) max.: 100 °C / 212 °F
- Lumen maintenance: L70/B50 50,000 hrs.
  - \( T_p = 85 \) °C / 185 °F
- Leads: PVC 0.35 mm² / AWG22
- Packaging unit: 45 pcs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Input supply</th>
<th>Typ. luminous flux (lm)</th>
<th>Typ. current (mA)</th>
<th>Typ. voltage (V)</th>
<th>Power consumption (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCH052</td>
<td>12 V</td>
<td>140</td>
<td>167</td>
<td>—</td>
<td>2.0</td>
</tr>
<tr>
<td>LCH016</td>
<td>350 mA</td>
<td>110</td>
<td>—</td>
<td>3.0</td>
<td>1.1</td>
</tr>
<tr>
<td>LCH016</td>
<td>700 mA</td>
<td>200</td>
<td>—</td>
<td>3.0</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Tolerances of electrical and optical data: ±10%

Emission data at \( T_p = 85 \) °C / 185 °F (4000/4500 K)

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.

**IPLine**

Lens material: glass

- Beam angle: 42° / 54°
- Colour temperatures: 3000 K or 4500 K
- \( T_c \) max.: 100 °C / 212 °F
- Lumen maintenance: L70/B50 50,000 hrs.
  - \( T_p = 85 \) °C / 185 °F
- Leads: PVC 0.35 mm² / AWG22
- Packaging unit: 45 pcs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Input supply</th>
<th>Typ. luminous flux (lm)</th>
<th>Typ. current (mA)</th>
<th>Typ. voltage (V)</th>
<th>Power consumption (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCH022</td>
<td>350 mA</td>
<td>125/110</td>
<td>—</td>
<td>3.0</td>
<td>1.1</td>
</tr>
<tr>
<td>LCH022</td>
<td>700 mA</td>
<td>240/210</td>
<td>—</td>
<td>3.0</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Tolerances of electrical and optical data: ±10%

Emission data at \( T_p = 85 \) °C / 185 °F (4000 K)

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.
Lampholders for Cooker Hoods

Nominal rating: 2/250
Connection: For solid and stranded conductors
0.5–1.5 mm² / AWG20/AWG15

E14 Lampholders
Temperature rating: T210 (410 °F)
Housing material: PET GF
Colour: black or white
Connection: push-in twin terminals
Fixing: insertion
Packaging unit: 1000 pcs.
Type: 64365

Temperature rating: T210 (410 °F)
Housing material: PET GF
Colour: natural white
Connection: push-in twin terminals
Fixing: click-in
Packaging unit: 200 pcs.
Type: 64314

Temperature rating: T210 (410 °F)
Housing material: PET GF
Colour: black or white
Connection: push-in twin terminals
Fixing: insertion
Packaging unit: 1000 pcs.
Type: 64305
Lampholders and Accessories for Cooker Hoods

Nominal rating: 2/250
Connection: For stranded conductors with ferrule on bare end of core
Ø 1.4–1.8 mm / AWG15/AWG13

GZ10/GU10 Lampholders
Temperature rating: T270 (518 °F)
Housing material: LCP
Colour: natural white
Connection: push-in twin terminals
Fixing: holes for screws M3
Packaging unit: 1000 pcs.
Type – GU10: 31000
Type – GZ10/GU10: 31010

Temperature rating: T180 (356 °F) / T270 (518 °F)
Housing material: PBT GF / LCP*
Colour: natural white
Connection: push-in twin terminals
Fixing: holes for screws M3
Packaging unit: 1000 pcs.
Type – GU10: 31020
Type – GZ10/GU10: 31030

Temperature rating: T240 (464 °F)
Housing material: steatite
Cover plate material: PPS
Connection: push-in twin terminals
Fixing: holes for screws M3
Packaging unit: 500 pcs.
Type – GU10: 31705
Type – GZ10/GU10: 31755
LED Solution

For Dishwasher Applications

- OVERVIEW OF PICTOGRAMS

The following overview of all used pictograms in this chapter should support you to find the right meaning:

Application field

For dishwasher applications

Approvals

CE conformity
**LEDSpots for Dishwashers**

For cut-out Ø 20.8 mm / 0.819 in

- **Colour rendering:** $R_0 > 80$
- **Fixing:** bayonet

---

**DW**

- **Lens material:** PSU
- **Gasket:** silicone
- **Colour temperatures:** 6500 K
- **$t_c$ max.:** 100 °C / 212 °F
- **Lumen maintenance:** L70/B50 50,000 hrs.
  - $t_p = 85 °C / 185 °F$
- **Electrical connection:** RAST 2.5 – 3 ways
- **Packaging unit:** 160 pcs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Input supply</th>
<th>Typ. luminous flux (lm)</th>
<th>Typ. current (mA)</th>
<th>Typ. voltage (V)</th>
<th>Power consumption (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDW002</td>
<td>6 V</td>
<td>35</td>
<td>122</td>
<td>—</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Tolerances of electrical and optical data ±10%

Emission data at $t_p = 85 °C / 185 °F$ (4000 K)

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.

---

**Mounting instructions**

1. Put the back assembly in place behind of the dishwasher wall.
2. Fit the lens and back assembly together, and screw the lens clockwise until it stops.
3. With that firmly in place, connect the leads.
LED Lamp and Lampholders

For Refrigerators

- **OVERVIEW OF PICTOGRAMS**

  The following overview of all used pictograms in this chapter should support you to find the right meaning:

<table>
<thead>
<tr>
<th>Application field</th>
<th>Beam angle types</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="icon" /> For refrigerators</td>
<td>Narrow Beams up to 30°</td>
</tr>
<tr>
<td><img src="image" alt="icon" /> IP40 protection</td>
<td>Medium Beams up to 60°</td>
</tr>
<tr>
<td><img src="image" alt="icon" /> CE conformity</td>
<td>Wide Beams up to 90°</td>
</tr>
<tr>
<td><img src="image" alt="icon" /> ENEC approved</td>
<td>Extra Wide Beams starting from 91°</td>
</tr>
<tr>
<td><img src="image" alt="icon" /> ASYM</td>
<td>Asymmetrical beam</td>
</tr>
</tbody>
</table>
**LED Lamps for Refrigerators**

With E14 screwfix

- Colour rendering: $R_a > 80$
- Fixing: E14 base

**LED Lamp**

- Beam angle: 120°
- Colour temperatures: 6500 K
- Allowed operation temperature: −15 to 45 °C / −5 to 113 °F
- Packaging unit: 100 pcs.
- Lumen maintenance: L70/B50 25,000 hrs. ($t_p = 25 ^\circ C / 77 ^\circ F$)

**Type Input Typical luminous Typ. Typ. Power con- supply flux [lm] current [mA] voltage (V) sumption [W]**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>T26-1</td>
<td>110–240 V</td>
<td>160</td>
<td>—</td>
<td>—</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Tolerances of electrical and optical data: ±10%

Emission data at $t_p = 25 ^\circ C / 77 ^\circ F$

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.
Lampholders and Accessories for Refrigerators

Nominal rating: 2/250
Temperature: for applications up to -20 °C / -4 °F
Connection: For solid and stranded conductors 0.5–1.5 mm² / AWG20/AWG15

E14 Lampholders
Temperature rating: T180 (356 °F)
Housing material: PBT GF
Connection: push-in twin terminals
Fixing: insertion
Packaging unit: 1000 pcs.
Type: 64365

Temperature rating: T180 (356 °F)
Housing material: PBT GF
Connection: push-in twin terminals
Fixing: click-in
Packaging unit: 500 pcs.
Type: 64312

Temperature rating: T180 (356 °F)
Housing material: PBT GF
Connection: push-in twin terminals
Fixing: clipping-in, bayonet
Packaging unit: 1000 pcs.
Type: 64316
Lampholders and Accessories for Refrigerators

Nominal rating: 2/250
Temperature: for applications up to –20 °C / –4 °F
Connection: For solid and stranded conductors 0.5–1.5 mm² / AWG20/AWG15

E14 Lampholders

Temperature rating: T180 (356 °F)
Housing material: PBT GF
Connection: push-in twin terminals
Fixing: insertion, clipping-in, bayonet
Packaging unit: 1000 pcs.
Type: 64308

Temperature rating: T180 (356 °F)
Housing material: PBT GF
Connection: push-in twin terminals
Fixing: lateral push-fit foot
Packaging unit: 1000 pcs.
Type: 64307

Temperature rating: T210 (410 °F)
Housing material: PET GF
Connection: push-in twin terminals
Fixing: clipping-in
Packaging unit: 1000 pcs.
Type: 64360
LED Constant-voltage and Constant-current Drivers

OVERVIEW OF PICTOGRAMS

The following overview of all used pictograms in this chapter should support you to find the right meaning:

**Technology**

12 V

- Constant-voltage operation 12 V

**Safety information**

- IP protection (f.e. IP20)
- SELV (Safety Extra Low Voltage)
- Protection class I
- Protection class II
- Independent operation
- Doubled short-circuit protection
- Temperature protection up to 100 °C
- Temperature protection up to 110 °C

**Approvals**

- CE conformity
- EAC conformity
- ENEC approved
- RCM approved
- TÜV approved

**Service life and warranty**

- Minimum service life 50,000 hrs.
- Minimum service life 30,000 hrs.
- Product guarantee 5 years
**LED Drivers CV 12 V**

**Output:** max. 12 W or 20 W  
**Mains voltage:** 220–240 V, 50–60 Hz  
**Safety functions:** electronic short-circuit protection, overload protection, protection against "no load" operation  
**Degree of protection:** IP20  
**Protection class:** II

### Capacity range

<table>
<thead>
<tr>
<th>Capacity range</th>
<th>Ref. No.</th>
<th>Output voltage (V ± 5%)</th>
<th>Output current (A)</th>
<th>Power factor at full load (230 V)</th>
<th>Efficiency at full load (%) (230 V)</th>
<th>Max. service life at t₀ (h)</th>
<th>t₀ max. (°C/°F)</th>
<th>Ambient temperature (°C/°F)</th>
<th>Connection Screw terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 W</td>
<td>186204</td>
<td>12</td>
<td>0–1</td>
<td>&gt; 0.57</td>
<td>&gt; 89</td>
<td>100,000 h</td>
<td>75/167</td>
<td>-20 to +50 / -4 to +122</td>
<td>0.2–1.5 mm² / AWG24/AWG15</td>
</tr>
<tr>
<td>20 W</td>
<td>186620</td>
<td>12</td>
<td>0–1.68</td>
<td>&gt; 0.5</td>
<td>&gt; 85</td>
<td>50,000 h</td>
<td>75/167</td>
<td>-15 to +45 / +5 to +113</td>
<td>0.5–1.5 mm² / AWG24/AWG15</td>
</tr>
</tbody>
</table>

### Specifications for 186204

- **Connection:** Screw terminals
- **Dimensions:**
  - Length: 35.5 mm
  - Width: 12.6 mm
  - Height: 12.6 mm
  - Weight: 2.5 g

### Specifications for 186620

- **Connection:** Screw terminals
- **Dimensions:**
  - Length: 45.5 mm
  - Width: 12.8 mm
  - Height: 12.8 mm
  - Weight: 2.8 g

---

**12 V CV Drivers**
LED CC Drivers

Output: max. 8.75 W or 9 W
Mains voltage: 220–240 V, 50–60 Hz
Safety functions: electronic short-circuit protection, overload protection, protection against "no load" operation
Degree of protection: IP20
Protection class II

**LED CC Drivers**

<table>
<thead>
<tr>
<th>Capacity range</th>
<th>Ref. No.</th>
<th>Output current (mA)</th>
<th>Output voltage (V)</th>
<th>Power factor</th>
<th>Efficiency</th>
<th>Max. service life at max. ambient temp (hrs)</th>
<th>t₀ max. (°C/°F)</th>
<th>Ambient temperature t₀ (°C/°F)</th>
<th>Connection terminals/leads</th>
</tr>
</thead>
<tbody>
<tr>
<td>350 mA</td>
<td>8.75</td>
<td>350 ±5%</td>
<td>3–25</td>
<td>&gt; 0.6</td>
<td>&gt; 78</td>
<td>100,000</td>
<td>80/176</td>
<td>-25 to +50 / -13 to +122</td>
<td>screw 2.5 mm² / AWG13</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>350 ±5%</td>
<td>2–40</td>
<td>&gt; 0.55</td>
<td>&gt; 81</td>
<td>100,000</td>
<td>80/176</td>
<td>-25 to +50 / -13 to +122</td>
<td>push-in 0.2–1.5 mm² / AWG24/AWG15</td>
</tr>
<tr>
<td>700 mA</td>
<td>9</td>
<td>700 ±7.5%</td>
<td>5–13</td>
<td>&gt; 0.93</td>
<td>83.5</td>
<td>50,000</td>
<td>75/167</td>
<td>-15 to +45 / 5 to +113</td>
<td>push-in 0.5–1.5 mm² / AWG20/AWG15</td>
</tr>
</tbody>
</table>

**186519**

**186229**

**186916**

---

**36 LED CONVERTERS AND DRIVERS**
Service life of an LED in extreme conditions

An LED – or Light Emitting Diode – is a semiconductor component that only lets current pass in one direction. If forward current is applied, the LED will emit light, dependent on the semiconductor material and doping (i.e. the inclusion of “foreign atoms”).

The decrease in luminous flux over the service life determines the quality of an LED solution. Based on the tests carried out in Vossloh-Schwabe’s laboratory, the LED solutions’ service life, even in extreme conditions such as ovens, exceeds 5,000 hrs.

Due to chemical and physical changes, LEDs lose some of their luminance over their service life. This process (known as degradation) is denoted by \( L \), and a common value for \( L \) is approx. 30%. Consequently, 70% of the initial luminous flux will be retained after 5,000 hours (L70). The B value is directly dependent on the L value and denotes how many LEDs (in percentage) are permitted to fall short of the L value. A common value is B50, which means that 50% of all LEDs can fall short of the L70 value after 5,000 hours.

Degradation

A comparison between ”Extreme O” LO004 and LO012. The graph shows that the relative luminous flux is dependent on the LED module (different LED, different PCB construction) and \( t_c/t_p \) point temperature. The decrease in luminous flux is affected by material’s degradation as well.

Which temperature must be measured to guarantee the proper functioning of the LED?

The temperature on the \( t_c/t_p \) point as showed in the figure below must to be measured. This measurement should be equal or below the \( t_p \) in the lumen maintenance section of each lighting solution and must never overstep \( t_c \) max. to guarantee its integrity.
**Technical Details**

**Conductors for installations**
All conductors must be selected to suit the lighting application conditions (see table) in terms of material, cross-section and insulation. Testing these conductors under worst case conditions is essential as the commonly occurring high temperatures considerably reduce the conductivity of the conductor and hence its current-carrying capacity.

<table>
<thead>
<tr>
<th>Insulation</th>
<th>Conductor Material</th>
<th>Cross-section mm²</th>
<th>Mains voltage V</th>
<th>Max. temperature °C / °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td>Cu/Cu tin-plated</td>
<td>0.35</td>
<td>300</td>
<td>105 / 221</td>
</tr>
<tr>
<td>SI</td>
<td>Cu tin-plated</td>
<td>0.75</td>
<td>300</td>
<td>180 / 356</td>
</tr>
<tr>
<td>FEP</td>
<td>Cu tin-plated</td>
<td>0.75</td>
<td>300</td>
<td>180 / 356</td>
</tr>
<tr>
<td>FEP/FEP</td>
<td>Cu tin-plated</td>
<td>0.25</td>
<td>450/750</td>
<td>180 / 356</td>
</tr>
<tr>
<td>PTFE</td>
<td>Cu tin-plated</td>
<td>0.50</td>
<td>500</td>
<td>180 / 356</td>
</tr>
<tr>
<td>PTFE</td>
<td>Cu nickel/plated</td>
<td>0.75</td>
<td>500</td>
<td>250 / 482</td>
</tr>
<tr>
<td>PTFE</td>
<td>Ni</td>
<td>1</td>
<td>500</td>
<td>250 / 482</td>
</tr>
<tr>
<td>PTFE</td>
<td>Ni</td>
<td>1.5</td>
<td>500</td>
<td>250 / 482</td>
</tr>
</tbody>
</table>

For consultation only.

**Wiring Diagrams for LED**
LED spotlights driven by a constant current source are highlighted with the 350 mA or 700 mA lettering. The constant current driven LED spotlights must be connected in series.

LED spotlights driven by a constant voltage source are highlighted with the 12 V or 24 V lettering. The constant voltage driven LED spotlights must be connected in parallel.

Failing to observe these directions lead to irreparable LED damage. LED spotlights may be destroyed if the polarity of the converter’s output and LED’s input is incorrect. Installation must be carried out in a voltage-free state (i.e. disconnected from the mains).
Tuneable White (Common Anode)

The dynamic white or tuneable white technology allows spotlights to change colour from one temperature to another depending on one’s preferences.

All products with the CA mark are tuneable white technology ready and are designed according to the **Common Anode (CA)** principle, which means that the common anode is connected directly to the positive source and one driving element is connected to each LED array cathode.

For example, the TW driver could apply a PWM signal variable on both channels (warm and cool) to change colour temperature.

Possible configurations to drive a TW CA spotlight

1. Through an external TW controller that communicates with the cooker hood’s motherboard by a predefined digital protocol (typical serial data protocol). The cooker hood’s motherboard takes the input from the user panel and sends data to the TW controller device. This configuration it is necessary to know the cooker hood’s motherboard serial data protocol.

Diagram of an external TW CA control device connection

2. Through a built-in TW CA controller on the cooker hoods’ motherboard. For this configuration we recommend to ask your electronic partner for more information.
## Contacts

<table>
<thead>
<tr>
<th>Market</th>
<th>Address</th>
<th>Phone / Email</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EMEA</strong></td>
<td>Vossloh-Schwabe Italia S.p.A.</td>
<td>Office: +39 0547 98 111</td>
</tr>
<tr>
<td></td>
<td>Via Strada S. Martino, 15</td>
<td><a href="mailto:vs-i@vossloh-schwabe.com">vs-i@vossloh-schwabe.com</a></td>
</tr>
<tr>
<td></td>
<td>47027 Sarsina (FC), Italy</td>
<td></td>
</tr>
<tr>
<td><strong>USA, Canada, Mexico</strong></td>
<td>Francisco Saracino Sales</td>
<td>Office: +39 0547 98 215</td>
</tr>
<tr>
<td></td>
<td>Via Strada S. Martino, 15</td>
<td>Mobile: +39 380 2675 177</td>
</tr>
<tr>
<td></td>
<td>47027 Sarsina (FC), Italy</td>
<td><a href="mailto:francesco.saracino@vossloh-schwabe.com">francesco.saracino@vossloh-schwabe.com</a></td>
</tr>
<tr>
<td><strong>South America</strong></td>
<td>Panasonic do Brasil Limitada Sales</td>
<td>Office: +55 11 3889 4137</td>
</tr>
<tr>
<td></td>
<td>Guilherme Covas Frighetto</td>
<td>Mobile: +55 11 95968 9099</td>
</tr>
<tr>
<td></td>
<td>Av. Do Cafe, 277 – Bloco – A, 8 andar – Jabaquara</td>
<td><a href="mailto:frighetto.guilherme@br.panasonic.com">frighetto.guilherme@br.panasonic.com</a></td>
</tr>
<tr>
<td></td>
<td>Sao Paulo, SP, Brasil</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CEP: 04311-900</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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 is a technology leader within the lighting sector. Top-quality, high-performance products form the basis of the company's success.

Vossloh-Schwabe's extensive product portfolio covers all lighting components: LED systems with matching control gear units and state-of-the-art control systems (Blu2Light and LiCS) as well as electronic and magnetic ballasts and lampholders.