LIGHTING ELECTRONICS

AC/DC supplied electronic ballasts for fluorescent lamps 3
DC supplied electronic ballasts for fluorescent lamps 7
Electronics for self-contained emergency luminaries using fluorescent lamps 10
Electronics for LED-luminaires 12

Presented here is a selection of our basic types. There are also many other alternatives available and even customized solutions are possible. Please enquire.
TEKNOWARE LIGHTING ELECTRONICS FOR DEMANDING APPLICATIONS

Our core expertise lies in the design and manufacture of electronic ballasts for fluorescent lights and power sources for LEDs and halogen lamps. We designed and built our first electronic ballast for vehicle use in 1972 and today we are one of the leading developers of lighting technology for special applications. Our products are sold worldwide to over 35 countries.

Our strengths lie in our wide-ranging and long experience in the design and manufacturing of lighting electronics. Our innovative and effective product development and strong commitment to meeting customer needs serve to reinforce our strength as a lighting provider. The design process of a new product starts always with thorough study of the applied standards and customer specifications. We also pay a lot of attention to the verification of the design before launching the product. Many of our products are tested and certified by independent accredited laboratories. We have also approvals from many organisations as railway operators DB, RATP, SNCF and SBB. Naturally the products sold in the EU and subject to EMC and LV directives carry the CE-mark as a proof of compliance.

Our strategy is to develop user-friendly, reliable, long lasting and innovative products and comprehensive solutions to meet the needs of the customer. We have designed numerous technical features, which guarantee the customer the most appropriate solutions. Following are some examples of them:

**Boosted Pre-Heat™**

Boosted Pre-Heat of the lamp cathodes enable that the lifetime of the fluorescent lamp is non-dependant on the amount of switching cycles. It is recommended when the average burning cycle is less than 3 hours.

**Dimming**

There are available both 2-step and continuous dimming for the fluorescent lamp, even down to 2% of the nominal output.

**Gentle Start™**

Gentle start feature is available with the continuous dimming. It controls the light output during and after the start-up so that the light level increases softly during approximately 5 seconds. This provides pleasant transition of the light level.

**Servisafe®**

Servisafe® –function switches the output voltage off in all lamp fault situations providing safe operation and lamp replacement. Once the lamp is replaced, the normal operation returns automatically without any manual re-setting actions or cycling of the input voltage needed.

**Regulated output power**

Electronic ballasts with regulated output power supply the lamp with the constant voltage and current regardless of the input voltage variations. This gives maximum life for the lamp and stable light output even if the input voltage fluctuates.

Generally, all our electronics products are protected against wrong polarity of the input voltage and all lamp fault situations.
### TM71411

TM71411 is an electronic ballast designed especially for centrally supplied 24V AC/DC emergency luminaries. It can be used also in other 24V applications where long life and high reliability are essential.

**Technical data**

- **Nominal input voltage:** 24V AC/DC (16-28 VAC / 18-35 VDC)
- **Fluorescent lamp:** 4-13W TL, 5-11W TC-E

**Special features**

- Constant output power over the whole input voltage range
- Servisafe -function which shuts the output voltage off in a case of lamp failure. The operation returns automatically when the lamp is replaced.

**Approvals**

- CE -marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC

**Dimensions (W x H x L):** 38 x 28 x 85 mm

### TM71431

TM71431 is an electronic ballast designed especially for centrally supplied 24V AC/DC emergency luminaries. It can be used also in other 24V applications where long life and high reliability are essential.

**Technical data**

- **Nominal input voltage:** 24V AC/DC (16-28 VAC / 18-35 VDC)
- **Fluorescent lamp:** 18W TL / TC

**Special features**

- Constant output power over the whole input voltage range
- Servisafe -function which shuts the output voltage off in a case of lamp failure. The operation returns automatically when the lamp is replaced.

**Approvals**

- CE -marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC

**Dimensions (WxHxL):** 34 x 27 x 116 mm
**TM717xx**

**TM717xx** is a small wattage electronic ballast designed especially for centrally supplied 230 V AC/DC emergency luminaries. It can be used also in other 230V applications where long life and high reliability are essential.

**Technical data**

<table>
<thead>
<tr>
<th>Nominal input voltage:</th>
<th>230 V AC/DC (180-250 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescent lamp:</td>
<td></td>
</tr>
<tr>
<td>TM71720:</td>
<td>4-8 W TL / 5-11 W TC-E</td>
</tr>
<tr>
<td>TM71721:</td>
<td>6-13 W TL / 5-11 W TC-E</td>
</tr>
</tbody>
</table>

**Special features**

Servisafe™ function, which shuts the output voltage off in a case of lamp failure. The operation returns automatically when the lamp is replaced.

**Approvals**

Tested and certified by SGS-Fimko and thus FI-marked

CE-marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC

**Dimensions (WxHxL):** 44 x 29 x 150 mm

---

**TMK4933**

**TMK4933** is a heavy duty electronic ballast designed for demanding use. Its especially wide input voltage range allows both 110 V and 230 V AC/DC supply.

**Technical data**

<table>
<thead>
<tr>
<th>Nominal input voltage:</th>
<th>110 - 230 V AC/DC (88-265 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescent lamp:</td>
<td>36-40W TL / TC</td>
</tr>
</tbody>
</table>

**Special features**

Constant output power within the whole input voltage range

Active power factor correction circuit

Especially vibration and shock-proof construction due to plated-through circuit board.

**Approvals**

CE-marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC

**Dimensions (WxHxL):** 44 x 29 x 142 mm
**TMK59xx**

TMK59xx is a heavy duty electronic ballast designed for demanding use.

**Technical data**

<table>
<thead>
<tr>
<th>Nominal input voltage:</th>
<th>110 V AC/DC (99-121 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMK5923:</td>
<td>230 V AC/DC (207-253 V)</td>
</tr>
<tr>
<td>TMK5933:</td>
<td></td>
</tr>
</tbody>
</table>

**Fluorescent lamp:**

| 36-40W TL / TC |

**Special features**

Especially vibration and shock-proof construction due to plated-through circuit board.

**Approvals**

CE –marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC

**Dimensions (WxHxL):** 44 x 29 x 142 mm

---

**TMB01xx**

TMB01xx is an electronic ballast designed especially for railway interior lighting, but it can be used also in other applications where long life, high reliability and good resistance against shocks and vibration are essential.

**Technical data**

<table>
<thead>
<tr>
<th>Nominal input voltage:</th>
<th>230 V AC/DC (172-265 V)</th>
</tr>
</thead>
</table>

**Fluorescent lamp(s):**

<table>
<thead>
<tr>
<th>TMB0131:</th>
<th>18 W TL / TC</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMB0132:</td>
<td>36 W TL / TC</td>
</tr>
<tr>
<td>TMB0138:</td>
<td>2 x 36 W TL / TC</td>
</tr>
</tbody>
</table>

**Special features**

Constant light output between nominal and maximum input voltage.

Active power factor correction circuit

Boosted Pre-Heat for long lamp life in conditions where lights are switched on/off frequently.

Servisafe™ —function which shuts the output voltage off in a case of lamp failure. The operation returns automatically when the lamp is replaced.

Especially vibration and shock-proof construction due to plated-through circuit board.

**Dimensions (WxHxL):** 42 x 30 x 290 mm
TMB03xx

TMB03xx is an electronic ballast with the same features as TMB01xx, but also with continuous dimming.

**Technical data**

<table>
<thead>
<tr>
<th></th>
<th>Nominal input voltage: 230 V AC/DC (172-265 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescent lamp(s):</td>
<td></td>
</tr>
<tr>
<td>TMB0335:</td>
<td>2 x 18 W TL / TC</td>
</tr>
<tr>
<td>TMB0338:</td>
<td>2 x 36 W TL / TC</td>
</tr>
<tr>
<td>TMB0366:</td>
<td>2 x 14/21 W T5</td>
</tr>
<tr>
<td>TMB0368:</td>
<td>2 x 28/35 W T5</td>
</tr>
<tr>
<td>Dimming control input:</td>
<td>1…10VDC</td>
</tr>
<tr>
<td>Dimming range:</td>
<td>3%…100%</td>
</tr>
</tbody>
</table>

**Special features**

- Constant light output between nominal and maximum input voltage
- Active power factor correction circuit
- Boosted Pre-Heating™ for long lamp life in conditions where lights are switched on/off frequently.
- Servisafe™ – function which shuts the output voltage off in a case of lamp failure. The operation returns automatically when the lamp is replaced.
- Especially vibration and shock-proof construction due to plated-through circuit board.

Dimensions (WxHxL): 42 x 30 x 290 mm
TM80012 is an electronic ballast designed especially for interior lighting of public transport vehicles. It can be used also in other applications where long life, high reliability and good resistance against temperature variations, shocks and vibration are essential.

**Technical data**
- Nominal input voltage: 24VDC (18-32 V)
- Fluorescent lamp: 8…14 W TL, 9…11 W TC

**Special features**
- Constant light output between nominal and maximum input voltage
- Servisafe™ – function which shuts the output voltage off in a case of lamp failure. The operation returns automatically when the lamp is replaced.

**Approvals**
- CE – marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC
- e17 according to the European directive 95/54/EC

**Dimensions (WxHxL):** 35 x 27 x 90 mm

---

TM80041 is an electronic ballast for small wattage lamps, designed to meet the UL – requirements for electronic ballasts.

**Technical data**
- Nominal input voltage: 12 V DC (10-16 V)
- Fluorescent lamp: 4…9 W TL/TC

**Special features**
- Constant light output between nominal and maximum input voltage
- Servisafe™ – function which shuts the output voltage off in a case of lamp failure. The operation returns automatically when the lamp is replaced.

**Approvals**
- UL – recognized
- CE – marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC
- e17 according to the European directive 95/54/EC

**Dimensions (WxHxL):** 39 x 29 x 85 mm
TM500 –series electronic ballasts are designed especially for the interior lighting of public transport vehicles. They can be used also in other applications where long life, high reliability and good resistance against temperature variations, shocks and vibration are essential.

**Technical data**

<table>
<thead>
<tr>
<th>Nominal input voltage:</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM5100x:</td>
</tr>
<tr>
<td>12 V DC (10-15 V)</td>
</tr>
<tr>
<td>TM5101x:</td>
</tr>
<tr>
<td>24 V DC (18-30 V)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fluorescent lamp(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM510x1:</td>
</tr>
<tr>
<td>4...13 W TL</td>
</tr>
<tr>
<td>TM510x6:</td>
</tr>
<tr>
<td>15...40 W TL</td>
</tr>
<tr>
<td>TM510x2:</td>
</tr>
<tr>
<td>2 x 8 W TL</td>
</tr>
<tr>
<td>TM510x8:</td>
</tr>
<tr>
<td>2 x 18 W TL</td>
</tr>
</tbody>
</table>

**Special features**

Optionally available also with Boosted Pre-Heating™ and/or 2-step dimming. Please enquire.

**Approvals**

CE –marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC

e17 according to the European directive 95/54/EC

**Dimensions (WxHxL):**

| Single lamp types: | 35 x 23 x 195 mm |
| Twin lamp and dimmable types: | 35 x 23 x 195 mm |

---

TM871xx electronic ballasts are designed to enable the usage of T5 fluorescent lamps in public transport vehicles. They can be used also in other applications where long life, high reliability and good resistance against temperature variations, shocks and vibration are essential.

**Technical data**

<table>
<thead>
<tr>
<th>Nominal input voltage:</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM8714x:</td>
</tr>
<tr>
<td>12 V DC (10-15 V)</td>
</tr>
<tr>
<td>TM8715x:</td>
</tr>
<tr>
<td>24 V DC (18-32 V)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fluorescent lamp(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM871x4:</td>
</tr>
<tr>
<td>14...21 W T5</td>
</tr>
<tr>
<td>TM871x6:</td>
</tr>
<tr>
<td>28 W T5</td>
</tr>
<tr>
<td>TM871x7:</td>
</tr>
<tr>
<td>2 x 14 W T5</td>
</tr>
</tbody>
</table>

**Special features**

Constant light output between nominal and maximum input voltage

Boostered Pre-Heating™ for long lamp life in conditions where lights are switched on/off frequently.

Servisafe™ –function which shuts the output voltage off in a case of lamp failure. The operation returns automatically when the lamp is replaced.

**Approvals**

CE –marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC

e17 according to the European directive 95/54/EC

**Dimensions (WxHxL):**

| Single lamp types: | 35 x 22 x 138 mm |
| Twin lamp types:   | 37 x 23 x 195 mm |
TM927xx

TM927xx electronic ballasts are designed to enable the usage of T5 fluorescent lamps in public transport vehicles. It has all the features of the TM871xx, and additionally it has also the possibility to continuous dimming of the lamp.

### Technical data
- **Nominal input voltage:** 24 V DC (18-32 V)
- **Fluorescent lamp(s):**
  - TM92753: 14 W T5
  - TM92754: 21 W T5
  - TM92756: 28 W T5
  - TM92757: 35 W T5

### Special features
- Continuous dimming 15...100%
- Constant light output between nominal and maximum input voltage
- Boosted Pre-Heating for long lamp life in conditions where lights are switched on/off frequently.
- Servisafe function which shuts the output voltage off in a case of lamp failure. The operation returns automatically when the lamp is replaced.

### Approvals
- CE-marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC
- e17, approval No. 020002

### Dimensions (WxHxL):
- 35 x 23 x 218 mm

---

TMAxxxx

TMAxxxx is an electronic ballast designed especially for railway interior lighting, but it can used also in other applications where long life, high reliability and good resistance against shocks and vibration are essential.

### Technical data
- **Nominal input voltage:**
  - TMA0408: 24 V DC (16,8-32 V)
  - TMA0148: 110 V DC (77-150 V)
- **Fluorescent lamp(s):**
  - 18…36 W / 2 x 18 W

### Special features
- Constant light output between nominal and maximum input voltage
- Boosted Pre-Heating for long lamp life in conditions where lights are switched on/off frequently.
- Servisafe function which shuts the output voltage off in a case of lamp failure. The operation returns automatically when the lamp is replaced.
- Especially vibration and shock-proof construction due to plated-through circuit board.

### Approvals
- CE-marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC

### Dimensions (WxHxL):
- 41 x 30 x 260 mm

---

![Logo](https://www.teknoware.fi/lookup/9.png)
ELECTRONICS FOR SELF-CONTAINED EMERGENCY LUMINAIRES USING FLUORESCENT LAMPS

TW770xx

TW770xx is an emergency lighting conversion unit which can be used with both electronic and magnetic ballast.

**Technical data**
- **Nominal input voltage:** 230 VAC (207-253 V)
- **Fluorescent lamp:**
  - TW77001: 11...65 W TL/TC-E
  - TW77002: 4...13 W TL/TC-E
  - TW77003: 4...13 W TL/TC-E
- **Emergency mode duration:**
  - TW77001: 1 h
  - TW77002: 1 h
  - TW77003: 3 h
- **Battery type:** NiCd 1,5 or 2,2 Ah

**Approvals**
- Tested and certified by SGS-Fimko and thus FI-marked
- CE-marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC

Dimensions (WxHxL): 40 x 35 x 195

TW964xx

TW964xx is an emergency lighting conversion unit which can be used with both electronic and magnetic ballast. Also available for 24V supply.

**Technical data**
- **Nominal input voltage:**
  - TW9640x: 230 VAC (184-253 V)
  - TW96411: 24 VAC/DC (19,2-28,8 V)
- **Fluorescent lamp:**
  - TW96401: 11...65 W TL/TC-E
  - TW96402: 4...13 W TL/TC-E
  - TW96403: 4...13 W TL/TC-E
  - TW96404: 18...65 W TL/TC-E
  - TW96411: 11...65 W TL/TC-E
- **Emergency mode duration:**
  - TW96401: 1 h
  - TW96402: 1 h
  - TW96403: 3 h
  - TW96404: 3 h
  - TW96411: 1 h
- **Battery type:** NiCd 1,5 or 2,2 Ah

**Approvals**
- Tested and certified by SGS-Fimko and thus FI-marked
- CE-marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC

Dimensions (WxHxL): 41 x 28 x 225
XW782xx is an emergency lighting electronics unit, which includes an electronic ballast for continuous normal operation and electronics for battery mode operation. The unit can be connected for both maintained and non-maintained use. Separate magnetic or electronic ballast is not needed.

### Technical data

<table>
<thead>
<tr>
<th>Nominal input voltage:</th>
<th>230 VAC (207-253 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescent lamp:</td>
<td></td>
</tr>
<tr>
<td>XW78201: 4...13 W TL/TC-E</td>
<td></td>
</tr>
<tr>
<td>XW78202: 4...13 W TL/TC-E</td>
<td></td>
</tr>
<tr>
<td>Emergency mode duration:</td>
<td></td>
</tr>
<tr>
<td>XW78201: 1 h</td>
<td></td>
</tr>
<tr>
<td>XW78202: 3 h</td>
<td></td>
</tr>
<tr>
<td>Battery type:</td>
<td>NiCd 1.5 or 2.2 Ah</td>
</tr>
</tbody>
</table>

### Approvals

- Tested and certified by SGS-Fimko and thus FI-marked
- CE-marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC
ELECTRONICS FOR LED -LUMINAIRES

TS89934

TS89934 is a power converter designed especially to supply LEDs in an emergency luminaire.

Technical data

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal input voltage:</td>
<td>230 VAC (180-250 V)</td>
</tr>
<tr>
<td>Output voltage:</td>
<td>24 VDC</td>
</tr>
<tr>
<td>Max output current:</td>
<td>200 mA</td>
</tr>
</tbody>
</table>

Special features

Regulated output voltage

Approvals

Tested and certified by SGS-Fimko and thus FI-marked
CE-marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC

Dimensions (WxHxL): 38 x 28 x 85 mm

TS89953

TS89953 is a power converter with battery back-up, designed especially to supply LEDs in a self contained emergency luminaire.

Technical data

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal input voltage:</td>
<td>230 VAC (180-250 V)</td>
</tr>
<tr>
<td>Output voltage:</td>
<td>3.6...4.6 VDC</td>
</tr>
<tr>
<td>Max output current:</td>
<td>500 mA</td>
</tr>
<tr>
<td>Battery type:</td>
<td>NiCd 3.6 V 600 mAh</td>
</tr>
</tbody>
</table>

Approvals

Tested and certified by SGS-Fimko and thus FI-marked
CE-marked according to the European EMC and LV directives 89/336/EEC and 73/23/EEC

Dimensions (WxHxL): 38 x 28 x 85 mm

We reserve the right to make modifications without prior notice