Product description

- Processor-controlled ballast with xtec inside
- Highest possible energy class CELMA EEI = A1 BAT
- Noise-free precise control via DSI signal, switchDIM or corridorFUNCTION
- 5-year guarantee

Interfaces

- DSI
- switchDIM (with memory function + selectable dimming rate)
- corridorFUNCTION

Functions

- Intelligent Temperature Guard (overtemperature protection)
- Intelligent Voltage Guard (overvoltage indication and undervoltage shutdown)
- Optimum filament heating in any dimmer setting
- Disconnection of filament heating from a dimming level of approx. 90 % for maximum energy efficiency (SMART-Heating concept)
- Automatically triggered emergency lighting value in DC mode, 70 %
- For emergency lighting systems as per EN 50172
- Automatic start after replacement of defective lamps
- Automatic shutdown if the lamp is faulty
- Backwards compatible

Standards, page 2

Wiring diagrams and installation examples, page 5

Specific technical data

<table>
<thead>
<tr>
<th>Lamp wattage</th>
<th>Lamp type</th>
<th>Type</th>
<th>Article number</th>
<th>Dimensions L x W x H</th>
<th>Hole spacing D</th>
<th>Lamp power</th>
<th>Circuit power</th>
<th>EEI</th>
<th>Current at 50 Hz 230 V</th>
<th>λ at 50 Hz 230 V</th>
<th>tc point max.</th>
<th>Ambient temperature t₀</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 x 14 W</td>
<td>T5</td>
<td>PCA 3x14/24 T5 ECO lp xtec</td>
<td>22176211</td>
<td>360 x 40 x 21 mm</td>
<td>350 mm</td>
<td>42 W</td>
<td>46.5 W</td>
<td>A1 BAT</td>
<td>0.21 A</td>
<td>0.97</td>
<td>75 °C</td>
<td>-25 ... 50 °C</td>
</tr>
<tr>
<td>3 x 24 W</td>
<td>T5</td>
<td>PCA 3x14/24 T5 ECO lp xtec</td>
<td>22176212</td>
<td>360 x 40 x 21 mm</td>
<td>350 mm</td>
<td>72 W</td>
<td>73.0 W</td>
<td>A1 BAT</td>
<td>0.32 A</td>
<td>0.97</td>
<td>75 °C</td>
<td>-25 ... 55 °C</td>
</tr>
</tbody>
</table>

For luminaires with 3 lamps

3 x 14 W T5 | PCA 4x14/24 T5 ECO lp xtec | 22176212 | 360 x 40 x 21 mm | 350 mm | 56 W | 60.5 W | A1 BAT | 0.27 A | 0.97 | 75 °C | -25 ... 50 °C |

For luminaires with 4 lamps

4 x 14 W T5 | PCA 4x14/24 T5 ECO lp xtec | 22176212 | 360 x 40 x 21 mm | 350 mm | 96 W | 97.5 W | A1 BAT | 0.43 A | 0.97 | 75 °C | -25 ... 50 °C |

¹ According to the EU directives on ecodesign requirements (EC) No. 245/2009 and (EC) No. 347/2010.
² Valid at 100 % dimming level.
³ +10 °C to t₀ max: unrestricted dimming. -25 °C to +10 °C: unrestricted dimming from 100 % to 30 %.
⁴ -25 °C to +10 °C, dimming below 30 %: malfunction possible but no damage to ECG. This applies to AC and DC operation.
FL ballasts
Electronic dimming

Standards
EN 55015
EN 55022
EN 60929
EN 61000-3-2
EN 61347-2-3
EN 61547

Suitable for emergency installations according to EN 50172

Lamp starting characteristics
Warm start
Starting time 0.5 s with AC
Starting time 0.2 s with DC
Start at any dimming level

AC operation
Mains voltage
220–240 V 50/60 Hz
198–264 V 50/60 Hz including safety tolerance (+10%)
202–254 V 50/60 Hz including performance tolerance (+6%/-8%)

DC operation
220–240 V 0 Hz
198–280 V 0 Hz certain lamp start
176–280 V 0 Hz operating range
Use in emergency lighting installations according to EN 50172 or for emergency luminaires according to EN 61347-2-3 appendix J.

Emergency units
The “PCA T5 ECO lp xxtex” ballasts are compatible with all emergency units from Tridonic. See the table in the data sheet. Also all “5-pole” emergency units can be used. When used with other emergency units tests are necessary.

Temperature range
Unlimited dimming range from 10 °C to t max.
-25 °C to +10 °C: dimming operation from 100% to 30%. If dimm level goes below 30% malfunction possible, but no electronic ballast damage. This applies to AC and DC operation.

Lamp type recognition
Each of ten lamps for which the control gear is designed will be operated correctly according the lamp specification. The currently used lamp is recognised during the start up process.
To avoid an incorrect lamp recognition due to fast multiple ON/OFF switches, new lamp data are only restored if the lamp has operated for at least 5 seconds.

Mains currents in DC operation (at 70% light output)

<table>
<thead>
<tr>
<th>Type</th>
<th>Wattage</th>
<th>Mains current at Un = 220 Vdc</th>
<th>Mains current at Un = 240 Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA 3x14/24 T5 ECO lp xxtex</td>
<td>3x14 W</td>
<td>0.17 A</td>
<td>0.16 A</td>
</tr>
<tr>
<td>PCA 3x14/24 T5 ECO lp xxtex</td>
<td>3x24 W</td>
<td>0.28 A</td>
<td>0.26 A</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 ECO lp xxtex</td>
<td>4x14 W</td>
<td>0.22 A</td>
<td>0.21 A</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 ECO lp xxtex</td>
<td>4x24 W</td>
<td>0.37 A</td>
<td>0.34 A</td>
</tr>
</tbody>
</table>

Ballast lumen factor AC operation (AC-BLF) EN 60929 8.1

<table>
<thead>
<tr>
<th>Type</th>
<th>Wattage</th>
<th>AC-BLF at U = 230 Vac</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA 3x14/24 T5 ECO lp xxtex</td>
<td>3x14 W</td>
<td>0.99</td>
</tr>
<tr>
<td>PCA 3x14/24 T5 ECO lp xxtex</td>
<td>3x24 W</td>
<td>0.99</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 ECO lp xxtex</td>
<td>4x14 W</td>
<td>0.99</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 ECO lp xxtex</td>
<td>4x24 W</td>
<td>0.99</td>
</tr>
</tbody>
</table>

The ballast lumen factor for AC operation (AC-BLF) does not alter from Un = 198 Vac to Un = 254 V ac.
The ballast lumen factor for DC operation (DC-BLF) on the basis of an automatic power reduction of the ballasts (default value is 70%) will be smaller than AC. It does not alter in the DC operating range (198–280 Vdc).

Harmonic distortion in the mains supply (at 230 V/50 Hz)

<table>
<thead>
<tr>
<th>Type</th>
<th>Wattage</th>
<th>THD 3</th>
<th>THD 5</th>
<th>THD 7</th>
<th>THD 9</th>
<th>THD 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA 3x14/24 T5 ECO lp xxtex</td>
<td>3x14 W</td>
<td>8.40</td>
<td>6.65</td>
<td>1.97</td>
<td>2.17</td>
<td>2.09</td>
</tr>
<tr>
<td>PCA 3x14/24 T5 ECO lp xxtex</td>
<td>3x24 W</td>
<td>7.98</td>
<td>6.23</td>
<td>1.76</td>
<td>1.75</td>
<td>2.17</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 ECO lp xxtex</td>
<td>4x14 W</td>
<td>8.67</td>
<td>6.97</td>
<td>2.85</td>
<td>2.86</td>
<td>1.86</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 ECO lp xxtex</td>
<td>4x24 W</td>
<td>7.52</td>
<td>6.37</td>
<td>1.53</td>
<td>1.94</td>
<td>1.04</td>
</tr>
</tbody>
</table>

The ballast lumen factor for AC operation (AC-BLF) does not alter from Un = 198 V to Un = 254 V. The ballast lumen factor for DC operation (DC-BLF) on the basis of an automatic power reduction of the ballasts (default value is 70%) will be smaller than AC. It does not alter in the AC operating range (198–280 V ac).
Dimming
Dimming curve is adapted to the eye sensitiveness. Dimming range:
- 4-lamp: 1 % to 100 %, 3-lamp: 5 % to 100 %
Digital control with:
- DSI signal: 8 bit Manchester Code
  Speed 1 % to 100 % in 1.4 s
Control input (D1, D2)
A push-to-make switch (switchDIM) can be wired on the same terminals (D1 and D2).

Digital signal DSI
The control input is non-polar and protected against accidental connection with a mains voltage up to 264 V. The control signal is not SELV. Control cable has to be installed in accordance to the requirements of low voltage installations.
Different functions depending on each module.

SMART interface
An additional interface for the direct connection of the SMART-LS II lp\(^1\) light sensor. The sensor registers actual ambient light and maintains the individually defined lux level.
After every mains reset the SMART interface automatically checks for an installed sensor. With the sensor installed the PCA T5 ECO one4all lp xtec automatically runs in the constant lux level mode. ON/OFF switch via mains, switchDIM or DSI signal.
DSI signal = 0 switches off.
With switchDIM signals it is possible to change the controlled light level temporarily. Temporarily means that after a switching cycle OFF/ON command the ballast will start at the preset value determined by the SMART-LS II lp. The installation of the two wire bus is according to the appropriate low voltage regulations.

switchDIM
Integrated switchDIM function allows a direct connection of a push to make switch for dimming and switching.
Brief push (< 0.6 s) switches ballast ON and OFF. The ballasts switch-ON at light level set at switch-OFF. When the push to make switch is held, PCA ballasts are dimmed. After repush the PCA is dimmed in the opposite direction.

\(^1\) SMART-LS II lp, article number 86458258

### Dimming characteristics

#### PCA T5 ECO lp xtec

<table>
<thead>
<tr>
<th>digital dimming value</th>
<th>relative lighting level in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>255</td>
<td>100</td>
</tr>
<tr>
<td>225</td>
<td>90</td>
</tr>
<tr>
<td>200</td>
<td>80</td>
</tr>
<tr>
<td>175</td>
<td>70</td>
</tr>
<tr>
<td>150</td>
<td>60</td>
</tr>
<tr>
<td>125</td>
<td>50</td>
</tr>
<tr>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>75</td>
<td>30</td>
</tr>
<tr>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Energy saving

#### PCA T5 ECO lp xtec

<table>
<thead>
<tr>
<th>mains power in %</th>
<th>dimming level in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

### Backwards compatibility

With a simple key combination a PCA T5 ECO lp xtec can be reset as a normal PCA ECO from the previous generation. Synchronisation simply has to take place three times within one minute (3x 10 s).
To activate the “xtec” settings again, synchronisation has to take place four times within one minute.

#### Loading of automatic circuit breakers

<table>
<thead>
<tr>
<th>Automatic circuit breaker type</th>
<th>C10</th>
<th>C13</th>
<th>C16</th>
<th>C20</th>
<th>B10</th>
<th>B13</th>
<th>B16</th>
<th>B20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation Ø</td>
<td>1.5 mm(^2)</td>
<td>1.5 mm(^2)</td>
<td>1.5 mm(^2)</td>
<td>2.5 mm(^2)</td>
<td>1.5 mm(^2)</td>
<td>1.5 mm(^2)</td>
<td>1.5 mm(^2)</td>
<td>2.5 mm(^2)</td>
</tr>
<tr>
<td>PCA 3x14/24 T5 ECO lp xtec</td>
<td>16</td>
<td>22</td>
<td>32</td>
<td>36</td>
<td>8</td>
<td>11</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 ECO lp xtec</td>
<td>14</td>
<td>22</td>
<td>32</td>
<td>34</td>
<td>7</td>
<td>11</td>
<td>16</td>
<td>17</td>
</tr>
</tbody>
</table>

Continuous operation: to calculate the protective safety switch see main current, page 1
Intelligent Temperature Guard

The intelligent temperature guard protects the PCA T5 ECO lp xtec from temporary thermal overheating by reducing the output power or switching off in case of operation above the thermal limits of the luminaire or ballast. Depending on the luminaire design, the ITG operates at about 5 to 10 °C above Tc temperature.

Intelligent Voltage Guard

Intelligent Voltage Guard is the name of the new electronic monitor from Tridonic. This innovative feature of the PCA family of control gear from Tridonic immediately shows if the mains voltage rises above certain thresholds. Measures can then be taken quickly to prevent damage to the control gear.

- If the mains voltage rises above approx. 305 V (voltage depends on the ballast type), the lamp starts flashing on and off.
- This signal "demands" disconnection of the power supply to the lighting system.
- The active-current-control of these control gears is protected against failure caused by the high mains currents generated as a result of mains undervoltage. The switch off level depends on lamp wattage and is typically < 140 V.

Wiring advice

The lead length is dependent on the capacitance of the cable.

With standard solid wire 0.5/0.75 mm² the capacitance of the lead is 30–80 pF/m. This value is influenced by the way the wiring is made.

Lamp connection should be made with symmetrical wiring.

- 3-lamp devices: Hot and cold leads should be separated as much as possible.
- 4-lamp devices: Middle and hot leads should be separated as much as possible.
- Hot leads (9, 10, 15, 16) and cold leads (11, 12, 13, 14) should be separated as much as possible.

When using two or more dimmable ballasts in one luminaire with separate dimming controls, the lamp leads must be kept separate.

Distance to plate: 5–10 mm

(ideal distance for optimal symmetrical light)

To avoid the damage of the control gear, the wiring must be protected against short circuits to earth (sharp edged metal parts, metal cable clips, louver, etc.).

Installation instructions

Wiring type and cross section

The wiring can be solid cable with a cross section of 0.5 to 0.75 mm² for push terminal and 0.5 mm² for IDC terminal. For the push-wire connection you have to strip the insulation (8–9 mm).
**FL ballasts**

**Electronic dimming**

Dimmable ballasts from Tridonic have to be earthed.

**RFI**
- Connection to the lamps of the hot leads must be kept as short as possible
- Mains leads should be kept apart from lamp leads (ideally 5–10 cm distance)
- Do not run mains leads adjacent to the electronic ballast
- Twist the lamp leads
- Keep the distance of lamp leads from the metal work as large as possible
- Mains wiring to be twisted when through wiring
- Keep the mains leads inside the luminaire as short as possible

**General advise:**
Electronic ballasts are virtually noise free. Magnetic fields generated during the ignition cycle can cause some background noise but only for a few milliseconds.

**Operation on DC voltage**
Our ballasts are construed to operate DC voltage and pulsed DC voltage. To operate ballasts with pulsed DC voltage the polarity is absolute mandatory.

**Insulation and electric strength testing of luminaires**
Electronic devices can be damaged by high voltage. This has to be considered during the routine testing of the luminaires in production.

According to IEC 60598-1 Annex Q (informative only!) or ENEC 303-Annex A, each luminaire should be submitted to an insulation test with 500 V DC for 1 second. This test voltage should be connected between the interconnected phase and neutral terminals and the earth terminal.

The insulation resistance must be at least 2 MΩ.

As an alternative, IEC 60598-1 Annex Q describes a test of the electrical strength with 1500 V AC (or 1.414 x 1500 V DC). To avoid damage to the electronic devices this test must not be conducted.

**Additional information**

- Additional technical information at [www.tridonic.com](http://www.tridonic.com) → Technical Data

- Guarantee conditions at [www.tridonic.com](http://www.tridonic.com) → Services

Life-time declarations are informative and represent no warranty claim.
No warranty if device was opened.