Product description
• Processor-controlled ballast with xtec inside
• Highest possible energy class CELMA EEI = A1 BAT III
• Noise-free precise control via DALI or DSI signal, switchDIM or corridorFUNCTION
• Multi-lamp management
• OEM-specific reserved memory areas
• Extended DALI commands
• 5-year guarantee

Interfaces
• DALI
• DSI
• switchDIM (with memory function + selectable dimming rate)
• corridorFUNCTION (individually programmable)

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)
• Fade rates between 50 ms and 90 s (min. – max.)
• Automatically triggered emergency lighting value in DC mode, can be set between 1 and 100 %
• For emergency lighting systems as per EN 50172
• Automatic start after replacement of defective lamps
• Automatic shutdown if the lamp is faulty
• Dimming possible in DC mode
• Backwards compatible

Standards, page 3
Wiring diagrams and installation examples, page 6
## 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(^{\circ})</th>
<th>Circuit power(^{\circ})</th>
<th>EEI Current at 50 Hz 230 V</th>
<th>λ at 50 Hz 230 V</th>
<th>tc point max.</th>
<th>Ambient temperature ta(^{\circ})</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>For luminaires with 3 lamps</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 x 14 W</td>
<td>T5</td>
<td>PCA 3x14/24 T5 EXCEL one4all lp xtec</td>
<td>22176209</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>
</tr>
<tr>
<td>3 x 24 W</td>
<td>T5</td>
<td>PCA 3x14/24 T5 EXCEL one4all lp xtec</td>
<td>22176209</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>
</tr>
<tr>
<td><strong>For luminaires with 4 lamps</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 x 14 W</td>
<td>T5</td>
<td>PCA 4x14/24 T5 EXCEL one4all lp xtec</td>
<td>22176210</td>
<td>360 x 40 x 21 mm</td>
<td>350 mm</td>
<td>56 W</td>
<td>60.5 W</td>
<td>A1 BAT</td>
<td>0.27 A</td>
<td>0.97</td>
<td>75 °C</td>
</tr>
<tr>
<td>4 x 24 W</td>
<td>T5</td>
<td>PCA 4x14/24 T5 EXCEL one4all lp xtec</td>
<td>22176210</td>
<td>360 x 40 x 21 mm</td>
<td>350 mm</td>
<td>96 W</td>
<td>97.5 W</td>
<td>A1 BAT</td>
<td>0.43 A</td>
<td>0.97</td>
<td>75 °C</td>
</tr>
</tbody>
</table>

\(^{\circ}\) According to the EU directives on ecodesign requirements (EC) No. 245/2009 and (EC) No. 347/2010.

\(\alpha\) Valid at 100 % dimming level.

\(\alpha +10 ^{\circ}C\) to ta max: unrestricted dimming. -25 °C to +10 °C: unrestricted dimming from 100 % to 30 %.

-25 °C to +10 °C, dimming below 30 %: malfunction possible but no damage to ECG. This applies to AC and DC operation.
Standards
- EN 55015
- EN 60929
- EN 61000-3-2
- EN 61347-2-3
- EN 61547

Suitable for emergency installations according to
- EN 50172
- CISPR 15
- CISPR 22
- IEC 60929
- IEC 61000-3-2
- IEC 61347-2-3
- IEC 61547
- IEC 62386 (according to DALI standard V1)

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.

Light output level in DC operation
- Programmable from 1 % to 100 %
- Programming by extended DSI or DALI signal (16 bit).
- Default value is 15 %
- In DC operation dimming mode can be activated.
- EBLF = 0.5 x adjusted DC dimming level
  (e.g. 0.5 x 0.7).

Emergency units
The “PCA T5 EXCEL lp xtec” 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 ta 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.

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Wattage</th>
<th>THD</th>
<th>3</th>
<th>5</th>
<th>7</th>
<th>9</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA 3x14/24 T5 EXCEL one4all lp xtec</td>
<td>3x14 W</td>
<td>6.40</td>
<td>6.65</td>
<td>1.97</td>
<td>2.17</td>
<td>2.09</td>
<td>1.36</td>
</tr>
<tr>
<td>PCA 3x14/24 T5 EXCEL one4all lp xtec</td>
<td>3x24 W</td>
<td>7.98</td>
<td>6.23</td>
<td>1.76</td>
<td>1.75</td>
<td>2.31</td>
<td>1.04</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 EXCEL one4all lp xtec</td>
<td>4x14 W</td>
<td>6.67</td>
<td>6.97</td>
<td>2.85</td>
<td>1.86</td>
<td>1.49</td>
<td>1.19</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 EXCEL one4all lp xtec</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>
<td>1.08</td>
</tr>
</tbody>
</table>

The ballast lumen factor for AC operation (AC-BLF) does not alter from \( U_n = 198 \) V ac to \( U_n = 254 \) 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 V dc).

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 ) V ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA 3x14/24 T5 EXCEL one4all lp xtec</td>
<td>3x14 W</td>
<td>0.99</td>
</tr>
<tr>
<td>PCA 3x14/24 T5 EXCEL one4all lp xtec</td>
<td>3x24 W</td>
<td>0.99</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 EXCEL one4all lp xtec</td>
<td>4x14 W</td>
<td>0.99</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 EXCEL one4all lp xtec</td>
<td>4x24 W</td>
<td>0.99</td>
</tr>
</tbody>
</table>

Lamp type recognition
Each of the lamps for which the control gear is designed
will be operated correctly according to 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 ( U_n = 220 ) Vdc</th>
<th>Mains current at ( U_n = 240 ) Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA 3x14/24 T5 EXCEL one4all lp xtec</td>
<td>3x14 W</td>
<td>0.17 A</td>
<td>0.16 A</td>
</tr>
<tr>
<td>PCA 3x14/24 T5 EXCEL one4all lp xtec</td>
<td>3x24 W</td>
<td>0.28 A</td>
<td>0.26 A</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 EXCEL one4all lp xtec</td>
<td>4x14 W</td>
<td>0.22 A</td>
<td>0.21 A</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 EXCEL one4all lp xtec</td>
<td>4x24 W</td>
<td>0.37 A</td>
<td>0.34 A</td>
</tr>
</tbody>
</table>

The ballast lumen factor for AC operation (AC-BLF) does not alter from \( U_n = 198 \) V ac to \( U_n = 254 \) 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 V dc).
**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
  - DALI signal: 16 bit Manchester Code

Maximum speed 1% to 100% in 1.4 s

Adjustable between 50 ms and 90 s

Programmable parameter:
- Minimum dimming level
- Maximum dimming level

**Defaults**
- 3-lamp: minimum = 5%, maximum = 100%
- 4-lamp: minimum = 1%, maximum = 100%

**Control input (DA/D1, DA/D2)**

Digital DALI or a push-to-make switch (switchDIM) can be wired on the same terminals (DA and DA).

**Digital signal DALI/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 lp1 light sensor. The sensor registers actual ambient light and maintains the individually controlled light level temporarily.

Automatic circuit breakers

Backwards compatibility:

With a simple key combination a PCA T5 EXCEL lp xtec can be reset as a normal PCA EXCEL from the previous generation. Synchronization simply has to take place three times within one minute (3 x 10 s). To activate the “xtexc” settings again, synchronization has to take 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>
<th>Inrush current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation Ø</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCA 3x14/24 T5 EXCEL one4all 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>18</td>
<td>36 A 215 µs</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 EXCEL one4all 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>
<td>38 A 205 µs</td>
</tr>
</tbody>
</table>

Continuous operation: to calculate the protective safety switch see main current, page 1
**corridorFUNCTION**  
Activation: To activate the corridorFUNCTION a voltage of 230 V simply has to be applied for five minutes at D1, D2. The unit will then switch automatically to the corridorFUNCTION.  
Deactivation: If the corridorFUNCTION is wrongly activated in a switchDIM system (for example a switch is used instead of pushbutton), there is the option of installing a pushbutton and deactivating the corridorFUNCTION mode by five short pushes of the button within three seconds.  
The corridorFUNCTION V2 offers the added benefit of a second and third preprogrammed profile. Application and functionality of profiles see user manual corridorFUNCTION.

**Intelligent Temperature Guard**  
The intelligent temperature guard protects the PCA T5 EXCEL lp x tec from 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.

**plugADDRESSING – simple handling, commissioning and wiring**  
The new plug&play solution simplifies handling. By attaching different colored marked plugs to the SMART-Interface, group addresses are assigned to the PCA T5 EXCEL one4all lp x tec. This supersedes a single addressing and the devices can be put into operation without any additional programming. Another significant advantage of this concept is in case of exchange and no limits to 64 DALI addresses. Ideal for RGB applications and cost-effective system solutions with simple controllers. Simple – Quick – Plug&Play!

**Operating voltage**

<table>
<thead>
<tr>
<th>Type</th>
<th>Wattage</th>
<th>Uout</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA 3x14/24 T5 EXCEL one4all lp x tec</td>
<td>3x14 W</td>
<td>430 V</td>
</tr>
<tr>
<td>PCA 3x14/24 T5 EXCEL one4all lp x tec</td>
<td>3x24 W</td>
<td>430 V</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 EXCEL one4all lp x tec</td>
<td>4x14 W</td>
<td>430 V</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 EXCEL one4all lp x tec</td>
<td>4x24 W</td>
<td>430 V</td>
</tr>
</tbody>
</table>

**Wiring advice**
The lead length is dependent on the capacitance of the cable.

<table>
<thead>
<tr>
<th>Ballast</th>
<th>Terminal</th>
<th>Maximum capacitance allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Cold</td>
<td>Middle</td>
</tr>
<tr>
<td>PCA 3x14/24 T5 EXCEL one4all lp x tec</td>
<td>7, 8</td>
<td>9, 10, 14, 15, 16, 17</td>
</tr>
<tr>
<td>PCA 4x14/24 T5 EXCEL one4all lp x tec</td>
<td>14, 15, 16, 17</td>
<td>7, 8, 9, 10, 12, 13, 18, 19</td>
</tr>
</tbody>
</table>

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.).
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.

**Programming**
With appropriate software and a USB interface different functions can be activated and various parameters can be configured in the new PCA T5 EXCEL one4all lp xtec. All that is needed is a DALI-USB and the software.

- **configTOOL**
  - Full version for programming all the functions and parameters.
- **pcaCONFIGURATOR**
  - For programming the corridorFUNCTION, device configuration (fade time, ePowerOnLevel, etc.) DC level, compatibility settings, and startup date and for resetting.
- **corridorFUNCTION CONFIGURATOR**
  - For activating and deactivating the corridorFUNCTION and for project-specific programming of the PCA T5 EXCEL one4all lp xtec units.

**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 → Technical Data

Guarantee conditions at www.tridonic.com → Services

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