Electronic ballasts for dimming to 1%
Linear lamps T5, 16 mm high efficiency

PC A T5 ECO 14–35 W 220–240 V 50/60/0 Hz, dimmable

-data sheet 09/11-384-3 We reserve the right to make technical changes without prior notice.

<table>
<thead>
<tr>
<th>Lamp</th>
<th>Ballast</th>
</tr>
</thead>
<tbody>
<tr>
<td>watt-age W</td>
<td>length</td>
</tr>
<tr>
<td>14</td>
<td>549</td>
</tr>
<tr>
<td>2x14</td>
<td>549</td>
</tr>
<tr>
<td>21</td>
<td>849</td>
</tr>
<tr>
<td>2x21</td>
<td>849</td>
</tr>
<tr>
<td>28</td>
<td>1449</td>
</tr>
<tr>
<td>2x28</td>
<td>1449</td>
</tr>
<tr>
<td>35</td>
<td>1449</td>
</tr>
<tr>
<td>2x35</td>
<td>1449</td>
</tr>
</tbody>
</table>

- dimming range from 1–100%
- lamp start at 1% possible
- lamp friendly warm start within 1.5 s with AC and 0.6 s with DC
- switch via the mains or with digital control signal
- dimming which is comfortable to the eye
- disturbance free precise control with a digital signal (DSI) or switch DIM
- integrated SMART interface
- fully electronic lamp management and digital communication with ASIC and µC
- constant light output independent of fluctuating supply voltage
- DC operation in emergency lighting installations to VDE 0108
- safe shutdown of defective lamps
- safe shutdown of lamps at end of life (rectifying effect)
- automatic restart after lamp replacement
- operating frequency ~40–100 kHz

Packaging:
- box of 25
- 28 boxes/pallet
- 700 pieces/pallet

Certified:
- EN 55015
- EN 55022
- EN 60929
- EN 61000-3-2
- EN 61347-2-3
- EN 61547
- in accordance with VDE 0108

PHASED OUT

Data sheet 09/11-384-3 We reserve the right to make technical changes without prior notice.
Lamp starting characteristics:
- Warm start:
  - Starting time 1.5 s with AC
  - Starting time 0.6 s with DC
- AC operation:
  - 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 %)

AC operation:
- PCA 1/14 T5 ECO 220–240 V 50/60 Hz: 0.07 A
- PCA 1/21 T5 ECO 220–240 V 50/60 Hz: 0.10 A
- PCA 1/28 T5 ECO 220–240 V 50/60 Hz: 0.11 A
- PCA 1/35 T5 ECO 220–240 V 50/60 Hz: 0.14 A
- PCA 2/14 T5 ECO 220–240 V 50/60 Hz: 0.12 A
- PCA 2/21 T5 ECO 220–240 V 50/60 Hz: 0.18 A
- PCA 2/28 T5 ECO 220–240 V 50/60 Hz: 0.21 A
- PCA 2/35 T5 ECO 220–240 V 50/60 Hz: 0.27 A

Light output level in DC operation:
- Default value is 70 %
- In DC operation dimming is not possible

Mains currents in DC operation:
<table>
<thead>
<tr>
<th>Ballast Type</th>
<th>Mains current at Un = 220 VDC</th>
<th>Mains current at Un = 240 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA 1/14 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.07 A</td>
<td>0.06 A</td>
</tr>
<tr>
<td>PCA 1/21 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.10 A</td>
<td>0.09 A</td>
</tr>
<tr>
<td>PCA 1/28 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.11 A</td>
<td>0.10 A</td>
</tr>
<tr>
<td>PCA 1/35 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.14 A</td>
<td>0.13 A</td>
</tr>
<tr>
<td>PCA 2/14 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.12 A</td>
<td>0.11 A</td>
</tr>
<tr>
<td>PCA 2/21 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.18 A</td>
<td>0.16 A</td>
</tr>
<tr>
<td>PCA 2/28 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.21 A</td>
<td>0.20 A</td>
</tr>
<tr>
<td>PCA 2/35 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.27 A</td>
<td>0.25 A</td>
</tr>
</tbody>
</table>

Ballast lumen factor AC operation (AC-BLF) EN 60929 8.1:
- PCA 1/14 T5 ECO 220–240 V 50/60 Hz: 1.05
- PCA 1/21 T5 ECO 220–240 V 50/60 Hz: 1.00
- PCA 1/28 T5 ECO 220–240 V 50/60 Hz: 0.99
- PCA 1/35 T5 ECO 220–240 V 50/60 Hz: 1.00
- PCA 2/14 T5 ECO 220–240 V 50/60 Hz: 1.05
- PCA 2/21 T5 ECO 220–240 V 50/60 Hz: 0.98
- PCA 2/28 T5 ECO 220–240 V 50/60 Hz: 0.98
- PCA 2/35 T5 ECO 220–240 V 50/60 Hz: 0.98

Harmonic distortion in the mains supply (at 220 V/50 Hz):
<table>
<thead>
<tr>
<th>Ballast Type</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 1/14 T5 ECO 220–240 V 50/60 Hz</td>
<td>8.0</td>
<td>8.6</td>
<td>2.3</td>
<td>1.6</td>
<td>1.3</td>
<td>1.0</td>
</tr>
<tr>
<td>PCA 1/21 T5 ECO 220–240 V 50/60 Hz</td>
<td>8.0</td>
<td>7.8</td>
<td>1.3</td>
<td>0.9</td>
<td>0.6</td>
<td>0.5</td>
</tr>
<tr>
<td>PCA 1/28 T5 ECO 220–240 V 50/60 Hz</td>
<td>12.4</td>
<td>11.6</td>
<td>3.7</td>
<td>2.1</td>
<td>1.5</td>
<td>1.1</td>
</tr>
<tr>
<td>PCA 1/35 T5 ECO 220–240 V 50/60 Hz</td>
<td>8.1</td>
<td>7.8</td>
<td>1.8</td>
<td>1.2</td>
<td>0.8</td>
<td>0.7</td>
</tr>
<tr>
<td>PCA 2/14 T5 ECO 220–240 V 50/60 Hz</td>
<td>10.6</td>
<td>10.3</td>
<td>2.2</td>
<td>1.3</td>
<td>1.0</td>
<td>0.8</td>
</tr>
<tr>
<td>PCA 2/21 T5 ECO 220–240 V 50/60 Hz</td>
<td>9.7</td>
<td>9.3</td>
<td>2.3</td>
<td>1.3</td>
<td>1.0</td>
<td>0.8</td>
</tr>
<tr>
<td>PCA 2/28 T5 ECO 220–240 V 50/60 Hz</td>
<td>6.0</td>
<td>6.0</td>
<td>0.8</td>
<td>0.4</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>PCA 2/35 T5 ECO 220–240 V 50/60 Hz</td>
<td>5.3</td>
<td>5.0</td>
<td>1.6</td>
<td>1.1</td>
<td>0.8</td>
<td>0.6</td>
</tr>
</tbody>
</table>

The ballast lumen factor for AC operation (AC-BLF) does not alter from Un = 198 VAC to Un = 254 VAC.

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).

Temperature range:
- Dimming range 100 % to 1 % from 10 °C to maximum permissible ambient temperature ta.

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 VDE 0108 or for emergency luminaires according to EN 61347-2-3 appendix J.

Harmonic distortion in the mains supply (at 220 V/50 Hz):
- PHASED OUT
Dimming:  
Dimming range 1 % to 100 %  
Digital control with DSI signal:  
8 bit Manchester Code  
Maximum speed 1 % to 100 % in 1.4 s  
Dimming curve that is friendly to the eye.

Control input (D1, D2):  
Digital DSI signal or 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 should be installed in accordance to the requirements of low voltage installations.  
Different functions depending on each DSI module.

SMART interface:  
An additional interface for the direct connection of the SMART-LS 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 ECO automatically runs in the constant lux level mode.  
ON/OFF-Switch via mains, switchDIM or DSI signal.  
DSI signal = 0 switches off,  
DSI signal ≠ 1 switches on.  
Dimming with a DSI signal with the SMART-LS installed is not possible.  
switchDIM enables a temporary change of light level.  
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 (Not in case of reset after mains failure – start at 100 %).  
When the push to make switch is held, PCA ballasts are dimmed. After repush the PCA is dimmed in the opposite direction.  
In installations with PCAs with different dimming levels or opposite dimming directions (e.g. after a system extension), all PCAs can be synchronized to 50 % dimming level by a 10 s push.  
Use of push to make switch with indicator lamp is not permitted.  
switchDIM is a very simple tool for controlling ballasts with conventional momentary-action switches or motion sensors.

To ensure correct operation a sinusoidal mains voltage with a frequency of 50 Hz or 60 Hz is required at the control input.  
Special attention must be paid to achieving clear zero crossings. Serious mains faults may impair the operation of switchDIM.

Loading of automatic circuit breakers:

<table>
<thead>
<tr>
<th>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>Automatic circuit</td>
<td>1.5 mm²</td>
<td>1.5 mm²</td>
<td>1.5 mm²</td>
<td>2.5 mm²</td>
<td>1.5 mm²</td>
<td>1.5 mm²</td>
<td>1.5 mm²</td>
<td>2.5 mm²</td>
</tr>
<tr>
<td>PCA 1/14 T5 ECO</td>
<td>30</td>
<td>50</td>
<td>70</td>
<td>80</td>
<td>15</td>
<td>25</td>
<td>35</td>
<td>40</td>
</tr>
<tr>
<td>PCA 1/23 T5 ECO</td>
<td>30</td>
<td>50</td>
<td>70</td>
<td>76</td>
<td>15</td>
<td>25</td>
<td>35</td>
<td>38</td>
</tr>
<tr>
<td>PCA 1/35 T5 ECO</td>
<td>32</td>
<td>50</td>
<td>72</td>
<td>80</td>
<td>16</td>
<td>25</td>
<td>36</td>
<td>40</td>
</tr>
<tr>
<td>PCA 2/14 T5 ECO</td>
<td>22</td>
<td>32</td>
<td>44</td>
<td>50</td>
<td>11</td>
<td>16</td>
<td>22</td>
<td>25</td>
</tr>
<tr>
<td>PCA 2/31 T5 ECO</td>
<td>16</td>
<td>22</td>
<td>30</td>
<td>34</td>
<td>8</td>
<td>11</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>PCA 2/35 T5 ECO</td>
<td>16</td>
<td>22</td>
<td>30</td>
<td>34</td>
<td>8</td>
<td>11</td>
<td>15</td>
<td>17</td>
</tr>
</tbody>
</table>
Installation instructions:

**Wiring type and cross section:**
The wiring can be solid cable with a cross section of 0.5 to 1.5 mm² for push terminal and 0.5 mm² for cutout terminal. For the push-wire connection you have to strip the insulation (7.5–8.5 mm).

**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></td>
<td>Cold</td>
<td>Hot</td>
</tr>
<tr>
<td>PCA 1/xx T5 ECO</td>
<td>11, 12</td>
<td>9, 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>200 pF</td>
</tr>
<tr>
<td>PCA 2/xx T5 ECO</td>
<td>11, 12, 13, 14</td>
<td>9, 10, 15, 16</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.

**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.
- Ballast must be earthed.
- Mains wiring to be twisted when through wiring.
- Keep the mains leads inside the luminaire as short as possible.

**Important advise:**
- When using two or more dimmable ballasts in one luminaire with separate dimming controls, the lamp leads must be kept separate.
- All lamps must have the same length lead.

Data sheet 09/11-384-3. We reserve the right to make technical changes without prior notice.