**Electronic ballasts for dimming to 3 %**

**Linear lamps T5, 16 mm high output**

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**PCA T5 ECO 24–80 W 220–240 V 50/60/0 Hz, dimmable**

- dimming range from 3–100 %
  (10–100 % with 80 W)
- lamp start at 3 % possible (10 % with 80 W)
- 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
- lamp friendly warm start within 1.5 s with AC and 0.6 s with DC
- 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

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### Lamp and Ballast Specifications

<table>
<thead>
<tr>
<th>Wattage W</th>
<th>Length</th>
<th>Lamp</th>
<th>Ballast</th>
<th>Article number</th>
<th>Length L (mm)</th>
<th>Length D (mm)</th>
<th>Fixing centres (mm)</th>
<th>Weight (kg)</th>
<th>Circuit power (W)</th>
<th>Lamp power (A)</th>
<th>Current at 230V/50Hz (A)</th>
<th>λ at 230V/50Hz (°C)</th>
<th>Temperature range (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>549</td>
<td>PCA 1/24 T5 ECO 220–240 V 50/60/0 Hz</td>
<td>22080104</td>
<td>360</td>
<td>350</td>
<td>0.32</td>
<td>25.8</td>
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<td>0.96</td>
<td>70</td>
<td>+10 → +60</td>
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<tr>
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<td>80</td>
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<tr>
<td>39</td>
<td>849</td>
<td>PCA 1/39 T5 ECO 220–240 V 50/60/0 Hz</td>
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<td>0.32</td>
<td>44.4</td>
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<td>0.98</td>
<td>70</td>
<td>+10 → +60</td>
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<td></td>
</tr>
<tr>
<td>2x39</td>
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<td>0.99</td>
<td>75</td>
<td>+10 → +50</td>
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<tr>
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<td>1149</td>
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<td>350</td>
<td>0.32</td>
<td>60</td>
<td>0.23</td>
<td>0.98</td>
<td>80</td>
<td>+10 → +60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2x54</td>
<td>1149</td>
<td>PCA 2/54 T5 ECO 220–240 V 50/60/0 Hz</td>
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<td>360</td>
<td>350</td>
<td>0.36</td>
<td>116</td>
<td>0.5</td>
<td>0.99</td>
<td>75</td>
<td>+10 → +50</td>
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<tr>
<td>80</td>
<td>1449</td>
<td>PCA 1/80 T5 ECO 220–240 V 50/60/0 Hz</td>
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<td>0.36</td>
<td>0.98</td>
<td>75</td>
<td>+10 → +50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Dimming to 3 % (10 % with 80 W) between 10 °C to ta max.
- Valid at 100 % light output

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**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

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Data sheet 09/11-386-3 We reserve the right to make technical changes without prior notice.
Electronic lamps for dimming to 3 %
Linear lamps T5, 16 mm high output

Lamp starting characteristics:
Warm start
Starting time 1.5 s with AC
Starting time 0.6 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 VDE 0108 or for emergency luminaires according to EN 61347-2-3 appendix J.

Temperature range:
Dimming range 100 % to 3 % (100 % to 10 % with 80 W) from 10 °C to maximum permissible ambient temperature ta.

Mains currents in DC operation:

<table>
<thead>
<tr>
<th>Ballast</th>
<th>Mains current at Un = 220 VDC</th>
<th>Mains current at Un = 240 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA 1/24 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.10 A</td>
<td>0.10 A</td>
</tr>
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<td>PCA 1/39 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.16 A</td>
<td>0.15 A</td>
</tr>
<tr>
<td>PCA 1/54 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.24 A</td>
<td>0.21 A</td>
</tr>
<tr>
<td>PCA 1/80 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.34 A</td>
<td>0.31 A</td>
</tr>
<tr>
<td>PCA 2/24 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.20 A</td>
<td>0.18 A</td>
</tr>
<tr>
<td>PCA 2/39 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.33 A</td>
<td>0.30 A</td>
</tr>
<tr>
<td>PCA 2/54 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.42 A</td>
<td>0.36 A</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Ballast</th>
<th>AC-BLF at Un = 230 VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA 1/24 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.96</td>
</tr>
<tr>
<td>PCA 1/39 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.95</td>
</tr>
<tr>
<td>PCA 1/54 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.97</td>
</tr>
<tr>
<td>PCA 1/80 T5 ECO 220–240 V 50/60 Hz</td>
<td>1.12</td>
</tr>
<tr>
<td>PCA 2/24 T5 ECO 220–240 V 50/60 Hz</td>
<td>1.00</td>
</tr>
<tr>
<td>PCA 2/39 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.97</td>
</tr>
<tr>
<td>PCA 2/54 T5 ECO 220–240 V 50/60 Hz</td>
<td>0.98</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).

Harmonic distortion in the mains supply (at 220 V/50 Hz):

<table>
<thead>
<tr>
<th>Ballast</th>
<th>THD</th>
<th>3</th>
<th>5</th>
<th>7</th>
<th>9</th>
<th>11</th>
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</thead>
<tbody>
<tr>
<td>PCA 1/24 T5 ECO 220–240 V 50/60 Hz</td>
<td>9.9</td>
<td>9.5</td>
<td>2.4</td>
<td>1.5</td>
<td>0.9</td>
<td>0.8</td>
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<tr>
<td>PCA 1/39 T5 ECO 220–240 V 50/60 Hz</td>
<td>8.7</td>
<td>8.2</td>
<td>2.4</td>
<td>1.5</td>
<td>1.0</td>
<td>0.8</td>
</tr>
<tr>
<td>PCA 1/54 T5 ECO 220–240 V 50/60 Hz</td>
<td>7.1</td>
<td>6.4</td>
<td>2.5</td>
<td>1.6</td>
<td>1.2</td>
<td>0.8</td>
</tr>
<tr>
<td>PCA 1/80 T5 ECO 220–240 V 50/60 Hz</td>
<td>7.2</td>
<td>6.7</td>
<td>2.3</td>
<td>1.6</td>
<td>1.2</td>
<td>0.8</td>
</tr>
<tr>
<td>PCA 2/24 T5 ECO 220–240 V 50/60 Hz</td>
<td>6.6</td>
<td>6.1</td>
<td>2.0</td>
<td>1.3</td>
<td>0.9</td>
<td>0.6</td>
</tr>
<tr>
<td>PCA 2/39 T5 ECO 220–240 V 50/60 Hz</td>
<td>7.4</td>
<td>7.0</td>
<td>2.0</td>
<td>1.2</td>
<td>0.8</td>
<td>0.7</td>
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<tr>
<td>PCA 2/54 T5 ECO 220–240 V 50/60 Hz</td>
<td>6.5</td>
<td>6.1</td>
<td>2.0</td>
<td>1.2</td>
<td>0.9</td>
<td>0.7</td>
</tr>
</tbody>
</table>
Dimming:
Dimming range 3 % to 100 %
(80 W from 10 % to 100 %)
Digital control with DSI signal:
8 bit Manchester Code
Maximum speed 3 % to 100 %
(80 W from 10 % 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
toltage up to 264 V. The control signal is not
SELV. Control cable should be installed in
accordance with 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 auto-
matically 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 mainsfailure – 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 bal-
lasts with conventional momentary-action switches
or motion sensors.
To ensure correct operation a sinusoidal mains volt-
age 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>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 size</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PCA 1/24 T5 ECO</td>
<td>22</td>
<td>32</td>
<td>44</td>
<td>50</td>
<td>11</td>
<td>16</td>
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<td>25</td>
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<tr>
<td>PCA 1/39 T5 ECO</td>
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<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 1/54 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 1/80 T5 ECO</td>
<td>22</td>
<td>32</td>
<td>46</td>
<td>52</td>
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<td>26</td>
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<tr>
<td>PCA 2/24 T5 ECO</td>
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<td>28</td>
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<tr>
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<td>7</td>
<td>11</td>
<td>14</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).

**Wire preparation:**
0.5 – 1.5 mm²

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.**

Hot leads (9, 10, 15, 16) and cold leads (11, 12, 13, 14) should be separated as much as possible.

**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>PCA 1/xx T5 ECO</td>
<td>11, 12</td>
<td>9, 10</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PCA 2/xx T5 ECO</td>
<td>11, 12, 13, 14</td>
<td>9, 10, 15, 16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.

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**Ballast Type**

<table>
<thead>
<tr>
<th>Ballast Type</th>
<th>Uout</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA 1/24 T5 ECO</td>
<td>220–240 V/ac 50/60 Hz</td>
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<tr>
<td>PCA 1/39 T5 ECO</td>
<td>220–240 V/ac 50/60 Hz</td>
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<tr>
<td>PCA 1/54 T5 ECO</td>
<td>220–240 V/ac 50/60 Hz</td>
</tr>
<tr>
<td>PCA 1/80 T5 ECO</td>
<td>220–240 V/ac 50/60 Hz</td>
</tr>
<tr>
<td>PCA 2/24 T5 ECO</td>
<td>220–240 V/ac 50/60 Hz</td>
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<tr>
<td>PCA 2/39 T5 ECO</td>
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</tr>
<tr>
<td>PCA 2/54 T5 ECO</td>
<td>220–240 V/ac 50/60 Hz</td>
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</tbody>
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