Digital dimmable ballasts for fluorescent lamps
ECO series

PCA T5c ECO, 22 – 55 W
Compact and T5c fluorescent lamps

Product description
• Noise-free precise control via DSI signal or switchDIM
• CELMA energy class A1

Interfaces
• DSI
• switchDIM
• Integrated SMART-Interface

Functions
• Optimum filament heating in any dimmer setting
• Automatically triggered emergency lighting value in DC mode, 70 %
• For emergency lighting systems as per EN 50172
  (Exclusion article number 22176468, PCA 1/55 T5c ECO not suitable for emergency lighting units according to EN 50172 and only ÖVE, EN 61347-2-3)
• Automatic start after replacement of defective lamps

1) according to the EU directives on ecodesign requirements (EC) No. 245/2009 and (EC) No. 347/2010

Standards, page 2
Wiring diagrams and installation examples, page 4

Technical data
Power input on standby < 1 W
Protective hot restart 1.5 s for AC / 0.6 s for DC
Dimming range 3 – 100 %
Lamp start possible from 3 %
Operating frequency ~40 – 100 kHz
Life 50,000 h
Height 31 mm

Ordering data
Type Article number
For luminaires with 1 lamp
PCA 1/22 T5c ECO 22086897
PCA 1/40 T5c ECO 22185146
PCA 1/55 T5c ECO 22176468

Packaging: 10 pieces/carton, 500 pieces/pallet

Specific technical data
<table>
<thead>
<tr>
<th>Lamp</th>
<th>Lamp type</th>
<th>Typ</th>
<th>Dimensions LxWxH</th>
<th>Hole spacing D</th>
<th>Weight</th>
<th>Circuit power</th>
<th>Lamp wattage</th>
<th>Current at 230 V / 50 Hz</th>
<th>A at 50 Hz / 230 V</th>
<th>tc point</th>
<th>Ambient temperature ta</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 W</td>
<td>T5c</td>
<td>PCA 1/22 T5c ECO</td>
<td>123 x 79 x 31 mm</td>
<td>66.5 mm</td>
<td>0.22 kg</td>
<td>26.1 W</td>
<td>22 W</td>
<td>0.12 A</td>
<td>0.96</td>
<td>70 °C</td>
<td>10 ... 60 °C</td>
</tr>
<tr>
<td>40 W</td>
<td>T5c</td>
<td>PCA 1/40 T5c ECO</td>
<td>123 x 79 x 31 mm</td>
<td>66.5 mm</td>
<td>0.22 kg</td>
<td>45.5 W</td>
<td>40 W</td>
<td>0.20 A</td>
<td>0.98</td>
<td>65 °C</td>
<td>10 ... 50 °C</td>
</tr>
<tr>
<td>55 W</td>
<td>T5c</td>
<td>PCA 1/55 T5c ECO</td>
<td>123 x 79 x 31 mm</td>
<td>66.5 mm</td>
<td>0.22 kg</td>
<td>61.0 W</td>
<td>55 W</td>
<td>0.24 A</td>
<td>0.98</td>
<td>75 °C</td>
<td>10 ... 50 °C</td>
</tr>
</tbody>
</table>

1) Exclusion PCA 1/55 T5c ECO only ÖVE, EN 61347-2-3, not suitable for emergency lighting units according to EN 50172.
2) Valid at 100 % dimming level
3) 3 % dimming from +10 °C to ta max.
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Standards
EN 55015
EN 55022
EN 60929
EN 61000-3-2
EN 61347-2-3
EN 61547

according to EN 50172
Exclusion PCA 1/55 T5c ECO only ÖVE, EN 61347-2-3, not suitable for emergency lighting units according to EN 50172.

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 EN 50172 or for emergency luminaires according to EN 61347-2-3 appendix J.

Temperature range
Dimming range 100 % to 3 % from 10 °C to maximum permissible ambient temperature ta.

Mains current in DC operation

<table>
<thead>
<tr>
<th>Type</th>
<th>Mains current at $U_r = 220\text{V}_\text{DC}$</th>
<th>Mains current at $U_r = 240\text{V}_\text{DC}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA 1/22 T5c ECO</td>
<td>0.10 A</td>
<td>0.09 A</td>
</tr>
<tr>
<td>PCA 1/40 T5c ECO</td>
<td>0.17 A</td>
<td>0.16 A</td>
</tr>
<tr>
<td>PCA 1/55 T5c ECO</td>
<td>0.24 A</td>
<td>0.22 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>Type</th>
<th>AC/DC-BLF at $U_r = 198–254\text{V}, 25 ^\circ\text{C}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA 1/22 T5c ECO</td>
<td>1.00</td>
</tr>
<tr>
<td>PCA 1/40 T5c ECO</td>
<td>1.01</td>
</tr>
<tr>
<td>PCA 1/55 T5c ECO</td>
<td>0.90</td>
</tr>
</tbody>
</table>

The ballast lumen factor for AC operation (AC-BLF) does not alter from $U_r = 198\text{V}_\text{AC}$ to $U_r = 254\text{V}_\text{AC}$.

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 (198–280V)_\text{DC}.

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

<table>
<thead>
<tr>
<th>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 1/22 T5c ECO</td>
<td>5.3</td>
<td>5.2</td>
<td>1.1</td>
<td>0.7</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>PCA 1/40 T5c ECO</td>
<td>8.9</td>
<td>8.3</td>
<td>3.1</td>
<td>1.2</td>
<td>1.7</td>
<td>0.4</td>
</tr>
<tr>
<td>PCA 1/55 T5c ECO</td>
<td>8.2</td>
<td>7.4</td>
<td>3.1</td>
<td>1.3</td>
<td>1.3</td>
<td>0.9</td>
</tr>
</tbody>
</table>
Dimming
Dimming range 3% to 100%
Digital control with DSI signal:
8 bit Manchester Code
Maximum speed 3% 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 ≥ 1 switches on, DSI signal = 0 switches off. 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.

Maximum 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 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 1/22 T5c ECO</td>
<td>24</td>
<td>38</td>
<td>54</td>
<td>64</td>
<td>12</td>
<td>19</td>
<td>27</td>
<td>32</td>
</tr>
<tr>
<td>PCA 1/40 T5c ECO</td>
<td>24</td>
<td>38</td>
<td>54</td>
<td>64</td>
<td>12</td>
<td>19</td>
<td>27</td>
<td>32</td>
</tr>
<tr>
<td>PCA 1/55 T5c ECO</td>
<td>16</td>
<td>24</td>
<td>34</td>
<td>40</td>
<td>8</td>
<td>12</td>
<td>17</td>
<td>20</td>
</tr>
</tbody>
</table>

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.
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Installation instructions

Wiring type and cross section
The wiring can be in flexible cable with ferules or solid with a cross section of 0.5–1.5 mm².
For perfect function of the simple to use push-wire terminals the strip length should be 9 mm.

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

Wire preparation: 0.5 – 1.5 mm²
9 mm ± 1

Installation instructions

Output voltage

<table>
<thead>
<tr>
<th>Type</th>
<th>Wattage</th>
<th>U out</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCA 1/22 T5c ECO</td>
<td>1x22 W</td>
<td>250 V</td>
</tr>
<tr>
<td>PCA 1/40 T5c ECO</td>
<td>1x40 W</td>
<td>250 V</td>
</tr>
<tr>
<td>PCA 1/55 T5c ECO</td>
<td>1x55 W</td>
<td>250 V</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

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.

Isolation 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 isolation 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 isolation 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.