CE RoHS

TC-F
TC-L

PCA TCL ECO c, 18 – 24 W

Compact and T5c fluorescent lamps

Product description

- Noise-free precise control via DSI signal or switchDIM
- CELMA energy class A1[1)]

Interfaces

- DSI
- switchDIM
- Integrated SMART-Interface

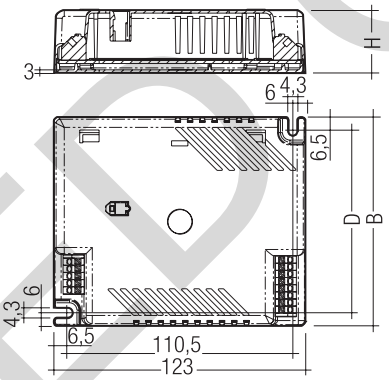
Functions

- Optimum filament heating in any dimmer setting
- Automatically triggered emergency lighting value in DC mode, 70 %
- For emergency lighting systems as per EN 50172
- 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 3

Wiring diagrams and installation examples, page 5



Technical data

Power input on standby	< 1 W
Protective hot restart	0.6 s for AC and DC / 1.5 s for AC (2 x 18 W)
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 1/18 TCL ECO c	**22085462**
PCA 1/24 TCL ECO c	**22176460**
For luminaires with 2 lamps	
PCA 2/18 TCL ECO c	**22085478**
PCA 2/24 TCL ECO c	**22176462**

Packaging: 10 pieces/carton, 500 pieces/pallet

Specific technical data

Lamp wattage	Lamp type	Type	Dimensions LxWxH	Hole spacing D	Weight	Circuit power①	Lamp wattage①	Current at 230 V / 50 Hz①	λ at 50 Hz / 230 V	tc point	Ambient temperature ta②
For luminaires with 1 lamp											
1 x 18 W	TC-F	**PCA 1/18 TCL ECO c**	123 x 79 x 31 mm	66.5 mm	0.22 kg	21 W	15 W	0.09 A	0.95	85 °C	-25 ... 60 °C
1 x 18 W	TC-L	**PCA 1/18 TCL ECO c**	123 x 79 x 31 mm	66.5 mm	0.22 kg	21 W	15 W	0.09 A	0.95	85 °C	-25 ... 60 °C
1 x 24 W	TC-F	**PCA 1/24 TCL ECO c**	123 x 79 x 31 mm	66.5 mm	0.22 kg	27 W	22 W	0.12 A	0.96	75 °C	-25 ... 60 °C
1 x 24 W	TC-L	**PCA 1/24 TCL ECO c**	123 x 79 x 31 mm	66.5 mm	0.22 kg	27 W	22 W	0.12 A	0.96	75 °C	-25 ... 60 °C
For luminaires with 2 lamps											
2 x 18 W	TC-F	**PCA 2/18 TCL ECO c**	123 x 102 x 31 mm	89.5 mm	0.25 kg	42 W	30 W	0.18 A	0.95	80 °C	-25 ... 50 °C
2 x 18 W	TC-L	**PCA 2/18 TCL ECO c**	123 x 102 x 31 mm	89.5 mm	0.25 kg	42 W	30 W	0.18 A	0.95	80 °C	-25 ... 50 °C
2 x 24 W	TC-F	**PCA 2/24 TCL ECO c**	123 x 102 x 31 mm	89.5 mm	0.25 kg	52 W	44 W	0.23 A	0.98	80 °C	-25 ... 60 °C
2 x 24 W	TC-L	**PCA 2/24 TCL ECO c**	123 x 102 x 31 mm	89.5 mm	0.25 kg	52 W	44 W	0.23 A	0.98	80 °C	-25 ... 60 °C

① Valid at 100 % dimming level

② 3 % dimming from +10 °C to ta max.

Standards
EN 55015
EN 55022
EN 60929
EN 61000-3-2
EN 61347-2-3
EN 61547
according to EN 50172

Lamp starting characteristics
Warm start
Starting time 0.6 s with AC (2 x 18 W within 1.5 s)
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 0 °C to maximum permissible ambient temperature ta.
100 % operation from -25 °C to maximum permissible ambient temperature ta.

Mains current in DC operation

Type	Wattage	Mains current at U_n = 220 V_{DC}	Mains current at U_n = 240 V_{DC}
PCA 1/18 TCL ECO c	1x18 W	0.08 A	0.07 A
PCA 1/24 TCL ECO c	1x24 W	0.10 A	0.09 A
PCA 2/18 TCL ECO c	2x18 W	0.13 A	0.12 A
PCA 2/24 TCL ECO c	2x24 W	0.19 A	0.18 A

Light output level in DC operation
Programmable from 3 % to 70 % (57 W from 10 % to 70 %)
Programming by extended DSI signal (16 bit) or DALI
Default value is 70 %
In DC operation dimming is not possible

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

Type	Wattage	AC-BLF at U = 230 V_{AC}
PCA 1/18 TCL ECO c	1x18 W	1.01
PCA 1/24 TCL ECO c	1x24 W	1.01
PCA 2/18 TCL ECO c	2x18 W	1.01
PCA 2/24 TCL ECO c	2x24 W	1.01

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}).

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

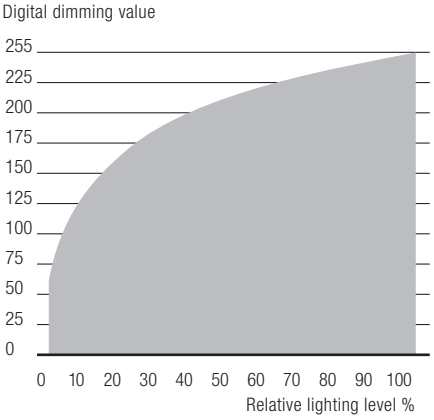
Type	Wattage	THD	3	5	7	9	11
PCA 1/18 TCL ECO c	1x18 W	9.2	8.5	3.1	1.5	1.8	0.7
PCA 1/24 TCL ECO c	1x24 W	7.7	7.5	1.5	1.1	0.8	0.6
PCA 2/18 TCL ECO c	2x18 W	9.3	8.9	2.0	1.8	0.7	0.9
PCA 2/24 TCL ECO c	2x24 W	4.4	4.4	0.5	0.2	0.0	0.0

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).

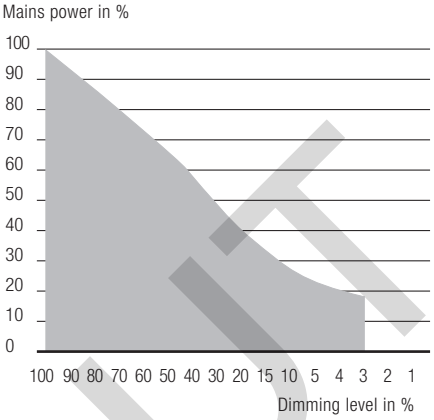
Digital signal DSI
The control input is non-polar and protected against accidental connection with a mains voltage up to 264 V. The control signal is not SELV. Control cable should be installed in accordance to the requirements of low voltage installations.
Different functions depending on each DSI module.

Dimming characteristics PCA ECO



Dimming characteristics
as seen by the human eye

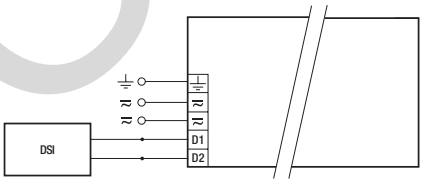
Energy Savings PCA ECO



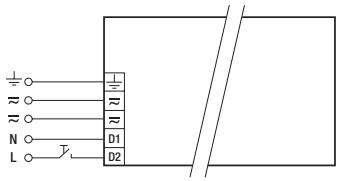
SMART interface
An additional interface for the direct connection of the SMART-LS light sensor. The sensor registers actual ambient light and maintains the individually defined lux level.
After every mains reset the SMART interface automatically checks for an installed sensor. With the sensor installed 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 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 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.



DSI PCA TCL ECO c



switchDIM PCA TCL ECO c

Loading of automatic circuit breakers

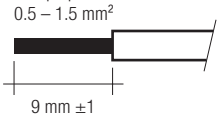
Automatic circuit breaker type	C10	C13	C16	C20	B10	B13	B16	B20
Installation Ø	1.5 mm²	1.5 mm²	1.5 mm²	2.5 mm²	1.5 mm²	1.5 mm²	1.5 mm²	2.5 mm²
PCA 1/18 TCL ECO c	20	24	40	46	10	12	20	23
PCA 1/24 TCL ECO c	24	38	54	64	12	19	27	32
PCA 2/18 TCL ECO c	10	12	16	20	5	6	8	10
PCA 2/24 TCL ECO c	16	20	24	30	8	10	12	15

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.

U_{out} = 250 V

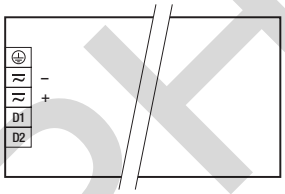
wire preparation:
0.5 – 1.5 mm²



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.

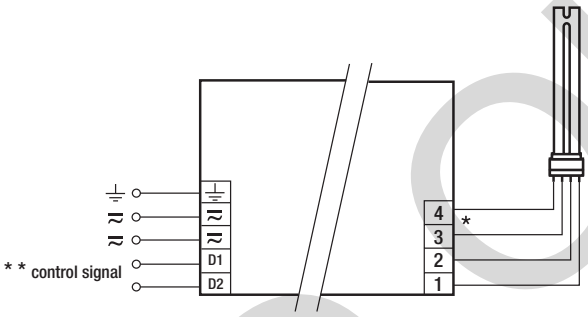


Wiring advice:
The lead length is dependent on the capacitance of the cable.

Ballast	Terminal		Maximum capacitance allowed	
Type	Cold	Hot	Cold	Hot
PCA 1/xx TCL ECO c	1, 2	3, 4	200 pF	100 pF
PCA 2/xx TCL ECO c	3, 4, 5, 6	1, 2, 7, 8	200 pF	100 pF

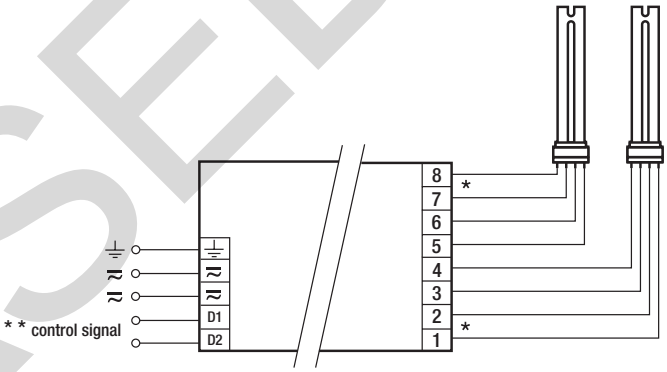
With standard solid wire 0.5/0.75 mm² the capacitance of the lead is 30–80 pF/m. This value is influenced by the way the wiring is made.

Lamp connection should be made with symmetrical wiring. Hot leads and cold leads should be separated as much as possible.



* leads 3, 4: keep wires short, max. 1.0 m
leads 1, 2: max. 2.0 m; ballast must be earthed
* * digital signal (DSI) or switchDIM

PCA TCL ECO c 18–24 W



* leads 1, 2, 7, 8: keep wires short, max. 1.0 m
leads 3, 4, 5, 6: max. 2.0 m; ballast must be earthed
* * digital signal (DSI) or switchDIM

PCA TCL ECO c 2x18–2x24 W

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.