



TC-DEL
TC-SEL
TC-TEL

PCA TCD ECO, 11 – 57 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

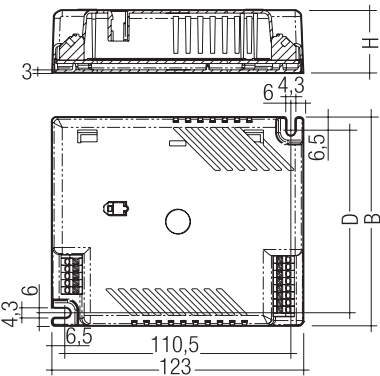
Functions

- Optimum filament heating in any dimmer setting
- Automatically triggered emergency lighting value in DC mode, 70 %
- For emergency lighting systems as per EN 50172
- Automatic start after replacement of defective lamps



Standards, page 3

Wiring diagrams and installation examples, page 5



Technical data

Power input on standby	< 1 W
Protective hot restart	0.6 s
Dimming range	3 – 100 % (10 – 100 % at 57 W)
Lamp start possible from	3 % (10 % at 57 W)
Operating frequency	~40 – 100 kHz
Life	50,000 h
Height	31 mm

Ordering data

Type	Article number
For luminaires with 1 lamp	
PCA 1/11/13 TCD ECO	22176456
PCA 1/18 TCD ECO	22084859
PCA 1/26 TCD ECO	22084765
PCA 1/32 TCT ECO	22088644
PCA 1/42 TCT ECO	22176464
PCA 1/57 TCT ECO	22086957
For luminaires with 2 lamps	
PCA 2/11/13 TCD ECO	22176458
PCA 2/18 TCD ECO	22084843
PCA 2/26 TCD ECO	22084752
PCA 2/32 TCT ECO	22088650
PCA 2/42 TCT ECO	22176466

Packaging: 10 pieces/carton, 500 pieces/pallet

Specific technical data

Lamp wattage	Lamp type	Type	Dimensions LxWxH	Hole spacing D	Weight	Circuit power ^①	Lamp wattage ^①	Current at 230 V / 50 Hz ^①	λ at 50 Hz / 230 V	tc point	Ambient temperature ta ^②
For luminaires with 1 lamp											
1 x 13 W	TC-DEL	PCA 1/11/13 TCD ECO	123 x 79 x 31 mm	66.5 mm	0.22 kg	16.5 W	12.7 W	0.076 A	0.95	70 °C	-15 ... 60 °C
1 x 11 W	TC-SEL	PCA 1/11/13 TCD ECO	123 x 79 x 31 mm	66.5 mm	0.22 kg	15.5 W	11.4 W	0.072 A	0.95	70 °C	-15 ... 60 °C
1 x 18 W	TC-DEL	PCA 1/18 TCD ECO	123 x 79 x 31 mm	66.5 mm	0.22 kg	20.5 W	16.0 W	0.100 A	0.96	75 °C	-25 ... 60 °C
1 x 18 W	TC-TEL	PCA 1/18 TCD ECO	123 x 79 x 31 mm	66.5 mm	0.22 kg	20.5 W	16.0 W	0.100 A	0.96	75 °C	-25 ... 60 °C
1 x 26 W	TC-DEL	PCA 1/26 TCD ECO	123 x 79 x 31 mm	66.5 mm	0.22 kg	27.5 W	23.0 W	0.130 A	0.97	85 °C	-25 ... 60 °C
1 x 26 W	TC-TEL	PCA 1/26 TCD ECO	123 x 79 x 31 mm	66.5 mm	0.22 kg	27.5 W	23.0 W	0.130 A	0.97	85 °C	-25 ... 60 °C
1 x 32 W	TC-TEL	PCA 1/32 TCT ECO	123 x 79 x 31 mm	66.5 mm	0.22 kg	36.2 W	30.0 W	0.160 A	0.95	80 °C	-25 ... 60 °C
1 x 42 W	TC-TEL	PCA 1/42 TCT ECO	123 x 79 x 31 mm	66.5 mm	0.22 kg	47.0 W	41.0 W	0.210 A	0.97	70 °C	-25 ... 60 °C
1 x 57 W	TC-TEL	PCA 1/57 TCT ECO	123 x 79 x 31 mm	66.5 mm	0.22 kg	66.0 W	57.0 W	0.290 A	0.99	85 °C	-25 ... 50 °C
For luminaires with 2 lamps											
2 x 13 W	TC-DEL	PCA 2/11/13 TCD ECO	123 x 102 x 31 mm	89.5 mm	0.25 kg	31.0 W	24.0 W	0.140 A	0.96	70 °C	-15 ... 60 °C
2 x 11 W	TC-SEL	PCA 2/11/13 TCD ECO	123 x 102 x 31 mm	89.5 mm	0.25 kg	29.5 W	22.5 W	0.132 A	0.96	70 °C	-15 ... 60 °C
2 x 18 W	TC-DEL	PCA 2/18 TCD ECO	123 x 102 x 31 mm	89.5 mm	0.25 kg	40.0 W	32.0 W	0.180 A	0.98	85 °C	-25 ... 60 °C
2 x 18 W	TC-TEL	PCA 2/18 TCD ECO	123 x 102 x 31 mm	89.5 mm	0.25 kg	40.0 W	32.0 W	0.180 A	0.98	85 °C	-25 ... 60 °C
2 x 26 W	TC-DEL	PCA 2/26 TCD ECO	123 x 102 x 31 mm	89.5 mm	0.25 kg	55.0 W	45.0 W	0.250 A	0.99	80 °C	-25 ... 50 °C
2 x 26 W	TC-TEL	PCA 2/26 TCD ECO	123 x 102 x 31 mm	89.5 mm	0.25 kg	55.0 W	45.0 W	0.250 A	0.99	80 °C	-25 ... 50 °C
2 x 32 W	TC-TEL	PCA 2/32 TCT ECO	123 x 102 x 31 mm	89.5 mm	0.25 kg	70.7 W	61.0 W	0.310 A	0.97	80 °C	-25 ... 50 °C
2 x 42 W	TC-TEL	PCA 2/42 TCT ECO	123 x 102 x 31 mm	89.5 mm	0.25 kg	91.0 W	81.0 W	0.400 A	0.98	70 °C	-25 ... 50 °C

① Valid at 100 % dimming level

② 3 % (10 % at 57 W) dimming from 0 °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
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 ($\pm 10\%$)
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 t_a .
(57 W from 100 % to 10 %)
100 % operation from -25 °C to maximum
permissible ambient temperature t_a .

Mains current in DC operation

Type	Wattage	Mains current at $U_n = 220 V_{DC}$	Mains current at $U_n = 240 V_{DC}$
PCA 1/11 TCD ECO	1x11 W	0.72 A	0.67 A
PCA 1/13 TCD ECO	1x13 W	0.73 A	0.66 A
PCA 1/18 TCD ECO	1x18 W	0.80 A	0.74 A
PCA 1/26 TCD ECO	1x26 W	1.16 A	1.07 A
PCA 1/32 TCT ECO	1x32 W	1.35 A	1.24 A
PCA 1/42 TCT ECO	1x42 W	1.80 A	1.66 A
PCA 1/57 TCT ECO	1x57 W	2.54 A	2.33 A
PCA 2/11 TCD ECO	2x11 W	1.18 A	1.10 A
PCA 2/13 TCD ECO	2x13 W	1.08 A	1.00 A
PCA 2/18 TCD ECO	2x18 W	1.46 A	1.34 A
PCA 2/26 TCD ECO	2x26 W	2.14 A	1.96 A
PCA 2/32 TCT ECO	2x32 W	2.40 A	2.11 A
PCA 2/42 TCT ECO	2x42 W	3.53 A	3.26 A

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 Pkt. 8.1

Type	Wattage	AC-BLF at $U = 230 V_{AC}$
PCA 1/11 TCD ECO	1x11 W	1.03
PCA 1/13 TCD ECO	1x13 W	0.99
PCA 1/18 TCD ECO	1x18 W	1.02
PCA 1/26 TCD ECO	1x26 W	0.97
PCA 1/32 TCT ECO	1x32 W	1.05
PCA 1/42 TCT ECO	1x42 W	1.02
PCA 1/57 TCT ECO	1x57 W	1.01
PCA 2/11 TCD ECO	2x11 W	1.03
PCA 2/13 TCD ECO	2x13 W	1.01
PCA 2/18 TCD ECO	2x18 W	0.99
PCA 2/26 TCD ECO	2x26 W	0.98
PCA 2/32 TCT ECO	2x32 W	1.01
PCA 2/42 TCT ECO	2x42 W	1.03

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 1/11 TCD ECO	1x11 W	17.1	16.0	5.0	3.2	1.9	1.2
PCA 1/13 TCD ECO	1x13 W	3.5	2.5	4.3	2.5	2.0	1.1
PCA 1/18 TCD ECO	1x18 W	8.1	7.5	2.8	1.2	1.8	1.0
PCA 1/26 TCD ECO	1x26 W	9.5	8.9	2.7	1.9	1.3	1.1
PCA 1/32 TCT ECO	1x32 W	10.2	9.3	3.6	2.4	1.7	1.1
PCA 1/42 TCT ECO	1x42 W	6.6	5.9	1.9	1.3	1.0	0.8
PCA 1/57 TCT ECO	1x57 W	11.6	9.9	5.6	1.8	3.9	1.5
PCA 2/11 TCD ECO	2x11 W	12.3	11.7	3.3	2.3	1.6	1.2
PCA 2/13 TCD ECO	2x13 W	11.3	10.6	3.1	2.1	1.5	1.2
PCA 2/18 TCD ECO	2x18 W	10.7	9.8	3.7	2.4	1.7	1.1
PCA 2/26 TCD ECO	2x26 W	9.1	8.5	2.7	1.8	1.3	0.9
PCA 2/32 TCT ECO	2x32 W	11.7	10.8	3.8	2.4	1.5	0.9
PCA 2/42 TCT ECO	2x42 W	8.4	7.7	2.9	1.9	1.3	0.7

Dimming

Dimming range 3 % to 100 %
(57 W from 10 % to 100 %)
Digital control with DSI signal:
8 bit Manchester Code
Maximum speed 3 % to 100 %
(57 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).

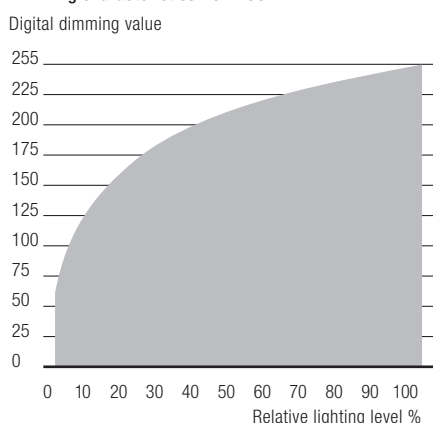
Digital signal DSI

The control input is non-polar and protected against accidental connection with a mains 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

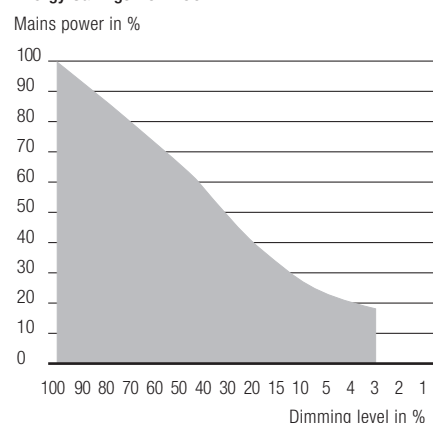
An additional interface for the direct connection of the SMART-LS light sensor. The sensor registers actual ambient light and maintains the individually defined lux level.
After every mains reset the SMART interface automatically checks for an installed sensor. With the sensor installed the PCA ECO automatically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

Dimming characteristics PCA ECO



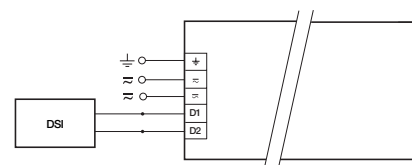
Dimming characteristics
as seen by the human eye

Energy Savings PCA ECO

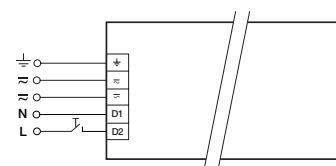


switchDIM

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.



DSI PCA TCx ECO



switchDIM PCA TCx ECO

Loading of automatic circuit breakers

Automatic circuit breaker type	C10	C13	C16	C20	B10	B13	B16	B20
Installation Ø	1.5 mm ²	1.5 mm ²	1.5 mm ²	2.5 mm ²	1.5 mm ²	1.5 mm ²	1.5 mm ²	2.5 mm ²
PCA 1/11 TCD ECO	40	60	80	80	20	30	40	40
PCA 1/13 TCD ECO	40	60	80	80	20	30	40	40
PCA 1/18 TCD ECO	30	50	70	76	15	25	35	38
PCA 1/26 TCD ECO	30	50	70	76	15	25	35	38
PCA 1/32 TCT ECO	26	38	50	58	13	19	25	29
PCA 1/42 TCT ECO	26	38	50	58	13	19	25	29
PCA 1/57 TCT ECO	12	16	22	26	6	8	11	13
PCA 2/11 TCD ECO	28	40	60	64	14	20	30	32
PCA 2/13 TCD ECO	28	40	60	64	14	20	30	32
PCA 2/18 TCD ECO	22	32	46	68	11	16	23	34
PCA 2/26 TCD ECO	22	32	46	56	11	16	23	28
PCA 2/32 TCT ECO	10	18	24	28	5	9	12	14
PCA 2/42 TCT ECO	12	18	24	28	6	9	12	14

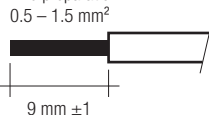
Installation instructions

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.

$U_{out} = 250\text{ V}$ ($U_{out} = 400\text{ V}$ for 57 W)

wire preparation:



RFI

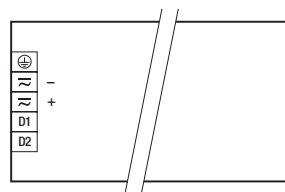
- Connection to the lamps of the hot leads must be kept as short as possible
- Mains leads should be kept apart from lamp leads (ideally 5–10 cm distance)
- Do not run mains leads adjacent to the electronic ballast
- Twist the lamp leads
- Keep the distance of lamp leads from the metal work as large 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.



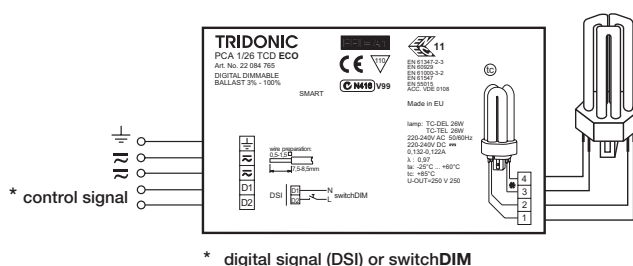
Wiring advice

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

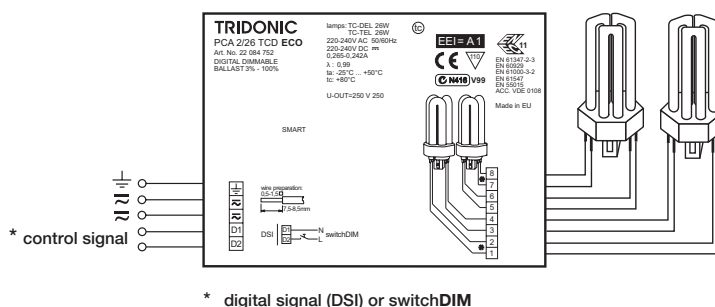
Ballast	Terminal		Maximum capacitance allowed	
	Type	Cold	Hot	Hot
PCA 1/xx TCx ECO		1, 2	3, 4	100 pF
PCA 2/xx TCx ECO		3, 4, 5, 6	1, 2, 7, 8	100 pF

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.



PCA ECO 11–57 W



PCA ECO 2x11–2x42 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 inter-connected 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.