

TC-DEL
TC-SEL
TC-TFI

PCA TCD EXCEL one4all, 11 – 57 W

Compact and T5c fluorescent lamps

Product description

- Noise-free precise control via DSI signal, switchDIM, corridorFUNCTION or DALI
- DALI-MEMORY
- Extended DALI commands
- CELMA energy class A1¹⁾

Interfaces

- DALI
- DSI
- switchDIM (with memory function)
- corridorFUNCTION (individually programmable)
- Integrated SMART-Interface

Functions

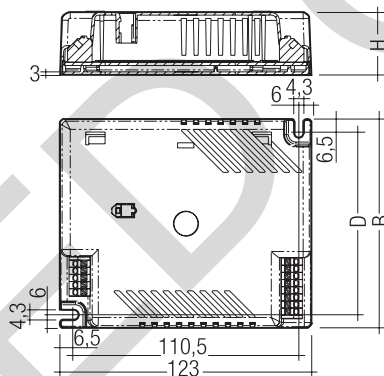
- Optimum filament heating in any dimmer setting
- Fade rates between 50 ms and 90 s (min-max.)
- Automatically triggered emergency lighting value in DC mode, can be set between 1 and 70 %
- For emergency lighting systems as per EN 50172
- Automatic start after replacement of defective lamps

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



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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 EXCEL one4all	22176455
PCA 1/18 TCD EXCEL one4all	22084709
PCA 1/26 TCD EXCEL one4all	22084686
PCA 1/32 TCT EXCEL one4all	22088622
PCA 1/42 TCT EXCEL one4all	22176463
PCA 1/57 TCT EXCEL one4all	22086941
For luminaires with 2 lamps	
PCA 2/11-13 TCD EXCEL one4all	22176457
PCA 2/18 TCD EXCEL one4all	22084692
PCA 2/26 TCD EXCEL one4all	22084670
PCA 2/32 TCT EXCEL one4all	22088638
PCA 2/42 TCT EXCEL one4all	22176465

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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL one4all	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 EXCEL	1x11 W	0.72 A	0.67 A
PCA 1/13 TCD EXCEL	1x13 W	0.73 A	0.66 A
PCA 1/18 TCD EXCEL	1x18 W	0.80 A	0.74 A
PCA 1/26 TCD EXCEL	1x26 W	1.16 A	1.07 A
PCA 1/32 TCT EXCEL	1x32 W	1.35 A	1.24 A
PCA 1/42 TCT EXCEL	1x42 W	1.80 A	1.66 A
PCA 1/57 TCT EXCEL	1x57 W	2.54 A	2.33 A
PCA 2/11 TCD EXCEL	2x11 W	1.18 A	1.10 A
PCA 2/13 TCD EXCEL	2x13 W	1.08 A	1.00 A
PCA 2/18 TCD EXCEL	2x18 W	1.46 A	1.34 A
PCA 2/26 TCD EXCEL	2x26 W	2.14 A	1.96 A
PCA 2/32 TCT EXCEL	2x32 W	2.40 A	2.11 A
PCA 2/42 TCT EXCEL	2x42 W	3.53 A	3.26 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 1/11 TCD EXCEL	1x11 W	1.03
PCA 1/13 TCD EXCEL	1x13 W	0.99
PCA 1/18 TCD EXCEL	1x18 W	1.02
PCA 1/26 TCD EXCEL	1x26 W	0.97
PCA 1/32 TCT EXCEL	1x32 W	1.05
PCA 1/42 TCT EXCEL	1x42 W	1.02
PCA 1/57 TCT EXCEL	1x57 W	1.01
PCA 2/11 TCD EXCEL	2x11 W	1.03
PCA 2/13 TCD EXCEL	2x13 W	1.01
PCA 2/18 TCD EXCEL	2x18 W	0.99
PCA 2/26 TCD EXCEL	2x26 W	0.98
PCA 2/32 TCT EXCEL	2x32 W	1.01
PCA 2/42 TCT EXCEL	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 EXCEL	1x11 W	17.1	16.0	5.0	3.2	1.9	1.2
PCA 1/13 TCD EXCEL	1x13 W	3.5	2.5	4.3	2.5	2.0	1.1
PCA 1/18 TCD EXCEL	1x18 W	8.1	7.5	2.8	1.2	1.8	1.0
PCA 1/26 TCD EXCEL	1x26 W	9.5	8.9	2.7	1.9	1.3	1.1
PCA 1/32 TCT EXCEL	1x32 W	10.2	9.3	3.6	2.4	1.7	1.1
PCA 1/42 TCT EXCEL	1x42 W	6.6	5.9	1.9	1.3	1.0	0.8
PCA 1/57 TCT EXCEL	1x57 W	11.6	9.9	5.6	1.8	3.9	1.5
PCA 2/11 TCD EXCEL	2x11 W	12.3	11.7	3.3	2.3	1.6	1.2
PCA 2/13 TCD EXCEL	2x13 W	11.3	10.6	3.1	2.1	1.5	1.2
PCA 2/18 TCD EXCEL	2x18 W	10.7	9.8	3.7	2.4	1.7	1.1
PCA 2/26 TCD EXCEL	2x26 W	9.1	8.5	2.7	1.8	1.3	0.9
PCA 2/32 TCT EXCEL	2x32 W	11.7	10.8	3.8	2.4	1.5	0.9
PCA 2/42 TCT EXCEL	2x42 W	8.4	7.7	8.4	8.4	1.3	0.7

Dimming

Dimming range 3 % to 100 %
(57 W from 10 % to 100 %)

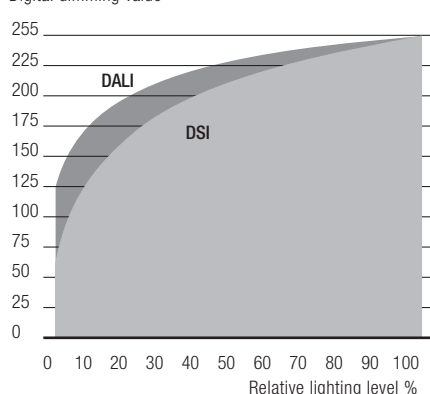
Digital control with:

- DSI signal: 8 bit Manchester Code
Maximum speed 3 % to 100 %
(57 W from 10 % to 100 %) in 1.4 s
 - DALI signal: 16 bit Manchester Code
Maximum speed 3 % to 100 %
(57 W from 10 % to 100 %) in 0.5 s
- Programmable parameter:
Minimum dimming level
Maximum dimming level
Default minimum = 3 % (10 % for 57 W)
Programmable range $3\% \leq \text{MIN} \leq 49\%$
($10\% \leq \text{MIN} \leq 49\%$ for 57 W)
Default maximum = 100 %
Programmable range $100\% \geq \text{MAX} \geq 50\%$

Dimming curve that is friendly to the eye.

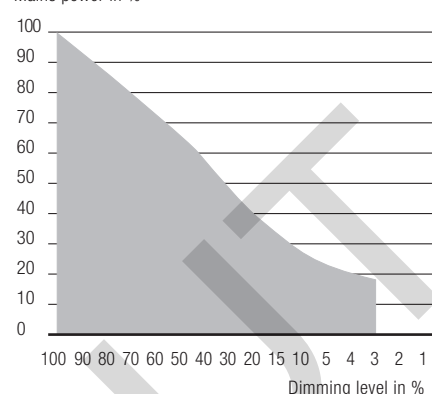
Dimming characteristics PCA EXCEL

Digital dimming value



Energy Savings PCA EXCEL

Mains power in %



Control input (D1, D2)

Digital DALI/DSI signal or switchDIM can be wired on the same terminals (D1 and D2).

Digital signal DALI/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 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 EXCEL automatically runs in the constant lux level mode.
ON/OFF switch via mains, switchDIM or DALI/DSI signal.

DALI/DSI signal = 0 switches off,
DALI/DSI signal ≥ 1 switches on.
Dimming with DALI or 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. 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.

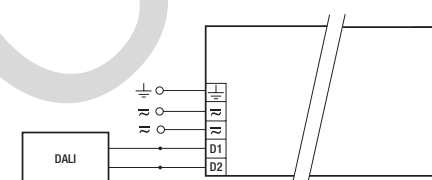
Use of push to make switch with indicator lamp is not permitted.

switchDIM and corridorFUNCTION are very simple tools for controlling ballasts with conventional momentary-action switches or motion sensors.

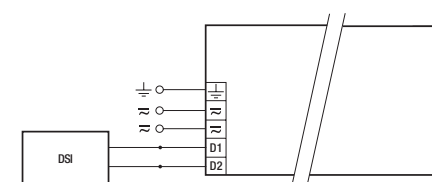
To ensure correct operation a sinusoidal mains voltage with a frequency of 50 Hz or 60 Hz is required at the control input.

Special attention must be paid to achieving clear zero crossings.

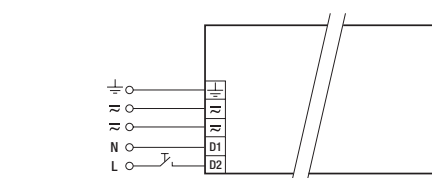
Serious mains faults may impair the operation of switchDIM and corridorFUNCTION.



DALI PCA TCx EXCEL one4all



DSI PCA TCx EXCEL one4all



switchDIM PCA TCx EXCEL one4all

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 EXCEL	40	60	80	80	20	30	40	40
PCA 1/13 TCD EXCEL	40	60	80	80	20	30	40	40
PCA 1/18 TCD EXCEL	30	50	70	76	15	25	35	38
PCA 1/26 TCD EXCEL	30	50	70	76	15	25	35	38
PCA 1/32 TCT EXCEL	26	38	50	58	13	19	25	29
PCA 1/42 TCT EXCEL	26	38	50	58	13	19	25	29
PCA 1/57 TCT EXCEL	12	16	22	26	6	8	11	13
PCA 2/11 TCD EXCEL	28	40	60	64	14	20	30	32
PCA 2/13 TCD EXCEL	28	40	60	64	14	20	30	32
PCA 2/18 TCD EXCEL	22	32	68	68	11	16	23	34
PCA 2/26 TCD EXCEL	22	32	46	56	11	16	23	28
PCA 2/32 TCT EXCEL	10	18	24	28	5	9	12	14
PCA 2/42 TCT EXCEL	12	18	24	28	6	9	12	14

Installation instructions

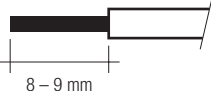
Wiring type and cross section

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:

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.



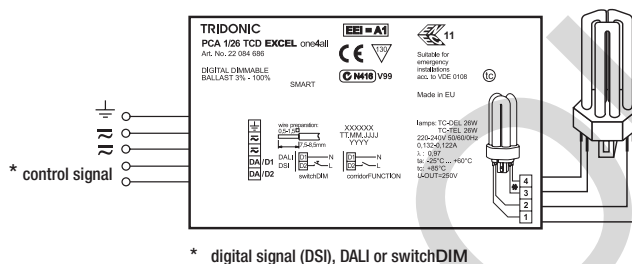
Wiring advice

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

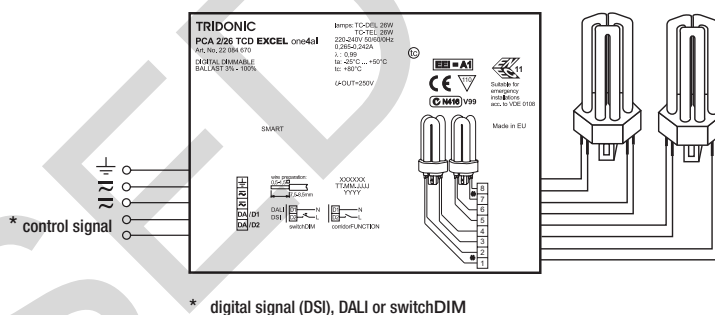
Ballast	Terminal	Maximum capacitance allowed			
		Cold	Hot	Cold	Hot
PCA 1/xx TCx EXCEL		1, 2	3, 4	100 pF	100 pF
PCA 2/xx TCx EXCEL		3, 4, 5, 6	1, 2, 7, 8	100 pF	100 pF

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.



PCA EXCEL one4all 11–57 W



PCA EXCEL one4all 2x11–2x42 W

corridorFUNCTION

The corridorFUNCTION can be programmed in two different ways.

To program the corridorFUNCTION by means of software a DALI-USB interface is needed in combination with a DALI PS. The software can be the configTOOL, the pcaCONFIGURATOR or the corridorFUNCTION CONFIGURATOR.

To activate the corridorFUNCTION without using software a voltage of 230 V simply has to be applied for five minutes at the switchDIM connection. The unit will then switch automatically to the corridorFUNCTION.

Note: If the corridorFUNCTION is wrongly activated in a switchDIM system (for example a switch is used instead of pushbutton), there is the option of installing a pushbutton and deactivating the corridorFUNCTION mode by five short pushes of the button within three seconds.

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.