



## PCA TCL EXCEL one4all, 18 – 80 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 A1<sup>1)</sup>

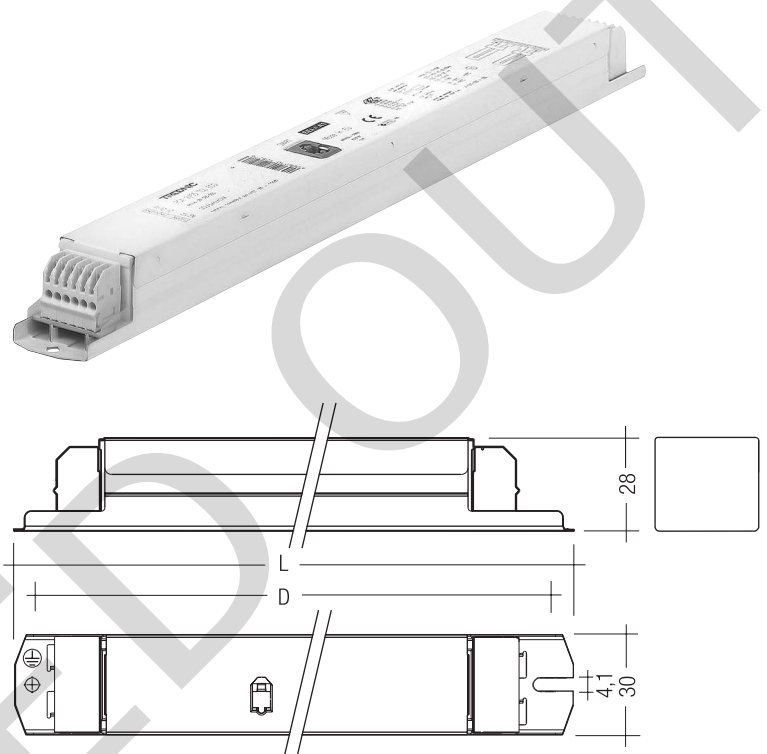
### Interfaces

- 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

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



### Technical data

Power input on standby	< 1 W
Protective hot restart	0.6 s / 1.5 s for AC (55 W, 80 W, 2 x 18 W and 2 x 55 W)
Dimming range	3 – 100 %
Lamp start possible from	3 %
Operating frequency	~40 – 100 kHz
Life	50,000 h
Height	28 mm

### Ordering data

Type	Article number
<b>For luminaires with 1 lamp</b>	
PCA 1/36 TCL EXCEL one4all	22085346
PCA 1/55 TCL EXCEL one4all	22085387
PCA 1/80 TCL EXCEL one4all	22089004
<b>For luminaires with 2 lamps</b>	
PCA 2/18 TCL EXCEL one4all	22086840
PCA 2/36 TCL EXCEL one4all	22176469
PCA 2/40 TCL EXCEL one4all	22085371
PCA 2/55 TCL EXCEL one4all	22085393

Packaging: 10 pieces/carton, 580 pieces/pallet



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Wiring diagrams and installation examples, page 5

Specific technical data

Lamp wattage	Lamp type	Type	Length L	Hole spacing D	Weight	Circuit power <sup>①</sup>	Lamp wattage <sup>②</sup>	Current at 230 V / 50 Hz <sup>③</sup>	λ at 50 Hz / 230 V	tc point	Ambient temperature ta <sup>②</sup>
<b>For luminaires with 1 lamp</b>											
1 x 36 W	TC-L	PCA 1/36 TCL EXCEL one4all	360 mm	350 mm	0.32 kg	37.5 W	32 W	0.165 A	0.97	75 °C	-25 ... 60 °C
1 x 55 W	TC-L	PCA 1/55 TCL EXCEL one4all	360 mm	350 mm	0.32 kg	61.5 W	55 W	0.270 A	0.99	80 °C	-25 ... 60 °C
1 x 80 W	TC-L	PCA 1/80 TCL EXCEL one4all	360 mm	350 mm	0.32 kg	90.0 W	80 W	0.399 A	0.98	70 °C	-25 ... 50 °C
<b>For luminaires with 2 lamps</b>											
2 x 18 W	TC-L	PCA 2/18 TCL EXCEL one4all	360 mm	350 mm	0.36 kg	42.0 W	30 W	0.165 A	0.98	80 °C	-20 ... 50 °C
2 x 36 W	TC-F	PCA 2/36 TCL EXCEL one4all	360 mm	350 mm	0.36 kg	74.0 W	64 W	0.325 A	0.99	85 °C	-25 ... 60 °C
2 x 36 W	TC-L	PCA 2/36 TCL EXCEL one4all	360 mm	350 mm	0.36 kg	74.0 W	64 W	0.325 A	0.99	80 °C	-25 ... 60 °C
2 x 40 W	TC-L	PCA 2/40 TCL EXCEL one4all	360 mm	350 mm	0.36 kg	87.9 W	76 W	0.380 A	0.99	75 °C	-25 ... 60 °C
2 x 55 W	TC-L	PCA 2/55 TCL EXCEL one4all	360 mm	350 mm	0.36 kg	118.9 W	110 W	0.520 A	0.98	70 °C	-25 ... 50 °C

<sup>①</sup> Valid at 100 % dimming level

<sup>②</sup> 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

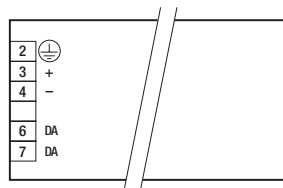
### AC operation

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.

Our ballasts are construed to operate DC voltage and pulsed DC voltage.  
To operate ballasts with pulsed DC voltage the polarity is absolute mandatory.



### Temperature range

Dimming range 100 % to 3 % from 10 °C to maximum permissible ambient temperature  $t_a$ .  
100 % operation from -25 °C to maximum permissible ambient temperature  $t_a$ .

### Lamp warm start (start at any dimming level)

Type	Wattage	Starting time	
		AC	DC
PCA 1/36 TCL EXCEL	1x36 W	0.6 s	0.6 s
PCA 1/40 TCL EXCEL	1x40 W	0.6 s	0.6 s
PCA 1/55 TCL EXCEL	1x55 W	1.5 s	0.6 s
PCA 1/80 TCL EXCEL	1x80 W	1.5 s	0.6 s
PCA 2/18 TCL EXCEL	2x18 W	1.5 s	0.6 s
PCA 2/24 TCL EXCEL	2x24 W	0.6 s	0.6 s
PCA 2/36 TCL EXCEL	2x36 W	0.6 s	0.6 s
PCA 2/40 TCL EXCEL	2x40 W	0.6 s	0.6 s
PCA 2/55 TCL EXCEL	2x55 W	1.5 s	0.6 s

### Mains current in DC operation

Type	Wattage	Mains current at	
		$U_n = 220 V_{DC}$	$U_n = 240 V_{DC}$
PCA 1/36 TCL EXCEL	1x36 W	0.14 A	0.13 A
PCA 1/40 TCL EXCEL	1x40 W	0.16 A	0.14 A
PCA 1/55 TCL EXCEL	1x55 W	0.23 A	0.22 A
PCA 1/80 TCL EXCEL	1x80 W	0.33 A	0.30 A
PCA 2/18 TCL EXCEL	2x18 W	0.14 A	0.12 A
PCA 2/24 TCL EXCEL	2x24 W	0.19 A	0.18 A
PCA 2/36 TCL EXCEL	2x36 W	0.27 A	0.25 A
PCA 2/40 TCL EXCEL	2x40 W	0.32 A	0.29 A
PCA 2/55 TCL EXCEL	2x55 W	0.55 A	0.51 A

### Light output level in DC operation

Programmable from 3 % to 70 %  
Programming by extended DSI signal (16 bit)  
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 1/36 TCL EXCEL	1x36 W	1.00
PCA 1/40 TCL EXCEL	1x40 W	1.04
PCA 1/55 TCL EXCEL	1x55 W	0.99
PCA 1/80 TCL EXCEL	1x80 W	1.00
PCA 2/18 TCL EXCEL	2x18 W	1.01
PCA 2/24 TCL EXCEL	2x24 W	1.01
PCA 2/36 TCL EXCEL	2x36 W	1.01
PCA 2/40 TCL EXCEL	2x40 W	1.03
PCA 2/55 TCL EXCEL	2x55 W	0.99

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 VDC).

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

Type	Wattage	THD					
			3	5	7	9	11
PCA 1/36 TCL EXCEL	1x36 W	7.6	7.2	2.0	1.2	0.9	0.8
PCA 1/40 TCL EXCEL	1x40 W	9.5	8.9	2.7	1.7	1.1	0.8
PCA 1/55 TCL EXCEL	1x55 W	10.1	9.5	3.1	1.8	1.1	0.7
PCA 1/80 TCL EXCEL	1x80 W	8.7	8.0	2.0	1.3	1.0	0.7
PCA 2/18 TCL EXCEL	2x18 W	9.3	8.9	2.0	1.8	0.7	0.9
PCA 2/24 TCL EXCEL	2x24 W	4.4	4.4	0.5	0.2	0.0	0.0
PCA 2/36 TCL EXCEL	2x36 W	10.1	9.3	3.3	2.0	1.3	1.0
PCA 2/40 TCL EXCEL	2x40 W	8.8	8.1	2.8	1.8	1.2	0.9
PCA 2/55 TCL EXCEL	2x55 W	8.9	8.0	3.1	2.1	1.4	1.0

### Dimming

Dimming range 3 % to 100 %

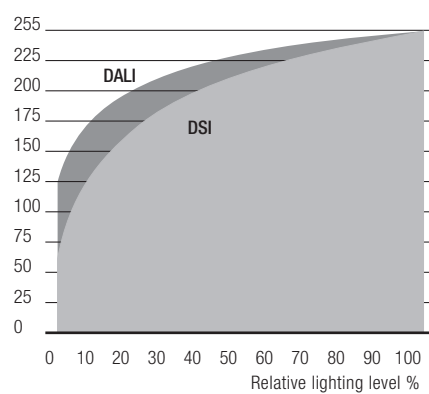
Digital control with:

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

Dimming curve that is friendly to the eye.

### Dimming characteristics PCA EXCEL

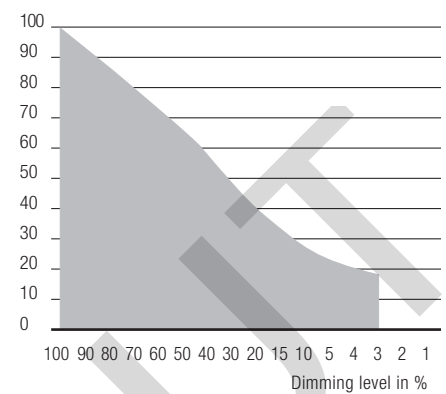
Digital dimming value



Dimming characteristics as seen by the human eye

### Energy Savings PCA EXCEL

Mains power in %



### Control input (D1/DA, D2/DA)

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

### 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  $\geq 1$  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.

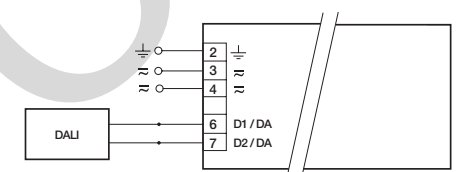
Use of push to make switch with indicator lamp is not permitted.

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

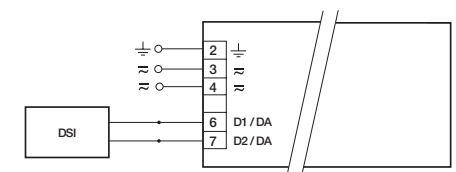
To ensure correct operation a sinusoidal mains voltage with a frequency of 50 Hz or 60 Hz is required at the control input.

Special attention must be paid to achieving clear zero crossings.

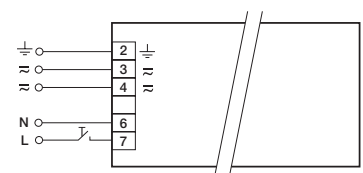
Serious mains faults may impair the operation of switchDIM and corridorFUNCTION.



DALI PCA TCL EXCEL one4all



DSI PCA TCL EXCEL one4all



switchDIM PCA TCL EXCEL one4all

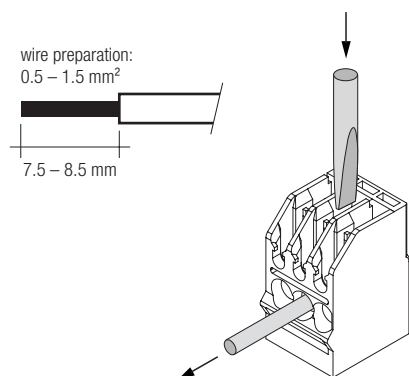
### Loading of automatic circuit breakers

Automatic circuit breaker type	C10	C13	C16	C20	B10	B13	B16	B20
Installation $\emptyset$	1.5 mm <sup>2</sup>	1.5 mm <sup>2</sup>	1.5 mm <sup>2</sup>	2.5 mm <sup>2</sup>	1.5 mm <sup>2</sup>	1.5 mm <sup>2</sup>	1.5 mm <sup>2</sup>	2.5 mm <sup>2</sup>
PCA 1/36 TCL EXCEL	30	50	70	76	15	25	35	38
PCA 1/40 TCL EXCEL	30	50	70	76	15	25	35	38
PCA 1/55 TCL EXCEL	20	30	40	46	10	15	20	23
PCA 1/80 TCL EXCEL	10	20	30	30	5	10	15	15
PCA 2/18 TCL EXCEL	10	12	16	20	5	6	8	10
PCA 2/24 TCL EXCEL	16	20	24	30	8	10	12	15
PCA 2/36 TCL EXCEL	10	20	30	30	5	10	15	15
PCA 2/40 TCL EXCEL	10	20	30	30	5	10	15	15
PCA 2/55 TCL EXCEL	10	14	18	20	5	7	9	10

## Installation instructions

### Wiring type and cross section

The wiring can be solid cable with a cross section of 0.5 to 1.5 mm<sup>2</sup> for push terminal and 0.5 mm<sup>2</sup> for concut terminal. For the push-wire connection you have to strip the insulation (7.5–8.5 mm).



### Output voltage

Type	Wattage	U <sub>out</sub>
PCA 1/36 TCL EXCEL	1x36W	250V
PCA 1/40 TCL EXCEL	1x40W	300V
PCA 1/55 TCL EXCEL	1x55W	300V
PCA 1/80 TCL EXCEL	1x80W	400V
PCA 2/18 TCL EXCEL	2x18W	250V
PCA 2/24 TCL EXCEL	2x24W	250V
PCA 2/36 TCL EXCEL	2x36W	250V
PCA 2/40 TCL EXCEL	2x40W	300V
PCA 2/55 TCL EXCEL	2x55W	300V

## 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

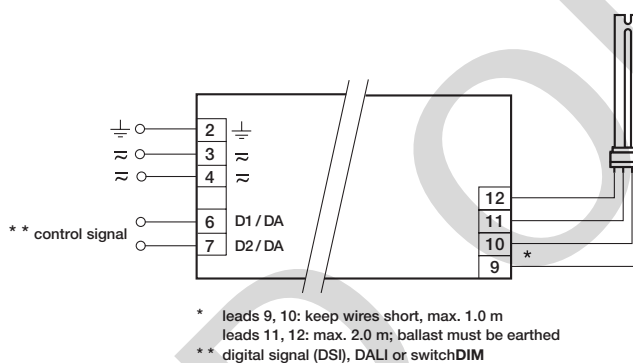
## Wiring advice

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

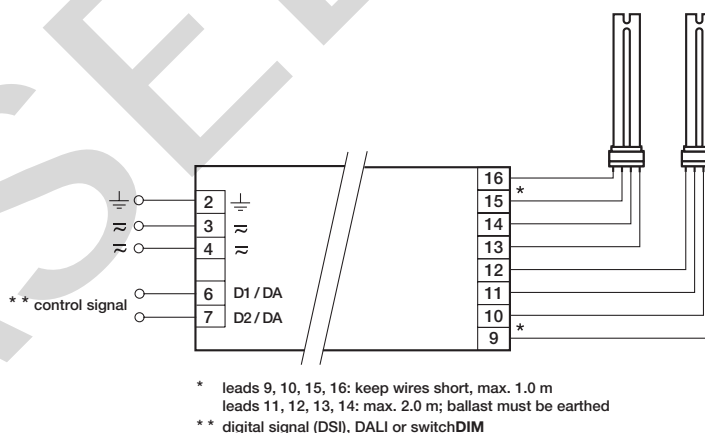
Ballast Type	Terminal	Maximum capacitance allowed			
		Cold	Hot	Cold	Hot
PCA 1/xx TCL EXCEL		11, 12	9, 10	200 pF	100 pF
PCA 2/xx TCL EXCEL		11, 12, 13, 14	9, 10, 15, 16	200 pF	100 pF

With standard solid wire 0.5/0.75 mm<sup>2</sup> 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.



PCA TCL EXCEL one4all 36–80 W



PCA TCL EXCEL one4all 2x18–2x55 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.