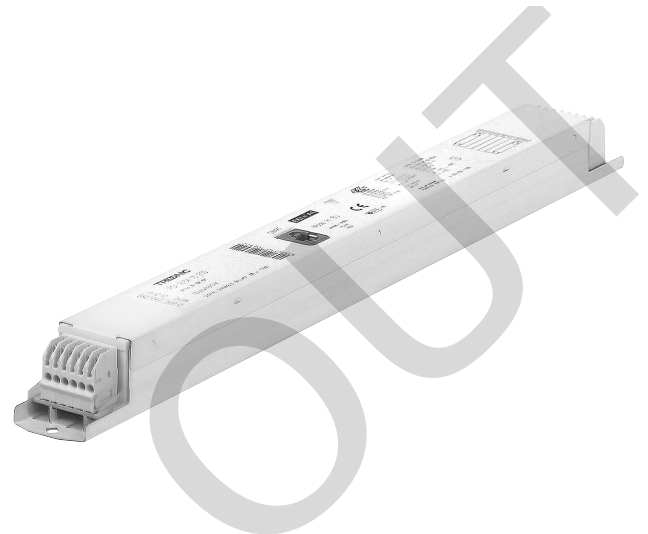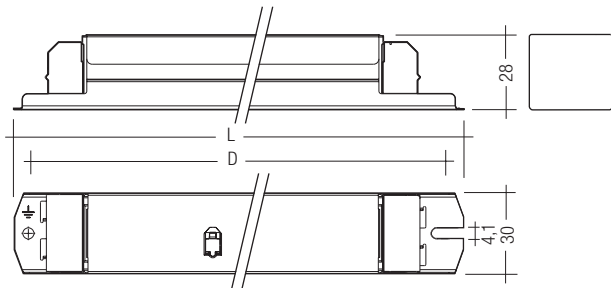**Electronic ballasts for dimming to 1 %**
Linear lamps T5, 16 mm high efficiency

PCA T5 EXCEL one4all 14–35 W 220–240 V 50/60/0 Hz, dimmable

- dimming range from 1–100 %
- lamp start at 1 % possible
- lamp friendly warm start within 1.5 s with AC and 0.6 s with DC
- switch via the mains or with digital control signal
- dimming which is comfortable to the eye
- disturbance free precise control with a digital signal (**DSI**), switch**DIM** or **DALI** (digital addressable lighting interface)
- error feed back and programmable features in both DALI and DSI mode
- integrated SMART interface

- fully electronic lamp management and digital communication with ASIC and µC
- constant light output independent of fluctuating supply voltage
- DC operation in emergency lighting installations to VDE 0108
- safe shutdown of defective lamps
- safe shutdown of lamps at end of life (rectifying effect)
- automatic restart after lamp replacement
- operating frequency ~40–100 kHz

Packaging:
box of 25
28 boxes/pallet
700 pieces/pallet

Certified:
EN 55015
EN 55022
EN 60929
EN 61000-3-2
EN 61347-2-3
EN 61547
in accordance
with VDE 0108

Lamp		Ballast										
watt-age W	length	type	article number	length L D mm	fixing centres	weight W ②	circuit power W ②	lamp power ②	current at 230V/50Hz A ②	λ at 230V/50Hz	tc point °C	temperature range ①
14	549	**PCA 1/14 T5 EXCEL** 220/240V 50/60/0Hz	22084884	360	350	0.32	17.8	14	0.09	0.92	70	+10 → +60
2x14	549	**PCA 2/14 T5 EXCEL** 220/240V 50/60/0Hz	22084890	360	350	0.36	35.6	2x14	0.16	0.97	80	+10 → +60
21	849	**PCA 1/21 T5 EXCEL** 220/240V 50/60/0Hz	22084907	360	350	0.32	25.1	21	0.12	0.95	65	+10 → +60
2x21	849	**PCA 2/21 T5 EXCEL** 220/240V 50/60/0Hz	22084916	360	350	0.36	47.7	2x21	0.22	0.98	70	+10 → +60
28	1149	**PCA 1/28 T5 EXCEL** 220/240V 50/60/0Hz	22084540	360	350	0.32	32	28	0.15	0.96	70	+10 → +60
2x28	1149	**PCA 2/28 T5 EXCEL** 220/240V 50/60/0Hz	22084556	360	350	0.36	61	2x28	0.28	0.98	75	+10 → +60
35	1449	**PCA 1/35 T5 EXCEL** 220/240V 50/60/0Hz	22084569	360	350	0.32	38	34	0.17	0.97	75	+10 → +60
2x35	1449	**PCA 2/35 T5 EXCEL** 220/240V 50/60/0Hz	22084575	360	350	0.36	75	2x34	0.32	0.98	85	+10 → +60

① dimming to 1 % between 10 °C to ta max.

② valid at 100 % light output

TRIDONIC

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 VDE 0108 or for emergency
luminaires according to EN 61347-2-3 appendix J.

Temperature range:
Dimming range 100 % to 1 % from 10 °C to
maximum permissible ambient temperature ta.

Mains currents in DC operation:

Ballast Type	Mains current at U_n = 220 VDC	Mains current at U_n = 240 VDC
PCA 1/14 T5 EXCEL 220–240V 50/60/0Hz	0.07 A	0.06 A
PCA 1/21 T5 EXCEL 220–240V 50/60/0Hz	0.10 A	0.09 A
PCA 1/28 T5 EXCEL 220–240V 50/60/0Hz	0.11 A	0.10 A
PCA 1/35 T5 EXCEL 220–240V 50/60/0Hz	0.14 A	0.13 A
PCA 2/14 T5 EXCEL 220–240V 50/60/0Hz	0.12 A	0.11 A
PCA 2/21 T5 EXCEL 220–240V 50/60/0Hz	0.18 A	0.16 A
PCA 2/28 T5 EXCEL 220–240V 50/60/0Hz	0.21 A	0.20 A
PCA 2/35 T5 EXCEL 220–240V 50/60/0Hz	0.27 A	0.25 A

Light output level in DC operation:
Programmable from 1 % 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 8.1:

Ballast Type	AC-BLF at U_n = 230 VAC
PCA 1/14 T5 EXCEL 220–240V 50/60/0Hz	1.05
PCA 1/21 T5 EXCEL 220–240V 50/60/0Hz	1.00
PCA 1/28 T5 EXCEL 220–240V 50/60/0Hz	0.99
PCA 1/35 T5 EXCEL 220–240V 50/60/0Hz	1.00
PCA 2/14 T5 EXCEL 220–240V 50/60/0Hz	1.05
PCA 2/21 T5 EXCEL 220–240V 50/60/0Hz	0.98
PCA 2/28 T5 EXCEL 220–240V 50/60/0Hz	0.98
PCA 2/35 T5 EXCEL 220–240V 50/60/0Hz	0.98

The ballast lumen factor for AC operation (AC-BLF) does not alter from U_n = 198 VAC to U_n = 254 VAC.

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 220 V/50 Hz):

| Ballast Type	THD	3	5	7	9	11
PCA 1/14 T5 EXCEL 220–240V 50/60/0Hz	9.0	8.6	2.3	1.6	1.3	1.0
PCA 1/21 T5 EXCEL 220–240V 50/60/0Hz	8.0	7.8	1.3	0.9	0.6	0.5
PCA 1/28 T5 EXCEL 220–240V 50/60/0Hz	12.4	11.6	3.7	2.1	1.5	1.1
PCA 1/35 T5 EXCEL 220–240V 50/60/0Hz	8.1	7.8	1.8	1.2	0.8	0.7
PCA 2/14 T5 EXCEL 220–240V 50/60/0Hz	10.6	10.3	2.2	1.3	1.0	0.8
PCA 2/21 T5 EXCEL 220–240V 50/60/0Hz	9.7	9.3	2.3	1.3	1.0	0.8
PCA 2/28 T5 EXCEL 220–240V 50/60/0Hz	6.0	6.0	0.8	0.4	0.3	0.3
PCA 2/35 T5 EXCEL 220–240V 50/60/0Hz	5.3	5.0	1.6	1.1	0.8	0.6

TRIDONIC

Dimming:

Dimming range 1 % to 100 %
Digital control with:
- DSI signal: 8 bit Manchester Code
  Maximum speed 1 % to 100 % in 1.4 s
- DALI signal: 16 bit Manchester Code
  Maximum speed 1 % to 100 % in 0.5 s
  Programmable parameter:
  Minimum dimming level
  Maximum dimming level
  Default minimum = 1 %
  Programmable range 1 % ≤ MIN ≤ 49 %
  Default maximum = 100 %
  Programmable range 100 % ≥ MAX ≥ 50 %
Dimming curve that is friendly to the eye.
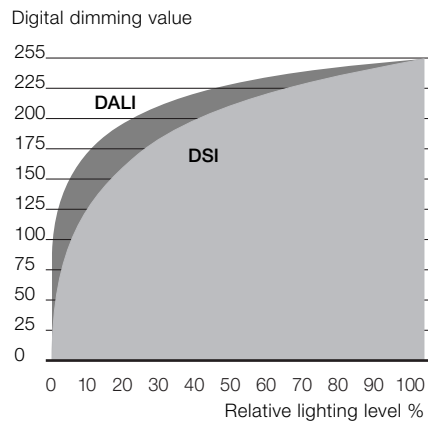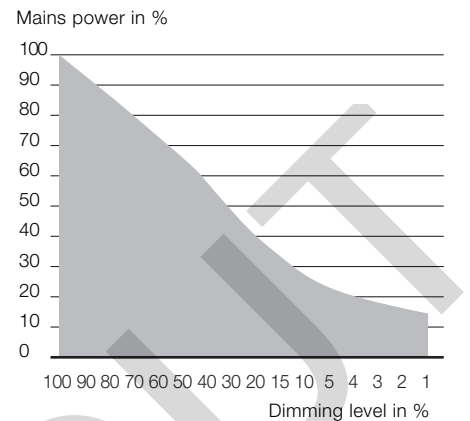
Control input (DA/D1, DA/D2):

Digital DALI/DSI signal or switchDIM can be wired
on the same terminals (DA/D1 and DA/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 auto-
matically 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
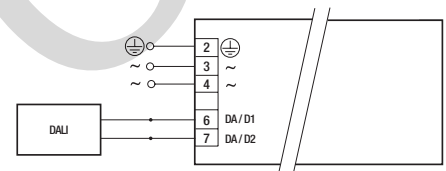dimmed in the opposite direction.
In installations with PCAs with different dimming
levels or opposite dimming directions (e.g. after a
system extension), all PCAs can be synchronized
to 50 % dimming level by a 10 s push.
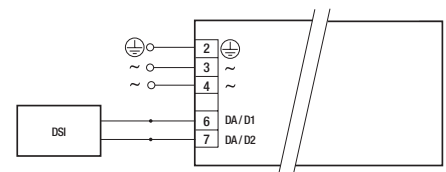Use of push to make switch with indicator lamp is
not permitted.

switchDIM is a very simple tool for controlling bal-
lasts with conventional momentary-action switches
or motion sensors.
To ensure correct operation a sinusoidal mains volt-
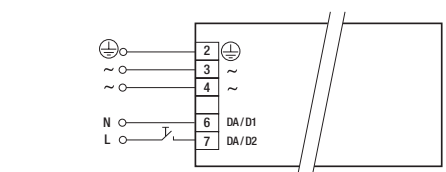age with a frequency of 50 Hz or 60 Hz is required
at the control input.
Special attention must be paid to achieving clear
zero crossings. Serious mains faults may impair the
operation of switchDIM.

Dimming characteristics PCA EXCEL

Digital dimming value

Dimming characteristics
as seen by the human eye

Energy Savings PCA EXCEL

Mains power in %

DALI PCA T5 EXCEL one4all

DSI PCA T5 EXCEL one4all

switchDIM PCA T5 EXCEL one4all

Loading of automatic circuit breakers:
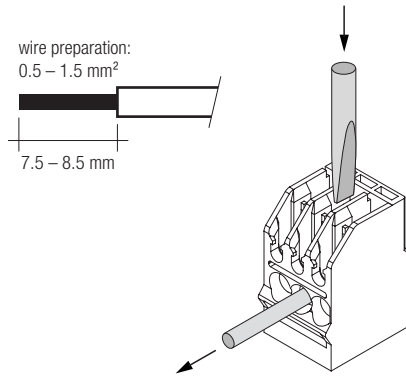
Automatic circuit

breaker type	C10	C13	C16	C20	B10	B13	B16	B20
Installation ∅	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 1/14 T5 EXCEL	30	50	70	80	15	25	35	40
PCA 1/21 T5 EXCEL	30	50	70	76	15	25	35	38
PCA 1/28 T5 EXCEL	32	50	72	80	16	25	36	40
PCA 1/35 T5 EXCEL	32	50	70	80	16	25	35	40
PCA 2/14 T5 EXCEL	22	32	44	50	11	16	22	25
PCA 2/21 T5 EXCEL	22	32	44	50	11	16	22	25
PCA 2/28 T5 EXCEL	16	22	30	34	8	11	15	17
PCA 2/35 T5 EXCEL	16	22	30	34	8	11	15	17

Data sheet 09/11-385-3 We reserve the right to make technical changes without prior notice.

TRIDONIC 3

Installation instructions:

Wiring type and cross section:

The wiring can be solid cable with a cross section of 0.5 to 1.5 mm² for push terminal and 0.5 mm² for concut terminal. For the push-wire connection you have to strip the insulation (7.5–8.5 mm).

wire preparation:
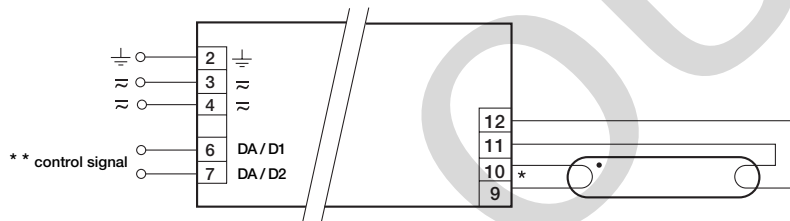0.5 – 1.5 mm²

7.5 – 8.5 mm

Ballast	
Type	U$_{out}$
PCA 1/14 T5 EXCEL 220–240V 50/60/0Hz	250 V 250
PCA 1/21 T5 EXCEL 220–240V 50/60/0Hz	250 V 250
PCA 1/28 T5 EXCEL 220–240V 50/60/0Hz	400 V 400
PCA 1/35 T5 EXCEL 220–240V 50/60/0Hz	450 V 450
PCA 2/14 T5 EXCEL 220–240V 50/60/0Hz	250 V 250
PCA 2/21 T5 EXCEL 220–240V 50/60/0Hz	250 V 250
PCA 2/28 T5 EXCEL 220–240V 50/60/0Hz	400 V 400
PCA 2/35 T5 EXCEL 220–240V 50/60/0Hz	450 V 450

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	Terminal		Maximum capacitance allowed	
Type	Cold	Hot	Cold	Hot
PCA 1/xx T5 EXCEL	11, 12	9, 10	200 pF	100 pF
PCA 2/xx T5 EXCEL	11, 12, 13, 14	9, 10, 15, 16	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.
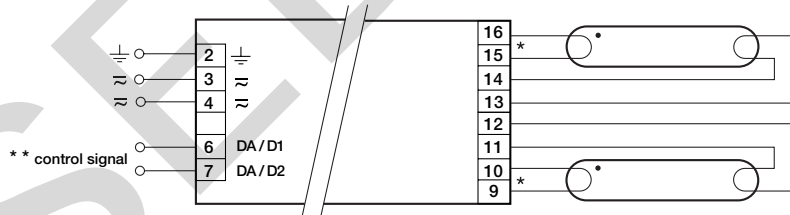
Lamp connection should be made with symmetrical wiring.
Hot leads (9, 10, 15, 16) and cold leads (11, 12, 13, 14) should be separated as much as possible.

* leads 9, 10: keep wires short, max. 1.0 m
leads 11, 12: max. 2.0 m; ballast must be earthed
** digital signal (DSI), DALI or switch**DIM**

PCA T5 EXCEL one4all 14–35 W

* leads 9, 10, 15, 16: keep wires short, max. 1.0 m
leads 11, 12, 13, 14: max. 2.0 m; ballast must be earthed
** digital signal (DSI), DALI or switch**DIM**

PCA T5 EXCEL one4all 2x14–2x35 W

TRIDONIC