



Enabling LED applications

Xitanium and Fortimo LED drivers – for reliable and flexible LED solutions

PHILIPS
sense and simplicity

The new Fortimo and Xitanium electronic LED drivers are specially designed to operate LED solutions for general lighting applications. There are fixed-output and dimmable (trailing edge and Touch & DALI) versions. The adjustable output current (200 / 300 to 700 / 1000mA) enables flexibility in LED fixture design. The output current can be set by placing a resistor on your LED PCB (Level 2 board). Thermal control of your LED PCB is possible by integrating a NTC (negative thermal coefficient) on the LED PCB.

There are Xitanium LED driver versions in 17W/24V and 25W/36V. The new housing design incorporates three different mounting options: independent, screw and click mounting. The 25W versions also feature a 12V output to operate active cooling or decorative LED light effects.

The Fortimo LED driver 45W/80V is available in fixed-output and dimmable (Touch & DALI) versions. Both versions are available in a built-in or independent housing. The dimmable versions also feature a 12V output to operate active cooling or decorative LED light effects. The high output voltage (up to 80V) and adjustable output current (200 to 700mA) enable operation of many LEDs (high light output) and flexibility in LED fixture design.

Features

- Adjustable output current from 200 / 300 to 700 / 1000mA
- Versions with trailing edge and Touch & DALI dimming protocols
- Temperature derating via NTC (negative thermal coefficient)
- 25 and 45W types with 12V output for active cooling
- New flexible housing design
- Hot wiring (Xitanium types)
- Improved ripple current

Benefits

- One driver can be used for various LED PCB solutions from different LED manufacturers
- Enables use of lighting controls to increase energy savings
- Guarantees product specifications, incl. lifetime
- Design freedom: enables smaller luminaire designs
- Savings on logistics:
 - One SKU for three different product variants
 - Flexibility when volumes are still small
- LED engine can be changed while driver is connected to mains (hot wiring)
- Increased lifetime for LED engine (ripple current)

Applications

- Offices (representative areas such as reception areas, boardrooms, restaurants, etc.)
- Public buildings (airports, cinemas, theaters, exhibition halls)
- High-end shops
- Retail (supermarkets, bakery/butcher's shops, leather goods, etc.)

Compliances and approvals

Generated disturbances and EMI

CISPR15 ed7.2: 2009 Conducted EMI, 9kHz-30MHz
 CISPR15 ed7.2: 2009 Radiated EMI, 30MHz-300MHz
 EN 55015 - Amendment A2
 IEC 61000-3-2 ed3.0 +A1 +A2
 IEC 61000-3-3: ed2: 2008

Immunity

IEC 61547 ed2: 2009, IEC 61000-4-2 ed1.2: 2001,
 IEC 61000-4-3 ed3.0 +A1, IEC 61000-4-4 ed2.0,
 IEC 61000-4-5 ed 2.0, IEC 61000-4-6 ed 2.2,
 IEC 61000-4-11 ed 2

Performance

IEC 62384

Safety standards

IEC 61347-1 (Lamp control gear Part 1: General and safety requirements)
 IEC 61347-2-13 (Lamp control gear Part 2: LED Particular requirements for DC or AC-supplied electronic control gear for LED modules)
 IEC 60598 (Class II / SELV output)

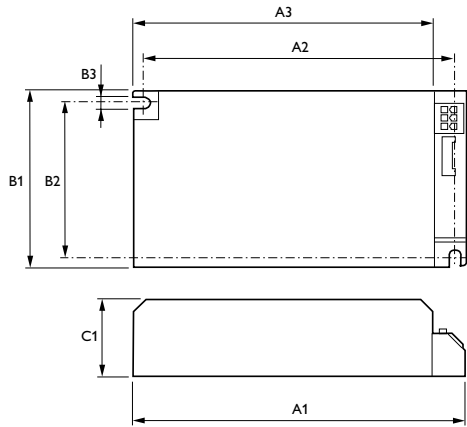
Possible configurations with Fortimo LED DLM & SLM modules

Xitanium LED driver	Fortimo LED DLM 1100Lm Gen 2 modules	Fortimo LED SLM 1100 17 & 18W modules
Xitanium 25W 0.3-0.7A 36V I 230V	x	x
Xitanium 25W 0.3-0.7A 36V TE/I 230V	x	x
Xitanium 25W 0.3-1A 36V TD/I 230V	x	x
Xitanium 25W/0.3-1A 36V TD/Is 230V	x	x

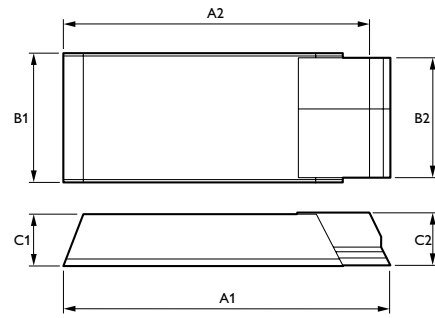
Recommended dimmer list for trailing edge dimming types

Brand	Description/type	Supplier
Busch-Jaeger	6513U-102	Busch-Jaeger
Jung-licht management	225T DE	Jung

Fortimo LED DLM driver



Fortimo LED DLM driver Independent



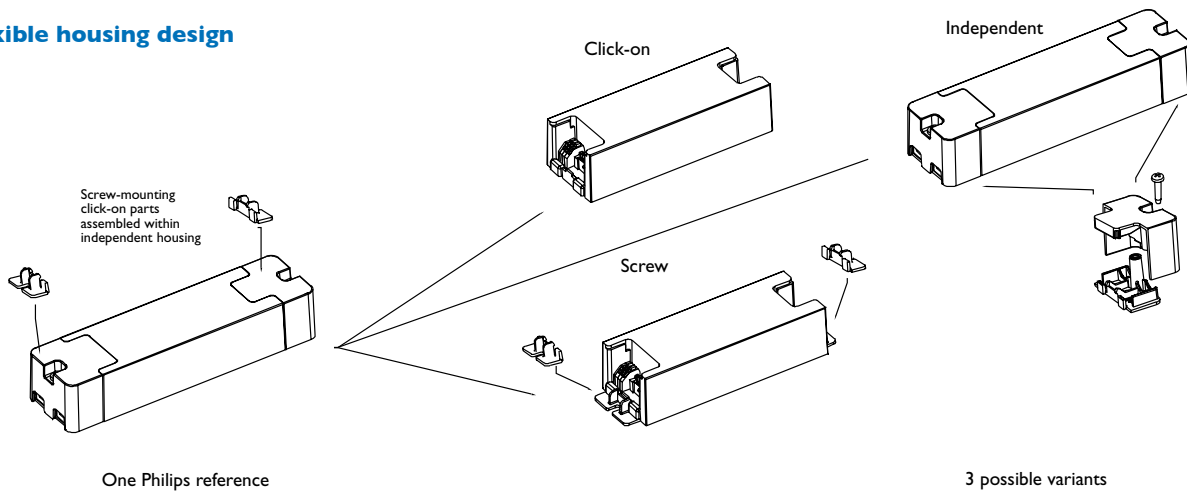
Dimensions (typical data; ± 2mm)

A1	A2	A3	B1	B2	B3	C1
138	128,5	124,5	74	63,3	4,5	32

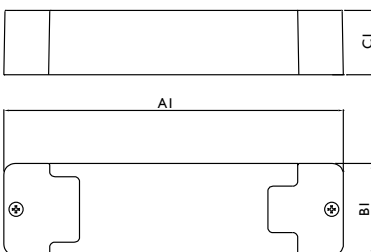
A1	A2	B1	B2	C1	C2
224	206	83	n.a.	34,5	n.a.

Xitanium LED drivers

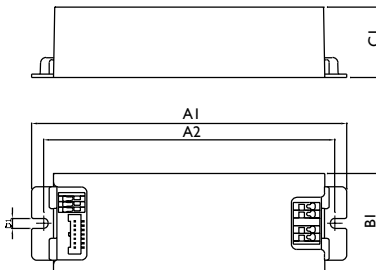
Flexible housing design



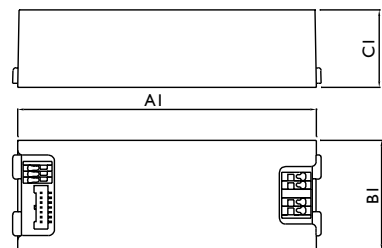
Independent versions



Screw versions



Click versions



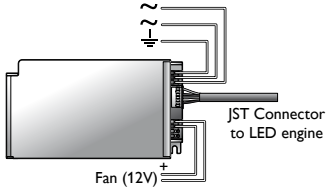
Type	A1	A2	B1	B2	C1	D1
Xitanium 17W 0.3-0.7A 24V I 230V	190	46	32			
Xitanium 17W 0.3-0.7A 24V TE/I 230V	190	46	32			
Xitanium 25W 0.3-0.7A 36V I 230V	190	46	32			
Xitanium 25W 0.3-0.7A 36V TE/I 230V	190	46	32			
Xitanium 25W 0.3-1A 36V TD/I 230V	170	46	32			
Xitanium 25W/0.3-1A 36V TD/Is 230V	150	46	32			

Type	A1	A2	B1	B2	C1	D1
Xitanium 17W 0.3-0.7A 24V I 230V	165	46	32			
Xitanium 17W 0.3-0.7A 24V TE/I 230V	165	46	32			
Xitanium 25W 0.3-0.7A 36V I 230V	165	46	32			
Xitanium 25W 0.3-0.7A 36V TE/I 230V	165	46	32			
Xitanium 25W 0.3-1A 36V TD/I 230V	145	46	32			
Xitanium 25W/0.3-1A 36V TD/Is 230V	125	46	32			

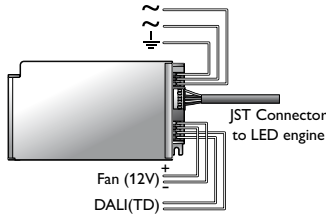
Type	A1	A2	B1	B2	C1	D1
Xitanium 17W 0.3-0.7A 24V I 230V	148	46	32			
Xitanium 17W 0.3-0.7A 24V TE/I 230V	148	46	32			
Xitanium 25W 0.3-0.7A 36V I 230V	148	46	32			
Xitanium 25W 0.3-0.7A 36V TE/I 230V	148	46	32			
Xitanium 25W 0.3-1A 36V TD/I 230V	128	46	32			
Xitanium 25W/0.3-1A 36V TD/Is 230V	108	46	32			

Reference wiring diagrams

Fortimo LED DLM driver (fixed output)



Fortimo LED DLM TD driver (Touch&DALI)



Xitanium 17W driver (fixed output)



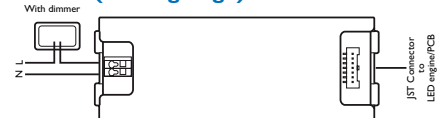
Xitanium 25W driver (fixed output)



Xitanium 25W TD driver (s-version without 12V output, Touch&DALI)



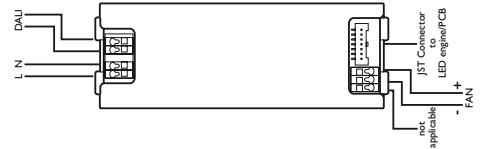
Xitanium 17W driver TE (trailing edge)



Xitanium 25W driver TE (trailing edge)



Xitanium 25W TD driver (with fan output 12v, Touch&DALI)



Product specifications

Fortimo LED drivers

Type	Output current (mA)	Output voltage range (Vdc)	Power consumption range (W)	Number of LEDs *	Type of dimming	Dimming range	12V output	Isolation classification	Efficiency range	Power factor range	Hot wiring	T ambient (°C)	Tc max (°C)	Life time (10% failure) (hrs)
Fortimo LED driver I100-3000	200-700	20-80	14-46	5 to 20	n.a.	n.a.	Yes	Basic (class I)	80-90%	0.9-0.98	No	-20 to +50°C	65	50000
Fortimo LED driver I100-2000/I	200-700	20-80	14-46	5 to 20	n.a.	n.a.	No	Basic (class I)	80-90%	0.9-0.98	No	-20 to +50°C	65	50000
Fortimo LED driver I100-2000/TD	200-700	20-80	14-46	5 to 20	Touch & DALI	100-10%	Yes	Basic (class I)	80-90%	0.9-0.98	No	-20 to +50°C	65	50000
Fortimo LED driver I100-2000/TDI	200-700	20-80	14-46	5 to 20	Touch & DALI	100-10%	Yes	Basic (class I)	80-90%	0.9-0.98	No	-20 to +50°C	65	50000

Xitanium LED drivers

Type	Output current (mA)	Output voltage range (Vdc)	Power consumption range (W)	Number of LEDs *	Type of dimming	Dimming range	12V output	Isolation classification	Efficiency range	Power factor range	Hot wiring	T ambient (°C)	Tc max (°C)	Life time (10% failure) (hrs)
Xitanium 17W 0.3-0.7A 24V I 230V	300-700	15-24	5-22	4 to 6	n.a.	n.a.	No	SELV	85-87%	0.9-0.95	No	-20 to +60°C	90	50000
Xitanium 17W 0.3-0.7A 24V TE/I 230V														
Xitanium 25W 0.3-0.7A 36V I 230V	300-700	25-36	8-36	8 to 9	n.a.	n.a.	Yes	SELV	85-87%	0.9-0.95	Yes	-20 to +60°C	90	50000
Xitanium 25W 0.3-0.7A 36V TE/I 230V														
Xitanium 25W 0.3-1A 36V TD/I 230V	300-1000	18-36	15-30	6 to 9	Touch & DALI	100-10%	Yes	SELV	85-87%	0.9-0.95	Yes	-20 to +60°C	90	50000
Xitanium 25W/0.3-1A 36V TD/Is 230V	300-1000	18-36	15-30	6 to 9	Touch & DALI	100-10%	No	SELV	85-87%	0.9-0.95	Yes	-20 to +60°C	90	50000

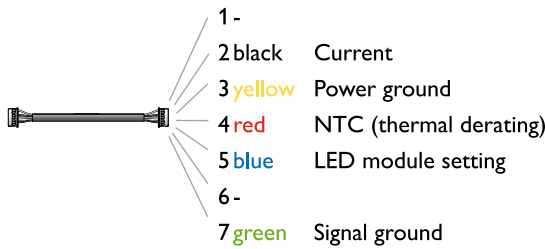
Note: total number of LEDs that can be operated depends on total Vf of LED string Min/max values defined in output Vdc range.

General product characteristics

Rated voltage (V)	220-240
Ripple current (%)	20
T ambient (°C)	-20 to +50
IP class	20
THD (%)	20
Rated frequency (Hz)	50/60
Relative humidity (°C)	95

Explanation Fortimo LED cables and connectors

The Fortimo and Xitanium LED drivers features a specific JST connector with 5 functions, being:



Fortimo LED DLM cable

The standard Fortimo LED cable is 250mm long. But there is also a 600mm version for independent operation that features also a wire to connect protective earth.



Fortimo LED DLM cable I 100-2000

Connector details:

DLM cables

- JST connector at cable to LED driver
 - Housing JST PAP-07V-S
 - Contact JST SPHD-001T-PO.5
- JST connector at cable to DLM LED module
 - Housing JST-PHR-7
 - Contact JST SPH-002T-PO.5S

Connector details:

SLM cables

- JST connector at cable to LED driver
 - Housing JST PAP-07V-S
 - Contact JST SPHD-002T-PO.5
- Tyco connector at cable to SLM LED module
 - Housing Tyco HPI 440146-8
 - Contact Tyco HPI 440147-2

Ordering & packing data Fortimo LED drivers

Type	Weight (Kg)	Qty. box packing (pcs)	Dimensions (cm)	EOC 8727900	I2NC codes
Fortimo LED driver I 100-3000	1.930	6	24.4 x 19.3 x 14.0	920857 00	9290 006 14403
Fortimo LED driver I 100-2000/I	2.420	6	26.6 x 17.2 x 8.6	825220 00	9290 004 65103
Fortimo LED driver I 100-2000/TD	2.072	6	24.4 x 19.3 x 14.0	842975 00	9290 004 65003
Fortimo LED driver I 100-2000/TDI	2.240	6	26.6 x 17.2 x 8.6	862706 00	9290 004 65203

Ordering & packing data Xitanium LED drivers

Type	Weight (Kg)	Qty. box packing (pcs)	Dimensions (cm)	EOC 8727900	I2NC codes
Xitanium 17W 0.3-0.7A 24V I 230V	2.200	10	24 x 23 x 8.6	900958 00	9290 006 00003
Xitanium 25W 0.3-0.7A 36V I 230V	2.200	10	24 x 23 x 8.6	900965 00	9290 006 00203
Xitanium 17W 0.3-0.7A 24V TE/I 230V					
Xitanium 25W 0.3-0.7A 36V TE/I 230V					
Xitanium 25W 0.3-1A 36V TD/I 230V	1.700	10	27 x 18 x 8	914344 00	9290 006 00403
Xitanium 25W/0.3-1A 36V TD/Is 230V	1.600	10	27 x 16 x 8	914351 00	9290 004 85803

I :independent housing design

TE :trailing edge dimming

TD :Touch & DALI dimming

s :small version without I2V

Ordering & packing data Fortimo LED cables

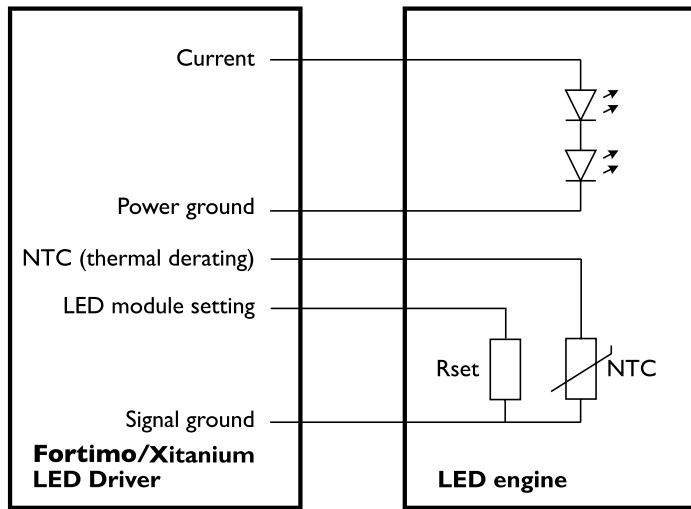
Type	Weight (Kg)	Qty. box packing (pcs)	Dimensions (cm)	EOC 8727900	I2NC codes
Fortimo LED DLM cable I 100-2000	0,084	6	13,8 x 12,8 x 3,8	807097 00	9290 004 63103
Fortimo LED DLM cable I 100-2000/I	0,25	6	23,3 x 20,2 x 4,2	850529 00	9290 004 78903
Fortimo LED SLM cable 25cm	0,055	10 (plastic bag)		921533 00	9290 006 14703

Setting desired output currents

By placing a resistor with a certain value you can determine the required current for your L2 board design.

See on the table below

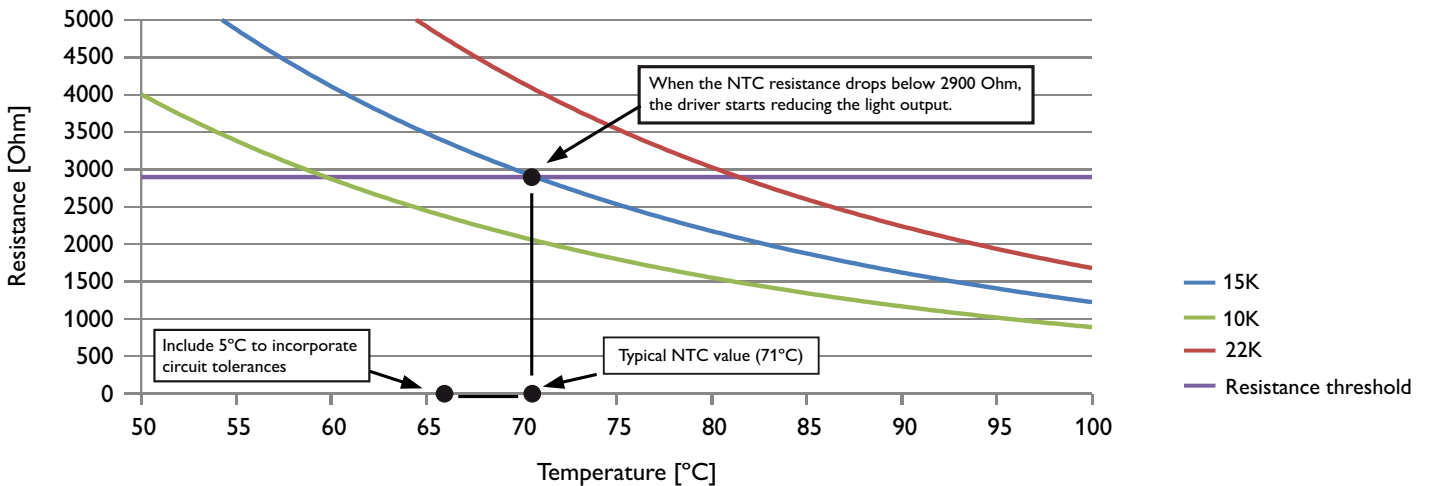
Schematic block diagram



Rset Ω	Iout (mA)	Rset Ω	Iout (mA)	Rset Ω	Iout (mA)	Rset Ω	Iout (mA)
39	200,3	510	292,2	6800	582,7	91000	690,1
43	201,2	560	300	7500	591,4	100000	691,1
47	202,2	620	309	8200	598,9	110000	692
51	203,1	680	317,6	9100	607,2	120000	692,8
56	204,3	750	327,1	10000	614,2	130000	693,4
62	205,7	820	336,2	11000	620,9	150000	694,5
68	207,1	910	347,3	12000	626,6	160000	694,9
75	208,7	1000	357,7	13000	631,6	180000	695,6
82	210,4	1100	368,6	15000	639,8	200000	696,2
91	212,4	1200	378,8	16000	643,2	220000	696,6
100	214,5	1300	388,4	18000	649	240000	697
110	216,7	1500	406	20000	653,7	270000	697,5
120	218,9	1600	414,1	22000	657,7	300000	697,9
130	221,1	1800	429	24000	661	330000	698,2
150	225,5	2000	442,4	27000	665,2	360000	698,5
160	227,6	2200	454,6	30000	668,6	390000	698,7
180	231,9	2400	465,6	33000	671,4	430000	698,9
200	236	2700	480,5	36000	673,8	470000	699,1
220	240,1	3000	493,6	39000	675,8	510000	699,3
240	244,1	3300	505,2	43000	678	560000	699,5
270	250	3600	516,6	47000	679,9	620000	699,7
300	255,7	3900	525	51000	681,6	680000	699,8
330	261,3	4300	536,1	56000	683,3	750000	700
360	266,8	4700	545,9	62000	685	820000	700,1
390	272,1	5100	554,5	68000	686,4	910000	700,2
430	279	5600	564,1	75000	687,7	100000	700,3
470	285,7	6200	574,1	82000	688,9		

Note 1: do not connect Signal ground and Power ground on L2 (PCB)

NTC resistance as function of temperature



NTC and thermal design

The thermal design of a LED engine should be designed in such way that the critical temperature, under normal application conditions, is not reached.

The NTC is meant for ensuring the lifetime of the LED engine in case that external thermal influences result in exceeding the critical temperature. The NTC is not meant for safety purposes.

If the temperature of a LED engine exceeds its critical temperature the light output will be regulated to remain below the critical temperature.

Setting the customized thermal derating threshold via NTC

The LED driver will start regulating the light output when the NTC reaches a value of 2900Ω. The NTC selection should be made as such that the 2900Ω represents the desired critical temperature within your LED engine / L2 PCB board.

For example: The Fortimo LED DLM has a defined Tc life at 65°C. Taking the tolerances of the NTC into account results in ±5 °C. This results in a typical value of the NTC of 71 ±5 °C. To match the 2900Ω at this temperature the NTC from Vishay 15K5 ±2 % (2381 615 54153) has been selected (see graph).

DC/Emergency operation

Both Fortimo and Xitanium LED drivers have not been tested and released for DC emergency operation.

Control characteristics

Control input

Regulating level (lamp power)

10 to 100%

The control input complies with EN 60929 (Annex E) and is compatible with Philips Lighting control equipment

Standby power consumption

< 375mW

Control input insulation, basic

≥ 1500Vac

Option I) DALI

Digital coded input signal according to “Digital Addressable Lighting Interface” protocol, including 16 presets and 64 addresses possibility.

Option II) Touch and DIM

A short push on the button represents the On/Off command. Personal light levels can be set by a firm longer push on the push button. Failure proof (non volatile) memory ensures that the driver always remembers your setting when next time switched on or in case of power failure.

Maximum number of drivers

28 pcs.

Connected in one circuit

(switched on by one or multiple switches)

Polarity free mains input signal

Retractive push-to-make switch

Ignore status, < 0.04 sec.

To avoid reaction on mains spikes

Short push, between 0.04 sec and 0.5 sec.

Switch On/Off

Long push, between 0.5 sec. and 10 sec.

Dim Up/Down

Reset push, > 10 sec.

Set light to mid value (35% output)

Notes

1. The dim direction will toggle after each individual push. Except when the value is lower than 10% it will always dim up, and when the light output is higher than 70% it will always dim down to perform according human perception
2. First digital regulating steps (DALI) are fixed at 1% light output (dimming specification)

Inrush current

Type	Maximum LED drivers on MCB (x)	Inrush current peak (A)	Inrush current Width (ms)
Xitanium 17W 0.3-0.7A 24V I 230V	12	21	0.40
Xitanium 25W 0.3-0.7A 36V I 230V	11	24	0.40
Xitanium 17W 0.3-0.7A 24V TE/I 230V			
Xitanium 25W 0.3-0.7A 36V TE/I 230V			
Xitanium 25W 0.3-1A 36V TD/I 230V	28	16	0.22
Xitanium 25W 0.3-1A 36V TD/Is 230V	28	16	0.22
Fortimo LED driver I 100-2000	12	48	0.18
Fortimo LED driver I 100-2000/I	12	48	0.18
Fortimo LED driver I 100-2000TD	12	48	0.18
Fortimo LED driver I 100-2000TD/I	12	48	0.18

Conversion table for max. quantities of ballasts on other types of Miniature Circuit Breaker

MCB type	Rating	Relative number of LED drivers
B	16A	100% (see table)
B	10A	63%
C	16A	170%
C	10A	104%
L, I	16A	108%
L, I	10A	65%
G, U, II	16A	212%
G, U, II	10A	127%
K, III	16A	254%
K, III	10A	154%

Notes:

1. Data is based on a mains supply with an impedance of 400m Ω (equal to 15m cable of 2.5mm² and other 20m to the middle of the power distribution), under worst case conditions. With an impedance of 800m Ω the number of drivers can be increased by 10%.
2. Measurements will be verified in real installations; therefore data are subject to change.
3. In some cases the maximum number of drivers is not determined by the MCB but by the maximum electrical load of the installation.
4. Note that the maximum number of drivers is given when these are all switched on at the same moment, i.e. by a wall switch.
5. Measurements were carried out on a single-pole MCB's. For multiple MCB's it is advisable to reduce the number of drivers by 20%.
6. The maximum number of drivers that can be connected to one Residential Current Detector of 30mA is 30.

Mains voltage fluctuations

Ballast is able to withstand low and high mains voltages during limited periods of time.

Low mains voltage:

With continuous low AC voltage (<198V) ballast lifetime can be adversely affected. Output power is limited correspondingly. The ballast will not fail at under voltage; for a maximum of 48 hours at minimum operating AC voltage and maximum ballast ambient temperature.

High mains voltage:

High mains voltage does stress the ballast and will adversely affect the ballast lifetime. Maximum 264V...320V during 48 hours, 321V...350V during 2 hours.

Mechanical installation notes

The lifetime of LED drivers depends on its temperature when operating. This means there is a relation between the T_c point on the LED driver and its lifetime. The Fortimo and Xitanium LED drivers have a specified lifetime of 50,000 hrs. with a maximum of 10% failures guaranteed at a measured T_{case} as indicated in the specification table on page 4.

For more information, visit:
www.philips.com/Fortimo
www.philips.com/Xitanium



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