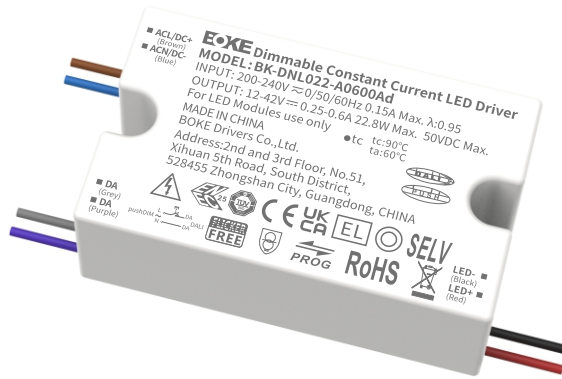


Constant current built-in dimming driver
DNL Series suffix d(DALI-2+pushDIM+DALI PROG)



Features

- Support DALI-2+pushDIM dimming interface
- The output current programming configuration of the driver can be realized through the DALI interface
- Flicker-free output, which meets the requirement of ErP standard
- Using HPC patented technology, at any dimming level, the brightness of the lights is the same
- Standby power input < 0.5W, meets the requirements of ErP certification
- High PF, high efficiency, low THD
- Intelligent LED hot-plug protection function
- SELV and Class II design, suitable for use inside of the light
- Passed CE, ENEC, RCM, DALI-2, EL and other certifications
- IP20 protection grade, indoor use
- Nominal life-time up to 100,000 h
- 5-year guarantee

Interfaces

- DALI-2(DALI-2 DT6)
- PUSH(pushDIM)

Functions

- Support central emergency application (dimming normal or fixed output of programming under in DC input)
- Support self-contained emergency application
- Configure via DALI (PROG)
- Protective features (short-circuit, overload, no-load, hot plug-in protection)

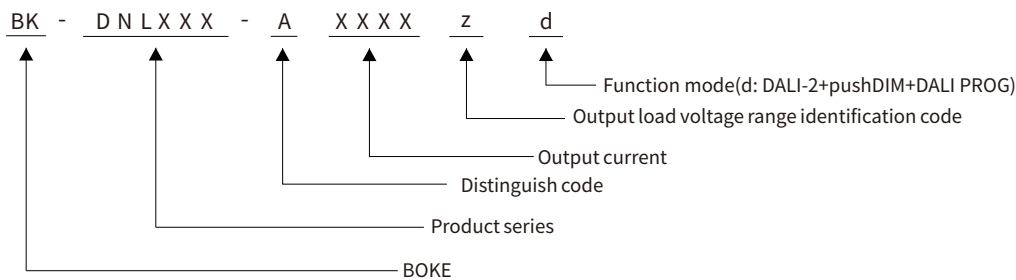
Suitable for lights

- Suitable for lights with built-in drivers such as downlight, rail lights, bracket lights

Typical applications

- LED indoor lighting
- LED office lighting
- LED commercial lighting

Model coding rules of DNL series



Function list

Model	Suffix	Wired dimming		Advanced functions				Device Configuration
		DALI-2	pushDIM	AOC	EL	CLO	corridorDIM	DALI interfaces
BK-DNL010-A BK-DNL022-A	d	√	√	√	√			√
BK-DNL036-A BK-DNL042-A	DP	√	√	√	√	√	√	√

* The description in this specification is only applicable to the products with the suffix **d** and the model are DNL010-A and DNL022-A.

Model list

Model	Input voltage	Output power	Output voltage	Output current	Dimension	Certifications
BK-DNL010-AxxxxAd	200-240VAC/DC	10.8W MAX.	12-25/30/36/42VDC	0.1-0.35A	L84*W44*H25mm	CE,ENEC,RCM,DALI-2,EL
BK-DNL010-AxxxxADP	200-240VAC/DC	10.8W MAX.	12-25/30/36/42VDC	0.1-0.35A	L84*W44*H25mm	CE,ENEC,RCM,DALI-2,EL
BK-DNL022-AxxxxAd	200-240VAC/DC	22.8W MAX.	12-38/40/42VDC	0.25-0.6A	L86*W52*H29mm	CE,ENEC,RCM,DALI-2,EL
BK-DNL022-AxxxxADP	200-240VAC/DC	22.8W MAX.	12-38/40/42VDC	0.25-0.6A	L86*W52*H29mm	CE,ENEC,RCM,DALI-2,EL
BK-DNL036-AxxxxAd	200-240VAC/DC	37.8W MAX.	12-42VDC	0.5-0.9A	L111*W52.9*H30mm	CE,ENEC,RCM,DALI-2,EL
BK-DNL036-AxxxxADP	200-240VAC/DC	37.8W MAX.	12-42VDC	0.5-0.9A	L111*W52.9*H30mm	CE,ENEC,RCM,DALI-2,EL
BK-DNL042-AxxxxAd	200-240VAC/DC	42W MAX.	12-38/40/42VDC	0.7-1.1A	L111*W52.9*H30mm	CE,ENEC,RCM,DALI-2,EL
BK-DNL042-AxxxxADP	200-240VAC/DC	42W MAX.	12-38/40/42VDC	0.7-1.1A	L111*W52.9*H30mm	CE,ENEC,RCM,DALI-2,EL

* The description in this specification is only applicable to the products with the suffix **d** and the model are DNL010-A and DNL022-A.

Technical data

Product model	BK-DNL010-A0250Ad	BK-DNL010-A0300Ad	BK-DNL010-A0350Ad	
Output parameters				
Regulation method	Constant Current	Constant Current	Constant Current	
Rated output current range	0.1-0.25A	0.26-0.3A	0.31-0.35A	
Rated output voltage range	15-42VDC	15-36VDC	15-30VDC	
Rated output power	10.5W Max	10.8W Max	10.5W Max	
Output current adjustment	Program settings	Program settings	Program settings	
Output current ripple LF	±2%	±2%	±2%	
Output current accuracy	±1%	±1%	±1%	
Linear regulation	±1%	±1%	±1%	
Load regulation	±1%	±1%	±1%	
No load output voltage	50VDC			
Flicker-free(typical)	Flickering percent(IEEE 1789)=0.128%, Flicker index(IEEE 1789)=0.000, Pst LM = 0.000, SVM = 0.003, (The above parameters are obtained from testing the panel lights)			
Input parameters				
Rated input voltage range	200-240VAC 200-240VDC			
Input voltage range	180-264VAC 180-264VDC			
Input voltage shock	<380 V AC			
Input current	<0.07A (Rated input voltage)			
Input frequency	0/50/60Hz			
Input PF/Input DF	PF>0.95 (230V AC & Full load),DF>0.96 (230V AC & Full load)			
Input THD	10% (230V AC & Full load)			
Efficiency(typical)	80.5% (230V AC & Full load)			
In-rush current	2.425A peak ,202us duration(50 % Ipeak), see the description below for details			
Start/Switchover/Turn off	<0.7s(AC start),<0.7s(DC start),<0.3s(AC/DC switchover),<0.5s(Turn off)			
Switching cycles	> 50,000 switching cycles			
Power consumption	Full load(Pin):10.8W, No load(Pno): N/A, On stand-by(Psb) : <0.5W, Network stand-by(Pnet) : N/A			
Safety				
Withstand voltage	I/P-O/P:3750VAC ,I/P-DALI: 1500V AC ,O/P-DALI: 1500V AC.			
Mains surge capability	L-N:2KV(Performance criterion:A)			
Leakage current	0.2mA (230V AC & Full load)			
Isolation resistance	I/P-O/P:100MΩ/500Vdc/25°C/70% RH			
Control interface				
DALI dimming port	Voltage range: 9.5-22.5V, typical 16V, interface current consumption: 1.8mA			
pushDIM dimming port	Voltage range: 180-264V 47/63Hz			
1-10V 3in1 dimming port	N/A			
Auxiliary power supply	N/A			
Dimming range	1-100%			
Dimming drive mode	AM(amplitude modulation)			
Emergency support				
Central emergency system	Supported(dimming normal or fixed output of programming under in DC input)			
Self-contained emergency	Supported			
Environment & Life time				
Operating temperature	Ta=-20-60°C			
Case temperature	Tc=90°C			
Operating humidity	5-85% RH, not condensed			
Storage temp./humidity	-40-80°C, 5-85% RH, not condensed			
IP grade	IP20			
MTBF	500,000H,MIL-HDBK-217F(25°C)			
Life-time	Nominal life-time up to 100,000 h, see the description below for details			
Vibration resistant	10~500Hz,5G 12min./1cycle,period for 72min. each along X,Y,Z axes			
Acoustic Noise	<25dB(30cm, Normal operation)			
Environmental protection	RoHS			
Certifications and standards				
Certified	CE,ENEC,RCM,DALI-2,EL			
Safety	EN61347-1, EN61347-2-13, EN62384			
EMC	EN55015, EN61000-3-2 , EN61000-3-3, EN61000-4-2,3,4,5,6,8,11, EN61547			
DALI-2	IEC 62386-101(DALI-2), IEC 62386-102(DALI-2), IEC 62386-207(DALI-2)			
EL	Compatible IEC 61347-2- 13 Annex J , compatible with EN 60598-2-22 and EN 50172			
RF	N/A			

Remarks

1.By default, all parameter are measured at 230VAC input, full load and 25°C of ambient temperature.

Technical data

Product model	BK-DNL022-A0500Ad	BK-DNL022-A0550Ad	BK-DNL022-A0600Ad	
Output parameters				
Regulation method	Constant Current	Constant Current	Constant Current	
Rated output current range	0.25-0.5A	0.51-0.55A	0.56-0.6A	
Rated output voltage range	15-42VDC	15-40VDC	15-38VDC	
Rated output power	21W Max	22W Max	22.8W Max	
Output current adjustment	Program settings	Program settings	Program settings	
Output current ripple LF	±2%	±2%	±2%	
Output current accuracy	±1%	±1%	±1%	
Linear regulation	±1%	±1%	±1%	
Load regulation	±1%	±1%	±1%	
No load output voltage	50VDC			
Flicker-free(typical)	Flickering percent(IEEE 1789)=0.179%,Flicker index(IEEE 1789)=0.000, Pst LM = 0.000, SVM = 0.004, (The above parameters are obtained from testing the panel lights)			
Input parameters				
Rated input voltage range	200-240VAC 200-240VDC			
Input voltage range	180-264VAC 180-264VDC			
Input voltage shock	<380 VAC			
Input current	<0.15A (Rated input voltage)			
Input frequency	0/50/60Hz			
Input PF/Input DF	PF>0.95 (230V AC & Full load),DF>0.97 (230V AC & Full load)			
Input THD	10% (230V AC & Full load)			
Efficiency(typical)	85.5% (230V AC & Full load)			
In-rush current	2.75A peak ,190us duration(50 % Ipeak), see the description below for details			
Start/Switchover/Turn off	<0.7s(AC start),<0.7s(DC start),<0.3s(AC/DC switchover),<0.5s(Turn off)			
Switching cycles	> 50,000 switching cycles			
Power consumption	Full load(Pin):26.7W, No load(Pno): N/A, On stand-by(Psb) : <0.5W, Network stand-by(Pnet) : N/A			
Safety				
Withstand voltage	I/P-O/P:3750VAC ,I/P-DALI: 1500V AC ,O/P-DALI: 1500V AC.			
Mains surge capability	L-N:2KV(Performance criterion:A)			
Leakage current	0.2mA (230V AC & Full load)			
Isolation resistance	I/P-O/P:100MΩ/500Vdc/25°C/70% RH			
Control interface				
DALI dimming port	Voltage range: 9.5-22.5V, typical 16V, interface current consumption: 1.8mA			
pushDIM dimming port	Voltage range: 180-264V 47/63Hz			
1-10V 3in1 dimming port	N/A			
Auxiliary power supply	N/A			
Dimming range	1-100%			
Dimming drive mode	AM(amplitude modulation)			
Emergency support				
Central emergency system	Supported(dimming normal or fixed output of programming under in DC input)			
Self-contained emergency	Supported			
Environment & Life time				
Operating temperature	Ta=-20-60°C			
Case temperature	Tc=90°C			
Operating humidity	5-85% RH, not condensed			
Storage temp./humidity	-40-80°C, 5-85% RH, not condensed			
IP grade	IP20			
MTBF	500,000H,MIL-HDBK-217F(25°C)			
Life-time	Nominal life-time up to 100,000 h, see the description below for details			
Vibration resistant	10~500Hz,5G 12min./1cycle,period for 72min. each along X,Y,Z axes			
Acoustic Noise	<25dB(30cm, Normal operation)			
Environmental protection	RoHS			
Certifications and standards				
Certified	CE,ENEC,RCM,DALI-2,EL			
Safety	EN61347-1, EN61347-2-13, EN62384			
EMC	EN55015, EN61000-3-2 , EN61000-3-3, EN61000-4-2,3,4,5,6,8,11, EN61547			
DALI-2	IEC 62386-101(DALI-2), IEC 62386-102(DALI-2), IEC 62386-207(DALI-2)			
EL	Compatible IEC 61347-2- 13 Annex J , compatible with EN 60598-2-22 and EN 50172			
RF	N/A			

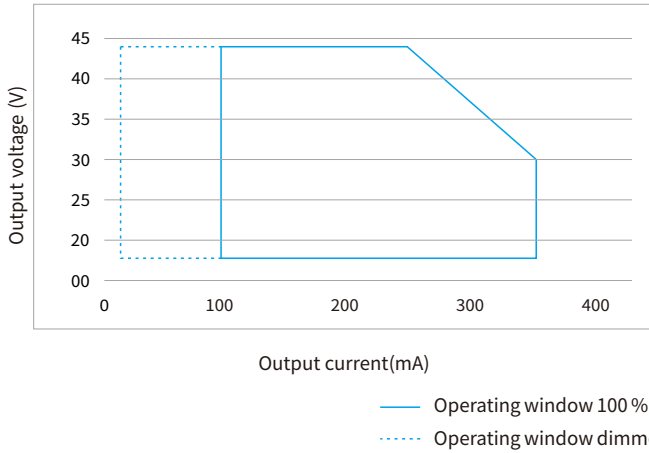
Remarks

1.By default, all parameter are measured at 230VAC input, full load and 25°C of ambient temperature.

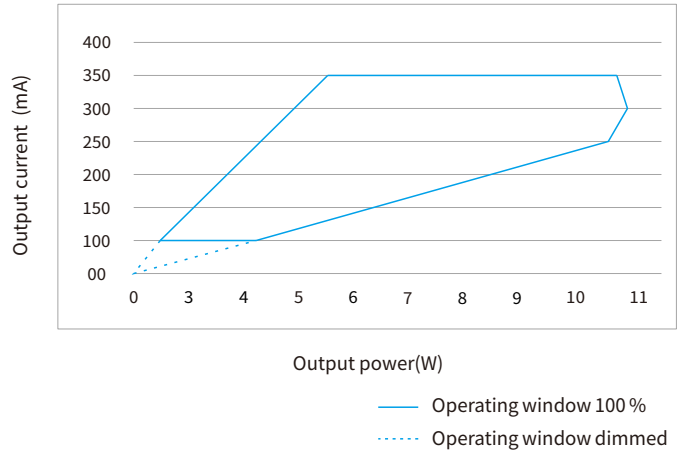
Electrical values

BK-DNL010-A

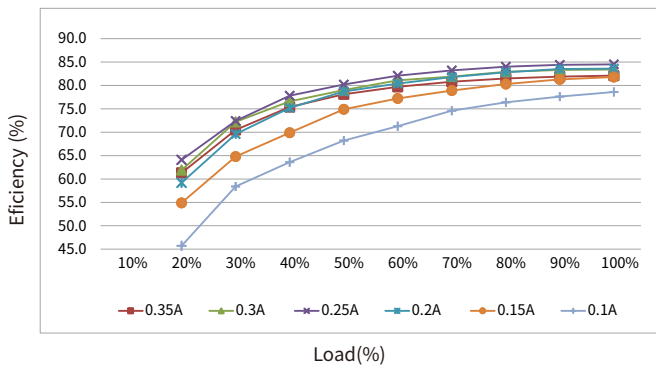
Operating window



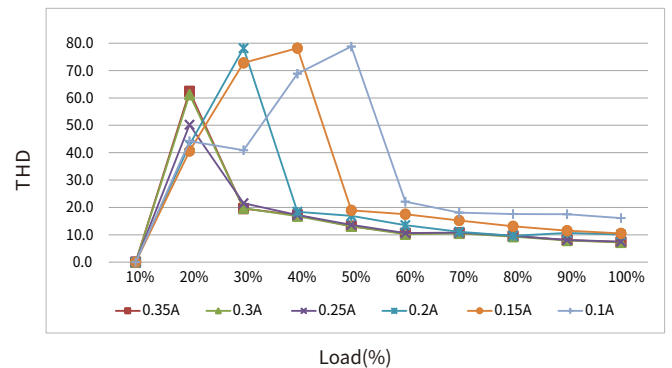
Operating window



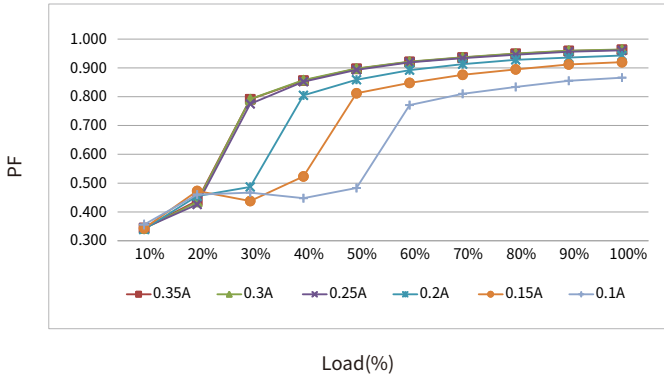
Efficiency vs Load



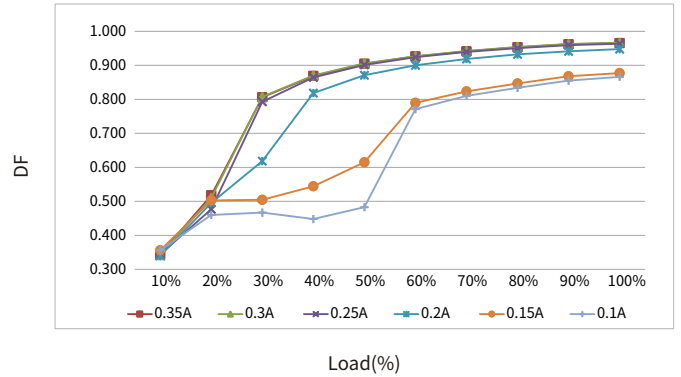
THD vs. Load



Power factor vs. Load

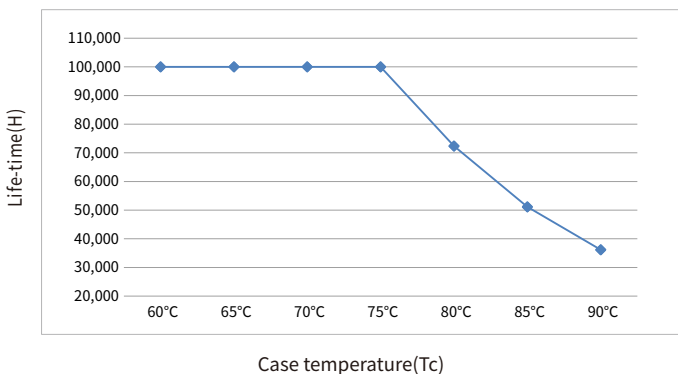


Displacement factor vs. Load



Expected life-time

Life-time vs. case temperature

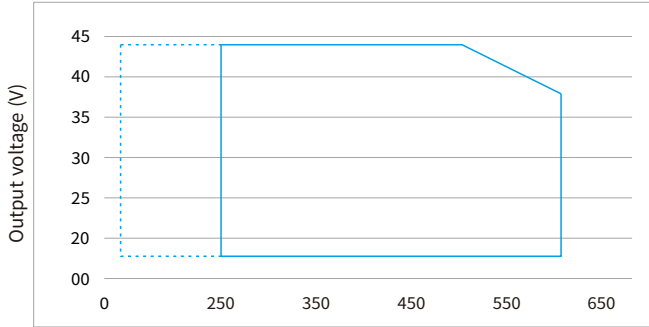


-The life-time of the LED driver is shown in the figure above (calculated based on the 90% survival rate).
 - The relation of tc to ta temperature depends also on the luminaire design.

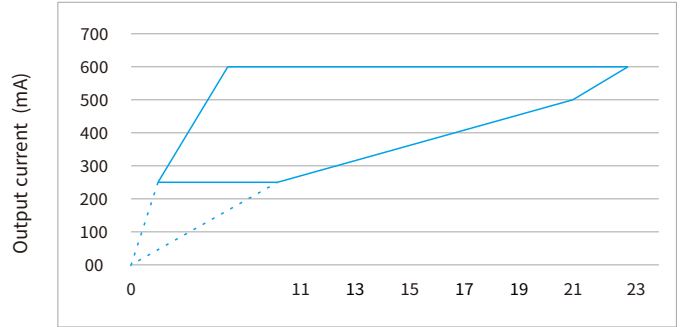
Electrical values

BK-DNL022-A

Operating window



Operating window



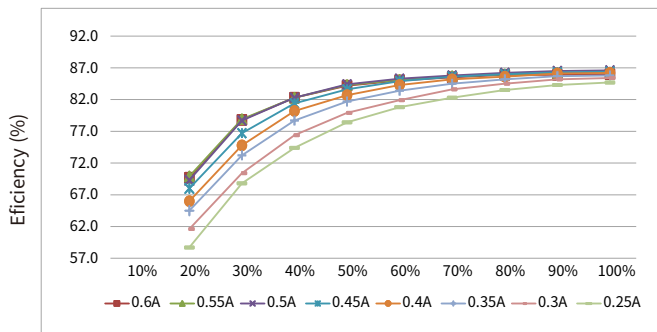
Output current(mA)

Output power(W)

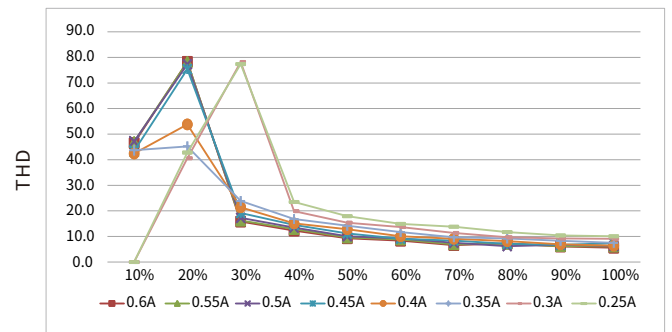
— Operating window 100 %
 - - - - - Operating window dimmed

— Operating window 100 %
 - - - - - Operating window dimmed

Efficiency vs load



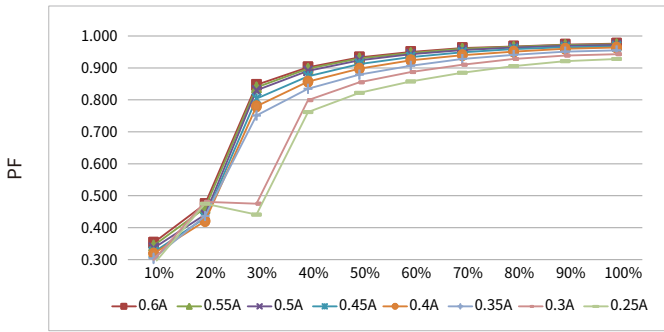
THD vs. Load



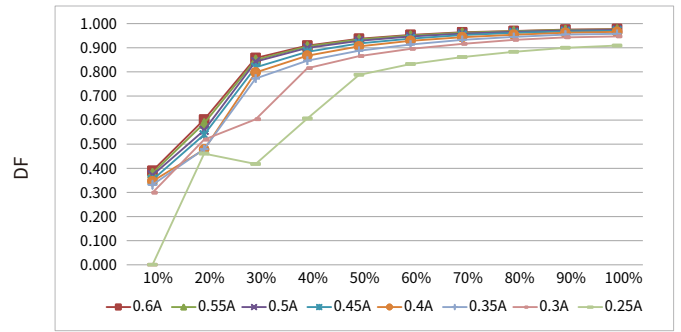
Load(%)

Load(%)

Power factor vs. Load



Displacement factor vs. Load

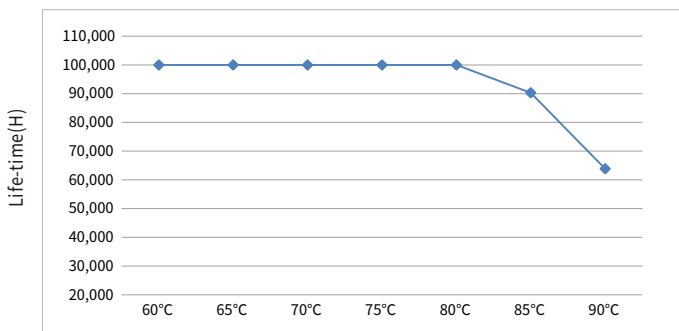


Load(%)

Load(%)

Expected life-time

Life-time vs. case temperature



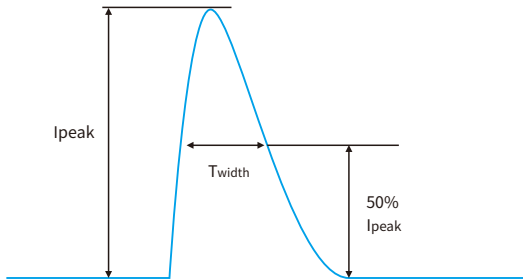
-The life-time of the LED driver is shown in the figure above (calculated based on the 90% survival rate).

- The relation of tc to ta temperature depends also on the luminaire design.

Case temperature(Tc)

Surge

Model	I _{peak}	T _{width}	Condition	Relative number of MCB/pcs														
				B10	B13	B16	B20	B25	C10	C13	C16	C20	C25	D10	D13	D16	D20	D25
BK-DNL010-A	2.425A	202us	AC 230V, Full load, Cold start, T _a ≤ 30°C, MCB is not installed side by side	104	135	166	208	260	117	152	187	234	293	117	152	187	234	293
BK-DNL022-A	2.75A	190us		59	77	94	118	147	59	77	94	118	147	59	77	94	118	147



Remarks

- The number of drives mounted under different MCBs in the table is the maximum value. Please do not exceed this number during installation.
- Calculation uses typical values from ABB series S200 as a reference.
- Different brands and models of miniature circuit breakers, the number of drives mounted will be slightly different.
- If the ambient temperature of the MCB installation exceeds 30°C or multiple MCBs are installed side by side, the number of drives mounted will be reduced and the calculation needs to be recalculated.
- Electrician's usually consider Type B for household lighting and Type C for commercial lighting application.

Functions

Output short-circuit behaviour

- In case of a short-circuit at the LED output ,the LED output is switched off.
- After restart of the LED driver ,the output will be activated again.

Output no-load operation

- The LED driver will not be damaged in no-load operation.
- The output will be deactivated and is therefore free of voltage.
- If a LED load is connected , the device has to be restarted before the output will be activated again.

Output overload protection

- If the output voltage range is exceeded the LED driver turns off the LED output.
- After restart of the LED driver the output will be activated again.

Output hot plug-in

- For protection LED if plug the LED into the output of the powered driver, the LED will not on, the device has to be restarted.

Driver restart method

There are two ways to restart the device:

- Through the AC input portr:disconnect the AC of the driver and power it again.
- Through dimming interface.

DALI:send "OFF" command first,then send "MAX" command.

pushDIM:short press PUSH switch two times,then long press PUSH switch.

Adjustable output current (AOC)

- The output current of the driver can be adjusted within a certain range, can be selected through the device configuration software.

Programming(PROG)

- Connect the "DALI Programmer" programmer to the DALI port of the driver and use the "Device configuration" software to configure the functions of the driver.

Device configuration(EasySet)

- Please see the "Device configuration" section.
- For further information see device configuration instruction manual.

Insulation between circuits

Isolation	Input	Output	DALI	PUSH	Case
Input	-	Double	Basic	-	Double
Output	Double	-	Double	Double	Basic
DALI	Basic	Double	-	-	Double
PUSH	-	Double	-	-	Double
Case	Double	Basic	Double	Double	-

Label

DNL010-A

■ ACL/DC+ (Brown)
 ■ ACN/DC- (Blue)

BOKE Dimmable Constant Current LED Driver
MODEL: BK-DNL010-A0350Ad
 INPUT: 200-240V \approx 0/50/60Hz 0.07A Max. λ :0.95
 OUTPUT: 12-42V \approx 0.1-0.35A 10.8W Max. 50VDC Max.
 For LED Modules use only

MADE IN CHINA
 BOKE Drivers Co.,Ltd.
 Address:2nd and 3rd Floor, No.51, Xihuan 5th Road,
 South District, 528455 Zhongshan City, Guangdong, CHINA

tc:90°C
 ta:60°C

■ DA (Grey)
 ■ DA (Purple)

pushDIM L N DA DALI

LED- (Black)
 LED+ (Red)

Laser carving craft

DNL022-A

■ ACL/DC+ (Brown)
 ■ ACN/DC- (Blue)

BOKE Dimmable Constant Current LED Driver
MODEL: BK-DNL022-A0600Ad
 INPUT: 200-240V \approx 0/50/60Hz 0.15A Max. λ :0.95
 OUTPUT: 12-42V \approx 0.25-0.6A 22.8W Max. 50VDC Max.
 For LED Modules use only

MADE IN CHINA
 BOKE Drivers Co.,Ltd.
 Address:2nd and 3rd Floor, No.51,
 Xihuan 5th Road, South District,
 528455 Zhongshan City, Guangdong, CHINA

tc:90°C
 ta:60°C

■ DA (Grey)
 ■ DA (Purple)

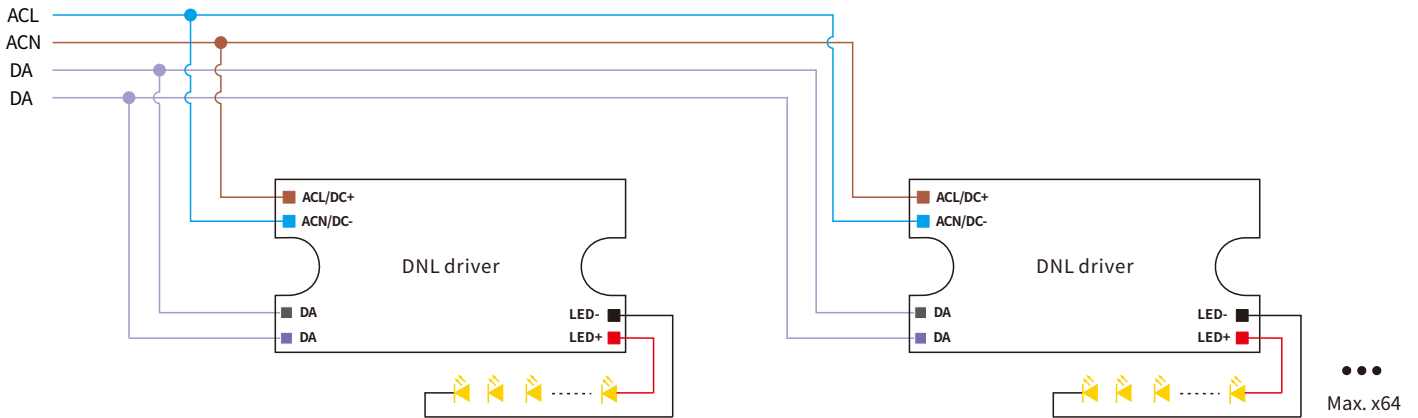
pushDIM L N DA DALI

LED- (Black)
 LED+ (Red)

Laser carving craft

DALI dimming application

Wiring diagram



Switch to the DALI dimming mode

- After installation according to the wiring diagram of DALI dimming application, the driver will automatically switch to the DALI control mode after receiving any DALI command.

Remarks:

- Standard DALI control line voltage range: 9.5V to 22.5V, type 16V.
- The two DALI control lines polarity-reversible.
- Max. 64 DALI drivers per DALI control line.
- The maximum distance length of the DALI control line is 300m at $2 \times 1.5\text{mm}^2$.
- DALI bus can be wired together with any mains voltage cables, but separate wiring is recommended.
- The configuration parameters of the driver can be set through the DALI configuration tool or DALI application controller during installation, such as setting device address, group address, power-on level, bus-failure level, scene level, fade time, dimming curve, etc.

Please refer to the table below

Cable size	Distance
$2 \times 0.50\text{mm}^2$	max.100m
$2 \times 0.75\text{mm}^2$	max.150m
$2 \times 1.00\text{mm}^2$	max.200m
$\geq 2 \times 1.50\text{mm}^2$	max.300m

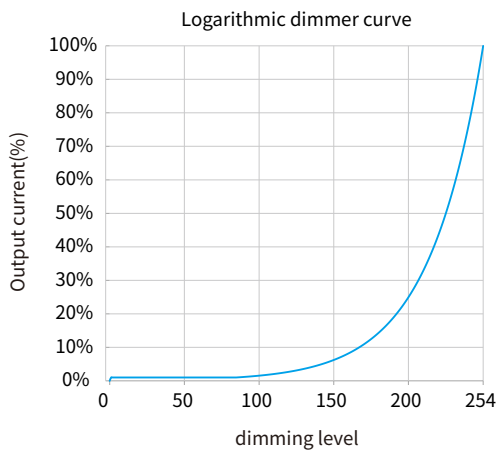
Power-on level :

When the driver is in DALI-2 dimming mode, the factory default level after each power-on is the brightest.

The power-on level can be set through the DALI configuration tool or DALI application controller during installation, and can be set to memory or fixed any brightness (such as off, darkest, 50%, etc.).

Note: The recommended setting for the default factory power-on level of the DALI-2 driver is the brightest in the DALI-2 standard.

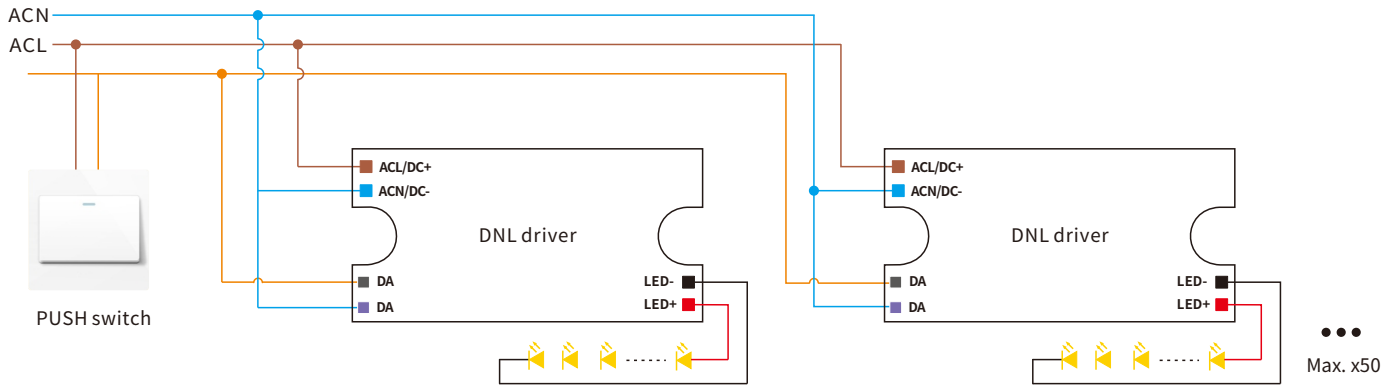
Dimming curve



Remarks: The dimming curve can be selected by DALI configuration. The default is logarithmic dimming curve.

pushDIM dimming application

Wiring diagram



Switch to the pushDIM dimming mode

After installation according to the wiring diagram of pushDIM dimming application, short press the pushbutton 1 times, the driver will automatically switch to the pushDIM dimming mode.

Remarks:

Max. 50 drivers per pushDIM control line.

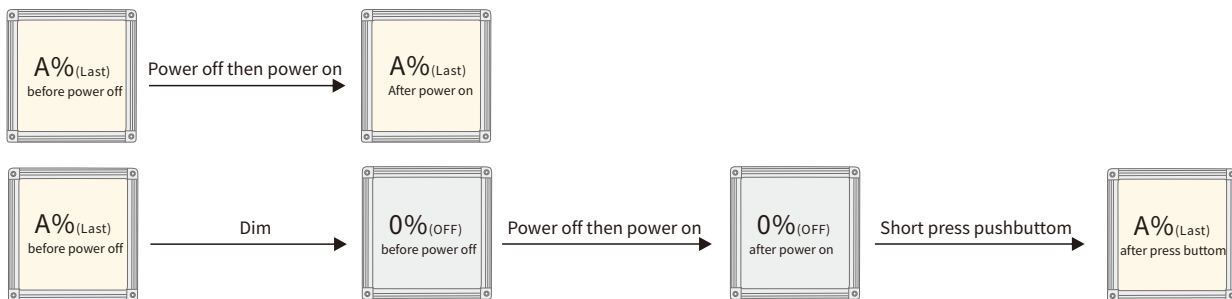
Turn on or turn off:short press pushbutton for 0.2-1s.

Dimming: long press pushbutton for 1-5s.

Power on status: after power on,the light state will be the same as the lighting on state.

If the light is on before power on,the light will be on after power on again,brightness will be the same as the last lighting on brightness.

If the light is off before power off,the light will be off after power on again,short press the pushbutton,then the light will be on,the brightness will be the same as the last brightness.



Multiple lights synchronize control operation

method 1:

Step 1:long press the pushbutton,confirm each light is on.

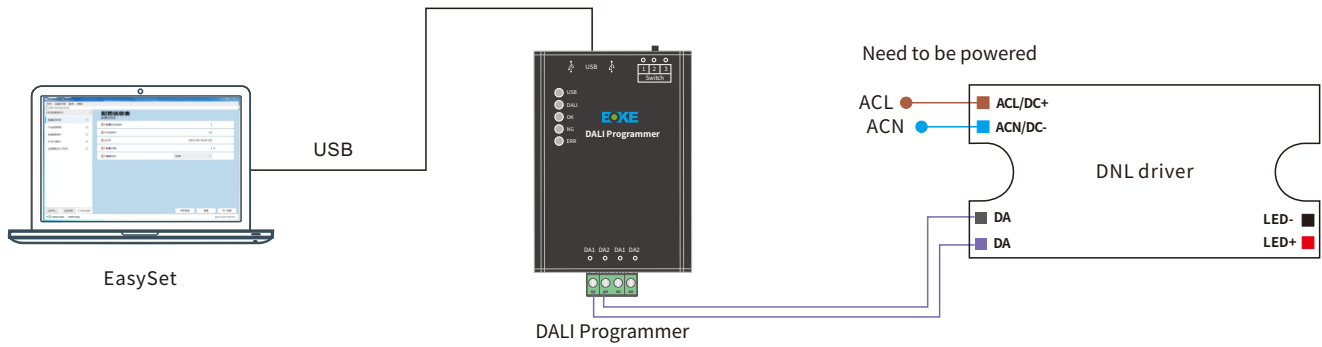
Step 2:short press the pushbutton,confirm each light is off.

Step 3:long press the pushbutton,confirm each light is from darkest to brightest and all the lights are synchronous.

method 2:

- Long press the pushbutton 15s,all lights output to the brightest state.

Device configuration



Configure tools and software

Name	Brand	Name	Minimum version
DALI Configurator	BOKE	DALI Programmer	V1.0.0
PC Software	BOKE	EasySet	V1.0.0

Parameters configure

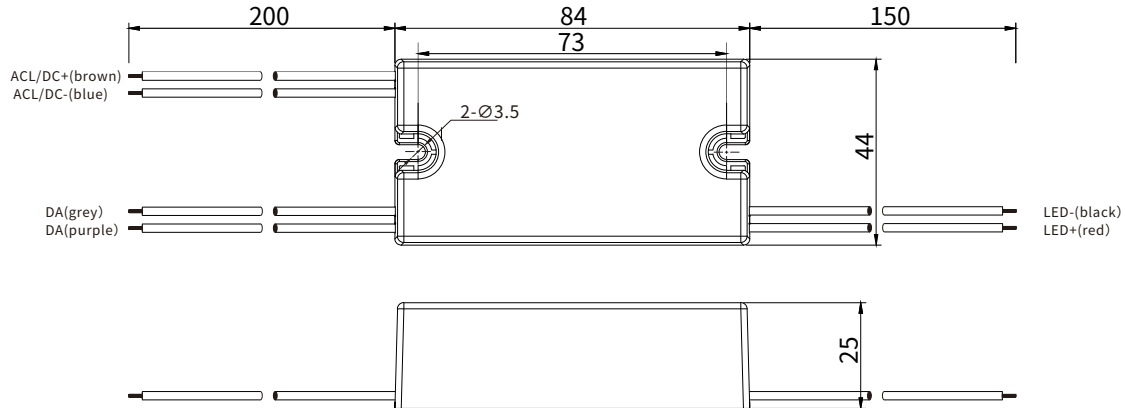
Configuration items	Factory settings	Parameter configuration	Read/Wirte
Product information	-	NO	Read Only
Adjustable output current(AOC)	Activated	YES	Read/Wirte
PUSH dimming function(pushDIM)	Activated	YES	Read/Wirte
Hot plug-in protection(HPP)	Activated	YES	Read/Wirte
Running time		NO	Read Only
Other parameters		YES	

Installation

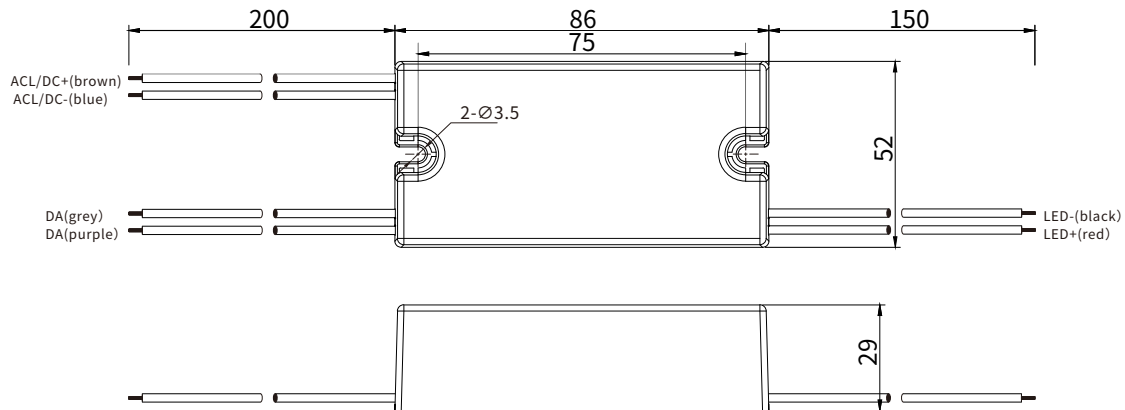
Mechanical dimensions

Unit:mm

DNL010-A



DNL022-A



Input wire

Numbering	function	colour	Wire type	Wire diameter	Wire length	Strip length
1	ACL/DC+	brown	VDE-REG 7997	AWG18	200mm	8mm
2	ACN/DC-	blue	VDE-REG 7997	AWG18	200mm	8mm
3	DA	grey	VDE-REG 7997	AWG20	200mm	8mm
4	DA	purple	VDE-REG 7997	AWG20	200mm	8mm

Output wire

Numbering	function	colour	Wire type	Wire diameter	Wire length	Strip length
1	LED-	black	VDE-REG 7997	AWG20	150mm	8mm
2	LED+	red	VDE-REG 7997	AWG20	150mm	8mm

Installation note

Hot plug-in

- Hot plug-in is not supported due to residual output voltage of > 0 V.
- If a LED load is connected the device has to be restarted.
- Restart can be achieved by re-powering the driver or executing a on/off command (action) through the control interface (DALI, pushDIM)

Wiring guidelines

- All connections must be kept as short as possible to ensure good EMI behaviour.
- Mains leads should be kept apart from LED Driver and other leads (ideally 5 – 10 cm distance)
- Max. length of output wires is 2 m.
- Incorrect wiring can damage LED modules.

Mounting screw specifications and torque

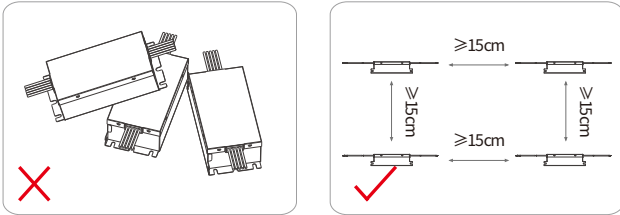
- Max. torque at the clamping screw: 0.5 Nm / M4

Replace LED module

1. Mains off
2. Remove LED module
3. Wait for 5 seconds
4. Connect LED module again

Installation requirements

- The driver should be installed in a dry, acid-free, oil-free, fat-free environment.
- The installation ambient temperature of the drive shall not exceed the value of Ta at any time.
- The temperature of the mounting surface of the driver should be lower than 40°C
- The driver should keep a certain distance from the heating stuff (such as the luminaire radiator).



Please do not stack the products. The distance between two products should be $\geq 15\text{cm}$ so as not to affect heat dissipation and the lifespan of the products.

Packaging



Model	Product size	Weight	Packaging size	Carton size	Qty/carton	N.W	G.W
DNL010-A	L84*W44*H25mm	138g	L100*W45*H65mm	L420*W285*H155mm	48pcs	6.62KG	8.13KG
DNL022-A	L86*W52*H29mm	182g	L100*W45*H65mm	L420*W285*H155mm	48pcs	8.74KG	10.2KG

Additional information

1. The life and MTBF of the product are for reference only, and do not represent a warranty statement.
2. For more information, please send an email to info@bokedriver.com.