

## LF-FSD060YB-E

Non-isolated DIP Switch DALI Dimmable Constant Current LED Driver



### Product family features

- DALI&PUSH dimmable
- Dims to off without afterglow
- Supports 2 sets of light fixtures connected in series
- Standby power consumption  $\leq 0.5W$
- Suitable for Class I light fixtures
- 5 years guarantee
- Lifetime up to 100,000h



### Product family benefits

- Advanced functions: EL, CorridorDIM, CLO
- DALI-2 part ext. 251, 252 and 253
- Parameters changeable via Lifud programmer
- 16-shift output current adjustable via DIP switch
- According to Zhaga Book13
- Surge level: PUSH: 1kV; L-N: 2kV; L/N-PE: 2kV

### Typical applications

- For linear light and tri-proof light
- For office, commercial and decorative lighting

### Product parameters

- |                            |                            |
|----------------------------|----------------------------|
| — Output current 75-450mA  | — Output voltage 54-240Vdc |
| — Output power 18-60W      | — Efficiency 93%           |
| — Input voltage 198-264Vac |                            |

## Electrical data

### Input data

|                                            |                                             |
|--------------------------------------------|---------------------------------------------|
| Rated input voltage                        | 220 ... 240V                                |
| AC voltage range                           | 198 ... 264V                                |
| Mains frequency                            | 0/50/60Hz                                   |
| Input voltage DC                           | 176...280V                                  |
| Power factor                               | ≥0.96                                       |
| Efficiency in max. power                   | ≥93%                                        |
| THD                                        | <8%                                         |
| Input current                              | 0.38A Max @AC input<br>0.08-0.30A @DC input |
| Inrush current                             | 28A <sup>1)</sup>                           |
| Loading number on circuit breaker 10 A (B) | 15                                          |
| Loading number on circuit breaker 10 A (C) | 24                                          |
| Loading number on circuit breaker 16 A (B) | 17                                          |
| Loading number on circuit breaker 16 A (C) | 28                                          |
| Protective conductor current               | ≤3.5mA                                      |
| Stand-by power consumption                 | ≤0.5W                                       |

### Output data

|                                |                                                   |
|--------------------------------|---------------------------------------------------|
| Nominal output voltage         | 54... 240V                                        |
| Nominal output current         | 75...450mA                                        |
| Default output current         | 75mA                                              |
| Current setting                | DIP switch (please see the DIP switch definition) |
| Maximum output power           | 60W                                               |
| Nominal output power           | 18 ... 60W                                        |
| Output ripple current (100 Hz) | ±3.3 %                                            |
| Flicker                        | According to IEEE Std 1789-2015                   |
| CIE SVM                        | ≤0.4                                              |
| IEC-Pst                        | ≤1                                                |
| Output current tolerance       | ±5%                                               |
| Temperature tolerance          | ±10%                                              |
| AC start-up time               | <1.2S                                             |
| DC start-up time               | <0.8S                                             |
| AC/DC switch time              | <0.8S                                             |

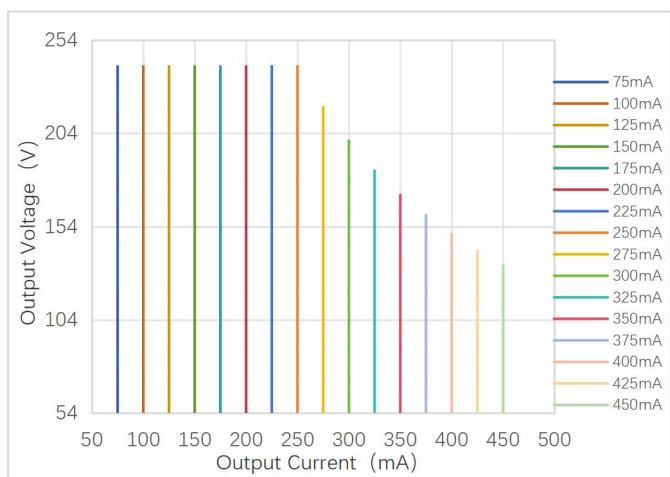
### Safety

|                           |                                                                        |
|---------------------------|------------------------------------------------------------------------|
| Withstanding voltage      | I/P-PE, O/P-PE, I/P-DA1/DA2, O/P-DA1/DA2,<br>DA1/DA2-PE: 1.5kV&5mA&60S |
| Surge capability (L-N)    | 2kV                                                                    |
| Surge capability (L/N-PE) | 2kV                                                                    |
| PUSH <sup>2)</sup>        | 1kV                                                                    |
| Insulation resistance     | I/P-PE, O/P-PE, I/P-DA1/DA2, O/P-DA1/DA2,<br>DA1/DA2-PE: >100MΩ@500VDC |
| Lifetime                  | Up to 100,000 hours <sup>3)</sup>                                      |

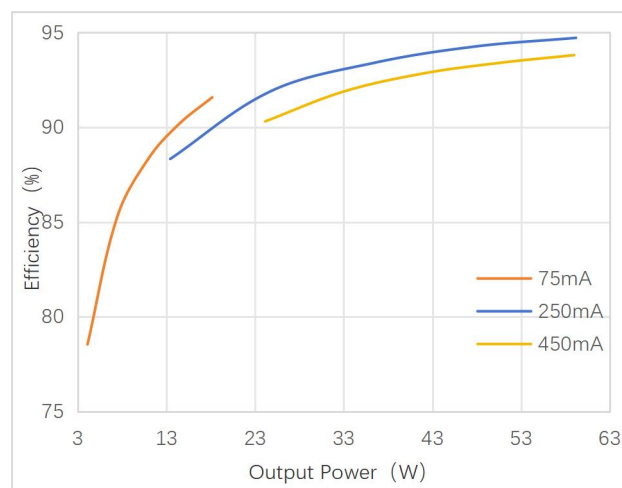
- 1)  $t = 210\mu s$
- 2) The surge test wiring at the PUSH terminal is connected in parallel with L-N
- 3) For details, please refer to the service life table
- 4) 5 years @  $T_c \leq 80^\circ C$

## Characteristic diagrams

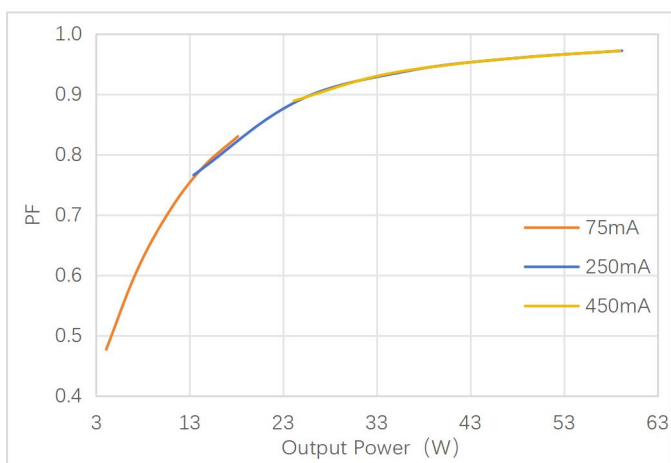
**Operating Window**



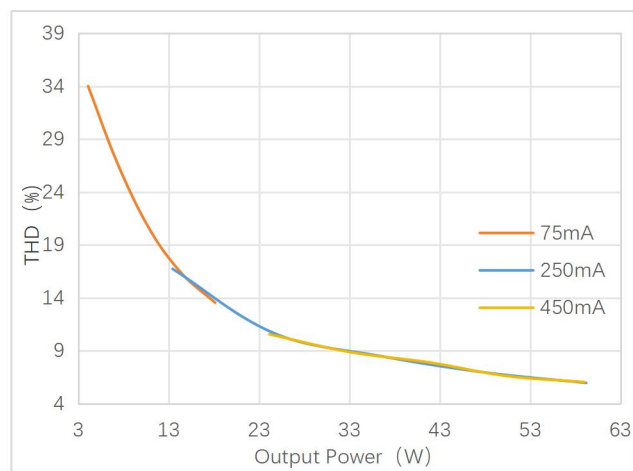
**Typical Efficiency vs Load**



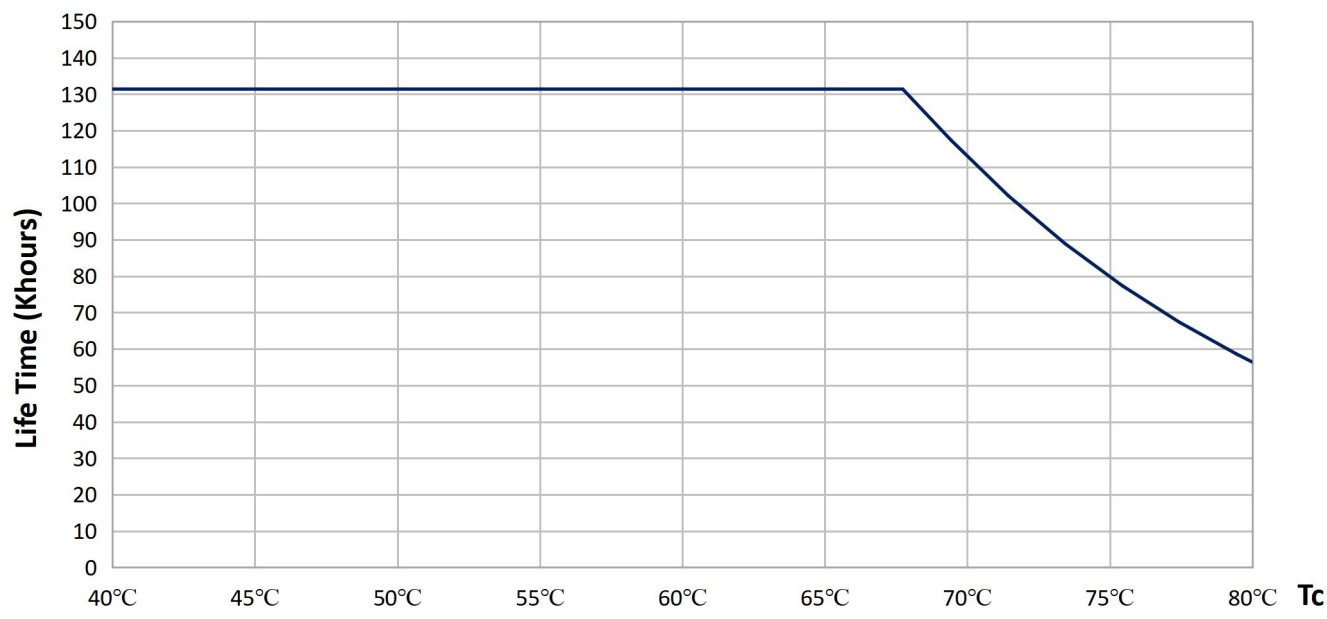
**Typical Power Factor vs Load**



**Typical THD vs Load**



Lifespan



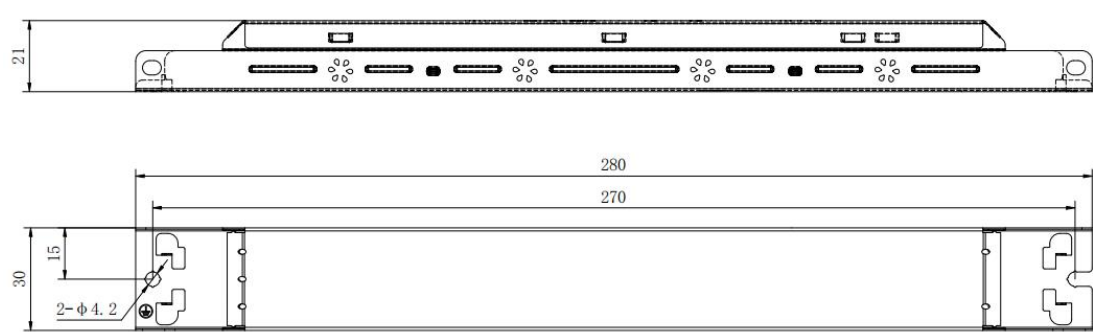
Service life

| Model         | Iout  | Pout | Ta       | 55°C      | 65°C     |
|---------------|-------|------|----------|-----------|----------|
| LF-FSD060YB-E | 450mA | 60W  | Tc       | 70°C      | 80°C     |
|               |       |      | Lifetime | >100,000h | >50,000h |

Note: The design life of the LED driver is as described above under reference conditions. The failure probability is less than 10%.

The relationship between Tc and Ta also depends on the design of the luminaire.

Dimensions



|                                      |                 |
|--------------------------------------|-----------------|
| Mounting hole spacing, length        | 270mm           |
| Product weight                       | 164g            |
| Cable cross-section, input side      | 0.5 ... 1.5 mm² |
| Cable cross-section, output side     | 0.5 ... 1.5 mm² |
| Wire preparation length, input side  | 7 ... 8mm       |
| Wire preparation length, output side | 7 ... 8mm       |

|        |        |
|--------|--------|
| Length | 280mm  |
| Width  | 30.0mm |
| Height | 21.0mm |

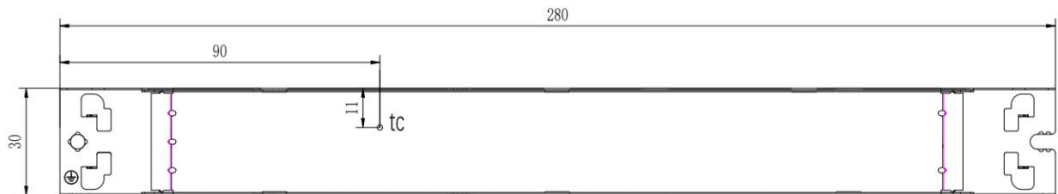
### Colors & materials

|                 |                    |
|-----------------|--------------------|
| Casing material | Color coated sheet |
| Casing color    | White              |

### Temperature & operating conditions

|                                      |                                                 |
|--------------------------------------|-------------------------------------------------|
| Ambient temperature range            | -30°C - +65°C                                   |
| Maximum temperature at tc test point | 80°C                                            |
| Temperature range at storage         | -30°C - +80°C (6 months in Class I environment) |
| Humidity range at storage            | 20-75%RH (no condensation)                      |
| Humidity during operation            | 20-95%RH (no condensation)                      |
| Atmospheric pressure                 | 86-106KPa                                       |
| RoHS                                 | RoHS 2.0 (EU) 2015/863                          |

### Tc test point



**Tc point is at the top of LED driver**

### Product terminal

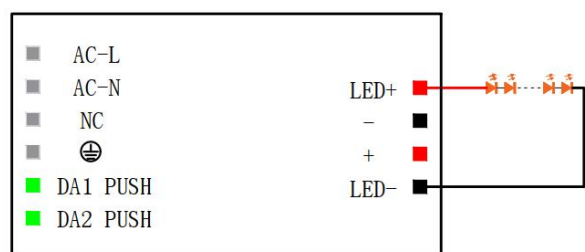
| Input            |                          | Output      |                                                   |
|------------------|--------------------------|-------------|---------------------------------------------------|
| AC-L (Gray)      | AC live wire input       | LED+ (Red)  | Positive terminal output of LED driver            |
| AC-N (Gray)      | AC neutral wire input    | - (Black)   | Negative terminal output of LED series connection |
| /                | /                        | + (Red)     | Positive terminal output of LED series connection |
| ⊕ (Gray)         | Earth wire               | LED-(Black) | Negative terminal output of LED driver            |
| DA1 PUSH (Green) | DALI1/PUSH dimming input |             |                                                   |
| DA2 PUSH (Green) | DALI2/PUSH dimming input |             |                                                   |

## DIP switch definition

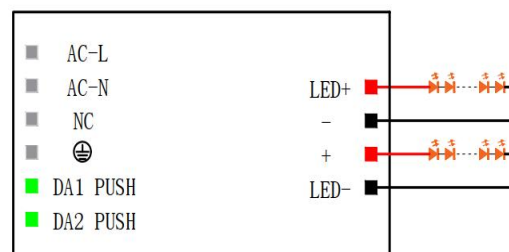
| Output current | Output voltage | DIP switch 1 | DIP switch 2 | DIP switch 3 | DIP switch 4 |
|----------------|----------------|--------------|--------------|--------------|--------------|
| *75mA          | 54-240Vdc      | -            | -            | -            | -            |
| 100mA          | 54-240Vdc      | ON           | -            | -            | -            |
| 125mA          | 54-240Vdc      | -            | ON           | -            | -            |
| 150mA          | 54-240Vdc      | ON           | ON           | -            | -            |
| 175mA          | 54-240Vdc      | -            | -            | ON           | -            |
| 200mA          | 54-240Vdc      | ON           | -            | ON           | -            |
| 225mA          | 54-240Vdc      | -            | ON           | ON           | -            |
| 250mA          | 54-240Vdc      | ON           | ON           | ON           | -            |
| 275mA          | 54-218Vdc      | -            | -            | -            | ON           |
| 300mA          | 54-200Vdc      | ON           | -            | -            | ON           |
| 325mA          | 54-184Vdc      | -            | ON           | -            | ON           |
| 350mA          | 54-171Vdc      | ON           | ON           | -            | ON           |
| 375mA          | 54-160Vdc      | -            | -            | ON           | ON           |
| 400mA          | 54-150Vdc      | ON           | -            | ON           | ON           |
| 425mA          | 54-141Vdc      | -            | ON           | ON           | ON           |
| 450mA          | 54-133Vdc      | ON           | ON           | ON           | ON           |

Note: "-": OFF; "\*": default current. When adjusting the output current via the DIP switch, please disconnect input AC first so as to use the DIP switch without the input AC connected.

## Wiring diagrams of output terminal



Wiring diagram of single light fixture



Wiring diagram of double light fixtures

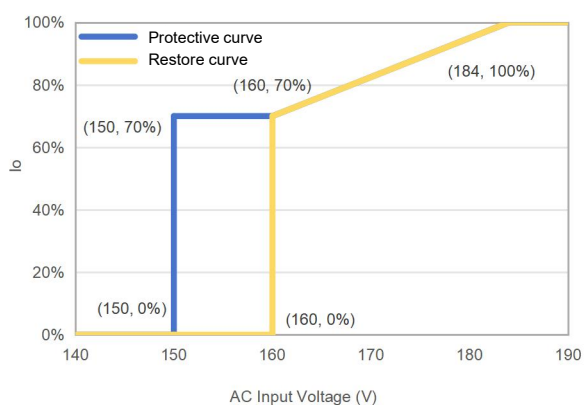
## Protective characteristics

| Protective type               |                    | Min.   | Typ.   | Max.   | Introduction                                                                                         |
|-------------------------------|--------------------|--------|--------|--------|------------------------------------------------------------------------------------------------------|
| Input undervoltage protection | Protective voltage | 145Vac | 150Vac | 155Vac | When the input voltage is lower than the protective voltage, the light will be off.                  |
|                               | Restore voltage    | 156Vac | 160Vac | 165Vac | When the input voltage is higher than the restore voltage, the light can be automatically turned on. |
| Input overvoltage protection  | Protective voltage | 310Vac | 320Vac | 330Vac | When the input voltage is higher than the protective voltage, the light will be off.                 |
|                               | Restore voltage    | 261Vac | 270Vac | 278Vac | When the input voltage is lower than the restore voltage, the light can be automatically turned on.  |

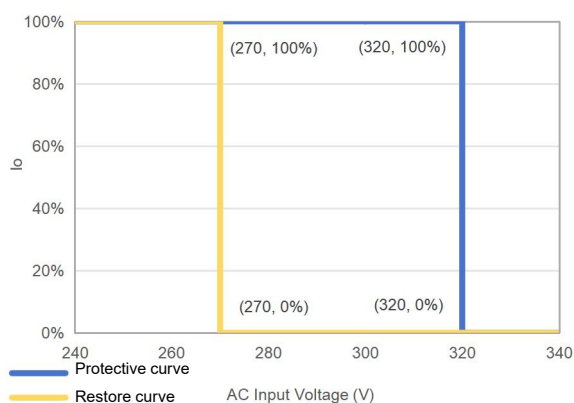
Note: By default, only the input undervoltage and input overvoltage states are reported, and the light will not be turned off. It will enter the power-off protection mode only after the software settings are activated.

## Protective characteristics schematic diagrams

Schematic diagram of input undervoltage protection



Schematic diagram of input overvoltage protection

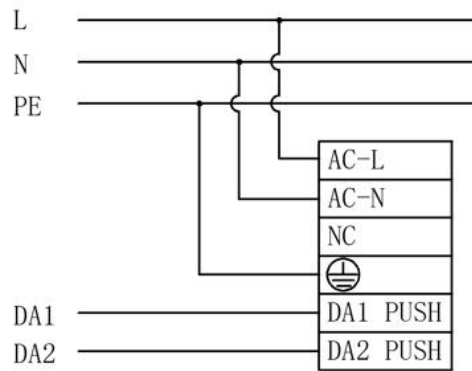


## Capabilities

|                                               |                             |
|-----------------------------------------------|-----------------------------|
| <b>Dimmable</b>                               | DALI/PUSH dimmable          |
| <b>Dimming range</b>                          | 1 ... 100%                  |
| <b>Overload protection</b>                    | Yes                         |
| <b>Short circuit protection</b>               | Hiccup mode (Self-recovery) |
| <b>No-load protection</b>                     | <250V                       |
| <b>Suitable for fixtures with prot. class</b> | I                           |
| <b>Programming interface</b>                  | DALI                        |
| <b>Control interface</b>                      | DALI                        |
| <b>Number of channels</b>                     | 1 channel                   |
| <b>CorridorDIM</b>                            | Yes                         |
| <b>EL</b>                                     | Yes                         |
| <b>CLO</b>                                    | Yes                         |
| <b>DALI Part 251 252 253</b>                  | Yes                         |

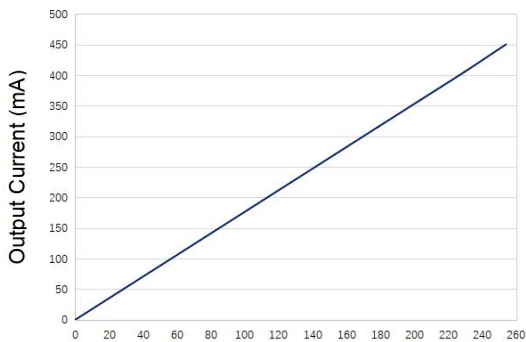
## Dimming function instructions

### • DALI dimming function

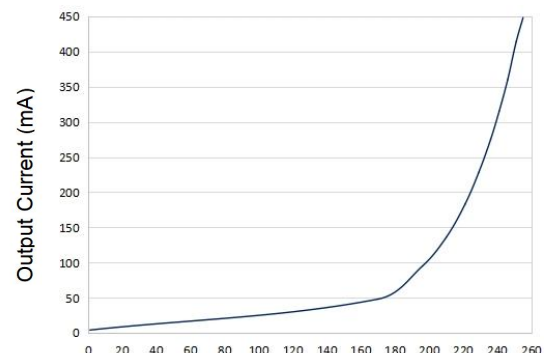


**Wiring diagram of DALI dimming**

- ① Default setting brightness is 100%.
- ② Connect DALI signal to DA1 PUSH and DA2 PUSH.
- ③ DALI protocol includes Max.16 scene groups.
- ④ Maximum number of LED drivers connected in parallel in DALI dimming mode: 64 pcs.
- ⑤ Current at minimum dimming of DALI dimming: 7mA.



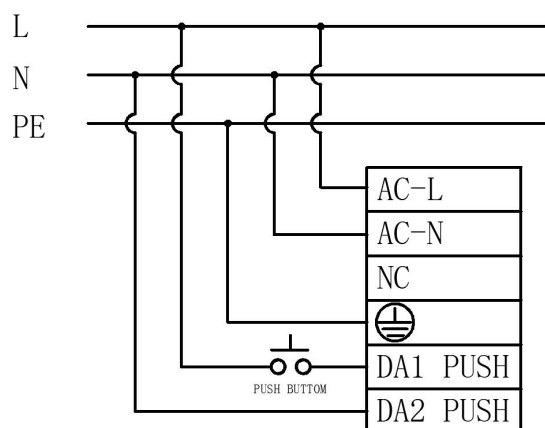
**Linear dimming**



**Logarithmic dimming**

Note: The DALI and PUSH dimming functions cannot be used simultaneously; otherwise, the DALI dimmer will be damaged.

### • PUSH dimming function



**Wiring diagram of PUSH dimming**

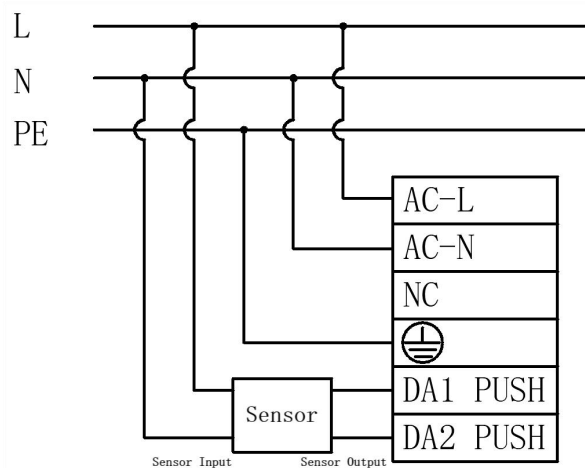
Switch from DALI mode to PUSH mode: short press PUSH switch to enable PUSH dimming function.

- ① Connect PUSH switch between AC-L and DA1 PUSH in series and connect DA2 PUSH to AC-N.
- ② Make sure that AC-L and AC-N are NOT directly connected to DA1 PUSH and DA2 PUSH terminals.
- ③ Make sure that PUSH switch is off before the AC is powered on; operate PUSH after the AC is powered on.
- ④ Make sure the PUSH switch is off before disconnecting the AC.
- ⑤ If you have any questions about the wiring and operation, please confirm with Lifud FAE.
- ⑥ Wrong wiring or operation may cause damage to the driver.

| Operation    | Duration | Function                                                                                                                                                                                                             |
|--------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Instant Push | 0.1-0.5S | LED light on/off                                                                                                                                                                                                     |
| Long Push    | 0.6-9S   | LED light dims up/down                                                                                                                                                                                               |
| Reset Push   | >9S      | Long press PUSH for more than 9s to reset the brightness to 50%. Wait for 5s, then short press PUSH to turn off the light. At last, long press PUSH again to turn on the light and synchronize the dimming direction |

- ① The PUSH operation won't cause any variations on LED driver if it's less than 0.1S.
- ② Current at minimum dimming of PUSH dimming: 7mA.
- ③ The PUSH dimming mode has the memory function in case of any power failure. When the LED driver is powered on again, the light will return to the previous state before power failure.
- ④ The present dimming direction of PUSH dimming is opposite to the former one.
- ⑤ In automatic mode, long press for more than 3 minutes to enter the corridor dimming function.

## • Corridor dimming function



**Wiring diagram of corridor dimming**

## Operations for entering corridor lighting mode

Approach 1: use Lifud programmer to enable the driver's corridor lighting mode and set parameters.

Approach 2: keep pressing PUSH for 3+ mins so as to switch to the corridor lighting mode.

Approach 3: keep the effective sensing signal for 3+ mins (set the sensor's hold time to 3+ mins) to enable the corridor lighting mode.

Remarks:

1. In the automatic detection mode, the driver can be switched from PUSH mode to corridor lighting mode by approach 2 and 3, and its brightness will dim up to 50%; long press for 3 mins and then it dims down first and then dims up, which means the driver has entered the corridor lighting mode.
2. After activating the corridor dimming mode, PUSH DIM is turned off.
3. In the case of AC input and any level of brightness in the corridor lighting mode, switching to DC and then returning to AC will restart the corridor lighting mode.

### Operations for exiting corridor lighting mode

Approach 1: use Lifud programmer to choose other modes and exit corridor lighting mode.

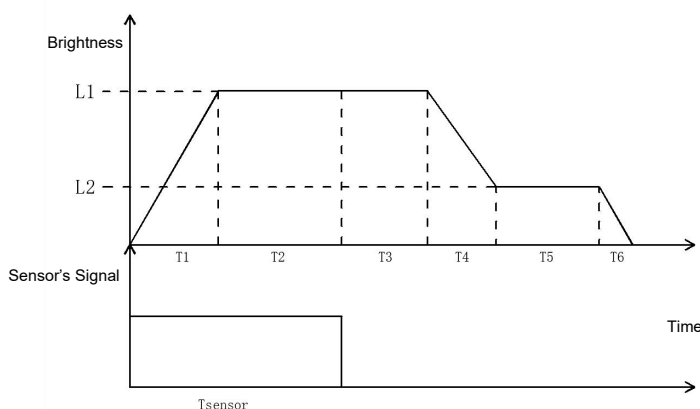
Approach 2: connect the driver to the DALI master to send DALI command, and the driver will return to the DALI dimming mode.

Approach 3: connect the driver to the PUSH switch and continuously press the switch 10 times within 10 secs, and the driver will return to the PUSH dimming mode.

Remark:

1. The 3-sec or above single press or release will cause the press number to be counted as 0.
2. The approach 2 and 3 CANNOT be used if the corridor lighting mode of driver is set via Lifud programmer.

### Working process of corridor dimming mode



| Symbol | Name                     | Default value     | Available setting scope     |
|--------|--------------------------|-------------------|-----------------------------|
| T1     | Fade-in time of sensing  | 1s                | 0-100s                      |
| T2     | Holding time of sensing  | Depends on sensor | Depends on sensor           |
| T3     | Waiting time of sensing  | 180s              | 0-59999s, 60000s (infinite) |
| T4     | Fade-out time of sensing | 5s                | 0-100s                      |
| T5     | Unattended time          | 60000s (infinite) | 0-59999s, 60000s (infinite) |
| T6     | Fade-out off time        | 0s                | 0-100s                      |
| L1     | Sensing brightness       | 100%              | 0-100%                      |
| L2     | Unattended brightness    | 10%               | 0-100%                      |

## Emergency function instruction

The default output current is 15% Io max in the case of DC emergency input.

Emergency input voltage: 176-280Vdc

Note:

1. The emergency output current can be set by Lifud programmer and programming software.
2. It can be set from 0 to 100%.
3. If the emergency mode is off, input current is DC and the working mode is the same as the AC input.
4. In the case of mains input, the brightness is random when using PUSH dimming. When the driver enters the emergency lighting mode and then reconnects AC, the light brightness will remain the one set via PUSH switch when mains is connected.
5. In the case of mains input, the brightness is random when using DALI dimming. When the driver enters the emergency lighting mode and then reconnects AC, the light brightness will return to the brightness when DALI is powered on.
6. When the input is less than 185VDC, the output is derated. At 160VDC, it drops to about 70% of the peak value.
7. After enabling the overvoltage and undervoltage protection function, the product will be power-off when the voltage is less than 165VDC and power-on when the voltage is greater than 180VDC; the product will be power-off when the voltage is greater than 286VDC and power-on when the voltage is less than 276VDC. (Deviation value:  $\pm 5V$ )

## Programmer tools and software

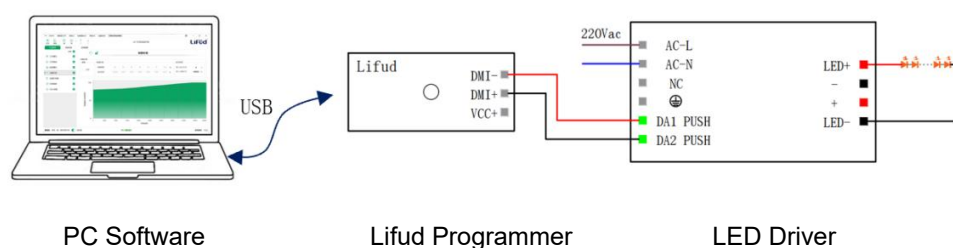
| Product                                                                            | Name             | Brand | Model      | Software       |
|------------------------------------------------------------------------------------|------------------|-------|------------|----------------|
|  | Lifud programmer | LIFUD | LF-SCS080C | Lifud SmartSet |

## Read/write and parameter configuration

| Programming project                | Default settings                | Parameters settings | Read/Write |
|------------------------------------|---------------------------------|---------------------|------------|
| Production information             | -                               | No                  | Read       |
| Operating mode                     | Automatic detection (DALI/PUSH) | Yes                 | Read/Write |
| EL                                 | 15% (default)                   | Yes                 | Read/Write |
| Input over/undervoltage protection | Inactivated                     | Yes                 | Read/Write |
| CorridorDIM                        | Inactivated                     | Yes                 | Read/Write |
| CLO                                | Inactivated                     | Yes                 | Read/Write |
| DALI Part 251                      | Activated                       | Yes                 | Read/Write |
| DALI Part 252                      | Activated                       | Can be reset only   | Read/Write |
| DALI Part 253                      | Activated                       | Can be reset only   | Read/Write |

## Function instructions

### ①Lifud programmer



**Note:** When using the programmer, the driver must be powered on with AC for normal reading and writing.

## Certificates & standards

|                    |                                                                                                                                                                                                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Approval marks     | ENEC, CE, CB, EL, RCM, DALI-2                                                                                                                                                                                                                                      |
| Standards          | EN 61347-2-13; EN 61347-1; EN 62384; EN 62493;<br>EN 55015; EN 61547; EN 61000-3-2; EN 61000-3-3;<br>IEC61347-1; IEC61347-2-13;<br>EN IEC 61347-2-13 Annex J;<br>AS 61347.2.13 & AS/NZS 61347.1NZS 61347.1<br>DALI-2 certified (Part 101, 102, 207, 251, 252, 253) |
| Type of protection | IP20                                                                                                                                                                                                                                                               |

## Logistical data

| Product       | Packaging unit<br>(Pieces/Unit) | Dimensions (L*W*H) | Volume                | Gross weight |
|---------------|---------------------------------|--------------------|-----------------------|--------------|
| LF-FSD060YB-E | 42                              | 385m*285mm*210mm   | 23.04 dm <sup>3</sup> | 7.8kg±5%     |

## Test equipment & condition

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test equipment                | AC power source: CHROMA6530, digital power meter: CHROMA66202, oscilloscope: Tektronix DPO3014, DC electronic load: M9712B, LED board, constant temperature and humidity chamber, lightning surge generator: Everfine EMS61000-5B, rapid group pulse generator: Everfine EMS61000-4A, spectroanalyzer: KH3935, hi-pot tester: EEC SE7440, flicker tester (flicker-free coefficient test): Everfine LFA-3000, etc. |
| Compatibility of DALI dimming | Yuanhao Master, Simon Master, Philips Master DDBC120-DALI, OSRAM Master, Helvar Master 905 Router, Tridonic Master and HDL MC64-DALI431 Master                                                                                                                                                                                                                                                                    |

If there are no special remarks, the above parameters are tested at the ambient temperature of 25℃, humidity of 50%, maximum output power and input voltage of 230Vac/50Hz.

## Additional information

1. It is recommended that user install the over voltage protection, under voltage protection and surge protection devices in the power supply circuits of light fixtures to ensure electricity safety.
2. The LED driver used in combination with the end device is one of the accessories of the whole light fixture, and the EMC of the whole light fixture is not only susceptible to the driver itself, but to the LED light fixture and the whole light fixture's wiring. Thus, the manufacturer of LED light fixture should re-confirm the EMC of the whole light fixture before the whole light fixture is finished.
3. The number of LED drivers that can be connected to a circuit breaker and the inrush current are tested under the same conditions.
4. The PC cover, casing and end cap for assembling the LED driver in the light fixture must meet the fire rating of UL94-V0 or above.
5. DC input is only for emergency.
6. In no-load condition, it is recommended that user not directly connect the LED driver to the light fixture in case that the light fixture is damaged.
7. It is well-advised that the withstanding voltage of LEDs and aluminum substrates be  $>3\text{kVac}$ .
8. When the load power of the product is  $<60\text{W}$ , it will output at the set constant current; when the load power is  $>60\text{W}$ , it will output at a constant power of  $60\text{W} \pm 2\text{W}$ .
9. The default current of LED driver is 75mA.
10. When using other DALI masters, please test their compatibilities with Lifud LED driver in advance.
11. If the parasitic capacitance between LEDs and the PCBA is too large, and the light fixture is grounded, there will be a slight flicker at the moment of power on.
12. Lifud Technology Co., Ltd. reserves the right to interpret any content of this specification.

## Transportation & storage

Suitable transportation means: vehicles, boats and aeroplanes.

In transit, it is necessary to prepare awnings for rain or sun protection. Moreover, please keep civilized loading and unloading to prevent the vibration or impact on LED driver as much as possible.

The storage of LED driver shall conform to the standard of Class I environment. When using LED drivers which have been stored for more than 6 months, please re-test them firstly. Do not use them unless they are tested to be qualified.

## Cautions

Please use Lifud LED driver according to its parameters in the specification, otherwise the LED driver may malfunction.

Using any incompatible light fixtures or those that have not been certified may cause fire, explosion or other risks.

Man-made damage is beyond the scope of Lifud warranty service.

## Disclaimer

Subject to change without notice. Errors and omissions excepted. Always make sure to use the most recent release.