

CUPOWER

BORN TO BE LIGHT.



Instruction Manual

i-CLO

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1. Introduction

The primary goal of Intelligent Constant Lumen Output (i-CLO) is to maintain consistent illuminance over the lifetime of an LED light source by compensating for light degradation.

Unlike Standard CLO, which applies a fixed current compensation curve based solely on operating time, i-CLO dynamically adjusts the LED driver output based on real-time temperature data. This approach enables more accurate lumen maintenance, especially under varying thermal conditions, thereby improving energy efficiency and extending system reliability.

It should be noted that the calculated LED temperature is not directly measured from the LED chip itself. A constant temperature difference between the temperature measured by the LED driver and the actual temperature of the LED is assumed.

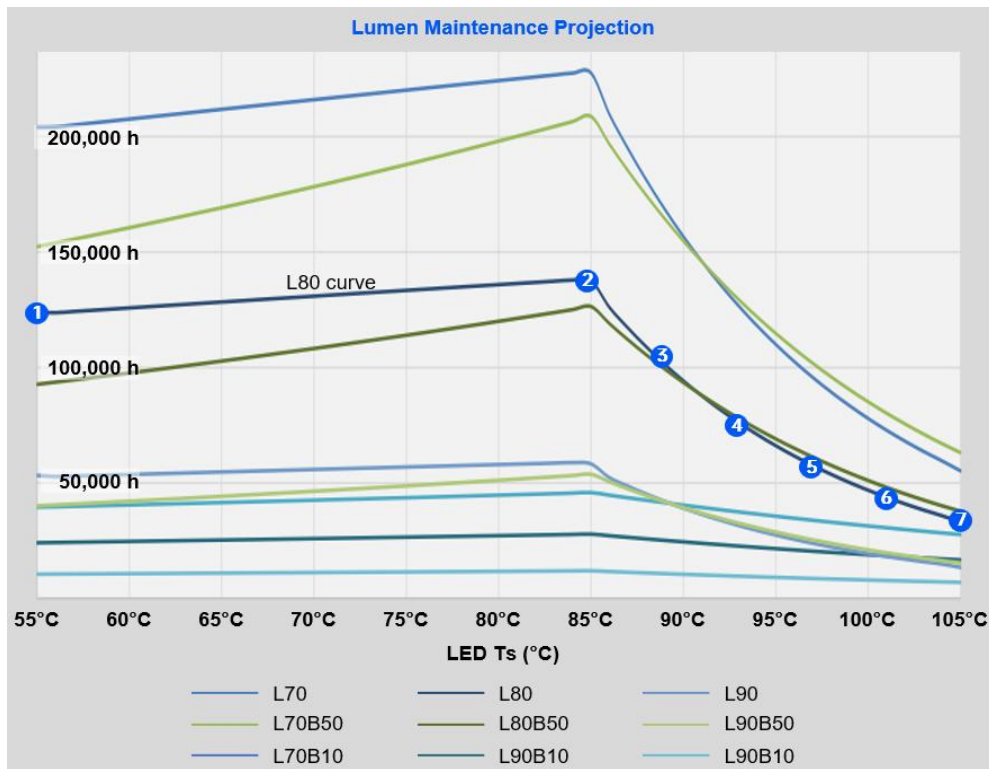
2. Data Preparation

2.1 Temperature vs. Lifetime Curve

2.1.1 Obtain the Curve Chart

You may find this data table in the datasheet for the LED chip used in the LED module, or request it from the LED chip manufacturer.

Typically, you will receive a set of curves depicting different "L" (lumen maintenance)



and "B" (failure rate) values. As shown in the diagram below.

2.1.2 Select 7 Sets of Data

You may select the corresponding 'Lx-Bx' curve based on the luminaire's specification requirements; here we shall use 'L80' as an example.

Seven data sets must be selected to reflect the fundamental characteristics of the curve's development.

In the example diagram above, these data sets are all labelled x.

! The software calculates the corresponding lifetime between each pair of temperature points using linear interpolation. Consequently, the linear segment may

select endpoints based on slope variation, whilst the non-linear segment uses more densely spaced data points to enhance accuracy.

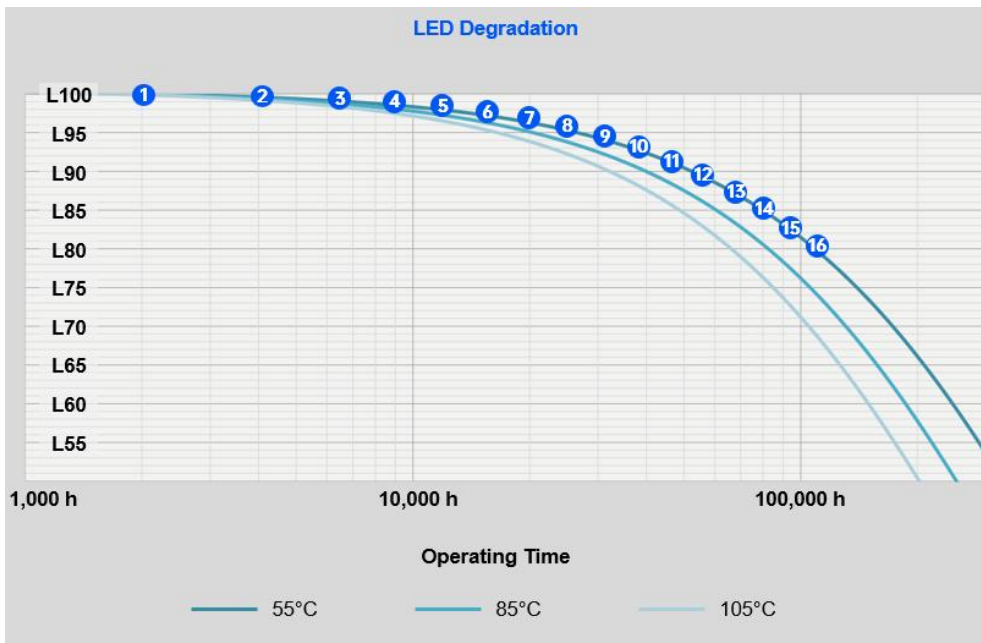
- ! The 1st set of data must correspond to the temperature on the subsequent lifetime-degradation curve, typically selecting the lowest temperature within the curve.
- ! When the measured LED chip temperature is lower than the temperature value in the 1st set of data, i-CLO shall calculate using the lifetime value from the 1st set of data. When the measured LED chip temperature is higher than the temperature value in the 7th set of data, i-CLO shall calculate using the lifetime value from the 7th set of data.

2.2 Lifetime vs. Degradation Curve

2.2.1 Obtain the Curve Chart


You may find this data table in the datasheet for the LED chip used in the LED module, or request it from the LED chip manufacturer.

This diagram shows the light output degradation over time for various LED temperatures. It is also used for defining the standard CLO (Constant Lumen Output) function.



2.2.2 Select 16 Sets of Data

Corresponding to the first temperature point selected on the Lifetime vs. Temperature Curve, which is 55°C, you need to locate the Lifetime vs. Degradation Curve for the 55°C condition on this diagram.

In the example diagram above, these data sets are all labelled .

- ! The degradation percentage range must correspond to the 'Lx-Bx' rating. Taking 'L80' as an example, you should select a value between 100% and 80%.
- ! The selected degradation percentage should be converted into a current adjustment percentage for setting the CLO parameter.
- ! The software calculates the corresponding current adjustment percentage between each pair of operation time points using linear interpolation. Consequently, the linear

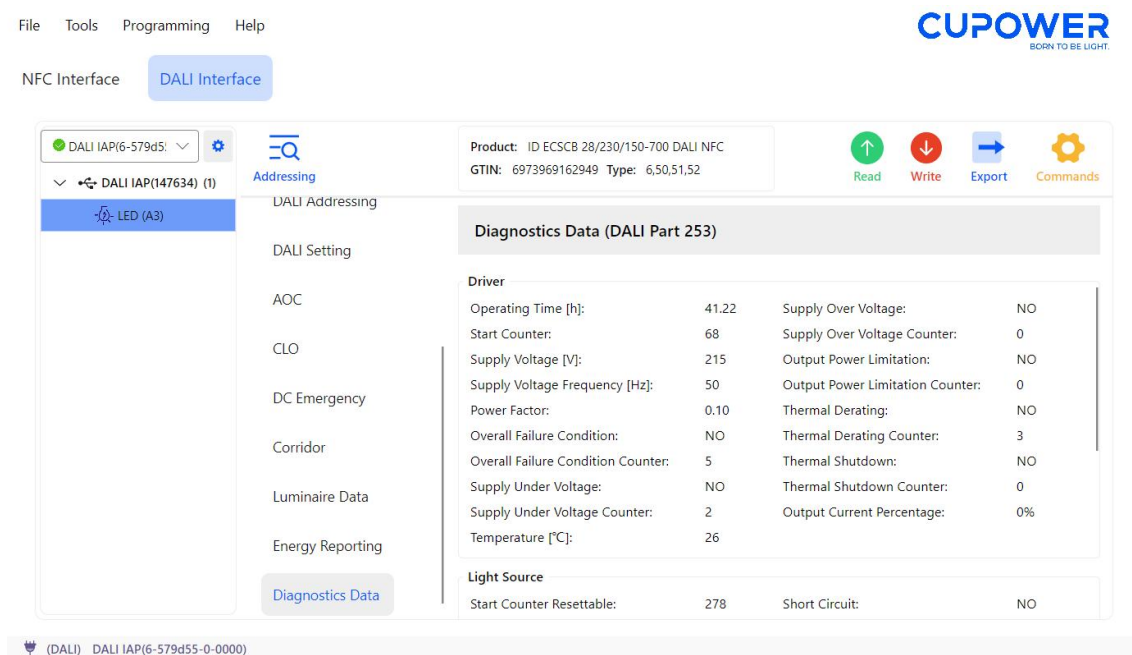
segment may select endpoints based on slope variation, whilst the non-linear segment uses more densely spaced data points to enhance accuracy.

2.3 Temperature Difference Measurement

2.3.1 Read the Temperature Measurement Value from the Driver

You may obtain driver measurement values via the data defined in DALI-2 Part 253.

The Toolbox provides i-DATA information, as shown in the image below, allowing you to easily read this data.



! Drivers featuring LTP (Luminaire Temperature Protection), such as the outdoor D4i series, should read the Light Source temperature. If the light source temperature cannot be read, check the LTP settings as per [Section 3.1](#) and verify that the NTC parameters are correctly configured.

! Drivers without LTP functionality, such as the industrial DALI series, are to read the Driver temperature.

! Readings should be taken after the temperature has stabilised; testing at 25°C is recommended.

2.3.2 LED chip temperature

You need to read the LED chip temperature in accordance with the method recommended by the LED chip manufacturer.

In the preceding example, where T_s denotes the surface temperature of the LED, T_s should also be measured during the measurement process.

2.3.3 Calculate the temperature difference

We define the formula for calculating the temperature difference as follows:

$$T_{diff} = T_{driver} - T_{LED}$$

- T_{diff} denotes the temperature difference.
- T_{driver} denotes the temperature value measured by the driver.
- T_{LED} denotes the temperature of the LED chip you are measuring.

! The effective temperature range is $\pm 60^\circ\text{C}$.

! This temperature difference value may be negative; please calculate strictly according to the formula.

3. Configure parameters in the Toolbox

3.1 LTP Parameter Settings

Drivers without LTP functionality may ignore this section.

File Tools Programming Help

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NFC Interface DALI Interface

Select All Product: ID ECSCB 110/230/150-1050 D4i NFC OUT
Type: NFC-DALI Min: 150mA Max: 1050mA

Diagnostics **Luminaire Temperature Protection**

Lamp/Life Time

Memory Bank 01

Memory Bank 207

Luminaire TP

AC AMP

End Of Life

Season Control

IDPS

Enabled

Thermal Derating[50,110] 110 ^ v °C

Thermal Shutdown[110,130] 130 ^ v °C

Thermal Shutdown Execution Brightness[0,30] 14 ^ v %

Temperature Coefficient β [0,6000] 3380 ^ v

NTC Resistance(25°C)[1000,5000000] 10000 ^ v Ω

(NFC) ID CPR30.xx(697798710)

As shown in the diagram above, when the luminaire temperature is higher than the set protection value, the driver will reduce the output current. Consequently, the operating range of the i-CLO will not be higher than the LTP protection temperature.

The temperature coefficient β and resistance value at 25°C for the NTC shall be filled in according to the NTC component selected.

! When LTP is disabled, the i-CLO ceases operation, and the drive output current is adjusted according to the CLO setting.

3.2 CLO Curve Settings

File Tools Programming Help

NFC Interface DALI Interface

Select All

Product: ID ECSCB 110/230/150-1050 D4i NFC OUT
Type: NFC-DALI Min: 150mA Max: 1050mA

Read Write Import Export

Product Information

- AOC
- Intelligent CLO
- CLO
- DALI Setting
- DALI Addressing
- Dimming Limit
- DC Emergency
- Diagnostics

CLO

CLO Data(1)
Time(Khrs) 0 80

CLO Data(2)
Time(Khrs) 4 80

CLO Data(3)
Time(Khrs) 6 81

CLO Data(4)
Time(Khrs) 9 82

CLO Data(5)

(NFC) ID CPR30.xx(697798710)

Enter the 16 sets of data prepared in Section 2.2 into the CLO curve settings and enable CLO.

! When CLO is disabled, the i-CLO ceases operation.

3.3 i-CLO Curve Settings

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NFC Interface DALI Interface

Select All Product: ID ECSCB 110/230/150-1050 D4i NFC OUT
Type: NFC-DALI Min: 150mA Max: 1050mA

Read
 Write
 Import
 Export

Intelligent CLO

Enable Temperature Difference (°C) -6

Group(1)	Temperature(°C)	<input type="text" value="55"/> <input type="button" value="↑"/> <input type="button" value="↓"/>	Lifetime(KHours)	<input type="text" value="123"/> <input type="button" value="↑"/> <input type="button" value="↓"/>
Group(2)	Temperature(°C)	<input type="text" value="85"/> <input type="button" value="↑"/> <input type="button" value="↓"/>	Lifetime(KHours)	<input type="text" value="142"/> <input type="button" value="↑"/> <input type="button" value="↓"/>
Group(3)	Temperature(°C)	<input type="text" value="88"/> <input type="button" value="↑"/> <input type="button" value="↓"/>	Lifetime(KHours)	<input type="text" value="106"/> <input type="button" value="↑"/> <input type="button" value="↓"/>
Group(4)	Temperature(°C)	<input type="text" value="93"/> <input type="button" value="↑"/> <input type="button" value="↓"/>	Lifetime(KHours)	<input type="text" value="77"/> <input type="button" value="↑"/> <input type="button" value="↓"/>
Group(5)	Temperature(°C)	<input type="text" value="97"/> <input type="button" value="↑"/> <input type="button" value="↓"/>	Lifetime(KHours)	<input type="text" value="58"/> <input type="button" value="↑"/> <input type="button" value="↓"/>
Group(6)	Temperature(°C)	<input type="text" value="102"/> <input type="button" value="↑"/> <input type="button" value="↓"/>	Lifetime(KHours)	<input type="text" value="46"/> <input type="button" value="↑"/> <input type="button" value="↓"/>

(NFC) ID CPR30.xx(697798710)

Enter the seven sets of data prepared in Section 2.1 and the temperature difference data prepared in Section 2.3 into the i-CLO curve settings, and enable i-CLO.

4. Conclusion

Once setup is complete, you may experience i-CLO after powering on.



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