IEC 63128

Edition 1.0 2024-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

AMENDMENT 1
AMENDEMENT 1

Lighting control interface for dimming – Analogue voltage dimming interface for electronic current sourcing controlgear

Interface de commande d'éclairage pour variation d'intensité – Interface de variation de tension analogique pour appareillage d'alimentation électronique

IEC 63128:2019-05/AMD1:2024-07(en-fr)

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LIGHTING CONTROL INTERFACE FOR DIMMING – ANALOGUE VOLTAGE DIMMING INTERFACE FOR ELECTRONIC CURRENT SOURCING CONTROLGEAR

AMENDMENT 1

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Amendment 1 to IEC 63128:2019 has been prepared by IEC technical committee 34: Lighting.

The text of this Amendment is based on the following documents:

Draft	Report on voting
34/1053/CDV	34/1137A/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Amendment is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications/.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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- withdrawn, or
- revised.

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3 Terms and definitions

Insert, between the existing entries 3.5 and 3.6, the following new entry 3.8:

3.8
correlated colour temperature factor
CCTF
ratio of the dimmed CCT to the full power CCT

Note 1 to entry: This ratio is used in the calculation of warm dimming responses for applicable LED systems.

Note 2 to entry: CCT (correlated colour temperature) is defined in IEV 845-23-068.

Add, at the end of Clause 3, the following new entry 3.9:

3.9
warm dimming
capability of controlgear to decrease the colour temperature of its LED light sources as the power, and therefore the luminous flux output of the light sources is decreased

5 Marking

Replace the last sentence below Figure 1 with the following:

Markings should be readable with normal vision.

6.5 Switch-on

Add, at the end of 6.5, the following new Clause 7:

7 Simulation of incandescent dimming (optional)

7.1 General

Warm dimming is an optional feature implemented in some lighting controlgear to imitate the behaviour of incandescent filament sources as the power supplied to them is decreased. If warm dimming is implemented, 7.2 shall apply.

For lighting systems that implement warm dimming and can utilize a variety of luminaires or light sources, uniform warm dimming response can be important for colour consistency throughout the lighting system.

7.2 Response to light source dimming

For an LED dim-to-warm system, the resultant output CCT for a given output power P, is determined as follows:

$$P_{\mathrm{r}} = P/P_{\mathrm{max}}$$

$$CCTF = P_{\mathrm{r}}^{0,37}$$

$$CCT = CCTF \times CCT_{\mathrm{max}}$$

where

P is the power delivered to the LEDs;

P_{max} is the maximum undimmed power delivered to the LEDs;

P_{r} is the relative power;

$CCTF$ is the CCT factor;

CCT_{max} is the maximum CCT;

CCT is the resultant output CCT at the given output power P.

Annex A provides examples of a relationship between the CCTF and an analogue 0 V to 10 V control voltage.

When implementing warm dimming, it is recommended that the minimum CCT is no less than 1 800 K.

7.3 Dim-to-warm marking

Electronic light source controlgear utilizing the dim-to-warm functionality in accordance with this document shall be clearly marked with the following marking (see Figure 4):

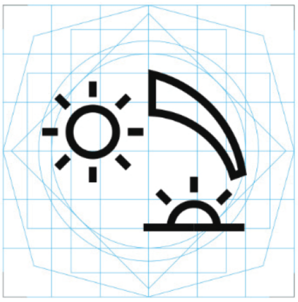


Figure 4 – Marking of dim-to-warm electronic light source controlgear

Markings should be readable with normal vision.

Add, at the end of Clause 7, the following new Annex A:

Annex A
(informative)

Warm dim control for analogue dimming having controlgear with a linear output power to control voltage response

A.1 General

Typically, dimming an LED simply lowers its luminous flux output while maintaining its rated colour temperature. Legacy heated filament lamps (incandescent) respond to dimming by a significant shift to warmer colour temperatures at lower power. This dim-to-warm characteristic is often a desirable response. Implementation of a dim-to-warm feature in an LED luminaire allows this response to be available along with the other positive features of LED equipment.

Typical warm dim systems utilize a dimmable LED driver with at least two output channels. Each channel controls an LED of a different colour temperature (CCT). The overall CCT of the system is controlled by independently varying the power delivered to each of the LEDs and mixing the output of all the LED sources to achieve a composite, uniform CCT. As an example, a basic block diagram of a two-channel system is shown in Figure A.1.

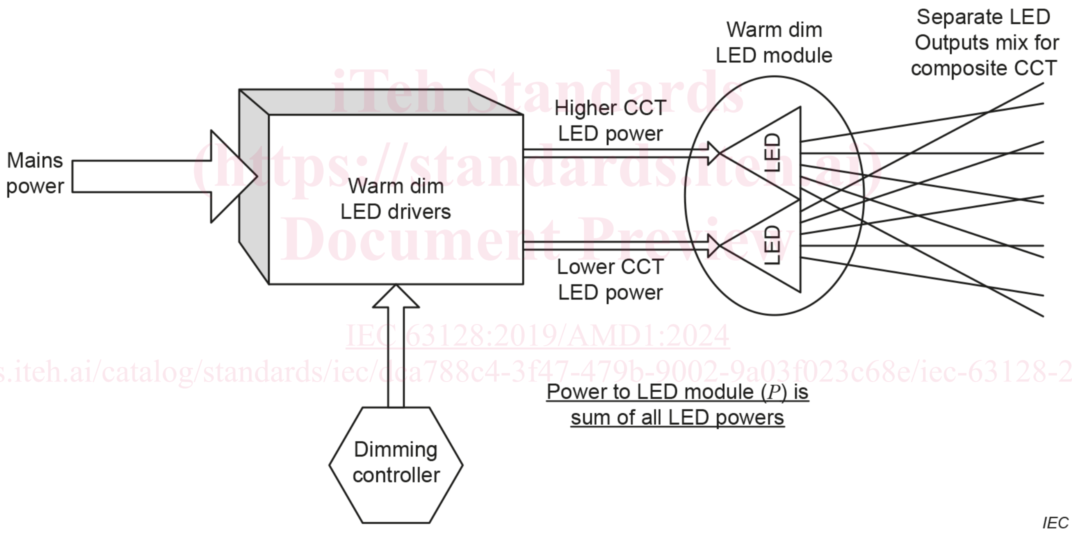


Figure A.1 – Typical warm dimming LED system utilizing two LED sources

A.2 Correlation to 0 V to 10 V control

In the warm dim control standard as described in Clause 7, the CCT during dimming is based on the relative power supplied to the LED source. Determining the CCT factor as a function of the 0 V to 10 V control voltage, V_c, of an analogue dimmer is more complex since the control voltage to power function is not completely defined for the controlgear. The minimum dimmed power depends on the design of the controlgear and should be taken into account in the calculation of the CCTF.

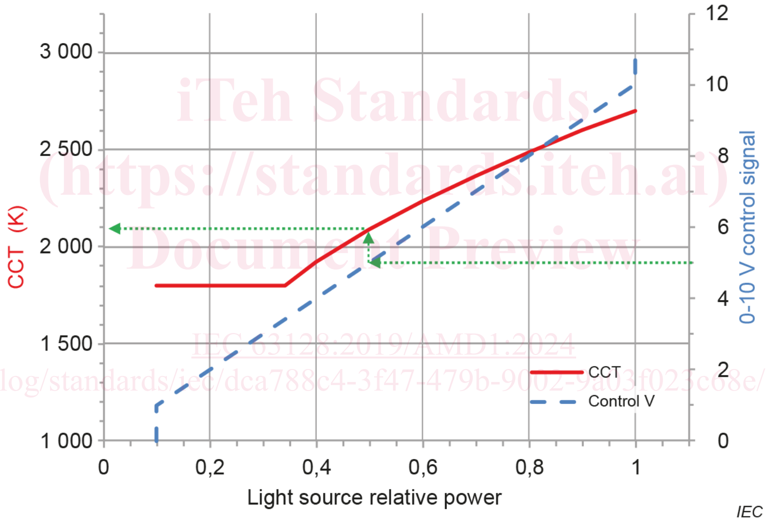
For controlgear that meets the following criteria, the CCTF for a given control voltage V_c can be calculated using Formula (A.1) where:

- the total LED power, P, is the sum of all power delivered to the LEDs involved in the dim-to-warm function;
- the minimum total LED power, P_{min}, occurs when $V_c = V_{min}$;

- the maximum total LED power, P_{max}, occurs when $V_c = V_{max}$;
- the minimum relative power, $P_{r(min)}$, $= P_{min} / P_{max}$;
- the controlgear output increases linearly between minimum and maximum power.

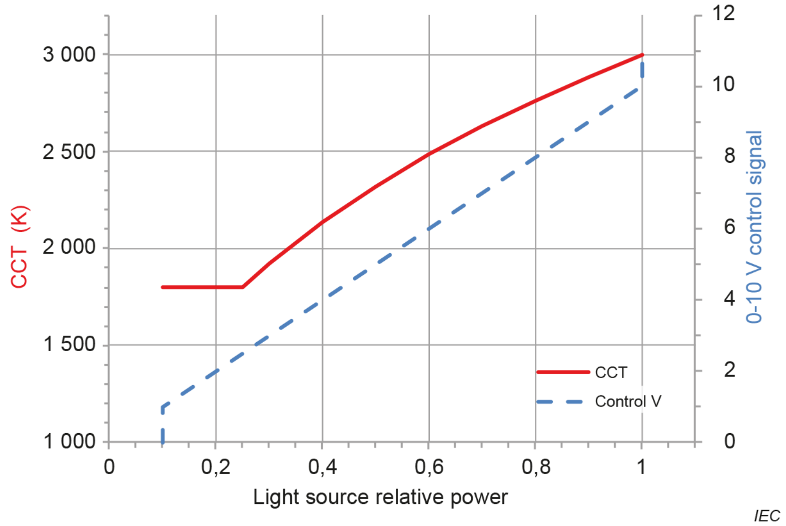
$$CCTF\left(V_c\right) = \left(\left(\frac{V_c - V_{min}}{V_{max} - V_{min}}\right) \times \left(1 - P_{r(min)}\right) + P_{r(min)}\right)^{0,37} \quad (A.1)$$

A graphical representation of the relationship between CCTF, relative LED power and a 0 V to 10 V control signal for a warm dim system is shown in Figure A.2, Figure A.3 and Figure A.4 for three different configurations. The required CCT and the 0 V to 10 V control are shown on the two vertical axes as a function of relative power. To find a CCT for a desired control voltage, the voltage is located on the right vertical axis, projected across to the dashed plot then projected vertically to the CCT curve where the required CCT is found on the left vertical axis. The process is shown with dotted lines in Figure A.2 for a 5 V control voltage resulting in an approximate CCT of 2 100 K (actually 2 089 K). All examples assume the CCT will not drop below 1 800 K.



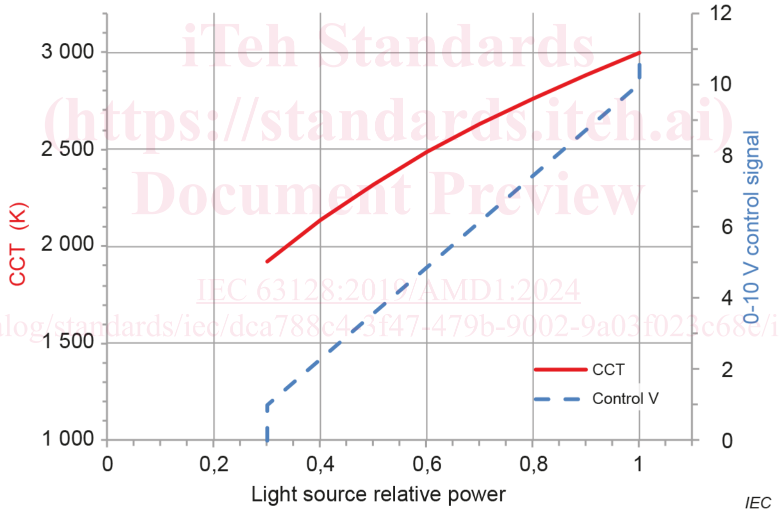
NOTE The CCT flattens out at the minimum of 1 800 K at approximately 35 % of full power.

Figure A.2 – Full power rated CCT: 2 700 K – Dimmed relative power minimum: 10 %



NOTE The CCT flattens out at the minimum of 1 800 K at approximately 25 % of full power. The minimum is reached later in the dim curve than for that shown in Figure A.2 because the CCT at full power is higher.

Figure A.3 – Full power rated CCT: 3 000 K – Dimmed relative power minimum: 10 %



NOTE The CCT does not flatten out as shown in Figure A.2 and Figure A.3 because the minimum relative power is higher, so the 1 800 K limit is not reached.

Figure A.4 – Full power rated CCT: 3 000 K – Dimmed relative power minimum: 30 %