



IEC 62756-1

Edition 1.0 2015-05

INTERNATIONAL STANDARD



**Digital load side transmission lighting control (DLT) –
Part 1: Basic requirements**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.140.99

ISBN 978-2-8322-2711-4

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD	5
INTRODUCTION	7
1 Scope	8
2 Normative references	8
3 Terms and definitions	8
4 General description	10
4.1 General	10
4.2 Master-slave structure	10
4.3 Specification overview	10
5 General requirements	10
5.1 Voltage rating	10
5.2 Frequency rating	11
5.3 Marking of control devices and control gear	11
6 Electrical specification	11
6.1 General	11
6.2 Wiring method	12
6.3 Wiring diagram	12
6.4 Block diagram of the control gear	12
6.5 Block diagram of the control device	13
6.6 Electrical characteristics in different periods of the mains waveform	13
6.6.1 General	13
6.6.2 Separation of the half-wave into time periods	14
6.6.3 Electrical characteristics of the supply period	14
6.6.4 Electrical characteristics of the operating period	19
6.6.5 Electrical characteristics of the data period	19
6.7 Data signal voltage range and timing	23
6.8 Power up timing	23
6.9 Electrical characteristics during the off state of control gear	24
6.9.1 General	24
6.9.2 Power controlled off state	24
6.9.3 Telegram controlled off state	25
7 Data timing	25
7.1 General	25
7.2 Information bit timing	25
7.3 Permissible frames	25
8 Telegram structure	26
8.1 General	26
8.2 Telegrams	27
8.2.1 General	27
8.2.2 Group number	27
8.2.3 Telegram type	27
8.2.4 Parity bit	27
8.2.5 Data for control of the control gear	27
9 Definition of telegram types	27
9.1 Summary of telegram types	27

9.2	Telegram type 0: Brightness	28
9.3	Telegram type 1: Colour control	28
9.4	Telegram type 2: Colour temperature control	29
9.5	Telegram type 3	29
9.6	Telegram type 4	29
9.7	Telegram type 5: commissioning: Group number assignment	29
9.8	Telegram type 6: Manufacturer specific	30
9.9	Telegram type 7: extended telegram	30
10	Method of operation	30
10.1	General	30
10.2	Brightness	31
10.2.1	General	31
10.2.2	Response time	31
10.2.3	Light output level	31
10.2.4	Start-up	31
10.3	Colour control	31
10.3.1	General	31
10.3.2	Colour (x, y)	31
10.3.3	Response time	32
10.3.4	Colour gamut	32
10.3.5	Start-up	32
10.4	Colour temperature control	33
10.4.1	General	33
10.4.2	CCT (correlated colour temperature)	33
10.4.3	Response time	33
10.4.4	Start-up	33
10.5	Telegram controlled group number assignment	33
10.6	Manufacturer specific telegram	34
11	Test procedures	34
11.1	General	34
11.2	Electrical characteristics tests	35
11.2.1	General	35
11.2.2	Test of control device	35
11.2.3	Test of control gear	38
11.3	Test of data timing	41
11.4	Test of telegram structure	41
11.4.1	Test of control device	41
11.4.2	Test of control gear	41
11.5	Test of telegram types	42
11.5.1	General	42
11.5.2	Rejection of unsupported telegram types	42
11.5.3	Test of telegram type 0: brightness	42
11.5.4	Test of telegram type 1: colour control	42
11.5.5	Test of telegram type 2: colour temperature control	43
11.5.6	Test of telegram type 5: commissioning	43
11.5.7	Test of telegram type 6: manufacturer specific	43
11.6	Test of method of operation	43
11.6.1	General	43
11.6.2	Group number operation	43

Annex A (informative) Examples of procedures for telegram controlled group number commissioning.....	47
A.1 Telegram controlled group number assignment of a new system	47
A.2 Telegram controlled group number assignment of replacement control gear	47
A.3 Telegram controlled changing of group numbers	48
 Figure 1 – Example wiring diagram	12
Figure 2 – Example of block diagram of control gear.....	13
Figure 3 – Example of block diagram of control device.....	13
Figure 4 – Time periods of each half-wave.....	14
Figure 5 – Timing of supply period	15
Figure 6 – Timing data period	20
Figure 7 – Rise time and fall time at the control interface	23
Figure 8 – Transmission of “start of telegram”	25
Figure 9 – Transmission of first bit 0, second bit 0	25
Figure 10 – Transmission of first bit 0, second bit 1	26
Figure 11 – Transmission of first bit 1, second bit 0	26
Figure 12 – Transmission of first bit 1, second bit 1	26
Figure 13 – Brightness telegram	28
Figure 14 – Colour control telegram	28
Figure 15 – Colour temperature telegram	29
Figure 16 – Group number assignment telegram	29
Figure 17 – Manufacturer specific telegram.....	30
Figure 18 – The CIE 1931 colour space chromaticity diagram	32
Figure 19 – Test Circuit for testing the Control Device	35
Figure 20 – Test Circuit for testing the Control Gear	38
Figure 21 – Voltage applied to control gear for test procedure	39
 Table 1 – Nominal mains voltage 100 V, frequency 50 Hz or 60 Hz.....	17
Table 2 – Nominal mains voltage 120 V; frequency 50 Hz or 60 Hz.....	17
Table 3 – Nominal mains voltage 200 V; frequency 50 Hz or 60 Hz.....	18
Table 4 – Nominal mains voltage 230 V; frequency 50 Hz or 60 Hz.....	18
Table 5 – Nominal mains voltage 277 V; frequency 50 Hz or 60 Hz.....	19
Table 6 – Nominal mains voltage 100 V; frequency 50 Hz or 60 Hz.....	21
Table 7 – Nominal mains voltage 120 V; frequency 50 Hz or 60 Hz.....	21
Table 8 – Nominal mains voltage 200 V; frequency 50 Hz or 60 Hz.....	21
Table 9 – Nominal mains voltage 230 V; frequency 50 Hz or 60 Hz.....	22
Table 10 – Nominal mains voltage 277 V; frequency 50 Hz or 60 Hz	22
Table 11 – Electrical characteristics of the data signal	23
Table 12 – Currents and Voltages for control gear during the power controlled off state	24
Table 13 – Telegram types	28
Table 14 – Dimming characteristic	31
Table 15 – Parameters for testing purposes	35
Table 16 – Group number test telegram sequence	44

INTERNATIONAL ELECTROTECHNICAL COMMISSION

DIGITAL LOAD SIDE TRANSMISSION LIGHTING CONTROL (DLT) –**Part 1: Basic requirements****FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62756-1 has been prepared by subcommittee 34C: Auxiliaries for lamps, of IEC technical committee 34: Lamps and related equipment.

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

CDV	Report on voting
34C/1054/CDV	34C/1081B/RVC

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62756 series, published under the general title *Digital load side transmission lighting control (DLT)*, can be found on the IEC website.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This standard concerning Digital Load Side Transmission Lighting Control (DLT) describes a protocol for simple control of brightness, colour, colour temperature, and other parameters for the purpose of controlling lighting sources such as CFLi, LED light engines, electronic control gear and any other light source with integrated or external control gear.

This protocol uses existing wiring and allows easy retrofit of standard switches, dimmers and lamps with the new devices described in this standard, with little or no configuration.

The following standards contain safety requirements for control devices and control gear:

- IEC 60669-2-1, Switches for household and similar fixed electrical installations – Part 2-1: Particular requirements – Electronic switches,
- IEC 61347, Lamp control gear,
- IEC 60968, Self-ballasted lamps for general lighting services – Safety requirements,
- IEC 62560, Self-ballasted LED-lamps for general lighting services by voltage > 50 V – Safety specifications.

DIGITAL LOAD SIDE TRANSMISSION LIGHTING CONTROL (DLT) –**Part 1: Basic requirements****1 Scope**

This International Standard specifies a protocol, electrical interface and test procedures for control of electronic lighting equipment by digital signals over the load side mains wiring.

Safety requirements are not covered by this standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60364 (all parts), *Low-voltage electrical installations*

IEC 60038, *IEC standard voltages*