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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Digital addressable lighting interface –
Part 102: General requirements – Control gear

Interface d'éclairage adressable numérique –
Partie 102: Exigences générales – Appareillages de commande

IEC 62386-102:2009

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FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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.
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International Standard IEC 62386-102 has been prepared by subcommittee 34C: Auxiliaries for lamps, of IEC technical committee 34: Lamps and related equipment.

This International Standard, together with IEC 62386-101 and IEC 62386-201, replaces Clause E.4, “Control by digital signals”, and Annex G, “Test procedures for ballasts with digital control interface according to Clause E.4”, of IEC 60929:2006.

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

FDIS	Report on voting
34C/874/FDIS	34C/883/RVD

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.

This Part 102 is intended to be used in conjunction with Part 101, which contains general requirements for the relevant product type (system), and with the appropriate part 2XX (particular requirements for control gear) containing clauses to supplement or modify the corresponding clauses in Parts 101 and 102 in order to provide the relevant requirements for each type of product.

A list of all parts of the IEC 62386 series, under the general title: *Digital addressable lighting interface*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

INTRODUCTION

This first edition of IEC 62386-102 is published in conjunction with IEC 62386-101 and with the various parts that make up the IEC 62386-200 series for control gear. A further number of parts covering control devices (to be published as the general requirements standard IEC 62386-103 and the various parts that make up the IEC 62386-300 series of particular requirements for control devices) is under consideration. The division of IEC 62386 into separately published parts provides for ease of future amendments and revisions. Additional requirements will be added as and when a need for them is recognized.

This International Standard, and the other parts that make up the IEC 62386-100 series, in referring to any of the clauses of IEC 62386-101 or IEC 62386-102, specify the extent to which such a clause is applicable and the order in which the tests are to be performed. The parts also include additional requirements, as necessary. All parts that make up IEC 62386-100 series are self-contained and therefore do not include references to each other.

Where the requirements of any of the clauses of IEC 62386-101 are referred to in this International Standard by the sentence "The requirements of IEC 62386-101, Clause “n” apply”, this sentence is to be interpreted as meaning that all requirements of the clause in question of Part 101 apply, except any which are clearly inapplicable to the specific type of control gear.

The standardization of the control interface for control of electronic control gear by digital signals is intended to achieve interoperable multi-vendor operation between electronic control gear and lighting control devices, below the level of building management systems. All numbers used in this International Standard are decimal numbers unless otherwise noted. Hexadecimal numbers are given in the format 0xVV, where VV is the value. Binary numbers are given in the format XXXXXXXXb or in the format XXXX XXXX, where X is 0 or 1; "x" in binary numbers means "don't care".

DIGITAL ADDRESSABLE LIGHTING INTERFACE –

Part 102: General requirements – Control gear

1 Scope

This International Standard specifies a protocol and methods of test for the control by digital signals of electronic control gear for use on a.c. or d.c. supplies.

NOTE Tests in this standard are type tests. Requirements for testing individual control gear during production are not included.

2 Normative references

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

IEC 60929:2006, *A.C.-supplied electronic ballasts for tubular fluorescent lamps – performance requirements*

IEC 61347-2-3, *Lamp control gear – Part 2-3: Particular requirements for a.c. supplied electronic ballasts for fluorescent lamps*

IEC 62386-101:2009, *Digital addressable lighting interface – Part 101: General requirements – System*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in Clause 3 of IEC 62386-101 and the following apply.

3.1
arc power
power supplied to the light sources (lamps), responsible for their output

3.2
arc power level
internal value representing the target arc power

3.3
forward frame
sequence of bits used to transmit data from a master to a slave

3.4
short address
kind of address used to address an individual control gear in the system

3.5
group address
kind of address used to address a group of control gear in the system at once

3.6
broadcast
kind of address used to address all control gear in the system at once

3.7
command
sequence of bits causing any reaction in the receiver

3.8
backward frame
sequence of bits used to transmit data from a slave to a master

3.9
frame sequence
group of consecutive frames

3.10
fade time
time taken for the light output to change from the actual dim level to the target dim level specified by the received command

3.11
fade rate
speed of change the light output

3.12
search address
24 bit number used to identify an individual control gear in the system during initialization

3.13
random address
24 bit address generated by the control gear during initialization

3.14
scene
preset light output level that can be configured

3.15
DTR (Data transfer register)
multipurpose registers used to transmit data from a control device to the control gear and vice versa

3.16
response time
actual time taken for a control gear to change its output without fading

3.17
reset state
state in which all configurable parameters of the control gear, as shown in Table 6 (including the actual level) have reset values

3.18
global trade item number – GTIN
number used for the unique identification of trade items worldwide

NOTE The key is comprised of a GS1 or U.P.C. company prefix followed by an item reference number and a check digit. It is described in the "GS1 General Specifications", Version 7.0, published by the GS1, Avenue Louise 326; BE-1050 Brussels; Belgium; and GS1, 1009 Lenox Drive, Suite 202, Lawrenceville, New Jersey, 08648 USA.

3.19
data byte
second byte of a forward frame

4 General

The requirements of 4.1 and 4.2 of IEC 62386-101 shall apply.

5 Electrical specification

The requirements of Clause 5 of IEC 62386-101 shall apply.

6 Interface power supply

The requirements of Clause 6 of IEC 62386-101 shall apply, if a power supply is integrated with the control gear.

7 Transmission protocol structure

7.1 General

A forward frame as well as a backward frame shall be analysed in the receiver. In case of code violation, the frame shall be ignored. 1,7 ms after the occurrence of a code violation, the control gear shall be ready again for a frame reception.

7.2 Forward frame

A forward frame shall consist of 19 bits, as shown in 8.2:

– 1 start bit: (logical '1', bi-phase code)
– 1 address byte 'YAAA AAAS': (bi-phase code)
– 1 data byte 'XXXX XXXX': (bi-phase code)
– 2 stop bits: (idle line)

7.2.1 Address byte 'YAAA AAAS'

The first byte of a forward frame is called the 'address byte'. Every control gear shall be able to react to a short address, 16 group addresses and broadcast. The following addressing scheme shall be used:

Type of addresses:			**address byte:**
64	short addresses	0 – 63	0AAA AAAS
16	group addresses	0 – 15	100A AAAS
	broadcast		1111 111S
	special commands		1010 0000 to 1111 1101

Y: short- or group address/broadcast: Y = "0": short address
Y = "1": group address or broadcast

A: significant address bit

S: selector bit: S = "0": data byte = direct arc power level
S = "1": data byte = command

When the address byte contains a short address, group address or broadcast address, the least significant bit (S) is known as the "selector bit". It is used to indicate whether a direct arc power level or a command follows in the data byte.

Special commands, requirements for which are given in 11.4, shall use CCCC CCCC transmitted in the address byte for selecting the command.

7.2.2 Data byte 'XXXX XXXX'

The least significant bit of the address byte in case of a short address, group address or broadcast (selector bit 'S') shall indicate whether the data byte contains a direct arc power level or a command:

S = "0": data byte = direct arc power level (see 11.1.1)

S = "1": data byte = command (see 11.1.2 and the subsequent subclauses)

In the case of special commands the content of the data byte shall be defined with the relevant commands, as given in 11.4.

7.3 Backward frame

A backward frame shall be sent only after the reception of a query command or a write memory command.

A backward frame shall consist of 11 bits, as shown in 8.3:

– 1 start bit: (logical '1', bi-phase code)
– 1 data byte 'XXXX XXXX': (bi-phase code)
– 2 stop bits: (idle line)

Depending on the command the backward frame (= answer) shall be either a 'Yes' / 'No' or 8-bit information:

'Yes': 1111 1111

'No': The control gear shall not react (idle line)

8-bit information: XXXX XXXX

8 Timing

8.1 Information bit timing

The start bit and the information bits shall be bi-phase encoded.

The information rate shall be 1 200 bit/s.

$$Te = \frac{1}{2 * 1200}\,s = 416.67\,\mu s$$

The timing for a logical "1" shall be as shown in Figure 1.