IEC 62386-216

Edition 1.0 2018-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Digital addressable lighting interface –
Part 216: Particular requirements for control gear – Load referencing (device type 15)

Interface d'éclairage adressable numérique –
Partie 216: Exigences particulières pour les appareillages de commande – Référence de charge (dispositifs de type 15)

IEC 62386-216:2018-04(en-fr)

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DIGITAL ADDRESSABLE LIGHTING INTERFACE –

Part 216: Particular requirements for control gear – Load referencing (device type 15)

FOREWORD

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International Standard IEC 62386-216 has been prepared by IEC technical committee 34: Lamps and related equipment.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
34/491/FDIS	34/513/RVD

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

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

This Part 216 of IEC 62386 is intended to be used in conjunction with:

- Part 101, which contains general requirements for system components;
- Part 102, which contains general requirements for control gear.

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

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

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- withdrawn,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

IMPORTANT – The 'colour inside' logo on the cover page of this document 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

IEC 62386 contains several parts, referred to as series. The 1xx series includes the basic specifications. Part 101 contains general requirements for system components, Part 102 extends this information with general requirements for control gear and Part 103 extends it further with general requirements for control devices.

The 2xx parts extend the general requirements for control gear with lamp specific extensions (mainly for backward compatibility with Edition 1 of IEC 62386) and with control gear specific features.

The 3xx parts extend the general requirements for control devices with input device specific extensions describing the instance types as well as some common features that can be combined with multiple instance types.

This first edition of IEC 62386-216 is intended to be used in conjunction with IEC 62386-101:2014, IEC 62386-101:2014/AMD1:—, IEC 62386-102:2014 and IEC 62386-102:2014/AMD1:—. The division 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.

The setup of the standards is graphically represented in Figure 1 below.

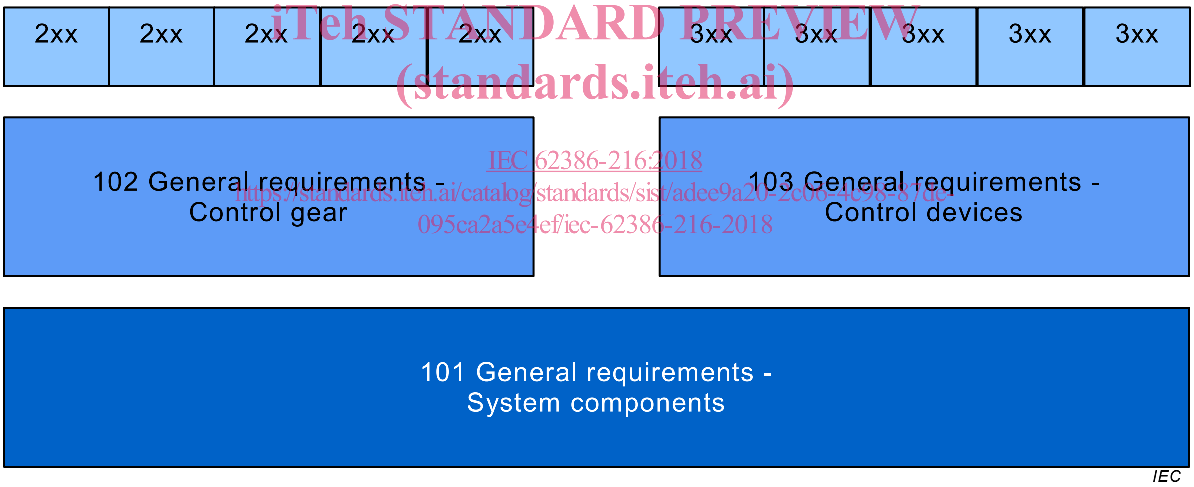

Figure 1 – IEC 62386 graphical overview

This document, and the other parts that make up the IEC 62386-200 series, in referring to any of the clauses of IEC 62386-1XX, specifies the extent to which such a clause is applicable; the parts also include additional requirements, as necessary.

Where the requirements of any of the clauses of IEC 62386-1XX are referred to in this document by the sentence "The requirements of IEC 62386-1XX, Clause "n" apply", this sentence is to be interpreted as meaning that all requirements of the clause in question of Part 1XX apply, except any which are clearly inapplicable.

The standardization of the control interface for control gear is intended to achieve compatible co-existence between electronic control gear and lighting control devices, below the level of building management systems. This document describes a method of implementing control gear.

All numbers used in this document 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”.

The following typographic expressions are used:

Variables: “*variableName*” or “*variableName[3:0]*”, giving only bits 3 to 0 of “*variableName*”.

Range of values: [lowest, highest]

Command: “COMMAND NAME”

DIGITAL ADDRESSABLE LIGHTING INTERFACE –

Part 216: Particular requirements for control gear – Load referencing (device type 15)

1 Scope

This part of IEC 62386 specifies a bus system for control by digital signals of electronic lighting equipment which is in line with the requirements of IEC 61347 (all parts), with the addition of DC supplies.

This document is only applicable to IEC 62386-102:2014 and IEC 62386-102:2014/AMD1:— control gear that implements load referencing.

NOTE Requirements for testing individual products during production are not included.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 62386-101:2014, *Digital addressable lighting interface – Part 101: General requirements – System components*
IEC 62386-101:2014/AMD1:—[1]

IEC 62386-102:2014, *Digital addressable lighting interface – Part 102: General requirements – Control gear*
IEC 62386-102:2014/AMD1:—[2]

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62386-102 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
reference measurement
measurement of the output load at a specific light level with a specific light source, stored in persistent memory

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1 Under preparation. Stage at the time of publication: IEC CCDV 62386-101/AMD1:2018.

2 Under preparation. Stage at the time of publication: IEC CCDV 62386-102/AMD1:2018.

3.2
load deviation
condition in which the actual load leaves the normal operating range

3.3
load referencing
series of reference measurements

4 General

4.1 General

The requirements of IEC 62386-102:2014 and IEC 62386-102:2014/AMD1:—, Clause 4 apply, with the restrictions, changes and additions identified below.

4.2 Version number

In 4.2 of IEC 62386-102:2014 and IEC 62386-102:2014/AMD1:—, 102 shall be replaced by "216", "version number" shall be replaced by "extended version number" and "*versionNumber*" shall be replaced by "*extendedVersionNumber*".

5 Electrical specification

The requirements of IEC 62386-102:2014 and IEC 62386-102:2014/AMD1:—, Clause 5 apply.

6 Interface power supply

The requirements of IEC 62386-102:2014 and IEC 62386-102:2014/AMD1:—, Clause 6 apply.

7 Transmission protocol structure

The requirements of IEC 62386-102:2014 and IEC 62386-102:2014/AMD1:—, Clause 7 apply.

8 Timing

The requirements of IEC 62386-102:2014 and IEC 62386-102:2014/AMD1:—, Clause 8 apply.

9 Method of operation

9.1 General

The requirements of IEC 62386-102:2014 and IEC 62386-102:2014/AMD1:—, Clause 9 apply with the following additions.

9.2 Reference measurement

For each reference measurement R_n (n = 1, .., N, with 1 ≤ N < 255) the manufacturer specifies (e.g. as percentage of the reference measurement R_n) the maximum limit $R_{n\text{Max}}$ and/or the minimum limit $R_{n\text{Min}}$ of the output load operating range. These limits shall verify:

$$R_{n\text{Min}} \leq R_n \leq R_{n\text{Max}}$$

where $R_{n\text{Min}}$ and $R_{n\text{Max}}$ are calculated based on the measured R_n.

These limits are manufacturer specific. The manual/documentation shall state the following:

- output levels used for reference measurement (reference levels), and
- minimum and maximum levels considered not to be a load deviation or the calculation method for minimum and maximum levels based on the reference level.

These levels shall be used for testing purposes.

9.3 Load referencing

Load referencing is a manufacturer specific method to determine the normal operating range of the currently connected load in order to detect and notify load deviations.

In order to perform load referencing, a series of reference measurements (R_n) are done at different output levels (L_n). The reference measurement can be done on load current, voltage or on any other derived physical quantity (e.g. power). The measurements shall be stored in NVM. After successful reference measurements have been done, load deviation can be detected.

Execution of command “REFERENCE SYSTEM POWER” shall:

- stop a running fade;
- start or prolong load referencing;
- when starting the load referencing: set “*referenceMeasurementFailed*” to TRUE to disable the load deviation detection, then set “*loadDeviation*” and “*lampFailure*” to FALSE.

During load referencing:

- the answer to query “QUERY REFERENCE RUNNING” shall be YES;
- “*loadDeviation*” status shall not be changed;
- the light output may be at any level between off and 100 %, “*minLevel*” and “*maxLevel*” as well as “*actualLevel*” being temporarily ignored. After the load referencing is finished or aborted the light output shall be adjusted as quickly as possible to reflect “*actualLevel*”;
- lamp failure detection may be temporary inactive until the first reference measurement is completed.

Load referencing shall be active for at least 500 ms.

The load referencing shall be aborted if one of the following conditions occur:

- 15 min ± 1,5 min elapsed since the last “REFERENCE SYSTEM POWER” command was executed;
- an external power cycle is applied;
- command “TERMINATE” is executed;
- “*controlGearFailure*” becomes TRUE;
- “*lampFailure*” becomes TRUE.

Command “REFERENCE SYSTEM POWER” shall be ignored if:

- “*controlGearFailure*” is TRUE, or
- *“initialisationState”* is not DISABLED.

When load referencing cannot be started or an ongoing load referencing is aborted, the control gear shall set “*referenceMeasurementFailed*” to TRUE. In that case “*loadDeviation*” shall not be changed.

When load referencing has been successfully done, the control gear shall set "*referenceMeasurementFailed*" to FALSE.

Any instruction received during the load referencing shall be ignored except "TERMINATE", "REFERENCE SYSTEM POWER", "ENABLE DEVICE TYPE(*data*)" with *data*="*deviceType*", "DTR0", "DTR1", "DTR2".

Reference measurements are related to a specific light source. If the light source is replaced a new load referencing is recommended, otherwise unexpected lamp failures might be indicated.

9.4 Load deviation

The control gear shall detect a load deviation only when successful load referencing has been executed and given a certain output level L_n, the measured output R_{actual} is outside the $R_{n\text{Min}}$ and $R_{n\text{Max}}$ boundaries:

$$R_{\text{actual}} < R_{n\text{Min}} \text{ or } R_{\text{actual}} > R_{n\text{Max}}$$

where R_n is the reference measurement related to L_n.

Load deviation shall be detected and indicated latest after 30s.

When a load deviation is detected the control gear shall:

- set "*loadDeviation*" to TRUE;
- set "*lampFailure*" to TRUE.

The control gear may switch and keep the lamp off when a load deviation is detected. In this case the control gear shall set "*lampOn*" to FALSE. Detection and improvement of the load deviation shall be treated as the lamp failure, as given in IEC 62386-102:2014 and IEC 62386-102:2014/AMD1:—, Clause 9. This implies load deviation shall be verified with the load switched on at least whenever "*targetLevel*" changes from 0x00 to a greater value. If the load deviation is no longer detected, "*loadDeviation*" shall be set to FALSE. Any additional criteria including switching the load on shall be stated in the manual/documentation.

9.5 Failure status

Failures are notified in the failure status byte. The failure status byte shall be updated as soon as possible by the control gear and shall reflect the actual situation without delay unless explicitly stated otherwise. The failure status byte can be queried with "QUERY FAILURE STATUS". See Table 1.

Table 1 – Control gear failure status

Bit	Description	Value
0	Reserved	-
1	Reserved	-
2	*"loadDeviation"*	"1" = Yes
3	Reserved	-
4	Reserved	-
5	Reserved	-
6	Reserved	-
7	*"referenceMeasurementFailed"*	"1" = Yes