IEC 62386-222

Edition 1.0 2018-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Digital addressable lighting interface –
Part 222: Particular requirements for control gear – Thermal lamp protection (device type 21)

Interface d'éclairage adressable numérique –
Partie 222: Exigences particulières pour les appareillages de commande – Protection thermique de la lampe (dispositifs de type 21)

IEC 62386-222:2018-04(en-fr)

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue
The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org
The world's leading online dictionary of electronic and electrical terms, containing 21 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary
67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue
Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - webstore.iec.ch/advsearchform
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,…). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org
Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 21 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary
67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC 62386-222

Edition 1.0 2018-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Digital addressable lighting interface – Part 222: Particular requirements for control gear – Thermal lamp protection (device type 21)

Interface d'éclairage adressable numérique – Partie 222: Exigences particulières pour les appareillages de commande – Protection thermique de la lampe (dispositifs de type 21)

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 29.140.50; 29.140.99

ISBN 978-2-8322-5503-2

Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

CONTENTS

FOREWORD 3
INTRODUCTION 5
1 Scope 7
2 Normative references 7
3 Terms and definitions 7
4 General 8
4.1 General 8
4.2 Version number 8
5 Electrical specification 8
6 Interface power supply 8
7 Transmission protocol structure 8
8 Timing 8
9 Method of operation 8
9.1 General 8
9.2 Thermal lamp behaviour 8
9.3 Thermal lamp overload 10
9.4 Thermal lamp shutdown 10
9.5 Failure status 11
10 Declaration of variables 12
11 Definition of commands 12
11.1 General 12
11.2 Overview sheets 12
11.3 Application extended commands 13
11.3.1 General 13
11.3.2 Configuration instructions 13
11.3.3 Queries 13
11.4 Special commands 14
11.4.1 General 14
11.4.2 ENABLE DEVICE TYPE (*data*) 14
Bibliography 15

Figure 1 – IEC 62386 graphical overview 5
Figure 2 – Thermal lamp protection state diagram 9
Figure 3 – Example of temperature change over time 10

Table 1 – Control gear failure status 11
Table 2 – Declaration of variables 12
Table 3 – Application extended commands for this device type 13

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

DIGITAL ADDRESSABLE LIGHTING INTERFACE –

Part 222: Particular requirements for control gear – Thermal lamp protection (device type 21)

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 62386-222 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
34/484/FDIS	34/507/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 222 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 62386-222 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.

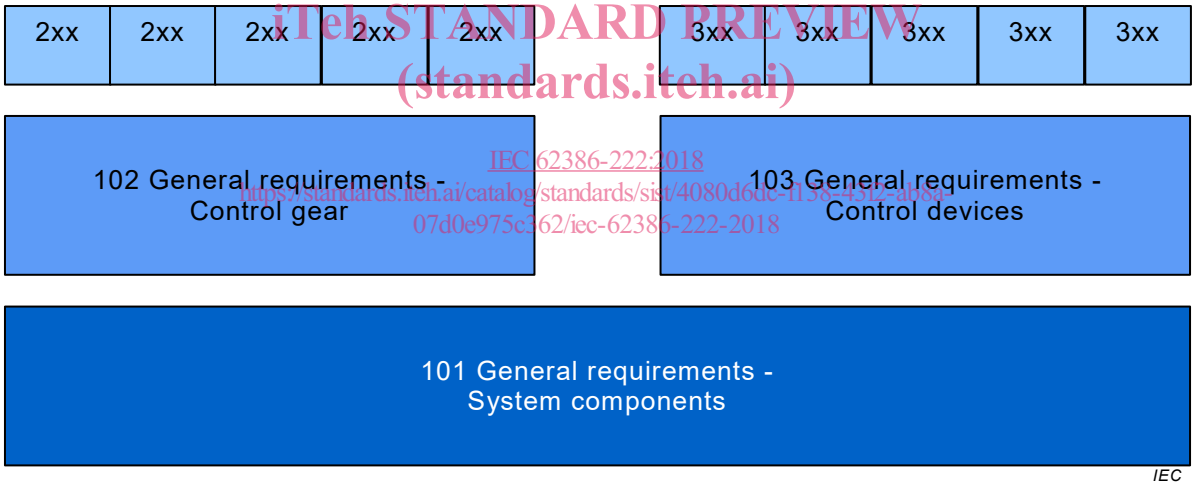

Figure 1 – IEC 62386 graphical overview

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 222: Particular requirements for control gear – Thermal lamp protection (device type 21)

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 thermal lamp protection.

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
thermal lamp overload
condition in which the lamp temperature exceeds the upper limit T_{ovl} of the normal operating range and with the consequence that the light output is reduced

---

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
thermal lamp shutdown
thermal lamp overload condition in which the lamp temperature exceeds the maximum permissible temperature T_{shut} and with the consequence that the lamp is switched off

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 “222”, “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 Thermal lamp behaviour

Depending on the lamp temperature, various states can be identified within a control gear:

- Normal: the lamp temperature is in the defined temperature ranges.
- Overload: the lamp temperature exceeds the defined overload temperature threshold (T_{ovl}).
- Shutdown: the lamp temperature exceeds the defined shutdown temperature threshold (T_{shut}).

All possible state transitions are illustrated in Figure 2.

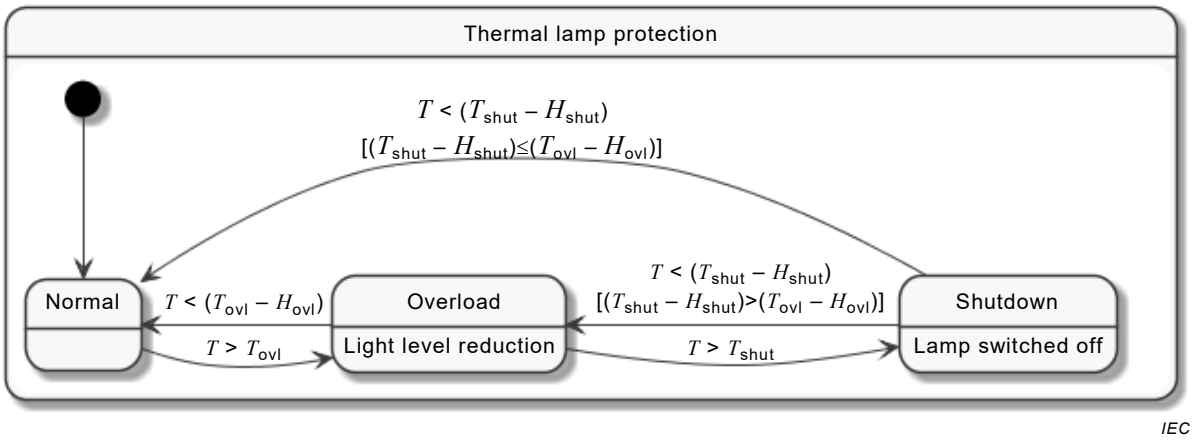

Figure 2 – Thermal lamp protection state diagram

To avoid unwanted frequent switching for each temperature threshold a hysteresis is defined as follows:

- H_{ovl}: hysteresis defined for T_{ovl};
- H_{shut}: hysteresis defined for T_{shut}.

The temperature thresholds T_{ovl} and T_{shut} and their corresponding hysteresis H_{ovl} and H_{shut} are manufacturer specific and shall be stated in the manual/documentation.

The relation between the temperature thresholds in Kelvin and their corresponding hysteresis is as follows:

- $T_{ovl} \leq T_{shut}$;
- $H_{ovl} < T_{ovl}$;
- $H_{shut} < T_{shut}$.

Starting from a normal state, if the lamp temperature rises above T_{ovl} the control gear shall enter the overload state. If the lamp temperature increases even more, rising above T_{shut}, the control gear shall enter the shutdown state. When the lamp temperature drops below ($T_{shut} - H_{shut}$), but above T_{ovl}, the control gear shall return to the overload state. When the lamp temperature drops below ($T_{ovl} - H_{ovl}$), the control gear shall return to the normal state. Figure 3 illustrates this case.

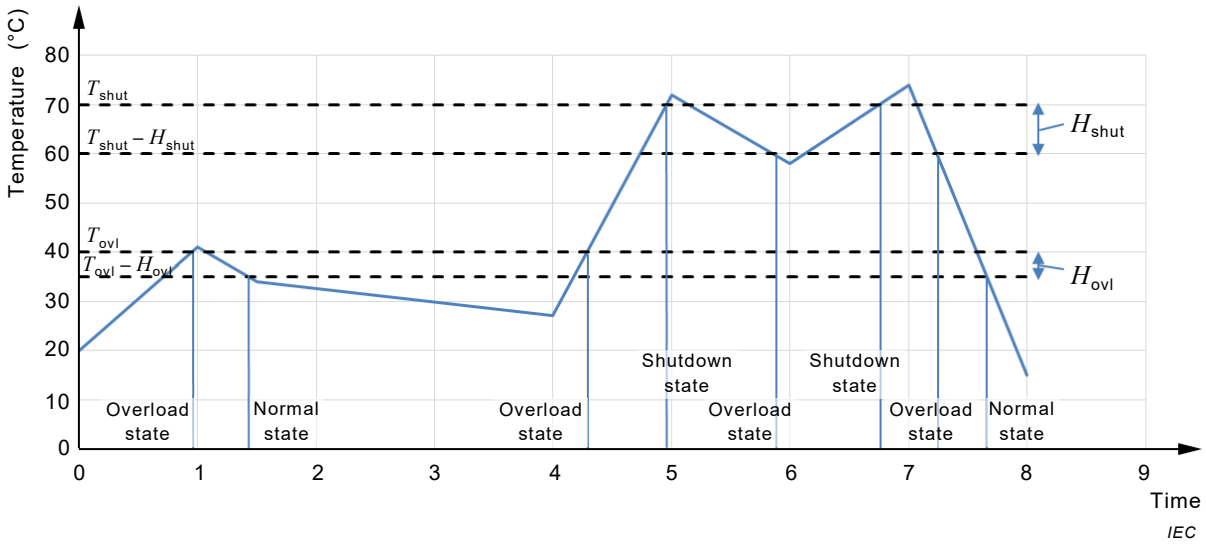

Figure 3 – Example of temperature change over time

The fact that a thermal lamp protection is implemented and its actual status can be queried does not relieve the user from the obligation to comply with safety relevant information for installation given by the manufacturer. A note to this effect shall be included in the manual/documentation.

9.3 Thermal lamp overload

When the lamp temperature rises above T_{ovl}, the control gear shall enter the overload state.

When entering the overload state the control gear shall:

- set "*lampFailure*" to TRUE;
- set "*thermalLampOverload*" to TRUE;
- when entering from normal state: increment *"overloadCounter"* by 1, unless it equals 255;
- change the normal relationship between "*actualLevel*" and light output in order to decrease the lamp temperature.

While in the overload state, there shall be light in case "*actualLevel*" is not zero, except in the case of total lamp failure.

When the lamp temperature drops below (T_{ovl} – H_{ovl}), the control gear shall return to the normal state. On return to the normal state the control gear shall:

- set "*lampFailure*" to FALSE;
- set "*thermalLampOverload*" to FALSE;
- re-establish the normal relationship between *"actualLevel"* and light output.

"*thermalLampOverload*" can be queried using QUERY THERMAL LAMP OVERLOAD.

9.4 Thermal lamp shutdown

When the lamp temperature rises above T_{shut}, the control gear shall enter the shutdown state.