# IEC 62386-103

Edition 2.0 2022-11
COMMENTED VERSION

# INTERNATIONAL STANDARD

colour inside

## Digital addressable lighting interface –
## Part 103: General requirements – Control devices



IEC 62386-103:2022-11 CMV(en)



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# DIGITAL ADDRESSABLE LIGHTING INTERFACE –

# Part 103: General requirements – Control devices

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**This commented version (CMV) of the official standard IEC 62386-103:2022 edition 2.0 allows the user to identify the changes made to the previous IEC 62386-103:2014+ AMD1:2018 CSV edition 1.1. Furthermore, comments from IEC TC 34 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.**

**A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.**

**This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.**

IEC 62386-103 has been prepared by IEC technical committee 34: Lighting. It is an International Standard.

This second edition cancels and replaces the first edition published in 2014 and Amendment 1:2018. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) the scope has been updated;
b) quiescent mode has been updated;
c) non-volatile memory (NVM) save time has been added, and SAVE PERSISTENT VARIABLES command removed;
d) memory bank 0 has been modified, and common memory bank requirements have been added;
e) IDENTIFY DEVICE has been updated;
f) version number has been changed;
g) bus unit configuration has been added; and
h) instance types and configuration have been added.

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

| Draft | Report on voting |
|---|---|
| 34/946/FDIS | 34/990/RVD |

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 International Standard 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/standardsdev/publications.

This Part 103 of IEC 62386 is intended to be used in conjunction with Part 101, which contains general requirements for the relevant product type (system), and with the appropriate Parts 3xx (particular requirements for control devices) containing clauses to supplement or modify the corresponding clauses in Part 101 and Part 103 in order to provide the relevant requirements for each type of product.

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 website under 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.

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# INTRODUCTION

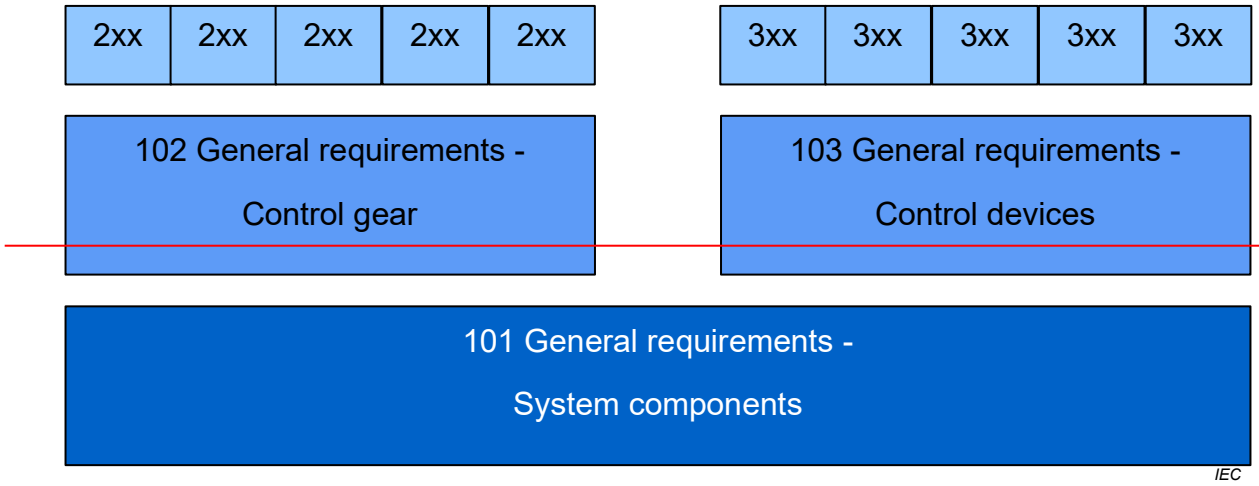
IEC 62386 contains several parts, referred to as series. The IEC 62386 series specifies a bus system for control by digital signals of electronic lighting equipment. The IEC 62386-1xx series includes the basic specifications. Part 101 contains general requirements for system components, Part 102 extends this information with general requirements for control gear and Part 103 extends it further with general requirements for control devices. Part 104 and Part 105 can be applied to control gear or control devices. Part 104 gives requirements for wireless and alternative wired system components. Part 105 describes firmware transfer. Part 150 gives requirements for an auxiliary power supply which can be stand-alone, or built into control gear or control devices.

The IEC 62386-2xx series extends 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 IEC 62386-3xx series extends 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~~ second edition of IEC 62386-103 is intended to be used in conjunction with IEC 62386-101~~:2014, IEC 62386-101:2014/AMD1:2018, IEC 62386-102:2014, IEC 62386-102:2014/AMD1:2018~~ and ~~with the various parts that make up the IEC 62386-2xx series for control gear, together~~ with the various parts that make up the IEC 62386-3xx series of particular requirements for control devices, and can be used together with IEC 62386-102 and with the various parts that make up the IEC 62386-2xx series for control gear. 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 recognised.

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



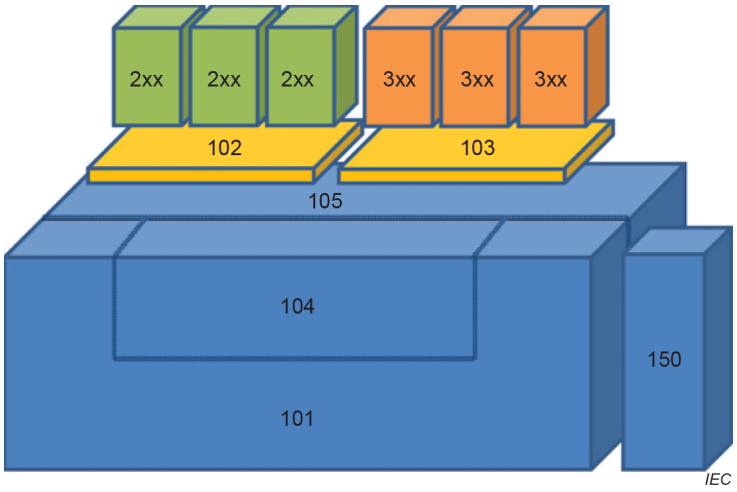




**Figure 1 – IEC 62386 graphical overview 1**

When this part of IEC 62386 refers to any of the clauses of the other ~~two~~ parts of the IEC 62386-1xx series, the extent to which such a clause is applicable ~~and the order in which the tests are to be performed are~~ is specified. The other parts also include additional requirements, as necessary.

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 103: General requirements – Control devices

## 1 Scope

This part of IEC 62386 is applicable to control devices ~~– in 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~~.

~~NOTE Tests in this standard are type tests. 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~~2022, *Digital addressable lighting interface – Part 101: General requirements – System components*
~~IEC 62386-101:2014/AMD1:2018~~

IEC 62386-102:~~2014~~2022, *Digital addressable lighting interface – Part 102: General requirements – Control gear*
~~IEC 62386-102:2014/AMD1:2018~~

IEC 62386-3xx *(all parts)*, *Digital addressable lighting interface – Part 3xx: Particular requirements for control devices*

## 3 Terms and definitions

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

ISO and IEC maintain terminology 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**
**broadcast**
type of address used to simultaneously address all control devices in the system ~~at once~~

**3.2**
**broadcast unaddressed**
type of address used to simultaneously address all control devices in the system that have no short address ~~at once~~

**3.3**
**device command**
command which addresses the control device and has a value of 0xFE in the instance byte of the command frame but is not an event message

**3.4**
**device group**
type of address used to address a group of control devices in the system at once

**3.5**
**DTR**
**data transfer register**
multipurpose register used to exchange data

**3.6**
**event**
instance report, characterized by its event number, of a change or a defined sequence of changes of its input value

Note 1 to entry: The event number is specific to the type of instance that sends the report.

**3.7**
**event scheme**
characterisation of the information, as provided by an instance when producing an event message, that identifies the source of the event

**3.8**
**feature**
optional extension at instance and/or device level

**3.9**
**feature command**
command which addresses one or more features of an input device or device instance and has a value different from 0xFE in the instance byte of the command frame but is not an instance command or an event message

**3.10**
**GTIN**
**global trade item number**
number used for the unique identification of trade items worldwide

Note 1 to entry: For further information see http://en.wikipedia.org/wiki/GTIN.

Note 2 to entry: The global trade item number 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" (see [1]).

**3.11**
**input signal**
physical value that an instance of an input device is designed to detect and process

Note 1 to entry: Examples for physical values are ~~"light level"~~ "illuminance" and "button state".

**3.12**
**identification**
temporary state used during commissioning that allows the installer to identify particular control devices

**3.13**
**input value**
encoded data, representing the input signal

Note 1 to entry: The way in which the input signal is encoded depends on the instance type.

**3.14**
**instance command**
command which addresses one or more instances of an input device and has a value different from 0xFE in the instance byte of the command frame but is not a feature command or an event message

**3.15**
**MASK**
~~the value 0Xff~~
value with all binary digits set to 1

Note 1 to entry: This means that an 8-bit backward frame of MASK is a value of 0xFF, and a multi-byte memory location of 24 bits containing MASK is a value of 0xFFFFFF.

**3.16**
**NO**
answer ~~used to deny or refuse~~ to a query where no backward frame is sent

Note 1 to entry: If a query is asked where the answer is NO, there will be no response, such that the sender of the query will conclude "no backward frame" following IEC 62386-101:~~2014 and IEC62386-101:2014/AMD1:2018~~2022, 8.2.5.

Note 2 to entry: The answer NO could also be triggered by a missed query.

**3.17**
**NVM**
**non-volatile memory**
non-volatile read/write memory, the content of which can be changed and will not be lost due to a power cycle

**3.18**
**NVM-RO**
NVM that cannot be written using any command

**3.19**
**NVM-RW**
NVM that can be modified using one or more commands

**3.20**
**opcode**
**operation code**
that part of a command frame that identifies the command to be executed

**3.21**
**operating mode**
set of states identified by a number in the range [0,255], characterised by a collection of variables and memory settings, and used to select a set of functionalities to be exhibited by a control device, including its required reaction to commands

Note 1 to entry: Control devices ~~may~~ can support more than one operating mode.

**3.22**
**PING**
16-bit forward frame with bits [15:0] equal to 0xAD00

Note 1 to entry: As specified in IEC 62386-102, PING has no meaning for control gear.

**3.23**
**quiescent mode**
temporary mode in which the device does not send forward frames

**3.24**
**RAM**
volatile read/write memory, the content of which can be changed and will be lost due to a power cycle

**3.25**
**RAM-RO**
RAM that cannot be written using any command

**3.26**
**RAM-RW**
RAM that can be modified using one or more commands

**3.27**
**random address**
random 24-bit number generated by the control device on request during system initialisation

**3.28**
**reset state**
state in which all NVM variables of the control device have their reset value, except those that are marked "no change" or are otherwise explicitly excluded

**3.29**
**ROM**
non-volatile read-only memory, the content of which is fixed

Note 1 to entry: In this document read-only is meant from a system perspective. A ROM variable may actually be implemented in NVM, but this document does not provide any mechanism to change its value.

**3.30**
**search address**
24-bit number used to identify an individual control device in the system during initialisation

**3.31**
**short address**
type of address used to address an individual control device in the system

**3.32**
**TMASK 2**
value with the least significant bit set to 0 and all other binary digits set to 1

Note 1 to entry: This means that an 8-bit backward frame of TMASK is a value of 0xFE, and a multi-byte memory location of 24 bits containing TMASK is a value of 0xFFFFFE.

**3.33**
**YES**
answer ~~used to accept or affirm~~ to a query where a backward frame of MASK is sent

~~Note 1 to entry: If a query is asked where the answer is YES, the response will be a backward frame containing the value of MASK.~~

# 4 General

## 4.1 General

The requirements of IEC 62386-101:~~2014 and IEC62386-101:2014/AMD1:2018~~2022, Clause 4 apply, with the restrictions, changes and additions identified below.

## 4.2 Version number

This subclause replaces IEC 62386-101:~~2014 and IEC62386-101:2014/AMD1:2018~~2022, 4.2.

The version shall be in the format "x.y", where the major version number x is in the range of 0 to 62 and the minor version number y is in the range of 0 to 2. When the version number is encoded into a byte, the major version number x shall be placed in bits 7 to 2 and the minor version number y shall be placed in bits 1 to 0.

At each amendment to an edition of IEC 62386-103 the minor version number shall be incremented by one.

At a new edition of IEC 62386-103 the major version number shall be incremented by one and the minor version number shall be set to 0.

The current version number is "*versionNumber*" as defined in Table 19.

NOTE ~~Normally 2 amendments on IEC documents are made before a new edition is created.~~ IEC documents are generally subject to two amendments before a new edition is prepared.

# 5 Electrical specification

The requirements of IEC 62386-101:~~2014 and IEC 62386-101:2014/AMD1:2018~~2022, Clause 5 apply.

# 6 ~~Interface~~ Bus power supply

If a bus power supply is integrated into a control ~~gear~~ device, the requirements of IEC 62386-101:~~2014 and IEC62386-101:2014/AMD1:2018~~2022, Clause 6 apply.

# 7 Transmission protocol structure

## 7.1 General

The requirements of IEC 62386-101:~~2014 and IEC62386-101:2014/AMD1:2018~~2022, Clause 7 apply with the following additions.

## 7.2 24-bit forward frame encoding

### 7.2.1 Frame format for instructions and queries

#### 7.2.1.1 General

For 7.2.1, commands shall be interpreted as instructions and queries, and exclude event messages 3. The 24-bit forward frame shall be encoded as shown in Table 1 and Table 2.