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Edition 3.0 2022-11
COMMENTED VERSION

INTERNATIONAL STANDARD

colour inside

Digital addressable lighting interface –
Part 101: General requirements – System components



IEC 62386-101:2022-11 CMV(en)



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Digital addressable lighting interface – Part 101: General requirements – System components

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DIGITAL ADDRESSABLE LIGHTING INTERFACE –

Part 101: General requirements – System components

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This commented version (CMV) of the official standard IEC 62386-101:2022 edition 3.0 allows the user to identify the changes made to the previous IEC 62386-101:2014+ AMD1:2018 CSV edition 2.1. 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 62386-101 has been prepared by IEC technical committee 34: Lighting. It is an International Standard.

This third edition cancels and replaces the second 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) safety and earthing have been updated and extended;
c) references have been updated;
d) the use of bus-power and external-power has been clarified;
e) polarity sensitivity for bus units including a bus power supply has been updated;
f) frame sizes of 32 bits are no longer reserved.

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

Draft	Report on voting
34/947/FDIS	34/988/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 101 of IEC 62386 is intended to be used in conjunction with:

- Part 102, which contains general requirements for the relevant product type (control gear), and with the appropriate Part 2xx (particular requirements for control gear);
- Part 103, which contains general requirements for the relevant product type (control devices), and the appropriate Part 3xx (particular requirements for control devices);
- Part 104, which contains general requirements for wireless and alternative wired system components;
- Part 105, which contains particular requirements for firmware transfer for control gear and control devices.

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

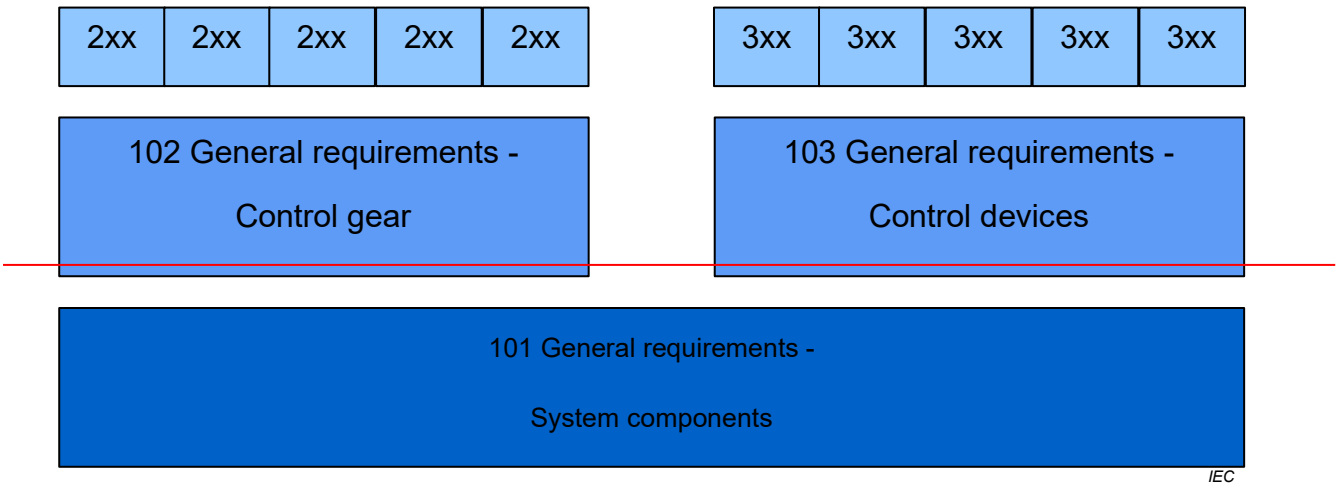
IEC 62386 contains several parts, referred to as series. The IEC 62386 series specifies a bus system for control by digital signals of electronic lighting equipment. The IEC 62386-1xx series includes the basic specifications. Part 101 contains general requirements for system components, Part 102 extends this information with general requirements for control gear and Part 103 extends it further with general requirements for control devices. Parts 104 and 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 ~~second~~ third edition of IEC 62386-101 is intended to be used in conjunction with IEC 62386-102~~:2014 and IEC 62386-102:2014/AMD1:—~~ and with the various parts that make up the IEC 62386-2xx series for control gear, together with IEC 62386-103~~:2014 and IEC 62386-103:2014/AMD1—~~ and the various parts that make up the IEC 62386-3xx series of particular requirements for control devices. 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.



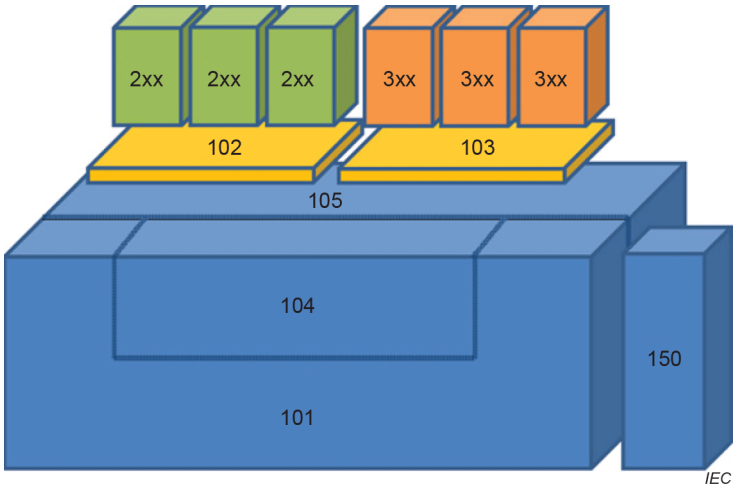


Figure 1 – IEC 62386 graphical overview 1

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".

DIGITAL ADDRESSABLE LIGHTING INTERFACE –

Part 101: General requirements – System components

1 Scope

This part of IEC 62386 is applicable to system components 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 bus units during production are not included.~~

The control methods, algorithms and data exchange methods of application controllers used for lighting control are not within the scope of the IEC 62386 series. EMC requirements are not within the scope of the IEC 62386 series. **2**

2 Normative references **3**

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 61347-1:2015, *Lamp controlgear – Part 1: General and safety requirements*
IEC 61347-1:2015/AMD1:2017

IEC 62386-102:~~2014~~2022, *Digital addressable lighting interface – Part 102: General requirements – Control gear*
~~IEC 62386-102:2014/AMD1:—~~ [1]

IEC 62386-103:~~2014~~2022, *Digital addressable lighting interface – Part 103: General requirements – Control devices*
~~IEC 62386-103:2014/AMD1:—~~ [2]

IEC 62386-104, *Digital addressable lighting interface – Part 104: General requirements – Wireless and alternative wired system components*

IEC 62386-105, *Digital addressable lighting interface – Part 105: Particular requirements for control gear and control devices – Firmware Transfer*

IEC 62386-2xx (all parts), *Digital addressable lighting interface – Part 2xx: Particular requirements for control gear*

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

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[1] ~~Under preparation. Stage at the time of publication: IEC DECFDIS 62386-102/AMD1:2018.~~

[2] ~~Under preparation. Stage at the time of publication: IEC RFDIS 62386-103/AMD1:2018.~~

IEC 61000-4-11, *Electromagnetic compatibility (EMC) – Part 4-11:Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase*

IEC 60664-1, *Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests*

IEC 60990:2016, *Methods of measurement of touch current and protective conductor current*

IEC 61643-11, *Low-voltage surge protective devices – Part 11: Surge protective devices connected to low-voltage power systems – Requirements and test methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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
active state
phase of low level voltage during a transmission

Note 1 to entry: Noise and short pulses may be ignored and therefore do not change the state.

3.2
advanced bus power supply
bus power supply capable of checking the bus for fault conditions before switching on its output continuously

Note 1 to entry: Examples of fault conditions are mains voltage connected to the bus or short circuit of the bus.

3.3
application controller
control device that is connected to the bus and sends commands in order to control input devices and/or control gear connected to the same bus

3.4
backward frame
frame used for backward transmission

3.5
backward transmission
transmission of data as a reply to and triggered by a forward transmission

3.6
bus
two-wire connection line carrying power and frames

3.7
bus powered
drawing the power for operation from the bus

3.8
bus power down
bus power interruption longer than 45 ms

3.9
bus power interruption
abnormal condition where the bus voltage is in the receiver low level voltage range, but not because of a transmitter being active

3.10
bus power supply
unit feeding defined energy to the bus

3.11
bus unit
logical unit or combination of logical units, containing one transmitter and optionally one receiver

Note 1 to entry: See 4.6.6.

3.12
charge overshoot
product of current overshoot time and current overshoot amplitude

~~Note 1 to entry: Within this standard the charge overshoot is a simple multiplication of the current overshoot time and the current overshoot amplitude.~~

3.13
collision
situation in which two or more transmitters are transmitting simultaneously

Note 1 to entry: Collisions can go unnoticed if the transmission timing is sufficiently similar and the transmitted frame content is identical.

3.14
command
forward transmission with appropriate information content, intended to cause a reaction in the receiver

Note 1 to entry: A receiver, having decoded a command can, when appropriate, decide to ignore the command.

Note 2 to entry: Refer to IEC 62386-102, IEC 62386-103, IEC 62386-104, IEC 62386-105, the IEC 62386-2xx series and IEC 62386-3xx series for command definitions.

3.15
control device
device that is connected to the bus and sends commands to other devices ~~(for example control gear)~~ connected to the same bus

Note 1 to entry: Control devices can also receive commands and backward transmissions. Control devices can contain application controllers and/or input devices.

3.16
control gear
device that is connected to the bus and receives commands in order to control at least one output in a direct or indirect way

Note 1 to entry: The lamp controlgear described in IEC 61347-1 can cover control gear.

3.17
current overshoot time
time per bit during which the current supplied by the bus power supply is above the allowed maximum of 250 mA after a transition from idle state to active state

Note 1 to entry: See 6.5.4.

3.18
destroy area
time slot where a valid frame cannot be ~~guaranteed and therefore the frame has to be invalidated~~ ensured

3.19
edge
change from active state to idle state or vice versa

3.20
event message
command sent by a control device in order to distribute information on the bus

3.21
externally powered
drawing the power for operation from a separate power supply

Note 1 to entry: The separate power supply can be mains power, DC power, etc.

3.22
forward frame
frame used for forward transmission

3.23
forward frame priority
property of a forward frame used to prioritize access to the bus

3.24
forward transmission
transmission of data initiated by a control device

Note 1 to entry: See also 3.5.

3.25
frame
set of consecutive bits followed by a stop condition

Note 1 to entry: See Clause 8 for the timing definition of a stop condition.

3.26
grey area
time slot containing the decision point separating adjacent time slots

Note 1 to entry: A grey area indicates that the decision is arbitrary. Typically the previous or next entry in a table should be used as an action. See Clause 8 for further information.

3.27
idle state
phase of high level voltage between and during transmissions

Note 1 to entry: Noise and short pulses may be ignored and therefore do not change the state.

3.28
input device
control device that is connected to the bus and sends commands using a multi-master transmitter in order to distribute information about user actions and/or sensor values

Note 1 to entry: Input devices do not transmit commands to the control gear.

3.29
instance
signal processing unit of an input device

3.30
instruction
command transmitted to change one or more variables in a bus unit **4**

3.31
integrated bus power supply
bus power supply integrated into a physical device also containing a bus unit

3.32
interface
terminals or wires for connection to the bus

3.33
logical unit
control gear or control device that conforms to IEC 62386-102 or IEC 62386-103

Note 1 to entry: See 4.6.6.

3.34
multi-master application controller
application controller that is ~~intended to share~~ capable of sharing **5** the bus with other control devices and uses a multi-master transmitter

3.35
multi-master transmitter
transmitter that follows the multi-master timing and supports collision detection, collision avoidance, and collision recovery methods

Note 1 to entry: Multi-master transmitters are used in control devices intended for multi-master control systems.

3.36
proprietary forward frame
~~frame other than a standard forward frame, reserved forward frame or backward frame~~

~~Note 1 to entry: Proprietary frames are intended for manufacturer specific purposes~~

forward frame for manufacturer-specific purposes

3.37
query
command transmitted to observe a variable in a bus unit

Note 1 to entry: A query can be followed by a backward frame.

3.38
receiver
part of a bus unit detecting and decoding frames on the bus

3.39
reserved
intended for future use ~~by this standard~~

3.40
send-twice command
command transmitted by send-twice forward frames

Note 1 to entry: Refer to 9.4, IEC 62386-102, IEC 62386-103, the IEC 62386-2xx series and IEC 62386-3xx series for further details on send-twice commands.

3.41
send-twice forward frame
forward frame that needs to be transmitted twice with a limited settling time in order to be processed by the receiver

3.42
settling time
time during which the bus is in idle state after the last rising edge of one frame and before the first falling edge of the next frame

3.43
single-master application controller
application controller that is ~~intended not to share the bus with other control devices~~ not required to use a multi-master transmitter **6**

Note 1 to entry: The implication is that no other application controllers, and no other input devices with event messages enabled, may be connected to the bus.

3.44
standard forward frame
forward frame as defined and described in the IEC 62386 series

3.45
system failure
bus power interruption longer than 550 ms

3.46
transaction
uninterruptible set of one or more consecutive forward frames transmitted from a single control device, with zero or more backward frames

3.47
transmitter
part of a bus unit placing frames on the bus

3.48
voltage overshoot time
time per bit during which the voltage supplied by the bus power supply is above 20,5 V after a transition from active state to idle state

Note 1 to entry: See 6.5.4.

3.49
voltage undershoot time
time per bit during which the voltage supplied by the bus power supply is below 12,0 V after a transition from active state to idle state

Note 1 to entry: See 6.5.4.

3.50
frame accepted
frame that has been received and uses the correct frame type and data bit content

3.51
frame ignored
frame received but not accepted

3.52
frame received
frame with a valid start bit, valid data bits, and a stop condition

3.53
frame rejected
frame not received

3.54
FELV
functional extra-low voltage
ELV in a circuit provided for functional purposes and not fulfilling the requirements for SELV (or PELV)

Note 1 to entry: FELV has basic insulation from LV.

Note 2 to entry: An FELV circuit is not safe to touch.

[SOURCE: IEC 60598-1:2020, 1.2.42.1, modified – The notes have been added.]

4 General

4.1 Purpose

The standardization of the digital addressable lighting interface is intended to achieve interoperable multi-vendor operation below the level of building management systems.

~~EN 50491 and ISO 14672 are not applicable for the purposes of this standard.~~

Annex A gives further information for systems.

NOTE The IEC 63044 series and ISO/IEC 14762 are not applicable for the purposes of this IEC 62386 series. The IEC 63044 series can be applicable to application controllers if intended to be used as HBES/BACS.

4.2 Version number

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 62386-101 the minor version number shall be incremented by one.

At a new edition of IEC 62386-101 the major version number shall be incremented by one and the minor version number shall be set to 0.

The current version number is ~~"2.01"~~ "3.0".

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.