

AS/NZS 62386.101:2024
IEC 62386-101:2022



STANDARDS
Australia



Australian/New Zealand Standard™

Digital addressable lighting interface

Part 101: General requirements — System components (IEC 62386-101:2022, MOD)



AS/NZS 62386.101:2024

This Joint Australian/New Zealand Standard™ was prepared by Joint Technical Committee EL-041, Lighting. It was approved on behalf of Standards Australia's Standards Development and Accreditation Committee on 06 February 2024 and by the New Zealand Standards Approval Board on 01 November 2023.

This Standard was published on 8 March 2024.

The following are represented on Committee EL-041:

- Australian Industry Group
- Better Regulation Division (Fair Trading, SafeWork NSW, TestSafe)
- Consumer Electronics Suppliers Association
- Consumers Federation of Australia
- Department of Climate Change, Energy, the Environment and Water
- Electrical Compliance Testing Association of Australia
- Electrical Regulatory Authorities Council, Australia
- Energy Efficiency & Conservation Authority of New Zealand
- Energy Efficiency Council
- IES: The Lighting Society
- Joint Accreditation System of Australia & New Zealand
- Joint Accreditation System of Australia and New Zealand — New Zealand
- Lighting Council Australia
- Lighting Council New Zealand
- Master Electricians NZ
- National Association of Testing Authorities Australia

This Standard was issued in draft form for comment as DR AS/NZS 62386.101:2024.

Keeping Standards up-to-date

Ensure you have the latest versions of our publications and keep up-to-date about Amendments, Rulings, Withdrawals, and new projects by visiting:

www.standards.org.au

www.standards.govt.nz

ISBN 978 1 76139 551 2

Australian/New Zealand Standard™

Digital addressable lighting interface

Part 101: General requirements — System components (IEC 62386-101:2022, MOD)

First published as AS/NZS 62386.101:2020.
Second edition 2024.



© IEC Geneva Switzerland 2024 — All rights reserved

© Standards Australia Limited/the Crown in right of New Zealand, administered by the New Zealand Standards Executive 2024

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of either the IEC or the publisher, unless otherwise permitted under the Copyright Act 1968 (Cth) or the Copyright Act 1994 (New Zealand). If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please see the contact details on the back cover or the contact us page of the website for further information.

Preface

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee EL-041, Lighting, to supersede AS/NZS 62386.101:2020, *Digital addressable lighting interface, Part 101: General requirements — System components (IEC 62386-101:2014 AMD1:2018 CSV (ED. 2.1) MOD)*.

The objective of this document is to specify system components in a bus system for control by digital signals of electronic lighting equipment.

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.

This document is an adoption with national modifications and has been reproduced from IEC 62386-101:2022, *Digital addressable lighting interface — Part 101: General requirements — System components*.

The modifications are additional requirements and are set out in [Appendix ZZ](#), which has been added at the end of the source text.

As this document has been reproduced from an International document, a full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

Contents

Preface	ii
FOREWORD	vii
INTRODUCTION	ix
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 General	6
4.1 Purpose	6
4.2 Version number	7
4.3 System structure and architecture	7
4.4 System information flow	8
4.5 Command types	8
4.6 Bus units	8
4.6.1 Transmitters and receivers in bus units	8
4.6.2 Control gear	9
4.6.3 Input device	9
4.6.4 Single-master application controller	9
4.6.5 Multi-master application controller	10
4.6.6 Sharing an interface	10
4.6.7 Power for operation	11
4.7 Bus power supply and load calculations	11
4.7.1 Current demand coverage	11
4.7.2 Maximum signal current compliance	11
4.7.3 Simplified system calculation	12
4.8 Wiring	12
4.8.1 Wiring structure	12
4.8.2 Wiring specification	12
4.9 Electrical safety requirements	12
4.9.1 General	12
4.9.2 Insulation	12
4.9.3 Electric strength	13
4.9.4 Limitation of the touch current from the device to the bus	13
4.10 Earthing of the bus	13
4.11 Power interruptions at bus units	13
4.11.1 Different levels of power interruptions	13
4.11.2 Short power interruptions of external power supply	14
4.11.3 External power cycle	14
4.11.4 Short interruptions of bus power supply	14
4.11.5 Bus power down	15
4.11.6 System start-up timing	15
5 Electrical specification	16
5.1 General	16
5.2 Marking of the interface	16
5.3 Capacitors between the interface and earth	16
5.4 Signal voltage rating	17
5.5 Signal current rating	17
5.6 Marking of bus powered bus unit	18
5.7 Signal rise time and fall time	18
6 Bus power supply	19
6.1 General	19
6.2 Marking of the bus power supply terminals	20
6.3 Capacitors between the interface and earth	20

6.4	Voltage rating.....	20
6.5	Current rating.....	20
6.5.1	General current rating.....	20
6.5.2	Single bus power supply current rating.....	21
6.5.3	Integrated bus power supply current rating.....	21
6.5.4	Dynamic behaviour of the bus power supply.....	21
6.6	Bus power supply timing requirements.....	22
6.6.1	Short power supply interruptions.....	22
6.6.2	Short circuit behaviour.....	22
7	Transmission protocol structure.....	23
7.1	General.....	23
7.2	Bit encoding.....	23
7.2.1	Start bit and data bit encoding.....	23
7.2.2	Stop condition encoding.....	24
7.3	Frame description.....	24
7.4	Frame types.....	24
7.4.1	16-bit forward frame.....	24
7.4.2	24-bit forward frame.....	24
7.4.3	32-bit forward frame.....	24
7.4.4	Reserved forward frame.....	24
7.4.5	Backward frame.....	24
7.4.6	Proprietary forward frames.....	24
8	Timing.....	25
8.1	Single-master transmitter timing.....	25
8.1.1	Single-master transmitter bit timing.....	25
8.1.2	Single-master transmitter frame sequence timing.....	26
8.2	Receiver timing.....	26
8.2.1	Receiver bit timing.....	26
8.2.2	Receiver bit timing violation.....	28
8.2.3	Receiver frame size violation.....	28
8.2.4	Receiver frame sequence timing.....	28
8.2.5	Reception of backward frames.....	29
8.3	Multi-master transmitter timing.....	29
8.3.1	Multi-master transmitter bit timing.....	29
8.3.2	Multi-master transmitter frame sequence timing.....	29
9	Method of operation.....	30
9.1	Dealing with frames and commands.....	30
9.1.1	General.....	30
9.1.2	Frame received or rejected.....	31
9.1.3	Frame accepted or ignored.....	31
9.1.4	Command accepted or ignored.....	31
9.1.5	Command executed or discarded.....	32
9.2	Collision avoidance, collision detection and collision recovery.....	32
9.2.1	General.....	32
9.2.2	Collision avoidance.....	32
9.2.3	Collision detection.....	32
9.2.4	Collision recovery.....	34
9.3	Transactions.....	35
9.4	Send-twice forward frames and send-twice commands.....	35
9.5	Command iteration.....	36
9.6	Usage of a shared interface.....	36
9.6.1	General.....	36
9.6.2	Backward frames.....	37
9.6.3	Forward frames.....	37
9.7	Use of multiple bus power supplies.....	37
10	Declaration of variables.....	37

11	Definition of commands	37
Annex A	(informative) Background information for systems	38
Annex B	(informative) Touch current	52
	Bibliography	53
Appendix ZZ	(normative) Modifications to IEC 62386-101:2022 for Australia	54

List of Figures

Figure 1	— IEC 62386 graphical overview	ix
Figure 2	— System structure example	7
Figure 3	— Communication between bus units (example)	8
Figure 4	— Example of a shared interface	10
Figure 5	— Start-up timing example	16
Figure 6	— Maximum signal rise and fall time measurements	19
Figure 7	— Minimum signal rise and fall time measurements	19
Figure 8	— Bus power supply current behaviour	22
Figure 9	— Bus power supply voltage behaviour	22
Figure 10	— Frame example	23
Figure 11	— Bi-phase encoded bits	23
Figure 12	— Bit timing example	25
Figure 13	— Settling time illustration	26
Figure 14	— Receiver timing decision example	28
Figure 15	— Dealing with frames and commands	31
Figure 16	— Collision detection timing decision example	34
Figure 17	— Collision recovery example	35
Figure A.1	— Single-master architecture example	40
Figure A.2	— Multi-master architecture example with one application controller	41
Figure A.3	— Multi-master architecture example with two application controllers	42
Figure A.4	— Multi-master architecture example with integrated input device	43
Figure A.5	— Multi-master architecture example with integrated input device and bus power supply	44
Figure A.6	— Collision detection timing diagram	45
Figure A.7	— Transmitter and receiver timing illustration	46
Figure A.8	— Bus power supply current values	47
Figure A.9	— Current demand coverage	47
Figure A.10	— Combination of four bus power supplies	48
Figure A.11	— Redundant bus power supplies	49
Figure B.1	— Touch current from a bus unit	52
Figure B.2	— Summation of touch currents from several bus units	52

List of Tables

Table 1	— System components	7
Table 2	— Transmitters and receivers in bus units	8
Table 3	— Power-interruption timing of external power	13
Table 4	— Power-interruption timing of bus power	14
Table 5	— Short power interruptions	14
Table 6	— Start-up timing	15
Table 7	— System voltage levels	17
Table 8	— Receiver voltage levels	17
Table 9	— Transmitter voltage levels	17
Table 10	— Current rating	17
Table 11	— Signal rise and fall times	18
Table 12	— Bus power supply output voltage	20
Table 13	— Bus power supply current rating	20
Table 14	— Bus power supply dynamic behaviour	21

Table 15 — Short circuit timing behaviour 22

Table 16 — Transmitter bit timing 25

Table 17 — Transmitter settling time values 26

Table 18 — Receiver timing starting at the beginning of a logical bit 27

Table 19 — Receiver timing starting at an edge inside of a logical bit 27

Table 20 — Receiver settling time values 28

Table 21 — Multi-master transmitter bit timing 29

Table 22 — Multi-master transmitter settling time values 29

Table 23 — Checking a logical bit, starting at an edge at the beginning of the bit 33

Table 24 — Checking a logical bit, starting at an edge inside the bit 33

Table 25 — Collision recovery timing 34

Table 26 — Transmitter command iteration timing 36

Table 27 — Receiver command iteration timing 36

Table A.1 — Maximum cable length 38

Table A.2 — OSI layer model of the IEC 62386 series 49

Table A.3 — Effects of combining version number 1 and version number 2.y devices 51

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.

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.

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 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 third edition of IEC 62386-101 is intended to be used in conjunction with IEC 62386-102 and with the various parts that make up the IEC 62386-2xx series for control gear, together with IEC 62386-103 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.

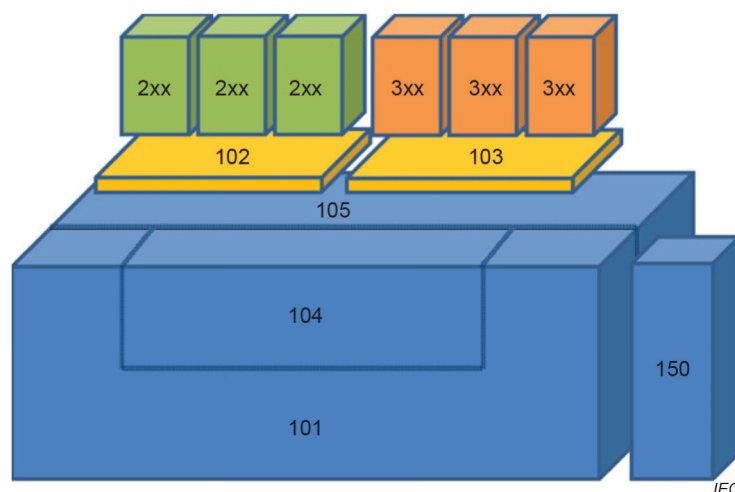


Figure 1 — IEC 62386 graphical overview

When this part of IEC 62386 refers to any of the clauses of the other parts of the IEC 62386-1xx series, the extent to which such a clause is applicable 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".

NOTES

Australian/New Zealand Standard

Digital addressable lighting interface

Part 101: General requirements — System components (IEC 62386-101:2022, MOD)

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.

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 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 61347-1:2015, *Lamp controlgear – Part 1: General and safety requirements*

IEC 61347-1:2015/AMD1:2017

IEC 62386-102:2022, *Digital addressable lighting interface – Part 102: General requirements – Control gear*

IEC 62386-103:2022, *Digital addressable lighting interface – Part 103: General requirements – Control devices*

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*

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

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 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 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

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 capable of sharing 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**

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

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 not required to use a multi-master transmitter

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.

[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 "3.0".

NOTE IEC documents are generally subject to two amendments before a new edition is prepared.

4.3 System structure and architecture

A system shall consist of the components listed in [Table 1](#).

Table 1 — System components

Component	Quantity	For detailed information see
Bus power supply	≥ 1	Clause 6
Control gear	≥ 0	IEC 62386-102
Application controller	≥ 1	IEC 62386-103
Input devices	≥ 0	IEC 62386-103
Bus	1	Subclause 4.8 and Clause A.2

In a system all bus units as well as the bus power supplies are connected in parallel to the bus.

NOTE As a consequence of this, every frame is visible to all power supplies, control gear, and control devices on the bus.

[Figure 2](#) shows a system structure example.

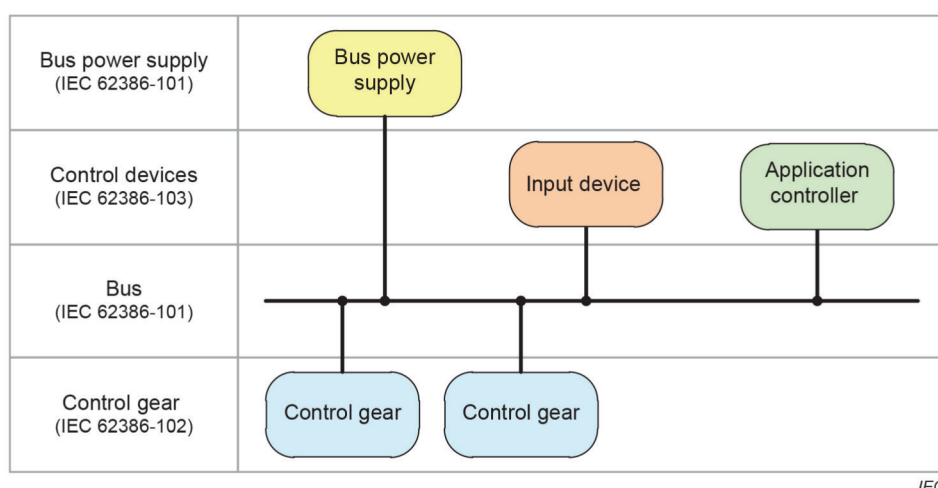


Figure 2 — System structure example

See [4.8](#) for detailed information on the wiring and [Clause A.2](#) for information on possible system architectures.

4.4 System information flow

Figure 3 shows the different frame types that are used for communication between the bus units in a system. A backward frame is only ever transmitted in response to a forward frame.

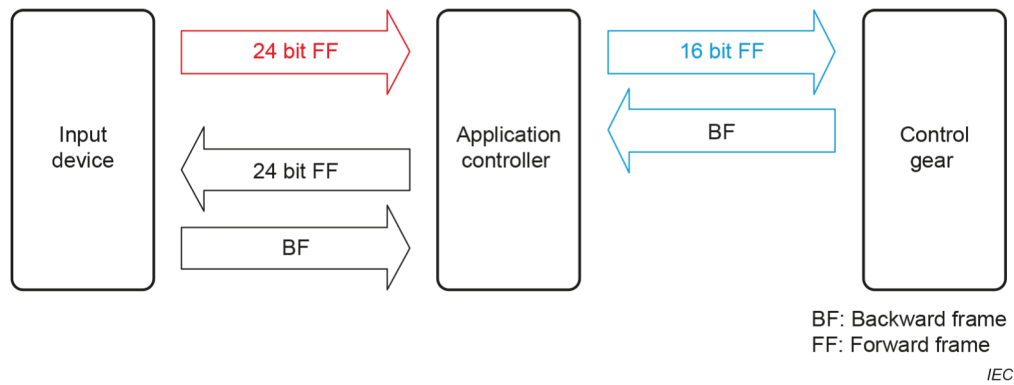


Figure 3 — Communication between bus units (example)

A direct information flow from an input device to control gear is not allowed. In addition to communications shown in Figure 3, for firmware transfer (IEC 62386–105), application controllers can transmit 32-bit forward frames and all three of the bus units shown can receive 32-bit forward frames. Multi-master application controllers can also be transmitters of 8-bit backward frames.

NOTE An example of a system conforming to this document can consist of an application controller and control gear only, see A.2.4. In such a system, user input does not result in 24-bit forward frames on the bus.

4.5 Command types

Bus units conforming to this document shall use the following different types of commands for communication:

- event messages,
- instructions, and
- queries.

NOTE Refer to the other parts of the IEC 62386 series for further details on event messages, instructions and queries.

4.6 Bus units

4.6.1 Transmitters and receivers in bus units

Table 2 gives a short summary of the different receivers and transmitters allowed for each bus unit. It is not allowed for a bus unit to transmit or receive other frames than the ones indicated in Table 2, except proprietary forward frames. See 7.4 for details of the different frame types.

Table 2 — Transmitters and receivers in bus units

Bus unit	Receiver of	Transmitter of
Control gear	32-bit forward frames	Backward frames, following the single-master timing requirements ^a
	16-bit forward frames	

Table 2 (continued)

Bus unit	Receiver of	Transmitter of		
Input device	32-bit forward frames	24-bit forward frames	Following the multi-master timing requirements	
	24-bit forward frames	Backward frames ^a		
Multi-master application controller	32-bit forward frames	32-bit forward frames		
	24-bit forward frames	24-bit forward frames		
	16-bit forward frames ^b	16-bit forward frames		
	Backward frames	Backward frames ^a		
Single-master application controller	Backward frames ^c	16-bit forward frames, following the single-master timing requirements ^d		

^a No collision detection or collision avoidance methods shall be applied to backward frame transmissions.

^b Only applicable when the multi-master application controller is able to process 16-bit forward frames transmitted by other application controllers.

^c Only required if the single-master application controller uses addressing or queries.

^d A single-master application controller can also send 24-bit frames if polling input devices, and 32-bit forward frames.

4.6.2 Control gear

A control gear shall be conformant to this document and to IEC 62386-102 and the applicable parts of the IEC 62386-2xx series.

It shall contain a receiver for 16-bit forward frames and a transmitter for transmitting backward frames. The backward frame transmitter shall conform to the timing requirements for a single-master transmitter defined in [8.1](#) and shall not implement collision detection or recovery. It can contain a receiver for 32-bit forward frames.

4.6.3 Input device

An input device shall be conformant to this document and to IEC 62386-103 and the applicable parts of the IEC 62386-3xx series.

It shall contain a multi-master transmitter following the multi-master transmitter timing requirements defined in [8.3](#) to transmit 24-bit forward frames. It shall also contain a transmitter to transmit backward frames. The backward frame transmitter shall conform to the timing requirements for a multi-master transmitter and shall not implement collision detection or recovery.

NOTE Although they are logically distinct objects, the multi-master transmitter and the backward frame transmitter can share the same hardware.

An input device shall contain a receiver to receive 24-bit forward frames transmitted by other control devices. It can contain a receiver for 32-bit forward frames.

4.6.4 Single-master application controller

A single-master application controller shall be conformant to this document and to IEC 62386-103.

It shall contain a transmitter following the transmitter timing requirements defined in [8.1](#) to transmit forward frames.

NOTE Typically, however, a single-master application controller also contains a receiver to receive backward frames transmitted by control gear.

A single-master application controller shall use the commands defined in IEC 62386-102 and, if applicable, the relevant parts of the IEC 62386-2xx series to communicate with the control gear.