

AS/NZS IEC 62386.103:2024
IEC 62386-103:2022



Australian/New Zealand Standard™

Digital addressable lighting interface

Part 103: General requirements — Control devices



AS/NZS IEC 62386.103:2024

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- Consumers Federation of Australia
- Department of Climate Change, Energy, the Environment and Water
- Electrical Compliance Testing Association of Australia
- Electrical Regulatory Authorities Council, Australia
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- Energy Efficiency Council
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- Joint Accreditation System of Australia & New Zealand
- Joint Accreditation System of Australia and New Zealand — New Zealand
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Digital addressable lighting interface

Part 103: General requirements — Control devices

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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 62386.103:2020, *Digital addressable lighting interface, Part 103: General requirements — Control devices (IEC 62386-103:2014 AMD1:2018 CSV (ED. 1.1) MOD)*.

The objective of this document is to specify control devices for control by digital signals of electronic lighting equipment.

This document is identical with, and has been reproduced from, IEC 62386-103:2022, *Digital addressable lighting interface — Part 103: General requirements — Control devices*.

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- (a) In the source text “this part of IEC 62386” should read “this document”.
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FOREWORD

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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 second edition of IEC 62386-103 is intended to be used in conjunction with IEC 62386-101 and 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.

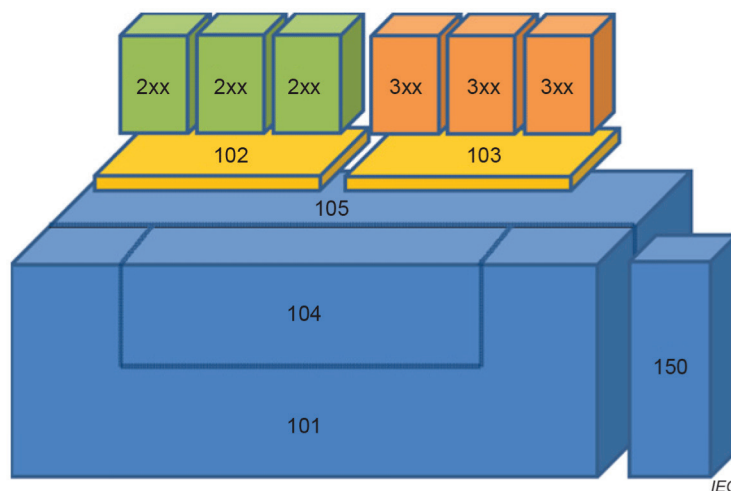


Figure 1 — IEC 62386 graphical overview

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".

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".

NOTES

Australian/New Zealand Standard

Digital addressable lighting interface

Part 103: General requirements — Control devices

1 Scope

This part of IEC 62386 is applicable to control devices for control by digital signals of electronic lighting equipment.

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 62386-101:2022, *Digital addressable lighting interface – Part 101: General requirements – System components*

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

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

3.2

broadcast unaddressed

type of address used to simultaneously address all control devices in the system that have no short address

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 "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

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 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 62386-101:2022, 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 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

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 to a query where a backward frame of *MASK* is sent

4 General

4.1 General

The requirements of IEC 62386–101:2022, Clause 4 apply, with the restrictions, changes and additions identified below.

4.2 Version number

This subclause replaces IEC 62386–101:2022, 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 IEC documents are generally subject to two amendments before a new edition is prepared.

5 Electrical specification

The requirements of IEC 62386–101:2022, Clause 5 apply.

6 Bus power supply

If a bus power supply is integrated into a control device, the requirements of IEC 62386–101:2022, Clause 6 apply.

7 Transmission protocol structure

7.1 General

The requirements of IEC 62386–101:2022, 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. The 24-bit forward frame shall be encoded as shown in Table 1 and Table 2.

Table 1 — 24-bit command frame encoding

Bytes/Bits									Device addressing	
Address byte							Instance byte	Opcode byte		
23	22	21	20	19	18	17	16	15...8		7...0
0	64 short addresses						1	Device or instance or feature, see Table 2		Short addressing
1	0	32 device group addresses					1			Device group addressing
1	1	1	1	1	1	0	1			Broadcast unaddressed
1	1	1	1	1	1	1	1			Broadcast
1	1	0	16 special command spaces				1	Command specific		Special command
1	1	1	0	x	x	x	1	Reserved		Reserved
1	1	1	1	0	x	x	1			
1	1	1	1	1	0	x	1			

Table 2 — Instance byte in a command frame

Instance byte								Addressing
15	14	13	12	11	10	09	08	
0	0	0	32 Instance numbers					Instance number
1	0	0	32 Instance groups					Instance group
1	1	0	32 Instance types					Instance type
0	0	1	32 Instance numbers					Feature on instance number level
1	0	1	32 Instance groups					Feature on instance group level
0	1	1	32 Instance types					Feature on instance type level
1	1	1	1	1	0	0	1	Feature broadcast
1	1	1	1	1	1	0	1	Feature on instance broadcast level

Table 2 (continued)

Instance byte								Addressing
15	14	13	12	11	10	09	08	
1	1	1	1	1	1	1	1	Instance broadcast
1	1	1	1	1	1	0	0	Feature on device level
1	1	1	1	1	1	1	0	Device
0	1	0	x	x	x	x	x	Reserved
1	1	1	0	x	x	x	x	
1	1	1	1	0	x	x	x	
1	1	1	1	1	0	1	x	
1	1	1	1	1	0	0	0	

7.2.1.2 Address byte

The address byte provides

- the method of device addressing used by the transmitter;
- the indication that a command, not an event message, is being transmitted: bit 16 is set for commands;
- 16 special command spaces;
- reserved device addresses. Reserved addresses shall not be used by the transmitter.

7.2.1.3 Instance byte

The instance byte provides

- for standard commands, the indication of whether a device command, feature command or an instance command is being transmitted;
- for standard instance commands, the method of instance addressing used by the transmitter;
- command-specific information for special commands;
- for standard commands, reserved instance addresses. Reserved instance addresses shall not be used by the transmitter;
- for standard feature commands, the feature that is being addressed;
- reserved information for reserved commands.

7.2.1.4 Opcode byte

The opcode byte provides

- for standard commands, the opcode;
- command-specific information for special commands;
- reserved information for reserved commands.

7.2.2 Frame format for event messages

7.2.2.1 General

For event messages, the 24-bit forward frame shall be encoded as shown in [Table 3](#).

Table 3 — 24-bit event message frame encoding

Bits														Event scheme ^a / Source			
Event source information													Event information				
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9...0			
0	64 short addresses						0	0	32 instance types						Event	1	Device
0	64 short addresses						0	1	32 instance numbers							2	Device and instance
1	0	32 device groups					0	0	32 instance types							3	Device group
1	0	32 instance types					0	1	32 instance numbers							0	Instance
1	1	32 instance groups					0	0	32 instance types							4	Instance group
1	1	0	x	x	x	x	0	1	x	x	x	x	x	Reserved	Reserved		
1	1	1	0	x	x	x	0	1	x	x	x	x	x				
1	1	1	1	0	x	x	0	1	x	x	x	x	x				
1	1	1	1	1	0	x	0	1	x	x	x	x	x				
1	1	1	1	!	1	0	0	1	x	x	x	x	x				
1	1	1	!	1	1	1	0	1	0	x	x	x	x				
1	1	1	1	1	1	1	0	1	1	0	x	x	x				
1	1	1	1	1	1	1	0	1	1	1	Short address and device group information, refer to 9.7.2 .			Device power cycle			
^a Refer to 9.7.3 for further information on event schemes.																	

^a Refer to [9.7.3](#) for further information on event schemes.

7.2.2.2 Event source information

The event source information in [Table 3](#) provides:

- the indication that an event message, not an instruction or query, is being transmitted: bit 16 shall be clear for event messages;
- relevant event instance type information, such that the receiver of an event message will be able to understand the meaning of the event;
- relevant event source information, such that the receiver of an event message is able to understand where the message is coming from;
- reserved values.

Events are instance type specific. Application controllers can derive, either explicitly or implicitly, the instance type of the transmitting instance, from the event source information.

NOTE The event source schemes are not equally valuable in terms of telling the receiver where the event message originated.

7.2.2.3 Event information

The event information provides the 10-bit event number and/or event data. Event information is instance type specific and is defined in the applicable parts of the IEC 62386–3xx series that describe the instance type.

8 Timing

The requirements of IEC 62386–101:2022, Clause 8 apply.

9 Method of operation

9.1 General

The requirements of IEC 62386–101:2022, Clause 9 apply with the following additions.

9.2 Device features

The IEC 62386 series allows for the future publication of feature extensions that extend the requirements in this document, or exempt particular requirements.

The features for a device can be queried by "QUERY FEATURE TYPE" and "QUERY NEXT FEATURE TYPE" while the instance byte is set to "feature on device level" (see [Table 2](#)).

[Table 5](#) shows the feature type encoding. For further information on the different feature types see parts of the IEC 62386–3xx series.

9.3 Application controller

9.3.1 General

An application controller is that part of a control system that makes the system "work":

- an application controller can commission and configure the system (including available control gear);
- an application controller can make the system react to changes in the environment (based on information coming from input devices);
- an application controller can change the system response of control gear in the system (possibly using any command defined in IEC 62386–102:2022).

9.3.2 Single-master application controller

A single-master application controller is not intended to share the bus with other control devices.

A single-master application controller can try to configure other control devices on the bus, and/or change the system response of control gear in the system, thereby using any command defined in IEC 62386–102 and/or instructions and queries defined in this document.

NOTE Especially if the single-master application controller does not handle collisions appropriately, any such attempt can fail and affect the system negatively.

On the other hand, a single-master application controller is not required to have a receiver on board. For this reason, the following holds:

From [9.3.3](#) onwards, this document assumes a control device to be a multi-master control device.

In order to make itself known as a possibly anonymous transmitting bus unit, a single-master application controller shall transmit a PING message at regular intervals of 10 min ± 1 min. The first such PING message shall appear at a random time between 5 min and 10 min after completion of the power-on procedure.

9.3.3 Multi-master application controller

From [9.3.3](#) onwards, this document assumes a control device to be a multi-master control device.

A control device that includes an application controller shall have *"applicationControllerPresent"* set to TRUE. *"applicationControllerPresent"* shall be set to FALSE otherwise.

NOTE 1 *"applicationControllerPresent"* can be observed through "QUERY DEVICE CAPABILITIES".

In most cases, a system will have only one application controller active (refer to [9.10.1](#)), but multiple application controllers can be operational in a single system.

An application controller shall accept commands (from other application controllers) according to [Table 23](#) and [Table 24](#). It is part of the system integration to ensure that the application controllers will accept commands in such a way that it results in a correctly functioning system.

NOTE 2 System integrity is easiest to achieve by allowing only a single application controller to do commissioning and configuration.

NOTE 3 An application controller can be commissioned through alternative interfaces.

An application controller shall not transmit event messages other than for the device power cycle event.

NOTE 4 If an application controller is active, it can send 24-bit forward frames for purposes other than transmitting events.

An application controller shall not transmit PING messages.

9.4 Input device

Input devices make a system sensitive to changes in its environment, by transmitting event messages.

Input devices shall be multi-master control devices and shall allow commissioning and configuration by an application controller.

Input devices shall use forward frames only to transmit event messages.

9.5 Instances of input devices

9.5.1 General

An input device shall have at least one instance and a maximum of 32 instances, as shall be indicated by *"numberOfInstances"*, which can be queried using "QUERY NUMBER OF INSTANCES".

A control device that is only an application controller shall have a *"numberOfInstances"* equal to 0.

9.5.2 Instance number

Each instance shall have a unique *"instanceNumber"* in the range [0, *"numberOfInstances"* – 1].

9.5.3 Instance type

The instance type for each of the instances of an input device can be different. It can be queried by "QUERY INSTANCE TYPE" while the instance byte is set to either "instance type" or "instance number" scheme (see [Table 2](#)). The meaning of event information transmitted by means of "INPUT NOTIFICATION (*device/instance, event*)" depends on the instance type.

[Table 4](#) shows the instance type encoding. For further information on the different instance types see the relevant parts of the IEC 62386–3xx series.