IEC 62386-303

Edition 1.1 2024-04
CONSOLIDATED VERSION

INTERNATIONAL STANDARD

colour inside

Digital addressable lighting interface –
Part 303: Particular requirements – Input devices – Occupancy sensor

IEC 62386-303:2017-05+AMD1:2024-04 CSV(en)

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DIGITAL ADDRESSABLE LIGHTING INTERFACE –

Part 303: Particular requirements – Input devices – Occupancy sensor

FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 62386-303 edition 1.1 contains the fifth edition (2017-05) [documents 34C/1313/FDIS and 34C/1333/RVD] and its amendment 1 (2024-04) [documents 34/1013/CDV and 34/1078A/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 62386-303 has been prepared by subcommittee 34C: Auxiliaries for lamps, of IEC technical committee 34: Lamps and related equipment.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

This Part 303 of IEC 62386 is intended to be used in conjunction with:

- Part 101, which contains general requirements for system components;
- Part 103, which contains general requirements for 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 and its amendment 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- withdrawn, or
- revised.

IMPORTANT – The *'colour inside'* logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

IEC 62386 contains several parts, referred to as series. The 1xx series includes the basic specifications. Part 101 contains general requirements for system components, Part 102 extends this information with general requirements for control gear and Part 103 extends it further with general requirements for control devices.

The 2xx parts extend the general requirements for control gear with lamp specific extensions (mainly for backward compatibility with Edition 1 of IEC 62386) and with control gear specific features.

The 3xx parts extend the general requirements for control devices with input device specific extensions describing the instance types as well as some common features that can be combined with multiple instance types.

This first edition of IEC 62386-303 is to be used in conjunction with ~~IEC 62386-101:2014, IEC 62386-101:2014/AMD1:—~~ IEC 62386-101:2022, ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~ IEC 62386-103:2022. The division of IEC 62386 into separately published parts provides for ease of future amendments and revisions. Additional requirements will be added as and when a need for them is recognized.

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

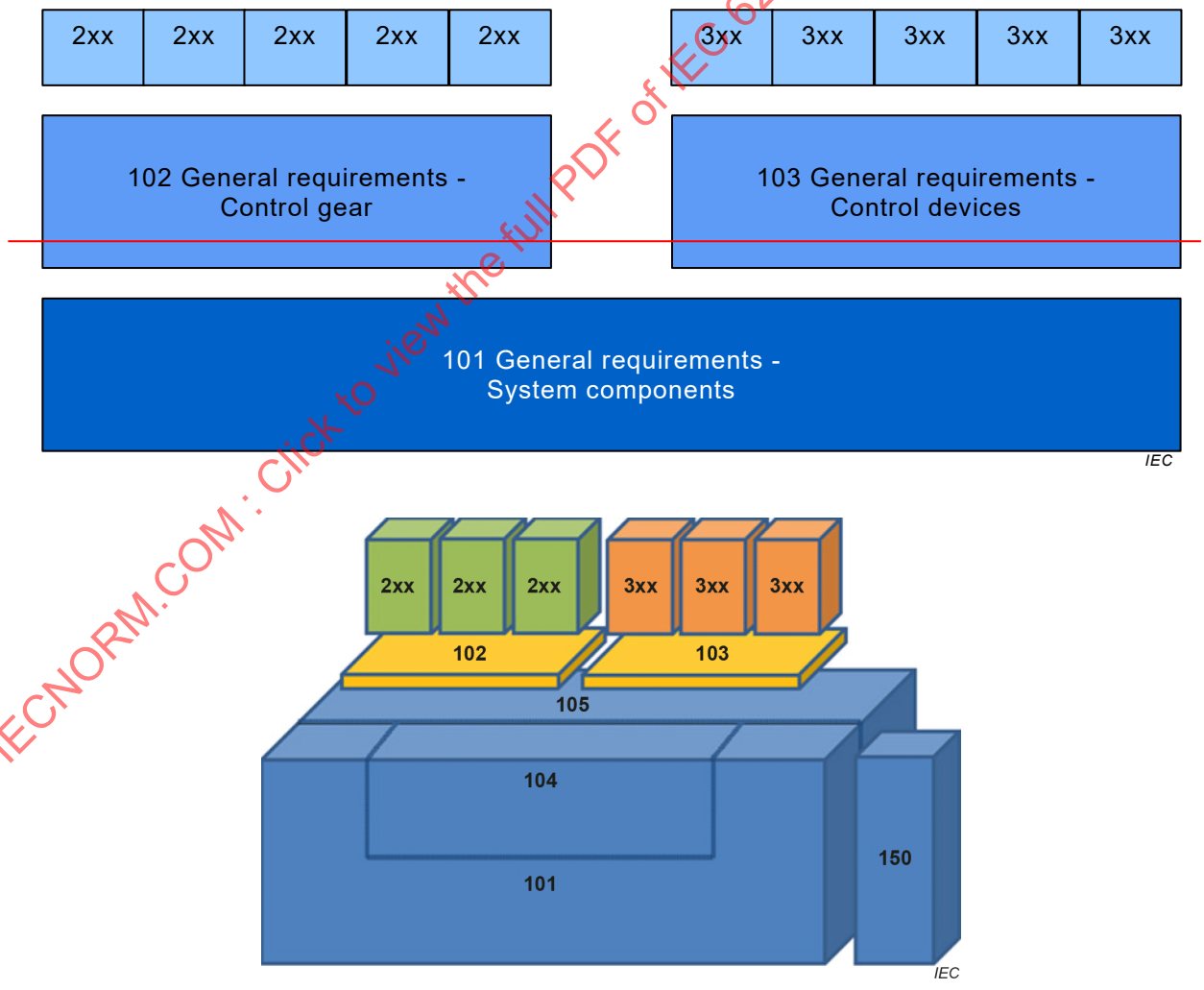


Figure 1 – IEC 62386 graphical overview

This document, and the other parts that make up the IEC 62386-300 series, in referring to any of the clauses of IEC 62386-1XX, specifies the extent to which such a clause is applicable; the parts also include additional requirements, as necessary.

Where the requirements of any of the clauses of IEC 62386-1XX are referred to in this document by the sentence “The requirements of IEC 62386-1XX, Clause “n” apply”, this sentence is to be interpreted as meaning that all requirements of the clause in question of Part 1XX apply, except any which are clearly inapplicable.

The standardization of the control interface for control devices is intended to achieve compatible co-existence and multi-master operation between electronic control gear and lighting control devices, below the level of building management systems. This document describes a method of implementing occupancy sensors.

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 303: Particular requirements – Input devices – Occupancy sensor

1 Scope

~~This part of IEC 62386 specifies a bus system for control by digital signals of electronic lighting equipment which is in line with the requirements of IEC 61347, with the addition of DC supplies.~~

~~This document is only applicable to IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:— input devices that deliver occupancy information to the lighting control system through movement or presence sensing.~~

~~NOTE Requirements for testing individual products during production are not included.~~

This part of IEC 62386 is applicable to input devices that provide occupancy information to the lighting control system through movement or presence sensing.

This document is only applicable to input devices complying with IEC 62386-103:2022.

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:—[1]~~

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

IEC 62386-333:~~—[3]~~2018, *Digital addressable lighting interface – Part 333: Particular requirements for control devices – Manual configuration (feature type 33)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62386-101 and IEC 62386-103 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

~~1 Under preparation. Stage at the time of publication: IEC ACDV 62386-101/AMD1:2017.~~

~~2 Under preparation. Stage at the time of publication: IEC ACDV 62386-103/AMD1:2017.~~

~~3 Under preparation. Stage at the time of publication: IEC CCDV 62386-333:2017.~~

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
instance
movement or presence input signal processing unit of an input device

[SOURCE: IEC 62386-101:~~2014~~2022, 3.29, modified – "movement or presence input" added]

3.2
movement sensor
instance based on movement detection only where occupancy is implied by movement and vacancy is concluded from the absence of movement during a specified amount of time

Note 1 to entry: Movement sensing is typically done using a passive infra-red detector combined with Fresnel optics.

3.3
presence sensor
instance based on means other than only movement detection where occupancy and vacancy can be concluded immediately and where, in some cases, movement can also be detected

Note 1 to entry: Presence sensing may be implemented using for example camera based systems.

4 General

4.1 General

The requirements of ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~ IEC 62386-103:2022, Clause 4 apply, with the restrictions, changes and additions identified below.

4.2 Version number

In 4.2 of ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~ IEC 62386-103:2022, "103" shall be replaced by "303", "version number" shall be replaced by "extended version number" and "*versionNumber*" shall be replaced by "*extendedVersionNumber*".

4.3 Insulation

According to ~~IEC 61347-1~~ applicable safety standards, it ~~might~~ can be required that the input device has at least supplementary insulation to accessible parts. This depends on the connected components. In this case special attention should be paid with respect to the sensor(s) being used.

NOTE ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~ IEC 62386-103:2022 requires system components to have at least basic insulation.

5 Electrical specification

The requirements of ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~ IEC 62386-103:2022, Clause 5 apply.

6 Interface power supply

The requirements of ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~ IEC 62386-103:2022 IEC 62386-103:2022, Clause 6 apply.

7 Transmission protocol structure

The requirements of ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~ IEC 62386-103:2022, Clause 7 apply.

NOTE Subclause 9.4 provides detailed event information applicable to instances.

8 Timing

The requirements of ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~ IEC 62386-103:2022, Clause 8 apply.

9 Method of operation

9.1 General

The requirements of ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~ IEC 62386-103:2022, Clause 9 apply, with the following restrictions and additions.

9.2 Instance type

The instance type (*"instanceType"*) shall be equal to 3.

9.3 Input signal and value

9.3.1 General

The input *"resolution"* shall be equal to 2.

NOTE 1 A *"resolution"* of 2 implies that *"inputValue"* is a single byte variable with possible values limited to 0x00, 0x55, 0xAA and 0xFF.

NOTE 2 Since *"inputValue"* is a single byte variable, the instance will answer NO to "QUERY INPUT VALUE LATCH".

"inputValue" shall reflect the occupancy state in the area covered by the sensor, as shown in Table 1.

Table 1 – Meaning of *"inputValue"*

"inputValue"	Area state	Movement
0x00	Vacant	No
0x55	Vacant	Yes
0xAA	Occupied	No
0xFF	Occupied	Yes

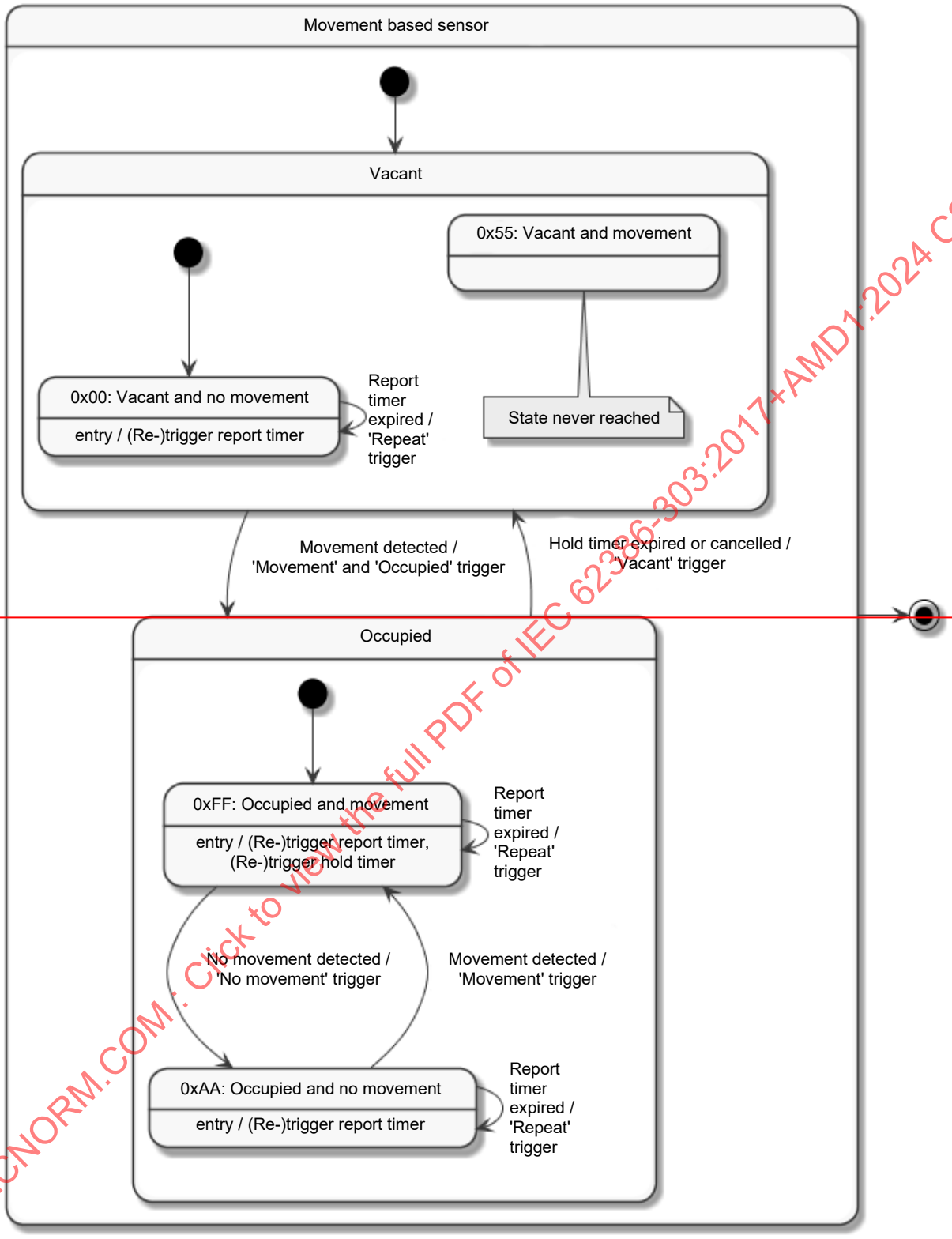
9.3.2 Input signal mapping for movement sensors

For movement sensors, the input signal shall directly map onto movement (only). Depending on the type of sensor used, it is possible that a very short pulse can be produced only when movement is first detected, or a longer signal can be produced whilst movement continues to be detected. In any case, the instance shall change "*inputValue*" to 0xFF immediately if movement is detected, remaining in this state for at least 1 s, thus reporting an occupied area state as well. See Figure 2.

NOTE 1 This means that an instance receiving a rapid succession of movement signals which are less than 1 s apart, will remain in the occupied and movement state, and will create a movement event only at the time it entered this state.

A movement sensor shall support a hold timer, with timeout value T_{hold}~~, which shall be (re)started each time movement is detected~~. A transition of *"inputValue"* to 0x00 shall only take place at the moment the hold timer expires or is cancelled. In such a case the "vacant" trigger shall be generated. (Re)starting the hold timer means: "discard any remaining hold time and start timing a new hold time period".

While the area is occupied, the *"inputValue"* shall change between 0xFF and 0xAA depending on momentary movement detection only.



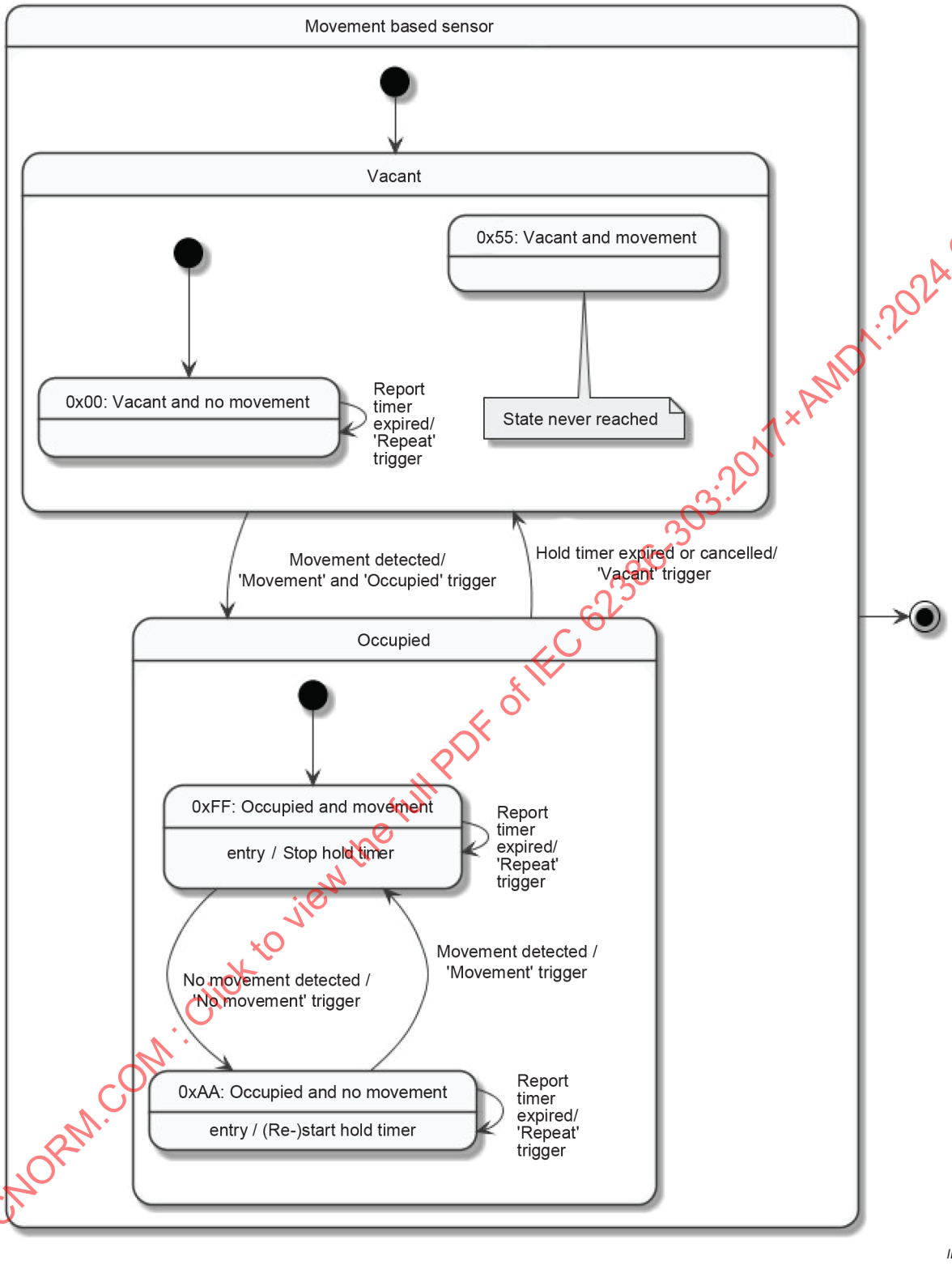


Figure 2 – State diagram for movement based sensor

NOTE ~~1~~2 An input value of 0x55 is not applicable, since movement implies occupancy.

NOTE ~~2~~3 Vacancy and occupancy can be concluded from *"inputValue"* only.

NOTE 4 "Stop hold timer" means the hold timer is frozen. "(Re-)start hold timer" means the hold timer is re-started with the full hold time T_{hold}.

9.3.3 Input signal mapping for presence sensors

Presence sensors shall report the movement state and area state as quickly as possible. If a presence sensor is not able to detect motion, it shall report no movement and shall not enter states 0x55 or 0xFF. See Figure 3.

NOTE This means that the hold timer in a presence sensor will never be started.

If a presence sensor is not able to detect motion without this also causing occupancy, then the presence sensor shall not enter state 0x55.

EXAMPLE For a presence sensor that is not able to detect motion without this also causing occupancy, example state transitions are as follows: Starting in state 0x00, a person moving into the area is detected, causing simultaneous movement and occupancy triggers and entry to state 0xFF. Without the movement stopping, the person exits the area causing movement and presence to simultaneously end, causing a return to state 0x00. If, instead, the person entering the area then pauses (ceases movement) for a while, this would cause a state change to 0xAA. From this state, a return to 0x00 or 0xFF are both possible.

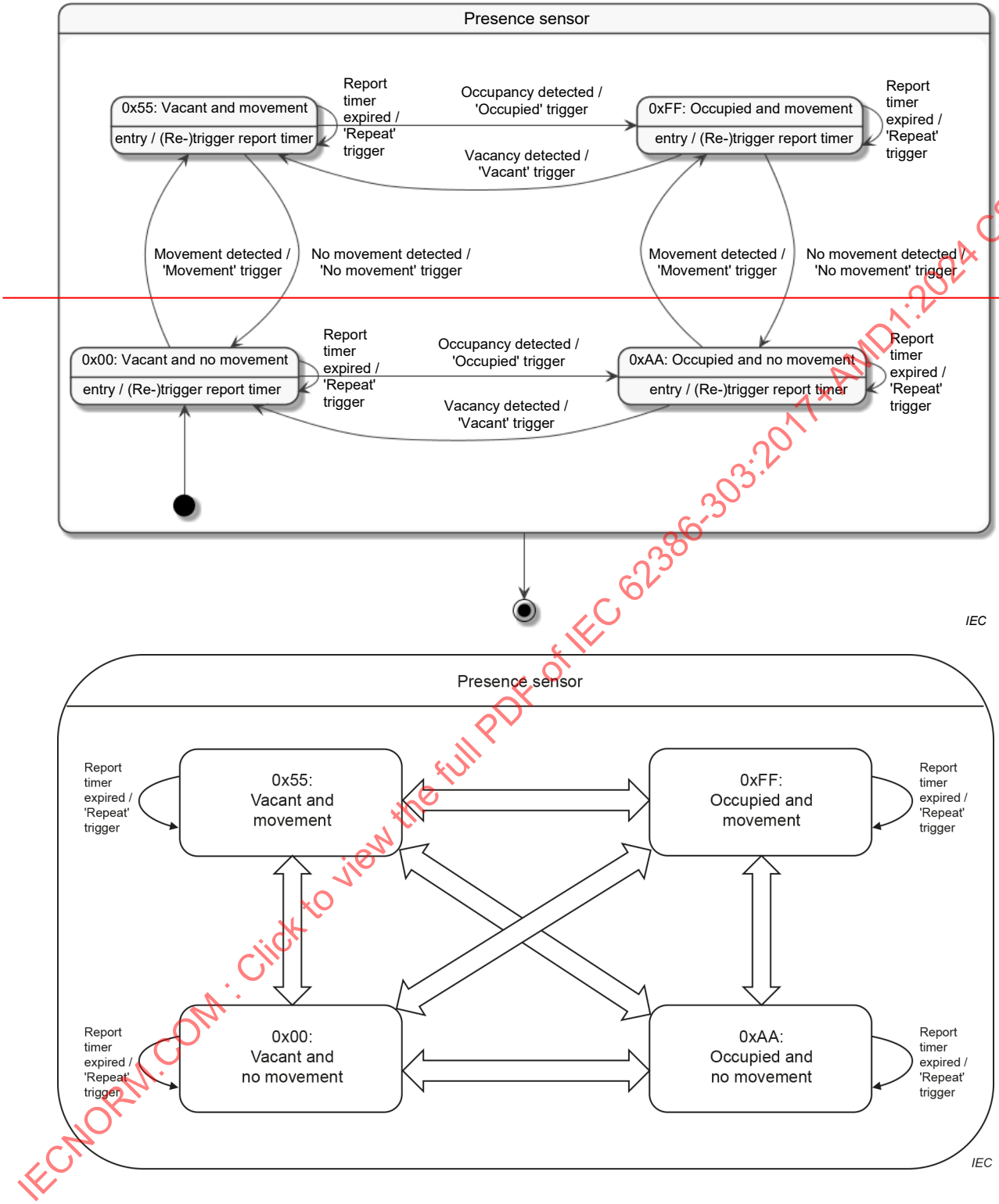


Figure 3 – State diagram for presence sensor

Table 11 shows the state transitions with the conditions for exiting each state, and the action upon exit.

Table 11 – Presence sensor state transitions

Initial state	Exit condition	Action on exit	New state
0x00: Vacant and no movement	Movement detected	"Movement" trigger	0x55: Vacant and movement
	Occupancy detected	"Occupied" trigger	0xAA: Occupied and no movement
	Occupancy and movement detected	"Occupied" and "movement" triggers	0xFF: Occupied and movement
0x55: Vacant and movement	No movement detected	"No movement" trigger	0x00: Vacant and no movement
	Occupancy detected	"Occupied" trigger	0xFF: Occupied and movement
	Occupancy and no movement detected	"Occupied" and "no movement" triggers	0xAA: Occupied and no movement
0xAA: Occupied and no movement	Movement detected	"Movement" trigger	0xFF: Occupied and movement
	Vacancy detected	"Vacant" trigger	0x00: Vacant and no movement
	Vacancy and movement detected	"Vacant" and "movement" triggers	0x55: Vacant and movement
0xFF: Occupied and movement	No movement detected	"No movement" trigger	0xAA: Occupied and no movement
	Vacancy detected	"Vacant" trigger	0x55: Vacant and movement
	Vacancy and no movement detected	"Vacant" and "no movement" triggers	0x00: Vacant and no movement

9.4 Events

9.4.1 Priority use

9.4.1.1 General

The default *"eventPriority"* shall be priority 4. Since the application controller needs a timeslot to respond, "*eventPriority*" should not be set to 2.

9.4.1.2 Periodic events

The periodic "INPUT NOTIFICATION" message to report the occupancy confirmation event (still vacant or still occupied) shall always be sent with priority 5.

NOTE This makes *"eventPriority"* inapplicable for this event only.

9.4.2 Bus usage

9.4.2.1 Instance level

Multiple events from an instance shall not be sent in a transaction. There is a configurable delay T_{deadtime} that shall be taken into account. See 9.5.3 for more information.

9.4.2.2 Device level

On device level, events from different instances may be sent in a transaction.

9.4.3 Encoding

Occupancy and vacancy events shall be encoded as shown in Table 2.

Table 2 – Occupancy and vacancy events

Event name	Event information	Description
No movement	00 0000 ---0b	No movement detected. Corresponding trigger is the ‘No movement’ trigger.
Movement	00 0000 ---1b	Movement detected. Corresponding trigger is the ‘Movement’ trigger.
Vacant	00 0000 -00-b	The area has become vacant. Corresponding trigger is the ‘Vacant’ trigger.
Still vacant	00 0000 -10-b	The area is still vacant. The event occurs at regular intervals as long as the vacant condition holds. Corresponding trigger is the ‘Repeat’ trigger.
Occupied	00 0000 -01-b	The area has become occupied. Corresponding trigger is the ‘Occupied’ trigger.
Still occupied	00 0000 -11-b	The area is still occupied. The event occurs at regular intervals as long as the occupied condition holds. Corresponding trigger is the ‘Repeat’ trigger.
Presence sensor	00 0000 0---b	The current event is triggered by a presence based sensor.
Movement sensor	00 0000 1---b	The current event is triggered by a movement based sensor.
	1x xxxx xxxxb	Reserved.
	01 xxxx xxxxb	
	00 1xxx xxxxb	
	00 01xx xxxxb	
	00 001x xxxxb	
	00 0001 xxxxb	

NOTE 1 In order to save bus bandwidth, the application controller has the possibility to inhibit event notifications that it does not need, as is described in 9.4.4.

The event shall be reported in one “INPUT NOTIFICATION” by bitwise OR-ing the event information values. In order to perform the OR-ing, every bit that is marked with “-“ for the listed event names shall be assumed 0.

The information contained in bit 3 can be used by the application controller to determine whether the sensor already applied a hold timer or not (movement based sensor).

NOTE 2 Every enabled event leads to a complete event, reporting both the movement and occupancy information.

9.4.4 Event configuration

~~The application controller may not need all the event triggers mentioned in 9.4.3. The instance shall allow the application controller to set the *“eventFilter”* (see IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—, 9.7.4) to inhibit those event triggers that the application controller does not need. For this document, *“eventFilter”* shall be reduced to one byte.~~

Events shall be enabled or disabled according to the value of "*eventFilter*". For this document, "*eventFilter*" shall be reduced to one byte.

NOTE Inhibiting event triggers increases the effective bus bandwidth availability.

The *“eventFilter”* shall have the definition as given in Table 3:

Table 3 – Event filter

Bit	Description	Value	Default
0	Occupied event enabled?	"1" = "Yes"	1
1	Vacant event enabled?	"1" = "Yes"	1
2	Repeat event enabled?	"1" = "Yes"	0
3	Movement event enabled?	"1" = "Yes"	0
4	No movement event enabled?	"1" = "Yes"	0
5	Reserved	0	0
6	Reserved	0	0
7	Reserved	0	0

The filter can be set via "SET EVENT FILTER (*DTR0*)" and be queried using "QUERY EVENT FILTER 0-7", see ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:~~ IEC 62386-103:2022 for details.

If the 'repeat' event is enabled, on expiration of the report timer the 'still vacant' event shall be sent if the 'vacant' event is enabled, and the '~~v~~ still occupied' event shall be sent if the 'occupied' event is enabled.

Disabling an event shall not cancel transmission of an event that has already occurred and is waiting to be sent due to the deadtime timer or bus unavailability.

9.4.5 Event generation

An event shall be generated on every change of "*inputValue*" or when the report timer expires.

In case a new event occurs before the current event is ~~being~~ sent, the new event shall replace the current event. This could be caused for example by bus unavailability or the deadtime timer.

9.4.6 Movement trigger and catching

The event filter can be adjusted to enable or disable the "movement" event. ~~Care should be taken when enabling the 'movement' event, as it is likely to flood the bus.~~

NOTE 1 Application controllers can consider the need to enable the "movement" event as this can result in flooding the bus.

If the movement event is disabled, ~~the application controller can explicitly ask for the event to be sent once (setting "*catching*"),~~ and the variable *"catching"* is TRUE, then a movement trigger shall cause an "INPUT NOTIFICATION" event to be sent. *"catching"* is set using the command "CATCH MOVEMENT". Each "INPUT NOTIFICATION" that was triggered by movement, shall clear *"catching"*, which implies that "CATCH MOVEMENT" is a single-notification request. The instruction shall not change the event filter.

If the "movement" event is disabled and the "CATCH MOVEMENT" command is executed whilst in the "occupied and movement" state, "*catching*" shall be set to TRUE but an "INPUT NOTIFICIATION" shall not be triggered until the next change from a "no movement" to a "movement" state.

If the movement event is enabled the "CATCH MOVEMENT" instruction shall be ~~ignored~~ discarded and "*catching*" shall be set to FALSE.

NOTE 2 Another "CATCH MOVEMENT" has no effect if a command has not (yet) led to a notification.

NOTE 3 "*catching*" does not affect event generation due to the "no movement" trigger.

The query "QUERY CATCHING" can be used to verify that no "movement" notification has been sent yet ("*catching*" has been set).

9.5 Configuring the input device

9.5.1 Using the hold timer

The hold timer is only implemented for movement based sensors. The model in Figure 2 shows how the hold timer is used to derive occupancy.

~~The hold timer can be cancelled using "CANCEL HOLD TIMER". This forces a transition to the vacant state.~~

If the hold timer is running, then "CANCEL HOLD TIMER" shall cancel the hold timer and force a transition to the "vacant" state.

Both cancellation of the hold timer and expiration of the hold timer shall generate a 'vacant' trigger.

9.5.2 Using the report timer

If the report timer is set, it shall generate a 'repeat' trigger every T_{report} even if the "*inputValue*" has not changed. The report timer shall be restarted every time an event is sent.

The report timer shall be started,

- at power-on: if enabled, immediately after the receiver has started up, with the time to the first trigger recommended to be shortened to a random time between 0 s and T_{report} s;
- otherwise immediately after enablement.

This implies that the first "INPUT NOTIFICATION" message due to the report timer is sent at a maximum time of T_{report} after starting. This may be delayed by other "INPUT NOTIFICATION" messages, or by bus availability.

NOTE If multiple devices have the report timer enabled, they might send out conflicting data ~~controlling~~ used by application controllers to control the same control gear. ~~Depending on the application, care needs to be taken when enabling the report timer.~~ Application controllers can avoid this problem by enabling only the required report timer(s).

9.5.3 Using the deadtime timer

If the deadtime timer is set, the instance shall not send out an event until the deadtime timer has expired. If an event was suppressed due to the deadtime timer, then the latest event shall be sent on expiry of the deadtime timer. The deadtime timer shall be restarted every time an event is sent.

NOTE 1 The following example demonstrates this: The event filter is configured with only the movement event enabled. The deadtime timer is currently running due to a previous INPUT NOTIFICATION from this instance. A new movement trigger occurs. The transmission of a new INPUT NOTIFICATION is supressed because the deadtime timer is still running. Next, the "occupied and movement" state ends, with the instance changing to the "occupied and no-movement" state. Next, the deadtime timer expires. Owing to the supressed event during the deadtime, a new INPUT NOTIFICATION is now sent. This will indicate "no movement" and "occupied" because these are the current states.

NOTE 2 The purpose of the deadtime timer is to increase the effective bus bandwidth availability. It is not intended to be used as a hold timer.

9.5.4 Setting the timers

~~Event~~ Deadtime, hold and report timers shall be programmable as is indicated in Table 4. The time can be calculated as follows:

Time = T_{incr} * *multiplier*

Only on (re-)starting a timer the actual time shall be calculated based on the corresponding variable. This implies that the times only change after any running timer has been retriggered, cancelled or expired. The tolerance on the time shall be ±5 %.

Table 4 – Event timer setting

Time	Multiplier	Default value	T_{incr}	$T_{default}$	T_{min}	T_{max}
$T_{deadtime}$	*"tDeadtime"*	2	50 ms	100 ms	0 s	12,75 s
T_{hold} [a]	*"tHold"*	90	10 s	15 min	1 s	42,3 min
T_{report}	*"tReport"*	20	1 s	20 s	1 s	4 min 15 s
[a] Only applicable for movement based sensors.						

The input device shall expose the following operations to set and observe the timer multipliers:

- "SET HOLD TIMER (*DTR0*)", "QUERY HOLD TIMER" to set or query "*tHold*";
- "SET REPORT TIMER (*DTR0*)", "QUERY REPORT TIMER" to set or query "*tReport*";
- "SET DEADTIME TIMER (*DTR0*)", "QUERY DEADTIME TIMER" to set or query "*tDeadtime*".

"QUERY HOLD TIMER" shall answer MASK if the hold timer is not implemented, "*tHold*" if it is implemented.

If the hold timer is implemented, "SET HOLD TIMER (*DTR0*)" shall set "*tHold*" to "*DTR0"* unless *"DTR0"* equals MASK in which case the command shall be ~~ignored~~ discarded. The minimum time in case "*tHold*" equals 0 shall be 1 s.

"SET REPORT TIMER (*DTR0*)" shall set "*tReport*" depending on "*DTR0*". If "*tReport*" is set to 0, the report timer shall be disabled immediately.

"SET DEADTIME TIMER (*DTR0*)" shall set "*tDeadtime*" depending on "*DTR0*". If "*tDeadtime*" is set to 0, the deadtime timer shall be disabled immediately, but shall not affect T_{report} until the report timer is (re-)started. Disabling of the deadtime timer shall not cause previously supressed events to be sent.

If T_{report} < $T_{deadtime}$, T_{report} shall be $T_{deadtime}$ (independent of the value of "*tReport*"). This does not affect the value of "*tReport*".

NOTE If an application controller intends to change a running hold timer, it can wait for it to expire, or it can first force it to expire using "CANCEL HOLD TIMER".

9.5.5 Manual configuration

If IEC 62386-333 is implemented, the instance level variables according to Table 5 may be manually configured. QUERY MANUAL CONFIGURATION CAPABILITY 3xx (see IEC 62386-333) shall return the byte as defined in Table 5:

Table 5 – "*manualCapabilityInstance3xx*" values

Bit	Description	Value
0	Manual configuration of "*tReport*" supported	"1" = "Yes"
1	Manual configuration of "*tHold*" supported	"1" = "Yes"
2	Manual configuration of "*tDeadtime*" supported	"1" = "Yes"
3	~~Reserved~~ Manual configuration of "*detectionRange*" supported	~~"0"~~ "1" = "Yes"
4	~~Reserved~~ Manual configuration of "*detectionSensitivity*" supported	~~"0"~~ "1" = "Yes"
5	Reserved	"0"
6	Reserved	"0"
7	Reserved	"0"

9.5.6 Occupancy sensor capabilities

The supported occupancy capabilities are given in "*occupancyCapabilities*" which can be queried. The encoding of "*occupancyCapabilities*" shall be as shown in Table 12.

Table 12 – "*occupancyCapabilities*" values

Bit	Description	Value
0	Configuration and querying of "*detectionRange*" supported.	"1" = "Yes"
1	Configuration and querying of "*detectionSensitivity*" supported.	"1" = "Yes"
2	Reserved	"0"
3	Reserved	"0"
4	Reserved	"0"
5	Reserved	"0"
6	Reserved	"0"
7	Reserved	"0"

9.5.7 Configuring the sensitivity and range

Depending on the value of "*occupancyCapabilities*", the input device instance may allow adjustment of the sensor's detection sensitivity and detection range. If the corresponding capability is present, the input device instance shall implement the following SET instructions to set the corresponding variables, with the corresponding QUERY commands always implemented:

- adjustable detection range: "SET DETECTION RANGE (*DTR0*)", "QUERY DETECTION RANGE" to set or query "*detectionRange*";
- adjustable detection sensitivity: "SET SENSITIVITY (*DTR0*)", "QUERY SENSITIVITY" to set or query "*detectionSensitivity*".

Values of "*detectionRange*" and "*detectionSensitivity*" shall have the following meaning:

- [0,100]: 0 % to 100 %. 0 is the lowest detection range or detection sensitivity. 100 is the highest.
- 255: Adjustment not supported.

9.6 Exception handling

9.6.1 Physical sensor failure

If a physical sensor failure is detected, the instance shall set *"instanceError"* to TRUE, from the moment the failure is detected until the failure is resolved. While the error is detected, no further events shall be sent.

9.6.2 Manufacturer specific errors

If a manufacturer specific error other than physical sensor failure is detected, the instance shall set *"instanceError"* to TRUE, from the moment the error occurs until the error is gone.

9.6.3 Error value

"instanceError" can be observed via "QUERY INSTANCE STATUS".

While *"instanceError"* is set, "QUERY INSTANCE ERROR" shall return *"instanceErrorByte"* according to Table 6.

Table 6 – "*instanceErrorByte*" values

Bit	Description	Value
0	Physical sensor failure?	"1" = "Yes"
1	Reserved	"0"
2	Reserved	"0"
3	Reserved	"0"
4	Manufacturer specific error 1?	"1" = "Yes"
5	Manufacturer specific error 2?	"1" = "Yes"
6	Manufacturer specific error 3?	"1" = "Yes"
7	Manufacturer specific error 4?	"1" = "Yes"

If used, the meaning of bits [7:4] of "*instanceErrorByte*" shall be documented in the manual/documentation. The impact on event generation shall also be documented.

10 Declaration of variables

The requirements of ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:~~ IEC 62386-103:2022, Clause 10 apply, with the following considerations.

Table 7 shows additions to the device variables.

Table 7 – Declaration of device variables

Variable	Default value (factory)	Reset value	Power on value	Range of validity	Memory type
"extendedVersion Number"	~~2.0~~ 2.1	no change	no change	~~00001000b~~ 00001001b	ROM

Table 8 shows restrictions to the instance variables.

Table 8 – Restrictions to instance variables defined in ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~ IEC 62386-103:2022

Variable	Default value (factory)	Reset value	Power on value	Range of validity	Memory type
"instanceType"	3	no change	no change	3	ROM
"resolution"	2	no change	no change	2	ROM
"inputValue"	[a]	no change	no change[b]	0x00, 0x55, 0xAA,0xFF	RAM
"eventFilter"	0000 0011b	0000 0011b	no change	000x xxxxb	NVM
"eventPriority"	4	4	no change	[2,5]	NVM
"*instanceConfiguration[x]*"[c]	reserved	reserved	reserved	reserved	reserved

[a] Not applicable.

[b] The value should reflect the actual situation as soon as possible.

[c] Where x is in the range [0,190].

Table 9 shows additions to the instance variables.

Table 9 – Declaration of instance variables

Variable	Default value (factory)	Reset value	Power on value	Range of validity	Memory type
"instanceErrorByte"	[a]	no change	0 [b]	xxxx 000xb	RAM
"tDeadtime"	2	2	no change	[0,255]	NVM
"tHold" [c]	90	90	no change	[0,254]	NVM
"tReport"	20	20	no change	[0,255]	NVM
"catching"	[a]	FALSE	FALSE	[TRUE,FALSE]	RAM
"detectionRange"	factory burn-in	factory burn-in	no change	[0,100], MASK[d]	NVM[d]
"detectionSensitivity"	factory burn-in	factory burn-in	no change	[0,100], MASK[d]	NVM[d]
"occupancyCapabilities"	factory burn-in	no change	no change	[0,3]	ROM

[a] Not applicable.

[b] The value should reflect the actual situation as soon as possible.

[c] Only applicable for a movement based sensor, otherwise "*tHold*" is MASK.

[d] If feature is not implemented, value is MASK, memory type is ROM.

11 Definition of commands

11.1 General

Unused opcodes shall be reserved for future needs.

11.2 Overview sheets

11.2.1 General

The requirements of ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~ IEC 62386-103:2022, 11.2 apply, with the following additions.

11.2.2 Standard commands

Table 10 gives an overview of the additional commands and queries.

Table 10 – Standard commands

Command name	Address byte	Instance byte	Opcode byte	DTR0	DTR1	DTR2	Answer	Send twice	See subclause	Command subclause
CATCH MOVEMENT	*Device*	*Instance*	0x20						9.4.6	11.7.2
SET HOLD TIMER (*DTR0*)	*Device*	*Instance*	0x21	✓				✓	9.5.1	11.8.3
SET REPORT TIMER (*DTR0*)	*Device*	*Instance*	0x22	✓				✓	9.5.2	11.8.4
SET DEADTIME TIMER (*DTR0*)	*Device*	*Instance*	0x23	✓				✓	9.5.3	11.8.5
CANCEL HOLD TIMER	*Device*	*Instance*	0x24						9.5.1	11.7.3
SET DETECTION RANGE (*DTR0*)	*Device*	*Instance*	0x25	✓				✓	9.5.7	11.8.6
SET SENSITIVITY (*DTR0*)	*Device*	*Instance*	0x26	✓				✓	9.5.7	11.8.7
QUERY INSTANCE CAPABILITIES	*Device*	*Instance*	0x29				✓		9.5.6	11.9.7
QUERY DETECTION RANGE	*Device*	*Instance*	0x2A				✓		9.5.7	11.9.8
QUERY SENSITIVITY	*Device*	*Instance*	0x2B				✓		9.5.7	11.9.9
QUERY DEADTIME TIMER	*Device*	*Instance*	0x2C				✓		9.5.3	11.9.3
QUERY HOLD TIMER	*Device*	*Instance*	0x2D				✓		9.5.1	11.9.4
QUERY REPORT TIMER	*Device*	*Instance*	0x2E				✓		9.5.2	11.9.5
QUERY CATCHING	*Device*	*Instance*	0x2F				✓		9.4.6	11.9.6

11.3 Event messages

11.3.1 INPUT NOTIFICATION (*device/instance, event*)

The requirements of ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~ IEC 62386-103:2022, 11.3.1 apply, with the following additions:

"catching" shall be set to FALSE if the trigger for the input notification is 'movement'.

Refer to 9.4.3 for an overview of *event* values.

11.3.2 POWER NOTIFICATION (*device*)

The requirements of ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~ IEC 62386-103:2022, 11.3.2 apply.

11.4 Device control instructions

The requirements of IEC 62386-103:2022 ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~, 11.4 apply.

11.5 Device configuration instructions

The requirements of IEC 62386-103:2022 ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~, 11.5 apply.

11.6 Device queries

The requirements of IEC 62386-103:2022 ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~, 11.6 apply.

11.7 Instance control instructions

11.7.1 General

The requirements of IEC 62386-103:2022 ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~, 11.7 apply, with the following additions:

11.7.2 CATCH MOVEMENT

If the movement event is enabled the" CATCH MOVEMENT" instruction shall be ~~ignored~~ discarded.

If the movement event is disabled *"catching"* shall be set to TRUE. Once a movement detected event has been sent, "*catching*" shall be reset to FALSE.

The event filter shall not be modified by this instruction.

Refer to 9.4.6 for more information.

11.7.3 CANCEL HOLD TIMER

This instruction shall be ~~ignored~~ discarded if the hold timer is not implemented.

If the hold timer is implemented and the timer is running, this instruction shall clear the timer and generate a "vacant" trigger.

Refer to 9.5.1 for more information.

11.8 Instance configuration instructions

11.8.1 General

The requirements of IEC 62386-103:2022 ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:—~~, 11.8 apply, with the following additions and replacements:

11.8.2 SET EVENT FILTER (*DTR0*)

"eventFilter" shall be set to *DTR0* if the value is within the valid range. Otherwise, the command shall be ~~ignored~~ discarded.

11.8.3 SET HOLD TIMER (*DTR0*)

If the hold timer is implemented, "SET HOLD TIMER (*DTR0*)" shall set "*tHold*" to "*DTR0"* unless *"DTR0"* equals MASK in which case the command shall be ~~ignored~~ discarded.

Refer to 9.5.1 for more information.

11.8.4 SET REPORT TIMER (*DTR0*)

"*tReport*" shall be set to "*DTR0"*.

Refer to 9.5.2 for more information.

11.8.5 SET DEADTIME TIMER (*DTR0*)

"tDeadtime" shall be set to "*DTR0*".

Refer to 9.5.3 for more information.

11.8.6 SET DETECTION RANGE (*DTR0*)

If "detection range" is not supported (see "*occupancyCapabilities*"), this command shall be discarded, otherwise "*detectionRange*" shall be set as follows:

- "*DTR0*" = [0, 100]: "*DTR0*", or
- "*DTR0*" = 254: reset value of "*detectionRange*", or
- all other values of "*DTR0*": the command shall be discarded.

Refer to 9.5.7 for more information.

11.8.7 SET SENSITIVITY (*DTR0*)

If "detection sensitivity" is not supported (see "*occupancyCapabilities*"), this command shall be discarded, otherwise "*detectionSensitivity*" shall be set as follows:

- "*DTR0*" = [0, 100]: "*DTR0*", or
- "*DTR0*" = 254: reset value of "*detectionSensitivity*", or
- all other values of "*DTR0*": the command shall be discarded.

Refer to 9.5.7 for more information.

11.9 Instance queries

11.9.1 General

The requirements of ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:~~ IEC 62386-103:2022, 11.9 apply, with the following additions:

11.9.2 QUERY INSTANCE ERROR

The detailed error information shall be "*instanceErrorByte*".

Refer to 9.6.3 for more information.

11.9.3 QUERY DEADTIME TIMER

The answer shall be *"tDeadtime"*.

Refer to 9.5.3 for more information.

11.9.4 QUERY HOLD TIMER

The answer shall be MASK if the hold timer is not implemented, "*tHold*" if it is implemented.

Refer to 9.5.1 for more information.

11.9.5 QUERY REPORT TIMER

The answer shall be *"tReport"*.

Refer to 9.5.2 for more information.

11.9.6 QUERY CATCHING

The answer shall be YES if *"catching"* equals TRUE, and NO otherwise.

Refer to 9.4.6 for more information.

11.9.7 QUERY INSTANCE CAPABILITIES

The answer shall be "*occupancyCapabilities*".

Refer to 9.5.6 for more information.

11.9.8 QUERY DETECTION RANGE

The answer shall be "*detectionRange*".

Refer to 9.5.7 for more information.

11.9.9 QUERY SENSITIVITY

The answer shall be "*detectionSensitivity*".

Refer to 9.5.7 for more information.

11.10 Special commands

The requirements of ~~IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:~~ IEC 62386-103:2022, 11.10 apply.

Bibliography

[1] IEC 61347 (all parts), *Lamp controlgear*

[2] IEC 61347-1, *Lamp controlgear – Part 1: General and safety requirements*

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

DIGITAL ADDRESSABLE LIGHTING INTERFACE –

Part 303: Particular requirements – Input devices – Occupancy sensor

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.
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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 62386-303 edition 1.1 contains the fifth edition (2017-05) [documents 34C/1313/FDIS and 34C/1333/RVD] and its amendment 1 (2024-04) [documents 34/1013/CDV and 34/1078A/RVC].

This Final version does not show where the technical content is modified by amendment 1. A separate Redline version with all changes highlighted is available in this publication.

International Standard IEC 62386-303 has been prepared by subcommittee 34C: Auxiliaries for lamps, of IEC technical committee 34: Lamps and related equipment.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

This Part 303 of IEC 62386 is intended to be used in conjunction with:

- Part 101, which contains general requirements for system components;
- Part 103, which contains general requirements for 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 and its amendment 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, or
- revised.

IMPORTANT – The *'colour inside'* logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

IEC 62386 contains several parts, referred to as series. The 1xx series includes the basic specifications. Part 101 contains general requirements for system components, Part 102 extends this information with general requirements for control gear and Part 103 extends it further with general requirements for control devices.

The 2xx parts extend the general requirements for control gear with lamp specific extensions (mainly for backward compatibility with Edition 1 of IEC 62386) and with control gear specific features.

The 3xx parts extend the general requirements for control devices with input device specific extensions describing the instance types as well as some common features that can be combined with multiple instance types.

This first edition of IEC 62386-303 is to be used in conjunction with IEC 62386-101:2022, IEC 62386-103:2022. The division of IEC 62386 into separately published parts provides for ease of future amendments and revisions. Additional requirements will be added as and when a need for them is recognized.

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

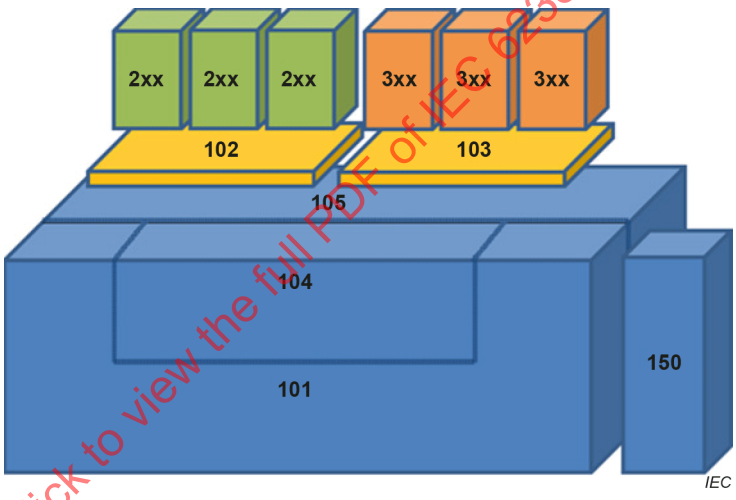

Figure 1 – IEC 62386 graphical overview

This document, and the other parts that make up the IEC 62386-300 series, in referring to any of the clauses of IEC 62386-1XX, specifies the extent to which such a clause is applicable; the parts also include additional requirements, as necessary.

Where the requirements of any of the clauses of IEC 62386-1XX are referred to in this document by the sentence “The requirements of IEC 62386-1XX, Clause “n” apply”, this sentence is to be interpreted as meaning that all requirements of the clause in question of Part 1XX apply, except any which are clearly inapplicable.

The standardization of the control interface for control devices is intended to achieve compatible co-existence and multi-master operation between electronic control gear and lighting control devices, below the level of building management systems. This document describes a method of implementing occupancy sensors.

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 303: Particular requirements – Input devices – Occupancy sensor

1 Scope

This part of IEC 62386 is applicable to input devices that provide occupancy information to the lighting control system through movement or presence sensing.

This document is only applicable to input devices complying with IEC 62386-103:2022.

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

IEC 62386-333:2018, *Digital addressable lighting interface – Part 333: Particular requirements for control devices – Manual configuration (feature type 33)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62386-101 and IEC 62386-103 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
instance
movement or presence input signal processing unit of an input device

[SOURCE: IEC 62386-101:2022, 3.29, modified – "movement or presence input" added]

3.2
movement sensor
instance based on movement detection only where occupancy is implied by movement and vacancy is concluded from the absence of movement during a specified amount of time

Note 1 to entry: Movement sensing is typically done using a passive infra-red detector combined with Fresnel optics.

3.3
presence sensor
instance based on means other than only movement detection where occupancy and vacancy can be concluded immediately and where, in some cases, movement can also be detected

Note 1 to entry: Presence sensing may be implemented using for example camera based systems.

4 General

4.1 General

The requirements of IEC 62386-103:2022, Clause 4 apply, with the restrictions, changes and additions identified below.

4.2 Version number

In 4.2 of IEC 62386-103:2022, “103” shall be replaced by “303”, “version number” shall be replaced by “extended version number” and “*versionNumber*” shall be replaced by "*extendedVersionNumber*".

4.3 Insulation

According to applicable safety standards, it can be required that the input device has at least supplementary insulation to accessible parts. This depends on the connected components. In this case special attention should be paid with respect to the sensor(s) being used.

NOTE IEC 62386-103:2022 requires system components to have at least basic insulation.

5 Electrical specification

The requirements of IEC 62386-103:2022, Clause 5 apply.

6 Interface power supply

The requirements of IEC 62386-103:2022 IEC 62386-103:2022, Clause 6 apply.

7 Transmission protocol structure

The requirements of IEC 62386-103:2022, Clause 7 apply.

NOTE Subclause 9.4 provides detailed event information applicable to instances.

8 Timing

The requirements of IEC 62386-103:2022, Clause 8 apply.

9 Method of operation

9.1 General

The requirements of IEC 62386-103:2022, Clause 9 apply, with the following restrictions and additions.

9.2 Instance type

The instance type (*"instanceType"*) shall be equal to 3.

9.3 Input signal and value

9.3.1 General

The input *"resolution"* shall be equal to 2.

NOTE 1 A *"resolution"* of 2 implies that *"inputValue"* is a single byte variable with possible values limited to 0x00, 0x55, 0xAA and 0xFF.

NOTE 2 Since *"inputValue"* is a single byte variable, the instance will answer NO to "QUERY INPUT VALUE LATCH".

"inputValue" shall reflect the occupancy state in the area covered by the sensor, as shown in Table 1.

Table 1 – Meaning of *"inputValue"*

"inputValue"	Area state	Movement
0x00	Vacant	No
0x55	Vacant	Yes
0xAA	Occupied	No
0xFF	Occupied	Yes

9.3.2 Input signal mapping for movement sensors

For movement sensors, the input signal shall directly map onto movement (only). Depending on the type of sensor used, it is possible that a very short pulse can be produced only when movement is first detected, or a longer signal can be produced whilst movement continues to be detected. In any case, the instance shall change "*inputValue*" to 0xFF immediately if movement is detected, remaining in this state for at least 1 s, thus reporting an occupied area state as well. See Figure 2.

NOTE 1 This means that an instance receiving a rapid succession of movement signals which are less than 1 s apart, will remain in the occupied and movement state, and will create a movement event only at the time it entered this state.

A movement sensor shall support a hold timer, with timeout value T_{hold}. A transition of *"inputValue"* to 0x00 shall only take place at the moment the hold timer expires or is cancelled. In such a case the "vacant" trigger shall be generated. (Re)starting the hold timer means: "discard any remaining hold time and start timing a new hold time period".

While the area is occupied, the *"inputValue"* shall change between 0xFF and 0xAA depending on momentary movement detection only.

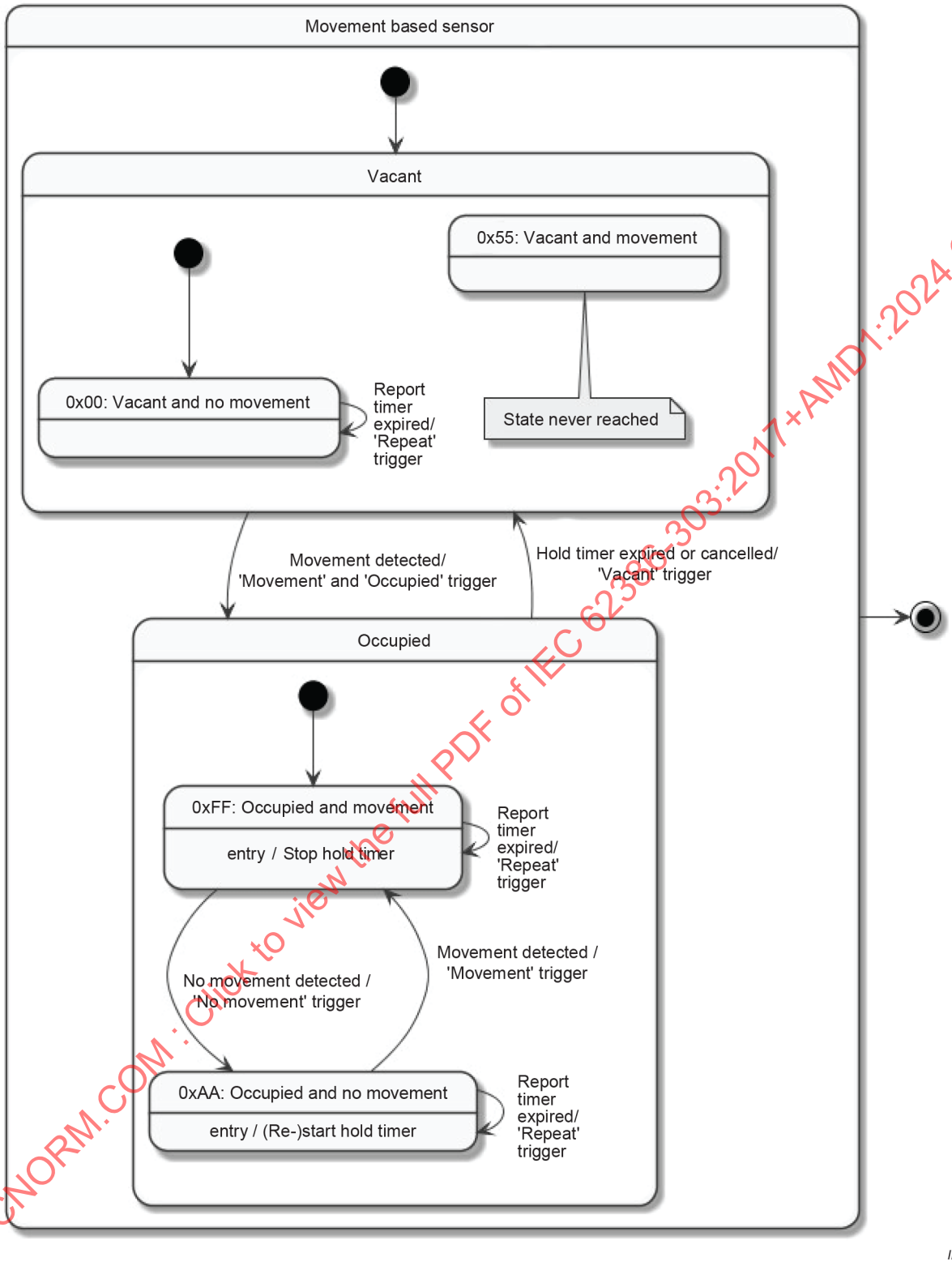

Figure 2 – State diagram for movement based sensor

NOTE 2 An input value of 0x55 is not applicable, since movement implies occupancy.

NOTE 3 Vacancy and occupancy can be concluded from *"inputValue"* only.

NOTE 4 "Stop hold timer" means the hold timer is frozen. "(Re-)start hold timer" means the hold timer is re-started with the full hold time T_{hold}.

9.3.3 Input signal mapping for presence sensors

Presence sensors shall report the movement state and area state as quickly as possible. If a presence sensor is not able to detect motion, it shall report no movement and shall not enter states 0x55 or 0xFF. See Figure 3.

NOTE This means that the hold timer in a presence sensor will never be started.

If a presence sensor is not able to detect motion without this also causing occupancy, then the presence sensor shall not enter state 0x55.

EXAMPLE For a presence sensor that is not able to detect motion without this also causing occupancy, example state transitions are as follows: Starting in state 0x00, a person moving into the area is detected, causing simultaneous movement and occupancy triggers and entry to state 0xFF. Without the movement stopping, the person exits the area causing movement and presence to simultaneously end, causing a return to state 0x00. If, instead, the person entering the area then pauses (ceases movement) for a while, this would cause a state change to 0xAA. From this state, a return to 0x00 or 0xFF are both possible.

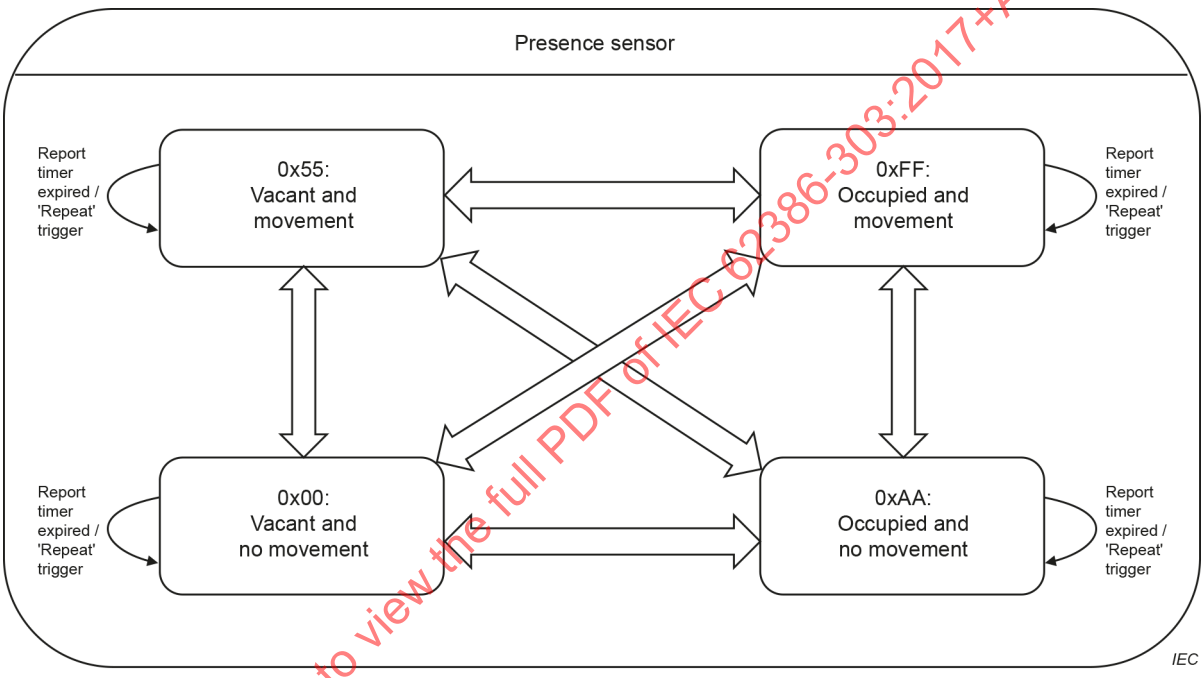

Figure 3 – State diagram for presence sensor

Table 11 shows the state transitions with the conditions for exiting each state, and the action upon exit.

Table 11 – Presence sensor state transitions

Initial state	Exit condition	Action on exit	New state
0x00: Vacant and no movement	Movement detected	"Movement" trigger	0x55: Vacant and movement
	Occupancy detected	"Occupied" trigger	0xAA: Occupied and no movement
	Occupancy and movement detected	"Occupied" and "movement" triggers	0xFF: Occupied and movement
0x55: Vacant and movement	No movement detected	"No movement" trigger	0x00: Vacant and no movement
	Occupancy detected	"Occupied" trigger	0xFF: Occupied and movement
	Occupancy and no movement detected	"Occupied" and "no movement" triggers	0xAA: Occupied and no movement
0xAA: Occupied and no movement	Movement detected	"Movement" trigger	0xFF: Occupied and movement
	Vacancy detected	"Vacant" trigger	0x00: Vacant and no movement
	Vacancy and movement detected	"Vacant" and "movement" triggers	0x55: Vacant and movement
0xFF: Occupied and movement	No movement detected	"No movement" trigger	0xAA: Occupied and no movement
	Vacancy detected	"Vacant" trigger	0x55: Vacant and movement
	Vacancy and no movement detected	"Vacant" and "no movement" triggers	0x00: Vacant and no movement

9.4 Events

9.4.1 Priority use

9.4.1.1 General

The default *"eventPriority"* shall be priority 4. Since the application controller needs a timeslot to respond, "*eventPriority*" should not be set to 2.

9.4.1.2 Periodic events

The periodic "INPUT NOTIFICATION" message to report the occupancy confirmation event (still vacant or still occupied) shall always be sent with priority 5.

NOTE This makes *"eventPriority"* inapplicable for this event only.

9.4.2 Bus usage

9.4.2.1 Instance level

Multiple events from an instance shall not be sent in a transaction. There is a configurable delay T_{deadtime} that shall be taken into account. See 9.5.3 for more information.

9.4.2.2 Device level

On device level, events from different instances may be sent in a transaction.

9.4.3 Encoding

Occupancy and vacancy events shall be encoded as shown in Table 2.

Table 2 – Occupancy and vacancy events

Event name	Event information	Description
No movement	00 0000 ---0b	No movement detected. Corresponding trigger is the ‘No movement’ trigger.
Movement	00 0000 ---1b	Movement detected. Corresponding trigger is the ‘Movement’ trigger.
Vacant	00 0000 -00-b	The area has become vacant. Corresponding trigger is the ‘Vacant’ trigger.
Still vacant	00 0000 -10-b	The area is still vacant. The event occurs at regular intervals as long as the vacant condition holds. Corresponding trigger is the ‘Repeat’ trigger.
Occupied	00 0000 -01-b	The area has become occupied. Corresponding trigger is the ‘Occupied’ trigger.
Still occupied	00 0000 -11-b	The area is still occupied. The event occurs at regular intervals as long as the occupied condition holds. Corresponding trigger is the ‘Repeat’ trigger.
Presence sensor	00 0000 0---b	The current event is triggered by a presence based sensor.
Movement sensor	00 0000 1---b	The current event is triggered by a movement based sensor.
	1x xxxx xxxxb	Reserved.
	01 xxxx xxxxb	
	00 1xxx xxxxb	
	00 01xx xxxxb	
	00 001x xxxxb	
	00 0001 xxxxb	

NOTE 1 In order to save bus bandwidth, the application controller has the possibility to inhibit event notifications that it does not need, as is described in 9.4.4.

The event shall be reported in one “INPUT NOTIFICATION” by bitwise OR-ing the event information values. In order to perform the OR-ing, every bit that is marked with “-“ for the listed event names shall be assumed 0.

The information contained in bit 3 can be used by the application controller to determine whether the sensor already applied a hold timer or not (movement based sensor).

NOTE 2 Every enabled event leads to a complete event, reporting both the movement and occupancy information.

9.4.4 Event configuration

Events shall be enabled or disabled according to the value of "*eventFilter*". For this document, "*eventFilter*" shall be reduced to one byte.

NOTE Inhibiting event triggers increases the effective bus bandwidth availability.

The *“eventFilter”* shall have the definition as given in Table 3:

Table 3 – Event filter

Bit	Description	Value	Default
0	Occupied event enabled?	"1" = "Yes"	1
1	Vacant event enabled?	"1" = "Yes"	1
2	Repeat event enabled?	"1" = "Yes"	0
3	Movement event enabled?	"1" = "Yes"	0
4	No movement event enabled?	"1" = "Yes"	0
5	Reserved	0	0
6	Reserved	0	0
7	Reserved	0	0

The filter can be set via “SET EVENT FILTER (*DTR0*)” and be queried using “QUERY EVENT FILTER 0-7”, see IEC 62386-103:2022 for details.

If the ‘repeat’ event is enabled, on expiration of the report timer the ‘still vacant’ event shall be sent if the ‘vacant’ event is enabled, and the ‘still occupied’ event shall be sent if the ‘occupied’ event is enabled.

Disabling an event shall not cancel transmission of an event that has already occurred and is waiting to be sent due to the deadtime timer or bus unavailability.

9.4.5 Event generation

An event shall be generated on every change of “*inputValue*” or when the report timer expires.

In case a new event occurs before the current event is sent, the new event shall replace the current event. This could be caused for example by bus unavailability or the deadtime timer.

9.4.6 Movement trigger and catching

The event filter can be adjusted to enable or disable the "movement" event.

NOTE 1 Application controllers can consider the need to enable the "movement" event as this can result in flooding the bus.

If the movement event is disabled, and the variable *"catching"* is TRUE, then a movement trigger shall cause an "INPUT NOTIFICATION" event to be sent. *"catching"* is set using the command "CATCH MOVEMENT". Each "INPUT NOTIFICATION" that was triggered by movement shall clear *"catching"*, which implies that "CATCH MOVEMENT" is a single-notification request. The instruction shall not change the event filter.

If the "movement" event is disabled and the "CATCH MOVEMENT" command is executed whilst in the "occupied and movement" state, "*catching*" shall be set to TRUE but an "INPUT NOTIFICIATION" shall not be triggered until the next change from a "no movement" to a "movement" state.

If the movement event is enabled the “CATCH MOVEMENT” instruction shall be discarded and "*catching*" shall be set to FALSE.

NOTE 2 Another "CATCH MOVEMENT" has no effect if a command has not (yet) led to a notification.

NOTE 3 "*catching*" does not affect event generation due to the "no movement" trigger.

The query "QUERY CATCHING" can be used to verify that no "movement" notification has been sent yet ("*catching*" has been set).

9.5 Configuring the input device

9.5.1 Using the hold timer

The hold timer is only implemented for movement based sensors. The model in Figure 2 shows how the hold timer is used to derive occupancy.

If the hold timer is running, then "CANCEL HOLD TIMER" shall cancel the hold timer and force a transition to the "vacant" state.

Both cancellation of the hold timer and expiration of the hold timer shall generate a 'vacant' trigger.

9.5.2 Using the report timer

If the report timer is set, it shall generate a 'repeat' trigger every T_{report} even if the "*inputValue*" has not changed. The report timer shall be restarted every time an event is sent.

The report timer shall be started,

- at power-on: if enabled, immediately after the receiver has started up, with the time to the first trigger recommended to be shortened to a random time between 0 s and T_{report} s;
- otherwise immediately after enablement.

This implies that the first "INPUT NOTIFICATION" message due to the report timer is sent at a maximum time of T_{report} after starting. This may be delayed by other "INPUT NOTIFICATION" messages, or by bus availability.

NOTE If multiple devices have the report timer enabled, they might send out conflicting data used by application controllers to control the same control gear. Application controllers can avoid this problem by enabling only the required report timer(s).

9.5.3 Using the deadtime timer

If the deadtime timer is set, the instance shall not send out an event until the deadtime timer has expired. If an event was suppressed due to the deadtime timer, then the latest event shall be sent on expiry of the deadtime timer. The deadtime timer shall be restarted every time an event is sent.

NOTE 1 The following example demonstrates this: The event filter is configured with only the movement event enabled. The deadtime timer is currently running due to a previous INPUT NOTIFICATION from this instance. A new movement trigger occurs. The transmission of a new INPUT NOTIFICATION is supressed because the deadtime timer is still running. Next, the "occupied and movement" state ends, with the instance changing to the "occupied and no-movement" state. Next, the deadtime timer expires. Owing to the supressed event during the deadtime, a new INPUT NOTIFICATION is now sent. This will indicate "no movement" and "occupied" because these are the current states.

NOTE 2 The purpose of the deadtime timer is to increase the effective bus bandwidth availability. It is not intended to be used as a hold timer.

9.5.4 Setting the timers

Deadtime, hold and report timers shall be programmable as is indicated in Table 4. The time can be calculated as follows:

Time = T_{incr} * *multiplier*

Only on (re-)starting a timer the actual time shall be calculated based on the corresponding variable. This implies that the times only change after any running timer has been retriggered, cancelled or expired. The tolerance on the time shall be ±5 %.