

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Digital addressable lighting interface –  
Part 204: Particular requirements for control gear – Low voltage halogen lamps  
(device type 3)**

**Interface d'éclairage adressable numérique –  
Partie 204: Exigences particulières pour les appareillages de commande –  
Lampes à halogène à basse tension (dispositif de type 3)**



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Part 204: Particular requirements for control gear – Low voltage halogen lamps  
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Partie 204: Exigences particulières pour les appareillages de commande –  
Lampes à halogène à basse tension (dispositif de type 3)**

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Low voltage halogen lamps (device type 3)**

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International Standard IEC 62386-204 has been prepared by subcommittee 34C: Auxiliaries for lamps, of IEC technical committee 34: Lamps and related equipment.

The text of this standard is based on the following documents:

FDIS	Report on voting
34C/876/FDIS	34C/885/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

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

This part 204 is intended to be used in conjunction with IEC 62386-101 and IEC 62386-102, which contain general requirements for the relevant product type (control gear or control devices).

A list of all parts of IEC 62386 series, under the general title *Digital addressable lighting interface*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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- withdrawn;
- replaced by a revised edition; or
- amended.

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## INTRODUCTION

This first edition of IEC 62386-204 is published in conjunction with IEC 62386-101 and IEC 62386-102. 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 recognised.

This International Standard, and the other parts that make up IEC 62386-200 series, in referring to any of the clauses of IEC 62386-101 or IEC 62386-102, specifies the extent to which such a clause is applicable and the order in which the tests are to be performed. The parts also include additional requirements, as necessary. All parts that make up the IEC 62386-200 series are self-contained and therefore do not include references to each other.

Where the requirements of any of the clauses of IEC 62386-101 or IEC 62386-102 are referred to in this International Standard 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 101 or Part 102 apply, except any which are inapplicable to the specific type of lamp control gear covered by Part 204.

All numbers used in this International Standard 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".

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# DIGITAL ADDRESSABLE LIGHTING INTERFACE –

## Part 204: Particular requirements for control gear – Low voltage halogen lamps (device type 3)

### 1 Scope

This International Standard specifies a protocol and methods of test for the control by digital signals of electronic control gear for use on a.c. or d.c. supplies, associated with low voltage halogen lamps.

NOTE Tests in this standard are type tests. Requirements for testing individual control gear during production are not included.

### 2 Normative references

The following referenced documents are indispensable for the application 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 62386-101:2009, *Digital addressable lighting interface – Part 101: General requirements – System*

IEC 62386-102:2009, *Digital addressable lighting interface – Part 102: General requirements – Control gear*

<https://standards.iteh.ai/catalog/standards/sist/00bb29c9-5d1c-48a5-b54c-1fb49960115/iec-62386-204-2009>

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in Clause 3 of IEC 62386-101:2009 and Clause 3 of IEC 62386-102:2009 apply, with the following additions.

#### 3.1

##### reference measurement

process during which gear determines the actual lamp load with internal procedures and measurements, not specified by this standard

NOTE The details of this process are a matter of detailed design of gear and are outside the scope of this standard.

#### 3.2

##### detection of load decrease

recognition that the actual lamp load is significantly below the load measured during a successful 'reference measurement'

NOTE The criteria for regarding a load increase or decrease as significant can only be decided by the manufacturer and these criteria should be described in the manual.

#### 3.3

##### detection of load increase

recognition that the actual lamp load is significantly above the load measured during a successful 'reference measurement'

NOTE The criteria for regarding a load increase or decrease as significant can only be decided by the manufacturer, and these criteria should be described in the manual.



### **3.4 current protector**

protective device switching off the output if the actual lamp load differs by more than  $\Delta P$  from the load detected during the reference measurement.

NOTE The value  $\Delta P$  can only be specified by the manufacturer of the control gear and this value should be stated in the manual.

### **3.5 thermal overload**

scenario where the maximum permissible gear temperature is exceeded

### **3.6 thermal shut down**

scenario where gear switches off the lamp because of a persistent thermal overload

### **3.7 light level reduction due to thermal overload**

reduction of light level with the objective of decreasing gear temperature

## **4 General**

The requirements of Clause 4 of IEC 62386-101:2009 and Clause 4 of IEC 62386-102:2009 apply.

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## **5 Electrical specifications (standards.iteh.ai)**

The requirements of Clause 5 of IEC 62386-101:2009 and Clause 5 of IEC 62386-102:2009 apply.

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## **6 Interface power supply**

The requirements of Clause 6 of IEC 62386-101:2009 and Clause 6 of IEC 62386-102:2009 apply, if a power supply is integrated with the control gear.

## **7 Transmission protocol structure**

The requirements of Clause 7 of IEC 62386-101:2009 and Clause 7 of IEC 62386-102:2009 apply.

## **8 Timing**

The requirements of Clause 8 of IEC 62386-101:2009 and Clause 8 of IEC 62386-102:2009 apply.

## **9 Method of operation**

The requirements of Clause 9 of IEC 62386-101:2009 and Clause 9 of IEC 62386-102:2009 apply, except as follows:

*Addition to Clause 9 of IEC 62386-102:2009:*

### 9.9 Detection of load decrease

If the actual lamp load is significantly below the load measured during a successful 'reference measurement', the gear may switch off the lamp if this is necessary for its safe operation. The flag bit 'load decrease' is to be set in such circumstances.

### 9.10 Detection of load increase

If the actual lamp load is significantly above the load measured during a successful 'reference measurement', the gear may switch off the lamp if this is necessary for its safe operation. The flag bit 'load increase' is to be set in such circumstances.

### 9.11 Current protector

If the actual lamp load of the control gear differs by more than a defined amount  $\Delta P$  from the load detected during the reference measurement, the current protector becomes active and switches off the lamp.

The current protector shall not become active until there has been a successful reference measurement.

There are two possible situations in which the current protector becomes active:

- Overload: The actual lamp load is higher than the load detected during the reference measurement by at least  $\Delta P$ .
- Underload: The actual lamp load is lower than the load detected during the reference measurement by at least  $\Delta P$ .

The current protector shall become inactive either on mains voltage interruption or on receipt of a command which causes the arc power level to be 0. If after switching on again the situation causing the current protector to become active still pertains, the current protector shall become active again.

The current protector can be enabled and disabled by the commands 225 'ENABLE CURRENT PROTECTOR' and 226 'DISABLE CURRENT PROTECTOR'.

An active current protector shall become inactive on reception of command 226 'DISABLE CURRENT PROTECTOR'.

If the current protector is active command 224 'REFERENCE SYSTEM POWER' shall be ignored.

### 9.12 Lamp replacement on gear with load increase/decrease or current protector feature

If a lamp is replaced with one of a different wattage without a new 'REFERENCE SYSTEM POWER' measurement being performed, the gear shall detect a load increase or a load decrease as appropriate.

NOTE If a lamp is replaced with one of the same wattage, the user should initiate a new 'REFERENCE SYSTEM POWER' measurement only if this is recommended by the manufacturer.

## 10 Declaration of variables

The requirements of Clause 10 of IEC 62386-101:2009 and Clause 10 of IEC 62386-102:2009 apply, with the following additional variables for this device type, as indicated in Table 1.

Power levels stored in persistent memory due to command 224 'REFERENCE SYSTEM POWER' shall not be changed due to command 'RESET'.

Additional variables for this device type are as indicated in Table 1.

**Table 1 – Declaration of variables**

Variable	Default value (control gear leaves the factory)	Reset value	Range of validity	Memory <sup>a</sup>
"FAILURE STATUS"	???? ???? <sup>b</sup>	no change	0 – 255	1 byte RAM <sup>c</sup>
"FEATURE BYTE"	factory burn-in	no change	0 – 255	1 byte ROM
"EXTENDED VERSION NUMBER"	1	no change	0 – 255	1 byte ROM
"DEVICE TYPE"	3	no change	0 – 254, 255 (mask)	1 byte ROM
<p>? = undefined.</p> <p><sup>a</sup> Persistent memory (storage time indefinite) if not stated otherwise.</p> <p><sup>b</sup> Power up value.</p> <p><sup>c</sup> Bit 7 of this byte shall be stored in the persistent memory.</p>				

## 11 Definition of commands

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The requirements of Clause 11 of IEC 62386-101:2009 and Clause 11 of IEC 62386-102:2009 apply, except as follows:

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*Amendment of Clause 11 of IEC 62386-102:2009*

### 11.3.1 Queries related to status information

*Amendment:*

**Command 146:**            **YAAA AAA1 1001 0010**        **'QUERY LAMP FAILURE'**

Asks if there is a lamp problem at the given address. Answer shall be 'Yes' or 'No'.

'Yes' means either open circuit or short circuit or load increase or load decrease or current protector active. 'No' does not necessarily imply that no lamps have failed.

**Command 153:**            **YAAA AAA1 1001 1001**        **'QUERY DEVICE TYPE'**

Answer shall be 3.

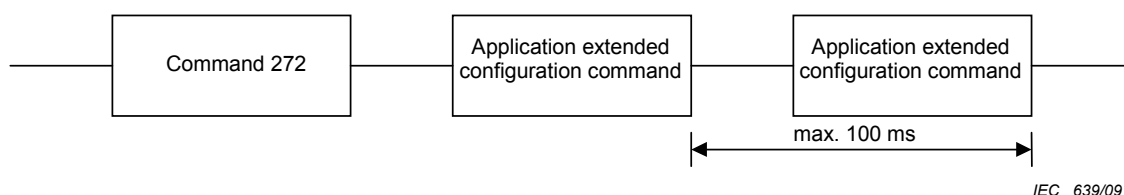
### 11.3.4 Application extended commands

*Replacement:*

#### 11.3.4.1 Application extended configuration commands

Every configuration command (224 – 226) shall be received a second time within 100 ms (nominal) before it is executed in order to reduce the probability of incorrect reception. No other commands addressing the same control gear shall be sent between these two commands, otherwise the first such command shall be ignored and the respective control or configuration sequence shall be aborted.

Command 272 shall be received before the two instances of the application extended configuration command, but not between them (see Figure 1).



**Figure 1 – Application extended configuration command sequence example**

All values of DTR shall be checked against the values mentioned in Clause 10, Range of validity, i.e. the value shall be set to the upper / lower limit if it is above / below the valid range defined in Table 1.

**Command 224:            YAAA AAA1 1110 0000            'REFERENCE SYSTEM POWER'**

Reference measurement is an optional feature, the presence of which is indicated in bits 2, 3 and 4 of the 'FEATURES' byte (see command 240). If all these bits are zero, then reference measurement is not supported, and this command shall be ignored. Otherwise, on receipt of this command, the control gear shall proceed as follows.

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The control gear shall measure and store system power levels in order to detect load increase or load decrease. It is up to the manufacturer to decide upon the number of system power levels each type of gear should measure.

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The measured power level shall be stored in the persistent memory. Commands received during the measuring period shall be ignored except query commands and command 256.

After 15 min at most, the control gear shall finish the measurement process and shall go back to normal operation. The measurement process shall be aborted if command 256 'TERMINATE' is received.

When there has been no successful reference measurement or the most recent reference measurement was unsuccessful, bit 7, reference measurement failed, in the answer to command 240 'QUERY FAILURE STATUS' shall be set and command 249 'QUERY REFERENCE MEASUREMENT FAILED' shall be answered with 'Yes'.

If the current protector is active this command shall be ignored. In this case bit 7, reference measurement failed, in the answer to command 240 'QUERY FAILURE STATUS' shall be set and command 249 'QUERY REFERENCE MEASUREMENT FAILED' shall be answered with 'Yes'.

**Command 225:            YAAA AAA1 1110 0001            'ENABLE CURRENT PROTECTOR'**

Enables the current protector of the control gear. The current protector can become active after a successful reference measurement started by command 224.

The default configuration of the gear is 'CURRENT PROTECTOR ENABLED'. The status of the current protector (enabled / disabled) shall be stored in the persistent memory of the control gear.

The current protector is an optional feature. Control gear without this feature shall not react (see command 240).

**Command 226: YAAA AAA1 1110 0010 'DISABLE CURRENT PROTECTOR'**

Disables the current protector of the control gear.

The current protector is an optional feature. Control gear without this feature shall not react in any way.

(see command 240).

**Commands 227: YAAA AAA1 1110 0011**

Reserved for future needs. The control gear shall not react in any way.

**Commands 228-231: YAAA AAA1 1110 01XX**

Reserved for future needs. The control gear shall not react in any way.

**Commands 232-239: YAAA AAA1 1110 1XXX**

Reserved for future needs. The control gear shall not react in any way.

**11.3.4.2 Application extended query commands****Command 240: YAAA AAA1 1111 0000 'QUERY FEATURES'**

The answer from the control gear shall be the following information about which optional features and query commands are implemented.

bit 0	'1' = short circuit detection can be queried
bit 1	'1' = open circuit detection can be queried
bit 2	'1' = detection of load decrease can be queried
bit 3	'1' = detection of load increase can be queried
bit 4	'1' = current protector is implemented and can be queried
bit 5	'1' = thermal shut down can be queried
bit 6	'1' = light level reduction due to thermal overload can be queried
bit 7	'1' = physical selection supported

Bits 2, 3, 4. If any of these features is available, command 224 'REFERENCE SYSTEM POWER', command 249 'QUERY REFERENCE RUNNING' and command 250 'QUERY REFERENCE MEASUREMENT FAILED' are mandatory.

Bit 5; bit 6. A 'thermal shut down' or a 'light level reduction due to thermal overload' are not interpreted as lamp failure; nevertheless the control gear shall answer 'MASK' to a 'QUERY ACTUAL LEVEL'.

NOTE The fact that a thermal overload protection is implemented, the actual status of which can be queried, does not relieve the user from the obligation to comply with any safety-relevant information for installation given by the manufacturer. A note to this effect should be included in the manual.

**Command 241: YAAA AAA1 1111 0001 'QUERY FAILURE STATUS'**

Answer is the following 'FAILURE STATUS' byte:

bit 0	short circuit	'0' = No
bit 1	open circuit	'0' = No
bit 2	load decrease	'0' = No
bit 3	load increase	'0' = No
bit 4	current protector active	'0' = No
bit 5	thermal shut down	'0' = No
bit 6	thermal overload with light level reduction	'0' = No
bit 7	reference measurement failed	'0' = No

Bit 0, short circuit, means either a severe short circuit or a physical control gear overload (> 100 % of nominal load).

If any of the bits 0 to 4 are set, the answer to command 146 'QUERY LAMP FAILURE' shall be 'Yes' and bit 1 in the answer to command 144 'QUERY STATUS' shall be set.

If any of the back-channel bits 0, 1, 5 or 6 are set, the answer to command 160 'QUERY ACTUAL LEVEL' shall be 'MASK'.

Bit 7 shall be set if the reference measurement of the system power failed for any reason, or if there has been no reference measurement at all. It shall be stored in the persistent memory. If the reference measurement is not supported, this bit shall always be '0'.

The 'FAILURE STATUS' byte shall be available in the RAM of the control gear and shall be updated regularly by the control gear according to the actual situation. The bits shall not be changed if the relevant situation cannot be checked.

**Command 242:            YAAA AAA1 1111 0010        'QUERY SHORT CIRCUIT'**

Asks if there is a short circuit detected at the given address. Answer shall be 'Yes' or 'No'.

If this query is answered with 'Yes' the answer to command 146 'QUERY LAMP FAILURE' shall be 'Yes' and bit 1 in the answer to command 144 'QUERY STATUS' shall be set.

Control gear without this feature shall not react (see command 240).

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**Command 243:            YAAA AAA1 1111 0011        'QUERY OPEN CIRCUIT'**

Asks if there is an open circuit detected at the given address. Answer shall be 'Yes' or 'No'.

If this query is answered with 'Yes' the answer to command 146 'QUERY LAMP FAILURE' shall be 'Yes' and bit 1 in the answer to command 144 'QUERY STATUS' shall be set.

Control gear without this feature shall not react (see command 240).

**Command 244:            YAAA AAA1 1111 0100        'QUERY LOAD DECREASE'**

Asks if there is a significant load decrease (compared to the system reference power) detected at the given address.

If this query is answered with 'Yes' the answer to command 146 'QUERY LAMP FAILURE' shall be 'Yes' and bit 1 in the answer to command 144 'QUERY STATUS' shall be set.

Answer shall be 'Yes' or 'No'. Control gear without this feature shall not react (see command 240).

**Command 245:            YAAA AAA1 1111 0101        'QUERY LOAD INCREASE'**

Asks if there is a significant load increase (compared to the system reference power) detected at the given address.

If this query is answered with 'Yes' the answer to command 146 'QUERY LAMP FAILURE' shall be 'Yes' and bit 1 in the answer to command 144 'QUERY STATUS' shall be set.

Answer shall be 'Yes' or 'No'. Control gear without this feature shall not react (see command 240).

**Command 246:**            **YAAA AAA1 1111 0110**        **'QUERY CURRENT PROTECTOR ACTIVE'**

Asks if the current protector is active at the given address. Answer shall be 'Yes' or 'No'.

If this query is answered with 'Yes' the answer to command 146 'QUERY LAMP FAILURE' shall be 'Yes' and bit 1 in the answer to command 144 'QUERY STATUS' shall be set.

Control gear without this feature shall not react (see command 240).

**Command 247:**            **YAAA AAA1 1111 0111**        **'QUERY THERMAL SHUT DOWN'**

Asks if there is a thermal shut down detected at the given address. Answer shall be 'Yes' or 'No'.

Control gear without this feature shall not react (see command 240).

**Command 248:**            **YAAA AAA1 1111 1000**        **'QUERY THERMAL OVERLOAD'**

Asks if there is a thermal overload with light level reduction detected at the given address. Answer shall be 'Yes' or 'No'. Control gear without this feature shall not react (see command 240).

**Command 249:**            **YAAA AAA1 1111 1001**        **'QUERY REFERENCE RUNNING'**

Asks if there is the 'REFERENCE SYSTEM POWER' measurement running at the given address.

Answer shall be 'Yes' or 'No'.

Control gear without this feature shall not react (see command 240).

**Command 250:**            **YAAA AAA1 1111 1010**        **'QUERY REFERENCE MEASUREMENT FAILED'**

Asks if the reference measurement started by command 224 'REFERENCE SYSTEM POWER' failed at the given address. Answer shall be 'Yes' or 'No'.

Control gears without this feature shall not react (see command 240).

**Command 251:**            **YAAA AAA1 1111 1011**        **'QUERY CURRENT PROTECTOR ENABLED'**

Asks if the current protector is enabled. Answer shall be 'Yes' or 'No'.

The current protector is an optional feature. Control gear without this feature shall not react in any way (see command 240).

**Commands 252-253:** **YAAA AAA1 1111 110X**

Reserved for future needs. The control gear shall not react in any way.

**Command 254:**            **YAAA AAA1 1111 1110**

Reserved for future needs. The control gear shall not react in any way.

**Command 255:**            **YAAA AAA1 1111 1111**        **'QUERY EXTENDED VERSION NUMBER'**