IEC 62386-102

Edition 2.0 2018-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

AMENDMENT 1
AMENDEMENT 1

Digital addressable lighting interface – Part 102: General requirements – Control gear

Interface d'éclairage adressable numérique – Partie 102: Exigences générales – Appareillages de commande

IEC 62386-102:2014-11/AMD1:2018-09(en-fr)

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Digital addressable lighting interface – Part 102: General requirements – Control gear

Interface d'éclairage adressable numérique – Partie 102: Exigences générales – Appareillages de commande

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

This amendment has been prepared by IEC technical committee 34: Lamps and related equipment.

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

FDIS	Report on voting
34/523/FDIS	34/534/RVD

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

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

Replace the first sentence of the fourth paragraph with the following new text:

This second edition of IEC 62386-102 is intended to be used in conjunction with IEC 62386-101:2014 and IEC 62386-101:2014/AMD1:2018 and with the various parts that make up the IEC 62386-2xx series for control gear, together with IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:2018 and the various parts that make up the IEC 62386-3xx series of particular requirements for control devices.

1 Scope

Delete the second sentence and add, at the end of the first sentence, the following new text:

which is in line with the requirements of IEC 61347 (all parts), with the addition of DC supplies.

2 Normative references

Replace the text and references with the following new text and 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, *Digital addressable lighting interface – Part 101: General requirements – System components*
IEC 62386-101:2014/AMD1:2018

IEC 62386-103:2014, *Digital addressable lighting interface – Part 103: General requirements – Control devices*
IEC 62386-103:2014/AMD1:2018

3 Terms and definitions

Add, after the first sentence, the following new text:

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

3.13
NO

Replace the definition and Note 1 to entry with the following new definition and new Note 1 to entry:

answer used to deny or refuse a query

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 62386-101:2014 and IEC62386-101:2014/AMD1:2018, 8.2.5.

Renumber the existing Note 1 to entry as Note 2 to entry, as follows:

Note 2 to entry: The answer NO could also be triggered by a missed query.

3.15
opcode
operation code

Replace the definition with the following new definition:

part of a forward frame that identifies the command to be executed

3.28
YES

Replace the definition with the following new definition:

answer used to accept or affirm a query

Add the following new Note 1 to entry:

Note 1 to entry: If a query is asked where the answer is YES, the response will be a backward frame containing the value of MASK.

4.1 General

Replace the sentence with the following new sentence:

The requirements of IEC 62386-101:2014 and IEC 62386-101:2014/AMD1:2018, Clause 4 apply, with the restrictions, changes and additions identified below.

4.2 Version number

Replace the first sentence with the following new sentence:

This subclause replaces IEC 62386-101:2014 and IEC 62386-101:2014/AMD1:2018, 4.2.

Replace the fifth paragraph with the following new paragraph:

The current version number is "*versionNumber*" as defined in Table 14.

5 Electrical specification

Replace the sentence with the following new sentence:

The requirements of IEC 62386-101:2014 and IEC 62386-101:2014/AMD1:2018, Clause 5 apply.

6 Interface power supply

Replace the sentence with the following new sentence:

If a bus power supply is integrated into a control gear, the requirements of IEC 62386-101:2014 and IEC 62386-101:2014/AMD1:2018, Clause 6 apply.

7.1 General

Replace the sentence with the following new sentence:

The requirements of IEC 62386-101:2014 and IEC 62386-101:2014/AMD1:2018, Clause 7 apply, with the following additions.

8 Timing

Replace the sentence with the following new sentence:

The requirements of IEC 62386-101:2014 and IEC 62386-101:2014/AMD1:2018, Clause 8 apply.

9.1 General

Replace the sentence with the following new sentence:

The requirements of IEC 62386-101:2014 and IEC 62386-101:2014/AMD1:2018, Clause 9 apply with the following additions.

9.2 Control gear

Replace the content of 9.2 with the following new subclauses:

9.2.1 General

Control gear may receive commands from an application controller. The application controller is specified in IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:2018.

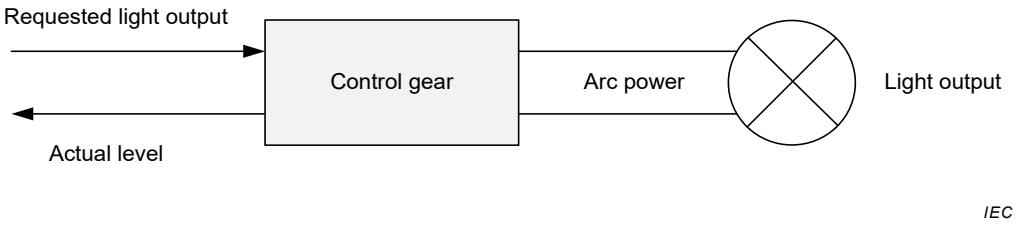

Figure 2 – Control gear directly operating a light source

Figure 2 shows how the various levels lead to light output. The maximum (light) output level of a control gear is referred to as 100 %. All levels are specified in a relative way. Physically there is a minimum that the control gear can supply whilst there is still light output. This is known as the physical minimum level (PHM).

NOTE PHM is control gear specific, and is greater than 0.

9.2.2 Control gear phases

9.2.2.1 General

Depending on the light source various phases of operation can be identified within a control gear. In general these are as follows.

9.2.2.2 Standby

During this phase, the lamp is off and only in this phase both "*targetLevel*" and "*actualLevel*" are 0.

9.2.2.3 Startup

Startup is a transitional phase changing from standby to normal operation or failure. This phase is sometimes noticeable as a delay. Examples are:

- preheat: the lamp is heated to prepare for ignition. This is typically seen for fluorescent light sources;
- ignition: the lamp is ignited. This is typically seen for HID light sources and fluorescent light sources after preheat;
- power stage preparation.

For further information and exceptions refer to 9.16.3.

9.2.2.4 Normal operation

While in normal operation the lamp is emitting light and can be operated as expected.

For further information and exceptions refer to 9.16.3.

9.2.2.5 Failure

During the failure phase the lamp cannot be operated as expected.

For further information and exceptions refer to 9.16.3.

9.3 Dimming curve

Replace, in the last sentence of the fourth paragraph, "reproduceablility" with "reproducibility".

Table 2

Replace, in the first column and first row,"Arc power level" with "Level" as follows:

Level	1	60	85	126	145	170	195	216	229	243	254
Minimum value	0,05	0,25	0,50	2,00	3,93	7,00	15,00	27,28	40,00	63,53	
Nominal value	0,10	0,50	0,99	3,04	5,10	10,09	19,97	35,43	50,53	74,05	100,00
Maximum value	0,20	1,00	2,00	4,50	7,50	15,0	30,00	52,09	71,00	86,14	

9.5.1 General

Replace the sixth paragraph with the following new paragraph:

During a process of fading up, *"actualLevel"* shall be incremented at a time corresponding to the intersection of an ideal fading curve with the mid-point between *"actualLevel"* and

"actualLevel" + 1. Likewise, when fading down, *"actualLevel"* shall be decremented at a time corresponding to the intersection of an ideal fading curve with the mid-point between *"actualLevel"* and *"actualLevel"* – 1. Figure 4 illustrates this, and applies for fades started using either fade time or fade rate.

Replace the ninth paragraph with the following new paragraph:

If a lamp is to be lit at the beginning of the fade and dimmed to a certain value, the step from 0x00 to *"minLevel"* shall not contribute to the fade time. This means that the fade time starts when the startup phase has finished.

9.5.3 Fade rate

Replace the first paragraph with the following new sentence:

The fade rate shall be according to Table 5:

9.5.4 Extended fade time

Delete the second paragraph.

Replace, after Table 7, the text with the following new text:

On execution of "SET EXTENDED FADE TIME (*DTR0*)" the control gear shall set the following values based on *"DTR0"*. The format used shall be 0YYYAAAAb, where YYYb equals the fade time multiplier, and AAAAb the fade time base. The resulting fade time shall be monotonically increasing when the base time increases.

- If "*DTR0*" > 0100 1111b:
  - "*extendedFadeTimeBase*" shall be set to 0;
  - "*extendedFadeTimeMultiplier*" shall be set to 0 ms, effectively setting the fade time to 0 s meaning no fade (as quickly as possible). The transition from *"actualLevel"* to *"targetLevel"* shall take place immediately and the light output shall be adjusted as quickly as possible, meaning less than 0,8 s which represents the maximum fade time for *"fadeTime"* = 1 (see Table 4).
- In all other cases:
  - "*extendedFadeTimeBase*" shall be set to AAAAb;
  - "*extendedFadeTimeMultiplier*" shall be set to YYYb.

The extended fade time can be queried using "QUERY EXTENDED FADE TIME". The answer shall be 0 YYY AAAAb, where YYYb equals "*extendedFadeTimeMultiplier*" and AAAAb equals "*extendedFadeTimeBase*".

9.5.5 Using the fade time

Replace the third paragraph with the following new paragraph:

Since the extended fade time also supports fade times below 0,7 s that might not be realised by all control gear and light source combinations, such control gear may simply adjust the light output as quickly as possible when an extended fade time is requested that it physically cannot support. However, it should respond as if the fade has finished within the requested time.

9.5.6 Using the fade rate

Replace the content of 9.5.6 with the following new subclauses:

9.5.6.1 Fading with “UP” and “DOWN” commands

Commands “UP” and “DOWN” shall start a 200 ms ± 20 ms fade.

“*targetLevel*” shall be calculated on the basis of the *“actualLevel”* using the applicable fade rate. After the 200 ms fade has expired, the calculated target level shall be reached.

NOTE 1 Since the fade rate is used, it is possible to reach *“minLevel”* or *“maxLevel”* before the end of the fade. This does not result in the *“fadeRunning”* bit being cleared.

NOTE 2 Because there are fade rate tolerances, different control gear can react to commands that use the fade rate at slightly different effective rates. Consequently, after the processing of these relative dimming commands, different gear might have different values for “*targetLevel*” (and therefore also for “*actualLevel*” and “*lastLightLevel*”).

9.5.6.2 Fading with “CONTINUOUS UP” and “CONTINUOUS DOWN” commands

Command “CONTINUOUS UP” shall set *“targetLevel”* to *“maxLevel”* and start a fade using the applicable fade rate. The fade shall stop when “*maxLevel”* is reached.

Command “CONTINUOUS DOWN” shall set *“targetLevel”* to *“minLevel”* and start a fade using the applicable fade rate. The fade shall stop when “*minLevel”* is reached.

Upon execution of either a “CONTINUOUS UP” or “CONTINUOUS DOWN” instruction at least one step shall be made, unless this is precluded by the values of *"minLevel"* or *"maxLevel"*.

Refer to 9.5.9 for stopping a fade before reaching *“minLevel”* or *“maxLevel”*.

NOTE 1 In contrast to the “UP” and “DOWN” instructions, it is not possible to reach *“minLevel”* or *“maxLevel”* before the end of the fade. Therefore, *“fadeRunning”* bit is going to be cleared at the end of a fade.

NOTE 2 Similar to the “UP” and “DOWN” instructions, different gear might end up with different values for *“targetLevel”*, “*actualLevel*” and *“lastLightLevel”* after the fade has been stopped ahead of time (e.g. via DAPC(MASK)).

9.5.7 Behaviour during a fade

Replace the title of Subclause 9.5.7 with the following new title:

9.5.7 System response to changes during a fade

9.5.8 Behaviour during start-up

Replace the existing Subclause 9.5.8 including its title with the following new title and new text:

9.5.8 System response to changes during standby and start-up

If a fade is initiated during standby, the fade process shall be pended with “*actualLevel*” equal to “*minLevel*” during the startup phase. The reaction to level commands shall be the same as if the lamp(s) were operating at *“minLevel”*.

If a fade is initiated during start-up, the fade process shall be pended at “*actualLevel*”. The reaction to level commands shall be the same as if the lamp(s) were operating at *“actualLevel”*.

The fade shall start:

- as soon as *“lampOn”* is TRUE, or
- in the case of total lamp failure, as soon as “*lampFailure*” is confirmed TRUE.

For further information on *“lampOn”* and “*lampFailure*” see 9.16.3 and 9.16.4.

9.5.9 Stopping a fade

*Replace, in the first paragraph, "*reception*" with "*execution*".*

9.6 Min and max level

Add, at the end of the third paragraph and at the end of the fifth paragraph, the following new sentence:

As a consequence, "*limitError*" shall be set to TRUE.

9.7.1 General

Replace the first sentence with the new following new sentence:

A control gear shall check the device addressing scheme to see if it is addressed by a command. The control gear shall execute the command, unless any of the following conditions hold:

Add, in the first paragraph, at the end of the fifth bulleted list item ("The command is not defined") the following new text:

(e.g. reserved command).

9.7.3 Level instructions initiating a fade

Add, after the last dashed item, the following new dashed item:

– "CONTINUOUS UP", "CONTINUOUS DOWN"

9.8.1 General

Replace the first sentence with the following new sentence:

The requirements of IEC 62386-101:2014 and IEC62386-101:2014/AMD1:2018, 9.4 apply with the following additions.

9.8.2 Command iteration of "UP" and "DOWN" commands

Replace, in the first paragraph, the second sentence with the following new sentence:

Upon execution of the first instruction of such an iteration, unless this is precluded by the values of "*minLevel*" or "*maxLevel*", one step (final "*targetLevel*" = calculated "*targetLevel*"±1) shall be made.

Replace the second paragraph with the following new paragraph:

After that first step, the 200 ms fade shall start using the applicable fade rate. Subsequent steps shall be executed at intervals determined by the applicable fade rate, as long as the iteration continues. Every "UP" or "DOWN" instruction executed as a part of the iteration shall cause the 200 ms fade time to be restarted and *"targetLevel"* to be recalculated accordingly. The transition of "*actualLevel*" shall occur according to 9.5.1 and Figure 4, with the first such transition, excluding the initial step, occurring at a time of 1/(2* *"fadeRate"*) after execution of the first "UP" and "DOWN" command.

Replace Figure 5 with the following new Figure 5:

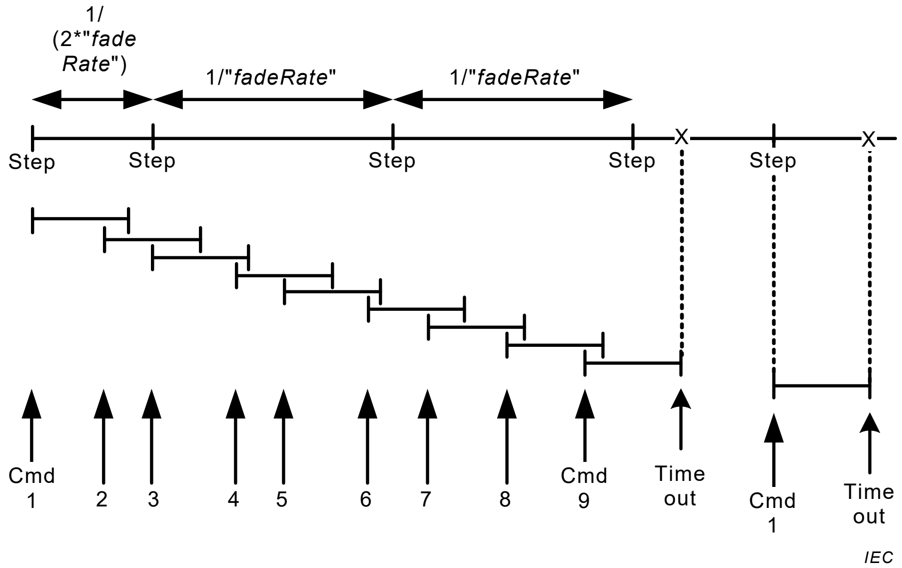

Figure 5 – Timing and response when executing command iteration

9.8.3 DAPC SEQUENCE (deprecated)

*Replace, in the second paragraph, “*reception*” with “*execution*”.*

Replace, after the NOTE, the existing text with the following new text:

The DAPC sequence shall end if 200 ms elapse without the control gear accepting a “DAPC (*level*)” command. The DAPC sequence shall be aborted on execution of an indirect arc power control command. “ENABLE DAPC SEQUENCE” accepted during DAPC command iteration, shall be discarded.

While the DAPC sequence is active, each execution of a “DAPC (*level*)” command shall start a 200 ms fade.

Since the DAPC sequence uses a fade time of 200 ms that might not be realised by all control gear and light source combinations, such gear may simply adjust the light output as quickly as possible. However, it should respond as if the fade has finished within the requested time.

9.9.4 Operating mode 0x80 to 0xFF: manufacturer specific modes

Add, at the end of the first bulleted list item, the following new text:

and IEC62386-101:2014/AMD1:2018;

9.10.4 Memory bank reading

*Replace, in the second paragraph, “*ignored*” with “*discarded*”.*

9.10.5 Memory bank writing

*Replace, in the first paragraph, “*reception*” with “*execution*”.*

*Replace, in the second paragraph, “*accept*” with “*execute*”.*

Replace, in the third paragraph, “received” with “accepted”.

Replace, in the sixth paragraph, “received” with “accepted”.

9.10.6 Memory bank 0

Replace Table 9 with the following new Table 9:

Table 9 – Memory map of memory bank 0

Address	Description	Default value (factory)	Memory type
0x00	Address of last accessible memory location	factory burn-in	ROM
0x01	Reserved – not implemented	answer NO	n.a.
0x02	Number of last accessible memory bank	factory burn-in, range [0,0xFF]	ROM
0x03	GTIN byte 0 (MSB)[a]	factory burn-in	ROM
0x04	GTIN byte 1	factory burn-in	ROM
0x05	GTIN byte 2	factory burn-in	ROM
0x06	GTIN byte 3	factory burn-in	ROM
0x07	GTIN byte 4	factory burn-in	ROM
0x08	GTIN byte 5 (LSB)	factory burn-in	ROM
0x09	Firmware version (major)	factory burn-in	ROM
0x0A	Firmware version (minor)	factory burn-in	ROM
0x0B	Identification number byte 0 (MSB)	factory burn-in	ROM
0x0C	Identification number byte 1	factory burn-in	ROM
0x0D	Identification number byte 2	factory burn-in	ROM
0x0E	Identification number byte 3	factory burn-in	ROM
0x0F	Identification number byte 4	factory burn-in	ROM
0x10	Identification number byte 5	factory burn-in	ROM
0x11	Identification number byte 6	factory burn-in	ROM
0x12	Identification number byte 7 (LSB)	factory burn-in	ROM
0x13	Hardware version (major)	factory burn-in	ROM
0x14	Hardware version (minor)	factory burn-in	ROM
0x15	101 version number [b]	factory burn-in, according to implemented version number	ROM
0x16	102 version number of all integrated control gear [c]	factory burn-in, according to implemented version number	ROM
0x17	103 version number of all integrated control devices [d]	factory burn-in, according to implemented version number	ROM
0x18	Number of logical control device units in the bus unit	factory burn-in, range [0,64]	ROM
0x19	Number of logical control gear units in the bus unit	factory burn-in, range [1,64]	ROM
0x1A	Index number of this logical control gear unit	factory burn-in, range [0,(location 0x19)-1]	ROM
[0x1B,0x7F]	Reserved – not implemented	answer NO	n.a.
[0x80,0xFE]	Additional control gear information [e]	[e]	ROM
0xFF	Reserved – not implemented	answer NO	n.a.

[a] It is recommended that the product GTIN is not re-used within the expected lifetime of the product after installation.

[b] Format of the version number is defined in IEC 62386-101:2014 and IEC 62386-101:2014/AMD1:2018, 4.2.

[c] Format of the version number is defined in 4.2.

[d] Format of the version number is defined in IEC 62386-103:2014 and IEC 62386-103:2014/AMD1:2018, 4.2. If not implemented, this is indicated by 0xFF.

[e] Purpose and (default) value of these bytes shall be defined by the manufacturer.

Replace, in the first sentence of the seventh paragraph, "identificaton number byte 7" with "identification number byte 7" and "prefereably" with "preferably".

Replace the NOTE with the following new NOTE:

NOTE As an example there might be a product containing three logical devices with three different short addresses. Each of these control gear has the same GTIN and identification number, each reports as number of devices the value 3 and the index of the three control gear is reported as 0, 1 or 2 respectively. Reading location 0x1A using broadcast yields a backward frame according to IEC 62386-101:2014 and IEC62386-101:2014/AMD1:2018, 9.5.2 (overlapping backward frame).

9.12 System failure

Replace the first sentence with the following new sentence:

If the control gear detects a system failure (see IEC 62386-101:2014 and IEC62386-101:2014/AMD1:2018, 4.11) and *"systemFailureLevel"* is not MASK, *"targetLevel"* shall be calculated on the basis of *"systemFailureLevel"*.

9.13 Power on

Replace the first sentence with the following new sentence:

After an external power cycle (see IEC 62386-101:2014 and IEC62386-101:2014/AMD1:2018 4.11.1), the device shall retain its most recent configuration, with the following exceptions:

Add after the last bulleted list item, the following new list item:

- All variables mentioned in Table 14 shall be set to the value indicated in the power on value column. The variables that are marked with "no change" in the power on value column shall not be considered. The variables defined in implemented Parts 2xx shall be included.

Replace, in the third paragraph, "received" *with* "accepted".

Replace the fourth paragraph with the new following paragraph:

If "GO TO SCENE (*sceneNumber*)" where the value of the scene equals MASK is accepted, the control gear shall discard the command and continue as if no level control command has been accepted.

Replace, in the fifth paragraph, "received" *with* "executed".

Replace, in the seventh paragraph, "received" *with* "accepted".

Table 11

Replace the header of the first column "Power on behavior" *with the following new header.*

Power on system response

Replace NOTE 3 with the following new text:

It is possible that a system failure is detected before the power on level has been reached. If "*systemFailureLevel*" is not MASK, the *"targetLevel"* is recalculated on the basis of *"systemFailureLevel"* and the power on level shall not be activated.

Add, in the last paragraph, after "IEC 62386-101", the following new text:

:2014 and IEC62386-101:2014/AMD1:2018.

9.14.2 Random address allocation

*Replace, in the second paragraph, "*received*" with "*executed*".*

9.14.3.1 General

*Replace, in the third paragraph, "*reception*" with "*execution*".*

9.14.3.3 Method two: using "RECALL MAX LEVEL" and/or "RECALL MIN LEVEL" (deprecated)

Replace the second paragraph with the following new paragraph:

Alternatively, the control gear shall execute "IDENTIFY DEVICE", starting or re-triggering the identification procedure.

Replace the NOTE with the following new NOTE:

NOTE It is acceptable for the process of identifying individual control gear to depend upon both commands being executed in an alternating sequence.

*Replace, in the third paragraph, "*reception*" with "*execution*".*

9.15 Failure state behaviour

*Replace, in the second paragraph, "*received*" with "*executed*".*

Replace the NOTE with the following new NOTE:

NOTE For example, a control gear might, on detecting an excessively high temperature, protect itself from the risk of thermal damage by limiting the light output.

9.16.3 Bit 1: lamp failure

Replace the existing text with the following new text:

A lamp failure according to this standard is a situation in which the lamp cannot be operated as intended due to for example incorrect lamp connection or lamp defects. The minimum detection method for lamp failure is lamp disconnect, unless explicitly stated otherwise depending on the light source type (see 11.5.19).

If a lamp failure is detected, *"lampFailure"* shall be set to TRUE. Lamp failure shall be detected and indicated latest after 30 s when the control gear is not in standby (see 9.2). In case the startup phase takes longer than 30 s, for example for HID lamps, *"lampFailure"* shall be set at the end of the startup phase to the correct value.

A total lamp failure is a lamp failure with no light output. A partial lamp failure is a lamp failure with still some light output.

If "*lampFailure*" is TRUE, the control gear shall periodically check to determine whether the lamp situation has improved. This check shall be executed at least whenever "*targetLevel*" changes from 0x00 to a greater value. After a successful startup, *"lampFailure"* shall be set to FALSE.