DiiA Specification

DALI Part 351 – Luminaire-mounted Control Devices

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DALI Part 351 – Luminaire-mounted Control Devices

1 Scope

This standard specifies the characteristics of a bus-powered or externally powered control device to be used in, on or attached to a luminaire. This standard builds on the Digital Addressable Lighting Interface as specified in the IEC62386 series of standards, by adding specific requirements for power consumption, a mechanism to arbitrate between multiple application controllers, and a memory bank definition for multi-master devices.

2 References

The following normative documents are adopted, in whole or in part as indicated, in this Standards Publication. The latest edition of the publication applies (including amendments).

IEC 62386-101:2014/AMD1:2018, Digital addressable lighting interface – Part 101: General requirements – System components

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

DiiA specification Part 150 AUX power supply

3 Terms and definitions

3.1 AUX

external 24V DC power supply specified in *DiiA specification Part 150 AUX power supply*

4 General

Clause 4.9 "Insulation" of IEC 62386-101 has the following paragraph appended:

This insulation requirement does not apply between the interface and the +24V AUX supply input, where the device is externally powered by the AUX supply and the negative side of the control interface is electrically common with the GND or negative rail of the AUX supply input.

Clause 5.1 "General" of IEC 62386-101 is modified as follows:

The control interface is permitted to be polarity sensitive if all of the following conditions apply:

- • The control device includes a connector for luminaire mounting, and
- • the negative side of the control interface, which is marked "DA-", is common with the GND or negative rail of an AUX supply input, and
- • the AUX supply input is used as the external power source.

5 Types of devices

This specification defines the following types of devices

- A. a control device with an integrated multi-master application controller
- B. a control device with either an integrated multi-master application controller with arbitration algorithm or one or more input device instances, or both
- C. a control device with an integrated multi-master application controller
- D. a control device with an integrated single-master application controller

NOTE   Some examples of type A devices are: an outdoor luminaire controller, or a wireless communication device. An example of a type B device is a light sensor. An example of a type C device is a multi-master application controller with occupancy sensor for indoor luminaire control. An example of a type D device is a single-master application controller with integrated sensor for use in a stand-alone luminaire.

Table 1 – Types of devices

Type	Power source	Maximum consumption from AUX supply	Maximum current consumption from bus
A	Externally powered device	2W average / 5W peak	2 mA
B	Bus powered device	not used for powering the device	46 mA
	Externally powered device	1W average / 1W peak	2 mA
C	Bus powered device	not used for powering the device	46 mA
D	Bus powered device	not used for powering the device	46 mA
	Externally powered device	No requirement	2 mA

NOTE   The definition of different types A and B is intended to allow up to one type A and up to one type B device to be attached or connected to a luminaire that also contains an AUX supply, whilst meeting power consumption limits and ensuring that the application controller in a type A device takes priority. Type B devices may be suitable for use in systems with other application controllers. Types A and C are dominant when in used in systems with type B control devices. Only one of type A or type C control devices should be used in a system. Type D control devices are not intended to be used with other application controllers.

6 Electrical specification of AUX supply consumption

Control devices described in this standard may be externally-powered from the AUX supply. In this case, the AUX supply voltage, V_{Aux}, may be connected between the AUX supply positive input pin, and the negative side of the interface. Requirements are given in Table 2 for type A devices and in Table 3 for type B devices.

Table 2 - AUX supply consumption requirements of type A device

Description	Rated value	Min. value	Max. value	Conditions
Operating voltage V_{Aux_nom}	24.0 V	21.6 V	26.4 V	$0.1\ W \leq P_{Load} \leq 5.0\ W$; Including load steps
AUX supply withstand voltage		30.0 V		$t \geq 10$ s; Note 1
Average load power consumption $P_{Load\_A\_avg}$			2.0 W	$21.6\ V \leq V_{Aux} \leq 26.4\ V$; averaging period ≥ 6 ms
Pulsed load power consumption $P_{Load\_A\_pk}$			5.0 W	$21.6\ V \leq V_{Aux} \leq 26.4\ V$; $t_{pulse} \leq 2.2$ ms; repetitive, Note 2
Input current during start up $I_{Load\_A\_start}$			0.11 A	$V_{Aux} < 21.6$ V

Note 1: Control device shall at least withstand 30.0 V for at least 10 s.

Note 2: Permissible duty-cycle and peak value for such pulsed load are limited by the specified average power consumption of the load $P_{Load\_A\_avg}$.

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Table 3 - AUX supply consumption requirements of type B device

Description	Rated value	Min. value	Max. value	Conditions
Operating voltage V_{Aux_nom}	24.0 V	21.6 V	26.4 V	$0.1\ W \le P_{Load} \le 1.0\ W$; Including load steps
Permissible voltage at load terminals		30.0 V		$t \ge 10\ s$; Note 1
Load power consumption P_{Load_B} (peak)			1.0 W	$21.6\ V \le V_{Aux} \le 26.4\ V$; at any time
Input current during start up $I_{Load\_B\_start}$			0.05 A	$V_{Aux} < 21.6\ V$

Note 1: Load shall at least withstand 30.0 V for at least 10 s.

7 Application controller arbitration

To ensure the type B device's application controller does not send forward frames when a type A device or type C device is used in the same system, the type B device shall do the following if its own memory bank 201 location 0x7 is not equal to 0x00 and forward frame transmission is not disabled by another method:

- Schedule the transmission of QUERY APPLICATION CONTROLLER ENABLED, using broadcast addressing with priority 5, at the following times:
    - within 30 s ± 3 s after a power cycle, and
    - repeating 15 minutes ± 1.5 minutes after the application controller previously transmitted such a query, and
    - if location 0x07 contains 0xFF: 10 s ± 1 s after reception of a 16-bit or 24-bit forward frame that did not originate from this application controller, or increased to ensure at least 10 s ± 1 s have elapsed since the previous transmission of such a query.

NOTE   This means that the first forward frame received from another application controller results in the above query being scheduled within 11 s. Additional forward frames received will not delay the transmission of this query, except possibly due to bus unavailability.

The application controller shall not reply to its own transmission of the above query.

On receiving any reply to the above query, including a corrupted reply, and if location 0x7 is equal to 0xFF, then location 0x7 shall be set to 0xFE.

On receiving NO reply to the above query, and if location 0x7 is equal to 0xFE, then location 0x7 shall be set to 0xFF.

This arbitration method shall prevent further forward frame transmissions from the application controller, except for the above query, according to the value in location 0x7:

- Bank 201, location 0x07 = 0x00: arbitration disabled, forward frames from the application controller not disabled by the arbitration method.
- Bank 201, location 0x07 = 0xFE: arbitration enabled, forward frames from the application controller disabled by the arbitration method.

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- Bank 201, location 0x07 = 0xFF: arbitration enabled, forward frames from the application controller not disabled by the arbitration method.

NOTE   This affects the application controller, but not input device instances (if any).

The application controller in the type B device shall not disable application controllers in other devices.

8 Device Identification

8.1   Marking

The luminaire mounted control device shall be marked according to its type as follows:

- Type A device: "A".
- Type B device: "B".
- Type C device: "C".
- Type D device: "D".

It is recommended that this marking is located close to other marking related to IEC 62386 standards or related certifications.

8.2   Memory bank

Table 4 defines memory bank 201 that shall be implemented if the control device contains an integrated multi-master application controller or one or more input device instances.

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Table 4 - Memory bank 201

Address	Description	Default value (factory)	RESET value[a]	Memory type
0x00	Address of last addressable memory location	0x07	No change	ROM
0x01	Indicator byte	Manufacturer specific	Manufacturer specific	Manufacturer specific
0x02	Lock byte Lockable bytes in the memory bank shall be read-only while the lock byte has a value different from 0x55.	0xFF	0xFF[b]	RAM-RW
0x03	Version of the memory bank	0x01	No change	ROM
0x04	Type of device 0 = Type A; 1 = Type B; 2 = Type C; 3-255 = reserved for future use	Manufacturer specific	No change	ROM
0x05	Maximum current consumed from the bus power supply (rounded up, with 1 mA resolution) Range, type A device: [0, 2] Range, all other types: [0, 46]	Manufacturer specific	No change	ROM
0x6	Maximum average power consumed from the AUX power supply (rounded up with 0,1W resolution) Range Type A device: [0, 20] Range Type B device: [0, 10] Range, other types: [0, 30], MASK where MASK = unknown	Manufacturer specific	No change	ROM
0x7	Application controller arbitration Type B device with integrated application controller (AC): 0xFF = arbitration enabled; 0xFE = arbitration enabled, forward frames from application controller disabled. Otherwise: arbitration disabled. Values: 0, 0xFE, 0xFF All other cases: Reserved (answer 0x00)	Type B with integrated AC: 0xFF All other cases: 0x00	No change	Type B with integrated AC: NVM-RW All other cases: ROM

[a] Reset value after "RESET MEMORY BANK".
[b] Also used as power on value.

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