digitalSTROM Light

digitalSTROM

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Contents

1 Output Value

Each digitalSTROM light device has an 8 bit output value (0...255). The output can be switched on or off. The switching point is variable, see 2.3. If the illuminant and the digitalSTROM-Device are both dimming capable, the output value represents the brightness.

Rule 1 The 8 bit output value represents the brightness.

The leading or trailing edge phase angle for the dimmer is calculated using the desired output value and a characteristic curve. With this curve it is possible to achieve a similar dimming behaviour independent of the illuminant, e.g. when dimming a whole room containing different illuminants. The curve furthermore linearizes the output value to match the brightness sensation of the human eyes. Half output value means half brightness.

Rule 2 The output value is linear to the brightness. Half output value means half brightness.

2 digitalSTROM-Device Behavior

This chapter describes the digitalSTROM-Device behavior when a scene is called or the digitalSTROM-Device is dimmed. A new digitalSTROM light device should turn on at each on-scene and off at each off-scene, so that the user can easily use the new digitalSTROM-Ready-Device without configuration. The correct scenetable defaults are essential for the users plug&play experience. Please take account of the scenetable defaults in chapter 3.

2.1 Scenes

The digitalSTROM-Device executes the called scenes. A scene has an output value and configuration registers. If the configuration register *Don't Care* of a called scene is set, the output value will not be changed. But the scene also contains some more registers to control e.g. the ramp time or the local LED. But the scene is only executed if the digitalSTROM-Device is not in local priority state.
Rule 3 If a digitalSTROM-Device is in local priority state, a scene call is ignored.

2.2 Dimming

The digitalSTROM-Device can be dimmed locally, through zone pushbuttons or area pushbuttons.

All selected devices, whose output is not turned off, simultaneously use the dimming mechanism. When using a zone pushbutton, all digitalSTROM-Devices which are not in local priority state are selected, or, when using an area pushbutton, all digitalSTROM-Devices which are member of this area are selected and will take part in the dimming process.
Rule 4 All devices which are turned on and not in local priority state take part in the dimming process.

Remember that a switched digitalSTROM-Devices takes part in the dimming process even if the output is off but the internal output value is greater than 0 and less than *SW_THR*. See also 2.3.

The dimming area starts at *MINDIM* (parameter of bank 3) and ends at the value 255.

While dimming, the system generates INC or DEC commands (for dimming up or down) consecutively every 250ms (approx.). Each command increases or decreases the output value by 11. A transition time of 300ms is used to provide a flawless dimming experience. If e.g. the output value is 50 and an INC command is received, the new target value is 61. The transition from 50 to 61 takes 300ms. If a new INC command is received after 250ms, the actual value is about 59. The digitalSTROM-Device then adds 11 to the target value, so the new target value is 72. The ongoing transition gets restarted at 59 with a new transition time of 300ms.
Rule 5 Decrement commands only reduce the output value down to a minimum value, but not to zero. If a digitalSTROM-Device reaches one of its limits, it stops its ongoing dimming process.

The outcome of this is that it is possible to destroy the brightness proportions of a called scene, when the user dims in one direction until all devices reach the end. If the user then dims in the other direction, the devices will all have the same output value.

> **Notice** Dimming to values lower than *MINDIM* is avoided because a lamp could appear to be off even if it is consuming power.

2.3 Smart Dimming

A dimmable digitalSTROM-Device that can be set to switched mode, has to provide the threshold defining *SW_THR* parameter which defaults to 128. Output values greater or equal to this parameter turn the output on, all other values turn the output off. It is possible to vary this parameter in such a way that the brightness of a room or a lamp containing several bulbs can be dimmed up and down even if there are only switchable illuminants. Imagine a lamp containing 3 switched 5W illuminants. The first is set to SW_THR=16, the second to 100 and the third to 180. Now it is possible to dim this lamp to 5W, 10W or 15W light outlet (using a zone pushbutton).

Rule 6 A digitalSTROM-Device in switched mode switches on if the output value is greater or equal than the defined threshold value which defaults to 128.

digitalSTROM-Ready-Devices which contain more than one digitalSTROM-Device can have other threshold values to support smart dimming.

2.4   Special Commands

If a digitalSTROM-Device receives a *Device Identification (Blink)*, *Programming Mode Start* or *Programming Mode Finish* command, it shows the user its presence by flashing the output. The flashing can be configured (see ds-basics documentation).

2.5   Special Scenes

If a light device receives the *Stop* scene when there is an ongoing transition, it stops the transition and the output value remains at the current value. The scene *Maximum* sets the output value to 255, scene *Minimum* to 0.

2.6   Apartment Scenes

digitalSTROM light devices will turn off when the user leaves the room or the apartment. Therefor the defaults for *Standby*, *Auto Standby*, *Deep Off* and *Absent* need to be set to off. The same is necessary for *Sleeping*, because the user expects that all needless appliances get turned off when he goes to sleep. *Panic* indicates that the user is scared and believes there is someone in the apartment who should not be there. digitalSTROM-Devices shall switch to a protection state. Therefore a digitalSTROM light device has to turn on when *Panic* is triggered.

The local LED turns off when *Deep Off* is executed to visualize power saving. This feature is also useful in dark rooms, e.g. sleeping rooms, where users are more sensitive for light sources.

3   Scenetable Defaults

Rule 7 The digitalSTROM-Device must implement the default scene values and configuration registers according to table 1 and 2 (sections 3.2 and 3.3).

The scenetable defaults are essential for the users plug&play experience. A digitalSTROM Light Device has to turn on with the on-scenes and turn off with the off scenes. If the digitalSTROM-Ready-Device is dimmable, the user should get different brightnesses when he runs through the presets. Therefore we decided to define:

Preset	Output Value
0	0
1	255
2	192
3	128
4	64

Because the threshold parameter SW_THR defaults to 128, the presets 1...3 turn the digitalSTROM-Devices on, even if the illuminant doesn't support dimming.

The same values are used for the presets 10...14, presets 20...24, and so on.

Since area pushbuttons should also turn the light on, the default for the area on-scenes is defined as 255.

Each scene has some configuration registers. With these registers the behavior of the digitalSTROM-Device can be adjusted when a scene is called. The transition time is always the same for all but *Auto Standby*. *Auto Standby* needs a very slow transition time so the user can react before he is sitting in the dark, when the system turn off lights automatically. The LED behaves always the same except for *Deep Off*. If a user turns a room into *Deep Off* state, all LEDs are also going off. The local priority is always respected but for most apartment scenes and some special scenes like stop scenes and the area scenes as well as minimum and maximum scenes (only used in programming mode) and - of course - the local on/off scenes. Some scenes need to get marked so that they do not change the output value. The appropriate *Don't Care* flag is set only for some reserved scenes and also for some apartments scenes, e.g *Door Bell*. The user has to define, which digitalSTROM-Devices should react to the door bell because there is no standard behavior.

The complete scenetable with its configuration registers can be found in section 3.1.

3.1   Scenetable

Flags with the value 0 (or false) are marked with "-" for better readability. The scenetable uses some abbreviations for the scene configuration registers, which are explained in the following table.

Abbr.	Description
DT	Transition time between the current and the new output value. 1=normal, 2=slow.
LC	LED Configuration. 1=normal, 2=LED off.
Flash	Flash Configuration. 0=don't flash, 1=flash.
Res	Reserved. Internal use only, must not be changed.
LPRIO	Ignore Local Priority when set.
DC	Don't Care. Do not change output when set.

The full description can be found in the document ds-basics.

3.2   Group Related Scenes

Scene	Value	DT	LC	Flash	Res	LPrio	DC	Activity
0	0	1	1	-	-	-	-	Preset 0
1	0	1	1	-	-	1	-	Area 1 Off
2	0	1	1	-	-	1	-	Area 2 Off
3	0	1	1	-	-	1	-	Area 3 Off
4	0	1	1	-	-	1	-	Area 4 Off
5	255	1	1	-	-	-	-	Preset 1
6	255	1	1	-	1	1	-	Area 1 On
7	255	1	1	-	1	1	-	Area 2 On
8	255	1	1	-	1	1	-	Area 3 On
9	255	1	1	-	1	1	-	Area 4 On
10	0	1	1	-	1	1	-	Area Stepping Continue
11	0	1	1	-	1	-	-	Decrement
12	0	1	1	-	1	-	-	Increment
13	0	1	1	-	-	1	-	Minimum
14	255	1	1	-	-	1	-	Maximum
15	0	1	1	-	1	1	-	Stop
16	0	1	1	-	-	-	1	reserved
17	192	1	1	-	-	-	-	Preset 2
18	128	1	1	-	-	-	-	Preset 3
19	64	1	1	-	-	-	-	Preset 4
20	192	1	1	-	-	-	-	Preset 12
21	128	1	1	-	-	-	-	Preset 13
22	64	1	1	-	-	-	-	Preset 14
23	192	1	1	-	-	-	-	Preset 22
24	128	1	1	-	-	-	-	Preset 23
25	64	1	1	-	-	-	-	Preset 24
26	192	1	1	-	-	-	-	Preset 32
27	128	1	1	-	-	-	-	Preset 33
28	64	1	1	-	-	-	-	Preset 34
29	192	1	1	-	-	-	-	Preset 42
30	128	1	1	-	-	-	-	Preset 43
31	64	1	1	-	-	-	-	Preset 44
32	0	1	1	-	-	-	-	Preset 10
33	255	1	1	-	-	-	-	Preset 11
34	0	1	1	-	-	-	-	Preset 20
35	255	1	1	-	-	-	-	Preset 21
36	0	1	1	-	-	-	-	Preset 30
37	255	1	1	-	-	-	-	Preset 31
38	0	1	1	-	-	-	-	Preset 40
39	255	1	1	-	-	-	-	Preset 41

Scene	Value	DT	LC	Flash	Res	LPrio	DC	Activity
40	0	2	1	-	-	-	-	Auto-Off
41	0	1	1	-	-	-	1	reserved
42	0	1	1	-	1	1	-	Area 1 Decrement
43	0	1	1	-	1	1	-	Area 1 Increment
44	0	1	1	-	1	1	-	Area 2 Decrement
45	0	1	1	-	1	1	-	Area 2 Inrement
46	0	1	1	-	1	1	-	Area 3 Decrement
47	0	1	1	-	1	1	-	Area 3 Increment
48	0	1	1	-	1	1	-	Area 4 Decrement
49	0	1	1	-	1	1	-	Area 4 Increment
50	0	1	1	-	-	1	-	Device Off
51	255	1	1	-	1	1	-	Device On
52	0	1	1	-	1	1	-	Area 1 Stop
53	0	1	1	-	1	1	-	Area 2 Stop
54	0	1	1	-	1	1	-	Area 3 Stop
55	0	1	1	-	1	1	-	Area 4 Stop
56	0	1	1	-	-	-	1	reserved
57	0	1	1	-	-	-	1	reserved
58	0	1	1	-	-	-	1	reserved
59	0	1	1	-	-	-	1	reserved
60	0	1	1	-	-	-	1	reserved
61	0	1	1	-	-	-	1	reserved
62	0	1	1	-	-	-	1	reserved
63	0	1	1	-	-	-	1	reserved

Table 1: Scenetable for group related scenes

3.3 Group Independent Scenes

Scene	Value	DT	LC	Flash	Res	LPrio	DC	Activity
64	0	2	1	-	-	1	-	reserved
65	255	1	1	-	-	1	-	Panic
66	0	1	1	-	-	1	1	reserved
67	0	1	1	-	-	1	-	Standby
68	0	1	2	-	-	1	-	Deep Off
69	0	1	1	-	-	1	-	Sleeping
70	255	1	1	-	-	1	1	Wakeup
71	255	1	1	-	-	1	1	Present
72	0	1	1	-	-	1	-	Absent
73	0	1	1	-	-	1	1	Door Bell
74	0	1	1	-	-	1	1	Alarm
75	255	1	1	-	-	-	1	Zone Active
76	255	1	1	-	-	1	-	Fire

77	255	1	1	-	-	-	1	reserved
78	0	1	1	-	-	-	1	reserved
79	0	1	1	-	-	-	1	reserved
80	0	1	1	-	-	-	1	Bell 2
81	0	1	1	-	-	-	1	Bell 3
82	0	1	1	-	-	-	1	Bell 4
83	0	1	1	-	-	-	1	Alarm 2
84	0	1	1	-	-	-	1	Alarm 3
85	0	1	1	-	-	-	1	Alarm 4
86	0	1	1	-	-	-	1	Wind
87	0	1	1	-	-	-	1	No Wind
88	0	1	1	-	-	-	1	Rain
89	0	1	1	-	-	-	1	No Rain
90	0	1	1	-	-	-	1	Hail
91	0	1	1	-	-	-	1	No Hail
127..92	0	1	1	-	-	-	1	reserved

Table 2: Scenetable for group independent scenes

4 Certification Rules

Rule 1 The 8 bit output value represents the brightness.

Rule 2 The output value is linear to the brightness. Half output value means half brightness.

Rule 3 If a digitalSTROM-Device is in local priority state, a scene call is ignored.

Rule 4 All devices which are turned on and not in local priority state take part in the dimming process.

Rule 5 Decrement commands only reduce the output value down to a minimum value, but not to zero. If a digitalSTROM-Device reaches one of its limits, it stops its ongoing dimming process.

Rule 6 A digitalSTROM-Device in switched mode switches on if the output value is greater or equal than the defined threshold value which defaults to 128.

Rule 7 The digitalSTROM-Device must implement the default scene values and configuration registers according to table 1 and 2 (sections 3.2 and 3.3).