digitalSTROM Shade

digitalSTROM

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Contents

1 Classification

There are three types of shade devices:

- roller blind
- jalousie
- sun blind

Roller blinds and sun blinds can only be adjusted in their position. A jalousie can additionally be adjusted in their angle. Every shade device has its own end switches. This enables the digitalSTROM Device to determine the state of the shade device (running/stopped) by measuring the energy consumption.

2 Output Value

Each digitalSTROM shade device has an 16 bit output value (0...65535). The 16 bit output value represents the position of the shade device relative to the maximum length of the attached device. The maximum length of the attached device is determined by measuring the motion time needed to move the device from the closed to the opened position in a calibration run.

Rule 1 The 16 bit output value represents the position of the shade device.

Rule 2 The output value is linear to the position of the device. Half output value means middle position.

Since the position is calculated using the motion time for a complete movement, half position (that is half of the motion time) could lead to a specific inaccuracy compared to the real opening position, because of mechanical reasons (different motion speed at different positions, roller blind slots, etc.). But same output value always means same position.

When saving a value into a scene, the last 4 bits are cut off and the resulting 12 bits are stored because of limited resources. When a scene is called, the 16 bit value is built by doubling the last 4 bits. Example: 0xFA35 is stored as 0xFA3 and restored as 0xFA33. The resulting inaccuracy is very little.

A jalousie has an additional 8 bit output value (0...255) for the angle of the blades. This output value is technically independent of the position output value although they are physically interdependent.

3 digitalSTROM Device Behavior

digitalSTROM shade devices show different standard behavior according to the device attached. Devices like roller blinds, jalousies, sun blinds etc. are distinguished because of different default settings for activity calls like 'heavy wind warning'. Roller blinds ignore this activity call whereas jalousies fully open and sun blinds fully roll in to prevent potential damage. The document 'digitalSTROM Standard Device Behavior' defines standard behavior for each device separately. This chapter describes the digitalSTROM Device behavior when a scene is called or the digitalSTROM Device is dimmed.

3.1 Scenes

The digitalSTROM Device executes the called scene. A scene has one (roller blind, sun blind) or two (jalousie) output values and a set of configuration registers. If the configuration register *Don't Care* of a called scene is set, the output values will not be changed. Other registers control e.g. the local LED. If the device is moving while a scene is called which needs an inversion of the direction, the movement gets paused for 500ms to protect the motor.

3.2 Dimming

The digitalSTROM system uses increment and decrement commands which are continuously generated while a button is held. digitalSTROM shade devices use them to adjust their position. An increment command opens roller blinds (move up), jalousies (move up) and sun blinds (roll out), a decrement command closes them. The digitalSTROM Device can be dimmed locally, through zone pushbuttons or area pushbuttons.

All selected devices whose position is not closed, simultaneously react to dimming commands. When using a zone pushbutton, all digitalSTROM Devices 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. When using a 2-way push-button, even closed devices take part.

Rule 3 All devices which are in an opened position take part in the dimming process. When dimming through a 2-way push-button even closed devices take part.

The dimmable area starts at value 0 and ends at the value 65535. The parameter *MINDIM* is ignored.

While dimming, the digitalSTROM system generates INC or DEC commands (for moving in opened or closed direction) consecutively every 250ms (approx.). Each dim command results in a transition time of 300ms beginning at the current position to provide a flawless moving experience.

It is not easy to dim a shade device to a defined position because of overall system latencies. To solve this issue, the shade devices are able to do some small steps with a pause between them, before going over to uninterrupted moving. The length of a step, the pause between steps and the count of dim steps are configurable, see A.1.9.

3.3 Position Calculation

The actual position is internally calculated by adding the movement times. With the knowledge of the movement times from opened to closed position and closed to opened position, which are measured in a calibration run, this is easily possible. To eliminate actuation delays, the movement times are determined by measuring the energy consumption.

3.4 Turn Jalousie Blades

The jalousie shade device turns the blades like normal jalousie switches: When the moving direction changes, first the blades turn around and then the position starts to move. The actual angle of the blades can be read out, see A.2.2.

3.5 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 moving up and down for a very short time. The moving time can be configured, see A.1.5.

3.6 Special Scenes

If a shade device receives the *Stop* scene when there is an ongoing movement, it stops the movement. The actual position can be read out, see A.2.3. The scene *Maximum* sets the output value to 65535 (fully opened), scene *Minimum* to 0 (fully closed).

3.7 Apartment Scenes

digitalSTROM shade devices show specific behavior for certain apartment scenes depending on the device type:

- roller blind
- jalousie
- sun blind

The scenes affected include the following:

- Room off
- Absent
- Panic
- Fire
- Smoke
- Wind
- Hail
- Rain

This is due to security and damage protection reasons. Please refer to chapter 4.3 for detailed settings of the different device types.

4 Scenetable Defaults

Rule 4 The digitalSTROM Device must implement the default scene values and configuration registers according to table 1 and table 2 for roller blinds, table 1 and table 3 for sun blinds, table 1 and table 4 for jalousies.

The scenetable defaults are essential for the users plug&play experience. A digitalSTROM Shade Device has to open with the on-scenes and close with the off scenes. The values for shade devices are as follows:

Preset	Output Value
0	0
1	65535
2	65535
3	32768
4	16384

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

Area pushbuttons also use the the default value of 65535 for on scenes.

Each scene has some configuration registers. With these registers the behavior of the digitalSTROM Device can be adjusted when a scene is called. The LED behaves always the same except for *Deep Off*, *Sleeping* and *Absent*. If a user turns a room into one of these states, the LED is going off. 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 complete scenetable with its configuration registers can be found in section 4.1 ff.

4.1 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.

4.2 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	65535	1	1	-	-	-	-	Preset 1
6	65535	1	1	-	1	1	-	Area 1 On
7	65535	1	1	-	1	1	-	Area 2 On
8	65535	1	1	-	1	1	-	Area 3 On
9	65535	1	1	-	1	1	-	Area 4 On
10	0	1	1	-	1	1	-	Area Stepping Continue
11	0	1	1	-	1	-	-	Increment
12	0	1	1	-	1	-	-	Decrement
13	0	1	1	-	-	1	-	Minimum
14	65535	1	1	-	-	1	-	Maximum
15	0	1	1	-	1	1	-	Stop
16	0	1	1	-	-	-	1	reserved
17	65535	1	1	-	-	-	-	Preset 2
18	32768	1	1	-	-	-	-	Preset 3
19	16384	1	1	-	-	-	-	Preset 4
20	65535	1	1	-	-	-	-	Preset 12
21	32768	1	1	-	-	-	-	Preset 13
22	16384	1	1	-	-	-	-	Preset 14
23	65535	1	1	-	-	-	-	Preset 22
24	32768	1	1	-	-	-	-	Preset 23
25	16384	1	1	-	-	-	-	Preset 24
26	65535	1	1	-	-	-	-	Preset 32
27	32768	1	1	-	-	-	-	Preset 33
28	16384	1	1	-	-	-	-	Preset 34
29	65535	1	1	-	-	-	-	Preset 42
30	32768	1	1	-	-	-	-	Preset 43
31	16384	1	1	-	-	-	-	Preset 44
32	0	1	1	-	-	-	-	Preset 10
33	65535	1	1	-	-	-	-	Preset 11
34	0	1	1	-	-	-	-	Preset 20
35	65535	1	1	-	-	-	-	Preset 21
36	0	1	1	-	-	-	-	Preset 30
37	65535	1	1	-	-	-	-	Preset 31
38	0	1	1	-	-	-	-	Preset 40
39	65535	1	1	-	-	-	-	Preset 41

Scene	Value	DT	LC	Flash	Res	LPrio	DC	Activity
40	0	1	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	65535	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

4.3 Group Independent Scenes

As mentioned in the introduction of Section 3 and Section 3.7, different types of digitalSTROM shade devices show specific behavior for certain apartment scenes due to security and damage protection reasons. The settings are as follows:

4.3.1 Group Independent Scenes for Roller Blinds

Scene	Value	DT	LC	Flash	Res	LPrio	DC	Activity
64	0	2	1	-	-	1	1	Auto Standby
65	65535	1	1	-	-	1	-	Panic
66	0	1	1	-	-	1	1	reserved
67	0	1	1	-	-	1	1	Standby
68	0	1	2	-	-	1	1	Deep Off
69	0	1	2	-	-	1	1	Sleeping
70	65535	1	1	-	-	1	1	Wakeup
71	65535	1	1	-	-	1	1	Present
72	0	1	2	-	-	1	1	Absent
73	0	1	1	-	-	1	1	Bell 1
74	0	1	1	-	-	1	1	Alarm 1
75	65535	1	1	-	-	-	1	Zone Active
76	65535	1	1	-	-	1	-	Fire
77	65535	1	1	-	-	1	-	Smoke
78	0	1	1	-	-	1	1	Water
79	0	1	1	-	-	1	1	Gas
80	0	1	1	-	-	1	1	Bell 2
81	0	1	1	-	-	1	1	Bell 3
82	0	1	1	-	-	1	1	Bell 4
83	0	1	1	-	-	1	1	Alarm 2
84	0	1	1	-	-	1	1	Alarm 3
85	0	1	1	-	-	1	1	Alarm 4
86	0	1	1	-	-	1	1	Wind
87	0	1	1	-	-	1	1	No Wind
88	0	1	1	-	-	1	1	Rain
89	0	1	1	-	-	1	1	No Rain
90	65535	1	1	-	-	1	-	Hail
91	0	1	1	-	-	1	1	No Hail
127..92	0	1	1	-	-	-	1	reserved

Table 2: Scenetable for group independent scenes of roller blinds

4.3.2 Group Independent Scenes for Sun Blinds

Scene	Value	DT	LC	Flash	Res	LPrio	DC	Activity
64	0	2	1	-	-	1	1	Auto Standby
65	0	1	1	-	-	1	-	Panic
66	0	1	1	-	-	1	1	reserved
67	0	1	1	-	-	1	1	Standby
68	0	1	2	-	-	1	-	Deep Off
69	0	1	2	-	-	1	-	Sleeping
70	65535	1	1	-	-	1	1	Wakeup
71	65535	1	1	-	-	1	1	Present
72	0	1	2	-	-	1	-	Absent
73	0	1	1	-	-	1	1	Bell 1
74	0	1	1	-	-	1	1	Alarm 1
75	65535	1	1	-	-	-	1	Zone Active
76	0	1	1	-	-	1	-	Fire
77	0	1	1	-	-	1	-	Smoke
78	0	1	1	-	-	1	1	Water
79	0	1	1	-	-	1	1	Gas
80	0	1	1	-	-	1	1	Bell 2
81	0	1	1	-	-	1	1	Bell 3
82	0	1	1	-	-	1	1	Bell 4
83	0	1	1	-	-	1	1	Alarm 2
84	0	1	1	-	-	1	1	Alarm 3
85	0	1	1	-	-	1	1	Alarm 4
86	0	1	1	-	-	1	-	Wind
87	0	1	1	-	-	1	1	No Wind
88	0	1	1	-	-	1	-	Rain
89	0	1	1	-	-	1	1	No Rain
90	0	1	1	-	-	1	-	Hail
91	0	1	1	-	-	1	1	No Hail
127..92	0	1	1	-	-	-	1	reserved

Table 3: Scenetable for group independent scenes of sun blinds

4.3.3 Group Independent Scenes for Jalousie

Scene	Value	DT	LC	Flash	Res	LPrio	DC	Activity
64	0	2	1	-	-	1	1	Auto Standby
65	65535	1	1	-	-	1	-	Panic
66	0	1	1	-	-	1	1	reserved
67	0	1	1	-	-	1	1	Standby
68	0	1	2	-	-	1	1	Deep Off
69	0	1	2	-	-	1	1	Sleeping
70	65535	1	1	-	-	1	1	Wakeup
71	65535	1	1	-	-	1	1	Present
72	0	1	2	-	-	1	1	Absent
73	0	1	1	-	-	1	1	Bell 1
74	0	1	1	-	-	1	1	Alarm 1
75	65535	1	1	-	-	-	1	Zone Active
76	65535	1	1	-	-	1	-	Fire
77	65535	1	1	-	-	1	-	Smoke
78	0	1	1	-	-	1	1	Water
79	0	1	1	-	-	1	1	Gas
80	0	1	1	-	-	1	1	Bell 2
81	0	1	1	-	-	1	1	Bell 3
82	0	1	1	-	-	1	1	Bell 4
83	0	1	1	-	-	1	1	Alarm 2
84	0	1	1	-	-	1	1	Alarm 3
85	0	1	1	-	-	1	1	Alarm 4
86	65535	1	1	-	-	1	-	Wind
87	0	1	1	-	-	1	1	No Wind
88	0	1	1	-	-	1	1	Rain
89	0	1	1	-	-	1	1	No Rain
90	65535	1	1	-	-	1	-	Hail
91	0	1	1	-	-	1	1	No Hail
127..92	0	1	1	-	-	-	1	reserved

Table 4: Scenetable for group independent scenes of jalousies

5 Certification Rules

Rule 1 The 16 bit output value represents the position of the shade device.

Rule 2 The output value is linear to the position of the device. Half output value means middle position.

Rule 3 All devices which are in an opened position take part in the dimming process. When dimming through a 2-way push-button even closed devices take part.

Rule 4 The digitalSTROM Device must implement the default scene values and configuration registers according to table 1 and table 2 for roller blinds, table 1 and table 3 for sun blinds, table 1 and table 4 for jalousies.

A Device Parameters

digitalSTROM shade devices have additional configuration parameters of different categories. The system relevant parameters described below are mandatory for digitalSTROM shade devices.

A.1 Class 3 - Function Specific Parameters

A.1.1 Motion Time Up

Offset 0x30, 16 bit - Moving Time Up

Motion time from down to up. Used to calculate current position. Resolution is 10ms. Example: Value 2500 means 25 seconds.

A.1.2 Motion Time Down

Offset 0x32, 16 bit - Moving Time Down

Motion time from up to down. Used to calculate current position. Resolution is 10ms. Example: Value 2500 means 25 seconds.

A.1.3 Blades Turn Time

Offset 0x3E, 16 bit - Blades Turn Time

The time the blades need to turn around from 0 to 180 degrees. Resolution is 10ms. Example: Value 300 means 3 seconds.

A.1.4 Direction of Travel

Offset 0x36, 8 bit - Direction of Travel

Value 0 means direction of travel as stated on the product. Value 1 means inversed direction of travel.

A.1.5 Motion Time When Blinking

Offset 0x11, 8 bit - Motion Time When Blinking

When the digitalSTROM shade device receives a blink command, it shows the user its presence by moving up and down for a very short time. The motion time can be configured with this parameter. Resolution is 33ms. Example: Value 30 means 990ms motion time.

A.1.6 Reverse Time on Direction Change

Offset 0x37, 8 bit - Reverse Time on Direction Change

This time specifies the pause length when reversing the motion direction. Resolution is 10ms. Example: Value 50 means 500ms.

A.1.7 Follow-up Time at End Position

Offset 0x38, 8 bit - Follow-up Time at End Position

This time is added to the motion time after reaching an end position (0x0000 or 0xffff). This ensures that the shade device gets "calibrated" by driving onto the end switch. Resolution is 100ms. Example: Value 20 means 2 seconds.

A.1.8 Threshold of End Switch Recognition

Offset 0x39, 8 bit - Threshold of End Switch Recognition

Reaching an end switch is detected by measuring the electric current of the motor. When the current falls below the here specified threshold, the end switch is detected. The value is a multiple of 58mA (rms). Value 4 means 232mA. Value 0 disables end switch detection.

A.1.9 Number of Steps for Fine Tuning Adjustment

Offset 0x3A, 8 bit - Number of Steps for Fine Tuning Adjustment

Defines the number of dimming steps before going over into flawless motion.

A.1.10 Motion Time for Fine Tuning Adjustment

Offset 0x3B, 8 bit - Motion Time for Fine Tuning Adjustment

The motion time when doing the fine tunings steps. Resolution is 10ms. Example: Value 20 means 200ms.

A.1.11 Pause Time for Fine Tuning Adjustment

Offset 0x3C, 8 bit - Pause Time for Fine Tuning Adjustment

The pause time between the fine tunings steps. Resolution is 10ms. Example: Value 80 means 800ms.

A.1.12 Protect Calibration Values

Offset 0x3D, 8 bit - Protect Calibration Values

Setting this parameter to 0 disables the calibration mode. A calibration can only be done if this value is >0.

A.2 Class 64 - Output

A.2.1 Target Position

Offset 0x02 (lo) + 0x03 (hi), 16 bit - Target Position

The target position of the first output channel can be read back for configuration purposes from offset 2 & 3.

A.2.2 Target Blades Angle

Offset 0x04, 8 bit - Target Blades Angle

The target angle of the blades (second output channel) can be read back for configuration purposes from offset 4. Only available on jalousie devices.

A.2.3 Current Position

Offset 0x06 (lo) + 0x07 (hi), 16 bit - Current Position

The current position of the first output channel can be read back for configuration purposes from offset 6 & 7.