

- Sunlight-Simulator -

# SLS 4

(software version WSUS2.2)



**Artificial light dimming  
with brightness controllable light systems**

For use in livestock production (e.g. birds, aquaria, terrariums).

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**Light control  
with integrated timer**

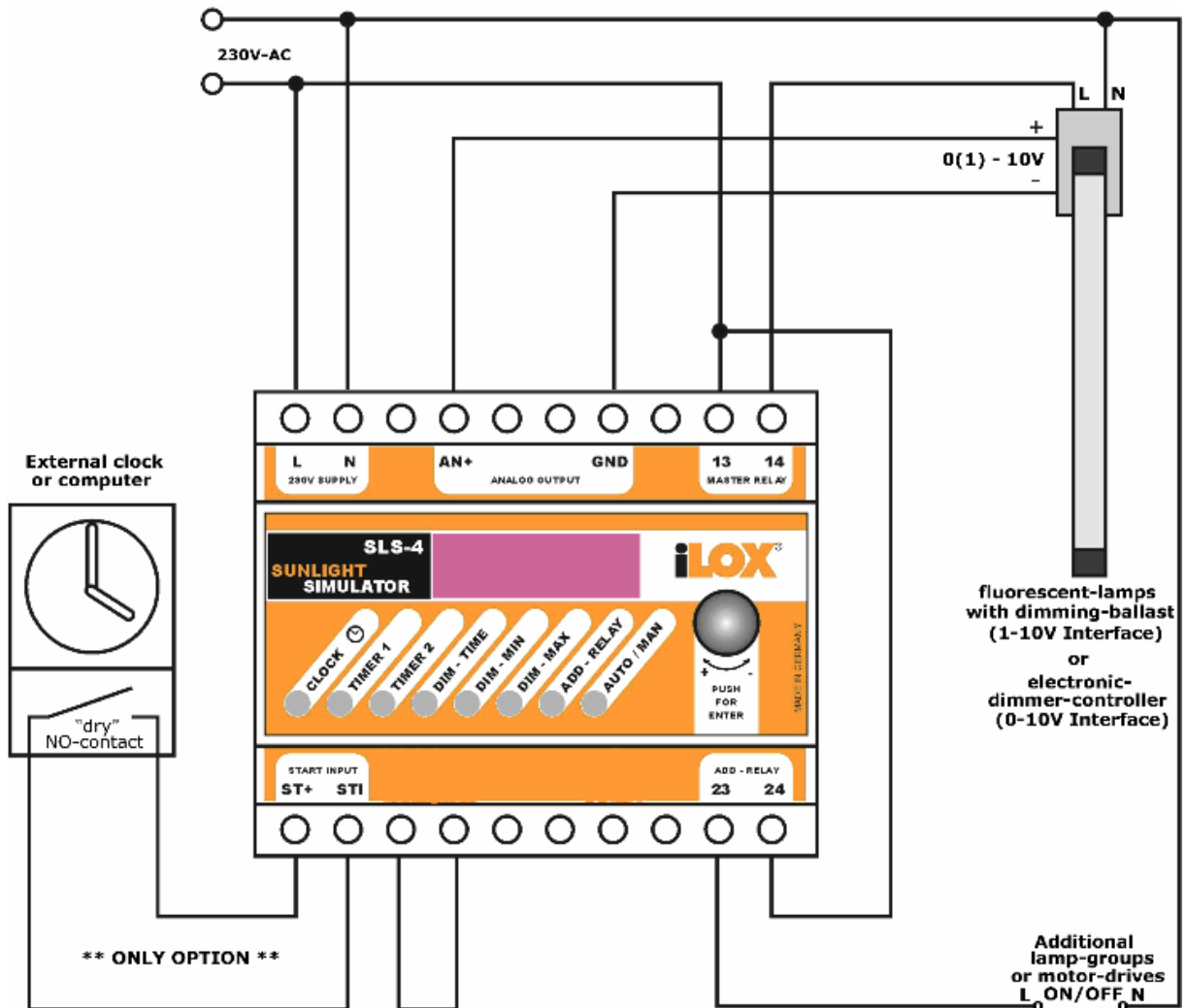
## Technical Data

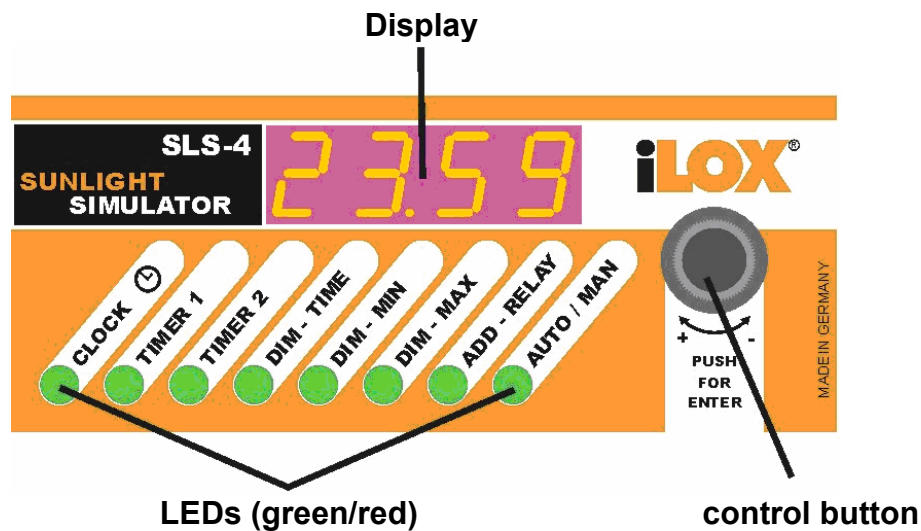
nominal voltage/ consumption	230 VAC (+/-10%), 50-60Hz --- 2.6VA
data buffer in case of mains failure	< 2.5h (GOLD-CAP)
“ <b>MASTER-Relay</b> ” (13,14)	make contact (NO), max.8A/ 230V, <u>Mode of operation:</u> ➤ contact is closed, when current intensity > 0%.
“ <b>ADD-Relay</b> ” (23, 24)	make contact (NO), max.8A/ 230V, <u>Mode of operation:</u> ➤ contact is closed, once programmed threshold is reached. ➤ contact is open, once programmed threshold is not met.
“ <b>START-INPUT</b> ” (St+, STI)	connection option for external control contact (option) <u>Mode of operation:</u> The input can be used as external START/STOP signal for the dimming process, instead of using the internal timer.  <b>Caution!</b> You must use a voltage-free contact (NO) as an internal voltage of 12V (7mA) is applied.
“ <b>ANALOG-OUTPUT</b> ” (AN+, GND)	connection for dimming ballast (1-10V) or light dimmer with 0-10V control input.  I “sink” = max. 800mA (ballast 1-10V) I “drive” = max. 80mA (0-10V Output)  <b>Note:</b> approx.200 pc. dimmable ballast-lamps (1-10V current sink) can be directly controlled.

**Important!** If loads of more than 8amp switching-current are connected to the relay switching contacts of SLS-4, the electrician has to insert coupling-power-contactors in any case!

The SLS-4 control unit must be installed by approved electricians only. Please observe the standards and regulations that apply in your country!

**Connection example:**





The control button ("turn and push") is used to select different menus and increase or decrease parameter values, depending on the direction in which the button is turned.

- 8 coloured signal LEDs indicate the different statuses:
  - **GREEN - steady light** = indicates the positioned / selected menu item
  - **RED - blinking** = selected menu item is in programming mode
  - **GREEN - blinking** = TIMER 1, TIMER 2 / ADD-Relay is active / connected
- The red LED-Display (7-segment display) indicates time, parameter values or error messages.
- When the pushbutton is pushed (1sec.) to save parameter values, it gives off an acoustic confirmation ("beep").

Initial operation / Factory settings:

When the system is connected to power for the first time, the error message “E1” appears in the display. Push the control button to erase this error message and to activate the programming menu (green LED indicates “Clock”, display reads “OFF”). Now, you may enter your individual settings.

parameter (menu item)	factory setting	„individual setting“
CLOCK (time)	OFF	
TIMER 1 (START + STOP)	OFF	
TIMER 2 (START + STOP)	OFF	
DIM-TIME (dimming time)	1 minute	
DIM-MIN (minimum-brightness)	10%	
DIM-MAX (maximum-brightness)	100%	
ADD RELAY (additional relay)	OFF	

Set time:

The SLS-4 process control contains a digital real time clock, which can be set from **00:00** to **23:59** by means of the control button.

To set the time turn the control button until you reach the menu item “CLOCK” (see green LED steady light). Open the menu item by pushing the control button for approx. 1 sec (=beep). You can now set the hour value (00...23h) by turning and pushing the button, and in a second step you can set and save the minute value (00...59min) in the same manner.

Deactivation of Timer/ Use of external START/STOP-Function:

If you do not require the internal timer of the SLS-4 and you wish to alternatively control the dimming simulation (START-STOP) by means of an external switching contact (terminal ST+/ STi) proceed as follows:

Set the hour to “23” and turn the minutes to “59”. If you turn the button one step further, the display reads “OFF”. Push the button 1sec. to confirm and save this function.

Now the display reads “on” during an active lighting phase and “OFF” if the lighting phase is inactive.

TIMER 1 + 2:

For the control of the daily lighting phases, 2 TIMER switching times (each with START/STOP) are available.

Programming of a TIMER is done in the same manner as setting the time.

However, first, you have to program the START-time (h + min) and immediately after that the STOP-time (h +min). Do not forget to push the button to confirm and save the times.

As was the case in the menu item "CLOCK", the TIMERS can also be deactivated individually.

#### DIM-TIME:

In the "DIM-TIME" menu (= dimming interval between min. and max.-brightness value) it is possible to set and save a time value from 1min to 2:59 (h/min). You have to make sure that the dimming interval is smaller than the timer intervals, otherwise you receive an error message.

#### DIM-MIN:

In the "DIM-MIN" menu (= lower limit value of brightness) it is possible to set a value from 0 to 100%. If the distance between DIM-MIN and DIM-MAX is too small, it could happen that the dimming phase ("sunset") is initiated before the actual maximum is reached.

#### DIM-MAX:

In the "DIM-MAX" menu (= upper limit value of brightness) it is possible to set a value from 0 to 100%. It is important to remember that this value has to be higher than the "DIM-MIN" value!

#### ADD-RELAY:

This menu item is used to program the operating threshold of an additional relay (NO-contact). The value can be set from 1 to 100% or as "OFF" value. The additional relay can be used to activate / deactivate additional lamps or other (motor) drives against a brightness value.

#### AUTO/ MAN:

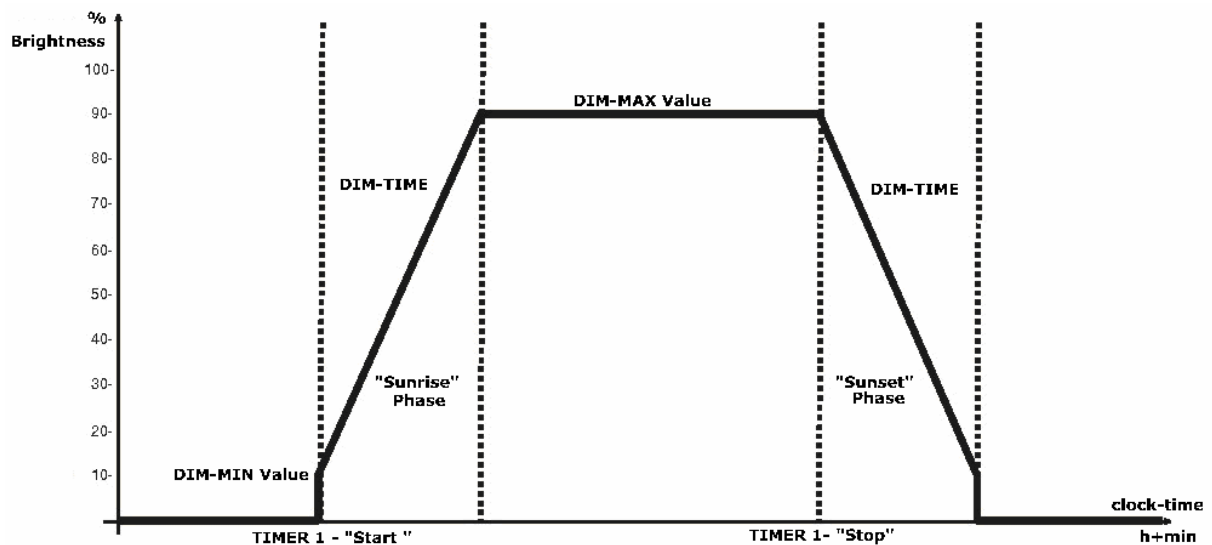
During normal operation, the SLS-4 control unit is always in automatic mode. However, maintenance works might require a short-term manual operation. To switch the system to manual operation, select the menu item "AUTO/MAN" and press the control button for approx. 1sec. The system now switches to manual mode with 50% brightness for the duration of 60 minutes. Turn the control button to additionally adjust the brightness from 0-100%. Push the control button three times in a row (1sec. each time) to switch the system back to automatic mode before the 60 minutes are up.

**Special feature:** When changing from "MAN" mode to "AUTO" mode, the display reads "t 1" (= TIMER1) when you push the button for the first time, and "t 2" (= TIMER 2) when you push the button for the second time and finally you get back to "AUTO" when you push the button for the third time.  
Under menu item "t 1" or "t 2" it is possible to temporarily set a forced time (ON/OFF) of a TIMER by turning the button.

The system is reset automatically once the next "official" TIMER switching time is reached.

Function lighting phase:

The following illustration demonstrates the sequence of a lighting phase. During the active lighting phase (switching time ON until end of dimming phase) the corresponding timer LED blinks green.



Switching times programming with day changeover:

As a matter of principle it is possible to program a TIMER with day changeover.

Example:

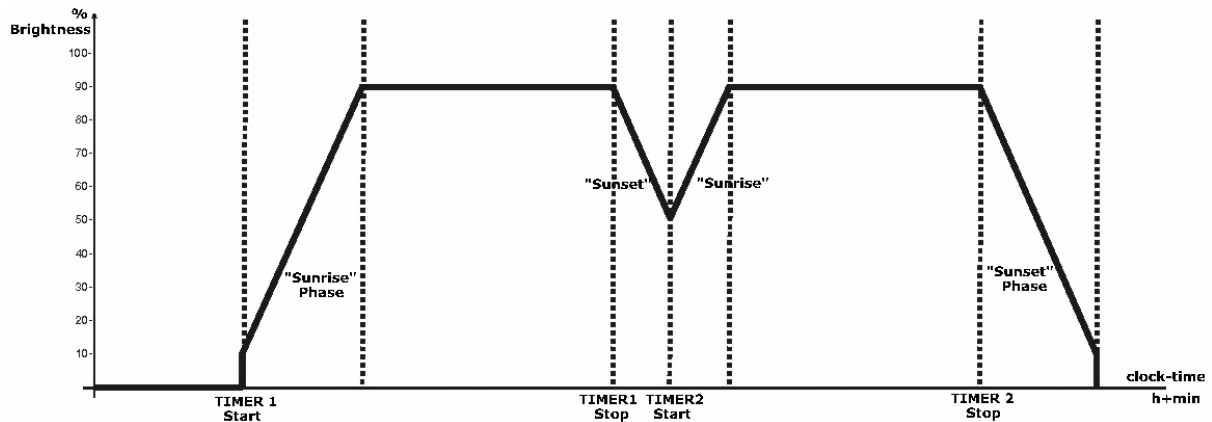
TIMER1-START = 22:30 (h/min)

TIMER1- STOP = 05:15 (h/min)

Overlapping of switching times:

An overlapping programming of timer switching times is not permitted.

Exception: if a new "Sunrise" (= TIMER 2 Start) is activated during a "Sunset"-phase:



**Though it is possible to re-program (change parameters) at any time when the system is in automatic mode, the following anomalies have to be observed:**

**Change day-time (CLOCK):**

As a matter of principle, it is of course possible to change the day-time (CLOCK) at any time when the system is in automatic mode. However, such a change can adversely affect the current TIMER function.

You have to remember that programmed TIMER lighting phases will only be started or stopped when the CLOCK time and the set TIMER time value “meet”.

If the day-time value is changed during a running TIMER lighting phase, it is possible that the TIMER times are not accepted / newly activated until day-time and TIMER time meet again on the next day.

**Example:** If only the hour value of the day-time is changed, an active light phase might stay active until the next day.

To ensure a safe deactivation of a light phase during a day-time change, it is recommended to set and save the entire new day-time (h+min) using the CLOCK programming step “set minutes” (= turn the button).

**Change TIMER 1/ TIMER 2 values:**

If re-programming is carried out during an active lighting phase, the newly programmed values do not immediately become effective!

Neither is the new light phase started, even though the currently displayed time lies in the newly programmed TIMER interval:

A new Start time is only accepted when the newly programmed TIMER-time (START / STOP) meets / matches the current CLOCK-time.

**Change DIM-TIME:**

A change of the DIM-TIME value becomes effective immediately.





It is possible, however, that such a change during an active “Sunrise”-phase causes a premature “Sunset”-phase so that the maximum brightness value is not reached.

Change DIM-MIN:

A change of the DIM-MIN value becomes effective immediately.  
The new value, however, is only accepted at the start of a dimming phase (“Sunrise” / “Sunset”).

Change DIM-MAX:

A change of the DIM-MAX value becomes effective immediately.  
However, re-programming during a currently active light phase has the following effect:

- Premature stop of the “Sunrise”-phase if the currently set brightness value has already reached / exceeded the newly defined maximum value.
- If the “Sunrise”-phase (= maximum brightness) is already finished, the system adjusts to the new MAX-value.
- During the “Sunset”-phase a change of the DIM-MAX value influences the duration of this dimming phase.

Change ADD-RELAY:

A new input value is accepted immediately and the switching output is controlled accordingly.

### **Recovery of factory settings (Reset)**

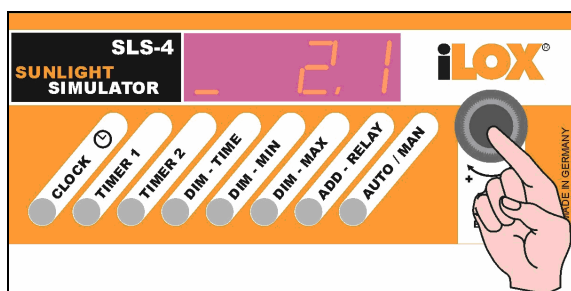
If you wish to recover the factory standard settings, proceed as follows:

1. Turn the control button to the menu item "CLOCK" (= green LED).
2. Push the control button for 10sec. until the display reads "OFF".

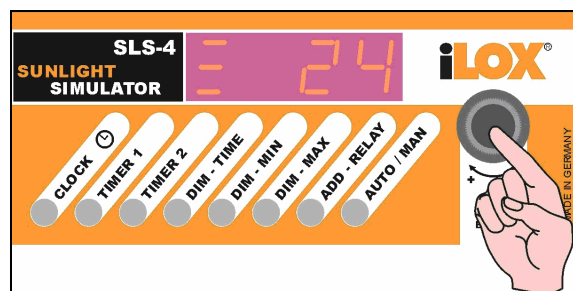
Now the system is in the factory settings menu which allows to re-new all settings. An active lighting phase is immediately interrupted.

### **Monitoring function**

If the SLS-4 control is not in the menu (the 8 LEDs are neither green nor do they blink red), push and hold down the control button and the installed software version is briefly displayed and then substituted by a permanent display of the currently controlled brightness value (%) at the output:



- Display software version -



- Display currently controlled brightness (%) -

Let go of the button and the display returns to normal operating mode

**Power save function at the ADD-Relay**

The add relay is specifically controlled by the software so that it accepts only 50% of regular power. This mode of control might possibly lead to a low hum (approx. 1kHz) when the relay is active.

**Error messages (LED-Display)**

All error messages can be deleted by pushing the control button. This action automatically opens a menu where you can make adjustments or possible corrections of the settings.

	<b>Cause</b>	<b>Solution</b>
<b>E0</b>	undefined error	confirm error by pushing a button
<b>E 1</b>	data memory has been erased, reset to factory-settings	buffer cells are / were discharged due to power failure
<b>E 2</b>	internal system failure (1)	processor defective => repair / replacement required
<b>E 3</b>	internal system failure (2)	processor defective => repair / replacement required
<b>E 5</b>	“DIM-MIN“ is higher or equal “DIM-MAX“	the MIN-value has to be lower than the MAX-value
<b>E 6</b>	illegitimate programming Start-/Stop-time of TIMER 1	both times must not be equal
<b>E 7</b>	illegitimate programming Start-/Stop-time of TIMER 2	both times must not be equal
<b>E 8</b>	illegitimate programming Timer 1 and Timer 2 (without day changeover)	TIMER times must not overlap
<b>E 11</b>	illegitimate programming Timer 1 and Timer 2 (with day changeover one Timer)	TIMER times must not overlap

<b>E 12</b>	illegitimate programming Timer 1 and Timer 2 (w/ day changeover both timers)	TIMER times must not overlap
<b>E 13</b>	illegitimate programming dimming time and Timer 1	the dimming time must not be longer than the interval of Timer 1
<b>E 14</b>	illegitimate programming dimming time and Timer 2	the dimming time must not be longer than the interval of Timer 2

### General failures

failure	possible causes / procedure
lamps do not work	<ul style="list-style-type: none"> <li>- experimentally switch the control button to "MAN"-mode and change brightness (+/-)</li> <li>- if MAN-mode does not work: check fuses, relay contacts and all other switches</li> <li>- in AUTO-mode use monitoring function to check the current intensity (%) at the analogue output</li> </ul>
lamp cannot be dimmed or is permanently dark	possible mix-up of analogue output wiring or short circuit
lamp always shines with full brightness	control lead (AN+/GND) interrupted / open
ADD-RELAIS (23/24) immediately switches on	programmed value is lower or equal DIM-MIN
external start input (ST+/STi) does not work	CLOCK is not programmed OFF
device switches alternately off and on after activation of lighting	load at analogue output (AN+/GND) too high
programming of Timer 1 or 2 reads OFF and cannot be accessed	main timer CLOCK has been programmed OFF (= deactivated)

