

# Operating Manual for 4-way Universal Dimmer with Integral Analogue Interface

**SDK-U4-10-AN**  
Art. No. 215.0041.00

## 1 Introduction



The 4-way universal dimmer is suitable for use with all conventional dimmable types of lighting. There are 4 separate dimmer inputs and outputs, each with a load capacity of 570W. Dimming circuit 1 must always be used, i.e. connected to the mains. The control circuits automatically detect the connected load, and automatically change over from forward phase control to reverse phase control, and regulate the light output using a suitable control characteristic (Ueff).

- **Control of incandescent lamps, high-voltage halogen filament lamps and low voltage halogen lamps with magnetic and electronic transformers. Control of fluorescent lamps with VIP90.**
- **Two dimmer outputs can be connected in parallel to increase the power output.**

The 4-way universal dimmer can be controlled by various bus protocols:

- **Control via a potentiometer connected to the internal power source, by an external voltage source or a sink-current source.**

### 1.1 Intended use

The universal dimmer is intended only for the control of light sources, and is designed for indoor use in electrical control panels.

Note



The manufacturer (and/or supplier of the SDK-U4-10-AN) is not liable for any personal injury or property damage whatsoever, arising from use other than the intended use or from failure to comply with the information set out in this operating manual.

## 2 Safety Instructions

### 2.1 Responsibilities

The person installing the unit is responsible for ensuring protection against personal injury and property damage, and also for the provision of the necessary information to the installation owner. He is also responsible for ensuring compliance with the applicable general health and safety regulations and the specific safety regulations applying to work on medium-voltage electrical installations.

### 2.2 Residual hazards



Potential residual hazard from contact with medium-voltage (230 VAC) conductors. When the SDK-U4-10-AN is used for its intended purpose, the equipment meets all relevant standards and regulations relating to the avoidance of personal injury and property damage. However, residual hazards arising from power-conductors cannot be completely eliminated. The key areas with a potential residual hazard are shown in the adjacent illustration.

### 2.3 Regulations specific to the equipment

**DANGER!**



The SDK-U4-10-AN universal dimmer must be installed and used only in a perfect condition and in accordance with the operating manual. The unit must be disconnected from the power supply before any electrical terminals (power supply and dimmer output, etc.) are connected or disconnected. Work carried out on live terminals can result in severe injury from electric shocks.

Output LD is not disconnected from the power supply when the dimmer is switched off. A separate automatic safety cut-out must be installed in the power feed.

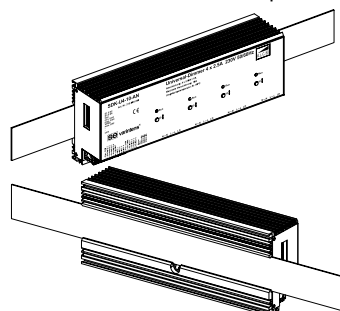
**Attention!**



Connection and disconnection of the load or parts of the load is not permitted during operation.

## 3 Installation

The SDK is mounted on a top-hat rail. It is clipped in to the rail from below. Gentle pressure is then applied to the top front to snap it in place.



Installation position:	Terminals horizontal
Horizontal spacing:	min. 1mm
Minimum vertical rail grid spacing:	115mm (90+25mm) (excluding conduit)
Recommended vertical rail grid spacing:	160mm
	160mm (with 40mm conduit)

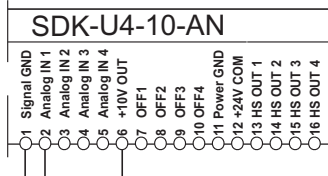
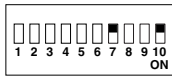
Each individual SDK-U4-10-AN generates 23W dissipation power under rated load. If a number of dimmers are installed in an electrical cabinet, measures must be taken to ensure that the temperature of the individual control units does not exceed 70°C.

## 4 Control Modes

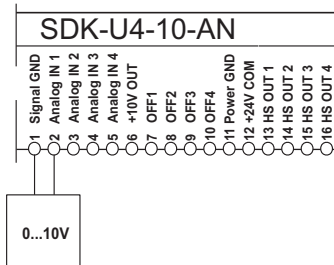
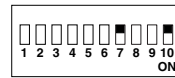
The SDK can be controlled by a standard potentiometer, a voltage source or a sink-current source. The following illustrations show the connections for dimmer circuit 1.

### 4.1 Auto OFF mode

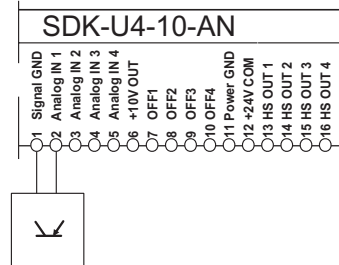
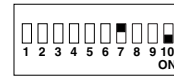
When DIP switch 7 is in the position shown, the Auto OFF function is activated, i.e. with an input voltage < 0.6 V, the output is switched off. This function can be deactivated by changing the position of DIP switch 7.



Control by standard potentiometer



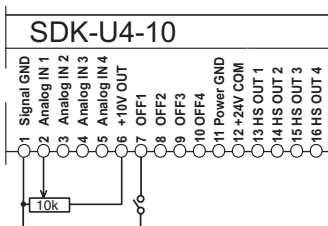
Control by external voltage source



Control by sink-current source (e.g. EIB)

### 4.2 Using a N/O contact to switch On and Off

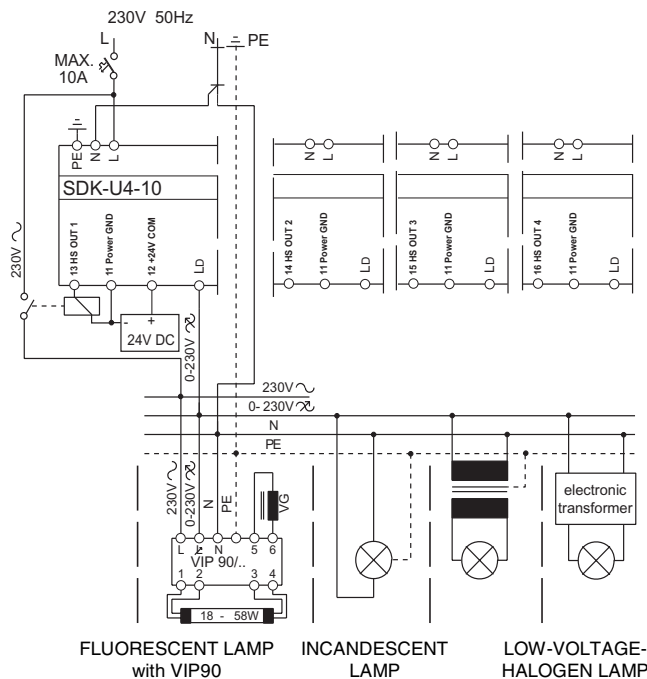
The SDK has a master ON/OFF function, allowing it to be switched off independently of the applied control voltage. The relevant output is switched off, if a N/O contact connects the relevant control input 7-10 (OFF1 – OFF4) to GND.



Using a N/O contact to switch off  
On = N/O contact open

The described ON/OFF function naturally applies in all control modes (potentiometer, voltage source, sink-current source), with DIP switch 7 set to ON in each case.

## 5 Load Circuit



The 4-way universal dimmer is capable of controlling 230V incandescent lamps, low voltage halogen lamps **with electronic or magnetic transformers** or fluorescent lamps with VIP90 up to a maximum current of 2.5 A (570 W). The dimmed voltage is present at output "LD". The universal dimmer uses transistor circuitry to control the output voltage.

To control fluorescent lamps with VIP90, the heating circuit (230V at terminal L of the VIP90) is switched on by a 24V relay, which is switched by output HS Out1 (terminal 13).

### 5.1 Parallel power connection

To increase the power, two dimming circuits ( 1+2 and 3+4 ) can be connected in parallel. ( 2 x 570W = 1140W ).

- The circuits connected together must be in the same phase.
- Set DIP switches as described in Section 6.
- On the power section, the contacts of the common dimming circuits must be connected together ( L with L, N with N and LD with LD).

## 6 DIP-switch settings:

Switch:	Function:	"OFF" position: (up)	"ON" position: (pushed back)
DIP 1	1    2	Circuits 1 + 2 not connected in parallel	Circuits 1 + 2 connected in parallel
DIP 2	3    4	Circuits 3 + 4 not connected in parallel	Circuits 3 + 4 connected in parallel
DIP 3	fast	Slow stepped response (dimming speed)	Fast stepped response (dimming speed)
DIP 4	min. limit	Min. lighting value 0%	Min. lighting value 30%
DIP 5	max. limit	Max. lighting value 100%	Max. lighting value 90%
DIP 6	VIP90	No preheating	Preheating time 1.5 s
DIP 7	man. OFF	Dimmer switches off at control voltage < 0.6 V	No On/Off switching threshold at 0.6 V (manual)
DIP 8	--	not used	not used
DIP 9	--	not used	not used
DIP 10	sink	Control via control voltage or potentiometer	Control via sink-current source

To switch 1: The control signal from circuit 1 also controls circuit 2 with the same values.

**Attention!**



When two circuits are connected in parallel, both circuits must be connected to the same phase. If the two circuits are connected to different phases, the dimmer will be instantly destroyed when switched in parallel.

To switch 2: The control signal from circuit 3 also controls circuit 4 with the same values. Note the above warning.

To switch 3: In normal situations, the slow-stepped response (ramp 400ms) is used. For effect lighting, the response can be shortened (ramp 100ms).

To switch 4: This switch is used to increase the minimum output of the dimmer from 0% to 30%. This value is output at a potentiometer setting of 0% or an input voltage of 0V. A desired basic level of brightness can be ensured by increasing the minimum lighting value.

**Attention!**



If the minimum lighting value is set to 30%, the output voltage can reach a dangerous level, even if there is no input voltage (potentiometer set to 0V). The safety cut-out, mains-side of the dimmer, must be switched off before changing the lamp.

To switch 5: This switch is used to reduce the maximum output of the dimmer from 100% to 90%. This value is output at a potentiometer setting of 100% or an input voltage of 10V. Reduction of the maximum lighting value to 90% extends lamp life.

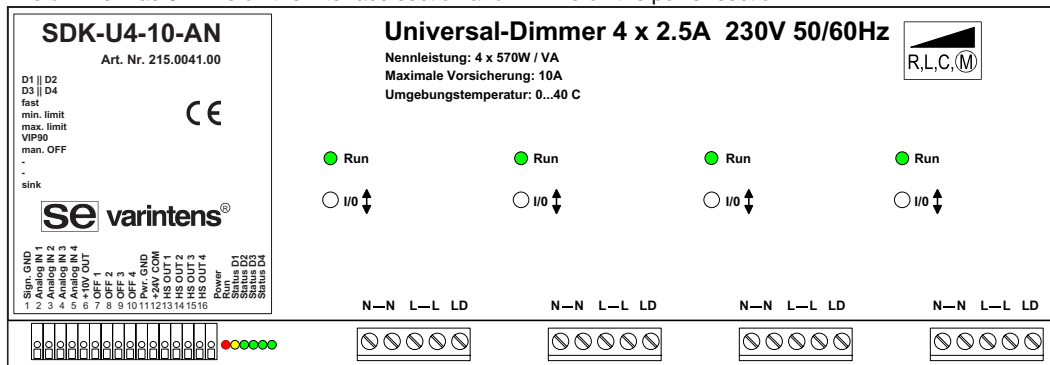
To switch 6: Fluorescent lamps with VIP90 need to be preheated.

To switch 7: The use of the Auto-OFF function is described in Section 4.

To switch 10: The various control modes are described in Section 4.

## 7 LED Indicators on the Dimmer

The dimmer has 6 LEDs on the interface section and 4 LEDs on the power section:



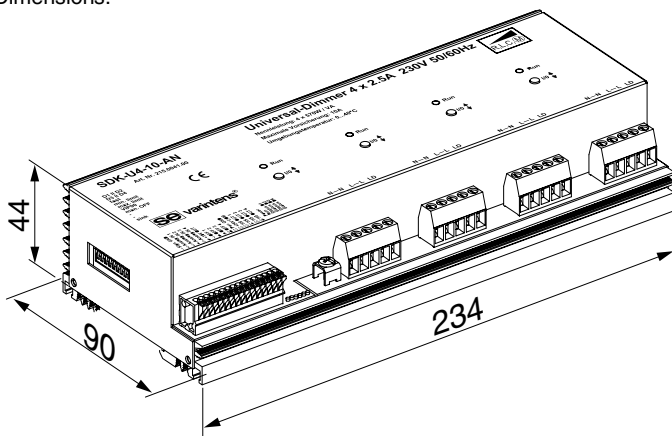
Interface section:	Power section:
<ul style="list-style-type: none"> <li>Red LED (Power) 230V power supply</li> <li>Yellow LED (Run) Dimmer operational</li> <li>Green LED 1-4 (Status D1-D4) Status indicator, circuits 1-4</li> </ul> <p>Red LED Off: No voltage at interface section On: Voltage at interface section.</p> <p>Yellow LED Off: Interface section not OK Flashing: slow: Interface section OK and Communication OK fast: Interface section OK, but Communication not OK</p> <p>Green LED: Off: Relevant output is OFF. On: Relevant output is ON. Flashing: 1x, then interval: Over-current 2x, then interval: Over-voltage. 3x, then interval: Overheating 4x, then interval: Load not detected by dimmer</p>	<p>Green LED 1 (Run) Status indicator, circuits 1-4</p> <p>Green LED 1-4 Flashing regularly: Dimmer running, but not receiving data from the interface card. Flickering: Data being received.</p>

## 8 Fault Finding and Elimination

Fault	Remedy
Lamp does not brighten.	<ul style="list-style-type: none"> <li>• Check the bus voltage on the SDK (red LED must come on).</li> <li>• Dimming circuit 1 must always be connected to the mains.</li> <li>• Check control voltage. Set DIP switch 1 in accordance with the control mode.</li> <li>• 0V possibly not connected.</li> <li>• If the yellow LED flashes at a fast rate, one of the dimmer circuits is not receiving power or the dimmer is faulty.</li> </ul>
Lamps do not dim completely.	<ul style="list-style-type: none"> <li>• Minimum lighting value not 0% (DIP switch 4 is ON).</li> </ul>
Dimmer cannot be controlled up to 100%.	<ul style="list-style-type: none"> <li>• Maximum lighting value not 100% (DIP switch 5 is ON).</li> </ul>
Green LED (Run) flashes 1x	<ul style="list-style-type: none"> <li>• Dimmer has over-current. Reduce load, possibly connect in parallel.</li> </ul>
Green LED (Run) flashes 2x	<ul style="list-style-type: none"> <li>• Dimmer has over-voltage. Check installation.</li> </ul>
Green LED (Run) flashes 3x.	<ul style="list-style-type: none"> <li>• Dimmer overheating. Improve cooling.</li> </ul>
Light goes out and green LED (Run) flashes 4x.	<ul style="list-style-type: none"> <li>• Dimmer has not recognised type of load. Load detection can be repeated by switching On – Off – On within one minute.</li> </ul>

## 9 Technical Data

Dimensions:



### Electrical data: per channel

Mains voltage:	230 V ±10%
Mains frequency:	50 / 60 Hz
Preliminary fuse:	10 A max.
Dimming output technology:	Transistor-driven forward phase control / reverse phase control
Maximum load, dimming output:	570 W / VA (2.5A) resistive / inductive / capacitive
Minimum load, dimming output:	5 W resistive
Leakage power at rated load:	5.7 W at rated load
Leakage power on standby:	1.4 W
Cooling:	Natural air circulation
No-load voltage:	Approx. 55 V <sub>rms</sub>
Short-circuit protection:	Electronic fast cut-off
Overload protection:	Temperature monitoring. (trigger value approx. 85°C)
Symmetry errors:	Not measurable
Impulse switching flank:	100µs, with incandescent-lamp at rated load
Operational and fault indicator:	Green "Run" LED per channel
Keys (integrated single-key control):	On / brighter / dimmer. (for test purposes at initial start-up)
Insulation:	2500 V between interface unit and dimmer
Switch-on delay:	approx. 1s (mains switch-on)

### Type

**SDK-U4-10-AN**

### Article number

**215.0041.00**

### Mechanical data:

Case:	Steel sheet with aluminium cooler
Dimensions:	Width: 234 mm (with screws) Height: 90 mm Depth: 44 mm (from top-hat prof.)
Weight:	850 g
Installation:	On DIN top-hat profile rails 35 mm
Mains power connection:	4 screw terminals max. 2.5 mm <sup>2</sup>
Load connection:	1 screw terminal max. 2.5 mm <sup>2</sup>
Control connections:	4 screw terminals max. 2.5 mm <sup>2</sup>

### Ambient conditions:

Ambient temperature:	ta 0-40 °C max. Do not block airflow at cooler.
Storage temperature:	70 °C max.
Air humidity:	10%...80% relative air humidity, non-condensing
Case temperature:	tc 70 °C max.
IP protection:	IP20

### Control:

Control voltage:	0...10 V, electrically separated
Input resistance:	200 kΩ
Potentiometer:	External, 10 kΩ
Potentiometer lead:	3-core, non-screened Ø 0.5 mm <sup>2</sup> . Lead length max. 100 m
Control characteristic:	U <sub>eff</sub> - linear
Sink current control:	0...10 V, 1.2 mA
Adjustment time analogue:	approx. 400 ms (spec. value for transfer response)
Operational and fault indicator:	6 LED (Power, Run, 4 x Status)
<b>CE mark:</b>	as per 89/336/EWG and 73/23/EWG
EN 60669-2-1	Safety requirements
EN 55015	Interference transmission
EN 55014-2 (VDE 0875)	Radio interference
EN 61000-3-2	Harmonics

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