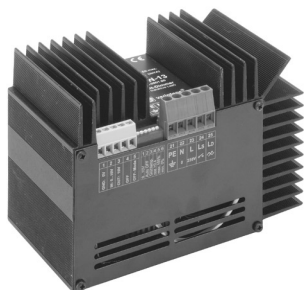


Operating Instructions for Dimmer Forward Phase Control

SDK-AN-13
Art. No. 215.0001.00

1 Introduction



The SDK-AN-13 is a digital dimmer with forward phase control, which on one hand can be driven in various ways, while on the other hand it can also regulate different loads:

- **Driven via potentiometer from the internal voltage source, by an external voltage source or also from a sink current source.**
- **Control of incandescent lamps and high-voltage halogen lamps, as well as low-voltage halogen lamps with magnetic transformer or fluorescent lamps with VIP-90 lamp insert unit.**

An automatic or manual switch-off function extends the range of application. The SDK has both a controlled (dimmable) as well as a switched output. Both outputs have an integrated on/off switching function. It is not therefore necessary to fit the usual contactor. The heating element of fluorescent lamps can be switched separately via the VIP-90 with the switched output.

1.1 Intended use

The forward phase control dimmer should only be used for the control of light sources and in internal switchboards.

Caution!



The SDK-AN-13 must not be used to drive low-voltage halogen lamps with electronic transformer.

Note



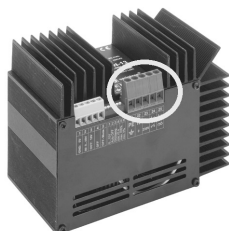
The manufacturer (or supplier of the SDK-AN-13) disclaims all liability for any injury suffered by persons or damage to material owing to use other than for the intended purpose or failure to comply with the data in these operating instructions.

2 Safety regulations

2.1 Responsibilities

The equipment installer bears responsibility for the protection of persons and prevention of damage to material, in addition to the required information for the operator. He is also responsible for compliance with the general working safety regulations in effect and safety regulations for work on electrical medium-voltage installations.

2.2 Residual dangers



Risk of residual danger by contact with live medium-voltage connections (230 VAC). With use of the SDK-AN-13 for the intended purpose, compliance is ensured with all effective standards and regulations for the prevention of injury to persons and damage to material. Residual dangers from live conductors cannot be entirely excluded however. The most important areas with risk of residual danger are shown in the adjoining figure.

2.3 Regulations for the specific unit

DANGER



The standard dimmer SDK-AN-13 must only be installed and used when fully serviceable and in accordance with the operating instructions. The electrical connections (power supply and dimmer output, etc.) must only be connected and disconnected when not under voltage. Working on live connections can cause serious injury from electric shock. There is no electrical isolation of the LD and LS outputs when the dimmer is switched off. A separate automatic safety cut-out must be installed in the power feed.

3 Installation

The SDK is mounted on a cap rail by inserting it from above in the rail and then engaging with slight pressure at the bottom on the front.

Mounting position:	Cooling fins vertical	Horizontal spacing:	min. 1mm
Minimum vertical rail grid: (without cable duct)	115mm (90+25mm)	Recommended vertical rail grid: (with 40mm cable duct)	160mm

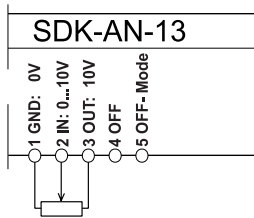
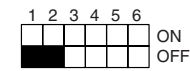
Every individual SDK produces 30W dissipation power on rated load. If several dimmers are fitted in the switch cabinet, it must be ensured that the temperature of the individual control units does not exceed 70°C.

4 Control modes

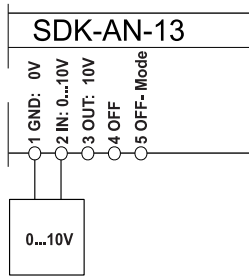
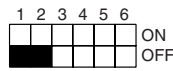
The SDK can be driven via a standard potentiometer, a voltage source or by a sink current source. The following illustrations show the type of connection necessary.

4.1 Auto-OFF mode of operation

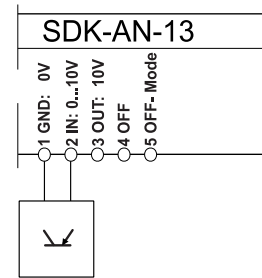
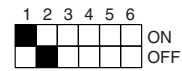
If DIP switch 2 is at the position shown, the **Auto-OFF** function is activated, i.e. with an input voltage < 0.6 V the outputs are disconnected. This function can be deactivated by changing over switch 2.



Drive with standard pot.



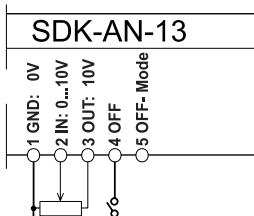
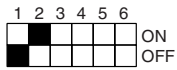
Drive with external voltage source



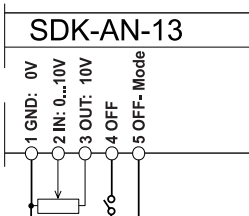
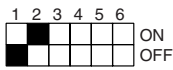
Drive with sink current source (e.g. EIB)

4.2 Switching on and off by N/O contact

The SDK has an overriding ON/OFF function, with which it can be switched off independently of the control voltage applied. All outputs are switched off when control input 4 (OFF) is connected to GND by a N/O contact. If control input 5 is also connected to GND, the function of the N/O contact is inverted (outputs are switched on).



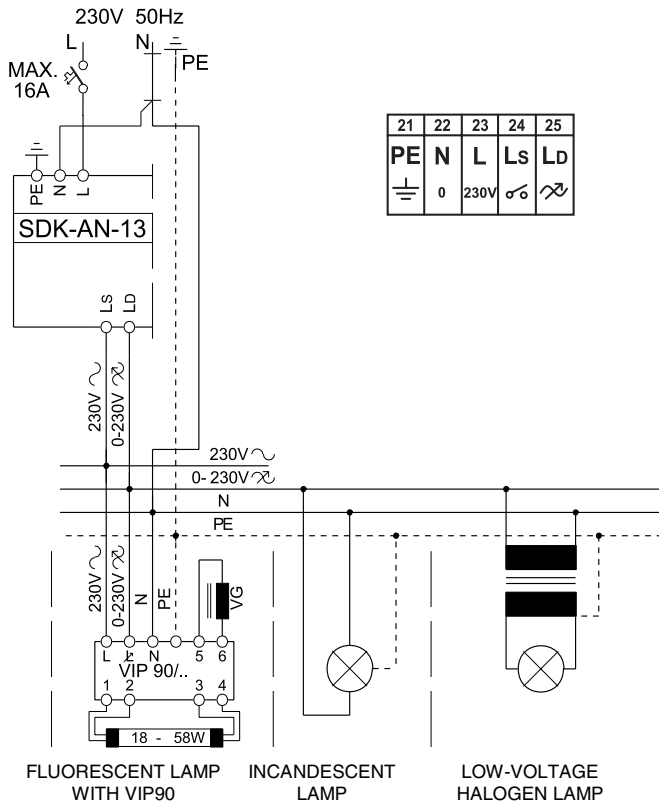
Contact open = ON
Contact closed = OFF



Contact open = OFF
Contact closed = ON

The ON/OFF function described naturally applies to all types of drive (pot., voltage source, sink current source) with DIP switch 2 at ON in each case.

5 Load circuit

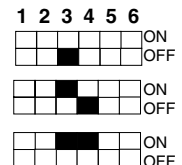


The standard dimmer is able to drive fluorescent lamps or incandescent lamps, or halogen lamps up to a maximum current of 13 A (3 kVA). This dimmed voltage is available at output "LD". In addition to the controlling triac, with which it performs forward phase dimming, the standard dimmer has a solid-state relay, with which the electrode heating for fluorescent lamps is switched on and off or for supplying a contactor. This switched voltage is available at output "LS". DIP switches 3 and 4 are used to select the fluorescent material to be controlled. The dimmer then operates with the corresponding control curve, so that the controlled voltage (rms) is linear with the reference value (e.g. potentiometer at 50% = voltage at 50%). When a fluorescent lamp is selected, the heating element has a lead time of 1.5 s. Incandescent lamps, halogen lamps and low-voltage halogen lamps (with magnetic transformer) are operated with the "incandescent lamps" fluorescent material mode. The lead time of LS is 50 ms.

For fluorescent lamps connected via a VIP, $\cos\phi$ (ballast unit) should be known, see table.

Switch position:

- Incandescent lamps
- Fluorescent lamps $\cos\phi$ 0.4 to 0.5
- Fluorescent lamps $\cos\phi$ 0.27 to 0.4



The SDK-AN-13 must not be used to control low-voltage halogen lamps connected to an electronic transformer (the SDK-AB-10 is available for this purpose on request).

6 DIP switch settings

The functions shown on the unit refer to the "OFF" position of the DIP switch.

Switch:	Function:	"OFF" position:	"ON" position:
1	Control mode	Control via control voltage or potentiometer	Control via sink current source
2	Auto-OFF	Dimmer switches off with control voltage < 0.6 V	No on/off switching threshold at 0.6 V
3	Load selector	Incandescent lamps	Fluorescent lamps (with VIP)
4	cosφ	cosφ 0.4 - 0.5	cosφ 0.27 - 0.4
5	Max. light value	100%	90%
6	Min. light value	0%	30%

- To Switch 1: The various kinds of drive are shown in section 4.
 To Switch 2: The use of the Auto-OFF function is shown in section 4.
 To Switch 3: The switch position for the various lamp types and the associated preheating time are described in section 5.
 To Switch 4: The cosφ resulting from the type of fluorescent lamps in conjunction with the corresponding VIP can be seen in the following table.
 To Switch 5: This switch is used to reduce the maximum output value of the dimmer from 100% to 90%. This value is obtained with a pot. position of 100% or an input voltage of 10V. Reduction of the maximum light value to 90% prolongs the life of lamps.
 To Switch 6: This switch is used to increase the minimum output value of the dimmer from 0% to 30%. This value is obtained with a pot. position of 0% or an input voltage of 0V. The desired basic illumination can be ensured by increasing the minimum light value.

Caution!



If the minimum light value is set to 30%, the output voltage can rise to a dangerous value even without input voltage (pot. at zero position). The safety cut-out, mains-side of the dimmer, must be switched off before changing the lamp.

Fluorescent lamp with VIP	cos φ	VIP 90 long / square	Lamp current	Number of lamps
T26 18W	0.27... 0.4	2 / 5	0.370 A	35
TC-D 10W	0.27... 0.4	6 / 7	0.190 A	68
TC-F 18W	0.27... 0.4	8 / 9	0.375 A	34
TC-L 18W	0.27... 0.4	8 / 9	0.375 A	34
T26 36W	0.4 ... 0.5	2 / 5	0.430 A	30
T26 58W	0.4 ... 0.5	2 / 5	0.670 A	19
TC-D 13W	0.4 ... 0.5	6 / 7	0.175 A	74
TC-D 18W	0.4 ... 0.5	3 / 4	0.220 A	59
TC-D 26W	0.4 ... 0.5	8 / 9	0.320 A	40
TC-T 13W	0.4 ... 0.5	6 / 7	0.175 A	74
TC-T 18W	0.4 ... 0.5	3 / 4	0.220 A	59
TC-T 26W	0.4 ... 0.5	8 / 9	0.320 A	40
TC-F 24W	0.4 ... 0.5	8 / 9	0.345 A	37
TC-F 36W	0.4 ... 0.5	8 / 9	0.435 A	29
TC-L 24W	0.4 ... 0.5	8 / 9	0.345 A	37
TC-L 36W	0.4 ... 0.5	8 / 9	0.435 A	29

7 LED indication on the unit

○ Power **CE**

○ Run

○ Status

Extern 16A max.
230V / 50Hz / 13A (3kVA)

SDK-AN-13
Art.Nr. 215.0001.00

Anschnitt-Dimmer
(Ohmsch / Induktive Last)

se varintens®

PE	N	L	Ls	Ld
	0	230V		

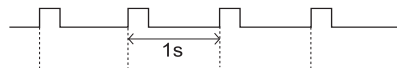
The dimmer has three light-emitting diodes:

- red LED Power supply 230V (Power)
- yellow LED Dimmer running (Run)
- green LED Status indication (Status)

The red LED indicates that the supply voltage is present.

When the yellow LED flashes every second, the dimmer is operating correctly.

When the dimmer is switched on, the green LED is lit. It is off when the dimmer is off. At the same time the green LED indicates excess temperature inside the SDK. At a temperature of approx. 70°C the over-temperature indication is given (flashing of green LED). The dimmer phase control is automatically reduced to 50%. If the temperature continues to rise, the load is switched off entirely.



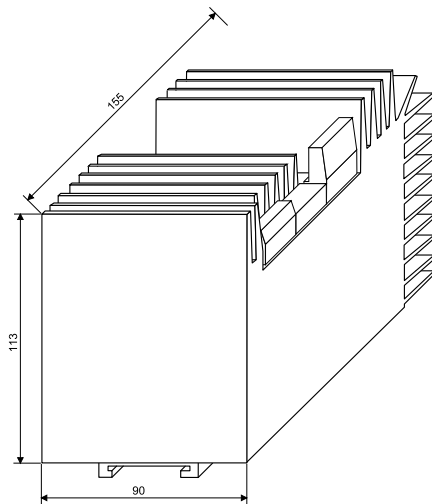
Indication of green LED (Status) with excess temperature.

8 Troubleshooting

Fault	Elimination
Lamp remains dark.	<ul style="list-style-type: none"> • Check mains voltage to SDK (red LED must light) • Check control voltage. • 0V possibly not wired.
Lamp can only be turned on and off	<ul style="list-style-type: none"> • LS and LD connections interchanged
Lamps cannot be fully darkened	<ul style="list-style-type: none"> • Minimum light value not 0% (DIP switch 6 is ON)
Dimmer cannot be set to 100%.	<ul style="list-style-type: none"> • Maximum light value not 100% (DIP switch 5 is ON). • "Fluorescent lamps" fluorescent material selected
Lamps can only be approx. half darkened and flicker in the faded state	<ul style="list-style-type: none"> • Change relevant SDK (a triac has failed, i.e. has lost its blocking capacity in the conducting direction)
Lamps flicker over the entire control range and can only be brightened to approx. half.	<ul style="list-style-type: none"> • Change relevant SDK (a triac has failed, i.e. cannot be controlled)

9 Technical data

Dimension drawing:



Electrical data:

Mains voltage:	230 V ±10%
Mains frequency:	50 Hz (option 60Hz)
Dimmer output technology:	Forward phase control with triac
Maximum load dimmer output:	13 A (3 kVA) resistive / inductive $\cos \varphi > 0.3$
Minimum load dimmer output:	5 W resistive
Switching output technology:	Switched triac (solid-state relay)
Heating current at switching output:	1.5 A with dimmer rated current
Maximum load switching output:	13 A when dimmer output not used
Lead time switching output:	50 ms for incandescent lamps 1.5 s for fluorescent lamps
Follow-on time switching output:	50 ms
Dissipation power at rated load:	30 W
Dissipation power at standby:	2 W
Cooling:	Natural circulating air
No load voltage:	<50 V _{rms}
Short-circuit protection:	Miniature circuit breaker 16 A max. (characteristic B or C)
Overload protection:	By reduction of output voltage with over-temperature (Status LED flashes)
Switch-on delay:	ca. 400 ms (mains switch-on)
Current rise time:	90 µs, with lamp rated load
Noise:	40 dB(A), at 1 m distance
Operating and fault indication:	3 LEDs (Power, Run, Status)

Type

SDK-AN-13

Article number

215.0001.00

Mechanical data:

Case:	Sheet steel with aluminium cooler
Dimensions:	Width: 155 mm Height: 90 mm Depth: 113 mm (from cap section)
Weight:	1.4 kg
Installation:	On DIN cap-section rails 35 mm
Mains connection:	Screw terminals max. 6 mm ²
Load connection:	Screw terminals max. 6 mm ²
Control connection:	Screw terminals max. 2.5 mm ²

Ambient conditions:

Ambient temperature:	ta 0-40 °C max. The air flow through the cooler must not be interrupted.
Storing temperature:	70 °C max.
Humidity:	10% - 80% relative humidity, no condensation
Case temperature:	tc 70 °C max.
IP-protection class:	IP20

Control:

Control voltage:	0 - 10 V, 50 µA (<0,6 V = off)
Input resistance:	200 kΩ
Potentiometer:	External, 10 kΩ
Potentiometer conductor:	3-pole without screen Ø 0.5 mm ² . Conductor length max. 100 m
Control characteristic:	U _{eff} - linear
Sink current control:	0 - 10 V, 1.2 mA
Input "OFF":	Switched on/off by connection to GND, 1 mA
Input "OFF-Mode":	Inversion of "OFF" input, 1mA
CE-designation:	according to 89/336/EWG and 73/23/EWG
EN 60669-2-1	Safety requirements
EN 55104	Noise immunity
EN 55014	Radio interference
EN 61000-3-2	Harmonics
EN 61000-3-3	Voltage fluctuations (flicker)

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