

N 528/31 Universal dimmer, main module
AC 230 V, 20...300 VA

5WG1 528-1AB31

Product and functional description



The universal dimmer main module N 528/31 is an installation device for DIN-rail mounting, with N-system dimensions. It is designed for lighting control, i.e. for switching and dimming resistive, inductive or capacitive loads from 20 to 300 VA at 230V AC, 50-60 Hz. The bus is connected via a bus terminal and the power supply for the electronics is provided by an integrated 230V AC power supply unit.

Connecting universal dimmer submodules

You can connect a universal dimmer submodule N 528/41 (dimnable load 20-300 VA), a universal dimmer submodule N 527/41 (dimnable load 20-500 VA) or a universal dimmer submodule N 527/51 (dimnable load 20-1,000 VA) with the 2-pin interface T+, T- (see, for example, device B in figure 1) using a twisted pair of wires. Up to 5 universal dimmer submodules can be connected to a universal dimmer main module, in which the twisted pair T+, T- is also to be looped from interface to interface. In this way, a main module can be extended if required from a KNX dimmer with one output to a KNX dimmer with up to 6 outputs.

When connecting a new universal dimmer submodule to a universal dimmer main module, it is essential that you connect their 2-pin interfaces T+/T- first before applying the mains voltage to the submodule(s). This is the only way to guarantee that the communication between main module and submodule(s) takes place correctly.



DANGER

- The lines T+ and T- are to be installed safely isolated from the 230 V potential. The maximum permitted line length between the main module and the submodule furthest away is 2 m.

Connection example

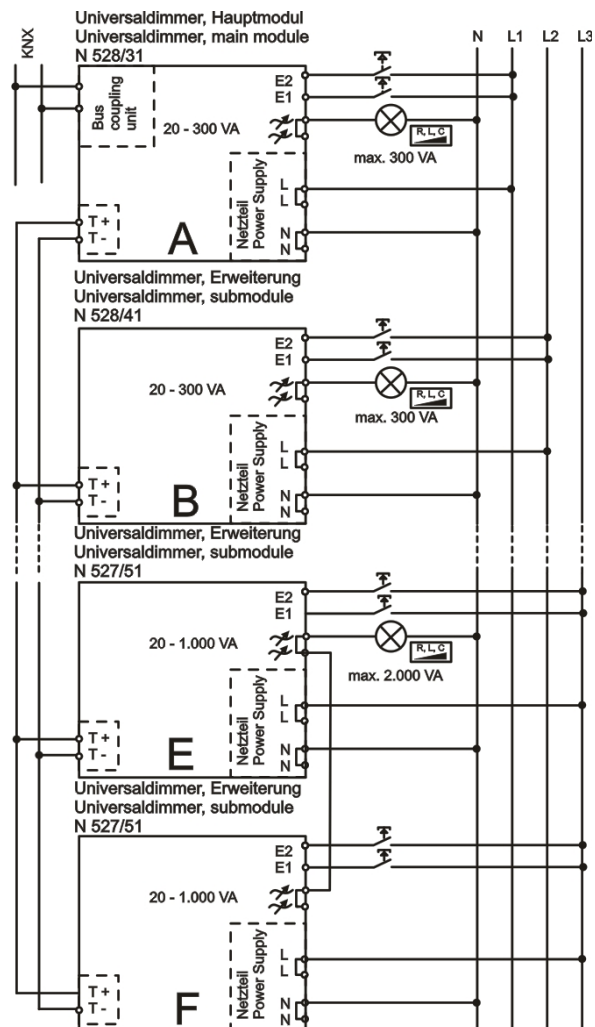


Figure 1. Connection example

Device address

You set to which dimming channel (B...F) of the main module the relevant submodule is to be assigned with a rotary switch on the underside of the housing (see A1 in figure 2). A universal dimmer main module must always be set on channel A. If two or more devices are set incorrectly to the same address, then the light emitting diodes (LED) for the relevant channels will flash.

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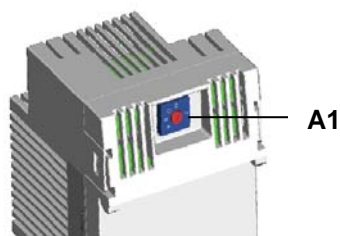


Figure 2. Rotary switch for device address

Dimming loads from 40 to 2,000 VA

The outputs from two N 527/51 universal dimmer sub-modules (dimnable load each 20-1,000 VA) can be connected in parallel, in order to be able to dim a load in the range from 40-2,000 VA (see devices E and F in figure 1).



DANGER

- You must not connect the outputs of more than two N 527/51 devices in parallel. Parallel operation of the outputs from universal dimmer main modules with each other or with a submodule, as well as of all other universal dimmer submodules, is not permitted!

LED indications

6 bi-color (red/green illuminating) light emitting diodes (LED) on the top of the main module (see figure 3, B8) indicate which module was selected (LED illuminates green if the output is switched off and illuminates red if the output is switched on). If any of the LED A...F flashes, then an error has been detected on this module. This is the case, for example, if more modules are configured than are actually connected, the configured module type is incompatible with the module type actually connected, the same device address has been set more than once or if a module was detected as defective.

Switching between bus mode and direct mode

You use the "Direct mode" pushbutton (see figure 3, B6) to switch between "Bus mode" and "Direct mode". If this button is held down for at least 3 seconds, then the yellow LED (see figure 3, B7) comes on permanently to indicate direct mode.

In direct mode, you select a module (channel) and switch and dim it with the two pushbuttons (see figure 3, B5) on the top of the main module. A module (channel) is selected if the "Direct mode" pushbutton (see figure 3, B6) is tapped several times until the LED for the wanted module A...F flashes (red or green according to the current switching status). Modules in which an error is indicated in bus mode by a green flashing LED A...F cannot be switched or dimmed in direct mode. The corresponding LED goes out when switching on the direct mode.

You use a parameter to set whether direct mode can be switched on permanently or for a limited time. At the factory, direct mode is set to a timed on-time of 15 min-

utes. Each time the pushbutton is operated in direct mode, the timer for on-time limiting is restarted. After the on-time has elapsed without a further press of the pushbutton, direct mode switches off automatically and thus "Bus mode" is re-enabled (if communication over the bus is possible). Alternatively, direct mode can be ended at any time by pressing the "Direct mode" pushbutton again for at least 3 seconds. The yellow LED for indicating direct mode then goes out and the actuator is again in bus mode. In bus mode, pressing the pushbutton to switch an output on or off directly has no effect. When direct mode is switched on, switching, dimming value and scene recall commands received via the bus are buffered and will be executed automatically after the return to bus mode, i.e. the last received switch-/dimming command received is then executed and the scenes are recalled in the received sequence.

Pushbutton inputs E1, E2

A conventional pushbutton can be connected each to the E1 and E2 inputs of the main module for direct switching and dimming of the output A. Tapping the pushbutton on the E1 input leads to switching on, holding it down to dimming brighter, tapping the pushbutton on the E2 input leads to switching off, holding it down to dimming darker. You use a parameter to set whether pressing one of the buttons is also to lead to sending switching and dimming telegrams via the bus to other actuators.



DANGER

- On electrical safety reasons, both pushbuttons must be connected to the same phase conductor as the dimmer module in question.

Application program

The universal dimmer main module N 528/31 needs the application program "07B0 A6 Universal dimmer 982101", which is configured and loaded with the Engineering Tool Software (ETS) from Version ETS 3.0 f onwards. This controls the outputs both from the main module and all connected sub-modules. *Inter alia*, it includes monitoring of each channel for short circuit, overload and overheating, switching and dimming status reporting, a warning before switching off, time functions, blocking and releasing a channel, a configurable behaviour at bus voltage failure and recovery, as well as at mains voltage recovery, and an integrated 8-bit scene control in which each channel can be integrated in up to 8 scenes.

Behaviour at voltage failure / recovery

Because the power for the main module's electronics is generated via an integrated 230 V AC power supply unit, a mains voltage failure means that the affected module also fails. In the event of a mains voltage failure at the

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main module, night mode is ended if it is active and the current switching states and dimming values of all modules (channels) are stored permanently, in order that they can be regenerated automatically after mains voltage recovery. You use a parameter to configure the behaviour after mains voltage recovery: switching on all channels, switching off all channels, restoring the switching / dimming states of all channels at mains voltage failure. However, if night mode was active before mains voltage failure, this will not be re-enabled.

A mains voltage failure exclusively at a submodule results as well in switching off this channel as in the complete failure of this module. The submodule will remain switched off after mains voltage recovery if the main module didn't receive any switching or dimming commands for this module during mains voltage failure at it. Otherwise the main module will transmit the last meanwhile received switching / dimming command to the submodule after mains voltage recovery at this module.

In contrast, a bus voltage failure results only in a communication failure via the KNX bus. But communication between the main module and all connected submodules via the interface T+ / T- is unaffected by this. Each module retains its current status. If pushbuttons for direct switching and dimming are connected to a module's pushbutton inputs E1, E2, you can use these connected buttons to switch and dim this module. You can also select each module (i.e. each channel) with the pushbuttons on the top of the universal dimmer main module and switch and dim in direct mode. Parameters are used to set the behaviour in each case on bus voltage failure and on bus voltage recovery.

Technical specifications

Power supply

- Bus voltage: provided via the bus line
- Bus current: typically 7 mA, max. 10 mA.
- Electronics: - integrated power supply for 230 V AC, + 10 % / - 15 %, 50-60 Hz

Mains supply

- Rated voltage: 230 V AC, +10% / -15%, 50-60 Hz
- Rated current: 1.3 A
- Power loss if output A = OFF: 1.3 W, maximum power loss at trailing edge dimming: 2.0 W, maximum power loss at leading edge dimming: 4.6 W.

Pushbutton inputs

- 2 inputs
- Rated voltage: 230 V AC, 50-60 Hz
- Maximum length of the connecting cable: 100 m

Load output

- Rated voltage: 230 V AC, 50-60 Hz

- Rated current: 1.3A
- Connection output at 45 °C ambient temperature:
 - Incandescent lamps: 20...300 W
 - High voltage halogen lamps: 20...300 W
 - Low voltage halogen lamps with electronic transformers: 40...300 VA
 - Low voltage halogen lamps with magnetic transformers: 20...300 VA
 - Osram dimmable energy-saving lamps: 1...5 units 15 VA resp. 20 VA

Short circuit / overload protection

Electronic protection, i.e. the universal dimmer cuts off if there is a short circuit or overload. After resolving the short circuit / overload, the universal dimmer can be reconnected by switching off and on again or by interrupting the mains voltage until a period of at least 2 minutes has elapsed.

Temperature rise protection

Electronic protection, i.e. the universal dimmer dims to the minimum dimming value if the maximum permitted temperature is exceeded. When the excess temperature has fallen to below the maximum permitted value, the universal dimmer reverts to the previous dimming value after 2 minutes.



DANGER

- Connecting mixed loads to the same output (both inductive and capacitive loads, e.g. a group of low voltage halogen lamps with magnetic transformer, together with a group of low voltage halogen lamps with electronic transformer or together with dimmable energy-saving lamps) is not permitted.
- Low voltage halogen lamps with an electronic transformer may only be used in mixed operation together with incandescent lamps and high voltage halogen lamps.
- Magnetic transformers may only be used if they comply with the relevant standards and contain a thermal fuse.
- Low voltage halogen lamps with a magnetic transformer may only be used at the same output together with incandescent lamps and dimmable energy-saving lamps from Osram if the parameter "Load matching" has been set from "Automatic load matching" to "Leading edge mode".
- With Osram's dimmable energy-saving lamps, the parameter "Load matching" must be set from "Automatic load matching" to "Leading edge mode" and the parameter "Minimum dimming value" to a value \geq 20%.

Operating elements

- 1 commissioning pushbutton: for toggling between normal / addressing mode
- 1 pushbutton: for toggling between bus / direct mode
- 2 pushbuttons: for switching and dimming the selected channel in direct mode

Display elements

- 1 red LED:
for checking the bus voltage and for displaying normal mode / addressing mode
- 1 yellow LED:
for displaying direct mode / bus mode
- 6 bicolor LED (red and green):
for status indication of the 6 channels A...F

Connections

- Mains, load and pushbuttons connections:
Screw-type terminals, insulation strip length 7... 9 mm.
The following conductor cross-sections are permitted:
 - 0,5... 4.0 mm² single core,
 - 0,5... 2.5 mm² finely stranded, without / with connector sleeve
- KNX bus line: Bus terminal block, screwless, conductor cross-section 0.6 ... 0.8 mm Ø single core, insulation strip length 5 mm
- Submodule: Low voltage terminal block, screwless, conductor cross-section 0.6 ... 0.8 mm Ø single core, insulation strip length 5 mm, maximum length of cable between modules A and F: 2 m

Mechanical data

- Housing: plastic
- Dimensions: device for DIN-rail mounting with N-system dimensions, width 3 MU
(1 Module Unit = 18 mm)
- Weight: approx. 130 g
- Fire load: approx. 2470 kJ
- Installation: Snap-on mounting on DIN rail
EN 60715-TH35-7.50

Electrical safety

- Degree of pollution (according to IEC 60664-1): 2
- Protection type (according to EN 60529): IP 20
- Overvoltage category (according to IEC 60664-1): III
- Bus: safety extra-low voltage SELV DC 24 V
- Device complies with: EN 50428

EMC requirements

- complies with EN 50428

Environmental conditions

- Climatic withstand capability: EN 50090-2-2
- Ambient operating temperature: - 5 ... + 45 °C
- Storage temperature: - 25 ... + 70 °C
- Relative humidity (not condensing): 5 % to 93 %

Reliability

- Failure rate: 893 fit at 40°C

Markings

- KNX *EIB*

CE mark

- In accordance with the EMC guideline (residential and functional buildings), low voltage guideline

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Position and function of the display and operating elements

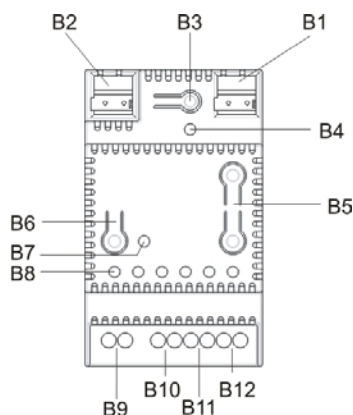


Figure 3. Display- / operating elements

- B1 Plug for bus connection terminal block
- B2 Plug for low voltage terminal block for connecting universal dimmer submodules
- B3 Pushbutton for switching between normal mode and addressing mode for transferring the physical address.
- B4 LED for indicating normal mode (LED Off) or addressing mode (LED On); it turns off automatically after transferring the physical address
- B5 Pushbuttons for switching and dimming the selected device (output) in direct mode
- B6 Pushbutton for selecting a device (output) and for toggling between bus and direct mode
- B7 LED (yellow) for indicating direct mode = On
- B8 LEDs (bicolor) for indicating via a steady light whether the selected device (output) is switched on (red) or off (green) or is defective (flashing light)
- B9 Screw terminals for connecting / looping the N-conductor
- B10 Screw terminals for connecting / looping the L-conductor
- B11 Screw terminals for connecting the load
- B12 Screw terminals for connecting in each case a pushbutton for direct switching and dimming of the load connected to the output

Mounting and wiring

Installation notes

The device can be used for permanent installation in dry interior rooms and for insertion in control cabinets or small distribution boards.

Mounting and dismantling the device:

see figure 4 and figure 5

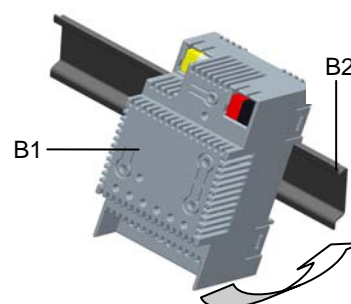


Figure 4. Mounting on a DIN-rail

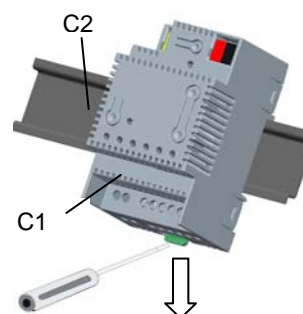


Figure 5. Dismounting from a DIN-rail

Connecting and disconnecting the bus line:

see Figure 6

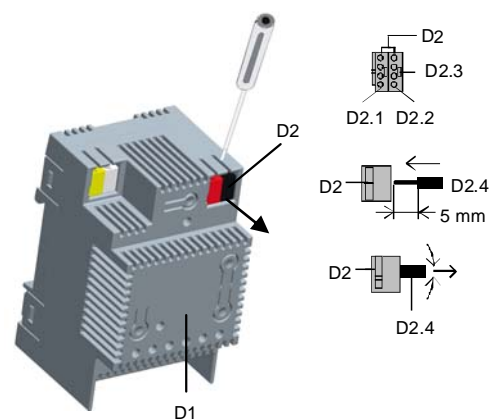


Figure 6. Attaching / removing the bus terminal

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Connecting a universal dimmer submodule:
see figure 7

Snap the universal dimmer submodule on to the DIN-rail and interconnect the T+ and T- connections from the universal dimmer main module and the universal dimmer submodule via a twisted pair of wires. After this connect the AC power line and switch the mains voltage on.

Connecting the twisted pair T+ / T-:
see figure 6 (commensurate with the bus line)

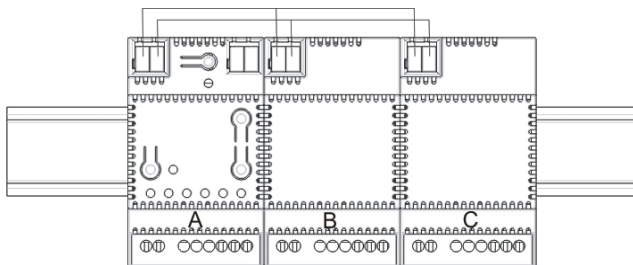


Figure 7. Connecting universal dimmer submodules

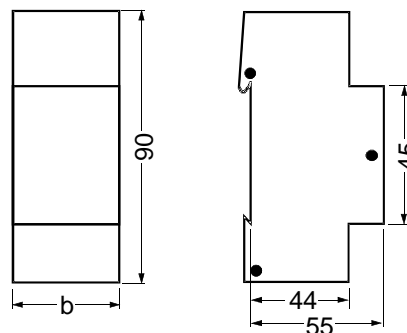
⚠ DANGER

- The system may only be installed and commissioned by an authorized electrician.
- If the phase conductor connected to the device is to be looped to one or more submodules, then the phase conductor is to be fused with a miniature circuit breaker with B or C characteristic for a rated current of 16A, in order that the maximum permissible terminal current is not exceeded.
- If the main module and the submodules connected to it are to be used on more than one phase, then the third harmonics of the load currents are summed in the jointly fed neutral conductor. In this way, the neutral conductor can be loaded more heavily than the phase conductors. The neutral conductor in this case is to be rated adequately or protected against excessive current, as there may otherwise be a fire risk.
- Running magnetic transformers at no load is prohibited both on start-up and in operation, because this may lead to damage to the device (even when the dimmer has cut off). This is to be ensured by connecting at least two lamps or transformers in parallel to an output. Failed lamps are to be replaced immediately.
- The device may only be operated vertically with the ventilation slots at the top and at the bottom. The device must be well ventilated. Heat dissipation must be ensured.

- This device contains a varistor. Due to a disruption of the neutral conductor, overvoltage or conventional transformers running at no load, damage may arise which can lead to the failure of the device at a later date. The conductors (outer and neutral conductor) are to be connected with each other for dielectric tests.
- For dielectric tests of cables, which measure core against core contrary to the current valid norm DIN VDE 0100 T. 610, the device must be disconnected, because otherwise it may be damaged.
- When connecting the device, it should be ensured that the device can be isolated.
- The device must not be opened.
- For planning and construction of electrical installations, the relevant guidelines, regulations and standards of the respective country are to be considered.

Dimension drawing

Dimensions in mm



b = 3 MU

1 Module Unit (MU) = 18 mm

General notes

- The operating instructions must be handed over to the client.
- Any faulty device is to be sent together with a return delivery note of the local Siemens office to:
Siemens AG, Siemensstr. 10, D-93055 Regensburg
- If you have further questions concerning the product, please contact our Technical Support:
☎ +49 (0) 180 50 50-222 (0,14€/min. from the German landline network, deviating mobile communications prices are possible)
☎ +49 (0) 180 50 50-223
E-Mail: support.automation@siemens.com
Internet: www.siemens.com/automation/service&support