Universal pushbutton dimmer ETD 2

(Rail mount version)

With central control inputs, front button and various operating modes and functions

General purpose, user-friendly electronic pushbutton dimmer for a wide variety of lamps (LED, CFL, incandescent, LV halogen with electronic or wound transformer, HV halogen)

Special features

- Dims suitable LED lamps, CFLs, incandescent lamps, LV halogen lamps with electronic or wound transformers and HV halogen lamps
- Dimming modes: forward phase control, reverse phase control, automatic detection of wound transformers, special dimming mode for CFLs (with delay for ignition and warm-up)
- Electronic short-circuit and overload protection
- Suitable for use with automatic demand switches – built-in base load and brightness memory
- Rated load for HV/LV incandescent lamps: up to 500 VA (up to 4x 500 VA with power extension)
- Rated load for LED/CFL: up to 400 VA with reverse phase control
- Three inputs (1, Z1, Z2) and additional front button individually programmable
- Z1 & Z2 electrically isolated, controllable using 8-230V UC
- Various configurable operating modes and functions: slumber, discrete dim up, sync, twilight/dawn simulation, minimum lighting (emergency lighting function), timer, pulse switching (like true pulse switches), etc.

General information

The ETD 2 electronic universal pushbutton dimmer can dim virtually any type of lamp (LED, CFL, incandescent, LV halogen with electronic or wound transformer, HV halogen) suitable for forward or reverse phase control.
Along with automatic detection of wound transformers in Auto dimming mode, the dimming mode can be set manually to forward or reverse phase control if necessary (especially for lamps with electronic ballasts). A special CFL dimming mode additionally provides an ignition and warm-up delay for compact fluorescent lamps.
The ETD 2 has two extra electrically isolated inputs that can also be used for group control. It can also be operated directly using a front button. All three inputs and the front button are individually programmable. This allows the dimmer to be switched and dimmed with one button, or alternatively with two buttons. Pure switching functions are also available. The memory function, slumber function, run time, soft up and down ramps, and initial brightness can also be configured.

Operation

A short button press toggles the lamp; a long press increases or reduces the brightness. Brief pauses at minimum and maximum brightness simplify setting the range limits.
Using special operating modes, a wide variety of functions can be assigned independently to inputs 1, Z1 and Z2 and the front button.

Switching functions

Switch on / dim up, switch off / dim down With this function the dimmer can also be controlled with two buttons. These two functions are additionally ideal for group control of several dimmers because they are unique.
Only toggle, only switch on, only switch off These pure switching functions allow the dimmer to be switched with one or two buttons (including group control) without changing the brightness. A defined initial brightness can also be set, making this function ideal for use in locations such as public buildings.
Switching sequence A suitably programmed input cycles through the switching sequence „maximum brightness, memory brightness, off“ with successive button presses.
Timer Ideal for controlling the dimmer with a timer. Since the on ramp and off ramp times can be set up to 30 minutes, this can also be used to simulate twilight. To enable the dimmer to be operated from the other inputs despite the constant connection to the timer contact, the dimmer only responds to pulse edges (signal level changes) with this function.

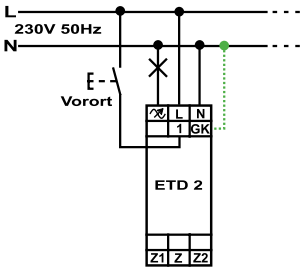
Slumber (e.g. for helping children get to sleep) When this function is activated by dimming the lamp, the light level is dimmed down very slowly, with a duration that depends on the brightness at the start of dimming (duration from maximum brightness: 60 min).
Discreet dim up In response to a long button press when the lamp is off, the dimmer switches on and dims up from the minimum brightness.
Sync If several dimmers are controlled by a single button, they may become unsynchronised because the button command (toggle) is not unambiguous. Synchronisation is achieved by holding the button pressed long enough (approximately 10 s) for all dimmers to dim down to minimum brightness and then stop at maximum brightness (maximum level).

Installation

The ETD 2 dimmer has a neutral line connection, so the lower load limit is 0 VA. However, the dimmer must be operated without a neutral connection with incandescent lamp loads over 100 W to avoid EMC problems. In this case the neutral terminal is jumpered to the load output. This has no effect on operation. If the dimmer is used in a circuit with an automatic demand switch, the integrated base load (GK terminal) must be connected to the N terminal (and thus to the load terminal as well with incandescent lamps over 100 W).

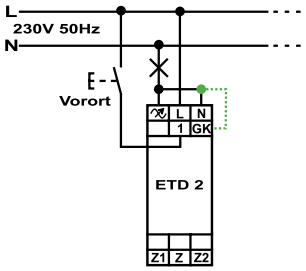
Standard connection

For dimmable LED, CFL and LV halogen lamps (with electronic or wound transformers) up to the maximum rated load, and for HV halogen and incandescent lamps up to 100 W

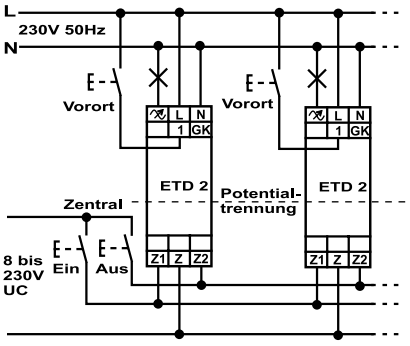


Connection without neutral line

For HV halogen and incandescent lamps over 100 W

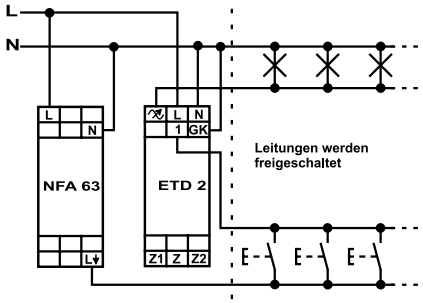


Connection with central control



Connection with an automatic demand switch

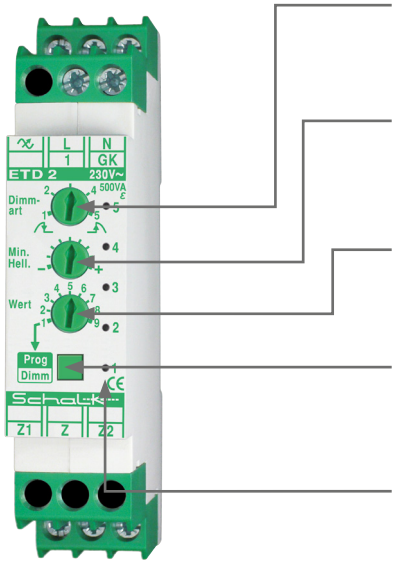
For incandescent lamps over 100 W



------- Optional; only necessary with an automatic demand switch

Settings and initial use

Controls and indicators:



„Dimmart“ („Dimming Mode“ control):
Used to select a suitable dimming mode for the lamp (see „Setting the dimming mode“)

„Min. Hell“ („Min. Brightness“ control):
Used to set the minimum lamp brightness (see „Setting the minimum brightness“)

„Wert“ („Value“ control):
Used to make settings in programming mode (run time, on and off ramp times, initial brightness)

Front button
Used in normal mode as a local dimming button and in programming mode as a setting button

LED‘s 1-5:
These LEDs show device status (operating state, selected function in programming mode, fault codes)

LED states:
○ LED off
● LED on
◔ LED blinking

Inputs:

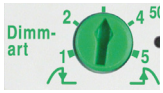
1	push button input (230V AC)
Z1	input 1 (8-230V UC)
Z2	input 2 (8-230V UC)

Definition of terms:

Dim on	Increase brightness from the off state (starting at minimum brightness if so configured)
Dim off	Reduce brightness to the off state
Mem/Memory	Brightness memory – the last set brightness is saved on switch-off and restored on the next switch-on
Sync	Synchronise – restore the synchronisation of several linked dimmers operated by a single button or signal input
Soft on/off	Soft on/off switching
Slumber	Function for very slow automatic dimming down (duration depends on starting brightness; max. 1 hour)
CFL	Compact fluorescent lamp
Electronic load	Any lamp with an electronic ballast or electronic transformer
Toggle	Switch on and off with a single button or signal input
HV incandescent lamps	Incandescent lamps operated directly from 230 V without a transformer
LV incandescent lamps	Low voltage incandescent lamps (e.g. 12 V) requiring a transformer (electronic or wound)

1. Setting the dimming mode

Set the „Dimming Mode“ control to a dimming mode suitable for the lamp (see table)



= **forward phase control**
= **reverse phase control**

Dimmart (= dimming mode)

All suitable dimmable lamps can usually be operated in dimming mode 3 (Automatic).
Exceptions:
- Dimming mode 5 must be selected for lamps with wound transformers in a circuit with an automatic demand switch.
- Dimming mode 2 (or if appropriate mode 4) must be selected for CFLs which require an ignition and warm-up time.

„Dimmart“ (dimming mode)	Description
1: Reverse phase control	For incandescent lamps, HV halogen lamps, LV halogen lamps with electronic transformers, and dimmable LED lamps
2: Reverse phase control with CFL mode	For dimmable CFLs which require an ignition and warm-up time
3: Automatic	For dimming nearly all loads with reverse phase control (with automatic change to forward phase control for wound transformers) *Not suitable for lamps with wound transformers in a circuit with an automatic demand switch; select dimming mode 5 instead.*
4: Forward phase control with CFL mode	For dimmable CFLs which require an ignition and warm-up time, and when dimming mode 2 does not provide smooth dimming.
5: Forward phase control	For dimming lamps with wound transformers located in a circuit with an automatic demand switch

CFL mode (dimming modes 2 and 4)
Most CFLs need full mains voltage for ignition. For this reason, this mode provides an ignition phase at half brightness before adjusting to the last (saved) brightness level. A warm-up phase with elevated minimum brightness is also provided because most CFLs have significantly reduced minimum dimming capability (without going out) when cold. The minimum brightness is gradually reduced to the normal value during the warm-up phase. The warm-up time depends on the off time, so the full warm-up time (max. 1 minute) is only used when the lamp has been off for an extended time. If a CFL is switched off at very low brightness and then switched on again when cold, the previous minimum brightness will be attained only after the warm-up phase.

Automatic detection of wound transformers (dimming mode 3)
Wound transformers must be dimmed with forward phase control because reverse phase control generates inductive reverse voltages that can destroy the dimmer if it does not detect them and switch off on time.
In this dimming mode the dimmer automatically changes to forward phase control after being switched on as soon as overvoltages (not yet dangerous) are detected. This setting is retained until loss of mains voltage. This dimming mode is not suitable for use with automatic demand switches because the mains voltage is always disconnected after the lights are switched off.

2. Setting the dimming mode

The minimum brightness should be set depending on the lamp so that the on state of the lamp can still be recognised at minimum brightness.

Switch on the dimmer and dim down as far as possible. Then set the minimum brightness to the desired level with the „Min. Brightness“ control.

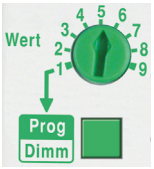
Min. Hell. = Min. Brightness control

3. Programming the functions and settings

Functions and additional options or settings can be assigned independently to the three inputs (1, Z1 and Z2) and the front button.

„Value“ control and front button

The „Value“ control is used to enable programming mode (turned to the left stop) and to set values for functions 13 to 16. The range of values depends on the selected function; see the „Settings“ table on the next page for suitable values for functions 13 to 15.



Value

Front button

Programming:
To enable programming mode, first **turn the „Value“ control to the left stop („Prog“)**. Then **press the front button for 2 seconds** to enter function selection mode. LED 1 lights up to indicate that function 1 is selected.

Now select a specific **function (1–21) by pressing the front button repeatedly** (if function 13–16 or 21 is selected, the value is taken directly from the position of the „Value“ control) and then **assign an input (1, Z1 or Z2) by briefly activating the input**. Note: The front button must be held for 2 seconds to assign the selected function to the front button.

Function selection mode is exited automatically after 20 seconds. Normal operation of the dimmer is not possible as long as the „Value“ control is in the „Prog“ position. After completing programming, turn the „Value“ control back from the „Prog“ position to exit programming mode and enable normal dimmer operation.

Programmable functions

LED display 5 4 3 2 1	Function	Description
○○○○●	**1: Toggling and dimming**	Brief button press = toggle; long button press = dim up/down
○○○●○	**2: Switch on / dim up**	Short button press = switch on; long button press = dim up
○○○●●	**3: Switch off / dim down**	Short button press = switch off; long button press = dim down
○○●○○	**4: Only toggle (pulse switch)**	Short button press = toggle (dimming not possible)
○○●○●	**5: Only switch on**	Short button press = switch on (dimming not possible)
○○●●○	**6: Only switch off**	Short button press = switch off (dimming not possible)
○○●●●	**7: Switching sequence (max. / memory / off)**	Repeated short button presses actuate the switching sequence: maximum brightness → memory brightness → off
○●○○○	**8: Timer**	Switching input signal level (edge triggered): on = switch on; off = switch off
○●○○●	**9: Option: Brightness memory**	On = switch on with previous brightness; Off = switch on with maximum brightness
○●○●○	**10: Option: Slumber**	On = slumber mode enabled; Off = slumber mode disabled
○●○●●	**11: Option: Time scale (ramp time)**	On = on/off ramp time settable up to 30 s; Off = on/off ramp time settable up to 30 min
○●●○○	**12: Option: Minimum lighting level**	On = dim down/ switch off stops at minimum brightness; Off = dim down / switch off stops in off state
○●●○●	**13: Setting: Run time**	The run time can be set up to 300 min with the „Value“ control
○●●●○	**14: Setting: Switch-on ramp**	The switch-on ramp time can be set with the „Value“ control up to 30 s or 30 min, depending on the setting in function 11
○●●●●	**15: Setting: Switch-off ramp**	The switch-off ramp time can be set with the „Value“ control up to 30 s or 30 min, depending on the setting of function 11
●○○○○	**16: Setting: Initial brightness**	Set the initial brightness with the „Value“ control (the dimmer switches on for this)
●○○○●	**17: Default settings**	Press the front button for 10 seconds to return all settings to the default values
●○○●○	**18: force OFF**	while this input is active, the dimmer remains in off state
●○○●●	**19: force minimum brightness**	while this input is active, a switch-off signal (via other control inputs) will cause the dimmer to dim to minimum brightness, but never completely switches off („emergency light function“)

LED display 5 4 3 2 1	Function	Description
●○●○○	**20: force ON (defined brightness)**	while this input is active, the dimmer remains switched ON at defined brightness (set by the „Value“ control)
●○●○●	**21: dim to defined brightness**	a pulse signal at this input causes the dimmer to dim to a defined brightness (set by the „Value“ control)

Table: Settings

Value	With function 14 or 15: **Short on/off ramp [s]** Prerequisite: Function 11 enabled	With function 14 or 15: **Long on/off ramp [min]** Prerequisite: Function 11 disabled	With function **13: Run time [min]**
1	1	0	0
2	2	4	12
3	3	8	30
4	4	11	55
5	6	15	90
6	13	19	130
7	19	23	180
8	23	27	240
9	30	30	300

Table: adjustment aid (function 13)

Run time [min]	Blink ratio LED ON/OFF [s]
> 0	0.1 / 0.1
> 6	0.1 / 0.2
> 12	0.1 / 0.4
> 30	0.1 / 0.8

Programming example

Assign the following functionality to button input 1:
Function 4: Only toggle (pulse switch) with option 12: Minimum lighting level
(this function is useful in locations such as corridors where it should not be possible to switch off the lighting completely with the normal light switch, such as in senior care facilities)

Turn the „Value“ control to the „Prog“ position (left stop) to enable programming mode.
To enter programming mode, press and hold the front button for 2 s until LED 1 lights up (function 1 selected).
Press the front button three times to select function 4 (LED 3 lit).
Briefly press the button connected to input 1 to assign the selected function to this input.
All LEDs go dark. Function selection mode has been exited.
To return to function selection mode, press and hold the front button for 2 s again until LED 1 lights up (function 1 selected).
Press the front button eleven times to select function 12 (LEDs 3 and 4 lit).
Briefly press the button connected to input 1 to activate the minimum lighting option.
All LEDs go dark. Function selection mode has been exited.

As long as the „Value“ control is in the „Prog“ position, normal dimmer operation is not possible. After completing programming, turn the „Value“ control back from the „Prog“ position to exit programming mode and enable normal dimmer operation.

Default settings

The following functions are preset in the default configuration:

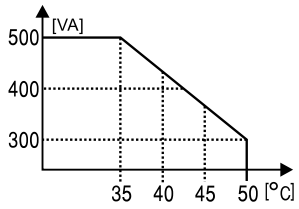
Front button	Function 1: Toggling and dimming
Input 1	Function 1: Toggling and dimming
Input Z1	Function 5: Only switch-on
Input Z2	Function 6: Only switch-off
Options	Memory always enabled, start and stop ramps set to minimum value (1 s) (function 11 activated). All other functions are deactivated.

Restoring default settings:
Turn the „Value“ control to the „Prog“ position (left stop) to enable programming mode.
To enter programming mode, press and hold the front button for 2 s until LED 1 lights up (function 1 selected).
Press the front button sixteen times to select function 17 (LEDs 1 and 5 lit).
Press and hold the front button longer than 10 seconds to restore the default settings.

As long as the „Value“ control is in the „Prog“ position, normal dimmer operation is not possible. After completing programming, turn the „Value“ control back from the „Prog“ position to exit programming mode and enable normal dimmer operation.

Ambient conditions and troubleshooting

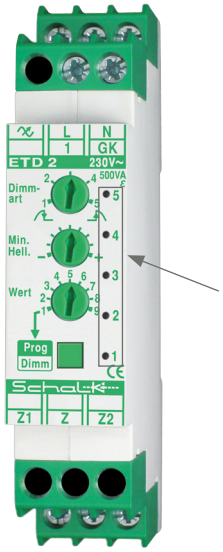
Allowable load:



Maximum allowable load versus ambient temperature (with adequate air circulation)

The efficiency of wound transformers and electronic loads (LEDs, CFLs and electronic transformers) must be taken into account. The (primary) VA value is the critical parameter for the dimmer. Electronic loads must be approved by the manufacturer for dimming with forward or reverse phase control dimmers.
The dimmer heats up during operation, depending on the connected load. The connected load must be reduced if this heat cannot be dissipated adequately. Do not mount dimmers immediately next to each other or next to heat sources; always leave a gap.

LED status display:



LED display in normal operation

LED display	Description
LEDs lit continuously	Display of selected function in programming mode
LEDs blink quickly	Display of function assigned to currently activated input
LEDs blink every 3 seconds	Fault display (see table below)
LEDs light up in fast sequence (5...1)	Run time expiring
LEDs light up in slow sequence (2...4)	Up ramp active (brightness increased to nominal level)
LEDs light up in slow sequence (4...2)	Down ramp active (brightness reduced to off state)
LEDs 2 and 4 blink alternately	On state without run time (nominal brightness already reached)
LED 5 blinks intermittently	Dimming mode has been changed

LED display in fault mode

LED display 1 2 3 4 5	Fault
◐○○○○	**1: Overload > 500 VA**
○◐○○○	**2: Overtemperature**
◐◐○○○	**3: Overcurrent (short-circuit)**
○○◐○○	**4: Transformer reverse voltage**
◐○◐○○	**5: Transformer saturation (unbalanced load)**
○◐◐○○	**6: Overload > 900 VA**
◐◐◐○○	**7: Mains overvoltage**
○○○◐○	**8: Synchronisation fault**
◐○○◐○	**9: Memory fault**
○◐○◐○	**10: Current peaks (to high capacitive load at LEDs/forward phase control operation)**

There is a restart lockout interval of up to 10 seconds after an overload, overtemperature, overcurrent or overvoltage condition to allow the heated components to cool down.

General information

Lamps approved for the same dimming mode can usually be used together. Incandescent lamps may always be operated in parallel. However, functional impairments occur fairly often when electronic loads from different manufacturers are operated in parallel, due to mutual interference of manufacturer-specific ballasts and/or electronic transformers. Wound transformers may not be combined with electronic loads.
The dimmer is designed to work with as many different types of lamps as possible. However, it is not possible to guarantee trouble-free operation of every dimmable lamp with the dimmer, since this can be affected by the design or construction of the lamp ballast or transformer.
Flickering or erratic dimming in the low brightness range with LED lamps and CFLs is usually due to the lamp being designed for higher minimum input power. We recommend raising the minimum brightness setting in such cases.
Ripple control signals from electricity plants can lead to perceptible flickering of the lighting. The magnitude of this effect varies from one region to the next.

Technical data

Operating voltage	230V AC 50 Hz
Power consumption	0.3 W in off state
Power dissipation	max. 2W bei 500VA Last
Rated load	
Incandescent, HV and LV halogen lamps, wound or electronic transformers	500 VA with ambient temperatures up to 35°C; 300 VA with ambient temperatures up to 50°C
LED/CFL	Up to 400 VA (lamps of the same make recommended). **Differences in manufacture-specific ballast or electronic transformer circuitry may lead to restrictions on load capacity, the maximum number of lamps or the dimming and/or switching functions.**
Input 1:	
Wiring capacitance on terminal 1	max. 100 nF
Glow lamp load on terminal 1	max. 20 mA
Inputs Z1, Z2:	
Wiring capacitance on terminal Z1/Z2	max. 20nF
Glow lamp load on terminal Z1/Z2	max. 1mA
Ambient temperature range	-10°C to +50°C (reduced power above +35°C)
Connections	Socket terminals with captive screws M3.5
Clamping range	0.5 mm² - 4.0 mm²
Strip length	6.0 mm - 6.5 mm
Screwing torque	0.80 Nm
Mounting	Click-mount on standard 35-mm rail (EN 60715)
Outside dimensions	18 x 88(45) x 58 mm
Weight	80 g
Installation depth	55 mm
RAL colour	Grey 7035 / Green 6029

Order data

Item no.	EAN	Typ e	Item designation
ETD209	4 046929 201124	ETD 2	Universal Pushbutton Dimmer (REB), also for LED/CFL, with Z input

2017-05-01