



Flush Dimmer 0-10V

ORDERING CODE	Z-WAVE FREQUENCY
ZMNHVD1	868,4 MHz
ZMNHVD2	921,4 MHz
ZMNHVD3	908,4 MHz
ZMNHVD4	869,0 MHz
ZMNHVD5	916,0 MHz
ZMNHVD8	865,2 MHz

Universal dimmer module with a standard 0-10V output and a multi-function input, which may be a push button / switch, a potentiometer or 0-10V signal

Supported control types

- Push button (mono stable switch)
- Bi stable switch
- Potentiometer
- 0-10V input (requires external source)

Installation

- Before the installation disconnect power supply (12-24VDC)
- Connect the module according to electrical diagram.
- Locate the antenna far from metal elements (as far as possible).
- Do not shorten the antenna.

Danger of electrocution!

- Module installation requires a great degree of skill and may be performed only by a qualified and licensed electrician.
- Even when the module is turned off, voltage may be present on its terminals. Any works on configuration changes related to connection mode or load must be always performed by disconnected power supply (disable the fuse).

Note!

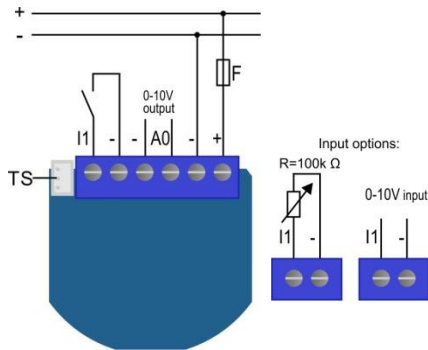
Do not connect the module to loads exceeding recommended values. Connect the module only in accordance to the below diagrams. Improper connections may be dangerous.

- For overload protection use fuse F (ESKA 522.504 50mA 250V) according to Electrical diagram.

Package contents:

- Flush Dimmer 0-10V

Electrical diagram



Notes for the diagram:

- +** 12 - 24VDC
- GND
- AO** 0 - 10VDC
- I1** Input for push button/switch/potentiometer or 0-10V
- TS** Terminal for digital temperature sensor (only for Flush Dimmer 0-10V module compatible digital temperature sensor, which must be ordered separately).



S Service button (used to add or remove module from the Z-Wave network).

Module Inclusion (Adding to Z-Wave network)

- Connect module to power supply (with temperature sensor connected - if purchased), enable add/remove mode on main controller
- auto-inclusion (works for about 5 seconds after connected to power supply) or
- press service button **S** for more than 2 second or
- press push button **I1** three times within 3s (3 times change switch state within 3 seconds).

NOTE1: For auto-inclusion procedure, first set main controller into inclusion mode and then connect module to power supply.

NOTE2: When connecting temperature sensor to module that has already been included, you have to exclude module first. Switch off power supply, connect the sensor and re-include the module.

Module Exclusion/Reset (Removing from Z-Wave network)

- Connect module to power supply
- bring module within maximum 1 meter (3 feet) of the main controller,
- enable add/remove mode on main controller,
- press push button **I1** five times within 3s (5 times change switch state within 3 seconds) in the first 60 seconds after the module is connected to the power supply or

- press service button **S** (only applicable for 24 V SELV supply voltage) for more than 6 second.

By this function all parameters of the module are set to default values and own ID is deleted. If push button **I1** is pressed three times within 3s (or service button **S** is pressed more than 2 and less than 6 seconds) module is excluded, but configuration parameters are not set to default values.

NOTE: If the module is included with parameter 1 value 3, 4 or 5 and module reset is done, wait at least 30s before next inclusion.

NOTE: Please use this procedure only when the network primary controller is missing or otherwise inoperable.

Association

Association enables Flush Dimmer 0-10V module to transfer commands inside Z-Wave network directly (without main controller) to other Z-Wave modules.

Associated Groups:

- Group 1: Lifeline group (reserved for communication with the main controller), 1 node allowed.
- Group 2: basic on/off (triggered at change of the input I1 state and reflecting its state) up to 16 nodes
- Group 3: start level change/stop level change (triggered at change of the input I1 state and reflecting its state) up to 16 nodes. Working only when the Parameter no. 1 is set to mono stable switch type.
- Group 4: multilevel set (triggered at changes of state/value of the Flush Dimmer 0-10V) up to 16 nodes. Working only when the Parameter no. 1 is set to mono stable switch type.
- Group 5: multilevel sensor report (triggered at change of analogue sensor) up to 16 nodes.
- Group 6: multilevel sensor report (triggered at change of temperature sensor) up to 16 nodes.

Endpoint 1:

- Group 1: Lifeline group, 0 nodes allowed.
- Group 2: basic on/off (triggered at change of the input I1 state and reflecting its state) up to 16 nodes
- Group 3: start level change / stop level change (triggered at change of the input I1 state and reflecting its state) up to 16 nodes
- Group 4: multilevel set (triggered at changes of state / value of the Flush Dimmer 0-10V) up to 16 nodes

Endpoint 2:

- Group 1: Lifeline group, 0 nodes allowed.
- Group 2: multilevel sensor report (triggered at change of analogue sensor) up to 16 nodes.

Endpoint 3:

- Group 1: Lifeline group, 0 nodes allowed.
- Group 2: multilevel sensor report (triggered at change of temperature sensor) up to 16 nodes.

Configuration parameters

Parameter no. 1 – Input 1 type

By this parameter the user can set input based on device type (switch, potentiometer, 0-10V sensor,...). Available configuration parameters (data type is 1 Byte DEC):

- default value 0
- 0 - mono-stable switch type (push button) – button quick press turns between previous set dimmer value and zero)
- 1 - Bi-stable switch type
- 2 - Potentiometer (Flush Dimmer 0-10V is using set value the last received from potentiometer or from Z-wave controller)
- 3 - 0-10V Temperature sensor (regulated output)
- 4 - 0-10V Illumination sensor (regulated output)

- 5 - 0-10V General purpose sensor (regulated output)
- NOTE:** After parameter change to value 3, 4 or 5 first exclude module (without setting parameters to default value) then wait at least 30s and then re include the module!

Parameter no. 10 - Activate / deactivate functions ALL ON / ALL OFF

Available configuration parameters (data type is 2 Byte DEC):

- default value 255
- 255 - ALL ON active, ALL OFF active.
- 0 - ALL ON is not active, ALL OFF is not active
- 1 - ALL ON is not active, ALL OFF active
- 2 - ALL ON active, ALL OFF is not active

Flush Dimmer 0-10V module responds to commands ALL ON / ALL OFF that may be sent by the main controller or by other controller belonging to the system.

Parameter no. 11 - Automatic turning off output after set time

Turns off the output after set time. Available configuration parameters (data type is 2 Byte DEC):

- default value 0
- 0 - Auto OFF disabled
- 1 - 32536 = 1second - 32536 seconds Auto OFF enabled with define time, step is 1 second.

Parameter no. 12 - Automatic turning on output after set time

Turns on the output after set time. Available configuration parameters (data type is 2 Byte DEC):

- default value 0
- 0 - Auto ON disabled
- 1 - 32535 = 1second - 32535 seconds Auto ON enabled with define time, step is 1 second.

Parameter no. 21 – Enable/Disable Double click function

If Double click function is enabled, a fast double click on the push button will set dimming power at maximum dimming value. Available configuration parameters (data type is 1 Byte DEC):

- default value 0
- 0 - Double click disabled
- 1 - Double click enabled

Valid only if input is set as mono-stable (push button).

Parameter no. 30 - Saving the state of the device after a power failure

Based on the parameter settings the stores/does not store the last value of the output after power failure. Available configuration parameters (data type is 1 Byte DEC):

- default value 0
- 0 - Flush Dimmer 0-10V module saves its state before power failure (it returns to the last position saved before a power failure).
- 1 - Flush Dimmer 0-10V module does not save the state after a power failure, it returns to "off" position.

Parameter no. 52 – Auto or manual selection

This parameter is influencing on the software only when the value of parameter number 1 is set to value 3, 4 or 5. Available configuration parameters (data type is 1 Byte DEC):

- default value 0
- 0 - Manual
- 1 - Auto

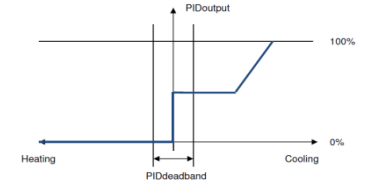
In manual mode regulation (how the input influence on output) is disabled

Parameter no. 53 - PID value inside deadband

Available config. parameters (data type is 1 Byte DEC):

- default value 0 (PID value equal ZERO)
- 1 - PID value set to LAST VALUE

NOTE: When ZERO PID inside deadband is forced to zero. LASTVALUE means that PID remains on same level as was before entering into deadband



Parameter no. 54 - PID deadband

Available config. parameters (data type is 1 Byte DEC):

- default value 1 (1%)
- 0 - 100 - 0 - 100%, step is 1%

NOTE: This parameter defines the zone where PID is not active. If the temperature difference between actual and setpoint is bigger than PID deadband, then the PID will start to regulate the system, otherwise the PID is zero or fixed.

Parameter no. 55 - Integral sampling time

Available config. parameters (data type is 1 Byte DEC):

- default value 5 (5s)
- 0 - 127 - 0s to 127s, step is 1s

Parameter defines the time between samples. On each sample the controller capture difference between SP-act.

Parameter no. 56 - P parameter

The error is multiplied by a negative (for reverse action) proportional constant P, and added to the current output. P represents the band over which a controller's output is proportional to the error of the system. E.g. for a heater, a controller with a proportional band of 10 deg C and a setpoint of 100 deg C would have an output of 100% up to 90 deg C, 50% at 95 Deg C and 10% at 99 deg C. If the temperature overshoots the setpoint value, the heating power would be cut back further. Proportional only control can provide a stable process temperature but there will always be an error between the required setpoint and the actual process temperature. Available config. parameters (data type is 2 Byte DEC):

- default value 100
- 0 -1000 - P value, step is 1

Parameter no. 57 - I parameter

The error is integrated (averaged) over a period of time, and then multiplied by a constant I, and added to the current control output. I represents the steady state error of the system and will remove setpoint / measured value errors. For many applications Proportional + Integral control will be satisfactory with good stability and at the desired setpoint.

Available config. parameters (data type is 2 Byte DEC):

- default value 1
- 0 - 1000 - I value, step is 1

Parameter no. 58 - D parameter

The rate of change of the error is calculated with respect to time, multiplied by another constant D, and added to the output. The derivative term is used to determine a controller's response to a change or disturbance of the process temperature (e.g. opening an oven door). The larger the derivative term, the more rapidly the controller will respond to changes in the process value.

Available config. parameters (data type is 2 Byte DEC):

- default value 1
- 0 - 1000 - D value, step is 1

Parameter no. 60 – Minimum dimming value

Available configuration parameters (data type is 1 Byte DEC):

- default value 1 = 1% (minimum dimming value)
- 1 - 98 = 1% - 98%, step is 1%. Minimum dimming values is set by entered value.

NOTE: The minimum level may not be higher than the maximum level! 1% min. dimming value is defined by Z-Wave multilevel device class. When the switch type is selected as Bi-stable, it is not possible to dim the value between min and max. If Switch_multilevel_set is set to the value "0", the output is turned OFF. If Switch_multilevel_set is set to the value "1", the output is set to the minimum dimming value.

Parameter no. 61 – Maximum dimming value

Available configuration parameters (data type is 1 Byte DEC):

- default value 99 = 99% (Maximum dimming value)
- 2 - 99 = 2% - 99%, step is 1%. Maximum dimming values is set by entered value.

NOTE: The maximum level may not be lower than the minimum level! 99% max. dimming value is defined by Z-Wave multilevel device class. When the switch type is selected as Bi-stable, it is not possible to dim the value between min and max.

Parameter no. 65 – Dimming time (soft on/off)

Set value means time of moving the Flush Dimmer 0-10V between min. and max. dimming values by short press of push button I1 or controlled through UI (BasicSet). Available config. parameters (data type is 2 Byte DEC):

- default value 100 = 1s
- 50 - 255 = 500 mseconds - 2550 mseconds (2,55s), step is 10 mseconds

Parameter no. 66 – Dimming time when key pressed

Time of moving the Flush Dimmer 0-10V between min. and max dimming values by continues hold of push button I1 or associated device. Available configuration parameters (data type is 2 Byte DEC):

- default value 3 = 3s
- 1 - 255 = 1 second - 255 seconds

Parameter no. 67 – Ignore start level

This parameter is used with association group 3.

A receiving device SHOULD respect the start level if the Ignore Start Level bit is 0. A receiving device MUST ignore the start level if the Ignore Start Level bit is 1. Available configuration parameters (data type is 1 Byte DEC):

- default value 0 (respect start level)
- 1 - (ignore start level)

Parameter no. 68 – Dimming duration

This parameter is used with association group 3.

The Duration field MUST specify the time that the transition should take from the current value to the new target value. A supporting device SHOULD respect the specified Duration value. Available configuration parameters (data type is 1 Byte DEC):

- default value 0 (dimming duration according to parameter 66)
- 1 – 127 (from 1 to 127 seconds)

Parameter no. 110 – Temperature sensor offset settings

Set value is added or subtracted to actual measured value by sensor. Available configuration parameters (data type is 2 Byte DEC):

- default value 32536
- 32536 - offset is 0.0C
- From 1 to 100 - value from 0.1 °C to 10.0 °C is added to actual measured temperature.
- From 1001 to 1100 - value from -0.1 °C to -10.0 °C is subtracted to actual measured temperature.

Parameter no. 120 – Digital temperature sensor reporting

If digital temperature sensor is connected, module reports measured temperature on temperature change defined by this parameter. Available configuration parameters (data type is 1 Byte DEC):

- default value 5 = 0,5°C change
- 0 - Reporting disabled
- 1 - 127 = 0,1°C - 12,7°C, step is 0,1°C

Parameter no. 140 – Input I1 Sensor reporting

If analogue sensor is connected, module reports measured value on change defined by this parameter. Available configuration parameters (data type is 2 Byte DEC):

- default value 5 = 0,5 change
- 0 - Reporting disabled
- 1 - 10000 = 0,1 - 1000 step is 0,1

NOTE: This value has influence only when the Parameter no. 1 is set to 3, 4 or 5.

Parameter no. 141 Input I1 0-10V reporting threshold

Parameter is associated with Association group No. 2. Below this value, the Association No. 2 will report Basic Set 0xFF and above this value will report Basic Set 0xFF. Basic Set is reported only, when the input value changes for more than 10% (1V). Available configuration parameters (data type is 1 Byte DEC):

- Default setting: 5 (0,5V)
- 1 - 100 - (0,1 - 10V)

Parameter no. 143 – Minimum sensor range value

Value that must correspond to minimum sensor range value. Valid only if parameter 1 is set to values 3, 4 or 5). Available configuration parameters (data type is 2 Byte DEC):

- default value 0 = 0.0°C / 0Lux / 0.0%rh
- 0 - 10000 – value from 0 to 1000 (resolution 0,1)
- 10001 – 20000 – value from -0,1 to -1000 (resolution 0,1)

NOTE: Minimum value must not be higher than maximum value!

Parameter no. 144 – Maximum sensor range value

Value that must correspond to maximum sensor range value. Valid only if parameter 1 is set to values 3, 4 or 5). Available configuration parameters (data type is 2 Byte DEC):

- default value 1000 = 100.0°C / 100Lux / 100%rh
- 0 - 10000 – value from 0 to 1000 (resolution 0,1)
- 10001 – 20000 – value from -0,1 to -1000 (resolution 0,1)

NOTE: Maximum value must not be lower than minimum value!

Parameter No. 250 – Unsecure / Secure Inclusion

Available configuration parameter (data type is 1 Byte Dec):

- default Value 0
- 0 – Unsecure Inclusion
- 1 – Secure Inclusion

A Flush dimmer supports secure and unsecure inclusion. Even if the controller does not support security command

classes, a dimmer could be included as unsecure and keep all the functionality.

Technical Specifications

Power supply	12-24VDC
Max. sinking control voltage	-20 / +20VDC
Max. sourcing control voltage	0-11VDC
Accuracy	<3% FS
Max. sinking current	2mA
Max. sourcing current	7mA
Digital temperature sensor range (sensor must be ordered separately)	50 ~ +125°C
Operation temperature	-10 ~ +40°C
Distance	up to 30 m indoors (depending on building materials)
Dimensions (WxHxD) (package)	41,8x36,8x15,4mm (79x52x22)
Weight (Brutto with package)	28g (34g)
Electricity consumption	0,5W

Z-Wave Device Class:

ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_ALWAYS_ON
GENERIC_TYPE_SWITCH_MULTILEVEL
SPECIFIC_TYPE_NOT_USED

Z-Wave Supported Command Classes:

COMMAND_CLASS_ZWAVEPLUS_INFO
COMMAND_CLASS_VERSION
COMMAND_CLASS_MANUFACTURER_SPECIFIC
COMMAND_CLASS_DEVICE_RESET_LOCALLY
COMMAND_CLASS_POWERLEVEL
COMMAND_CLASS_SWITCH_ALL
COMMAND_CLASS_SWITCH_BINARY
COMMAND_CLASS_SWITCH_MULTILEVEL
COMMAND_CLASS_SENSOR_MULTILEVE
COMMAND_CLASS_MULTI_CHANNEL
COMMAND_CLASS_ASSOCIATION
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION
COMMAND_CLASS_ASSOCIATION_GRP_INFO
COMMAND_CLASS_CONFIGURATION
COMMAND_CLASS_MARK
COMMAND_CLASS_BASIC
COMMAND_CLASS_SWITCH_MULTILEVEL

Endpoint 1

Device Class:

ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_ALWAYS_ON
GENERIC_TYPE_SWITCH_MULTILEVEL
SPECIFIC_TYPE_NOT_USED

Command Classes:

COMMAND_CLASS_ZWAVEPLUS_INFO
COMMAND_CLASS_VERSION
COMMAND_CLASS_SWITCH_ALL
COMMAND_CLASS_SWITCH_BINARY
COMMAND_CLASS_SWITCH_MULTILEVEL

COMMAND_CLASS_ASSOCIATION
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION
COMMAND_CLASS_ASSOCIATION_GRP_INFO
COMMAND_CLASS_MARK
COMMAND_CLASS_BASIC
COMMAND_CLASS_SWITCH_MULTILEVEL

Endpoint 2:

Device Class:

ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_ALWAYS_ON
GENERIC_TYPE_SENSOR_MULTILEVEL
SPECIFIC_TYPE_ROUTING_SENSOR_MULTILEVEL

Command Classes:

COMMAND_CLASS_ZWAVEPLUS_INFO
COMMAND_CLASS_VERSION
COMMAND_CLASS_ASSOCIATION
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION
COMMAND_CLASS_ASSOCIATION_GRP_INFO
COMMAND_CLASS_SENSOR_MULTILEVEL

Endpoint 3:

Device Class:

ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_ALWAYS_ON
GENERIC_TYPE_SENSOR_MULTILEVEL
SPECIFIC_TYPE_ROUTING_SENSOR_MULTILEVEL

Command Classes:

COMMAND_CLASS_ZWAVEPLUS_INFO
COMMAND_CLASS_VERSION
COMMAND_CLASS_ASSOCIATION
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION
COMMAND_CLASS_ASSOCIATION_GRP_INFO
COMMAND_CLASS_SENSOR_MULTILEVEL

NOTE: The above list is valid for the product with a temperature sensor connected to TS terminal. In case the sensor is not connected then following command class isn't supported:
COMMAND_CLASS_SENSOR_MULTILEVEL_V7
This product can be included and operated in any Z-Wave network with other Z-Wave certified devices from any other manufacturers. All constantly powered nodes in the same network will act as repeaters regardless of the vendor in order to increase reliability of the network.

COMMAND_CLASS_BASIC:

- The module will be turned ON or OFF after receiving the BASIC_SET command. To be turned ON: [Command Class Basic , Basic Set, Basic Value = 0x01-0x63 in percentage; FF set to last value]
- To be turned OFF:[Command Class Basic , Basic Set, Basic Value = 0x00]

This Security Enabled Z-Wave Plus product can be included and operated in any Z-Wave network with other Z-Wave certified devices from any other manufacturers. All constantly powered nodes in the same network will act as repeaters regardless of the vendor in order to increase reliability of the network.

Important disclaimer

Z-Wave wireless communication is inherently not always 100% reliable, and as such, this product should not be used in situations in which life and/or valuables are solely dependent on its function.

Warning!

Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities. Contact your local government for information regarding the collection systems available. If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being. When replacing old appliances with new ones, the retailer is legally obligated to take back your old appliance for disposal at least for free of charge. This user manual is subject to change and improvement without notice.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radi-ate radio frequency energy and, if not in-stalled and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/ TV technician for help.

NOTE:User manual is valid for module with SW version S2 (SW version is part of P/N!) Example: P/N: ZMNHVDx HxS2Px



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