

## Flush PWM thermostat

ORDERING CODE	Z-WAVE FREQUENCY
ZMNHLA2	868,4 MHz
ZMNHLA3	921,4 MHz
ZMNHLA4	908,4 MHz
ZMNHLA5	869,0 MHz
ZMNHLA6	916,0 MHz

This Z-Wave module is used to regulate temperature. Regulation is done using full wave PWM technology. The module can be controlled either through Z-wave network or through the wall switch. The module is designed to be mounted inside a "flush mounting box" and is hidden behind a traditional wall switch. Module measures power consumption of connected device. It is designed to act as repeater in order to improve range and stability of Z-wave network.

### Supported switches

Module supports **mono-stable** switches (push button) and **bi-stable** switches. The module is factory set to operate with bi-stable switches.

### Installation

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

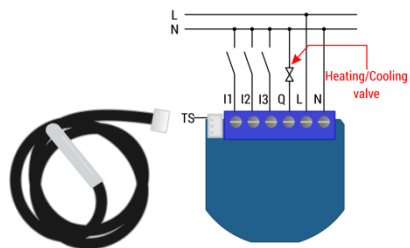
### Danger of electrocution!

- 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).

### Package contents:

- Flush PWM thermostat + Temperature sensor

### Electrical diagram 230VAC

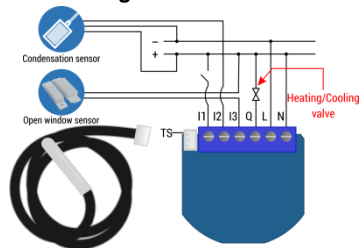


### Notes for the diagram:

- N** Neutral lead
- L** Live lead
- Q** Output
- I3** Input for switch /push button or sensor\*
- I2** Input for switch /push button or sensor\*
- I1** Input for switch /push button or sensor\*
- TS** Terminal for digital temperature sensor (only for Flush PWM thermostat module compatible digital temperature sensor).

\*For details please check parameters 11, 12 and 13 description

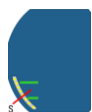
### Electrical diagram 24VDC



### Notes for the diagram:

- N** + VDC
- L** - VDC
- Q** Output
- I3** Input for switch /push button or sensor\*
- I2** Input for switch /push button or sensor\*
- I1** Input for switch /push button or sensor\*
- TS** Terminal for digital temperature sensor (only for Flush PWM thermostat module compatible digital temperature sensor).

\*For details please check parameters 11, 12 and 13 description



**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),
- bring module within maximum 1 meter (3 feet) of the main controller,
- enable add/remove mode on main controller,
- auto-inclusion (30 minutes after connected to power supply) or
- press service button **S** for more than 2 seconds or
- press push button **I1** three times within 3s (3 times change switch state within 3 seconds).

### 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 service button **S** for more than 6 seconds or
- 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.

By this function all parameters of the module are set to default values and own ID is deleted.

If service button **S** is pressed more than 2 and less than 6 second module is excluded, but configuration parameters are not set to default values.

### Association

Association enables Flush PWM thermostat module to transfer commands inside Z-Wave network directly (without main controller) to other Z-Wave modules:

#### Associated Groups:

- Group 1: basic on/off (triggered at change of the output Q state and reflecting its state) up to 16 nodes.
- Group 2: basic on/off (triggered at change of the input I2 state and reflecting its state) up to 16 nodes.
- Group 3: basic on/off (triggered at change of the input I3 state and reflecting its state) up to 16 nodes.
- Group 4: basic on/off (triggered by Too high temperature limit, it send FF) up to 16 nodes.
- Group 5: basic on/off (triggered by Too low temperature limit, it send FF) up to 16 nodes.
- Group 6: default reporting group (reserved for the main controller)

### Configuration parameters

#### Parameter no. 1 – Input 1 switch type

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

- default value 1
- 0 mono-stable switch type (push button)
- 1 bi-stable switch type

#### Parameter no. 2 – Input 2 switch type

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

- default value 1
- 0 mono-stable switch type (push button)
- 1 bi-stable switch type

#### Parameter no. 3 – Input 3 switch type

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

- default value 1
- 0 mono-stable switch type (push button)
- 1 bi-stable switch type

#### Parameter no. 4 – Input 1 contact type

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

- default value 0
- 0 NO (normally open) input type
- 1 NC (normally close) input type

#### Parameter no. 5 – Input 2 contact type

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

- default value 0
- 0 NO (normally open) input type
- 1 NC (normally close) input type

#### Parameter no. 6 – Input 3 contact type

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

- default value 0
- 0 NO (normally open) input type
- 1 NC (normally close) input type

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

Available configuration parameters (data type is 1 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 PWM thermostat 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- I1 Functionality selection

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

- default value 1
- 65535 – input I1 does not influence on the heat/ cool process
- 1 – input I1 changes the mode of the thermostat between Off and Auto. In this case function on flood sensor (if connected) is disabled.
- 2 – input I1 influences on cooling and heating valves according to status of flood sensor. In this case function of Off and Auto selection by I1 is disabled.

#### Parameter no. 12 – I2 Functionality selection

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

- default value 65535
- 65535 – input I2 does not influence on the heat/ cool process
- From 0 to 990 – Temperature set point from 0.0 °C to 99.0 °C. When I2 is pressed, temperature set point is automatically set to value defined here. In this case function of condense sensor is disabled.
- From 1001 to 1150 – Temperature set point from -0.1 °C to -15.0 °C. When I2 is pressed, temperature setpoint is automatically set to value defined here. In this case function of condense sensor is disabled.
- 2000 – Input I2 influences on the cooling valve according to status of condense sensor, In this case function of setpoint selection with I2 is disabled.

#### Parameter no. 13 – I3 Functionality selection

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

- default value 65535
- 65535 – input I3 does not influence on the heat/ cool process
- 1 – input I3 changes the mode of the thermostat between Heat and Cool. In this case function on window sensor is disabled.
- 2 – input I3 influences on cooling and heating valves according to status of window sensor. In this case function of Heat and Cool selection by I3 is disabled.

#### Parameter no. 40 – Power reporting in Watts on power change

Set value means percentage, set value from 0 - 100=0% - 100%.

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

- default value 0
- 0 – Reporting Disabled
- 1–100 = 1%-100% Reporting enabled. Power report is send (push)

only when actual power in Watts in real time changes for more than set percentage comparing to previous actual power in Watts, step is 1%.

**NOTE:** If power changed is less than 1W, the report is not send (pushed), independent of percentage set.

#### Parameter no. 42 – Power reporting in Watts by time interval

Set value means time interval (0 – 32767) in seconds, when power report is send. Available configuration parameters (data type is 2 Byte DEC):

- default value 300 (power report in Watts is send each 300s)
- 0 – Reporting Disabled
- 1 – 32767 = 1 second – 32767 seconds. Reporting enabled. Power report is send with time interval set by entered value.

#### Parameter no. 45 – Antifreeze

Set value means at which temperature the device will be turned on even if the thermostat was manually set to off. Parameter can be set from 0 to 255 where 0 to 127 means from 0.0 °C to 12.7 °C and from 128 to 254 means from -0.1 °C to -12.6 °C. Available configuration parameters (data type is 1 Byte DEC):

- default value 50 (5,0 °C)
- 255 – Antifreeze functionality disabled

**NOTE:** Antifreeze is activated only in heating mode

#### Parameter no. 50 - PWM maximum value

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

- default value 100 (Maximum PWM value)
- 2–100 = 2%-100%, step is 1%. Max. PWM set by entered value.

**NOTE:** The maximum level may not be lower than the minimum level!

#### Parameter no. 51 - PWM minimum value

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

- Default value 0 (Minimum PWM value is 0%)
- 1- 99 = 1% – 99%, step is 1%. Minimum PWM set by entered value.

**NOTE:** The minimum level may not exceed maximum level!

#### Parameter no. 52 - PWM cycle duration

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

- Default value 10 (Cycle duration set to 10s)
- 1-127 = 1–127s, step is 1s. PWM cycle duration set by entered value.

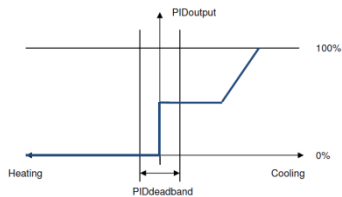
**NOTE:** PWM cycle duration define the summary of all ON plus OFF time periods. For example if Output is set to 70% with PWM cycle duration of 20s, output will be ON for 14s then OFF 6s, again 14s ON, etc...

#### Parameter no. 53 - PID value inside deadband

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

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

**NOTE:** When value is set to 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 configuration parameters (data type is 1 Byte DEC):

- default value 5 (0,5 °C)
- 0-127 – 0.0 °C to 12.7 °C, step is 0,1°C

**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 configuration 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

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

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

#### Parameter no. 57 - I parameter

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

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

#### Parameter no. 58 - D parameter

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

- default value 1
- 0 - 1000 – 0s-DI value, step is 1

#### Parameter no. 59 - Thermostat control

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

- default value 0
- 0 - Heat mode
- 1 - Cool mode

#### Parameter no. 60 – Too low temperature limit

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

- Default value 50 (Too low temperature limit is 5.0°C)
- 1 - 1000 = 0.1°C – 100.0°C, step is 0.1°C. Too low temperature limit is set by entered value. In case measured temperature is below set value, module sends BasicSet value. Look chapter associations.

#### Parameter no. 61 – Too high temperature limit

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

- Default value 700 (too high temperature limit is 70.0°C)
- 1 - 1000 = 0.1°C – 100.0°C, step is 0.1°C. Too high temperature limit is set by entered value. In case measured temperature is higher than set value, module sends BasicSet value. Look chapter associations.

#### Parameter no. 63 – Output Switch selection

Set value means the type of the device that is connected to the PWM output. The device type can be normally open (NO) or normally close (NC).

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

- default value 0
- 0 - When system is turned off the output is 0V (NC).
- 1 - When system is turned off the output is 230V (NO).

#### Parameter no. 70 – Input 1 status on delay

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

- default value 0
- 1 – 32000 seconds

If the value of parameter is different to 0, means that the Influence of this input to heating or cooling will react after inserted time. Parameter 11 must be set to 2!

**NOTE:** Device status on UI change immediately

#### Parameter no. 71 – Input 1 status off delay

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

- default value 0
- 1 – 32000 seconds

If the value of parameter is different to 0, means that the Influence of this input to heating or cooling will react after inserted time. Parameter 11 must be set to 2!

**NOTE:** Device status on UI change immediately

#### Parameter no. 72 – Input 2 status on delay

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

- default value 0
- 1 – 32000 seconds

If the value of parameter is different to 0, means that the Influence of this input to heating or cooling will react after inserted time. Parameter 12 must be set to 2000!

#### Parameter no. 73 – Input 2 status off delay

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

- default value 0
- 1 – 32000 seconds

If the value of parameter is different to 0, means that the Influence of this input to heating or cooling will react after inserted time. Parameter 12 must be set to 2000!

#### Parameter no. 74 – Input 3 status on delay

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

- default value 0
- 1 – 32000 seconds

If the value of parameter is different to 0, means that the Influence of this input to heating or cooling will react after inserted time. Parameter 13 must be set to 2!

#### Parameter no. 75 – Input 3 status off delay

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

- default value 0
- 1 – 32000 seconds

If the value of parameter is different to 0, means that the Influence of this input to heating or cooling will react after inserted time. Parameter 13 must be set to 2!

## Technical Specifications

Power supply	110 - 230 VAC ±10% 50/60Hz, 24 – 30VDC
Rated load current of AC output	0,85A / 230VAC
Rated load current of DC output	0,85A / 24VDC
Output circuit power of AC output (resistive load)	200W (230VAC)
Output circuit power of DC output (resistive load)	21W (24VDC)
Power monitoring accuracy	+/-2W
Frequency range	868.4 MHz, 921.4 MHz, 908.4 MHz, 869.0 MHz, Z-Wave
Operation temperature	-10 ~ +40°C
Distance	up to 30 m indoors (depending on building materials)
Dimensions (W x H x D)	41,8 x 36,8 x 15,4mm
Package dimensions (W x H x D)	115 x 96 x 22mm
Weight	48g
Brutto weight (package included)	64g
Electricity consumption	0,7W
For installation in boxes	Ø ≥ 60mm or 2M
Switching	MOSFET
Digital temperature sensor range	-50 ~ +125°C, resolution 0.1°C
Digital temperature sensor cable length	1000mm

#### Note!

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

#### Z-Wave Device Class:

BASIC\_TYPE\_ROUTING\_SLAVE  
GENERIC\_TYPE\_SWITCH\_MULTILEVEL  
SPECIFIC\_TYPE\_POWER\_SWITCH\_MULTILEVEL

#### Z-Wave supported Command Classes

COMMAND\_CLASS\_BASIC  
COMMAND\_CLASS\_SWITCH\_MULTILEVEL  
COMMAND\_CLASS\_SWITCH\_ALL  
COMMAND\_CLASS\_SWITCH\_BINARY  
COMMAND\_CLASS\_SENSOR\_MULTILEVEL\_V3  
COMMAND\_CLASS\_ASSOCIATION  
COMMAND\_CLASS\_CONFIGURATION  
COMMAND\_CLASS\_MANUFACTURER\_SPECIFIC  
COMMAND\_CLASS\_VERSION  
COMMAND\_CLASS\_MARK  
COMMAND\_CLASS\_BASIC  
COMMAND\_CLASS\_SWITCH\_MULTILEVEL  
COMMAND\_CLASS\_SENSOR\_BINARY

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.

#### 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.

NOTE:

User manual is valid for module with SW version S1 and above (SW version is part of P/N)

Example: P/N: ZMNHLAX H1S1P1



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