Qubino

Z-WAVE PLUS

The **INNOVATIVE** and **SMALLEST**

Flush PWM thermostat

ORDERING CODE	Z-WAVE FREQUENCY
ZMNHLD1	868,4 MHz
ZMNHLD2	921,4 MHz
ZMNHLD3	908,4 MHz
ZMNHLD4	869,0 MHz
ZMNHLD5	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).

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.
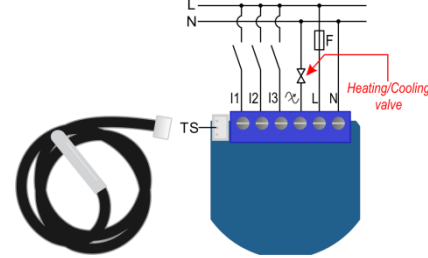Electrical installation must be protected by over current

protection fuse 1A, Tag lag T, rated breaking capacity 1500V (ESKA 522.7..) according to wiring diagram.

Package contents:

- Flush PWM thermostat + Temperature sensor
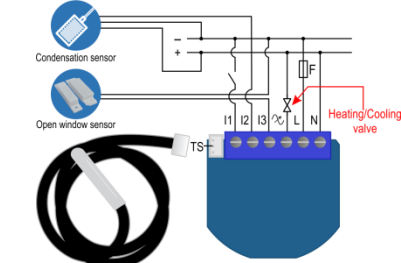
Electrical diagram 230VAC

Notes for the diagram:

- **N** Neutral lead
- **L** Live lead
- ∿ 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

Electrical diagram 24VDC

Notes for the diagram:

- **N** + VDC
- **L** - VDC
- ∿ 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).

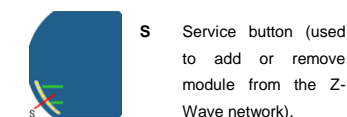*For details please check parameters 11, 12 and 13

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

NOTE: Service button S can't be used when module is connected to 110-230V power supply.

Module Inclusion (Adding to Z-wave network)

- Connect module to power supply (with temperature sensor connected),
- 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 (3feet) of the main controller,
- enable add/remove mode on main controller,
- press service button **S** for more than 6 second 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 seconds (or if push button I1 is pressed three times within 3s) 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: Lifeline group (reserved for communication with the main controller), 1 node allowed.
Group 2: basic on/off (triggered at change of the output Q state and reflecting its state) up to 16 nodes.
Group 3: basic on/off (triggered at change of thermostat mode) 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: basic on/off (trigged by change of I1) up to 16 nodes.
Group 7: basic on/off (trigged by change of I2) up to 16 nodes.
Group 8: basic on/off (trigged by change of I3) up to 16 nodes.
Group 9: sensor multilevel (trigged by change of temperature) up to 16 nodes.

Configuration parameters

Parameter no. 1 – Input I1 switch type
Available config. 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 I2 switch type
See parameter 1 (valid for I2 instead of I1)

Parameter no. 3 – Input I3 switch type
See parameter 1 (valid for I3 instead of I1)

Parameter no. 4 – Input 1 contact type
Available config. 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
See parameter 4 (valid for I2 instead of I1)

Parameter no. 6 – Input 3 contact type
See parameter 4 (valid for I3 instead of I1)

Parameter no. 10 - Activate / deactivate functions ALL ON/ALL OFF
Available config. 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 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 config. parameters (data type is 2 Byte DEC):
- default value 1
- 32767 – input I1 doesn't influence on the heat/cool process
- 1 - input I1 changes the mode of the thermostat between Off and On. In this case function on window sensor is disabled
- 2 - input I1 influences on cooling and heating valves according to status of window sensor. In this case function of Off and On selection by I1 is disabled

Parameter no. 12 – I2 Functionality selection
Available config. parameters (data type is 2 Byte DEC):
- default value 32767
- 32767 - 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, it automatically set temperature setpoint according 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, it automatically set temperature setpoint according 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 config. parameters (data type is 2 Byte DEC):
- default value 32767
- 32767 - 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 flood sensor is disabled
- 2 - input I3 influences on cooling and heating valves according to status of flood 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 config. parameters (data type is 2 Byte DEC):
- default value 0 (power report is disabled)
- 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. Available config. parameters (data type is 2 Byte DEC):
- default value 50 (5,0 °C)
- 0 - 127 = 0,0°C - 12,7 °C
- 128 - 254 = -0,1°C - 12,6 °C
- 255 - Antifreeze functionality disabled

NOTE: Antifreeze is activated only in heating mode

Parameter no. 50 - PWM maximum value
Available config. parameters (data type is 1 Byte DEC):
- default value 100 (Maximum PWM value)
- 2-100 = 2%-100%, step is 1%. Maximum PWM set by entered value

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

Parameter no. 51 - PWM minimum value
Available config. parameters (data type is 1 Byte DEC):
- Default value 0 (Minimum dimming value is 0%)
- 1- 99 = 1% - 99%, step is 1%. Minimum PWM set by entered value

NOTE: The minimum level may not exceed max. level!

Parameter no. 52 - PWM cycle duration
Available config. parameters (data type is 1 Byte DEC):
- default value 10 (Minimum dimming value is 0%)
- 5 - 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 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
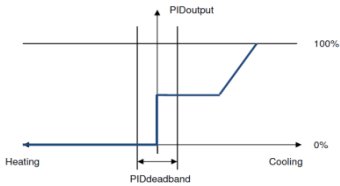
Parameter no. 54 - PID deadband
Available config. parameters (data type is 1 Byte DEC):
- default value 5 (0,5 °C)
- 0-127 - 0.0 °C to 12.7 °C, step is 0,1°C

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 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
Available config. parameters (data type is 2 Byte DEC):
- default value 100
- 0 -1000 - P value, step is 1

Parameter no. 57 - I parameter
Available config. parameters (data type is 2 Byte DEC):
- default value 1
- 0 - 1000 - I value, step is 1

Parameter no. 58 - D parameter
Available config. parameters (data type is2 Byte DEC):
- default value 1
- 0 - 1000 - D value, step is 1

Parameter no. 59 - Thermostat mode
Available config. parameters (data type is 1 Byte DEC):
- default value 0
- 0 - Heat mode
- 1 - Cool mode

Parameter no. 60 – Too low temperature limit
Available config. 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 is set value out of this range, module is changing set value automatically to default value.

Parameter no. 61 – Too high temperature limit
Available config. 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 is set value out of this range, module is changing automatically set value to default value.

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

- default value 0
- 0 - When system is turned off the output is 0 V.
- 1 - When system is turned off the output is 230 V.

Parameter no. 70 – Input 1 status on delay
Available config. 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
NOTE: Device status on UI change immediately

Parameter no. 71 – Input 1 status off delay
Available config. 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.
NOTE: Device status on UI change immediately

Parameter no. 72 – Input 2 status on delay
See parameter 70 (valid for I2 instead of I1)

Parameter no. 73 – Input 2 status off delay
See parameter 71 (valid for I2 instead of I1)

Parameter no. 74 – Input 3 status on delay
See parameter 70 (valid for I3 instead of I1)

Parameter no. 75 – Input 3 status off delay
See parameter 71 (valid for I3 instead of I1)

Parameter no. 100 – Enable / Disable Endpoint I1 or select Notification Type and Event
Enabling I1 means that Endpoint (I1) will be present on UI. Disabling it will result in hiding the endpoint according to the parameter set value. Additionally, a Notification Type and Event can be selected for the endpoint. Available configuration parameters (data type is 1 Byte DEC):
Endpoint device type selection:
- notification sensor (1 - 6): GENERIC_TYPE_SENSOR_NOTIFICATION, SPECIFIC_TYPE_NOTIFICATION_SENSOR
default value 0
1 - Home Security; Motion Detection, unknown location.
2 - CO; Carbon Monoxide detected, unknown location.
3 - CO2; Carbon Dioxide detected, unknown location.
4 - Water Alarm; Water Leak detected, unknown location.
5 - Heat Alarm; Overheat detected, unknown location.
6 - Smoke Alarm; Smoke detected, unknown location.
0 - Endpoint, I1 disabled
- sensor binary (9): GENERIC_TYPE_SENSOR_BINARY, SPECIFIC_TYPE_NOT_USED
9 - Sensor binary
NOTE1: After parameter change, first exclude module (without setting parameters to default value) and then re include the module!
NOTE 2: When the parameter is set to value 9 the notifications are send for Home Security.

Parameter no. 101 – Enable / Disable Endpoint I2 or select Notification Type and Event
See parameter 100 (valid for I2 instead of I1)

Parameter no. 102 – Enable / Disable Endpoint I3 or select Notification Type and Event
See parameter 100 (valid for I3 instead of I1)

Parameter no. 110 – Temperature sensor offset settings
Set value result in adding or subtracting that value to actual measured value by sensor.
Available config. 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 config. parameters (data type is 1 Byte DEC):
- default value 5
- 0 – Reporting disabled
- 1- 127 = 0,1°C - 12,7°C, step is 0,1°C

Technical Specifications

Power supply	110 - 230 VAC ±10% 50 or 60Hz**, 24-30VDC
Rated load current of AC output	0,85A / 230VAC
Rated load current of DC output	0,85A / 30VDC
Output circuit power of AC output (resistive load)*	200W (230VAC)
Output circuit power of DC output (resistive load)	21W (24VDC)
Power measurement accuracy	+/-2W
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 (79x52x22mm)
Weight (Brutto with package)	48g (64g)
Electricity consumption	0,7W
For installation in boxes	Ø ≥ 60mm or 2M
Switching	MOSFET (Trailing edge)
Digital temperature sensor range	-50 ~ +125°C, resolution 0.1°C
Digital temperature sensor cable length	1000mm

Z-Wave Device Class:
ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_ALWAYS_ON
GENERIC_TYPE_THERMOSTAT
SPECIFIC_TYPE_THERMOSTAT_GENERAL_V2
Z-Wave supported Command Classes
COMMAND_CLASS_ZWAVEPLUS_INFO_V2
COMMAND_CLASS_VERSION_V2
COMMAND_CLASS_MANUFACTURER_SPECIFIC_V2
COMMAND_CLASS_DEVICE_RESET_LOCALLY
COMMAND_CLASS_POWERLEVEL
COMMAND_CLASS_BASIC
COMMAND_CLASS_SWITCH_ALL
COMMAND_CLASS_SENSOR_BINARY
COMMAND_CLASS_THERMOSTAT_MODE_V2
COMMAND_CLASS_THERMOSTAT_SETPOINT_V2
COMMAND_CLASS_NOTIFICATION_V5
COMMAND_CLASS_METER_V4
COMMAND_CLASS_SENSOR_MULTILEVEL_V7
COMMAND_CLASS_MULTI_CHANNEL_V4
COMMAND_CLASS_ASSOCIATION_V2
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3
COMMAND_CLASS_ASSOCIATION_GRP_INFO_V2
COMMAND_CLASS_CONFIGURATION_V2
COMMAND_CLASS_MARK
COMMAND_CLASS_BASIC
Endpoint1

Device Class:
GENERIC_TYPE_THERMOSTAT
SPECIFIC_TYPE_THERMOSTAT_GENERAL_V2
Command Classes:
COMMAND_CLASS_ZWAVEPLUS_INFO_V2
COMMAND_CLASS_VERSION_V2
COMMAND_CLASS_BASIC_V2
COMMAND_CLASS_SWITCH_ALL
COMMAND_CLASS_THERMOSTAT_MODE_V2
COMMAND_CLASS_THERMOSTAT_SETPOINT_V2
COMMAND_CLASS_METER_V4
COMMAND_CLASS_ASSOCIATION_V2
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3
COMMAND_CLASS_ASSOCIATION_GRP_INFO
COMMAND_CLASS_MARK
COMMAND_CLASS_BASIC
Endpoint 2 (I1):
Device Class:
GENERIC_TYPE_SENSOR_BINARY
SPECIFIC_TYPE_NOT_USED
Command Classes:
COMMAND_CLASS_ZWAVEPLUS_INFO_V2
COMMAND_CLASS_VERSION_V2
COMMAND_CLASS_BASIC_V2
COMMAND_CLASS_SENSOR_BINARY
COMMAND_CLASS_NOTIFICATION_V5
COMMAND_CLASS_ASSOCIATION_V2
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3
COMMAND_CLASS_ASSOCIATION_GRP_INFO
COMMAND_CLASS_MARK
COMMAND_CLASS_BASIC_V2
Endpoint 3 (I2):
Device Class:
GENERIC_TYPE_SENSOR_BINARY
SPECIFIC_TYPE_NOT_USED
Command Classes:
COMMAND_CLASS_ZWAVEPLUS_INFO_V2
COMMAND_CLASS_VERSION_V2
COMMAND_CLASS_BASIC_V2
COMMAND_CLASS_SENSOR_BINARY
COMMAND_CLASS_NOTIFICATION_V5
COMMAND_CLASS_ASSOCIATION_V2
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3
COMMAND_CLASS_ASSOCIATION_GRP_INFO
COMMAND_CLASS_MARK
COMMAND_CLASS_BASIC_V2
Endpoint 4 (I3):
Device Class:
GENERIC_TYPE_SENSOR_BINARY
SPECIFIC_TYPE_NOT_USED
Command Classes:
COMMAND_CLASS_ZWAVEPLUS_INFO_V2
COMMAND_CLASS_VERSION_V2
COMMAND_CLASS_BASIC_V2
COMMAND_CLASS_SENSOR_BINARY
COMMAND_CLASS_NOTIFICATION_V5
COMMAND_CLASS_ASSOCIATION_V2
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3
COMMAND_CLASS_ASSOCIATION_GRP_INFO
COMMAND_CLASS_MARK
COMMAND_CLASS_BASIC_V2
Endpoint 5 (SENSOR MULTILEVEL):
Device Class:
GENERIC_TYPE_SENSOR_MULTILEVEL
SPECIFIC_TYPE_ROUTING_SENSOR_MULTILEVEL
Command Classes:
COMMAND_CLASS_ZWAVEPLUS_INFO_V2
COMMAND_CLASS_VERSION_V2
COMMAND_CLASS_SENSOR_MULTILEVEL_V7

COMMAND_CLASS_ASSOCIATION_V2
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3
COMMAND_CLASS_ASSOCIATION_GRP_INFO
COMMAND_CLASS_BASIC
The basic command class supports the functions BASIC SET and BASIC GET. Through the function basic SET is possible to set the mode of the module. Basic SET can send the values 0xff which means Heat and 0x00 which means Off. Through the function basic GET is possible to read the mode of the module. The module returns 0xff which means Heat or 0x00 which means Off.
COMMAND_CLASS_SENSOR_MULTILEVEL The Flush on/off thermostat supports reading of actual temperature which is 2 bytes long, scale is °C and its precision is 1 (it means 0,1°C).
COMMAND_CLASS_THERMOSTAT_MODE
The Flush on/off thermostat supports the following modes:
- Mode Off
- Mode Heat
COMMAND_CLASS_THERMOSTAT_SETPOINT
The Flush on/off thermostat supports temperature set point, which is 2 bytes long, scale is °C and its precision is 1 (it means 0,1°C).
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 once, 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 (SW version is part of P/N)!
Example: P/N: ZMNHLD1 H1**S1**P1

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