LOGIC GROUP

ZIF MODULE
5020

Z-Wave Interface for Underfloor Heating

Installation Guide and User's Manual

Firmware version 2.01
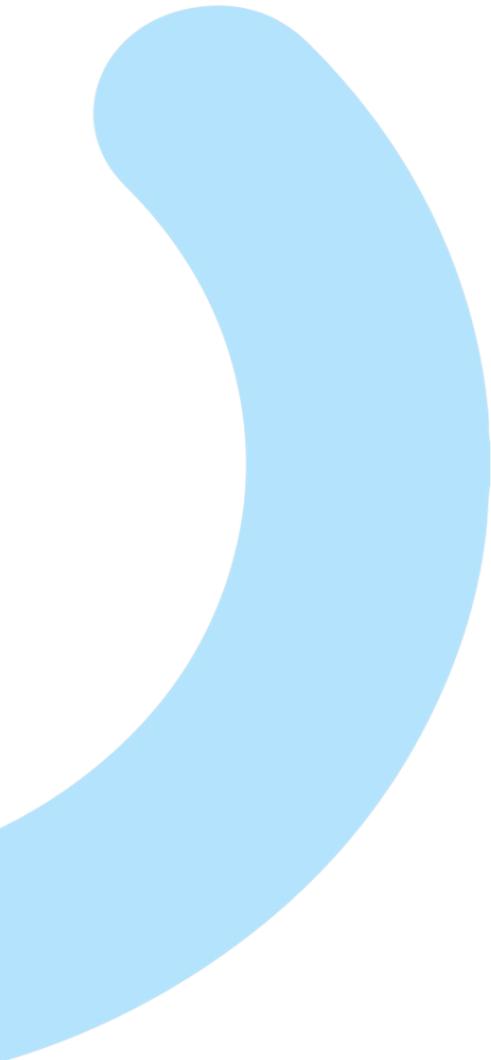
Z-Wave DIN-rail Module
Type ZIF5020 / LHC5020

LOGIC
GROUP

Content

1. Safety Instructions

📖 *Please read and follow the manual carefully.*

2. Disposal

Dispose of the packaging in an environmentally-friendly manner. This product is labelled in accordance with European Directive 2012/19/EU concerning used electrical and electronic appliances (Waste Electrical and Electronic Equipment – WEEE). The guideline determines the framework for the return and recycling of used products as applicable throughout the EU.

3. Warranty

The guarantee conditions for this product are as defined by your representative in the country in which it is sold. Details regarding these conditions can be obtained from the dealer from whom the product was purchased. The bill of sale or receipt must be produced when making any claim under the terms of this guarantee.

4. Product description

The ZIF5020 DIN-rail module, which is built upon the wireless Z-Wave communication protocol, has 10 MOS-FET driven outputs and 4 digital inputs. The unit is a multi-purpose Z-Wave I/O module, which can be used for many applications. E.g. ZIF5020 provides the possibility to control other systems via the Z-Wave network, by utilizing the 10 outputs as a kind of hand-over function to another automation system.

It is also possible to use the ZIF5020 as a control unit for controlling water-based floor heating valves. The 10 outputs can directly be connected to 24V valve actuators (requires ZIF5020 to be fitted with 24Vdc) and ZIF5020 is then able to control 10 pieces of floor-heating actuators.
The actual heat regulation itself will have to take place in the Z-Wave Controller, where the temperature measurement for the heating circuits can come from different Z-Wave temperature sensors or thermostats and the Controller will send on/off commands to the ZIF5020 to regulate the floor heating.

The 4 digital inputs of the ZIF5020 are useful for various purposes, where potential-free contacts, or Open Collector outputs, can be connected. The inputs can be configured to different trigger modes; leading edge, trailing edge or level triggered.
The ZIF5020's inputs can be programmed to control other Z-Wave devices when the inputs are activated, by sending Z-Wave commands over the Z-Wave network to e.g. Z-Wave relay modules, dimmer units etc. ZIF5020 allows sending different types of Z-Wave commands by utilizing the different association groups for the 4 inputs.

In addition, the ZIF5020 also acts as a repeater, thus extending the range of the Z-Wave network.

5. Mounting
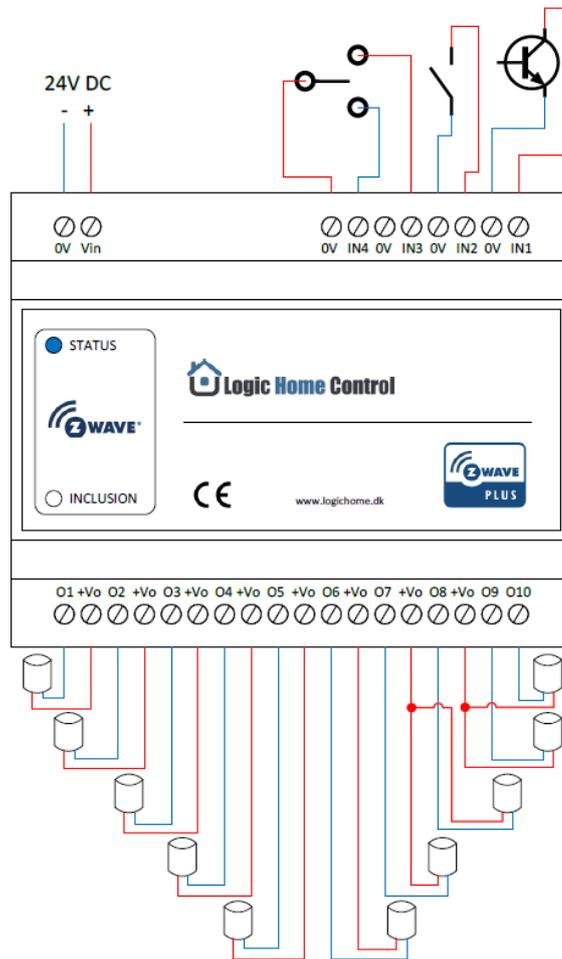
ZIF5020 must be connected to a DC power supply on the terminals marked with 0V and Vin. The power supply must be dimensioned to be able to source the loads connected to the outputs of the module. For example, if it is connected to 10 pieces of 24V 2W actuator on the outputs, then the power supply should at least be able to supply:

$$10 \times 2W + 1W = 21 \ W, \text{ equivalent to } 24V \ 0.875 \ A$$

The voltage on the output terminals marked **+ Vo** comes directly from the supply terminal marked **Vin**.
It is possible to source a maximum of 100 mA (0.1 A) on each **+ Vo** terminal, or a maximum of 1A from all **+ Vo** terminals together (for example if only two **+ Vo terminals are** used, 0.5 A can be sourced from each).
The module can be powered with a supply voltage from 10V to 24V. But note that it is the supply voltage that is directly carried out on the **+ Vo** terminals.

5.1. Outputs

The ZIF5020 module outputs are so-called "low-side switches", or open-Collector outputs. Which means when an output is activated, the output is pulled down to the 0V.
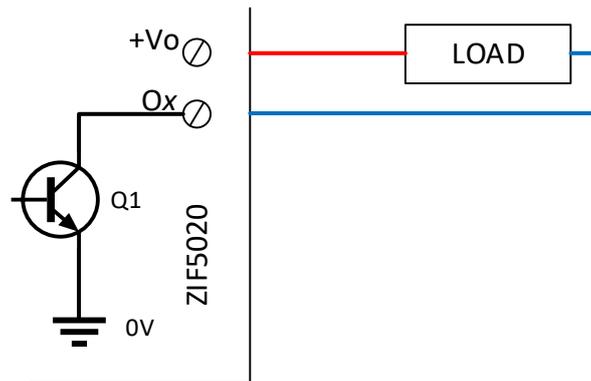
The internal MOS-FET located in the ZIF5020 module can handle a maximum of 60V 1A, but ZIF5020 is "only" sized to be able to supply the module's supply voltage, and a maximum of 1A in total on the + Vo terminals (or 0.125A from each of the 8 + Vo Maximum 1A total).

However, if you want to use larger loads or voltages on the outputs, it is possible to connect an external supply directly to the load and then connect this external supply 0V to the ZIF5020's 0V supply terminal.
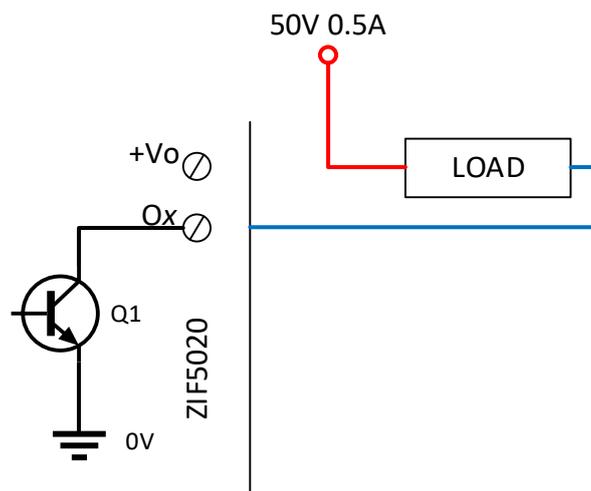
5.2. Inputs

The digital inputs of the ZIF5020 module can be connected to different types of control signals - switches, relays, open-collector outputs, etc.

The inputs IN1, IN2, IN3 and IN4 which operates as active low, are pr. default pulled up to 3V DC and must be pulled low in order to work, by mounting e.g. a contact between [IN1..IN4] and 0V.

The inputs can be configured to different trigger functions using configuration parameters 3, 5, 7 and 9.

The default setup of the inputs is switching between the modes on/off, or off/on the leading edge of the input signal, i.e. on each activation of the input, the mode will change (toggle relay function).

The following modes can be setup for inputs:

Input Mode 1.

When the configuration parameters for the inputs are set to the value '1', the inputs will have the functionality as shown in the figure below:
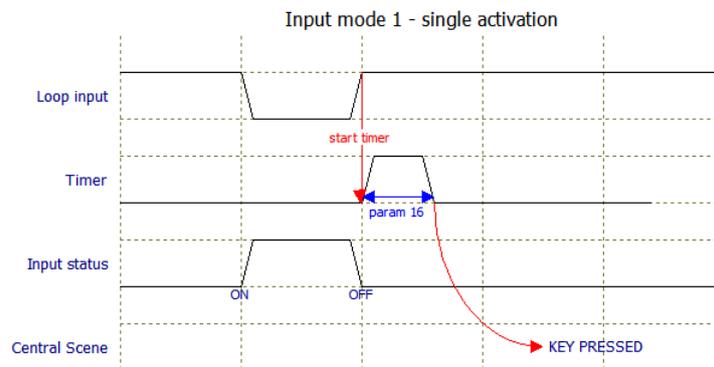
Loop input: Physical signals on the input. Will become 0V when the input is shorted by e.g. a contact.

Timer: A software timer that begins when the input is passivated. The time is set in configuration parameter 12.

Input status: The status that the input takes and is reported through the various association groups.

Central Scene: Specifies which type of Central Scene message is sent through the Lifeline association group.

Input mode 1 - double activation
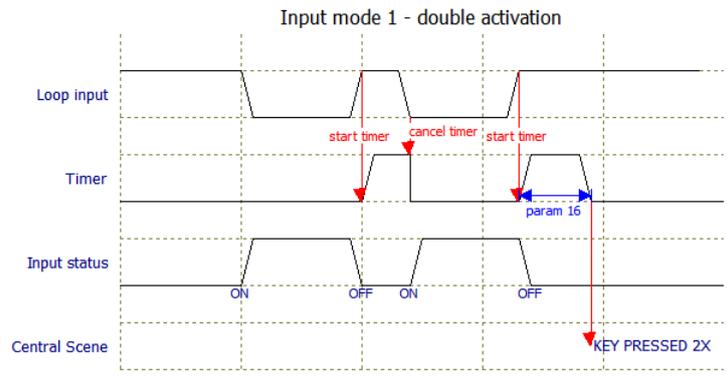
The figure above shows how a double activation is detected. The two activations must happen within the time specified in configuration parameter 12 to be accepted as a double activation.

Input mode 1 - long activation
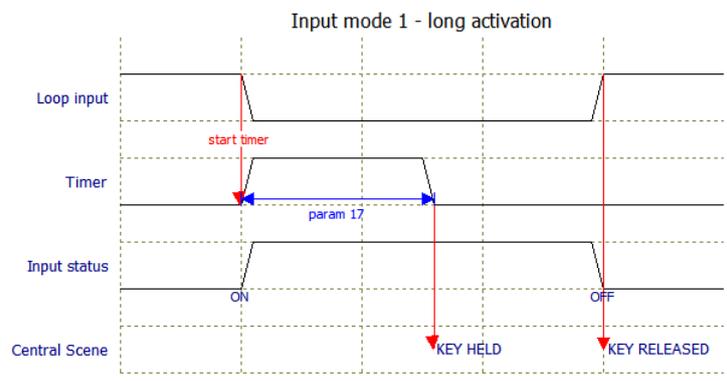
The figure above shows how the timing works at a long activation, where the activation must be longer than the time specified in configuration parameter 13 to be accepted as a long activation (Central Scene Key Held).

Input Mode 2.

When the configuration parameters for the inputs are set to the value '2' the inputs will have same functionality as Input Mode 1 except the input signal is inverted, making it possible to use contacts of the type 'normally-closed'.

Input mode 2 - single activation
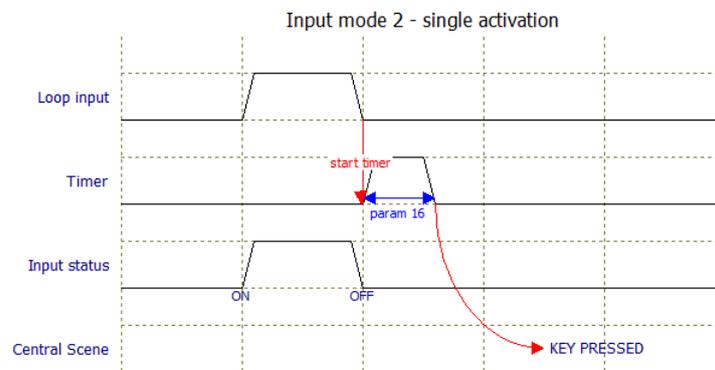
Other activations are corresponding to Input Mode 1 except *Loop Input* is inverted.

Input Mode 3.

When configuration parameters for an input is set to the value '3' the inputs will work as a toggle switch; the first activation will give the input the status "ON", next activation will change the status to "OFF". See figure below.

Input mode 3 - single activations
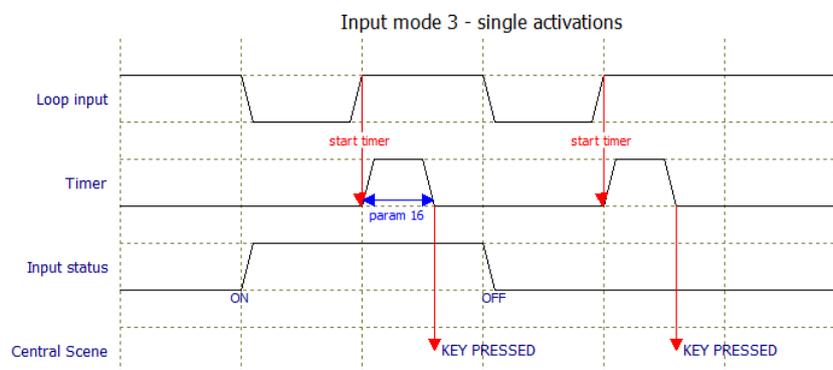
Other activation scenarios are as described in Input Mode 1, except the input status will change for each activation of the input instead of following *Loop input*.

Input Mode 4.

When the configuration parameters for the inputs are set to the value '4', the inputs will have same function as Input Mode 3 except the detection of the input signal is inverted, making it possible to use contacts of the type 'normally-closed'.
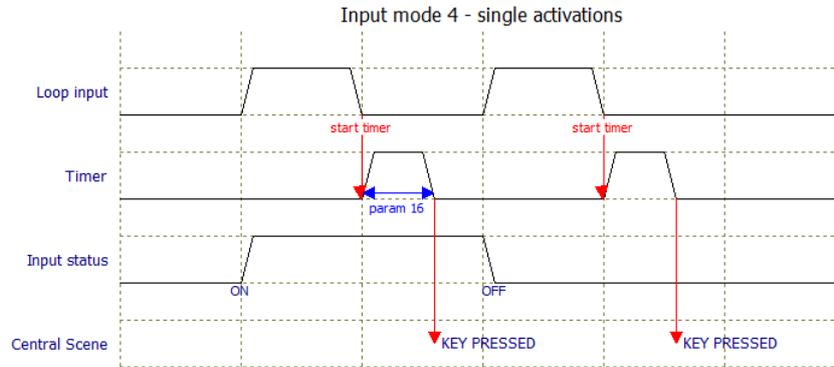
Other activations are corresponding to Input Mode 3, except the *Loop Input* is inverted.

Input Mode 5.

When the configuration parameters for the inputs are set to the value '5', the inputs will have same function as for Input Mode 1, except the input status can be prolonged with a configurable timer (configuration parameter 4, 6, 8, and 10).

This makes it possible to control e.g. lighting where the input is connected to a motion detector. So, when a movement is detected the status is preserved during the time the associated timer is set to.
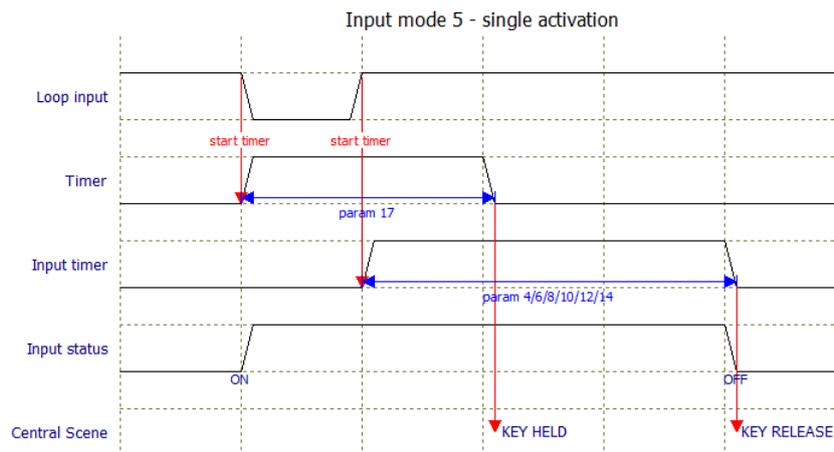
As seen from the above, a KEY HELD Central Scene notification will appear even though the activation on the input is shorter than configuration parameter 17. This is because the status on the input is prolonged with the time specified in the configuration parameter for the input timer (parameter 4/6/8/10).

Input Mode 6.

When the configuration parameters for the inputs are set to the value '6' the inputs will have same function as for Input Mode 5, except the detection of the input signal is inverted, making it possible to use contacts of the type 'normally-closed'.


Input mode 6 - single activation
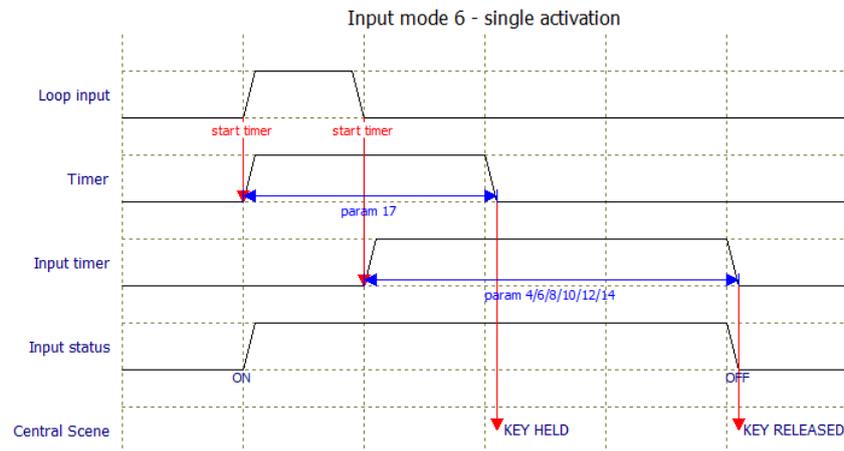
Other activations are corresponding to Input Mode 5, except the *Loop Input* is inverted.

6. Factory Reset

ZIF5020 can be reset to factory settings, i.e. all configurations and device address will be reset to default settings. The device must then be reconnected to the Z-Wave network.

Resetting is performed by activating the small pushbutton marked "INCLUSION" located on the front for at least 10 seconds until the LED flashes briefly. E.g. slide a needle pin or a toothpick through the small hole to activate the pushbutton.

This procedure only applies to cases where the primary network controller is not available or not operational.

7. Z-Wave network enrollment

Upon delivery, the ZIF5020 module has not been enrolled into any Z-Wave network. In order to communicate with other devices in the Z-Wave network, ZIF5020 must be enrolled in the network. This process is called to *add* the device in the Z-Wave network. Devices can also be removed from the Z-Wave network if they are to be used in another installation. This is called to *remove* the device from the Z-Wave network.

Both processes are initiated by setting the central network controls in either *inclusion* or *exclusion* mode. Please refer to the network controller's manual how to set the central controls in either inclusion or exclusion mode. Then, the inclusion mode / exclusion mode on the ZIF5020 device is activated by pressing the small button through the hole in the front of the module, marked "INCLUSION", after which the status LED will start flashing. If the device already belongs to a network, the device must be excluded before it can be included in the current network, otherwise the inclusion process will fail.

8. Association Groups

The ZIF5020 consists of 14 virtual devices (endpoints), as well as a basic virtual device; I.e. basic device (root device or endpoint 0), as well as 14 sub devices (endpoint 1 to 14).
The base device is used by the Controllers which does not support Multichannel communication, hence providing a very limited use of this module.

The 14 endpoints consist of 10 devices for controlling module outputs and 4 units for reporting module inputs.
Shown below is an overview of the various association groups for each individual unit.
The first number in the association group number indicates the group number for actual device, and the second number is the group number on the root device (endpoint 0).

Device 1 (*End Point 1*)	Output **1**
Group 1 / 1	*Lifeline*. Lifeline group for the entire module.
	Sends Basic Report On / Off when relay output 1 is activated. This group is typically used for reporting the actual status of the output to the Controller to let the Controller visualize the output in its user interface. Max. nodes in the group: 1

Device 2 (*End Point 2*)	Output **2**
Group 1 / -	*Lifeline*. Lifeline group for the entire module. Sends Basic Report On / Off when output 2 is activated. This group is typically used for reporting the actual status of the output to the Controller to let the Controller visualize the output in its user interface. Max. nodes in the group: 1

Device 3 (*End Point 3*)	Output **3**
Group 1 / -	*Lifeline*. Lifeline group for the entire module. Sends Basic Report On / Off when output 3 is activated. This group is typically used for reporting the actual status of the output to the Controller to let the Controller visualize the output in its user interface. Max. nodes in the group: 1

Device 4 (*End Point 4*)	Output 4
Group 1 / -	*Lifeline*. Lifeline group for the entire module. Sends Basic Report On / Off when output 4 is activated. This group is typically used for reporting the actual status of the output to the Controller to let the Controller visualize the output in its user interface. Max. nodes in the group: 1
Device 5 (*End Point 5*)	Output 5
Group 1 / -	*Lifeline*. Lifeline group for the entire module. Sends Basic Report On / Off when output 5 is activated. This group is typically used for reporting the actual status of the output to the Controller to let the Controller visualize the output in its user interface. Max. nodes in the group: 1
Device 6 (*End Point 6*)	Output 6
Group 1 / -	*Lifeline*. Lifeline group for the entire module. Sends Basic Report On / Off when output 6 is activated. This group is typically used for reporting the actual status of the output to the Controller to let the Controller visualize the output in its user interface Max. nodes in the group: 1
Device 7 (*End Point 7*)	Output 7
Group 1 / -	*Lifeline*. Lifeline group for the entire module. Sends Basic Report On / Off when output 7 is activated. This group is typically used for reporting the actual status of the output to the Controller to let the Controller visualize the output in its user interface Max. nodes in the group: 1
Device 8 (*End Point 8*)	Output 8
Group 1 / -	*Lifeline*. Lifeline group for the entire module. Sends Basic Report On / Off when output 8 is activated. This group is typically used for reporting the actual status of the output to the Controller to let the Controller visualize the output in its user interface Max. nodes in the group: 1

Device 9 (*End Point 9*)	Output **9**
Group 1 / -	*Lifeline*. Lifeline group for the entire module. Sends Basic Report On / Off when output 9 is activated. This group is typically used for reporting the actual status of the output to the Controller to let the Controller visualize the output in its user interface Max. nodes in the group: 1

Device 10 (*End Point 10*)	Output **10**
Group 1 / -	*Lifeline*. Lifeline group for the entire module. Sends Basic Report On / Off when output 10 is activated. This group is typically used for reporting the actual status of the output to the Controller to let the Controller visualize the output in its user interface Max. nodes in the group: 1

Device 11 *(End Point 11)*	Digital Input **1**
Group 1 / -	*Lifeline*. Sends **Basic Report On / Off** when input 1 is activated. Max. nodes in the group: 1
Group 2 / 2	Sends **Basic Set On / Off** when input 1 is activated. For example, used to control relay modules or for visualization in the central controller unit (e.g., Fibaro Home Center). Max. nodes in the group: 5
Group 3 / 3	Sends **Binary Switch Set On / Off** when input 1 is activated. For example, used to control relay modules. Max. nodes in the group: 5
Group 4 / 4	Sends **Multilevel Switch Set / Multilevel Switch Start Level Change / Multilevel Switch Stop Level Change** when input 1 is activated. Typically used to control dimmers, curtain controls, etc. Max. Number of units in the group: 5

Device 12 (*End Point 12*)	Digital Input **2**
Group 1 / -	*Lifeline*. Sends **Basic Report On / Off** when input 2 is activated. Max. Number of units in the group: 1
Group 2 / 5	Sends **Basic Set On / Off** when input 2 is activated. For example, used to control relay modules or for visualization in the central controller unit (E.g. Fibaro Home Center).

Max. Number of units in the group: 5

Group 3 / 6   Sends **Binary Switch Set On / Off** when input 2 is activated.

For example, used to control relay modules.

Max. Number of units in the group: 5

Group 4 / 7   Sends **Multilevel Switch Set / Multilevel Switch Start Level Change / Multilevel Switch Stop Level Change** when input 2 is activated.
Typically used to control dimmers, curtain controls, etc.
Max. Number of units in the group: 5

Device 13
(*End Point 13*)   Digital Input **3**

Group 1 / -   *Lifeline*.

Sends **Basic Report On / Off** when input 3 is activated.

Max. Number of units in the group: 1

Group 2 / 8   Sends **Basic Set On / Off** when input 3 is activated.

For example, used to control relay modules or for visualization in the central controller unit (E.g. Fibaro Home Center).

Max. Number of units in the group: 5

Group 3 / 9   Sends **Binary Switch Set On / Off** when input 3 is activated.

For example, used to control relay modules.

Max. Number of units in the group: 5

Group 4 / 10   Sends **Multilevel Switch Set / Multilevel Switch Start Level Change / Multilevel Switch Stop Level Change** when input 3 is activated.
Typically used to control dimmers, curtain controls, etc.
Max. Number of units in the group: 5

Device 14
(*End Point 14*)   Digital Input **4**

Group 1 / -   *Lifeline*.

Sends **Basic Report On / Off** when input 4 is activated.

Max. Number of units in the group: 1

Group 2 / 11   Sends **Basic Set On / Off** when input 4 is activated.

For example, used to control relay modules or for visualization in the central controller unit (E.g. Fibaro Home Center).

Max. Number of units in the group: 5

Group 3 / 12   Sends **Binary Switch Set On / Off** when input 4 is activated.

For example, used to control relay modules.

Max. Number of units in the group: 5

Group 4 / 13   Sends **Multilevel Switch Set / Multilevel Switch Start Level Change / Multilevel Switch Stop Level Change** when input 4 is activated.
Typically used to control dimmers, curtain controls, etc.
Max. Number of units in the group: 5

9. Configuration parameters

Z-Wave devices should be able to work directly after they have been included in the Z-Wave network, but by use of different configuration parameters, the device functionality can be changed to better match individual wishes or needs, as well as allow for additional features.

Parameter 1: *Parameter size: 1 byte. Status of LED.*
This parameter can be used to change the mode of the front-mounted status LED.

Value	Description
0	The LED is Off.
1	The LED is steadily lit-up. (Standard)
2	The LED flashes in 1 second interval (1 Hz).
3	The LED flashes in ½ second interval (½ Hz).

Parameter 2: *Parameter size: 1 byte. Brightness of status LED.*
Determines the brightness of the status LED.

Value	Description
0	Switch off LED.
1 - 99	Brightness level (%). (Standard 50%)

Parameter 3: *Parameter size 1 byte. Function setup of input 1.*
Select the value from the table below. Please refer to the section reg. input functions.

Value	Description
0	Inactive.
1	Mode 1, level-controlled input – normally open.
2	Mode 2, level-controlled input – normally closed.
3	Mode 3, toggle-controlled input – normally open (Standard)
4	Mode 4, toggle-controlled input – normally closed
5	Mode 5, timer-controlled input – normally open.
6	Mode 6, timer-controlled input – normally closed.

Parameter 4: *Parameter size: 1 byte. Timer for input 1*
Timer value for input 1, used when input Mode 5 or 6 is chosen.

Value	Description
0	Inactive (standard)
1 - 127	Time in seconds: 1 – 127 seconds.
128 - 255	Time in minutes: 128 – 255 minutes.

Parameter 5: *Parameter size: 1 byte. Function setup of input 2.*

Select the value from the table below. Please refer to the section reg. input functions.

Value	Description
0	Inactive.
1	Mode 1, level-controlled input – normally open.
2	Mode 2, level-controlled input – normally closed.
3	Mode 3, toggle-controlled input – normally open (Standard)
4	Mode 4, toggle-controlled input – normally closed
5	Mode 5, timer-controlled input – normally open.
6	Mode 6, timer-controlled input – normally closed.

Parameter 6: *Parameter size: 1 byte. Timer for input 2*

Timer value for input 2, used when input Mode 5 or 6 is chosen.

Value	Description
0	Inactive (standard)
1 - 127	Time in seconds: 1 – 127 seconds.
128 - 255	Time in minutes: 128 – 255 minutes.

Parameter 7: *Parameter size: 1 byte. Function setup of input 3.*

Select the value from the table below. Please refer to the section reg. input functions.

Value	Description
0	Inactive.
1	Mode 1, level-controlled input – normally open.
2	Mode 2, level-controlled input – normally closed.
3	Mode 3, toggle-controlled input – normally open (Standard)
4	Mode 4, toggle-controlled input – normally closed
5	Mode 5, timer-controlled input – normally open.
6	Mode 6, timer-controlled input – normally closed.

Parameter 8: *Parameter size: 1 byte. Timer for input 3.*

Select the value from the table below. Please refer to the section reg. input functions.

Value	Description
0	Inactive (standard)
1 - 127	Time in seconds: 1 – 127 seconds.
128 - 255	Time in minutes: 128 – 255 minutes.

Parameter 9: *Parameter size: 1 byte. Function setup of input 4.*

Select the value from the table below. Please refer to the section reg. input functions.

Value	Description
0	Inactive.
1	Mode 1, level-controlled input – normally open.
2	Mode 2, level-controlled input – normally closed.
3	Mode 3, toggle-controlled input – normally open (Standard)
4	Mode 4, toggle-controlled input – normally closed
5	Mode 5, timer-controlled input – normally open.
6	Mode 6, timer-controlled input – normally closed.

Parameter 10: *Parameter size: 1 byte. Timer for input 4.*

Select the value from the table below. Please refer to the section reg. input functions.

Value	Description
0	Inactive (standard)
1 - 127	Time in seconds: 1 – 127 seconds.
128 - 255	Time in minutes: 128 – 255 minutes.

Parameter 11: *Parameter size: 1 byte. Input Snubber-filter time constant.*

Specifies the time used to define the time constant of the input snubber-filter. (Increments in 0.01 second resolution.)

Value	Description
0 - 255	0 – 2,55 seconds. The standard value is 5, which corresponds to a snubber-filter-time constant of 50 milliseconds (0,05 seconds).

Parameter 12: *Parameter size: 1 byte. Threshold value for activation of inputs.*

Specifies the time that an entry must be stable before it is accepted as active / idle in 0.01 second resolution.

Value	Description
0 - 255	0 – 2,55 seconds. The standard value is 20, which corresponds to 200 milliseconds (0,2 seconds).

Parameter 13: *Parameter size: 1 byte. Threshold for input in latched mode.*

Indicates the time that an input must be activated before it accepts the button latched mode. (Increments in 0.01 second resolution.)

Value	Description
0 - 255	0 – 2,55 seconds. The standard value is 50, which corresponds to 500 milliseconds (0,5 seconds).

Parameter 14: *Parameter size: 1 byte. Deactivate Central Scene notifications.*

It is possible to enable Central Scene notifications when the 4 inputs are activated.

Value	Description
0	Central Scene notifications enabled. (Standard)
1	Central Scene notifications disabled.

Parameter 15: *Parameter size: 2 bytes. Associations groups, transmission when included secure.*

This parameter specifies if commands are transmitted as a secure message for each of the association groups.

This parameter is only used when the device is included in security mode (either S0 or S2).

Value	Description
0	All messages in all groups are sent as insecure.
1	Messages in association group 2 are sent as secure.
2	Messages in association group 3 are sent as secure.
4	Messages in association group 4 are sent as secure.
8	Messages in association group 5 are sent as secure.
16	Messages in association group 6 are sent as secure.
32	Messages in association group 7 are sent as secure.
64	Messages in association group 8 are sent as secure.
128	Messages in association group 9 are sent as secure.
256	Messages in association group 10 are sent as secure.
512	Messages in association group 11 are sent as secure.
1024	Messages in association group 12 are sent as secure.
2048	Messages in association group 13 are sent as secure.
4095	Messages in **all** association groups are sent as secure. (Default)

NB. *The above values are bitmasks and can be added up to select several options.*

10. Command Classes

Supported Command Classes.

- *Association (version 2)*
- *Association Group Information (version 1)*
- *Multi-Channel Association (version 3)*
- *Version (version 3)*
- *Configuration (version 3)*
- *Manufacturer Specific (version 2)*
- *Z-Wave Plus Information (version 2)*
- *Device Reset Locally (version 1)*
- *Power level (version 1)*
- *Firmware Update (version 4)*
- *Basic (version 2)*
- *Binary Switch (version 1)*
- *Security Command Class (version 2)*
- *Supervision Command Class (version 1)*
- *Central Scene (version 3)*

Controlled Command Classes

- *Basic (version 2)*
- *Binary Switch (version 1)*
- *Multilevel Switch (version 4)*
- *Central Scene (version 3)*

11. Technical Specifications

Power supply	10 - 24V DC
Outputs	A maximum of 1A can be sourced from the outputs of the module. Open-collector outputs, max. 60Vdc 1A.
Inputs	Digital potential free, input impedance 22Kohm.
Terminals	Screw terminals: 0,2 – 2,5 mm^2
	Outputs: 18 pin connection, 10 x low-side switch, 8 x supply out.
	Input: 8 pin connection, 4 x Input, 4 x 0V.
Power consumption	Standby: 0,6 W.
Radio protocol	Z-Wave®: EU 868.4MHz – 500 Series.
Approvals	CE
Explorer Frame Support	Ja
SDK	6.81.03
Device type	Slave with router / repeater functionality.
Generic Device Class	Binary Switch.
Specific Device Class	Valve Open Close.
Routing	Yes
FLiRS	No
Z-Wave Plus	Yes
Firmware Version	2.01