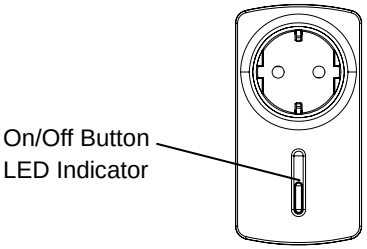
AN158 ON/OFF MODULE

This plug-in ON/OFF Module is a transceiver which is a Z-Wave™ enabled device and is fully compatible with any Z-Wave™ enabled network. Z-Wave™ enabled devices displaying the Z-Wave™ logo can also be used with it regardless of the manufacturer, and ours can also be used in other manufacturer's Z-Wave™ enabled networks. Remote On/Off control of the connected load is possible with other manufacturer's Wireless Controller. Each module is designed to act as a repeater. Repeaters will re-transmit the RF signal to ensure that the signal is received by its intended destination by routing the signal around obstacles and radio dead spots. The plug-in ON/OFF Module is compatible with our Motion Detectors SP814 and Door/Window Detectors SM103.

This plug-in ON/OFF Module is able to detect current wattage (5~3150W) and overload wattage (3010~3300W) of connected non-dimmable lights or appliances. When detecting overload state, the Module will be disabled and its On/Off button will be locked out of which LED will flash quickly for 30 seconds. However, unplug and re-connect the Module will reset its overload condition to normal status.

Include to or Exclude from a Z-Wave™ Network

In the front casing, there is an On/Off button with LED indicator which is used to carry out inclusion, exclusion, reset or association. Toggle On/Off button between On and Off. When first power is applied, its LED flashes on and off alternately and repeatedly at 2-second intervals. It implies that it has not been assigned a node ID and cannot work with Z-Wave enabled devices. Please get familiar with the terms below before starting the operations.



Function	Description
Inclusion	Add a Z-Wave enabled device (e.g. On/Off Module) to Z-Wave network.
Exclusion	Delete a Z-Wave enabled device (e.g. On/Off Module) from the network.
Association	After inclusion, you have to define the relationship between devices. Through association, device can be assigned as master/slave, and specify which slave is going to be controlled by which master.
Reset	Restore On/Off Module to factory default.

The table below lists an operation summary of basic Z-Wave functions. Please refer to the instructions for your Z-Wave™ Certificated Primary Controller to access the setup function, and to include/exclude/associate devices.

Function	Description	LED Indication
No node ID	The Z-Wave Controller does not allocate a node ID to the Module.	2-second on, 2-second off
Inclusion	1. Have Z-Wave Controller entered inclusion mode.	Press On, for on Press Off, for off
	2. Pressing On/Off button three times within 1.5 seconds will enter inclusion mode.	
Exclusion	1. Have Z-Wave Controller entered exclusion mode.	Press On, for on Press Off, for off
	2. Pressing On/Off button three times within 1.5 seconds will enter exclusion mode.	
	Node ID has been excluded.	2-second on, 2-second off
Reset	1. Pressing On/Off button three times within 1.5 seconds will enter inclusion mode.	Press On, for on Press Off, for off
	2. Within 1 second, press On/Off button again for 5 seconds until LED is off.	
	3. IDs are excluded.	2-second on, 2-second off
Association	1. Have Z-Wave Controller entered association mode. Or Pressing On/Off button three times within 1.5 seconds will enter association mode	Press On, for on Press Off, for off
	2. There are two groupings - 1 and 2. Refer to Z-Wave's Groups as described on page 3 & 4.	

※Including a node ID allocated by Z-Wave Controller means inclusion. Excluding a node ID allocated by Z-Wave Controller means exclusion.
※Failed or success in including/excluding the node ID can be viewed from the Z-Wave Controller.

LED Indication

To distinguish what mode the Module is in, view from the LED for identification.

State Type	LED Indication
Normal	Under normal operation, toggle On/Off button between On and Off. When pressing On, LED lights up, whereas Off, LED is off.
No node ID	Under normal operation, when the Module has not been allocated a node ID, the LED flashes on and off alternately at 2-second intervals. By pressing On/Off button, it will stop flashing temporarily. However, after unplugging and reconnecting the Module, the LED will flash on and off alternately at 2-second intervals.
Overload	When overload state occurs, the Module is disabled of which LED flashes on and off alternately for 30 seconds at 0.1 second intervals. Overload state can be cleared by unplugging and reconnecting the Module to the wall outlet.

Choosing a Suitable Location

1. Do not locate the Module facing direct sunlight, humid or dusty place.
2. The suitable ambient temperature for the Module is 0˚C~40˚C.
3. Do not locate the Module where exists combustible substances or any source of heat, e.g. fires, radiators, boiler etc.
4. After putting it into use, the body of Module will become a little bit hot of which phenomenon is normal.

Installation

1. Plug this On/Off Module into a wall outlet near the load to be controlled.

2. Plug the load into the Module. Make sure the load to be controlled cannot exceed 2990/3000 watts.

3. Press the button or switch on the load to the ON position.

4. To manually turn ON the Module, press and release the On/Off button. The LED will turn ON, and the load plugged into the Module will also turn ON.

5. To manually turn OFF the Module, simply press and release the On/Off button. The LED will turn OFF and the load plugged into the Module will also turn OFF.

6. If Motion Detector SP814 or Door/Window Detector SM103 has been removed from the wall by triggering the tamper switch, the Detector (SP814 or SM103) will send an alarm command **(ALARM_REPORT, Alarm Type == 0x01, Alarm Level == 0x11)** to the Module, of which LED and the load plugged into the Module will be on and off alternately for 10 times.

   Note: When putting Motion Detector or Door/Window Detector in use, do not connect the load belongs to motor or electronic transformers, as the load would be impaired.

Programming

1. Basic Command Class / Binary Switch Command Class

The Module will respond to BASIC and BINARY commands that are part of the Z-Wave system.

1-1 BASIC_GET / BINARY_SWITCH_GET

Upon receipt of the following commands from a Z-Wave Controller, the Module will report its On/Off state to the Controller.

Basic Get Command: **[Command Class Basic, Basic Get]**
Basic Report Command: Report OFF: **[Command Class Basic, Basic Report, Value = 0(0x00)]** Report ON:**[Command Class Basic, Basic Report, Value = (255)0xFF]**

Binary Switch Get Command:**[Command Class Switch Binary, Switch Binary Get]**
Binary Switch Report Command: Report OFF:**[Command Class Switch Binary, Switch Binary Report, Value =0(0x00)]** Report ON:**[Command Class Switch Binary, Switch Binary Report, Value = (255)0xFF]**

1-2 BASIC_SET / SWITCH_BINARY_SET

Upon receipt of the following commands from a Z-Wave Controller, the load

attached to the Module will turn on or off.

[Command Class Basic, Basic Set, Value = (255)0xFF]: the load attached to the Module turns on.
[Command Class Basic, Basic Set, Value = 0(0x00)]: the load attached to the Module turns off.
[Command Class Switch Binary, Switch Binary Set, Value = (255)0xFF]: the load attached to the Module turns on.
[Command Class Switch Binary, Switch Binary Set, Value = 0(0x00)]: the load attached to the Module turns off.

2. Z-Wave's Groups (Association Command Class Version 2)

The Module can be set to send reports to or to control associated Z-Wave devices. It supports two association groups with one node support for Grouping 1 and four nodes support for Grouping 2. For grouping 1, the Module will report its latest status to Z-Wave Controller. There are two conditions to be controlled the associated Z-Wave devices in grouping 2.

In order to control associated Z-Wave devices, the prerequisite is to enable the BASIC_SET command. (see 2-2-1 for details)

Condition 1: Upon receipt of the commands from Z-Wave Controller, the Module will control all devices associated in grouping 2 for On or Off operation.

Condition 2: Pressing On/Off button directly on the Module, all devices associated with the Module will be turned on or off simultaneously.

Grouping 1 includes POWER_APPLIED, SWITCH_BINARY_REPORT, METER_REPORT_COMMAND

Grouping 2 includes BASIC_SET

2-1 Grouping 1 (Maximum Node 1)

2-1-1 POWER_APPLIED command

The Module will send ALARM_REPORT command to the nodes of Grouping 1 to inform the Z-Wave Controller that the Module is connected to a wall outlet properly.

ALARM_REPORT Command: **[Command Class Alarm, Alarm Type = 0x02, Alarm Level = 0x01]**

2-1-2 On/Off Event Report (TRUE STATE)

When toggling between "on" and "off " button, it will send Switch Binary Report to the nodes of Grouping 1. However by setting a specified period of time (referred to as the "true period") as indicated below in item 3 -- Z-Wave's configuration parameter 1, toggle On/Off button between "on" and "off" will not send Switch Binary Report instantly. As a result, when pressing "on" or "off" button for the first time, the Module will be locked out for the preset true period during which shifting between "on" and "off" button will not send Switch Binary Report. It will be unlocked until the preset true period is expired. As soon as the Module is unlocked, it will check if the current state is different from the initial state. If it is different, the Module will send Switch Binary Report to the nodes of Grouping 1 immediately; whereas if it is the same, the Module will not send report to the nodes of Grouping 1.

The true period can be set through configuration command class. Refer to the true period of configuration.

2-1-3 Binary Switch Report Command

ON:**[Command Class Switch Binary, Switch Binary Report, Value =(255)0xFF]** OFF:**[Command Class Switch Binary, Switch Binary Report, Value =0(0x00)]**

2-1-4 Meter Report Command

The Module will report its instant power consumption to the node of Grouping 1. For detailed description of meter report command, refer to page 4.

2-2 Grouping 2 (Max. Nodes 4)

2-2-1 Control Other Z-Wave Devices (Basic Set)

Enable or disable BASIC_SET command. Refer to the table below describing "send basic command to grouping 2".

Note: AN158 can associate up to 4 pc of AN158, acting as an active and passive device respectively. The active one cannot be set and controlled by passive device.

3. Z-Wave's Configuration

Configuration Parameter	Function	Size (Byte)	Value	Unit	Default	Description
1	True Period	1	0-120	100ms	10	10*100ms=1second 0: Disable
2	Send Basic Command to Group 2	1	0,1		0	0:Disable 1:Enable
3	Meter Report Period	2	0-3240 (9Hr)	10s	3	3*10=30seconds 0:Disable

3-1 The true period:

If the setting is configured for 1 second, pressing On or Off button alternately within 1 second will not send out RF command. After 1 second has elapsed, it will examine if current On/Off state is the same as the initial 1 second. If the same, no RF command will be sent, whereas if it is different, RF command will be sent to update the status. The maximum interval is 12 second (100ms*12=12000ms).

3-2 Send basic command to grouping 2:

If the setting is configured for 0, whenever pressing On/Off button manually on the Module or receiving basic_set command from the Z-Wave Controller, the Module will not send command to other devices of Grouping 2 for On or Off operation; whereas if the setting is configured for 1, the Module will send command to other devices of Grouping 2 for On or Off operation.

3-3 Meter Report Period:

If the setting is configured for 30 seconds, the Module will report its instant power consumption every 30 seconds to Z-Wave Controller. The maximum interval to report its instant power consumption is 9 hours (10s*3240/3600=9hr).

4. Meter Command Class

The Module will report its instant or accumulated power consumption to Z-Wave Controller. If the calculation of accumulated power consumption is needed, the Z-Wave Controller needs to be sent Meter Reset Command to the Module, enabling to reset to zero.

4-1 Instant Power Consumption of Module

When receiving Meter Get Command, it will report Meter Report Command to the node of Grouping 1.

Meter Get Command: **[Command Class Meter, Meter Get, Scale =0x02(W)]**

Meter Report Command: **[Command Class Meter，Meter Report，Rate Type+Meter Type，Precision+Scale+ Size，Meter Value 1，Meter Value 2]**

Rate Type = 0x01
Meter Type = 0x01
Precision = 0
Scale = 0x02(W)
Size = 2 Bytes (Meter Value)
Meter Value 1 = High Byte (W)
Meter Value 2 = Low Byte (W)

Example:
Meter Value 1 = 0x01(W)
Meter Value 2 = 0xF4(W)
Meter (W) = Meter Value 1*256 + Meter Value 2 = 500W

4-2 Accumulated Power Consumption(KW/h)

When receiving Meter Get Command, it will report Meter Report Command to the node of grouping 1.

Meter Get Command: **[Command Class Meter, Meter Get, Scale = 0x00 KW/h)]**

Meter Report Command:
[Command Class Meter，Meter Report，Rate Type + Meter Type，Precision+ Scale + Size，Meter Value 1，Meter Value 2，Meter Value 3，**Meter Value 4]**

Rate Type = 0x01
Meter Type = 0x01
Precision = 1
Scale = 0x00 (KWh)
Size = 4 bytes (Meter Value)
Meter Value 1 = (W) MSB
Meter Value 2 = (W)
Meter Value 3 = (W)
Meter Value 4 = (W) LSB

Example:
Scale = 0x00 (KWh)
Precision = 1
Size = 4 Bytes (KW/h)
Meter Value 1 = 0x00(W)
Meter Value 2 = 0x01(W)
Meter Value 3 = 0x11(W)
Meter Value 4 = 0x70(W)

Accumulated power consumption (KW/h) = (Meter Value 2*65536) + (Meter Value 3*256) + (Meter Value 4) = 70.1 (KW/h)

4-3 Clearing accumulated power consumption

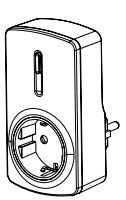
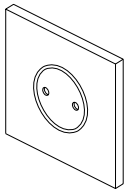
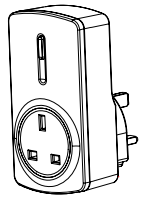
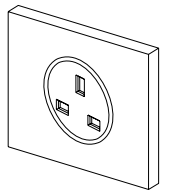
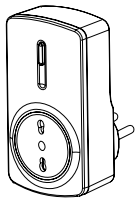
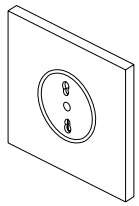
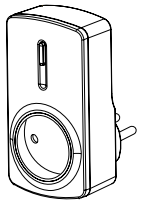
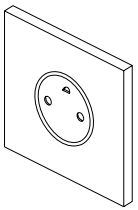
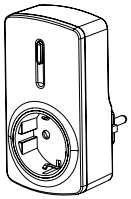
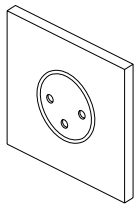
Meter Reset Command: **[Command Class Meter, Meter Reset]**

5. Command Classes

The Module supports Command Classes including…
* COMMAND_CLASS_SWITCH_BINARY
* COMMAND_CLASS_BASIC
* COMMAND_CLASS_MANUFACTURER_SPECIFIC
* COMMAND_CLASS_VERSION
* COMMAND_CLASS_SWITCH_ALL
* COMMAND_CLASS_ASSOCIATION_V2
* COMMAND_CLASS_METER_V2
* COMMAND_CLASS_ALARM
* COMMAND_CLASS_CONFIGURATION

Socket Type

Since the socket type for each country in Europe varies, refer to the outline for each socket suited for each country as follows:

AN158-2	Germany	AN158-3	U.K.
			
AN158-4	**Italy**	**AN158-5**	**Denmark**
			
AN158-6	**France**		
			

Note: Please make sure that the intensity of the plug of the electrical device must be 16A and have same head as the enclosed plug before inserting to the socket.

Troubleshooting

Symptom	Cause of Failure	Recommendation
The Module not working and LED off	1. The Module is not plugged into the electrical outlet properly 2. The Module break down	1. Check power connections 2. Don't open up the Module and send it for repair.
The Module LED illuminating, but cannot	Check if the load plugged into the Module has its	Set the ON/OFF switch of the load attached to ON

control the ON/OFF Switch of the load attached	own ON/OFF switch	
Symptom	**Cause of Failure**	**Recommendation**
The Module LED illuminating, but the Detector cannot control the Module	1. Not carry out association 2. Same frequency interference	1. Carry out association 2. Wait for a while to re-try
LED keep flashing 30 seconds, but cannot control	Overload occurs	Remove the load attached or check max. load cannot exceed 3010W~3300W

Specification

Operating Voltage	230V/50Hz
Maximum Load	2990W for UK, Denmark; 3000W for Germany, Italy and France
Effective Range	Approx. 100 meters (open area)
Operating Temperature	0˚C ~ 40˚C
Frequency Range	868.42 MHz
ZDK Version	V 5.02

** Specifications are subject to change and improvement without notice. A501111534R

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.