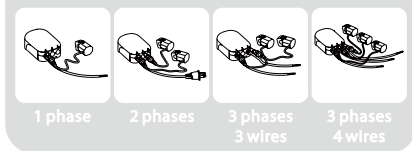
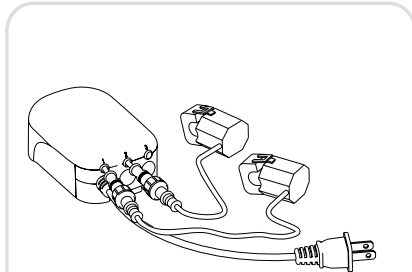


AEOTEC
BY AEON LABS

HOME ENERGY METER GEN6



View the expanded manual:
<http://aeotec.com/support>



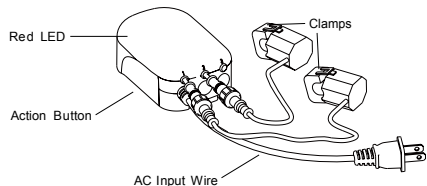
1 Aeotec by Aeon Labs Home Energy Meter.

You hear a lot about energy use these days. About how if you reduce the amount of energy you use you'll both save money and the environment. But saving money by using less electricity is only possible if you understand when and how you are using it. That's what Aeotec's Home Energy Meters provide you with: understanding, for your whole home.

Installed in an electricity box, your new energy meter will monitor the total amount of electricity your home uses with accuracy and speed. Using a wireless Z-Wave® connection, it'll then feed the data it records back to your smart home's gateway. In near real-time you'll have a full understanding of how much electricity you use and when you use it.

2 Familiarize yourself with your Home Energy Meter.

Your Home Energy Meter from Aeotec by Aeon Labs is comprised of two parts: the Main Body and Clamps. Once installed, the meter will sit near your home's main circuit box, while the clamps are attached to it.



3 Quick start.

The installation of your Home Energy Meter has two major parts: the installation of it into your home's main circuit box and the syncing of it to your Z-Wave network. What follows are the instructions for both parts. Please note that only a licensed electrician, with knowledge and understanding of electrical systems and electrical safety, should perform the electrical installation of your meter into your home's circuit box. The syncing of your Home Energy Meter with your Z-Wave network can be performed by you.

- Installing the meter into a circuit box.



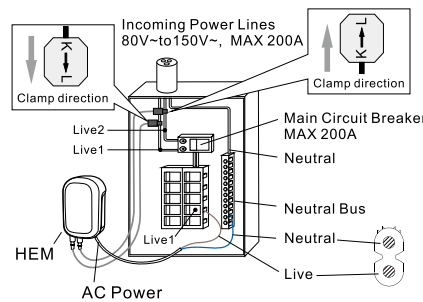
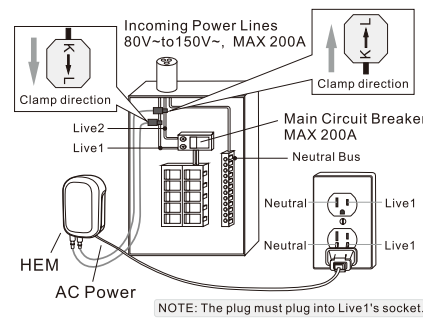
Important: Only a licensed electrician should perform these steps.

Important: The circuit box's main breaker should be turned off to perform these installation steps.

The following diagrams highlight how the Home Energy Meter should be installed dependent on the region you are in;

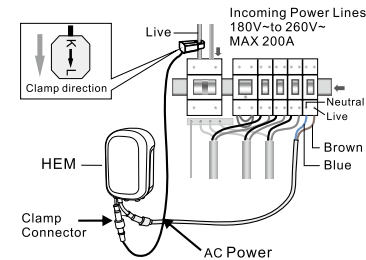
In the United States, it is always a 2-phase installation;

Diagram of USA Version(2 Phases):



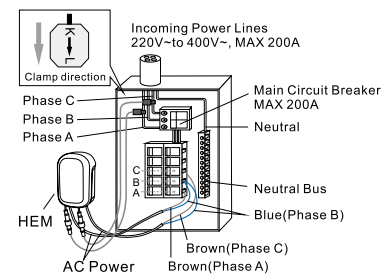
In 230 volt countries with a 1 phase installation;

Diagram of EU/AU Version(1 Phase):



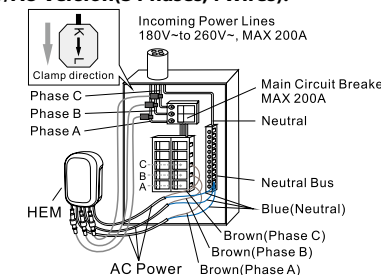
In 230 volt countries with a 3 phases and 3 wires installation;

Diagram of EU/AU Version(3 Phases,3 Wires):



In 230 volt countries with a 3 phases and 4 wires installation;

Diagram of EU/AU Version(3 Phases,4 Wires):



To perform the electrical installation for your Home Energy Meter (HEM), utilize the previous images to determine the phase version of the HEM and to also illustrate the following steps 3 through 7.

1. Turn off the home's main electricity breaker and open the main circuit box panel.
2. Connect each clamp to the HEM using the clamp connector and screw them tight.
3. Clip the clamps of the HEM around the incoming electricity cables that connect to the main circuit breaker.
4. Connect AC Wire to the meter using the AC Wire Connector.
5. Insert the HEM's neutral AC Wire into the main circuit breaker's neutral bus terminal.
6. Insert the HEM's live AC Wire into the main circuit breaker's live terminal.
7. Replace the main circuit box panel.
8. Turn the main breaker back on.

It is now time to permanently affix the Home Energy Meter to a surface. Within each meter is a low-frequency radio antenna that's used for wireless communication. This must be taken into consideration when selecting a final location for the meter. Thick concrete walls, metals, or motor devices will affect the signal strength of the controller and the meter.

If the home's circuit box is made of a metal, it is recommended that the Main Body of the meter be installed outside of the circuit box. Placing the meter inside the circuit box could degrade the quality of the radio signal and negatively impact its wireless range. To assist with such an installation, each meter is weatherised to the IP44 international standard. This makes it resistant to rain and snow when installed vertically.

To place the Home Energy Meter (HEM):

1. Remove the backing plate from the back of the HEM.
2. Affix the plate to the selected wall space using the provided screws. The plate should be installed vertically and aligned so that the wires of the HEM are at the bottom.
3. Attach the HEM to the backing plate.

- Linking your meter to an existing Z-Wave network.

The electrical installation of your Home Energy Meter (HEM) is now complete. You must now wirelessly link it to your Z-Wave network.

1. Put your primary Z-Wave controller, usually a gateway or hub, into inclusion mode. If you are not sure how to do this, please refer to your controller's user manual.
2. Press the Action Button on your HEM. If it has been successfully linked to your network, its LED will remain illuminated. If the linking was unsuccessful, your HEM's LED will continue to blink.

The installation of your Home Energy Meter is now complete. The next step is to set up your Home Energy Meter within the interface of your primary Z-Wave controller. This will allow you to visualize and utilize the energy consumption data that your meter collects.

Your Home Energy Meter can report wattage energy usage or KWH energy usage to your primary controller. As each controller is different, please refer to your controller's

user manual for further information on monitoring and visualizing this data. The Z-Wave commands supporting energy monitoring are the Meter Command Classes.

4 Advanced functions.

- Removing your meter from a Z-Wave network.

Your Home Energy Meter (HEM) can be removed from your Z-Wave network at any time. You'll need to use your Z-Wave network's primary to do this.

- Put your main controller into its device removal mode. If you are unsure how to do this, please refer to your controller's user manual.
- Press the Action Button on your HEM. If it has been successfully removed from your network, its LED will blink. If the removal was unsuccessful, its LED will be solid and it will be then repeated again.

- Resetting your Home Energy Meter.

Your Home Energy Meter can be reset to default factory settings with ease if your primary controller is missing or inoperable.

- Press and hold the Action Button for 10 seconds.
- If successful, the LED on the HEM should begin to blink slowly.

- Associating your Home Energy Meter to Report Automatically.

Your Home Energy Meter can send Wattage and KWH usage reports to associated devices. To enable this, please refer to your controller's manual on how to configure settings on Z-Wave devices linked to your controller. Initially, the meter is set up to report Watt and KWH reports.

Some gateways/controllers will automatically configure devices enabling you to take full advantage of the Home Energy Meter's features. Others may not perform any automatic configuration. In such a case you can choose to manually configure your meter to output the data that you wish to view.

Setting automatic report flags.

Parameter 101-103 [4 byte dec] can be configured through your gateway in case that the default settings of your meter are not what you desire.

Decimal Flag	Report Total HEM:	Decimal Flag	Report Watt for Clamps:
1	Report KWH	256	Clamp 1
2	Report Watt	512	Clamp 2
4	Report Voltage	1024	Clamp 3
8	Report Current		
Decimal Flag	Report KWH for Clamps:	Decimal Flag	Report Voltage (V) for Clamps:
2048	Clamp 1	65536	Clamp 1
4096	Clamp 2	131072	Clamp 2

8192	Clamp 3	262144	Clamp 3
Decimal Flag	Report Current (A) for Clamps:		
524288	Clamp 1		
1048576	Clamp 2		
2097152	Clamp 3		

The table above shows a decimal representation of all flags that can be set on parameter 101-103 to report specific data.

Example use of the Report Table.

For example, if you want to report only the total KWH consumption, and the Wattage for clamp 3, you would add 1 + 1024 and set the sum (1025) to parameter 101, 102, or 103.

As another example, if you want to report Wattage and KWH power consumptions for all clamps, you would add 256 + 512 + 1024 + 2048 + 4096 + 8192, then set the sum (16128) to parameter 101, 102, or 103.

And if you want to report everything, you would add the whole table together and set it to 101, 102, or 103.

Setting an automatic report interval.

Parameter 111-113 [4 byte dec] can be configured through your gateway in case the default settings of your HEM is not what you desire.

Parameter 111 will set the interval for Group 1 (parameter 101), parameter 112 will set the interval for Group 2 (parameter 102), and parameter 113 will set the interval for Group 3 (parameter 103).

As an example, you have set parameter 101 to report the total KWH consumption and the wattage for clamp 3, and you want to report it every 500 seconds. Set

Utilizing different groups.

Your Home Energy Meter has 3 different groups that you may setup, from the settings and examples above, you may configure each group to report different clamps and total reports to report at different interval. Group 1 uses Parameter 101 and 111, group 2 uses parameter 102 and 112, and group 3 uses parameter 103 and 113.

5 Technical specifications.

Model number: ZW095

Input: 120V~, 60Hz, 20mA (USA version, 2P)
230V~, 50Hz, 10mA (EU/AU version, 1P/3P4)
380V~, 50Hz, 18mA (EU/AU version, 3P3)

Measure range of voltage:
80V~ to 150V~ (USA version, 2P)

180V~ to 260V~ (EU/AU version, 1P/3P4)
220V~ to 400V~ (EU/AU version, 3P3)
Measure range of current: 0A to 200A.
Operating distance: Up to 300 feet/100 metres outdoors.
Operating temperature: -10°C to 50°C .
Relative humidity: 8% to 80%.

6 Warranty.

Aeon Labs warrants to the original purchaser of Products that for the Warranty Period (as defined below), the Products will be free from material defects in materials and workmanship. The foregoing warranty is subject to the proper installation, operation and maintenance of the Products in accordance with installation instructions and the operating manual supplied to Customer. Warranty claims must be made by Customer in writing within thirty (30) days of the manifestation of a problem. Aeon Labs' sole obligation under the foregoing warranty is, at Aeon Labs' option, to repair, replace or correct any such defect that was present at the time of delivery, or to remove the Products and to refund the purchase price to Customer.

The "Warranty Period" begins on the date the Products is delivered and continues for 12 months.

Any repairs under this warranty must be conducted by an authorized Aeon Labs service representative and under Aeon Labs' RMA policy. Any repairs conducted by unauthorized persons shall void this warranty.

Excluded from the warranty are problems due to accidents, acts of God, civil or military authority, civil disturbance, war, strikes, fires, other catastrophes, misuse, misapplication, storage damage, negligence, electrical power problems, or modification to the Products or its components.

Aeon Labs does not authorize any person or party to assume or create for it any other obligation or liability in connection with the Products except as set forth herein.

Aeon Labs will pass on to Customer all manufacturers' Material warranties to the extent that they are transferable, but will not independently warrant any Material.

Customer must prepay shipping and transportation charges for returned Products, and insure the shipment or accept the risk of loss or damage during such shipment and transportation. Aeon Labs will ship the repaired or replacement products to Customer freight prepaid.

Customer shall indemnify, defend, and hold Aeon Labs and Aeon Labs' affiliates, shareholders, directors, officers, employees, contractors, agents and other representatives harmless from all demands, claims, actions, causes of action, proceedings, suits, assessments, losses, damages, liabilities, settlements, judgments, fines, penalties, interest, costs and expenses (including fees and disbursements of counsel) of every kind (i) based upon personal injury or death or injury to property to the extent any of the foregoing is proximately caused either by a defective product (including strict liability in tort) or by the negligent or willful acts or omissions of Customer or its officers, employees, subcontractors or agents, and/or (ii) arising from or relating to any actual or alleged infringement or misappropriation of any patent, trademark, mask work, copyright,

trade secret or any actual or alleged violation of any other intellectual property rights arising from or in connection with the products, except to the extent that such infringement exists as a result of Aeon Labs' manufacturing processes.

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STORE INDOORS WHEN NOT IN USE. SUITABLE FOR DRY LOCATIONS. DO NOT IMMERSE IN WATER. NOT FOR USE WHERE DIRECTLY EXPOSED TO WATER.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation. 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 radiate radio frequency energy and, if not installed 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.

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.

Certifications (regional):



Z-Wave and Z-Wave Plus are registered trademarks of Sigma Designs and its subsidiaries in the United States and other countries

symbols	Description
	This product has been tested to the requirements of CAN/CSA-C22.2 No. 61010-1, second edition, including Amendment 1, or a later version of the same standard incorporating the same level of testing requirements
	Double insulation or reinforced insulation
	Caution, risk of danger
	CONFORMS TO UL STD 61010-1; CERTIFIED TO CSA STD C22.2 NO.61010-1 and IEC STD 61010-2-032
CAT II	For measurements performed on circuits directly connected to the low voltage installationp

Version:5011009500001-AA

www.aeotec.com



Aeon Labs Home Energy Meter Gen5
Engineering Specifications and Advanced Functions for Developers
(V1.30)

Aeon Labs Home Energy Meter is energy meter for the entire home. It can wirelessly report instantaneous Power, KWH, Voltage and Amperage measurements to Z-Wave gateway/controller. It can send Z-Wave REPORTS (Meter v3 Command Class) at any time when it receives Z-Wave Get Commands.

The HEM can be setup to send automatic reports to any associated nodes in association group 1 at an interval time

The HEM can independently report the measurements from the Clamps via the Multi Channel Command Class encapsulation.

It can be included and operated in any Z-wave network with other Z-wave certified devices from other manufacturers and/or other applications. All non-battery operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.

It also supports Security Command Class and has the AES-128 bit security encryption built right in. While a Security enabled Controller is needed in order to fully use the security feature.

1. Library and Command Classes

1.1 SDK: 6.51.02

1.2 Library

- Basic Device Class: BASIC_TYPE_ROUTING_SLAVE
- Generic Device class: GENERIC_TYPE_METER
- Specific Device Class: SPECIFIC_TYPE_SIMPLE_METER

1.3 Commands Class

	Non- Security Network	Security Network
Node Info Frame	COMMAND_CLASS_ZWAVEPLUS_INFO V2 COMMAND_CLASS_VERSION V2 COMMAND_CLASS_MANUFACTURER_SPECIFIC V2 COMMAND_CLASS_METER V3 COMMAND_CLASS_CRC_16_ENCAP V1 COMMAND_CLASS_MULTI_CHANNEL V3 COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V2 COMMAND_CLASS_CONFIGURATION V1 COMMAND_CLASS_ASSOCIATION_GRP_INFO V1 COMMAND_CLASS_ASSOCIATION V2 COMMAND_CLASS_FIRMWARE_UPDATE_MD V2 COMMAND_CLASS_POWERLEVEL V1 COMMAND_CLASS_SECURITY V1 COMMAND_CLASS_MARK V1 COMMAND_CLASS_DEVICE_RESET_LOCALLY V1	COMMAND_CLASS_ZWAVEPLUS_INFO V2 COMMAND_CLASS_VERSION V2 COMMAND_CLASS_MANUFACTURER_SPECIFIC V2 COMMAND_CLASS_SECURITY V1 COMMAND_CLASS_CRC_16_ENCAP V1 COMMAND_CLASS_MARK V1 COMMAND_CLASS_DEVICE_RESET_LOCALLY V1
Security Command Supported Report Frame	–	COMMAND_CLASS_VERSION V2 COMMAND_CLASS_MANUFACTURER_SPECIFIC V2 COMMAND_CLASS_METER V3 COMMAND_CLASS_CRC_16_ENCAP V1 COMMAND_CLASS_MULTI_CHANNEL V3 COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V2 COMMAND_CLASS_CONFIGURATION V1 COMMAND_CLASS_ASSOCIATION_GRP_INFO V1 COMMAND_CLASS_ASSOCIATION V2

		COMMAND_CLASS_FIRMWARE_UPDATE_MD V2 COMMAND_CLASS_POWERLEVEL V1 COMMAND_CLASS_DEVICE_RESET_LOCALLY V1
--	--	-------------------------------------------------------------------------------------------------------------

2. Technical Specifications

Operating distance: Up to 500 feet/150 meters outdoors.

Input: 120V~, 60Hz. (USA Version)

230V~, 50Hz. (EU, AU, BR Version)

Rated Current: 120V~, 60Hz, 2 Phase 200A measuring current. (USA Version)

230V~, 50Hz, 1 Phase 60/100/200A measuring current. (EU Version)

230V~, 50Hz, 1 Phase 60/100/200A measuring current. (IN Version)

230V~, 50Hz, 1 Phase 60/100/200A measuring current. (AU Version)

230V~, 60Hz, 1 Phase 60/100/200A measuring current. (BR version)

Operating Temperature: 0°C to 40°C.

Relative Humidity: 8% to 80%.

3. Familiarize yourself with your HEM

3.1 Interface



4. All functions of each trigger

4.1 Function of Z-Wave Button

Trigger	Description
Click one time	Add HEM G5 into an Existing Z-wave Network: <ol style="list-style-type: none"> 1. Insert the HEM G5 to power socket, The HEM G5 LED will blink slowly. 2. Let the primary controller of existing Z-Wave network into inclusion mode (If you don't know how to do this, refer to its manual). 3. Press the Z-Wave button. 4. If the Learning success, HEM G5 LED will stop the slow blink. If the LED is still in slow

	<p>blink, please repeat the process from step 2.</p> <p>Remove HEM G5 from an Existing Z-wave Network:</p> <ol style="list-style-type: none"> 1. Insert the HEM G5 to power socket, The HEM G5 LED will keep turn on. 2. Let the primary controller of existing Z-Wave network into remove mode (If you don't know how to do this, refer to its manual). 3. Press the Z-Wave button. 4. If the remove success, HEM G5 LED will blink slowly. If HEM G5 LED still keep turning on, please repeat the process from step 2.
Press and hold 10 seconds	<p>Reset HEM G5 to Factory Default:</p> <ol style="list-style-type: none"> 1. Make sure the HEM G5 has been connected to the power supply. 2. Press and hold the Learn button for 10 seconds. 3. If HEM G5 LED blinks slowly, it indicates reset success, otherwise please repeat step 2. <p>Note:</p> <ol style="list-style-type: none"> 1. This procedure should only be used when the primary controller is missing or inoperable. 2. Reset HEM G5 to factory default Settings will: <ol style="list-style-type: none"> a), exclude the HEM G5 from the Z-Wave network; b), delete the Association setting, power measure value; c). restore the configuration settings to the default.

5. Special rule of each command

5.1 Basic Command Class

No Basic mapping is defined for the Device Type. Any received Basic commands will be ignored.

5.1 Association Command Class

The HEM supports 1 association group and max 5 association nodes in association group 1. Automatic REPORTs come from the HEM will be sent via single-cast to associated devices in association group 1. What kind of reports need to be sent that can be configured via Configuration Command Class (see below section).

5.2 Association Group Info Command Class

5.2.1 Association Group Info Report Command Class

Profile: General: NA (Profile MSB=0, Profile LSB=0)

5.2.2 Association Group Name Report Command Class

Group 1: Lifeline

5.3 Multi Channel Command Class

The Multi Channel Command supports 2 end points, which corresponding to 2 clamps.

The Multi Channel CC also encapsulates Meter Command Class, which can get the measurement of watt, KWH, voltage and current from 2 clamps.

5.4 Z-Wave Plus Info Report Command Class

Parameter	Value
Z-Wave Plus Version	1
Role Type	5 (ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_ALWAYS_ON)
Node Type	0 (ZWAVEPLUS_INFO_REPORT_NODE_TYPE_ZWAVEPLUS_NODE)
Installer Icon Type	0x1000 (ICON_TYPE_GENERIC_SUB_ENERGY_METER)
User Icon Type	0x1000 (ICON_TYPE_GENERIC_SUB_ENERGY_METER)

5.5 Configuration Set Command Class

7	6	5	4	3	2	1	0
Command Class = COMMAND_CLASS_CONFIGURATION							
Command = CONFIGURATION_SET							
Parameter Number							
Default	Reserved					Size	
Configuration Value 1(MSB)							
Configuration Value 2							
.....							
Configuration Value n(LSB)							

Parameter Number Definitions (8 bit):

Parameter Number	Description	Default Value	Size
2	This parameter is used to configure the energy detection mode when the parameter 101~103 have been configured: 0 = report Wattage and the absolute KWH value; 1 = report positive/negative Wattage and the algebraic sum KWH value; 2 = report positive/negative Wattage and the positive KWH value (consuming electricity); 3 = report positive/negative Wattage and the negative KWH value (generating electricity).	0	1
3	Enable selective reporting only when power change reaches a certain threshold or percentage set in 4-10 below. This is used to reduce network traffic. (0 == disable, 1 == enable)	1	1
4	Threshold change in wattage to induce a automatic report (Whole HEM). (Valid values 0-60000)	50(W)	2
5	Threshold change in wattage to induce a automatic report (Clamp 1). (Valid values 0-60000)	50(W)	2
6	Threshold change in wattage to induce a automatic report (Clamp 2). (Valid values 0-60000)	50(W)	2
8	Percentage change in wattage to induce a automatic report (Whole HEM). (Valid values 0-100)	10	1
9	Percentage change in wattage to induce a automatic report (Clamp 1). (Valid values 0-100)	10	1

10	Percentage change in wattage to induce a automatic report (Clamp 2). (Valid values 0-100)	10	1
13	Enable /disable reporting CRC-16 Encapsulation Command. (0 == disable, 1 == enable)	0	1
101	Which reports need to send in Report group 1 (See flags in table below).	0x00 00 00 02	4
102	Which reports need to send in Report group 2 (See flags in table below).	0x00 00 00 01	4
103	Which reports need to send in Report group 3 (See flags in table below).	0	4
111	The time interval of sending Report group 1 (Valid values 0x01-0x7FFFFFFF).	0x00 00 00 3C	4
112	The time interval of sending Report group 2 (Valid values 0x01-0x7FFFFFFF).	0x00 00 00 78	4
113	The time interval of sending Report group 3 (Valid values 0x01-0x7FFFFFFF).	0x00 00 00 78	4
200	Partner ID (0= Aeon Labs Standard Product, 1= others..	0	1
252	Enable/disable Configuration Locked (0 =disable, 1 = enable).	0	1
255	1.Value=0x55555555、 Default=1、 Size=4 Reset to factory default setting and removed from the z-wave network	N/A	4
	2.Reset to factory default setting	N/A	1

Configuration Values for parameter 101-103:

	7	6	5	4	3	2	1	0
configuration Value 1(MSB)	Reserved							

configuration Value 2	Reserved	Auto send Meter REPORT (for A) at the group time interval (Clamp 2)	Auto send Meter REPORT (for A) at the group time interval (Clamp 1)	Reserved	Auto send Meter REPORT (for V) at the group time interval (Clamp 2)	Auto send Meter REPORT (for V) at the group time interval (Clamp 1)
configuration Value 3	Reserved	Auto send Meter REPORT (for kWh) at the group time interval (Clamp 2)	Auto send Meter REPORT (for kWh) at the group time interval (Clamp 1)	Reserved	Auto send Meter REPORT (for Watt) at the group time interval (Clamp 2)	Auto send Meter REPORT (for Watt) at the group time interval (Clamp 1)
configuration Value 4(LSB)	Reserved	Reserved	Auto send Meter REPORT (for A) at the group time interval (Whole HEM)	Auto send Meter REPORT (for V) at the group time interval (Whole HEM)	Auto send Meter REPORT (for wattage) at the group time interval (Whole HEM)	Auto send Meter REPORT (for KWH) at the group time interval (Whole HEM)

Example:

Automatically send reports every 30 seconds for Clamp 1 and Clamp 2:

1. Set the automatic report of Watt and KWH from clamp 1 and clamp 2 in report group 1.

```
ZW_SendData(0x70, 0x04, 0x65, 0x04, 0x00,0x00,0x1b,0x00); //Configuration Set
```

2. Set the interval time of automatic report in report group 1.

```
ZW_SendData(0x70, 0x04, 0x6F, 0x04, 0x00,0x00,0x00,0x1E); //Configuration Set
```

3. Associate to node "1"

```
ZW_SendData(0x85, 0x01, 0x01, 0x01); //Association set
```

Note: Meter CC (Watts) and Meter CC (KWH) of clamp 1 and clamp 2 are packaged with Multi Channel CC. End point 1 corresponds to clamp 1 and end point 2 corresponds to clamp 2.