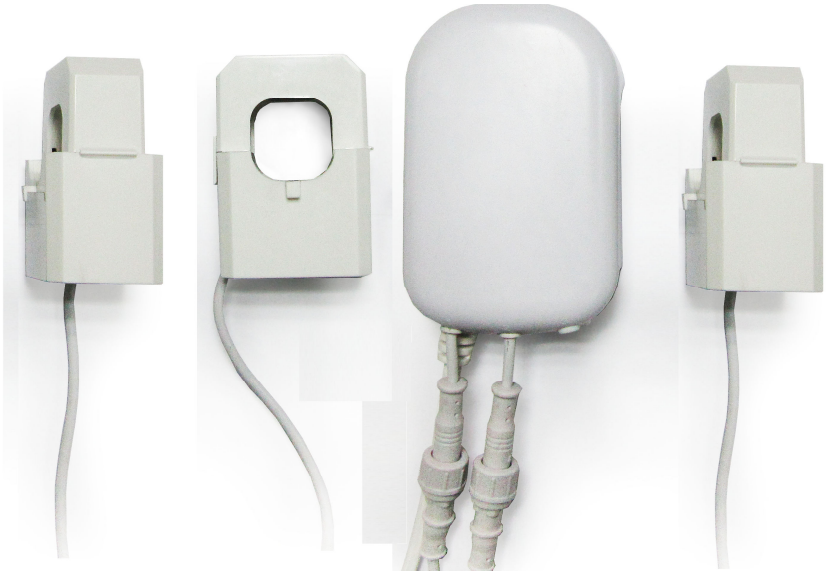
Aeon Labs Home Energy Meter Gen5

(Z-Wave Home Energy Meter Gen5)



Change history

Revision	Date	Change Description
1	9/01/2016	Initial draft.
2	10/10/2016	Update
3		
4		
5		

Aeon Labs Home Energy Meter Gen5
Engineering Specifications and Advanced Functions for Developers

Aeon Labs Home Energy Meter is a 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 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
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 is a security enabled Z-Wave plus device supports the 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.
It also supports the Over The Air (OTA) feature for the product's firmware upgrade.
As soon as the HEM is removed from a Z-Wave network it will be reset to default factory settings.

1. Library and Command Classes

1.1 SDK: 6.51.09

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 V4 COMMAND_CLASS_CRC_16_ENCAP V1 COMMAND_CLASS_MULTI_CHANNEL V4 COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION V3 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_DEVICE_RESET_LOCALLY V1 COMMAND_CLASS_MARK V1	COMMAND_CLASS_ZWAVEPLUS_INFO V2 COMMAND_CLASS_VERSION V2 COMMAND_CLASS_MANUFACTURER_SPECIFIC V2 COMMAND_CLASS_SECURITY V1 COMMAND_CLASS_DEVICE_RESET_LOCALLY V1 COMMAND_CLASS_MARK V1

Security Command Supported Report Frame	-	COMMAND_CLASS_VERSION V2 COMMAND_CLASS_MANUFACTURER_SPECIFIC V2 COMMAND_CLASS_METER V4 COMMAND_CLASS_CRC_16_ENCAP V1 COMMAND_CLASS_MULTI_CHANNEL V4 COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3 COMMAND_CLASS_CONFIGURATION V1 COMMAND_CLASS_ASSOCIATION_GRP_INFO V1 COMMAND_CLASS_ASSOCIATION V2 COMMAND_CLASS_FIRMWARE_UPDATE_MD V2 COMMAND_CLASS_POWERLEVEL V1

2. Technical specifications

Operating distance: Up to 492 feet/150 meters outdoors.

Input: 230V~, 50Hz, 10mA (EU/AU Version, 3P4)

380V~, 50Hz, 10mA (EU/AU Version, 3P3)

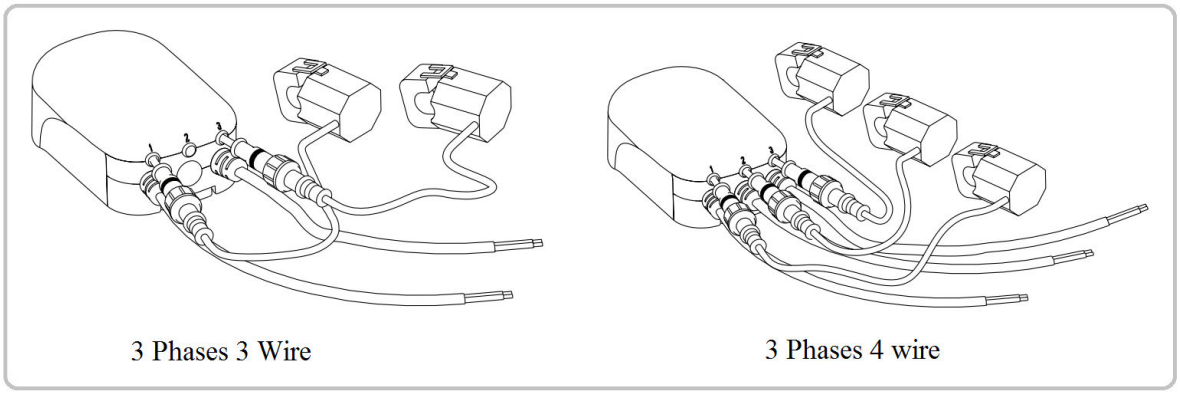
Measure range of current: 0A to 200A.

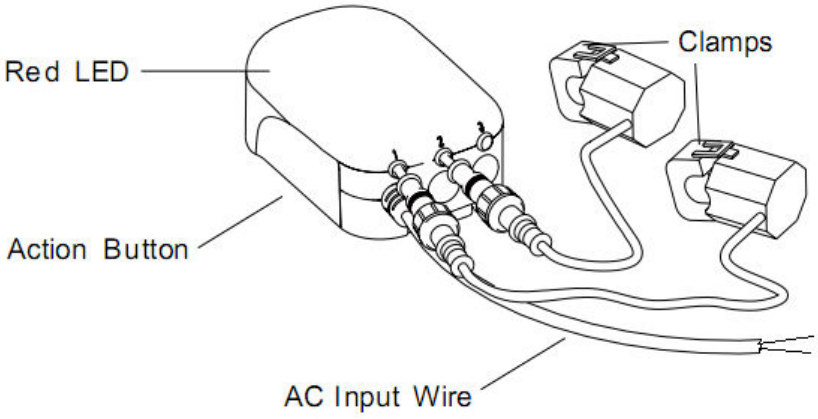
Operating temperature: 0℃ to 40℃.

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(Non-security):** 1. Power on the HEM, the LED will blink slowly. 2. Let the primary controller into inclusion mode (If you don't know how to do this, refer to its manual). 3. Press the Action Button. 4. If the inclusion is success, the LED will be solid. If the LED still blinks slowly, please repeat the process from step 2. **Remove HEM G5 from an existing Z-Wave Network:** 1. Power on the HEM, the LED will be solid. 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 Action Button. 4. If the removing is success, the LED will blink slowly. If the LED is still solid, please repeat the process from step 2.
Click 2 times	**Add HEM G5 into an existing Z-Wave Network(Security):** 1. Power on the HEM, the LED will blink slowly. 2. Let the primary controller into inclusion mode (If you don't know how to do this, refer to its manual). 3. Press the Action Button. 4. If the inclusion is success, the LED will be solid. If the LED still blinks slowly, please repeat the process from step 2. **Remove HEM G5 from an existing Z-Wave Network:** 1. Power on the HEM, the LED will be solid. 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 Action Button. 4. If the removing is success, the LED will blink slowly. If the LED is still solid, please repeat the process from step 2.
Press and hold 10 seconds	**Reset HEM G5 to Factory Default:** 1. Make sure the HEM G5 has been connected to the power supply. 2. Press and hold the Action Button for 10 seconds. 3. If the LED starts slow blinking, which indicates the reset is success, otherwise please repeat the process from step 2. Note: 1. This procedure should only be used when the primary controller is missing or inoperable. 2. Reset HEM G5 to factory default settings will: 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.

5.2 Association Command Class

The HEM supports 1 association group and can add max 5 association nodes in association group 1. Automatic REPORTs (configured via parameter 101/102/103) can be sent to the associated nodes in association group 1.

5.3 Association Group Info Command Class

5.3.1 Association Group Info Report Command Class

Profile: General: NA (Profile MSB=0, Profile LSB=1)

5.3.2 Association Group Name Report Command Class

Group 1: Lifeline

5.4 Multi Channel Command Class

1. For HEM 1 phase version, the Multi Channel Command supports 1 end point, which corresponding to clamp 1.

2. For HEM 2 phase version, the Multi Channel Command supports 2 end points, which corresponding to 2 clamps.
Clamp 1= Endpoint 1.
Clamp 2= Endpoint 2.
3. For HEM 3 phase version, the Multi Channel Command supports 3 end points, which corresponding to 3 clamps.
Clamp 1= Endpoint 1.
Clamp 2= Endpoint 2.
Clamp 3= Endpoint 3.

The Multi Channel CC encapsulates Meter Command Class, which can get the measurement of Watt (W or kVar), KWH or kVarh, Voltage and Current from the clamps.

5.5 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)

5.7 Configuration 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	For parameters of 101 - 103, power, energy detection mode configuration: 0 = Report power, energy absolute value; 1 = Report positive/negative power, report the algebraic sum energy; 2 = Report positive/negative power, only report energy positive part (consuming electricity); 3 = Report positive/negative power, only report energy negative part (generating electricity).	0	1
3	Enable selective reporting only when power change reaches a certain threshold or percentage set in 4-11 below. This is used to reduce network traffic. 0 = Disable 1 = Enable	1	1
4	Threshold change in wattage to induce an automatic report (Whole HEM). (Valid values 0-60000)	50(W)	2
5	Threshold change in wattage to induce an automatic report (Clamp 1). (Valid values 0-60000)	50(W)	2
6	Threshold change in wattage to induce an automatic report (Clamp 2). (Valid values 0-60000)	50(W)	2
7	Threshold change in wattage to induce an automatic report (Clamp 3). (Valid values 0-60000)	50(W)	2
8	Percentage change in wattage to induce an 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 an automatic report (Clamp 2). (Valid values 0-100)	10 (%)	1
11	Percentage change in wattage to induce an automatic report (Clamp 3). (Valid values 0-100)	10 (%)	1
13	Enable /disable reporting CRC-16 Encapsulation Command. 0 = Disable 1 = Enable	1	1
100	Set 101-103 to default.	N/A	1
101	Configure which report needs to be sent in Report group 1 (See flags in table below).	0x00 00 00 02	4
102	Configure which report needs to be sent in Report group 2 (See flags in table below).	0x00 00 00 01	4

103	Configure which report needs to be sent in Report group 3 (See flags in table below).	0	4
110	Set 111-113 to default.	N/A	1
111	Set the interval time of sending report in Report group 1 (Valid values 0x01-0x7FFFFFFF).	0x00 00 00 05	4
112	Set the interval time of sending report in Report group 2 (Valid values 0x01-0x7FFFFFFF).	0x00 00 00 78	4
113	Set the interval time of sending report in 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 to lock configuration parameters 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		Multi Channel Meter REPORT (**A**) on Clamp 3	Multi Channel Meter REPORT (**A**) on Clamp 2	Multi Channel Meter REPORT (**A**) on Clamp 1	Multi Channel Meter REPORT (**V**) on Clamp 3	Multi Channel Meter REPORT (**V**) on Clamp 2	Multi Channel Meter REPORT (**V**) on Clamp 1
Configuration Value 3	Reserved		Multi Channel Meter REPORT (**kWh**) on Clamp 3	Multi Channel Meter REPORT (**kWh**) on Clamp 2	Multi Channel Meter REPORT (**kWh**) on Clamp 1	Multi Channel Meter REPORT (**Watt**) on Clamp 3	Multi Channel Meter REPORT (**Watt**) on Clamp 2	Multi Channel Meter REPORT (**Watt**) on Clamp 1

Configuration Value 4(LSB)	Reserved	Reserved	Reserved	Meter REPORT (**A**) of whole Clamps	Meter REPORT (**V**) of whole Clamps	Meter REPORT (**Watt**) of whole Clamps	Meter REPORT (**kWh**) of whole Clamps