

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
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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.