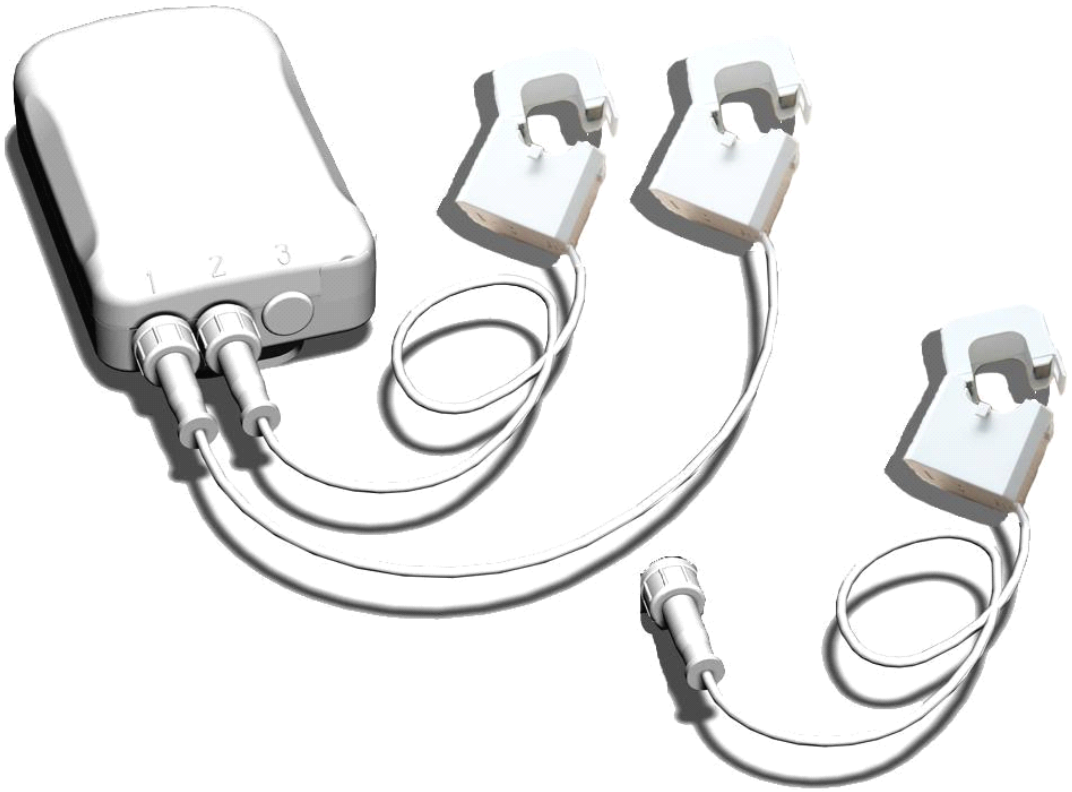
Aeon Labs Home Energy Meter G2

(Z-Wave Whole Home Energy Meter G2)



Aeon Labs HEM G2– Advanced Functions for Developers (SW Version: 1.12)

Overview:

The Aeon Labs Home Energy Meter is energy meter for the entire home. It can wirelessly report immediate wattage and kWh usage of the AC mains to a Z-Wave gateway. It can send Z-Wave REPORTS (Meter v3 Command Class) from Z-Wave GETs any time.

The HEM can also be setup to automatically REPORT to any given node within its own network via the Association Command Class (one association group). The sent REPORTs can be set to various intervals.

The HEM can also report separate instances/channels of its individual current clamps via the Multi Channel Command Class encapsulation.

The HEM also has the ability to reduce network traffic by reporting only when there is a significant change in wattage draw (configurable either by percentage or wattage increase).

Association:

The HEM can also be setup to automatically REPORT to any given node within its own network via the Association Command Class. There is only 1 group with a maximum of 5 associations within that group (group 1). Automatic REPORTs coming from the HEM will be sent via singlecast to all the 5 devices within the association group. The type of REPORTS (meter, battery, etc.) can be configured via Configuration Command Class (see below section).

Configuration:

We can configure the HEM to REPORT various command classes automatically at different timing intervals via the Configuration Command Class. These REPORTs will be sent to the association group.

Configuration Set Command Format:

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 (LSB)							

Parameter Number Definitions(8 bit):

Parameter Number	Description	Default Value	Size
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. (Bit 0: Whole HEM , Bit 1:Clamp 1, Bit 2:Clamp 2, Bit 3:Clamp 3)	1	1
4	Threshold change in wattage to induce a automatic report (Whole HEM). (Valid values 0-60000)	50	2
5	Threshold change in wattage to induce a automatic report (Clamp 1). (Valid values 0-60000)	50	2
6	Threshold change in wattage to induce a automatic report (Clamp 2). (Valid values 0-60000)	50	2

7	Threshold change in wattage to induce a automatic report (Clamp 3). (Valid values 0-60000)	50	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
11	Percentage change in wattage to induce a automatic report (Clamp 3). (Valid values 0-100)	10	1
13	Enable CRC16 encap of Report group 1,2,3(0 == disable, 1 == enable)	0	1
100	Reset to default parameters number 101-103. Any value other than 0 will initiate this reset.	0	4
101	Define which reports need to send in group1. (see flags in table below)	2	4
102	Define which reports need to send in group2. (see flags in table below)	1	4
103	Define which reports need to send in group3. (see flags in table below)	0	4
110	Reset to default parameters number 111-113. Any value other than 0 will initiate this reset.	0	4
111	The interval of sending report group 1(seconds) (Valid values 0x01-0xFFFFFFFF)	5	4
112	The interval of sending report group 2(seconds) (Valid values 0x01-0xFFFFFFFF)	120	4
113	The interval of sending report group 3(seconds) (Valid values 0x01-0xFFFFFFFF)	120	4
252	Lock or Unlock other configuration set function (0:unlock,1:Lock)	0	1

253	Re-Calibrate (Will destroy factory calibration). CONTACT AEON LABS before using.	0	4
254	Device Tag which will mark an ID number which will persist across device resets. (Valid values 0-60000)	0	2
255	Reset to the default Configuration	0	4

Configuration Flags for parameters 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 3)	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)	Auto send Meter REPORT (for V) at the group time interval (Clamp 3)	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 3)	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)	Auto send Meter REPORT (for Watt) at the group time interval (Clamp 3)	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				Auto send Meter REPORT (for A) at the group time interval	Auto send Meter REPORT (for V) at the group time interval	Auto send Meter REPORT (for wattage) at the group	Auto send Meter REPORT (for kWh) at the group time

		(Whole HEM)	(Whole HEM)	time interval (Whole HEM)	interval (Whole HEM)

Device Firmware Upgrades (DFU):

When upgrading software via DFU programs, remove the batteries from the HEM and plug in the USB cable from your computer to the HEM. Follow the on-screen instructions from the DFU software program to complete the upgrade. After a successful upgrade, remove all power from the HEM (USB and batteries) and exclude/remove the HEM from the old network.

Auto Report Every 30 seconds for Clamp 1 and Clamp 2

1.have report group 3 send Multi Channel Meter CC(Watts) and MultiChannel Meter CC (KWH) of clamp 1 and clamp 2 automatically
ZW_SendData(0x70, 0x04, 0x67, 0x04, 0x00,0x00,0x1b,0x00); //Configuration Set
2.set the interval of sending report group 3
ZW_SendData(0x70, 0x04, 0x71, 0x04, 0x00,0x00,0x00,0x1E); //Configuration Set
3.associate to node "1"
ZW_SendData(0x85, 0x01, 0x01, 0x01); //Assoc
note: Meter CC(Watts) and Meter CC (KWH) is of clamp 1 and clamp 2 is packaged in Multi Channel Command. end point 1 is clamp 1,end point 2 is clamp 2.

How to use delta function?

1. Turn on Delta function of the whole HEM and clamp 1 and clamp 2 and clamp 3:

   ZW_SendData(0x70, 0x04, 0x03, 0x01, 0x0F); //Configuration set

about value 0x0F: 00001111
LSB
bit 0: Switch of delta function of whole hem (1 on,0 off)
bit 1: Switch of delta function of clamp 1 (1 on,0 off)
bit 2: Switch of delta function of clamp 2 (1 on,0 off)
bit 3: Switch of delta function of clamp 3 (1 on,0 off)
MSB

2. **Change the wattage value of Delta function of the whole HEM to 255 watts (default:50 watts)**

ZW_SendData(0x70, 0x04, 0x04,0x02, 0x00, 0xFF); //Configuration set

3. **Change the wattage value of Delta function of clamp 1 to 255 watts (default:50 watts)**
   ZW_SendData(0x70, 0x04, 0x05,0x02, 0x00, 0xFF); //Configuration set

4. Change the wattage value of Delta function of clamp 2 to 255 watts (default:50 watts)
ZW_SendData(0x70, 0x04, 0x06,0x02, 0x00, 0xFF); //Configuration set

5. Change the wattage value of Delta function of clamp 3 to 255 watts (default:50 watts)
ZW_SendData(0x70, 0x04, 0x07,0x02, 0x00, 0xFF); //Configuration set

6. Change the percent of Delta function of the whole HEM to 15% (default:10%)
ZW_SendData(0x70, 0x04, 0x08, 0x01,0x0F); //Configuration set

7. Change the percent of Delta function of clamp 1 to 15% (default:10%)
ZW_SendData(0x70, 0x04, 0x09, 0x01,0x0F); //Configuration set

8. Change the percent of Delta function of clamp 2 to 15% (default:10%)

ZW_SendData(0x70, 0x04, 0x0A, 0x01,0x0F); //Configuration set

9. Change the percent of Delta function of clamp 3 to 15% (default:10%)

ZW_SendData(0x70, 0x04, 0x0B, 0x01,0x0F); //Configuration set

Other Examples:

a. automatically report Meter CC (Watts) to node "1" every 5 seconds

1.have report group 1 send Meter CC (Watts) automatically

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

2.set the interval of sending report group 1

ZW_SendData(0x70, 0x04, 0x6F, 0x04, 0x00,0x00,0x00,0x05); //Configuration Set

3.associate to node "1"

ZW_SendData(0x85, 0x01, 0x01, 0x01); //Association Set

a. (alternative) automatically report Meter CC (Watts) to node "1" every 12 minutes

1.have report group 1 send Meter CC (Watts) automatically

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

2.set the interval of sending report group 1

ZW_SendData(0x70, 0x04, 0x6F, 0x04, 0x00,0x00,0x02,0xd0); //Configuration Set

3.associate to node "1"

ZW_SendData(0x85, 0x01, 0x01, 0x01); //Association Set

b. Set default values

ZW_SendData(0x70, 0x04, 0xFF,0x01,0x00);

d. pull energy readings（METER_REPORT） for individual clamps

clamps 1 **(KWH)** :ZW_SendData(0x60,0x06,1,0x32,0x01,0x00)；

clamps 2 **(Watts)** :ZW_SendData(0x60,0x06,2,0x32,0x01,0x10)；

e. pull energy readings（METER_REPORT） for the entire unit

(KWH):ZW_SendData(0x32,0x01,0x00);

(Watts):ZW_SendData(0x32,0x01,0x10);

(V):ZW_SendData(0x32,0x01,0x20);

(A):ZW_SendData(0x32,0x01,0x28);