Swidget Z-Wave^{tm} Universal Insert Configuration

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Contents

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1 Introduction

This document provides technical details regarding the Configuration Command Class implementation for the Swidget Z-Wave^{tm} Universal Control Insert (SZWC) and its variants.

2 Device information

The Swidget Z-Wave^{tm} Universal Control insert may be mated with several different companion boards that extend the sensor capabilities of the base device as follows:

Catalogue #	Product Name
ZW000UWA	Swidget Z-Wave^{tm} Universal Control Insert (no companion board)
ZW001UWA	Swidget Z-Wave^{tm} Universal Control Insert + USB
ZW006UWA	Swidget Z-Wave^{tm} Universal Control Insert + Temperature/Humidity/Motion
ZW008UWA	Swidget Z-Wave^{tm} Universal Control Insert + Air Quality

The same firmware image is used for all products in the catalogue of Swidget Z-Wave^{tm} inserts. The list of supported configuration elements depends upon both the companion board and the host wiring device into which the insert is placed.

The Manufacturer Product Type provides information on the type of host device the insert is placed in as well as the type of companion board that it is mated with.

3 Report Constraints

Many of the configurable elements are designed to provide a method for the user to fine tune the conditions which determine when the device will generate reports. Reports can take the form of Meter Reports, Multilevel Sensor Reports, and/or Notification Reports.

Although the user can configure the device with a complex collection of report generating criteria including combinations of level triggers, change triggers, time triggers and delays, the Z-Wave^{tm} protocol requires that the device limit the frequency of unsolicited (automatic device-generated) data transmissions.

To achieve this, the device will combine reports of differing kinds into single 'bursts' of data and will limit these bursts to once every 30 seconds *maximum*.

For this reason, any given report *may* be delayed by up to 30 seconds.

All the time delay and report settings in the Swidget device use seconds as the time base. To optimize the bundling of reports into 'bursts', the user should choose values for periodic reports and report delays that are multiples of each other. Using multiples of 30 is a simple method of maintaining good data burst operations.

Note that even if delays and timed reports are synchronized with each other, asynchronous events like a temperature or power level change detection will cause a data burst that may disrupt the timed messages for a briefly, and not by more than 30 seconds.

4 Configuration parameters

Unless otherwise specified, all parameters are readable and writeable.

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4.1 System

Swidget Z-Wave™ Universal Control Inserts provide a set of system configuration parameters as described in this section.
The system LED behaviour may be configured using the system settings.

4.1.1 System Default Behaviour

By default, the system LED will operate at full brightness, and will reflect the current state of the switch load output; the LED will be on when the output/load is turned-on, and the LED will be off when the output/load is turned-off.

4.1.2 System Configuration Parameter List

4.1.2.1 System Status (152)

Number	152 (0x0098)
Name	**System Status**
Type	Unsigned Integer – [**READ ONLY] [ADVANCED]**
Size	4
Range(s)	0 – 4294967295
Units	N/A
Default	0
Comments	Used to provide status information for system troubleshooting.

4.1.2.2 System LED Brightness (153)

Number	153 (0x0099)
Name	**System LED Brightness**
Type	Unsigned Integer
Size	1
Range(s)	0 – 100
Units	Percent
Default	100
Comments	Used to set the power output to the system LED to control on brightness level.

4.1.2.3 System Options (154)

Number	154 (0x009A)		
Name	**System Options**		
Type	Bit field		
Size	2		
Bit fields	Bit	Default	Description
	0	0	LED Invert 0 == LED follows state of host switch, on when host is on. 1 == LED is inverse of state of host switch, off when host is on.
Range(s)	0 – 1 (0x0001)		
Units	N/A		
Default	0x0000		
Comments	Configure various system wide features and capabilities.		

4.2 3-Way Switch Host

Each Swidget Z-Wave™ Insert variant will support the following set of "3-Way Switch" configuration parameters when it is placed into the following Swidget host device:

S16001WA Swidget Switch 600W 1 pole / 3 pole - one power sensor

The switch on/off state may be configured to be determined by either the state of the host device relay, or the meter reading.

Using the relay state is desired for installs where the host switch is the sole controller of the output.

Use of the power meter reading to determine on/off state is desirable in 3-way or multi-way installations where the load may be controlled by other devices in addition to the host device, and therefore the state of the load may be different than the state of the host device relay.

4.2.1 3-Way Switch Default Behaviour

The default operation of the switch will be to have the state of the switch (On or Off) directly correlate to the state of the relay.

4.2.2 3-Way Switch Host Configuration Parameter List

4.2.2.1 3-Way Switch Options (168)

Number	168 (0x00A8)		
Name	**3-Way Switch Options**		
Type	Bit field		
Size	2		
Bit fields	Bit	Default	Description
	0	0	**USE POWER FOR STATE** 3-Way Mode: Use power level to determine on/off. 0 == Relay state determines on/off state 1 == Power level determines on/off state
	1	0	**USE INVERTED STATE** On/Off Invert: on/off state and commands are inverted. 0 == host output is reported on when energized, off when de-energized. Commands to host are not inverted. 1 == host output is reported off when energized, on when de-energized. Commands to host are inverted to match. Present to resolve potential wiring issues. ***Not normally set.***
Range(s)	0 – 3 (0x0003)		
Units	N/A		
Default	0 (0x0000)		
Comments	Configure 3-way switch host features and capabilities.		

4.3 Dimmer Host

Each Swidget Z-Wave[tm] Insert variant will support the following set of "Dimmer" configuration parameters when it is placed into any of the following Swidget host devices:

SD3001WA Swidget Dimmer Switch 300W - one power sensor
SD3002WA Multi - Location Dimmer - one power sensor

The insert exposes the Dimmer Switch host as a Multilevel Switch device.

The user may configure maximum, minimum and default brightness levels for the host switch using the following configuration parameters.

This provides a way for the user to optimize the output levels of the switch to match the capability of the lighting loads.

4.3.1 Dimmer Switch Default Behaviour

The default operation of the dimmer is set to match the capabilities of many dimmable light loads. The defaults for the different levels can be found in the configuration parameter tables.

4.3.2 Dimmer Host Configuration Parameter List

4.3.2.1 Dimmer Minimum Brightness (192)

Number	192 (0x00C0)
Name	**Dimmer Minimum Brightness**
Type	Unsigned Integer - **[ADVANCED]**
Size	1
Range(s)	20 – 80
Units	Percent
Default	42
Comments	Used to set the minimum power output to the dimmer on the lowest setting above 'off'. Used to trim the dimmer range to overcome flickering issues with some bulbs at low output levels.

4.3.2.2 Dimmer Maximum Brightness (193)

Number	193 (0x00C1)
Name	**Dimmer Maximum Brightness**
Type	Unsigned Integer **[ADVANCED]**
Size	1
Range(s)	80 – 100
Units	Percent
Default	100
Comments	Used to set the maximum power output to the dimmer on the highest 'on' setting. Used to trim the dimmer range to overcome flickering issues with some bulbs at high output levels.

4.3.2.3 Dimmer Default Brightness (194)

Number	194 (0x00C2)

Name	**Dimmer Default Brightness**
Type	Unsigned Integer
Size	1
Range(s)	0 – 100
Units	Percent
Default	80
Comments	Used to set the power output to the dimmer when it is initially turned on by the manual switch.

4.4 Power Monitoring Host

Each Swidget Z-Wave™ Insert variant supports a collection of "Power" configuration parameters when it is placed a Swidget host wiring device that contains power monitoring capabilities.

An insert supports up to two separate power meter devices depending on the host device capabilities. The following table identifies wiring products that have power monitoring capabilities and the number of power monitoring readings each supports:

Catalogue #	Product Name	Power Sensors
R1015SWA	Swidget Outlet - 15A Standard	2
R1015SWA	Swidget Outlet - 15A Split	2
R1020SWA	Swidget Outlet - 20A Standard	2
S16001WA	Swidget Switch 600W 1 pole / 3 pole	1
SD3001WA	Swidget Dimmer Switch 300W	1
SD3002WA	Multi-Location Dimmer	1

If a host device supports 1 power sensor (one load), then it presents support for a Meter Command Class associated with the controlled output (switch or outlet receptacle) and is accessible through the root.

Parameters identified as **"*Power 1*"** are associated with the controlled load (light, dimmer or receptacle depending on the host device).

Parameters identified as **"*Power 2*"** are available only with a dual receptacle power outlet host and are associated with the power reading from the always-on receptacle load.

If a host device supports 2 power sensors, the Meter Command Class associated with the controlled output (switch or outlet receptacle) is accessible through the root and through Endpoint 1 via Multi-Channel operations. The second Meter Command Class is associated with the always-on, unswitched receptacle, and is accessible only through Endpoint 2 Multi-Channel operations.

Meter reports generated by either power sensor based on asynchronous activities (timed reports, change reports, etc.) are delivered to the **Lifeline** associations.

The device will generate an accumulated kWh report according to the Periodic Reporting setting. For all other power-related reporting events, an instantaneous Watts report will be delivered.

Meter reports generated by the power sensor 2 are only generated and delivered to Lifeline devices that have established a multi-channel association to the Lifeline.

The configuration values for power monitoring provides parameters to configure high and low power thresholds that may be used to define high and low power states and can be used to generate reports and/or initiate the delivery of BASIC SET commands to associated devices.

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4.4.1 Power Monitoring Default Behaviour

Both ***"Power 1"*** and ***"Power 2"*** have identical default power reporting configurations:

- An accumulated kWh Meter Report will be generated and delivered to the **Lifeline** associations every 3600 seconds (hourly).
- An instantaneous Watts Meter Report will be generated and delivered to the **Lifeline** associations if the associated power reading changes by more than 10 Watts.

Note that ***"Power 2"*** Meter Reports will only be generated and delivered to Lifeline *multi-channel* associations.

All power range related parameters are set to their minimum/maximum boundaries thereby disabling high power and low power range activities.

4.4.2 Power 1 Configuration Parameter List

REMINDER:

"*Power 1*" parameters are associated with the controlled load (light, dimmer or receptacle depending on the host device).

4.4.2.1 Power 1 High Entry Level (1)

Number	1 (0x0001)
Name	**Power 1 High Entry Level**
Type	Unsigned Integer
Size	2
Range(s)	0 – 2400 (0x0000 – 0x0960)
Units	Watts
Default	2400 (0x0960)
Comments	Used to set the power value for Power 1 (the controlled load) that indicates ***entry into*** a Power 1 High state. ***NOTE:*** Under normal circumstances, this value should be set higher than the Power 1 Low threshold values and greater-than or equal to Power 1 High Exit Level.

4.4.2.2 Power 1 Low Entry Level (2)

Number	2 (0x0002)
Name	**Power 1 Low Entry Level**
Type	Unsigned Integer
Size	2
Range(s)	0 – 2400 (0x0000 – 0x0960)
Units	Watts
Default	0 (0x0000)

Comments	Used to set the power value for Power 1 (the controlled load) that indicates ***entry into*** a Power 1 Low power state. ***NOTE:*** Under normal circumstances, this value should be set lower than the Power 1 High threshold values and less-than or equal to the Power 1 Low Exit Level.

4.4.2.3 Power 1 High Exit Level (3)

Number	3 (0x0003)
Name	**Power 1 High Exit Level**
Type	Unsigned Integer
Size	2
Range(s)	0 – 2400 (0x0000 – 0x0960)
Units	Watts
Default	2400 (0x0960)
Comments	Used to set the power value for Power 1 (the controlled load) that indicates ***exit from*** a Power 1 High state. ***NOTE:*** Under normal circumstances, this value should be set higher than Power 1 Low threshold values and less-than or equal to Power 1 High Entry Level.

4.4.2.4 Power 1 Low Exit Level (4)

Number	4 (0x0004)
Name	**Power 1 Low Exit Level**
Type	Unsigned Integer
Size	2
Range(s)	0 – 2400 (0x0000 – 0x0960)
Units	Watts
Default	0 (0x0000)
Comments	Used to set the power value for Power 1 (the controlled load) that indicates ***exit from*** a Power 1 Low power state. ***NOTE:*** Under normal circumstances, this value should be set lower than Power 1 High threshold values and greater-than or equal to Power 1 Low Entry Level.

4.4.2.5 Power 1 High Delay (5)

Number	5 (0x0005)
Name	**Power 1 High Delay**
Type	Unsigned Integer
Size	2
Range(s)	0 – 65535
Units	Seconds
Default	0
Comments	Used to set the time duration that Power 1 High state change power level conditions must exist before Power 1 High state entry and/or exit is registered, and the associated actions are executed. See the "Power 1 High Actions" configuration parameter settings for how the delay can be applied.

4.4.2.6 Power 1 Low Delay (6)

Number	6 (0x0006)
Name	**Power 1 Low Delay**
Type	Unsigned Integer
Size	2
Range(s)	0 – 65535 (0x0000 – 0xFFFF)
Units	Seconds
Default	0 (0x0000)
Comments	Used to set the time duration that Power 1 Low state change power level conditions must exist before Power 1 Low state entry and/or exit is registered, and the associated actions are executed. See the "Power 1 Low Actions" configuration parameter settings for how the delay can be applied.

4.4.2.7 Power 1 Periodic Report (7)

Number	7 (0x0007)
Name	**Power 1 Periodic Report**
Type	Unsigned Integer
Size	2
Range(s)	0 to 65535 Setting to 0 disables periodic reporting. There is a 30 second maximum report frequency limit, so setting to a value between 1 and 30 results in a setting of 30 and will be reported back as 30.
Units	Seconds
Default	3600 (0x0E10) - 1 hour
Comments	Used to set the time in seconds between sending Power 1 accumulated kWh METER REPORTs to the Lifeline.

4.4.2.8 Power 1 Change Report (8)

Number	8 (0x0008)
Name	**Power 1 Change Report**
Type	Unsigned Integer
Size	2
Range(s)	0 to 2400 (0x0000 – 0x0960) Setting to 0 disables power change reporting. There is a 10-Watt minimum change detection level, so setting to a value between 1 and 10 results in a setting of 10 and will be reported back as 10.
Units	Watts
Default	10 (0x000A)
Comments	Used to set the power in Watts that a reported reading of Power 1 must change by since the last reported value before a new instantaneous Watts METER REPORT is sent to the Lifeline. Note that devices will not exceed recommended report frequency regardless of the rate of power reading changes. If the power is changing rapidly, the device will wait for it to stabilize before reporting the change.

4.4.2.9 Power 1 Renotification Delay (9)

Number	9 (0x0009)

Name	**Power 1 Renotification Delay**
Type	Unsigned Integer
Size	2
Range(s)	0 to 65535 (0x0000 – 0xFFFF) Setting to 0 disables use of renotification periodic reporting rate; no change to reporting rate when in Power 1 High or Low states. When disabled, "Power 1 Periodic Report" and/or "Power 1 Change Report" parameter settings will still apply.
Units	Seconds
Default	0 (0x0000)
Comments	Used to set the time in seconds between sending repeated Power 1 instantaneous Watts METER REPORTs to the Lifeline while in a Power 1 Low or High state. This can be used to increase report frequency when Power 1 readings are outside of the desired range(s).

4.4.2.10 Power 1 High Entry SET Value (10)

Number	10 (0x000A)
Name	**Power 1 High Entry SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 255 (0x00 – 0xFF) Note: 100 - 254 (0x64 – 0xFE) is interpreted as 255 (0xFF).
Units	BASIC CC SET LEVEL
Default	255 (0xFF) - turn ***on*** associated devices
Comments	BASIC SET value sent to associated nodes on ***entry into*** Power 1 High state.

4.4.2.11 Power 1 High Exit SET Value (11)

Number	11 (0x000B)
Name	**Power 1 High Exit SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 255 (0x00 – 0xFF) Note: 100 - 254 (0x64 – 0xFE) is interpreted as 255 (0xFF).
Units	BASIC CC SET LEVEL
Default	0 (0x00) - turn ***off*** associated devices
Comments	BASIC SET value sent to associated nodes on ***exit from*** Power 1 High state.

4.4.2.12 Power 1 Low Entry SET Value (12)

Number	12 (0x000C)
Name	**Power 1 Low Entry SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 255 (0x00 – 0xFF) Note: 100 - 254 (0x64 – 0xFE) is interpreted as 255 (0xFF).
Units	BASIC CC SET LEVEL
Default	255 (0xFF) - turn ***on*** associated devices
Comments	BASIC SET value sent to associated nodes on ***entry into*** Power 1 Low state.

4.4.2.13 Power 1 Low Exit SET Value (13)

Number	13 (0x000D)
Name	**Power 1 Low Exit SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 255 (0x00 – 0xFF) Note: 100 - 254 (0x64 – 0xFE) is interpreted as 255 (0xFF).
Units	BASIC CC SET LEVEL
Default	0 (0x00) - turn ***off*** associated devices
Comments	BASIC SET value sent to associated nodes on ***exit from*** Power 1 Low state.

4.4.2.14 Power 1 High Actions (14)

Number	14 (0x000E)		
Name	**Power 1 High Actions**		
Type	Bit field		
Size	2		
Bit fields	Bit	Default	Description
	0	1	**CONTROL ASSOCIATIONS ON ENTRY** If set, send BASIC SET with "Power 1 High Entry SET Value" to "Power 1 High" association group on Power 1 High state entry.
	1	1	**CONTROL ASSOCIATIONS ON EXIT** If set, send BASIC SET with "Power 1 High Exit SET Value" to "Power 1 High" association group on Power 1 High state exit.
	2	0	**CONTROL HOST ON ENTRY** If set, execute BASIC SET with "Power 1 High Entry SET Value" on host device on Power 1 High state entry. ***NOTE: Possible side effects as the host actuator controls the activation/de-activation of the load used for Power 1***
	3	0	**CONTROL HOST ON EXIT** If set, execute BASIC SET with "Power 1 High Exit SET Value" on host device on Power 1 High state exit. ***NOTE: Possible side effects as the host actuator controls the activation/de-activation of the load used for Power 1***
	4	0	**REPORT TRANSITIONS** If set, send instantaneous Watts METER REPORT to Lifeline on Power 1 High state entry and exit.
	5	1	**APPLY ENTRY DELAY** If set, apply "Power 1 High Delay" for Power 1 High state entry. When not in Power 1 High state, Power 1 level must equal or exceed "Power 1 High Entry Level" for "Power 1 High Delay" time before device will enter Power 1 High state.
	6	1	**APPLY EXIT DELAY** If set, apply "Power 1 High Delay" for Power 1 High state exit. When in Power 1 High state, Power 1 level must fall equal to or below "Power 1 High Exit Level" for "Power 1 High Delay" time before device will exit Power 1 High state.
Range(s)	0 to 127 (0x7F)		
Units	N/A		

Default	99 (0x0063)
Comments	Enable/disable various high-power reporting and activation capabilities.

4.4.2.15 Power 1 Low Actions (15)

Number	15 (0x000F)		
Name	**Power 1 Low Actions**		
Type	Bit field		
Size	2		
Bit fields	Bit	Default	Description
	0	1	**CONTROL ASSOCIATIONS ON ENTRY** If set, send BASIC SET with "Power 1 Low Entry SET Value" to "Power 1 Low" association group on Power 1 Low state entry.
	1	1	**CONTROL ASSOCIATIONS ON EXIT** If set, send BASIC SET with "Power 1 Low Exit SET Value" to "Power 1 Low" association group on Power 1 Low state exit.
	2	0	**CONTROL HOST ON ENTRY** If set, execute BASIC SET with "Power 1 Low Entry SET Value" on host device on Power 1 Low state entry. ***NOTE: Possible side effects as the host actuator controls the activation/de-activation of the load used for Power 1***
	3	0	**CONTROL HOST ON EXIT** If set, execute BASIC SET with "Power Low Exit SET Value" on host device on Power 1 Low state exit. ***NOTE: Possible side effects as the host actuator controls the activation/de-activation of the load used for Power 1***
	4	0	**REPORT TRANSITIONS** If set, send instantaneous Watts METER REPORT to Lifeline on low-power state entry and exit.
	5	1	**APPLY ENTRY DELAY** If set, apply "Power 1 Low Delay" for Power 1 Low state entry.
	6	1	**APPLY EXIT DELAY** If set, apply "Power 1 Low Delay" for Power 1 Low state exit.
Range(s)	0 to 127 (0x7F)		
Units	N/A		
Default	99 (0x0063)		
Comments	Enable/disable various low-power related reporting and activation capabilities.		

4.4.3 Power 2 Configuration Parameter List

REMINDER:

"*Power 2*" parameters are available only with a dual receptacle power outlet host, as they are associated with the always-on receptacle load.
Meter reports for Power 2 are only generated and delivered to Lifeline devices that have established a multi-channel association.

4.4.3.1 Power 2 High Entry Level (24)

Number	24 (0x0018)
Name	**Power 2 High Entry Level**
Type	Unsigned Integer
Size	2
Range(s)	0 – 2400 (0x0000 – 0x0960)
Units	Watts
Default	2400 (0x0960)
Comments	Used to set the power value for Power 2 that indicates ***entry into*** a Power 2 High state. ***NOTE:*** Under normal circumstances, this value should be set higher than the Power 2 Low threshold values and greater-than or equal to Power 2 High Exit Level.

4.4.3.2 Power 2 Low Entry Level (25)

Number	25 (0x0019)
Name	**Power 2 Low Entry Level**
Type	Unsigned Integer
Size	2
Range(s)	0 – 2400 (0x0000 – 0x0960)
Units	Watts
Default	0 (0x0000)
Comments	Used to set the power value for Power 2 that indicates ***entry into*** a Power 2 Low power state. ***NOTE:*** Under normal circumstances, this value should be set lower than the Power 2 High threshold values and less-than or equal to the Power 2 Low Exit Level.

4.4.3.3 Power 2 High Exit Level (26)

Number	26 (0x001A)
Name	**Power 2 High Exit Level**
Type	Unsigned Integer
Size	2
Range(s)	0 – 2400 (0x0000 – 0x0960)
Units	Watts
Default	2400 (0x0960)
Comments	Used to set the power value for Power 2 that indicates ***exit from*** a Power 2 High state. ***NOTE:*** Under normal circumstances, this value should be set higher than Power 2 Low threshold values and less-than or equal to Power 2 High Entry Level.

4.4.3.4 Power 2 Low Exit Level (27)

Number	27 (0x001B)
Name	**Power 2 Low Exit Level**
Type	Unsigned Integer
Size	2
Range(s)	0 – 2400 (0x0000 – 0x0960)
Units	Watts
Default	0 (0x0000)

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Comments	Used to set the power value for Power 2 that indicates ***exit from*** a Power 2 Low state. ***NOTE:*** Under normal circumstances, this value should be set lower than Power 2 High threshold values and greater-than or equal to Power 2 Low Entry Level.

4.4.3.5 Power 2 High Delay (28)

Number	28 (0x001C)
Name	**Power 2 High Delay**
Type	Unsigned Integer
Size	2
Range(s)	0 – 65535
Units	Seconds
Default	0
Comments	Used to set the time duration that Power 2 High state change power level conditions must exist before Power 2 High state entry and/or exit is registered, and the associated actions are executed. See the "Power 2 High Actions" configuration parameter settings for how the delay can be applied.

4.4.3.6 Power 2 Low Delay (29)

Number	29 (0x001D)
Name	**Power 2 Low Delay**
Type	Unsigned Integer
Size	2
Range(s)	0 – 65535 (0x0000 – 0xFFFF)
Units	Seconds
Default	0 (0x0000)
Comments	Used to set the time duration that Power 2 Low state change power level conditions must exist before Power 2 Low state entry and/or exit is registered, and the associated actions are executed. See the "Power 2 Low Actions" configuration parameter settings for how the delay can be applied.

4.4.3.7 Power 2 Periodic Report (30)

Number	30 (0x001E)
Name	**Power 2 Periodic Report**
Type	Unsigned Integer
Size	2
Range(s)	0 to 65535 Setting to 0 disables periodic reporting. There is a 30 second maximum report frequency limit, so setting to a value between 1 and 30 results in a setting of 30 and will be reported back as 30.
Units	Seconds
Default	3600 (0x0E10) - 1 hour

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Comments	Used to set the time in seconds between sending Power 2 1 accumulated kWh METER REPORTs to the Lifeline. **NOTE: Power 2 Meter Reports are only delivered to Lifeline associations created with a Multi-Channel Association.**

4.4.3.8 Power 2 Change Report (31)

Number	31 (0x001F)
Name	**Power 2 Change Report**
Type	Unsigned Integer
Size	2
Range(s)	0 to 2400 (0x0000 – 0x0960) Setting to 0 disables power change reporting. There is a 10-Watt minimum change detection level, so setting to a value between 1 and 10 results in a setting of 10 and will be reported back as 10.
Units	Watts
Default	10 (0x000A)
Comments	Used to set the power in Watts that a reported reading of Power 2 must change by since the last reported value before a new instantaneous Watts METER REPORT is sent to the Lifeline. Note that devices will not exceed recommended report frequency regardless of the rate of power reading changes. If the power is changing rapidly, the device will wait for it to stabilize before reporting the change. **NOTE: Power 2 Meter Reports are only delivered to Lifeline associations created with a Multi-Channel Association.**

4.4.3.9 Power 2 Renotification Delay (32)

Number	32 (0x0020)
Name	**Power 2 Renotification Delay**
Type	Unsigned Integer
Size	2
Range(s)	0 to 65535 (0x0000 – 0xFFFF) Setting to 0 disables use of renotification periodic reporting rate; no change to reporting rate when in Power 2 High or Low states. When disabled, "Power 2 Periodic Report" and/or "Power 2 Change Report" parameter settings will still apply.
Units	Seconds
Default	0 (0x0000)
Comments	Used to set the time in seconds between sending repeated Power 2 instantaneous Watts METER REPORTs to the Lifeline while in a Power 2 Low or High state. This can be used to increase report frequency when Power 2 readings are outside of the desired range(s). **NOTE: Power 2 Meter Reports are only delivered to Lifeline associations created with a Multi-Channel Association.**

4.4.3.10 Power 2 High Entry SET Value (33)

Number	33 (0x0021)
Name	**Power 2 High Entry SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 255 (0x00 – 0xFF) Note: 100 - 254 (0x64 – 0xFE) is interpreted as 255 (0xFF).
Units	BASIC CC SET LEVEL
Default	255 (0xFF) - turn ***on*** associated devices
Comments	BASIC SET value sent to associated nodes on ***entry into*** Power 2 High state.

4.4.3.11 Power 2 High Exit SET Value (34)

Number	34 (0x0022)
Name	**Power 2 High Exit SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 255 (0x00 – 0xFF) Note: 100 - 254 (0x64 – 0xFE) is interpreted as 255 (0xFF).
Units	BASIC CC SET LEVEL
Default	0 (0x00) - turn ***off*** associated devices
Comments	BASIC SET value sent to associated nodes on ***exit from*** Power 2 High state.

4.4.3.12 Power 2 Low Entry SET Value (35)

Number	35 (0x0023)
Name	**Power 2 Low Entry SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 255 (0x00 – 0xFF) Note: 100 - 254 (0x64 – 0xFE) is interpreted as 255 (0xFF).
Units	BASIC CC SET LEVEL
Default	255 (0xFF) - turn ***on*** associated devices
Comments	BASIC SET value sent to associated nodes on ***entry into*** Power 2 Low state.

4.4.3.13 Power 2 Low Exit SET Value (36)

Number	36 (0x0024)
Name	**Power 2 Low Exit SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 255 (0x00 – 0xFF) Note: 100 - 254 (0x64 – 0xFE) is interpreted as 255 (0xFF).
Units	BASIC CC SET LEVEL
Default	0 (0x00) - turn ***off*** associated devices
Comments	BASIC SET value sent to associated nodes on ***exit from*** Power 2 Low state.

4.4.3.14 Power 2 High Actions (37)

Number	37 (0x0025)

Name	**Power 2 High Actions**		
Type	Bit field		
Size	2		
Bit fields	Bit	Default	Description
	0	1	**CONTROL ASSOCIATIONS ON ENTRY** If set, send BASIC SET with "Power 2 High Entry SET Value" to "Power 2 High" association group on Power 2 High state entry.
	1	1	**CONTROL ASSOCIATIONS ON EXIT** If set, send BASIC SET with "Power 2 High Exit SET Value" to "Power 2 High" association group on Power 2 High state exit.
	2	0	**CONTROL HOST ON ENTRY** If set, execute BASIC SET with "Power 2 High Entry SET Value" on host device on Power 2 High state entry.
	3	0	**CONTROL HOST ON EXIT** If set, execute BASIC SET with "Power 2 High Exit SET Value" on host device on Power 2 High state exit.
	4	0	**REPORT TRANSITIONS** If set, send instantaneous Watts METER REPORT to Lifeline on Power 2 High state entry and exit.
	5	1	**APPLY ENTRY DELAY** If set, apply "Power 2 High Delay" for Power 2 High state entry. When not in Power 2 High state, Power 2 level must equal or exceed "Power 2 High Entry Level" for "Power 2 High Delay" time before device will enter Power 2 High state.
	6	1	**APPLY EXIT DELAY** If set, apply "Power 2 High Delay" for Power 2 High state exit. When in Power 2 High state, Power 2 level must fall equal to or below "Power 2 High Exit Level" for "Power 2 High Delay" time before device will exit Power 2 High state.
Range(s)	0 to 127 (0x7F)		
Units	N/A		
Default	99 (0x0063)		
Comments	Enable/disable various high-power reporting and activation capabilities.		

4.4.3.15 Power 2 Low Actions (38)

Number	38 (0x0026)		
Name	**Power 2 Low Actions**		
Type	Bit field		
Size	2		
Bit fields	Bit	Default	Description
	0	1	**CONTROL ASSOCIATIONS ON ENTRY** If set, send BASIC SET with "Power 2Low Entry SET Value" to "Power 2 Low" association group on Power 2 Low state entry
	1	1	**CONTROL ASSOCIATIONS ON EXIT** If set, send BASIC SET with "Power 2 Low Exit SET Value" to "Power 2 Low" association group on Power 2 Low state exit.
	2	0	**CONTROL HOST ON ENTRY** If set, execute BASIC SET with "Power 2 Low Entry SET Value" on host device on Power 2 Low state entry.

	3	0	**CONTROL HOST ON EXIT** If set, execute BASIC SET with "Power 2 Low Exit SET Value" on host device on Power 2 Low state exit.
	4	0	**REPORT TRANSITIONS** If set, send instantaneous Watts METER REPORT to Lifeline on Power 2 Low state entry and exit.
	5	1	**APPLY ENTRY DELAY** If set, apply "Power 2 Low Delay" for Power 2 Low state entry. When not in Power 2 Low state, Power 2 level must equal or fall below "Power 2 Low Entry Level" for "Power 2 Low Delay" time before device will enter Power 2 Low state.
	6	1	**APPLY EXIT DELAY** If set, apply "Power 2 Low Delay" for Power 2 Low state exit. When in Power 2 Low state, Power 2 level must rise equal to or above "Power 2 Low Exit Level" for "Power 2 Low Delay" time before device will exit Power 2 Low state.
Range(s)	0 to 127 (0x7F)		
Units	N/A		
Default	99 (0x0063)		
Comments	Enable/disable various low-power related reporting and activation capabilities.		

4.5 Temperature

An insert with a temperature sensor can provide temperature multilevel sensor reports with temperature readings in either Fahrenheit or Celsius based on request responses, on a periodic schedule, and/or in response to change of temperature.

In addition, "High/Over Temperature State" and "Low/Under Temperature State" configurations are supported that may be used to trigger additional notifications and reports and may also be used to generate BASIC SET commands to associated nodes and/or the local device based on user-defined temperature ranges.

Please visit the Swidget website for instructions on how the temperature configuration parameters may be used in various scenarios.

4.5.1 Temperature Sensor Default Behaviour

The default temperature configuration settings result in the device providing a Temperature Multilevel Sensor report in Celsius every 3600 seconds (hourly).

4.5.2 Temperature Configuration Parameter List

4.5.2.1 Temperature High Entry Level (80)

Number	80 (0x0050)
Name	**Temperature High Entry Level**
Type	Signed Integer
Size	2

Range(s)	-400 to +850 (0xFE70 – 0x0352) (tenths of a degree Celsius) -400 to +1850 (0xFE70 – 0x073A) (tenths of a degree Fahrenheit)
Units	Tenths of a Degree (*0.1)
Default	+230 (0x00E6) (23.0° Celsius) +734 (0x01DC) (73.4° Fahrenheit)
Comments	Used to set the temperature value that indicates ***entry into*** a high/over temperature state. ***NOTE:*** should be set higher than temperature low entry/exit threshold values under normal circumstances

4.5.2.2 Temperature Low Entry Level (81)

Number	81 (0x0051)
Name	**Temperature Low Entry Level**
Type	Signed Integer
Size	2
Range(s)	-400 to +850 (0xFE70 – 0x0352) (tenths of a degree Celsius) -400 to +1850 (0xFE70 – 0x073A) (tenths of a degree Fahrenheit)
Units	Tenths of a Degree (*0.1)
Default	+170 (0x0078) (17.0° Celsius) +626 (0x0196) (62.6° Fahrenheit)
Comments	Used to set the temperature value that indicates ***entry into*** a low/under temperature state. ***NOTE:*** should be set lower than temperature high exit/entry threshold values under normal circumstances

4.5.2.3 Temperature High Exit Level (82)

Number	82 (0x0052)
Name	**Temperature High Exit Level**
Type	Unsigned Integer
Size	2
Range(s)	-400 to +850 (0xFE70 – 0x0352) (tenths of a degree Celsius) -400 to +1850 (0xFE70 – 0x073A) (tenths of a degree Fahrenheit)
Units	Tenths of a Degree (*0.1)
Default	+230 (0x00E6) (23.0° Celsius) +734 (0x01DC) (73.4° Fahrenheit)
Comments	Used to set the temperature value that indicates ***exit from*** a high/over temperature state. ***NOTE:*** should be set higher than temperature low exit/entry values under normal circumstances

4.5.2.4 Temperature Low Exit Level (83)

Number	83 (0x0053)
Name	**Temperature Low Exit Level**
Type	Unsigned Integer
Size	2
Range(s)	-400 to +850 (0xFE70 – 0x0352) (tenths of a degree Celsius) -400 to +1850 (0xFE70 – 0x073A) (tenths of a degree Fahrenheit)

Units	Tenths of a Degree (*0.1)
Default	+170 (0x0078) (17.0° Celsius) +626 (0x0196) (62.6° Fahrenheit)
Comments	Used to set the temperature value that indicates ***exit from*** a low/under temperature or under-temperature state. ***NOTE:*** should be set lower than temperature high exit/entry values under normal circumstances

4.5.2.5 Temperature High Delay (84)

Number	84 (0x0054)
Name	**Temperature High Delay**
Type	Unsigned Integer
Size	2
Range(s)	0 – 65535
Units	Seconds
Default	0
Comments	Used to set the time duration that high-power state change conditions must exist before high state entry and/or exit is registered, and the associated actions are executed. See the "Temperature High Actions" bitflags settings for how the delay can be applied.

4.5.2.6 Temperature Low Delay (85)

Number	85 (0x0055)
Name	**Temperature Low Delay**
Type	Unsigned Integer
Size	2
Range(s)	0 – 65535
Units	Seconds
Default	0
Comments	Used to set the time duration that low-power state change conditions must exist before low state entry and/or exit is registered, and the associated actions are executed. See the "Temperature Low Actions" bitflags settings for how the delay can be applied.

4.5.2.7 Temperature Periodic Report (86)

Number	86 (0x0056)
Name	**Temperature Periodic Report**
Type	Unsigned Integer
Size	2
Range(s)	0 to 65535 0..5 == 5 second maximum report frequency
Units	Seconds
Default	3600 (0x0E10) (1 hour)
Comments	Used to set the time in seconds between sending a periodic MULTILEVEL SENSOR REPORT to the Lifeline

4.5.2.8 Temperature Change Report (87)

Number	87 (0x0057)
Name	**Temperature Change Report**
Type	Unsigned Integer
Size	1
Range(s)	0 – 255 0 == Temperature change reporting disabled 1 to 5 == 5 (0.5° is the minimum change detection setting)
Units	Tenths of a Degree Celsius or Fahrenheit (*0.1)
Default	10 (0x0A) (1.0°)
Comments	Used to set the temperature in degrees that a reported reading must change by to trigger a new temperature MULTILEVEL SENSOR REPORT to the Lifeline

4.5.2.9 Temperature Renotification Delay (88)

Number	88 (0x0058)
Name	**Temperature Renotification Delay**
Type	Unsigned Integer
Size	2
Range(s)	0 to 65535 0 == No renotifications sent when in high or low-temperature states 1..5 == 5 second maximum renotification frequency
Units	Seconds
Default	0 (0x00)
Comments	Used to set the time in seconds between sending repeated temperature MULTILEVEL SENSOR REPORT messages and optionally NOTIFICATION REPORTS to the Lifeline while in a low/under or high/over temperature state. If set to 0 (disabled) then normal change and periodic reporting still apply. Typically used to increase the report rate during out-of-bounds conditions as desired. See 'Actions' flags

4.5.2.10 Temperature High Entry SET Value (89)

Number	89 (0x0059)
Name	**Temperature High Entry SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 99 or 255
Units	BASIC CC SET LEVEL
Default	255 (turn ***on*** associated devices)
Comments	BASIC SET value sent to associated nodes on ***entry into*** high/over-temperature state

4.5.2.11 Temperature High Exit SET Value (89)

Number	90 (0x005A)
Name	**Temperature High Exit SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 99 or 255

Units	BASIC CC SET LEVEL
Default	0 (turn ***off*** associated devices)
Comments	BASIC SET value sent to associated nodes on ***exit from*** high/over-temperature state

4.5.2.12 Temperature Low Entry SET Value (91)

Number	91 (0x005B)
Name	**Temperature Low Entry SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 99 or 255
Units	BASIC CC SET LEVEL
Default	255 (turn ***on*** associated devices)
Comments	BASIC SET value sent to associated nodes on ***entry into*** low/under temperature state

4.5.2.13 Temperature Low Exit SET Value (92)

Number	92 (0x005C)
Name	**Temperature Low Exit SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 99 or 255
Units	BASIC CC SET LEVEL
Default	0 (turn ***off*** associated devices)
Comments	BASIC SET value sent to associated nodes on ***exit from*** low/under temperature state

4.5.2.14 Temperature High Actions (93)

Number	93 (0x005D)
Name	**Temperature High Actions**
Type	Bit field
Size	2

Bit fields	Bit	Default	Description
	0	1	**CONTROL ASSOCIATIONS ON ENTRY** If set, send BASIC SET with "Temperature High Entry SET Value" to "Temperature High" association group on high/over temperature state entry
	1	1	**CONTROL ASSOCIATIONS ON EXIT** If set, send BASIC SET with "Temperature High Exit SET Value" to "Temperature High" association group on high/over temperature state exit
	2	0	**CONTROL HOST ON ENTRY** If set, execute BASIC SET with "Temperature High Entry SET Value" on host device on high/over temperature state entry
	3	0	**CONTROL HOST ON EXIT** If set, execute BASIC SET with "Temperature High Exit SET Value" on host device on high/over temperature state exit.
	4	0	**REPORT TRANSITIONS** If set, send temperature MULTILEVEL SENSOR REPORT to Lifeline on high/over temperature state entry *and* exit
	5	1	**RENOTIFY** If set, resend NOTIFICATION REPORT (Heat Alarm: Overheat) to Lifeline while in high/over temperature state during the Renotification Period (if enabled)
	6	1	**APPLY ENTRY DELAY** If set, apply Temperature High Delay for high/over temperature entry
	7	1	**APPLY EXIT DELAY** If set, apply Temperature High Delay for high/over temperature exit
Range(s)	0 to 255 (0x00FF)		
Units	N/A		
Default	227 (0x00E3)		
Comments	Enable/disable various high/over temperature reporting and activation capabilities.		

4.5.2.15 Temperature Low Actions (94)

Number	94 (0x005E)
Name	**Temperature Low Actions**
Type	Bit field
Size	2

Bit fields	Bit	Default	Description
	0	1	**CONTROL ASSOCIATIONS ON ENTRY** If set, send BASIC SET with "Temperature Low Entry SET Value" to "Temperature Low" association group on low/under temperature state entry
	1	1	**CONTROL ASSOCIATIONS ON EXIT** If set, send BASIC SET with "Temperature Low Exit SET Value" to "Temperature Low" association group on low/under temperature state exit
	2	0	**CONTROL HOST ON ENTRY** If set, execute BASIC SET with "Temperature Low Entry SET Value" on host device on low/under temperature state entry
	3	0	**CONTROL HOST ON EXIT** If set, execute BASIC SET with "Temperature Low Exit SET Value" on host device on low/under temperature state exit
	4	0	**REPORT TRANSITIONS** If set, send Temperature MULTILEVEL SENSOR REPORT to Lifeline on high/over temperature state entry *and* exit
	5	1	**RENOTIFY** If set, resend NOTIFICATION REPORT (Heat Alarm: Under Heat) to Lifeline while in high/over temperature state during the Renotification Period (if enabled)
	6	1	**APPLY ENTRY DELAY** If set, apply Temperature Low Delay for low/under temperature state entry
	7	1	**APPLY EXIT DELAY** If set, apply Temperature Low Delay for low/under temperature state exit.
Range(s)	0 to 255 (0x00FF)		
Units	N/A		
Default	227 (0x00E3)		
Comments	Enable/disable various low/under temperature reporting and activation capabilities.		

4.5.2.16 Temperature Units (95)

Number	95 (0x005F)
Name	**Temperature Units**
Type	Enumerated (Radio buttons)
Size	1
Values	0x00: Celsius 0x01: Fahrenheit
Units	N/A
Default	0 (Celsius)

4.6 Humidity

An insert with a humidity sensor can provide humidity multilevel sensor reports based on request responses, on a periodic schedule, and/or in response to change of humidity.

In addition, "High/Over Humidity State" and "Low/Under Humidity State" configurations are supported that may be used to trigger additional notifications and reports and may also be used to generate BASIC SET commands to associated nodes and/or the local device based on user-defined humidity ranges.

Please visit the Swidget website for instructions on how the humidity configuration parameters may be used in various scenarios.

4.6.1 Humidity Sensor Default Behaviour

The default humidity configuration settings result in the device providing a Humidity Multilevel Sensor report in percent relative humidity every 3600 seconds (hourly).

4.6.2 Humidity Configuration Parameter List

4.6.2.1 Humidity High Entry Level (128)

Number	128 (0x0080)
Name	**Humidity High Entry Level**
Type	Unsigned Integer
Size	1
Range(s)	0 to 100
Units	Percent
Default	100
Comments	Used to set the humidity value that indicates ***entry into*** a high/over humidity state. This value represents the percentage in absolute terms, that the relative humidity must rise above to enter a high-humidity state. For example, when not in a high-humidity state, if the *Humidity High Entry Level* is set to 35%, then the humidity level must rise to or above 35% to enter the high-humidity state. ***NOTE:*** Under normal circumstances, this value should be set higher than or equal to "Humidity High Entry Level", and higher than "Humidity Low Exit Level".

4.6.2.2 Humidity Low Entry Level (129)

Number	129 (0x0081)
Name	**Humidity Low Entry Level**
Type	Unsigned Integer
Size	1
Range(s)	0 to 100
Units	Percent
Default	0
Comments	Used to set the humidity value that indicates ***entry into*** a low/under humidity state. This value represents the percentage in absolute terms, that the relative humidity must fall to or below to enter a low-humidity state. For example, when not in a low-humidity state, if the *Humidity Low Entry Level* is set to 25%, then the humidity level must fall to or below 25% to enter the low-humidity state. ***NOTE:*** Under normal circumstances, this value should be set lower than or equal to "Humidity Low Exit Level" and lower than "Humidity High Exit Level".

4.6.2.3 Humidity High Exit Level (130)

Number	130 (0x0082)
Name	**Humidity High Exit Level**
Type	Unsigned Integer
Size	1
Range(s)	0 to 100
Units	Percent
Default	100
Comments	Used to set the humidity value that indicates ***exit from*** a high/over humidity state. This value represents the percentage in absolute terms, that the relative humidity must fall to or below to exit a high-humidity state. For example, when in a high-humidity state, if the *Humidity High Exit Level* is set to 35%, then the humidity level must fall to or below 35% to exit the high-humidity state. ***NOTE:*** Under normal circumstances, this value should be set equal to or lower than "Humidity High Entry Level", and higher than "Humidity Low Entry Level".

4.6.2.4 Humidity Low Exit Level (131)

Number	131 (0x0083)
Name	**Humidity Low Exit Level**
Type	Unsigned Integer
Size	1
Range(s)	0 to 100
Units	Percent
Default	0
Comments	Used to set the Humidity value that indicates ***exit from*** a low/under Humidity or under-Humidity state. This value represents the percentage in absolute terms, that the relative humidity must rise to or above to exit a low-humidity state. For example, when in a low-humidity state, if the *Humidity Low Exit Level* is set to 25%, then the humidity level must rise to or above 25% to exit the low-humidity state. ***NOTE:*** Under normal circumstances, this value should be set equal to or higher than "Humidity Low Entry Level" and lower than "Humidity High Exit Level".

4.6.2.5 Humidity High Delay (132)

Number	132 (0x0084)
Name	**Humidity High Delay**
Type	Unsigned Integer
Size	2
Range(s)	0 – 65535
Units	Seconds
Default	0

Comments	Used to set the time duration that high/over humidity state change conditions must exist before state entry/exit is registered, and the associated actions are executed. See the "Humidity High Actions" bitflags settings for how the delay can be applied.

4.6.2.6 Humidity Low Delay (133)

Number	133 (0x0085)
Name	**Humidity Low Delay**
Type	Unsigned Integer
Size	2
Range(s)	0 – 65535
Units	Seconds
Default	0
Comments	Used to set the time duration that low/under humidity state change conditions must exist before state entry/exit is registered, and the associated actions are executed. See the "Humidity Low Actions" bitflags settings for how the delay can be applied.

4.6.2.7 Humidity Periodic Report (134)

Number	134 (0x0086)
Name	**Humidity Periodic Report**
Type	Unsigned Integer
Size	2
Range(s)	0, 60 to 65535 0 == No timed reporting active 60 second (1 minute) maximum report frequency
Units	Seconds
Default	3600 (60 minutes)
Comments	Used to set the time in seconds between sending a periodic humidity MULTILEVEL SENSOR REPORT to the Lifeline

4.6.2.8 Humidity Change Report (135)

Number	135 (0x0087)
Name	**Humidity Change Report**
Type	Unsigned Integer
Size	1
Range(s)	0 – 100 0 == Humidity change reporting disabled
Units	Percent
Default	10
Comments	Used to set the humidity in percentage points that a reported reading must change by to trigger a new humidity MULTILEVEL SENSOR REPORT to the Lifeline

4.6.2.9 Humidity Renotification Delay (136)

Number	136 (0x0088)
Name	**Humidity Renotification Delay**
Type	Unsigned Integer

Size	2
Range(s)	0, 60 to 65535 0 == No renotifications sent when in high or low-power states 60 second (1 minute) maximum renotification frequency
Units	Seconds
Default	0
Comments	Used to set the time in seconds between sending repeated Humidity MULTILEVEL SENSOR REPORT messages to the Lifeline while in a low/under or high/over Humidity state. If set to 0 (disabled) then normal change and periodic reporting applies. Typically used to increase the report rate during out-of-bounds conditions as desired.

4.6.2.10 Humidity High Entry SET Value (137)

Number	137 (0x0089)
Name	**Humidity High Entry SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 99 or 255
Units	BASIC CC SET LEVEL
Default	255 (turn ***on*** associated devices)
Comments	BASIC SET value sent to associated nodes on ***entry into*** high/over-Humidity state

4.6.2.11 Humidity High Exit SET Value (138)

Number	138 (0x008A)
Name	**Humidity High Exit SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 99 or 255
Units	BASIC CC SET LEVEL
Default	0 (turn ***off*** associated devices)
Comments	BASIC SET value sent to associated nodes on ***exit from*** high/over-Humidity state

4.6.2.12 Humidity Low Entry SET Value (139)

Number	139 (0x008B)
Name	**Humidity Low Entry SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 99 or 255
Units	BASIC CC SET LEVEL
Default	255 (turn ***on*** associated devices)
Comments	BASIC SET value sent to associated nodes on ***entry into*** low/under Humidity state

4.6.2.13 Humidity Low Exit SET Value (140)

Number	140 (0x008C)
Name	**Humidity Low Exit SET Value**
Type	Unsigned Integer

Publish Date: 2023-06-08

Size	1
Range(s)	0 – 99 or 255
Units	BASIC CC SET LEVEL
Default	0 (turn ***off*** associated devices)
Comments	BASIC SET value sent to associated nodes on ***exit from*** low/under Humidity state

4.6.2.14 Humidity High Actions (142)

Number	142 (0x008E)		
Name	**Humidity High Actions**		
Type	Bit field		
Size	2		
Bit fields	Bit	Default	Description
	0	1	**CONTROL ASSOCIATIONS ON ENTRY** If set, send BASIC SET with "Humidity High Entry SET Value" to "Humidity High" association group on entry into high/over Humidity state
	1	1	**CONTROL ASSOCIATIONS ON EXIT** If set, send BASIC SET with "Humidity High Exit SET Value" to "Humidity High" association group on exit from high/over Humidity state
	2	0	**CONTROL HOST ON ENTRY** If set, execute BASIC SET with "Humidity High Entry SET Value" on host device on entry into high/over Humidity state. *Default will be to TURN ON host.*
	3	0	**CONTROL HOST ON EXIT** If set, execute BASIC SET with "Humidity High Exit SET Value" on host device on exit from high/over Humidity state. *Default will be to TURN OFF host.*
	4	0	**REPORT TRANSITIONS** If set, send Humidity MULTILEVEL SENSOR REPORT to Lifeline on high/over Humidity state entry *and* exit
	5	0	**APPLY ENTRY DELAY** If set, apply Humidity High Delay for high/over humidity state entry
	6	0	**APPLY EXIT DELAY** If set, apply Humidity High Delay for high/over humidity state exit
Range(s)	0 to 255 (0x00FF)		
Units	N/A		
Default	3 (0x0003)		
Comments	Enable/disable various high/over Humidity reporting and activation capabilities.		

4.6.2.15 Humidity Low Actions (143)

Number	143 (0x008F)		
Name	**Humidity Low Actions**		
Type	Bit field		
Size	2		
Bit fields	Bit	Default	Description
	0	1	**CONTROL ASSOCIATIONS ON ENTRY** If set, send BASIC SET with "Humidity Low Entry SET Value" to "Humidity Low" association group on low/under humidity state entry

	1	1	**CONTROL ASSOCIATIONS ON EXIT** If set, send BASIC SET with "Humidity Low Exit SET Value" to "Humidity Low" association group on low/under humidity state exit
	2	0	**CONTROL HOST ON ENTRY** If set, execute BASIC SET with "Humidity Low Entry SET Value" on host device on entry to low/under humidity state
	3	0	**CONTROL HOST ON EXIT** If set, execute BASIC SET with "Humidity Low Exit SET Value" on host device on exit from low/under humidity state
	4	0	**REPORT TRANSITIONS** If set, send Humidity MULTILEVEL SENSOR REPORT to Lifeline on low/under Humidity state entry and exit.
	5	0	**APPLY ENTRY DELAY** If set, apply Humidity Low Delay for low/under humidity state entry
	6	0	**APPLY EXIT DELAY** If set, apply Humidity Low Delay for low/under humidity state exit.
Range(s)	0 to 255 (0x00FF)		
Units	N/A		
Default	3 (0x0003)		
Comments	Enable/disable various low/under humidity reporting and activation capabilities.		

4.7 Motion

Motion sensor related settings for occupancy/vacancy activations and notifications. The device will be in either a *Vacant State* or an *Occupied State* depending upon the detection of motion (or lack thereof).

4.7.1 Motion Sensor Default Behaviour

The default motion configuration settings result in the following behaviour:

The sensor is set to maximum sensitivity resulting in detection of motion within approximately 2 seconds.

A "Home Security: Motion" notification report will be sent to the Lifeline associations once motion has been detected, and the *Occupied State* has been entered.

When in an *Occupied State,* the device will resend a "Home Security: Motion" notification every 300 seconds (5 minutes) (see *Motion Renotification Delay*).

When in an *Occupied State*, and motion has not been detected for 300 seconds (5 minutes) (see *Motion Reset Delay*), the device will return to the *Vacant State* and a "Home Security: Idle" notification report will be sent to the Lifeline associations.

4.7.2 Motion Sensor Occupancy Switch Functionality

For all Swidget base devices, a motion sensor enabled insert will provide occupancy on/off functionality.

By default, the motion configuration is set to execute a basic set command with a value of 0xFF (On) on the host device when the device enters the *Occupancy State* and execute a basic set command with a value of 0x00 (Off) on the host device when the device leaves the *Occupancy State* and enters the *Vacancy State.*

The *Motion Detected Entry SET Value parameter* and the *Motion Detected Exit SET Value parameter* are used to control the values sent in the corresponding Basic Set commands.

This allows the device to be placed in any Swidget switch or outlet and have that device automatically turn on and off according to occupancy state ***without*** the need for network inclusion, and/or without additional configuration.

Once included in a network, the motion configuration parameters may be changed to modify this behaviour if desired.

4.7.3 Motion Configuration Parameter List

4.7.3.1 Motion Sensitivity Level (48)

Number	48 (0x0030)
Name	**Motion Sensitivity Level**
Type	Unsigned Integer
Size	1
Range(s)	0 – 100
Units	Not applicable
Default	0 (Most sensitive)
Comments	Used to set the sensitivity of the motion detection system.

4.7.3.2 Motion Renotification Delay (49)

Number	49 (0x0031)
Name	**Motion Renotification Delay**
Type	Unsigned Integer
Size	2
Range(s)	0 to 65535 0 == No renotifications 10 second maximum renotification frequency
Units	Seconds
Default	300 (5 minute)
Comments	Used to set the time in seconds between optionally resending NOTIFICATION REPORT (Home Security: Motion detection) messages to the Lifeline while in an "occupied" state.

4.7.3.3 Motion Reset Delay (50)

Number	50 (0x0032)
Name	**Motion Reset Delay**
Type	Unsigned Integer
Size	2
Range(s)	1 to 65535
Units	Seconds
Default	300 (5 minute)
Comments	Used to set the time in seconds between optionally resending NOTIFICATION REPORT (Home Security: Motion detection) messages to the Lifeline while in an "occupied" state.

4.7.3.4 Motion Detected Entry SET Value (51)

Number	51 (0x0033)
Name	**Motion Detected Entry SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 99 or 255
Units	BASIC CC SET LEVEL
Default	255 (turn ***on*** associated devices)
Comments	BASIC SET value sent to associated nodes on ***entry into*** motion detected state (Occupied)

4.7.3.5 Motion Detected Exit SET Value (52)

Number	52 (0x0034)
Name	**Motion Detected Exit SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 99 or 255
Units	BASIC CC SET LEVEL
Default	0 (turn ***off*** associated devices)
Comments	BASIC SET value sent to associated nodes on ***exit from*** motion detected state (Vacant)

4.7.3.6 Motion Actions (53)

Number	53 (0x0035)
Name	**Motion Actions**
Type	Bit field
Size	2

Bits	Bit	Default	Description
	0	1	**CONTROL ASSOCIATIONS ON ENTRY** If set, send BASIC SET with "Motion Detected Entry SET Value" to "Motion" association group on entry into motion detected state (Occupied)
	1	1	**CONTROL ASSOCIATIONS ON EXIT** If set, send BASIC SET with "Motion Detected Exit SET Value" to "Motion" association group on exit from motion detected state (Vacant)
	2	1	**CONTROL HOST ON ENTRY** If set, execute BASIC SET with "Motion Detected Entry SET Value" on host device on entry into motion detected state (Occupied) *Default will be to TURN ON host.*
	3	1	**CONTROL HOST ON EXIT** If set, execute BASIC SET with "Motion Detected Exit SET Value" on host device on exit from motion detected state (Vacant). *Default will be to TURN OFF host.*
	4	1	**RENOTIFY** If set, resend NOTIFICATION REPORT (Home Security: Motion detection) to Lifeline while in a motion detected state during the Renotification Period (if enabled).
Range(s)	0 to 31 (0x001F)		
Units	N/A		
Default	31 (0x001F)		
Comments	Enable/disable various motion sensor related capabilities.		

4.8 Air Quality

An insert with the Air Quality sensor provides Air Quality notifications and VOC multilevel sensor reports.

In addition, an "Air Quality Alert State" mechanism is supported that may be used to trigger additional notifications and reports and may be used to generate BASIC SET commands to associated nodes and/or the local device.

The sensor itself provides an air quality index value that ranges from 0 to 500 as illustrated here:

IAQ Index	**Air Quality**	**Impact (long-term exposure)**	**Suggested action**
0-50	Excellent	Pure air; best for well-being	No measures needed
51-100	Good	No irritation or impact on well-being	No measures needed
101-150	Lightly polluted	Reduction of well-being possible	Ventilation suggested
151-200	Moderately polluted	More significant irritation possible	Increase ventilation with clean air
201-250	Heavily polluted	Exposition might lead to effects like headache depending on type of VOCs	Optimize ventilation
251-350	Severely polluted	More severe health issue possible if harmful VOC present	Contamination should be identified if level is reached even w/o presence of people; maximize ventilation & reduce attendance

> 351	Extremely polluted	Headaches and additional neurotoxic effects possible	Contamination needs to be identified; avoid presence in room and maximize ventilation

The user can map the sensor index values to the four available Z-Wave^{tm} Home Health: VOC Level Status Event "Pollution level" notification states:

1. Clean
2. Slightly polluted
3. Moderately polluted
4. Highly polluted

The user may then select which of the four levels represent entry into an "Air Quality Alert State".

4.8.1 Air Quality Default Behaviour

The default configuration settings result in the following behaviour:

The sensor index values are mapped as follows:

- 0 to 100 is *Clean*
- 101 to 175 is *Slightly polluted*
- 176 to 250 is *Moderately polluted*
- >250 is *Highly polluted*

A "Home Health: VOC Level Status Event" Notification Report will be sent to the Lifeline associations with every level transition with the "Pollution level" parameter set to identify which level is active.
An initial notification is sent within 1 minute of power-up. This is typically a notification of "Clean" air however it provides the initial baseline for subsequent notifications.

The device will enter an *Air Quality Alert State* when the VOC Level Status Event "Pollution level" reaches "Moderately Polluted" which happens when the sensor returns an Air Quality Index value of 175 (half-way into the "Moderately polluted" range as documented by the sensor).

The device will deliver VOC Multilevel Sensor Reports every 3600 seconds (hourly).

When in an *Air Quality Alert State,* the device will resend a VOC Level Status Event Notification every 300 seconds (5 minutes) (see *Air Quality Renotification Delay*).

4.8.2 Air Quality Auto Control Functionality

When the insert is placed in a Swidget 20-40-60 Timer Switch, an *Air Quality Auto Control* feature is enabled by default to turn the host switch on when the device enters the *Air Quality Alert State*.

By default, the air quality configuration is set to execute a basic set command with a value of 0xFF (On) on the host device when the device enters the *Air Quality Alert State* and will execute a basic set command with a value of 0x00 (Off) on the host device when the device leaves the *Air Quality Alert State.*

The *Air Quality Alert Entry SET Value parameter* and the *Air Quality Alert Exit SET Value parameter* are used to control the values sent in the corresponding Basic Set commands.

The local switch may be operated to turn the host device off while in the *Air Quality Alert State.*

Since the 20-40-60 timer switch is typically used for a fan installation, this default behaviour allows the device to automatically provide poor air quality fan control ventilation functionality ***without*** the need for network add, and/or without additional configuration.

Once included in a network, the air quality configuration parameters may be changed to modify this behaviour if desired.

4.8.3 Air Quality Configuration Parameter List

4.8.3.1 Air Quality Level 1 Index (64)

Number	64 (0x0040)
Name	**Air Quality Level 1 Index**
Type	Unsigned Integer
Size	2
Range(s)	0 – 500 (0 == cleanest, 500 == most polluted)
Units	AQ Index Value
Default	100
Comments	Used to set the index value representing the upper limit for the "Clean" air state. Above this level, the air state is set to "Slightly Polluted"

4.8.3.2 Air Quality Level 2 Index (65)

Number	65 (0x0041)
Name	**Air Quality Level 2 Index**
Type	Unsigned Integer
Size	2
Range(s)	0 – 500 (0 == cleanest, 500 == most polluted)
Units	AQ Index Value
Default	175
Comments	Used to set the index value representing the upper limit for the "Slightly Polluted" air state. Above this level, the air state is set to "Moderately Polluted"

4.8.3.3 Air Quality Level 3 Index (66)

Number	66 (0x0042)
Name	**Air Quality Level 3 Index**
Type	Unsigned Integer
Size	2
Range(s)	0 – 500 (0 == cleanest, 500 == most polluted)
Units	AQ Index Value
Default	250
Comments	Used to set the index value representing the upper limit for the "Moderately Polluted" air state. Above this level, the air state is set to "Extremely Polluted"

4.8.3.4 Air Quality Alert Level (67)

Number	67 (0x0043)

Name	**Air Quality Alert Level**
Type	Unsigned Integer
Size	1
Range(s)	1 to 3
Units	Air quality level: 1 ="Slightly Polluted" 2 ="Moderately Polluted" 3 ="Extremely Polluted"
Default	2 ("Moderately Polluted")
Comments	Used to set the air quality level that will trigger Air Quality Alert State actions

4.8.3.5 Air Quality Alert Delay (68)

Number	68 (0x0044)
Name	**Air Quality Alert Delay**
Type	Unsigned Integer
Size	2
Range(s)	0 – 65535
Units	Seconds
Default	0
Comments	Delay after detection of a level change before acting on change of air quality state

4.8.3.6 Air Quality Renotification Delay (69)

Number	69 (0x0045)
Name	**Air Quality Renotification Delay**
Type	Unsigned Integer
Size	2
Range(s)	0, 30 to 65535 0 == No renotifications 30 second maximum renotification frequency
Units	Seconds
Default	300 (5 minute)
Comments	Used to set the time in seconds between optionally resending NOTIFICATION REPORT (Home Health: VOC Level Status Event) messages to the Lifeline while in an "Air Quality Alert" state. In addition, VOC multilevel sensor reports will be delivered as well if they are enabled for periodic reporting.

4.8.3.7 Air Quality VOC Periodic Report (70)

Number	70 (0x0046)
Name	**Air Quality VOC Periodic Report**
Type	Unsigned Integer
Size	2
Range(s)	0, 60 to 65535 0 == No VOC reporting active 60 second (1 minute) maximum report frequency
Units	Seconds
Default	3600

Comments	Used to set the time in seconds between sending a periodic "Volatile Organic Compound level" MULTILEVEL SENSOR REPORT to the Lifeline

4.8.3.8 Air Quality Alert Entry SET Value (72)

Number	72 (0x0048)
Name	**Air Quality Alert Entry SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 99 or 255
Units	BASIC CC SET LEVEL
Default	255 (turn ***on*** associated devices)
Comments	BASIC SET value sent to associated nodes on ***entry into*** air quality alert state

4.8.3.9 Air Quality Alert Exit SET Value (73)

Number	73 (0x0049)
Name	**Air Quality Alert Exit SET Value**
Type	Unsigned Integer
Size	1
Range(s)	0 – 99 or 255
Units	BASIC CC SET LEVEL
Default	0 (turn ***off*** associated devices)
Comments	BASIC SET value sent to associated nodes on ***exit from*** air quality alert state

4.8.3.10 Air Quality Actions (74)

Number	74 (0x0050)		
Name	**Air Quality Actions**		
Type	Bit field		
Size	2		
Bits	Bit	Default	Description
	0	1	**CONTROL ASSOCIATIONS ON ENTRY** If set, send BASIC SET with "Air Quality Alert Entry SET Value" to "Air Quality" association group on entry into air quality alert state
	1	1	**CONTROL ASSOCIATIONS ON EXIT** If set, send BASIC SET with "Air Quality Alert Exit SET Value" to "Air Quality" association group on entry into air quality alert state
	2	1	**CONTROL HOST ON ENTRY** If set, execute BASIC SET with "Air Quality Alert Entry SET Value" to "Air Quality" association group on entry into air quality alert state. *Default will be to TURN ON host.*
	3	1	**CONTROL HOST ON EXIT** If set, execute BASIC SET with "Air Quality Alert Exit SET Value" to "Air Quality" association group on entry into air quality alert state. *Default will be to TURN OFF host.*
	4	1	**RENOTIFY** If set, resend NOTIFICATION REPORT (Home Health: VOC Level Status Event) to Lifeline with pollution level value while in air quality alert state during the renotification period (if enabled)

Range(s)	0 to 31 (0x001F)
Units	N/A
Default	19 (0x0013)
Comments	Enable/disable various Indoor Air Quality sensor related capabilities.

5 Factory Default Local Reset

Performing a Factory Default Local Reset will restore all configuration parameters to their factory default values.

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