

## 1. Introduction

This document is for the advanced user who has knowledge of the Z-Wave™ Command Classes and is able to initiate Z-Wave commands programmatically.

When the ABMHZ sends a Node Info Report, it reports itself as a Basic Slave device with generic support for Multilevel switch, specifically supporting the Multi-position motor class. In addition to the mandatory command classes, it also supports Manufacturer Specific, Version, All Switch, Configuration, and Power level command classes (details and examples on how to utilize these classes below).

## 2. Status LED

On power-up, LED blinks RED then GREEN indicating Z-Wave processor Version 2.  
This LED will blink green on reception of a valid Z-Wave command.  
This LED will blink red if an error has occurred.

## 3. Motor LED

On power-up, this LED will blink RED once indicating motor processor Version 1.  
This LED will stay red after power-up if the unit is not calibrated.  
This LED will be green when ready for calibration (please see Calibration section).

## 4. COMMAND\_CLASS\_CONFIGURATION Commands

There are 3 configuration parameters accessible via the COMMAND\_CLASS\_CONFIGURATION. Each parameter is a single byte, and can only contain the value of 1 or 0.

### ***Sample commands:***

To check unit calibration state, send CONFIGURATION\_GET, 1. Return is a 0 or 1.

To check unit motor direction state, send CONFIGURATION\_GET, 2. Return is a 0 or 1.

To check unit tilt feature state, send CONFIGURATION\_GET, 3. Return is a 0 or 1.

To initiate calibration sequence, send CONFIGURATION\_SET, 1, 1, 1.

To set motor direction to reversed and calibrate, send CONFIGURATION\_SET, 2, 1, 1 (if already reversed, then no action).

To return all settings to factory default, send CONFIGURATION\_SET, 1, 129, 1.

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Configuration parameter #	Length (bytes)	Read values	Write values	Description
1	1	0 = Not calibrated 1 = Calibrated	0 = No Action 1 = Begin calibration sequence	Unit calibration state.
2	1	0 = Motor direction normal 1 = Reversed motor direction	0 = Set direction to "normal" and begin calibration sequence 1 = Set direction to reverse and begin calibration sequence	Unit calibrated for normal or reversed motor direction.
3	1	0 = Tilt feature not enabled 1 = Tilt feature enabled	0 = Disable tilt 1 = Enable tilt	Allows precision positioning of wood blinds.
1,2, or 3	129	n/a	0 or 1 = Return to factory defaults	Unit uncalibrated, motor direction normal, tilt disabled

## **5. COMMAND\_CLASS\_BASIC Commands**

A BASIC\_GET will return a motor position value between 0 and 99, or 255. A value of 255 means the motor is not calibrated, and cannot report a valid position. (The Motor LED will also be red.)

A BASIC\_SET 0 will move the shade of a properly calibrated motor to the fully closed position. A BASIC\_SET 99 or 255 will move the shade to the fully open position. Sending BASIC\_SET 255 to an un-calibrated motor will also cause it to move to a limit. Sending a BASIC\_SET X (where X is 1 to 99) command to an uncalibrated motor will result in no motion. The Status LED will blink red to indicate an error condition.

### ***Sample commands:***

To move shade to 50%, send BASIC\_SET 50.

To check current shade position, send BASIC\_GET. The return value is 0 to 99.

## 6. COMMAND\_CLASS\_SWITCH\_MULTILEVEL Commands

A MULTILEVEL\_SWITCH\_GET will return a motor position value between 0 and 99, or 255. A value of 255 means the motor is not calibrated, and cannot report a valid position. (The Motor LED will also be red.)

A MULTILEVEL\_SWITCH\_SET 0 will move the shade of a properly calibrated motor to the fully closed position. A MULTILEVEL\_SWITCH\_SET 99 or 255 will move the shade to the fully open position. Sending MULTILEVEL\_SWITCH\_SET 255 to an uncalibrated motor will also cause it to move to a limit.

Sending a MULTILEVEL\_SWITCH\_START\_LEVEL\_CHANGE with parameter 1, bit 6 clear, causes the position value to increase and the shade opens regardless of the calibration status.

Sending a MULTILEVEL\_SWITCH\_START\_LEVEL\_CHANGE with parameter 1, bit 6 set, causes the position value to decrease and the shade closes regardless of the calibration status.

The values of the Ignore Start Level bit (parameter 1, bit 5) and the Start Level parameter (parameter 2) are ignored. However, for compatibility with other Z-Wave devices, the Ignore Start Level bit should be set to 1.

Sending a MULTILEVEL\_SWITCH\_STOP\_LEVEL\_CHANGE at any time will stop the motor.

### ***Sample commands:***

To move shade to 50%, send MULTILEVEL\_SWITCH\_SET 50.

To check current shade position, send MULTILEVEL\_SWITCH\_GET. The return value is 0 to 99.

To force a shade open (regardless of whether the motor control is calibrated), send MULTILEVEL\_SWITCH\_START\_LEVEL\_CHANGE 32.

To force a shade closed (regardless of whether the motor control is calibrated), send MULTILEVEL\_SWITCH\_START\_LEVEL\_CHANGE 96.

## 7. COMMAND\_CLASS\_SWITCH\_ALL Commands

The Factory default setting for SWITCH\_ALL is ALL\_ON and ALL\_OFF commands disabled.

Send SWITCH\_ALL\_GET to get the SWITCH\_ALL\_ON and SWITCH\_ALL\_OFF status.

Send SWITCH\_ALL\_SET 0 to disable SWITCH\_ALL\_ON and SWITCH\_ALL\_OFF commands.

Send SWITCH\_ALL\_SET 1 to enable SWITCH\_ALL\_OFF commands only.

Send SWITCH\_ALL\_SET 2 to enable SWITCH\_ALL\_ON commands only.

Send SWITCH\_ALL\_SET 255 to enable both SWITCH\_ALL\_ON and SWITCH\_ALL\_OFF commands.

## 8. COMMAND\_CLASS\_POWERLEVEL Commands

Send POWERLEVEL\_TEST\_NODE\_SET, 2, 0, 0, 100 to have this node send 100 test frames at maximum signal strength to node 2. When the test completes, node 2 sends a POWERLEVEL\_TEST\_NODE\_REPORT back. If a single message is acknowledged, the test passes. The last 2 parameters represent the number of test frames acknowledged.

It is also possible to query for the results of the last test by sending a POWERLEVEL\_TEST\_NODE\_GET.

Send POWERLEVEL\_SET, 5, 60 to set node to power level 5 (mid-level power) for 60 seconds.

## 9. COMMAND\_CLASS\_MANUFACTURER\_SPECIFIC Command

Send MANUFACTURER\_SPECIFIC\_GET. The return message should be 0x00, 0x33, 0x52, 0x50, 0x30, 0x32 This shows the ESI product data as Manufacturer ID: 0033, Product Type ID: "RP", and Product ID: "02".

## 10. COMMAND\_CLASS\_VERSION Commands

Send VERSION\_GET.

The returned message is 0x04, 0x02, 0x06, 0x01, 0x01, 0x5A.

This represents Library type 4 for basic slave device

Protocol Version 2

Protocol Sub Version 6

Application Version is the Z-Wave™ processor code version (currently 2)

Application Sub Version is the motor processor code version (currently 1)

## 11. SCENE\_ACTIVATION\_SET Commands

Send SCENE\_ACTIVATION\_SET *id*, 0

where *id* is the scene number (1-255). This "activates" a scene, commanding the device to move the shade to the position configured for the scene using SCENE\_ACTUATOR\_CONF. If no level has been configured then the shade does not move.

## 12. COMMAND\_CLASS\_SCENE\_ACTUATOR\_CONF Commands

To configure a scene level to be set to the current shade position send

SCENE\_ACTUATOR\_CONF\_SET *id*, 0, 0, 0

where *id* is the scene number (1-255).

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To configure a scene level to a percentage position send SCENE\_ACTUATOR\_CONF\_SET *id*, 0, 128, *pos* where *id* is the scene number (1-255) and *pos* is the percentage position the shade should move to when that scene is activated. See COMMAND\_CLASS\_BASIC for valid positions.

To request the current setting for a scene send SCENE\_ACTUATOR\_CONF\_GET *id* where *id* is the scene number.

***Sample commands***

To configure scene 1 for 75% send SCENE\_ACTUATOR\_CONF\_SET 1, 0, 128, 75.

To query the level for scene 1 send SCENE\_ACTUATOR\_CONF\_GET 1. Assuming the previous example the returned message will be

0x2C, 0x03, 0x01, 0x4B, 0x00

where 0x01 indicates scene number 1, 0x4B is the hexadecimal representation of the decimal number 75.

## **13. Manual Buttons**

The two small push-buttons located on the side of the unit are labeled "OPEN" and "CLOSE".

Pressing the OPEN button should open the shade.

If the OPEN button closes the shade instead of opening it, the motor direction must be reversed using one of the following:

1. Use the reverse direction & calibrate button sequence.
2. Set Configuration Parameter #2 to a 1.
3. Swap motor directional wires on the motor connector.

Pressing the CLOSE button should close the shade. (If it does not, fix this as described above.)

A press of either button while the shade is moving will cause the shade to stop.

## **14. Calibration**

Calibration is required before SET and GET will work correctly. Calibration is accessed by pressing and holding down both the OPEN and CLOSE buttons simultaneously for approximately 10 seconds, until the Motor LED turns green.

While the Motor LED is green (within 10 seconds):

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- Press the CLOSE button to start a calibration sequence.
- or -
- Press the OPEN button to place motor orientation into the reverse direction and start a calibration sequence.

A calibration sequence consists of the shade moving between the limits to determine travel time and stopping at a limit position.

After the calibration sequence completes, the Motor LED turns off.

**NOTE:** The ABMHZ is a Z-Wave enabled device and is fully compatible with any Z-Wave enabled network. Z-Wave enabled devices displaying the Z-Wave logo can also be used with ESI Z-Wave enabled motor controllers such as ABMHZ regardless of the manufacturer. ESI Z-Wave enabled motor controllers can also be used in other manufacturer's Z-Wave enabled networks and all listening devices act as repeaters, regardless of vendor.

Z-Wave 868MHz certification number is ZC08-09050005

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