# 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 GREEN once indicating Z-Wave processor Version 1.
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 Ø.

**Sample commands:**

To check unit calibration state, send CONFIGURATION_GET, 1.  Return is a Ø or 1.
To check unit motor direction state, send CONFIGURATION_GET, 2.  Return is a Ø or 1.
To check unit tilt feature state, send CONFIGURATION_GET, 3.  Return is a Ø 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.

| Configuration parameter # | Length (bytes) | Read values | Write values | Description |
|---|---|---|---|---|
| 1 | 1 | ∅ = Not calibrated<br><br>1 = Calibrated | ∅ = No Action<br><br>1 = Begin calibration sequence | Unit calibration state. |
| 2 | 1 | ∅ = Motor direction normal<br><br>1 = Reversed motor direction | ∅ = Set direction to "normal" and begin calibration sequence<br><br>1 = Set direction to reverse and begin calibration sequence | Unit calibrated for normal or reversed motor direction. |
| 3 | 1 | ∅ = Tilt feature not enabled<br><br>1 = Tilt feature enabled | ∅ = Disable tilt<br><br>1 = Enable tilt | Allows precision positioning of wood blinds. |
| 1,2, or 3 | 129 | n/a | ∅ 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 ∅ 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 ∅ 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 5∅%, send BASIC_SET 5∅.
To check current shade position, send BASIC_GET. The return value is ∅ to 99.

# 6. COMMAND_CLASS_SWITCH_MULTILEVEL Commands

A MULTILEVEL_SWITCH_GET will return a motor position value between Ø 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 Ø 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 5Ø%, send MULTILEVEL_SWITCH_SET 5Ø.
To check current shade position, send MULTILEVEL_SWITCH_GET. The return value is Ø 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 Ø 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, Ø, Ø, 1ØØ to have this node send 1ØØ 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, 6Ø to set node to power level 5 (mid-level power) for 6Ø seconds.

# 9. COMMAND_CLASS_MANUFACTURER_SPECIFIC Command

Send MANUFACTURER_SPECIFIC_GET.  The return message should be ØxØØ, Øx33, Øx52, Øx5Ø, Øx3Ø, Øx31  This shows the ESI product data as Manufacturer ID: ØØ33, Product Type ID: "RP", and Product ID: "Ø1".

# 10.  COMMAND_CLASS_VERSION Commands

Send VERSION_GET.

The returned message is ØxØ4, ØxØ2, ØxØ6, ØxØ1, ØxØ1, Øx5A.
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 1)
Application Sub Version is the motor processor code version (currently 1)

# 11.  Manual Buttons

The two small push-button 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.

## 12.  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 1Ø seconds, until the Motor LED turns green.

While the Motor LED is green (within 1Ø seconds):

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

A calibration sequence consists of the shade moving between the upper and lower limits and stopping at the fully closed 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.