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# Smart Button - SBTZB-110

## Technical manual

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## 1 Cautionary notes

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## 2 Features

### 2.1 Smart Button - SBTZB-110

The Smart Button is a programmable, Zigbee-based button that can be used for multiple purposes. For example, the Smart Button can be used as a door lock button, or as a switch for lights or “all on/ off” functionality that enables the user to switch multiple home appliances on or off in the press of a single button. You can program the button to fit the requirements of your solution.

Key features are:

- Configurable wireless button
- Water-resistant
- ZigBee 3.0

#### Configurable button with different commands

The Smart Button is programmable and can be configured to carry out different commands with different ways of pressing the button. For instance, the button can be configured as a switch or as a Panic Button

#### Water-proof button for indoor and outdoor use

The Smart Button is water-proof and is thus suitable to use as a doorbell both indoors and outdoors. It can be mounted on the wall with double-sided tape or screws to ensure a high flexibility in mounting and use-options.

### 2.2 Key features

- Configurable button
- ZigBee OTA cluster for firmware upgrades
- ZigBee 3.0 stack supported
- Water repellent
- ZigBee 3.0

## 3 Endpoints

The device implements the following standard HA devices on different end points.

### 3.1 ZigBee Device Object (ZDO)

- End point number 0x00
- Application profile Id 0x0000
- Application device Id 0x0000
- Supports all mandatory clusters

### 3.2 Combined Interface

- End point number 0x20
- Application profile Id 0x0104 (Home Automation)
- Application device Id 0x0007 (Combined Interface)

### 3.3 IAS Zone

- End point number 0x23
- Application profile Id 0x0104 (Home Automation)
- Application device Id 0x0402 (IAS Zone)

### 3.4 Onics Utility

- Application profile Id 0xC0C9 (Onics (Formerly Develco Products) private profile)
- Application device Id 0x0001
- Manufacturer code is 0x1015
- Private profile for internal Onics (Formerly Develco Products) use only.

## 4 Supported Clusters

### 4.1 Common cluster for each end point

The ZCL “General Function Domain” clusters in this section are implemented as server clusters.

#### 4.1.1 Basic – Cluster id 0x0000

Only the first set has mandatory attributes, also the optional attributes that can be relevant to a Onics (Formerly Develco Products) device are all in set 0x000.

##### 4.1.1.1 Attribute

| Id# | Name             | Type       | Range      | Man/Opt | Relevance and ref. |
|-----|------------------|------------|------------|---------|--------------------|
| 0x0 | ZCLVersion       | UInt8      | Type range | M       |                    |
| 0x4 | ManufacturerName | String     | 0-32 byte  | O       | 4.1.1.1.1          |
| 0x5 | ModelIdentifier  | String     | 0-32 byte  | O       | 4.1.1.1.2          |
| 0x6 | DateCode         | String     | 0-32 byte  | O       |                    |
| 0x7 | PowerSource      | 8 bit enum | Type range | M       |                    |

##### 4.1.1.1.1 ManufacturerName

“frient A/S” or “Develco Products A/S” – depending on the product version.

##### 4.1.1.1.2 ModelIdentifier

“SBTZB-110”

#### 4.1.2 Identify – Cluster id 0x0003

##### 4.1.2.1 Attribute

| Id#    | Name         | Type   | Range      | Man/Opt | Relevance and ref. |
|--------|--------------|--------|------------|---------|--------------------|
| 0x0000 | IdentifyTime | UInt16 | Type range | M       |                    |

##### 4.1.2.2 Commands

The identify cluster has 2 commands as server.

| Id#  | Name           | Payload                          | Man/Opt | Relevance and ref. |
|------|----------------|----------------------------------|---------|--------------------|
| 0x00 | Identify       | UInt16 - Identify Time (seconds) | M       | 0x00               |
| 0x01 | Identify Query | none                             | M       | 0x01               |

The identify cluster has 1 command as client.

| Id#  | Name                    | Payload                          | Man/Opt | Relevance and ref. |
|------|-------------------------|----------------------------------|---------|--------------------|
| 0x00 | Identify Query Response | UInt16 - Identify Time (seconds) | M       | 0x00               |

## 4.2 Combined Interface – EP 0x20

### 4.2.1 Power Configuration - Cluster id 0x0001

The power configuration cluster is described in ZigBee Cluster Library Specification

#### 4.2.1.1 Attribute

| Id#    | Name           | Type  | Range       | Man/Opt | Relevance and ref.                   |
|--------|----------------|-------|-------------|---------|--------------------------------------|
| 0x0020 | BatteryVoltage | UInt8 | 0x00 - 0xFF | O       | ZCL configure reporting is supported |

Note: The attribute “*BatteryVoltage*” is measuring the battery voltage, in units of 100mV.

### 4.2.2 On/Off – Cluster id 0x0006

The On/Off cluster has 1 attribute set defined. The cluster is implemented as a client cluster.

#### 4.2.2.1 On/Off Cluster – Manufacture Specific Attributes

The On/Off cluster support the following manufacture specific attributes

NOTE: ZCL header setting – Manufacturer code for Onics (Formerly Develco Products) is 0x1015

| Id#    | Name                   | Type   | Range           | Relevance and ref.                                            |
|--------|------------------------|--------|-----------------|---------------------------------------------------------------|
| 0x8001 | ButtonPressActionDelay | UInt16 | 0x0000 – 0xFFFF | The delay before a button press will trigger a Toggle command |

|        |                     |       |  |                                                                                  |
|--------|---------------------|-------|--|----------------------------------------------------------------------------------|
|        |                     |       |  | [msec unit, default = 100]]                                                      |
| 0x8001 | ButtonPressBlinkLED | Enum8 |  | Value<br>0x00 = disable<br>0x01 = Red<br>0x02 = Green (Default)<br>0x03 = Yellow |

#### 4.2.2.2 On/Off Cluster Commands

The On/Off cluster can generate the following commands when the button is pressed.

| Id#  | Name   | Man/Opt | Relevance and ref.                |
|------|--------|---------|-----------------------------------|
| 0x02 | Toggle | M       | ZCL specification section 3.8.2.3 |

### 4.2.3 Binary Input Cluster - Cluster id 0x000F

The Binary input cluster is described in ZigBee Cluster Library Specification

#### 4.2.3.1 Attribute

| Id#    | Name         | Type | Range                 | Man /Opt | Relevance and ref.                                                      |
|--------|--------------|------|-----------------------|----------|-------------------------------------------------------------------------|
| 0x0051 | OutOfService | Bool | False (0) or True (1) | M        | Not used                                                                |
| 0x0055 | PresentValue | Bool | False (0) or True (1) | M        | Reflects the state of the physical button.<br>0 = Released. 1 = Pressed |
| 0x006F | StatusFlag   | Map8 | 0x00-0x0F             | M        | Not used                                                                |

#### 4.2.3.2 Manufacture Specific Attribute

The Binary Input cluster support the following manufacture specific attributes.

NOTE: ZCL header setting – Manufacturer code for Onics (Formerly Develco Products) is 0x1015

| Id#    | Name                | Type | Relevance and ref.                                                                                                                                                                   |
|--------|---------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x8000 | IAS Zone Activation | Map8 | Enables the IAS Zone endpoint (0x23) and enrolls the button as the chosen device type. When this attribute set, the button will behave like a PanicButton with a flashing red light. |

|  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  |  | <b>Supported values:</b><br>STANDARD_CIE = 0x0000<br>MOTION_SENSOR = 0x000D<br>CONTACT_SWITCH = 0x0015<br>FIRE_SENSOR = 0x0028<br>WATER_SENSOR = 0x002A<br>GAS_SENSOR = 0x002B<br>PERSONAL_EMERGENCY_DEVICE = 0x002C (Suggested for PanicButton)<br>VIBRATION_MOVEMENT_SENSOR = 0x002D<br>REMOTE_CONTROL = 0x010F<br>KEY_FOB = 0x0115<br>KEYPAD = 0x021D<br>STANDARD_WARNING_DEVICE = 0x0225<br>GLASS_BREAK_SENSOR = 0x0226<br>CARBON_MONOXIDE_SENSOR = 0x0227<br>SECURITY_REPEATER = 0x0229<br>IAS_ZONE_DISABLED = 0xFFFF (Default value) |
|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 4.2.4 Poll Control - Cluster id 0x0020

The poll control cluster is described in ZigBee Cluster Library Specification

This cluster provides a mechanism for the management of an end device's MAC Data Request rate. For the purposes of this cluster, the term "poll" always refers to the sending of a MAC Data Request from the end device to the end device's parent.

This cluster can be used for instance by a configuration device to make an end device responsive for a certain period of time so that the device can be managed by the controller.

### 4.2.4.1 Attribute

| Id#    | Name             | Type   | Range       | Man/Opt | Relevance and ref.      |
|--------|------------------|--------|-------------|---------|-------------------------|
| 0x0000 | Check-inInterval | UInt32 | 0x00 - 0xFF | M       | Default value is 1 hour |

|        |                   |        |  |   |                            |
|--------|-------------------|--------|--|---|----------------------------|
| 0x0001 | LongPoll Interval | Uint32 |  | M | Default value is disabled  |
| 0x0002 | ShortPollInterval | Uint16 |  | M | Default value is 3 seconds |
| 0x0003 | FastPollTimeout   | Uint16 |  | M | Default value is 5 minutes |

Start up, auto scan for client poll control cluster on the coordinator. If it is support on the coordinator an auto bind is created and the smoke sensor will send a check-in command in the interval specified in attribute "Check-inInterval. The coordinator has to reply with a check-in response. The sensor supports the following commands send from the client (Typically the coordinator).

- 0x00 Check-in Response,
- 0x01 Fast Poll Stop,
- 0x02 Set Long Poll Interval,
- 0x03 Set Short Poll Interval,

If it doesn't find a poll client it will search again periodically.

## 4.2.5 OTA Upgrade – Cluster id 0x0019

The cluster provides a ZigBee standard way to upgrade devices in the network via OTA messages. The devices support the client side of the cluster.

When the devices has joined a network it will automatically auto scan for a OTA upgrade server in the network. If it finds a server an auto bind is created and ones every 24 hour it will automatically send its "current file version" to the OTA upgrade server. It is the server that initiate the firmware upgrade process.

### 4.2.5.1 Attributes

| Id#    | Name               | Type         | Range      | Man/Opt | Relevance and ref. |
|--------|--------------------|--------------|------------|---------|--------------------|
| 0x0000 | UpgradeServerID    | IEEE Address | -          | M       |                    |
| 0x0001 | FileOffset         | Uint32       | Type range | O       |                    |
| 0x0002 | CurrentFileVersion | Uint32       | Type range | O       |                    |

|        |                              |            |              |   |  |
|--------|------------------------------|------------|--------------|---|--|
| 0x0003 | CurrentZigBeeStackVersion    | UInt16     | Type range   | O |  |
| 0x0004 | DownloadedFileVersion        | UInt32     | Type range   | O |  |
| 0x0005 | DownloadedZigBeeStackVersion | UInt16     | Type range   | M |  |
| 0x0006 | ImageUpgradeStatus           | 8 bit enum | 0x00 to 0xFF | O |  |
| 0x0007 | Manufacturer ID              | UInt16     | Type range   | O |  |
| 0x0008 | Image Type ID                | UInt16     | Type range   | O |  |
| 0x0009 | MinimumBlockRequestDelay     | UInt16     | Type range   | O |  |

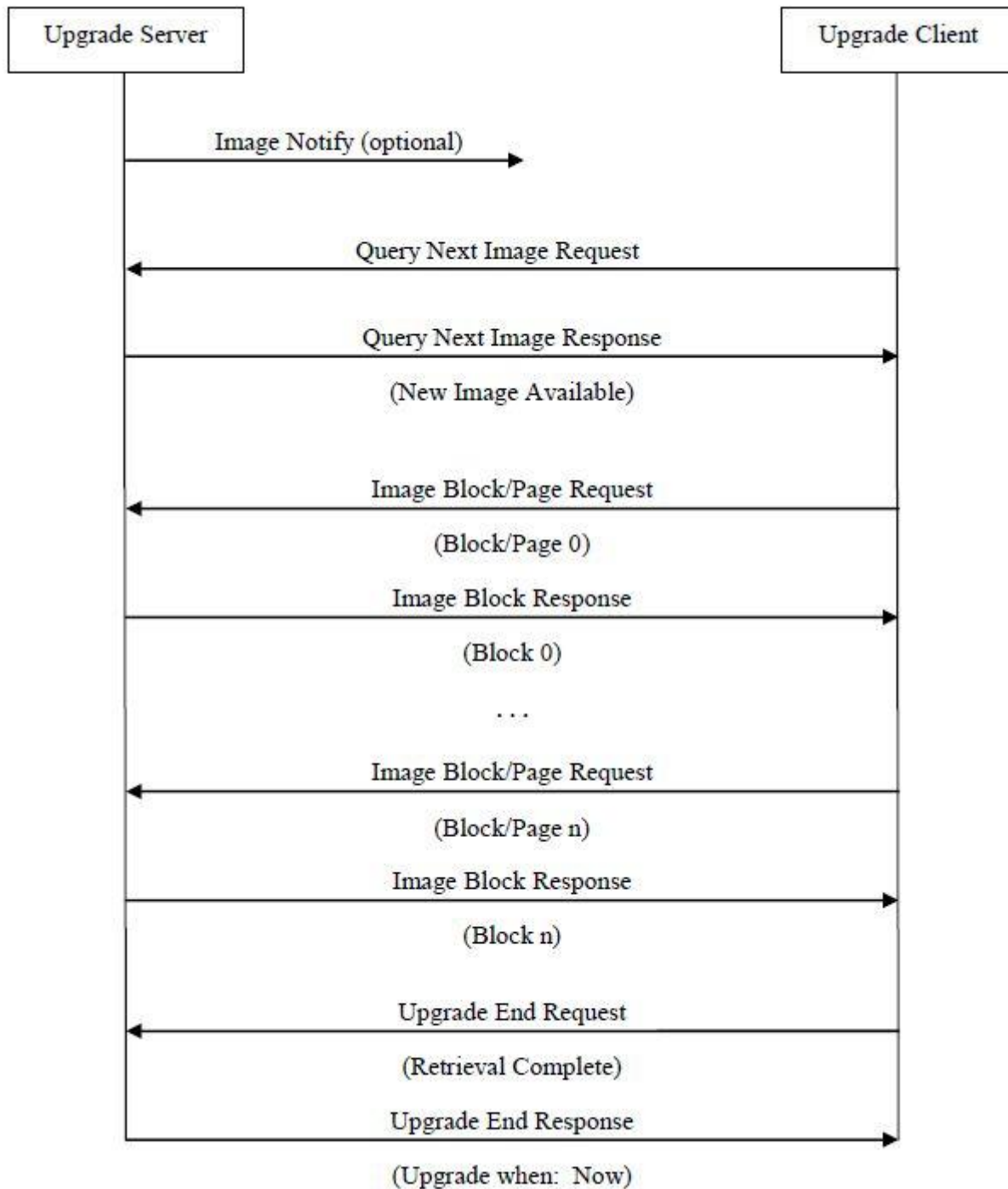
Above attribute description is to be found in section 6.7 “OTA Cluster Attributes” in ZigBee document – “Zigbee Cluster Library OTA Cluster (0x0019) Test Specification” provided by the Connectivity Standards Alliance.

#### 4.2.5.2 Commands

The OTA Client cluster can send the following commands

| Id#  | Name                     | Man/Opt | Relevance and ref.                     |
|------|--------------------------|---------|----------------------------------------|
| 0x01 | Query Next Image request | M       | 6.10.1 OTA Cluster Command Identifiers |
| 0x03 | Image Block Request      | M       | 6.10.1 OTA Cluster Command Identifiers |
| 0x06 | Upgrade End Request      | M       | 6.10.1 OTA Cluster Command Identifiers |

#### 4.2.5.3 OTA Upgrade Messages Diagram



## 4.2.6 Time – Cluster id 0x000A

The Time cluster is a general cluster for time it is based on a UTC time in seconds since 0 hrs 0 mins 0 sec on 1st January 2000.

The device will use this clusters as a client – provided that a suitable Time Server is available on the network (most likely on the Gateway).

### 4.2.6.1 Attribute

| Id#    | Name       | type                | Range         | Man/Opt | Relevance and ref.                                                                  |
|--------|------------|---------------------|---------------|---------|-------------------------------------------------------------------------------------|
| 0x0000 | Time       | UTCTime<br>(UInt32) | Type<br>range | M       | The module will periodically update its clock by synchronizing through this cluster |
| 0x0001 | TimeStatus | 8 bit<br>bitmap     | 00000xxx      | M       |                                                                                     |

## 4.3 IAS Zone Device – EP 0x23

### 4.3.1 IAS Zone - Cluster id 0x0500

The IAS Zone cluster is described in ZigBee Cluster Library Specification.

#### 4.3.1.1 Attribute

| Id#    | Name            | Type                      | Man/Opt | Relevance and ref.                                                                                                        |
|--------|-----------------|---------------------------|---------|---------------------------------------------------------------------------------------------------------------------------|
| 0x0000 | Zone State      | 8-bit Enumeration         | M       |                                                                                                                           |
| 0x0001 | Zone Type       | 16-bit Enumeration        | M       | Hard coded to Personal emergency device                                                                                   |
| 0x0002 | Zone Status     | Uint16                    | M       | The following bits are supported:<br>Bit1: Alarm 2<br>Bit3: Battery<br>Bit4: Supervision reports<br>Bit5: Restore reports |
| 0x0010 | IAS CIE Address | Valid 64-bit IEEE address | M       |                                                                                                                           |
| 0x0011 | ZoneID          | Uint8                     | M       |                                                                                                                           |

#### 4.3.1.1.1 Zone State

The device will automatically start to scan the network for an IAS Zone client in a predefined interval. When the client is found it will automatically attempt to enrol. When it has successfully enrolled the Zone Status command is sent to the IAS Zone client.

The attribute value will change from not enrolled (0x00) to Enrolled (0x01).

#### 4.3.1.1.2 IAS CIE Address

Attribute specifies the address that commands generated by the server shall be sent to.

To un-enrol the device the back end system has to write a new address into this attribute. Any value is valid. If the back end system writes an IEEE address then it will try to enrol to this device represented by the IEEE address.

#### 4.3.1.1.3 ZoneID

A unique reference number allocated by the CIE at zone enrolment time.

Used by IAS devices to reference specific zones when communicating with the CIE. The *ZoneID* of each zone stays fixed until that zone is un-enrolled.

#### 4.3.1.2 Commands

The IAS Zone cluster has 2 commands as server.

| Id#  | Name                            | Payload           |             |                   | Man/Opt | Relevance and ref. |
|------|---------------------------------|-------------------|-------------|-------------------|---------|--------------------|
| 0x00 | Zone Status Change Notification | Uint16 – bit mask |             |                   | M       |                    |
| 0x01 | Zone Enroll Request             | Bits              | 16          | 16                | M       |                    |
|      |                                 | Data type         | 16 bit enum | UINT16            |         |                    |
|      |                                 | Field name        | Zone type   | Manufacturer code |         |                    |

Init sequence – when the device has join the network it start to scan for an IAS zone client cluster. If a client is found a Zone enroll request command is send and a Zone Enroll response is expected. If it doesn't receive a response it will wait for 15 minutes and try again.

The following bits are supported in Zone status:

Bit1: Alarm 2

Bit3: Battery

Bit4: Supervision reports

Bit5: Restore reports

Bit0, Alarm

#### Note: How to clear a alarm in the "Zone status"

The sensor requests ZCL Default Response on the Zone Status Change notification, if any new Alarm bit has been set. Until the IAS CIE has acknowledged the received alarm by sending the mandated Default Response, the Alarm bits are not cleared – even if there is no longer an alarm

situation. When the Default Response is received, a new Zone Status Change notification is sent with the Alarm bits cleared, if the alarm situation has disappeared since sending the Zone Status message with alarm set.

**Bit3:** When the battery is below 2.2 VDC. Battery bit is set high and “Zone Status” is transmitted to the coordinator.

## 5 MMI user guide

The MMI menu allows the user to perform various operations on the device. Its use is explained in section 5.2 Push Button Menu

### 5.1 Accessing and re-enabling MMI menu

The MMI menu is accessible while the device is initially scanning for a network. When the device joins a network, the MMI menu is accessible for an additional 60 seconds. After this point, the MMI menu is inaccessible. To re-enable the MMI menu, use one of the two methods below.

**WARNING:** Using method 1 will temporarily put the device into alarm state until the MMI menu becomes active. If this is of concern, method 2 can be used instead.

Method 1:

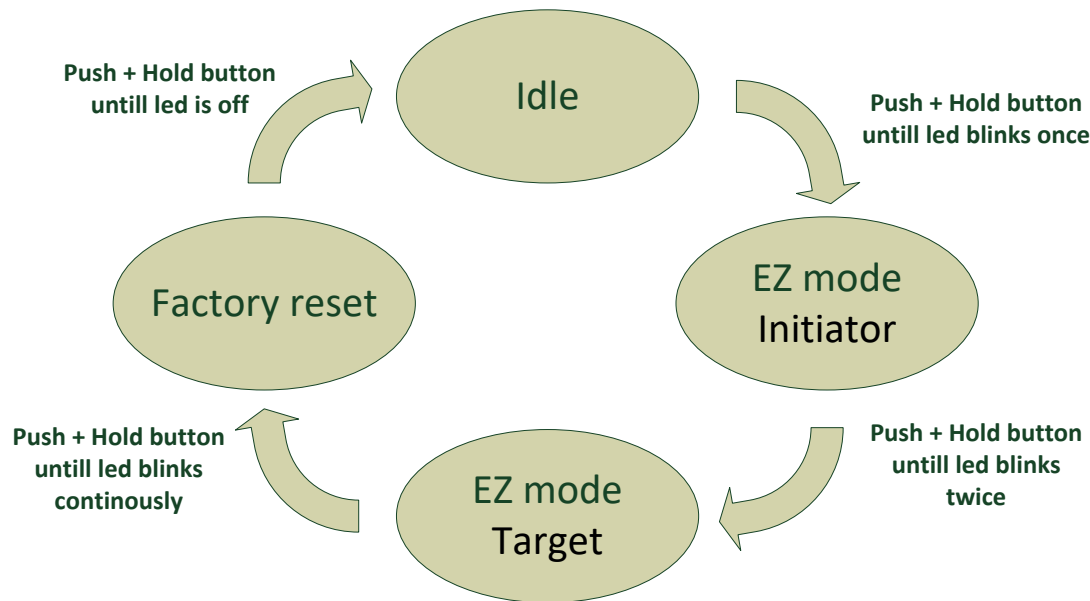
- Press and hold the button for 10 seconds. When the LED flashes green, release the button immediately

Method 2:

- Remove the battery, wait 10 seconds and re-insert it into the device

### 5.2 Push Button Menu

When MMI menu is active the user can push the button and select the different menus described below. Pushing the button for longer (push, hold for a few seconds, and release) allows the user to set the device into a desired mode. A mode change happens at 5 second interval. Below, these modes are illustrated in a state chart.



When cycling through the menu modes, the state is indicated by a number of 100ms blinks on the LED. The device is supporting the ZigBee standardized EZ- mode Commissioning.

### 5.2.1 EZ mode - Initiator

If the device is not on the network EZ-Mode Network Steering is invoked when the user enters this menu. The LED blinks once every 1 sec until the device has joined the network. If the device was already on the network it will broadcast the PermitJoin messages. It is the trust center policy that decides if the device is allowed to join the network.

When the device has joined the network EZ-Mode Finding and Binding is invoked and the device starts to blink every 3 sec until a cluster match is found. When a match is found or the cluster examine is finished the blinking stops and the device sends a message to the target device to stop the identify time.

The following clusters are supported in EZ-mode finding and binding:

- Power configuration cluster

The EZ-mode time is hard coded to 3 minutes. This is the Minimum and recommended PermitJoin time broadcast for EZ-Mode Network Steering and minimum IdentifyTime set for EZ-Mode Finding and Binding. If the user enters the menu again another 3 minutes is started.

### 5.2.2 EZ mode - Target

If the device is not on the network EZ-Mode Network Steering is invoked when the user enters this menu. The LED blinks twice every 1 sec until the device has joined the network. If the device was already on the network it will broadcast the PermitJoin messages. It is the trust center policy that decides if the device is allowed to join the network.

When the device has joined the network identify mode is invoked and the device starts to blink twice every 3 sec until identify mode is stopped or after the EZ-mode time has expired. If the user enters the menu again another 3 minutes is started.

### 5.2.3 Factory reset

To allow a device to join a network, one either has to power up a device that has not previously joined a network or push the button until the Reset To Factory default mode is indicated – and subsequently release the button. This will cause the device to reset to its factory default state and scan for a suitable coordinator.

## 5.3 Action on Power On

As a general rule, all end devices and routers that have not previously joined a network (or have been reset to factory default) will start up and search for a network with join permit open. In this mode, the Yellow LED will flash while searching for a network to join.

Once the device has joined the network, it will start scanning for an OTA server, Time server, Poll control client and an IAS Zone client.

If a device has joined a network and is powered down, it will attempt to rejoin this network upon power up. For the first 30 seconds hereafter, the device will be available for communication. This time can be expanded using the poll control cluster functionality.

## 6 General network behaviour

### 6.1 Installation

When the device is virgin and powered for the first time it will start looking for a ZigBee PAN Coordinator or router to join. The device will scan each ZigBee channel starting from 11 to 24. The LED will flash once every second until it joins a device.

| #Scan mode - 1                                             | #factory storage mode - 2                                                    |
|------------------------------------------------------------|------------------------------------------------------------------------------|
| Scan all 16 ZigBee channel until join network or 3 minutes | MCU is in sleep mode (Radio off)<br><br>Press button to reactivate scan mode |

Scan mode 1 will only be activated when the user presses the button. If the devices don't join a ZigBee

network, it will go back to factory storage mode. Press button again to reactivate scan mode.

If the user invokes EZ-mode it will start scanning the next 3 minutes

In section 5 "MMI" it is explained how to put the device into a join or leave network mode.

Network settings are stored in NV-memory are after a power cycle the device re-join the same network.

If the device has to join a new PAN coordinator the MMI menu supports a "**Reset To Factory Fresh Settings**" mode. This will erase all current network information.

### 6.2 Low battery

The current battery voltage can be read from the power configuration cluster described in section 4.3.1. The attribute "*BatteryVoltage*" is measuring the battery voltage, in units of 100mV.

**Low batt LED indication** – RED LED will blink twice every 60 second

## 7 Specifications

|                        |                                                     |
|------------------------|-----------------------------------------------------|
| <b>General</b>         |                                                     |
| Dimensions (L x B x H) | 40 x 53 x 10,8 mm                                   |
| Colour                 | White – Optional Orange marking on the button       |
| Battery                | Battery: CR2450 (Coin Cell)                         |
| Battery life           | Up to 3 year                                        |
|                        |                                                     |
| Radio                  | Sensitivity: -100 dBm                               |
|                        | Output power: +10 dBm                               |
|                        |                                                     |
| Environment            | Water-resistant when used in the bathtub and shower |
|                        | Operation temperature 0 to +50°C                    |
|                        |                                                     |
| <b>Function</b>        |                                                     |
| Button                 | Smart Button                                        |
|                        |                                                     |
| <b>Communication</b>   |                                                     |
| Wireless protocol      | ZigBee 3.0                                          |
|                        | ZigBee end-device                                   |
|                        |                                                     |
| <b>Certifications</b>  |                                                     |
|                        | Conforming to CE, RoHS and REACH directives         |

## 8 Contact Information

**Technical support:** Please contact Onics for support.  
[products@onics.com](mailto:products@onics.com)

**Sales:** Please contact Onics for information on prices, availability, and lead time.  
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