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DEVELCO WISZB 120 Window Sensor User Manual

Contents

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DEVELCO WISZB 120 Window Sensor

Product Information

- **Product Name:** Window Sensor – WISZB-120
- **Manufacturer:** Develco Products A/S
- **Website:** http://develcoproducts.com
- **Email:** info@develcoproducts.com
- **Revision Date:** 21.03.2016

Features

- Detects whether windows or doors are closed or open
- Activates an alarm when the sensor part and the magnet part are separated
- Includes temperature measuring functionality
- Battery powered
- Easily mounted using included screws or double-stick tape
- **Two ZigBee end points**: one for the magnetic sensor and one for temperature

End Points

- **ZigBee Device Object (ZDO)**: End point number 0x00, Application profile Id 0x0000, Application device Id 0x0000, Supports all mandatory clusters
- **IAS Zone**: End point number 0x23, Application profile Id 0x0104 (Home Automation), Application device Id 0x0402
- **Temperature Sensor**: End point number 0x26, Application profile Id 0x0104 (Home Automation), Application device Id 0x0302
- **Develco Utility:** Application profile Id 0xC0C9 (Develco Products private profile), Application device Id 0x0001, Manufactor code for Develco Products is 0x1015, Private profile for internal Develco Products use only

Product Usage Instructions

1. Mounting the Window Sensor
   - Choose a suitable location on your window or door to mount the sensor.
   - Use the included screws or double-stick tape to securely mount the sensor.
2. Connecting the Window Sensor
   - Ensure that the sensor is within range of your ZigBee network.
   - Follow the instructions provided by your ZigBee gateway or hub to add the Window Sensor to your network.
3. Using the Window Sensor
   - To detect if a window or door is open or closed, ensure that the sensor part and the magnet part are properly aligned and close together.
   - If the sensor part and the magnet part are separated, an alarm will be activated.
   - The Window Sensor also measures temperature. You can access the temperature reading through the designated ZigBee end point.

If you encounter any issues or have further questions, please refer to the reference documents provided or contact Develco Products A/S through their website or email.

Cautionary notes

Develco Products A/S reserves the right to make changes to any product to improve reliability without further notice. Develco Products A/S does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under patent rights or the rights of third parties.

Features

Window Sensor – WISZB-120

The Window Sensor enables you to detect whether windows or doors are closed or open. When the sensor part and the magnet part is separated the alarm is activated. It protects your home and gives an alert when unexpected action is occurred.
The Window Sensor also includes temperature measuring functionality. The sensor is battery powered and is easily mounted by the included screws or double-stick tape.
The sensor has two ZigBee end points, one for the magnetic sensor and one for temperature.

IAS Zone

The Window Sensor is implemented as a IAS Zone ZigBee end point according to ZigBee Home Automation profile „IAS Zone".

Temperature

- The temperature sensor measures temperature with a resolution of 0.1°C.
- It supports standard ZigBee reporting (on change or interval).
- The end point is configured as the Home Automation profile "Temperature Sensor"

Key features
Key features are

- Alarm sensor – IAS Zone
- Temperature sensor
- ZigBee OTA cluster for firmware upgrades
- ZigBee HA 1.2 Certified application profile
- ZigBee PRO is supported
- RoHS compliant according to the EU Directive 2002/95/EC
- Standard ZigBee Home Automation security and stack settings are used

Endpoints

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

ZigBee Device Object (ZDO)

- End point number 0x00
- Application profile Id 0x0000
- Application device Id 0x0000

- Supports all mandatory clusters

IAS Zone

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

Temperature Sensor

- End point number 0x26
- Application profile Id 0x0104 (Home Automation)
- Application device Id 0x0302

Develco Utility

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

Reference documents

- 053474r18ZB_CSG-ZigBee-Specification.pdf
- 075123r03ZB_AFG-ZigBee_Cluster_Library_Specification.pdf
- 053520r27ZB_HA_PTG-Home-Automation-Profile.pdf
- 075356r15ZB_ZSE-ZSE-AMI_Profile_Specification.pdf

They can all be downloaded from
http://www.zigbee.org/Products/DownloadZigBeeTechnicalDocuments.aspx

Supported Clusters

Common clusters for each end point
The ZCL "General Function Domain" clusters in this section are implemented as server clusters. Refer to ZigBee Cluster Library Specification. **http://www.zigbee.org/Specifications.aspx**

Basic – Cluster id 0x0000
Only the first set has mandatory attributes, also the optional attributes that can be relevant to a Develco device are all in set 0x000.

Attribute

Id#	Name	Type	Range	Man/opt	Relevance and ref.
0x0	ZCL Version	Uint8	Type range	M	
0x4	Manufacturer Name	String	0-32 byte	O	4.1.1.1.1
0x5	Model Identifier	String	0-32 byte	O	4.1.1.1.2
0x6	Date Code	String	0-32 byte	O	
0x7	Power Source	8 biennium	Type range	M	

Manufacturer Name

- "Develco Products A/S"

Model Identifier

- "WISZB-120"

Manufacture Specific Attribute

Id#	Name	Type	Range	Man/Opt	Relevance and ref.
0x8000	PrimarySwVersion	OctetString		M	SW version

ZCL header setting – Manufacture code for Develco Products is 0x1015

Identify – Cluster id 0x0003

Attribute

Id#	Name	Type	Range	Man/Opt	Relevance and ref.
0x0000	IdentifyTime	Uint16	Type range	M	

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

IAS Zone Device – EP 0x23

IAS Zone – Cluster id 0x0500
The IAS Zone cluster is described in ZigBee Cluster Library Specification.

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 0x0015 Contact Switch
0x0002	Zone Status	Uint16	M	The following bits are supported **Bit0**: Alarm 1 **Bit2**: Tamper **Bit3**: Battery **Bit4:** Supervision reports **Bit5**: Restore reports
0x0010	IAS CIE Address	Valid 64-bit IEEE address	M	
0x0011	Zone ID	Uint8	M	

Zone State
The device will automatically start to scan the network for an IAS Zone client in a predefine interval. When the client is found it will automatically attempt to enrol. When it has successfully enrolled the Zone Status command is send every 5 minutes.

IAS CIE Address
Attribute specifies the address that commands generated by the server shall be sent to.
To unenrol 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 devices represented by the IEEE address.

Zone ID
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 Zone ID of each zone stays fixed until that zone is un-enrolled.

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	The status is report to the coordinator e very 5 min
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 I AS zone client cluster. I f a client is found a Zone enroll request comm and is send and a Zone Enroll response is expected. I f it doesn't receive a response within 15 sec it gives up and will continue to scan x number of attempts. When the in it sequence is over it will enter a state where it scans for a client every 12 hour.
The following bits are supported in Zone status

- **Bit0**: Alarm 1
- **Bit2:** Tamper
- **Bit3:** Battery
- **Bit4**: Supervision reports
- **Bit5**: Restore reports

When the battery is below 2.2 VDC Bit3: Battery is set high and "Zone Status" is transmitted to the coordinator.

Power Configuration – Cluster id 0x0001
The power configuration cluster is described in ZigBee Cluster Library Specification section 4.8

Attribute

Id#	Name	Type	Range	Man/Opt	Relevance and ref.
0x0020	Battery Voltage	Uint8	0x00 – 0xFF	O	

Note: The attribute "Battery Voltage" is measuring the battery voltage, in units of 100mV.

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.

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	Short Poll Interval	Uint16		M	Default value is 3 seconds
0x0003	Fast Poll Timeout	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.

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.

Attributes

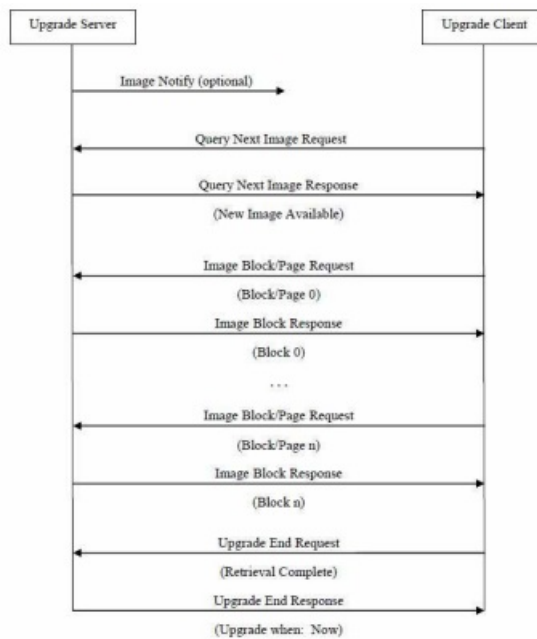| Id#	Name	Type	Range	Man/Opt	Relevance and ref.
0x0000	Upgrade Server ID	IEEE Address	–	M	
0x0001	File Off set	Uint32	Type range	O	
0x0002	Current File Version	Uint32	Type range	O	
0x0003	Current Zig Bee Stack Version	Uint16	Type range	O	
0x0004	Downloaded File Version	Uint32	Type range	O	
0x0005	Downloaded ZigBee Stack Version	Uint16	Type range	M	
0x0006	Image Upgrade Status	8 bitenum	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-ota-upgrade-cluster-specification" provided by the ZigBee alliance.

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

OTA Upgrade Messages Diagram

Upgrade Server   Upgrade Client

Image Notify (optional)

Query Next Image Request

Query Next Image Response

(New Image Available)

Image Block/Page Request

(Block/Page 0)

Image Block Response

(Block 0)

. . .

Image Block/Page Request

(Block/Page n)

Image Block Response

(Block n)

Upgrade End Request

(Retrieval Complete)

Upgrade End Response

(Upgrade when: Now)

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. Refer to [Z2] for ZigBee specification of the time cluster.

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).

Attribute

Id#	Name	type	Range	Man/Opt	Relevance and ref.
0x0000	Time	UTC Time (Uint32)	Type range	M	The module will periodically update its clock by synchronizing through this cluster
0x0001	TimeStatus	8 bit bitmap	00000xxx	M	

Temperature Sensor Device – EP 0x26

The ZCL "Measurement and Sensing" cluster in this section is implemented as a server cluster. Refer to ZigBee Cluster Library Specification.

Temperature Measurement – Cluster id 0x0402

The temperature measurement cluster is described in ZigBee Cluster Library Specification section 4.4.

Attribute

Id#	Name	type	Range	Man/Opt	Relevance and ref.
0x0000	MeasuredValue	Sint16	MinValue to MaxValue	M	ZCL Reporting is support DP default is configured
0x0001	MinMeasuredValue	Sint16	0	M	
0x0002	Max Measured Value	Sint16	5000	M	

Measured Value
The attribute is configured with the following default "ZCL configure reporting" setting.

- **Min Reporting Interval:** 0x003C [60 sec]
- **Max Reporting Interval**: 0x0258 [600 sec]
- **Reportable Change**: 0x000A [0.1 °C]

If the temperature value is stable it will be send every 10 minutes.
If the temperature changes more than 0.1 °C it will be reported but not faster than every 1 minute since last reporting value.

Note: Min reporting interval 0 sec is invalid when reportable change is configured.

Min Measured Value
The temperature sensor is NOT supporting temperature measurements below 0 degrees Celsius.

Max Measured Value
The temperature sensor is NOT supporting temperature measurements above 50 degrees Celsius.

MMI user guide

Push Button Menu
Pushing the button on a device provides the user with several possibilities.
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.
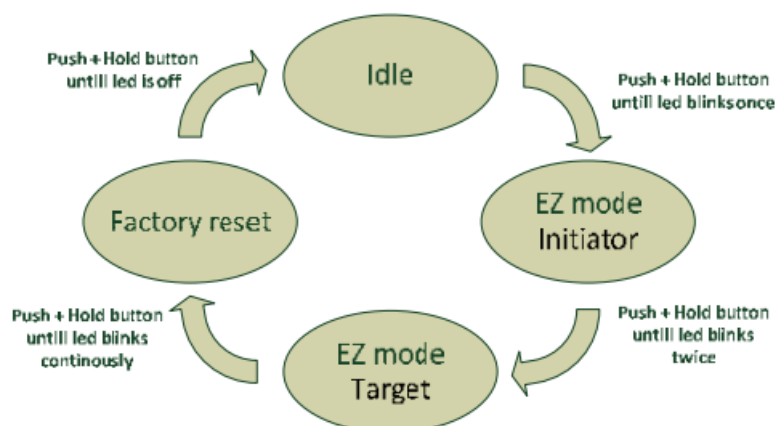
When cycling through the menu modes, the state is indicated by a number of 100ms blinks on the LED. The device is supporting the ZigBee standardized EZ- mode Commissioning.

EZ mode – Initiator
If the devices is not on the network EZ-Mode Network Steering is invoked when the user enter this menu. The led blinks once every 1 sec until the devices 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 start 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 messages to the target device to stop the identify time.
The following clusters are support in EZ-mode finding and binding:

- Temperature cluster
- 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.

EZ mode – Target
If the devices is not on the network EZ-Mode Network Steering is invoked when the user enter this menu. The led blinks twice every 1 sec until the devices 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 invoke and the device start 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.

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.

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 LED will flash once every second.
Once the device has joined the network, is 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.

General network behaviour

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	#Sleep mode	#Scan mode – 2	#Sleep mode	#Scan mode – 2
Scan all 16 ZigBee c hannel until join network or 15	MCU is in sleep mo de (Radio off) 15 mi nutes	Scan all 16 ZigBee c h x 4 or until join network	MCU is in sleep mo de (Radio off) 15 mi nutes	Scan all 16 ZigBee c h x 4 or until join network
minutes		~ 30 seconds		~ 30 seconds

The device will start up using scan mode 1. To increase battery lifetime when the device is joining a network for the first time a scan mode 2 will be used after scan mode 1 has expired. Scan mode 1 it will only be executed one time when the device is powered. 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.

Normal – Keep alive
The device is sending a "keep alive" message to the PAN coordinator every 15 minute to verify that the device is still connected to the network.

Network lost

*
* If no "keep alive" responses are received 5 times in a row (Worst case 1h15m), the devices will start scanning as specified in the table below.
* When the device is in scan mode the LED will flash once every second until it re-joins the network.
* According to the ZigBee specification TX is NOT allowed to be enabled all the time and a TX silent period has to be defined.

#Scan mode – 1	#Sleep mode	#Scan mode – 2	#Sleep mode	#Scan mode – 2
Scan current ch 3 ti mes Scan remaining 15	MCU is in sleep mo de (Radio off) 15 mi nutes	Scan current ch 3 ti mes Scan remaining 15	MCU is in sleep mo de (Radio off) 15 mi nutes	Scan current ch 3 ti mes Scan remaining 15
ch 1 time		ch 1 time		ch 1 time
Scan all 16 ch 3				
times				

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.

Specifications

General	
Dimensions (L x B x H)	65 x 25 x 17 mm (Sensor part) and 65 x 17 x 17 (magnet part)
Colour	White and light grey
Battery	**Battery:** 2 x AAA, exchangeable
Battery life	**Battery life**: up to 2 years, 2 minutes reporting
Radio	**Sensitivity:** -92 dBm
	Output power: +3 dBm
Environment	**IP class**: IP40
	Operation temperature 0 to +50°C
Function	
Temperature sensor	**Range**: 0 to +50°C
	Resolution: 0.1°C (accuracy ± 0.5°C)
	Sample time: config.: 2 s -65.000 s
	Reporting: configurable
Detection	**Magnetic**: 0.1-1.0 cm
Communication	
Wireless protocol	ZigBee Home Automation compliant
	ZigBee end-device
Certifications	
	RoHS compliant according to the EU Directive 2002/95/EC

Contact Information

- **Technical support:** Please contact Develco Products for support.
- **products@develcoproducts.com**
- **Sales:** Please contact Develco Products for information on prices, availability, and lead time.
- **info@develcoproducts.com**

Documents / Resources

DEVELCO WISZB 120 Window Sensor [pdf] User Manual
WISZB 120 Window Sensor, WISZB 120, Window Sensor, Sensor

References

- ○ **Develco Products - White label products for security, home care, and energy management.**