



IO module - IOMZB-110

Technical manual

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1 Cautionary notes

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2 Features

2.1 IO module - IOMZB-110

Bringing your wired devices online

Do you want to connect your wired devices to a wireless network? The digital IO Module enables you to connect wired devices to a network, allowing your wired devices to communicate and receive information wirelessly.

Establishing reliable communication between wired devices and Zigbee networks

The digital IO Module integrates wired devices into wireless Zigbee networks. Providing four inputs and two outputs, the IO Module works as a bridge of reliable communication between wired devices and a control system over Zigbee networks. Devices connected to the input will trigger events, and devices connected to the output will respond to events.

Numerous options for users

The digital IO Module can be connected to a wide range of devices. An example could be to connect a heat pump to the network through the IO Module so you can control the heat pump and make it consume energy when other appliances in the building do not require electricity. Also, the module can be used to connect an access system to a network, so that automatic doors can be connected to and controlled through a gateway. The IO Module is interoperable with other Zigbee devices. For instance, you can use it to connect window blinds to a Motion Sensor Mini, so the blinds close when the sensor detects bright light. The module has a convenient, compact size, as it is designed to fit in a small box. For instance, the module fits behind an electricity outlet. The inputs can be configured as IAS alarm inputs, bridging wired alarm systems/sensors into the Zigbee network.

2.2 Key features

The Digital IO module is a router in the ZigBee network.

Key features are:

- Bridging wired devices and Zigbee networks
- Four digital inputs with dry contact
- Two relay outputs with NO and NC contacts
- On/off or pulse functionality
- Saves cabling efforts
- Remote data collection and control of wired devices
- Power Failure alarm
- ZigBee 3.0 certified
- ZigBee OTA cluster for firmware upgrades
- ETSI compliant.
- RoHS compliant according to the EU Directive 2002/95/EC.

3 Endpoints

The device has 7 endpoints:

3.1 ZigBee Device Object (ZDO)

- Application profile Id 0x0000
- Application device Id 0x0000
- Supports all mandatory clusters

3.2 Simple Sensor – End Point 0x70,0x71,0x72 and 0x73

- Application profile Id 0x0104 (Home Automation)
- Application device Id 0x000C (Simple Sensor)
- Clusters
 - Clusters supported as server
 - Basic
 - Binary Input
 - Identify
 - IAS Zone (pr. Default disabled)
 - Clusters supported as client
 - Identify
 - Time
 - OTA Upgrade

3.3 On/Off Output – End Point 0x74 and 0x75

- Application profile Id 0x0104 (Home Automation)
- Application device Id 0x0002 (On/Off Output)
- Clusters
 - Clusters supported as server
 - Identify
 - Scenes, Groups
 - On Off
 - Clusters supported as client
 - Binary Input

3.4 Develco Utility

- Application profile Id 0xCoC9 (Develco Products private profile)
- Application device Id 0x0001
- Develco ZigBee Manufacturer code 0x1015
- Private profile for internal Develco Products use only.

4 Supported Clusters

4.1 Basic – Cluster id 0x0000

The cluster is implemented as a server cluster.

The Basic cluster is described in ZigBee Cluster Library Specification

4.1.1 0x0000 Basic Device Information attribute set

Id#	Name	Type	Range	Man/Opt	Relevance and ref.
0x00	ZCLVersion	Uint8	Type range	M	
0x04	ManufacturerName	String	0-32 byte	O	
0x05	ModelIdentifier	String	0-32 byte	O	
0x06	DataCode	String	0-16 byte	O	
0x07	PowerSource	8 bit enum	Type range	M	

4.1.1.1 Manufacturer name

"Develco Products A/S"

4.1.1.2 Model identifier

"IOMZB-110"

4.1.1.3 Power source

Mains powered single phase

4.1.1.4 Manufacture Specific Attribute

Id#	Name	Type	Relevance and ref.
0x8000	Primary SW Version	OctetString	Read only
0x8010	Primary Bootloader SW Version	OctetString	Read only
0x8020	Primary HW version	OctetString	Read only
0x8030	Primary HW name	OctetString	Read only
0x8050	Primary SW Version 3 rd Party	OctetString	Read only

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

4.2 Identify – Cluster id 0x0003

The identify cluster serves as a way to make a device identify itself either visually or by sound.

Normally this is done by toggling an LED at some interval.

4.2.1 Attribute

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

4.2.1.1 Commands

The identify cluster has 2 commands as server.

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

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	

4.3 Binary Input Basic - Cluster id 0x000F

The Binary input Basic cluster is described in ZigBee Cluster Library Specification

The cluster is implemented both as a server and client cluster.

4.3.1 Server

4.3.1.1 Attribute - Server

Id#	Name	Type	Range	Man/Opt	Relevance and ref.
0x0051	OutOfService	Bool	False (0)	M	Always FALSE (0)
0x0054	Polarity	Enum8			
0x0055	PresentValue	Bool	False (0) or True (1)	M	Reflects the state of the input. Reportable. Default Min 1 sec, max 10 min
0x006F	Status flag	Map8	0x00	O	No used – Always 0x00

4.3.1.2 Manufacture Specific Attribute

Id#	Name	Type	Relevance and ref.
0x8000	IAS Activation	UInt16	Zonetype according to ZigBee specification. 0xFFFF : default = disabled NOTE: Alarm1 is only supported

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

4.3.2 Client

4.3.2.1 Manufacture Specific Attribute

Id#	Name	Type	Range	Relevance and ref.
0x8000	OnWithTimeOff_OnTime	UInt16		Ref. OnWithTimeOff in ZigBee specification Unit: 100ms
0x8001	OnWithTimeOff_OffWaitTime	UInt16		Ref. OnWithTimeOff in ZigBee specification Unit: 100ms

- If OnWithTimeOff_OnTime is 0, output follows input
- If OnWithTimeOff_OnTime > 0. Output makes a pulse with the configured OnWithTimeOff_OnTime and OnWithTimeOff_OffWaitTime when input goes from 0 to 1
 - o Equivalent to sending an OnWithTimedOff command to the OnOff cluster
- Receives Report attribute of PresentValue

4.4 On/Off – Cluster id 0x0006

The On/Off cluster has 1 attribute set defined. In the following section the set is listed. Refer to Fejl! H envisningskilde ikke fundet.Fejl! Henvisningskilde ikke fundet. for ZigBee specification of the On/Off Cluster. The cluster is implemented as a server cluster.

4.4.1 On/Off Cluster - Attributes

On the On/Off cluster the following attributes are defined:

Id#	Name	Type	Range	Man/Opt	Relevance and ref.
0x0000	OnOff	Boolean	0x00 – 0x01	M	Section 3.8.2.2 ZCL configure reporting is supported

4.4.2 On/Off Cluster Commands

The server generates no commands

The On/Off cluster can receive the following commands from a client

Id#	Name	Man/Opt	Relevance and ref.
0x00	Off	M	ZCL specification section 3.8.2
0x01	On	M	ZCL specification section 3.8.2
0x02	Toggle	M	ZCL specification section 3.8.2
0x42	OnWithTimedOff	O	ZCL specification section 3.8.2

4.5 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 Fejl! Henvisningskilde ikke fundet. for ZigBee specification of the time cluster.

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

4.5.1 Attribute

Id#	Name	Type	Range	Man /Opt	Relevance and ref.
0x0000	Time	UTCTime (Uint32)	Type range	M	The module will periodically update its clock by synchronizing through this cluster
0x0001	TimeStatus	8 bit bitmap	00000xxx	M	
0x0002	TimeZone	Uint32	Type range	O	
0x0003	DstStart	Uint32	Type range	O	
0x0004	DstEnd	Int32	Type range	O	
0x0005	DstShift	Uint32	Type range	O	

4.6 Groups – Cluster 0x0004

The Group cluster has 1 attribute set defined. In the following section the set is listed. Refer to Fejl! Henvisningskilde ikke fundet. for ZigBee specification of the Groups Cluster. The cluster is implemented as a server cluster.

4.6.1 Groups Cluster - Attributes

On the groups cluster the following attributes are defined:

Id#	Name	Type	Range	Man /Opt	Relevance and ref.
0x0000	NameSupport	8bitmap	Type range	M	Section 3.6.2.2

4.6.2 Groups Cluster Commands

The groups cluster can receive the following commands from the client.

Id#	Name	Man /Opt	Relevance and ref.
0x00	Add group response	M	ZCL specification section 3.6.2.3
0x01	View group response	M	ZCL specification section 3.6.2.3
0x02	Get group membership response	M	ZCL specification section 3.6.2.3
0x03	Remove group response	M	ZCL specification section 3.6.2.3

The groups cluster can generate the following command and send them to the client.

Id#	Name	Man /Opt	Relevance and ref.
0x00	Add group	M	ZCL specification section 3.6.2.2
0x01	View group	M	ZCL specification section 3.6.2.2
0x02	Get group membership	M	ZCL specification section 3.6.2.2
0x03	Remove group	M	ZCL specification section 3.6.2.2
0x04	Remove all groups	M	ZCL specification section 3.6.2.2
0x05	Add group if identifying	M	ZCL specification section 3.6.2.2

4.7 Scenes – Cluster id 0x0005

The Scenes cluster has the following attribute sets defined. In the following sections the attributes of these sets is listed. Refer to Fejl! Henvisningskilde ikke fundet. for ZigBee specification of the Scenes cluster.

4.7.1 0x00 Scenes attribute set

Id#	Name	Type	Range	Man /Opt	Note
0x00	Scene Count	UInt8	Type range	M	
0x01	CurrentScene	UInt8	Type range	M	
0x02	CurrentGroup	UInt16	Type range	M	
0x03	SceneValid	Bool	Type range	M	
0x04	NameSupport	Bitmap8	Type range	M	

4.8 OTA Upgrade – Cluster id 0x0019

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

4.8.1 OTA Cluster 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-ota-upgrade-cluster-specification" provided by the ZigBee alliance.

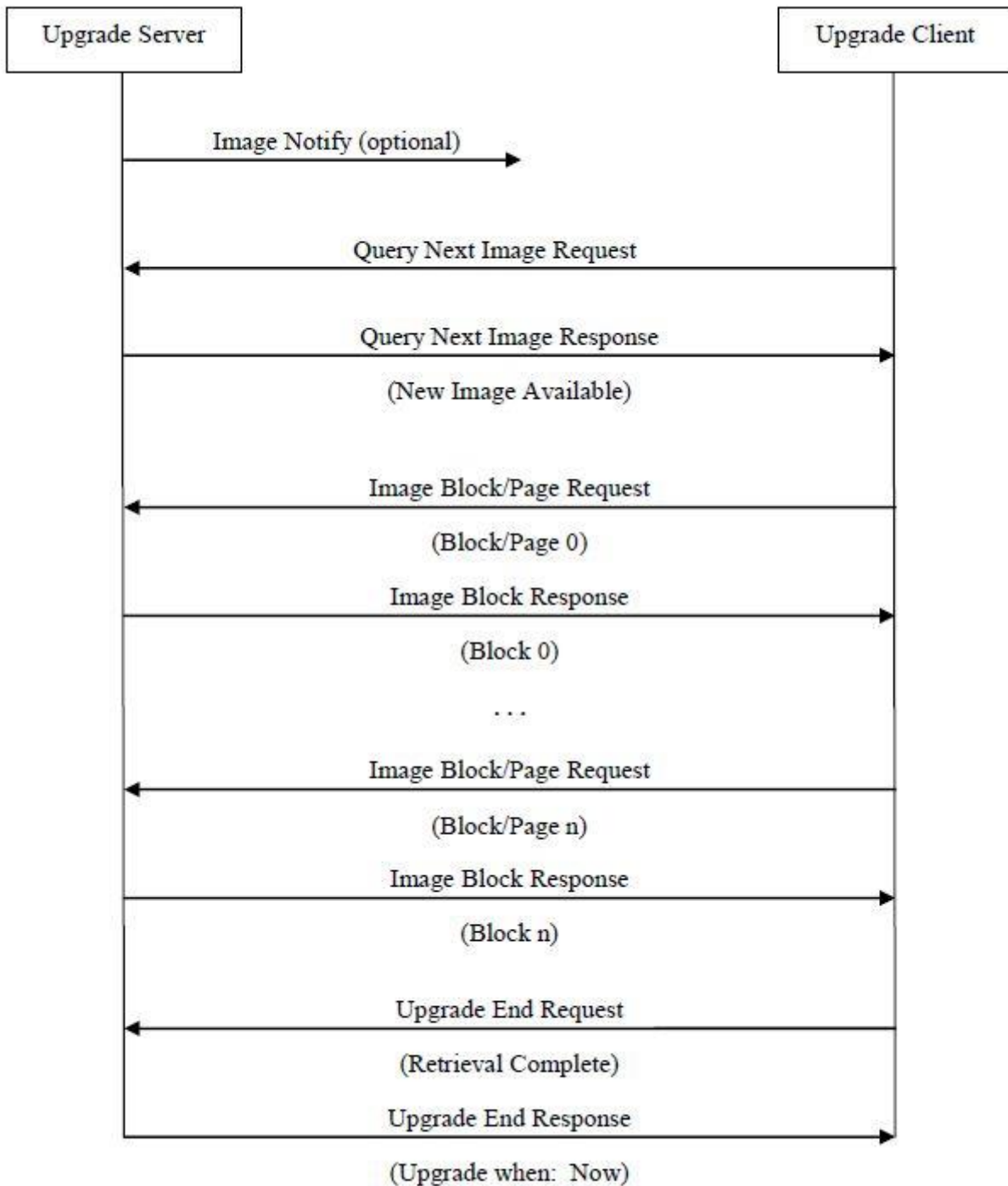
4.8.2 OTA Cluster Commands

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

4.8.3 OTA Upgrade Diagram

OTA Upgrade Message Diagram

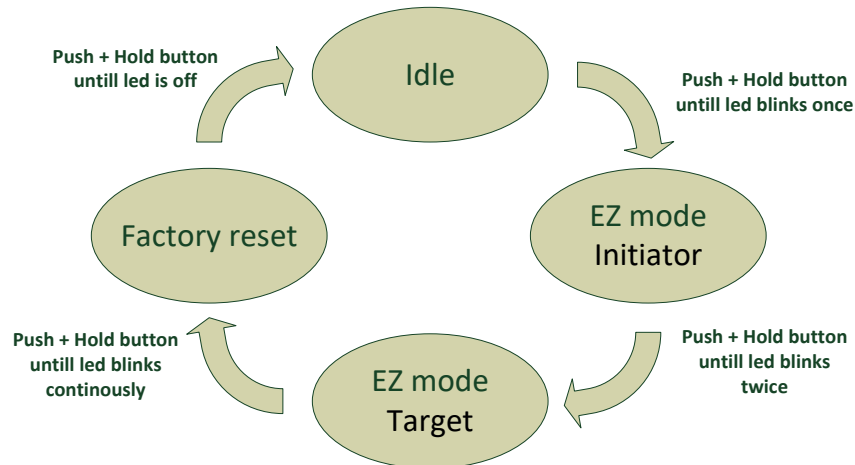


5 MMI user guide

5.1 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.

5.1.1 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:

- On/Off 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.

5.1.2 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.

5.1.3 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.

5.2 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, it will start scanning for an OTA server and Time server.

If a device has joined a network and is powered down, it will attempt to rejoin this network upon power up

6 General network behavior

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 continually scans each ZigBee channel starting from 11 to 24. The LED will flash once every second until it joins a device.

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 and 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 “Join / Leave” mode.

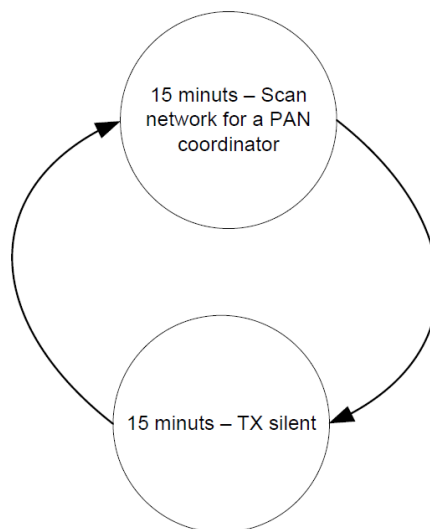
6.2 Normal – Keep alive

The device is sending a “keep alive” message to the PAN coordinator every 15 minutes to verify that the device is still connected to the network.

6.2.1 Network lost

If no “keep alive” responses are received 5 times in a row (1 hour and 15 minutes), the devices will start scanning every ZigBee channel for the PAN coordinator and try to re-join it. 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.



7 Specifications

7.1 General

Dimensions	Ø 45 x 45 x 16 mm
Colour	White
Power consumption,	0.3W
Power supply	6 – 28 VDC (Alternative: uUSB – e.g. for power bank)
Max. switch voltage	30V
Max. switch current	1A
IP-class	20
Storage temperature	-20°C to +80°C
Operation temperature	0 to +50°C
Relative humidity	5 – 95% (non-condensing)
Sensitivity	-100 dBm @ 1% PER
Output power	+12 dBm
Function Output	2 pcs NO/NC - on/off or pulse
Function Input	4 pcs contact input (potential free switch or relay) NO/NC by SW Each input can be configured as an IAS alarm

8 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.

