



Pico Duo Switch

(ZGA003)

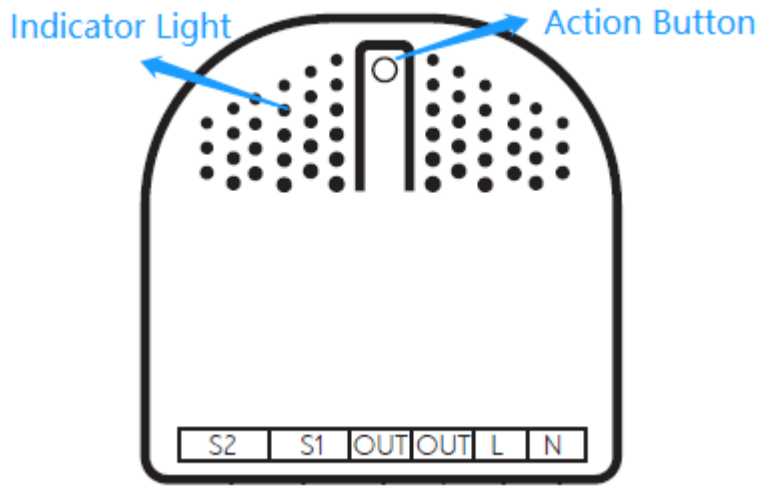


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1 INTERFACES & ACCESSORIES



Terminology	Description
Action Button	Used for networking, resetting, and other features.
Indicator Light	Used for indicating the current state of the product.

2 FEATURES & SPECIFICATIONS

2.1 Structural Characteristics

Parameter	Value
Product Identifier	ZGA003
Dimensions	44mm x 40mm x 21.5mm
Color	White
Usage	For indoor use.
Operating Temperature	32~104°F (0~40°C)
Relative Humidity	8%~80%

2.2 Hardware Characteristics

Parameter	Value
ZigBee Module	EFR32MG21
RF TX Power	Max: 17.02dBm
Indicator Light Color	Blue
Buttons and Connectors	Action Button (x1)
Input Voltage	AU EU US (100-240V),50/60Hz
Battery Included	No
Output Capacity	1,Resistive Ampere Rating: 8A per way 2,General Use Ampere Rating: 8A@cosΦ = 0.75~0.80 3,Horsepower Rating: 3.6A, 1/3Hp
Input Capacity	2 Channel@Support Momentary Button/On-off Switch/SPDT Switch
Working Current	MAX: 150mA@230VAC,50Hz
Power Consumption	MAX: 1.0W
Over-Heat Protection	Support
Built-in Sensors	Temperature Sensor
Surge Protection	Support

2.3 Software Characteristics

Parameter	Value
Wireless Technology	ZigBee [2.4Ghz]
Stack	ZigBee 3.0
ZigBee logical device type	Router
Profile	Home Automation [0x0104]
Device	HA/LO Profile
Device Type	On/Off output
ZigBee Compliant Platform	EFR32MG21x Family EmberZNet 6.10.3
Manufacturer	AEOTEC LIMITED [0x1310]
Compatible	Backwards compatible to ZHA (ZigBee Home Automation) Backwards compatible to ZLL (ZigBee Light Link) profile
Over The Air (OTA)	Support
Factory Reset	Support

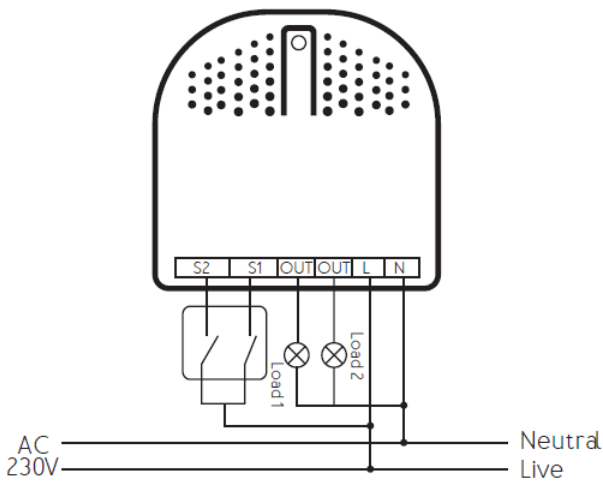
3 PRODUCT QUICK START

3.1 Important safety information

Please read this Engineering Specification carefully for correct and effective use.

Failure to follow the recommendations set forth by AEOTEC Limited may be dangerous or cause a violation of the law. The manufacturer, importer, distributor, and/or reseller will not be held responsible for any loss or damage resulting from not following any instruction in this guide or in other materials.

3.2 How to install the product



The product needs to be wired according to the diagram above.

3.3 How to join the product into centralized network

This product can be included and operated in any ZigBee 3.0 network with other ZigBee certified devices from other manufacturers and/or other applications.

3.3.1 Using Action Button

1. Set your ZigBee coordinator into connect mode to pair a device into a network during a time. Refer to the controller/coordinator's manual if you are unsure how to perform this step.
2. Make sure that Pico Switch is powered. Its LED will breathe slowly to indicate it's ready to pair.
3. Click Action Button twice quickly on Pico Switch, it will flash its blue light rapidly until it is joined into the network.
4. If pairing fails, Pico Switch Light Indicator will revert back to slow breathing light;
5. If pairing succeeds, the Light Indicator will become solid on or off depending on the state on/off state of Pico Switch. Now, this product is a part of your ZigBee home control system.

3.3.2 Using Install Code

Products can be paired into a ZigBee network by scanning the QR Code / Install Code located on the product with the Zigbee controller/coordinator. No further action is required, and the product will be paired automatically.

Note: What Is an Install Code?

ZigBee installation codes, sometimes also referred to as "install codes," are provided as a means for a device to join a ZigBee network in a secure fashion. The installation code itself is a random key installed on each device during its

manufacturing. It's used to encrypt the initial network key transported from the ZigBee network's centralized Trust Center device (the coordinator) to the device being paired.

The installation code can be thought of as similar to the PIN code on Bluetooth devices when two devices are paired. The PIN code is provided as an authorization code for the parent device so that the device being paired knows it is receiving information securely, such as when a hands-free headset is paired to a smartphone.

3.4 How to join the product into ZLL network (as a Touch Link target)

1. Pico Duo Switch is always in Touchlink target mode and can be joined to other networks with Touchlink commission;
2. Place the remote device within 10cm of Pico Duo Switch. When in Touch Link communication, the indicator light will start to flash rapidly;
3. If pairing fails, Pico Duo Switch Light Indicator will revert back to slow breathing light;
4. If pairing succeeds, the Light Indicator will become solid on or off depending on the state on/off state of Pico Duo Switch. Now, this product is a part of your ZigBee home control system.

3.5 How to join other ZLL device into network (as a touch link initiator)

1. Press and hold Action Button for 2 - 5s and then release.
2. Indicator Light will animation will dim on slowly and then turns off quickly.
3. Hold the Pico Duo Switch close to the ZLL device (must be 10cm apart).

3.6 How to create a distributed network

1. Press and hold Action Button for 17s, the LED will become solid.
2. Pico Duo Switch will factory reset and then join a distributed network. If this succeeds, its Light Indicator will remain solid on/off depending on the state of the switch.

3.7 How to open network (created a distributed network)

A distributed network must be created before this feature is used.

1. Press and hold Action Button for 17s, the LED will become solid.
2. Pico Duo Switch will factory reset and then join a distributed network. If this succeeds, its Light Indicator will remain solid on/off depending on the state of the switch.

3.8 How to send On/Off cluster to the binding node

1. Click external switch once.
2. Pico Duo Switch will send on off cluster to the binded node;

3.9 How to send Level Control cluster to binding node

1. Press and hold external switch (momentary switch only)
2. Pico Duo Switch will send the Level Control cluster to the binded node; Increasing / Decreases step by 5 every 200 ms while the external switch momentary button is held.

3.10 How to find and bind a device (as an initiator)

1. Click external switch 1 three times, endpoint 2 will enter bind initiator mode for 5 seconds, indicator light will turn on quickly and turns off slowly.
2. Click external switch 2 three times, endpoint 3 will enter bind initiator mode for 5 seconds, indicator light turns on quickly and turns off slowly.

3.11 How to enter identify mode (as a find and bind target)

1. Click Action Button 5 times, endpoint 1 will enter identify mode, during this time, the indicator light will flash quickly.
2. Click Action Button 6 times, endpoint 2 will enter identify mode, during this time, the indicator light will flash slowly.
3. Pico Duo switch will enter identify mode for 180 seconds.

3.12 How to factory reset

If the coordinator is missing or inoperable, you may need to reset the device to factory settings in order to pair it to a new Zigbee coordinator.

Make sure the product is powered. To complete the reset process manually:

1. Press and hold the Action Button for at least 10s.
2. The Indicator Light will become a slow breathing light. This indicates the factory reset operation is successful.

SOFTWARE FUNCTION DEFINITION

3.13 User Behavior Interaction

3.13.1 ZigBee Button

User behavior	outside network	Inside network
Power OFF	N/A	N/A
Power ON	1, If external switch is a 2-state switch, the relays will synchronize the status with the position of the external switch, otherwise all relays will turn off. 2, The device start the Touch Link target process automatically. Touch Link lasts only 3 seconds. 3. Enter ZigBee3.0 initial start up. The LED will flash quickly for about 180 sec while scanning or until the device is joined to a controller. If device is not joined within 180 sec. The LED will start slow breathing.	The status of the relays is determined by the priority as follows: 1, If the external switch endpoint has any binded devices, and if the external switch is a 2-state switch, the relays will synchronize it. 2, Refer to the attribute StartUpOnOff belong to On/off cluster to determine the status of the relays. The led will turn on for 1 seconds, then synchronize to the status of the relays.
Click Action Button 1 time	Toggles on or off. - If one channel is on, both channels will turn off. - if both channels are off, both channels will turn on Indicator Light will continue slow breathing.	Toggles on or off. - If one channel is on, both channels will turn off. - if both channels are off, both channels will turn on Indicator light will synchronize to the status of the relays.
Click Action Button 2 times	Pair to Zigbee Controller/Coordinator: Indicator Light will quickly flash blue light until it is join into the network or times out if nothing is detected after 180 seconds. If pairing fails, Light Indicator will return to a slow breathe animation. If pairing succeeds, the Light Indicator will enter regular light mode (constantly blue light or off based on the state of the Pico Switch).	Central network mode: Nothing to be done. Distribute network mode: The device open network for 180 seconds, can join other nodes into the existed network. Indicator Light will blink slowly.
Click Action Button 3 times	No function	External Switch 1 (S1) identify mode: Start identify mode of external switch 1 (S1). The Light Indicator will flash rapidly while attempting to identify the switch automatically. You may toggle/push external switch 1 to identify faster.
Click Action Button 4 times	No function	External Switch 2 (S2) identify mode: Start identify mode of external switch 2 (S2). The Light Indicator will flash rapidly while attempting to identify the switch automatically. You may toggle/push external switch 2 to identify faster.
Click Action Button 5 times	No function	Endpoint 1 Find and Bind target mode (Initiator): Endpoint 1 enters find and bind target mode, this progress will continue to 180s. Indicator Light will blink quickly while Pico Duo Switch is scanning.
Click Action Button 6 times	No function	Endpoint 2 Find and Bind target mode (Initiator): Endpoint 2 enters find and bind target mode, this progress will continue to 180s.

		Indicator Light will blink slowly while Pico Duo Switch is scanning.
Press and hold Action Button for [1, 2s)	No function Indicator Light will turn off when pressed/held, and return to breathing light when release between 1-2s.	No function Indicator Light will turn off when pressed/held, and then return to its regular light mode when released (Light Indicator follows switch state of Pico Switch).
Press and hold Action Button for [2, 5s)	No function, Indicator Light will start breathing.	Touch Link initiator mode. Trigger the device to start Touch Link initiator mode. Indicator Light will turn on solid when held between 2-5s, and fades on slowly then off quickly 5x times when released.
Press and hold Action Button for [5, 10s)	No function, Indicator Light will speed up flashing when held between 5-10s, and returns to breathing light when released.	Indicator Light will flash even faster when held between 5 – 10s, and then returns to regular light mode when released (Light Indicator follows switch state of Pico Switch).
Press and hold Action Button for [10, 12s)	No function, Indicator Light will become constantly light when press, and become breathing light when released.	Factory reset When Action button is held for 10s or more, Factory Reset is performed on Pico Switch. The Indicator Light will return to a slow breathing light, which indicates a successful factory reset operation.
Press and hold Action Button for [17s]	Factory reset, then create and join a Distributed Network If joining a distributed network succeeds, it will enter regular light mode (Light Indicator follows switch state of Pico Duo Switch).	Factory reset, then create and join a Distributed Network If joining a distributed network succeeds, it will enter regular light mode (Light Indicator follows switch state of Pico Switch).

3.13.2 External Switch

User behavior	outside network	Inside network
Click 1 time	N/A	1. Binding ON/OFF (server) delivery. 2. Toggles Pico Switch on/off - S1 controls Out1 - S2 controls Out2
Click 2 times	N/A	switch 1 : Multicast delivery (group 1, recall scenes, ID1) switch 2 : Multicast delivery (group 1, recall scenes, ID2)
Click 3 times	N/A	Endpoint 2/3 Find and Bind target mode (Initiator): Switch 1 : enter endpoint 2 bind initiator mode for 5s. Switch 2 : enter endpoint 3 bind initiator mode for 5s. Indicator Light will turn on quickly and turn off slowly while in this mode.
Click 6 times	Pair to Zigbee Controller/Coordinator: Indicator Light will quickly flash blue light until it is join into the network or times out if nothing is detected after 180 seconds. If pairing fails, Light Indicator will return to a slow breathe animation. If pairing succeeds, the Light Indicator will enter regular light mode (constantly blue light or off based on the state of the Pico Switch).	N/A
Press and hold	N/A	Binding Level control (server) delivery (Momentary switch only)

3.14 Device type

ZigBee Logical Device type	Router	ZigBee Security type	ZigBee 3.0 Security
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3.15 Device Simple Descriptor

Endpoint	Device id	Cluster id (Server)	Cluster id (Client)
endpoint1	0x0002 HA On/Off Output	0x0000 (Basic) 0x0002 (Device Temperature Configuration) 0x0003 (Identify) 0x0004 (Groups) 0x0005 (Scenes) 0x0006 (On/off) 0x0009 (Alarm) 0x0B04 (Electrical Measurement) 0x0702 (Simple Metering)	0x0003 (Identify) 0x000A (Time) 0x0019 (OTA Upgrade)
Endpoint2	0x0002 HA On/Off Output	0x0000 (Basic) 0x0003 (Identify) 0x0004 (Groups) 0x0005 (Scenes) 0x0006 (On/off) 0x0009 (Alarm) 0x0B04 (Electrical Measurement) 0x0702 (Simple Metering)	0x0003 (Identify) 0x000A (Time)
Endpoint3	0x0830 LO Non-color Scene Controller	0x0000 (Basic) 0x0003 (Identify) 0x1000 (ZLL Commissioning) 0xFD00 (switch type configuration)	0x0003 (Identify) 0x0004 (Groups) 0x0005 (Scenes) 0x0006 (On/Off) 0x0008 (Level Control) 0x1000 (ZLL Commissioning)
Endpoint4	0x0830 LO Non-color Scene Controller	0x0000 (Basic) 0x0003 (Identify) 0xFD00 (switch type configuration)	0x0003 (Identify) 0x0004 (Groups) 0x0005 (Scenes) 0x0006 (On/Off) 0x0008 (Level Control)
Endpoint242	0x0061 GP Proxy Basic		0x0021 (Green Power)

3.16 Basic Cluster [0x0000]

This cluster supports an interface to the node or physical device. It provides attributes and commands for determining basic information, setting user information such as location, and resetting to factory defaults.

Command:

Command Identifier	Description	Remarks
0x00	Reset to Factory Defaults	Reset to Factory Defaults

Command Generated: NULL

Attributes:

Identifier	Name	Type	Range	Access	Default
0x0000	<i>ZCL Version</i>	uint8	0x00-0xff	Read Only	0x08
0x0001	<i>Application Version</i>	uint8	0x00-0xff	Read Only	0x41
0x0002	<i>Stack Version</i>	uint8	0x00-0xff	Read Only	0x00
0x0003	<i>HW Version</i>	uint8	0x00-0xff	Read Only	0x01
0x0004	<i>Manufacturer Name</i>	string	0-32 bytes	Read Only	AEOTEC
0x0005	<i>Model Identifier</i>	string	0-32 bytes	Read Only	ZGA003
0x0006	<i>Date Code</i>	string	0-16 bytes	Read Only	--

0x0007	<i>Power Source</i>	enum8	0x00-0xff	Read Only	0x01
0x0008	<i>Generic Device-Class</i>	enum8	0x00-0xff	Read Only	0xff
0x0009	<i>Generic Device-Type</i>	enum8	0x00-0xff	Read Only	0xff
0x000a	<i>Product Code</i>	octstr	8 bytes	Read Only	(MAC)
0x000b	<i>Product URL</i>	string		Read Only	www.aeotec.com
0x000d	<i>Serial Number</i>	string	20 bytes	Read Only	(SN)
0x000e	<i>Product Label</i>	string	40 bytes	Read Only	(Install Code)
0x0012	<i>Device Enabled</i>	bool	0/1	Read Write	1
0x0013	<i>Alarm Mask</i>	map8	000000xx	Read Write	0
0x0014	<i>Disable Local Config</i>	map8	000000xx	Read Write	0
0x4000	<i>SW Build ID</i>	string	0 to 16 bytes	Read Write	1.0.1

Note:

Application Version format: fv.sv.tv (0.0.0 –3.3.15)

Shortened name	Full name	Description
fv	First version	- The first bit, 2 bits, numbers 1 ~ 3, when sv bit is full, fv++ - fv counts from 1
sv	Second version	- The second bit, 2 bits, numbers 0 ~ 3, when the tv bit is full, sv++ - Value range: 0 ~ 3 - sv counts from 0
tv	Third version	- The third, 4 bits, numbers 0-15, test once, tv++ - tv counts from 0

3.17 Device Temperature Configuration [0x0002]

Attributes for determining information about a device's internal temperature, and for configuring under/over temperature alarms for temperatures that are outside the device's operating range.

Command Received: NULL

Command Generated: NULL

Attributes:

Identifier	Name	Type	Range	Access	Default
0x0000	Current temperature	int16	-200 to +200	Read Only	25 (C)
0x0002	Max Temp Experienced	int16	-200 to +200	Read Only	80 (C)
0x0003	Over Temp Total Dwell	unt16	0x0000 to 0xffff	Read Only	0x0000
0x0010	Device Temp Alarm Mask	map8	0000 00xx	Read Write	0x02 (too high)
0x0012	High Temp Threshold	int16	-200 to +200	Read Write	50 (C)
0x0014	High Temp Dwell Trip Point	Unt24	0 to 0xffffffff	Read Write	60 (S)

Reporting:

Client/Server	Attribute	Min Interval(S)	Max Interval(S)	Reportable change
Server	Current temperature	1	65534	10

3.18 Identify Cluster [0x0003]

Attributes and commands to put a device into an Identification mode (e.g., flashing a light), that indicates to an observer – e.g., an installer - which of several devices it is, also to request any device that is identifying itself to respond to the initiator.

Identify effect

events	effect
Blink	Flashing 2 times
Breathe	Flashing 4 times
Okay	Flashing 6 times
Channel change	Flashing 8 times

3.19 Groups [0x0004]

The cluster provides the capability for group addressing.

Attributes:

Identifier	Name	Type	Range	Access	Default
0x0000	Name Support	map8	x0000000	Read Only	0

3.20 Scenes [0x0005]

The scenes cluster provides attributes and commands for setting up and recalling scenes.

Maximum Number of Scenes is 10.

3.21 OnOff [0x0006]

Attributes and commands for switching devices between 'On' and 'Off' states.

Attributes:

Identifier	Name	Type	Range	Access	Default
0x4000	<i>Global Scene Control</i>	bool	0x00-0x01	Read Only	0x01
0x4001	On Time	uint16	full-non	Read Write	0x0000
0x4002	Off Wait Time	uint16	full	Read Write	0x0000
0x4003	Start up on off	enum8	desc	Read Write	0xFF (previous value)

Reporting:

Client/Server	Attribute	Min Interval(S)	Max Interval(S)	Reportable change
Server	On/off	1	65534	0

3.22 Alarm [0x0009]

Attributes and commands for sending alarm notifications and configuring alarm functionality.

Support alarm code:

Alarm code	Description
0x16	US: Over Current L1 (Greater than 8.5A) EU/ANZ: Over Current L1 (Greater than 8.5A) (need to be explicitly reset by user, and the operation of the relay is prohibited)
0x23	US: Under Voltage (Less than 95V) EU/ANZ: Under Voltage (Less than 200V)

	(reset automatically when the conditions that cause are no longer active)
0x24	US: Over Voltage (Greater than 125V) EU/ANZ: Over Voltage (Greater than 260V) (reset automatically when the conditions that cause are no longer active)
0x86	Temperature Exceeded (Greater than 80°C) (reset automatically when the conditions that cause are no longer active)

3.23 Time [0x000A]

This cluster provides a basic interface to a real-time clock.

3.24 Electrical Measurement Cluster [0x0B04]

Id Set Name	Identifier	Name	Type	Range	Access	Default
Basic Information	0x0000	<i>Measurement Type</i>	map32	0-0xFFFFFFFF	Read Only	0
AC (Single Phase or Phase A) Measurements	0x0505	<i>RMS Voltage</i>	uint16	0x0000-0xFFFF	Read Only	0
	0x0508	<i>RMS Current</i>	uint16	0x0000-0xFFFF	Read Only	0
	0x050b	<i>Active Power</i>	int16	-32768—32768	Read Only	0
AC Formatting	0x0600	<i>AC Voltage Multiplier</i>	uint16	0x0001-0xFFFF	Read Only	1
	0x0601	<i>AC Voltage Divisor</i>	uint16	0x0001-0xFFFF	Read Only	10
	0x0602	<i>AC Current Multiplier</i>	uint16	0x0001-0xFFFF	Read Only	1
	0x0603	<i>AC Current Divisor</i>	uint16	0x0001-0xFFFF	Read Only	1000
	0x0604	<i>AC Power Multiplier</i>	uint16	0x0001-0xFFFF	Read Only	1
	0x0605	<i>AC Power Divisor</i>	uint16	0x0001-0xFFFF	Read Only	10

Reporting:

Client/Server	Attribute	Min Interval(S)	Max Interval(S)	Reportable change	Remarks
Server	rms voltage	10	600	200	Threshold: 20.0V
Server	rms current	10	600	200	Threshold: 0.500A
Server	active power	10	600	500	Threshold: 50.0W

3.25 Simple Metering Cluster [0x0702]

Id Set Name	Identifier	Name	Type	Access	Default	Remarks
Reading Information Set	0x0000	<i>Current Summation Delivered</i>	uint48	Read Only	--	
Meter Status	0x0200	<i>Status</i>	map8	Read Only	0x00	BIT3= Power Failure BIT4= Power Quality
Formatting	0x0300	<i>Unit of Measure</i>	enum8	Read Only	0x00	Unit = kWh
	0x0301	<i>Multiplier</i>	uint24	Read Only	0x01	<i>Multiplier</i>
	0x0302	<i>Divisor</i>	uint24	Read Only	1000	<i>Divisor</i>
	0x0303	<i>Summation formatting</i>	map8	Read Only	0xAB	Formatting=

						1-0101-011
	0x0306	Metering device type	map8	Read Only	0x00	Electric Metering
Alarm Mark	0x0801	Electricity Alarm Mask	map32	Read Write	Single=0x6040	0x16=Over Current L1 0x23=Under Voltage 0x24=Over Voltage

Reporting:

Client/Server	Attribute	Min Interval(S)	Max Interval(S)	Reportable change	Remarks
Server	Current Summation Delivered	10	600	1000	Threshold: 1.000kwh

3.26 ZLL commissioning [0x1000]

The *touchlink commissioning* cluster shall have a cluster identifier of 0x1000. Those commands in the touchlink commissioning command set shall be sent using the profile identifier, 0xc05e whereas those commands in the commissioning utility command set shall sent using the profile identifier, 0x0104.

3.27 Over the Air (OTA) Upgrade [0x00019]

The main goal of Over The Air Upgrade cluster is to provide an interoperable mean for devices from different manufacturers to upgrade each other's image. Additionally, the OTA Upgrade cluster defines a mechanism by which security credentials, logs and configuration file types are accessible by offering a solution that utilizes a set of optional and mandatory commands.

Firmware information:

Command Identifier	Description
Manufacture ID	0x1310
Image Type	0x0803

3.28 Switch Type Configuration [0xFD00]

Manufacturer ID is required when reading and writing attributes. The manufacturer code is 0x1310.

Attributes and commands for configuring switch type.

Attributes:

Identifier	Name	Type	Range	Access	Default
0x0000	Switch Type	enum8	0x00-0xFF	Read/Write	0x00
0x0010	Switch Actions	enum8	0x00-0xFF	Read/Write	0x02
0x0011	controls	enum8	0x00-0x01	Read/Write	0x01

Switch Type:

Value	Description
0x00	Toggle

0x01	Momentary
0x04	Into Auto Recognize Mode
0x02-0x03, 0x05-0xFF	Not support

Switch Actions:

Value	State 2 (Press)	State 1 (release)
0x00	On	Off
0x01	Off	On
0x02	Toggle	Toggle

controls:

Value	Description
0x00	control local disable
0x01	control local enable