4-noks

WIRELESS FAMILY DEVICES
ZIGBEE CLUSTER LIBRARY
Router ZR-PLUG
(product code: ZR-PLUG-XX-HA)

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1 REVISION HISTORY

Date	Revision Number	Author	Modifications
28. February 2011	1.0	Paolo Caronello	Initial revision

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2 GENERAL DEVICE CHARACTERISTICS

ZR-PLUG-XX-HA belongs to Zigbee Cluster Library devices family and it is compliant with Home Automation gateways. It is put between the wall mains socket and an electric load, typically a home appliance. It lets both measure active power and energy consumptions and switch on/off an electric load with radio messages.

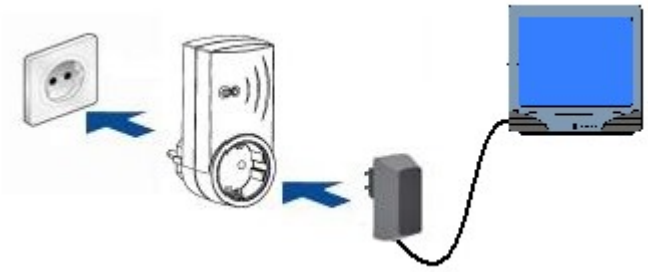
It is also possible to set a Power threshold below which the device considers its electric load as working in standby mode and therefore it is switched off (Standby Killer).

This device is directly and continuously mains powered. For network purposes, it is a Router (Repeater) i.e. it has the active function of maintaining radio traffic from and to other similar devices and it can also act as a parent device for battery-powered sensors of the same family.

2.1 Electrical device characteristics

POWER SUPPLY:	90/250 Vac; 1W; 50/60Hz
WIRELESS CHARACTERISTICS:	2405 MHz ÷ 2480 MHz DSSS Modulation Nominal transmission Power +3dBm IEEE 802.15.4 compliant Stack EmberZNet 4.3.x Stack version 2 Profile ID: 0x0104 (Home Automation) Device ID: 0x0009 (Mains Power Adapter) Security: Home Automation security.
MEASURES:	Energy consumed [Wh] Active Power [W]
RELAY:	Contacts 250V Maximum load: -Resistive: 10A -Incandescent lamps: 10A -Fluorescent lamps/transformers: 4A Expected life: 100.000 cycles with resistive load
OUTLET:	Schuko Plug, French Plug, UK Plug, Italian Plug, US Plug Schuko Socket, French Socket, UK Socket, Italian Socket, US Socket
OPERATING CONDITIONS:	Operating temperature: 0 ÷ +50°C; <80% U.R. not condensing Storage temperature: -20 ÷ +70°C; <80% U.R. not condensing Protection degree: IP 30
COMPLIANT WITH 2006/95/CE, 89/336/CE, 99/5/CE DIRECTIVES REFERENCE NORMS	ETSI EN 300 328: Radio Compatibility for digital wide band transmissions ETSI EN 301 489: Radio Compatibility EN 61000-6-2: Electromagnetic Compatibility - Emissions EN 61000-6-3: Electromagnetic Compatibility - Immunity EN 60950-1: Electric Safety

2.2 Typical application



2.3 Joining a compatible network

The joining process is activated pressing the button of the device if the node does not have network parameters, this happens if the device is new or if it has been voluntarily reset to the factory defaults. This process consists in scanning radio channels 11-14-15-19-20-24-25, in search of an “open” and compatible network .

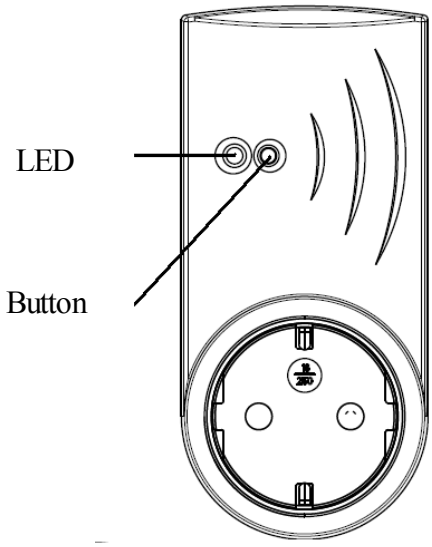
2.4 Restoring to factory fresh settings

Sometimes it may become necessary to bring the node back to its initial conditions. In this case the device will leave any network it was previously part of and load the default value for each of its operation parameters.

This task can be achieved in two ways:

- Receipt of Reset To Factory Default Command of Basic Cluster.
- Holding the push button on the board down for at least 6 seconds, until led becomes green. This makes the device go back to default settings.

2.5 led/push-button interface



The ZR-PLUG device has a bicolor led (red/green) that provides information about device operation status.

Operating status	Behavior of LEDS
Not joined any network	The **green** and the **red** led flash simultaneously (orange led) for 5 seconds and then stop for 2 seconds. It is done cyclically.
During joining process	**Green** led flash.
Joined a network	**Red** led fixed (with electric load disconnected) **Green** led fixed (with electric load activated)

The device has also a push button which is used to join a network, activate/deactivate the electric load or restore to factory defaults.

Operating status		Effect of a button pressure
Not joined any network		Network joining procedure starts
Joined a network	Electric load active	Deactivate the electric load
	Electric load disconnected	Activate the electric load
	Pressure for more then 6 seconds	Restore to factory defaults

2.6 Performing measurements and switching the electric load on/off

The device is able to evaluate active power (Watt) and total energy consumed (Watt hour). These measurements are performed only when the relay is on.

An automatic and periodic saving of energy counter occurs every six hours.

To manually switch the load on/off just press the button and release it immediately.

3 COMMUNICATION PROTOCOL

The communication between all the devices belonging to a wireless sensor network and a gateway/coordinator is based on Zigbee Cluster Library specifications. Refer to [1] to learn more about the Zigbee Cluster Library networks.

3.1 General supported Clusters and Attributes

All general supported clusters and attributes are listed below.

Basic Cluster

Server

Attributes

Identifier	Name	Type	Range	Access	Default
0x0000	ZCL version	Unsigned 8-bit integer	0x00 – 0xff	Read Only	0x01
0x0001	ApplicationVersion	Unsigned 8-bit integer	0x00 – 0xff	Read Only	0x00
0x0002	StackVersion	Unsigned 8-bit integer	0x00 – 0xff	Read Only	0x00
0x0003	HWVersion	Unsigned 8-bit integer	0x00 – 0xff	Read Only	0x00
0x0004	ManufacturerName	Character string	0 – 32 bytes	Read Only	Empty string
0x0005	ModelIdentifier	Character string	0 – 32 bytes	Read Only	Empty string
0x0006	DateCode	Character string	0 – 16 bytes	Read Only	Empty string
0x0007	PowerSource	8-bit Enumeration	0x00 – 0xff	Read Only	0x00

For detailed description refer to [1].

Custom attributes

Identifier	Name	Type	Range	Access	Default
0xffff	Bootloader activation	Boolean	0x00 – 0x01	Read / Write	0x00

By default this attribute is set to 0x00. Setting it to 0x01, in 5 seconds the ZR-PLUG-XX-HA will be in bootloader. As soon as the device is in bootloader, it will be possible to perform a firmware upgrade using an appropriate 4-noks device (Z-Handzer).

Command

Command Identifier Field Value	Description
0x00	Reset to Factory Defaults

For detailed description refer to [1].

Identify Cluster

Server

Attributes

Identifier	Name	Type	Range	Access	Default
0x0000	Identify Time	Unsigned 16-bit integer	0x0000 – 0xffff	Read / write	0x0000

For detailed description refer to [1].

Command

Command Identifier Field Value	Description
0x00	Identify
0x01	Identify Query

For detailed description refer to [1].

Groups Cluster

Server

Attributes

Identifier	Name	Type	Range	Access	Default
0x0000	NameSupport	8-bit bitmap	x0000000	Read Only	-

For detailed description refer to [1].

Command

Command Identifier Field Value	Description
0x00	Add group
0x01	View group
0x02	Get group membership
0x03	Remove group
0x04	Remove all groups
0x05	Add group if identifying

For detailed description refer to [1].

Scenes Cluster

Server

Attributes

Identifier	Name	Type	Range	Access	Default
0x0000	SceneCoutn	Unsigned 8-bit integer	0x00 – 0xff	Read Only	0x00
0x0001	CurrentScene	Unsigned 8-bit integer	0x00 – 0xff	Read Only	0x00
0x0002	CurrentGroup	Unsigned 16-bit integer	0x0000 – 0xffff	Read Only	0x0000
0x0003	SceneValid	Boolean	0x00 – 0x01	Read Only	0x00
0x0004	NameSupport	8-bit bitmap	x0000000	Read Only	-

For detailed description refer to [1].

Command

Command Identifier Field Value	Description
0x00	Add scene
0x01	View scene
0x02	Remove scene
0x03	Remove all scenes
0x04	Store scene

For detailed description refer to [1].

3.2 Device specific supported Clusters and Attributes

All device specific supported clusters and attributes are listed below.

On Off cluster

Server

Attributes

Identifier	Name	Type	Range	Access	Default
0x0000	OnOff	Boolean	0x00 – 0x01	Read Only	0x00

For detailed description refer to [1].

Custom attributes

Identifier	Name	Type	Range	Access	Default
0x0001	StatusChangeReason	8-bit enumeration	0x00 – 0xff	Read Only	0x00

This attribute can assume the following values:

Value	Description
0x00	Remote command
0x01	Local action
0x02	Standby-killer action

Command

Command Identifier Field Value	Description
0x00	Off
0x01	On
0x02	Toggle

For detailed description refer to [1].

Analog Value Basic Cluster

Server

Attributes

Identifier	Name	Type	Range	Access	Default
0x0051	OutOfService	Boolean	0x00 – 0x01	Read / write	0x00
0x0055	PresentValue	Single precision	-	Read / write	-

PresentValue attribute is used to specify the standby power threshold. If the load connected to the ZR-PLUG-XX-HA is requiring an instantaneous power lower than this threshold, then the load will be disconnected after a while. If *PresentValue* is set to zero, than the standby-killer functionality is disable. For any other detailed description refer to [1].

Custom attributes

Identifier	Name	Type	Range	Access	Default
0x0400	StandbyToOffTime	Unsigned 16-bit integer	0x0000 – 0xffff	Read / write	0x0000

StandbyToOffTime allows to specify the time before load disconnection.

Simple Metering Cluster

Server

Attributes

Identifier	Name	Type	Range	Access	Default
0x0000	CurrentSummationDelivered	Unsigned 48-bit integer	0x000000000000 to 0xffffffffffff	Read Only	0x00
0x0200	MeterStatus	8-bit bitmap	0x00 - 0xff	Read Only	0x00
0x0300	UnitOfMeasure	8-bit enumeration	0x00 – 0xff	Read Only	0x00
0x0301	Multiplier	Unsigned 24-bit integer	0x000000 to 0xffffff	Read Only	-
0x0302	Division	Unsigned 24-bit integer	0x000000 to 0xffffff	Read Only	-
0x0303	SummationFormatting	8-bit bitmap	0x00 - 0xff	Read Only	-
0x0304	DemandFormatting	8-bit bitmap	0x00 - 0xff	Read Only	-
0x0306	MeteringDevideType	8-bit bitmap	0x00 - 0xff	Read Only	-
0x0400	InstantaneousDemand	Signed 24-bit integer	0x000000 to 0xffffff	Read Only	-

For detailed description refer to [2].

REFERENCES

[1] 075123r03ZB_AFG-ZigBee_Cluster_Library_Specification
[2] 075356r15ZB_ZSE-ZSE-AMI_Profile_Specification