VIMAR

03906

4-button flat device with 2.4 GHz Zigbee Green Power for Friends of Hue standard radiofrequency transmitter, energy harvesting supply powered by built-in electrodynamic generator, to complete with Eikon 20506, Arké 19506 or Plana 14506 buttons - 2 modules.

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1. General description

1.1 Basic functionality

The Zigbee Friends of Hue is designed to control devices in the Philips Hue ecosystem. The device, using the lo Hue Bridge v2 (square shape), makes it possible to turn a lamp on or off, adjust its intensity and activate scenarios involving several lamps.
03906 pushbutton transmitters are self-powered (no batteries) and fully maintenancefree.
They can therefore be used in all environments including locations that are difficult to reach or within hermetically sealed housings. The required energy is generated by an electro- dynamic energy transducer actuated by an energy bar located on the left and right of the module. This energy bar which can be pushed from outside the module by an appropriate pushbutton.

When the energy bar is pushed down or released, electrical energy is created and a 2.4GHz radio telegram according to the IEEE 802.15.4 standard is transmitted. This radio telegram transmits the operating status of all four contact nipples at the moment when the energy bar was pushed down or released (see chapter 2.2).

The format of the telegrams for command 03906 has been designed to maximize compatibility with a wide range of devices, including those conforming to Zigbee Green Power standard compatible with system devices Philips Friends of Hue.

The radio telegrams 3.0 are protected with AES-128 security based on a device-unique private key.

The control 03906 is compatible with systems including Zigbee 3.0 Green Power controls for Friends of Hue in the Philips ecosystem via the Hue Bridge v2 (square shape)
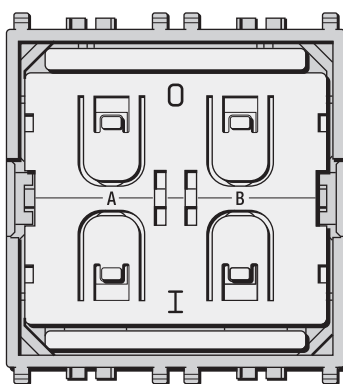
Figure 1 below shows 03906.

Fig. 1: 03906

1.2 Technical data

Antenna	Integrated antenna
Radio Transmission Power (typ. at 25°C)	+7 dBm
Radio Standard	IEEE 802.15.4 using 2.4 GHz radio channels CH11, CH15, CH20, CH25
Default radio channel (which can be modified using the Philips Hue APP during the configuration procedure)	IEEE 802.15.4 radio channel 11
Radio Channel Selection	User-selectable (Commissioning)
Device Identification	Individual 32 Bit Device ID (factory programmed)
Security	AES128 (CBC Mode) with Sequence Code
Power Supply	Integrated Kinetic Energy Harvester
Installable buttons	Art. 20506-19506-14506 and respective colour variants
Protection class	IP20

1.3 Environmental conditions

Operating Temperature	-25°C ... 65°C
Storage Temperature	-25°C ... 65°C
Humidity	0% to 95% r.h. (non-condensing)

2. Functional information

2.1 03906 Device Overview

The pushbutton transmitter module 03906 from Zigbee enables the implementation of wireless remote controls without batteries. Power is provided by a built-in electrodynamic power generator. 03906 device transmits data based on the 2.4GHz IEEE 802.15.4 standard.
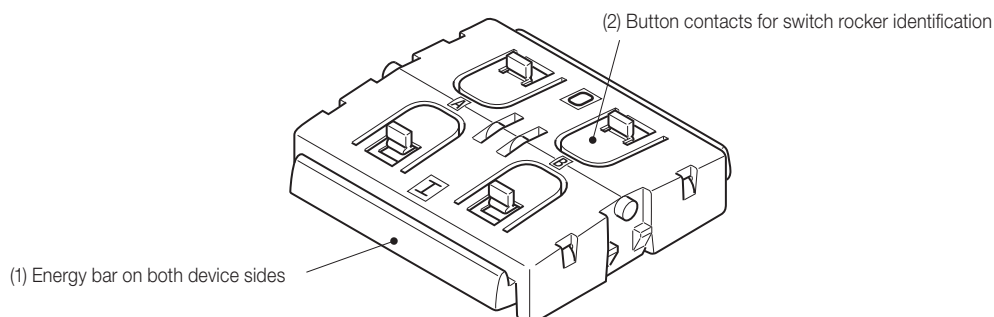
The outer appearance of 03906 is shown in Figure 2 below.

(2) Button contacts for switch rocker identification

(1) Energy bar on both device sides

Fig. 2: Electro-dynamic powered pushbutton transmitter module 03906

2.2 Basic Functionality

The controls 03906 contain an electrodynamic energy transducer powered by an activation bar (1) which is pressed by a pair of buttons (art. 20506-19506-14506) mounted on the device. An internal spring will release the energy bar a soon as it is not pushed down anymore.

When the energy bar is pushed down, electrical energy is created and an IEEE 802.15.4 radio telegram is transmitted which identifies the status (pressed or not pressed) of the four button contacts (2). Releasing the energy bar similarly generates energy which is used to transmit a different radio telegram.

It is therefore possible to distinguish between radio telegrams sent when the energy bar was pushed and radio telegrams sent when the energy bar was released.

By identifying these different telegrams types and measuring the time between pushing and releasing of the energy bar, it is possible to distinguish between "Long" and "Short" button contact presses. This enables simple implementation of applications such as dimming control or blinds control including slat action.

2.3 User Interface

03906 devices provide four button contacts. They are grouped into two channels (Channel A and Channel B) each containing two button contacts (State O and State I). The state of all four button contacts (pressed or not pressed) is transmitted together with a unique device identification (32 Bit device ID) whenever the energy bar is pushed or released.

IMPORTANT: control 03906 must always be installed with the indication 0 facing upwards.

Figure 3 below shows the arrangement of the four button contacts and their designation:
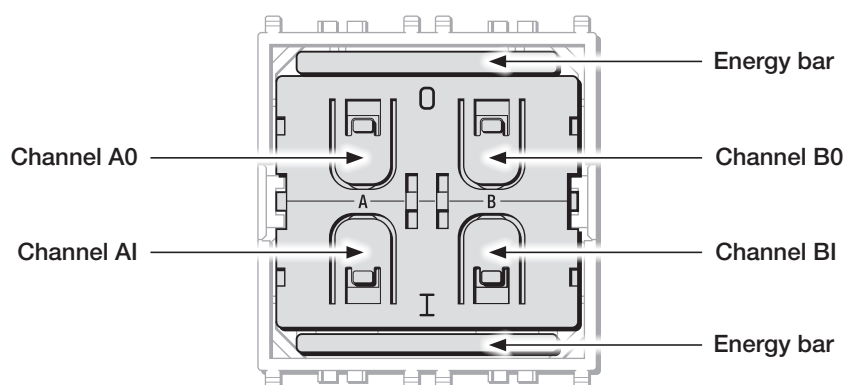
Channel A0

Channel AI

Energy bar

Channel B0

Channel BI

Energy bar

Fig. 3: Button contact designation

2.4 03906 radio channel parameters

Module 03906 uses the 4 channels CH11, CH15, CH20 and CH25; each radio channel occupies 5 MHz.

2.5 Supported user actions

The product shall support the user actions:

• Press of no (only energy bar), one, two, three or four buttons.

• Release of the pressed buttons after less than 7 seconds (short release).

• Release of the pressed buttons after more than 7 seconds (long release).

Functional information

2.6 Button versus command mapping for data telegrams

The product shall support the button actions listed in Table 1 for data tele-grams.

Button actuated	Command Code	Command Definition
Press of Energy Bar		
None	0x22	Toggle
A0 only	0x10	Scene 0
AI only	0x11	Scene 1
B0 only	0x13	Scene 3
BI only	0x12	Scene 2
AI and BI	0x62	Press button 1 of 2
A0 and B0	0x64	Press button 2 of 2
Release of Energy Bar after < 7 seconds		
A0 only	0x14	Scene 4
AI only	0x15	Scene 5
B0 only	0x17	Scene 7
BI only	0x16	Scene 6
AI and BI	0x63	Release button 1 of 2
A0 and B0	0x65	Release button 2 of 2

Tab.1: Button actions for data telegrams

2.7 Configuration

The following procedure allows the device to interact with a receiver or to operate within a specific network.
Configuration requires a Philips HUE v2 Bridge (square shape) and the installation of the Philips HUE app for Android or iOS. For all details refer to the website meethue.com. To add the "Friends of Hue Switch" device access the Philips HUE app and access the accessories configuration page.
Configuration should always be made so that the channel used by the device for transmitting matches the one used by the system (see table below).

Push Button	Action on the energy bar	Function
AI and B0	None	Confirms channel change
A0	Press > 7 seconds	Commissioning CH15
AI	Press > 7 seconds	Commissioning CH20
B0	Press > 7 seconds	Commissioning CH11
BI	Press > 7 seconds	Commissioning CH25
No push button	Press > 7 seconds	Commissioning CH11
A0 and AI and BI	Press > 7 seconds	Disables Commissioning *
A0 and AI and B0 and BI	Press > 7 seconds	Enables Commissioning **

* The operation is performed without the left-hand button (channel A), pressing the buttons A0 and AI and using the right-hand button to select BI and at the same time control the activation bar.
** The operation is performed without the buttons.

The configuration phase uses CH11 by default. Changing channel is recommended when the system does not respond to the pressing of the keys and it can be done by following the instructions provided by the Hue App. Upon completion of configuration, we recommend you disable the Commissioning.

Make sure that the HUE lamp is inserted and always powered; it can be controlled by the HUE system when the light is on.
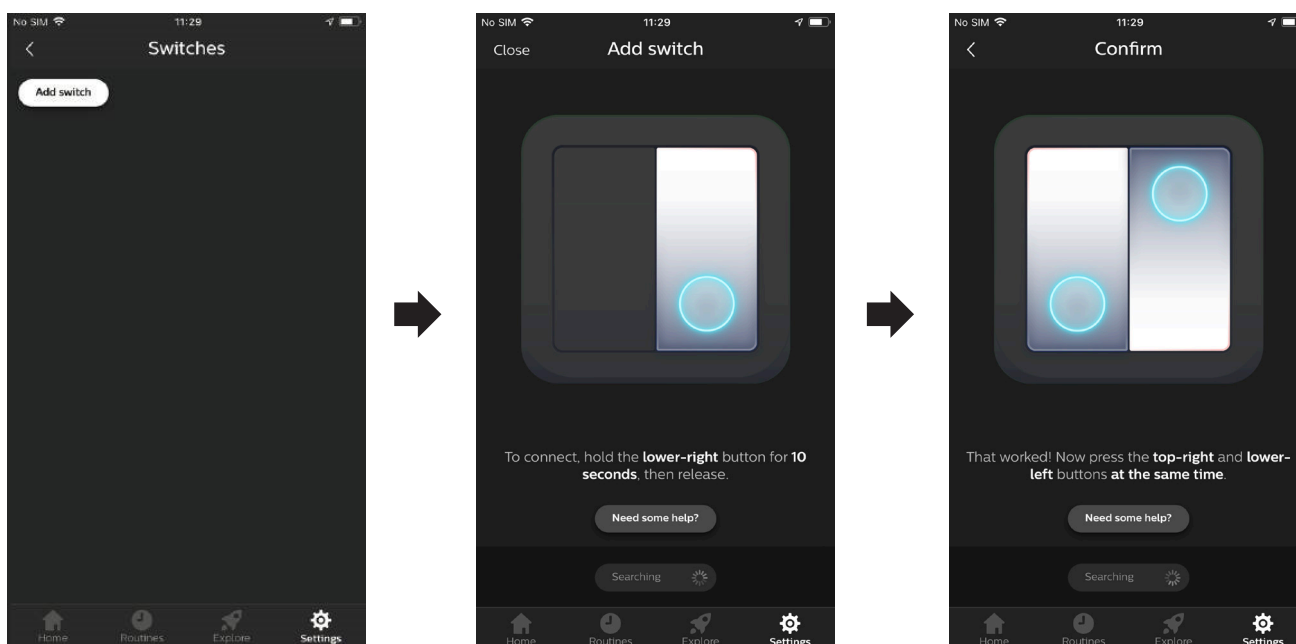
Functional information

CONFIGURATION EXAMPLE FOR THE USE OF THE PHILIPS HUE APP.

• Follow the instructions displayed by the App and access the section entitled "Accessories configuration".
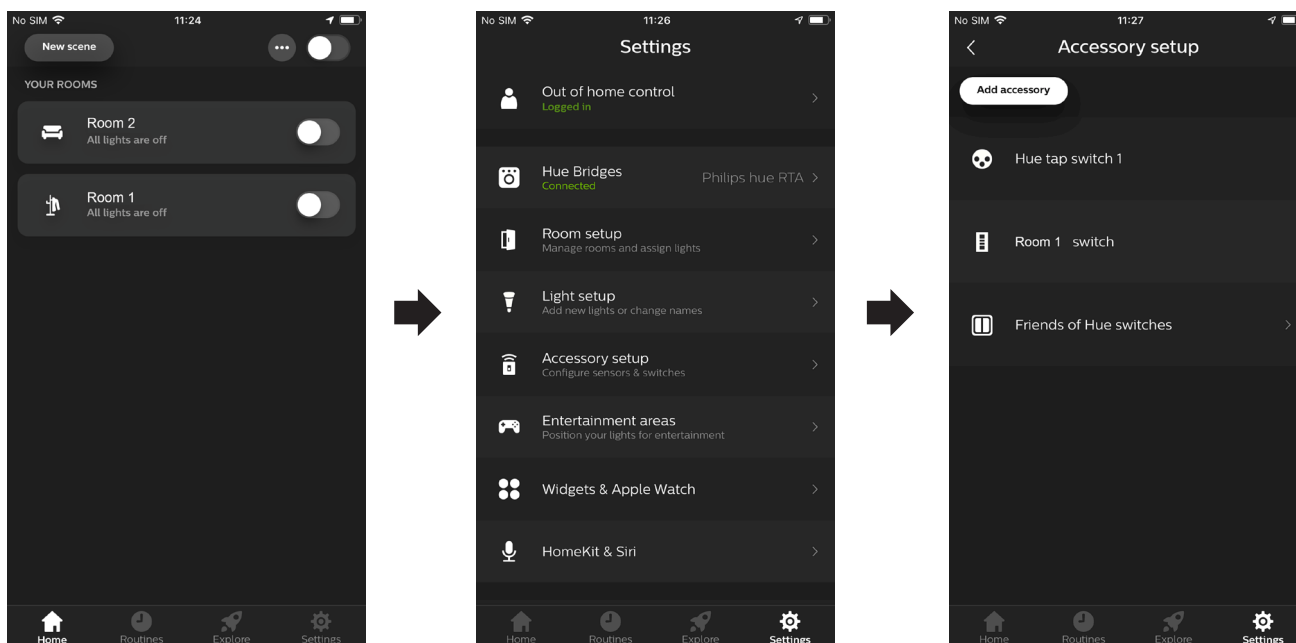
• To associate the button hold down the button related to the channel to be associated (corresponding to the one on which the system works) for at least 7 seconds, as specified in the Philips Hue APP; then press AI and B0 for < 7 seconds to confirm the selected channel. If this operation is not performed the device will return to the previous channel.

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• For each of the four buttons, then set the control to use.
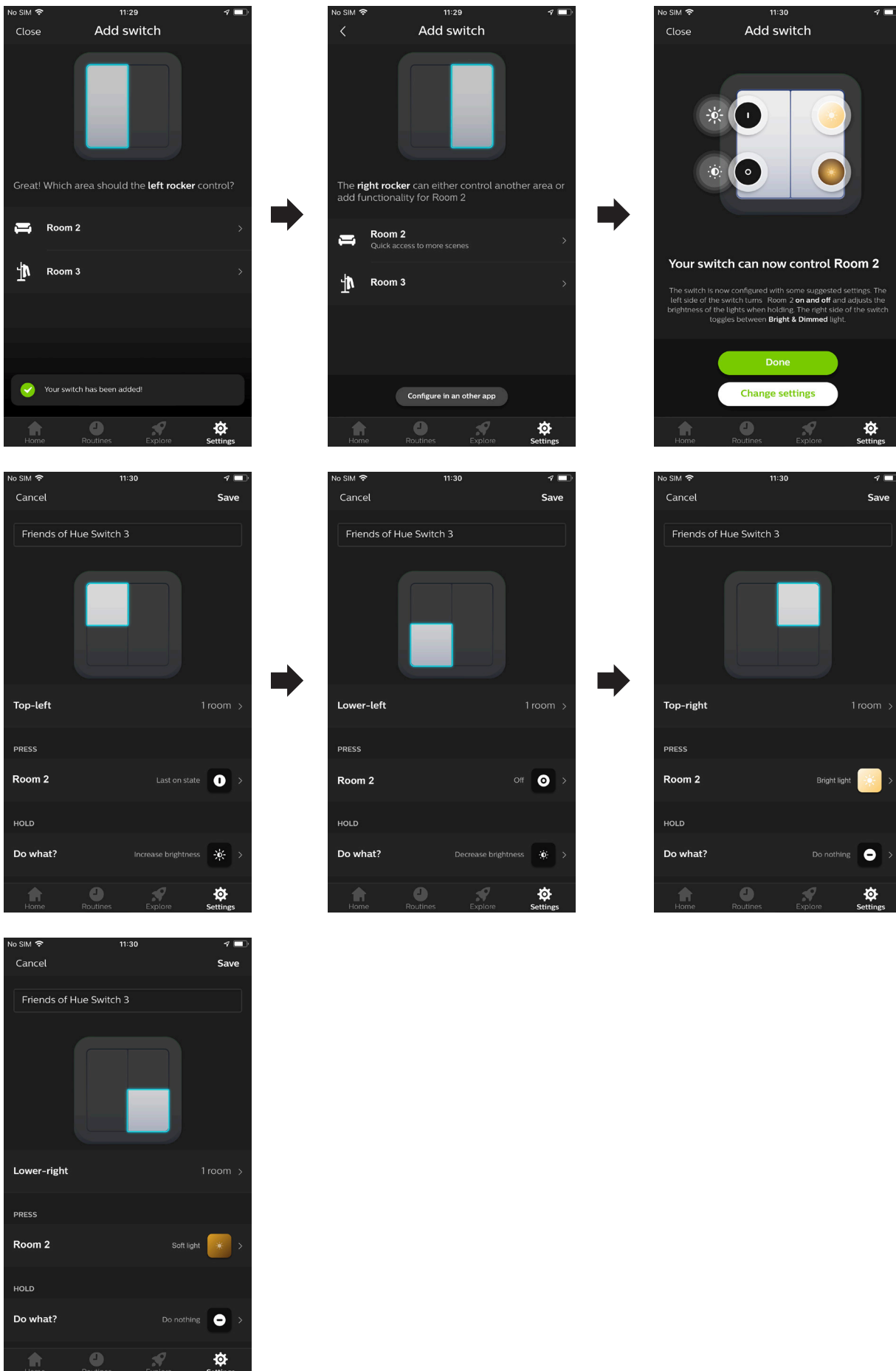
Functional information

- When the configuration has been completed, it is advised to deactivate the Commissioning; release the left-hand button (channel A), press the buttons A0 and AI and using the right-hand button select BI and at the same time control the activation bar.

2.8 Commissioning and channel change

What illustrated below is useful if the system uses a channel other than the default channel of the device (CH11); check the channel used via the App.

The mechanism to trigger channel change and transmission of a commission-ing telegram shall be a two-step process:

- Step 1
Long press of any of the four buttons (or the energy bar) triggers transmission of a commissioning telegram on the corresponding channel; different from the existing implementation, this will only occur if com-missioning and channel change has not been disabled as described in chapter 2.9. Different from the existing implementa-tion, the channel change will not be permanent unless Step 2 is executed directly after Step 1.

- Step 2
Diagonal press of AI and B0 will confirm the channel change if – and only if - it is executed directly after successful execution of Step 1; Step 2 can therefore only be executed if commissioning and channel change is enabled (otherwise execution of Step 1 was not successful).
Step 2 can be repeated several times as long as no other button action occurs in between.
If Step 2 is executed then the product will transmit a data telegram (0x68) on press of AI and B0 to confirm the permanent channel change on the new channel ("Hello" telegram).
If Step 2 is executed and the new channel is different from the old one then the product will transmit a data telegram (0x60) on release (short or long) of AI and B0 to confirm the permanent channel change on the old channel ("Bye" telegram).

If Step 2 is not executed directly after Step 1 (i.e. with no other button press in between) then the product shall continue to operate on the previously se-lected channel. No telegram shall be sent in that case as result of Step 2.

The commissioning telegram shall be compliant with Zigbee 3.0 certification requirements, i.e. it shall include the list of supported commands as de-scribed below.

2.8.1 Commissioning telegram format

The product shall use the following commissioning telegram (compliant with Zigbee 3.0):

- Command (1 byte): 0xE0
- DeviceID (1 byte): 0x02
- OptionField (1 byte): 0xC5
- ExtendedOption (1 byte): 0xF2
- keyEncrypted (16 byte): OOB encrypted with Zigbee TC Link Key
- keyMIC (4 byte): MIC of OOB
- FrameCounter (4 byte): Current security frame counter value
- ApplicationInformation (1 byte) 0x04 (GPD commands are present)
- ManufacturerSpecific (18 byte)
  - Number of GPD commands (1 byte): 0x11
  - GPD CommandID list (17 byte): 0x10, 0x11, 0x12, 0x13, 0x14, 0x15, 0x16, 0x17, 0x22, 0x60, 0x62, 0x63, 0x64, 0x65, 0x66, 0x67, 0x68

2.9 Enable/disable channel change and commissioning

The product shall provide the option to enable and disable channel change and the transmission of commissioning telegrams to further minimize the likelihood of unintended actions. This requirement shall be implemented as follows:

- Pressing buttons A0, AI and BI together and holding them for more than 7 seconds before releasing them shall disable the mechanism for channel change and commissioning telegram transmission (as described in chapter 2.8). Command 0x66 will be transmitted to notify the receiver of the success-ful completion of this action.

- Pressing buttons A0, AI, B0 and BI together and holding them for more than 7 seconds before releasing them shall enable the mechanism for channel change and commissioning telegram transmission (as described in chapter 2.8). Command 0x67 will be transmitted to notify the receiver of the success-ful completion of this action.

The default (out of the box) state shall be that commissioning and channel change is enabled.

If commissioning and channel change is disabled then no telegram shall be transmitted upon long press of any button and no channel change shall be confirmed upon diagonal press of AI and B0. The product shall notify the receiver that channel change is disabled using a data telegram with command 0x66.

2.10 Device ID

The product shall use a dedicated ID range allocated by Philips to EnOcean for the exclusive use within this product.

2.11 Device label

Each 03906 module contains a device label as shown in figure below.

The QR code used in the product label encodes the product parameter according to the ANSI/MH10.8.2-2013 industry standard.

Table 3 below describes the ANSI/MH10.8.2 data identifiers used by the 03906 device label and shows the interpretation of the data therein.

Identifier	Length of data (excluding identifier)	Value
30S	8 characters	Device Address (hex)
Z	32 characters	Security Key (hex)
30P	14 characters	Ordering Code (S3071-A215-FoH)
2P	4 characters	Step Code - Revision (DA-01)
S	14 characters	Serial Number (decimal)

Tab.3: QR code format

3. Application information

3.1 Transmission range

The main factors that influence the system transmission range are:
- Type and location of the antennas of receiver and transmitter.
- Type of terrain and degree of obstruction of the link path.
- Sources of interference affecting the receiver.
- "Dead spots" caused by signal reflections from nearby conductive objects.

Since the expected transmission range strongly depends on this system conditions, range tests should always be performed to determine the reliably achievable range under the given conditions.

The following figures should be treated as a rough guide only:

- Line-of-sight connections
  Typically 15 m range in corridors, up to 50 m in halls.

- Plasterboard walls / dry wood
  Typically 15 m range, through max. 2 walls.

- Ferro concrete walls / ceilings
  Maximum 1 wall or ceiling, depending on thickness and material.

- Fire-safety walls, elevator shafts, staircases and similar areas should be consideredas shielded.

The angle at which the transmitted signal hits the wall is very important. The effective wall thickness – and with it the signal attenuation – varies according to this angle. Signals should be transmitted as directly as possible through the wall. Wall niches should be avoided.

Other factors restricting transmission range include:
- Switch mounting on metal surfaces (up to 30% loss of transmission range).
- Hollow lightweight walls filled with insulating wool on metal foil.
- False ceilings with panels of metal or carbon fibre.
- Lead glass or glass with metal coating, steel furniture.

The distance between the receiver and other transmitting devices such as computers, audio and video equipment that also emit high-frequency signals should be at least 0.5 m.

4. Installation rules

Installation should be carried out by qualified staff in compliance with the current regulations regarding the installation of electrical equipment in the country where the products are installed.

5. Regulatory compliance

RED Directive. EN 60950-1, EN 301489-17, EN 300 328, EN 62479 standards.

Vimar SpA declares that the radio equipment complies with Directive 2014/53/EU. The full text of the EU declaration of conformity is on the product sheet available at the following Internet address: www.vimar.com.

WEEE - Information for users
If the crossed-out bin symbol appears on the equipment or packaging, this means the product must not be included with other general waste at the end of its working life. The user must take the worn product to a sorted waste center, or return it to the retailer when purchasing a new one. Products for disposal can be consigned free of charge (without any new purchase obligation) to retailers with a sales area of at least 400 m^2, if they measure less than 25 cm. An efficient sorted waste collection for the environmentally friendly disposal of the used device, or its subsequent recycling, helps avoid the potential negative effects on the environment and people's health, and encourages the re-use and/or recycling of the construction materials.

Privacy and Data Protection

With regards to the Processing of Personal Data, Parties acknowledge and agree that they shall: (i) respectively comply with Applicable Data Protection Law; and (ii) be autonomously responsible to collect and further process Personal Data in accordance with requirements of Applicable Data Protection Laws, in particular for justification of any transmission of such Personal Data to the other Party, including providing any required notices and obtaining any required consents, and for its decisions concerning the Processing and use of the Personal Data; and (iii) not do anything which may cause the other Party to infringe any Applicable Data Protection Law. Partner will inform the end-users in writing and include a notice with respect to the collection of personal and usage data as follows: "Please be informed that Philips Lighting will have access to your personal and usage data via the Hue bridge. In order to understand how Philips Lighting processes your personal data and usage data please read respectively Philips Lighting's privacy notice and terms of use which can be found on www.meethue.com."