Technical Manual

Binary Input

free@home

Binary Input

BI-F-2.0.1 (6241/2.0U)

BI-F-4.0.1 (6241/4.0U)

BI-M-4.0.1 (6241/4.0)

Power and productivity
for a better world™

ABB

1   Notes on the instruction manual

Please read this manual through carefully and adhere to the information contained therein. This will assist you in preventing damage to persons and property and ensure reliable operation and long service life of the device.

Please keep this manual in a safe place.

If you pass the device on, also include this manual.

If you require additional information or have questions about the device, please contact ABB STOTZ-KONTAKT GmbH or visit our Internet site at:

www.abb.com/freeathome

2   Safety

The device has been constructed according to the latest valid regulations governing technology and is operationally reliable. It has been tested and left the factory in a technically safe and reliable state.

However, residual hazards remain. Read and adhere to the safety instructions to prevent such hazards.

ABB STOTZ-KONTAKT GmbH accepts no liability for failure to observe the safety instructions.

2.1   Used symbols

The following symbols point to particular dangers involved in the use of the device and provide practical instructions.

Notice
A notice indicates information or references to additional useful topics. This is not a signal word for a dangerous situation.

Examples
Examples for application, installation and programming

Important
This safety notice is used as soon as there is the danger of malfunction without the risk of damage to property or risk of injury.

Caution
This safety notice is used as soon as there is the danger of malfunction without the risk of damage to property or risk of injury.

⚠ **Danger**
This safety notice is used as soon as there is a threat to life and limb due to improper handling.

⚠ ⚡ **Danger**
This safety notice is used as soon as there is a serious threat to life due to improper handling.

2.2   Intended use

The device must only be operated within the specified technical data.

The binary inputs serve as interface for operating free@home systems via conventional push-buttons or for coupling message contacts.

Version BI-F-2.0.1 and BI-F-4.0.1 are intended for flush-mounting.

Version BI-M-4.0.1 is a rail mounting device for installing in the distributor.

The integrated bus coupler makes possible the connection to the free@home bus.

Note
The device must only be installed in flush-mounted boxes in dry indoor rooms. The currently valid regulations must be adhered to.

2.3   Improper use

The device is dangerous if used improperly. Any non-intended use is deemed improper use. The manufacturer is not liable for damages resulting from such improper use. The associated risk is borne exclusively by the user/operator.

The device must never be used outdoors or in bathroom areas. Do not push objects through the openings in the device. Only the available options for connection are to be used in accordance with the technical data.

The device has an integrated bus coupler. The use of an additional bus coupler is therefore not admissible.

2.4   Target group / qualification of personnel

Installation, commissioning and maintenance of the product must only be carried out by trained and properly qualified electrical installers. The electrical installer must have read and understood the manual and follow the instructions provided. The operator must adhere to the valid national regulations in his country governing the installation, functional test, repair and maintenance of electrical products.

2.5   Liability and warranty

Improper use, non-observance of this manual, the use of inadequately qualified personnel, as well as unauthorized modification excludes the liability of the manufacturer for the damages caused. It voids the warranty of the manufacturer.

3   Environment

Always dispose of the packaging material and electric devices and their components via the authorized collecting depots and disposal companies.

The products meet the legal requirements, in particular the laws governing electronic and electrical devices and the REACH ordinance.

(EU Directive 2006/96/EC, 2004/108/EC and 2011/65/EC RoHS)

(EU REACH ordinance and law for the implementation of the ordinance (EC) No.1907/2006)

4   Product description

The devices are binary inputs for decentralized flush-mounted installation and installation on mounting rails. The devices have two or four channels and serve as interface for the convenient operation of free@home systems via conventional push-buttons or for reading out technical binary signals.

Advantages:

» Two or four binary inputs in the one device
» The support of floating contacts or 230 V~

Note
Basic information about system integration is contained in the system manual. It is available for downloading at www.abb.com/freeathome.

4.1   Scope of supply

The scope of supply contains the binary input including bus terminal for coupling to the free@home bus. The flush-mounted devices also contain the cable set for connecting push-buttons, for example.

4.2   Overview of types

Type	Product name	Sensor channels	Device
BI-F-2.0.1	Binary input, flush-mounted, floating binary contacts	2	
BI-F-4.0.1	Binary input, flush-mounted, floating contacts	4	
BI-M-4.0.1	Binary input MDRC, 230 V~	4	

Table 1: Overview of types

4.3   Function overview

The following table provides an overview of the possible functions and applications of the device:

Icon of the operating surface	Information
Rocker	**Name:** Sensor (rocker) Control element for the control of free@home functions
Movement detect...	**Name:** Movement detector Sensor for movement- and brightness-dependent control of free@home functions
Window sensor	**Name:** Window contact Signals an open window (Application: Automatic deactivation of the heating when the window is open)
Frost alarm	**Name:** Frost alarm Triggers a frost alarm (Application: Automatic retraction of the blinds, and roller blinds or awnings)
Rain alarm	**Name:** Rain alarm For detecting a rain alarm (Application: Automatic retraction of the blinds, and the roller blinds or awnings)
Wind Alarm	**Name:** Wind alarm For detecting a wind alarm (Application: Automatic retraction of the blinds, and the roller blinds or awnings)
Switchover heati...	**Name:** Switchover heating/cooling Is used for the switchover of heating/cooling in two-pipe heating/cooling systems

Table 2: Function overview

4.4   Description of functions

4.4.1   Rocker

The function rocker is to be used if push-buttons are connected to the binary input. Depending on whether single or double push-buttons are used, this must be set in "Device configuration" in the main menu of the System Access Point. There the respective binary input is to be selected, and then in field "Channel selection" to select the coupling of two channels for the connection of a multiple push-button.

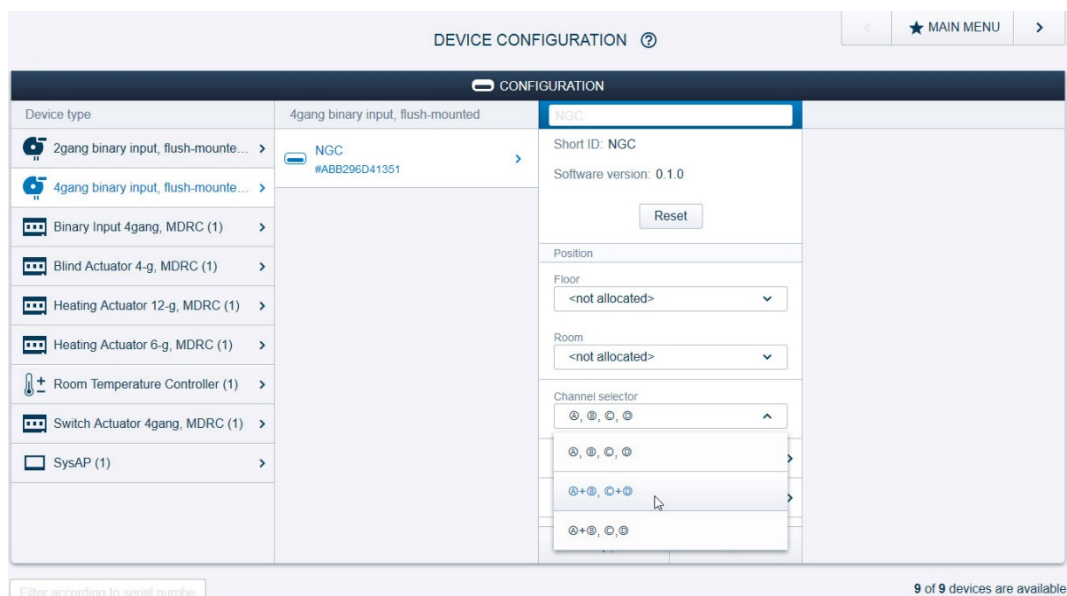| Note |
|------|
| Channels can only be coupled as long as they have not been allocated to other free@home devices in menu "Placement" of the System Access Point. |

Fig. 1: Coupling of two channels for the connection of a double push-button

Switching of (light) electric circuits

If the rocker function is used in connection with a switch actuator, for switching a lamp, for example, the function "Control element" is to be selected. When connecting a double push-button to binary input BI-F-2.0.1, the rocker connected to channel A (binary input) activates the channel allocated to the switch actuator, and the rocker connected to channel B (binary input) deactivates the channel allocated to the switch actuator. This equally applies to channel coupling A+B and C+D of 4gang binary input BI-F-4.0.1 or BI-M-4.0.1.

Switching and dimming of lamps

If a single or double push-button connected to a binary input is to be used together with a dimmer to dim a lamp, the function "Dimming sensor" is to be selected for the binary input. (compare section 7.2). For a single push-button, dimming brighter or darker is carried out with an alternating long press of the push-button rocker. A brief press switches the lamp on or off. With a double push-button the long press of the rocker(s) connected to channel A (coupling channels A+B for BI-F-2.0.1) or channels A and C (coupling A+B and C+D for BI-F-4.0.1) causes the light to become brighter. A brief press is used to switch the lamp on. Dimming darker is carried out with a long press of the rocker(s) connected to channel B (Bi-F-2.0.1) and channels B and D (for BI-F-4.0.1 and BI-M-4.0.1). A brief press of these rockers is used to switch the lamp off (compare the previous section).

Operating blinds

The operation of blinds can be carried out via single or double push-buttons. For this the channels must be configured the same as in section 4.4.1. When using a single push-button, a long button press leads alternately to upward or downward movement of the blind, the roller blind or the awning. A brief press of the push-button during a movement leads to a stop.After a movement has been stopped, further brief presses of the push-button cause the slats to be adjusted opposite to the direction of the previous movement. When using double push-buttons, a long press of the rocker(s) connected to channel A (coupling channels A+B for BI-F-2.0.1) and channels A and C (coupling A+B and C+D for BI-F4.01) causes the blind(s) to move up and a brief press to a stop and the upward movement of the slats. The downward movement or adjustment of the slats to a downward movement is carried out analogous to the rocker(s) connected to channel B (Bi-F-2.0.1) and channels B and D (for BI-F-4.0.1 or BI-M-4.0.1).

Staircase lighting

If a push-button connected to a binary input is to be used for switching staircase lighting, the function "Staircase lighting sensor" is to be selected (compare section 7.2). In the configuration of the associated switch actuator to which the lamps of the staircase are connected), can be configured in "Switch-off delay". The switch-off delay indicates how long a channel of the switch actuator remains in the ON state after being switch on. If the staircase lighting has already been switched on by the press of a push-button, the switch-off delay can be extended (retriggered) by a renewed press of the push-button.

If several switching channels are to be activated via the binary output, the respective channels of the binary input (to which the staircase push-buttons are connected) are to be linked with the channels of the switch actuator (to which the staircase lamps are connected). Each channel of a switch actuator can be programmed with its own switch-off delay. This allows pre-warning prior to the switch-off to be implemented, in which part of the lighting group can be programmed with a shorter switch-off delay and thus switch off earlier.

Force-position sensor On/Off

If several binary inputs are connected to a channel of a switch actuator, this channel can initially be operated from all binary inputs. After configuring a channel of the linked binary input with the function "Force-position sensor ON/OFF", the sensor force-position for the channel of the switch actuator can be activated or deactivated with a press of the push-button of the rocker connected to this channel. After the activation the operation of the affected switch actuator channel is blocked by all other devices. In the parameter settings of the binary input the forced behavior can be configured, and it can be specified whether the channel of the switch actuator concerned is to be switched on (Force-position ON) or off (Force-position OFF).

Blind force-position

This function makes possible a forced behaviour of blinds via the blind actuator. The forced behaviour can be configured in the parameter settings of the binary inputs: The associated blind(s) (and roller blinds or awnings) can be moved to the top end position (Force-position top) or to the bottom end position (Force-position bottom).
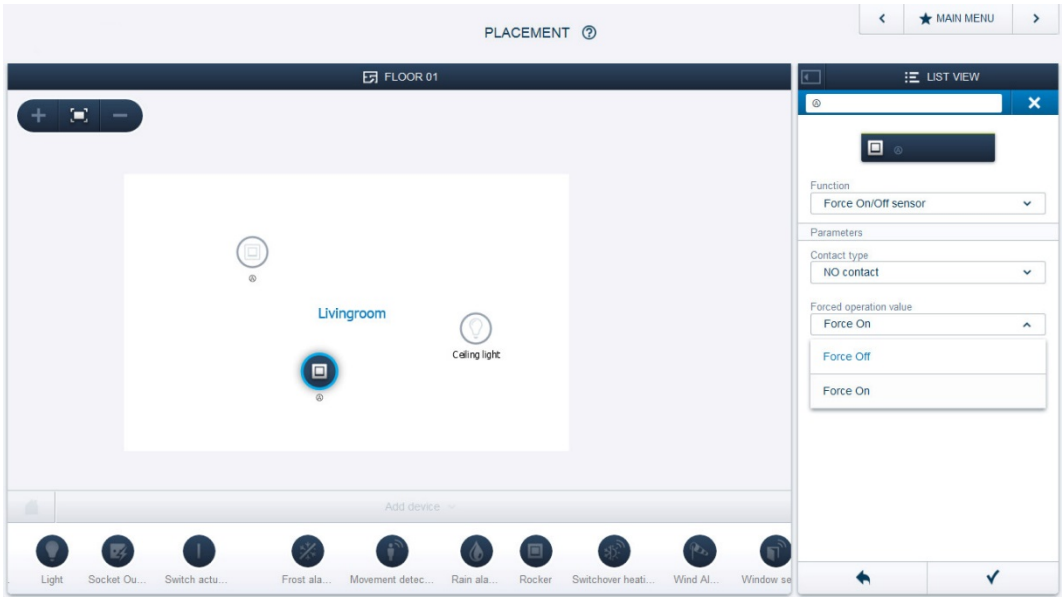
Fig. 2: Configuration of force-position ON/OFF

4.4.2 Movement detector sensor

This function is to be selected if a movement detector is connected to the binary input for light control. If the binary input is connected with a switch actuator, the duration of the light of the lamps connected to the switch actuator can be set via parameter "Switch-off delay" in the parameter settings of menu "Placement" of the System Access Point. The duration of the light extends again automatically by the switch-off delay if persons continue to be detected by the movement detector.

4.4.3 Window contact

The window contact function is to be selected if a window contact is connected to the binary input. If the associated channel of the binary input is connected with the room temperature controller, the room temperature controller switches to "Frost protection" mode when an open window is detected and reduces the set-point temperature for the respective room by 7 K, to prevent unnecessary loss of energy.

4.4.4 Frost, rain and wind alarm

These functions are to selected when connecting the relevant sensors, to protect blinds or roller blinds from damage. The channel of a binary input configured with this function is to be linked with one or several channels of a blind actuator (blind and roller blind or awning). During a frost alarm the respective channel of the blind actuator is blocked to make movement impossible. During rain or wind alarm the blind is moved to the end position and then the associated channel of the blind actuator is blocked. Operating the blind with further free@home devices or Venetian blind switches is then impossible.

4.4.5 Switchover heating/cooling

This function is to be selected if there is to be a manual switchover between heating and cooling via a connected switch. If the associated heating/cooling system offers a corresponding binary output for heating/cooling, it can be connected to the binary input.

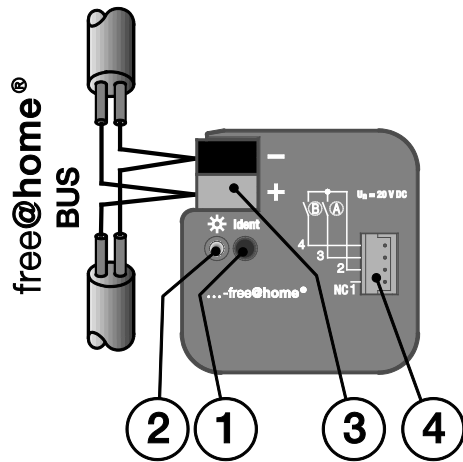## 4.5   Device overview of 2gang binary input BI-F-2.0.1

Fig. 3: Device overview of 2gang, flush-mounted binary input BI-F-2.0.1

[1]   Device identification during commissioning

[2]   Identification LED

[3]   Bus connection terminal

[4]   Inputs, 4 wires

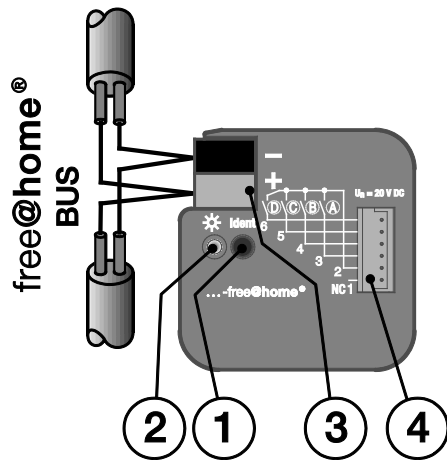## 4.6   Device overview of 4gang binary input BI-F-4.0.1

Fig. 4: Device overview of 4gang, flush-mounted binary input BI-F-2.0.1

[1]   Device identification during commissioning

[2]   Identification LED

[3]   Bus connection terminal

[4]   Inputs, 6 wires

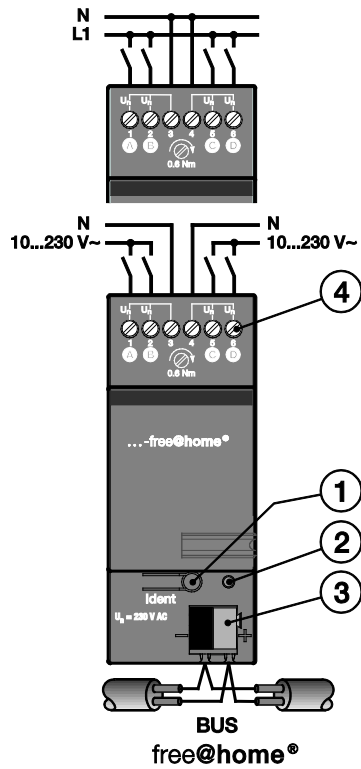## 4.7   Device overview of 4gang binary input BI-M-4.0.1

Fig. 5: Device overview of 4gang, MDRC binary input

[1]   Device identification during commissioning

[2]   Identification LED

[3]   Bus connection terminal

[4]   Connecting terminal

5   Technical data

5.1   Overview of BI-F-2.0.1 and BI-F-4.0.1

Parameters	Value	
Power supply	24 V DC (via the bus)	
Bus subscribers	1 (12 mA)	
Connection (free@home)	Bus connection terminal: 0.4 - 0.8 mm	
Line type	J-Y(St)Y, 2 x 2 x 0.8 mm	
Inputs	Number of BI-F2.0.1	2
	Number of BI-F-4.0.1	4
	Polling voltage	20 V DC (pulsed)
	Input current	0.5 mA
Ambient temperature	Operation	-5°C to +45°C
	Storage	-25°C to +55°C
	Transport	-25°C to +70°C
Environmental conditions	Maximum humidity	93%, no dew permissible
Protection type	IP 20 (EN 60 529) in an installed state	
Protection class	III	
Mounting	In installation box, Ø 60 mm	
Design	Flush-mounted device (FM)	
	Housing, colour	Plastic, basalt grey (RAL 7012)
Dimensions	39 x 40 x 12 mm (W x H x D)	
Weight	0.04 kg	
CE marking	According to EMC and low-voltage guidelines	

Table 3: Technical data for BI-F-2.01 and BI-F-4.0.1

5.2 Overview of BI-M-4.0.1

Parameters	Value	
Power supply	21 to 23 V DC (via the bus)	
Bus subscribers	1 (5 mA)	
Connection	Bus connection terminal: 0.4 - 0.8 mm	
Line type	J-Y(St)Y, 2 x 2 x 0.8 mm	
Inputs	Number	4 independent
	Admissible voltage range U_N	0 to 265 V AC/DC
	AC/DC input current I_N	Maximum 1 mA
	Signal level for 0 signal	0 to 2 V AC/DC
	Signal level for 1 signal	7 to 265 V AC/DC
	Admissible cable length	Maximum 100 m at 1.5 mm
Connecting terminals	Screw-type terminal	0.2 to 2.5 mm² fine-wire 0.2 to 4.0 mm² single-wire
	Tightening torque	Maximum 0.6 Nm
Ambient temperature	Operation	-5°C to +45°C
	Storage	-25°C to +55°C
	Transport	-25°C to +70°C
Environmental conditions	Maximum humidity	93%, no dew permissible
Protection type	IP20	Acc. to DIN EN 60 529
Protection class	II	Acc. to DIN EN 61 140
Insulation category	Over voltage category	III acc. to DIN EN 60 664-1
	Degree of contamination	2 acc. to DIN EN 60 664-1
Mounting	On 35 mm mounting rail	Acc. to DIN EN 60 715
Built-in position	Any	
Design	Rail mounting device (MDRC)	Modular installation device, Pro *M*
	Installation width	2 modules à 18 mm
	Installation depth	64.5 mm
	Housing, colour	Plastic, basalt grey (RAL 7012)
Dimensions	36 x 90 x 64.5 mm (W x H x D)	
Weight	0.1 kg	
CE marking	According to EMC and low-voltage guidelines	

Table 4: Technical data BI-M-4.0.1

5.3   Dimensions

Note
All dimensions are in mm.

Binary Input BI-F-2.0.1

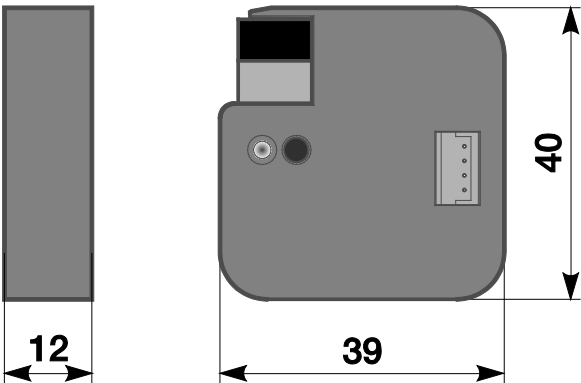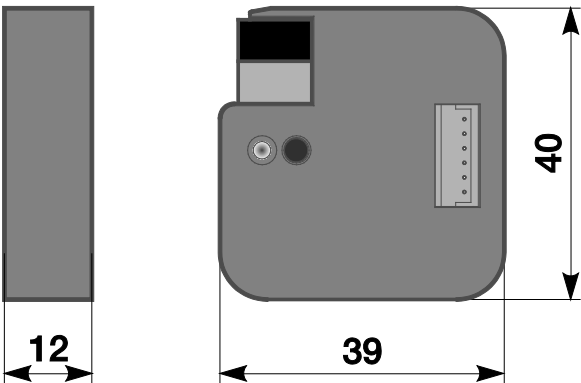*Fig. 6: Dimensions of BI-F-2.0.1*

Binary Input BI-F-4.0.1
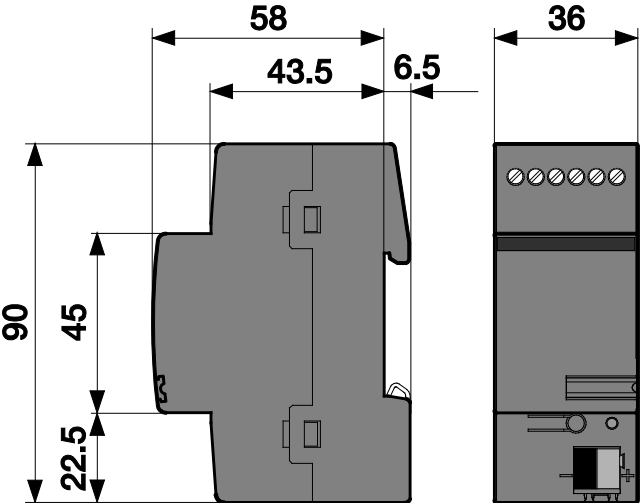

Fig. 7: Dimensions of BI-F-4.0.1

BI-M-4.0.1

Fig. 8: Dimensions of BI-M-4.0.1
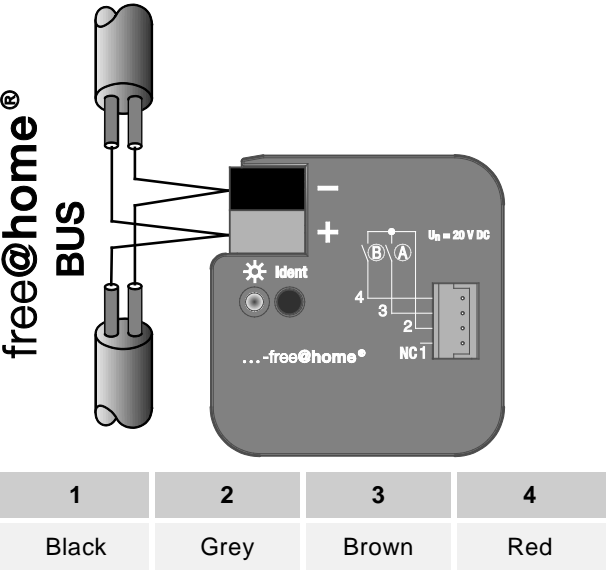
5.4   Connection diagram

Binary Input BI-F-2.0.1

1	2	3	4
Black	Grey	Brown	Red

Fig. 9: Electrical connection of BI-F-2.0.1

Binary Input BI-F-4.0.1

1	2	3	4	5	6
Black	Grey	Brown	Red	Orange	Yellow
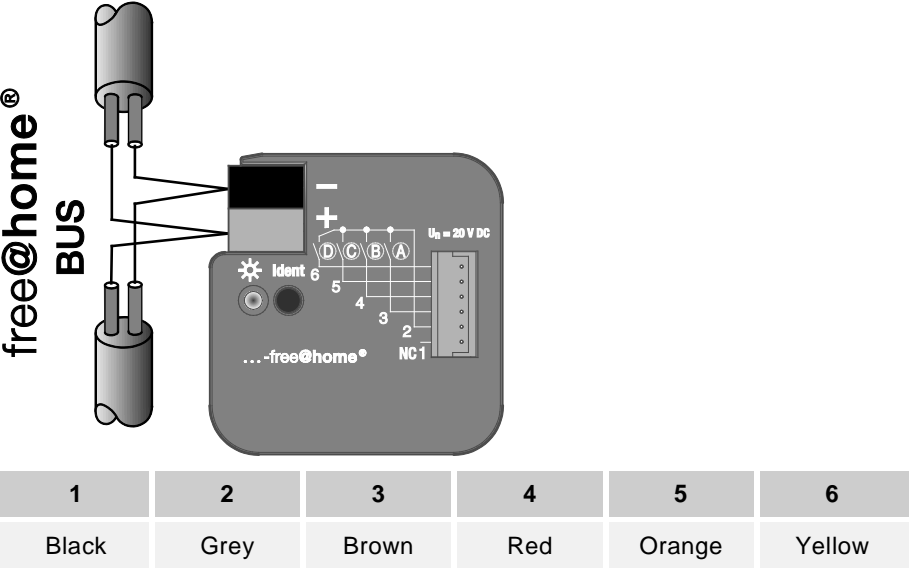
Fig. 10: Electrical connection of BI-F-4.0.1

Binary Input BI-M-4.0.1
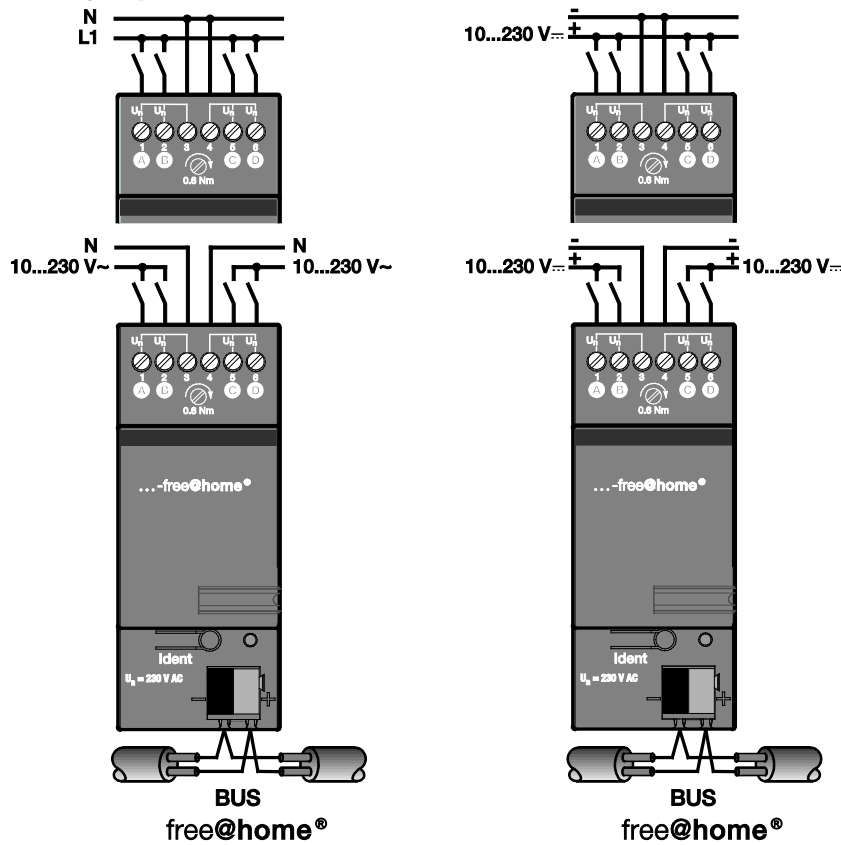
Fig. 11: Electrical connection of BI-M-4.0.1

6   Mounting

6.1   Safety instructions for mounting

⚠️ ⚡   **Danger**
Risk of death due to electrical voltage
Dangerous currents flow through the body when coming into direct or indirect contact with live components. This results in electric shock, burns or even death.
Work improperly carried out on electrical systems is a hazard to one's own life and that of the user. Also fires and serious damage to property can result.
» Observe the relevant standards.
» Apply at least the "five safety rules" (DIN VDE 0105, EN 50 110):
1.   Disconnect
2.   Secure against being re-connected
3.   Ensure there is no voltage
4.   Connect to earth and short-circuit
5.   Cover or barricade adjacent live parts
» Install the device only if you have the necessary electrical engineering knowledge and experience (see chapter 2.4).
» Use suitable personal protective clothing.
» Use suitable tools and measuring devices.
» Check the supply network type (TN system, IT system, TT system) to secure the following power supply conditions (classic connection to ground, protective earthing, necessary additional measures, etc.).

> ⚠️ ⚡ **Danger**
>
> **Risk of death due to short-circuit**
>
> Risk of death due to electrical voltage of 230 V during short-circuit in the low-voltage line.
>
> » During mounting observe the spatial division (> 10 mm) of SELV electric circuits to other electric circuits.
> » Observe the spatial division of SELV electric circuits and other electric circuits. Otherwise short-circuits can occur.
>
>
>
> » If the minimum distance is insufficient, use electronic boxes or insulating tubes.
> » Observe the correct polarity.
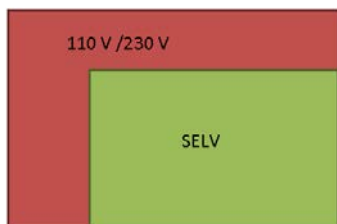
6.2   Installation/mounting

BI-F-2.0.1 and BI-F-4.0.1

Installation is carried out flush-mounted in a Ø 60 mm installation box, behind the push-button, for example.

BI-M-4.0.1

The device is a rail mounting device for installing in distributors for easy installation on 35 mm mounting rails according to DIN EN 60 715.

The following applies to both versions:

The device can be mounted in any position.

The stick-on label is to be removed and glued into the list (see system manual System Access Point).

Wires not required are to be insulated.

The bus connection is established by means of the enclosed bus connection terminal.

The device is ready for operation after the bus voltage has been applied.

The description of the terminals is found on the housing.

Access to the device must be guaranteed for operation, testing, inspection, maintenance and repairs according to DIN VDE 0100-520.

6.3   Electrical connection

BI-F-2.0.1 and BI-F-4.0.1

» The bus line connection is established by means of the enclosed bus con-
nection terminal.

» The inputs/outputs are connected according to the circuit diagram via six
plug-in connecting cables that are approx. 30 cm long.

» The connecting cables can be lengthened to a maximum of 10 m.

- The device is ready for operation after the bus voltage has been applied.

BI-M-4.0.1

» The electrical connection is made via screw terminals. The bus connection is
established by means of the enclosed bus connection terminal. The terminal
designation is located on the housing.

» To ensure that the glow lamps of illuminated inserts of switches and push-
buttons function correctly and are adequately illuminated, the use of switch
or push-button inserts with N terminals is absolutely necessary.

- The device is ready for operation after the bus voltage has been applied.

The following applies to both versions:

Mounting and commissioning must only be carried out by qualified electrical in-
stallers. When planning and setting up electrical systems and security-related
systems for the detection of intrusion and of fires, the relevant standards, guide-
lines, rules and regulations of the respective country are to be observed.

» Protect the device against humidity, dirt and damage during transport, stor-
age and operation!

» Operate the device only within the specified technical data!

» Operate the device only in a closed housing (distributor)!

» Prior to performing installation work the device is to be deactivated.

⚠ ⚡   **Danger**
Danger to life
To prevent dangerous contact currents due to feedback from different ex-
ternal conductors, an all-pole deactivation is to be carried out when extend-
ing or changing the electric connection.

6.4   Dismantling

Dismantling is carried out in the reverse order.

7   Commissioning

Commissioning is always carried out via the Web-based surface of the System Access Point.

The System Access Point establishes the connection between the free@home participants and the smartphone, tablet or PC. It is used to identify and program the participants during commissioning.

Devices which are physically connected to the free@home bus, log themselves automatically into the System Access Point. They transmit information about their type and supported functions (see Table 2: Function overview, chapter 4.3).

During initial commissioning all devices are given a generic name (e.g. switch actuator 1, etc.). The user must change this name to a name practical for the system (Example: "Living room light" for an actuator in the living room.

The devices must be parameterised for the use of additional functions.

Commissioning of the binary input is described in the following chapters. Here it is assumed that the basic commissioning steps of the overall system have already been carried out. General knowledge about the Web-based commissioning software of the System Access Point is assumed.

Note
General information about commissioning and parameterization is available in the system manual and the online Help of the "System Access Point" (www.abb.com/freeathome).

7.1   Allocation of devices and specifying channels

The devices connected to the system must be identified, i.e. they are allocated to a room according to their function and are given a descriptive name.
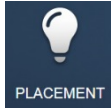
The allocation is made via the allocation function of the Web-based user interface of the System Access Point.
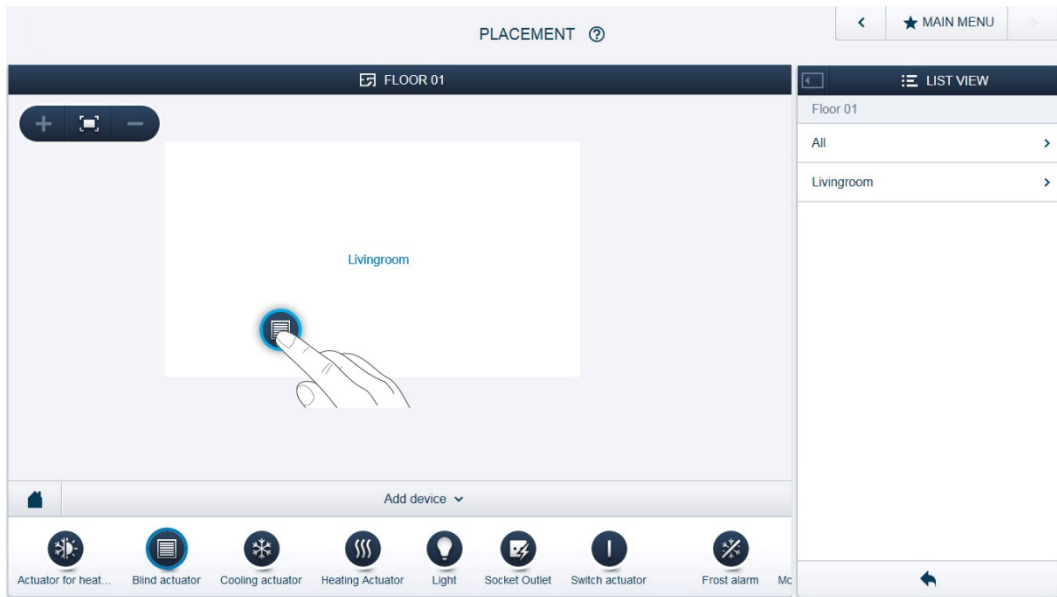
Device selection

Fig. 12: Allocating devices

»   In the "Add device" bar select the desired application and pull it via drag-and-drop onto the floor plan in the working area.
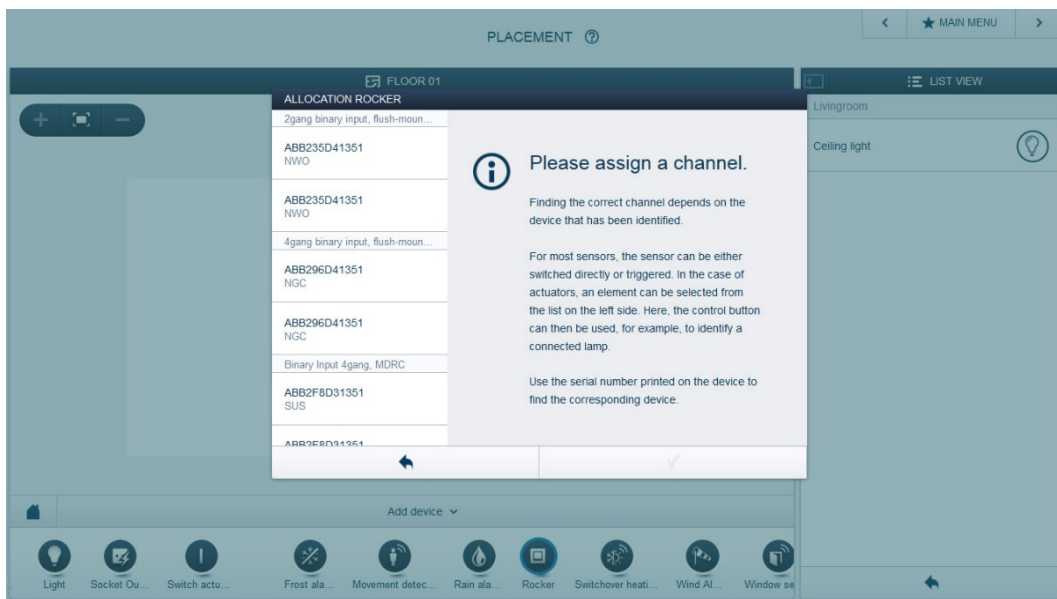
Fig. 13: Allocation

- A pop-up window opens automatically which lists all the devices suitable for the application selected.

The desired device can now be identified.

Identification via serial number

Fig. 14 Identification via serial number

» Compare the short 3-digit number of the identification label with the numbers in the list and in this way identify the device you are searching for and, if necessary, also the channel.

Identification by pressing the "Identification button"

» Press the identification button on the device which you wish to add.

- The desired device is faded in automatically.

» Select the desired channel.

Assigning a name
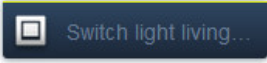
Fig. 15: Assigning a name

» Enter a name that is easy to understand and under which the application is to be displayed later (e.g. "Living room light switch").

» Press the tick at the bottom right to take over the entry.

Note
The settings of the device can be adjusted via the Web-based user interface of the System Access Point.
For pre-programmed devices the default settings can be adjusted. This allows the channel selection to be influenced.
These settings, however, can only be made with a fitter access (see online Help of the System Access Point). The parameter settings remain as described above.

7.2   Setting options per channel

General settings and parameter settings can be made for each channel.
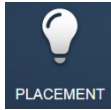
The settings are made via the allocation function of the Web-based user interface of the System Access Point.
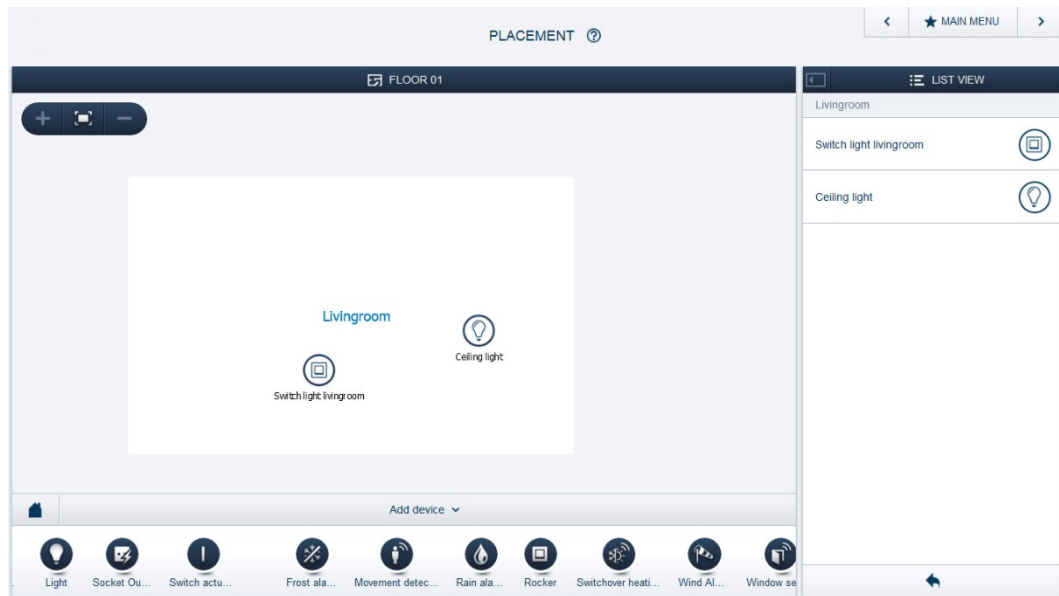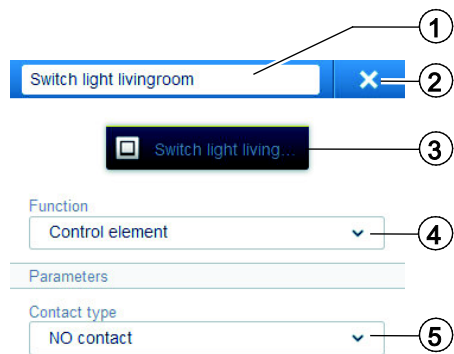
Device selection

Fig. 16: Device selection

» Select the device icon in the floor plan of the working area view.
- All setting options for the respective channel are displayed in the list view. For rockers (sensors) the corresponding rocker must be selected.

The following settings are available.

7.2.1   Binary input settings

[1]   Changing the name

[2]   Deleting the channel via "X"

[3]   Switching of the linked actuator via the button

[4]   Selection of function (see section 4.3)

[5]   Selecting the contact type of the switch (NC contact is closed in the rest position, a NO contact is open)

Fig. 17: Settings

7.3   Linking

The binary inputs created via the allocation function can now be linked with a second device (e.g. switch actuator). This allows simple ON/OFF circuits or two-way circuits to be implemented.
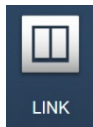
The linking in the list view is then made via the linking function of the Web-based user interface of the System Access Point.
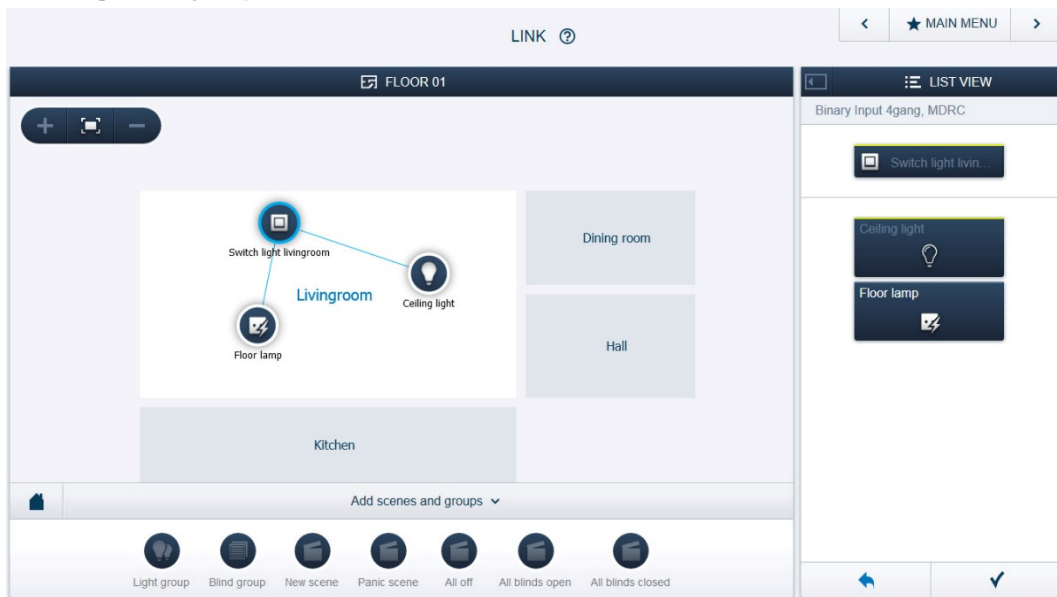
Linking binary inputs

Fig. 18: Linking binary input and actuator

» To link a binary input with an actuator, first click on the desired binary input and then on the actuator.

- A blue connecting line appears between the two devices to indicate the link.

» To link the binary input with an additional actuator, click again on the desired binary input and then on the device to be linked.

- After the link has been completed the push-button or sensor can be operated directly locally.

Note
The links can be changed manually at all times.

7.4   Light scenes and light groups

A light scene means calling up a preset light situation (e.g. preset dimming value) via a single push-button. For a light group, a group of lamps is switched simultaneously by means of a single push-button. This function, for example, replaces two-way circuits or intermediate switches of conventional electrical installations.

Light scenes and light groups can be configured in menu "Linking" in the main menu of the System Access Point. There the corresponding function "Light scene" or "Light group" is to be added and linked with the corresponding channel of a binary sensor (to which a push-button is connected for calling up light scenes, for example), as well as the corresponding channels of the switch actuators (to which the lamps that are included in the light scene are connected). In the list view (see Fig. 19) the light scene can be configured and stored by clicking on the respective lamps. Light scenes are generally called up by a brief press of the rocker of a single push-button. A longer press (5 s) stores the current light situation and stores the light scene on top. If double push-buttons are used, the channels are not to be coupled. Each of the two rockers can be used to call up a specific light scene.
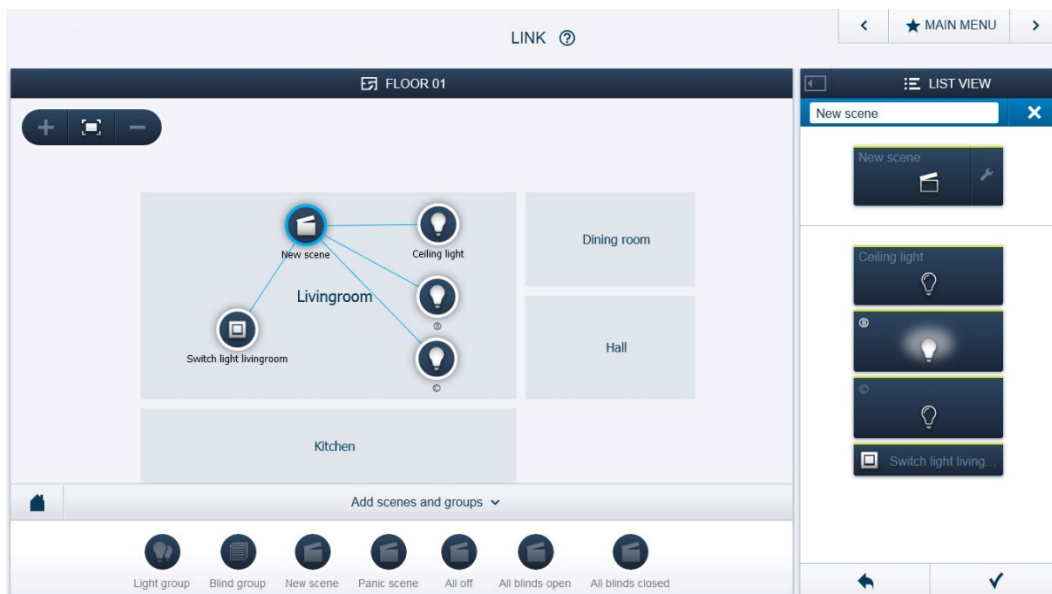

Fig. 19: Configuration of light scenes and light groups

8   Updating options

A firmware update is carried out via the Web-based user interface of the System Access Point. For this, visit the free@home website www.abb.com/freeathome.

9   Maintenance

The devices are maintenance-free. In case of damage (e.g., during transport or storage), do not perform repairs. Once the device is opened, the warranty is void!

Access to the device must be guaranteed for operation, testing, inspection, maintenance and repairs (according to DIN VDE 0100-520).

9.1   Cleaning

Dirty devices can be cleaned with a dry cloth. If this is not sufficient, a cloth slightly moistened with a soap solution can be used. Caustic cleaning agents or solvents must not be used.

ABB-free@home®

ABB STOTZ-KONTAKT GmbH
Eppelheimer Straße 82
69123 Heidelberg, Germany
Telephone: +49 2351 956-1600

E-mail: knx.helpline@de.abb.com
              www.abb.com/freeathome

Further information and contact:

Power and productivity
for a better world™

ABB