

Powerline → BKN230-24-PL

BKN(E)230-24-PL

Technical datasheet

Powerline communication and power supply for one motorized fire protection or smoke extraction damper with **conventional 24V** or **Belimo Top-Line "ST"** actuator



Primary features

- + 230VAC Powerline communication with dynamic signal adjustment and zero crossing detection
- + Connector for conventional or **Belimo Top-Line** actuator (auto-detection)
- + Connector for smoke detector
- + Push-button on device for damper function check
- + Topology: Free
- + Maximum distance from master 1200 m
- + Automatic detection by master (device has unique MAC address)
- + USB interface permits pre-addressing (BUS-ID) and issue of an identifier (ID/Location; e.g. location in the building, also possible via master)
- + Monitoring of the damper position (incl. angle*)
- + Run-time monitoring
- + Actuator power consumption monitoring
- + Powerline and USB Bootloader (firmware updates possible via master or directly via USB)

*Belimo Top-Line actuators only

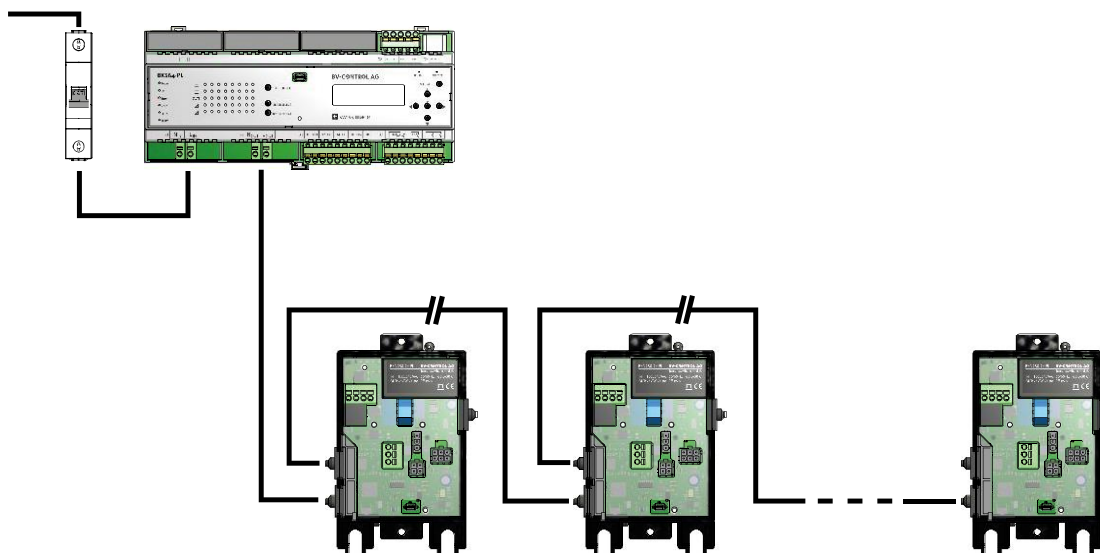
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2 SUMMARY

The BKN230-24-PL is the linking element between a Powerline Master (e.g. BKS64-PL) and the motorized damper. It supplies electrical energy to a conventional spring return, smoke extraction or a Belimo Top-Line "ST" actuator and optional to a smoke detector. It communicates directly with the master device via the 230VAC power supply (POWERLINE technology).

The Powerline slaves (BKN230-24-PL) have a unique physical MAC address so are always detected by the master, irrespective of pre- or automatic addressing by the master.



3 SAFETY INSTRUCTIONS

The device is designed for use in stationary heating, ventilation and air conditioning systems and may not be used for applications outside the specified area of use.

Installation and connection of the 230VAC power supply must be carried out by a qualified electrical fitter. All statutory and official directives must be observed.

DANGER



Electric shock in the event of contact with 230 VAC lines

Wiring may only be carried out when the system is disconnected from the power supply!

Make sure the device cover is fitted before commissioning.

The device may not be disposed of as domestic waste.

4 TECHNICAL DATA

Electrical data	Rated voltage	100-240 VAC 50/60Hz	
	Power consumption	2 W	
	Power supply for actuator and smoke alarm	24VDC max. 700 mA	
	Dimensioning	20 VA	
Connections	230VAC Powerline	4 x spring terminals (2 x L + 2 x N) "Daisy-chain permitted"	
	Smoke detector	Spring terminals (GND, +24V, IN)	
	Actuator	AMP 3 and 6-way (conventional) AMP 4-way (communicative)	
	USB interface	Mini-USB	
Powerline communication	Frequencies	Frequency 1: 9-250 kHz Frequency 2: 9-250 kHz	
	Modulation type	PSK	
	Baud rate	Max. 28.8 kbps	
	Reception sensitivity	Max. 36 dBµV	
	Bus detection	Automatic via MAC address	
	Addressing	Manual via USB or Automatic or manual via master	
	Max. range of master to BKN with TT installation cables	Line: 1200 m Otherwise: max. 1200 m END to END	
Safety	Protection class	II	
	EMC	CE according to 2014/30/EU	
	Low Voltage Directive	CE according to 2014/35/EU	
	Mode of operation	Type 1 (EN 60730-1)	
	Ambient temperature	-30° ... +50°C	
	Storage temperature	-30° ... +80°C	
	Humidity test	95% rel. H., non condensing (EN 60730-1)	
Mechanical data	Maintenance	maintenance-free	
	Dimensions	Width	88 mm
		Height	153 mm
		Depth	54 mm
	Weight	290 g	
Power consumption measurement	Assembly	Screw-fitted	
	Accuracy	3% above/below measured value	
	Resolution	0.1W	

5 LIMITATIONS AND INSTRUCTIONS

The BKN230-24-PL may only be used with a designated master (e.g. BKS64-PL).

If possible, avoid routing the 230VAC Powerline cable immediately parallel to lines leading to devices which cause major interference e.g. inverters. If this cannot be avoided, switching to other channels at the master end can avoid possible interference.

6 COMMISSIONING, OPERATION AND DISPLAY

The device needs no configuration for operation. Detection by the master takes place automatically, based on a unique fixed MAC address. The slave address (BUS-ID) can be assigned automatically or manually. Together with the usual LEDs for damper positions and faults, the device has two white LEDs which indicate Powerline communication. The blue LED indicates the bootloader mode and is a means of identification.

LED for Damper Positions

Green: blinking: Damper is opening
 on: Damper is open
 (Bootloader) is updating

Yellow: blinking: Damper is closing
 on: Damper closed

Error LED (Error list: see Chapter 8.9)

Red: blinking: error present
 on: error saved

Communication-LED

White TX: on: PL Data sent
White RX: on: PL Data received

GP-LED

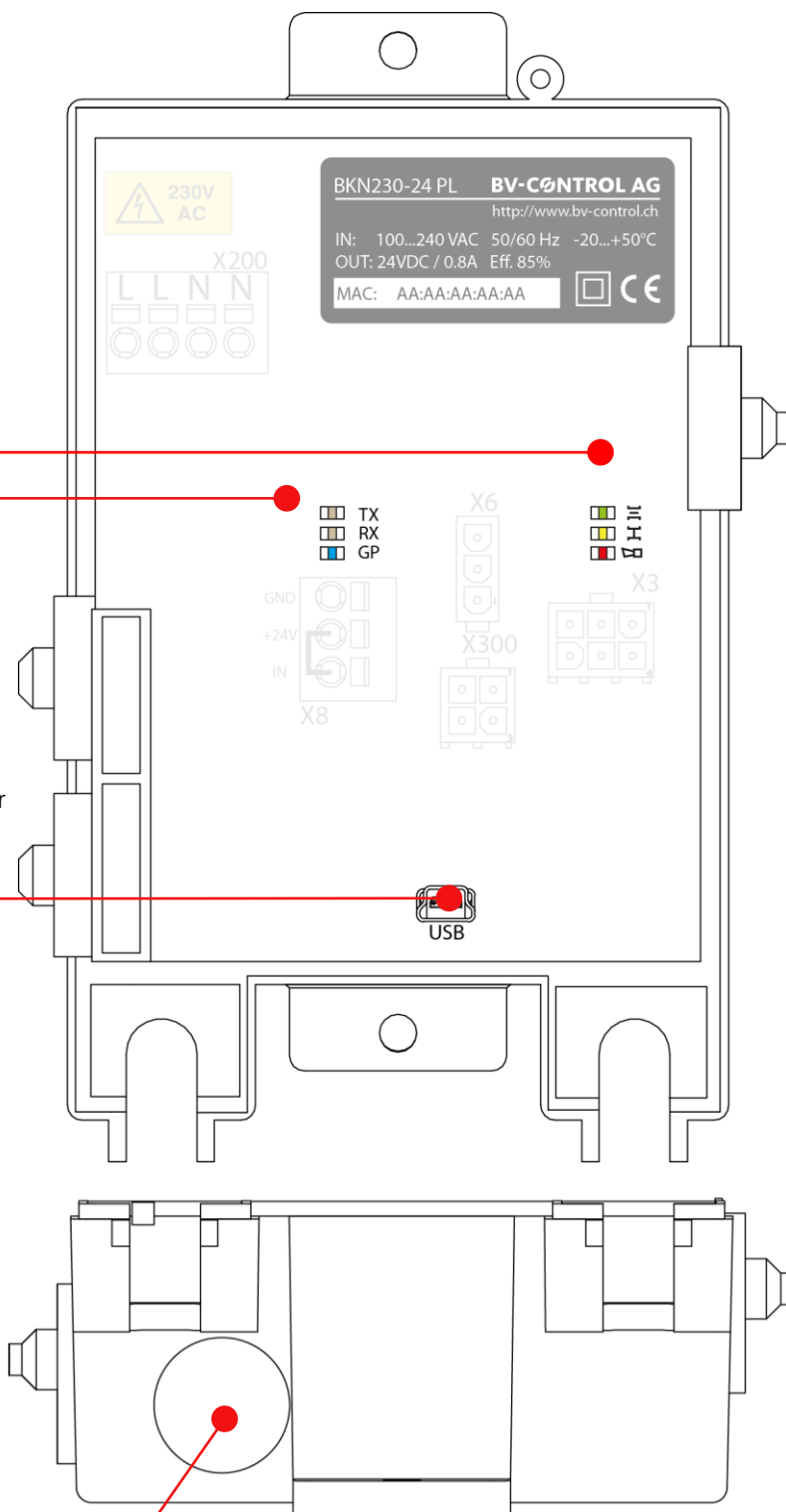
Blue: on: Device in Bootloader
 mode
 blinking: Identified by the Master

USB Interface

The USB interface allows reading of the MAC address and optionally setting the BUS-ID (1..64) and a device identifier in plain text (for example, location in the building)

Button

The button has several functions: A short keystroke erases stored errors. When the button is pressed, the actuator moves to the opposite position. The master recognizes a pressed button, what makes it easy to identify devices.



7 ELECTRIC CONNECTIONS AND TERMINAL CONFIGURATION



The connection of the 230 VAC Powerline cable to the spring terminals X200 may only be carried out by a qualified electrical fitter.

X200

Spring-terminals for 230VAC with Powerline Signal
Assignment: f.l.t.r.: L L N N

X6 und X3*

AMP plug-in connections for conventional actuators

X6: Supply (3-pole) X3: Limit switch (6-pole)

X8

Spring terminal for a smoke detector

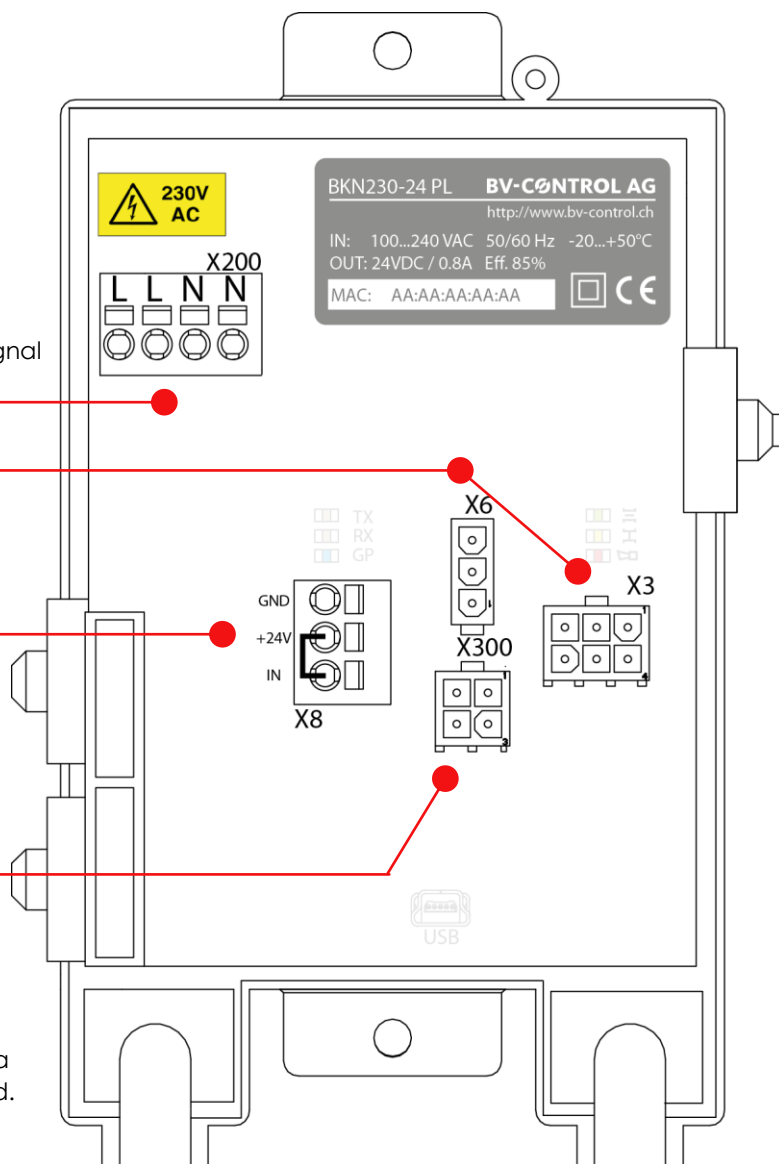
Assignment: 1: GND
2: + 24VDC
3: IN

(without smoke detector: connect + 24V and IN)

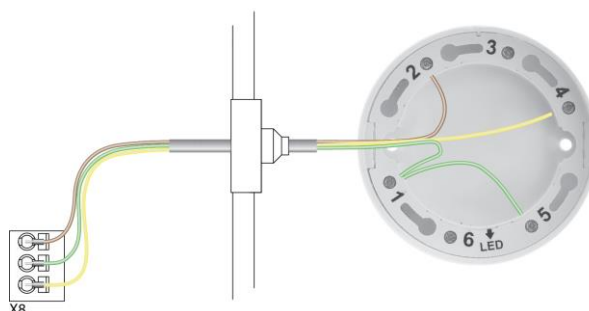
X300*

AMP connector, 4-pin, for Belimo top-line actuator

* The X6 and X300 terminals are arranged so that only either a conventional actuator or a Belimo Top-Line actuator can be connected.

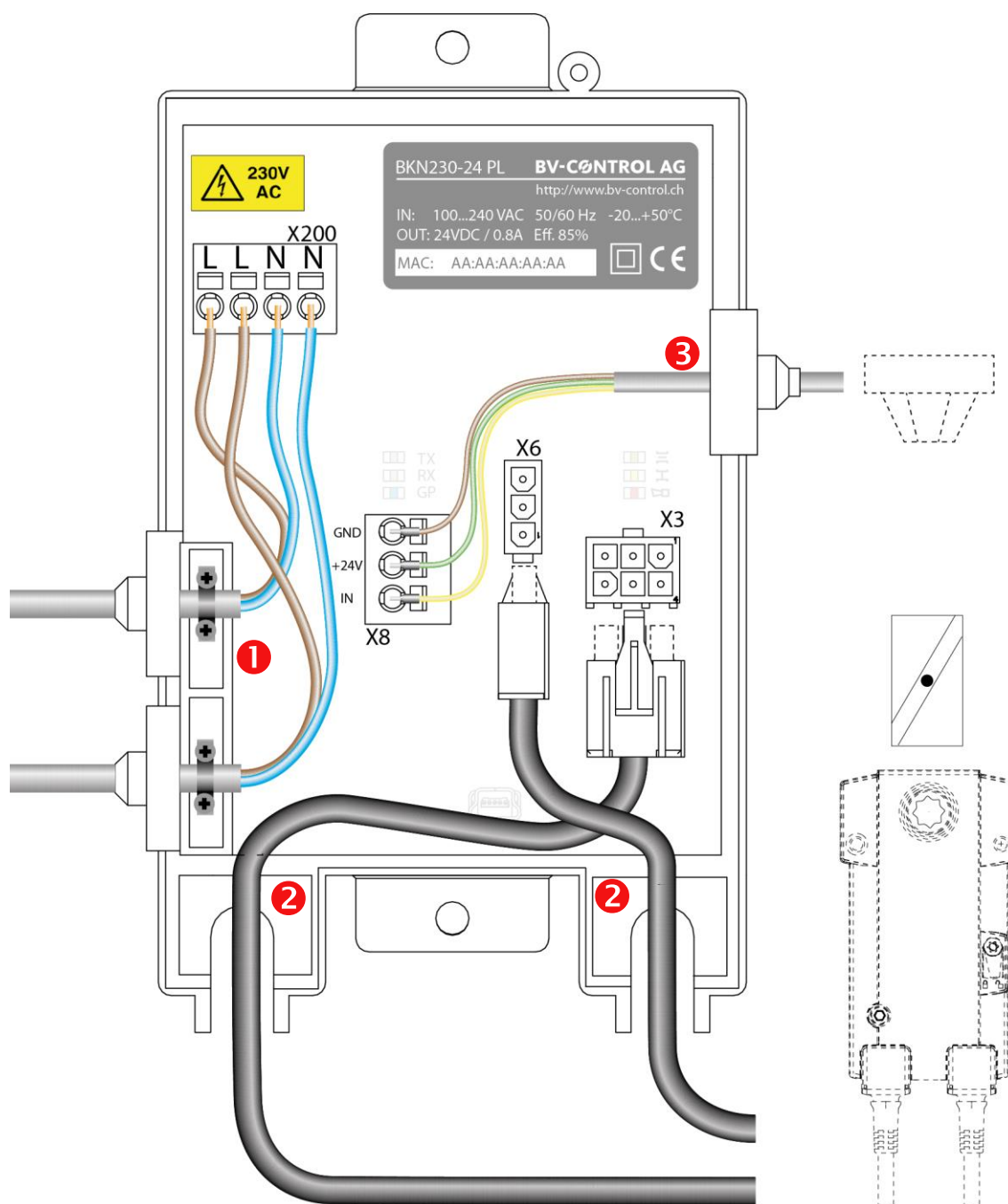


Smoke Detector example: ORS142 K (Hekatron)



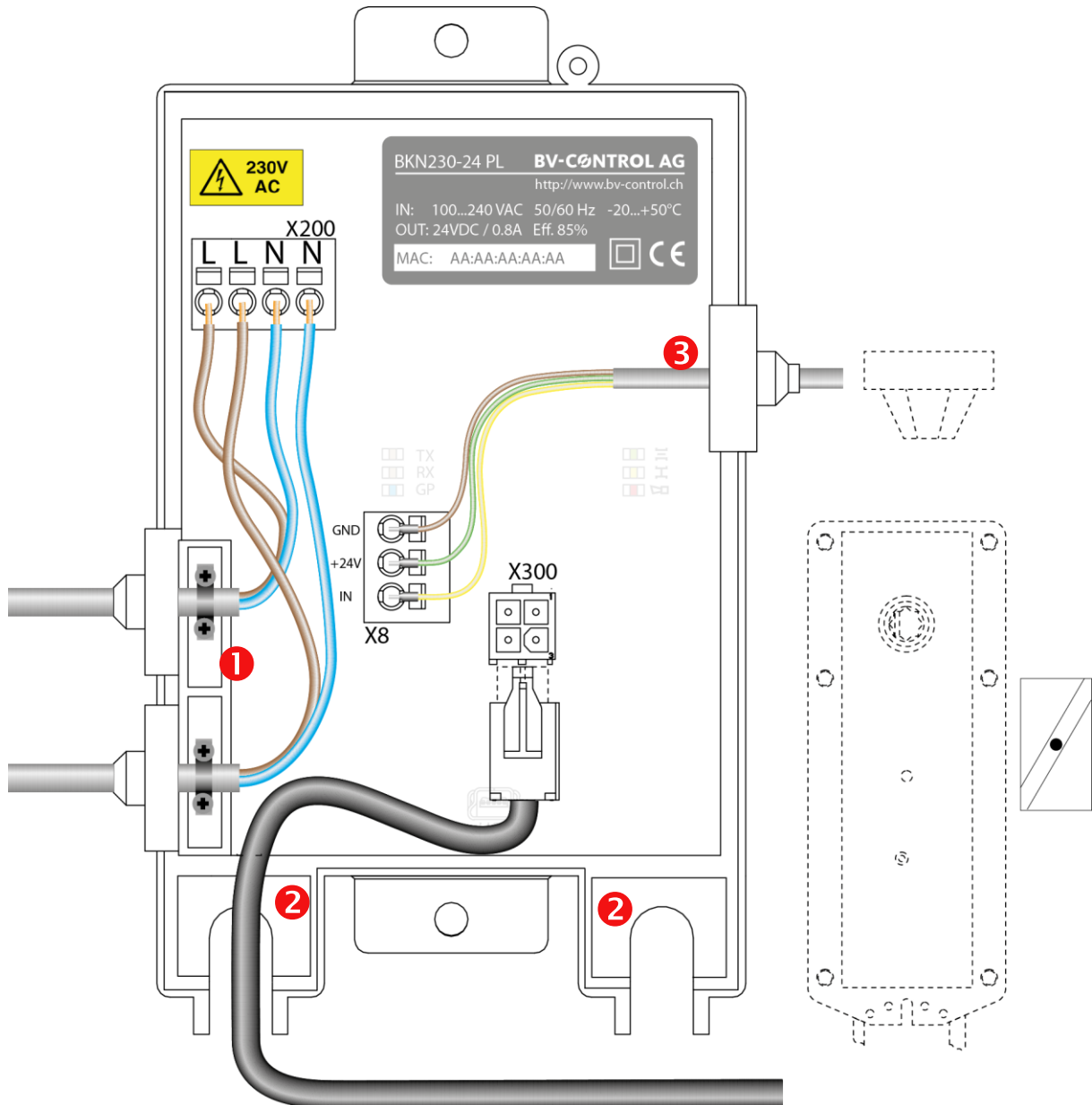
7.1 CABLE ROUTING INSIDE THE DEVICE WITH CONVENTIONAL ACTUATOR AND SMOKE DETECTOR

The following image shows how the cables can be routed inside the device. The 230VAC Powerline cables should be inserted through the corresponding strain relief devices (1). The cables of the conventional actuator are fed through the bottom openings (2). The grommet, top right (3), is used for the smoke detector.



7.2 WIRING WITH BELIMO TOPLINE ACTUATOR AND SMOKE DETECTOR

The cable of the communicative actuator (e.g. BF24TL-T-ST) is fed through the opening (2), on the bottom left or right.



8 CHARACTERISTICS AND FUNCTIONS

8.1 SWITCHING ON BEHAVIOR AND BOOTLOADER (SOFTWARE UPDATES)

After switching on the power, the device waits in bootloader mode for approx. 20 seconds. This is indicated by a steady blue LED. In this mode, the firmware of the slave can be updated via the Powerline signal via the master. The master may also end Bootloader mode before the 20 seconds has expired.

The device can be updated at any time directly via a USB cable. This update option is a precautionary measure in case of unforeseen system problems or new requirements.

The communication channels used are also set in bootloader mode. More about this in the next section.

Operating parameters such as e.g. the BUS timeout or the communication channels used can be set via the master at any time **without** firmware update.

8.2 COMMUNICATION

Communication with the master takes place via digital phase modulation (phase-shift keying) simultaneously on two frequencies. Depending on the connection quality, for each individual BKN the master can automatically select between different PSK types (B-PSK, Q-PSK, 8-PSK). In Addition, if connections are subject to strong interference, communication can only take place in the zero crossing phase.

8.3 BUS MONITORING

If the BKN receives no control signal from the master during the pre-set BUS timeout, it forces the actuator to travel to the safety position (fire damper only). This time can be set via the master.

8.4 ADDRESSING AND IDENTIFICATION

The device has a **unique physical MAC address** which permits automatic detection of the device by the Master. It is shown on the rating plate and is present in duplicate.

The **BUS-ID** (1..XX) is defined by the Powerline slave address. It is set to 0 as standard, i.e. the device is not addressed.

The BUS-ID can be assigned in different ways:

- Directly at the device via the USB interface and the Windows software "**BKN-PL Tool.exe**" (this option enables pre-addressing. The device must be connected to a 230 VAC power supply)
- Via the master (automatic, or via Drag and Drop)

As well as the BUS-ID, plain text identification is possible (**ID/Location**). It is optional and is used to locate the slaves within the building. Like the BUS-ID, it can be entered via the master or BKN software.

If pre-addressing is performed, a list (CSV file) can be produced automatically with the BKN-PL Tool.exe, in which MAC addresses, BUS-IDs and the identifiers are listed. To produce the list, you need to create a new project in the tool: **Edit -> New Project**:

MAC	Bus Id	Location	Time
00:04:a3:44:a7:78	1	HB_VW03_U04_TL001_F01	26.10.2017 10:20:24
00:04:a3:44:20:a2	2	HB_VW03_U04_TL001_F02	26.10.2017 10:21:14
00:04:a3:44:c9:ff	3	HB_VW03_U04_TL001_F04	26.10.2017 10:21:43

Content of the CSV file:

Project: Beispielprojekt			
Author: Robin Hohl			
MAC	Bus Id	Location	Time
00:04:a3:44:a7:78	1	HB_VW03_U04_TL001_F01	26.10.2017 10:20
00:04:a3:44:20:a2	2	HB_VW03_U04_TL001_F02	26.10.2017 10:21
00:04:a3:44:c9:ff	3	HB_VW03_U04_TL001_F04	26.10.2017 10:21

If dampers are installed in the wrong places in the building, the descriptions and the BUS-IDs are easily corrected via the Master. The pre-addressing list can be corrected in this case with Excel but needs to be saved as a CSV file so that it can be opened again with the BKN tool.

8.5 ACTUATOR TEST RUN

Pressing the **TEST** button allows checking that the damper reaches both limit positions.

8.6 TRAVEL TIME MONITORING / LIMIT SWITCH MONITORING

The damper must reach the limit positions in a pre-specified time. The BKN monitors the two travel times and sets a **mechanical error** message if they are exceeded.

The maximum allowed travel time can be set via the master. At initialization the BSK must reach the lower limit position, otherwise an "Initialization error" is set.

8.7 POWER CONSUMPTION MEASUREMENT AND MONITORING

The BKN230-24-PL can measure the power consumption of the actuator and cut off the power supply if it is too high. The threshold can be set via the master. If exceeded, an error message is set.

8.8 SMOKE DETECTOR MONITORING

Additionally, the BKN powers a smoke detector and monitors its switch contact. Again, an error is triggered if the **+24 V** contact and **IN** is not connected on terminal **X8**. **If the smoke detector is triggered, the power supply to the actuator is cut off directly.**

8.9 SUMMARY OF FAULTS

All faults are indicated by a red LED. The precise cause of the fault can be obtained from the master or the respective Windows software. The following faults exist:

Fault	Description	Remedy
INIT	Error at start up	Check connections and perform reset
ORS	+24V and IN not connected	Check smoke detector
Mechanical fault	Limit switches not reached in set time	Check limit switch cable and damper
Overload	Actuator's current consumption is too high	Check damper mechanically
BAE*	No actuator connected or BAE* triggered on actuator	Check connection and BAE* of the actuator
actuator connection lost	Connection to Top-Line actuator lost	Check connection of the Top-Line actuator
BAE* Top-Line	BAE* of the Top-Line actuator has triggered	Check BAE* of the TL actuator

BAE = Thermoelectric tripping device.

9 TOPOLOGIES, CABLE CROSS SECTIONS AND MAX. DISTANCES

The Powerline communication technology permits different topologies including star-shaped, line, bus or tree. The following limitation applies for all topologies:

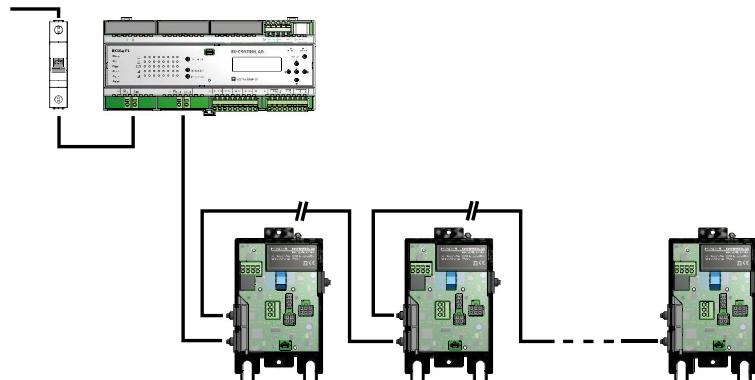
If there are fewer than 32 slaves and the maximum distance from master to BKN is less than 400m, an electrical installation cable with a cross section of 1.5mm² can be used.

From a distance (master to BKN) of 400m or a system with more than 32 slaves, a cross-section of 2.5mm² must be used. The maximum cable length from master to BKN must not exceed 1200m.

A number of topology examples are described below.

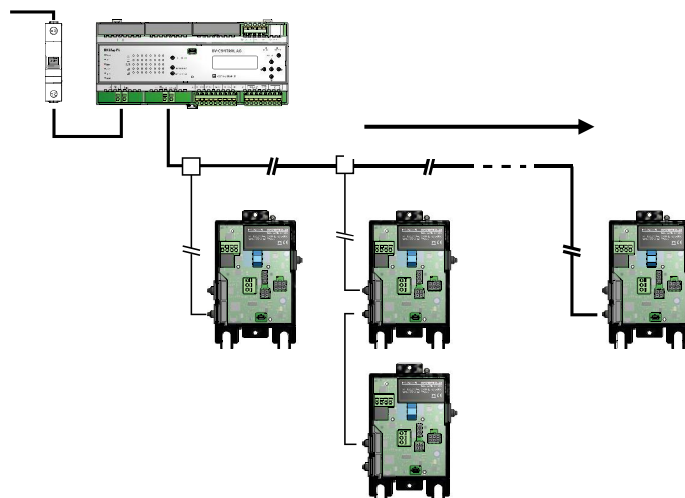
9.1.1 Line

Individual BKNs are daisy-chained directly in a linear topology



9.1.2 Basic BUS topology

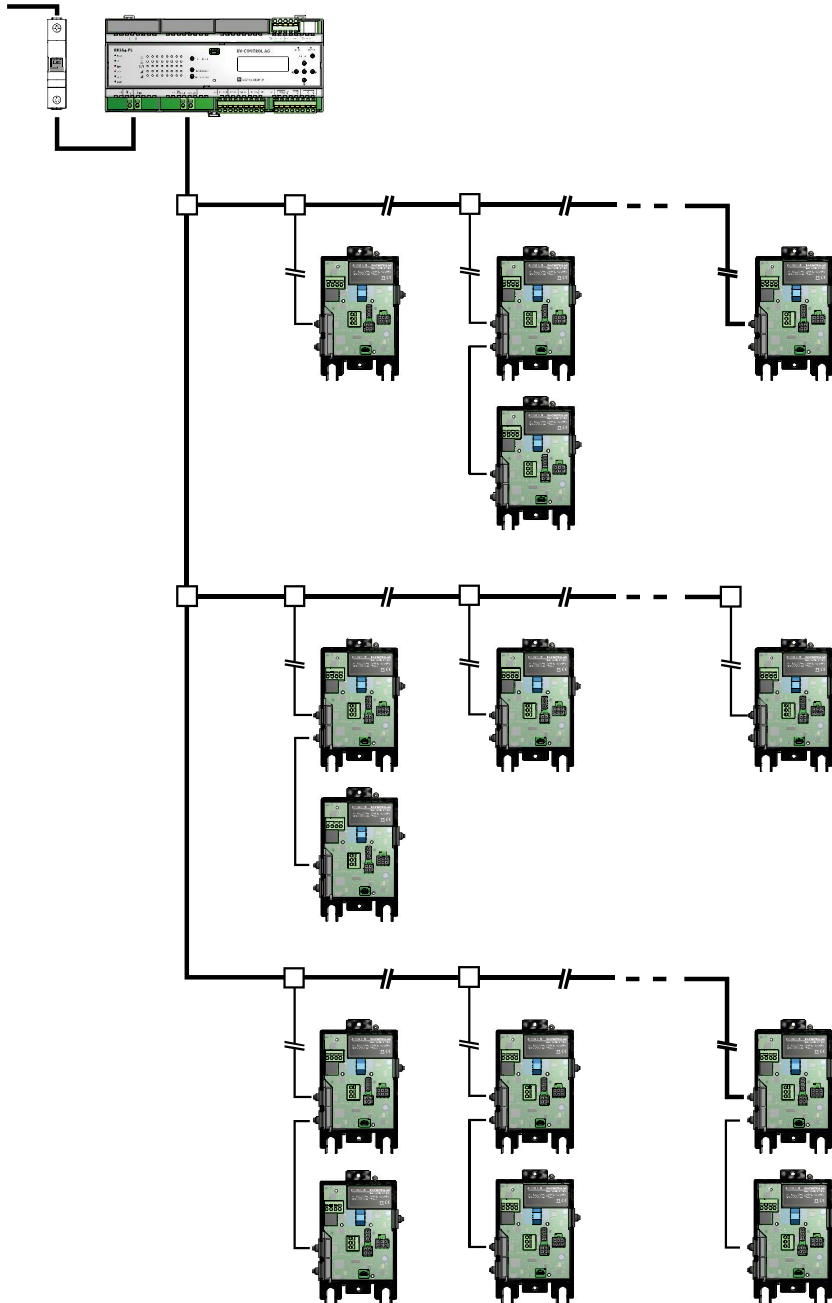
In the basic bus topology, the individual BSKs are connected via branches to a main line. Several BSKs can be daisy-chained vertically one after the other.



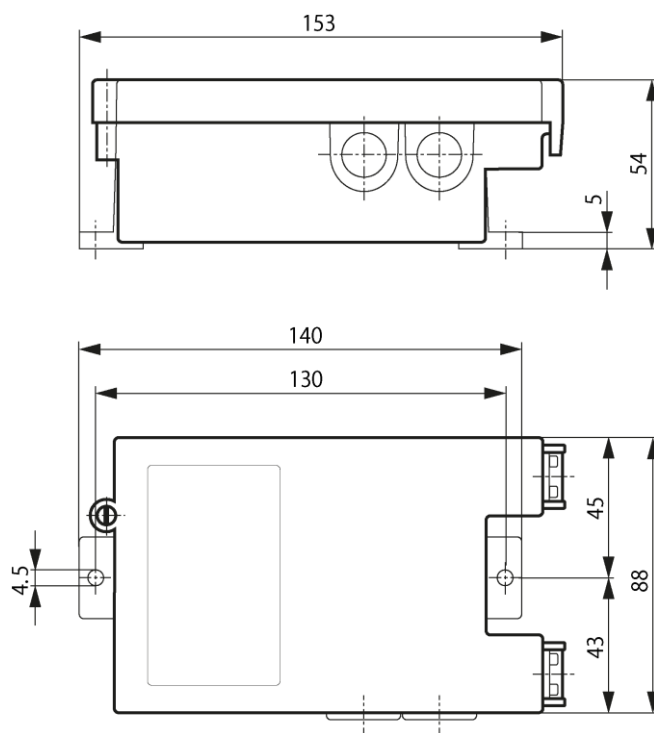
9.1.3 Extended BUS topology

Secondary lines can also be branched from a main line.

The maximum distance from the master to each BKN is again 1200 m. The overall length of all cables therefore may be several kilometres.



10 DIMENSIONS



Dimensions in mm

BV-CONTROL AG
Elektronische Steuersysteme

Russikerstrasse 37

8320 Fehraltorf

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