









en

OPERATING INSTRUCTIONS

ekey home converter LAN RS-485

ID 51/491/0/326: Version 4, 2015-11-12; Media Center ID: 3009

English

Translation of the original instructions – ID51/491/0/326

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1 General

ekey biometric systems GmbH operates a quality management system in compliance with EN ISO 9001:2008 and is certified accordingly.

1.1 Note

These instructions form a component of the product. Ensure that they are stored in a safe place. Please contact your dealer for further information about the product.

1.2 Product liability and limitation of liability

Safe operation and function of the devices can be impaired in the following situations. Liability due to malfunctioning is transferred to the operator/user in such cases:

- The system devices are not installed, used, maintained, and cleaned in accordance with the instructions
- The system devices are not used within the scope of proper use
- Unauthorized modifications are carried out on the system devices by the operator.

These operating instructions are not subject to updating. We reserve the right to make technical modifications and change the product's appearance; any liability for errors and misprints is excluded.

1.3 Warranty and manufacturer's warranty

The version of our general terms and conditions in force on the date of purchase shall apply. See http://www.ekey.net.

2 Notices, symbols, and abbreviations

NOTICE

Denotes additional information and useful tips.

DANGER

Denotes imminent danger which could lead to death or serious injuries.

ATTENTION

Denotes possible property damage which cannot result in injuries.

Symbols:

1.	Step-by-step instructions
	References to sections of these instructions
	References to the mounting instructions
	References to the wiring diagram
Displayed value	Displayed values
ekey home CV LAN RS-485	Product names
MENU ITEM	Menu items
Button	Buttons

Abbreviations and terminology

CV	Converter
Data sink	Destination of the data
IP address	Internet Protocol address. The IP address serves to identify a computer on a network. IP addresses are not specific to a device and can be changed.
LAN	Local Area Network. A local network for network-compatible devices.
MAC address	Media Access Control address. The MAC address provides each network interface controller on the network with a unique ID.
RS-485 bus	Totality of all ekey home/multi devices which are networked serially via a 2-core cable, including the *ekey home converter LAN RS-485*
UDP	User Datagram Protocol. The User Datagram Protocol is used to send unique data packets to applications on the network.

3 Safety information

3.1 Life-threatening danger resulting from electricity

DANGER

All *ekey home* devices are to be operated with safety extra-low voltage (SELV). Only use power supplies rated protection class 2 according to VDE 0140-1 to supply *ekey home* devices.
Failure to do so will create a risk of electrocution.
Only certified electricians are authorized to carry out the electrical installation work!

3.2 Tamper-proofing

Mount the converter in a safe internal area. This prevents tampering from the outside.

4 Product description

4.1 System overview

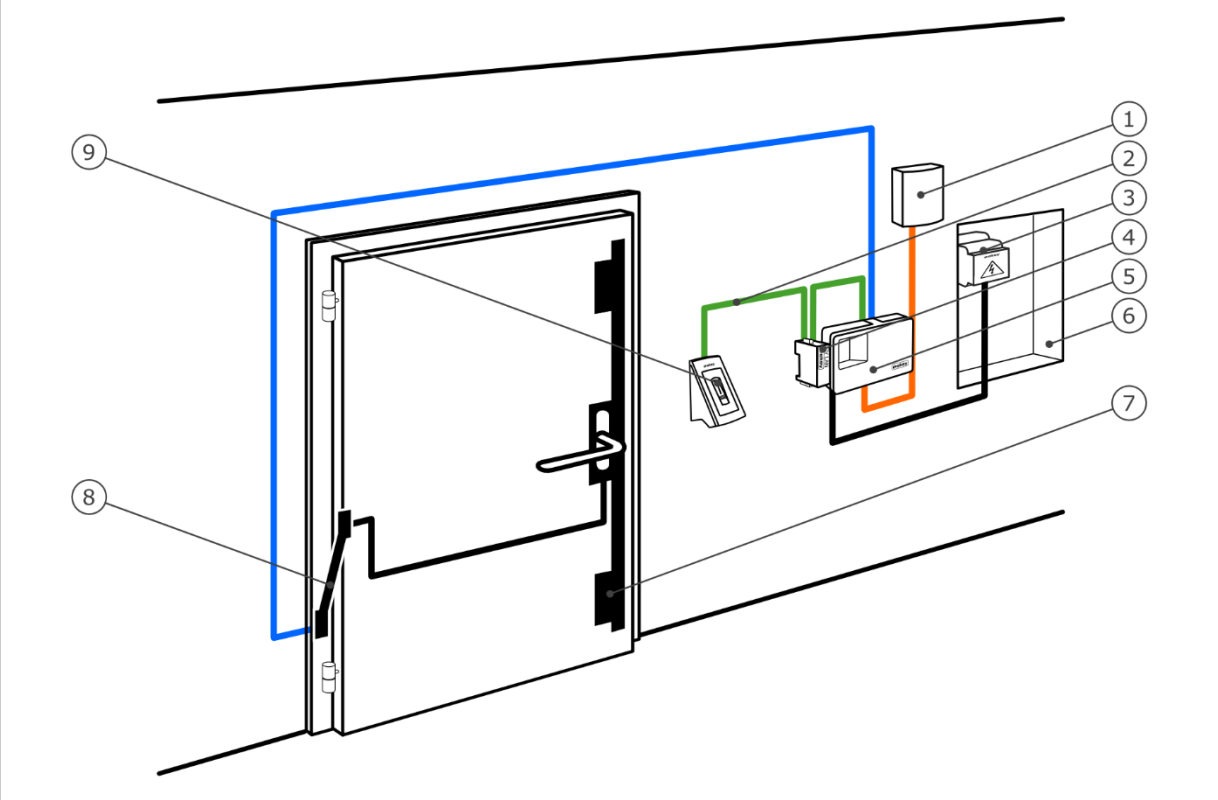


Fig. 1: Overview of the system (example)

1 Third-party system
2 ekey RS-485 bus
3 Power supply
4 LAN RS-485 converter
5 Control panel
6 Distributor
7 Motorized lock
8 Cable transfer
9 Finger scanner

4.2 Scope of delivery

- LAN RS-485 converter;
- Software CD: *ekey home converter LAN config* software, Operating instructions, wiring diagram, data sheet;
- Optional: Finger scanner, control panel, USB converter, cable transfer, power supply, connection cable, covers, etc.

4.3 Proper use and areas of application

This product is an accessory for a finger scan access control system. The device is integrated into the system. The system is comprised of a finger scanner, control panel, converter, and receiver (data sink). It is available in various modells and component combinations. For certain activities, the converter sends a defined data packet in the UDP protocol on the RS-485 bus via the Ethernet network. Data is transmitted in one direction from the *ekey home* or *ekey multi* system to the receiver, and never the other way round.

The system is used to establish a data connection between the *ekey home* or *ekey multi* system and a defined receiver, such as a Home Automation System.

4.4 Requirements for the installer

The following skills and knowledge are needed to commission the *ekey home* or *ekey multi* system with LAN RS-485 converter:

- Electrical connection: The system installer must be familiar with electrical connections and be competent in this field in order to guarantee safe operation.
- Data transmission: The system installer must be familiar with network technology and IP addressing in order to install and configure the system correctly.
- Data processing: The creator/operator of the receiver (data sink) must be familiar with data technology and data processing in order to adjust the interface correctly.

4.5 Requirements for the user

No particular skills or knowledge are needed to use the *ekey home* or *ekey multi* system with LAN RS-485 converter. No alterations or servicing should be carried out after the system has been correctly commissioned by qualified personnel, unless the fundamental system properties (network structure, addressing, etc.) change.

4.6 LAN RS-485 converter

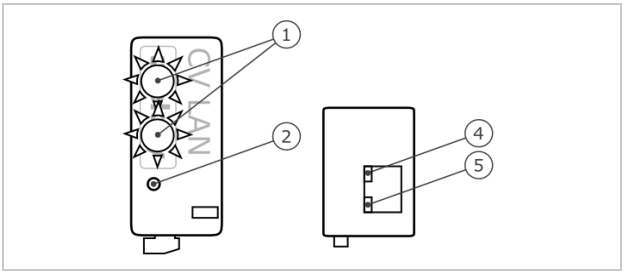
4.6.1 Function of the converter

For certain activities, the converter sends a defined data packet in the UDP protocol on the RS-485 bus via the Ethernet network. A receiver (data sink) can interpret this data packet and set a defined event. The converter supports three protocol types: rare, home, and multi. Configuration of the protocol type and the network settings is carried out using the *ekey home converter LAN config* software.

The converter functions in conjunction with the following ekey control panels:

- *ekey home CP WM 1*
- *ekey home CP WM 3*
- *ekey home CP IN 1*
- *ekey home CP IN 2*
- *ekey home CP DRM 1*
- *ekey home CP DRM 2*
- *ekey multi CP DRM 4*

4.6.2 Controls and visual signals on the converter



1 Status LED
2 Button
3 10/100 LED
4 Link/activity LED

Fig. 2: Overview of ekey home CV LAN RS-485

The converter has two status LEDs for displaying operating statuses. Two LEDs on the RJ45 socket for displaying network statuses. There is a button for restarting the device/resetting the device to its default settings.

Button operation	Function
Press and hold button for >0.3 sec.	The converter is restarted.
Press and hold button for >10 sec.	Reset to default settings.

Table 1: Button operation of ekey home CV LAN RS-485

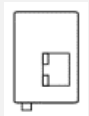
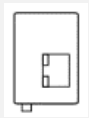
Display		Description
	Status LED flashes green.	Normal mode. The sent packets can be decrypted.
	Status LED flashes red.	Incorrect connection. The sent packets cannot be decrypted.
	Status LED lights up red.	Software error/update required.
	The lower status LED flashes red briefly.	Converter is starting/reset to default settings was carried out.
	Link/activity LED off.	No network connection.
	Link/activity LED flashing.	Network activities.
	Link/activity LED on.	Network connection enabled.
	10/100 LED off.	LAN speed 10 Mb.
	10/100 LED on.	LAN speed 100 Mb.

Table 2: Visual signals of ekey home CV LAN RS-485

4.6.3 Default settings

The LAN RS-485 converter comes with the following default settings.

ekey converter LAN RS-485	
IP address	192.168.1.250
Network mask	255.255.255.0
Network gateway	0.0.0.0
Receiver port	56000
Receiver IP address	0.0.0.0
Spacer	_
Protocol type	rare
Communication type	data transmission only

Table 3: Default settings of ekey home CV LAN RS-485

4.7 Protocol types

The converter supports three protocol types for sending data packets over the Ethernet network:

- **rare protocol**: Complex protocol for system developers who are incorporating an *ekey home* system. The data is transferred in binary format. This protocol is the default setting.
- **home protocol**: Simple protocol for automation technicians who are incorporating an *ekey home* system. The data is transferred in string format.
- **multi protocol**: Simple protocol for automation technicians who are incorporating an *ekey multi* system. The data is transferred in string format.

The individual data fields can be separated by means of a spacer. This character is defined in the settings. The spacer takes effect in the home and multi protocols.

4.7.1 Structure of a data packet with the rare protocol

The rare protocol can only be used in *ekey home* systems. This protocol has the following structure:

Position	Data set	Data type	Values and meaning
1	nVersion	Long	3
2	nCmd	Long	0x88 = Decimal 136.. Open door with finger 0x89 = Decimal 137.. Wrong or unrecognized finger
3	nTerminalID	Long	Address of the finger scanner. See calculation below.
4	strTerminalSerial	Char[14]	0
5	nRelayID	Char[1]	0.. Relay 1 1.. Relay 2 2.. Relay 3 15.. Double relay
6	nReserved	Char[1]	Empty
7	nUserID	Long	User number according to *ekey home control panel:* 1.. User 1 2.. User 2 3.. User 3 .. 99.. User 99 0.. Unrecognized user
8	nFinger	Long	Finger number according to *ekey home control panel:* 0.. Finger 1 1.. Finger 2 2.. Finger 3 .. 8.. Finger 9 9.. Finger 0 13.. RFID
9	strEvent	Char[16]	0
10	sTime	Char[16]	0
11	strName	Unsigned short	0
12	strPersonalID	Unsigned short	0

Table 4: Structure of a data packet with the rare protocol

Calculating the address of the finger scanner

The serial number of the finger scanner is required to calculate the address. This can be found on the label attached to the finger scanner. The serial number is composed of multiple parts:

Part no.	Production week	Production year	Sequential number
aaaaaa	ww	yy	ssss
801310	10	11	0405

Table 5: Serial number structure with example

Calculation formula:

Address = (((yy * 53 + ww) * 655367)) + ssss) + 0x70000000

Example calculation:

ww = 10 = 0xA
yy = 11 = 0xB
ssss = 0405 = 0x195

Address = (((0xA * 53 + 0xB) * 655367) + 0x195) + 0x70000000
= ((0x21D * 655367) + 0x195) + 0x70000000
= (0x21D0000 + 0x195) + 0x70000000
= 0x21D0195 + 0x70000000
= 0x721D0195

4.7.2 Structure of a data packet with the home protocol

The home protocol can only be used in *ekey home* systems. Data packets are created for each recognized finger and every time a refusal takes place at the finger scanner. The data fields within the data packet are ASCII-encoded. This protocol has the following structure:

Data field name	Number of digits	Data type	Value range	Meaning
PACKET TYPE	1	String	1	"User data" packet type
USER ID	4	String (decimal)	0000-9999	User number (default 0000)
FINGER ID	1	String (decimal)	0-9	1.. = left little finger 2.. = left ring finger 3.. = left middle finger 4.. = left index finger 5.. = left thumb 6.. = right thumb 7.. = right index finger 8.. = right middle finger 9.. = right ring finger 0.. = right little finger R.. RFID "-".. no finger
SERIAL NO. FS	14	String	xxxxxx xx xx xxxx	Digits 1-6 = Part no. Digits 7-8 = Production week Digits 9-10 = Production year Digits 11-14 = Sequential number
ACTION	1	String	1, 2	1.. Open 2.. Refuse unrecognized finger
RELAY	1	String	1-4; "-"	1.. Relay 1 2.. Relay 2 3.. Relay 3 4.. Relay 4 d.. Double relay "-".. no relay

Table 6: Structure of a data packet with the home protocol

Examples:

The finger scanner in the example has the serial number 80156809150025

- **Opening:** The user who is assigned number 46 swipes his/her left index finger – which switches relay 2 – over the finger scanner. The finger is recognized and the control panel switches relay 2. The following data set is sent:
  1_0046_4_80156809150025_1_2
- **Refusal:** An unrecognized finger is swiped over the finger scanner. The following data set is sent:
  1_0000_–_80156809150025_2_-

4.7.3 Structure of a data packet with the multi protocol

The multi protocol can only be used in *ekey multi* systems and is essential for this system. Data packets are sent for each recognized finger or each time a refusal takes place at the finger scanner, and when the digital input is enabled. The data packet is sent for every finger scanner in the *ekey multi* system. The data fields within the data packet are HEXASCII-encoded. This protocol has the following structure:

Data field name	Number of digits	Data type	Value range	Meaning
PACKET TYPE	1	String	1	"User data" packet type
USER ID	4	String (decimal)	0000-9999	User number (default 0000)
USER NAME	9	String	xxxxxxxxx	User name xx.. alphanumeric -.. undefined
USER STATUS	1	String	0, 1, "-"	0.. Disable user 1.. Enable user "-".. undefined
FINGER ID	1	String (decimal)	0-9	1.. left little finger 2.. left ring finger 3.. left middle finger 4.. left index finger 5.. left thumb 6.. right thumb 7.. right index finger 8.. right middle finger 9.. right ring finger 0.. right little finger "-".. no finger
KEY ID	1	String	1-4; "-"	1.. Key 1 2.. Key 2 3.. Key 3 4.. Key 4 "-".. Master key
SERIAL NO. FS	14	String	xxxxxx xx xx xxxx	Digits 1-6 = Part no. Digits 7-8 = Production week Digits 9-10 = Production year Digits 11-14 = Sequential number
NAME FS	4	String	xxxx	Finger scanner designation
ACTION	1	String	1-8	1.. Open 2.. Refuse unrecognized finger 3.. Refuse time slot A 4.. Refuse time slot B 5.. Refuse disabled 6.. Refuse "Only always users" 7.. Finger scanner not connected to control panel 8.. digital input A.. Code pad 1-minute lock B.. Code pad 15-minute lock
INPUT ID	1	String	1-4; "-"	1.. digital input 1 2.. digital input 2 3.. digital input 3 4.. digital input 4 "-".. no digital input

Table 7: Structure of a data packet with the multi protocol

Examples:

The finger scanner in the example has the serial number 80156809150025

- **Opening:** The user who is assigned number 3 and has the name "Joseph" swipes his right index finger – which serves as key 2 and switches relay 2 – across the finger scanner that has been allocated number 2 and has the name "GAR". The finger is recognized and relay 2 switches. The following data set is sent:
  1_0003_JOSEPH---_1_7_2_80156809150025_GAR-_1_-
- **Time slot A refusal:** The user who is assigned number 3 and has the name "Joseph" swipes his right index finger – which serves as key 2 and switches relay 2 – across the finger scanner that has been allocated number 2 and has the name "GAR". The finger is recognized, but entry is refused as Joseph is not permitted access when time slot A is enabled. The following data set is sent:
  1_0003_JOSEPH---_1_7_2_80156809150025_GAR-_3_-

4.8 Configuration tool

The *ekey home converter LAN config* software serves as a configuration tool. This can be found on the CD supplied with the *ekey home converter LAN RS-485* and is also available to download from the ekey homepage. Click on the following link to go to the download area: http://www.ekey.net.

4.8.1 Function of the configuration tool

The configuration tool is used to configure and set the parameters for the converter.

4.8.2 Software requirement

The software only operates on MS Windows operating systems.

5 Technical specifications

Name	Unit	Values
Supply	VDC	8-24
Power consumption	W	Approx. 1
Temperature range	°C	-25 to +75
Baud rate at the RS-485 end	Bd	115200
IP code	IP	20

Table 8: Technical specifications: ekey home CV LAN RS-485

6 System setup

The converter is integrated directly into the ekey RS-485 bus.

6.1 *ekey home* variant

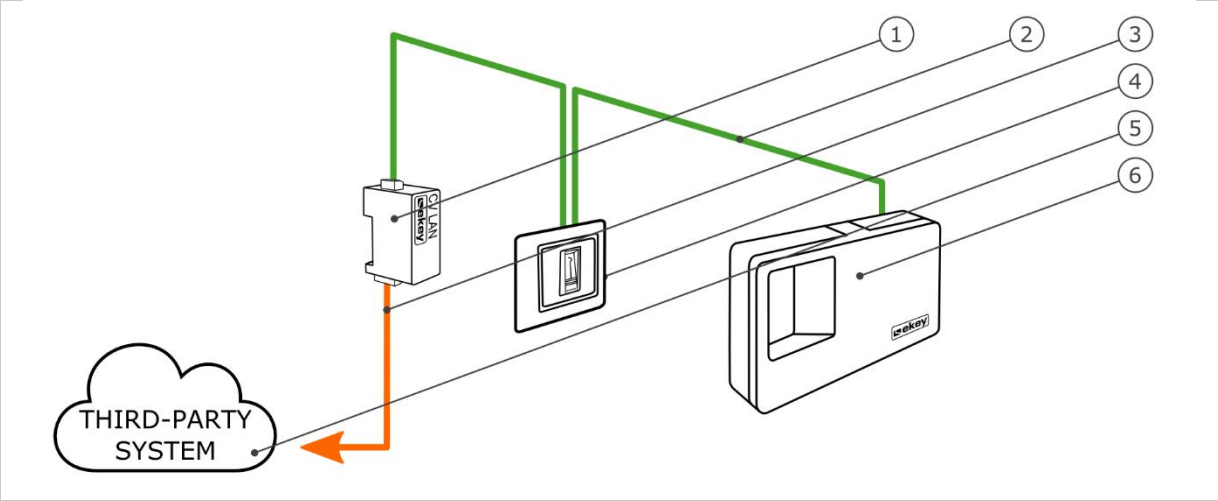


Fig. 3: Overview of the ekey home *variant*

1 LAN RS-485 converter
2 ekey RS-485 bus
3 LAN connection cable for third-party system
4 Finger scanner
5 Third-party system
6 Control panel

The *ekey home* variant comprises a finger scanner, a control panel, a converter, and an interface to the third-party system. The converter transmits the defined data packet from the finger scanner to the third-party system.

6.2 *ekey multi* variant

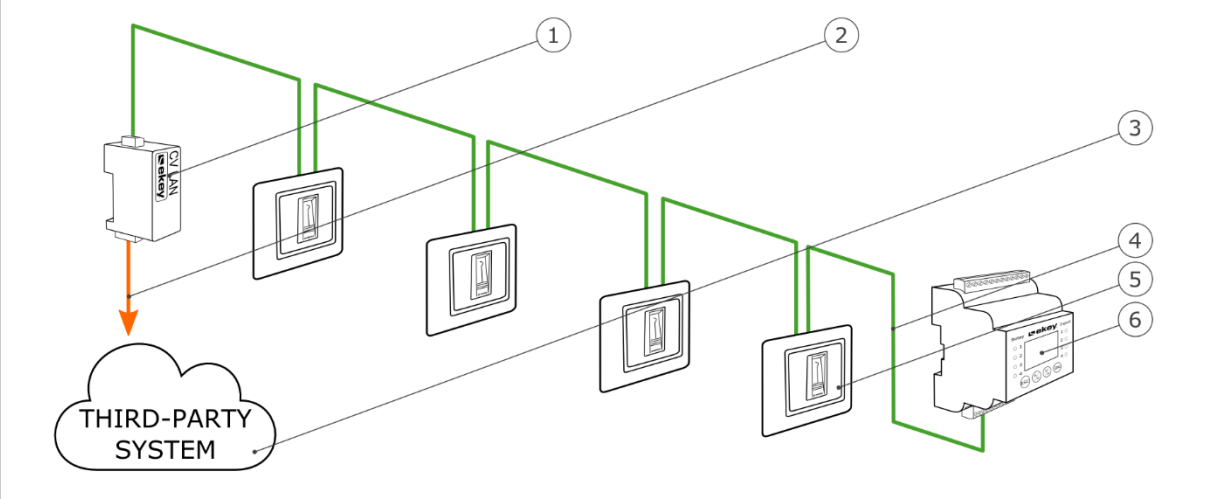


Fig. 4: Overview of ekey multi *variant*

1 LAN RS-485 converter
2 LAN connection cable for third-party system
3 Third-party system
4 ekey RS-485 bus
5 Finger scanner 1-4
6 Control panel

The *ekey multi* variant comprises up to four finger scanners, a control panel, a converter, and an interface to the third-party system. The converter transmits the defined data packet from each finger scanner to the third-party system.

7 Converter configuration

7.1 Preparing for configuration

The following components are required to configure the converter:

- PC with MS Windows operating system and Ethernet interface;
- *ekey home converter LAN config* software;
- Network cable;
- Power supply.

The PC must be on the same network as the *ekey home converter LAN RS-485* if you have already commissioned your system.

NOTICE

Connect the *ekey home converter LAN RS-485* to your PC without a router.

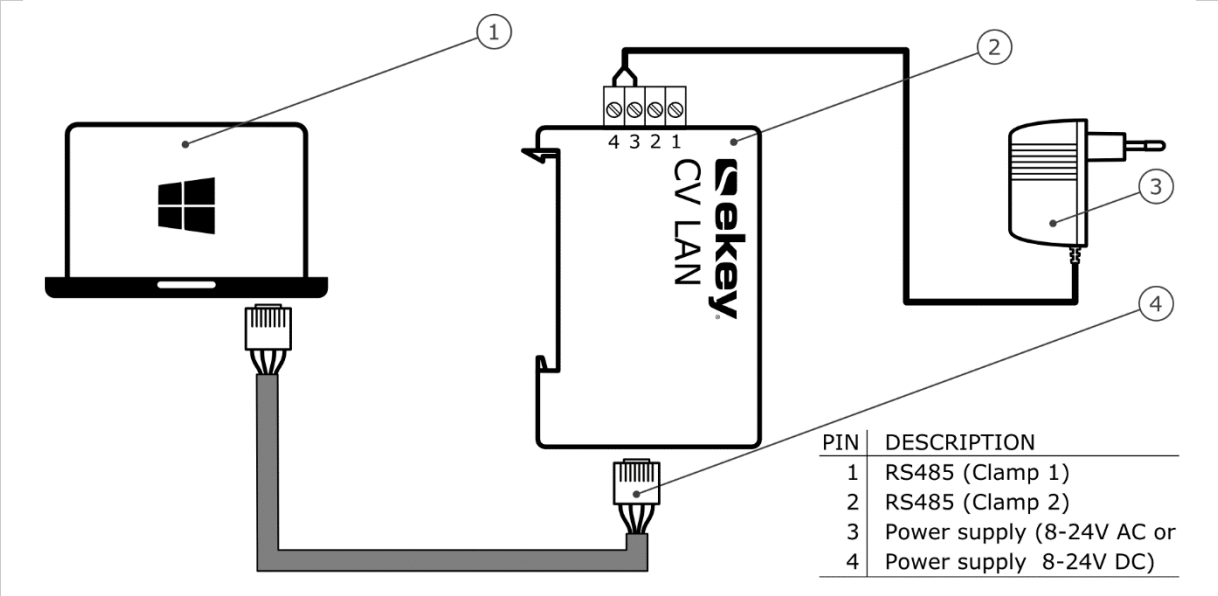


Fig. 5: Wiring diagram for configuring the converter

1 PC with MS Windows operating system
2 LAN RS-485 converter
3 Power supply
4 Network cable

Cable the system according to the wiring diagram (Fig. 5).

ATTENTION

The device connections are not polarity reversal protected!
Possible property damage!
Check the configuration of the wires carefully before connecting the grid supply.

Step	Instruction
1st	Connect the network cable to the converter and the PC.
2nd	Connect the power supply to the grid supply.

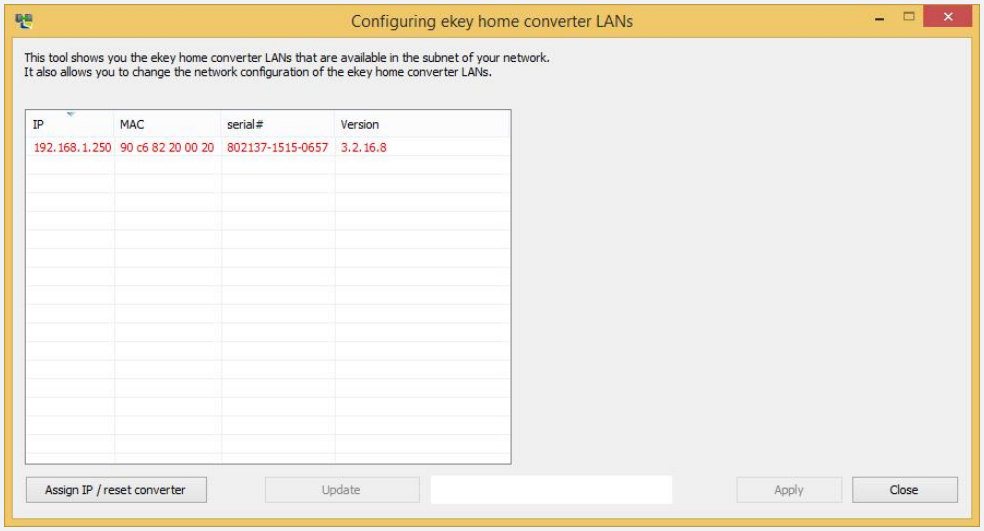
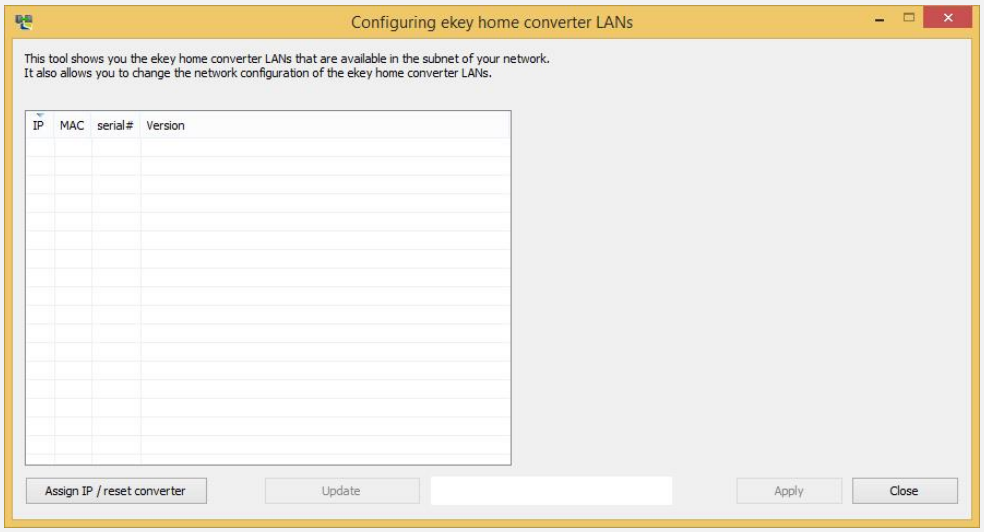
The system is ready for integration into the network.

7.2 Integrating the converter into the network

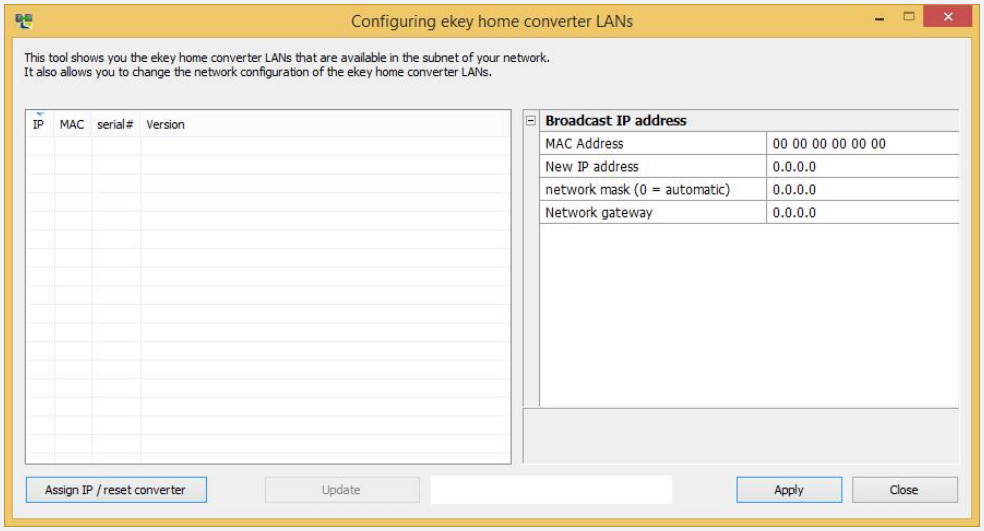
Settings relating to the network are necessary for identifying the converter on the network. For this, you must obtain an IP address, the network mask, and the network gateway from the system administrator.

Prepare the system for integration into the network.

See Preparing for configuration, page 16.

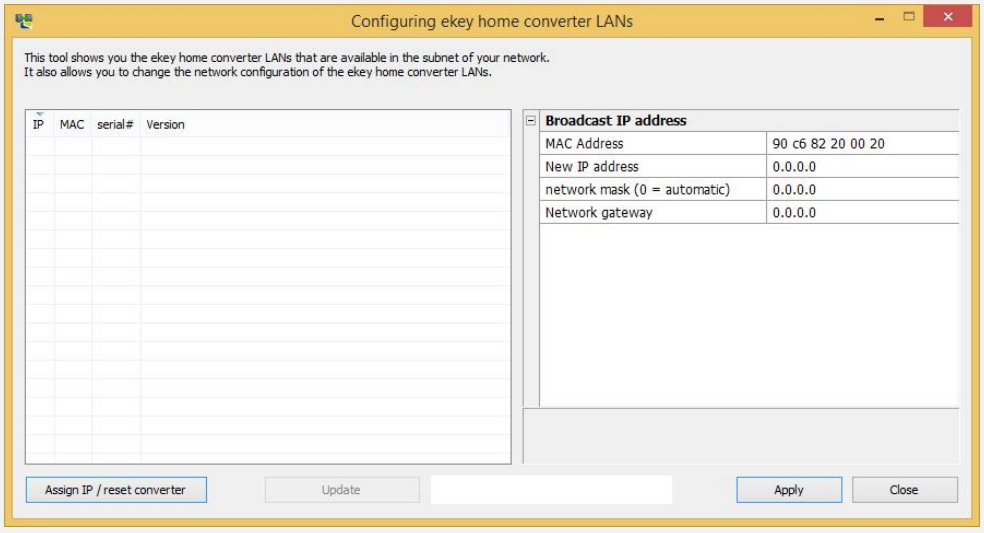
Step	Instruction
1st	Start the *ekey home converter LAN config* software.
2nd	**Variant a:** The start screen is displayed and the *ekey home converter LAN RS-485*, which is not configured, is displayed in the device list on the left. Select the converter and go to step 3.  **Variant b:** The start screen is displayed and no *ekey home converter LAN RS-485* is displayed in the device list on the left.  Click on Assign IP / reset converter so that you can use the *ekey home converter LAN RS-485* to establish a connection.

Step	Instruction
	The input screen opens on the right-hand side of the configuration tool.

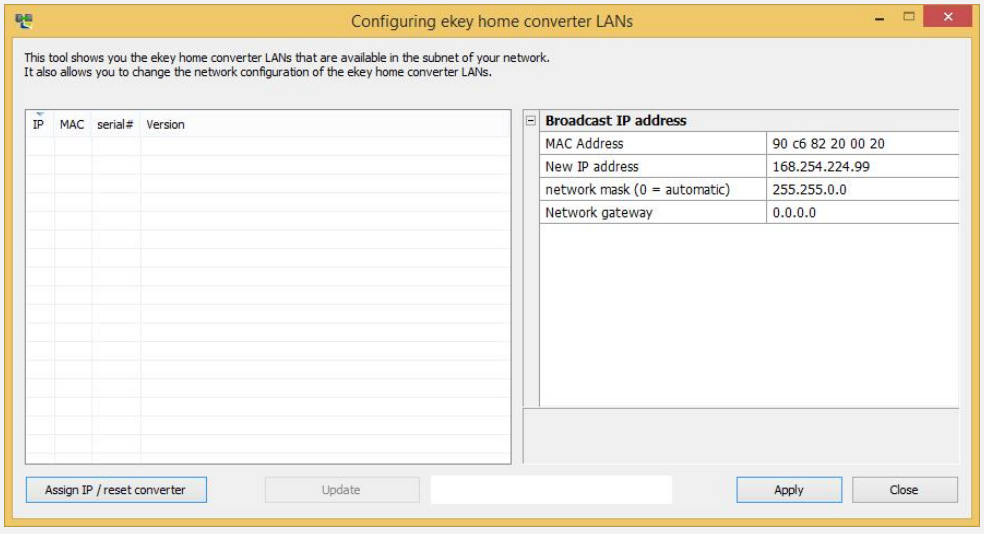


Specify the MAC address of the *ekey home converter LAN RS-485*. The 12-digit MAC address can be found on the label on the bottom of the converter.

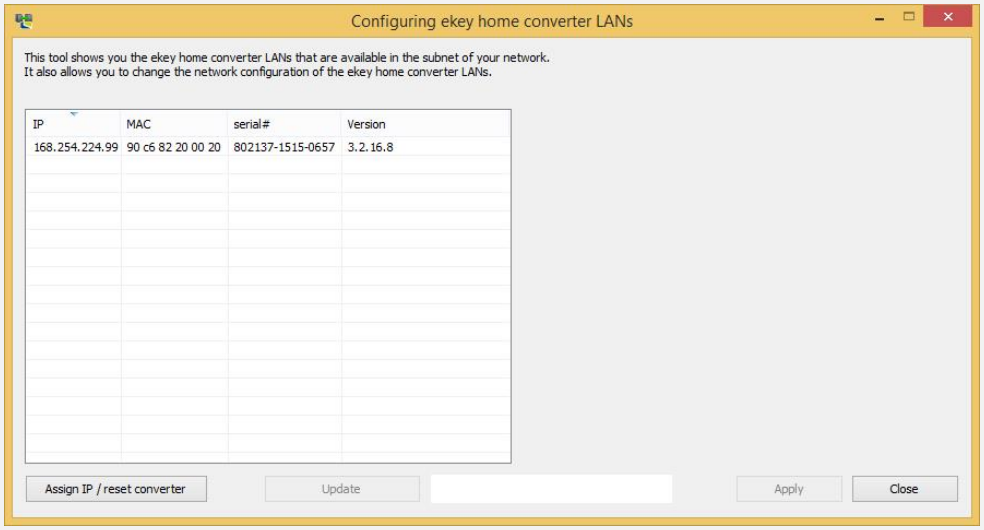
Enter the determined MAC address.



3rd	Enter the desired new IP address, the network mask, and the network gateway in the input fields.



Step	Instruction
4th	Click on Apply.
5th	After a few seconds, the configured *ekey home converter LAN RS-485* appears in the device list on the left.



The *ekey home converter LAN RS-485* is accessible on the network and ready for data packet configuration.

IP	MAC	Serial#	Version
169.254.224.99	90 c6 B2 20 00 01	802137-1315-0218	3.2.15.18
IP address of the *ekey home CV LAN RS-485*	MAC address of the *ekey home CV LAN RS-485*	Serial number of the *ekey home CV LAN RS-485*	Firmware version

Table 9: Description of the device list

7.3 Configuring data packets

You can use the configuration tool to configure data packets and set their parameters. The following aspects must be set:

- The receiver port;
- The receiver IP address;
- The spacer;
- The protocol type;

Receiver port and receiver IP address

The receiver port and the receiver IP address define the receiver (data sink) uniquely on the network.

NOTICE

The receiver port and the default transmitter port (56000) must be activated on the network. In the router settings, make sure that the defined ports are also freely routed to the receiver.

Spacer and protocol type

The spacer and the protocol type define the composition of the data packet. The receiver must be able to read and interpret the defined data packet.

Depending on the system you are using, there are three protocol types you can set.

See Protocol types, page 9.

Communication type

Only data transmission works with the *ekey home converter LAN RS-485*. The communication type must therefore remain set to data transmission only.

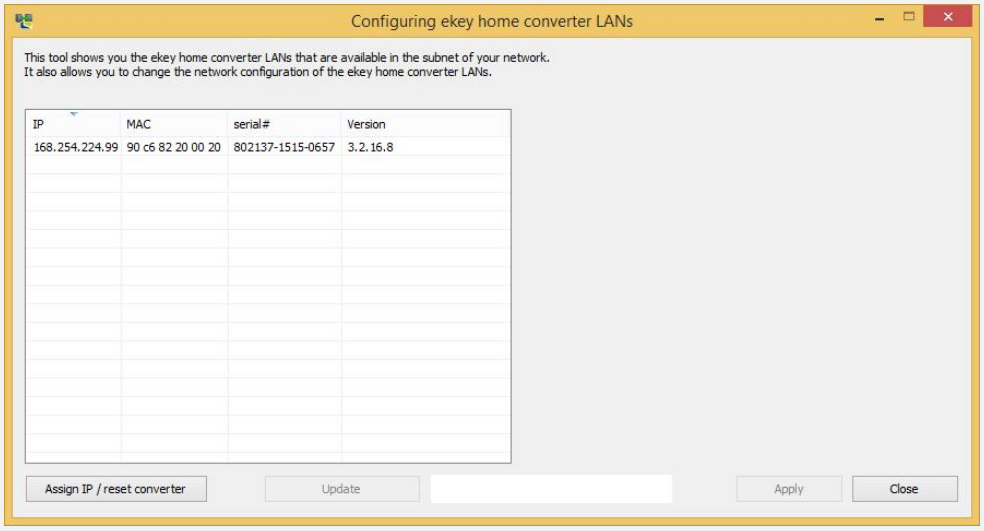
NOTICE

Adapt the data packet in line with the options for the receiver (data sink). See the documents provided by the third-party system supplier for information on how to do this.

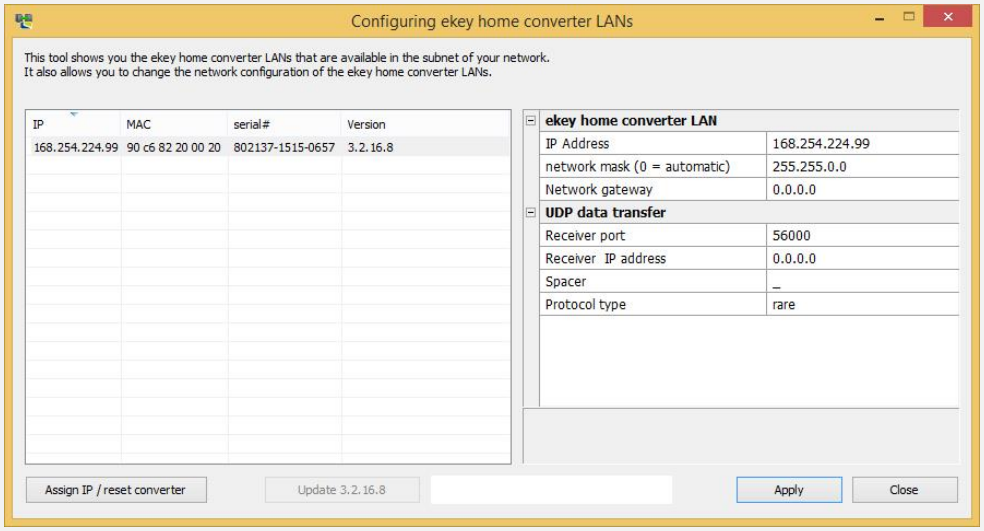
The converter must be integrated into the network.

See Integrating the converter into the network, page 17.

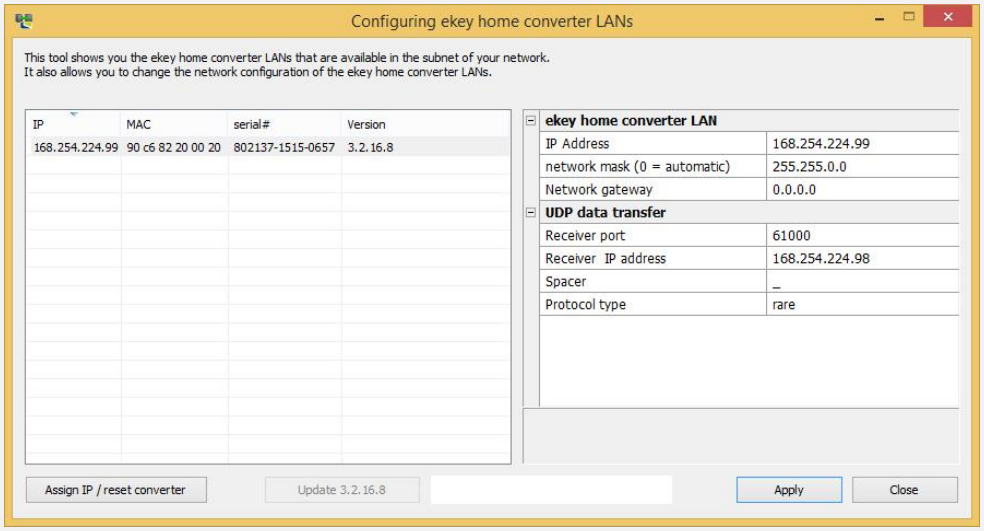
Step	Instruction
1st	Click on the desired *ekey home converter LAN RS-485* in the device list.



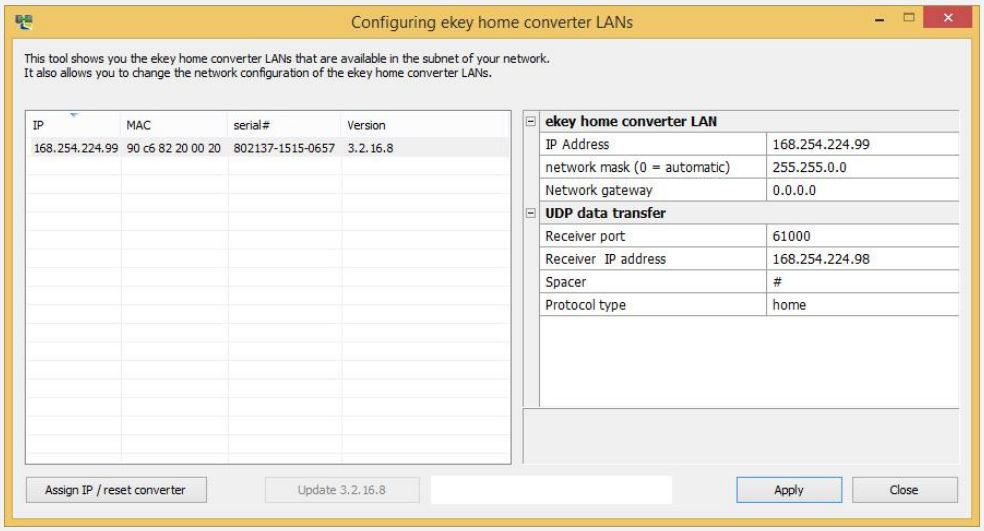
2nd	The input screen opens on the right-hand side of the configuration tool.



Step	Instruction
3rd	Enter the receiver port and receiver IP address in the input fields.



4th	Select a spacer and the protocol type.



5th	Click on Apply.

Configuration of the data packet is complete. The converter is ready for installation. If the converter is already integrated into the system, installation is not required.

8 Installation

ATTENTION

Mount and cable the product correctly before connecting power.
Possible property damage!
Do not connect the grid supply beforehand!

Mount the system in accordance with the supplied mounting instructions.

Cable the system in accordance with the supplied wiring diagram.

Step	Figure	Description
1st	-	Ensure safe installation of the devices. Close the covers.
2nd	-	Connect the power supply to the mains.
3rd		The status LED flashes red: Incorrect connection. The sent packets cannot be decrypted.
4th		The status LED flashes green: Normal mode. The sent packets can be decrypted.
5th		If no LEDs light up, check the wiring and power supply.

The system has been installed. The data connection between the two systems has been established. The system is ready for use.

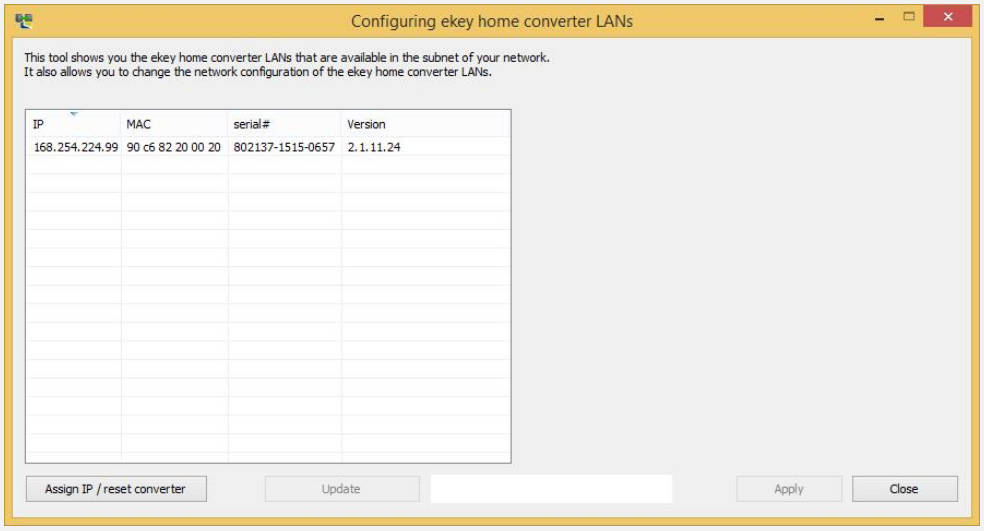
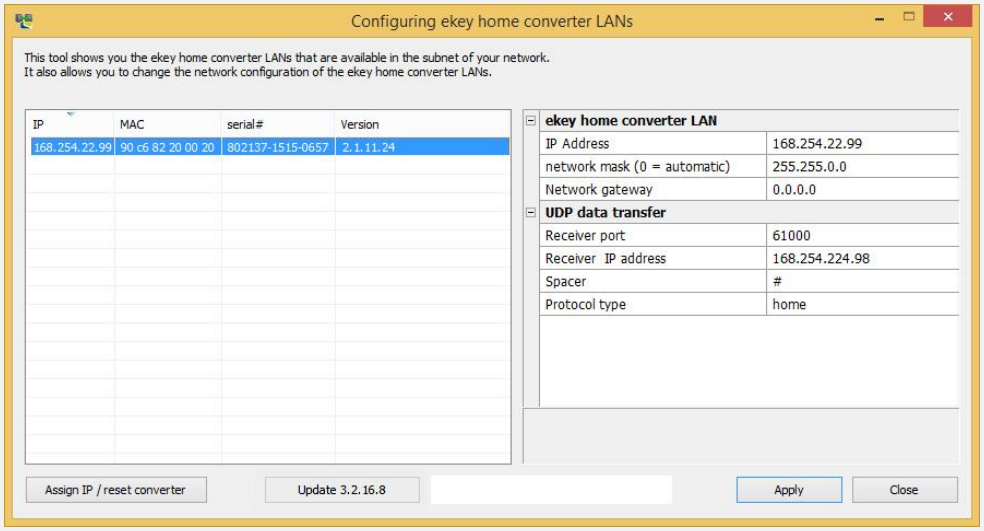
NOTICE

For information regarding the further processing of the sent data packets in the third-party system, refer to the documents provided by the third-party system supplier.

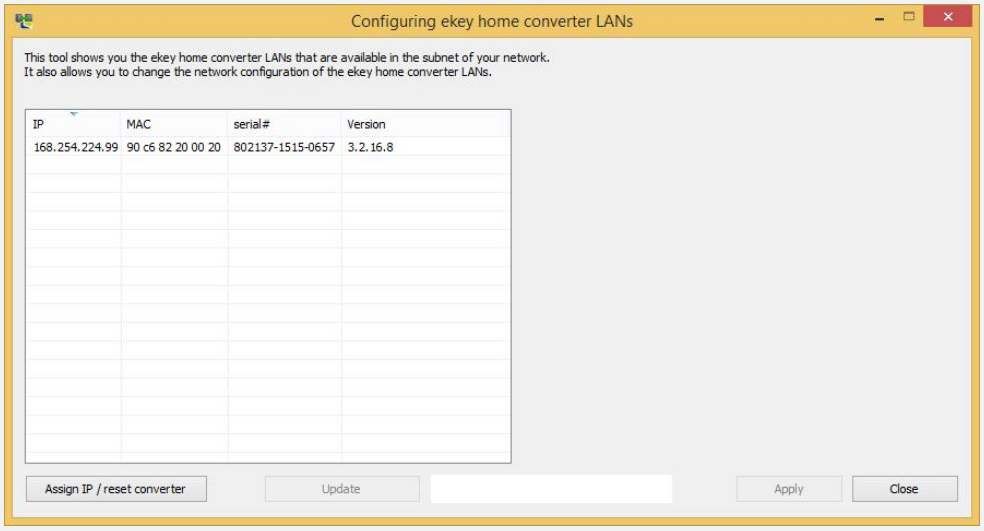
9 Updating the software

The software update is initiated via the configuration tool. The system must be prepared for the update.

See Preparing for configuration, page 16.

Step	Instruction
1st	Start the *ekey home converter LAN config* software.
2nd	The start screen is displayed. 
3rd	Select the converter you want to update. 
4th	Click on Update x.x.x.x.

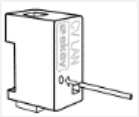
Step	Instruction
5th	After a few seconds, the updated *ekey home converter LAN RS-485* appears in the device list on the left.



The converter has been updated.

10 Restarting the converter

A restart is initiated via the converter. The configured settings of the converter remain unaffected.

Step	Figure	Description	Display
1st		Press and hold the button with the operating rod for at least 0.3 seconds.	 Status LED flashes red. The lower status LED flashes red briefly.

The converter has been restarted.

11 Resetting default settings

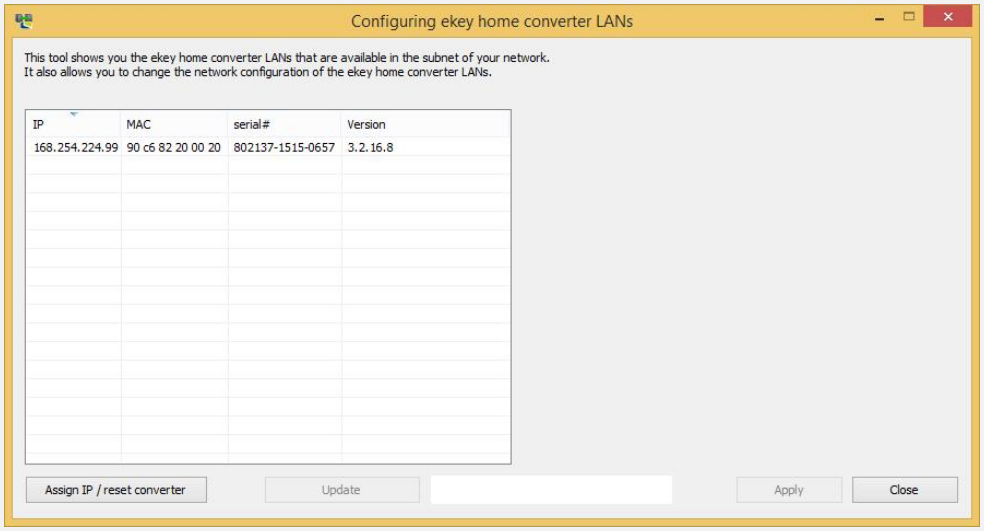
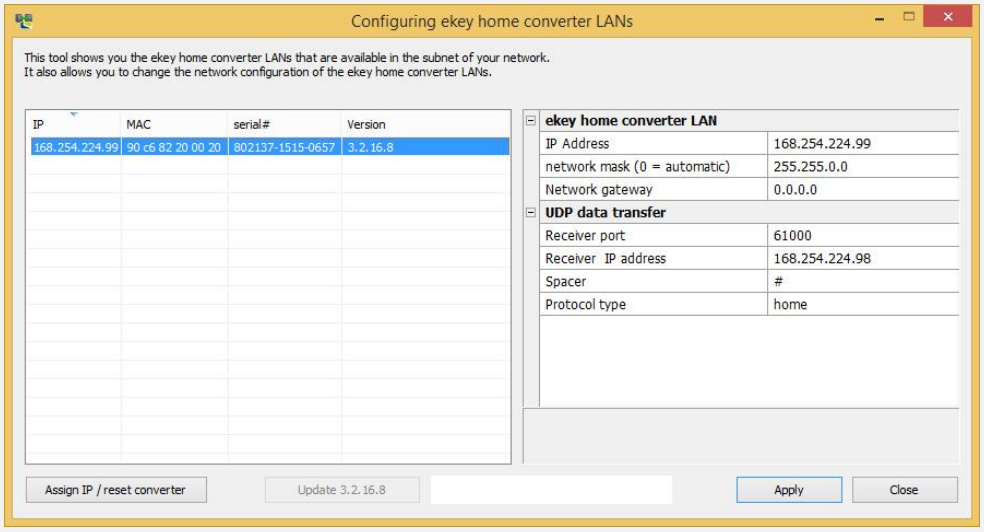
You can reset the converter to its default settings either via the configuration tool or using the converter. Resetting to default settings deletes the configured settings on the converter and resets them to their defaults.

See Default settings, page 8.

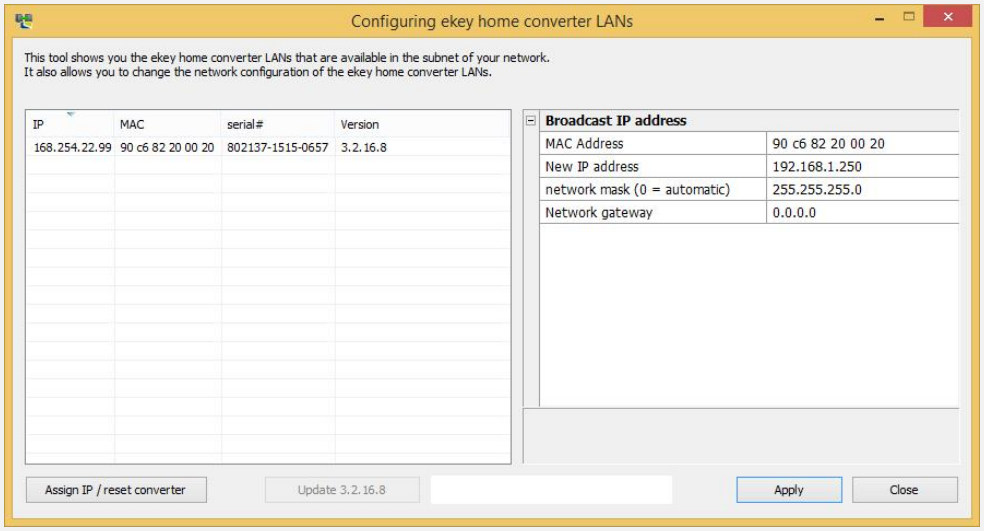
11.1 Resetting via the configuration tool

The process of resetting to the default settings is initiated by the configuration tool. The system must be prepared for the reset.

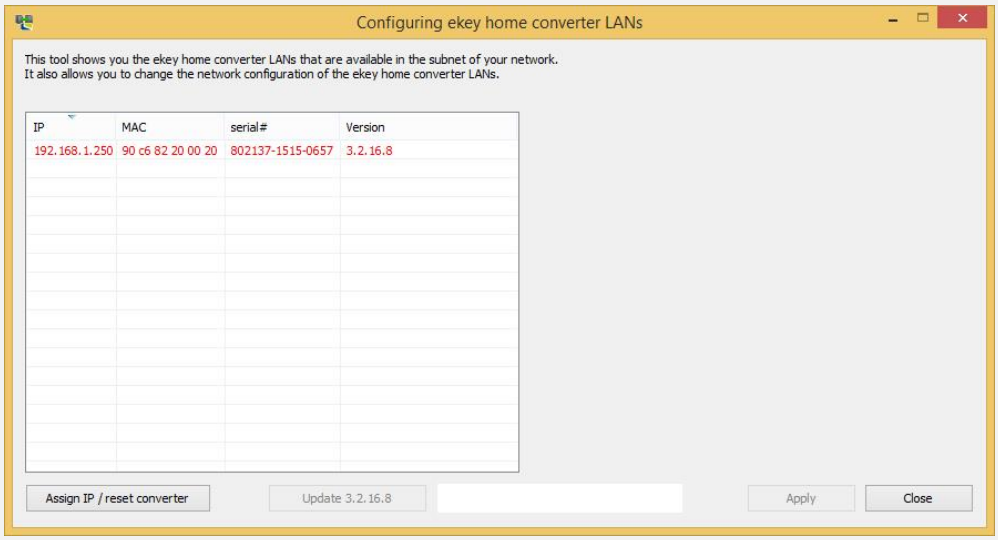
See Preparing for configuration, page 16.

Step	Instruction
1st	Start the *ekey home converter LAN config* software.
2nd	The start screen is displayed. 
3rd	Select the converter you want to reset. 
4th	Click on Assign IP / reset converter.

Step	Instruction
5th	The default settings are displayed on the input screen.



6th	Click on Apply.
7th	After a few seconds, the *ekey home converter LAN RS-485*, which is not configured, appears in the device list on the left.

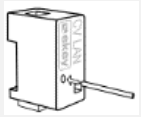
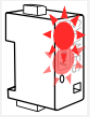


The converter has been reset to its default settings. You can now recommission the system.

See Integrating the converter into the network, page 17.

11.2 Resetting via the hardware

The process of resetting to the default settings is initiated by the converter.

Step	Figure	Description	Display
1st		Press and hold the button with the operating rod for at least 10 seconds.	 Status LED flashes red. The lower status LED flashes red briefly.

The converter has been reset to its default settings. You can now recommission the system.

See Converter configuration, page 16.

12 Maintenance

The system is largely maintenance-free.

13 Disposal



Pursuant to Directive 2002/96/EC of the European Parliament and Council of January 27, 2003 on the sale, return, and environmentally friendly disposal of waste electrical and electronic equipment (WEEE), electrical and electronic equipment supplied after August 13, 2005 is to be recycled. It must not be disposed of with household waste. As disposal regulations within the EU can differ from country to country, please contact your dealer for further information as necessary.

14 Declaration of conformity

ekey biometric systems GmbH hereby declares that the product conforms to the relevant European Union directives.

15 Copyright

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ekey biometric systems GmbH operates a quality management system in compliance with EN ISO 9001:2008 and is certified accordingly.