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# KNX IP router

## Order No. 2167 00



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## 1 Product definition

### 1.1 Product catalogue

Product name: KNX/IP router  
Application: Gateway, data logger/IP interface  
Design: DRA (series installation)  
Order No.: 2167 00

### 1.2 Accessories

Additional power supply  
Order No.: 1296 00  
KNX power supply 320 mA  
Order No.: 1086 00

### 1.3 Application

The KNX/IP router connects the Instabus KNX lines via data networks (Ethernet) using the Internet Protocol (IP). It uses the KNXnet/IP standard so that KNX telegrams can not only be forwarded between lines via an IP network, but bus access is also possible from a PC or other data processing devices.

The KNX/IP router can be used as an IP data interface for the ETS 3.0 Version "f" or higher or the ETS 4.0 or higher.

The device supports up to 4 KNXnet/IP tunneling connections and thus enables parallel bus access, e.g. via the ETS and other PC software.

It has an integrated switch with two RJ45 connections. This enables several KNX/IP routers or other IP devices to be connected to the distribution without the aid of other active components.

The KNX/IP router can be used as an area or line coupler. In this function, it interconnects two KNX lines to a logistical functional area and guarantees electrical isolation between these lines. As a result, each bus line of a KNX installation can be operated electrically independently of the other lines. The exact function of the device is determined by the physical address.

The KNX/IP router can be used as a data logger. It features a card reader for Micro SDHC cards up to 32 GB. The KNX telegrams in an ETS3 or ETS4-compliant format can be recorded to the card for analysis purposes. The card memory can be used as a ring memory or as a ROM.

As a clock, the KNX/IP router can send the time and date to the bus at configurable intervals. Synchronisation with a NTP server is possible. It is possible to trigger the sending of the current time and the current date via a trigger.

The KNX/IP router requires a separate power supply 24..30V DC  $\pm 10\%$  to operate. The KNX/IP router is supplied with power by this operating power connection. Thus, it is possible for bus voltage failures to be reported via the data network.

## 2 Installation, electrical connection and operation

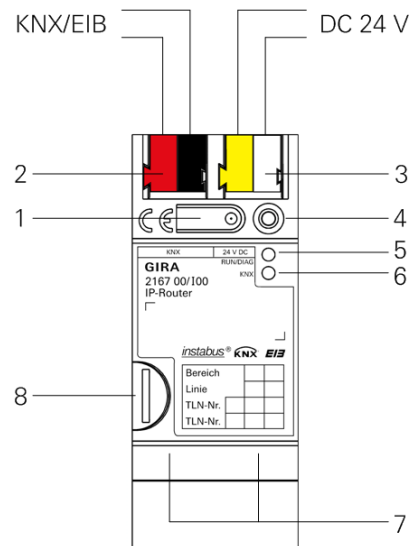
### 2.1 Safety instructions

Installation and mounting of electrical devices may only be carried out by a qualified electrician. In doing so, the applicable accident prevention regulations must be observed.

Failure to observe the installation instructions can result in damage to the device, fire or other dangers.

Please see the operating instructions enclosed with the device for more information.

### 2.2 Device design



#### Dimensions:

Width (W):  
36 mm (2 HP)

Height (H):  
90 mm

Depth (D):  
74 mm

Figure 1: KNX/IP router

- 1 Programming button
- 2 KNX connection
- 3 External power supply connection\* 24..30V DC  $\pm 10\%$ .
- 4 Programming LED (red/yellow/orange)
  - red=router
  - yellow=data logger/clock
  - orange=router and data logger/clock
- 5 LED operation indication (green)
  - on: ready for operation
  - flashing: diagnosis code
- 6 LED KNX (yellow)
  - on: KNX is connected
  - off: KNX is not connected
  - flashing: data on KNX line
- 7 Ethernet connection
  - 10/100 speed (green)
    - on: 100 Mbit/s
    - off: 10 Mbit/s
  - link/ACT (orange)
    - on: link to IP network
    - off: no connection
    - flashing: data reception on IP
- 8 Micro SD card holder

### 2.3 Installation and electrical connection

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**DANGER!**

**Electric shock if live parts are touched. Electric shock may lead to death.**

**Isolate connection cables before working on the device. Cover up live parts in the vicinity!**

---

#### Installing the device

- Snap the top-hat rail on according to DIN EN 60715. Network connection must be located on the bottom.
- ❗ A KNX data rail is not necessary.
- ❗ Observe temperature range (0 °C...+45 °C) and ensure sufficient cooling if necessary.

#### Connecting the device

- Connecting the KNX bus to the KNX connection of the router (2) with a KNX connection terminal.
- Connecting the external power supply\* to the power supply connection (3) of the router using a KNX connection terminal (preferably yellow/white).
- Connecting one or two network lines to the network connection of the router (7).

Note: Only one KNX/IP router per KNX power supply should be connected to the additional 30 V DC supply. Otherwise, the KNX power supply may become overloaded following a power failure and subsequent return.

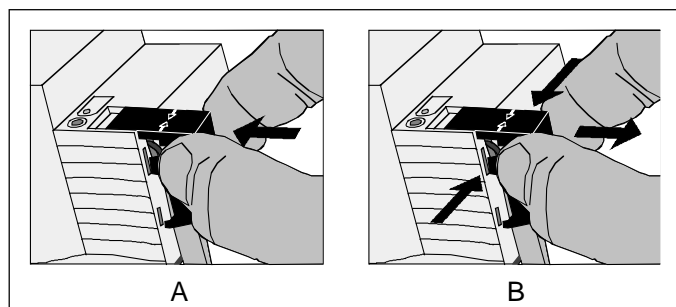
\*: The non-choked output of a KNX power supply unit can also be used as an external power supply. Ensure that the maximum quantity of KNX devices which can be operated with the KNX power supply unit is reduced accordingly.

### Mounting / removing the cover cap

A cover cap can be mounted for secure isolation to protect the bus connection / power supply connection from dangerous voltage, particularly in the connection area.

The cap is mounted with an attached bus and power supply terminal and a connected bus and power supply line to the rear.

- Mounting the cover cap: The cover cap is pushed over the bus terminal (compare with Figure 2.A) until it engages noticeably.
- Removing the cover cap: The cover cap is removed by pressing it in slightly on the side and pulling it off to the front (compare with Figure 2.B).



**Figure 2: Mounting / removing the cover cap**

### 2.4 Start-up

After installing the device and connecting the bus line, power supply and Ethernet, the device can be started up.

The following physical addresses are factory preset

|                     |           |
|---------------------|-----------|
| Router              | 15.15.0   |
| Data logger / clock | 15.15.255 |

These addresses have to be reprogrammed in order to be able to use the device. Without the imported application, the router works with default settings. The router and the data logger/clock are secured against importing an incorrect application. The ETS will cancel the download in a case like this. However, as the physical addresses have already been programmed, the operation indication LED (5) of the device will show a projected status during the next start.

#### Programming the physical address of the router

Programming is done in the programming environment of the ETS (3.0f, 4.0 or higher). An additional KNX data interface is not required for programming. A connection to the device can be established via IP or KNX.

- Ensure that the device and bus voltage are switched on
- Ensure that the programming LED (4) is not illuminated. If it lights up yellow, press the programming button (1) until it goes out (>4s).
- Briefly (<4s) press the programming button (1).  
Programming LED (4) lights up red
- Program the physical address using the ETS.  
Programming LED (4) goes out after a successful programming process.
- Make note of the physical address on the device
- If the device was programmed without an additional KNX data interface, the tunneling connection must be set up again after the programming process.

#### Programming the physical address of the data logger/clock

Programming is done in the programming environment of the ETS (3.0f, 4.0 or higher). An additional KNX data interface is not required for programming. A connection to the device can be established via IP or KNX.

- Ensure that the device and bus voltage are switched on
- Ensure that the programming LED (4) is not illuminated. If it lights up red, press the programming button (1) as briefly as necessary to deactivate it (<4s).
- Press the programming button (1) for a long time (>4s).  
Programming LED (4) lights up yellow.
- Program the physical address using the ETS.  
Programming LED (4) goes out after a successful programming process.
- Make note of the physical address on the device
- If the device was programmed without an additional KNX data interface, the tunneling connection must be set up again after the programming process.

#### Programming application programmes and configuration data

After programming the physical address, the application programmes for the router and the data logger/clock must be imported into the device. A connection to the device can be established via IP or KNX.

- Ensure that the device and bus voltage are switched on
- Parameterise the respective device accordingly in the ETS
- Import the software to the device
- Wait approximately 10 seconds after the download, during which the device transfers the data
- Start-up is complete
- If the device was programmed without an additional KNX data interface, the tunneling connection must be set up again after the programming process.

#### 2.4.1 Factory reset

The device can be reset to the factory settings via a sequence during starting.

- Make sure that the device is switched off.
- Press and hold the programming button (1) and switch on the device.

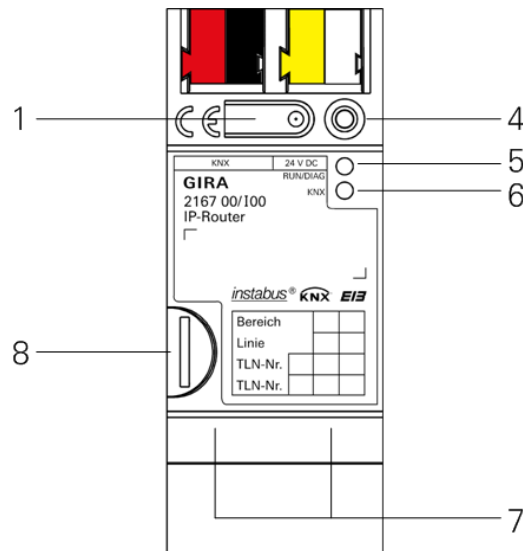
- Press and hold the programming button until the programming LED (4), the operation indication LED (5) and the KNX LED (6) simultaneously slowly flash.
- Briefly release the programming button (1), then press and hold it again until the programming LED (4), the operation indication LED (5) and the KNX LED (6) simultaneously quickly flash.
- The factory reset has been carried out.
- Release the programming button.
- The device need not be restarted following a factory reset.

The factory reset can be cancelled at any time by interrupting the sequence.

Following the factory reset, the device behaves as in the state of delivery. The device is unplanned. This can be recognized after starting up the device from the slowly flashing green operation indication LED (5). The settings of the parameters can be seen in the sections "4.2.5 State of delivery (router)" and "4.3.5 State of delivery (data logger/clock).

### 2.5 Operation

The KNX/IP router features 3 status LEDs on the top of the housing and 4 status LEDs on the network connection. In addition, there is a programming button with which the router and / or the data logger/clock can be put into programming mode.



**Figure 3: KNX/IP router**

**1** Programming button

**4** Programming LED (red/yellow/orange)  
 red=router  
 yellow=data logger/clock  
 orange=router and data logger/clock

**5** LED operation indication (green)  
 on: ready for operation  
 flashing: diagnosis code

**6** LED KNX (yellow)  
 on: KNX is connected  
 off: KNX is not connected  
 flashing: data on KNX line

**7** Ethernet connection

- 10/100 speed (green)
  - on: 100 Mbit/s
  - off: 10 Mbit/s
- link/ACT (orange)
  - on: link to IP network
  - off: no connection
  - flashing: data reception on IP

**8** Micro SD card holder

### Diagnosis codes

The current device status can be concluded using the operation indication (5):

- LED off: device is not switched on or not yet completely powered up.
- LED on: device is ready for operation.
- LED flashes slowly (~1Hz): Device is not configured or was configured with impermissible parameters. The LED stops flashing when the router and/or data logger has been imported. See "2.4 Start-up" for more details.
- LED flashes quickly (~4Hz): internal device error. Please contact support.

### LED status when starting up the device

When the device is started up properly, the yellow LED (6) flashes when the operating voltage is applied, thus signalling the start-up process. As soon as the device has completely started up, the green LED (5) lights up continuously if the device is already parameterised, or it flashes according to the diagnosis codes. From this time on, the yellow LED (6) signals the KNX bus status and KNX telegrams.

A self-test is carried out when the device is started up. If an error occurs here, the yellow LED (6) and the green LED (5) flash alternately directly after the operating voltage is applied. In this case, please contact support.

### Micro SD card holder (8)

A Micro SD card must be inserted for the data logger to be able to record telegrams. In addition, if a Micro SD card is inserted, a log file with system events is automatically created on the card. Cards up to a maximum of 32 GB are supported. The cards must be formatted with FAT32.

### 3 Technical data

|                     |  |
|---------------------|--|
| KNX medium          | TP   |
| Start-up mode       | S mode (ETS)   |
| KNX supply          | DC 21...30V SELV   |
| KNX connection      | Bus connection terminal  |
| External supply     |  |
| Voltage             | DC 24..30V $\pm$ 10%   |
| Connection          | Connection terminal  |
| Power consumption   | Typically 2W (for 24V DC, 2 Ethernet lines connected)  |
| IP communication    | Ethernet 10 /100 BaseT (10/100 MBit)   |
| IP connection       | 2 x RJ45   |
| Supported protocols | ARP, ICMP, IGMPv3, UDP/IP, DHCP, AutoIP<br>KNXnet/IP in compliance with KNX system specification:<br>core, routing, tunneling, device management |
| Micro SD card       | max. 32 GByte  |
| RTC buffering       | $\geq$ 24h   |
| ambient temperature | 0 °C to +45 °C   |
| storage temperature | -25 °C to +70 °C   |
| Installation width  | 36 mm (2 HP)   |
| Installation height | 90 mm  |
| Installation depth  | 74 mm  |
| Protection type     | IP20 (compliant with EN60529)  |
| Protection class    | III (compliant with IEC 61140)   |
| Test marks          | KNX, CE  |

## 4 Software description

### 4.1 Software specification

ETS search paths:       - System devices / IP router / KNX/IP router  
                          - Communication / IP data logger / KNX/IP router

Configuration:           S-mode standard

Applications:

| No. | Brief description   | name                          | Version |
|-----|---------------------|-------------------------------|---------|
| 1   | KNX/IP router       | KNX/IP router V2.0 901610     | 2.0     |
| 2   | Data logger / clock | Data logger/clock V2.0 901510 | 2.0     |

## 4.2 "KNX/IP router V2.0 901610" software

### 4.2.1 Range of functions

- Simple connection to higher-level network systems by using the Internet Protocol (IP)
- Direct access from each point in the IP network to the KNX installation (KNXnet/IP tunneling – no bus monitor mode)
- Fast communication between KNX lines, areas and systems (KNXnet/IP routing)
- Communication across buildings and estates (networking of estates)
- Filtering and forwarding of telegrams depending on:
  - physical address
  - group address
- Simple configuration with the ETS 3/4
- Failure message of the KNX system to applications via KNXnet/IP
- Support of up to 4 parallel KNXnet/IP tunneling connections
- Simple connection of visualisation systems and facility management systems
- If a Micro SD card is inserted, there is automatic creation of a system log with important events for analysis purposes

## 4.2.2 Information on the software

- The KNX/IP router can be parameterised for ETS 3.0f or higher.
- When using ETS 3.0f, the Falcon must be updated to Version 2.0. The update can be obtained from the KNX homepage (<http://www.knx.org>) free of charge.
- The "bus monitor" function is not supported by the KNX/IP router.
- The KNX/IP router is protected against importing an invalid application version.
- There is also router functionality without a parameterised data logger.

## 4.2.3 Object table

Number of communication objects: 0

## 4.2.4 Functional description

### Monitoring for bus voltage failure

The KNX/IP router monitors the KNX bus for power failure. It can be configured so that a message is sent to the IP network if there is a state change to the bus voltage. This can be configured using the "Monitoring for bus voltage failure" parameter on the "General" parameter page. The default is "blocked".

If the parameter is activated, a TP bus voltage failure on the IP side will trigger a broadcast command (GA=0/0/0) of the type "NetworkParameterWrite".

The data content is "00063301" (hex) for bus voltage failure and "00063300" (hex) for bus voltage return. This command can for example be evaluated by the HomeServer with the reception of a simple IP telegram. (Setting: UDP/Multicast with the port 3671 and the corresponding IP addresses. Initially "any desired data" must first be received for the data blocks, and then the binary data "000633". The values "01" and "00" for the failure and return respectively can be assigned a 1-byte communication object.)

### IP address assignment

The device's IP address can either be assigned manually or via a DHCP server. This can be configured using the "IP address assignment" parameter on the "General" parameter page.

For the "Manual entry" setting, the values which are preset on the "IP address", "IP subnet mask" and "IP standard gateway" parameter pages are valid for the router. In the state of delivery, the router gets its IP address from a DHCP server.

For the "From DHCP service" setting, a DHCP server must assign the KNX/IP router a valid IP address. If there is not a DHCP server available for this setting, the router starts up after a certain waiting time with an AutoIP address (address range from 169.254.1.0 to 169.254.254.255). As soon as a DHCP server is available, the device is automatically assigned a new IP address.

### IP routing multicast address

The IP routing multicast address determines the target address of the KNX/IP router's IP telegrams. The default setting is 224.0.23.12. This is the address determined for KNX IP devices by the KNX Association in conjunction with the IANA. It should only be changed if it becomes necessary due to the existing network. In the process, it must be observed that all KNX IP devices which should communicate with one another via IP must use the same IP routing multicast address. The corresponding setting can be carried out on the "General" parameter page.

If a new IP routing multicast address is loaded to the device per KNX/IP routing, the ETS outputs the error message "Download failed". Redownloading should then run without issues. This behaviour is due to the system.

## Telegram filtering

The KNX/IP router can filter telegrams both from KNX to IP as well as in the other direction. For this, there are the parameters "Group telegrams of the main group 0-13" and "Group telegrams of the main group 14-31" on the "Bus->IP" and "IP->Bus" parameter pages. For telegrams of the main groups 0-13, the options "forward", "block" and "filter (normal)" are available. If this parameter is set to "filter (normal)", a filter table is created automatically by the ETS and also loaded to the device during downloading. For telegrams of the main groups 14-31, the options "forward" and "block" are available. Filtering is not possible here as the ETS does not provide a corresponding filter table. In addition, a filter option for individually (physically) addressed telegrams and broadcast telegrams is available for both communication directions. This can either be forwarded, blocked or filtered. The corresponding parameter is located on the "Bus->IP" and "IP->Bus" parameter pages.

**Note:** The KNX/IP-Router will be always forwarded a telegram with routing counter "7" in the parameter setting "block" .

## Telegram confirmation of group-oriented telegrams

From the KNX side, the KNX/IP router can either confirm all group-oriented telegrams or only those telegrams which are forwarded from KNX to IP. In this case, only those telegrams are confirmed which are entered in the filter table of the device. The corresponding "Telegram confirmation of group-oriented telegrams" parameter is located on the "Bus->IP" parameter page. The default is "always".

## Automatic creation of a system log when a Micro SD card is inserted

If a Micro SD card is inserted in the device, a system log is automatically created on the card. This log is saved in the card's root directory in the file System.txt. Important system events are noted in this log. Specifically, these events are:


- Programming the router
- Programming the data logger / clock
- Setting the time via KNX or NTP
- Error during NTP synchronisation
- Change of the IP address
- KNX power failure
- KNX return of voltage
- Restart of the device
- KNX bus status when starting up the device
- Fill level warning when 70 %, 80 % and 90 % of the SD card memory capacity is reached
- SD card full and resulting end of system event logging

The System.txt file can have a maximum size of 1 megabyte. If this size is exceeded, the current System.txt is renamed System.bak and a new System.txt file is created. If this again exceeds the 1 megabyte limit, the old System.bak is overwritten and a new System.txt file is created. Micro SDHC cards up to a maximum of 32 GB are supported. The cards must be formatted with FAT32.

## 4.2.5 State of delivery

|  |                    |
|--|--------------------|
| Physical address                                     | 15.15.0            |
| Physical address of the tunneling connections        | 15.15.255          |
| Device name  | Gira KNX/IP router |
| Monitoring for bus voltage failure                   | blocked            |
| IP address assignment                                | from DHCP service  |
| IP address   | DHCP               |
| IP routing multicast address                         | 224.0.23.12        |
| IP subnet mask                                       | DHCP               |
| IP standard gateway                                  | DHCP               |
| Bus->IP  |                    |
| Group telegrams of the main group<br>0-13            | filter (normal)    |
| Group telegrams of the main group<br>14-31           | forward            |
| Individually addressed telegrams                     | filter (normal)    |
| Broadcast telegrams                                  | forward            |
| Telegram confirmation of group-oriented<br>telegrams | always             |
| IP->Bus  |                    |
| Group telegrams of the main group<br>0-13            | filter (normal)    |
| Group telegrams of the main group<br>14-31           | forward            |
| Individually addressed telegrams                     | filter (normal)    |
| Broadcast telegrams                                  | forward            |

## 4.2.6 Parameters

| Description:  | Values:                                       | Comments:   |
|---|---|---|
|  General |   |   |
| Device name (maximum of 30 characters)  | max. 30 characters, <b>Gira KNX/IP router</b> | Via this parameter, the KNX/IP router receives a unique name of a maximum of 30 characters which serves the simple recognition of the device when searching with a KNXnet/IP visualisation or with the ETS. |
| Monitoring for bus voltage failure  | <b>blocked</b><br>released                    | Defines if a bus voltage status change is signalled in the IP network   |
| IP address assignment   | <b>From DHCP service</b><br>manual entry      | Defines if the IP address of the device is assigned manually or automatically (by the DHCP server).   |

|                              |  |   |
|------------------------------|--|---|
| IP routing multicast address | <p><b>Use system multicast address</b></p> <p>use individual multicast address</p> | <p>The IP address for KNXnet/IP routing is set with this and the four following parameters. Bus telegrams are forwarded from one IP router to all other IP routers via KNXnet/IP routing. In doing so, only the IP routers communicate which use the same IP routing multicast address.</p> <p>The factory-set default value is "Use system multicast address". In this case, the device communicates via the 224.0.23.12. This address is assigned to KNXnet/IP routing and reserved for this application. However, all addresses in the 239.0.0.0 to 239.255.255.255 range can be used in a network for general use. In order to use an address from this range, the parameter must be set to "Use individual multicast address".</p> <p>An individual address can then be parameterised with the "Byte2" to "Byte4" parameters.</p> <p>If a new IP routing multicast address is loaded to the device per KNX/IP routing, the ETS outputs the error message "Download failed". Redownloading should then run without issues. This behaviour is due to the system.</p> |
| Byte 1                       | <p><b>224</b></p> <p>239</p>   | <p>The first byte of the IP routing multicast address.</p> <p>If the system multicast address is use, "224" is permanently set. If an individual multicast address is use, "239" is permanently set.</p>  |
| Byte 2                       | <p><b>0</b></p> <p>0..255</p>  | <p>The second byte of the IP routing multicast address.</p> <p>Can only be set manually if an individual multicast address is used.</p>   |
| Byte 3                       | <p><b>23</b></p> <p>0..255</p>   | <p>The third byte of the IP routing multicast address.</p> <p>Can only be set manually if an individual multicast address is used.</p>  |
| Byte 4                       | <p><b>12</b></p> <p>0..255</p>   | <p>The fourth byte of the IP routing multicast address.</p> <p>Can only be set manually if an individual multicast address is used.</p>   |

## IP address

### IP address

|                  |                    |
|------------------|--------------------|
| Byte 1 (0...255) | 0..255, <b>192</b> |
| Byte 2 (0...255) | 0..255, <b>168</b> |
| Byte 3 (0...255) | 0..255, <b>0</b>   |
| Byte 4 (0...255) | 0..255, <b>10</b>  |

Defines the IP address of the KNX/IP router if manual address assignment is activated. The address is compiled of 4 individual bytes. Default is 192.168.0.10. If invalid parameters are configured (e.g. a gateway which does not match the set IP address), the device is automatically set to DHCP and the green LED begins to flash slowly (approx. 1 Hz).

## IP subnet mask

### IP subnet mask

|                  |                    |
|------------------|--------------------|
| Byte 1 (0...255) | 0..255, <b>255</b> |
| Byte 2 (0...255) | 0..255, <b>255</b> |
| Byte 3 (0...255) | 0..255, <b>255</b> |
| Byte 4 (0...255) | 0..255, <b>0</b>   |

Defines the IP subnet mask of the KNX/IP router if manual address assignment is activated. The mask is compiled of 4 individual bytes. Default is 255.255.255.0.

## IP standard gateway

### IP standard gateway

|                  |                  |
|------------------|------------------|
| Byte 1 (0...255) | 0..255, <b>0</b> |
| Byte 2 (0...255) | 0..255, <b>0</b> |
| Byte 3 (0...255) | 0..255, <b>0</b> |
| Byte 4 (0...255) | 0..255, <b>0</b> |

Defines the IP address of the standard gateway if manual address assignment is activated. The address is compiled of 4 individual bytes. Default is 0.0.0.0.

## DNS

### Primary DNS

|                  |                  |
|------------------|------------------|
| Byte 1 (0...255) | 0..255, <b>0</b> |
| Byte 2 (0...255) | 0..255, <b>0</b> |
| Byte 3 (0...255) | 0..255, <b>0</b> |
| Byte 4 (0...255) | 0..255, <b>0</b> |

Defines the IP address of the first DNS server to be used if manual address assignment is activated. The address is compiled of 4 individual bytes. Default is 0.0.0.0.

### Secondary DNS

|                  |                  |
|------------------|------------------|
| Byte 1 (0...255) | 0..255, <b>0</b> |
| Byte 2 (0...255) | 0..255, <b>0</b> |
| Byte 3 (0...255) | 0..255, <b>0</b> |
| Byte 4 (0...255) | 0..255, <b>0</b> |

Defines the IP address of the second DNS server to be used if manual address assignment is activated. It is automatically used if the first DNS server cannot be reached. The address is compiled of 4 individual bytes. Default is 0.0.0.0.

 Bus->IP

Group telegrams of the main group 0-13

How to proceed with telegrams with group addresses of the main groups 0-13 is determined with this parameter. They can either be forwarded, blocked or filtered.

forward

All telegrams with group addresses of the main groups 0 to 13 are forwarded from the KNX bus to IP.

block

All telegrams with group addresses of the main groups 0 to 13 from the KNX bus to IP are blocked.

**filter (normal)**

All telegrams with group addresses of the main groups 0 to 13 from the KNX bus to IP are filtered according to the filter table. The filter table is calculated automatically by the ETS.

Group telegrams of the main group 14-31

How to proceed with telegrams with group addresses of the main groups 14-31 is determined with this parameter. They can either be forwarded or blocked. Filtering is not an option here as the ETS does not calculate a filter table for these main groups.

**forward**

All telegrams with group addresses of the main groups 14-31 are forwarded from the KNX bus to IP.

block

All telegrams with group addresses of the main groups 14-31 from the KNX bus to IP are blocked.

Individually addressed telegrams


How to proceed with individually addressed processes is determined with this parameter. They can either be forwarded, blocked or filtered.

forward

All individually addressed telegrams are transferred from the KNX bus to IP.

block

Individually addressed telegrams are blocked by the KNX/IP router. With this setting, it is not possible to send individually addressed telegrams from the line in a lower level than the KNX/IP router to another line (e.g. during programming).

|   |                        |  |
|---|------------------------|--|
|   | <b>filter (normal)</b> | Only the individually addressed telegrams which should leave the line of the KNX/IP router are transmitted from the KNX bus to IP.   |
| Broadcast telegrams   |                        | How to proceed with broadcast telegrams is determined with this parameter. They can either be forwarded or blocked.  |
|   | <b>forward</b>         | All broadcast telegrams are transferred from the KNX bus to IP.  |
|   | block                  | Broadcast telegrams are blocked by the KNX/IP router. With this setting, it is not possible to send broadcast telegrams from the line in a lower level than the KNX/IP router to another line. |
| Acknowledgement of group telegrams  |                        | When the KNX/IP router group telegrams should be confirmed with a telegram is determined with this parameter.  |
|   | <b>for forwarding</b>  | Only those group telegrams which are also forwarded to IP are confirmed with a telegram. That means that only telegrams which are also entered in the filter table are confirmed.              |
|   | always                 | All group telegrams on the KNX bus are confirmed by the KNX/IP router with a telegram.   |
|  IP->Bus |                        |  |
| Group telegrams of the main group 0-13  |                        | How to proceed with telegrams with group addresses of the main groups 0 to 13 is determined with this parameter. They can either be forwarded, blocked or filtered.                            |
|   | forward                | All telegrams with group addresses of the main groups 0 to 13 are forwarded from the IP to the KNX bus.  |
|   | block                  | All telegrams with group addresses of the main groups 0 to 13 from the IP to the KNX bus are blocked.  |
|   | <b>filter (normal)</b> | All telegrams with group addresses of the main groups 0 to 13 from IP to the KNX bus are filtered according to the filter table. The filter table is calculated automatically by the ETS.      |

Group telegrams of the  
main group 14-31

How to proceed with telegrams with group addresses of the main groups 14-31 is determined with this parameter. They can either be forwarded or blocked. Filtering is not an option here as the ETS does not calculate a filter table for these main groups.

**forward**

All telegrams with group addresses of the main groups 14-31 are forwarded from the IP to the KNX bus.

block

All telegrams with group addresses of the main groups 14-31 from the IP to the KNX bus are blocked.

Individually addressed  
telegrams

How to proceed with individually addressed telegrams is determined with this parameter. They can either be forwarded, blocked or filtered.

forward

All individually addressed telegrams are transferred from the IP to the KNX bus.

block

Individually addressed telegrams are blocked by the KNX/IP router.

**filter (normal)**

Only the individually addressed telegrams which are addressed in the line of the KNX/IP router are transmitted from the IP to the KNX bus.

Broadcast telegrams

How to proceed with broadcast telegrams is determined with this parameter. They can either be forwarded or blocked.

**forward**

All broadcast telegrams are transferred from the IP to the KNX bus.

block

Broadcast telegrams are blocked by the KNX/IP router.

## 4.3 "Data logger/clock V2.0 901510" software

### 4.3.1 Range of functions

- Clock
  - The current time and current date are sent to the bus periodically.
  - Triggering of the sending of the current time and date by means of a group telegram (trigger).
- Timekeeper
  - Receives the current time and / or the current date from the bus.
- Data logger
  - Records all KNX telegrams of the higher-level and lower-level lines to a Micro SD card.

## 4.3.2 Information on the software

- The data logger / clock can be parameterised on ETS 3.0f or higher.
- The data logger/clock is protected against importing an invalid application version.

**Note:**

If IP telegrams are recorded in the ETS3 format with the data logger, a faulty display of the analysis results with the ETS3.


**Recommendation:**

Use only the ETS4 to display and analyse IP telegram recordings in the ETS3 format. It is available for downloading in the online shop of the KNX Association. The bus monitor can be used without restriction in the free demo version.


### 4.3.3 Object table

|                                  |     |
|----------------------------------|-----|
| Number of communication objects: | 13  |
| Number of addresses (max):       | 60  |
| Number of assignments (max):     | 60  |
| Dynamic table management:        | No  |
| Maximum table length:            | 255 |


Function: Clock

| Object  | Position | Name | Type   | DP type | Flag* |
|---|----------|------|--------|---------|-------|
|  0         | Send     | Time | 3 byte | 10.001  | C, T  |
| Description: 3 byte object for sending the current time. The interval can be parameterised. |          |      |        |         |       |


Function: Clock

| Object  | Position | Name | Type   | DP type | Flag* |
|---|----------|------|--------|---------|-------|
|  1         | Send     | Date | 3 byte | 11.001  | C, T  |
| Description: 3 byte object for sending the current date. The interval can be parameterised. |          |      |        |         |       |


Function: Clock

| Object  | Position | Name                   | Type  | DP type | Flag* |
|---|----------|------------------------|-------|---------|-------|
|  2 | Receive  | Trigger send date/time | 1 bit | 1.001   | C, W  |
| Description: 1 bit object for triggering the sending of the current time/date.        |          |                        |       |         |       |


Function: Timekeeper

| Object  | Position | Name | Type   | DP type | Flag* |
|---|----------|------|--------|---------|-------|
|  3 | Receive  | Time | 3 byte | 10.001  | C, W  |
| Description: 3 byte object for receiving the current time.                            |          |      |        |         |       |

Function: Timekeeper


| Object  | Position | Name | Type   | DP type | Flag* |
|---|----------|------|--------|---------|-------|
|  4 | Receive  | Date | 3 byte | 11.001  | C, W  |
| Description: 3 byte object for receiving the current date.                            |          |      |        |         |       |

Function: Data logger

| Object   | Position | Name                 | Type  | DP type | Flag*   |
|--|----------|----------------------|-------|---------|---------|
|  5  | Receive  | Activate data logger | 1 bit | 1.001   | C, R, W |
| Description: 1 bit object to activate the data logger. When a "1" is assigned to the object, the data logger is active. If a "0" is assigned to it, it is deactivated. |          |                      |       |         |         |

Function: Data logger


---

| Object  | Position | Name               | Type  | DP type | Flag*   |
|---|----------|--------------------|-------|---------|---------|
|  6 | Send     | Data logger status | 1 bit | 1.001   | C, R, T |

Description: 1-bit object which reflects the state of the data logger. If the object has a value of "1", the data logger is active. A "0" means the data logger is inactive.

Function: Data logger  
Parameter: Data memory = ROM  
TypeMemoryStatus = binary


---

| Object  | Position | Name                 | Type  | DP type | Flag* |
|---|----------|----------------------|-------|---------|-------|
|  7 | Send     | SD card memory state | 1 bit | 1.001   | C, R  |

Description: 1-bit object for display of the filling state of the SD card. When a "1" is assigned to the object, the SD card is full. If it is assigned a "0", then there is still space for logging on the SD card.

Function: Data logger  
Parameter: Data memory = ROM  
TypeMemoryStatus = value


---

| Object  | Position | Name                         | Type  | DP type | Flag* |
|---|----------|------------------------------|-------|---------|-------|
|  8 | Send     | SD card memory filling state | 8 bit | 5.001   | C, R  |

Description: 8-bit object for display of the filling state of the SD card. The value range is 0-255 (equivalent to 0-100 %).

Function: NTP


---

| Object  | Position | Name       | Type  | DP type | Flag*   |
|---|----------|------------|-------|---------|---------|
|  9 | Send     | NTP status | 1 bit | 1.001   | C, R, T |

Description: 1-bit object for display of the status of the last NTP query. If the object is assigned a "1", the last NTP query was successful. If it is assigned a "0", the last NTP query was not successful.

Function: Data logger


---

| Object   | Position | Name                | Type  | DP type | Flag* |
|--|----------|---------------------|-------|---------|-------|
|  10 | Send     | Bus voltage failure | 1 bit | 1.001   | C, T  |

Description: 1 bit object which signals the status of the bus voltage. A "1" is sent in case of bus voltage failure. A "0" is sent in case power is restored.

Function: Always

---

| Object   | Position | Name          | Type  | DP type | Flag*   |
|--|----------|---------------|-------|---------|---------|
|  12 | Send     | SD card error | 1 bit | 1.001   | C, R, T |


Description: 1-bit object for signalling an SD card error. When a "1" is assigned to the object, an SD card error has occurred.

Function: Always

---

| Object | Position | Name | Type | DP type | Flag* |
|--------|----------|------|------|---------|-------|
|--------|----------|------|------|---------|-------|

---

|   |    |      |               |       |      |
|---|----|------|---------------|-------|------|
|  | 13 | Send | SD error code | 8 bit | C, R |
| Description: 8-bit object for signalling an SD card error.                        |    |      |               |       |      |
| 0 = SD card OK  |    |      |               |       |      |
| 1 = SD card full  |    |      |               |       |      |
| 2 = SD card not inserted  |    |      |               |       |      |
| 4 = Fault has occurred in SD card (e.g. incorrectly formatted)                    |    |      |               |       |      |

\*The default values are specified.

## 4.3.4 Functional description

### Clock

As a clock, the device can send the current time to the bus at configurable intervals. For this, first the "Time function" parameter must be set to "Clock" in the "General" parameter view so that the further configuration parameters become visible. With the "Send time" and "Send date" parameters, the respective desired interval can be configured. The time sent is obtained from the system time. This can be synchronised with a configurable NTP server. For this, the "Use NTP server" parameter must be set to "Yes" in the "General" parameter view. Then the NTP server can be configured in the newly available "NTP configuration" parameter view.

The device can be configured for various UTC time zones. The "Time zone" parameter used for this is located in the "General" parameter view.

Time changeover is taken into account either automatically depending on the time zone set or not at all. A "Generic Time Zone w/o DST" must be parameterised so that no automatic time changeovers are carried out.

With the clock function, a communication object is provided with which the sending of the time/date can be triggered (trigger). For more details, see "4.3.3 Object table".

The time function is deactivated at delivery.

### Timekeeper

As a timekeeper, the device synchronises the system time with time information from KNX time telegrams which for example can be sent from clocks or the ETS. For this, the "Time function" parameter must be set to "Timekeeper" in the "General" parameter view.

The time function is deactivated at delivery.

### Bus voltage monitoring

The device monitors the bus voltage and provides a communication object for this purpose. If the group address of the communication object is entered in the filter table of the router, the notification of the bus voltage state will not only be sent via TP, but also via IP.

For more details, see "4.3.3 Object table".

### Data logger

The device can be used as a data logger. The data logger functionality is controlled via the "Data logger" parameter in the "General" parameter view. If it is set to "Yes", the data logger functionality is always activated. If a Micro SD card is inserted into the device or if there is already a card in the device, logging begins automatically if it is not deactivated via the "Activate data logger" communication object.

The data logger state is sent via the "Data logger status" communication object, however can also be queried directly. The communication object has the value 1 for as long as the data logger is active. If the SD card is pulled, then no memory capacity is available, or if the data logger is deactivated via the "Activate data logger" communication object, the "Data logger status" communication object assumes the value "0" and sends it.

The data logger supports two types of memory management. The SD card memory can be used as ROM or as a ring memory. When used as a ring memory, the remaining memory is monitored. When the remaining memory capacity of 2.5 MByte is dropped below, the oldest log file is deleted to create space for new data.

When used as ROM, logging is automatically ended as soon as the Micro SD card is full until a new card with sufficient capacity is inserted.

Via the "Data logging format" parameter in the same parameter view, it can be configured whether an ETS3 (.trx) or an ETS4 (.xml) compliant data format should be used. The data logger can be activated or deactivated via the "Activate data logger" communication object.

Naming and saving the data on the Micro SD card is in accordance with the following scheme:

```
Year
----Month
-----Day
-----2010_01_06_LAN.trx
-----2010_01_06_TP1.trx
```

If there is a loss of voltage and a resulting loss of time/date, a file name can be repeated. In this case, a tilde (~) is attached to the end of the file name. For additional repetitions, a tilde with a successive number (~1) is used.

Before the Micro SD card is removed, logging should be deactivated to prevent damage to the card.


The KNX/IP router supports SDHC cards up to a maximum of 32GB. The cards must be formatted with FAT32.


Various communication objects are available for monitoring the memory status. The current card status and the fill level are queried via these communication objects. For more details, see "4.3.3 Object table".

## 4.3.5 State of delivery

|                  |                              |
|------------------|------------------------------|
| Physical address | 15.15.255                    |
| Time function    | No                           |
| Data logger      | No                           |
| Time zone        | (UTC +01:00) Europe / Berlin |
| Use NTP server   | No                           |

## 4.3.6 Parameters

| Description:  | Values:  | Comments:   |
|---|--|---|
|  General |  |   |
| Time function   | <p><b>No</b></p> <p>Clock</p> <p>Timekeeper</p>            | <p>This parameter determines which time function the device executes.</p> <p>No time function is executed.</p> <p>The device works as a clock and sends the current time and date to the bus at configurable intervals.</p> <p>The device works as a timekeeper and receives the time telegrams sent from a clock and evaluates them.</p> |
| Send time   | <p><b>Each minute</b></p> <p>Each hour</p> <p>Each day</p> | <p>Only visible when the device works as a clock. The interval for sending the time to the bus is configured with this parameter.</p>   |
| Send date   | <p><b>Each minute</b></p> <p>Each hour</p> <p>Each day</p> | <p>Only visible when the device works as a clock. The interval for sending the date to the bus is configured with this parameter.</p>   |
| Data logger   | <p><b>No</b></p> <p>Yes</p>                                | <p>This parameter determines whether the data logger function is activated or not. The corresponding communication objects are only available when it is activated.</p> <p>The data logger function is deactivated.</p> <p>The data logger function is activated.</p>   |
| Data logging format   | <p>ETS3</p> <p><b>ETS4</b></p>                             | <p>Only visible when "Data logger" is set to "yes". This parameter determines which format the data should be logged in on the Micro SD card.</p> <p>The data is stored in an ETS3-compliant format (.trx).</p> <p>The data is stored in an ETS4-compliant format (.xml).</p>   |

|   |  |  |
|---|--|--|
| Data memory   |  | Only visible when "Data logger" is set to "yes". This parameter specifies how the SD card memory is to be used.  |
|   | Ring memory  | The SD card memory is used as a ring memory.   |
|   | <b>ROM</b>   | The SD card memory is used as ROM.   |
| ROMStatusType   |  | Only visible when "Data logger" is set to "yes" and the data memory parameter is set to "ROM". This parameter specifies what type the status object of the card fill level is to correspond to.  |
|   | Binary   | An 1-bit object is used. "1" means the card is full, "0" means there is still capacity for logging on the card.  |
|   | <b>Value (0-255)</b>                                   | An 8-bit object is used. The value range is between 0 and 255. Here "255" is equal to 100 %.   |
| Time zone   |  | The time zone the device works with is configured with this parameter.   |
|   | <b>(UTC +01:00) Europe / Berlin</b><br>Other UTC zones | The time zone to be used is selected here. There are several time zones with identical UTC deviations. In each of these time zones, summer/winter switchover is at a different time. One of the "Generic Time Zone w/o DST" time zones must be selected so that no automatic time changeovers are carried out. |
| Use NTP server  |  | Whether an NTP server should be used is determined with this parameter. It is only taken into account in operation as a clock.   |
|   | <b>No</b>  | No NTP server is used. The system time serves as a reference.  |
|   | Yes  | An NTP server is used.   |
|  | NTP configuration                                      | Only available when an NTP server is used.   |

NTP server address

This parameter defines the host name or the IP address of the NTP server to be used. When using a manual IP address for the router, a DNS server must be parameterised so that defining a host name is possible.

NTP interval (min)      **60**

This parameter determines at which interval the time should be synchronised to the NTP server. The information is in minutes.

## 5 Appendix

### 5.1 Operation as an area or line coupler

#### Topology

As an area / line coupler, the KNX/IP router transmits telegrams between a lower-level line and the IP network. The function of the device is defined as follows with the physical address:

- Area coupler (AC)      B.0.0    ( $1 \leq B \leq 15$ )
- Line coupler (LC)      B.L.0    ( $1 \leq B \leq 15, 1 \leq L \leq 15$ )

Fundamentally the KNX/IP router can be used as a line coupler or an area coupler (compare with Figure 4).

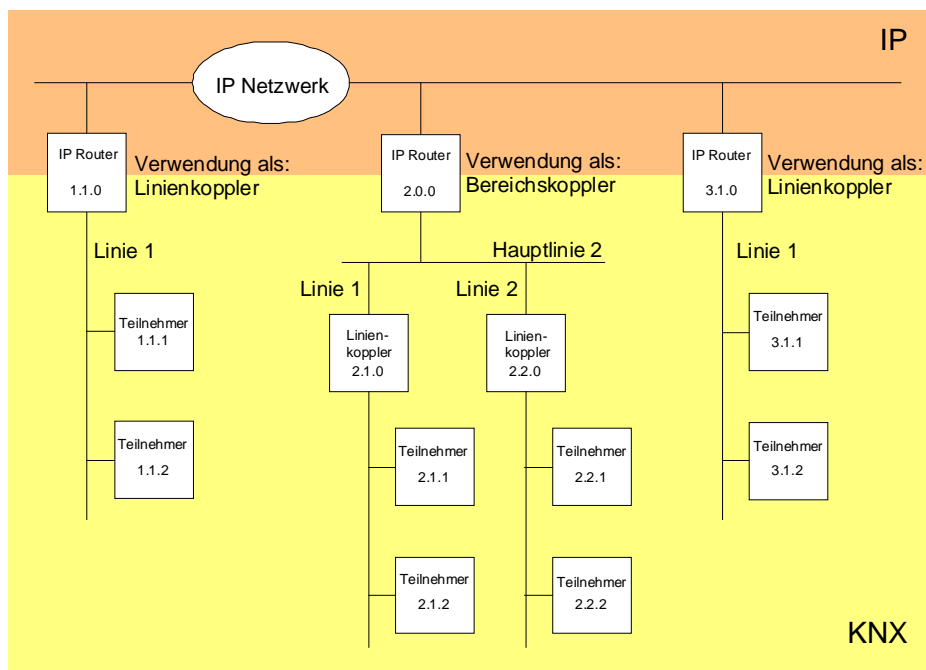


Figure 4: KNX/IP router as an area or line coupler

If the KNX/IP router is used as an area coupler with the physical address  $x.0.0$  ( $x = 1 \dots 15$ ), no additional IP routers may be used topologically 'lower than' this IP router as a line coupler  $x.y.0$  ( $y = 1 \dots 15$  – same area address) (compare with Figure 5).

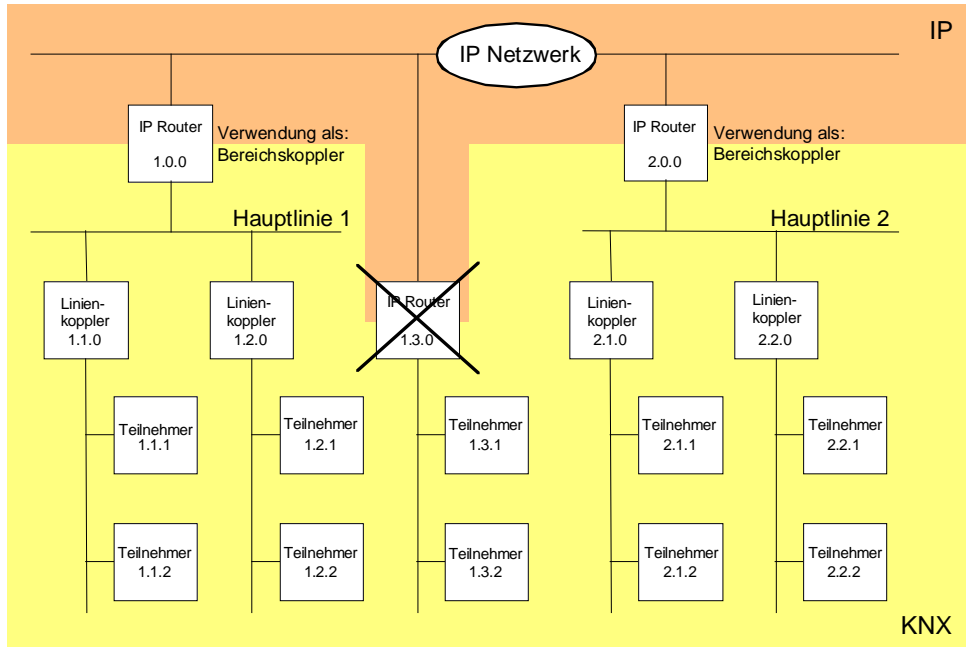


Figure 5: KNX/IP router as an area coupler

If the KNX/IP router is used as a line coupler with the physical address  $x.y.0$  ( $x = 1 \dots 15$ ,  $y = 1 \dots 15$ ), no additional IP routers with the same area address  $x.0.0$  may be used 'higher' in the system (compare with Figure 6).

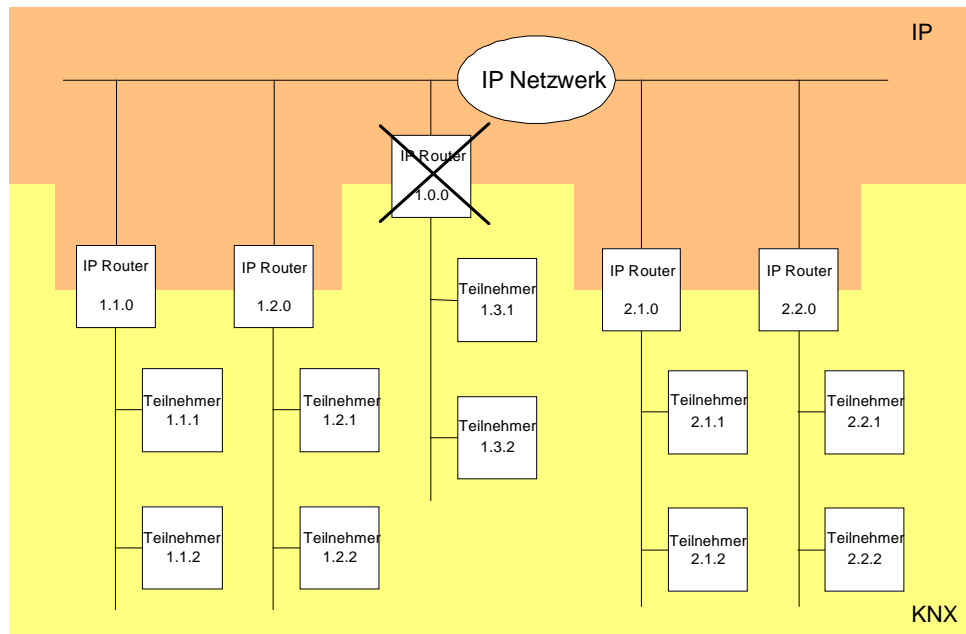


Figure 6: KNX/IP router as a line coupler

**Note:**

Error-free functioning of the KNX/IP router as an area or line coupler (KNXnet/IP routing) requires network components which support IP multicasting. Particularly, network / LAN routers must be able to be set or already be set to forward IP multicasting datagrams. For KNXnet/IP routing, the IP multicast address 224.0.23.12 is reserved internationally for this purpose.

## 5.2 Operation as an IP data interface in the ETS3

Via an IP data network and a KNX/IP router, a direct connection can be established from a PC or other data processing devices in the networks (e.g. visualisations) to the KNX. Thus, access to the bus is possible from every point in the IP data network.

The ETS3 and ETS4 facilitate the configuration of KNX installations via the existing IP data network and use the KNX/IP router such as a conventional serial RS232 or USB data interface to communicate with the bus. This also includes downloading from bus devices or the function of the group monitor (no support of the bus monitor mode).

For stable communication via KNXnet/IP tunneling, a second physical address (similar to the local physical address for an RS232 or USB connection) must be set via the ETS3 or ETS4.

The following steps must be carried out to configure the communication interfaces:

1. First the ETS3 must be started and the option dialogue of the communication properties must be called up  
(Extras → Options → Communication – compare with Figure 7).

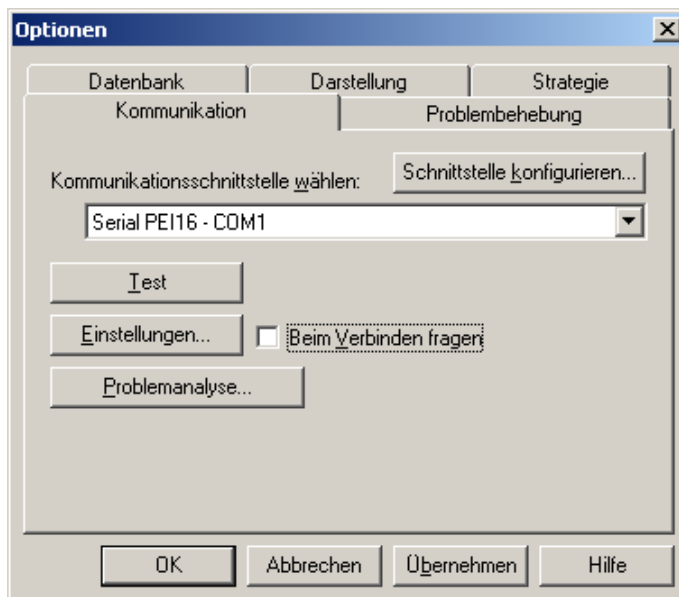
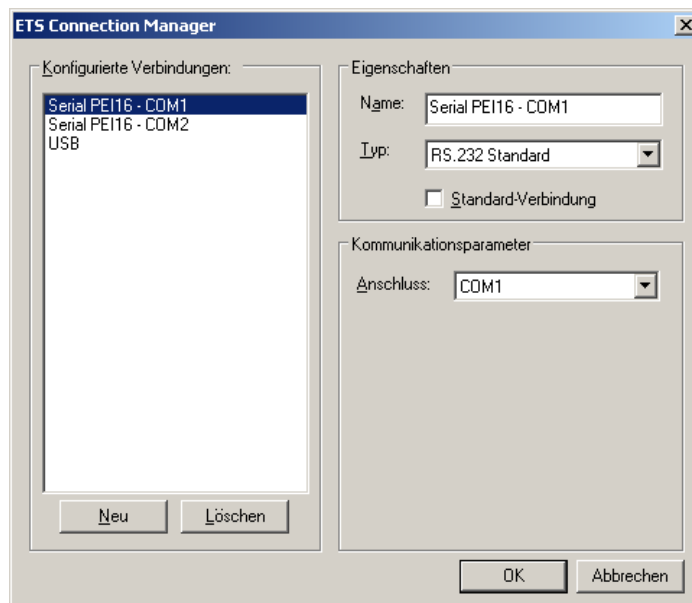


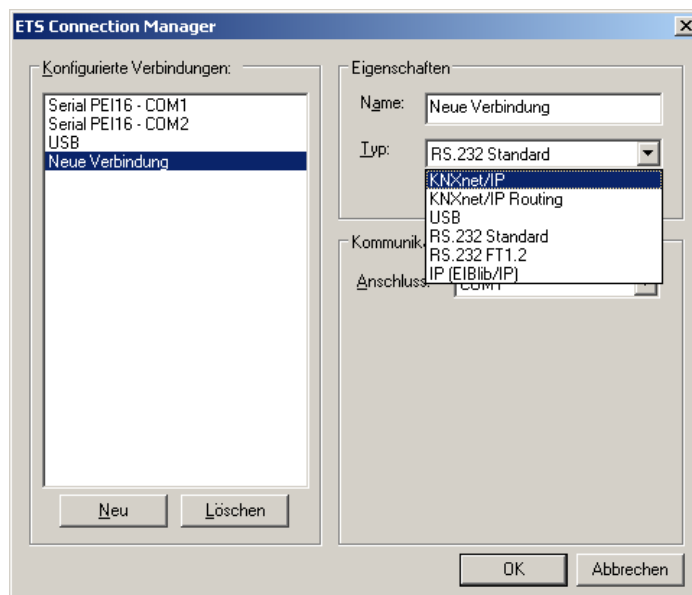
Figure 7: Option dialogue of the communication properties of the ETS3

2. Select the "Configure interface" button. The "ETS Connection Manager" window opens (compare with Figure 8).



**Figure 8: ETS Connection Manager**

3. Create a new connection. For this, select the "New" button. Give the new connection a unique name. Select "KNXnet/IP" as type (compare with Figure 9). Subsequently the ETS automatically searches the IP data network for available IP communication devices.



**Figure 9: Create new connection as KNXnet/IP**

4. In the "KNXnet/IP device" device list, all KNX/IP routers found in the IP network are listed (compare with Figure 10). The name assigned in the ETS (default "Gira KNX/IP router") and the IP address of the KNX/IP router are displayed. The (P) following this information signals an activated programming mode. In this way, individual devices can also be identified specifically in systems with several routers. In the device list, the KNX/IP router must be selected which should serve as a "data interface" in the configured connection. By clicking the "Scan again" button, the ETS begins an additional scan process and again searches the IP network for IP routers.

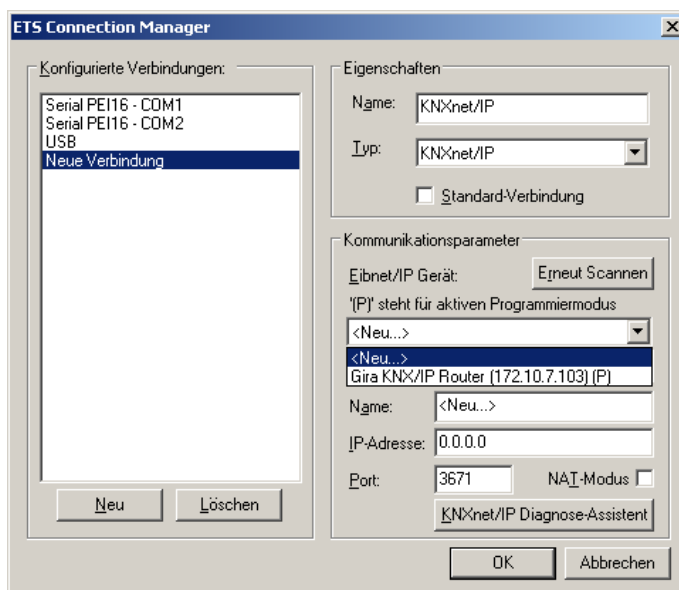


Figure 10: Device list under communication parameters with all IP routers found

5. Subsequently the configuration of the new connection can be completed by clicking the "OK" button. The communication parameters (compare with Figure 11) should remain unchanged.

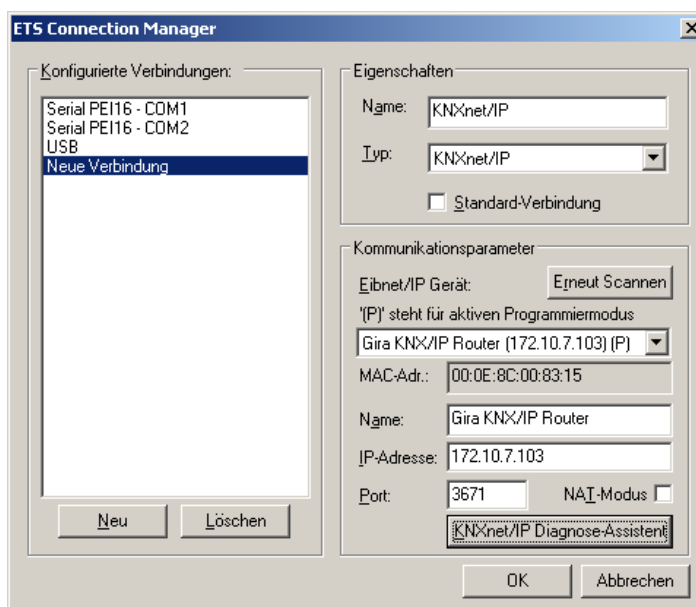


Figure 11: Complete interface configuration of the KNX/IP router

- For stable communication via KNXnet/IP tunneling, a second physical address (similar to the local physical address for an RS232 or USB connection) must be set via the ETS. For this, select the new KNXnet/IP connection as the interface in the option dialogue of the communication properties (compare with Figure 12) and click the "Settings" button.

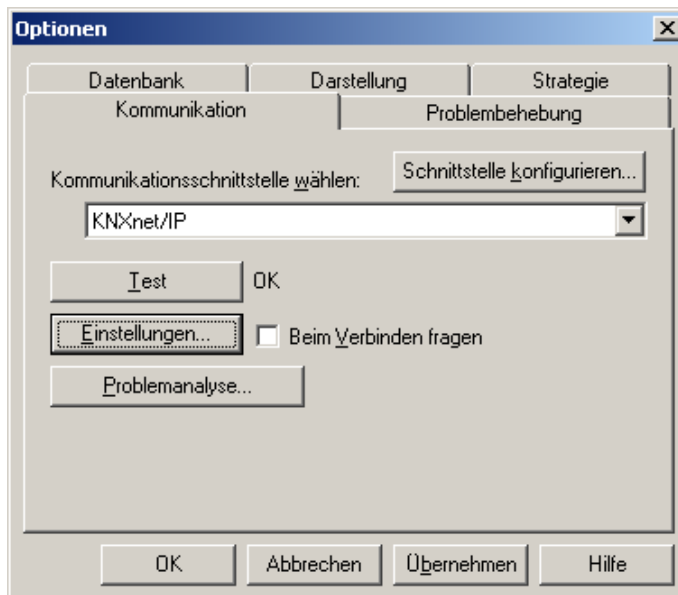


Figure 12: Select communication interface KNXnet/IP and open settings

- The settings of the local interface open (compare with Figure 13). In the "Physical address" field, the physical address of the IP data interface must now be entered. It must be ensured that an address from another device in the ETS project is not used (if necessary, check using the ETS "Is the address free?"). Following successful address assignment, a dummy device should be inserted in the ETS project at the topologically correct position.  
In the state of delivery, the physical address "15.15.255" is preset.  
By clicking the "OK" button, configuration of the IP data interface is completed. The IP connection can then be used.

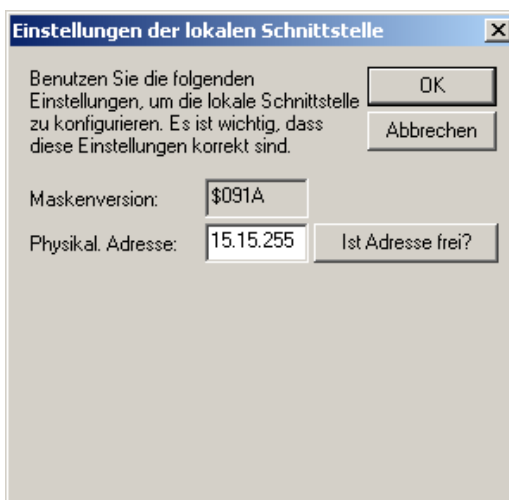


Figure 13: Settings of the local interface

### 5.3 Operation as an IP data interface in the ETS4

Via an IP data network and a KNX/IP router, a direct connection can be established from a PC or other data processing devices in the networks (e.g. visualisations) to the KNX. Thus, access to the bus is possible from every point in the IP data network.

The ETS3 and ETS4 facilitate the configuration of KNX installations via the existing IP data network and use the KNX/IP router such as a conventional serial RS232 or USB data interface to communicate with the bus. This also includes downloading from bus devices or the function of the group monitor (no support of the bus monitor mode).

For stable communication via KNXnet/IP tunneling, a second physical address (similar to the local physical address for an RS232 or USB connection) must be set via the ETS3 or ETS4.

The following steps must be carried out to configure the communication interfaces:

1. First the ETS4 must be started and the settings for communication must be opened (Settings->Communication – compare with Figure 14)

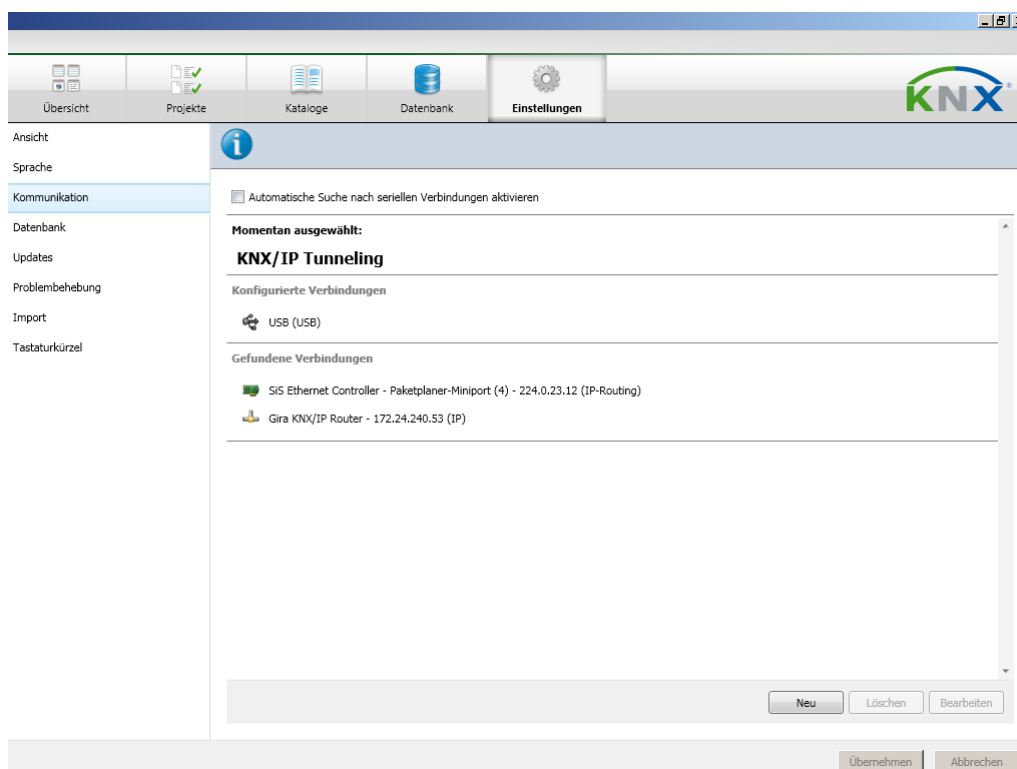


Figure 14: Communication settings in the ETS4

2. Then select the KNX/IP router in the device list under "Connections found" and click on "Select".

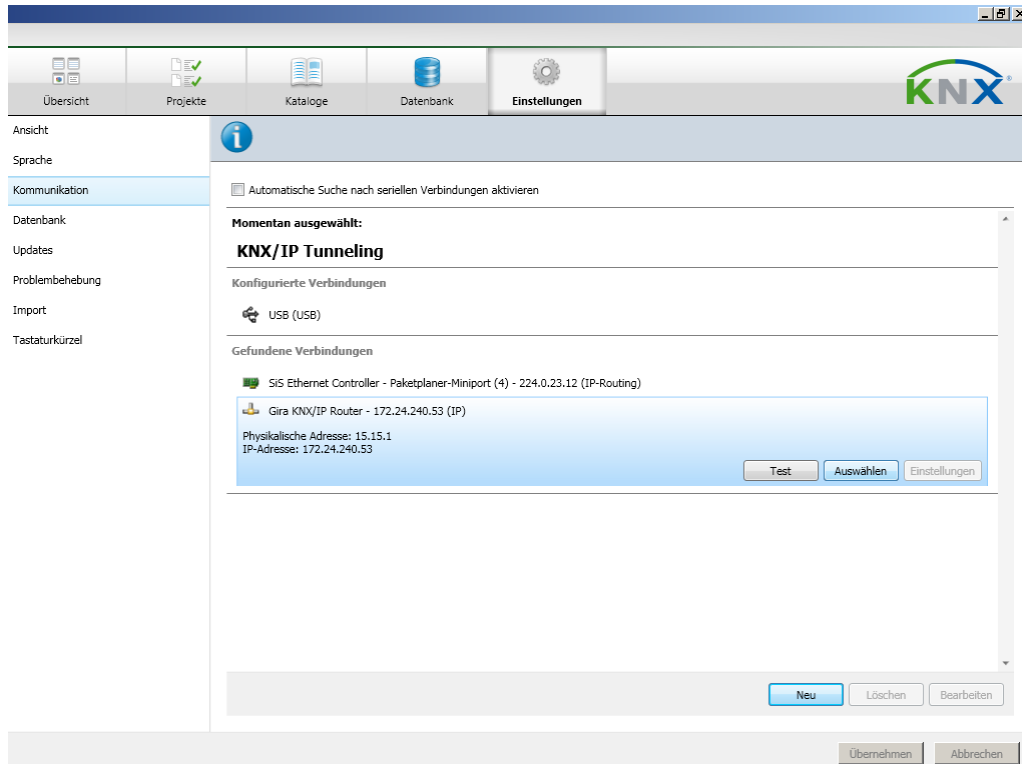


Figure 15: Select device for tunneling connection in the ETS 4

3. The router now appears under "Configured connections".

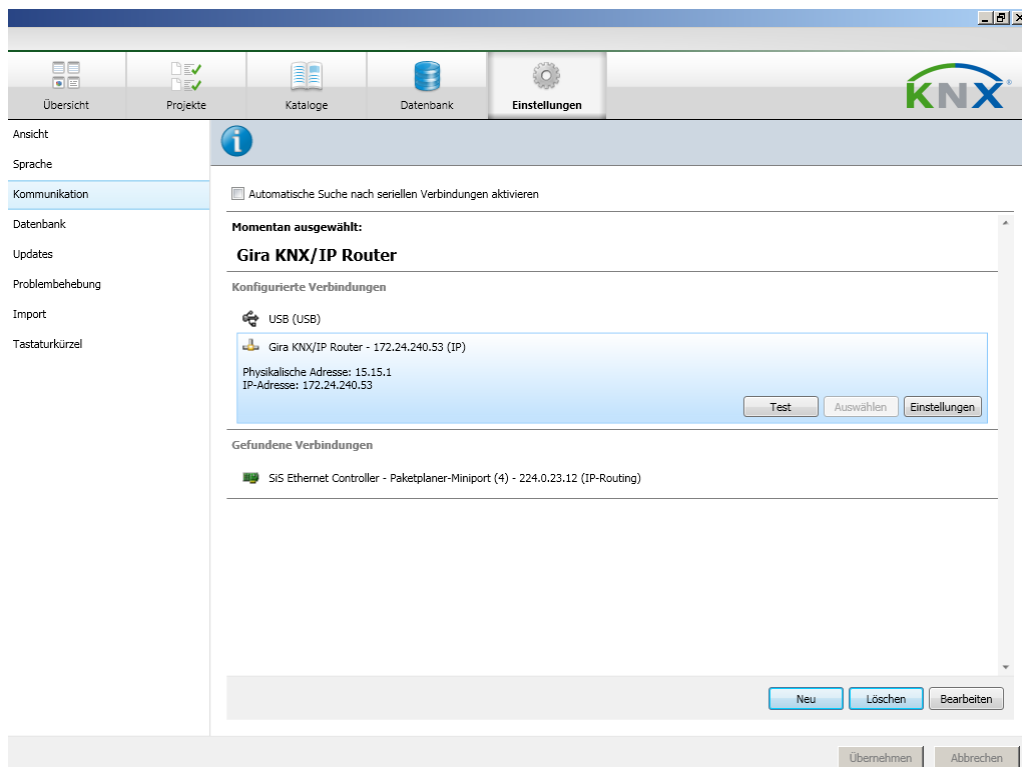
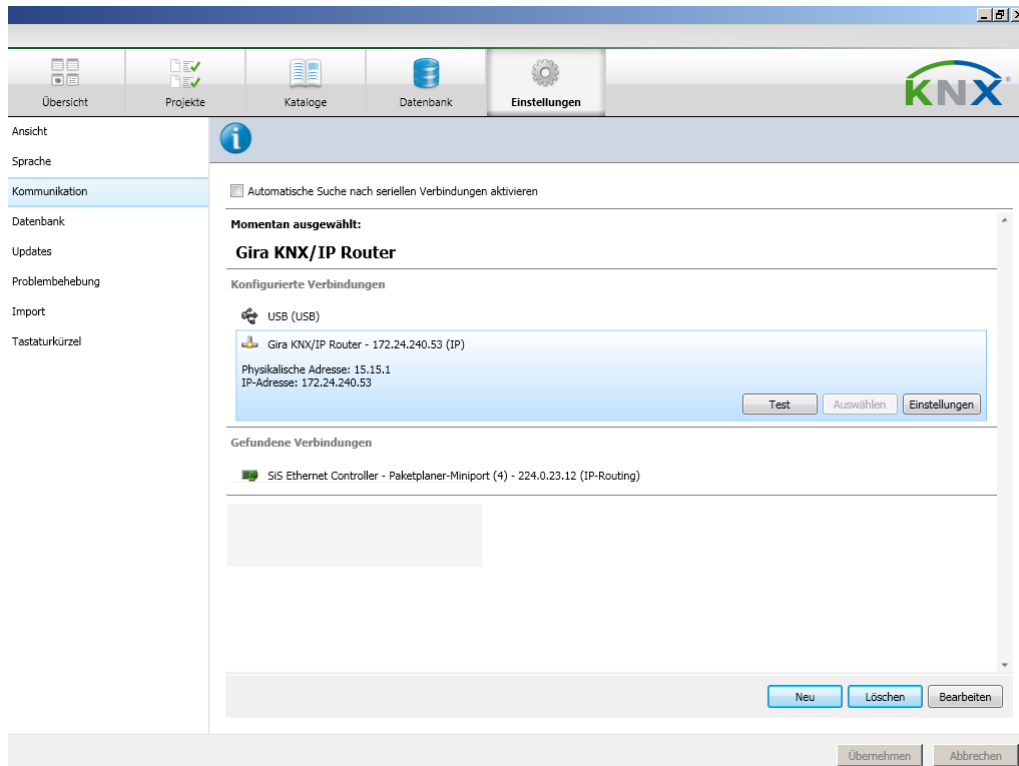


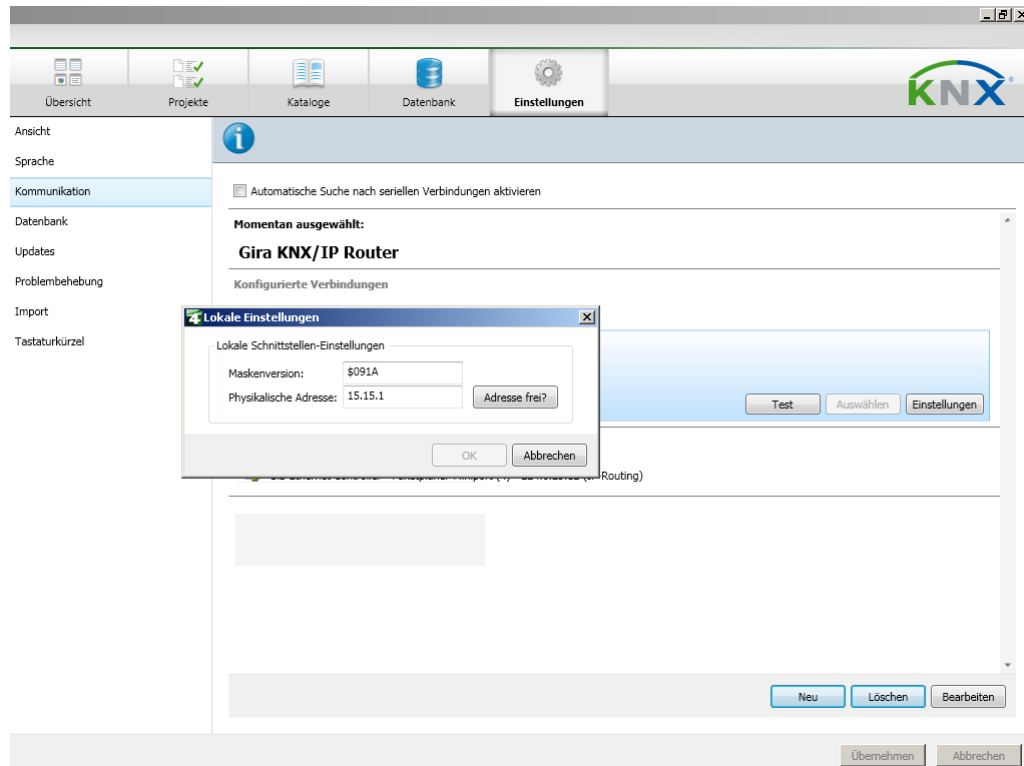
Figure 16: Device was selected in the ETS4

4. For stable communication via KNXnet/IP tunneling, a second physical address (similar to the local physical address for an RS232 or USB connection) must be set via the ETS. For this, select the device under "Configured connections" and click "Settings".



**Figure 17: Select device in the ETS4 under "Configured connections"**

5. The configuration dialogue opens. The desired address must now be entered in the field of the physical address of the device. It must be ensured that an address from another device in the ETS project is not used (if necessary, check using the ETS "Address free?").



**Figure 18: Setting the local physical address**

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