KNX/EIB
Product documentation

GIRA

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KNX/IP router

Order No. 2167 00

Table of contents

1 Productdefinition

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/EIB power supply 320 mA
Order No.: 1086 00

1.3 Application

The KNX/IP router connects the Instabus KNX/EIB lines via data networks (Ethernet) using the Internet Protocol (IP). It uses the KNXnet/IP standard so that KNX/EIB 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 tunnelling 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/EIB lines to form a logic functional area and guarantees electrical isolation between these lines. As a result, each bus line of a KNX/EIB installation can be operated electrically independent of the other lines. The exact function of the device is determined by its physical address.

The KNX/IP router can be used as a data logger. It incorporates a card reader for micro SDHC cards up to 32 GB. The KNX/EIB 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 an 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 ±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 Mounting, electrical connection and operation

2.1 Safety notes

Electrical devices may only be installed and mounted by a qualified electrician. 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 refer to the operating instructions enclosed with the device for more information.

2.2 Device components

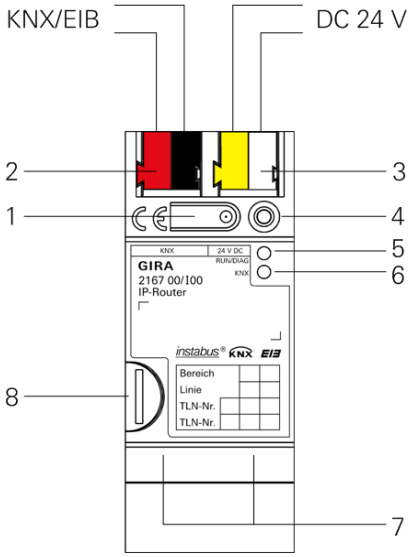

Figure 1: KNX/IP router

Dimensions:

Width (W):
36 mm (2 TE)

Height (H):
90 mm

Depth (D):
74 mm

1 Programming button

2 KNX connection

3 External power supply connection* 24..30V DC ±10%.

4 Programming LED (red/yellow/orange)
red = router
yellow = router applications
orange = router and router applications

5 LED operation display (green)
on: Ready for operation
flashing: Diagnosis code

6 LED KNX (yellow)
on: KNX is connected
off: KNX is not connected
flashing: Router is receiving data on KNX/TP line or on KNX/IP 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 Mounting and electrical connection

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!

Mounting the device

- Snap on the top-hat rail according to DIN EN 60715. Network connection must be located on the bottom.

ⓘ A KNX/EIB data rail is not necessary.

ⓘ Observe temperature range (0 °C…+45 °C) and ensure sufficient cooling if necessary.

Connecting the device

- Connecting the KNX/EIB bus to the KNX connection of the router (2) with a KNX/EIB connection terminal.
- Connecting the external power supply* to the power supply connection (3) of the router using a KNX/EIB 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/EIB power supply unit can also be used as an external power supply. Ensure that the maximum number of KNX/EIB devices which can be operated with the KNX/EIB 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).

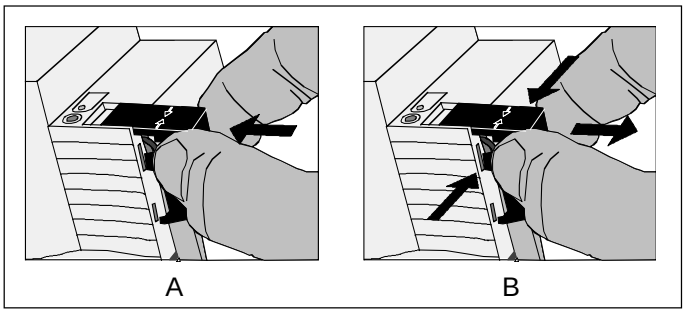

Figure 2: Mounting / removing the cover cap

2.4 Commissioning

After mounting 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
Router applications	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 router applications are secured against importing an incorrect application. The ETS will cancel the download in a case like this. However, as the physical address has 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/EIB 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/EIB data interface, the tunnelling connection must be set up again after the programming process.

Programming the physical address of the router applications
Programming is done in the programming environment of the ETS (3.0f, 4.0 or higher). An additional KNX/EIB 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/EIB data interface, the tunnelling 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 router applications 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.
- Commissioning is complete.

- If the device was programmed without an additional KNX/EIB data interface, the tunnelling connection must be set up again after the programming process.

2.4.1 Factory reset

The device can be reset to factory settings with the Gira Project Assistant.

- Ensure the device is switched on and has an Ethernet connection to the computer.
- Start the Gira Project Assistant (GPA) on the computer.
- In the GPA, open the main menu and then open the Action Centre.
- Click on the gear symbol in the KNX/IP router column to select the functions.
- Select the "Factory reset" function.
- The device is restarted and the factory reset is carried out.

Alternatively, a factory reset can be carried out directly on the device via a sequence during start-up if, for example, no Ethernet connection is possible.

- 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) slowly flash simultaneously. This happens after approx. 30 seconds.
- 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) flash quickly simultaneously.
- 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. After starting up the device, this is indicated by the slowly flashing green operation indication LED (5). For the settings of the parameters please refer to the sections "4.2.5 State of delivery (router)" and "4.3.5 State of delivery (router applications)".

2.4.2 Information on start-up

For the router, programming the physical address as well as programming the application programme via KNX/IP routing is already possible when no KNX bus line is connected to the KNX connection (2). When programming via KNX/IP routing is started for the router applications, it will continue to run if the KNX bus connection is interrupted, ensuring that it is concluded successfully.

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 router applications can be put into programming mode.

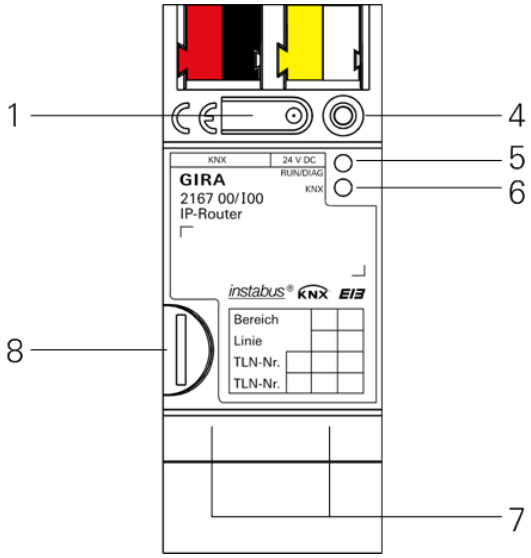

Figure 3: KNX/IP router

1 Programming button

4 Programming LED (red/yellow/orange)
red = router
yellow = router applications
orange = router and router applications

5 LED operation display (green)
on: Ready for operation
flashing: Diagnosis code

6 LED KNX (yellow)
on: KNX is connected
off: KNX is not connected
flashing: Router is receiving data on KNX/TP line or on KNX/IP 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 application of the router and/or the router applications have been imported via the ETS. Refer to "2.4 Commissioning".
- 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 signalising the start-up process. Shortly afterwards the green LED (5) starts flashing. 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) signalises 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 ±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, IGMP, UDP/IP, DHCP, AutoIP KNXnet/IP according to KNX system specification: Core, Routing, Tunnelling, Device Management
Micro SD card	max. 32 GByte
RTC buffering	≥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 / router applications / KNX/IP router applications

Configuration: S-mode standard

Applications:

No.	Brief description	Name	Version
1	KNX/IP router	KNX/IP router V3.0 901B30	1.0
2	Router applications	Router applications V3.0 901A10	1.0

Note: In versions V1.0 and V2.0 of the KNX/IP router, the router applications were referred to as "data logger / clock".

4.2 Software "KNX/IP router V3.0 901B30"

4.2.1 Range of functions

- Simple connection to higher-level network systems by using the Internet Protocol (IP)
- Direct access from any point in the IP network to the KNX/EIB installation (supports group and bus monitor connections via KNXnet/IP tunnelling)
- Fast communication between KNX/EIB 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
- Easy configuration from ETS 3f
- Failure message of the KNX/EIB system to applications via KNXnet/IP
- Support of up to 4 parallel KNXnet/IP tunnelling 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 at least Version 2.0. The update can be obtained from the KNX homepage (http://www.knx.org) free of charge.
- The KNX/IP router is protected against importing an invalid application version.
- Router functionality is maintained without parameterised router applications.

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 failure and return respectively can be assigned to 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.

Acknowledgement of group 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 respective "Acknowledgement of group telegrams" parameter is located on the "Bus IP" parameter page. The default is "for forwarding".

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 applications
- Setting the time via KNX or NTP
- Error during NTP synchronisation
- Change of the IP address
- KNX power failure
- KNX voltage recovery
- Restarting 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 tunnelling connections	15.15.255
Device name	Gira KNX/IP router
Monitoring for bus voltage failure	blocked
TTL	128
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 0-13	filter (normal)
Group telegrams of the main group 14-31	forward
Individually addressed telegrams	filter (normal)
Broadcast telegrams	forward
Acknowledgement of group telegrams	for forwarding
IP > Bus	
Group telegrams of the main group 0-13	filter (normal)
Group telegrams of the main group 14-31	forward
Individually addressed telegrams	filter (normal)
Broadcast telegrams	forward

4.2.6 Parameter

Description:	Values:	Comments:
General		
Device name (maximum of 30 characters)	max. 30 characters, **Gira KNX/IP router**	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	**blocked** approved	Defines if a bus voltage status change is signalled in the IP network.
TTL	0..255, **128**	Defines the lifetime (**T**ime **T**o **L**ive) of data packets in IP communication. The value defines the number of stops the data packet may pass before it is declared invalid and ignored.
IP address assignment	**from DHCP service** manual entry	Defines if the IP address of the device is assigned manually or automatically (by the DHCP server).
IP routing multicast address	**Use system multicast address** Use individual multicast address	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. The factory-set default value is "Use system multicast address". In this case, the device communicates via 224.0.23.12. This address is assigned to KNXnet/IP routing and reserved for this application. However, all addresses in the 224.0.0.0 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". An individual address can then be parameterised with the "Byte1" to "Byte4" parameters. 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.

Byte 1 (224…239)	224..239, **224**	Defines the IP routing multicast address if an individual multicast address is used. The address is compiled of 4 individual bytes. Default is 224.0.23.12.
Byte 2 (0…255)	0..255, **0**	
Byte 3 (0…255)	0..255, **23**	
Byte 4 (0…255)	0..255, **12**	

IP address

IP address		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.
Byte 1 (0…255)	0..255, **192**	
Byte 2 (0…255)	0..255, **168**	
Byte 3 (0…255)	0..255, **0**	
Byte 4 (0…255)	0..255, **10**	

IP subnet mask

IP subnet mask		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.
Byte 1 (0…255)	0..255, **255**	
Byte 2 (0…255)	0..255, **255**	
Byte 3 (0…255)	0..255, **255**	
Byte 4 (0…255)	0..255, **0**	

IP standard gateway

IP standard gateway		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.
Byte 1 (0…255)	0..255, **0**	
Byte 2 (0…255)	0..255, **0**	
Byte 3 (0…255)	0..255, **0**	
Byte 4 (0…255)	0..255, **0**	

DNS

Primary DNS		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.
Byte 1 (0…255)	0..255, **0**	
Byte 2 (0…255)	0..255, **0**	
Byte 3 (0…255)	0..255, **0**	
Byte 4 (0…255)	0..255, **0**	
Secondary DNS		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.
Byte 1 (0…255)	0..255, **0**	
Byte 2 (0…255)	0..255, **0**	
Byte 3 (0…255)	0..255, **0**	
Byte 4 (0…255)	0..255, **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 telegrams 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).

	filter (normal)	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.
	forward	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		This parameter determines when the KNX/IP router should confirm group telegrams with a telegram.
	for forwarding	Only those group telegrams which are also forwarded to IP are confirmed with a telegram. This 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.
	filter (normal)	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 to 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 from the IP to the KNX bus are blocked.
	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 from the IP to the KNX bus are blocked.

4.3 Software "Router applications V3.0 901A10"

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.
- NTP
  - Requesting current time and date from NTP server
- Reliable communication
  - Expansion of the KNXnet/IP protocol for minimising data loss in communication between KNX devices

4.3.2 Information on the software

- Router applications can be parameterised from ETS 3.0f.
- Router applications are protected against importing an invalid application version.
- If the parameters for the time zone or for using reliable communication are changed, the device automatically restarts after successful programming of the application.

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	Function	Name	Type	DP type	Flag*
1	Send	Time	3 bytes	10.001	C, T
Description:	3 byte object for sending the current time. The interval can be parameterised.				

Function:	Clock				
Object	Function	Name	Type	DP type	Flag*
2	Send	Date	3 bytes	11.001	C, T
Description:	3 byte object for sending the current date. The interval can be parameterised.				

Function:	Clock				
Object	Function	Name	Type	DP type	Flag*
3	Receive	Trigger send date/time	1 bit	1.001	C, W
Description:	1 bit object for triggering the sending of the current time/date if the object has been assigned any desired value.				

Function:	Timekeeper				
Object	Function	Name	Type	DP type	Flag*
4	Receive	Time	3 bytes	10.001	C, W
Description:	3 byte object for receiving the current time.				

Function:	Timekeeper				
Object	Function	Name	Type	DP type	Flag*
5	Receive	Date	3 bytes	11.001	C, W
Description:	3 byte object for receiving the current date.				

Function:	Data logger				
Object	Function	Name	Type	DP type	Flag*
6	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		Function	Name	Type	DP type	Flag*
	7	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 that the data logger is inactive.

Function: Data logger
Parameter: Memory type = ROM
Memory status type = binary

Object		Function	Name	Type	DP type	Flag*
	8	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: Memory type = ROM
Memory status type = value (0-255)

Object		Function	Name	Type	DP type	Flag*
	9	Send	SD card memory filling state	1 byte	5.001	C, R

Description: 1-bit object for displaying the filling state of the SD card. The value range is 0-255 (equivalent to 0-100 %).

Function: NTP

Object		Function	Name	Type	DP type	Flag*
	10	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 NTP query was successful and the system time has been reset as a result or if there was an error during the previous query, the object is assigned a "1". If the last NTP query was not successful, the object is assigned a "0".

Function: Data logger

Object		Function	Name	Type	DP type	Flag*
	11	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		Function	Name	Type	DP type	Flag*
	13	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	Function	Name	Type	DP type	Flag*
14	Send	SD error code	1 byte		C, R

Description: 1-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.

If an NTP server is used, the clock will only send the date and time if at least one successful NTP synchronisation has been executed after device start-up. This is to prevent the sending of a wrong system time even if the the NTP function is activated.

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 removed, 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 drops below 2.5 Mbyte, 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 log files 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 further repetitions, consecutive numbers (~1) are added to the tilde.

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".

Reliable communication
Reliable communication can be activated for the device. This is an extension of the KNXnet/IP protocol that serves to minimise data loss in communication over potentially unreliable connections. This is recommended for communication via WLAN, for example.

To use reliable communication, suitable components (e.g. the Gira G1 or other KNX/IP router) for which reliable communication has also been activated must be used in the system.

Via the "Use Reliable communication?" parameter in the "Reliable communication" parameter view of the ETS, this function can be activated.

If this parameter is changed, the router restarts directly after downloading the application.

The router should always be programmed separately.

Reliable communication is deactivated in the state of delivery.

4.3.5 State of delivery

Physical address	15.15.255
Time function	None
Data logger	No
Time zone	(UTC+01:00) Europe/Berlin
Use NTP server	No
Use reliable communication?	No

4.3.6 Parameter

Description:	Values:	Comments:
General		
Time function		This parameter determines which time function the device executes.
	None	No time function is executed.
	Clock	The device works as a clock and sends the current time and date to the bus at configurable intervals. If an NTP server us used in addition, the date/time will only be sent if the system time was synchronised at least once since the device started up.
	Timekeeper	The device works as a timekeeper and receives the time telegrams sent from a clock and evaluates them.
Send time	**Each minute** Each hour Each day	Only visible when the device works as a clock. The interval for sending the time to the bus is configured with this parameter.
Send date	**Each minute** Each hour Each day	Only visible when the device works as a clock. The interval for sending the date to the bus is configured with this parameter.
Data logger		This parameter determines whether the data logger function is activated. The corresponding communication objects are only available when it is activated.
	No	The data logger function is deactivated.
	Yes	The data logger function is activated.
Data logging format		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.
	ETS4	The data is stored in an ETS4-compliant format (.xml) which is also readable by the ETS5.
	ETS3	The data is stored in an ETS3-compliant format (.trx).

Data logger memory type		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.
	ROM	The SD card memory is used as ROM.
Data logger memory status type		Only visible when "Data logger" is set to "Yes" and the "Data logger memory type" is set to "ROM". This parameter specifies what type the status object of the card fill level is to correspond to.
	Binary	A 1-bit object is used. The value "1" means that the card is full, "0" means that there is still space on the card for logging.
	Value (0-255)	A 1-byte object is used. The value range is between 0 – 255. The value "255" corresponds to a card fill level of 100 %.
Time zone		The time zone the device works with is configured with this parameter.
	(UTC+01:00) Europe/Berlin Other UTC time Zones	The time zone to be used is selected here. There are several time zones with identical UTC deviations. In some of these time zones, summer/winter time 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. If this setting is changed, the router will restart directly after the application has been programmed!
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.
	No	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** 1..65535	This parameter determines at which interval the time should be synchronised to the NTP server. The information is in minutes.

Reliable communication

Use reliable communication?		This parameter determines if reliable communication is to be used. Activating this function enables reliable KNX communication within the system (recommended for communication via WLAN). To use this function, the system must contain suitable components (e.g. the Gira G1 or other KNX/IP router) with the corresponding settings activated. If this setting is changed, the router will restart directly after the application has been programmed! The router should always be programmed separately.
	No	Reliable communication is not used.
	Yes	Reliable communication is used.

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).

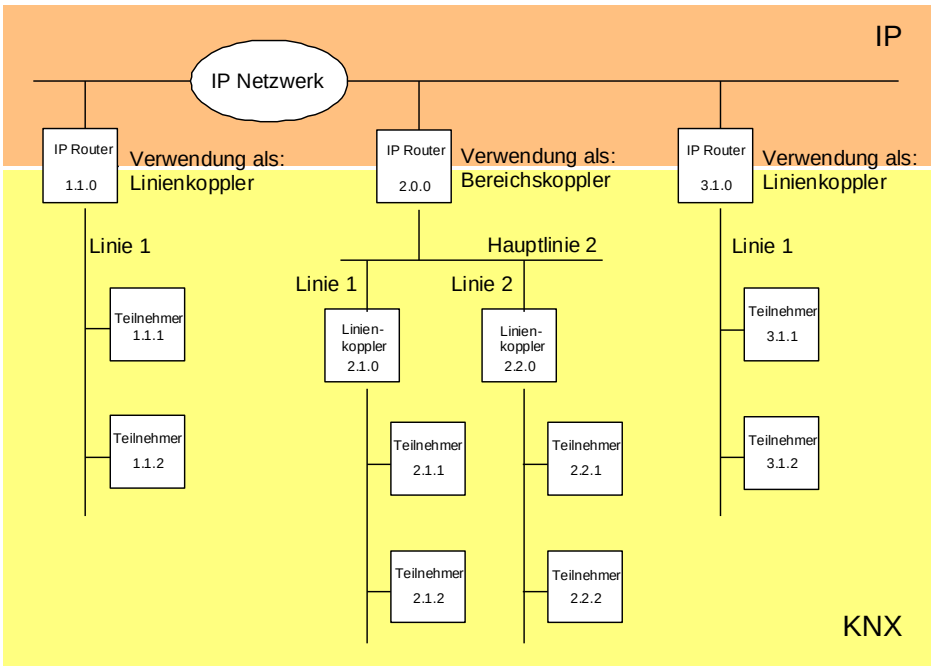

Figure 4: KNX/IP router as an area or line coupler

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

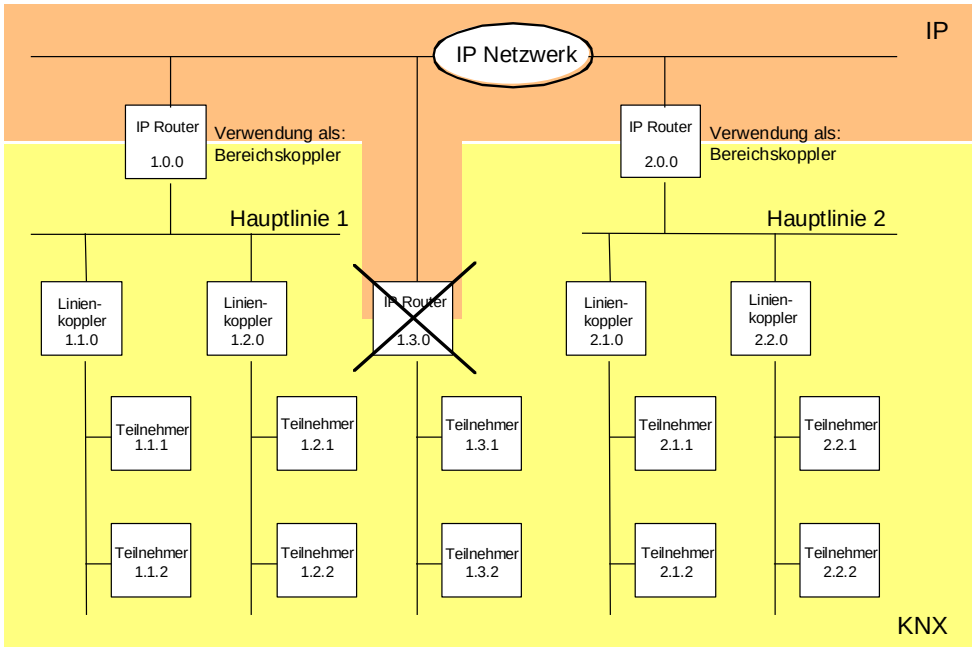

Figure 5: KNX/IP router as an area coupler

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

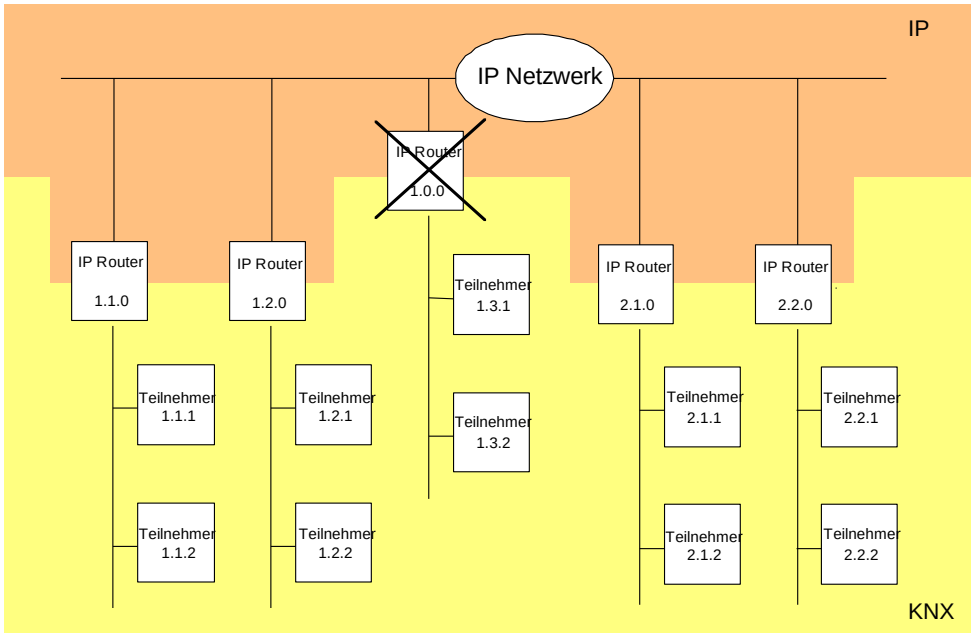

Figure 6: KNX/IP router as a line coupler

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/EIB. Thus, access to the bus is possible from every point in the IP data network.

The ETS3 and ETS4 facilitate the configuration of KNX/EIB 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 bus or group monitor.
For stable communication via KNXnet/IP tunnelling, 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).

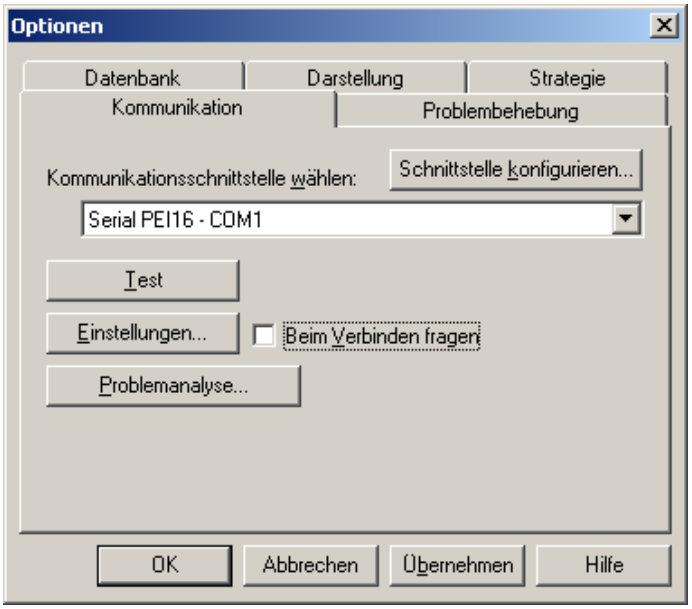

Figure 7: Option dialogue of the communication properties of the ETS3

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

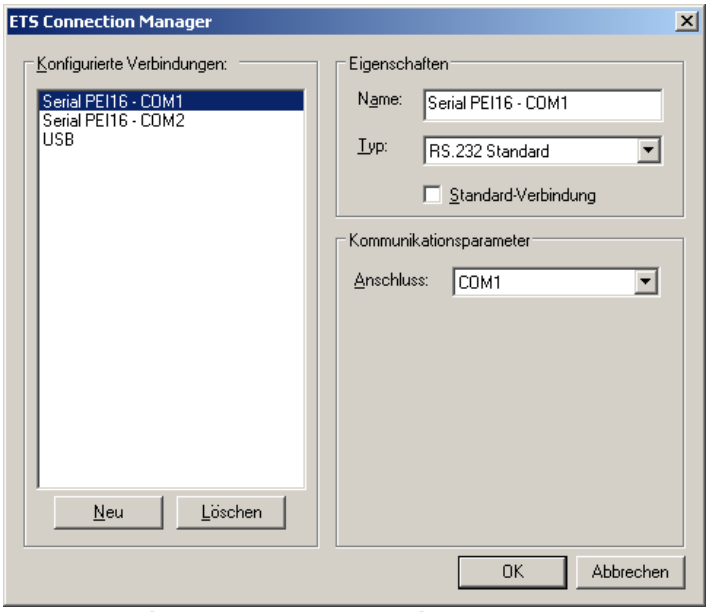

Figure 8: ETS Connection Manager

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.

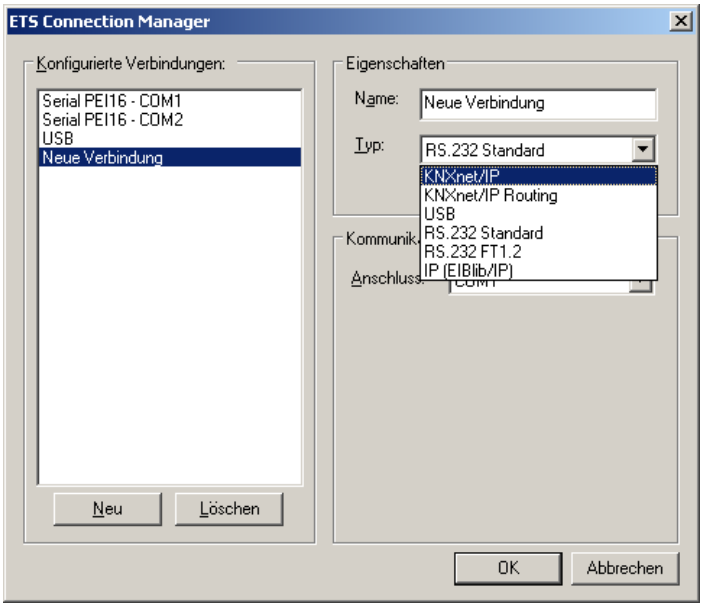

Figure 9: Create new connection as KNXnet/IP

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 signalises 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.

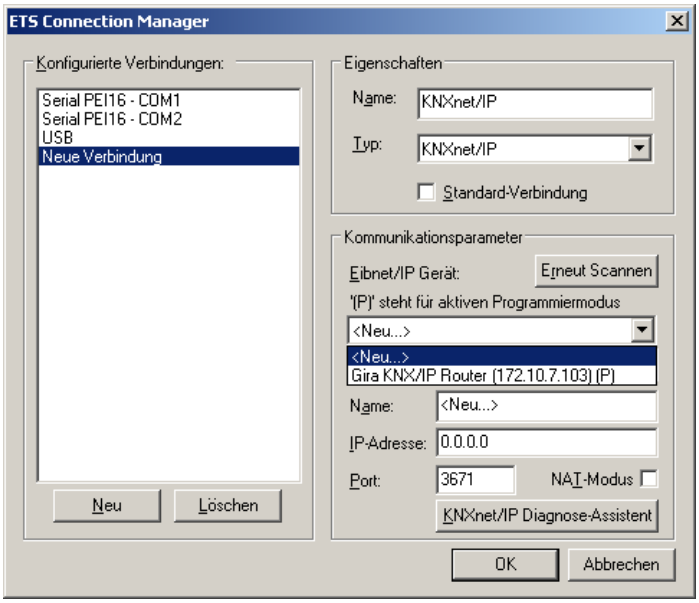

Figure 10: Device list under communication parameters with all IP routers found

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.

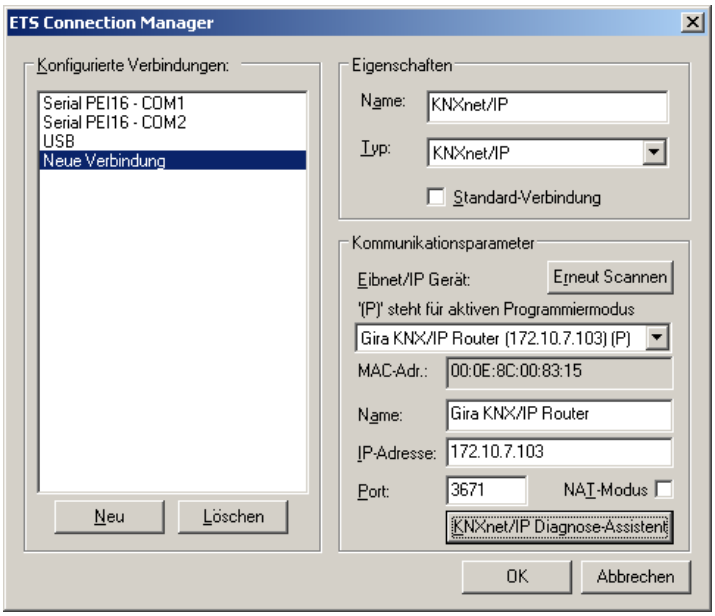

Figure 11: Complete interface configuration of the KNX/IP router

6. For stable communication via KNXnet/IP tunnelling, 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.

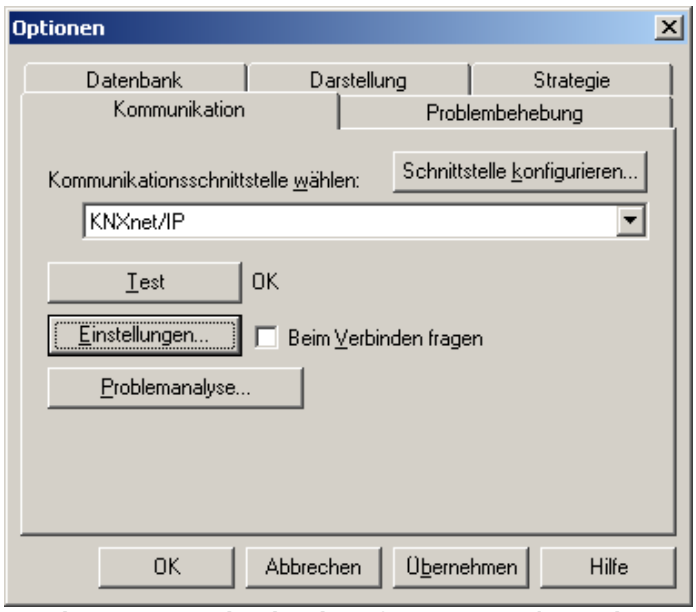

Figure 12: Select communication interface KNXnet/IP and open settings

7. 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.

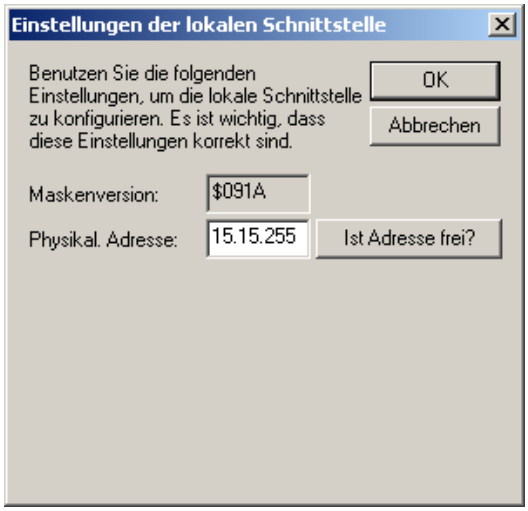

Figure 13: Settings of the local interface

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/EIB. Thus, access to the bus is possible from every point in the IP data network.

The ETS3 and ETS4 facilitate the configuration of KNX/EIB 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 bus or group monitor.
For stable communication via KNXnet/IP tunnelling, 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)

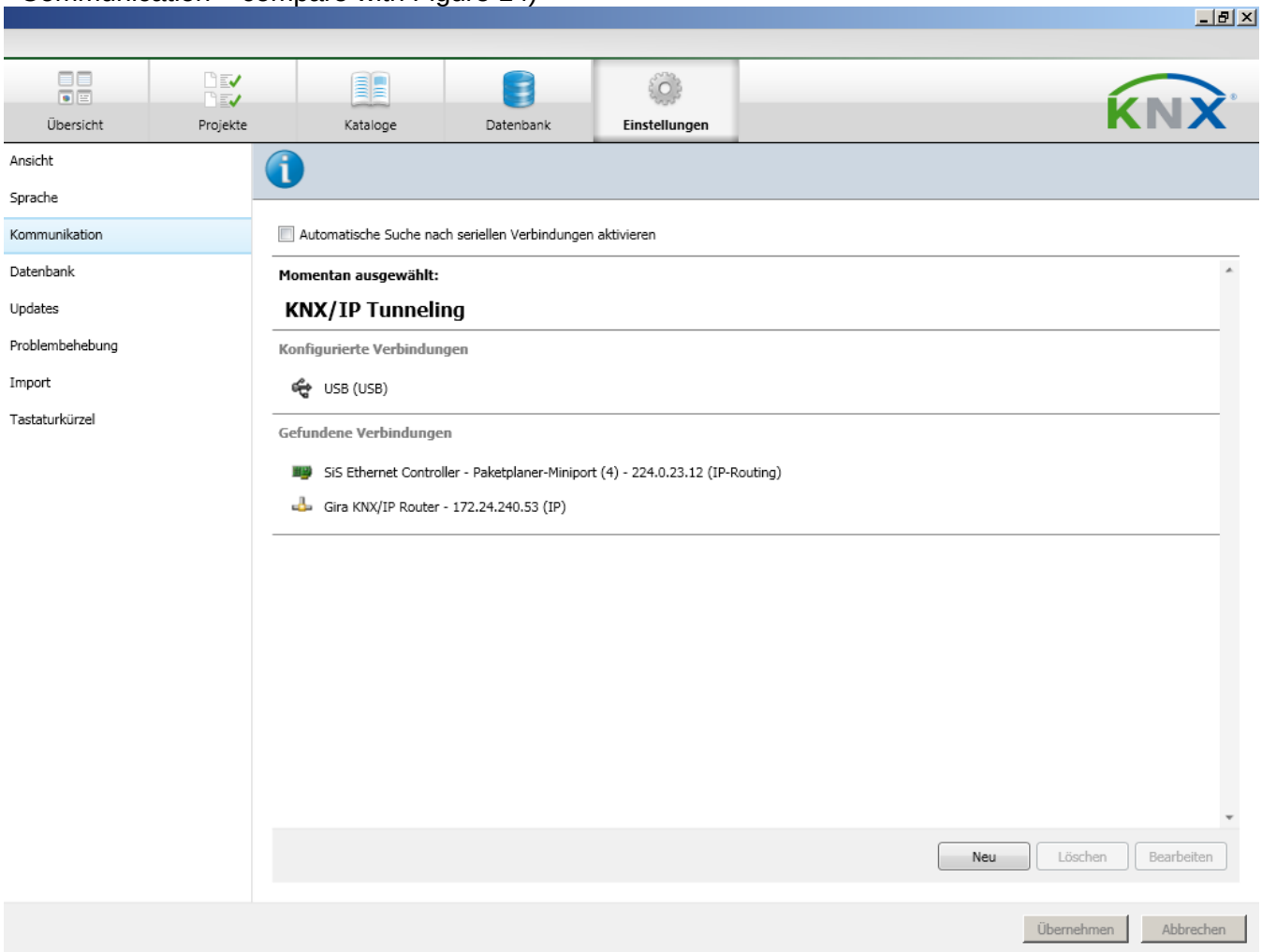

Figure 14: Communication settings in the ETS4

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

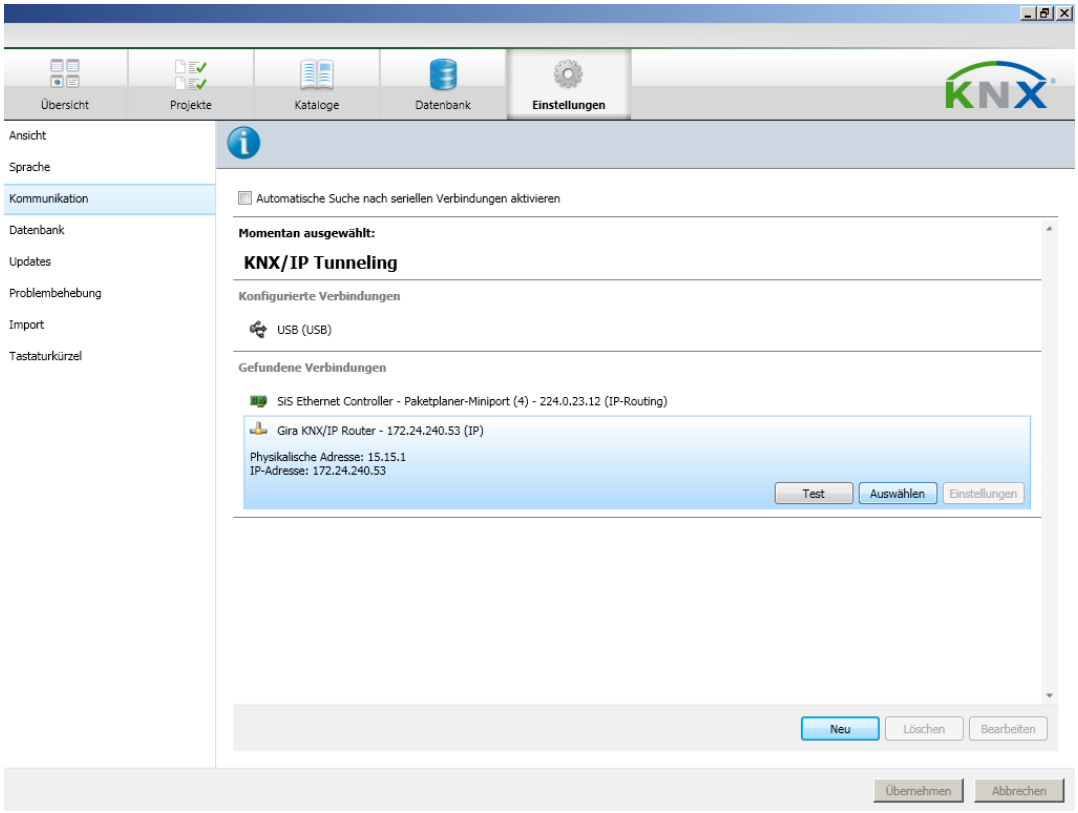

Figure 15: Select device for tunnelling connection in the ETS 4

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

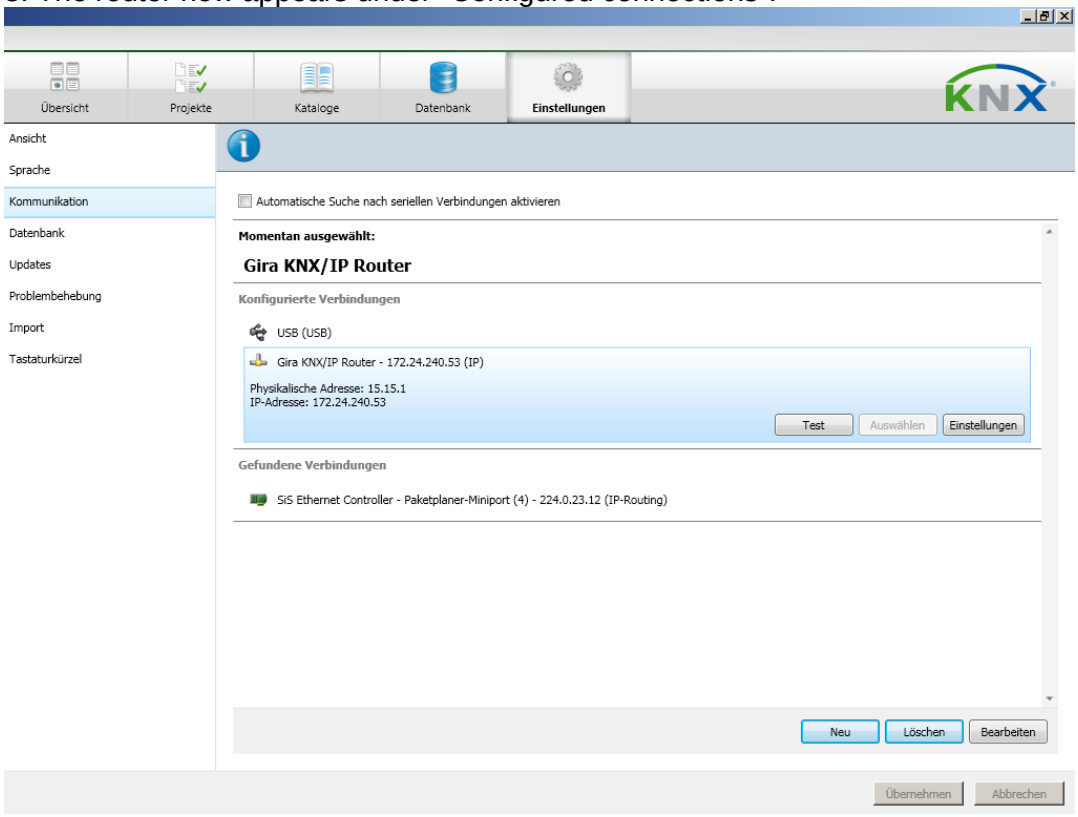

Figure 16: Device was selected in the ETS4

4. For stable communication via KNXnet/IP tunnelling, 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".

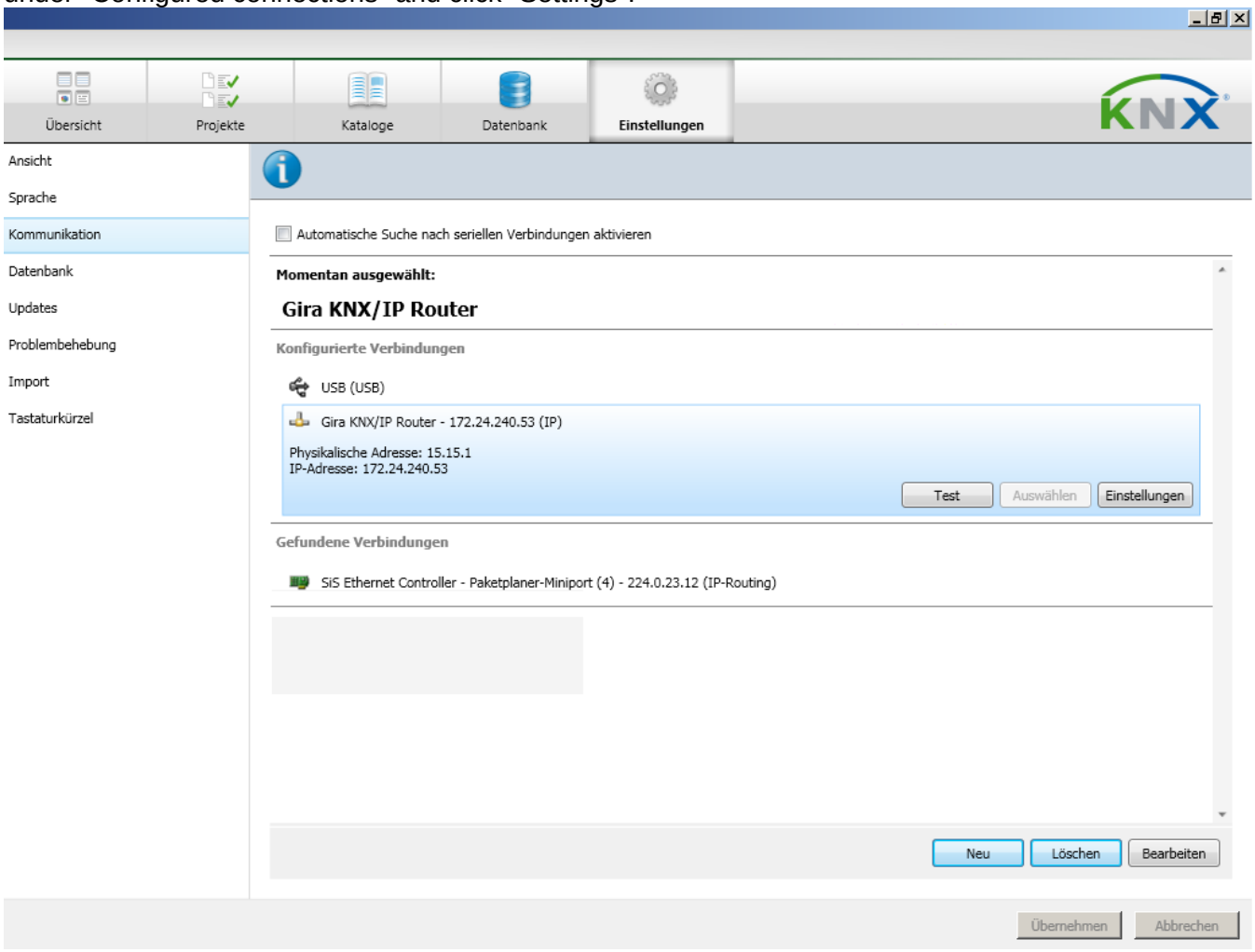

Figure 17: Select device in the ETS4 under "Configured connections"

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?").

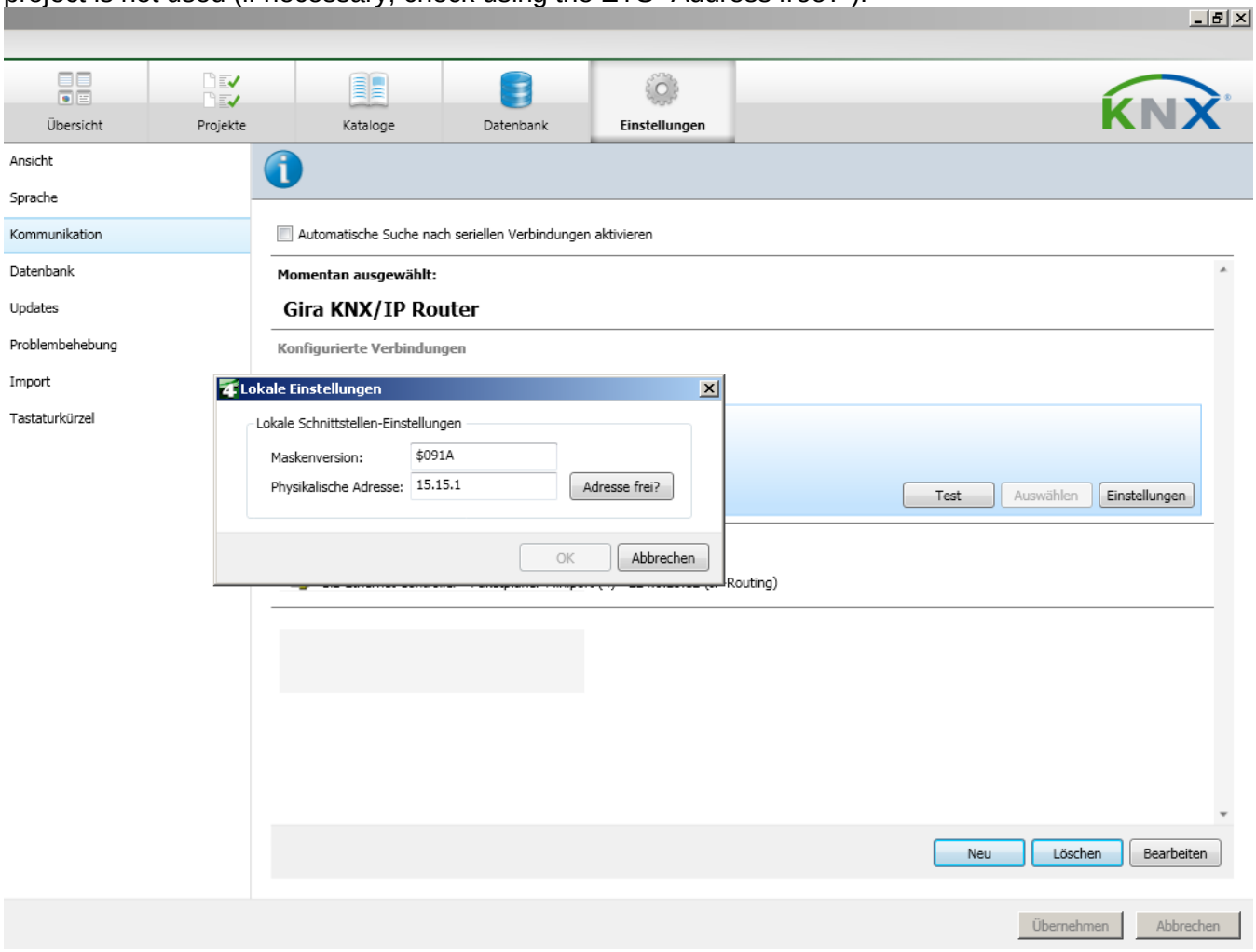

Figure 18: Setting the local physical address

6 License AgreementKNX/IP-Router Software

Hereinafter are the contract terms for your use of the software as the "licensee".
By accepting this agreement and installing the KNX/IP-Router software or putting the KNX/IP-Routerinto use, you conclude an agreement with Gira, Giersiepen GmbH & Co KG and agree to be legally bound to the terms of this agreement.

6.1 Definitions

Licensor: Gira, Giersiepen GmbH & Co KG, Radevormwald, Germany
Licensee: The legal recipient of the KNX/IP-Router software
Firmware: Software which is embedded on the KNX/IP-Router hardware and enables operation of the KNX/IP-Router.
KNX/IP-Router Software: The KNX/IP-Router software denotes all of the software provided for the KNX/IP-Router product, including the operating data. This particularly includes the firmware and the product database.

6.2 Subject matter of the agreement

The subject matter of this agreement is the KNX/IP-Router software provided on data carriers or through downloads, as well as the corresponding documentation in written and electronic form.

6.3 Rights of use of theKNX/IP-Router software

The licensor grants the licensee the non-exclusive, non-transferable right to use the KNX/IP-Router for an unlimited time in accordance with the following conditions for the purposes and applications specified in the valid version of the documentation (which shall be provided in printed form or also as online help or online documentation).
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c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

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