Technical Manual
MDT IP Router

SCN-IP100.01

DIN EN ISO 9001
TAW *Cert*
Zert.Nr.19050608

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1 Introduction

The KNX IP Router forwards telegrams between different lines via a rapid LAN (IP) backbone. The KNX IP Router can also be used as an interface for accessing the bus via IP, replacing an RS232 or USB interface. It has an external 12 V to 24 V power supply or can alternatively be powered via Power-over-Ethernet (IEEE 802.3af).

1.1 Installation and connection

The KNX IP Router is designed for installation in a rack with a depth of 2 units. It contains the following display and control elements: 2 Areas of application
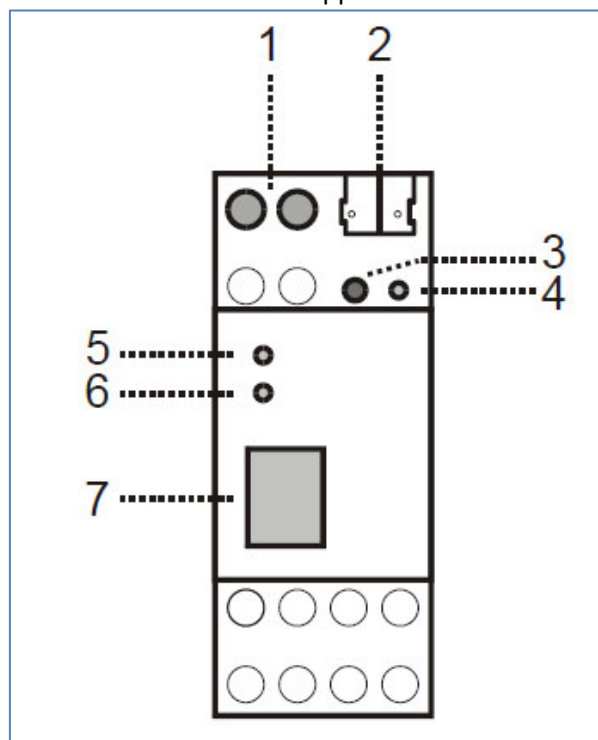

Figure 1: Structure of the hardware device

1:	Connector for external power supply (12 V to 24 V AC/DC)
2:	Connector for KNX/EIB with a bus terminal
3:	Learn key
4:	Learn LED (red)
5:	LED (green): - Lights up to indicate bus voltage on KNX/EIB - Flashes to indicate telegram traffic
6:	LED (green): - Lights up to indicate an Ethernet connection - Flashes to indicate telegram traffic
7:	RJ 45 socket for connecting an Ethernet patch cable

Chart 1: Structure

2.1 Coupler function

The IP Router can operate as a line and/or backbone coupler. In both cases, the LAN (IP) acts as a backbone.
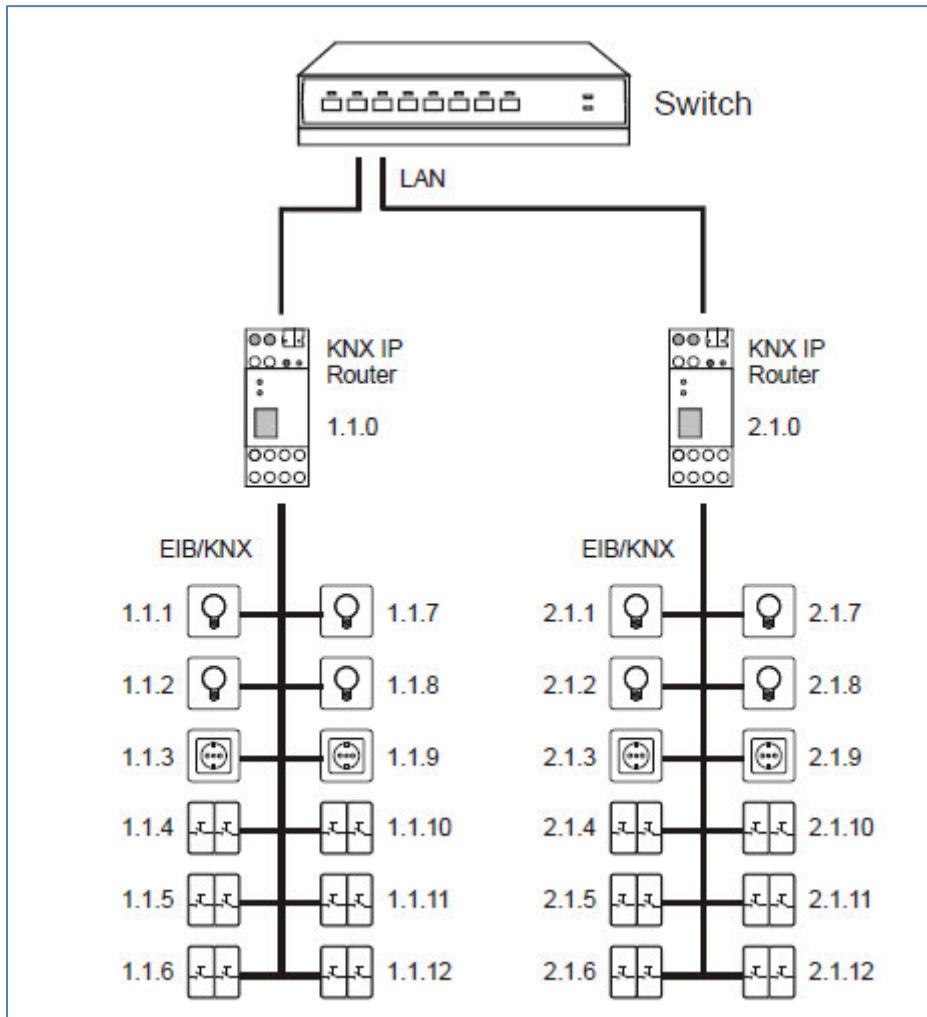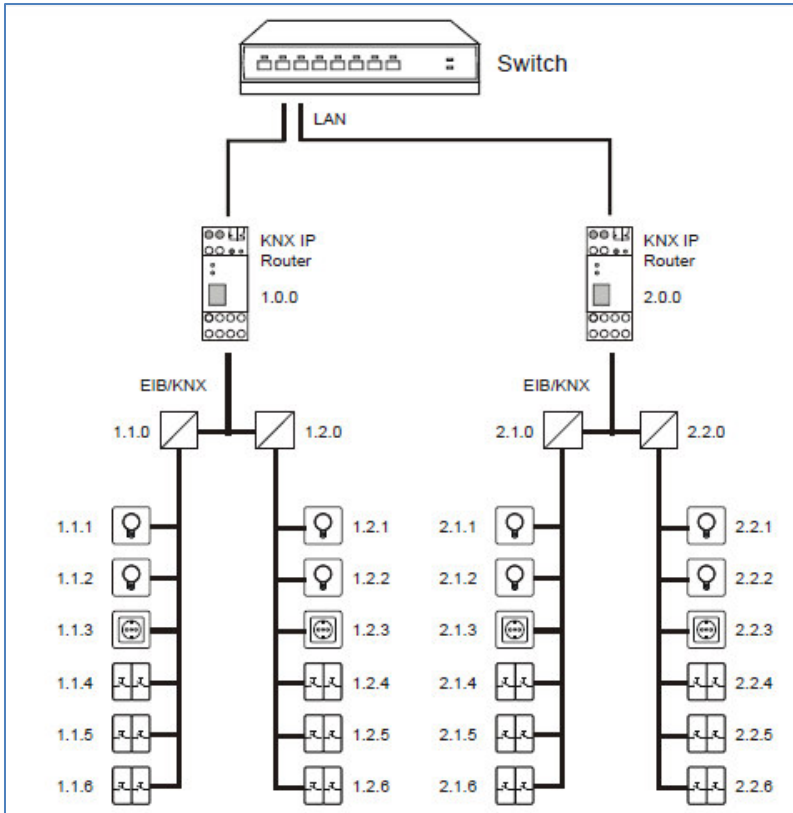

Figure 2: KNX IP Router as Line Coupler

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Figure 3: KNX IP Router as a backbone coupler
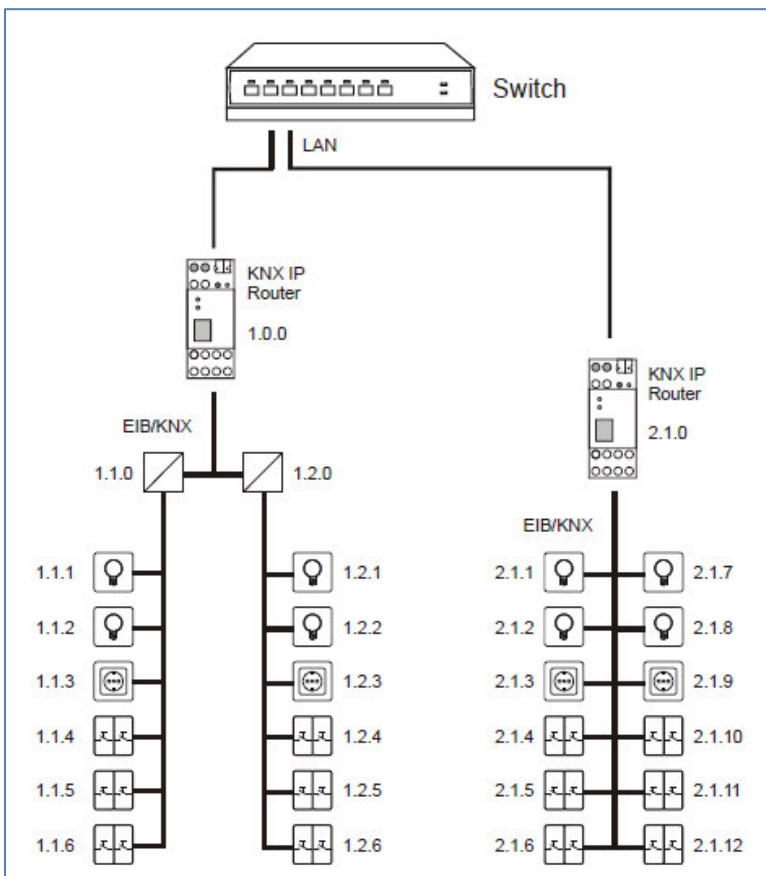
Figure 4: KNX IP Router as a backbone and line coupler

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The physical address assigned to the KNX IP Router determines whether the device operates as a line or backbone coupler. If the physical address is in the form of x.y.0 (x, y: 1..15), the router operates as a line coupler. If it is in the form of x.0.0 (x: 1..15), the router acts as a backbone coupler.

Attention:
If the KNX IP Router is used as a backbone coupler (x.0.0), there must be no KNX IP Router in the topology beneath it. For example, if a KNX IP Router has the physical address of 1.0.0, there must be no KNX IP Router with the address 1.1.0.

If the KNX IP Router is used as a line coupler (x.y.0), there must be no KNX IP Router in the topology above it. For example, if a KNX IP Router has the physical address of 1.1.0, there must be no KNX IP Router with the ad-dress 1.0.0.

The KNX IP Router has a filter table and thus contributes to reducing bus load. The filter table is automatically generated by the ETS.

Because of the speed difference between the Ethernet (10 Mbit/s) and KNX/EIB (9.6 kbit/s), a far greater number of telegrams can be transmitted on IP. If several consecu-tive telegrams are transmitted on the same line, they must be buffered in the router to avoid telegram loss. The KNX IP Router has a memory for 150 telegrams (from IP to KNX/EIB).

2.2 Bus access function (KNXnet/IP Tunneling)

The KNX IP Router can be used as an interface to KNX/EIB. KNX/EIB can be accessed from any point in the LAN. For this purpose, a second physical address must be assigned as described in the ETS Connection Manager section.

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3 ETS Parameter

3.1 General

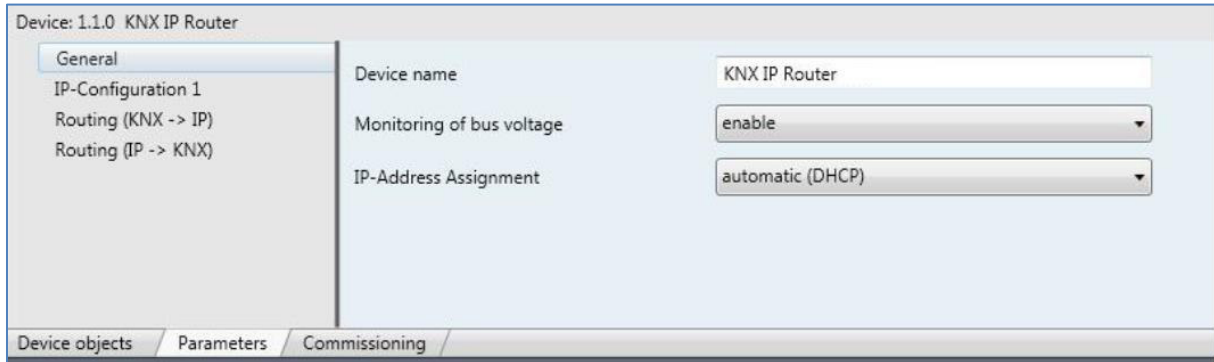The following parameters can be set at the general settings:

Figure 5: General settings

Device name:
The KNX IP Router can be assigned a name of your choice. The device name should be descriptive (e.g. Line TF). It is used to search for and recognize a device.

Monitoring bus voltage failure:
If a KNX/EIB failure is detected, it is reported on the IP. Return of the bus voltage is also reported. Parameters: disable, enable

IP address assignment:
> **Automatic(DHCP):**
> The IP address is automatically assigned on the DHCP, i.e. additional settings are not required. To be able to use this function, there must be a DHCP server in the LAN (many DSL routers have an integrated DHCP server).
>
> **Manual:**
> In this case, the IP address, the subnet and the gateway IP address must be entered manually.

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3.2 IP –Configuration

The following parameters can be set at the IP-Configuration 1:
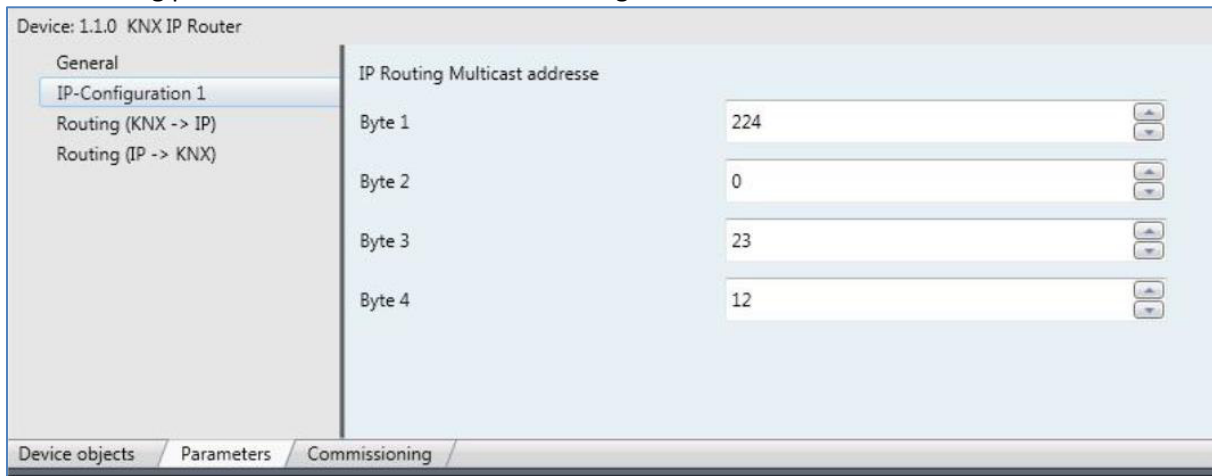
Figure 6: IP configuration 1

IP Routing Multicast Address:
This address is used for routing telegrams on IP. The multicast IP address 224.0.23.12 was reserved (KNXnet/IP) at the IANA (Internet Assigned Numbers Authority) for this purpose. If a different multicast IP ad-dress is required, it must lie within the range of 239.0.0.0 to 239.255.255.255.

IP address:
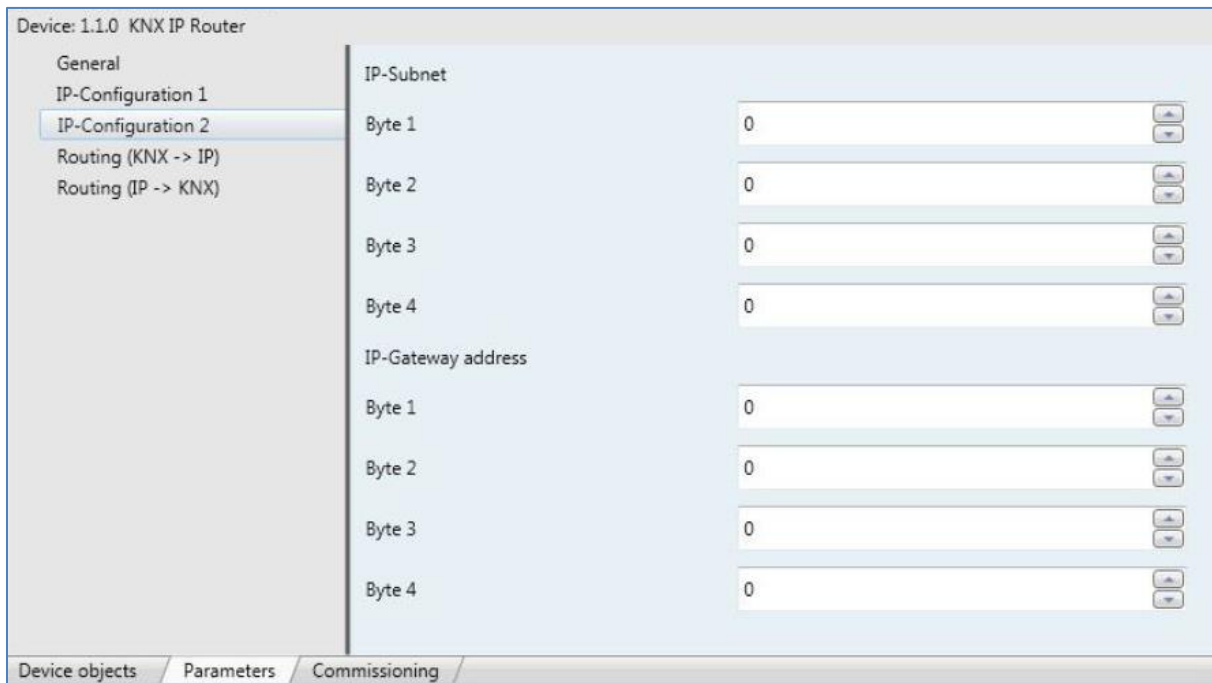This is the IP address of the KNX IP Router.

Figure 7: IP configuration 2

IP subnet:
Enter the subnet mask here. The device uses the values entered in this mask to determine whether there is a communications partner in the local network. If there is no partner in the local network, the device will not send the telegrams directly to the partner but to the gateway that routes the telegram.

IP gateway address:
Enter the IP address of the gateway here.

Note: If the KNX IP Router will only be used in the local LAN, the entry of 0.0.0.0 can remain unchanged.
Example of assigning IP addresses:

A PC is to be used to access the KNX IP Router.
IP address of the PC: 192.168.1.30
Subnet of the PC: 255.255.255.0
The KNX IP Router is located in the same local LAN, i.e. it uses the same subnet. The subnet constrains the IP addresses that can be assigned. In this example, the IP address of the IP router must be 192.168.1.xx, where xx can be a number from 1 to 254 (with the exception of 30, which is already in use). It must be ensured that no numbers are assigned twice.
IP address of the IP router: 192.168.1.31
Subnet of the IP router: 255.255.255.0

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3.3 Routing (KNX --> IP)

The following parameters can be set at the Routing KNX --> IP:
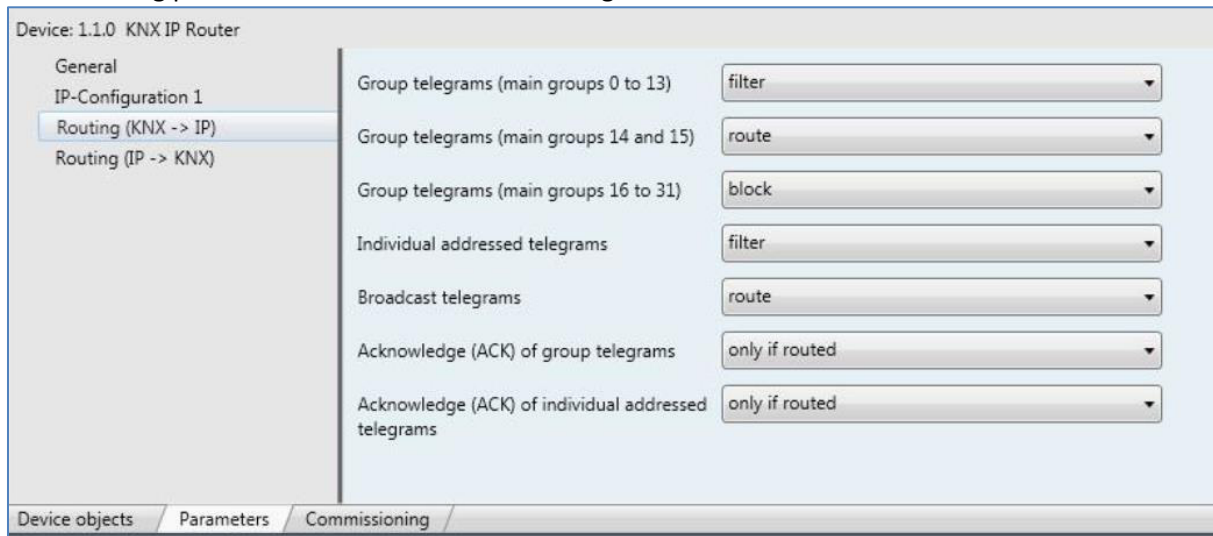
Figure 8: Routing (KNX --> IP)

Group telegrams (main group 0 to 13):

Block:	No group telegrams of this main group are routed to IP.
Route:	All group telegrams of this main group are routed to IP independent of the filter table. This setting is for testing purposes only.
Filter:	The filter table is used to check whether or not the received group telegram should be routed to IP.

Group telegrams (main groups 14 and 15):

Block:	No group telegrams of main groups 14 and 15 are routed to IP.
Route:	All group telegrams of main groups 14 and 15 are routed to IP. Group telegrams (main groups 16 to 31):
Block:	No group telegrams of these main groups are routed to IP.
Route:	An additional page appears on which the routing of main groups 16 to 31 can be disabled or enabled in pairs.

Note:
The group addresses of main groups 16 to 31 are re-served addresses that can be used for special applica-tions (e.g. in Easy Mode). These group addresses are not available in the ETS.

Physically addressed telegrams:

Block:	No physically addressed telegrams are routed to IP.
Route:	All physically addressed telegrams are routed to IP.
Filter:	The physical address is used to check whether the received physically ad-dressed telegram should be routed to IP.

Broadcast telegrams:

Block:	No received broadcast telegrams are routed to IP.
Route:	All received broadcast telegrams are routed to IP.

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Acknowledge (ACK) of group telegrams:

Always: An acknowledge is generated for every received group telegram (from KNX/EIB).

Only if routed: An acknowledge is only generated for received group telegrams (from KNX/EIB) if they are routed to IP.

Acknowledge (ACK) of physically addressed telegrams:

Always: An acknowledge is generated for every received physically addressed telegram (from KNX/EIB).

Only if routed: An acknowledge is only generated for received physically addressed group telegrams (from KNX/EIB) if they are routed to IP.

Answer with NACK: Every received physically addressed telegram (from KNX/EIB) is responded to with NACK (not acknowledge). This means that communication with physically addressed telegrams on the corres-ponding KNX/EIB line is not possible. Group communication (group telegrams) is not affected. This setting can be used to block attempts at manipulation.

3.4 Routing (IP -> KNX)

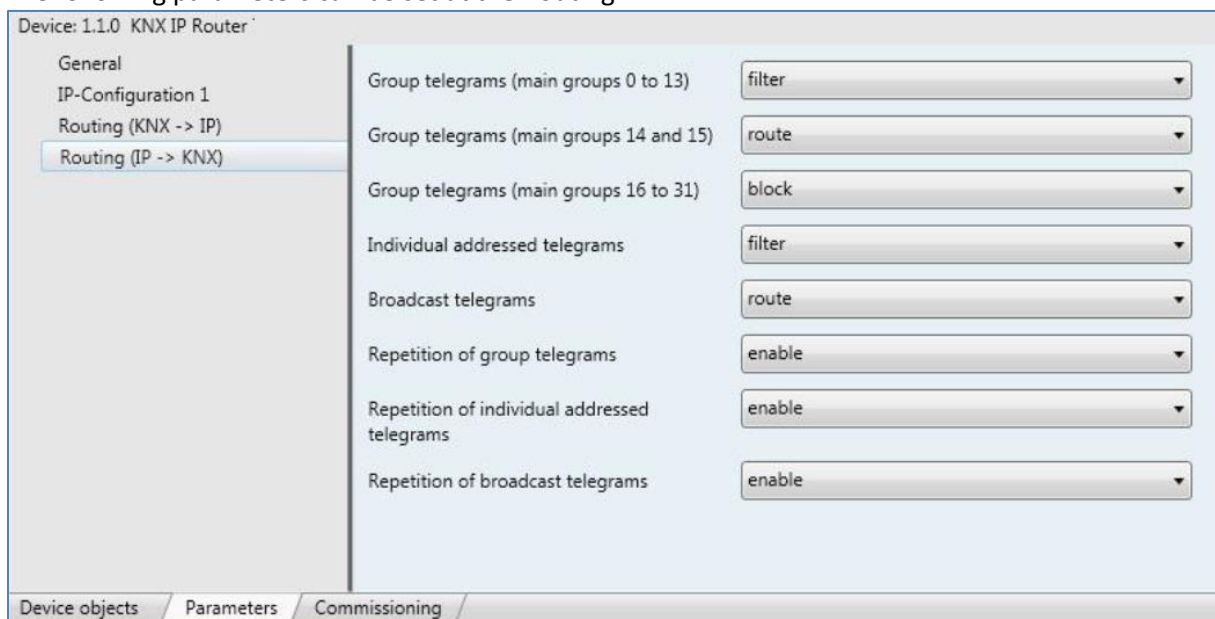The following parameters can be set at the Routing KNX --> IP:

Figure 9: Routing (IP --> KNX)

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Group telegrams (main groups 0 to 13):

Block:	No group telegrams of these main groups are routed to KNX/EIB.
Route:	All group telegrams of this main group are routed to KNX/EIBG independent of the filter table. This setting is used for testing purposes only.
Filter:	The filter table is used to check whether the received group telegram should be routed to KNX/EIB.

Group telegrams (main groups 14 and 15):

Block:	No group telegrams of main groups 14 and 15 are routed to KNX/EIB.
Route:	All group telegrams of the main groups 14 and 15 are routed to KNX/EIB. Group telegrams (main groups 16 to 31):
Block:	No group telegrams of these main groups are routed to KNX/EIB.
Route:	An additional page appears on which the routing of main groups 16 to 31 can be disabled or enabled in pairs.

Physically addressed telegrams:

Block:	No physically addressed telegrams are routed to KNX/EIB.
Route:	All physically addressed telegrams are routed to KNX/EIB.
Filter:	The physical address is used to check whether the received physically ad-dressed telegram should be routed to KNX/EIB.

Broadcast telegrams:

Block:	No received broadcast telegrams are routed to KNX/EIB.
Route:	All received broadcast telegrams are routed to KNX/EIB.

Resending of group telegrams:

Disable:	The received group telegram is not re-sent to KNX/EIB in case of a fault.
Enable:	The received group telegram is resent up to three times in case of a fault.

Resending of physically addressed telegrams:

Disable:	The received physically addressed tele-gram is not resent to KNX/EIB in case of a fault.
Enable:	The received physically addressed tele-gram is resent up to three times in case of a fault.

Resending of broadcast telegrams:

Disable:	The received broadcast telegram is not resent to KNX/EIB in case of a fault.
Enable:	The received broadcast telegram is re-sent up to three times in case of a fault.

4 ETS Connection Manager

If the IP configuration of the KNX IP Router is valid, the router can be used as an interface to KNX/EIB. The following configuration is necessary:
Select the button Settings and the tab Communication in the main window of ETS4. All available connections are listed by Configured connections. Select the desired connection.
To be able to access KNX/EIB, the KNX IP Router requires an second physical address. This second physi-cal address is only used for bus access and must be set up separately.
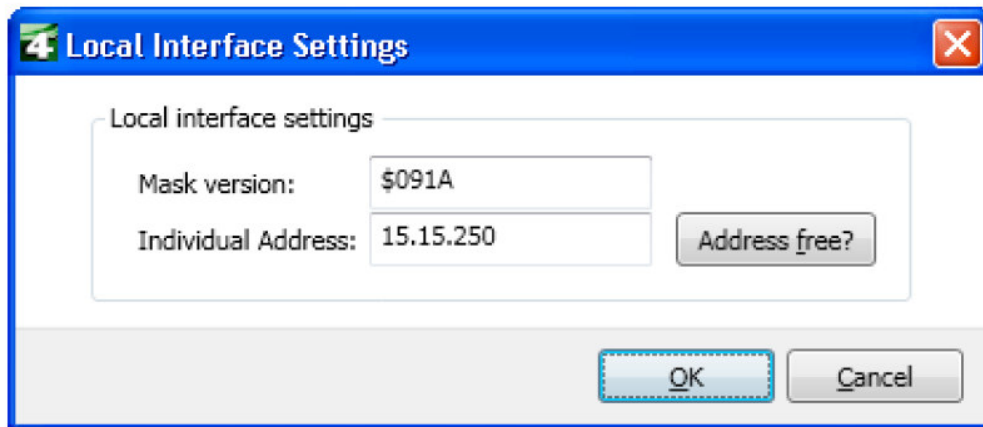

Figure 10: Communication Manager

A dummy device may have to be added to the ETS project to reserve this address.

4.1 More than one connection

The KNX IP Router supports up to 5 simultaneous tunneling connections. Each connection uses its own physical address. The address of the first tunneling connection can be changed within the 'Local Interface Settings'.
Physical addresses of the additional tunneling connections can be assigned directly on the device. This is done by pressing the learn key on the device longer than one second. After that, the Learn-LED will start blinking, which indicates that the assignment of the additional addresses was successful. The additional addresses are assigned as follows:
Tunneling connection 2 receives the next higher address than tunneling connection 1, tunneling connection 3 the next higher address than tunneling connection 2 etc.. For example: Device address: 1.1.255 (address within ETS topology) Connection 1: 1.1.250 (address within local settings)
Connection 2: 1.1.251 (assigned by learnkey) Connection 3: 1.1.252 (assigned by learnkey)
Connection 4:1.1.253 (assigned by learnkey)Connection 5:1.1.254 (assigned by learnkey) All addresses have to be unique and valid within the sub line of the interface
Note: be careful not to assign the same address as the device address for a connection. The device address can be changed within the topology view of the ETS software. For new devices (i.e. in the factory settings state), only the additional individual address of the first connection is active with the address 15.15.250. To support multiple concurrent connections additional address assignment is required.

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5.1 Register of illustrations

5.2 List of tables

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6 Attachment

6.1 Statutory requirements

The above-described devices must not be used with devices, which serve directly or indirectly the purpose of human, health- or lifesaving. Further the devices must not be used if their usage can occur danger for humans, animals or material assets.
Do not let the packaging lying around careless, plastic foil/ -bags etc. can be a dangerous toy for kids.

6.2 Routine disposal

Do not throw the waste equipment in the household rubbish. The device contains electrical devices, which must be disposed as electronic scrap. The casing contains of recyclable synthetic material.

6.3 Assemblage

⚠ Risk for life of electrical power!
All activities on the device should only be done by an electrical specialist. The county specific regulations and the applicable EIB-directives have to be observed.

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MDT Interface, MDRC

Version		
SCN-USBR.01	USB Interface	2SU MDRC
SCN-IP000.01	IP Interface	2SU MDRC
SCN-IP100.01	IP Interface with Routing	2SU MDRC
SCN-LK001.01	Line Coupler	2SU MDRC

MDT technologies offers four KNX Interfaces to enable communication between PC and the KNX/EIB system.

KNX USB Interface: The USB Interface enables the communication between the PC and the KNX/EIB system. The USB interface is galvanically isolated from the KNX/EIB bus.

KNX IP Interface: The IP Interface enables the communication between the PC and the KNX/EIB system via LAN. 5 simultaneous connections possible. An external power supply (12 to 24VAC/DC) or power over ethernet is required.

KNX IP Interface with routing: This interface offers the same functions as the IP Interface, but the device routes telegrams as a line/area coupler using the the LAN.

KNX IP Line Coupler: The Line Coupler connects two KNX lines to each other. Electrical isolation between the lines and reduction of the busload by using the filter function.

The MDT KNX Interfaces are modular installation devices for fixed installation in dry rooms. They fit on DIN 35mm rails in power distribution boards or closed compact boxes.

For project design and commissioning of the MDT KNX Interfaces it is recommended to use the ETS3f/ETS4 or later. Please download the application software at www.mdt.de/Downloads.html

SCN-USBR.01

SCN-LK001.01

- Production in Germany, certified according to ISO 9001

USB Interface:
- To enable bidirectional communication between PC and the KNX bus via USB
- Fully compatible to ETS3f/4

IP Interface:
- To enable bidirectional communication between PC and the KNX bus TCP/IP
- 5 simultaneous connections possible (SCN-IP000.01 only)
- Programming the KNX bus via TCP/IP
- External power supply or PoE required

- Modular installation device for DIN 35mm rails
- Integrated bus coupling unit
- 3 years warranty

Technical Data	SCN-USBR.01	SCN-IP000.01	SCN-IP100.01	SCN-LK001.01
Interface	USB	Ethernet	Ethernet	KNX
Permitted wire gauge				
Screw terminal	--	0,5 - 4,0mm² solid core 0,5 - 2,5mm² finely stranded		--
KNX busconnection terminal	0,8mm Ø, solid core	0,8mm Ø, solid core	0,8mm Ø, solid core	0,8mm Ø, solid core
Power Supply	KNX bus	12 to 24VAC/DC	12 to 24VAC/DC	KNX bus
Power consumption	< 0,3W	< 0,8W	< 0,8W	< 0,3W each line
Operation temperature range	0 to + 45°C	0 to + 45°C	0 to + 45°C	0 to +45°C
Enclosure	IP 20	IP 20	IP 20	IP 20
Dimensions MDRC (Space Units)	2SU	2SU	2SU	2SU