EAE KNX IP Router

Product Manual IPR100

(sayfa düzeni ve foto düzenlemesi gerekli)

EAE

TECHNOLOGY

CONTENTS

1 GENERAL

EAE KNX IP Routers are similar to TP line couplers, except that they use Ethernet for the main line. However, it is also possible to directly integrate KNX end devices via IP, making Ethernet respectively IP (Internet Protocol) a KNX medium in its own right.

EAE KNX IP Router is a **tunnelling** and **routing** device. It can be used as **line- or backbone** coupler and provides a data connection between the upper KNXnet/IP line (main line or backbone) and the lower TP KNX bus line (sub line). It also provides with the tunnelling protocol a connection point for ETS to enable commissioning and monitoring.

IPR100 can also connect two separate installations/systems

   Following highlights are characterising EAE KNX IP Router:

     - Support of long messages up to 250 byte. In combination with EAE IPR100 line coupler and USB interface "UIM-KNX 42" long messages are made possible (e.g. energy metering applications).

     - It provides the tunnelling protocol, a connection point for ETS to enable commissioning and monitoring (4 parallel connections are possible).

     - IPR100 can be used for replacing a line coupler or an area coupler. The best advantage of this change is using LAN as a fast medium for exchange of telegrams between the lines and/or areas.

     - sending IAK on own message: sending of immediate acknowledged (IACK) on a frame that is sent by the EAE KNX device itself.

When the IPR100 sends a message and there is nobody to acknowledge this message, the it would repeat the last message up to 3 times. In case there is an IACK, there will be no repetition. The failure mechanism in case of a negative IACK or BUSY is still maintained.

     - switching off the filter table with a button on the device without reconfiguring the device with ETS, necessary for fast diagnostic on site. It can temporarily disable filtering of messages by pressing a button. This eases commissioning and debugging of the system. The temporary access to other lines is possible without download from ETS.

     - Automatically switching on filter tables and filtering of device oriented tables after time out. Time out is ETS configurable. No forgetting of reactivating the tables anymore.

     - Routing of all physically addressed messages (no filtering of device oriented messages), no matter of own physical address, on press of a button on the device without reconfiguring the device with ETS.

     - High internal amount of communication buffers capable smoothing peeks in communication load.

     - Detailed possibility for diagnosis by displaying all operational states with 6 duo LEDs. (Bus OK (each line), traffic (each line), errors/faulty communication NACK, BUSY on the bus (each line), state of the filter table …)

     - UPnP available to discover the device in IP network. The ETS can discover the device as communication interface through Eibnet/IP Search Request.

     - WEB interface: currently providing device settings and an opportunity to switch on to program mode.

     - The firmware can be updated through the web interface.

     - Wide power supply voltage.

- Modular installation device for 35mm DIN rails

1.1 COMMUNICATION OBJECTS

IPR100 has no KNX communication objects.

1.2 IPR100 AS PROGRAMMING INTERFACE

IPR100 can be used together with the ETS as a programming interface. The device provides an additional physical address for this purpose which can be used for a tunnelling connection.

1.3 TUNNELLING

The presence of the Internet Protocol (IP) has led to the definition of KNXnet/IP. KNXnet/IP provides the means for point-to-point connections -KNXnet/IP Tunnelling- for ETS and/or between a supervisory system and a KNX installation.
KNXnet/IP Device Management provides configuration of KNXnet/IP devices through the KNX network effectively reducing the time required for configuration.

1.4 ROUTING

Routing is how lines or areas may interconnect using IP networks via KNXnet/IP. KNXnet/IP Routing defines how KNXnet/IP routers communicate with each other using IP networks.

1.5 COUPLER

The basic functionality of IPR100 is coupling the Ethernet with KNX-TP line(s). IPR100 provides galvanic isolation between the two connected lines.

Due to the flexibility of IPR100, the coupler can be used as a line coupler e.g. to connect trough Ethernet several TP lines together, as a backbone coupler to connect trough Ethernet several TP areas or to connect different TP installations/systems.

The main task of IPR100 is filtering the traffic according the installation place in the hierarchy or according to the built-in filter tables for group oriented communication. The IPR100 provides outstanding features compared to other similar products, for example support for long messages (up to 250 byte length) and a configurable one button activation of special functions (e.g. transmit all group telegrams). These are helpful during installation, during run time and for trouble shooting. The high informative 6 duo LED display shows accurate the bus status on each line. This helps identifying common communication problems due to bus load or retransmissions on both lines.

2 FUNCTION DESCRIPTION
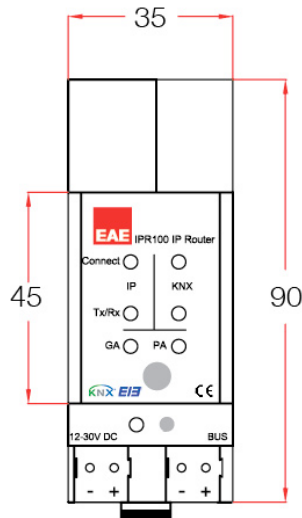
2.2 NORMAL MODE

LED Bus Stat LAN green
> Off: LAN line error
> On: LAN line OK

LED Bus Stat LAN red
> On: manual overwrite active

LED Bus Stat KNX green
> Off: KNX line error or not connected
> On: KNX line OK

LED Traffic LAN green
> Blinking: bus traffic on LAN line
> Off: no traffic on LAN line
> Speed up to 10 Mbit/s

LED Traffic KNX green
> Blinking: bus traffic on KNX line
> Off: no traffic on KNX line

LED Traffic LAN red
> Blinking: transmission error on LAN line

LED Traffic KNX red
> Blinking: transmission error on KNX line

LED Group Address
> Routing of group telegrams
> Off: LAN and KNX different
> Green: filter table active
> Green *and* red: route all
> Red: block

LED Physical Address

 Routing of physical addressed telegrams
 Off: LAN and KNX different
 Green: filter table active
 Green *and* yellow: route all
 Yellow: block

2.3 FUNCTION BUTTON

Long press (3 sec)

 Switch to manual override.
 Default function is set with LAN line and (KNX) line parameter.
 Manual override functionality is configured in "General parameters".

NOTE

The latest downloaded settings (parameters) and filter table are still available after switching back from "Manual operation" to "Normal operation".

Very long press (15s)

 LEDs: LEDs are on red
  - release button and press again for some sec: resets all the parameter to factory default (incl. physical address).

2.4 ADDRESSING MODE

LED addressing mode

 Off: normal operating mode
 On: addressing mode
 After receiving the physical address the IPR100 automatically returns from addressing mode to the normal operating mode.

Button addressing mode

 Button for switching between normal operating mode and addressing mode for assigning the physical address.

2.5 KNX TELEGRAMS IN THE NETWORK

The IP Router sends telegrams from/to the KNX to/from the IP network in accordance with the KNXnet/IP protocol specification. These telegrams are sent in the default setting as multicast telegrams to the multicast IP address 224.0.23.12 port 3671. The Multicast IP address 224.0.23.12 is the defined address for the KNXnet/IP from the KNX Association in conjunction with the IANA. This address should stay as defined and only changed if it becomes necessary due to the existing network. By commissioning, it should be regarded that all KNX IP devices which should communicate with one another via IP must use the same IP routing multicast address.
Settings are to be changed in the "General Parameters".

NOTE

Multicast IP address 224.0.23.12 may need to be enabled corresponding to the type of network and the setting of the network components.
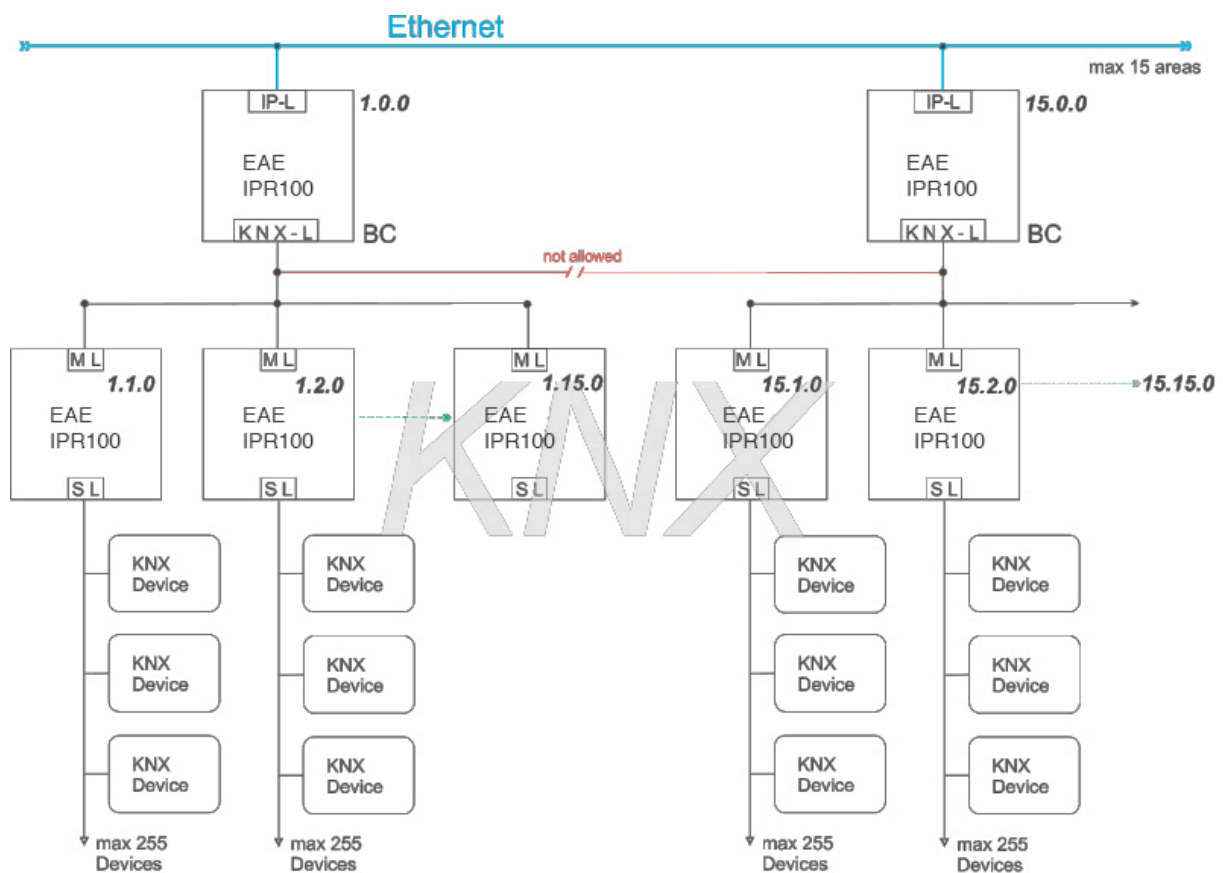
IPR100 as Area coupler

IPR100 in a KNX system can assume the function of an **area coupler**.

For this purpose it must receive the physical address of an area coupler (1.0.0 till 15.0.0).

For now in the actual ETS, up to **15 areas** can be defined with area couplers.

The following illustration shows the topology with IPR100 routers as area couplers and IPR100 couplers as line couplers.

IP-L: IP line
KNX-L: KNX line
BC: Backbone coupler
ML: Main line
SL: Sub line
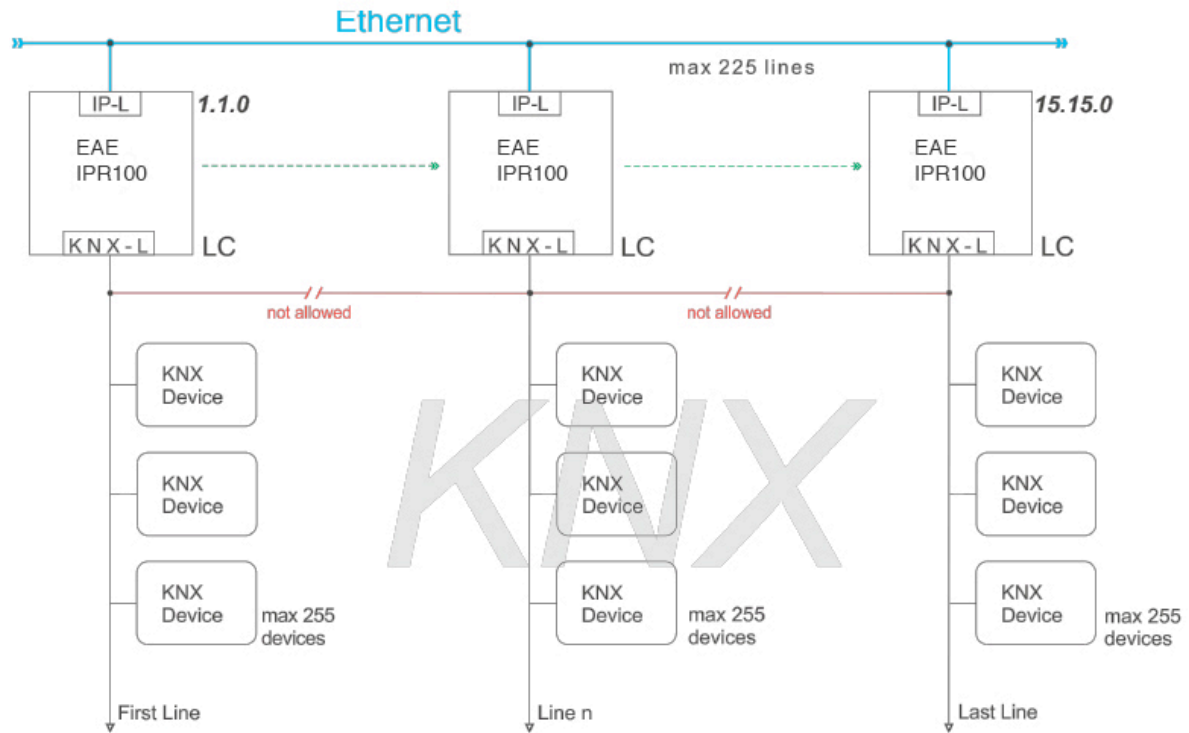
2.6 IPR100 AS LINE COUPLER

(Bu alandaki TAPKO MECıp yerine EAE IPR100 yazılacak!)

IPR100 in a KNX system can assume the function of a **line coupler**.
For this purpose it must receive the physical address of a line coupler (1.1.0 till 15.15.0).
For now in the actual ETS, up to **225 lines** can be defined (1.1.0 till 15.15.0).
The following illustration shows the topology with IPR100 routers as line couplers.
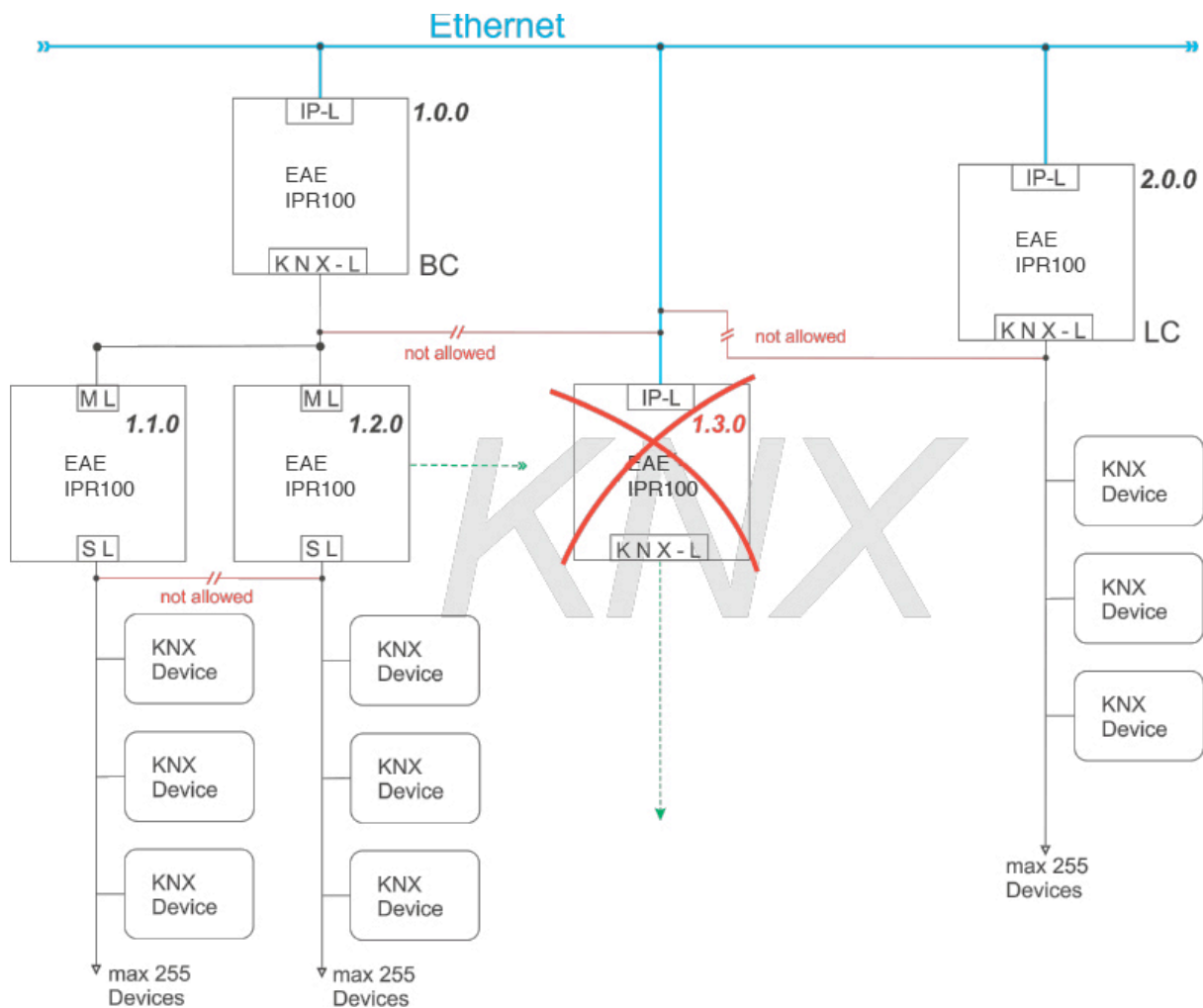

IP-L: IP line
KNX-L: KNX line
LC: Line coupler

2.7 IPR100 IN MIXED SYSTEM

If it is necessary in a KNX system to use the IPR100 at one point as an **area coupler**, e.g. office complex, and at another point as a **line coupler**, e.g. a remote underground garage; this is possible.

It is only necessary to ensure that the IPR100 used as a line coupler uses a line coupler address from a free area.

IP-L: IP line
KNX-L: KNX line
BC: Backbone coupler
LC: Line coupler
ML: Main line
SL: Sub line

3 TECHNICAL DATA

⚠ Warning: may not be connected to 230V!

Type of protection	IP 20	EN 60 529
Safety class	II	EN 61 140
Power supply :	- Voltage	21V… 30V DC, SELV
	- Current consumption	< 10 mA
Type of contact	- potential-free, bistable	
Installation	- 35mm mounting rail	EN 60 715
Operating elements	- LED (red) and button	For physical address
Temperature range	- Ambient	-5° C + 45° C
	- Storage	-25° C + 55° C
	- Transport	-25° C + 70° C
Humidity	- max. air humidity	95 % no moisture condensation
Dimensions	IPR100 90x36x70 mm	
Weight	IPR100 66g	
Box	Plastic, polycarbonate, colour grey	
CE	In accordance with the EMC guideline and low voltage	

4 STATE OF DELIVERY

> NOTE
> Every IPR100 Router is delivered with these default parameters.

Marking/Design	IPR100
Physical address	15.15.255
Physical address for tunnelling connections	15.15.255
IP address	DHCP
IP address assignment	from DHCP service
IP routing multicast address	224.0.23.12
IP subnet mask	DHCP
IP standard gateway	DHCP

IP to KNX

Group telegrams 0-13	Filter
Main group telegrams 14-15	Transmit all
Physical telegrams	Filter

KNX to IP

|	
Group telegrams 0-13	Filter
Main group telegrams 14-15	Transmit all
Physical telegrams	Filter
Physical: Repetition if errors on sub line	normal
Group: Repetition if errors on sub line	normal
Telegram confirmations on line	if routed
Send confirmation on own telegrams	no

5 TECHNICAL DRAWING

> NOTE
> Please note that all dimensions are in mm. Device width is 2 SU (1 SU = 18mm).
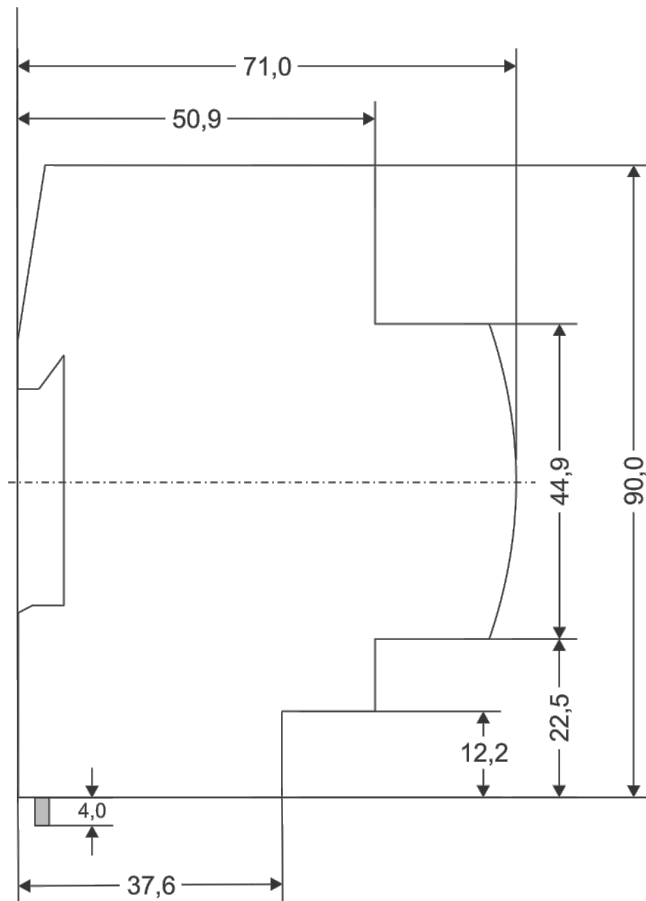
Dimensions in mm
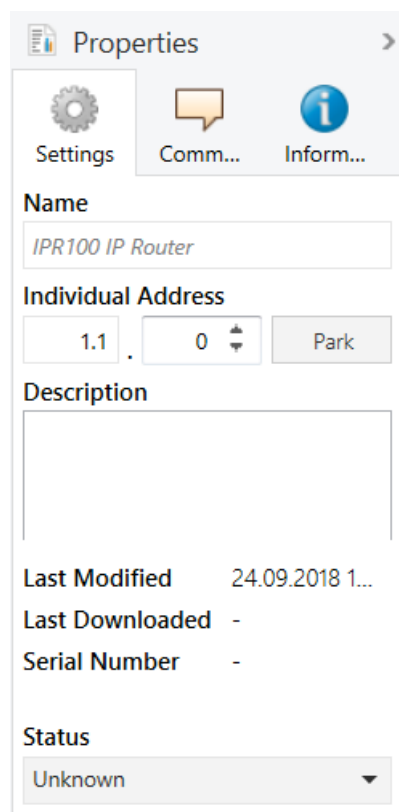Tolerance: -0,5 mm/DIN 16742
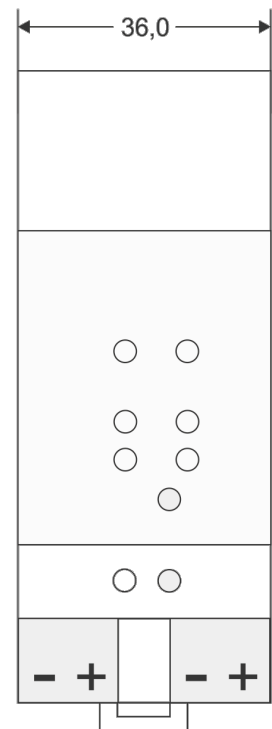
6 APPLICATION DESCRIPTION

If the coupler receives telegrams (for example during commissioning) which use a physical address as destination address, it compares the physical addresses of the receiver with its own physical address and then decides whether it must route the telegrams or not.
The coupler reacts to telegrams with group addresses in accordance with its parameter settings. During normal operation (default setting), the coupler only routes those telegrams whose group addresses have been entered in its filter table.
If the coupler routes a telegram and does not receive an acknowledgement, or if a bus device finds a transmission error, the coupler repeats the telegram three times. With the parameters „Repetitions if errors...", this behaviour can be set separately for both lines. These parameters should be left in the default setting.
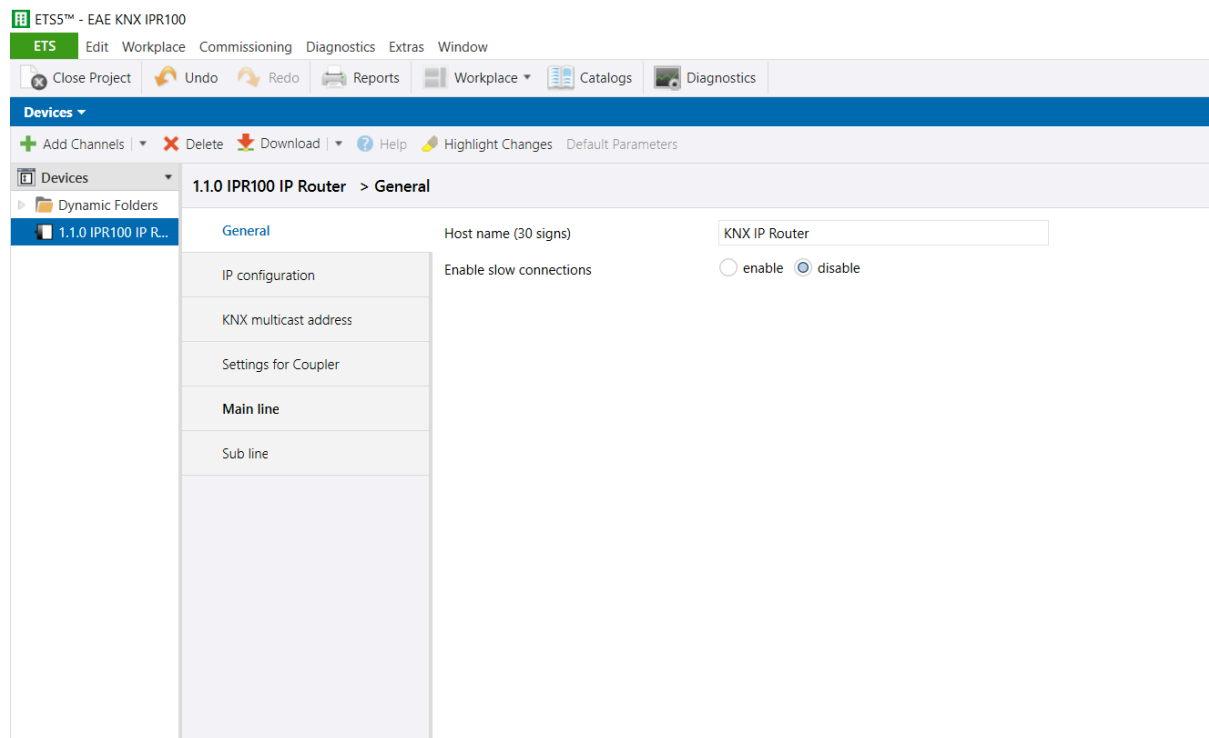
7 ETS-PARAMETERS

7.2 PROPERTIES

Picture 0: Properties

7.2.1 GENERAL

Picture 1: General

ETS-Text	Range [Default value]	Comment
Host name	ZYXW **[KNX IP Router]**	Field to enter the IPR100 name (30 signs max.). For an easy search of the device with the ETS or with a KNXnet/IP visualisation system.
Enable slow connections	enable disable **[disable]**	Enable to support slow tunnelling connections

Table 1: Parameter General

7.2.2 IP CONFIGURATION
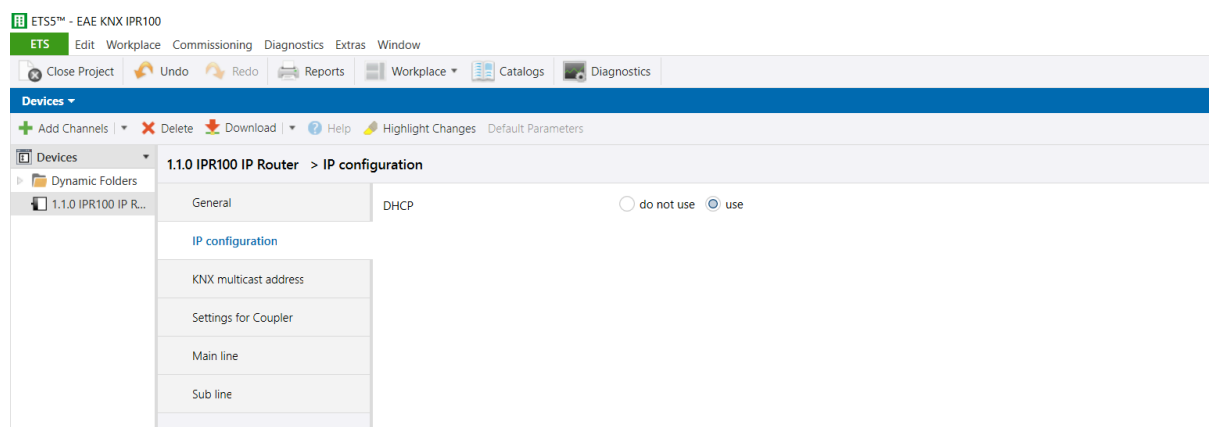
Picture 2: DHCP configuration

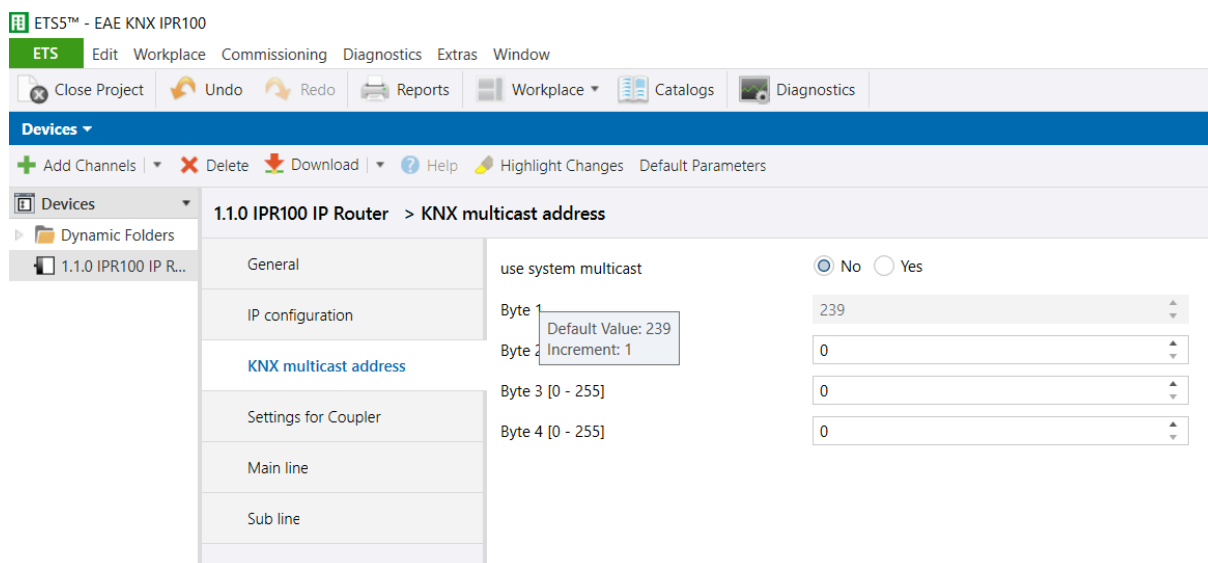| ETS-Text	Range [Default value]	Comment
DHCP	use do not use [use]	If DHCP is used, no parameterisation needed. If DHCP is not used, following parameters are to be set.

Table 2: DHCP configuration

Picture 3: DHCP manual configuration

ETS-Text	Range [Default value]	Comment
DHCP configuration [Byte1]. [Byte2]. [Byte3]. [Byte4]	use do not use [use]	If DHCP is not used, following parameters are to be set.
IP Address IP Byte 1 IP Byte 2 IP Byte 3 IP Byte 4	 0…255 0…255 0…255 0…255	IP Byte 1 to 4: manual input.
Net mask NM Byte 1 NM Byte 2 NM Byte 3 NM Byte 4	 0…255 0…255 0…255 0…255	Net mask Byte 1 to 4: manual input.
Gateway GW Byte 1 GW Byte 2 GW Byte 3 GW Byte 4	 0…255 0…255 0…255 0…255	Gateway Byte 1 to 4: manual input.

Table 3: DHCP manual configuration

7.2.3 KNX MULTICAST ADDRESS

Picture 4: KNX multicast address

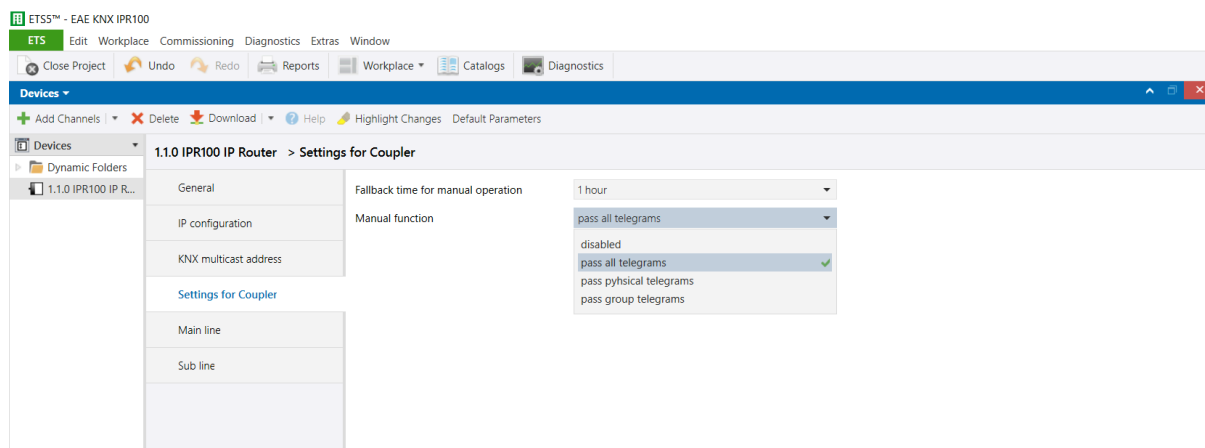| ETS-Text	Range **[Default value]**	Comment
Byte 1 [224 … 239]	224…239 **System: [224]** **Individual: [239]**	First byte of the IP routing multicast address. If System multicast address used: "224" is permanently set. If Individual multicast address used: "239" is permanently set.
Byte 2 [0 … 255]	0…255 **[0]**	Second byte of the IP routing multicast address. Can only be set manually if an individual multicast address is used.
Byte 3 [0 … 255]	0…255 **[23]**	Third byte of the IP routing multicast address. Can only be set manually if an individual multicast address is used.
Byte 4 [0 … 255]	0…255 **[12]**	Fourth byte of the IP routing multicast address. Can only be set manually if an individual multicast address is used.

Table 4: KNX multicast address

NOTE

The Multicast IP address 224.0.23.12 is the defined address for the KNXnet/IP from the KNX Association in conjunction with the IANA. This address should stay as defined and only changed if it becomes necessary due to the existing network.

By commissioning, it should be regarded that all KNX IP devices which should communicate with one another via IP must use the same IP routing multicast address.

7.2.4 SETTINGS FOR COUPLER

Picture 5: Settings for coupler

ETS-Text	Range [Default value]	Comment
Fallback time for manual operation	10 min, 1 hour, 4 hours, 8 hours [1 hour]	Time duration required to exit from "manual operation"
Manual function	Disabled Pass all telegrams Pass physical telegrams Pass group telegrams [pass all telegrams]	Telegram routing configuration for the manual function.

Table 5: Parameter General

7.2.5 MAIN LINE
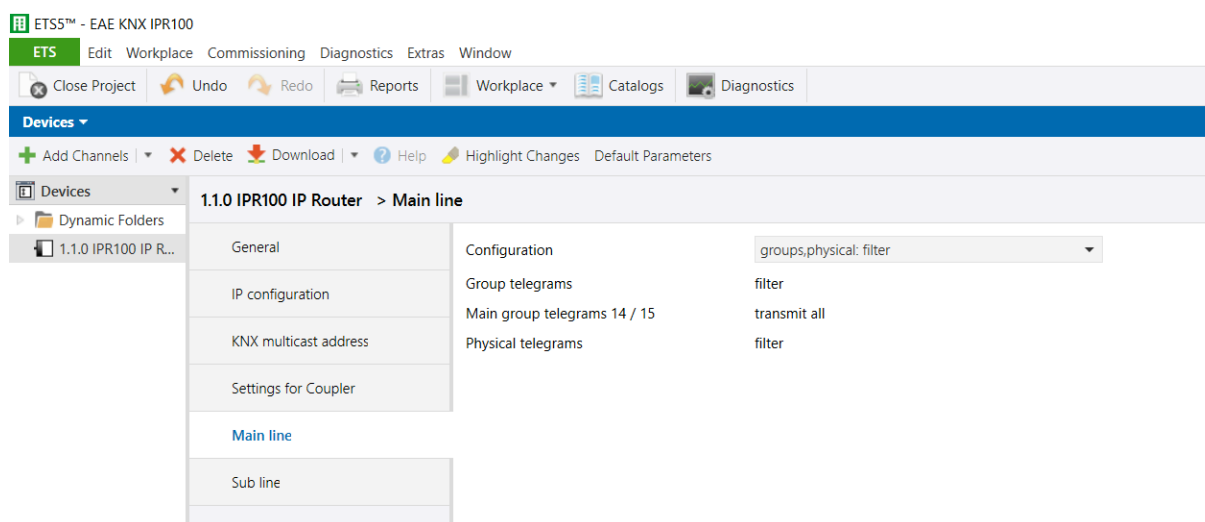
Picture 6: Main Line/Configuration
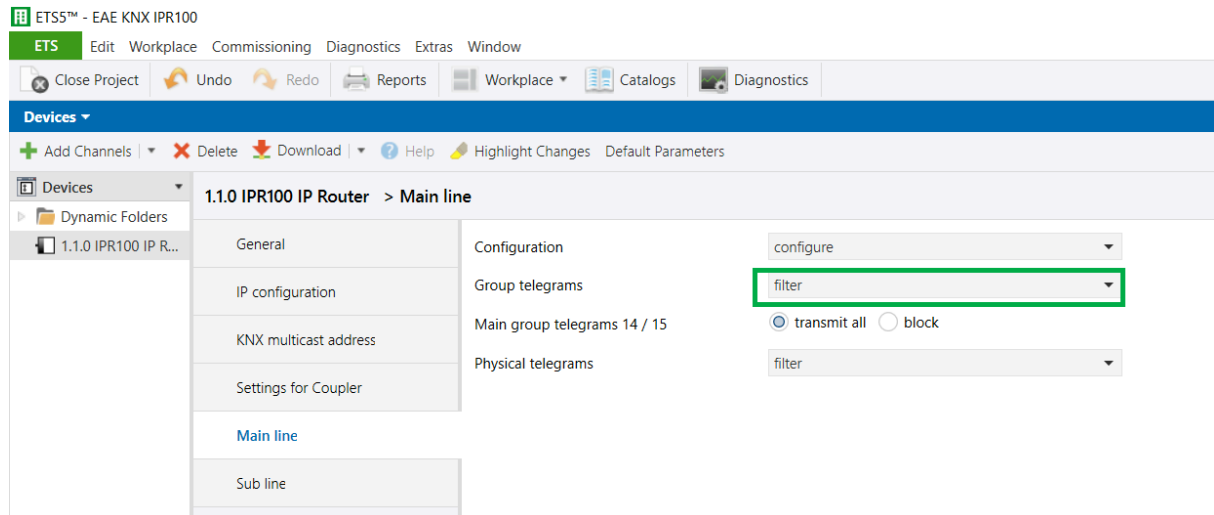
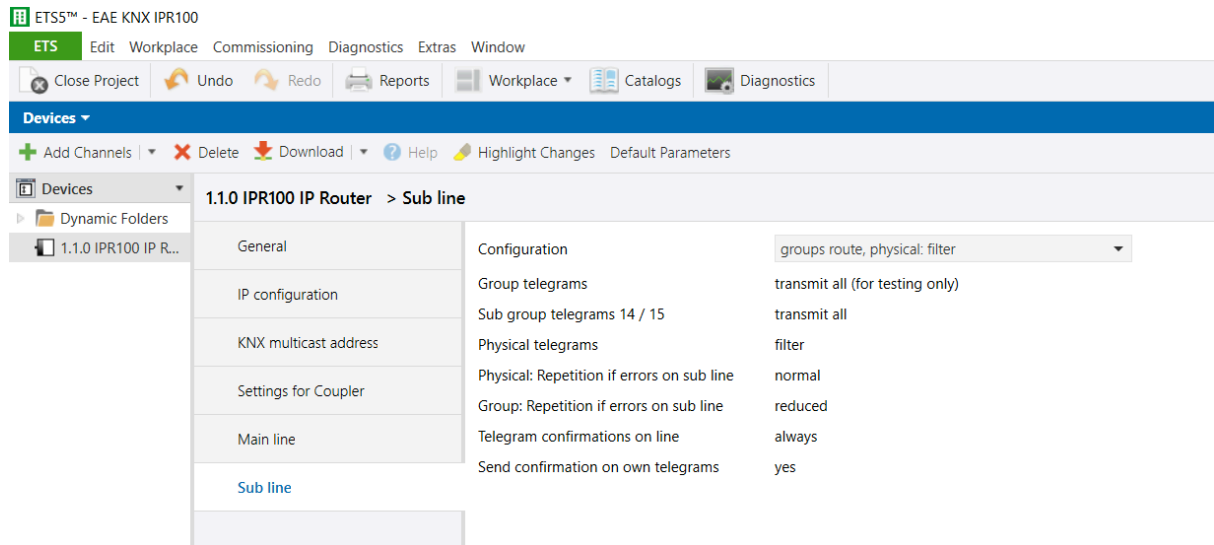Picture 6.1: Main Line/Group or Physical telegrams configured individually

ETS-Text	Range [Default value]	Comment
Configuration	groups: filter, physical: block groups, physical: filter groups: route, physical: filter groups, physical: route configure [groups, physical: filter]	- Block: no telegram is routed. - Filter: Only telegrams are routed which are entered in the filter table. - Route: the telegrams are routed. - Configure: the following parameters can be set individually. This parameter is to be set depending on the planed configuration.
Group telegrams	1. transmit all (for testing only) 2. block 3. filter [filter]	1. All group telegrams are transmitted. 2. No group telegram is transmitted. 3. Only group telegrams are routed which are entered in the filter table. The ETS 3/4 produces the filter table automatically.
Main group telegrams 14/15	1. transmit all 2. block [transmit all]	1. Group telegrams with the main group 14 or 15 (e.g. 14/1) are routed. 2. Group telegrams with the main group 14 or 15 (e.g. 14/1) are not routed.
Physical telegrams	1. transmit all (for testing only) 2. block 3. filter [filter]	1. All physical telegrams are transmitted. 2. No physical telegram is transmitted. 3. Only physical telegrams are routed based on physical address.

Table 6: Main Line

NOTE
Please note that the parameter "transmit all" for Group or Physical telegrams is intended only for testing purposes and it *should not be* set for normal operation.

7.2.6   SUB LINE

Picture 7: Sub line

ETS-Text	Range [Default value]	Comment
Configuration	groups: filter, physical: block groups, physical: filter groups: route, physical: filter groups, physical: route configure **[groups, physical: filter]**	- <u>Block</u>: no telegram is routed. - <u>Filter</u>: Only telegrams are routed which are entered in the filter table. - <u>Route</u>: the telegrams are routed. - <u>Configure</u>: the following parameters can be set individually. This parameter is to be set depending on the planed configuration.
Group telegrams	1. transmit all (for testing only) 2. block 3. filter **[filter]**	1. All group telegrams are transmitted. 2. No group telegram is transmitted. 3. Only group telegrams are routed which are entered in the filter table. The ETS 3/4 produces the filter table automatically.
Sub group telegrams 14/15	1. transmit all 2. block **[transmit all]**	1. Group telegrams with the sub group 14 or 15 (e.g. 14/1) are routed. 2. Group telegrams with the sub group 14 or 15 (e.g. 14/1) are not routed.
Physical telegrams	1. transmit all (for testing only) 2. block 3. filter **[filter]**	1. All physical telegrams are transmitted. 2. No physical telegram is transmitted. 3. Only physical telegrams are routed based on physical address.
Physical: Repetition if errors on sub line	1. no 2. normal 3. reduced **[normal]**	If a transmission error (e.g. due to missing receiver) is found when sending a physical telegram on the sub line: 1. The physical telegram is not repeated. 2. The physical telegram is repeated up to 3 times. 3. The physical telegram will be repeated only one time.

Group: Repetition if errors on sub line	1. no 2. normal 3. reduced **[normal]**	If a transmission error (e.g. due to missing receiver) is found when sending a group telegram on the sub line: 1. The group telegram is not repeated. 2. The group telegram is repeated up to 3 times. 3. The group telegram will be repeated only one time.
Telegram confirmations on line	1. if routed 2. always **[if routed]**	1. Only telegrams which are to be routed are confirmed on the sub line (ACK). 2. Each telegram on the sub line is confirmed (ACK).
Send confirmation on own telegrams	1. yes 2. no **[no]**	1. Every telegram on the sub line is confirmed with its own ACK (from the Line coupler). 2. No confirmation with own ACK

Table 7: Sub Line

NOTE

If the parameter "*Send confirmation on own telegrams*" is set yes, IPR100 will send an ACK systematically when sending **any** own routed telegram.

8 Lw IP

LwIP is used in developing IPR100.
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