KNX routeur IP DIN

Cat. No(s): 0 035 45

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1. USE

Legrand 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.

LEGRAND 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.
IP Router can also connect two separate installations/systems.
Following highlights are characterising LEGRAND KNX IP Router:
• Support of long messages up to 250 byte. In combination with LEGRAND IP Router 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).
• IP Router 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 LEGRAND KNX device itself.

When the IP Router 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.

■ 1.1 Communication Objects

IP Router has no KNX communication objects.

■ 1.2 IP Router as Programming Interface

IP Router 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 tunneling connection.

■ 1.3 Tunneling

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. USE (continued)

■ 1.5 Coupler

The basic functionality of IP Router is coupling the Ethernet with KNX-TP line(s).

IP Router provides galvanic isolation between the two connected lines.

Due to the flexibility of IP Router, 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 IP Router is filtering the traffic according the installation place in the hierarchy or according to the built-in filter tables for group oriented communication.

The IP Router 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. TECHNICAL CHARACTERISTICS

■ 2.1 Connections characteristics
• IP Line RJ45 socket for 10/100BaseT
• KNX Line BUS connection terminal

■ 2.2 Consumption
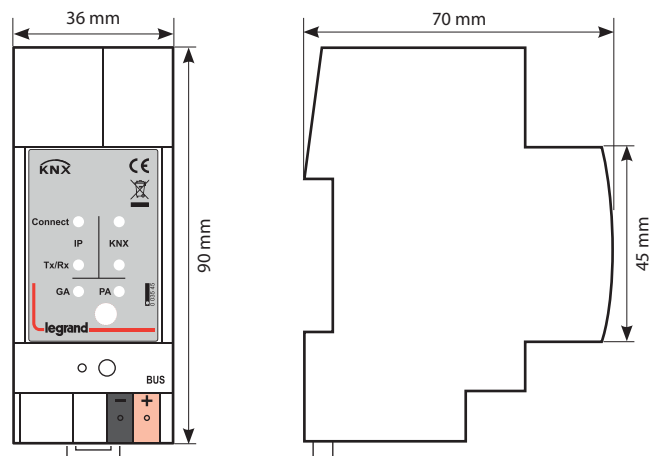• BUS: DC 21…30V SELV
• Current consumption: < 20 mA

■ 2.3 Mechanical characteristics
• IP 20
• Safety class III
• Number of modules: 2
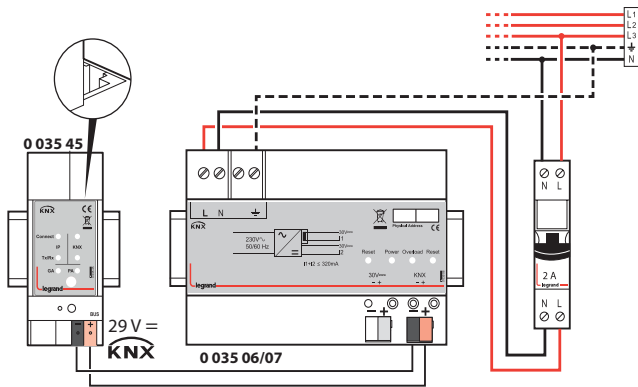• Weight: 68 g

■ 2.4 Climate characteristics
• Operating temperature: -5°C to +45°C
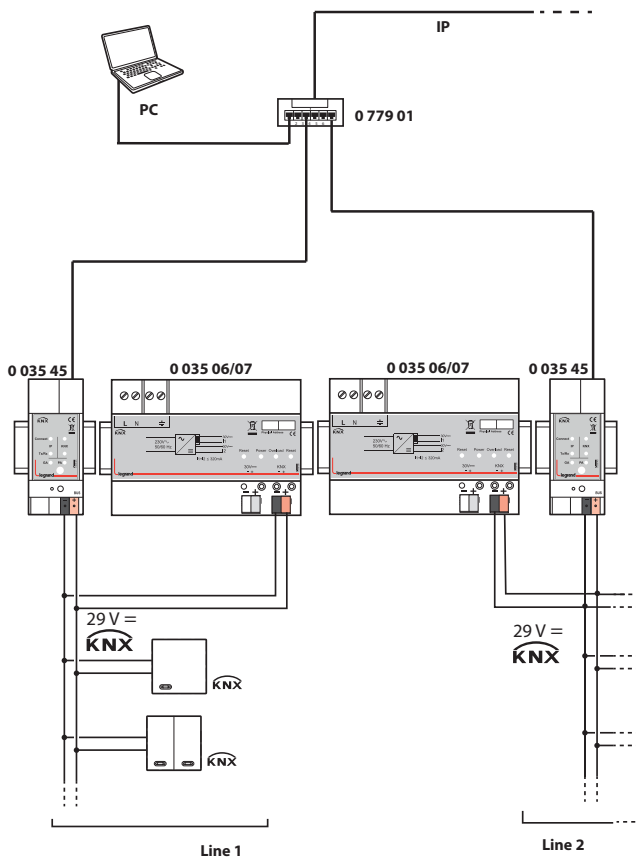• Storage temperature: -20°C to +60°C

3. DIMENSIONS
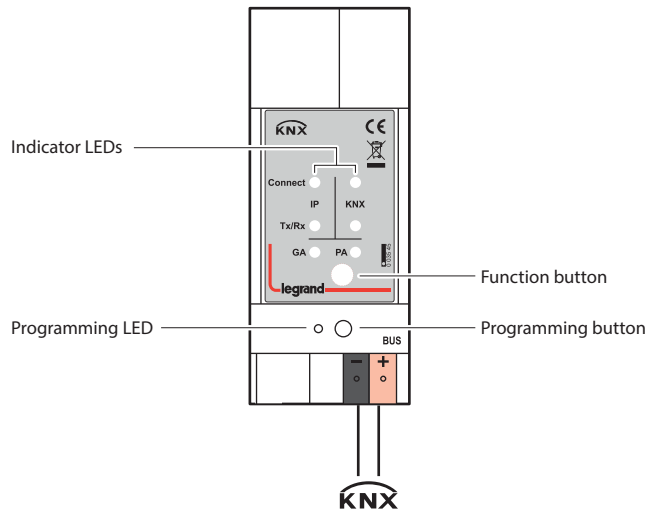
4. CONNECTION

■ 4.1 Single wiring

■ 4.2 Double wiring

5. OPERATION

■ 5.1 Description of the device

■ 5.2 Operation and Display

Indicator	Green	Blinked Green	Orange	Red	Blinked Red	Off
Connect – IP	IP line OK	-	Manual Function Active	-	-	No IP connection
Connect – KNX	KNX line OK	-	-	-	-	No KNX connection
Tx/Rx – IP	-	Traffic on IP line	-	Transmission Error on IP line	-	No traffic on IP line
Tx/Rx – KNX	-	Traffic on KNX line	-	Transmission Error on KNX line	-	No traffic on KNX line
Group Address	Filter	-	Route all	Block all	-	No route
Physical Address	Filter		Router all	Block all	-	No route
Programming LED	-	-	-	Programming mode active	No IP Connection	Programming mode de-active or LAN cable connected

Note:
Device default physical address is 15.15.255.

■ 5.3 Function Button

5.3.1 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".

5.3.2 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).

■ 5.4 Addressing Mode

5.4.1 LED addressing mode
• Off: normal operating mode
• On: addressing mode
After receiving the physical address, the IP Router automatically returns from addressing mode to the normal operating mode.

5.4.2 Button addressing mode

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

5. OPERATION (continued)

■ 5.5 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 can 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.

■ 5.6 IP Router as Area Coupler

• IP Router in a KNX system can assume the function of an area coupler.
• For this purpose, physical address of an area coupler must between 1.0.0 and 15.0.0 .
• Up to 15 areas can be defined with area couplers.

■ 5.7 IP Router as Line Coupler

• IP Router 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).
• Up to 225 lines can be defined (1.1.0 till 15.15.0).

■ 5.8 IP Router in Mixed Systems

If it is necessary in a KNX system to use the IP Router 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 IP Router used as a line coupler uses a line coupler address from a free area.

■ 5.9 Factory Settings

Marking/Design	IP Router
Physical address	15.15.255
Physical address for tunneling 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

6. STANDARDS

• Type of protection: EN 60 529
• Safety class III: IEC 61140
• Overvoltage class III: IEC 60664
• Degree of Pollution: IEC 60664
• Installation: EN 60 715 TH 35-75
  In accordance with the EMC guideline and low voltage directives

7. COMMUNICATION OBJECTS

■ 7.1 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 behavior can be set separately for both lines. These parameters should be left in the default setting.

■ 7.2 ETS Parameters

7.2.1 General

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

Table 1: Parameter General

7.2.2 IP 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

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: Manual IP Configuration

7. COMMUNICATION OBJECTS (continued)

7.2.3 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

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

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.
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 4/5 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

7. COMMUNICATION OBJECTS (continued)

7.2.6 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**]	- 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 4/5 produces the filter table automatically.
Sub 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.
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, IP Router will send an ACK systematically when sending any own routed telegram.