EN

WEINZIERL

Operation and installation manual

KNX IP LineMaster 762

(Art. # 5212)

KNX Power supply with integrated KNX IP Router and diagnosis functions

KNX IP LineMaster 762

Application

The KNX LineMaster 762 combines the essential functions of a KNX bus line: Power supply with choke, KNX IP Router and KNX IP Interface with a small footprint of only 6 units (108 mm).

The KNX IP Router in the KNX IP LineMaster 762 allows forwarding of telegrams between different lines through a LAN (IP) as a fast backbone. In addition this device is suited to connect a PC to the KNX network e.g. for ETS® programming.

The IP address can be obtained by a DHCP server, by manual configuration via the device menue or by downloading a configured ETS application. This device works according to the KNXnet/IP specification using the core, the device management, the tunneling and the routing part.

The KNX IP LineMaster 762 has a filter table (8 kByte) and is able to buffer up to 150 telegrams.

An easy to read OLED display on the front panel enables the user to display the operating parameters locally on the device.

Coupler function (KNXnet/IP Routing)

The KNX IP LineMaster 762 operates as a line or backbone coupler. In both cases, the LAN (IP) is used as a backbone.

The following table shows the application possibilities of the KNX IP LineMaster 762 compared to the classic topology:

|	Classical Topology (without IP)	IP coupling of areas (IP area coupl.)	IP coupling of lines (IP line coupler)
Area (Backbone)	TP	IP	IP
Coupling	KNX Line Coupler (max. 15 Pcs.)	KNX IP Router (max. 15 Pcs.)	Directly via LAN Switch
Main line	TP	TP	IP
Coupling	KNX Line Coupler (max. 15x15 Pcs.)	KNX Line Coupler (max. 15x15 Pcs.)	KNX IP Router (max. 225 Pcs..)
Line	TP	TP	TP
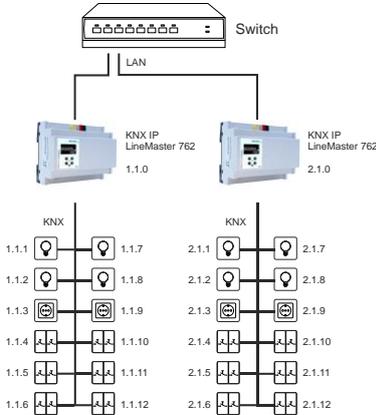
KNX IP LineMaster 762 as line coupler

The individual address assigned to the KNX IP LineMaster 762 determines whether the device operates as a line or area coupler. If the individual address is in the form of x.y.0 (x, y: 1..15), the KNX IP LineMaster 762 operates as a line coupler. If it is in the form of x.0.0 (x: 1..15), the KNX IP LineMaster 762 acts as a backbone coupler.
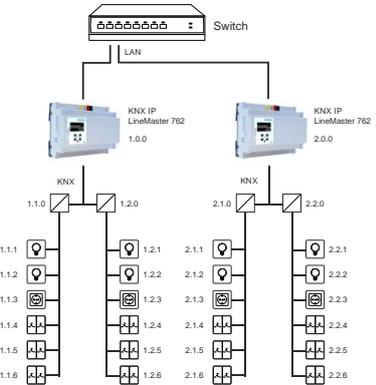
KNX IP LineMaster 762 as area coupler

If the KNX IP LineMaster 762 is used as an area coupler (x.0.0), there must not be a KNX IP Router in the topology beneath it. For example, if a KNX IP Router has the individual address 1.0.0, there must be no KNX IP Router with the address 1.1.0.

If the KNX IP LineMaster 762 is used as a line coupler (x.y.0), there must not be a KNX IP Router in the topology above it. For example, if a KNX IP Router has the individual address 1.1.0, there must be no KNX IP Router with the address 1.0.0.
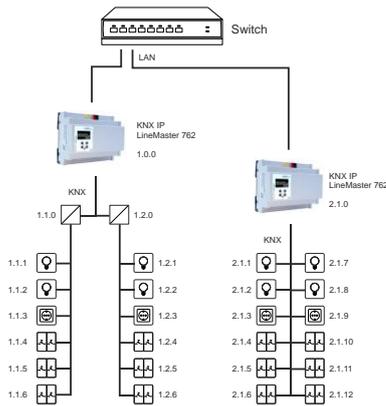
KNX IP LineMaster 762 as area and line coupler

The KNX IP LineMaster 762 has a filter table and thus contributes to reducing the bus load. The filter table (8kB) supports the extended group address range and is automatically generated by the ETS.
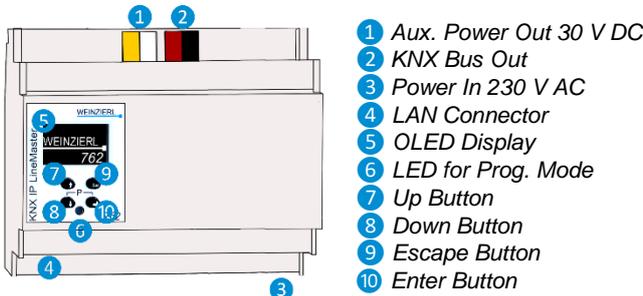
Because of the speed difference between the Ethernet (100 Mbit/s) and KNX TP (9.6 kbit/s), a far greater number of telegrams can be transmitted on IP. If several consecutive telegrams are transmitted for the same line, they must be buffered in the router to avoid telegram loss. The KNX IP LineMaster 762 has a memory for 150 telegrams (from IP to KNX).

Bus access function (KNXnet/IP Tunneling)

The KNX IP LineMaster 762 can be used as an interface to KNX. The KNX bus can be accessed from any point in the LAN. The device supports up to 6 simultanous Tunneling connections. For each connection an additional individual address must be assigned. This is described in the following sections.

Installation and Connection

The KNX IP LineMaster 762 is designed for installation on DIN rail with a width of 6 units (108 mm). It features the following controls (7 8 9 10) and displays (5 6):

1 *Aux. Power Out 30 V DC*
2 *KNX Bus Out*
3 *Power In 230 V AC*
4 *LAN Connector*
5 *OLED Display*
6 *LED for Prog. Mode*
7 *Up Button*
8 *Down Button*
9 *Escape Button*
10 *Enter Button*

Settings

The settings of the device can be accessed via

1. Local display on the device (partly)
2. ETS (Version 4.2 or higher)

The KNX Programming Mode is activated/deactivated by simultaneously pressing the buttons 8 10 – when activated the programming LED 6 lights up.

Programming and status LED 6

The red LED on the front panel is used to display the KNX programming mode and errors. The LED can have the following states:

- *LED off: The programming mode is not active and there is no error (normal operating mode).*

- *LED lights up: The programming mode is active, any errors are not visualized/notified by the LED, but can be read on the display.*

- *LED flashes quickly: The programming mode is not active. The rapid flashing indicates one of the following faults:*
  - *Overload (sum of the current of auxiliary and Bus power)*
  - *The device is not loaded correctly, for example, a cancelled download.*

Factory default settings

The following configuration is set by factory default:

Individual device address:	15.15.0
Number of configured KNXnet/IP tunneling con.:	6
Individual address of tunneling con. 1:	15.15.240
Individual address of tunneling con. 2:	15.15.241
Individual address of tunneling con. 3:	15.15.242
Individual address of tunneling con. 4:	15.15.243
Individual address of tunneling con. 5:	15.15.244
Individual address of tunneling con. 6:	15.15.245
IP address assignment:	DHCP

Direct Setting via display on device

A. Startup and idle display

During startup of the device, the physical address and the status of the application is displayed.
The device name "KNX IP LineMaster" can be changed within ETS parameter settings.

The status can be one of the following values:

- *Running: Application is loaded and running*

- *Stopped: The application is stopped - 6 LED for Programming Mode is flashing*

- *Unloaded: The application is not loaded- 6 LED for Programming Mode is flashing*

- *Loading: The application is currently loading by ETS*

- *Overload: The output current is above the limit of 900mA - 6 LED for Programming Mode is flashing*

- *Manual: Parameterized coupler settings were manually overwritten (filter, repetition and acknowledge) via the manual operation in the device display. By pressing long on on Enter 10, the normal operating mode, as parameterized, is restored.*

The power supply functionality (KNX and auxiliary voltage) is not dependent whether the application is running or not.

After 10 minutes of inactivity the display will turn into screensaver mode (blank screen with a bouncing dot) to safe display life time. Press any key to turn the display on again.

B. Main Menu
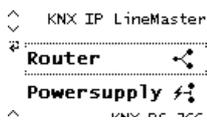
By pressing ⑧ (arrow down) you enter the main menu of the device. By pressing ⑩ (enter) you enter the submenus. Within the menus you can use ⑦ (arrow up) and ⑧ (arrow down) for navigation; ⑩ (enter) is for confirmation and ⑨ (escape) is to cancel / go back / one level higher.

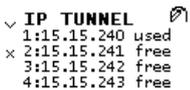Router <-> Powersupply <-> System Info <-> Dev Reset <-> Contrast

C. Submenu Router

The Router menu item offers the following submenus:
IP Config <-> IP Tunnel <-> Filter <-> Rep / ACK <-> Tel Counter <-> Bus Errors

D. Submenu IP Config
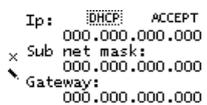
Select DHCP or Manual for IP configuration. Within Manual you can set the IP, subnet and gateway. Use ⑦ and ⑧ to navigate/set and ⑩ to select.

E. Submenu IP Tunnel

The KNX IP LineMaster 762 supports 6 simultaneous KNXnet/IP tunneling connections. You can display them in the submenu IP Tunnel including their actual status as well as the corresponding individual address.

F. Submenu Filter

For commissioning or test purposes, the filter settings parameterized by the ETS can be bypassed temporarily. The settings for broadcast telegrams (BC), individually addressed telegrams (IA) and group telegrams (main groups 0 to 13 GA^0 and main groups 14 to 31 GA^{14}) can be changed separately. The left-hand side relates to the forwarding from the main (IP) to the subline (TP), the right-hand side to the forwarding from the sub (TP) to the main line (IP). The following options are available: - Forward, x Block and \ Filter.

Settings differing from parameterization are marked with an angular bracket. The parameterized setting can be restored with a long press on Enter ⑩.

G. Submenu Rep / ACK
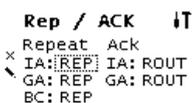
In this submenu, the settings for repeating telegrams on the subline (TP) can be changed. The settings for broadcast telegrams (BC), individually addressed telegrams (IA) and group telegrams (GA) can be changed separately: --- no repetition, REP up to 3 repetitions.

In addition, the settings for the telegram acknowledge can be changed on the subline (TP): **ROUT** Acknowledge only when forwarding, **ACK** acknowledge always, **NACK** negative acknowledgment. When answering with NACK, access to the device via KNX TP is no longer possible, see ETS parameter settings.

These settings are temporary.

Settings differing from parameterization are marked with an angular bracket. The parameterized setting can be restored with a long press on Enter ⑩.

H. Tel Counter
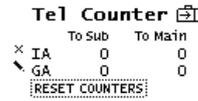
This submenu contains telegram counters. The number of forwarded telegrams is displayed here, separated from the direction (mainline IP to subline TP and vice versa) and telegram type (individually addressed telegrams IA and group telegrams GA). The counters can be reseted here.

I. Submenu Bus Errors
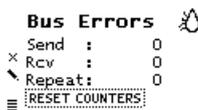
In this submenu, you can display **bus errors** and reset the bus error counters by pressing ⑩ (enter).

The following errors are counted:

- *Send errors:* Send failed after final repetition due to missing ACK, NACK or BUSY.

- *Receive errors:* Malformed telegrams or telegram fragments received.

- *Repetitions:* Number of received repeated telegrams. Also own repetitions are counted.

J. Submenu Submenu Powersupply

The Powersupply menu item offers the following submenus:

Diagnosis <-> History <-> Bus Reset <-> Event Counters

K. Submenu Diagnosis

This submenu shows actual values of **busload** (%), **voltage** (V), **current** (mA), and **temperature** (°C).
The busload is an indication of number of telegrams in a time span.

A value of 100 % busload is achieved by about 50 telegrams per second (Group Value Write, 1 Byte data). Voltage is the bus voltage, current the sum of bus and auxiliary current. The temperature is measured within the device.

L. Submenu History

History displays the value range (min and max) for **busload, voltage, current** and **temperature** over the last 24 hours.
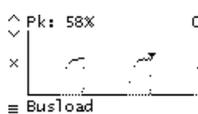
By pressing the ⑧ (arrow down) several times a graphical 'realtime' visualization is displayed: for busload, voltage, current, and temperature. To go back to the main menu, press ⑨ (escape).

The time span of each graph is approximately 2 minutes.

M. Submenu Bus Reset
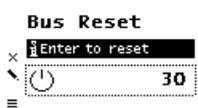
This submenu allows you to reset the KNX Bus line. Press ⑩ (enter) to switch off the KNX voltage. The default reset time is 30 seconds. To stop the countdown, press ⑨ (escape)

N. Submenu Event Counter

The operating status is logged automatically in the device and can be viewed in this sub menu. All times as displayed in the format "hours:minutes".

Operation time: Summed up the complete operation time of the device.

Run time: Time since the last device reboot. Timer starts new when device is powered on.

Restarts: Number of restarts. Counter counts up when device is powered on.

Time > 75 °C: Summed up operation time with in-device temperature above 75 °C.

Time > 640 mA: Summed up operation time with current load over 640 mA; current load of both outputs is logged.

Time > 900 mA: Summed up operation time with current load over 900 mA; current load of both outputs is logged.

To extend the lifespan of the internal memory the counter writes the log with a dynamic time span of up to 8 hours. Thus the log data may be lower if the device power was cut during a log period.

O. Submenu System Info

This submenu displays **information about the device**: serial number (SerNo), Application-ID (Info), App status (State),Firmware Revision (Vers.) and MAC address (MAC).

P. Submenu Device Reset

This submenu allows you to restart the device or to **reset to factory settings** (master reset). Select one option and keep ⑩ pressed until the small animation is finished and the option is executed.

Master reset will make a new ETS application download necessary.

Q. Submenu Contrast

To set the contrast of the display, select this entry in the menu. By pressing ⑩ (enter) several times you can set the contrast to different levels.

Interface settings with ETS

Within the ETS Software KNX interfaces can be selected and set up via the ETS menu "Bus Interfaces".

The ETS can access configured KNX IP LineMaster 762 even without a database entry. If the setup of the KNX IP LineMaster 762 does not comply with the conditions of the KNX installation it must be configured via an ETS project. See the ETS database section for more information.

As factory default the assignment of the IP address is set to "automatically via DHCP" no further IP settings are necessary. To use this feature a DHCP server on the LAN must be present (e.g. many DSL routers have an integrated DHCP server).

After connecting the KNX IP LineMaster 762 to the LAN, it should automatically appear in the ETS within the menu "Bus" under "Discovered interfaces".

By clicking on the discovered interface it is selected as the current interface. On the right side of the ETS window all specific information and options of the connection appear.

The indicated device name and the "Host Individual Address" (individual address of the device) can be changed within your ETS project then.

Like all programmable KNX devices the KNX IP LineMaster 762 has an individual address (device address) which can be used to access the device. It is used, for example, by the ETS when downloading the application to the KNX IP LineMaster 762 via the bus.

For the interface function the device contains additional individual addresses that can be set in the ETS (ETS 4.2 or higher). When a client (e.g. ETS) sends via the KNX IP LineMaster 762 telegrams to the bus, they contain a sender address as one from the additional addresses. Each address is associated with a connection. Thus response telegrams can be clearly transmitted to the respective client.

The additional individual addresses must be selected from the address range of the bus line which the KNX IP LineMaster 762 provides and may not be used by another device.

Example:

Device address	1.1.0	(address within ETS topology)
Connection 1	1.1.240	(1. additional address)
Connection 2	1.1.241	(2. additional address)
Connection 3	1.1.242	(3. additional address)
Connection 4	1.1.243	(4. additional address)
Connection 5	1.1.244	(5. additional address)
Connection 6	1.1.245	(6. additional address)

The section "Individual Address" enables you to change the individual KNX address of the currently used KNXnet/IP Tunneling connection. To check if the address you want to assign is unique within your KNX installation you can click the button "Address free?"
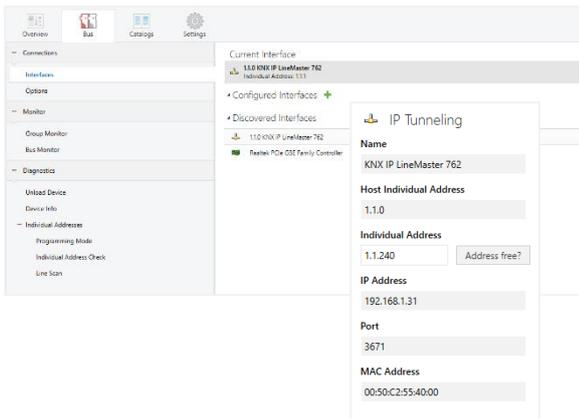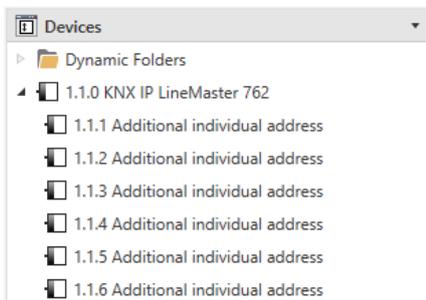
The individual KNX device address and the individual KNX addresses for additional tunneling connections can be changed within the ETS project (ETS 4.2 and ETS 5), after the device has been added to the project.

ETS database

The ETS database (for ETS 4.2 and ETS 5) can be downloaded from the product website of the KNX IP LineMaster 762 (www.weinzierl.de).

When using the ETS® product database for ETS 4 / 5 some settings are displayed in addition to the parameter dialog of the Properties dialog (on the right side of the ETS window). So the IP settings can be changed here. In the ETS 4 also the additional individual addresses can be set here. In the ETS 5 those addresses appear in the topology view.

Each individual KNX address can be changed by clicking on the list entry and typing in the desired address into the "Individual Address" text field. If the text field frame switches to color red after entering the address, the address is already taken within your ETS project.

Make sure that none of the addresses above are already used in your KNX installation.

By clicking on the KNX IP LineMaster 762 device entry within your ETS projects topology view, an information column 'Properties' will appear on the right side of the ETS window. Within the 'Settings' overview, you can change the name of the device.
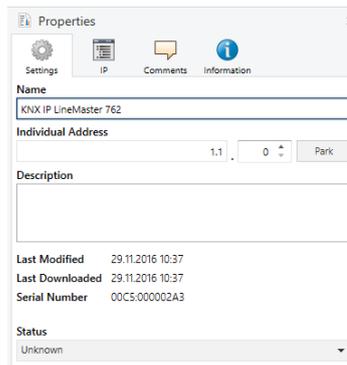
Within the "IP" overview the IP network specific options of the KNX IP LineMaster can be changed.

By changing "obtain an IP address automatically (via DHCP)" to "Use a static IP address" (static IP address) the IP address, subnet mask, and default gateway can be set freely.

All changes in the properties menu become effective only after a successful application download.
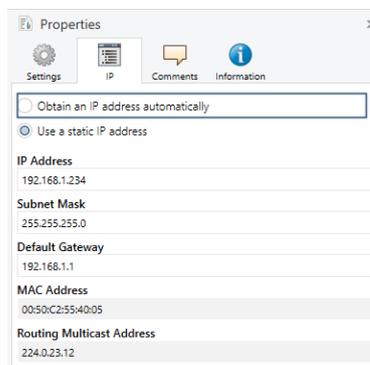
IP address

Here the IP address of the KNX IP LineMaster 762 can be entered. This is used to address the device via the IP network (LAN). The IP addressing should be coordinated with the administrator of the network.

Subnet mask

Enter the subnet mask here. The device uses the values entered in this mask to determine whether there is a communication 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. If the device should not be connected to external networks (e.g. internet), the subnet mask shall be set to 0.0.0.0.

Default gateway

Enter the IP address of the gateway here, e.g. the DSL router of the installation. If the device should not be connected to external networks (e.g. internet), this address shall be 0.0.0.0.

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 address is required, it must be within the range of 239.0.0.0 to 239.255.255.255.

Example of assigning IP addresses

A PC is to be used to access the KNX IP LineMaster 762.

IP address of the PC: 192.168.1.30

Subnet of the PC: 255.255.255.0

The KNX IP LineMaster 762 is located in the same 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 KNX IP LineMaster must be 192.168.1.xx, where xx can be a number from 1 to 254 (with the exception of 30, which is already taken by the client PC). It must be ensured that no IP addresses are assigned twice.

IP address of the KNX IP LineMaster 192.168.1.31

Subnet of the KNX IP LineMaster: 255.255.255.0

Remote access

Remote access via Internet is possible with the KNX IP LineMaster 762. More details can be found in the document "Remote access with the ETS" at www.weinzierl.de

ETS parameter dialogue

The following parameters can be set using the ETS.

Device Description

This page provides a general description of the device and the wiring scheme.

General

Local settings via menu

By disabeling this option, it is no longer possible to change settings via the device menu. This includes setting the IP configuration, resetting the counters, the device reset, the bus reset, and temporarily changing the filter settings.

Manual operation on device (bypass filtering)

The duration of the manual operating mode is set here. The filter table can be bypassed temporarily for commissioning or test purposes. This can be set under the menu item "Filter". After termination, the normal operating mode as programmed by ETS is automatically processed again.

Routing (KNX TP -> IP)

Group telegrams (main group 0 to 13)

Main group 0 to 13 is the standard range of group addresses in ETS.

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 used 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 group 14 to 31)

Main group 14 to 31 is the extended range of group addresses in ETS.

Block:	No group telegrams of main groups 14 to 31 are routed to IP.
Route:	All group telegrams of main groups 14 to 31 are routed to IP.
Filter:	The filter table is used to check whether or not the received group telegram should be routed to IP.

Individually addressed telegrams

Individual addresses are used during a download.

Block:	No individually addressed telegrams are routed to IP.
Route:	All individually addressed telegrams are routed to IP.
Filter:	The individual address is used to check whether the received individually addressed telegram should be routed to IP.

Broadcast telegrams

Broadcast telegrams are used when assigning individual addresses.

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

Acknowledge (ACK) of group telegrams

Always:	A acknowledge is generated for every received group telegram (from KNX).
Only if routed:	A acknowledge is only generated for received group telegrams (from KNX) if they are routed to IP.

Acknowledge (ACK) of individually addressed telegrams

Always:	A acknowledge is generated for every received individual addressed telegram (from KNX).
Only if routed:	A acknowledge is only generated for received individually addressed group telegrams (from KNX) if they are routed to IP.
Answer with NACK:	Every received individually addressed telegram (from KNX) is responded to with NACK (Not acknowledge). This means that communication with individually addressed telegrams on the corresponding KNX line is not possible. Group communication (group telegrams) is not affected. This setting can be used to block attempts at manipulation.

ℹ️ *When using "Answer with NACK" an access to the device via KNX TP is no longer possible. The configuration must be performed via IP.*

Routing (IP -> KNX TP)

Group telegrams (main group 0 to 13)

Block:	No group telegrams of these main groups are routed to KNX TP.
Route:	All group telegrams of this main group are routed to KNX TP 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 TP.

Group telegrams (main group 14 to 31)

Block:	No group telegrams of main groups 14 to 31 are routed to KNX TP.
Route:	All group telegrams of the main groups 14 to 31 are routed to KNX TP.

Filter:	The filter table is used to check whether the received group telegram should be routed to KNX TP.

Individually addressed telegrams

Block:	No individually addressed telegrams are routed to KNX TP.
Route:	All individually addressed telegrams are routed to KNX TP.
Filter:	The individual address is used to check whether the received individually addressed telegram should be routed to KNX TP.

Broadcast telegrams

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

Resending of group telegrams

Disable:	The received group telegram is not resent to KNX TP in case of a fault.
Enable:	The received group telegram is resent up to three times in case of a fault.

Resending of individually addressed telegrams

Disable:	The received individually addressed telegram is not resent to KNX TP in case of a fault.
Enable:	The received individually addressed telegram 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 TP in case of a fault.
Enable:	The received broadcast telegram is resent up to three times in case of a fault.

Programming

The KNX IP LineMaster 762 can be programmed in different ways by the ETS:

Via KNX Bus

The device only needs to be connected to the KNX bus. The ETS requires an additional interface (for example, USB) to have access to the bus. Via this way both the individual address and the entire application including IP configuration can be programmed. Programming via the bus is recommended if no IP connection can be established.

Via KNXnet/IP Tunneling

No additional interface is required. Programming via KNXnet/IP Tunneling is possible if the device already has a valid IP configuration (e.g. by using DHCP or Auto IP). In this case the device is displayed in the interface configuration of the ETS and must be selected. The download is executed via the ETS project as with many other devices.

Via KNXnet/IP Routing

Programming via KNXnet/IP Routing is possible if the device already has a valid IP configuration (e.g. by using DHCP or Auto

IP). In the ETS, the routing interface appears if at least one device on the network which supports routing is available. The name of the network interface appears in the PC as description. If routing is selected as interface, the programming is done from the ETS project as like with other devices. In this case LAN is used as a KNX medium like TP. There is no additional interface device required.

Via direct IP connection

While KNXnet/IP Tunneling and KNXnet/IP Routing is limited to the speed of KNX TP the device can be loaded via a direct IP connection at high speed. The direct IP connection is possible if the device already has a valid IP configuration as well as an individual address. To do this select "Use direct IP connection if available" in the ETS menu "Bus – Connections - Options". The download is then directly performed in the device and is not visible in the ETS group monitor.
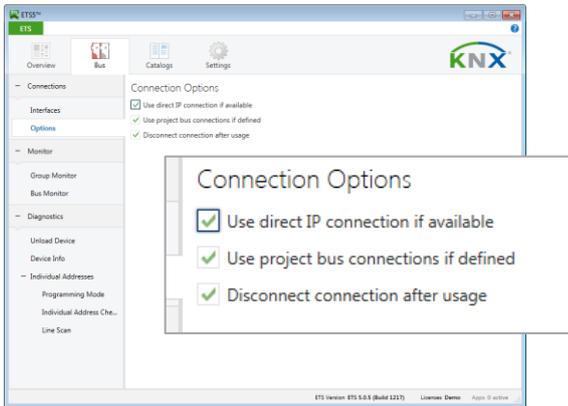
Due to the significantly shorter transmission times it is recommended to perform downloads via IP.

⚠ **WARNING**

- The device must be mounted and commissioned by an authorized electrician.
- The prevailing safety rules must be heeded.
- The device must not be opened.
- For planning and construction of electric installations, the relevant guidelines, regulations and standards of the respective country are to be considered.