Product documentation

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KNX SECURE COUPLER

Art. no. 10351



Product image non-binding

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1 Information on the product

1.1 Product catalogue

Product name:	KNX SECURE COUPLER
Use:	System device
Design:	RMD (rail-mounted device)
Art. no.	10351

1.2 Purpose

The backbone/line coupler interconnects two KNX lines into a logical function area ensuring at the same the electrical separation between these lines. Each bus line of a KNX installation can thus be operated electrically, independently from other bus lines.

The exact function of the device is determined by the selected parameterization and by the physical address. The device can be used as a backbone coupler, line coupler, segment coupler or line amplifier for implementing line segments in existing new KNX installations.

Used as a backbone coupler (BC) (physical address: X.0.0):
Connection of a subordinate line (main line) to a higher-order line (backbone bus) optionally with and without filter function for group communication. The coupler is logically assigned to the subordinate line by way of its physical address.

Used as a line coupler (LC) (physical address: X.Y.0):
Connection of a subordinate line (line) to a higher-order line (main line) optionally with and without filter function for group communication. The coupler is logically assigned to the subordinate line by way of its physical address.

Used as a segment coupler (SC) (physical address: X.Y.Z):
Connection of a subordinate line segment to a higher-order segment of the line optionally with and without filter function for group communication. Using segment couplers allows the first segment of a line to be expanded by further line segments switched in parallel. The segment coupler is logically assigned to the subordinate line segment.

Used as a line amplifier (LR) (physical address: X.Y.Z):
Connection of a subordinate line segment to a higher-order segment of the line without filter function for group communication. Using line amplifiers allows the first segment of a line to be expanded by further line segments switched in parallel. The line amplifier is logically assigned to the subordinate line segment.

Each line (backbone line, main line, line) or each line segment requires a separate power supply. The backbone/line coupler is supplied with power from the higher-level side.

Used as a secure proxy.
KNX Data Secure offers protection against manipulation in building automation and can be configured in the ETS project. For maximum protection, all devices are to use KNX Data Secure. If individual devices cannot communicate securely via group addresses, a secure proxy allows for the connection of the devices using KNX Data Secure. Here, the devices that can support KNX Data Secure and those that cannot must be installed in separate lines or segments.

Planning, installation and commissioning of the device is carried out using ETS version 5.7.7. or higher in the case of use as a backbone coupler, line coupler or amplifier or 6.1.1 in the case of use as a backbone coupler, line coupler, segment coupler or secure proxy.

The device can be updated using ETS version 6.4.0 or later.

1.3 Device components

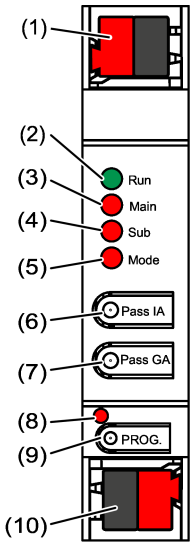


Figure 1: Front view

(1) KNX device connection terminal, subordinate line **SL**
(2) Status LED **Run**
(3) Status LED **Main**
(4) Status LED **Sub**
(5) Status LED **Mode**
(6) Button **Pass IA**
(7) Button **Pass GA**
(8) Programming LED, red
(9) Programming button **PROG.**
(10) KNX device connection terminal, higher-order line **ML**

Off	Power failure on higher-order line
Lights up green	Ready for operation, higher-order and subordinate lines are supplied with voltage.
Lights up red	Power failure on subordinate line.
Lights up orange	Group address filter function is deactivated
Flashes orange (approx. 1 Hz)	Physical address filter function is deactivated
Flashes orange quickly (approx. 4 Hz)	Both filter functions are deactivated

Table 1: Status LED function **Run**

Lights up orange for 6 ms	Telegram reception, higher-order line
Lights up red for 6 ms	One-time communication error, higher-order line
Lights up red for 100 ms	Repeated communication error, higher-order line

Table 2: Status LED function **Main**

The display of errors has a higher priority.

Lights up orange for 6 ms	Telegram reception, subordinate line
Lights up red for 6 ms	One-time communication error, subordinate line
Lights up red for 100 ms	Repeated communication error, subordinate line

Table 3: Status LED function **Sub**

The display of errors has a higher priority.

Off	Device functions as a backbone coupler or line coupler
Lights up green	Device functions as a segment coupler or line amplifier
Lights up orange	Device functions as a backbone coupler, line coupler or segment coupler; and the secure proxy is activated
Lights up red for 100 ms	**Pass IA** or **Pass GA** button has been pressed

Table 4: Status LED function **Mode**

Self-test of the status LED

During restart, the status LEDs light up green for 0.5 seconds and then red in sequence from the top to the bottom

1.4 Technical data

Ambient temperature	-5 ... +45 °C
Storage/transport temperature	-25 ... +70 °C
Protection class	III
Weight	90 g
Installation width	18 mm / 1 HP
KNX medium	TP256
Commissioning mode	S mode
Rated voltage KNX	DC 21 ... 32 V SELV
Current consumption KNX	
Higher-order line	9 mA
Subordinate line	5 mA
Connection mode KNX	Device connection terminal

2 Safety instructions

To avoid potential damage, read and follow the following instructions:



Electric devices may only be mounted and connected by electrically skilled persons.

Danger of electric shock. Comply with the regulations and standards that apply to SELV circuits during the installation and cable routing.

Instructions are part of the product. So keep them in a safe place.

3 Mounting and electrical connection

Secure operation

- Secure commissioning in the ETS is activated.
- Remove the device certificate from the device and store it securely.
- Enter or scan the device certificate and add it to the project. Recommendation: Use a high resolution camera to scan the QR code.
- Document all passwords and keep them safe.

Mounting and connecting the device

- Observe cable routing and spacing
- Mount device on DIN rail.
- Connect bus lines to KNX device connection terminals (see figure 1) observing the correct polarity.
- Connect the higher-order line to the lower device connection terminal (10). Power is supplied to the device via this terminal.
- Connect the subordinate line to the upper device connection terminal (1).
- Attach the cover caps to the KNX connections as protection against hazardous voltages.

The subordinate line requires a separate power supply.

4 Commissioning

Programming the physical address and application program with ETS

- Switch on the bus voltage.
- Press the programming button **PROG.** (9).

  The programming LED (8) lights up.
- Programming the physical address.

  The programming LED goes out.
- Program the application programme and filter table.

Activating safe-state mode

The safe-state mode stops the execution of the loaded application program.

ⓘ Only the system software of the device is still functional. ETS diagnosis functions and programming of the device are possible. No telegrams are transmitted.

- Switch off the bus voltage or remove the KNX device connection terminal (10) of the higher-order line.
- Press and hold down the programming button for approx. 15 seconds.
- Switch on the bus voltage or attach the KNX device connection terminal. Release the programming button only after the programming LED starts flashing slowly.

  Safe-state mode is activated.

  By briefly pressing the programming button again, the programming mode can also be switched on and off in the safe-state mode. The programming LED stops flashing if the programming mode is active.

Deactivating safe-state mode

- Switch off the bus voltage for approx. 15 seconds or trigger a restart via the ETS.

Master reset

The master reset restores the basic device settings (physical address 15.15.0, firmware remains in place). The device must then be recommissioned with the ETS.

In secure operation, a master reset will deactivate the device security. The device can then be recommissioned with the device certificate.

Performing a master reset

Prerequisite: safe-state mode is activated.

- Press and hold down the programming button for > 5 s.

The programming LED flashes quickly.

- Release the programming button.

  The device performs a master reset, restarts and is ready for operation again after approx. 5 s.

5 Application programs

Name	Backbone line segment coupler 902322
Version	2.2 for ETS6 version 6.1.1 onwards
From mask version	0912
Summarized description	Backbone line segment coupler. KNX Data Secure capable. Suitable as a secure proxy.

Name	Backbone line coupler / amplifier 902423
Version	2.3 for ETS5 version 5.7.7 or higher and ETS6 version 6.1.1 or higher
From mask version	0912
Summarized description	Backbone line coupler or line amplifier. KNX Data Secure capable. Not suitable as a secure proxy.

6 Scope of functions

General:

- Status LED to display device statuses
- Buttons for manually deactivating the filter functions for group addresses and physical addresses
- Support of extended frames
- Use as a secure proxy (ETS 6.1.1 onwards) with ETS application program "Backbone line segment coupler 90232x"
- Safe-state mode to stop the application program (e.g. if the device does not function properly due to errors in the project design or during commissioning)
- Function for reset to delivery state

Function as a backbone or line coupler:

- Depending on the physical address, use as a backbone or line coupler
- Reduced bus load due to filter function
- Support of the full address range (main groups 0-31) for filter function
- Forwarding of group telegrams (Higher-order line -> Subordinate line, Subordinate line -> Higher-order line) parameterizable
- Forwarding of physically addressed telegrams (Higher-order line -> Subordinate line, Subordinate line -> Higher-order line) parameterizable
- Telegram confirmation for group and physically addressed telegrams separately parameterizable
- Telegram repetitions in case of transmission errors for group, broadcast and physically addressed telegrams presettable separately

Function as a segment coupler:

- Depending on the physical address or the list of devices for the subordinate segment, use as a segment coupler (ETS 6.1.1 onwards) with ETS application program "Backbone line segment coupler 90232x"
- Expansion of a line by further line segments.
- Reduced bus load due to filter function
- Support of the full address range (main groups 0-31) for filter function
- Forwarding of group telegrams (Higher-order line segment -> Subordinate line segment, Subordinate line segment -> Higher-order line segment) parameterizable
- Forwarding of physically addressed telegrams (Higher-order line segment -> Subordinate line segment, Subordinate line segment -> Higher-order line segment) parameterizable
- Telegram confirmation for group and physically addressed telegrams separately parameterizable
- Telegram repetitions in case of transmission errors for group, broadcast and physically addressed telegrams presettable separately

Function as an amplifier:

- Use as a amplifier with ETS application program "Backbone line coupler/amplifier 90242x"
- Expansion of a line by further line segments.
- Forwarding of group telegrams and physically addressed telegrams without a filter function
- Telegram repetitions in case of transmission errors for group, broadcast and physically addressed telegrams presettable separately

If using ETS6, it is advisable to use the application program "Backbone line segment coupler 90232x" since it has significantly expanded functions for use as a segment coupler and as a secure proxy.

7 Operation and indication

Deactivating the physical address filter function

- Press the **Pass IA** button.

  The status LED **Mode** briefly lights up red.

  The status LED **Run** displays the state of the filter functions, (see figure 1).

  The filter is deactivated until the **Pass IA** button is pressed again.

Deactivating the group address filter function

- Press the **Pass GA** button.

  The status LED **Mode** briefly lights up red.

  The status LED **Run** displays the state of the filter functions, (see figure 1).

  The filter is deactivated until the **Pass GA** button is pressed again.

8 Application basics

The device can be used as a backbone coupler, line coupler, segment coupler or line amplifier. The type of function depends on the assignment of the physical address and on the parameterisation of the device (parameter "Operating mode").

Device working as a backbone / line coupler

The backbone/line coupler interconnects two KNX lines into a logical function area ensuring at the same the electrical separation between these lines. Each bus line of a KNX installation can thus be operated electrically independently from other bus lines.
With a coupler a distinction is made as to whether it forwards telegrams with the addressing via physical addresses (e.g. telegrams that are forwarded from the ETS to a device during a commissioning as in the case of an application download) or group telegrams (communication by means of group addresses during ongoing operation of a KNX installation, e.g. light switching).

To forward physically addressed telegrams it is important that the coupler knows its own physical address and thus its 'line affiliation' is defined. The coupler compares the destination address of a received telegram with its own line address and forwards or does not forward the telegram depending on the sending direction. The behaviour of the coupler can be configured.

With regard to the group communication the behaviour of the coupler can be configured depending on the sending direction. Thus, it either forwards all group telegrams or blocks them. During ongoing operation of a system, a filter table can be loaded into the coupler particularly to reduce the bus load on the lines. In the course of this, the coupler only forwards the group telegrams whose group address is entered in the filter table. The settings can be made separately for the main groups 0 to 13 and 14 to 31.

The filter table is generated by the ETS and programmed into the coupler during a download of the "application" or partial download of the "Group addresses".

The coupler alternatively always forwards broadcast telegrams (e.g. ETS Management telegrams - check whether devices are in the programming mode etc.) or blocks them.

Commissioning

During commissioning of a project with backbone/line couplers, the following sequence of operations should be observed:

- Project design of the KNX installation (physical addresses, group addresses, parameters)
- At first, the physical addresses of the couplers and their application programs must be programmed and then the physical addresses of the other KNX devices. Thereafter, the applications can be loaded into the KNX devices (actuators, sensors, etc.).

- For testing of a KNX installation, especially in the modification phase before project design completion, it is recommended to set the parameters "Group telegrams main line -> line" and "Group telegrams line -> main line" of all backbone/line couplers at first to "Forward all", or to deactivate the filter functions on the device with the "Pas GA" button. This means that any programmed filter tables are not yet taken into account in the testing phase.
- Finally, the filter tables should be programmed into the couplers. The filter tables are loaded automatically when the complete application is downloaded or also during partial programming of the "group addresses".

Topology
The backbone/line coupler forwards telegrams between a subordinate line and a higher-order line (line coupler: line - main line, backbone coupler: main line - backbone bus). In the project design phase, the function of the device is defined by the physical address as follows:

- Backbone coupler (BC) B.0.0 (1 ≤ B ≤ 15)
- Line coupler (LC) A.L.0 (1 ≤ A ≤ 15, 1 ≤ L ≤15)

Each line has a power supply (PS) of its own and is electrically isolated from the other lines. With line couplers, up to 15 lines can be grouped into an area. With backbone couplers (BC), up to 15 areas can be interconnected.
From a logical point of view, backbone / line couplers are assigned to the pertaining subordinate line. The hierarchy of line and backbone couplers in a KNX system is thus as follows (see figure 2).

Function as a segment coupler

When using ETS version 6.1.1 or higher as well as the application program "Backbone line segment coupler 90232x", the coupler can also be used as a segment coupler in order to expand larger systems.

The segment coupler connects the first line segment within a KNX line with a subordinate line segment to form a logical functional area ensuring at the same the electrical separation between these partial areas. The line segments can be operated electrically independently of one another.

The segment coupler has a list of the devices located in its subordinate segment so that it can filter all of the physically addressed telegrams.

The segment couple has a filter table, which allows it to filter all group telegrams as a backbone or line coupler.

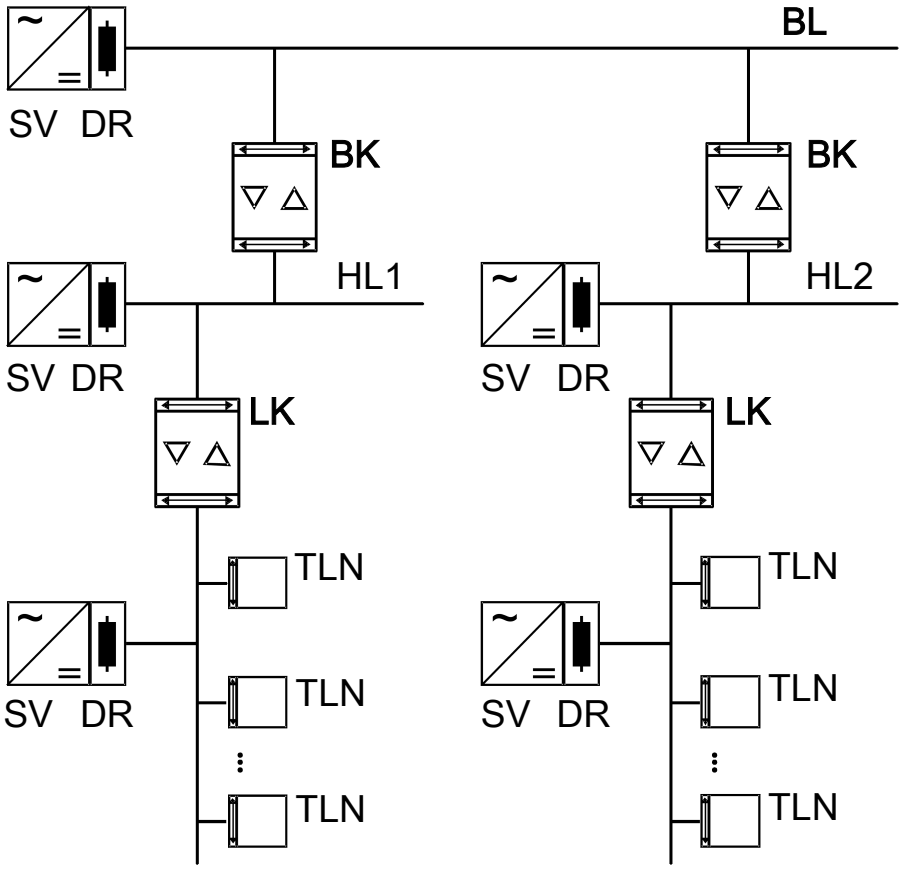


Figure 2: Use as a backbone and line coupler

The coupler logics is supplied with electric power from the higher-order line.

Function as an amplifier

When using ETS version 5.7.7 or higher as well as the application program "Backbone line coupler/amplifier 90242x", the coupler can also be used as a line amplifier in order to expand larger systems. Since line amplifiers are functionally limited compared to segment couplers, this variant is to be replaced with segment couplers if possible.

The line amplifier connects the first line segment within a KNX line with a subordinate line segment to form a logical functional area ensuring at the same the electrical separation between these partial areas. The line segments can be operated electrically independently of one another.

The line amplifier does not have information about the devices located in the various segments. It thus forwards all physically addressed telegrams.

The line amplifier has no filter tables so that all group telegrams will always be forwarded unfiltered.

A line amplifier always forwards broadcast telegrams.

Connecting several line amplifiers in series is not permitted!

Commissioning

During commissioning of a project with line amplifiers, the following sequence of operations should be observed:

- Project design of the KNX installation (physical addresses, group addresses, parameters)
- As a first step, program the physical addresses of the backbone / line couplers, if any.
- Then, program the physical addresses of the line amplifiers and their application programs.
- Transfer the application programs of the couplers.
- As a last step, program the physical addresses of the other KNX devices. Thereafter, the applications can be loaded into the KNX devices (actuators, sensors, etc.).

The line amplifier can be programmed from the higher-order and also from the subordinate line.

Topology

To connect more devices to an existing line or to expand the cable lengths, a line amplifier (LR) can be used to create further line segments. Each line or each line segment has a power supply (PS) of its own and is electrically isolated from the other line segments. The line amplifier forwards telegrams between the different line segments without filtering the group communication.

Line amplifiers must be connected in parallel since a telegram is routed due to the routing counter via 6 couplers max. (LR-LC-BC-BC-LC-LR).

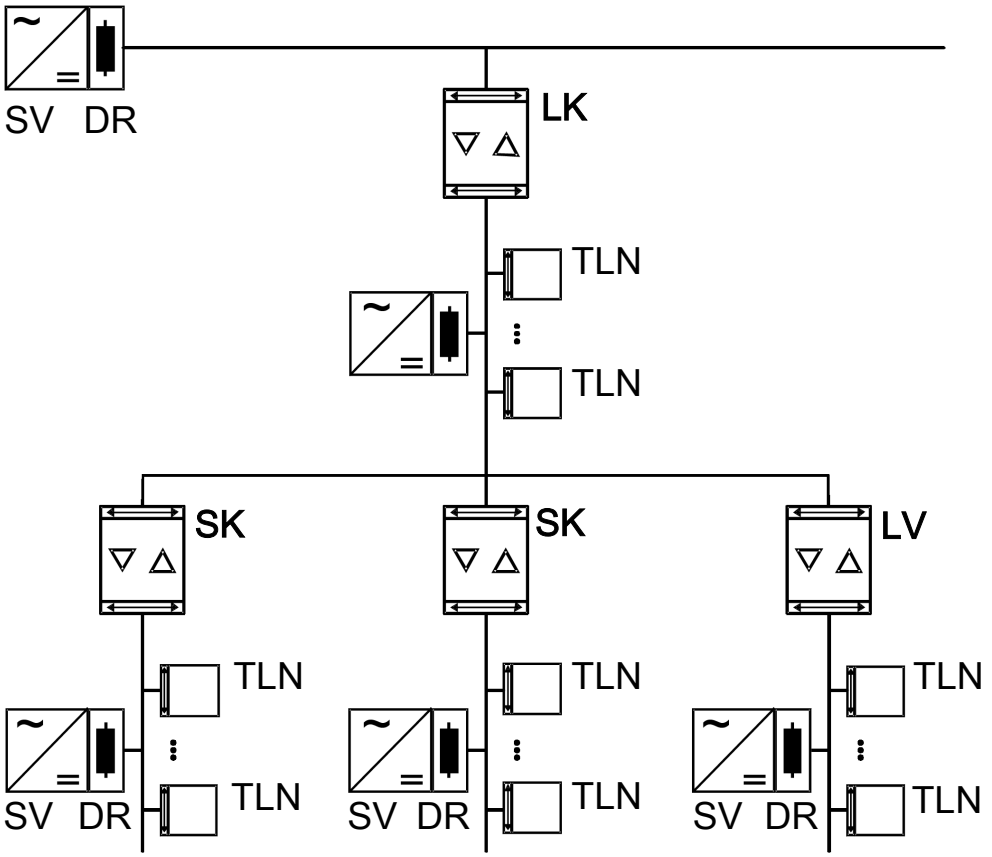


Figure 3: Use as a line coupler and segment coupler and amplifier

The amplifier logic is supplied with electric power from the higher-order line.

9 KNX Data Secure

KNX Data Secure offers protection against manipulation in building automation. The following list explains the individual components of the KNX Data Secure mechanism and the technical benefits of securing a system in this way:

– Freshness

  The "freshness" prevents an attacker from recording permissible telegrams at any time and replaying them again later. This reliably prevents repeating telegrams to trigger known, older actions in a KNX system (e.g. opening a garage door via an illicitly recorded 1-bit switching command).
  A receiver only evaluates "fresh" telegrams from a sender.

  In combination with data integrity (see next section), "freshness" is an effective security method to prevent unauthorised access to a KNX installation if a person illegally comes into possession of known, possibly recorded, telegram sequences.

– Data integrity

  Data integrity effectively prevents an attacker from obtaining control over a KNX system. It prevents telegrams from being manipulated or additional (incorrect) information from being input. This is done by inserting an encrypted authentication code into each telegram. Recipients can use this code to verify whether a message has been illicitly modified.

– Authentication

  Authentication is used to verify the identity of the telegram. It ensures that the source of a telegram is indeed an authorized communication partner. A receiver rejects a received commissioning or group telegram if the source address (physical address) of the telegram is unknown.

– Confidentiality

  The telegram confidentiality prevents the reading of telegrams at running time (group communication) and during ETS commissioning by means of encryption. This means that hackers no longer have access to KNX installation data forwarded. It is no longer possible to interpret telegram contents (e.g. ON, OFF, values) without having the group or ETS keys.

Use as secure proxy

For full communication security, all devices – from the sensors through to the couplers and actuators – must be KNX Data Secure capable. In practice, however, it may be that there are not devices for every application that support KNX Data Secure or that an existing system with devices not capable of supporting KNX Data Secure is to be expanded with new KNX Data Secure-capable devices.

In such cases, it is possible to structure the system in such a way that devices that can support KNX Data Secure and those that cannot can be located in separate segments. This separation also applies to individual group addresses. Between the individual segments, KNX Data Secure-capable backbone, line or segment couplers are

used which can operate as a secure proxy. The secure proxy applies group addresses to telegrams in both directions between secured and unsecured transmission. The difference cannot be detected by individual sensors and actuators.

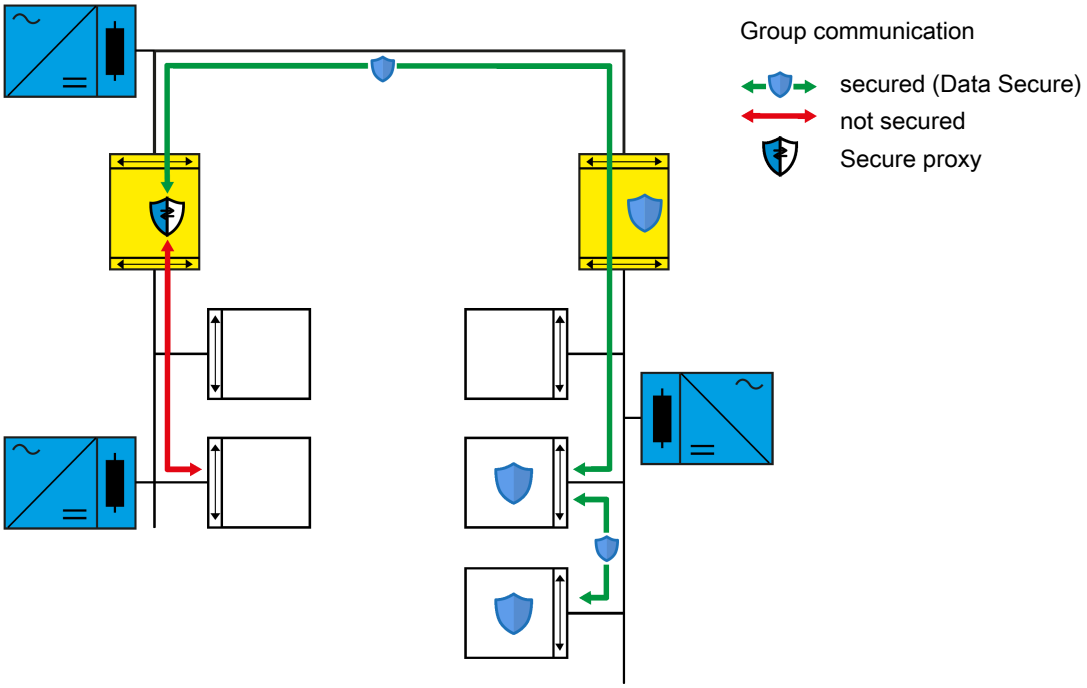


Figure 4: Function of a secure proxy

In ETS version 6.1.1 or higher, the coupler must be commissioned safely using its device certificate. Besides this, no other special settings must be made. The ETS detects the suitability of the coupler as a secure proxy and enters the groups addresses to be applied into the corresponding table for the coupler. When the coupler application is loaded, this table as well as the filter table for the group addresses are automatically updated.

Subnet isolation

For systems in which only some of the installed devices can support KNX Data Secure, the coupler with the application developed for ETS6 offers subnet isolation as a further protective function in addition to the individually adjustable parameters for forwarding telegrams. Subnet isolation is intended to prevent changes to non-KNX Data Secure-capable devices via the coupler without the appropriate ETS project. However, making changes with the appropriate ETS project as well as the access keys stored in the project should be possible without restriction.

For subnet isolation, the coupler has a list for the temporary forwarding of telegrams. For cross-coupler commissioning or diagnostics, the ETS enters the required addresses and a validity period into this list. Altering this list is only possible using the access key stored in the ETS project.

If the coupler receives a telegram with a broadcast address or a physical address when subnet isolation is activated, it checks before forwarding whether the list for the temporary forwarding of telegrams contains a corresponding entry and whether the validity period has expired. If these conditions are met, it forwards the telegram. If no matching entry is on the list, the coupler blocks the telegram.

Subnet isolation is automatically activated in the default ETS settings. However, it can also be activated or deactivated manually.

If the parameters for telegrams with physical and broadcast addresses are set to "block" on the "Forwarding of telegrams" page, the coupler does not forward these telegrams regardless of the subnet isolation setting.

If the "Pass IA" button is pressed, the coupler forwards telegrams with physical and broadcast addresses, regardless of the subnet isolation setting and the parameter setting.

10 General

Depending on its physical address, the coupler can be used as a backbone coupler, line coupler, segment coupler or line amplifier in the KNX topology. The functions and setting options are identical for backbone couplers, line couplers and segment couplers. The setting options are only restricted with line amplifiers.

When using ETS6 as well as the application program Backbone line segment coupler V2.20, the coupler can also be used as a segment coupler for expanding larger systems. This setting is preferable to use as a line amplifier.

When using the application program Backbone line coupler / amplifier V2.20, the coupler cannot be used as a segment coupler for expanding larger systems.

10.1 Parameter General

General

Operating mode	**Backbone coupler / line coupler / segment coupler**
This parameter defines the functions of the device as well as the visibility and presettings of further parameters. In addition, it is important to assign a correct physical address corresponding to the functions of the device. The parameter is only present when the application program "Backbone line segment coupler 90232x" is being used. ⓘ The "Operating mode" parameter cannot be changed. The segment coupler fully replaces the line amplifier and has significantly expanded functions for filtering telegrams.	

Operating mode	Backbone / Line coupler Amplifier
This parameter defines the functions of the device as well as the visibility and presettings of further parameters. In addition, it is important to assign a correct physical address corresponding to the functions of the device. The parameter is only present when the application program "Backbone line coupler / amplifier 90242x" is being used.	

Enabled functions

Manual control	Checkbox (**yes** / no)
This parameter enables the operation of the "Pass IA" and "Pass GA" buttons. On the "Forwarding of telegrams" page, the duration of forwarding after manual operation can also be limited. When using the application program "Backbone line coupler/amplifier 90242x", this parameter is not available if the device is used as an amplifier, as it generally forwards all telegrams in this case.	

11 Forwarding of telegrams

The functions for the forwarding of telegrams can be set separately for both communication directions "from the higher-order side" and "from the subordinate side". The options that can be set depend on the target addresses used.

Group addresses

For telegrams with group addresses, the coupler distinguishes between the main groups 0 ... 13 and 14 ... 31.

– forward unfiltered
With this setting, the coupler ignores the group addresses entered in the filter table.

  This setting is useful, for example, during the commissioning of a KNX installation if the filter tables of the couplers are not to be updated every time the assignment of group addresses to sensors or actuators is changed.

  Alternatively, the filter table of the coupler can also be deactivated with the "Pass GA" button.

– block
With this setting, no telegrams with group addresses are forwarded.

  This setting can be used temporarily for test purposes if parts of the KNX installation are to be tested independently of each other.

– filter
With this setting, the coupler compares the group addresses to the content of the filter table. The telegram is only forwarded if there is a match.

  This setting is typically useful since only the required telegrams are forwarded and the overall bus load is noticeably reduced.

Physical addresses

Telegrams with physical addresses are used for commissioning and for diagnostics.

– forward unfiltered
With this setting, the coupler does not check the physical address entered in a telegram.

  This setting is, for example, useful during the commissioning of a KNX installation if a data interface is repeatedly connected to different bus lines for testing purposes.

  Alternatively, the filter function of the coupler can also be deactivated with the "Pass IA" button.

– block
With this setting, no telegrams with physical addresses are forwarded.

  This setting can be used temporarily for test purposes or if manipulation of a KNX installation is to be made more difficult. However, "safe commissioning" must definitely be use for the couplers here.

– filter (depending on target and coupler address)
With this setting, the coupler compares the target address as a backbone and line coupler to its own physical address or as a segment coupler to its list of subordinate devices. The telegram is only forwarded if there is a match.

This setting is typically useful since only the required telegrams are forwarded and the overall bus load is noticeably reduced.

Broadcast

Telegrams with broadcast addresses (0/0 or 0/0/0) are used for commissioning and for diagnostics in order to check the physical address of another device or to program it.

– forward unfiltered
With this setting, the coupler always forwards broadcast telegrams. This setting is useful so that devices in other areas or lines can be commissioned from any point in a KNX installation.

– block
With this setting, no broadcast telegrams with are forwarded.

This setting can be used if manipulation of a KNX installation is to be made more difficult. However, "safe commissioning" must definitely be use for the couplers here.

Manual control

In normal operation, the coupler filters telegrams based on its filter table and its position within the bus topology. During commissioning and diagnostic activities, it may be useful for the coupler to temporarily forward all telegrams with group addresses and/or physical addresses. This forwarding can be activated using the "Pass IA" and "Pass GA" buttons.

The "Duration of manual operation" parameter can be used to specify that the coupler automatically switch back to normal filtering after a presettable time. If the button is pressed again within this time, the coupler immediately deactivates the forwarding.

11.1 Parameters for forwarding of telegrams

General -> Forwarding of telegrams

These parameters are available for both the "Backbone line segment coupler 90232x" application program and the "Backbone line coupler / amplifier 90242x" application program.

This parameter is not visible, if the parameter "Operating mode" is set to "Amplifier" on the "General" page.

from the higher-order side

Main groups 0...13	forward unfiltered block **filter**
Determines whether group telegrams of the groups 0-13 are forwarded from the higher-order side to the subordinate side. forward unfiltered: All group telegrams of the groups 0-13 are forwarded. The filter table will be disregarded. block: All group telegrams of the groups 0-13 are blocked. No group telegram of the groups 0-13 can pass the coupler. filter: In accordance with the filter table generated and programmed in the ETS, group telegrams of the groups 0-13 are either forwarded or blocked selectively.	

Main groups 14...31	forward unfiltered block **filter**
Determines whether group telegrams of the groups 14-31 are forwarded from the higher-order side to the subordinate side. forward unfiltered: All group telegrams of the groups 14-31 are forwarded. The filter table will be disregarded. block: All group telegrams of the groups 14-31 are blocked. No group telegram of the groups 14-31 can pass the coupler. filter: In accordance with the filter table generated and programmed in the ETS, group telegrams of the groups 14-31 are either forwarded or blocked selectively.	

Physical addresses	forward unfiltered block **filter (depending on target & coupler address)**
Determines whether physically addressed telegrams are forwarded from the higher-order side to the subordinate side. forward unfiltered: All physically addressed telegrams are forwarded. block: All physically addressed telegrams are blocked. No physically addressed telegram can pass the coupler. filter (depending on target & coupler address): Only physically addressed telegrams are forwarded whose target addresses match the line address of the coupler. All other physically addressed telegrams are blocked.	

Broadcast	**forward unfiltered** block
Determines whether broadcast telegrams for commissioning or diagnostics are forwarded from the higher-order side to the subordinate side. forward unfiltered: All broadcast telegrams are forwarded. block: All broadcast telegrams are blocked. The result	

from the subordinate side

Main groups 0...13	forward unfiltered block **filter**
Determines whether group telegrams of the groups 0-13 are forwarded from the subordinate side to the higher-order side. forward unfiltered: All group telegrams of the groups 0-13 are forwarded. The filter table will be disregarded. block: All group telegrams of the groups 0-13 are blocked. No group telegram of the groups 0-13 can pass the coupler. filter: In accordance with the filter table generated and programmed in the ETS, group telegrams of the groups 0-13 are either forwarded or blocked selectively. This parameter influences the behaviour of the red diagnosis LED. As soon as this parameter is set to "forward unfiltered", the LED is lit up.	

Main groups 14...31	**forward unfiltered** block filter
Determines whether group telegrams of the groups 14-31 are forwarded from the subordinate side to the higher-order side. forward unfiltered: All group telegrams of the groups 14-31 are forwarded. The filter table will be disregarded. block: All group telegrams of the groups 14-31 are blocked. No group telegram of the groups 14-31 can pass the coupler. filter: In accordance with the filter table generated and programmed in the ETS, group telegrams of the groups 14-31 are either forwarded or blocked selectively. This parameter does not influence the behaviour of the red diagnosis LED.	

Physical addresses	forward unfiltered block **filter (depending on target & coupler address)**
Determines whether physically addressed telegrams are forwarded from the subordinate side to the higher-order side. forward unfiltered: All physically addressed telegrams are forwarded. block: All physically addressed telegrams are blocked. No physically addressed telegram can pass the coupler. filter (depending on target & coupler address): Only physically addressed telegrams are forwarded whose target addresses do not belong to the line address of the coupler. Physically addressed telegrams whose target address match the coupler address are blocked.	

Broadcast	**forward unfiltered** block
Determines whether broadcast telegrams for commissioning or diagnostics are forwarded from the subordinate side to the higher-order side. forward unfiltered: All broadcast telegrams are forwarded. block: All broadcast telegrams are blocked. This restricts the cross-line commissioning of new devices and the search for devices in programming mode.	

Manual control

Duration of forwarding	**unlimited** 1 minute 15 minutes 30 minutes 1 hour 3 hours 12 hours 24 hours
In normal operation, the coupler filters telegrams based on its filter table and its position within the bus topology. During commissioning and diagnostic activities, it may be useful for the coupler to temporarily forward all telegrams with group addresses and/or physical addresses. This forwarding can be activated using the "Pass IA" and "Pass GA" buttons. The "Duration of manual operation" parameter can be used to specify that the coupler automatically switch back to normal filtering after a presettable time. If the button is pressed again within this time, the coupler immediately deactivates the forwarding.	

12 Confirmation of telegrams

The functions for the confirmation of telegrams can be set separately for both communication directions "to the higher-order side" and "to the subordinate side". The options that can be set depend on the target addresses used.

Group addresses

For telegrams with group addresses, the coupler does not distinguish between the main groups 0 ... 13 and 14 ... 31.

– always
  The coupler always confirms on the higher-order line every group telegram received.

  This setting is useful, for example, during the commissioning of a KNX installation if the filter tables of the couplers are not to be updated every time the assignment of group addresses to sensors or actuators is changed, or if devices are commissioned, depending on the ETS project, with a separate configuration software.

– only if forwarded
  With this setting, the coupler compares the group addresses to the content of the filter table. The telegram is only confirmed if there is a match, or if all group addresses are generally forwarded.

  This setting is useful if the filter tables of the couplers are up to date after successful commissioning. This sustainably reduces the bus load.

Physical addresses

Telegrams with physical addresses are used for commissioning and for diagnostics.

– always
  With this setting, the coupler does not check the physical address entered in a telegram.

  This setting is, for example, useful during the commissioning of a KNX installation if a data interface is repeatedly connected to different bus lines for testing purposes.

  Alternatively, the filter function of the coupler can also be deactivated with the "Pass IA" button.

– only if forwarded
  With this setting, the coupler compares the target address as a backbone and line coupler to its own physical address or as a segment coupler to its list of subordinate devices. The telegram is only confirmed if there is a match.

  This setting is typically useful since only the required telegrams are forwarded and the overall bus load is noticeably reduced.

– always reject (NACK)!
  The coupler rejects all physically addressed telegrams received and sends a NACK-Confirm. No physically addressed telegram can pass the coupler. The

coupler cannot be physically addressed from the higher-order side (no download possible). However, "safe commissioning" must definitely be use for the couplers here.

This setting can be used to make manipulation in a system more difficult. However, it can also significantly hinder regular maintenance work.

12.1 Parameters for confirmation of telegrams

General -> Confirmation of telegrams

These parameters are available for both the "Backbone line segment coupler 90232x" application program and the "Backbone line coupler / amplifier 90242x" application program.

This parameter is not visible, if the parameter "Operating mode" is set to "Amplifier" on the "General" page.

to the higher-order side

Group telegrams	always **only if forwarded**
It is possible to define when the device confirms the group telegrams received on the higher-order side. always: The coupler always confirms on the higher-order line every group telegram received. only if forwarded: The coupler confirms on the higher-order line only those group telegrams forwarded to the subordinate line.	

Physical addresses	always **only if forwarded** always reject (NACK) !
It is possible to define when the device confirms the physically addressed telegrams received on the higher-order main line / backbone bus. always: The coupler always confirms on the higher-order line every physically addressed telegram received. only if forwarded: The coupler confirms on the higher-order side only the physically addressed telegrams forwarded to the subordinate side. always reject (NACK)!: The coupler rejects on the higher-order side all physically addressed telegrams received and sends a NACK-Confirm. No physically addressed telegram can pass the coupler. The coupler cannot be physically addressed from the higher-order side (no download possible). Note: This setting cannot be parameterised on both sides at the same time.	

on the subordinate side

Group telegrams	always **only if forwarded**
It is possible to define when the device confirms the group telegrams received on the subordinate line. always: The coupler always confirms on the subordinate line every group telegram received. only if forwarded: The coupler confirms on the subordinate line only the group telegrams forwarded to the higher-order line.	

Physical addresses	always **only if forwarded** always reject (NACK) !
It is possible to define when the device confirms the physically addressed telegrams received on the subordinate line. always: The coupler always confirms on the subordinate line every physically addressed telegram received. only if forwarded: The coupler confirms on the subordinate line only the physically addressed telegrams forwarded to the higher-order line. always reject (NACK)!: The coupler rejects on the subordinate line all physically addressed telegrams received and sends a NACK-Confirm. No physically addressed telegram can pass the coupler. The coupler cannot be physically addressed from the subordinate line (no download possible). Note: This setting cannot be parameterised on both sides at the same time.	

13 Repetitions in case of errors

KNX devices can repeat telegrams for which they have not received a positive confirmation of receipt. This repetition can improve functional security in the event of short-term faults by a KNX installation. In the event of ongoing faults, the repetitions can result in a significantly larger bus load. As a result, further faults may occur. With an optimally configured KNX installation, the overall bus load can be significantly reduced through the filter function of the coupler. Unfavourable coupler settings, however, can also lead to an undesirable increase in the bus load. The settings for the repetition of telegrams must be taken into account here.

The functions for the repetition of telegrams can be set separately for both communication directions "to the higher-order side" and "to the subordinate side".

Group addresses

For telegrams with group addresses, the coupler does not distinguish between the main groups 0 ... 13 and 14 ... 31.

- Do not repeat
  With this setting, the coupler does not check whether it has received a positive confirmation of receipt for telegrams with group addresses.

  This setting is useful, for example, during the commissioning of a KNX installation if not all devices have been fully commissioned or if the couplers are to temporarily forward all telegrams with group addresses.
- Repeat
  With this setting, the coupler checks whether it has received a positive confirmation of receipt for telegrams with group addresses. If it does not receive a confirmation, or if it receives a negative confirmation (Busy or NACK), it repeats the telegram. The maximum number of repetitions can be jointly set for all telegram types.

  This setting is typically useful since it only improves functional security in the event of short-term faults.

Physical addresses

Telegrams with physical addresses are used for commissioning and for diagnostics.

- Do not repeat
  With this setting, the coupler does not check whether it has received a positive confirmation of receipt for telegrams with physical addresses.

  This setting is, for example, useful during the commissioning of a KNX installation if a data interface is repeatedly connected to different bus lines for testing purposes.
- Repeat
  With this setting, the coupler checks whether it has received a positive confirmation of receipt for telegrams with physical addresses. If it does not receive a confirmation, or if it receives a negative confirmation (Busy or NACK), it repeats the telegram. The maximum number of repetitions can be jointly set for all telegram types.

This setting is typically useful since only the required telegrams are forwarded and the overall bus load is noticeably reduced.

Broadcast

Telegrams with broadcast addresses (0/0 or 0/0/0) are used for commissioning and for diagnostics in order to check the physical address of another device or to program it.

– Do not repeat
With this setting, the coupler does not check whether it has received a positive confirmation of receipt for broadcast telegrams.

This setting is, for example, useful during the commissioning of a KNX installation if a data interface is repeatedly connected to different bus lines for testing purposes.

– Repeat
With this setting, the coupler checks whether it has received a positive confirmation of receipt for broadcast telegrams. If it does not receive a confirmation, or if it receives a negative confirmation (Busy or NACK), it repeats the telegram. The maximum number of repetitions can be jointly set for all telegram types.

This setting is typically useful since only the required telegrams are forwarded and the overall bus load is noticeably reduced.

Number of repetitions

As soon as the "Repeat" setting is selected for at least one of the parameters described above, the ETS displays the parameter "Number of repetitions".

– The "1" setting offers a compromise between functional security in the event of short-term faults and bus load with deactivated filter functions for the coupler.
– The "3" setting offers the best possible functional security with activated filter functions for the coupler. With deactivated filter functions, the bus load can become disruptive due to the telegram repetitions.

13.1 Parameters for repetitions in case of errors

General -> Repetitions in case of errors

These parameters are available for both the "Backbone line segment coupler 90232x" application program and the "Backbone line coupler / amplifier 90242x" application program.

to the higher-order side

Group addresses	Do not repeat **Repeat**
A group telegram forwarded by the coupler is checked for transmission errors. This parameter determines whether the telegram is to be repeated on reception of a BUSY or a NACK confirm signal or in the absence of the ACK confirm signal on the higher-order side.	

Physical addresses	Do not repeat **Repeat**[*]
A telegram with physical addressing forwarded by the coupler is checked for transmission errors. This parameter determines whether the telegram is to be repeated on reception of a BUSY or a NACK confirm signal or in the absence of the ACK confirm signal on the higher-order side. [*] To prevent a disruptive bus load due to repeated telegrams, this parameter must be preset to "Do not repeat" when using the device as a line amplifier.	

Broadcast	Do not repeat **Repeat**
A broadcast telegram forwarded by the coupler is checked for transmission errors. This parameter determines whether the telegram is to be repeated on reception of a BUSY or a NACK confirm signal or in the absence of the ACK confirm signal on the higher-order side.	

on the subordinate side

Group addresses	Do not repeat **Repeat**
A group telegram forwarded by the coupler is checked for transmission errors. This parameter determines whether the telegram is to be repeated on reception of a BUSY or a NACK confirm signal or in the absence of the ACK confirm signal on the subordinate side.	

Physical addresses	Do not repeat **Repeat***
A telegram with physical addressing forwarded by the coupler is checked for transmission errors. This parameter determines whether the telegram is to be repeated on reception of a BUSY or a NACK confirm signal or in the absence of the ACK confirm signal on the subordinate side. * To prevent a disruptive bus load due to repeated telegrams, this parameter must be preset to "Do not repeat" when using the device as a line amplifier.	

Broadcast	Do not repeat **Repeat**
A broadcast telegram forwarded by the coupler is checked for transmission errors. This parameter determines whether the telegram is to be repeated on reception of a BUSY or a NACK confirm signal or in the absence of the ACK confirm signal on the subordinate side.	

on both sides

Number of repetitions	1 **3**
If at least one of the preceding parameters is set to "Repeat", this parameter is visible. This parameter defines the maximum number of times an incorrectly acknowledged telegram is to be repeated. Particularly when setting the "Operating mode" parameter to "Amplifier", the bus load due to repeated telegrams must be taken into consideration.	

14 As-delivered state

In the as-delivered state for the coupler, no telegrams are forwarded to the KNX.

The device can be programmed and put into operation via the ETS. The physical address is preset to 15.15.0.

Safe commissioning is possible with the device certificate.

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