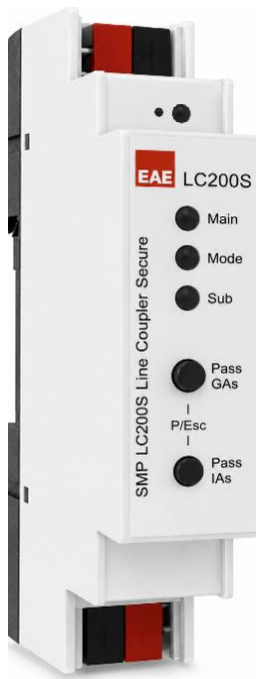


General Description



Application

The LC200S Line Coupler Secure is a KNX line coupler in a compact design. It connects two KNX bus segments (for example, a KNX line with a KNX area).

The device has an extended filter table for main group 0...31 and ensures a galvanic isolation between the lines.

The coupler supports KNX Data Security and KNX Long Frames. It is compatible with the ETS® software ETS 5 or higher. The functionality of Security Proxy and Segment Coupler is only supported with the ETS 6 database.

The buttons on the front panel allow disabling the telegram filter for testing purposes. The LEDs indicate operating conditions as well as communication errors on the KNX bus.

KNX Security

The KNX standard was extended by KNX Security to protect KNX installations from unauthorized access. KNX Security reliably prevents the monitoring of communication as well as the manipulation of the system.

The specification for KNX Security distinguishes between KNX IP Security and KNX Data Security. KNX IP Security protects the communication over IP while on KNX TP the communication remains unencrypted. Thus KNX IP Security can also be used in existing KNX systems and with non-secure KNX TP devices.

KNX Data Security describes the encryption on telegram level. This means that the telegrams on the twisted pair bus or via RF (radio frequency) are also encrypted.



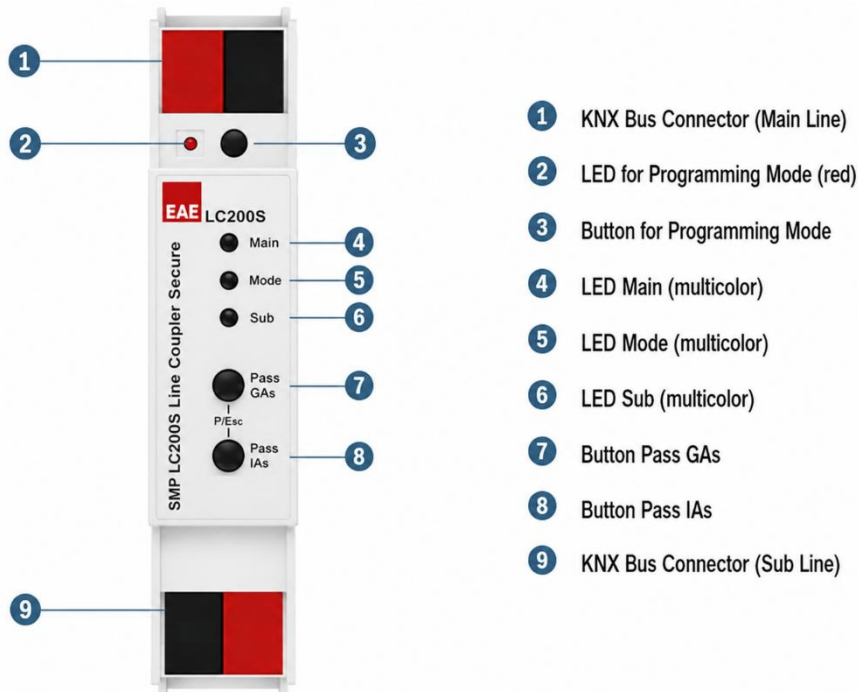
Encrypted telegrams are longer than the previously used unencrypted ones. For secure programming via the bus, it is therefore necessary that the interface used (e.g. USB) and any intermediate line couplers support the so called KNX long frames.

Security Proxy

A Security Proxy translates secure group communication from one side (e.g. secured KNX TP line) into unsecured group communication on the other side (e.g. unsecured KNX TP area) and vice versa.

Installation and Connection

The LC200S is designed for installation on a DIN rail with a width of 1 unit (18mm). It features the following controls and displays:



The KNX LC200S Line Coupler Secure is powered by the KNX bus. An external power supply is not necessary.

 The device is not working without KNX bus power.

KNX Programming Mode

The KNX programming mode is activated/deactivated either by pressing the flushed KNX programming button **3** or by simultaneously pressing the buttons **7** and **8**.

When the programming mode is active, the programming LED **2** and the LED Mode **5** light up red.

The operation/visualization of the programming mode on the front can be activated/deactivated in the ETS® on page general settings.

Manual Operation and Status Display

The LED Main **4** lights up green if the device is successfully powered by the KNX bus. The LED indicates telegrams on the KNX bus by flickering.

Communication failures (e.g. repetitions of telegram or telegram fragments) are indicated by a short change of the LED color to red.

Overview of the different indications of the LED Main ④:

LED Status	Meaning
LED lights green	KNX bus power active (main line)
LED flashes green	Telegram traffic on the KNX bus (main line)
LED briefly red	Communication failures on the KNX bus (main line)

The LED Sub ⑥ lights up green when the device is ready for operation (supplied by the main line) and the KNX bus voltage is present on the sub line. If the LED is flickering, telegram traffic takes place on the sub line.

Errors in the communication (such as telegram repeats or telegram fragments) are indicated by a short-time color change to red.

Overview of the different indications of the LED Sub ⑥:

LED Status	Meaning
LED lights green	KNX bus power active (sub line)
LED flashes green	Telegram traffic on the KNX bus (sub line)
LED briefly red	Communication failures on the KNX bus (sub line)

For testing purposes (for example, during commissioning) the configured routing settings (filter or block) can be bypassed via manual operation.

With the button Pass GAs ⑦ the forwarding of group addressed telegrams can be activated.

With the button Pass IAs ⑧ the forwarding of individually addressed telegrams can be activated.

This is visualized with a single flash of the LED Mode ⑤ (orange). If both modes are activated the LED Mode ⑤ flashes two times.

Pressing button Pass GAs ⑦ or button Pass IAs ⑧ again these settings can be selected and deselected on demand. Via the Escape function (Esc) the manual operation can be stopped by simultaneously pressing the button Pass GAs ⑦ and button Pass IAs ⑧.

If neither programming mode nor manual mode are active the LED Mode ⑤ can visualize configuration errors (for details see table below).

Overview of the different indications of the LED Mode ⑤:

LED Status	Meaning
LED lights green	Device is working in standard operation mode.
LED lights red	Programming mode is active
LED flashes 1x orange	Programming mode is not active. Manual operation is active: Forwarding IA or GA.
LED flashes 2x orange	Programming mode is not active. Manual operation is active: Forwarding IA and GA.
LED flashes red	Programming mode is not active. Manual operation is not active. The device is not loaded correctly, e.g. after aborting a download.
LED flashes green	The device is currently loaded by the ETS.

Factory Default Settings

Factory default configuration:

In the factory default settings, the device has the physical address 15.15.0. Also, KNX Data Security is disabled and the initial key (FDSK) must be used for secure commissioning.

Routing (Sub -> Main)

Group telegrams: Lock

Individual addressed telegrams: Filter

Routing (Main -> Sub)

Group telegrams: Lock

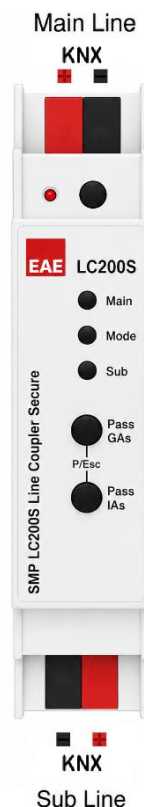
Individual addressed telegrams: Filter

Reset to factory device settings (Master-Reset)

It is possible to reset the device to its factory settings:

- Separate the KNX Bus connector (main line) ① from device.
- Press the KNX programming button ③ and keep it pressed down.
- Reconnect the KNX Bus connector (main line) ① to the device.
- Keep the KNX programming button ③ pressed for at least another 6 seconds.
- A short flashing of all LEDs (② ④ ⑤ ⑥) visualizes the successful reset of the device to factory default settings.

Wiring Scheme :



Function as Line or Area Coupler

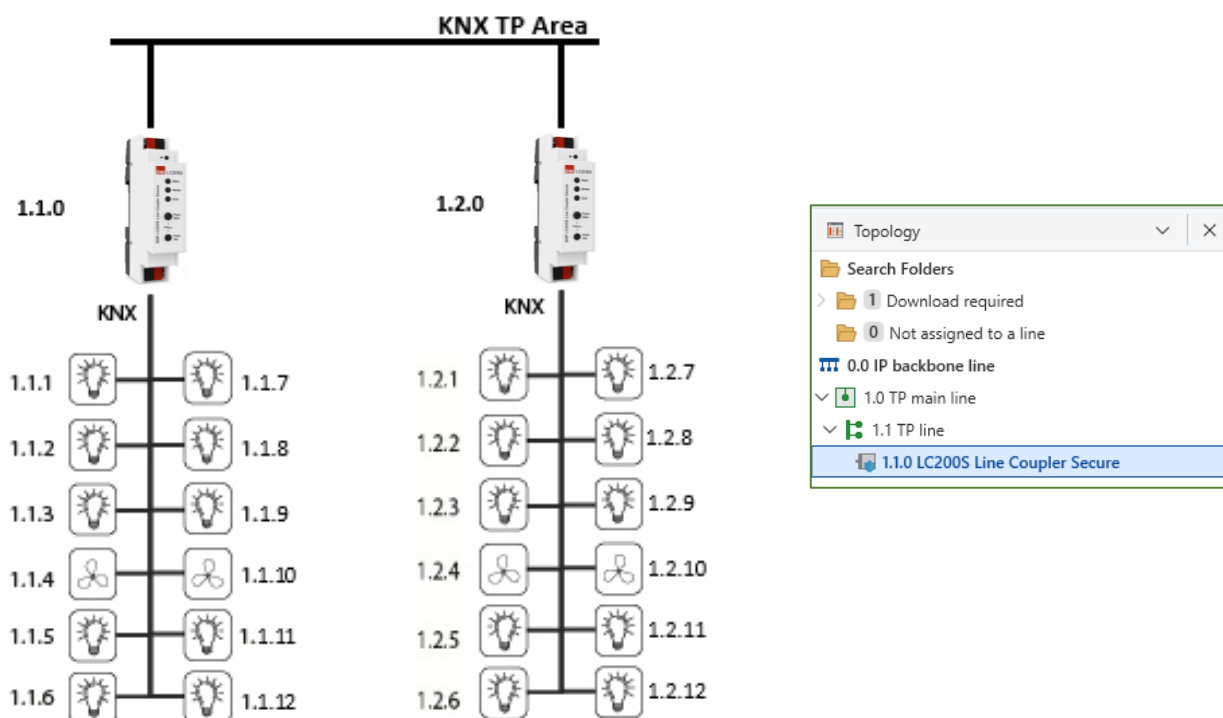
The KNX LC200S Line Coupler Secure can work as line or area coupler.

The following table shows the possible applications of the LC200S compared to IP based topology:

	Classic topology (without IP)	IP coupling of the areas (IP area coupler)	IP coupling of the lines (IP line coupler)
Backbone	TP	IP	IP
Coupling	KNX TP line coupler (max. 15 couplers)	KNX IP router (max. 15 routers)	Directly via LAN with switch
Area	TP	TP	IP
Coupling	KNX TP line coupler (max. 15x15 couplers)	KNX TP line coupler (max. 15x15 couplers)	KNX IP router (max. 225 routers)
Line	TP	TP	TP

The KNX LC200S Line Coupler Secure has a filter table and therefore helps to reduce the bus load. The filter table supports the extended group address range (main groups 0 ... 31) and is automatically generated by the ETS.

Line Coupler

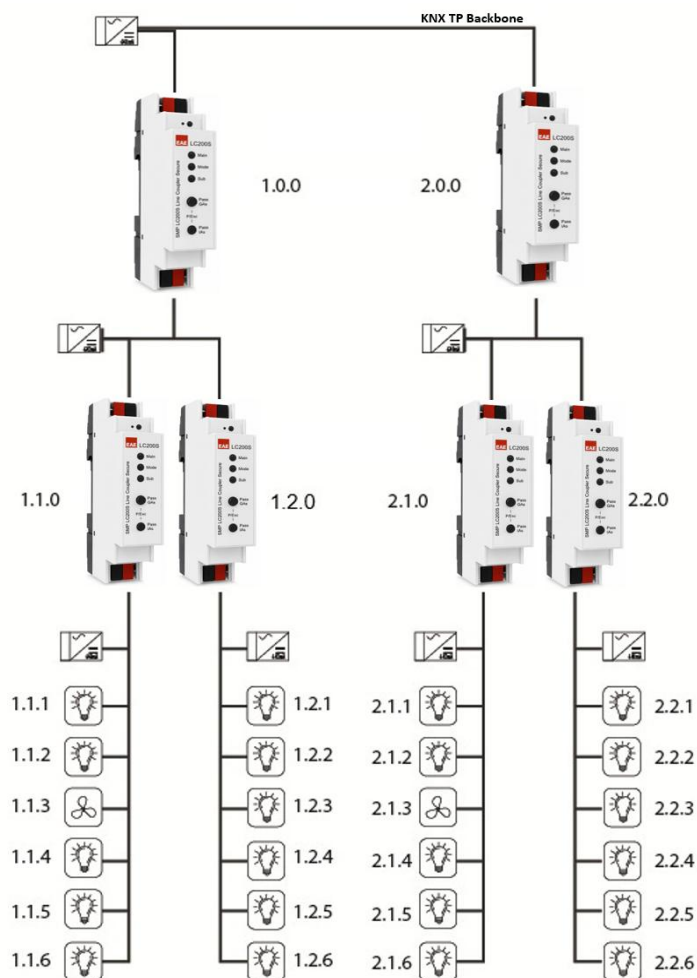


The individual address of the KNX LC200S Line Coupler Secure corresponds to the form x.y.0 (x, y: 1 ... 15). Thus the device functions as line coupler.

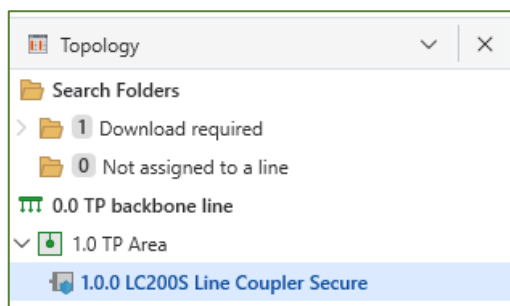


The device functions as line coupler only if its individual address has the form x.y.0.

Area Coupler

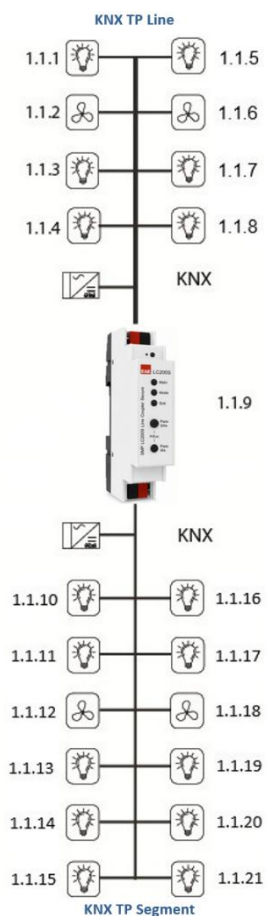


The individual address of the KNX LC200S Line Coupler Secure corresponds to the form x.0.0 (x: 1 ... 15). Thus the device functions as area coupler.

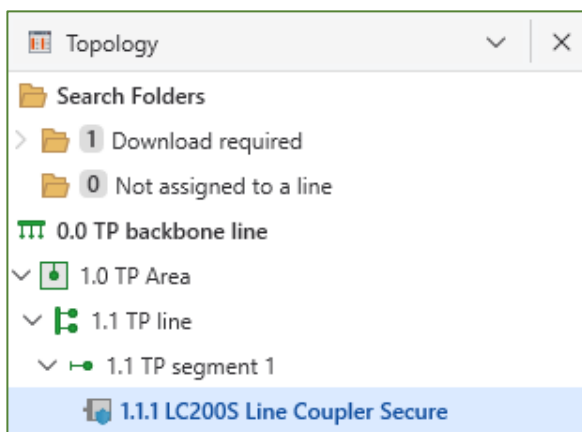


The device functions as area coupler only if its individual address has the form x.0.0.

Function as Segment Coupler



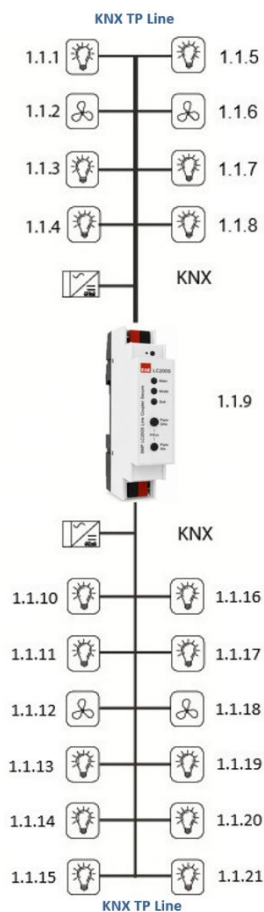
The individual address of the KNX LC200S Line Coupler Secure corresponds to the form x.y.z (x, y: 1 ... 15, z: 1 ... 255). Thus the device functions as segment coupler.



i The device functions as segment coupler only if its individual address has the form x.y.z.

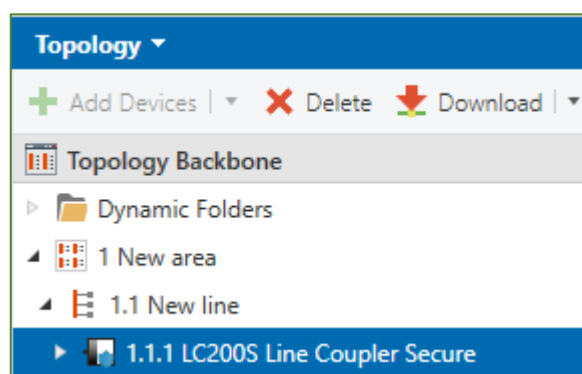
i If the segment is extended with a new device, the segment coupler must be downloaded again before a download can be performed on the new device.

Function as Repeater (only with ETS5)



The individual address of the KNX LC200S Line Coupler Secure corresponds to the form x.y.z (x, y: 1 ... 15, z: 1 ... 255). Thus the device functions as repeater.

i The filter settings in the parameter dialog of the ETS are ineffective in repeater mode.



i The device functions as repeater coupler only if its individual address has the form x.y.z.

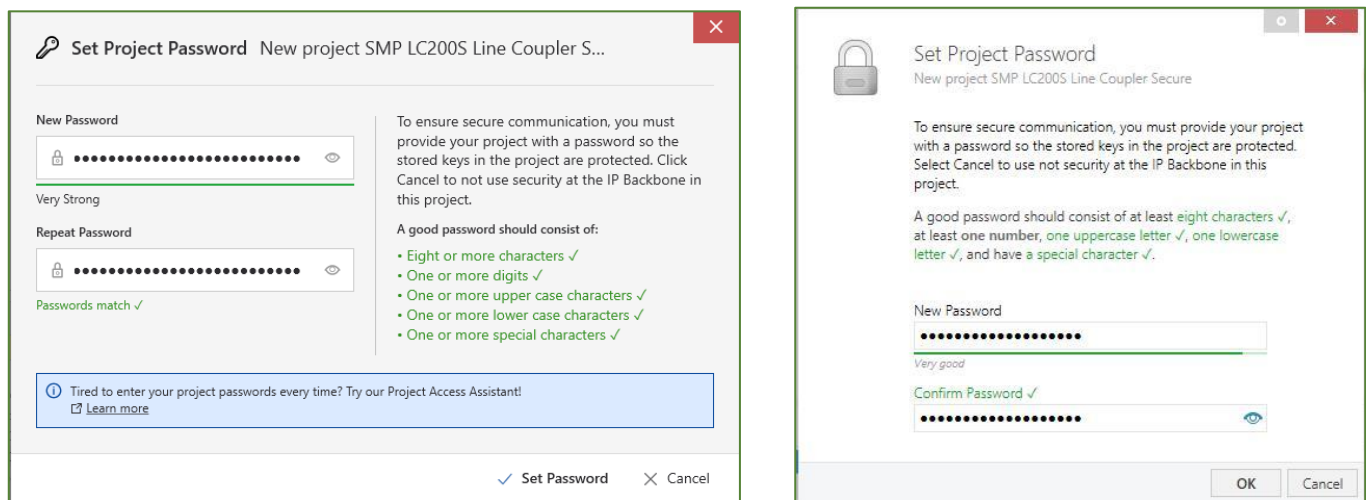
ETS Database

The ETS database (ETS 5.7 or higher) can be downloaded from the product website of the LC200S Line Coupler Secure (www.eaetechnology.com) or via the KNX online catalogue.

- The **ETS 5** database supports only KNX Data Security. The functionality of Security Proxy and Segment Coupler is not supported.
- The **ETS 6** database supports KNX Data Security as well as the functionality of Security Proxy and Segment Coupler.

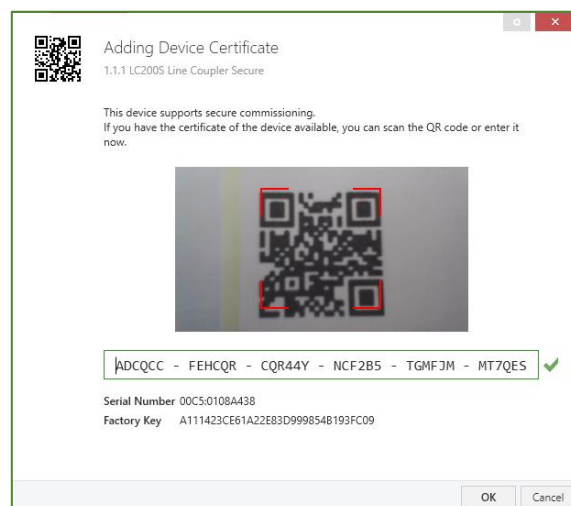
The KNX LC200S Line Coupler Secure supports KNX Data Security to protect the device against unauthorized access from the KNX bus. If the device is programmed via the KNX bus, this is done with encrypted telegrams.

If the first product is inserted into a project with KNX Security, the ETS prompts you to enter a project password.



This password protects the ETS project from unauthorized access. This password is not a key that is used for KNX communication. The entry of the password can be bypassed with "Cancel", but this is not recommended for security reasons.

ETS requires a device certificate for each device with KNX Security that is created in the ETS. This certificate contains the serial number of the device as well as an intangible key (FDSK = Factory Default Setup Key).



The certificate is printed as text on the device. It can also be conveniently scanned from the printed QR code via a webcam.

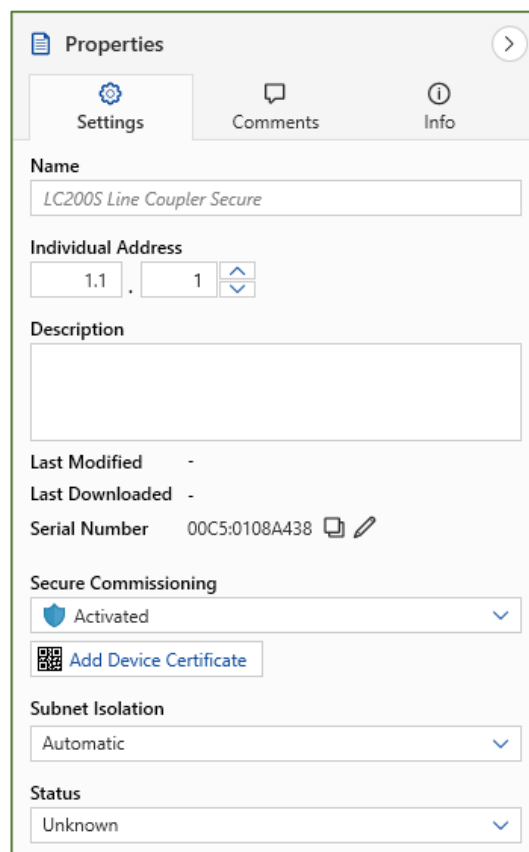
The list of all device certificates can be managed in the ETS Project - Panels - Project Security window.

This initial key is required to safely put a device into operation from the start. Even if the ETS download is recorded by a third party, the third party has no access to the secured devices afterwards. During the first secure download, the initial key is replaced by the ETS with a new key that is generated individually for each device.

This prevents persons or devices who may know the initial key from accessing the device. The initial key is only reactivated after a master reset.

The serial number in the certificate enables the ETS to assign the correct key to a device during a download.

In the ETS project in the properties of the device, secure commissioning can be activated and the device certificate can be added:



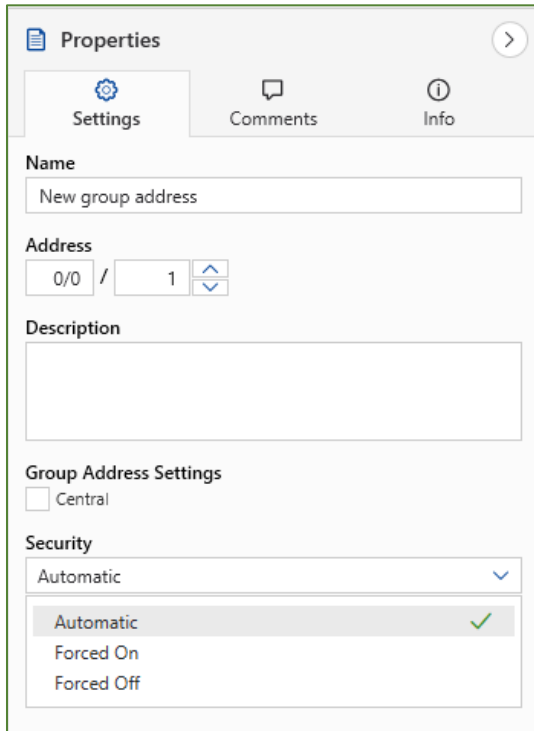
The screenshot shows the 'Properties' window for the 'LC200S Line Coupler Secure' device. The window has three tabs: 'Settings' (selected), 'Comments', and 'Info'. The 'Settings' tab contains the following fields and controls:

- Name:** A text field containing 'LC200S Line Coupler Secure'.
- Individual Address:** Two numeric fields separated by a dot, with values '1.1' and '1'.
- Description:** A large empty text area.
- Last Modified:** A field with a hyphen '-'.
- Last Downloaded:** A field with a hyphen '-'.
- Serial Number:** A field containing '00C5:0108A438' with a QR code icon and an edit icon.
- Secure Commissioning:** A dropdown menu showing 'Activated' with a shield icon.
- Add Device Certificate:** A button with a QR code icon.
- Subnet Isolation:** A dropdown menu showing 'Automatic'.
- Status:** A dropdown menu showing 'Unknown'.

Secure Group Communication

Each object of the device can communicate either encrypted or unencrypted. The encryption is set under "Security" in the properties of the used group address:

-  The setting "Automatic" activates encryption if both objects to be connected can communicate encrypted. Otherwise encrypted communication between the objects is not possible.



Group Addresses 4		
	Se	Address ^ Name
		0/0/1 New group address - (Automatic)
		0/0/2 New group address - (Automatic)
		0/0/3 New group address - (Forced On)
		0/0/4 New group address - (Forced Off)

-  In the overview of communication objects in the ETS project, secured objects can be recognized by a blue shield symbol.

A separate key is automatically generated by the ETS for each secured group address. These keys can also be checked in the ETS panel Reports – Project Security.

To enable all devices to communicate with a secure group address, the keys must be known to all. Therefore a download must be made into all devices that use this group address when a key is created or changed. A key is changed by the ETS e.g. when the encryption of a group address is switched off and on again.

-  Telegrams from the bus that do not address the LC200S Line Coupler Secure as a device are forwarded or blocked according to the filter settings (parameters and filter table). It does not matter whether the telegrams are unencrypted or encrypted. The forwarding is done exclusively on the basis of the destination address. The security properties are checked by the respective recipient.

Description

This page shows the device description and the corresponding connection diagram.

Group Objects 0

Parameters

1.1.1 LC200S Line Coupler Secure > Description

Description

General settings

Routing (Sub -> Main)

Routing (Main -> Sub)

LC200S Line Coupler Secure

Compact KNX line coupler with support of

KNX Data Security, Security Proxy

and Segment Coupler



The LC200S Line Coupler Secure is a KNX line coupler in a compact design. It connects two KNX bus segments (for example, a KNX line with a KNX area).

The device has an extended filter table for main group 0...31 and ensures a galvanic isolation between the lines. The coupler supports KNX Data Security and KNX Long Frames.

It is compatible with the ETS® software ETS 5 or higher. The functionality of Security Proxy and Segment Coupler is only supported with the ETS 6 database.

The buttons on the front panel allow disabling the telegram filter for testing purposes. The LEDs indicate operating conditions as well as communication errors on the KNX bus.

The power is supplied via the KNX bus (main line).

Wiring scheme:



Please consult device data sheet or manual for further information.

Contact:

EAE Technology

Eski Turgut Özal cad. No: 20

Bağakşehir – İstanbul

Turkey

www.eaetechnology.com

export.eaetechnology@eaegroup.com

ETS Parameters

General Settings

Group Objects 0 Parameters	
1.1.1 LC200S Line Coupler Secure > General settings	
Description	Device name LC200S Line Coupler Secure
General settings	Prog. mode on device front ☐ Disabled ☒ Enabled
Routing (Sub -> Main)	Manual operation on device Enabled with time limit 1 min
Routing (Main -> Sub)	

 The device's name can not exceed 30 characters.

Programming Mode on Device Front

In addition to the normal programming button  the device allows activating the programming mode on the device front without opening the switchboard cover.

The programming mode can be activated and deactivated via pressing simultaneously both buttons  and .

This feature can be enabled and disabled via the parameter "Prog. mode on device front". The recessed programming button  (next to the Programming LED ) is always enabled and not influenced by this parameter.

Manual Operation On Device

This parameter is used to configure manual operation on the device. The manual operation mode can be blocked or activated (with or without time limit).

The time limit defines the duration until the automatic return from manual operation back to the normal operating mode.

The following configuration options are available:

- Disabled
- Enabled with time limit 1 min
- Enabled with time limit 10 min
- Enabled with time limit 30 min
- Enabled without time limit

 The activated manual operation can reduce the security of the installation.

Routing (Sub -> Main)

1.1.1 LC200S Line Coupler Secure > Routing (Sub -> Main)		
Description	Group telegrams (main groups 0 to 13)	Filter
General settings	Group telegrams (main groups 14 to 31)	Filter
Routing (Sub -> Main)	Individual addressed telegrams	Filter
Routing (Main -> Sub)	Broadcast telegrams	☐ Block ☒ Route
	Repetition of group telegrams	☐ Disabled ☒ Enabled
	Repetition of individual addressed telegrams	☐ Disabled ☒ Enabled
	Repetition of broadcast telegrams	☐ Disabled ☒ Enabled
	Acknowledge (ACK) of group telegrams	☐ Always ☒ Only if routed
	Acknowledge (ACK) of individual addressed telegrams	Only if routed

Group Telegrams (0-13, 14-31)

- **Block** → No group telegrams of this main group are routed to the main line.
- **Route** → All group telegrams of this main group are routed to the main line independent of the filter table.
- **Filter** → The filter table is used to check whether or not the received group telegram should be routed to the main line.



The setting "Route" should only be used for test purposes.

Individually Addressed Telegrams

- **Block** → No individually addressed telegrams are routed to the main line.
- **Route** → All individually addressed telegrams are routed to the main line.
- **Filter** → The individual address is used to check whether the received individually addressed telegram should be routed to the main line.



The setting "Route" should only be used for test purposes.

Broadcast Telegrams

- **Block** → No received broadcast telegrams are routed to the main line.
- **Route** → All received broadcast telegrams are routed to the main line.

Repetition of Group Telegrams

- **Disabled** → The received group telegram is not resent to the main line in case of a fault.
- **Enabled** → The received group telegram is resent up to three times in case of a fault.



If repetitions are enabled, it is possible that the device suppresses the repetitions dynamically in order to limit a high bus load.

Repetition of Individually Addressed Telegrams

- **Disabled** → The received individually addressed telegram is not resent to the main line in case of a fault.
- **Enabled** → The received individually addressed telegram is resent up to three times in case of a fault.

 If repetitions are enabled, it is possible that the device suppresses the repetitions dynamically in order to limit a high bus load.

Repetition of Broadcast Telegrams

- **Disabled** → The received broadcast telegram is not resent to the main line in case of a fault.
- **Enabled** → The received broadcast telegram is resent up to three times in case of a fault.

 If repetitions are enabled, it is possible that the device suppresses the repetitions dynamically in order to limit a high bus load.

Acknowledge (ACK) of Group Telegrams

- **Always** → A acknowledge is generated for every received group telegram (from the sub line).
- **Only If Routed** → A acknowledge is only generated for received group telegrams (from the sub line) if they are routed to the main line.

Acknowledge (ACK) of Individually Addressed Telegrams

- **Always** → A acknowledge is generated for every received individual addressed telegram (from the sub line).
- **Only If Routed** → A acknowledge is only generated for received individually addressed group telegrams (from the sub line) if they are routed to the main line.
- **Answer With NACK** → Every received individually addressed telegram (from the sub line) 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.

 When using “Answer with NACK” an access to the device via the KNX sub line is no longer possible. The configuration must be performed via the main line.

Routing (Main -> Sub)

The screenshot shows the configuration interface for the '1.1.1 LC200S Line Coupler Secure'. The 'Parameters' tab is selected. The 'Routing (Main -> Sub)' section is active, showing various settings for routing telegrams from the main line to the sub line.

Setting	Value
Description	Group telegrams (main groups 0 to 13)
General settings	Group telegrams (main groups 14 to 31)
Routing (Sub -> Main)	Individual addressed telegrams
Routing (Main -> Sub)	Broadcast telegrams
	Repetition of group telegrams
	Repetition of individual addressed telegrams
	Repetition of broadcast telegrams
	Acknowledge (ACK) of group telegrams
	Acknowledge (ACK) of individual addressed telegrams

Filter settings for each telegram type are set to 'Filter'. Broadcast telegrams are set to 'Route'. Repetition of group, individual addressed, and broadcast telegrams are set to 'Enabled'. Acknowledge (ACK) of group telegrams is set to 'Only if routed', and Acknowledge (ACK) of individual addressed telegrams is set to 'Only if routed'.

Group Telegrams (0-13, 14-31)

- **Block** → No group telegrams of this main group are routed to the sub line.
- **Route** → All group telegrams of this main group are routed to the sub line independent of the filter table.
- **Filter** → The filter table is used to check whether or not the received group telegram should be routed to the sub line.

 The setting "Route" should only be used for test purposes.

Individually Addressed Telegrams

- **Block** → No individually addressed telegrams are routed to the sub line.
- **Route** → All individually addressed telegrams are routed to the sub line.
- **Filter** → The individual address is used to check whether the received individually addressed telegram should be routed to the sub line.

 The setting "Route" should only be used for test purposes.

Broadcast Telegrams

- **Block** → No received broadcast telegrams are routed to the sub line.
- **Route** → All received broadcast telegrams are routed to the sub line.

Repetition of Group Telegrams

- **Disabled** → The received group telegram is not resent to the sub line in case of a fault.
- **Enabled** → The received group telegram is resent up to three times in case of a fault.

 If repetitions are enabled, it is possible that the device suppresses the repetitions dynamically in order to limit a high bus load.

Repetition of Individually Addressed Telegrams

- **Disabled** → The received individually addressed telegram is not resent to the sub line in case of a fault.
- **Enabled** → The received individually addressed telegram is resent up to three times in case of a fault.

 If repetitions are enabled, it is possible that the device suppresses the repetitions dynamically in order to limit a high bus load.

Repetition of Broadcast Telegrams

- **Disabled** → The received broadcast telegram is not resent to the sub line in case of a fault.
- **Enabled** → The received broadcast telegram is resent up to three times in case of a fault.

 If repetitions are enabled, it is possible that the device suppresses the repetitions dynamically in order to limit a high bus load.

Acknowledge (ACK) of Group Telegrams

- **Always** → A acknowledge is generated for every received group telegram (from the main line).
- **Only If Routed** → A acknowledge is only generated for received group telegrams (from the main line) if they are routed to the sub line.

Acknowledge (ACK) of Individually Addressed Telegrams

- **Always** → A acknowledge is generated for every received individual addressed telegram (from the main line).
- **Only If Routed** → A acknowledge is only generated for received individually addressed group telegrams (from the main line) if they are routed to the sub line.
- **Answer With NACK** → Every received individually addressed telegram (from the main line) 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.

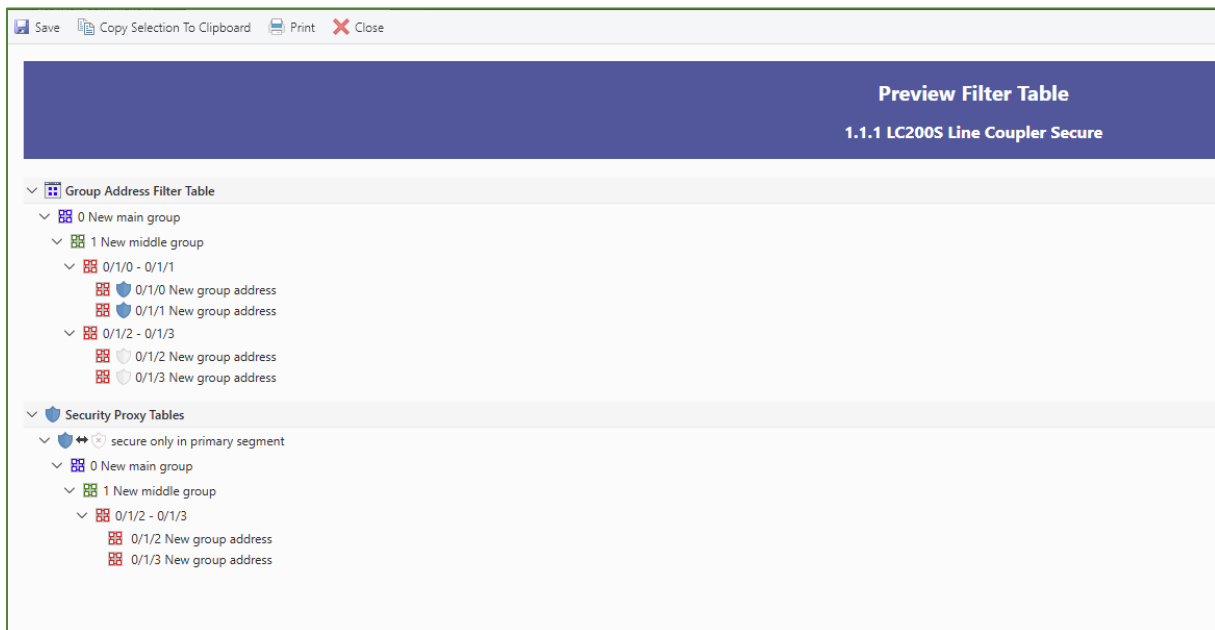
 When using “Answer with NACK” an access to the device via the KNX sub line is no longer possible. The configuration must be performed via the sub line.

Filter Table / Security Proxy Tables

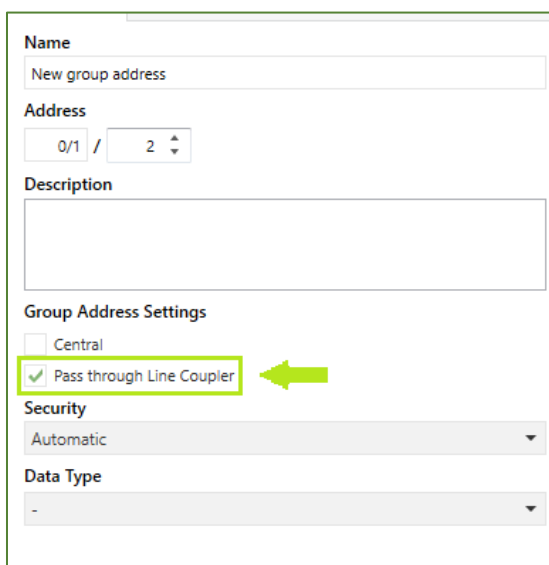
The filter table is created automatically by the ETS.

The group addresses of the telegrams that are to be forwarded via the coupler are included in the filter table for this purpose.

The content of the filter table can be displayed via the preview. Also the security proxy tables are displayed here.



The filter table can be extended by manually adding group addresses. For this purpose, “Pass through Line Coupler” must be activated in the properties window of the corresponding group address.



Commissioning

Determination of the physical address and setting of parameters are actualized with Engineering Tool Software (version 5.7 or higher). “.knxprod” file must be imported to the ETS.

 Installation and commissioning of device may only be implemented by trained electricians. The relevant standards, directives, regulations and instructions must be observed when planning and implementing the electrical installation.

- When connecting the device make sure that the device can be isolated!
- Protect the device against moisture, dirt and damage during transport, storage and operation!
- Do not operate the device out of the specified technical data which is stated.
- The device may only be operated in closed enclosures (Distribution boards)