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1. USE

The KNX TP Line Coupler provides a bi-directional data connection between two KNX TP lines or areas and works as a KNX line/area coupler in the KNX network. KNX TP main line and KNX TP subline are coupled having a galvanic isolation in between. Extended frames and long telegrams with up to 240 bytes APDU length are supported.

Using the TP Coupler application, Line Coupler can be used as KNX TP line coupler to connect different TP lines, but also as a KNX TP area coupler to connect different TP areas or installation systems via a TP Backbone. Telegram filtering is accomplished according to the installation place in the hierarchy (Physical[ly addressed] Telegrams) and according to the built in filter tables for group communication (Group [oriented] Telegrams). For detailed diagnosis, all operational modes/states are shown by a duo-LED display. Programming on main line from the subline can be suppressed. Number of repetitions on both KNX TP lines can be reduced.

Using the TP Repeater application, Line Coupler is able to extend a KNX TP line providing unfiltered data transfer and galvanic isolation between segments. Up to four line segments can form a single KNX TP line by connecting three Line Coupler line repeaters. Each line segment requires its own KNX power supply unit.

To ease commissioning and troubleshooting, special routing/repetition/confirmation ETS settings and a configurable Manual Function for short-time telegram filter switch-off are available. E.g. "transmit all group telegrams" can be activated by a single button press. After the set time period, Line Coupler switches back to normal operation automatically. Another feature to increase the data throughput is the ability to send IACKs on own telegrams.

1.1 Communication Objects

Line Coupler has no KNX communication objects.

1.2 Line Coupler as Programming Interface

Line Coupler can be used together with the ETS as a programming interface. The device provides an additional physical address for this purpose which can be used for a line coupling or repeating.

1.3 Feature Summary

- Line Coupler supports extended frames and long telegrams up to 240 bytes APDU length. (With all MEC couplers and UIM interfaces long messages e.g. for energy metering applications and visualization purposes can be processed.)
- IACK sending on sent out messages is ETS configurable.
- When there is no IACK response on the subline, Line Coupler is able to repeat messages up to three times. Repetitions can be configured for both Physical Telegrams and Group Telegrams via ETS (to ease troubleshooting). E.g. after an IACK response no repetition is following and the negative IACK/BUSY failure mechanism is maintained.
- For an ETS configurable time period, it is possible to switch off telegram filtering by only pressing a button on the device front panel. Without additional ETS download filtering is suspended. This is necessary for running fast diagnostics on site.
- Suspending telegram filtering eases commissioning and debugging. When filtering is suspended, temporary access to other lines becomes possible.
- Automatic function for switching back to run-time telegram filtering after configurable suspension period (see Manual Mode). This avoids forgetting the reactivation of filtering.
- In networks with high busload the internal amount of communication buffers are capable of smoothing peaks in the communication load course.
- Line Coupler's ETS database entries are available for ETS4 and later.

2. TECHNICAL CHARACTERISTICS

2.1 Connections characteristics

- KNX Main Line BUS connection terminal
- KNX Line BUS connection terminal
-

2.2 Consumption

- BUS: DC 21...30V SELV
- Current consumption: < 10 mA
-

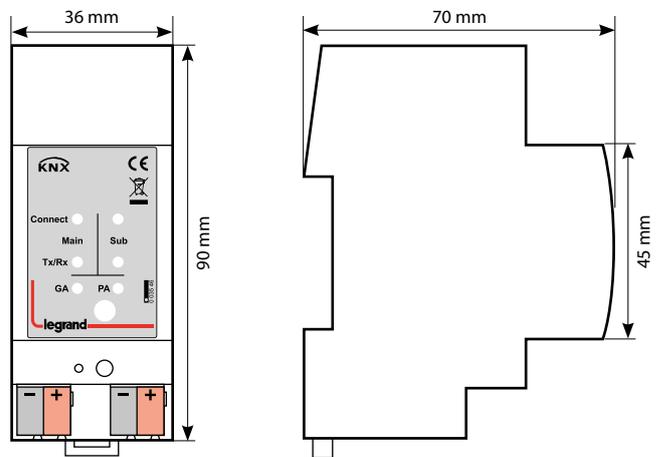
2.3 Mechanical characteristics

- IP 20
- Safety class III
- Number of modules: 2
- Weight: 62 g
-

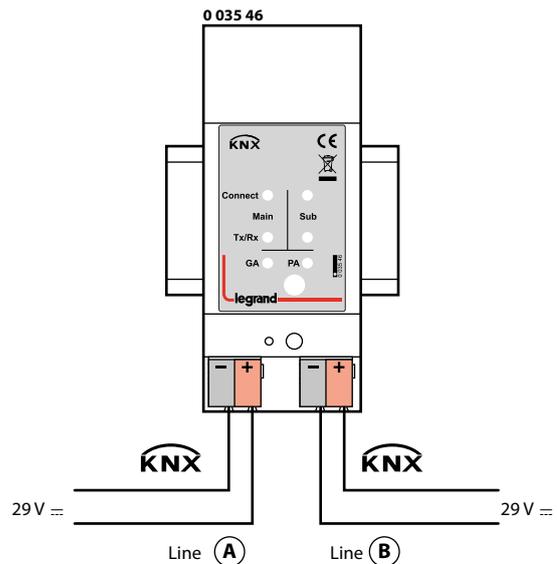
2.4 Climate characteristics

- Operating temperature: -5°C to +45°C
- Storage temperature: -20°C to +60°C

3. DIMENSIONS

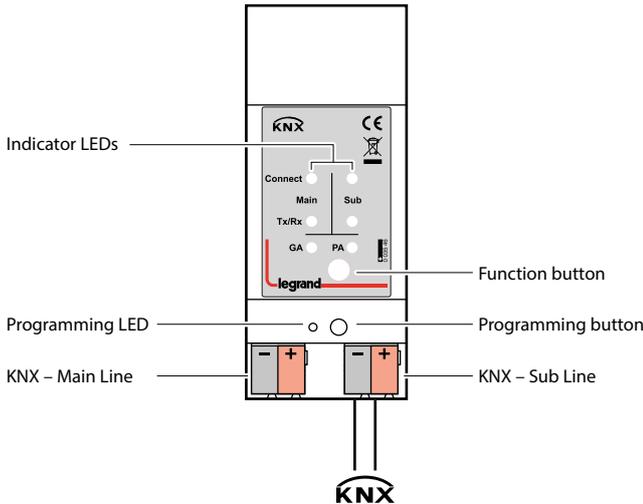


4. CONNECTION



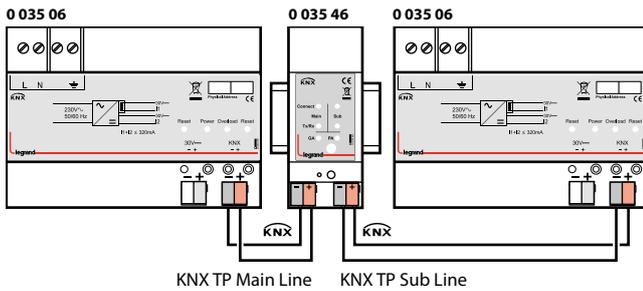
5. OPERATION

5.1 Description of the device



5.2 Commissioning

- Please note for commissioning with default settings:
- All telegrams are blocked because the filter table is not defined
 - The Manual Function switch-off time is 120 min
 - Physical address is 15.15.0



Please read carefully before first use:

- After connection to the KNX bus system, the device works with its default settings
- Warning: Do not connect to 230 V. The device is supplied by the KNX bus and does not require any additional external power supply
- The device may only be installed and put into operation by qualified electrician or authorized personnel
- For planning and construction of electric installations the appropriate specifications, guidelines and regulations in force of the respective country have to be complied
- For mounting use an appropriate equipment according to IEC60715
- Installation on a 35 mm DIN rail (TH35)
- Connect the KNX bus line as for common KNX bus connections with a KNX bus cable, to be stripped and plugged into a KNX TP connector
- Do not damage electrical insulations during connecting
- Installation only in dry locations
- Accessibility of the device for operation and visual inspection must be provided
- For changing the configuration use the ETS
- The housing must not be opened
- Protect the device from moisture, dirt and damage
- The device needs no maintenance
- If necessary, the device can be cleaned with a dry cloth
- In the case of damage (at storage, transport) no repairs may be carried out by unauthorized personnel

5. OPERATION (continued)

5.3 Operation and Display

Indicator	Green	Blinked Green	Orange	Red	Blinked Red	Off
Connect – Main	KNX Main line OK	-	Manual Function Active	-	-	No KNX Main Line connection
Connect – Sub	KNX Sub line OK	-	-	-	-	No KNX Sub Line connection
Tx/Rx – Main	-	Traffic on KNX Main line	-	-	Transmission Error on KNX Main line	No traffic on KNX Main line
Tx/Rx – Sub	-	Traffic on KNX Sub line	-	-	Transmission Error on KNX Sub line	No traffic on KNX Sub line
Group Address	Filter	-	Route all	Block all	-	No route
Physical Address	Filter	-	Router all	Block all	-	No route
Programming LED	-	-	-	Prg. mode	-	Programming mode de-active

5.4 Function Button

5.4.1 Long press (3 sec)

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

Note:

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

5.4.2 Very long press (15s)

- LEDs: LEDs are on red
- Press and release button after 15 sec and press again for 3 sec: resets all the parameter to factory default (incl. physical address).

5.5 Physical Addressing Mode

5.5.1 LED addressing mode

- Off: normal operating mode
 - On: addressing mode
- After receiving the physical address, the Line Coupler automatically returns from addressing mode to the normal operating mode.

5.5.2 Button addressing mode

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

5.6 KNX Topology

Via a line/area coupler up to 15 lines can be connected to a main line called an area. It is possible to have up to 64 bus devices on one line. With use of line repeaters, a line can theoretically be extended to 255 bus devices. This means up to four line segments form a single KNX TP line. But it is common practice on exceeding 64 bus devices to insert a new line instead of extending the originating one.

The free tree structure of the KNX topology prevents problems caused by circling telegrams and heavy bus load. To maintain this condition, interconnection between lines or line segments is strictly forbidden.

5. OPERATION (continued)

5.7 Line Coupler as TP Coupler

When Line Coupler receives telegrams (for example during commissioning) that use Physical Addresses as destination addresses, it compares the Physical Addresses of the receiver with its own physical address and decides on that whether it has to route the telegrams or not.

When Line Coupler receives telegrams that use group addresses as destination addresses, it reacts in accordance with the parameter settings. During normal operation (with Group Telegram routing set to filter), Line Coupler only routes telegrams whose group addresses are entered in its filter table.

If a telegram is routed by Line Coupler without receiving the corresponding acknowledgement, i.e. due to a missing receiver or to a transmission error, the telegram will be repeated up to three times (depending on the ETS setting). With the parameters "Repetitions if errors...", this function can be configured separately for each line and both kinds of telegrams. It is recommended to use the default parameter setting.

If not already configured as "Line Coupler", the ETS application program "TP Coupler" has to be downloaded to the device. Under the Information tab the configuration setting can be changed by the drop-down menu "Change Application Program". After changing the configuration setting the filter table entries can be added manually. Updating the application program version can also be done here.

5.8 Line Coupler as TP Repeater

Any received telegram is routed to all lines irrespective of in which line it is processed. Line repeaters make no use of a filter table. It is therefore not important whether the telegram is generated within a line or whether it is sent from an upper line to a lower line via a coupler.

If a telegram is routed by Line Coupler without receiving the corresponding acknowledgement, i.e. due to a missing receiver or to a transmission error, the telegram will be repeated up to three times (depending on the ETS setting). With the parameters "Repetitions if errors...", this function can be configured separately for each line and both kinds of telegrams. It is recommended to use the default parameter setting.

If not already configured as Line/Area/BB Repeater, the ETS application program "TP repeater" has to be downloaded to the device. Under the Information tab the configuration setting can be changed by the drop-down menu "Change Application Program". After changing the configuration setting the filter table entries can be added manually. Updating the application program version can also be done here.

5.9 Default Factory Settings

Marking/Design	Line Coupler
Physical address	15.15.0
Main Line	
Group telegrams 0-13	Filter (filter table is empty)
Group telegrams 14-31	route all
Physical telegrams	filter
Physical: Repetition if errors on main line	up to 3 repetitions
Group: Repetition if errors on main line	up to 3 repetitions
Telegram confirmations on main line	if routed
Send confirmation on own telegrams	no
Subline	
Group telegrams 0-13	Filter (filter table is empty)
Group telegrams 14-31	route all
Physical telegrams	filter
Physical: Repetition if errors on subline	up to 3 repetitions
Group: Repetition if errors on subline	up to 3 repetitions
Telegram confirmations on subline	if routed
Send confirmation on own telegrams	no
Configuration from subline	allow

6. STANDARDS

- Type of protection: EN 60 529
- Safety class III: IEC 61 140
- Overvoltage class III: IEC 60664
- Degree of Pollution: IEC 60664
- Installation: EN 60 715 TH 35-75
- CE: in accordance with the EMC guideline and low voltage directives

7. COMMUNICATION OBJECTS

7.1 ETS Parameters

7.1.1 General

ETS-Text	Range [Default value]	Comment
Manual Function	disabled pass all telegrams pass all Physical telegrams pass all Group telegrams [pass all telegrams]	Configuration setting for telegram routing when the Manual Function is active.
Switch-off time for Manual Function	10 min, 1 hour, 4 hours, 8 hours [1 hour]	After expiry of this time period the Manual Function is switched off automatically.

Table 1: Parameter General

7.1.2 Main Line

For Group Telegrams and Physical Telegrams the setting "transmit all" is intended only for testing purposes. Please do not use for normal operation.

Note:

If the parameter "Send confirmation on own telegrams" is set to "yes", the Line Coupler systematically sends an ACK on any own routed telegram. Since the repeater does not use a filter table, it is useful to have an ACK sent along with routed telegrams.

ETS-Text	Range [Default value]	Comment
Telegram routing	Group and Physical: route configure [Group and Physical: route]	route: all telegrams are routed configure: the following parameters must be set manually.
Physical telegrams	transmit all block [transmit all]	Physical telegrams are all routed. Physical telegrams are all blocked.
Physical telegrams: Repetition if errors on main line	no up to 3 repetitions only one repetition [only one repetition]	After main line transmission error (e.g. due to missing receiver) Physical telegrams • are not repeated. • are repeated max. 3 times. • are repeated once.
Group telegrams: Repetition if errors on main line	no up to 3 repetitions only one repetition [only one repetition]	After main line transmission error (e.g. due to missing receiver) Group telegrams • are not repeated. • are repeated max. 3 times. • are repeated once.
Telegram confirmation on main line	If routed always [always]	• Routed telegrams to the subline are confirmed by an ACK on the main line. • Each telegram on the mainline is confirmed by an ACK.
Send confirmation on own telegrams	yes no [yes]	• Telegrams sent out to the mainline are confirmed by added ACK. • No ACK confirmation.

Table 2: Main Line Tab Parameter Settings

7. COMMUNICATION OBJECTS (continued)

7.1.3 Subline

For Group Telegrams and Physical Telegrams the setting "transmit all" is intended only for testing purposes. Please do not use for normal operation.

ETS-Text	Range [Default value]	Comment
Telegram routing	Group and Physical: route configure [Group and Physical: route]	route: all telegrams are routed configure: the following parameters must be set manually.
Physical telegrams	transmit all block [transmit all]	Physical telegrams are all routed. Physical telegrams are all blocked.
Physical telegrams: Repetition if errors on main line	no up to 3 repetitions only one repetition [only one repetition]	After main line transmission error (e.g. due to missing receiver) Physical telegrams • are not repeated. • are repeated max. 3 times. • are repeated once.
Group telegrams: Repetition if errors on main line	no up to 3 repetitions only one repetition [only one repetition]	After main line transmission error (e.g. due to missing receiver) Group telegrams • are not repeated. • are repeated max. 3 times. • are repeated once.
Telegram confirmation on main line	If routed always [always]	• Routed telegrams to the subline are confirmed by an ACK on the main line. • Each telegram on the mainline is confirmed by an ACK.
Send confirmation on own telegrams	yes no [yes]	• Telegrams sent out to the mainline are confirmed by added ACK. • No ACK confirmation.

Table 3: Subline Tab Parameter Settings