KNX CP TP
KNX TP Area and Line Coupler

Item number 70148

elsner
elektronik

Installation and Adjustment

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KNX TP line coupler KNX CP TP • from application 1.0
Version: 21.09.2021 • Subject to technical changes. Errors excepted.

This manual is amended periodically and will be brought into line with new software releases. The change status (software version and date) can be found in the contents footer. If you have a device with a later software version, please check **www.elsner-elektronik.de** in the menu area "Service" to find out whether a more up-to-date version of the manual is available.

Clarification of signs used in this manual

⚠	Safety advice.
⚡	Safety advice for working on electrical connections, components, etc.
DANGER!	... indicates an immediately hazardous situation which will lead to death or severe injuries if it is not avoided.
WARNING!	... indicates a potentially hazardous situation which may lead to death or severe injuries if it is not avoided.
CAUTION!	... indicates a potentially hazardous situation which may lead to trivial or minor injuries if it is not avoided.
🛑 **ATTENTION!**	... indicates a situation which may lead to damage to property if it is not avoided.
ETS	In the ETS tables, the parameter default settings are marked by underlining.

1. Safety and usage instructions

Installation, testing, operational start-up and troubleshooting should only be performed by an authorised electrician.

CAUTION!
Live voltage!
There are unprotected live components inside the device.
• Inspect the device for damage before installation. Only put undamaged devices into operation.
• Comply with the locally applicable directives, regulations and provisions for electrical installation.
• Immediately take the device or system out of service and secure it against unintentional switch-on if risk-free operation is no longer guaranteed.

Use the device exclusively for building automation and observe the operating instructions. Improper use, modifications to the device or failure to observe the operating instructions will invalidate any warranty or guarantee claims.

Operate the device only as a fixed-site installation, i.e. only in assembled condition and after conclusion of all installation and operational start-up tasks, and only in the surroundings designated for it.

Elsner Elektronik is not liable for any changes in norms and standards which may occur after publication of these operating instructions.

For information on installation, maintenance, disposal, scope of delivery and technical data, please refer to the installation instructions.

2. Description

The **KNX TP line coupler KNX CP TP** 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, **KNX CP TP** 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, **KNX CP TP** 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 **KNX CP TP** 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, **KNX CP TP** switches back to normal operation automatically. Another feature to increase the data throughput is the ability to send IACKs on own telegrams.

In this document, physically addressed telegrams are named Physical Telegrams.

In this document, group oriented telegrams are named Group Telegrams.

Functions:

- Supports extended frames and long telegrams up to 240 bytes APDU length (With all 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, **KNX CP TP** is able to repeat messages up to three times. Repetition can be configured for both Physical Telegrams and Group Telegrams via ETS
- 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 peeks in the communication load course
- Database available for ETS4 and higher

3.   Commissioning

Configuration is made using the KNX software as of ETS 4. The **product file** can be downloaded from the ETS online catalogue and the Elsner Elektronik website on **www.elsner-elektronik.de** in the "Service" menu. There you will also find the product manual.

3.1.   Addressing of the device at the bus

The equipment is delivered with the individual address 15.15.0. This can be changed via the ETS. A button and a control LED are located on the unit for this purpose. Only individual addresses x.y.0 are allowed.

3.2. Default settings

- All telegrams are blocked because the filter table is not defined
- The Manual Function switch-off time is 120 min

4.   Operation

In network installations **KNX CP TP** can be used as KNX TP area/line coupler or KNX TP line repeater. After connecting the main line, **KNX CP TP** operates with its default settings. Setting the correct Individual Address is necessary.

4.1. TP Coupler Application

When **KNX CP TP** receives telegrams (for example during commissioning) that use Individual Addresses as destination addresses, it compares the Individual Addresses of the receiver with its own Individual Address and decides on that whether it has to route the telegrams or not.

When **KNX CP TP** 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), **KNX CP TP** only routes telegrams whose group addresses are entered in its filter table.

If a telegram is routed by **KNX CP TP** 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.

Fig. 1: TP Coupler Application Program
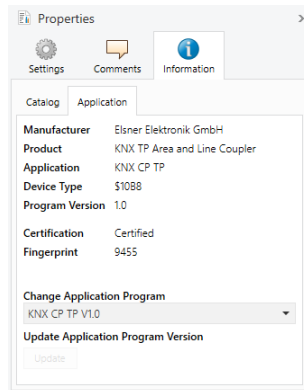
4.2. TP Repeater Application

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 **KNX CP TP** 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.

Fig. 2: TP Repeater Application Program
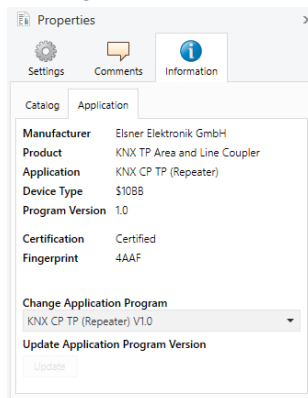

4.3. KNX Network Installation

4.3.1. Individual Address

For line coupler functionality in a KNX network **KNX CP TP** has to use the correct Individual Address of a line coupler (x.y.0, 1≤ x and y ≤15). In ETS up to 225 addresses can be defined (from 1.1.0 to 15.15.0).

For area coupler functionality in a KNX network **KNX CP TP** has to use the correct Individual Address of an area coupler (x.0.0, 1≤ x ≤15). In ETS up to 15 areas can be defined.

If **KNX CP TP** is used in a KNX system for both purposes, it is only necessary to ensure that the **KNX CP TP** used as a line coupler has a line coupler address assigned from a free addressing area. Following figure illustrates the **KNX CP TP** router topology for KNX lines and KNX areas.

Fig. 3: KNX CP TP Network
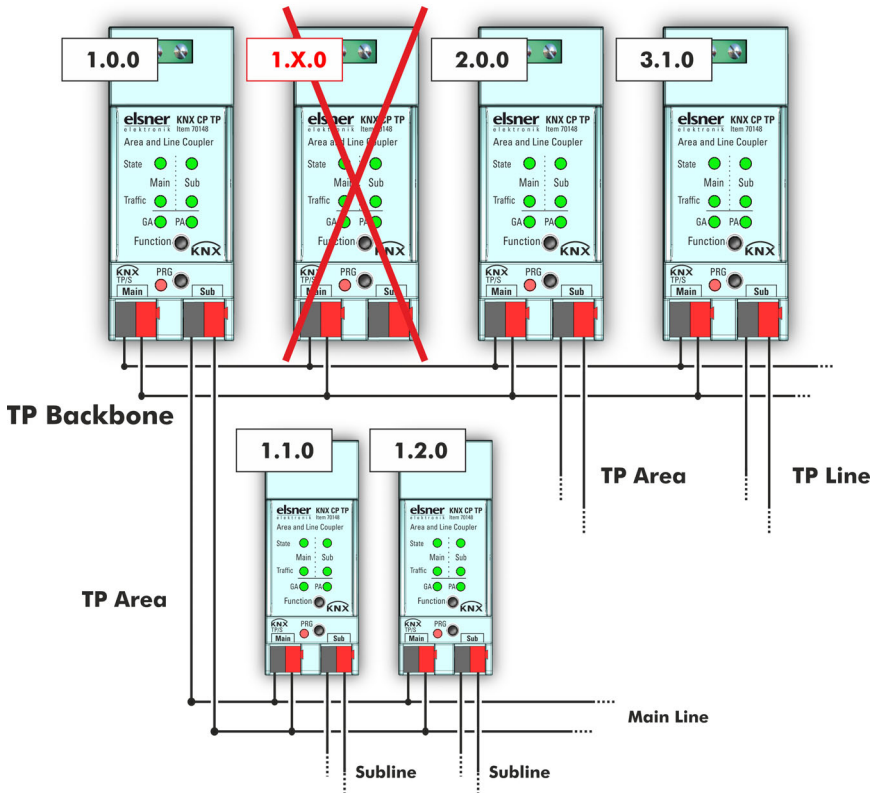
Example: If an area coupler with address 1.0.0 already exists on the backbone no line coupler with address 1.x.0, 1≤ x ≤15 can be added here. Even if no line coupler with address 1.1.0 exists on the subline of the 1.0.0 area coupler. Vice versa, if a line coupler with address 1.1.0 already exists in the installation no area coupler with address 1.0.0 can be added.

4.3.2. 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.

Fig. 4: KNX CP TP Network Topology
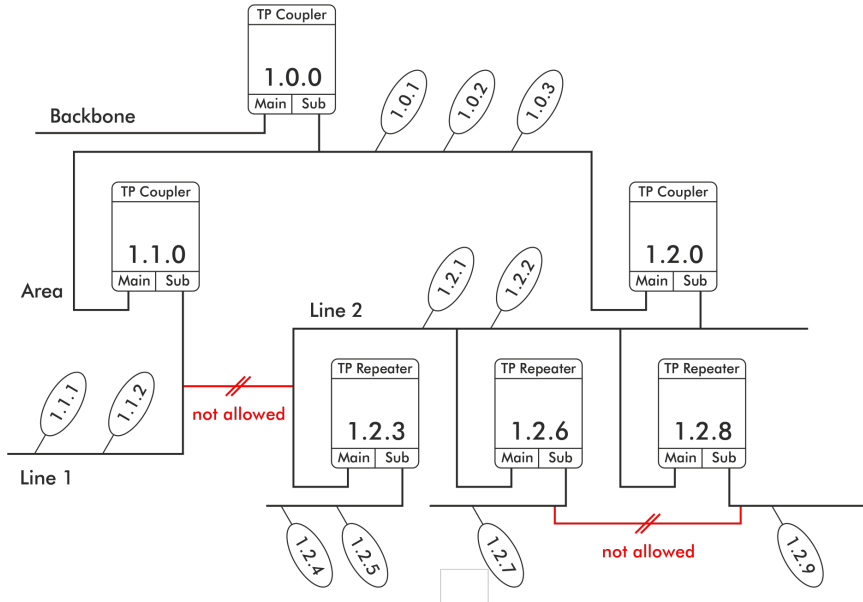
- Each line segment requires its own KNX power supply unit.
- Using repeaters on the backbone and main lines is not allowed.
- Interconnections are not allowed

## 4.4. Programming

4.4.1. Programming Button

To download the desired Individual Address or an ETS setting the Programming Mode must be activated. Successive pressing the Programming Button will turn on and off the Programming Mode. LED 7 lighting in red colour indicates Programming Mode is active. When Programming Mode is activated, the ETS is able to download the Individual Address.

4.4.2. Individual Address Assignment

To configure the device an interface connection (IP, USB) to the KNX bus system is required. The device is supplied with the Individual Address 15.15.0. The KNX product database entry can be downloaded from the website and from the KNX Online Catalog.

The Individual Address can be assigned to the device by setting the desired address in the properties window of the ETS. After starting the ETS download and then pressing the Programming Button the device restarts itself.

Fig. 5: ETS Properties Window
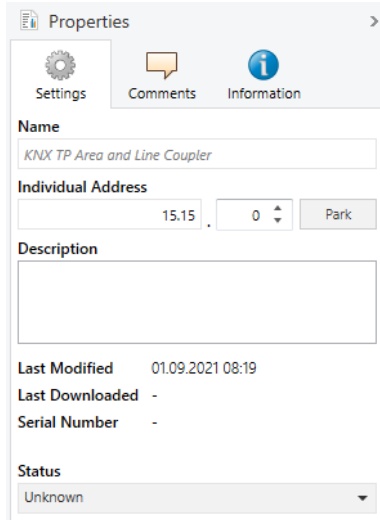
4.5. Special Functions

The Function Button activates **KNX CP TP**´s special functions. Manual Function and Factory Reset can be activated. It depends on time the Function Button is being pressed.

4.5.1. Manual Function

During normal operation a rather short press (approx. 3 sec) activates and deactivates the Manual Function.

When the Manual Function is active, either all Physical Telegrams or all Group Telegrams or both pass the **KNX CP TP** without filtering. After the Switch-off time period has elapsed, **KNX CP TP** automatically switches back to normal operation. To configure the Manual Function and set the Switch-off time use the General parameter tab like shown in chapters 5.1. and 6.1. After switching back from Manual Function to normal operation the latest downloaded parameter setting / filter table entries are active again.
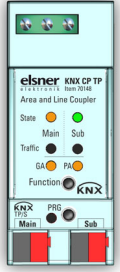
4.5.2. Factory Reset

A long press (approx. 15 sec) of the Function Button <u>soon</u> followed by a short press (approx. 3 sec) executes the Factory Reset. After the first press, the LED display lights like described in Table 1. After the second press, all parameters will be set to factory

default (incl. Individual Address). Subsequently, LEDs show the normal operation display again.

4.5.3. LED Status Display

Table 1: LED Status Display for Manual Function

Number	LED	Colour	Comment	
1	Bus State KNX TP (Main line)	orange		
2	Bus State KNX TP (Subline)	green	LED is <off> if not connected	
5	Group Address Routing	green: orange: red:	filter route all block all	
6	Individual Address Routing			

Table 2: LED Status Display for Factory Reset after first Button Press

Number	LED	Colour	Comment	
1	Bus State KNX TP (Main line)	orange		
2	Bus State KNX TP (Subline)	orange	LED lights red if not connected	
5	Group Address Routing	green: orange: red:	filter route all block all	
6	Individual Address Routing			

5. ETS Database Parameters Coupler

The default settings of the parameter are labelled by an underscore.

5.1. General

Manual Function	• disabled • pass all telegrams • pass all Physical telegrams • pass all Group 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
After expiry of this time period the Manual Function is switched off automatically.	

5.2. 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.

If the parameter „Send confirmation on own telegrams" is set to „yes", the **KNX CP TP** systematically sends an ACK on any own routed telegram.

Telegram routing	• Group: filter, Physical: block • Group and Physical: filter • Group: route, Physical: filter • Group and Physical: route • configure
block: no telegrams are routed. *filter:* telegrams entered in the filter table are routed. *route:* all telegrams are routed. *configure:* the following parameters must be set manually.	
Group telegrams: Main group 0…13	transmit all • block • filter
transmit all: Group telegrams (main group 0…13) are all routed. *block:* Group telegrams (main group 0…13) are all blocked. *filter:* Group telegrams (main group 0…13) are routed if entered in the filter table.	
Group telegrams: Main group 14…31	transmit all • block • filter
transmit all: Group telegrams (main group 14…31) are all routed. *block:* Group telegrams (main group 14…31) are all blocked. *filter:* Group telegrams (main group 14…31) are routed if entered in the filter table.	
Physical telegrams	transmit all • block • filter
transmit all: Physical telegrams are all routed. *block:* Physical telegrams are all blocked. *filter:* Depending on the Individual Address Physical telegrams are routed.	
Physical telegrams: Repetition if errors on main line	no • up to 3 repetitions • only one repetition

no: After main line transmission error (e.g. due to missing receiver) Physical telegrams are not repeated. *up to 3 repetitions:* After main line transmission error (e.g. due to missing receiver) Physical telegrams are repeated max. 3 times. *only one repetition:* After main line transmission error (e.g. due to missing receiver) Physical telegrams are repeated once.	
Group telegrams: Repetition if errors on main line	no • <u>up to 3 repetitions</u> • only one repetition
no: After main line transmission error (e.g. due to missing receiver) Group telegrams are not repeated. *up to 3 repetitions:* After main line transmission error (e.g. due to missing receiver) Group telegrams are repeated max. 3 times. *only one repetition:* After main line transmission error (e.g. due to missing receiver) Group telegrams are repeated once.	
Telegram confirmation on main line	<u>if routed</u> • always
if routed: Routed telegrams to the subline are confirmed by an ACK on the main line. *always:* Each telegram on the mainline is confirmed by an ACK.	
Send confirmation on own telegrams	yes • <u>no</u>
yes: Telegrams sent out to the mainline are confirmed by added ACK. *no:* No ACK confirmation.	

5.3. Sub Line

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

Telegram routing	• Group: filter, Physical: block • <u>Group and Physical: filter</u> • Group: route, Physical: filter • Group and Physical: route • configure
block: no telegrams are routed. *filter:* telegrams entered in the filter table are routed. *route:* all telegrams are routed. *configure:* the following parameters must be set manually.	
Group telegrams: Main group 0…13	transmit all • block • <u>filter</u>
transmit all: Group telegrams (main group 0…13) are all routed. *block:* Group telegrams (main group 0…13) are all blocked. *filter:* Group telegrams (main group 0…13) are routed if entered in the filter table.	
Group telegrams: Main group 14…31	transmit all • block • <u>filter</u>
transmit all: Group telegrams (main group 14…31) are all routed. *block:* Group telegrams (main group 14…31) are all blocked. *filter:* Group telegrams (main group 14…31) are routed if entered in the filter table.	
Physical telegrams	transmit all • block • <u>filter</u>
transmit all: Physical telegrams are all routed. *block:* Physical telegrams are all blocked. *filter:* Depending on the Individual Address Physical telegrams are routed.	

Physical telegrams: Repetition if errors on subline	no • <u>up to 3 repetitions</u> • only one repetition
no: After subline transmission error (e.g. due to missing receiver) Physical telegrams are not repeated. *up to 3 repetitions:* After subline transmission error (e.g. due to missing receiver) Physical telegrams are repeated max. 3 times. *only one repetition:* After subline transmission error (e.g. due to missing receiver) Physical telegrams are repeated once.	
Group telegrams: Repetition if errors on subline	no • <u>up to 3 repetitions</u> • only one repetition
no: After subline transmission error (e.g. due to missing receiver) Group telegrams are not repeated. *up to 3 repetitions:* After subline transmission error (e.g. due to missing receiver) Group telegrams are repeated max. 3 times. *only one repetition:* After subline transmission error (e.g. due to missing receiver) Group telegrams are repeated once.	
Telegram confirmation on subline	<u>if routed</u> • always
if routed: Routed telegrams to the main line are confirmed by an ACK on the main line. *always:* Each telegram on the subline is confirmed by an ACK.	
Send confirmation on own telegrams	yes • <u>no</u>
yes: Telegrams sent out to the subline are confirmed by added ACK. *no:* No ACK confirmation.	
Configuration from subline	<u>allow</u> • block
If blocked an ETS download to the **KNX CP TP** can occur only via main line	

6. ETS Database Parameters Repeater

The default settings of the parameter are labelled by an underscore.

6.1. General

Manual Function	• disabled • pass all telegrams • pass all Physical telegrams • pass all Group 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
After expiry of this time period the Manual Function is switched off automatically.	

6.2. 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.

If the parameter "Send confirmation on own telegrams" is set to "yes", the **KNX CP TP** 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.

Telegram routing	• Group and Physical: route • configure
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. *block:* Physical telegrams are all blocked.	
Physical telegrams: Repetition if errors on main line	no • up to 3 repetitions • only one repetition
no: After main line transmission error (e.g. due to missing receiver) Physical telegrams are not repeated. *up to 3 repetitions:* After main line transmission error (e.g. due to missing receiver) Physical telegrams are repeated max. 3 times. *only one repetition:* After main line transmission error (e.g. due to missing receiver) Physical telegrams are repeated once.	
Group telegrams: Repetition if errors on main line	no • up to 3 repetitions • only one repetition
no: After main line transmission error (e.g. due to missing receiver) Group telegrams are not repeated. *up to 3 repetitions:* After main line transmission error (e.g. due to missing receiver) Group telegrams are repeated max. 3 times. *only one repetition:* After main line transmission error (e.g. due to missing receiver) Group telegrams are repeated once.	
Telegram confirmation on main line	if routed • always

if routed: Routed telegrams to the subline are confirmed by an ACK on the main line. *always:* Each telegram on the mainline is confirmed by an ACK.	
Send confirmation on own telegrams	<u>yes</u> • no
yes: Telegrams sent out to the mainline are confirmed by added ACK. *no:* No ACK confirmation.	

6.3. Subline

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

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