Coupler RMD
75010011

Technical Documentation

The area / line coupler connects two instabus EIB lines with one another to form a logical functional area and ensures electrical separation between these lines. Each bus line of an EIB installation can therefore be electrically independent of other lines.

The exact function of the device is defined by the physical address and the selected application. The device can be used as an area coupler, line coupler or line amplifier to form line segments in existing EIB or new KNX-EIB.

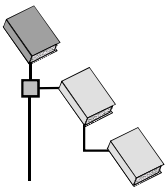
- *Use as line coupler (LC) (physical address: X.X.0 / application: coupler 900A01):*
  Connection of a subordinate line (line) with a higher-order line (main line) optionally with and without group communication filtering function. By its physical address, the coupler is logically assigned to the subordinate line. The coupler is supplied with power from the higher-order line (main line).

- *Use as area coupler (AC / backbone coupler) (physical address: X.0.0 / application: coupler 900A01):*
  Connection of a subordinate line (main line) to a higher-order line (area line) optionally with and without group communication filtering function. By its physical address, the coupler is logically assigned to the subordinate line. The coupler is supplied with power from the higher-order line (area line).

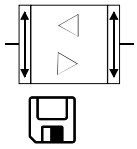
- *Use as line amplifier (LA) (physical address: X.X.X / application: Repeater 900B01):*
  With the help of a line amplifier, a line (max. 64 bus-connected devices) can be expanded by another line segment (further 64 bus-connected devices). With a maximum of 3 line amplifiers per line in parallel, the maximum number of 256 possible bus-connected devices per line can be achieved (including LA). The line amplifier has no filter tables so that all group telegrams are always forwarded without filtering.

Each line (area line, main line, line) or each line segment must have a separate power supply.

Product administration:



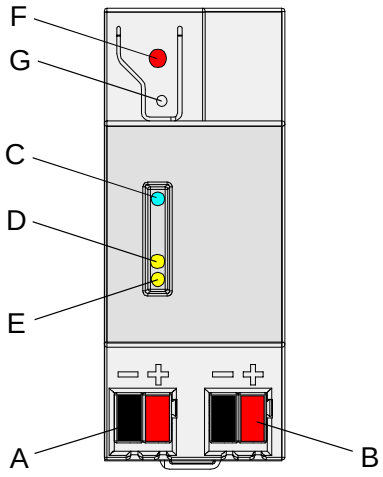
Gebr. Berker
System components
Coupler
Coupler RMD



Order No. 7501 00 11

Coupler 900A01
Repeater 900B01

Operational and display elements:
Illustration:



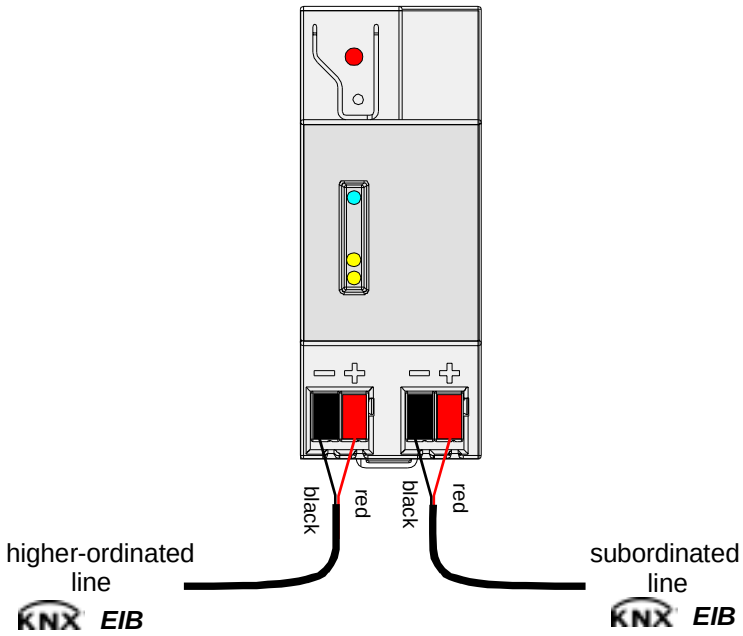
Dimensions:

Width: 36 mm; 2 modules
Height: 90 mm
Depth: 60 mm

Controls:

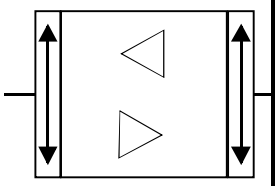
A bus connection terminal for higher-order line
B bus connection terminal for subordinate line
C operation LED (green); signals ready-for-operation state of the area / line coupler
D LED (yellow); on during reception of data (valid byte) on subordinate line
E on during reception of data (valid byte) on higher-order line
F programming LED (red)
G programming button

Technical characteristics	
Type of protection:	IP 20 (in acc. with EN 60529)
Safety class:	III (in acc. with IEC 61140)
Mark of approval:	EIB, KNX
Ambient temperature:	- 5 °C ... + 45 °C
Storage temperature:	- 25 °C ... + 70 °C (storage above + 45 °C reduces the service life)
Relative humidity:	5 % to 93 % (non-condensating)
Type of fastening:	snap-fastening on DIN rail (no data rail required)
Supply of instabus EIB	
Voltage:	24 V DC (21...31 V DC) (from higher-order line)
Power consumption	
higher-order line:	120 – 200 mW
subordinate line:	160 – 260 mW
Current rating	
higher-order line:	ca. 6 mA
subordinate line:	ca. 8 mA
Connection:	with instabus connecting and junction terminal (higher-order and subordinate line)
Response to bus voltage failure	
higher-order line:	Device not functional. All LEDs are off.
subordinate line:	Device continuing to function undisturbed on higher-order line. Telegrams are evaluated, programming is possible, all LEDs are fully functional.
Response on return of bus voltage	After an initialization phase of ca. 1 s, the device is functional.
Input:	---
Output:	---
Connecting diagram:	**Terminal connection:**



Hardware information

The filter tables are stored in an NV memory (flash). Stored addresses are therefore not lost during bus voltage failures and no internal backup battery is required.

Software description			
ETS search path: System devices / line couplers / area couplers, line couplers			**ETS symbol:** 
AST type	00 Hex	0 Dez	No adapter used

Applications:

No.	Summarized description:	Name:	Version:
1	Line / Area coupler	Coupler 900A01	0.1
2	Line amplifier	B: Repeater 900B01 /	0.1

Application:	1. Coupler 900A01		
Executable from mask version:	Coupler ($912)		
Number of addresses (max):	0	**dynamic table handling**	Yes ☐ No ☒
Number of assignments (max):	0	**maximum length of table**	0
Communication objects:	0		

Object	Function	Name	Type	Flag
- -	-	-	-	-

Object description

no object

Scope of functions

- Use as line or area coupler depending on physical address
- Reduction of bus loading due to filter function (filter table)
- Forwarding of group telegrams (line ⇨ main line, main line ⇨ line) parameterizable
- Telegram repetition in the event of communication errors adjustable
- Telegram acknowledgement parameterizable

Functional description

General

The area / line coupler connects two instabus EIB lines with one another to form a logical functional area and ensures electrical separation between these lines. Each bus line of an EIB installation can therefore be operated as a line that is electrically independent of other lines.

The "Coupler 900A01" application permits using the device as an area coupler or as a line coupler.

Couplers will either forward telegrams with addressing by physical addresses (e.g. during start-up) or group telegrams (e.g. communication via group addresses during the current operation of an EIB installation).
For forwarding of physical address telegrams it is important that the coupler knows its own physical address which determines the line to which the coupler 'belongs'. The coupler compares the target address of a received telegram to its own line address and transmits or not the telegram depending on the sense of transmission. This behaviour of the coupler is fixed in the coupler's program and cannot be changed.
As to group communication, the behaviour of the coupler can, however, be parameterized with respect to the sense of transmission, so that the coupler either forwards or disables all group telegrams. During operation of an installation – especially with a view to reducing bus loading on the lines – a filter table can be loaded into the coupler. In this case, the coupler forwards only those group telegrams whose group address is listed in the filter table.
With respect to what has been mentioned above, main groups "14" and "15" form an exception. All addresses belonging to these main groups cannot be stored in the filter table because of its limited overall capacity. These addresses can be separately disabled or forwarded by means of a parameter.
The filter table is generated by the ETS and programmed into the coupler during a download of the "application" or during a partial download of the "group addresses".

Start-up

During start-up of a project including area / line couplers, the following sequence should be observed:

1. Projecting of the EIB installation (generation of physical addresses, group addresses, parameters)

2. Start by programming the physical addresses of the couplers and their parameters before programming the physical addresses of the other EIB devices. Thereafter, the applications can be loaded into the EIB devices (actuators sensors, etc.).
   For testing of an EIB installation – especially during the modification phase before the project is finalized – , it is recommended to set the "group telegrams main line → line" and the " group telegrams line → main line" parameters at first to "transfer". This means that during testing any programmed filter tables will at this stage still be disregarded.

3. After the end of the projecting phase and after start-up, the filter tables can be generated (in the ETS 2 under menu item: Start-up/Projecting – Generate filter tables)

4. As a last step, the filter tables should be programmed into the couplers. The filter table is loaded automatically when the whole application is loaded or also during partial programming of the "group addresses".

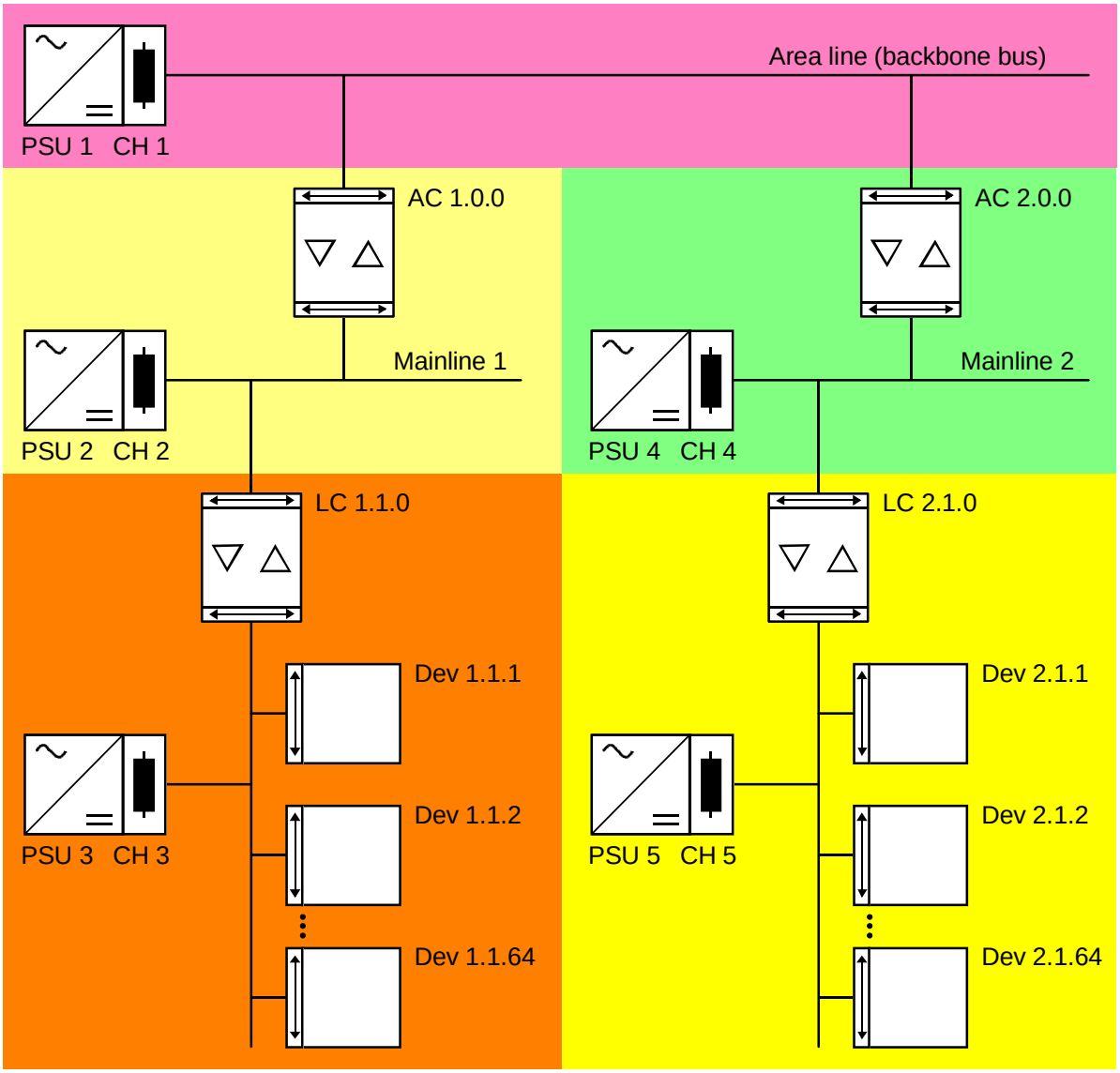
Especially for smaller projects it is recommended to generate and to program the filter tables already under point 2. (together with the programming of the physical coupler addresses).
For larger projects, programming of the filter tables is indispensable in order to avoid unnecessarily high bus loads and thus communication problems.
The area / line coupler can be programmed from the higher-order and also from the subordinate line.

Topology

The area / line coupler transmits telegrams between a subordinate and a higher-order line (line coupler: line – main line, area coupler: main line – area line). In the projecting stage, the function of the device is defined by the physical address as follows:

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

Each line has its own power supply unit (PSU) and is electrically isolated from the other lines. With line couplers, up to 15 lines can be combined to make up an area. With area couplers (AC), up to 15 areas can be connected with one another.
The area / line couplers are logically assigned to their respective subordinate line. The resulting line and area coupler hierarchy within an instabus EIB system is shown below:



AC = area coupler
LC = line coupler
CH = choke

Dev = bus device
PSU = power supply unit

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

Parameters		
Description:	**Value:**	**Remarks:**
Configuration		
Group telegram (main line → line)		Determines whether group telegrams are forwarded from the higher-order line (main line) to the subordinate line (line).
	transfer	All group telegrams are forwarded. The filter table is disregarded.
	block	All group telegrams are blocked. No group telegram can pass the coupler.
	filtering	Group telegrams are either forwarded or disabled selectively depending on the filter table generated or programmed with the ETS.
Group telegram (line → main line)		Determines whether group telegrams are forwarded from the subordinate line to the higher-order line (main line).
	transfer	All group telegrams are forwarded. The filter table is disregarded.
	block	All group telegrams are blocked. No group telegram can pass the coupler.
	filtering	Group telegrams are either forwarded or disabled selectively depending on the filter table generated or programmed with the ETS.
Main group 14/15		Main groups 14 and 15 are not stored in the filter table. This parameter defines whether the main groups are to be filtered or not.
	block	All group telegrams with main group 14 or 15 are disabled.
	transfer	All group telegrams with main group 14 or 15 are forwarded.
Repetition at transmission failure on main line	NO **YES**	A telegram transmitted by the coupler is checked for communication errors. This parameter defines whether the telegram is to be repeated 3 times on reception of a BUSY or NACK signal or in the event of a missing ACK signal on the higher-order line (main line).
Repetition at transmission failure on line	NO **YES**	A telegram transmitted by the coupler is checked for communication errors. This parameter defines whether the telegram is to be repeated 3 times on reception of a BUSY or NACK signal or in the event of a missing ACK signal on the subordinate line (line).

Telegram acknowledge on main line		This parameter defines the conditions under which the device acknowledges the received telegrams on the higher-order main line / area line.
	Permanently	The coupler basically acknowledges each received telegram on the higher-order line.
	Only at transfer	The coupler acknowledges on the higher-order line only the telegrams forwarded to the subordinate line.
Telegram acknowledge on line		This parameter defines the conditions under which the device acknowledges the received telegrams on the subordinate line.
	Permanently	The coupler basically acknowledges each received telegram on the subordinate line.
	Only at transfer	The coupler acknowledges on the subordinate line only the telegrams forwarded to the higher-order line.

Software information

In order to be able to edit all parameters, parameter editing in the ETS 2 must be set to "High access" (HA).

Deactivation of telegram repetition (repetition on reception of a BUSY or NACK signal or in the event of missing ACK signal) in the device results in a reduction of bus loading, but also in lower transmission security.

The device can be programmed via the higher-order or the subordinate line (physical address, filter tables, etc.). Start-up is moreover possible from every line of the EIB installation. The physical address of the data interface used is no longer of importance when this coupler is used.

From ETS2v1.1 onwards, this application program can only be loaded into the new coupler (2 modules wide device). It is, however possible, to program the new coupler with the old product applications ("Coupler 900501") from an existing ETS project. This may become necessary, for instance, if an old and already programmed coupler (4 modules wide device) is replaced by a 2 modules wide coupler.

In this case, the manufacturer-independent dummy application "LK_DUMMY.VD1" must first be imported into the product management of the ETS2 before the new coupler is put into operation. The new device can then be programmed with the physical address and with the old, i.e. existing filter table and the existing parameters.

Important:

- The "Repetition at transmission failure on main line" and "Repetition at transmission failure on a line" parameters in the "Coupler 900501" application can be set to values "none", "1", "2" or "3". The new device (2 modules wide) then has the following behaviour:

  Settings "none" and "1": no telegram repetition,
  Settings "2" or "3": 3 telegram repetitions.

- The filter table checking parameters in the old application are not operational in the new coupler.

Application:	2. Repeater 900B01		
Executable from mask version:	Coupler ($912)		
Number of addresses (max):	0	**dynamic table handling**	Yes ☐ No ☒
Number of assignments (max):	0	**maximum length of table**	0
Communication objects:	0		

Object	Function	Name	Type	Flag
- -	-	-	-	-

Object description

no objects

Scope of functions

- Expansion of a line to a maximum of 4 line segments with up to 64 bus devices
- Telegram repetitions in the event of communication errors adjustable

Functional description

General

The line amplifier connects an instabus EIB line to a line segment to form a logical functional area and ensures electrical separation between these areas. With the help of a line amplifier, a line (max. 64 bus-connected devices) can be expanded by another line segment (further 64 bus-connected devices). With a maximum of 3 line amplifiers per line in parallel, the maximum number of 256 possible bus-connected devices per line can be achieved (including LA). The line segments can be operated as electrically independent units.

The "Amplifier 900B01" application permits using the device as a line amplifier.

A line amplifier will either forward telegrams with addressing by physical addresses (e.g. during start-up) or group telegrams (e.g. communication via group addresses during the current operation of an EIB installation).
The line amplifier has no filter tables so that all group telegrams are always forwarded without filtering.
For forwarding of physical address telegrams it is important that the amplifier knows its own physical address which determines the line to which the amplifier 'belongs'. The amplifier compares the target address of a received telegram to its own line address and transmits or not the telegram depending on the sense of transmission. This behaviour of the amplifier is fixed in the coupler's program and cannot be changed.

The connection of several line amplifiers in series is not permitted!

Start-up
During start-up of a project including line amplifiers, the following sequence should be observed:

1. Projecting of the EIB installation (generation of physical addresses, group addresses, parameters)

2. Start by programming the physical addresses of the area / line couplers, if any, before programming the physical addresses of the line amplifiers and their parameters, and then the physical addresses of the other EIB devices. Thereafter, the applications can be loaded into the EIB devices (actuators sensors, etc.).

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

Functional description

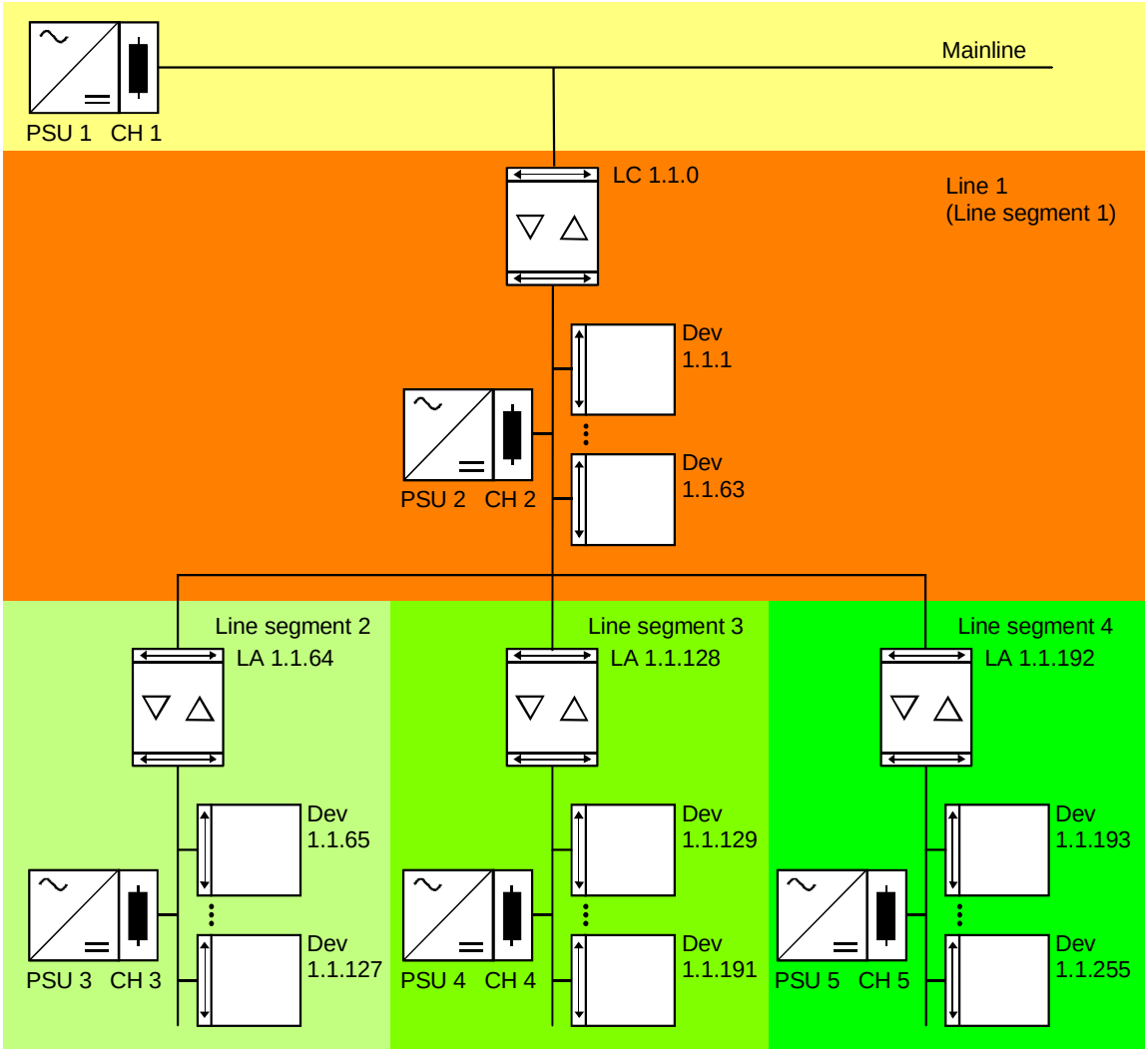
Topology

To connect more than 64 bus devices to a line, line amplifier (LA) can be used to form a maximum of 4 line segments each incorporating up to 64 further bus devices. Each line segment has its own power supply unit (PSU) and is electrically isolated from the other line segments. The line amplifier transmits telegrams between the different line segments without filtering the group communication.

For projecting, the device function is defined by the physical address (A.L.D) as follows:

$$0 \le A \le 15$$
$$0 \le L \le 15$$
$$1 \le D \le 255$$

Line amplifiers must be connected in parallel, since – due to the routing counter – a telegram is forwarded via a maximum of 6 couplers (LA-LC-AC-AC-LC-LA). The resulting line hierarchy with 4 line segments max. is shown below:



LC = line coupler
LA = line amplifier
CH = choke

Dev = bus device
PSU = power supply unit

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

Parameters		
Description:	**Value:**	**Remarks:**
Configuration		
Repetitions at transmission failure on line at physical addressing (HA)	**NO** YES	A telegram with a physical target address transmitted by the amplifier is checked for communication errors. This parameter defines whether the telegram is to be repeated 3 times on reception of a BUSY or NACK signal or in the event of a missing ACK signal on the higher-order line (segment 1).
Repetitions at transmission failure on line at group address telegrams (HA)	NO **YES**	A telegram with a group address as target address transmitted by the amplifier is checked for communication errors. This parameter defines whether the telegram is to be repeated 3 times on reception of a BUSY or NACK signal or in the event of a missing ACK signal on the higher-order line (segment 1).
Repetitions at transmission failure on segment at physical addressing (HA)	**NO** YES	A telegram with a physical target address transmitted by the amplifier is checked for communication errors. This parameter defines whether the telegram is to be repeated 3 times on reception of a BUSY or NACK signal or in the event of a missing ACK signal on the subordinate line (segments 2-3).
Repetitions at transmission failure on segment at group address telegrams (HA)	NO **YES**	A telegram with a group address as target address transmitted by the amplifier is checked for communication errors. This parameter defines whether the telegram is to be repeated 3 times on reception of a BUSY or NACK signal or in the event of a missing ACK signal on the subordinate line (segments 2, 3 or 4).

Software information

In order to be able to edit all parameters, parameter editing in the ETS must be set to "High access" (HA).

Deactivation of telegram repetition (repetition on reception of a BUSY or NACK signal or in the event of missing ACK signal) in the device results in a reduction of bus loading, but also in lower transmission security.

The device can be programmed via the higher-order or the subordinate line (physical address, parameters). Start-up is moreover possible from every line of the EIB installation. The physical address of the data interface used is no longer of importance when this coupler is used.

From ETS2v1.1 onwards, this application program can only be loaded into the new line amplifier (2 modules wide device).
It is, however possible, to program the new amplifier with the old product applications ("Amplifier 900701") from an existing ETS project. This may become necessary, for instance, if an old and already programmed amplifier (4 modules wide device) is replaced by a 2 modules wide amplifier.

In this case, the manufacturer-independent dummy application "LK_DUMMY.VD1" must first be imported into the product managment of the ETS2 before the new amplifier is put into operation. The new device can then be programmed with the physical address and with the old, i.e. existing filter table and the existing parameters.

Important:

- The "Repetition at transmission failure..." parameters in the "Repeater 900701" application can be set to values "none", "1", "2" or "3". The new device (2 modules wide) then has the following behaviour:

  Settings "none" and "1": no telegram repetition,
  Settings "2" or "3": 3 telegram repetitions.