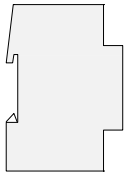
Area / Line coupler Version 4 (MW 2)



System

Product name:	Area / Line coupler Version 4 (MW 2)
Design:	REG (rail-mounted device)
Article-no.:	2142 REG
ETS search path:	System components / Line coupler / Backbone/line coupler SE
Issue:	22.05.2006

Functional description:

The area/line coupler interconnects two KNX / EIB lines into a logical function area ensuring at the same the electrical separation between these lines. Each bus line of a KNX / EIB 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 an area coupler, line coupler or line repeater for implementing line segments in existing new KNX / EIB installations.

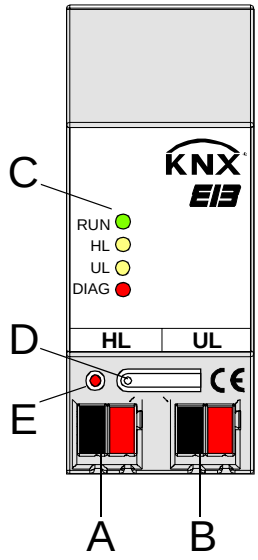
- *Used as a line coupler (LC) (physical address: X.X.0):*
  Connection of a subordinate line (line) to a higher-order line (main line) optionally with and without filter function for group communication. The coupler is logically assigned to the subordinate line by way of its physical address. The coupler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

- *Used as an area coupler (AC) (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. The coupler is supplied with power from the higher-level line (backbone bus).

- *Used as a line repeater (LR) (physical address: X.X.X):*
  By using a line repeater, a line (64 devices max.) can be expanded by a further line segment (further 64 devices). With a maximum of 3 line repeaters in parallel per line, the highest maximum number of 256 devices in a line (including LRs) can then be realized. The line repeater has no filter tables so that all group telegrams will always be transmitted unfiltered.

Each line (backbone bus, main line, line) or each line segment requires a separate power supply.

Illustration:



Dimensions:
Width: 36 mm; 2 modules
Height: 90 mm;
Depth: 70 mm;

Controls and displays:

A Bus connection terminal for higher-order line (HL)

B Bus connection terminal for subordinate line (UL)

C Status LED:

LED "RUN" (green): signals the ready-for-operation state of the area / line coupler

permanently OFF:	device OFF, no power on higher-order line
permanently ON:	device ON, power on both lines
flashing:	device ON, no power on subordinate line

LED "HL" (yellow): receiving data on higher-order line

LED "UL" (yellow): receiving data on subordinate line

LED "DIAG" (red): telegram transmission in group communication. Signalling is parameter-dependent.

permanently OFF:	The parameters "Group telegrams main line -> line" or "Group telegrams line -> main line" are set to "Block" or "Filter". In this case, group telegrams are filtered in acc. with the filter table loaded or completely blocked, depending on parameterization.
permanently ON:	The parameters "Group telegrams main line -> line" or "Group telegrams line -> main line" are set to "Transmit unfiltered". In this case, group telegrams will always be transmitted.

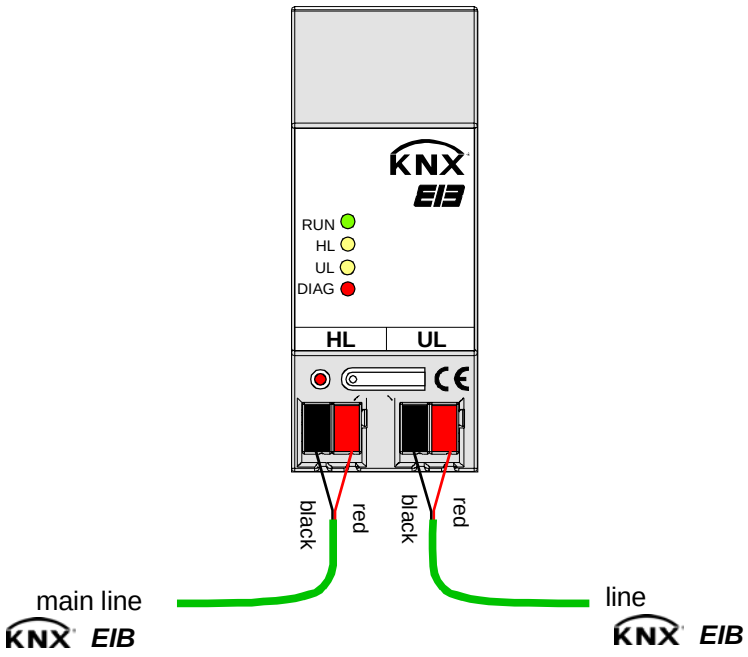
After complete start-up of the KNX / EIB installation, it is recommended to set the telegram transmission parameter to "Filter" and to load filter tables.

D programming key

E programming LED (red)

Technical data

Type of protection	IP 20 (acc. to EN 60529)
Safety class:	III (in acc. with EN 61140)
Mark of approval:	KNX / EIB
Ambient temperature:	- 5 °C ... + 45 °C
Storage temperature	- 25 °C ... + 70 °C (storage above + 45 °C reduces the lifetime)
Type of fastening:	snap-fastening on DIN rail (no data rail required)
KNX/EIB supply	
Voltage:	21 – 32 V DC SELV (from higher-order line)
Power consumption:	
higher-order line	approx. 120 – 190 mW
subordinate line:	approx. 170 – 260 mW
Current	
higher-order line:	approx. 6 mA
subordinate line:	approx. 8 mA
Connection:	with KNX / EIB connecting / branching terminal (higher-order line and subordinate line separated)
Response to bus voltage failure:	
higher-order line:	The device is not functional. All LEDs are off.
subordinate line:	Functioning of the device on the higher-order line is not affected. Telegrams are evaluated, programming is possible, all LEDs are functional.
Response to bus voltage return	After an initialization phase of ca. 1 s including the LED test, the device is ready to operate.
Input:	---
Output:	---
Wiring diagram:	**Terminals:**



Hardware information

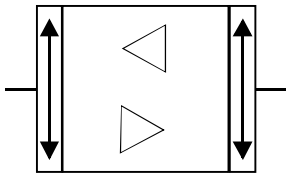
- After switch-on or after applying the bus voltage from the higher-order line, an LED test is started. During this test, all LEDs are switched on briefly and then off again beginning with the uppermost LED ("RUN"). After this test, the device is ready for operation and the LEDs indicate the device status.
- The filter tables are stored in a non-volatile memory (flash). This means that the stored addresses are not lost after a bus voltage failure and that no internal backup battery is required.

Software information

ETS search path:

System components / Line coupler / Backbone/line coupler SE

ETS symbol:



PEI type	00 $_{Hex}$	0 Dec	No adapter used

Applications:

No.	Short description:	Name:	Version:
1	Area / line coupler or repeater	Coupler / Repeater 900F01	0.1

Application:	1. Coupler / Repeater 900F01		
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

- The device can be parameterized as a coupler or as an repeater

Function as coupler:

- Depending on the physical address, use as line or area coupler
- Reduced bus load due to filter function (filter table) if used as a coupler
- Forwarding of group telegrams (Line ⇨ Main Line, Main Line ⇨ Line) parameterizable
- Telegram repetitions in case of transmission errors presettable
- Telegram confirmation parameterizable

Function as repeater:

- Expansion of a line into a maximum of 4 line segments with up to 64 devices per segment
- Telegram repetitions in case of transmission errors presettable

Functional description

The device can be used as an area or a line coupler or alternatively as a line repeater. The type of function depends on the assignment of the physical address and on the parameterization of the device (parameter "Function as").

Device working as an area / line coupler

General

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

A coupler either transmits telegrams using addressing by means of physical addresses (e.g. during start-up) or group telegrams (e.g. communication via group addresses during regular operation of a KNX / EIB installation. For transmitting physically addressed telegrams, it is important that the coupler knows its own physical address, i.e. its assignment to a line is fixed. The coupler compares the target address of a telegram received with his own line address and - depending on the transmitting direction - either forwards the telegram or not. This behaviour of the coupler is part of its fixed program and cannot be changed.
With respect to group communication, the coupler's behaviour can be parameterized depending on the transmitting direction. This way, the coupler either routes all group telegrams or blocks them. During regular operation of an installation and especially in order to reduce bus loading, a filter table can be loaded into the coupler. In this case, the coupler only routes such those group telegrams whose group address is included in the filter table.
This principle is valid with the exception of main groups "14" and "15". Addresses belonging to these main groups can no longer be included in the filter table due to its limited overall size. These addresses can be separately blocked by a parameter or transmitted.
The filter table is generated by the ETS and programmed into the coupler when the "application" is downloaded or when a partial download of the "group addresses" is made.

Commissioning

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

1. Project design of the KNX / EIB installation (physical address, group addresses, parameters)
2. At first, the physical addresses of the couplers and their application programs must be programmed and then the physical addresses of the other KNX / EIB devices. Thereafter, the applications can be loaded into the KNX / EIB devices (actuators, sensors, etc.).
   For testing of a KNX / EIB 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" at first to "Transmit all". This means that any programmed filter tables are not yet taken into account in the testing phase.
3. The filter tables can then be generated on completion of project design and commissioning (in the ETS 2 under menu item: Commissioning/Project design – generating filter tables / ETS 3 generates them automatically).
4. 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".

Especially with smaller projects, the filter tables can be generated and programmed already under item 2. (together with the programming of the physical addresses for the couplers).
In larger projects, it is absolutely important to program filter tables in order to avoid unnecessarily high bus loads and thus communication problems.

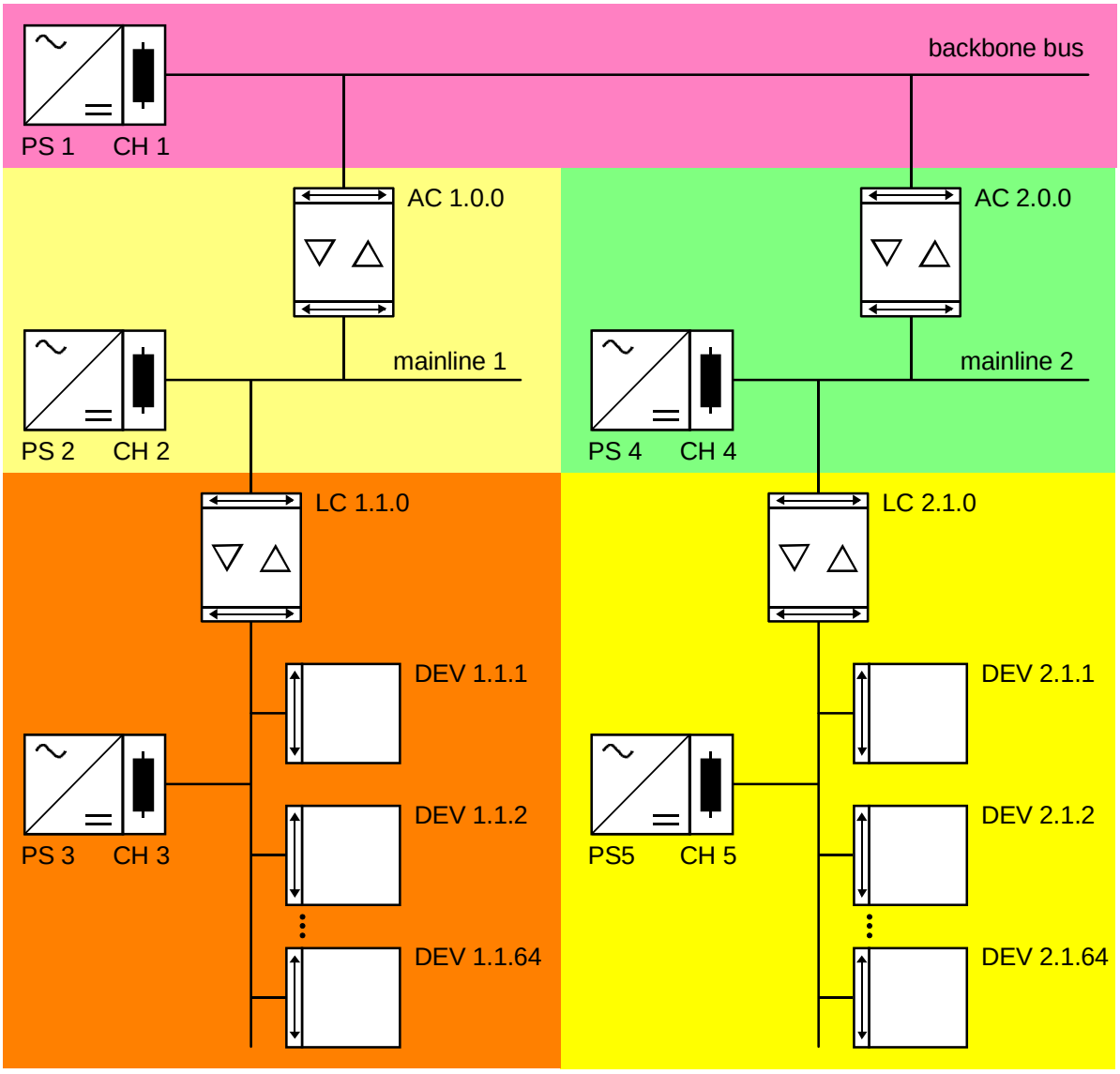
The area / line coupler can be programmed from the higher-order but also from the subordinate line.

Topology

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

Area coupler (AC)	A.0.0	$(1 \leq A \leq 15)$
Line coupler (LC)	A.L.0	$(1 \leq A \leq 15, 1 \leq L \leq 15)$

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



AC = Area coupler
LC = Line coupler
CH = Choke

DEV = Bus device
PS = Power supply

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

Function as an repeater:

General

The line repeater interconnects a KNX / EIB line with a line segment to form a logical functional area ensuring at the same the electrical separation between these partial areas. By using a line repeater, a line (64 devices max.) can be expanded by a further line segment (further 64 devices). With a maximum of 3 line repeaters in parallel per line, the highest maximum number of 256 devices in a line (including LVs) can then be realized. The line segments can be operated electrically independently of one another.

A line repeater either transmits telegrams using addressing by means of physical addresses (e.g. during start-up) or group telegrams (e.g. communication via group addresses during regular operation of an EIB installation). The line repeater has no filter tables so that all group telegrams will always be transmitted unfiltered.
For transmitting physically addressed telegrams, it is important that the coupler knows its own physical address, i.e. its assignment to a line is fixed. The coupler compares the target address of a telegram received with his own line address and - depending on the transmitting direction - either forwards the telegram or not. This behaviour of the coupler is part of its fixed program and cannot be changed.

Connecting several line repeaters in series is not permitted.

Commissioning

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

1. Project design of the KNX / EIB installation (physical address, group addresses, parameters)
2. As a first step, program the physical addresses of the area / line couplers, if any.
3. Then, program the physical addresses of the line repeaters and their application programs.
4. Transfer the application programs of the couplers.
5. As a last step, program the physical addresses of the other KNX / EIB devices. Thereafter, the applications can be loaded into the KNX / EIB devices (actuators, sensors, etc.).

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

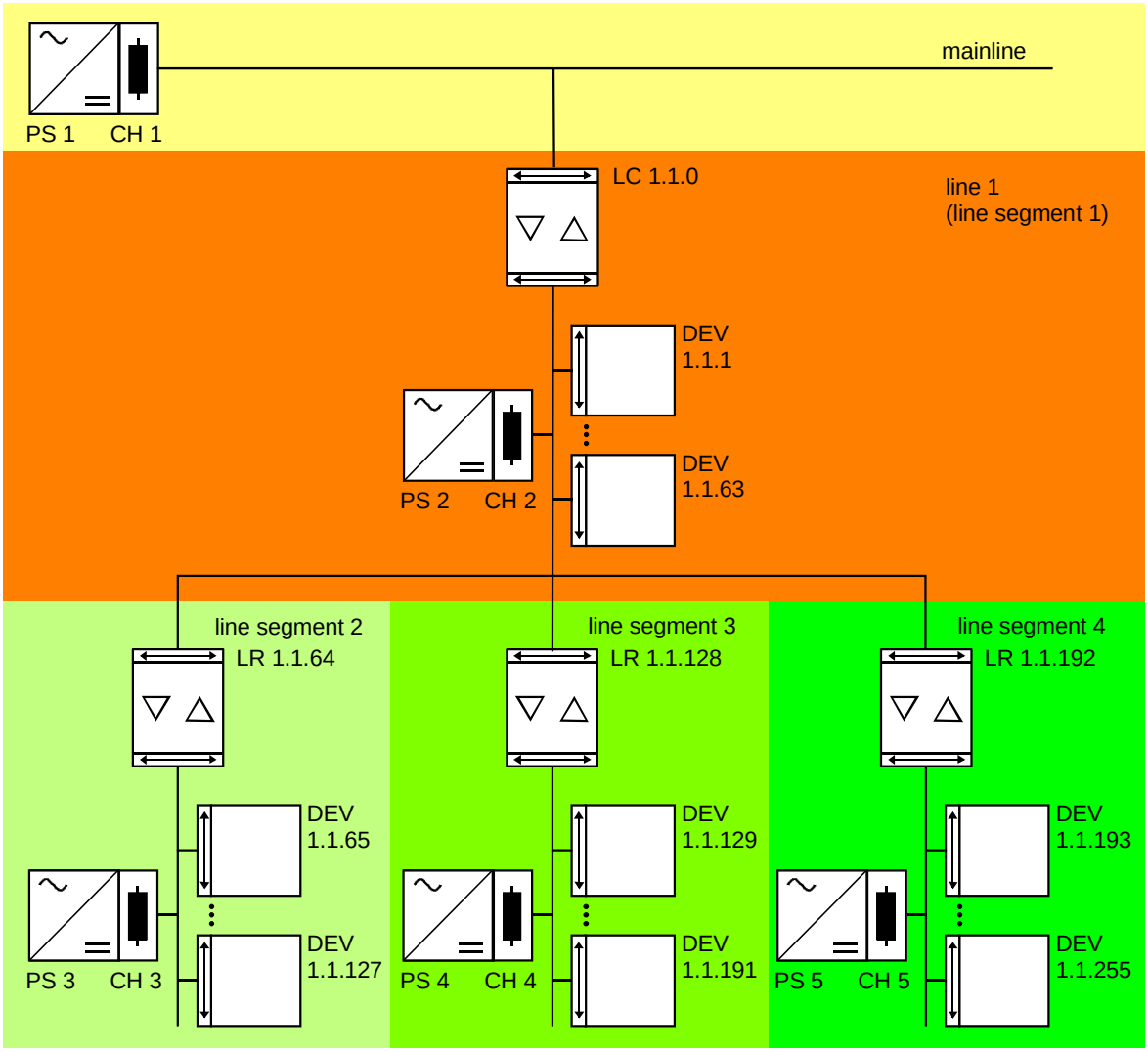
Topology

To connect more than 64 devices to a line, line repeater (LR) can be used to create 4 line segments max. each of which can accommodate up to further 64 devices. 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 repeater transmits telegrams between the different line segments without filtering the group communication.

In the project design phase, the function of the device is defined by the physical address as follows:

$0 \leq A \leq 15)$
$0 \leq L \leq 15$
$1 \leq D \leq 255$

Line repeaters must be connected in parallel since a telegram is routed due to the routing counter via 6 couplers max. (LR-LC-AC-AC-LC-LR) The hierarchy of a line with 4 line segments max. is thus as follows:



LC = Line coupler
LR = Line repeater
CH = Choke

DEV = Bus device
PS = Power supply

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

Parameters		
Description	**Values:**	**Comment:**
Configuration		
Function as	**Area / Line coupler** Repeater	This parameter defines the functions of the device. In addition, it is important to assign a correct physical address corresponding to the functions of the device. (cf. functional description).
Selection (for configuration as "Area / line coupler")		
Group telegrams main line → line		Defines whether group telegrams from the higher-order line (main line) are transmitted to the subordinate line (line).
	block	All group telegrams will be blocked. No group telegram can pass the coupler.
	transmit unfiltered	All group telegrams will be transmitted. The filter table will be disregarded.
	filter	In accordance with the filter table generated and programmed in the ETS, group telegrams are either transmitted or blocked selectively. This parameter influences the behaviour of the red diagnosis LED. When this parameter is set to "transmit unfiltered", the LED is lit up.
Group telegrams line → main line		Defines whether group telegrams are transmitted from the subordinate line (line) to the higher-order line (main line).
	block	All group telegrams will be blocked. No group telegram can pass the coupler.
	transmit unfiltered	All group telegrams will be transmitted. The filter table will be disregarded.
	filter	In accordance with the filter table generated and programmed in the ETS, group telegrams are either transmitted or blocked selectively. This parameter influences the behaviour of the red diagnosis LED. When this parameter is set to "transmit unfiltered", the LED is lit up.

Repetitions in case of transmission errors with group telegrams on higher-order line	No **Yes**	A group telegram transmitted 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 line (HL).
Repetitions in case of transmission errors with physical addressing on higher-order line	No **Yes**	A telegram transmitted by the coupler is checked for transmission errors in case of physical addressing. 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 line (HL).
Repetitions in case of transmission errors with group telegrams on subordinate line	No **Yes**	A group telegram transmitted 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 line (UL).
Repetitions in case of transmission errors with physical addressing on subordinate line	No **Yes**	A telegram transmitted by the coupler is checked for transmission errors in case of physical addressing. 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 line (UL).
Main group 14/15		Main groups 14 and 15 are not programmed into the filter table. This parameter defines whether these main groups are to be filtered or not.
	block	All group telegrams with main group 14 or 15 are blocked.
	transmit all	All group telegrams with main group 14 or 15 are transmitted. This parameter has no influence the behaviour of the red diagnosis LED.

Telegram confirmation on main line		This parameter defines the cases in which the device confirms the telegrams received on the main line / backbone bus
	always	On principle, the coupler confirms every telegram received on the higher-order line.
	only if transmitted	On principle, the coupler confirms on the higher-order line only those telegrams transmitted to the subordinate line
Telegram confirmation on line		This parameter defines the cases in which the device confirms the telegrams received on the subordinate line.
	always	On principle, the coupler confirms every telegram received on the subordinate line.
	only if transmitted	On principle, the coupler confirms on the subordinate line only those telegrams transmitted to the higher-order main line / backbone bus.
Selection (for configuration as "Repeater")		
Repetitions in case of transmission errors with group telegrams on higher-order line	No **Yes**	A group telegram transmitted 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 line (HL).
Repetitions in case of transmission errors with physical addressing on higher-order line	**No** Yes	A telegram transmitted by the coupler is checked for transmission errors in case of physical addressing. 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 line (HL).
Repetitions in case of transmission errors with group telegrams on subordinate segment	No **Yes**	A group telegram transmitted 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 segment (UL).
Repetitions in case of transmission errors with physical addressing on subordinate segment	**No** Yes	A telegram transmitted by the coupler is checked for transmission errors in case of physical addressing. 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 segment (UL).

Software information

- The deactivation of telegram repetition in the device (repetition on reception of a BUSY or a NACK confirm signal or in the absence of the ACK confirm signal) results in reduced bus loading but also in a lower transmission reliability.
- The device can be programmed via the higher-order or the subordinate line (physical address, filter tables, etc.). In addition, commissioning is possible from any line of the KNX / EIB installation. For programming, the higher-order line (HL) must be connected to the bus voltage.
- The device described in the present documentation can also be programmed with the product applications of the old MW 4 device with a width of 4 modules ("Coupler 900501" / "Repeater 900701").

  This may become necessary, for instance, when an old coupler is being replaced by an MW 2 coupler.
  In this case, the manufacturer-independent dummy product database "LK_DUMMY.VD1" is to be imported in the product administration of the ETS2. The new device can then be programmed with the physical address and with the old or existing filter table and the existing parameters. In the ETS3, an import of the dummy product database is not necessary.

  The device described in the present documentation can moreover be programmed with the product applications of the older MW 2 device ("Coupler 900A01" / "Repeater 900B01").

  Notes:

  - The parameters "Repetitions in case of transmission errors on main line" and "Repetitions in case of transmission errors on line" in the applications "Coupler 900501" or "Repeater 900701" can be set to the following values: "none", "1", "2" or "3". This results in the following reactions in the new device (MW 2)

    Settings "none" and "1": no telegram repetition,
    Settings "2" or "3": 3 telegram repetitions.
  - The filter table checking parameters in the old application "Coupler 900501" do not result in any reaction in the new coupler.
  - It is possible that the ETS displays a message indicating functional problems when old devices are programmed with the new application. This message can be ignored in consideration of the a.m. properties.