

# User Manual

## K-BUS® Line Coupler\_V1.3

BNLC-00/00.1



**KNX/EIB Home and Building Control System**

# Attentions

1. Please keep devices away from strong magnetic field, high temperature, wet environment;



2. Do not fall the device to the ground or make them get hard impact;



3. Do not use wet cloth or volatile reagent to wipe the device;



4. Do not disassemble the devices.

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## Chapter 1 Summary

The coupler can be used as line coupler, backbone coupler or repeater as well in existing KNX networks as in new KNX networks. It has a filter table with the help of which bus telegrams are either blocked off from one of the two lines or are passed on to another line thus reducing the bus load. The filter table is created by the ETS (KNX Tool Software) automatically on commissioning the system.

As there are no differences in hardware between the line coupler, the backbone coupler and the repeater they were given the same ordering number.

The power supply of the coupler electronics occurs via the connection to the main line.

Used as a line coupler, The basic functionality of the coupler is coupling a KNX-TP-main line with a KNX-TP-sub line. The coupler provides galvanic isolation between the two connected lines. Due to the flexibility of the coupler, it can be used as a line coupler to connect a line to a main line or as a backbone coupler to connect a main line to a backbone line. The main task of the coupler is filtering the traffic according the installation place in the hierarchy or according to the built in filter tables for group oriented communication. The coupler provides outstanding features compared to other similar products, for example support extended frames and long telegram with up to 240 bytes APDU length and a configurable one button activation of special functions (e.g. transmit all group telegrams). These are helpful during installation, during run time and for trouble shooting. The high informative 6 duo LED display shows accurate the bus status on each line. This helps identifying common communication problems due to bus load or re-transmissions on both lines.

Used as a repeater, its function has the target to link two lines for data transfer. And it still provides galvanic isolation between the connected lines. Up to three line repeaters can be used behind a line coupler. As a result, up to four lines can form a complete line. Each line must be supplied by a dedicated KNX power supply.

This manual provides the technical information about the coupler as well as assembly and programming in detail for users, and explains how to use the coupler by the application examples.

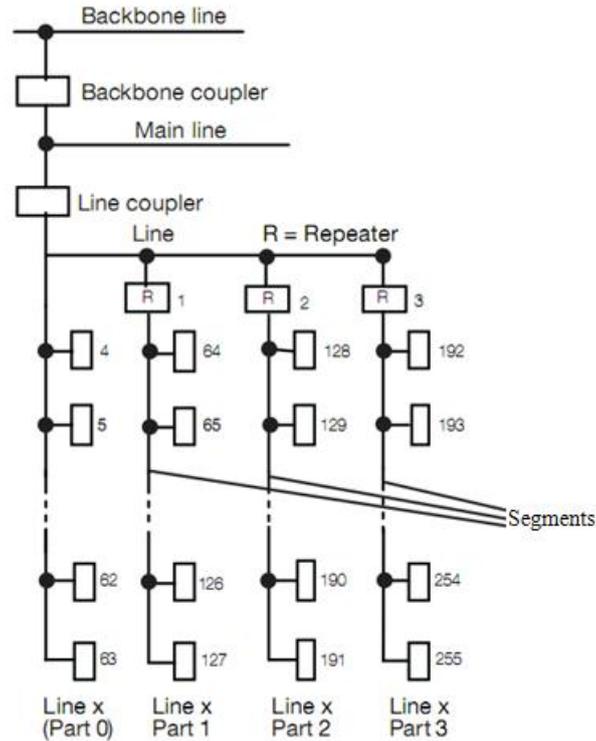


Fig.1. Connection of repeaters to a bus line

Application Programs :

The coupler can be programmed with the ETS up from version ETS4. Used as a line/backbone coupler the application program “KNX Line Coupler” and used as a repeater the application program “KNX Line Repeater” has to be downloaded.

Please note that commissioning straight at delivery status means:

- The line coupler does block all telegrams because the filter table is not defined,
- The fallback time after manual operation is 120 min
- The physical address is 15.15.0.

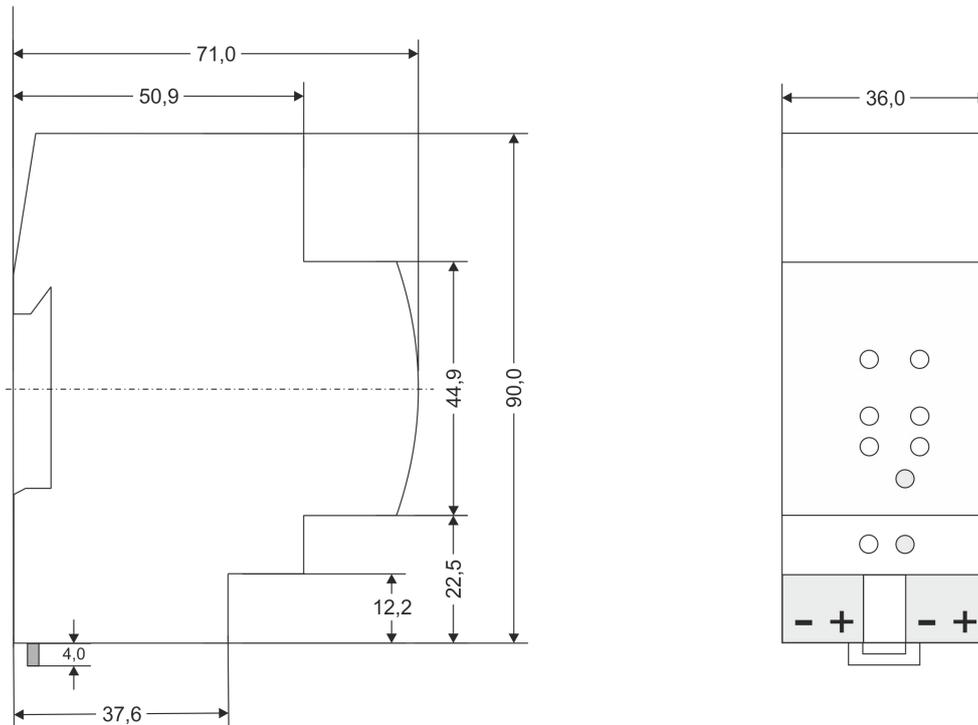
## Chapter 2 Technical Data, Dimension and Display & Operator elements

### 2.1. Technical data

<b>Power supply</b>	Main line	21-30V DC, used for power supply of the device
	Sub line	21-30V DC
	Current consumption	<10mA
<b>Connections</b>	KNX, Main line	Via bus connection terminal (red/black)
	KNX, Sub line	Via bus connection terminal (red/black)
<b>Operating and display</b>	Bus State Main LED	Green: Main line OK
		Orange: Manual function active
	Bus State Sub LED	Green: Sub line OK
		Off: Sub not connected
	Traffic Main LED	Green blinking: Telegram traffic on the main line
		Red blinking: Transmission error Off: No telegram traffic
	Traffic Sub LED	Green blinking: Telegram traffic on the sub line
		Red blinking: Transmission error Off: No telegram traffic
	GA LED	Green: Filter table active
		Orange: Route all
Red: Block all Off: Routing of group telegram is different on main line and sub line		
PA LED	Green: Filter table active	
	Orange: Route all	
	Red: Block all Off: Routing of physical telegram is different on main line and sub line	
Programming button and LED	For assignment of the physical address	
Function button	Switch to manual function or execute to the factory reset	

<b>Temperature</b>	Operation	-5 °C ... + 45 °C
	Storage	-25 °C ... + 55 °C
	Transport	- 25 °C ... + 70 °C
<b>Design</b>	Modular installation device, on 35mm mounting rail	
<b>Relative humidity</b>	5%~93% (non-condensing)	
<b>Dimensions</b>	90 mm×36 mm×70mm	
<b>Weight</b>	0.1KG	
<b>Housing colour</b>	Plastic PA66 housing, grey	
<b>Protection</b>	IP 20, to EN 60529	
<b>CE mark</b>	In accordance with EMC and low voltage guidelines	
<b>Markings</b>	KNX/EIB	

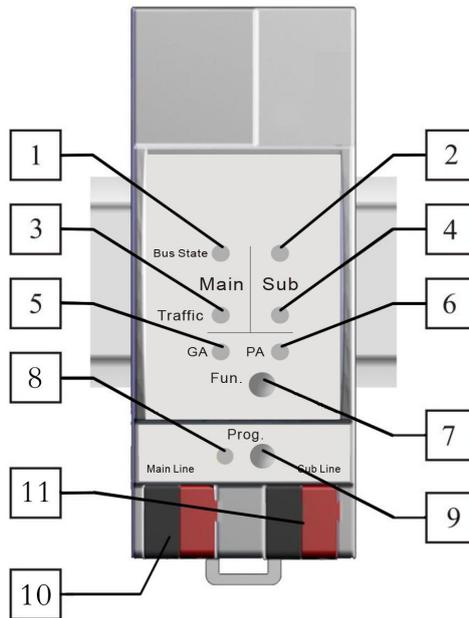
## 2.2. Dimension diagram



Dimensions in mm  
Tolerance: -0,5 mm/DIN 16742

1 SU = 18mm

### 2.3. Function of Display and Operator elements



Number	Element	Indication/Operation Description
1	Bus State Main LED	Green: Main line OK Orange: Manual function active
2	Bus State Sub LED	Green: Sub line OK Off: Sub not connected
3	Traffic Main LED	Green blinking: Telegram traffic on the main line Red blinking: Transmission error Off: No telegram traffic
4	Traffic Sub LED	Green blinking: Telegram traffic on the sub line Red blinking: Transmission error Off: No telegram traffic
5	GA LED	Green: Filter table active Orange: Route all Red: Block all Off: Routing of group telegram is different on main line and sub line

6	PA LED	<p>Green: Filter table active                  Orange: Route all                  Red: Block all                  Off: Routing of physical telegram is different on main line and sub line</p> <p><b>when used as the line couper without Individual Address x.y.0, PA LED works not like described here</b></p>
7	Function button	<p>During normal operation a rather short press (<math>\approx</math> 3 sec) activates and deactivates the Manual Function</p> <p>A long press (<math>\approx</math> 15 sec) soon followed by a short press (<math>\approx</math> 3 sec) executes the Factory Reset. After the second press, all parameters will be set to factory default (incl. Individual Address)</p>
8	Programming LED	<p>Red: device in addressing mode                  Off: device in normal operating mode</p> <p>Upon receiving the physical address the device automatically returns from addressing mode to normal operating mode</p>
9	Programming button	<p>Learning button for switching between normal operating mode and addressing mode for assigning the physical address</p>
10	KNX-Bus connection	TP Main line
11	KNX-Bus connection	TP Sub line

**Note:**

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

**Function button via very long press (15s), LEDs: Bus State Main and Bus State Sub are on orange, Group Addr and Physical Addr are on red (or green, or orange), release button and soon followed press again for 3 sec: resets all the parameter to factory default (incl. physical address), subsequently, LEDs show the normal operation display again.**

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## Chapter 3 Application Description Coupler

Application program	Max. number of communication objects	Max. number of group address	Max. number of associations
<b>KNX Line Coupler/Repeater</b>	<b>0</b>	<b>0</b>	<b>0</b>

### 3.1 Coupler

If the coupler receives telegrams (for example during commissioning) which use a physical address as destination address, it compares the physical addresses of the receiver with its own physical address and then decides whether it must route the telegrams or not.

The coupler reacts to telegrams with group addresses in accordance with its parameter settings. During normal operation (default setting), the coupler only routes those telegrams whose group addresses have been entered in its filter table.

If the coupler routes a telegram and does not receive an acknowledgement, or if a bus device finds a transmission error, the coupler repeats the telegram three times. With the parameters "Repetitions if errors...", this behaviour can be set separately for both lines. These parameters should be left in the default setting.

### 3.2 Repeater

Line repeaters do not have any filter tables. This means that a telegram is sent to all lines irrespective of whether it is processed in the corresponding line. It is therefore not important whether the telegram has been triggered within the lines or whether it has been sent from the main line to the lines via the line coupler.

If an error occurs during the transmission of a telegram with the physical address of a receiver, the line repeater can repeat the telegram. This behavior can be set separately for both line segments with the parameters "Physical telegrams: Repetition if errors on main line/on sub line".

If the line repeater routes a group telegram and does not receive an acknowledgement, or if a bus device finds a transmission error, the line repeater repeats the telegram three times. With the parameters "Group telegrams: Repetition if errors on main line/on sub line", this behaviour can be set separately for main line and sub line.

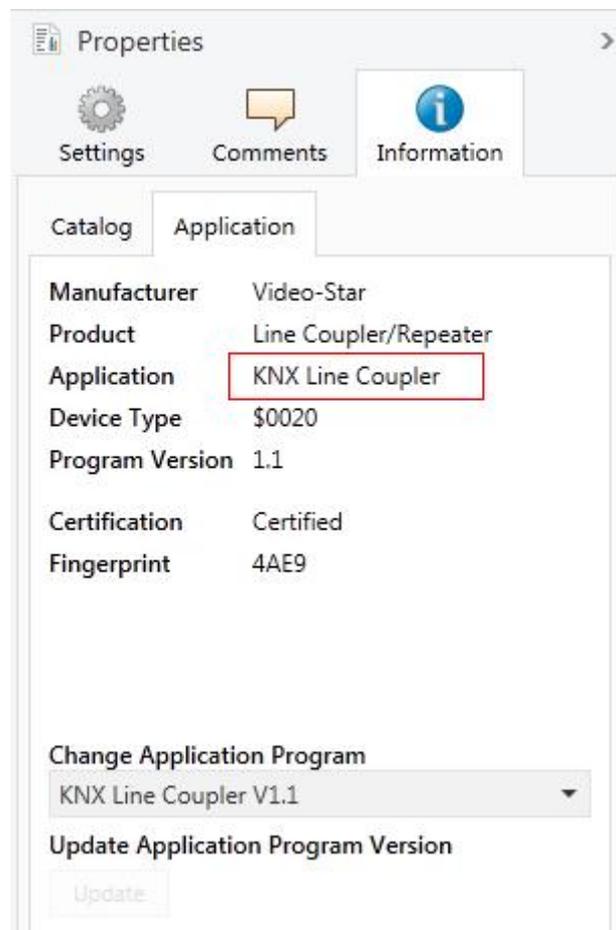
## Chapter 4 Parameter setting description in the ETS

### 4.1 Coupler

#### 4.1.1. Application

If not already configured as “coupler”, the corresponding application program for “coupler” should be downloaded.

Change can occur under “Change Application Program...” and could be checked under “Properties”:



#### 4.1.2. Parameter window “General”

Parameter window is shown as follow:

1.1.0 Line Coupler/Repeater > General		
General	Manual Function	pass all telegrams
Main line	Switch-off time for Manual Function	1 hour
Subline		

Fig.4.1: parameter window “General”

#### Parameter “Manual Function”

Telegram routing configuration for the manual function. Options:

- Disabled**
- Pass all telegrams**
- Pass all Physical telegrams**
- Pass all Group telegrams**

#### Parameter “Switch-off time for Manual Function”

Time duration required to exit from “manual operation”. Options:

- 10 min**
- 1 hour**
- 4 hours**
- 8 hours**

Please note that the parameter “transmit all” for Group or Physical telegrams is intended only for testing purposes and it should not be set for normal operation.

### 4.1.3. Parameter window "Main Line"

1.1.0 Line Coupler/Repeater > Main line

General	Telegram routing	Group and Physical: filter
Main line	Group telegrams: Main group 0...13	filter
	Group telegrams: Main group 14...31	filter
Subline	Physical telegrams	filter
	Physical telegrams: Repetition if errors on main line	up to 3 repetitions
	Group telegrams: Repetition if errors on main line	up to 3 repetitions
	Telegram confirmation on main line	if routed
	Send confirmation on own telegrams	no

Fig.4.2: parameter window "Main line"

#### Parameter "Telegram routing"

This parameter is to be set depending on the planned configuration. Options:

**Group: filter, Physical: block**

**Group and Physical: filter**

**Group: route, Physical: filter**

**Group and Physical: route**

**Configure**

Block: no telegram is routed.

Filter: only telegrams are routed which are entered in the filter table.

Route: the telegrams are routed.

Configure: the following parameters can be set individually.

#### Parameter "Group telegrams: Main group 0..13"

Options:

**Transmit all (not recommended)**

**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. The ETS produces the filter table automatically.

#### Parameter "Group telegram: Main group 14..31"

Options:

**Transmit all (not recommended)**

**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.

#### Parameter "Physical telegrams"

Options:

**Transmit all (not recommended)**

**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.

#### Parameter "Physical telegrams: Repetition if errors on main line"

Options:

**No**

**Up to 3 repetitions**

**Only one repetitions**

If a transmission error (e.g. due to missing receiver) is found when sending physical telegrams on the main line:

No: The physical telegrams are not repeated.

Up to 3 repetitions: The physical telegrams are repeated up to 3 times.

Only one repetitions: The physical telegrams are repeated only one time.

#### Parameter "Group telegrams: Repetition if errors on main line"

Options:

**No**

**Up to 3 repetitions**

**Only one repetitions**

If a transmission error (e.g. due to missing receiver) is found when sending group telegrams on the main line:

No: The group telegrams are not repeated.

Up to 3 repetitions: The group telegrams are repeated up to 3 times.

Only one repetitions: The group telegrams are repeated only one time.

#### Parameter "Telegram confirmations on main line"

Options:

**If routed**

**Always**

If routed: Only telegrams which are to be routed to the sub line are confirmed by an ACK on the main line .

Always: Each telegram on the main line is confirmed by an ACK.

#### Parameter "Send confirmation on own telegrams"

Options:

**Yes**

**No**

Yes: Every telegram on the main line is confirmed with its own ACK (from the Line coupler).

No: No confirmation with own ACK.

**Note:** If the parameter "Send confirmation on own telegrams" is set yes, the line coupler will send an ACK systematically when sending any own routed telegram.

#### 4.1.4. Parameter window "Sub Line"

1.1.0 Line Coupler/Repeater > Subline

General	Telegram routing	Group and Physical: filter
Main line	Group telegrams: Main group 0...13	filter
	Group telegrams: Main group 14...31	filter
Subline	Physical telegrams	filter
	Physical telegrams: Repetition if errors on subline	up to 3 repetitions
	Group telegrams: Repetition if errors on subline	up to 3 repetitions
	Telegram confirmation on subline	if routed
	Send confirmation on own telegrams	no
	Configuration from subline	<input checked="" type="radio"/> allow <input type="radio"/> block

Fig.4.3: parameter window "Sub line"

#### Parameter "Telegram routing"

This parameter is to be set depending on the planned configuration. Options:

**Group: filter, Physical: block**

**Group and Physical: filter**

**Group: route, Physical: filter**

**Group and Physical: route**

**Configure**

Block: no telegram is routed.

Filter: only telegrams are routed which are entered in the filter table.

Route: the telegrams are routed.

Configure: the following parameters can be set individually.

#### Parameter "Group telegrams: Main group 0..13"

Options:

**Transmit all (not recommended)**

**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. The ETS produces the filter table automatically.

#### Parameter "Group telegram: Main group 14..31"

Options:

**Transmit all (not recommended)**

**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.

#### Parameter "Physical telegrams"

Options:

**Transmit all (not recommended)**

**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.

#### Parameter "Physical telegrams: Repetition if errors on sub line"

Options:

**No**

**Up to 3 repetitions**

**Only one repetitions**

If a transmission error (e.g. due to missing receiver) is found when sending physical telegrams on the sub line:

No: The physical telegrams are not repeated.

Up to 3 repetitions: The physical telegrams are repeated up to 3 times.

Only one repetitions: The physical telegrams are repeated only one time.

Parameter "Group telegrams: Repetition if errors on sub line"

Options:

**No**

**Up to 3 repetitions**

**Only one repetitions**

If a transmission error (e.g. due to missing receiver) is found when sending group telegrams on the sub line:

No: The group telegrams are not repeated.

Up to 3 repetitions: The group telegrams are repeated up to 3 times.

Only one repetitions: The group telegrams are repeated only one time.

Parameter "Telegram confirmations on sub line"

Options:

**If routed**

**Always**

If routed: Only telegrams which are to be routed to the main line are confirmed by an ACK on the sub line .

Always: Each telegram on the sub line is confirmed by an ACK.

Parameter "Send confirmation on own telegrams"

Options:

**Yes**

**No**

Yes: Every telegram on the sub line is confirmed with its own ACK (from the Line coupler).

No: No confirmation with own ACK.

Parameter "Confirmation from sub line"

Options:

**Allow**

**Block**

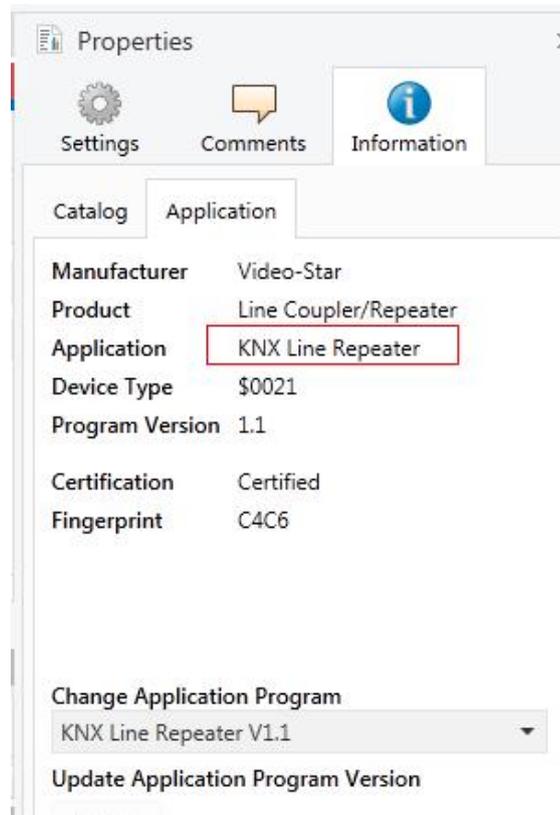
If blocked an ETS download to the line coupler can occur only via main line.

## 4.2 Repeater

### 4.2.1. Application

If not already configured as “repeater”, the corresponding application program for “repeater” should be downloaded.

Change can occur under “Change Application Program...” and could be checked under “Properties”:



#### 4.2.2. Parameter window "General"

Parameter window is shown as follow:

1.1.64 Line Coupler/Repeater > General

General	Manual Function	pass all telegrams
Main line	Switch-off time for Manual Function	1 hour
Subline		

Fig.4.4: parameter window "General"

#### Parameter "Manual function"

Telegram routing configuration for the manual function. Options:

- Disabled**
- Pass all telegrams**
- Pass all Physical telegrams**
- Pass all Group telegrams**

#### Parameter "Switch-off time for Manual function"

Time duration required to exit from "manual operation". Options:

- 10 min**
- 1 hour**
- 4 hours**
- 8 hours**

Please note that the parameter "transmit all" for Group or Physical telegrams is intended only for testing purposes and it should not be set for normal operation.

### 4.2.3. Parameter window "Main Line"

1.1.64 Line Coupler/Repeater > Main line

General	Telegram routing	<input checked="" type="radio"/> Group and Physical: route <input type="radio"/> configure
Main line	Physical telegrams	transmit all
Subline	Physical telegrams: Repetition if errors on main line	only one repetition
	Group telegrams: Repetition if errors on main line	only one repetition
	Telegram confirmation on main line	always
	Send confirmation on own telegrams	yes

Fig.4.5: parameter window "Main line"

#### Parameter "Telegram routing"

This parameter is to be set depending on the planned configuration. Options:

**Groups and Physical: route**

**Configure**

Route: the telegrams are routed.

Configure: the following parameters can be set individually.

#### Parameter "Physical telegrams"

Options:

**Transmit all**

**Block**

Transmit all: Physical telegrams are all routed.

Block: Physical telegrams are all blocked.

#### Parameter "Physical telegrams: Repetition if errors on main line"

Options:

**No**

**Up to 3 repetitions**

**Only one repetitions**

If a transmission error (e.g. due to missing receiver) is found when sending physical telegrams on the main line:

No: The physical telegrams are not repeated.

Up to 3 repetitions: The physical telegrams are repeated up to 3 times.

Only one repetitions: The physical telegrams are repeated only one time.

#### Parameter "Group telegrams: Repetition if errors on main line"

Options:

**No**

**Up to 3 repetitions**

**Only one repetitions**

If a transmission error (e.g. due to missing receiver) is found when sending group telegrams on the main line:

No: The group telegrams are not repeated.

Up to 3 repetitions: The group telegrams are repeated up to 3 times.

Only one repetitions: The group telegrams are repeated only one time.

#### Parameter "Telegram confirmations on main line"

Options:

**If routed**

**Always**

If routed: Only telegrams which are to be routed to the sub line are confirmed by an ACK on the main line .

Always: Each telegram on the main line is confirmed by an ACK.

#### Parameter "Send confirmation on own telegrams"

Options:

**Yes**

**No**

Yes: Every telegram on the main line is confirmed with its own ACK.

No: No ACK confirmation.

**Note:**

If the parameter “Send confirmation on own telegrams” is set yes, the repeater will send an ACK systematically when sending any own routed telegram.

Since the repeater has no filter table, it makes sense to send an ACK with every routed telegram.

**4.2.4. Parameter window “Sub Line”**

1.1.64 Line Coupler/Repeater > Subline

General	Telegram routing	<input checked="" type="radio"/> Group and Physical: route <input type="radio"/> configure
Main line	Physical telegrams	transmit all
Subline	Physical telegrams: Repetition if errors on subline	only one repetition
	Group telegrams: Repetition if errors on subline	only one repetition
	Telegram confirmation on subline	always
	Send confirmation on own telegrams	yes

Fig.4.6: parameter window “Sub line”

**Parameter “Telegram routing”**

This parameter is to be set depending on the planned configuration. Options:

**Groups and Physical: route**

**Configure**

Route: the telegrams are routed.

configure: the following parameters can be set individually.

**Parameter “Physical telegrams”**

Options:

**Transmit all**

**Block**

Transmit all: Physical telegrams are all routed.

Block: Physical telegrams are all blocked.

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**Parameter "Physical telegrams: Repetition if errors on sub line"**

Options:

**No**

**Up to 3 repetitions**

**Only one repetitions**

If a transmission error (e.g. due to missing receiver) is found when sending physical telegrams on the sub line:

No: The physical telegrams are not repeated.

Up to 3 repetitions: The physical telegrams are repeated up to 3 times.

Only one repetitions: The physical telegrams are repeated only one time.

**Parameter "Group telegrams: Repetition if errors on sub line"**

Options:

**No**

**Up to 3 repetitions**

**Only one repetitions**

If a transmission error (e.g. due to missing receiver) is found when sending group telegrams on the sub line:

No: The group telegrams are not repeated.

Up to 3 repetitions: The group telegrams are repeated up to 3 times.

Only one repetitions: The group telegrams are repeated only one time.

**Parameter "Telegram confirmations on sub line"**

Options:

**If routed**

**Always**

If routed: Only telegrams which are to be routed to the main line are confirmed by an ACK on the sub line .

Always: Each telegram on the sub line is confirmed by an ACK.

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Parameter "Send confirmation on own telegrams"

Options:

**Yes**

**No**

Yes: Every telegram on the sub line is confirmed with its own ACK .

No: No ACK confirmation .

## Chapter 5 State of Delivery

The KNX Line Coupler is delivered with the following default factory settings:

<b>Individual Address</b>	15.15.0
<b>Main line</b>	
<b>Telegram routing</b>	Group and Physical: filter
<b>Group telegrams: Main group 0...13</b>	filter (filter table is empty)
<b>Group telegrams: Main group 14...31</b>	route all
<b>Physical telegrams</b>	filter
<b>Physical telegram: Repetition if errors on main line</b>	up to 3 repetitions
<b>Group telegram: Repetition if errors on main line</b>	up to 3 repetitions
<b>Telegram confirmations on main line</b>	if routed
<b>Send confirmation on own telegrams</b>	no
<b>Sub line</b>	
<b>Telegram routing</b>	Group and Physical: filter
<b>Group telegrams: Main group 0...13</b>	filter (filter table is empty)
<b>Group telegrams: Main group 14...31</b>	filter
<b>Physical telegrams</b>	filter
<b>Physical telegram: Repetition if errors on sub line</b>	up to 3 repetitions
<b>Group telegram: Repetition if errors on sub line</b>	up to 3 repetitions
<b>Telegram confirmations on sub line</b>	if routed
<b>Send confirmation on own telegrams</b>	no
<b>Configuration from sub line</b>	allow