KSC-01L
TP Coupler/ TP Repeater
Instruction manual

KSC-01L Instruction Manual

Content

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KSC-01L Instruction Manual

Content

1 Product Description

The KNX TP Media Coupler KSC-01L works as a KNX line/area coupler to provide a bi-directional data connection between two KNX TP lines/areas. KNX TP main line and KNX TP subline are coupled having a galvanic isolation in between.

Using the TP Coupler application, KSC-01L can be used as a KNX TP line coupler to connect several KNX TP lines but also as a KNX TP area coupler to connect several TP areas or different KNX TP installation systems via a TP Backbone. Telegram filtering is accomplished according to the installation place in the hierarchy (Physically 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.

Using the TP Repeater application, KSC-01L 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 KSC-01L line repeaters. Each line segment requires its own KNX power supply unit.

To ease commissioning and troubleshooting the Manual Function for short-time telegram filter switch-off and special routing/repetition/confirmation settings are available.

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

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

1.1 Front Panel

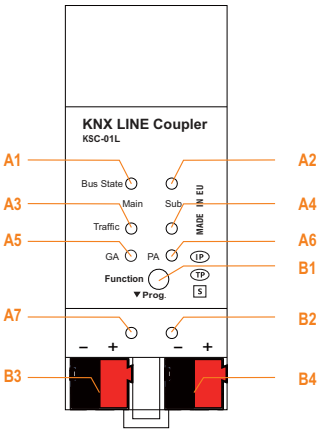

Figure 1: Front View

LEDs		Buttons / Connectors	
A1	Bus State KNX TP (Main line)	B1	Function Button
A2	Bus State KNX TP (Subline)	B2	Program Button
A3	Telegram Traffic KNX TP (Main line)	B3	KNX TP Main line Connector
A4	Telegram Traffic KNX TP (Subline)	B4	KNX TP Subline Connector
A5	Group Address Routing*		
A6	Physical Address Routing		
A7	Programming		

* only group telegrams with main groups 0...13

1.2 LED Indication

If KSC-01L is used as Line Couper without physical address x.y.0, LED 6 (PA) works not like described here.

Table 1: LEDs Colours

Number	LED	Colour	Explanation / Range
A1	Bus state KNX TP (Main line)	green	Main Line OK
		red	Manual Function active
A2	Bus state KNX TP (Subline)	green	Main Line OK
		<off>	Manual Function active
A3	Telegram Traffic KNX TP (Main line)	blinking green	Telegram traffic extent indicated by blinking
		blinking red	Transmission error
		<off>	No telegram traffic
A4	Telegram Traffic KNX TP (Subline)	blinking green	Telegram traffic extent indicated by blinking
		blinking red	Transmission error
		<off>	No telegram traffic
A5	Group Address Routing	green	Filter table active
		orange	Route all
		red	Block all
		<off>	Routing of Grout Telegrams is different on main line and subline
A6	Physical Address Routing	green	Filter active
		orange	Route all
		red	Block all
		<off>	Routing of Physical Telegrams is different on main line and subline
A7	Programming	red	Program Mode active
		<off>	Program Mode not active

1.3 Commissioning

Please note for commissioning with default settings:

- All telegrams are blocked because the filter table is not defined
- The Manual Function switch-off time is 120 min
- Physical address is 15.15.0
- WARNING: Do not connect to 230 V

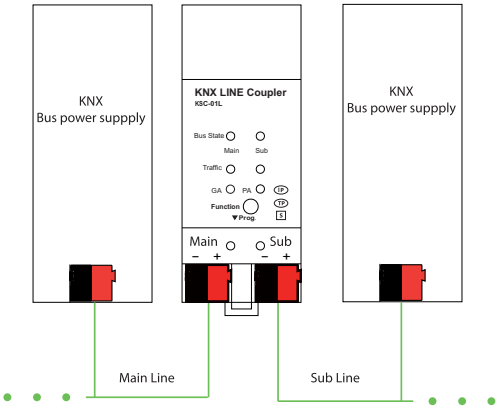

Figure 2: Connection Scheme

1.4 Feature Summary

- KSC-01L supports extended frames and long telegrams up to 239 bytes APDU length. With all Meanwell couplers and UIM interfaces long messages e.g. for energy metering applications and visualization purposes can be processed.
- ACK sending on sent out messages is ETS configurable.
- When there is no IACK response on the subline KSC-01L is able to repeat messages up to three times. Repetitions can be configured for both Physical Telegrams and Group Telegrams via ETS (to ease troubleshooting). After an IACK response no repetition is following and the negative IACK/BUSY failure echanism is maintained.
- Automatic function for switching back to run-time telegram filtering after configurable suspension period (see Manual Mode). This avoids forgetting the reactivation of filtering.
- 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.
- Temporarily suspending telegram filtering eases commissioning and debugging. Without ETS download temporary access to other lines becomes possible.
- In networks with high busload the internal amount of communication buffers are capable of smoothing peeks in the communication load course.
- KSC-01L's ETS database entries are available for ETS4 and later.

2 Operational Description

In network installations KSC-01L can be used as KNX TP area/line coupler or KNX TP line repeater. With its default settings KSC-01L operates as is supposed to.

2.1 TP Coupler Application

When KSC-01L receives telegrams (for example during commissioning) that use Physical Addresses as destination addresses, it compares the Physical Addresses of the receiver with its own physical address and decides on that whether it has to route the telegrams or not.

When KSC-01L receives telegrams that use group addresses as destination addresses, it reacts in accordance with the parameter settings. During normal operation (with default settings), KSC-01L only routes telegrams whose group addresses are entered in the filter table.

If KSC-01L routes a telegram and does not receive an acknowledgement, or if a bus device discovers a transmission error, the coupler repeats telegrams up to three times (depending on the corresponding parameter that is set by ETS). With the parameters „Repetitions if errors...“, this function can be configured separately for each line. 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.

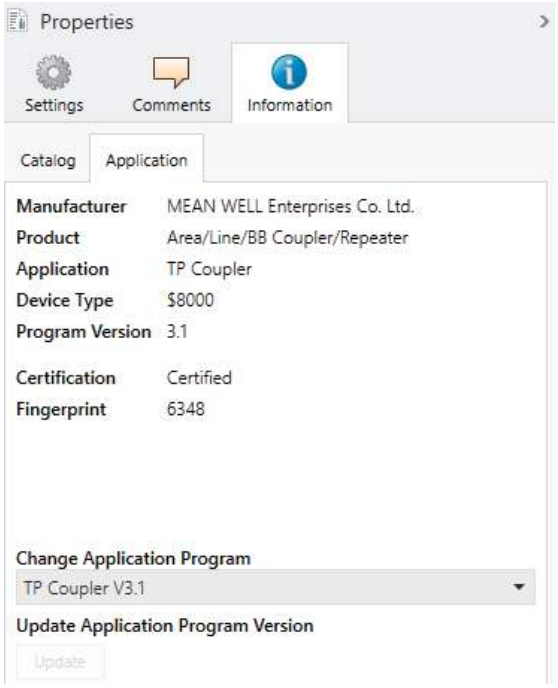

Figure 3: TP Coupler Application Program

2.2 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.

When a transmission error occurs, i.e. due to a wrong receiving Physical Address, the line repeater is able to repeat the telegram up to three times. With the parameter „Physical: Repetition if errors ...“ this function can be configured separately for each line.

In case of routing a Group Telegram without receiving an acknowledgement, the line repeater repeats telegrams up to three times. With the parameter „Group: Repetitions if errors…“, this function can be configured separately for each line.

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 can also be done here.

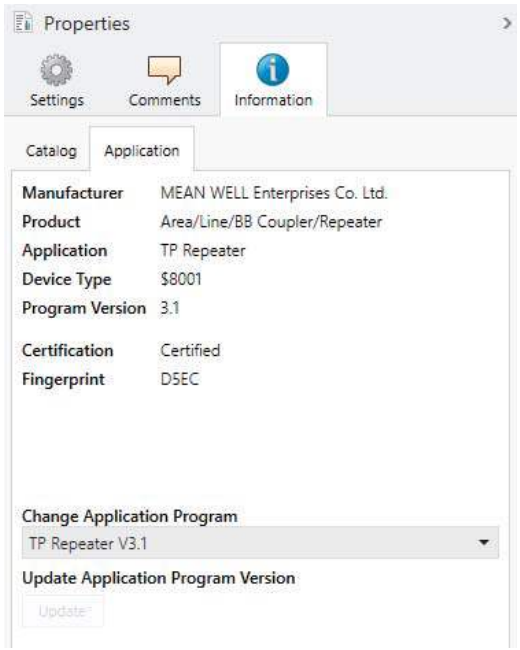

Figure 4: TP Repeater Application Program

2.3 KNX Network Installation

2.3.1 Physical Address

For line coupler functionality in a KNX network KSC-01L has to use the correct Physical Address of a line coupler (X.Y.0, 1≤X & 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 KSC-01L has to use the correct Physical Address of an area coupler (X.0.0, 1≤X≤15). In ETS up to 15 areas can be defined.

If KSC-01L is used in a KNX system for both purposes, it is only necessary to ensure that the KSC-01L used as a line coupler has a line coupler address assigned from a free addressing area. Following figure illustrates the KSC-01L router topology for KNX lines and KNX areas.

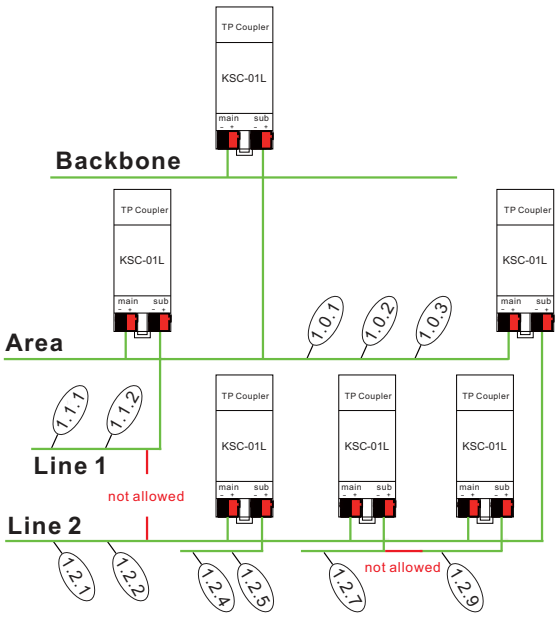

Figure 5: KSC-01L Network

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.

2.3.2 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 can 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.

Note: Each line segment requires its own KNX power supply unit.

Note: Using repeaters on the backbone or on the main line is not allowed.

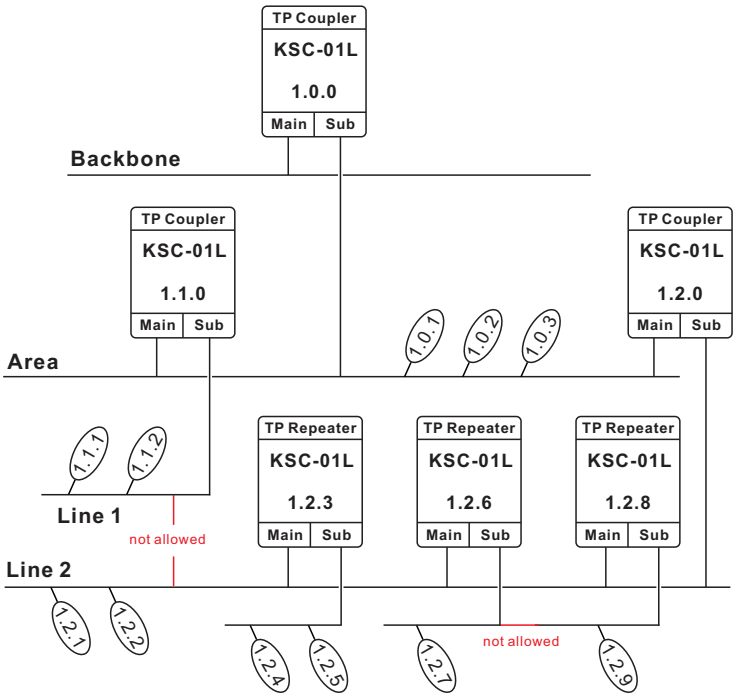

Figure 6: KSC-01L Network Topology

The free tree structure of the KNX topology prevents problems caused by circling telegrams and heavy bus load. So, interconnection between Lines is strictly forbidden.

2.4 Programming

2.4.1 Program Button

To download the desired physical address or an ETS setting the Program Button must be pressed first. Successive pressing the Program Button will turn on and off the Program Mode. LED 7 lighting in red colour indicates Program Mode is active. When Program Mode is active ETS recognizes the device of interest for downloading.

2.4.2 Physical Address Assignment

To commission the device an interface connection (IP, USB) to the KNX bus system is required. The device is supplied with the individual physical address 15.15.0. The KNX product database entry (available for ETS4 and higher) can be downloaded from the Meanwell website and from the KNX Online Catalog.

With the ETS the physical 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 Program Button the device restarts itself.

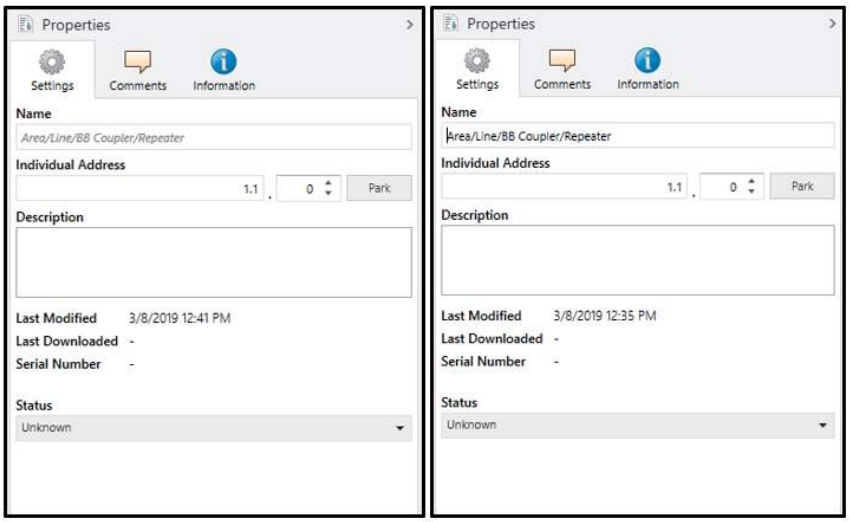

Figure 7: ETS Properties Window

Note: In this document only the term “physical address” is used. The term “physical address” means the KNX physical address as well as the ETS individual address. Both terms are used by the KNX organization interchangeably.

2.5 Special Functions

The Function Button activates KSC-01L´s special functions. Manual Function and Factory Reset can be activated. It depends on time/number/state the Function Button is being pressed.

2.5.1 Manual Function

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

When the Manual Function is active, either all Physical Telegrams or all Group Telegrams or both pass the KSC-01L without filtering. After the Switch-off time period has elapsed KSC-01L 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 3.1 and 4.1. After switching back from Manual Function to normal operation the latest downloaded parameter setting / filter table entries are active again.

2.5.2 Factory Reset

A very long press (≈ 15 sec) of the Function Button soon followed by a second press for some seconds executes the Factory Reset. After the first press the LED display lights different with mixed colour. After the second press all parameters will be set to factory default (incl. physical address). Subsequently, LEDs show the normal display again.

2.5.3 LED Status Display

Table 3: LED Status Display for Manual Function

Number	LED	Colour	Comment
A1	**Bus State KNX TP (Main line)**	green	
A2	**Bus State KNX TP (Subline)**	orange	If connected
A5	**Group Address Routing**	orange	
A6	**Physical Address Routing**	orange	

Table 4: LED Status Display for Factory Reset after first Button Press

Number	LED	Colour	Comment
A1	**Bus State KNX TP (Main line)**	orange	
A2	**Bus State KNX TP (Subline)**	orange	Lights red if not connected
A5	**Group Address Routing**	orange	
A6	**Physical Address Routing**	orange	

3 ETS Database Parameters Coupler

All screen shots are related to the KSC-01L database file R3-0f in ETS5.

3.1 General

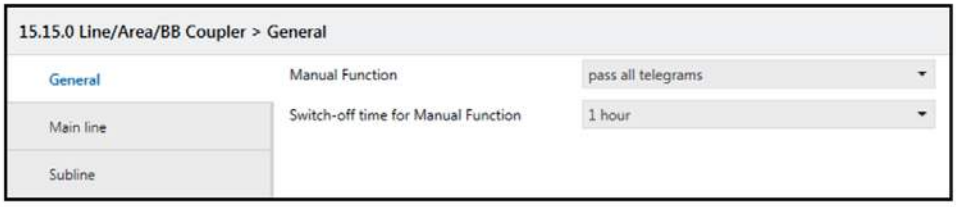

Figure 8: General Tab Parameters

Table 5: General Tab Parameter Settings

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

3.2 Main Line

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

Note: If the parameter “Send confirmation on own telegrams” is set to “yes”, the KSC-01L systematically sends an ACK on any own routed telegram.

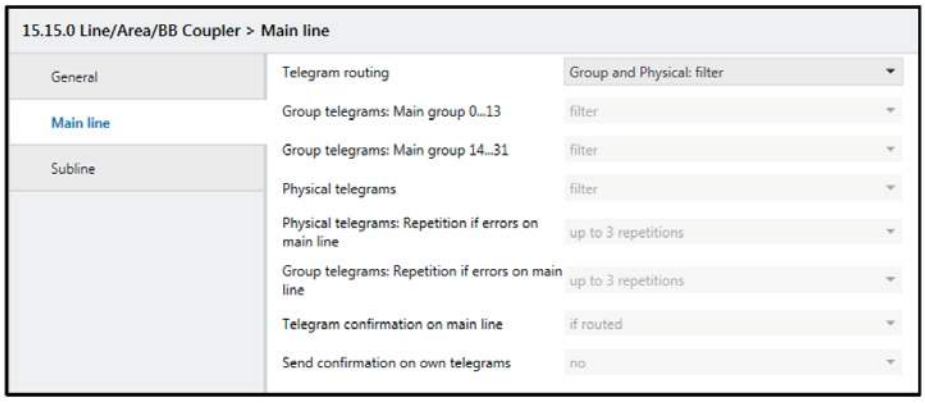

Figure 9: Main Line Tab Parameters

Table 6: Main Line Tab Parameter Settings

ETS Parameter	Setting [Factory Default]	Comment	
Telegram routing	Group: filter, Physical: block Group and Physical: filter Group: route, Physical: filter Group and Physical: route configure **[Group and Physical: filter]**	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 (not recommended) block filter **[filter]**	• Group telegrams (main group 0...13) are all routed. • Group telegrams (main group 0...13) are all blocked. • Group telegrams (main group 0...13) are routed if entered in the filter table.	
Group telegrams: Main group 14...31	transmit all (not recommended) block filter **[filter]**	• Group telegrams (main group 14...31) are all routed. • Group telegrams (main group 14...31) are all blocked. • Group telegrams (main group 14...31) are routed if entered in the filter table.	
Physical telegrams	transmit all (not recommended) block filter **[filter]**	• Physical telegrams are all routed. • Physical telegrams are all blocked. • Depending on the physical address Physical telegrams are routed.	

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

3.3 Subline

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

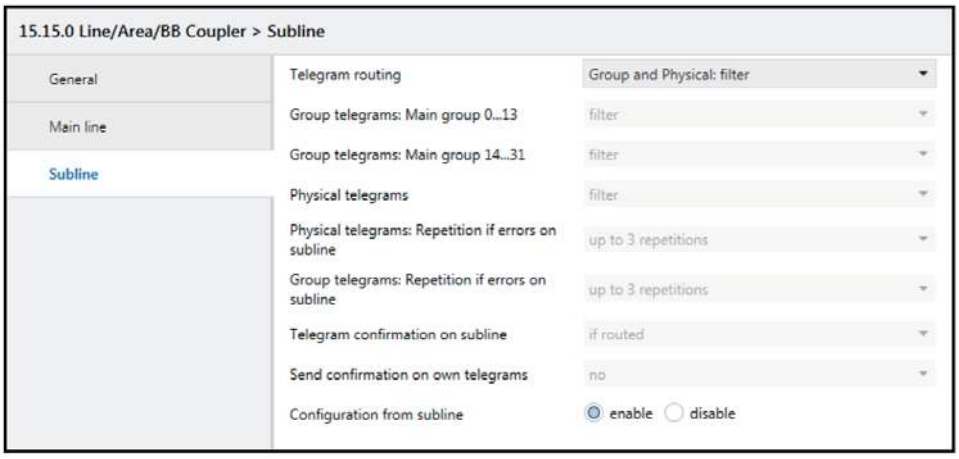

Figure 10: Subline Tab Parameters

Table 7-1: Subline Tab Parameter Settings

ETS Parameter	Setting [Factory Default]	Comment	
Telegram routing	Group: filter, Physical: block Group and Physical: filter Group: route, Physical: filter Group and Physical: route configure **[Group and Physical: filter]**	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 (not recommended) block filter **[filter]**	• Group telegrams (main group 0...13) are all routed. • Group telegrams (main group 0...13) are all blocked. • Group telegrams (main group 0...13) are routed if entered in the filter table.	
Group telegrams: Main group 14...31	transmit all (not recommended) block filter **[filter]**	• Group telegrams (main group 14...31) are all routed. • Group telegrams (main group 14...31) are all blocked. • Group telegrams (main group 14...31) are routed if entered in the filter table.	
Physical telegrams	transmit all (not recommended) block filter **[filter]**	• Physical telegrams are all routed. • Physical telegrams are all blocked. • Depending on the physical address Physical telegrams are routed.	

ETS Parameter	Setting [Factory Default]	Comment
Physical telegrams: Repetition if errors on subline	no up to 3 repetitions one repetition **[up to 3 repetitions]**	After subline transmission error (e.g. due to missing receiver) Physical telegrams • are not repeated. • are repeated max. 3 times. • are repeated once.
Group telegrams: Repetition if errors on subline	no up to 3 repetitions one repetition **[up to 3 repetitions]**	After subline transmission error (e.g. due to missing receiver) Group telegrams • are not repeated. • are repeated max. 3 times. • are repeated once.
Telegram confirmation on subline	if routed always **[if routed]**	• Routed telegrams to main line are confirmed by an ACK on the subline. • Each telegram on the subline is confirmed by an ACK.
Send confirmation on own telegrams	yes no **[no]**	• Telegrams sent out to the subline are confirmed by added ACK. • No ACK confirmation.
Configuration from subline	enable disable **[enable]**	If blocked an ETS download to the KSC-01IL can occur only via main line.

4 ETS Database Parameters Repeater

All screen shots are related to the **KSC-01L** database file R3-0f in ETS5.

4.1 General

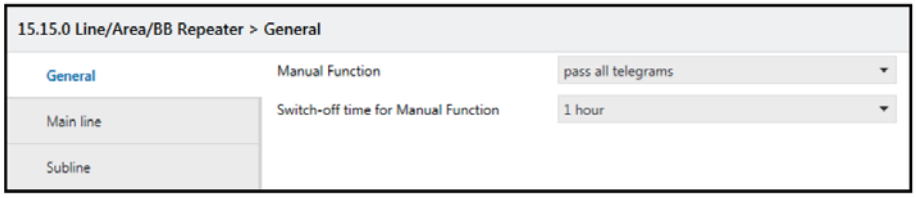

Figure 11: General Tab Parameters

Table 8: General Tab Parameter Settings

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

4.2 Main Line

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

Note: If the parameter “Send confirmation on own telegrams” is set to “yes”, the KSC-01L 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.

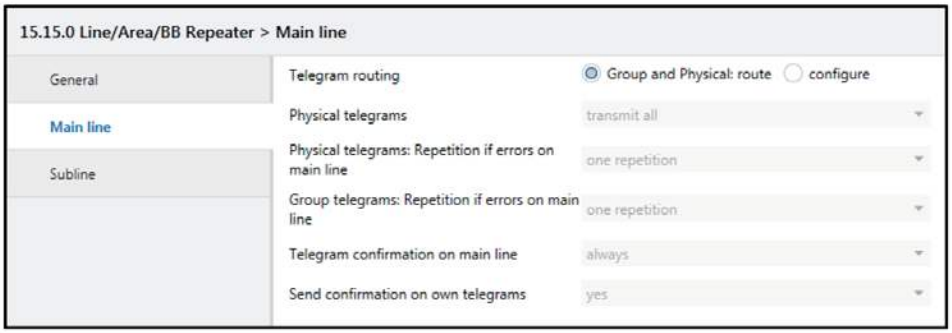

Figure 12: Main Line Tab Parameters

Table 9: Main Line Tab Parameter Settings

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

4.3 Subline

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

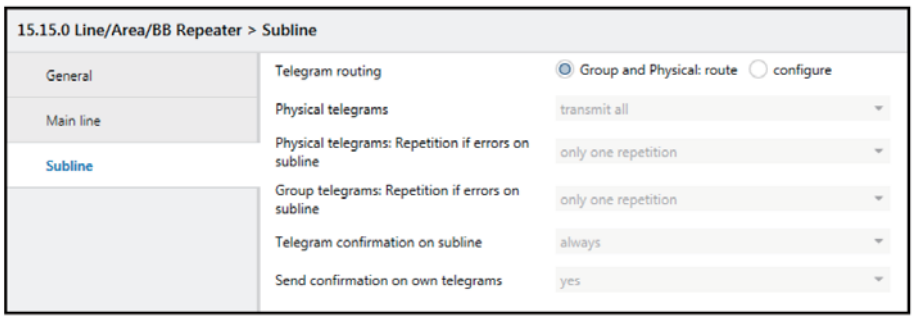

Figure 13: Subline Tab Parameters

Table 10-1: Subline (KNX TP) Tab Parameter Settings

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

5 State of Delivery

5.1 Default Factory Setting

Table 11: Default Factory Setting

General	
Product	Area/Line/BB Coupler/Repeater
Order Numbers	KSC-01L
Applications	TP Coupler, TP Repeater
ETS Names	Area/Line/BB Coupler/Repeater KSC-01L
Physical Address	15.15.0

Main line to Subline	
Group telegrams (main group 0...13)	filter
Group telegrams (main group 14...31)	filter
Physical telegrams	filter
Physical: Repetition if errors on main line	up to 3 repetitions
Group: Repetition if errors on main line	up to 3 repetitions
Telegram confirmations on main line	if routed

Subline to Main line	
Group telegrams (main group 0...13)	filter
Group telegrams (main group 14...31)	filter
Physical telegrams	filter
Physical: Repetition if errors on subline	up to 3 repetitions
Group: Repetition if errors on subline	up to 3 repetitions
Telegram confirmations on subline	if routed
Send confirmation on own telegrams	no
Configuration from subline	enable

5.2 Technical Datasheet

Marking/Design	KSC-01L
Current consumption	< 10 mA
Connections	KNX TP main line: KNX TP connector (red/black), screwless, for single-core cable Ø 0.6...0.8 mm KNX TP subline: KNX TP connector (red/black), screwless, for single-core cable Ø 0.6...0.8 mm
LED Display elements	State (Main and Sub) Traffic (Main and Sub) Routing (GA and PA) Programming
Control elements	Function Button Program Button
Mounting	35 mm top-hat rail (TH35) according to IEC60715
Protection type	IP20 according to IEC60529
Pollution degree	2 according to IEC60664-1
Protection class	III according to IEC61140
Overvoltage category	III according to IEC60664-1
Approbation	KNX-certified according to ISO/IEC14543-3
CE Marking	According to low voltage and EMC guidelines Compliance with EN50491-5, EN50581, EN60669 and EN61000-6
Power supply	Safety extra low voltage, 21...30V DC (SELV)
Housing colour	Plastic PA66 housing, grey
Housing dimensions	H = 90 mm, W = 36 mm (2 modules), D = 71 mm
Mounting depth	64 mm
Weight	66 g
Operating temperature	-5...45 °C
Storage temperature	-20...60 °C
Ambient humidity	5...93 %, non-condensing

5.3 Technical Drawings

Note: All dimensions shown here are specified in mm.

Note: The total device width is 2 modules at 18 mm.

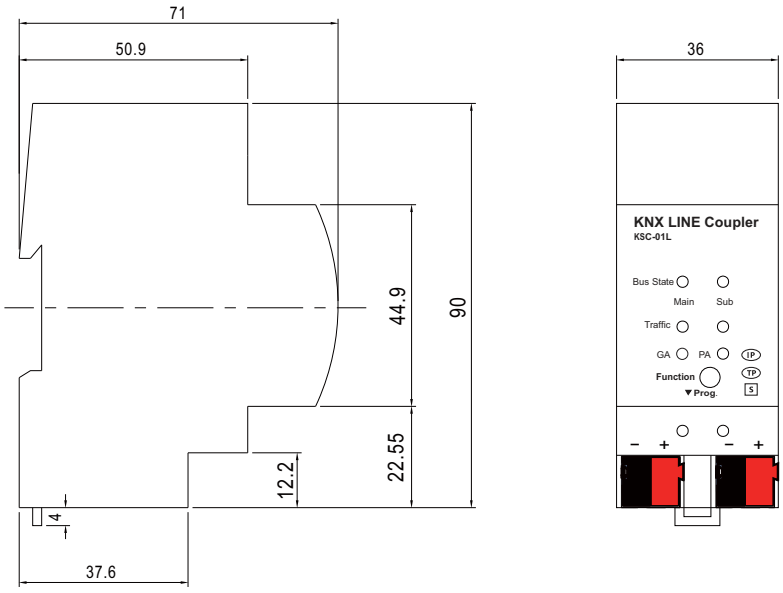

Figure 14: Dimension drawings

明緯企業股份有限公司
MEAN WELL ENTERPRISES CO., LTD.
248新北市五股區五權三路28號
No.28, Wuquan 3rd Rd., Wugu Dist., New Taipei City 248, Taiwan
Tel:886-2-2299-6100 Fax:886-2-2299-6200
http://www.meanwell.com E-mail:info@meanwell.com

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