**Segment coupler for DIN rail mounting**

The LCN-SK can be used in large establishments for coupling several LCN buses with each other. It is a member of the Lokal Control Network.

Every seperate bus (with up to 250 modules) will become a segment within the complete bus system. Up to 120 segments can be used, so that over 30000 LCN-modules can be operated in each object.

LCN-Bus

phase N data
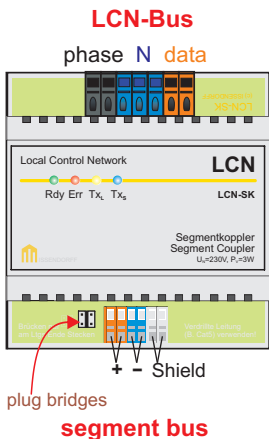
Application:

The LCN-SK modules can be used in dry rooms in main distribution boxes and sub distribution boxes.

The segment couplers communicate with each other over a symmetrical twisted wire pair (CAT5, for example), which galvanically seperates from the rest of the citcuit.

With the standard data rate (312,5kBit/s), the distance between two couplers must not exceed 800 m (see also page 4).

The segment bus cable is used preferably as a transfer line between main distibution boxes from different floors or in every part of a building, where an LCN-SK is situated.

Local Control Network   **LCN**

Rdy Err Tx_L Tx_S   **LCN-SK**

Segmentkoppler
Segment Coupler
U_s=230V, P_v=3W

+ − Shield

plug bridges

segment bus

The connection:

The LCN-SK module has two connecting blocks:
- The power supply side with the LCN-Bus (for the power supply of the segment coupler)
- The segment bus side for the two wire connection of the twisted pair and its shielding.

The terminals on the 230V side are colourfully marked as follows:

Description	Colour	Function
D	orange	data wire
N	blue	neutral wire
L	black	phase (L1, L2 or L3)

on the segment bus side there are grey and orange terminals, which are doubled for loop through functions.
The polarity is important: Within a construction all blue and all orange terminals with the same colours must be connected with each other. On the far right grey terminal pair, the shielding from the cable is to be connected.

If an LCN-SK is falsely connected to the segment bus, it will unsuccessfully try to commu-nicate with the Bus and will interfere with the rest of the segment couplers.

Rules for installation:

1. The segment bus may only be wired as a line - that differs it from the normal LCN Bus, which allows a free (tree) structure. In oter words: The segment cable is directly led from coupler to coupler. The segment couplers are lying in a row, just like pearls on a chain.

2. On both ends of the chain, the first and last coupler, the bridges (see illustr. page 1) have to be stuck in (Bus-termination). On all the other couplers the bridges have to be removed.

3. It is important, to only strip the cable short (max. 2 cm) and to pull the twisted pairs apart, just enough as is needed to connect.

4. You must make sure, that the shielding from all segment bus cables are joined to all couplers and are completely connected throughout.
The shielding must not be connected to the PE- or the N-potential!

5. Unused wires from the segment bus cable must not be used for any external signals.

These rules are important - the segment couplers cannot contact or the connection keeps breaking up (blue LED turns off/flashes).

Notes about segment bus lengths:
Depending on the length of the data wire and amount of the connected segment couplers , repeaters (ArcNet booster amplifiers) are required under certain circumstances.
Recommendation: The range reaches 800 m with only 2 installed LCN-segment couplers, 500 m with 5 couplers, 300 m with 10 couplers and 100 m when 30 segment couplers are connected to a strand. When the cable length and/or the amount of LCN-SK´s exceeds, repeaters must be switched betweeen. Every strand between the repeaters should apply to the rules mentione above.
The exact range depends on the type of cable (we recommend: CAT5, CAT6e) and from the care put into connecting: Please follow the rules on the next page: Do not seperate the twisting too far down - 2 cm are enough! (see also page 5)
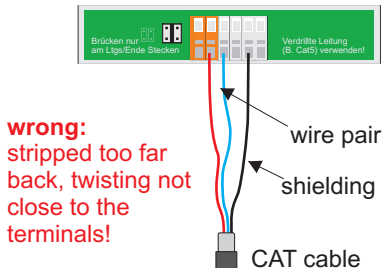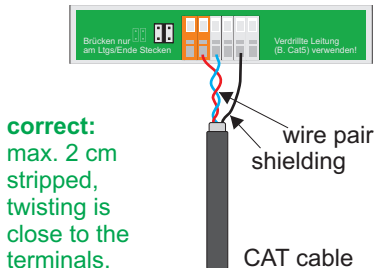The full transfer power (1000 T/s) is often not required. In these cases the speeds can be reduced down to 1/4 or 1/8, to increase the range. So are distances up to 3 km reachable (see also page 10).

Notes about overvoltage protection:
When operating overvoltage protection devices for the segment bus, the maximum given cable length is reduced to 50 m on each transfer route.

The power supply terminals are voltage fixed to a max. of 4kV according to VDE. Additional measures against operational overvoltages are normally not required. (Measures for lightning protection should be applied as usual.)

Notes about installing the segment bus:

wrong:
stripped too far
back, twisting not
close to the
terminals!

wire pair

shielding

CAT cable

correct:
max. 2 cm
stripped,
twisting is
close to the
terminals.

wire pair

shielding

CAT cable

Note:
As always with electronic, suppressor elements (e.g.VDR´s, RC-elements) are to be
planned with coils from 230V~ contactors and relays, that are installed in the same
distribution boxes as the LCN modules.

The LED displays:
The LCN-SK has 4 LEDs, Which show ist operating condition clearly:

Green:
The operation display has also the same function as the other LCN modules: It should flash 1x when operating.
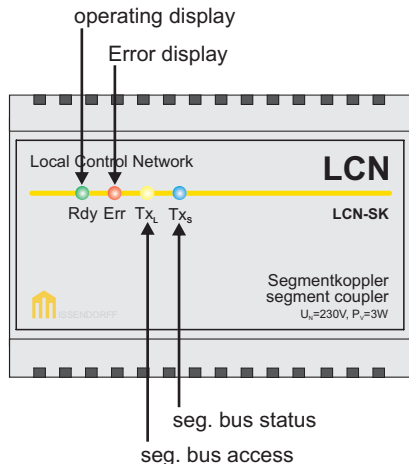
Red:
The error display normally stays dark. It shows operating errors on the LCN side - even the normal LCN modules have this LED.

Yellow:
The segment bus status is indicated through flashing. In normal operation this LED should flash 1x.

Blue:
The segment access LED shows the access on to the segment bus: Only when it lights up continuously, connection is good.

operating display

Error display

Local Control Network

LCN

Rdy Err Tx$_L$ Tx$_S$

LCN-SK

Segmentkoppler
segment coupler
U$_n$=230V, P$_v$=3W

ISSENDORFF

seg. bus status

seg. bus access

Status display of the lamps in detail:

nr. of flashes   message:

GREEN (flashes constantly):

1	normal operation
2	self testing-error, module is not programmed
3	Bus error: module cannot send
5	module is in programming mode

RED (flashes only when occurances are entered):

1	key was pressed, command was sent
2	different errors: please check with PC and the LCN-PRO
3	received telegram data was faulty
5	received illegal command (will be ignored)
6	error in the structure of a received command
7	parameter of a command exceeds permitted limit
8	command received cannot be carried out at the moment

YELLOW (flashes continuously):

1	everything is OK., connection exists with the segment bus
2	no contact to other segment couplers
4	setup error: segment number has been chosen twice

BLUE

bright	bright constant light show connection to the segment bus
schimmers	(flashes occasionally) no connection to other segment couplers
dark	segment coupler is locked (segmet number is greater than 127)

How it works:

As soon as the segment couplers are supplied with 230V (120V) operating voltage and are setup, they communicate with each other.

Every segment coupler, which is successfully connected to the segment bus in this way, shows this through a continuous blue luminous LED on the front plate of the LCN-SK. At the same time the segment bus observes ist LCN-Bus. When it finds telegrams there, which are to be transferred over the segment bus, it picks up the data. It then sends them directly to the target segment in a high speed. Once the receiving SK has verified the flawless news reception from the sending SK, is the transfer completed. (This ensures a safe transfer between the segments. The function verification of the modules do not depend on this (have own message levels.)

Setting up:
When not programmed, the segment coupler is **without** function: The green LED for the operating display (left) flashes 2x (in the same way as all unprogrammed LCN modules).

Note: Because the unprogrammed LCN-SK builds up no connection with other couplers, every coupler has to be programmed in ist own segment when setting up! As soon as the coupler becomes an ID in the normal way, it becomes active and tries to log in to the segment bus with this number.

At first the coupler uses ist own module ID as segment number!

If you give the coupler the ID=5 for example, it will try to log in to the segment bus as segment 5. This is desired in small objects:

When setting up the segment coupler, it´s enough to give it the ID (5 - 127) and to give the segment coupler a name - that´s all!

The segment number can be given independently from the module ID: Go directly into the properties in the LCN-PRO: The segment number may lie between 5 and 127. If you tip in 0 (zero), the module will take over ist module ID as segment number again.

When 128 is chosen, the segment couplers will lock. It will decouple itself from the segment bus; the blue LED turns off. This function can be useful in service cases.

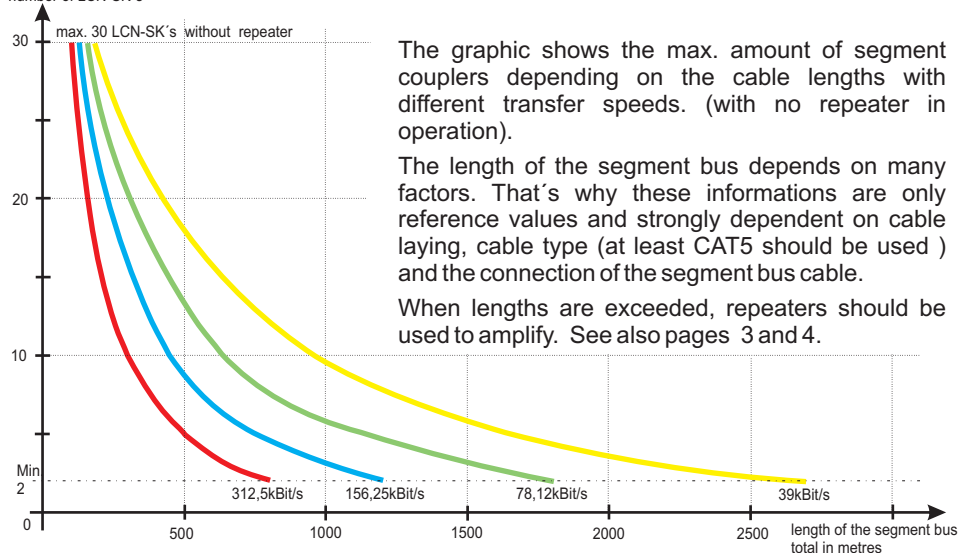**Note:**
When a telegram on a segment is not accepted from another segment coupler, the sending coupler will repeatedly try sending out for a duration of 2,5s. After this time it will discard the telegram.

The same goes for telegrams that are falsely sent out to segments that don´t exist. Please avoid such setup errors, through this data buffer will be unnecessary blocked in the LCN-SK for 2,5s.

Diagram over the segment bus lengths:

number of LCN-SK´s

max. 30 LCN-SK´s without repeater

The graphic shows the max. amount of segment couplers depending on the cable lengths with different transfer speeds. (with no repeater in operation).

The length of the segment bus depends on many factors. That´s why these informations are only reference values and strongly dependent on cable laying, cable type (at least CAT5 should be used) and the connection of the segment bus cable.

When lengths are exceeded, repeaters should be used to amplify. See also pages 3 and 4.

30

20

10

Min
2

312,5kBit/s   156,25kBit/s   78,12kBit/s   39kBit/s

0

500   1000   1500   2000   2500   length of the segment bus
                                                                                              total in metres

Important note:
Despite its extensive functionalities, the LCN system is simple to install and programme: It´s all in the hands of the electrician. However a **training course is necessary for every electrician,** who installs this system. The direct users support over the telephone hotline, is only free of charge and open to installers who have taken part in a training course.

Technical data

Connection

power supply:	230VAC ±15% 50/60Hz (110V lieferbar)
power consumption:	2W
terminals/wire type (load side):	screwless, solid max. 2,5mm² or fine wire with wire-end sleeves max. 1,5mm^2
	loop through current max. 16A

Segment-Bus

terminals/wie type:	screwless, solid max. 0,8 mm² (shielded)
cable length:	see page 10 and documentation "TDi LCN-SK"
participants:	max. 120

Installation

operating temperature:	-10^0C..$+ 40^0$C
air humidity:	max. 80% rel., non condensing
environmental conditions:	Use as stationary installation according to VDE632, VDE637
protection art:	IP20
dimensions (BxDxH):	85,5 mm (5HP) x 92 mm x 66,5 mm
installation:	DIN rail 35mm (DIN50022)

Technical information and images are non binding. Changes are reserved.
Technical hotline: +49 5066 998844 or www.LCN.de