# Light signal decoder 

for light-signals with LED
from the Digital-Professional-Series !
LS-DEC-SBB-F Part-No.: 513012
>> finished module <<

## Suitable for the digital systems: Märklin-Motorola and DCC

## For digital control of:

$\Rightarrow$ up to two Swiss SBB signals with 5 or 7 lamps
$\Rightarrow$ signals can be switched together or independent
$\Rightarrow$ for LED-signals with common anode or cathode
Realistic operation of the signal aspects by implemented dimming function and dark phase between the signal aspects.

This product is not a toy! Not suitable for children under 14 years of age! The kit contains small parts, which should be kept away from children under 3! Improper use will imply danger of injuring due to sharp edges and tips! Please store this instruction carefully.


## Introduction/Safety instruction:

You have purchased the light signal decoder LS-DEC-SBB for your model railway as a kit or as finished module.
The LS-DEC is a high quality product that is supplied within the Digital-Professional-Series of Littfinski DatenTechnik (LDT).
We are wishing you having a good time using this product.
The light signal decoder LS-DEC of the Digital-Professional-Series can be easily operated on your digital model railway.
By using a connector plug bridge you can choose if you want to connect the decoder to a Märklin-Motorola system or to a digital system with DCC standard.
The finished module comes with a 2 years limited warranty.

- Please read the following instructions carefully. Warranty will expire due to damages caused by disregarding the operating instructions. LDT will also not be liable for any consequential damages caused by improper use or installation.


## Connecting the decoder to your digital model railway

## layout:

- Attention: Before starting the installation-work switch off the layout voltage supply (switch-off the transformers or disconnect the main supply).
The Light signal decoder LS-DEC is suitable for the DCC data format as used e.g. by Lenz-Digital Plus, Roco-Digital (switching via Keyboard or multiMAUS only; switching via Lokmaus $2 \mathbb{B}$ and $R 3 ®$ is not possible), Zimo, LGB-Digital, Intellibox, TWIN-CENTER, DiCoStation, ECoS, EasyControl, KeyCom-DC and Arnold-Digital / Märklin-Digital= whenever no connector plug bridge is inserted in position J2.
The decoder is suitable for Märklin-Digital~ / Märklin Systems or Märklin-Motorola (e.g. Control-Unit, Central Station, Intellibox, DiCoStation, ECoS, EasyControl, KeyCom-MM) if you insert a connector plug bridge on J2.
The decoder receives the digital information via the clamp KL2. Connect the clamp with a rail or even better connect the clamp directly to the command station or a booster assuring the supply of digital information free from any interference.

Please attend to the marking on clamp KL2. The colors 'red' and 'brown' next to the clamp are usually used by Märklin-Motorola systems (e.g. Märklin-Digital~ / Märklin Systems / Intellibox).


Lenz-Digital systems are using the letters ' $\mathbf{J}$ ' and ' $K$ '.
In case you assemble the decoder to an Arnold-Digital (old) or Märklin-Digital= system, you have to connect 'black' to 'K' and 'red' to 'J'.
The decoder receives the power supply via the two poles clamp KL1. The voltage shall be in a range of $14 . .18 \mathrm{~V} \sim$ (alternate voltage output of a model rail road transformer).
If you do not want to supply voltage separately from a transformer to the LS-DEC decoder you can shorten the clamp KL1 and KL2 with two wires. In this case the decoder will get the power supply completely from the digital network.

## Connecting the signals:

General:
Up to 2 signals with 5 or 7 lamps can be connected to the light signal decoder LS-DEC. One signals per clamp block. The build up of the two clamps is identical. The following description refers mainly to one clamp only. As you can see on the identical marking the description is also valid for the second clamp.

Common connection:
All LED-signals of any manufacturer are designed in accordance to the same principle. One wire of all light emitting diodes of a signal will be generally connected to a common wire. Depending if all anodes or all cathodes are connected together the signals will be called as common anodes- respectively common cathodes-signal.

If you use signals with common anodes you have to clamp this wire to the connection marked ' + '. In addition you shall not insert the connection plug bridge in J1 in this case.
If you use signals with common cathodes you have to clamp this wire to the connection marked '- - '. In addition you shall insert the connection plug bridge in J1 in this case.
The second connection of each light diode is separated and mostly color marked at the end and contains a series resistor.

## Series resistor:

Light emitting diodes have always to be operated with a suitable series resistor to prevent that they will be destroyed. For this prevention all outputs have already a series resistor of 330 Ohm integrated on the printed circuit board of the light signal decoder LS-DEC. Is there no further external resistor the diode-current will be about 10 mA .
This provides sufficient brightness. In case your light diodes are to bright you can correct the brightness by assembling external resistors of some 100 Ohms to your personal requirement.

For assigning the single cables of the light diodes to the correct clamp connection please attend to the below signal images. The marks next to signal light diodes are not corresponding to the actual light color but to the marking of the connection at the light signal decoder LS-DEC.

1. Home signal with 5 or 7 lamps:

2. Advance signal with 5 lamps:


There are three wire bridges required. Connect GN1 with GN, RT2 with


If you do not know the correct allocation of the single wires to the light emitting diodes you can test the function by connecting the wires to clamp RT1 or RT2. These outputs are active because the decoder switches all signals to red after switching on.
Further sample connections are available at the internet on our WebSite (www.ldt-infocenter.com) under "Downloads". Please load the file "LSDEC-SBB_INFO_engl" onto your PC.

## Programming the decoder address:

- Switch on the power supply of your model rail way.
- Activate the programming key S1. Do not touch the integrated circuits of the pc-board because any electrostatic discharge can destroy the IC's.
- At least two light emitting diodes on a signal connected to the left clamp block will be automatically switched over every 1,5 seconds in a flashing mode. This indicates that the decoder is in the programming mode.
- The decoder addresses for magnet accessories also to be used for switching the signal-aspects are combined into groups of four. The address 1 to 4 build the first group. The address 5 to 8 build the second group etc. In accordance to the operation mode 4 or 8 addresses will be assigned to the decoder. At the mode "single function" both signals connected to the light signal decoder can be operated absolute independent. The decoder requires for the operation mode 8 addresses ( 4 addresses for each clamp bar).
At the "master/slave-function" both signals will be switched with one command. Therefore will it be possible e.g. to switch homeand advance signals together. In this operation mode the light signal decoder requires only 4 addresses.
The operation mode has to be entered together with the decoder address. If you activate during address-programming a key of the required group of four which would switch a turnout straight or a signal to green the decoder will go into the "single function mode". If you activate a key which would switch a turnout round or switch a signal to red you choose therefore the "function master/slave".
- If the decoder has recognized the assignment correctly the connected light emitting diode will flash a little faster. Afterwards the flashing slows down to the initial 1,5 seconds again.
In case the decoder will not recognize the address it could be that the two digital information connections (clamp2) are wrong connected. For testing this, switch off the power supply, exchange the connection on KL2 and start addressing again.
- Press now the programming key S1 again. Have you chosen the operation mode "master/slave function" the decoder will leave the programming mode because the programming of the group of four has been completed. All signals will be automatically switched to stop. The "master/slave function" has now been completed. Have you chosen the operation mode "single function" you have assigned the address group of the left clamp bar with the first programming step. Therefore two light emitting diodes will flash at the signal connected to the right clamp bar. Now activate any key of the address group assigned for this signal. The decoder will confirm the programming with a faster flashing.
Then press the programming key S1 again. The programming for the "single function" has now been completed. Both connected signals will switched to STOP by the decoder.


## Signal switching:

Below the drafts of the above signal aspects you can find a respective key-group for the addresses 1 to 4 and the corresponding keys 'red' and 'green'. Additionally is the meaning of the signal position indicated above or below. The addresses 1 to 4 are indicated as a sample only. The actual addresses are corresponding to the assignment of the clamp bar you choose during programming.
If you have connected an advance- and an exit-signal to one of the two clamp bars (as shown at the first sample) you can switch with the address 1 and the key green the exit signal to proceed (1).
The light emitting diode marked with GN will now indicate this at the signal.

## Dark switching:

In case a home- and an advance-signal are on one common signal post the advance-signal can remain dark if the home-signal indicates H or 6.

To activate the dark-switching-mode switch the home signal to $\mathbf{H}$ or 6. If you press now the key 4 'red' you can switch the advance-signalaspect to 'on' respectively to 'off' with each keystroke. If the advancesignal is in 'off' position the dark-switching mode is activated. The light signal decoder stores this mode permanently as well as the programmed addresses. All programmed modes can be changed at any time.
Advance signal aspects received during the signal has been switched to dark will be indicated whenever the exit signal has been switched to 1 , 2,3 or 5.

## Accessory:

For easy assembly of the printed circuit board below your model rail road layout base plate we offer a set of assembly material under the order identification: MON-SET. Under LDT-01 you can purchase a low priced durable case for the LS-DEC.

## Attention:

The Light signal decoder LS-DEC switches the signal aspect not just quickly on and off but is dimming the light emitting diodes realistic up and down. Even between the signal aspects a short off-phase is provided. Further digital commands received during this switch-overtime of about 0,4 seconds will not be taken up from the decoder. Please take care that the switching-commands are not in a to fast sequence. The impression is absolutely realistic if the switching is considerable slow.

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