Littfinski **D**aten**T**echnik (**LDT**)

Operating Instruction

Light signal decoder
for light-signals with LED
from the *Digital-Professional-Series* !
LS-DEC-DR-F Part-No.: 516012
>> finished module <<

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

For direct digital control of:
⇒ two main- and two advance signals each (Deutsche Reichsbahn)
⇒ or two main light signals (Deutsche Reichsbahn)
⇒ for LED light signals with common anodes or common cathodes

Realistic operation of the signal aspects by implemented **dimming function** and short **dark phase** between the switching of 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.

CE

red point

Multi-Digital

Introduction/Safety instruction:
You have purchased the Light-signal decoder **LS-DEC-DR** 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 **L**ittfinski **D**aten**T**echnik (**LDT**).
We wish 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**® and **R3**® is not possible), **Zimo, LGB-Digital, Intellibox, TWIN-CENTER, 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, 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 to be 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).**
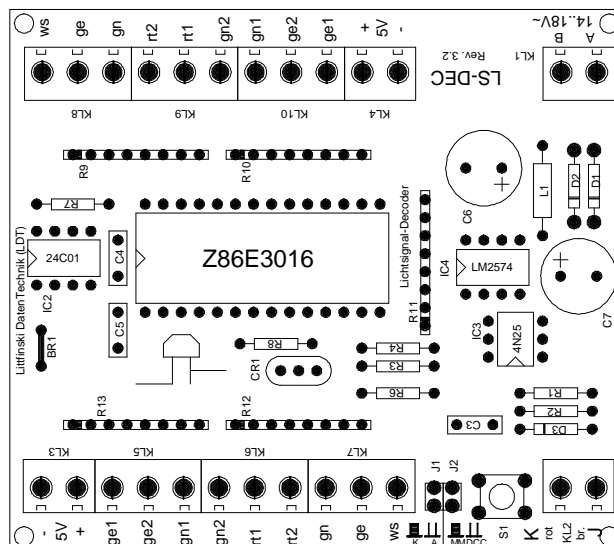
Lenz-Digital systems are using the letters **'J'** and **'K'**.

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 within a range of 14..18V~ (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 **connect** the clamp KL1 to clamp **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 **4 signals** can be connected to the **Light-signal decoder LS-DEC**. **Two signals per each 11poles clamp block**. The connection sequence of the two clamps is identical. The following description refers mainly to one clamp only. As you can see at the identical markings 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 cable. 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 cable 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 cable to the connection marked **'-'**. In this case you shall **insert** the **connection plug bridge in J1**.
The second connection of each light emitting diode is separated and mostly color marked at the end and contains a series resistor.
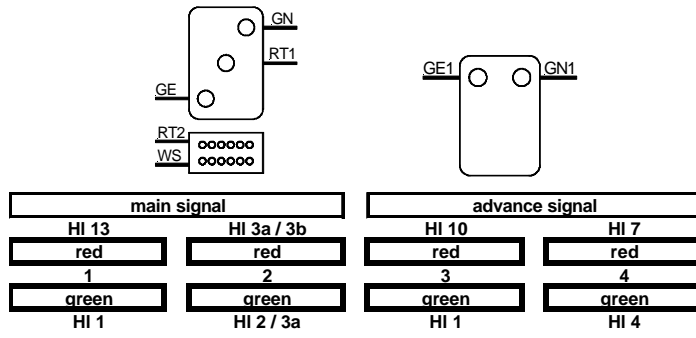
Series resistors:
Light emitting diodes have **always** to be **operated** with a suitable **series resistor** to prevent that they will be destroyed. For this prevention **all outputs** contain already a **series resistor** of **330 Ohm integrated** on the printed circuit board of the **Light-signal decoder LS-DEC.** Is there no further external resistor available the diode-current will be about 10mA.
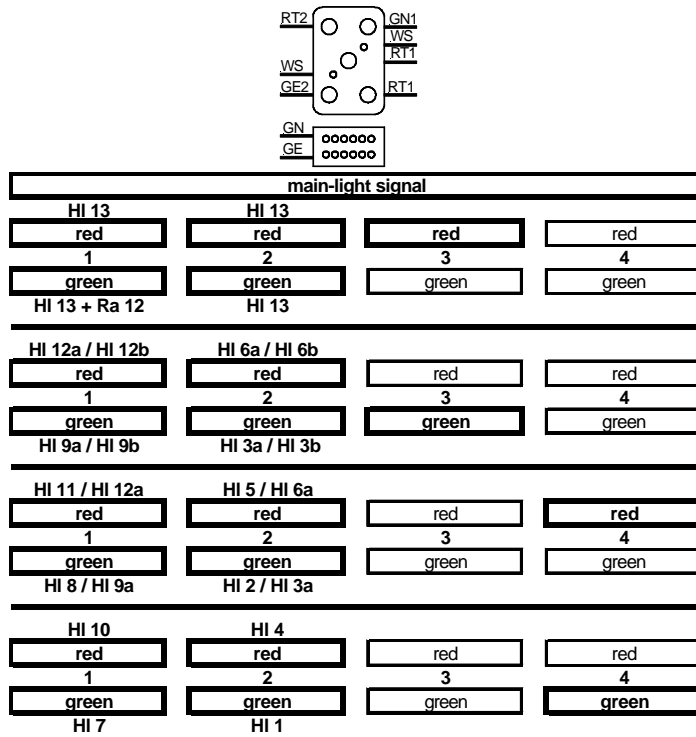This provides **sufficient brightness**. In case your **light emitting diodes** are **to bright** you can correct the brightness by assembling **external resistors** of **some 100 Ohms to your personal requirement**.

For assigning the **single cables of the light emitting 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. Main- and Advance Signal:

main signal		advance signal	
HI 13	HI 3a / 3b	HI 10	HI 7
red	red	red	red
1	2	3	4
green	green	green	green
HI 1	HI 2 / 3a	HI 1	HI 4

2. Main-Light Signal:

main-light signal			
HI 13	HI 13		
red	red	red	red
1	2	3	4
green	green	green	green
HI 13 + Ra 12	HI 13		
HI 12a / HI 12b	HI 6a / HI 6b		
red	red	red	red
1	2	3	4
green	green	green	green
HI 9a / HI 9b	HI 3a / HI 3b		
HI 11 / HI 12a	HI 5 / HI 6a		
red	red	red	red
1	2	3	4
green	green	green	green
HI 8 / HI 9a	HI 2 / HI 3a		
HI 10	HI 4		
red	red	red	red
1	2	3	4
green	green	green	green
HI 7	HI 1		

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**. This output is **active** because the decoder switches **all signals to red after switching on**.

Further sample connections are available at the internet on our Web-Site (www.ldt-infocenter.com) under "Downloads". Please load the file "LSDEC-DR_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**.
- **Press** now **one key** of the **key-group to be assigned** to the **left clamp block** of the decoder. For programming the decoder address you can also release a turnout switch signal via a personal computer.
  Remarks: 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 will be the first group. The address 5 to 8 will be the second group etc. Each clamp block of a **LS-DEC** decoder can be assigned to any of these groups. It does not matter which of the eight possible keys used for programming will be activated. The decoder stores always the complete group of keys.
  If the Light-Signal Decoder LS-DEC shall control **main- and advance signals** or **main-light signals** this has to be adjusted together with the decoder address. If you activate within the programming mode one key of the desired group of four keys designated for switching a turnout **straight** or a signal to **green** the decoder will be set for controlling of **main- and advance signals**.
  If you activate a key for switching a turnout **round** or a signal to **red** you have selected the option to switch **main-light signals**. It is essential to activate for both programming settings (left and right clamp bar) both either a red or a green key.
- 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 (clamp 2) 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. At least **two light emitting diodes** connected to the **right clamp block** will flash now. Repeat the programming for this clamp block as described above.
- Now **press** the programming key S1 a **third time** for **leaving the programming mode**. All signals will be **automatically switched** to **STOP**.

Signal switching:

Below the above drafts of 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 signal aspect assigned to the respective key indicated above or below. The addresses 1 to 4 are indicated as a sample only. The actual addresses are corresponding to the assignment you have selected during programming.

If you have selected during **programming** the light-signal decoder for the **switching** of **main- and advance signals** as shown at the upper draft you can switch for example with the address **1** and key **green** the main signal to **proceed (HI 1)**.

The light emitting diode marked with **GN** will now indicate this at the signal.

If you have **set** the decoder during **programming** the **addresses** for switching **main-light signals** you should refer to **sample 2**.

For the **main signal** is it possible to set a total of **14 signal aspects**. How to realize this with only 8 keys (4 addresses) shows the key occupation below the signal. After switching-on the main-light signal shows **HI 13**. If now e.g. **HI 1** shall be shown at first the address **4** with **green** key and then address **2** with **green** key shall be activated.

Only **bold framed keys** are required for switching the signal.

Is the main-light signal **equipped** with a **substitute-red** light emitting diode you can connect either the light emitting diode **main-red** or **substitute-red** to **RT 1** of the clamp bar on the Light-signal decoder.

Light bars:

The light-signal decoder **LS-DEC-DR supports** as well **light bars**. You can decide if you **connect** the **green light bar** to indicate with **HI 2** (**travel speed 100km/h**) or **leave it** to indicate with **HI 3a** (**travel speed 40km/h**). Just as well you can **connect** the **yellow bar** to indicate with **HI 3b** (**travel speed 60km/h**) or **leave** it to indicate with **HI 3a** (**travel speed 40km/h**).

If your DR-signal contains light bars with serial light emitting diodes (models of manufacturer Erbert) you require the adapter **Adap-LS**.

Attention:

The **Light signal decoder LS-DEC** switches the signal aspects not just 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-over-time 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.