



# Light-Signal Decoder

for light-signals with LED

from the *Digital-Professional-Series* !

**LS-DEC-FS-G** Part-No.: **510213**

>> finished module in a case<<

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

For direct digital control of:

⇒ up to four 3- and 4- aspect Light Signals of the Governmental Railway Corporation of Italy - Ferrovie dello Stato (FS)

⇒ up to two 11- aspect FS-Signals

With implemented **dimming function** and short **dark phase** between signal aspects.

Suitable for light signals of the company **Essemme S.r.l., Milano (Italy)**.

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-FS** for your model railway as a finished module in a case.

The **LS-DEC** is a high quality product that is supplied within the *Digital-Professional-Series* of Littfinski DatenTechnik (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.
- We designed our devices for indoor use only.

## Connecting the decoder to your digital model railway layout:

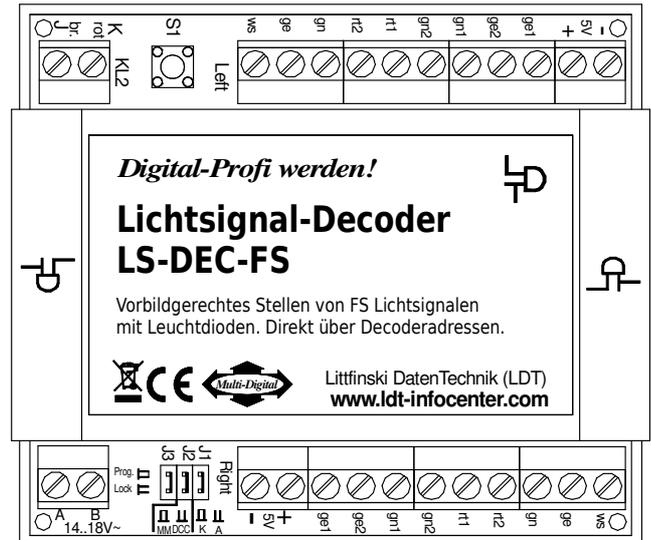
- **Attention:** Before starting the installation-work switch off the layout voltage supply (switch-off the transformers or disconnect the main supply).

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**, **DiCoStation**, **ECoS**, **EasyControl**, **KeyCom-DC** and **Arnold-Digital / Märklin-Digital=** respectively **Central Station 2 (60214/60215)** 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 to an own digital main ring supply 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 DiCoStation / ECoS / EasyControl**).



**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 bar**. 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** (e.g. from company **Viessmann** or **alphanodell**), 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.

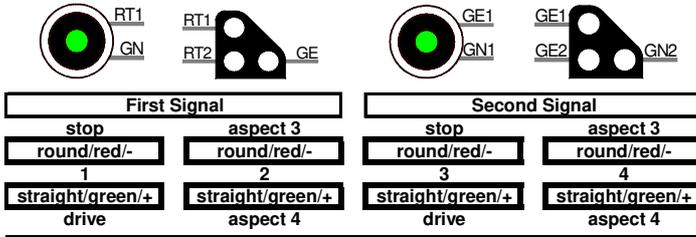
### Series resistors:

**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 10 mA. This provides **sufficient brightness**.

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**.

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**.

## 1. Two 3- and 4-aspect signals on each clamp bar:



## 2. One 11-aspect Signal on each clamp bar:



11-aspect signal			
stop	aspect 3	group 1	
round/red/-	round/red/-	round/red/-	round/red/-
1	2	3	4
straight/green/+	straight/green/+	straight/green/+	straight/green/+
drive	aspect 4		
aspect 5	aspect 7		
round/red/-	round/red/-	round/red/-	round/red/-
1	2	3	4
straight/green/+	straight/green/+	straight/green/+	straight/green/+
aspect 6	aspect 8	group 2	
aspect 9	aspect 11	group 3	
round/red/-	round/red/-	round/red/-	round/red/-
1	2	3	4
straight/green/+	straight/green/+	straight/green/+	straight/green/+
aspect 10			
round/red/-	round/red/-	round/red/-	round/red/-
1	2	3	4
straight/green/+	straight/green/+	straight/green/+	straight/green/+
			group 4

Further sample connections are available at the internet on our Web-Site ([www.ltd-infocenter.com](http://www.ltd-infocenter.com)) at the section "Sample Connections". Additionally you can find detailed information about the Light-Signal Decoder LS-DEC-FS at our Web site within the section "Digital-Compendium".

## Programming the decoder address:

- The jumper J3 has to be inserted for the programming of the decoder addresses.
- Switch-on the power supply of your model rail way.
- Activate the programming key S1.
- At least two light emitting diodes on a signal connected to the left clamp block (on this decoder side is the programming key S1) 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 fourfold address-group to be assigned to the left clamp block of the decoder. For programming the decoder address you can as well release a turnout switch signal via your model railway software.

**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 on this clamp bar two 3 and 4 aspect signals or one 11 aspect signal 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 the controlling of two 3- and 4- aspect signals.

If you activate a key for switching a turnout round or a signal to red you have selected the option to switch one 11 signal. For both programming modes (left and right clamp bar) you can individual select if two 3- and 4-aspect signals or one 11-aspect signal shall be digital controlled.

- 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 of this fourfold-address 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:

The opposite sample connections show how the fourfold address-group can be set by use of 8 keys of the push button panel for setting the turnouts or signals. Between each pair of keys are e.g. the addresses 1 to 4. The two keys red and green for each address are assigned to the turnout position round or straight respectively the corresponding signal aspect which is indicated above or below the key. The actual address section is related to which fourfold address-group has been selected during the programming.

If you use a remote control LH100 of Company Lenz Elektronik then red will be the minus key and green the plus key.

### 1. Two 3- and 4-aspect signals on each clamp bar:

If you have adjusted the Light-Signal Decoder LS-DEC-FS for switching two 3- and 4-aspect signals by programming one clamp bar as shown at picture left under 1 you can e.g. switch the first signal to drive with address 1 and key green.

Please activate the key green of the address 3 and the second signal will be switched to drive.

The first signal will be always switched via the address 1 and 2. The second signal of the clamp bar will be switched via the address 3 and 4 of the programmed four fold address group.

### 2. One 11-aspect signal on each clamp bar:

If you have adjusted the LS-DEC-FS by programming the address of one clamp bar for switching one 11-aspect signal the picture left under 2 will indicate the status.

Via the two first addresses of the clamp bar of this programmed four fold address group is it possible to switch four signal aspects.

As a total of 11 signal aspects can be controlled the selection of one of four signal aspect groups has to be performed via the addresses 3 and 4. The occupancy of keys below the signal shows the relation. After switching—on the signal indicates stop. If now e.g. the aspect 9 shall be indicated it is required at first to activate the address 4, key red for the third signal aspect group and then the address 1 key red.

Only the thick framed keys of the table will be required for switching the signal.

## 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 too fast sequence. The impression is absolutely realistic if the switching is considerable slow.

If the jumper J3 will be removed after programming of the decoder addresses the memory storage of the Light-Signal Decoder LS-DEC will be protected against any alteration.

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