

## *To be a Digital-Professional!*

### Light Signals of the Governmental Railway Corporation of Italy digital controlled by the Light-Signal Decoder LS-DEC-FS

Detailed constructed light signals with a realistic digital control are a real eye-catcher not only on digital model railway layouts. Particularly whenever light emitting diodes will be switched with up- and down-dimming including short dark phase as in reality.

The Light-Signal Decoder *LS-DEC-FS* supports three- four- and 11-aspects light signals and is suitable for light signals of the company **Essemme S.r.l., Milano (Italy)**.

The reed-in of the directly assigned decoder addresses is possible via the programming key S1 as on all our other accessory decoders.

#### BASICS

Up to four 3- and 4-aspect light signals or up to two 11-aspect signals can be connected to one Light-Signal Decoder *LS-DEC-FS*.

One Light-Signal Decoder occupies therefore 8 decoder addresses (4 addresses on each 11-poles clamp bar).

2 signal aspects can be assigned to each decoder address.

The 8 key combinations at one clamp bar (4 addresses with **red** / **green** each) can control 8 signal aspects.

The following sample connections show how the fourfold address-groups can be set by use of 8 keys of a push button panel for switching turnouts or signals.

|                      |                      |                      |                      |
|----------------------|----------------------|----------------------|----------------------|
| round / red / -      | round / red / -      | round / red / -      | round / red / -      |
| 1                    | 2                    | 3                    | 4                    |
| straight / green / + | straight / green / + | straight / green / + | straight / green / + |

At the centerline between two keys is the decoder address indicated. The two keys **red** and **green** of each address are assigned to the turnout position **round** and **straight** or the signal aspect **red** and **green**.

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

## THE DIGITAL SYSTEM

All Light-Signal Decoders “*LS-DEC*” are suitable for the DCC data format (e.g. Lenz-, Roco-, LGB-Digital, Intellibox, TWIN-CENTER, PIKO Digi-Power-Box and Smartbox, DiCoStation, ECoS, EasyControl, RedBox, Commander, KeyCom-DC, ZIMO, Märklin Digital= or Central Station 1, 2 and 3) as well as for the MOTOROLA-format (e.g. Märklin Digital~ [Control Unit, Central Station 1, 2 and 3] Intellibox, DiCoStation, ECoS, EasyControl, RedBox, Commander, KeyCom-MM).

■  
Adjusting the correct data format!

The data format will be selected via the jumper J2. If there is no jumper J2 inserted the DCC-format has been adjusted. By an inserted jumper has been the MOTOROLA-Format adjusted.

Please switch-off the complete model railway layout power supply whenever connection work has to be carried out (switch-off the transformers or unplug the mains supply).

The digital voltage will be supplied via the 2-poles clamp KL2. The colored marks **red / brown** next to the clamp are usually used by MÄRKLIN-Motorola. Other systems such as Lenz Digital are using the letters “J” and “K”.

The external alternated voltage supply of 14 ... 18Volt ~ (e.g. light-output of a model railway transformer) will be supplied via the two poles clamp KL1 to the decoder. It is possible to supply power to the decoders by the digital current (directly connection between clamp KL1 and clamp KL2). But this will be recommended by small layouts only because in this case will be “valuable” and “expensive” digital current wasted for the supply of the modules and for switching the drives.

■  
Booster

If the digital current intensity will not be sufficient (command stations with included integrated booster supply mostly 2.5 to 5 Ampere) for the driving and operation of the layout it is required to use additional digital amplifiers (=booster e.g. “DB-2” or “DB-4”). This will certainly require additional wiring and further cost (therefore “expensive” digital current).

As well for the Light-Signal Decoder is it recommended to install a separate second ring conductor for the digital current as by the turnout decoders and a third ring conductor for the supply voltage.

The digital information for the accessory decoders should never be taken directly from the rails. The traveling of locomotives can influence the digital signal by producing continually a kind of loose contact signal. This can result to the problem that the decoder cannot understand the transmitted signal. For this reason will be the loc-commands continually repeated. Especially for the switch-commands which will not be transmitted several times as done by the loc-commands is it possible that commands will be getting lost if the digital information has been taken directly from the rails.

## SIGNAL TECHNIQUE

The most LED equipped light signals available on the market contain a common anode connection (positive terminal) and integrated serial resistors at the colored LED-wires. The common wire shall be connected at the light signal decoder to the “+” terminal and the jumper J1 shall not be inserted!

■ LED – Light Emitting Diode

On all our Light-Signal Decoder is a connection of light signals with common cathode (negative terminal) possible. For this assembly shall the common wire connected to the “-“ terminal and the jumper J1 has to be inserted!

■ General Note

All our decoder modules contain an integrated serial resistor of 330 Ohm on each output. The light emitting diode will take then a current of about 10 mA. The brightness of the light emitting diodes should be sufficient. If individual LEDs will be too bright is it possible to match the brightness to your requirement by assembly of additional external resistors within the LED connection wire. The actual resistor value of some 100 Ohm has to be determined by test.

The different FS-signal types allow various connection possibilities. The following paragraphs shall explain exemplary these connection samples. As the two 11-poles connection clamps are wired identical the explanation of the corresponding signal aspects refer mostly to one clamp bar only.

To assure that you are able to assign the single wires of the light emitting diodes of the light signals correctly to the clamps of the light signal-decoder you should attend to the markings (e.g. *RT1* or *GE1*) at the following signal images.

The marks next to the light emitting diodes of the signals do not always correspond to the real signal colors but refer to the connection at the Light-Signal Decoder *LS-DEC*.

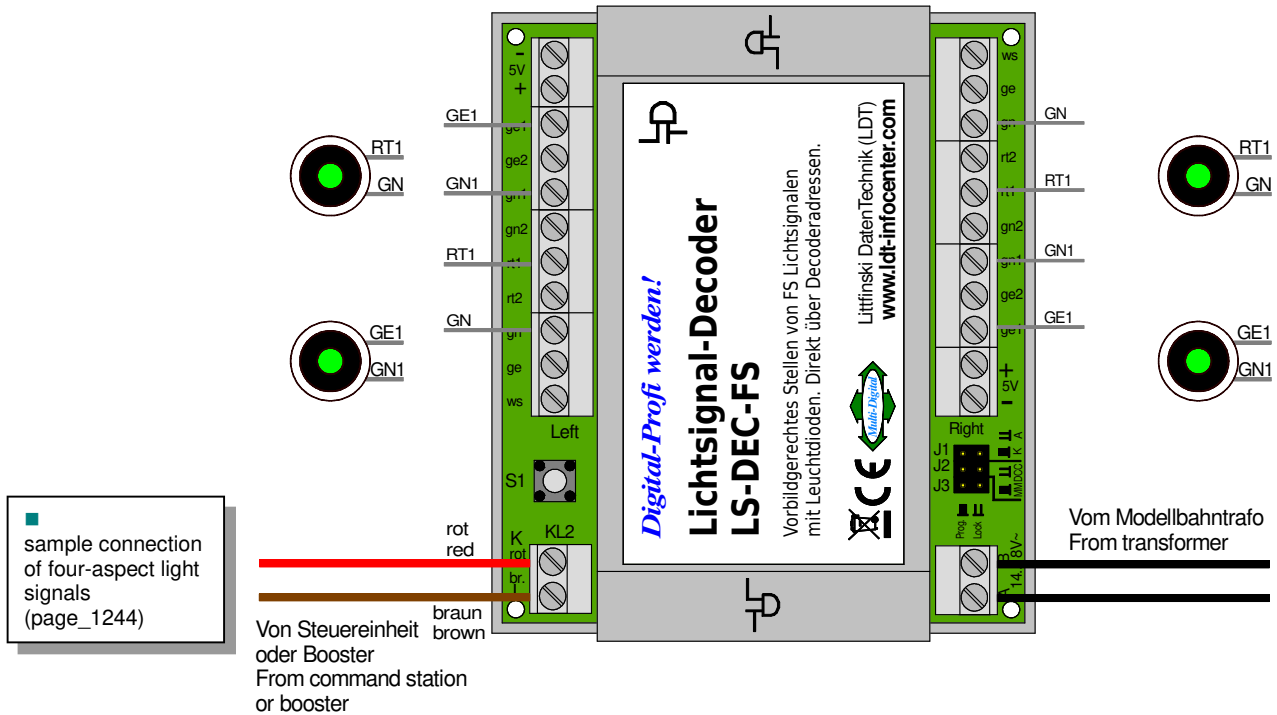
Please notice that the Light-Signal Decoder does not simply switchover the signal aspects but is dimming the light emitting diodes realistic up and down. Additionally there will be a dark phase of about 0.4 sec. between the signal aspects. During the dark phase is it not possible for the decoder to process incoming digital commands. Therefore you should not send switch commands at a very fast sequence. In any case it will be more realistic if the commands will be released with a little delay.

■ Important Tip

The following sample connections refer to the different FS-light signals. Within our delivery range we offer as well Light-Signal Decoder for signals of the German Railway (DB and KS), the Austrian Federal Railways (OEBB) the Swiss Federal Railways (SBB), the Nederlandse Spoorwegen (NS), the Nationale Maatschappij of the Belgium Spoorwegen (NMBS), the British Railway (BR) and furthermore. The connection of these signals will be explained within separate pages of our Digital-Compendium.

**TWO 3- AND 4-ASPECT SIGNALS ON EACH CLAMP BAR**

At our first sample connection are two 4-aspect signals connected to both clamp bars:



The signals connected to the left side occupy e.g. the decoder addresses 1 to 4. The addresses 5 to 8 will be used by the right signals. Each signal occupies therefore 2 decoder addresses and all signals can be switched independently.

After switching-on the layout the light signal decoder will switch all signals at first to red (train stop).

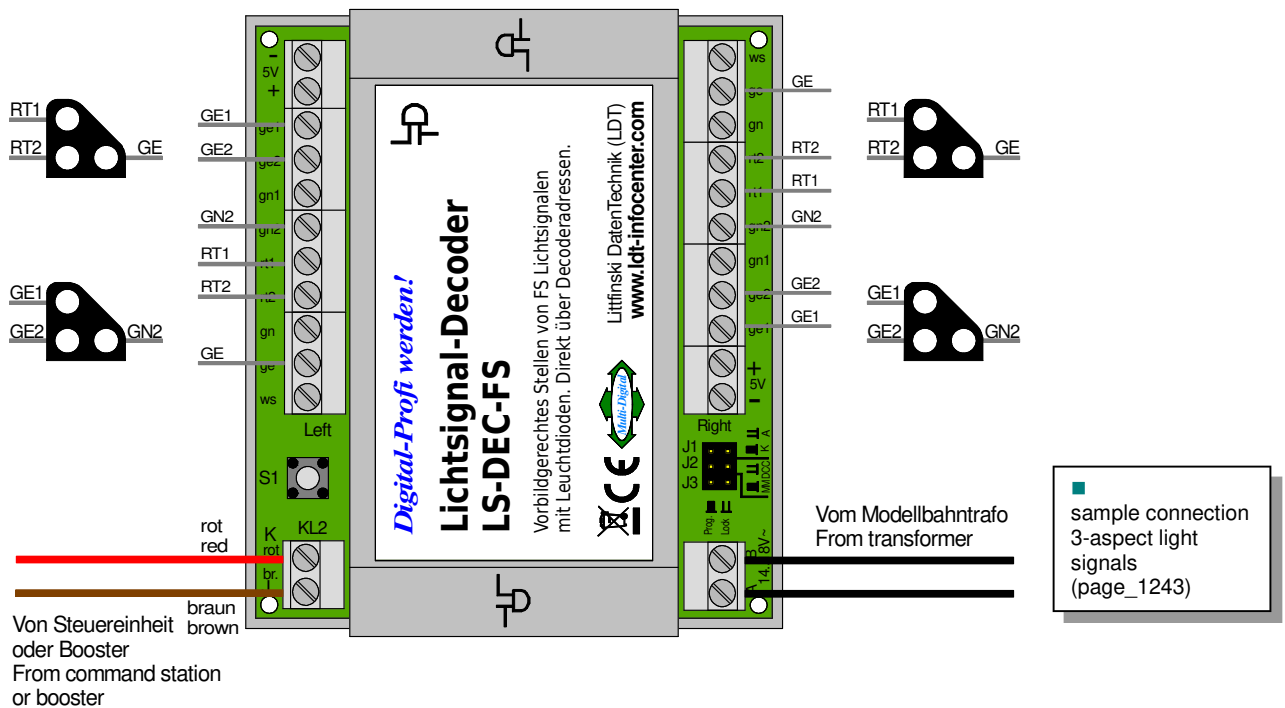
For switching the upper signal on the left clamp bar to green (drive) you have to activate the key **green** of the address 1. The following key-table shows the relation of signal aspects to the keys to the corresponding digital addresses:

| upper signal left    |                      | lower signal left    |                      |
|----------------------|----------------------|----------------------|----------------------|
| train stop           | aspect 3             | train stop           | aspect 3             |
| round / red / -      | round / red / -      | round / red / -      | round / red / -      |
| 1                    | 2                    | 3                    | 4                    |
| straight / green / + | straight / green / + | straight / green / + | straight / green / + |
| drive                | aspect 4             | drive                | aspect 4             |

To switch e.g. the lower signal of the right clamp bar to green (drive) you have to activate the **green** key of the address 7. The following table shows the setting of keys and the assignment of digital addresses:

| upper signal right   |                      | lower signal right   |                      |
|----------------------|----------------------|----------------------|----------------------|
| train stop           | aspect 3             | train stop           | aspect 3             |
| round / red / -      | round / red / -      | round / red / -      | round / red / -      |
| 5                    | 6                    | 7                    | 8                    |
| straight / green / + | straight / green / + | straight / green / + | straight / green / + |
| drive                | aspect 4             | drive                | aspect 4             |

The following sample connection shows the digital control of four 3-aspect signals by the Light-Signal Decoder *LS-DEC-FS*:



The following key-table shows the setting of keys and the assignment of digital addresses respectively signal aspects for the left clamp bar:

| upper signal left    |                      | lower signal left    |                      |
|----------------------|----------------------|----------------------|----------------------|
| train stop           | train stop           | train stop           | train stop           |
| round / red / -      | round / red / -      | round / red / -      | round / red / -      |
| 1                    | 2                    | 3                    | 4                    |
| straight / green / + | straight / green / + | straight / green / + | straight / green / + |
| drive                | aspect 3             | drive                | aspect 3             |

The addresses 5 to 7 will be exemplary used from the two signals at the right:

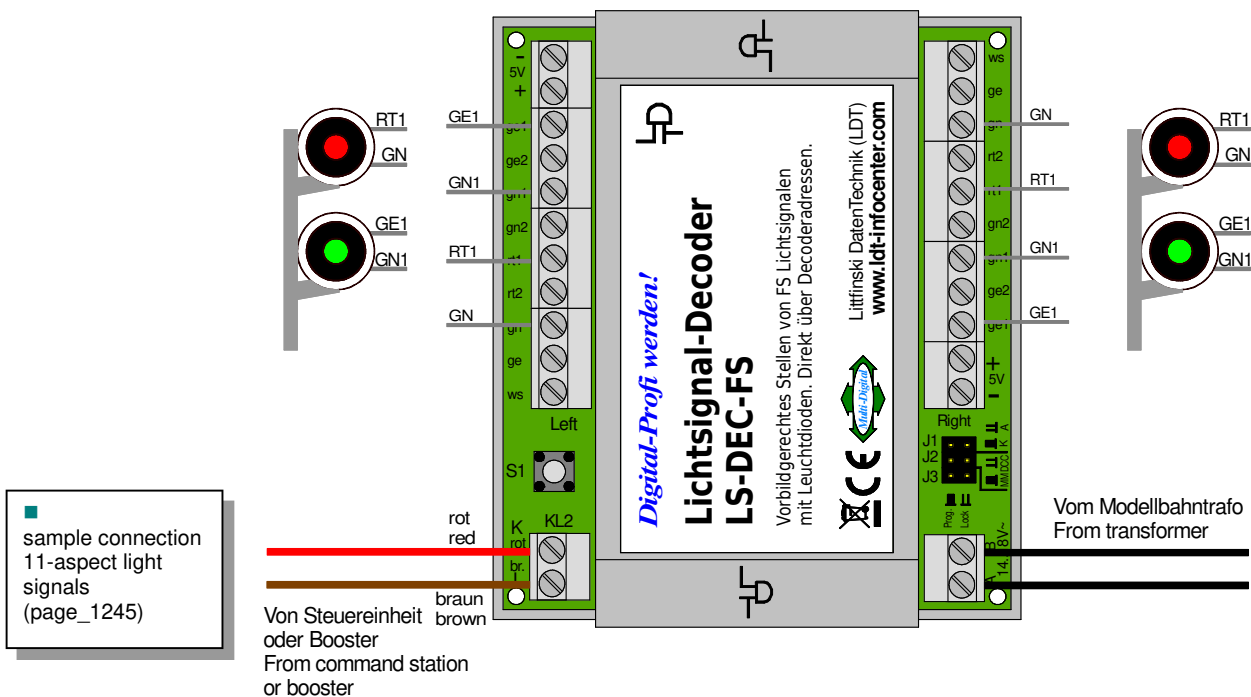


### ONE 11-ASPECT SIGNAL ON EACH CLAMP BAR

During programming of the decoder addresses of one clamp bar is it possible to arrange that via this clamp bar one 11-aspect signal can be controlled. At the next section “Programming” you can find for this feature detailed information under “Important Information”.

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

As a total of 11 signal aspects can be controlled it has to be one of four signal aspect groups selected via the third and fourth address of the programmed four-fold address group.



The following key-occupancy shows the relation for the two connected 11-aspect signals.

After switching-on both signals will show the aspect stop. If now e.g. the left signal shall indicate the aspect 7 it is required at first to activate the address 3 key **Green** of the second signal aspect group and then the address 2 key **Red**.

Only the colored marked keys are required for the switching of signals:



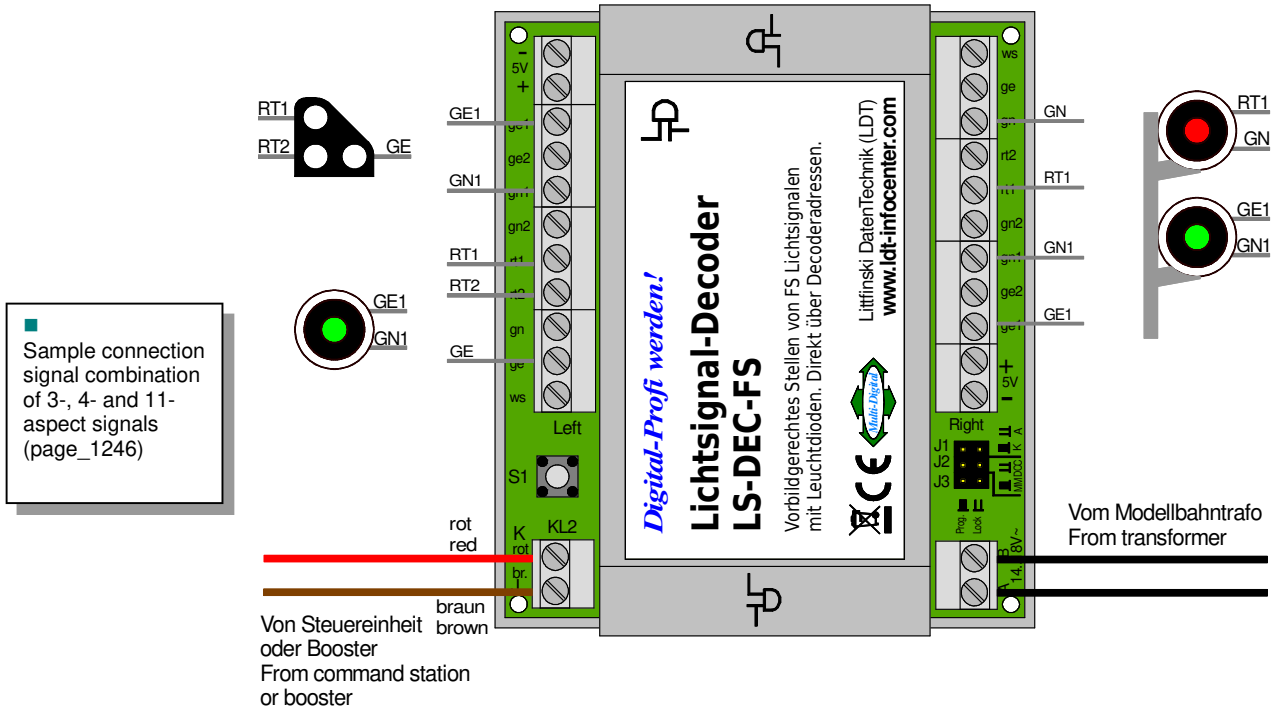
For indicating e.g. at the right signal the aspect 9 it is required at first to activate the address 8 key **Red** for the third signal aspect group and then the address 5 key **Red**. At the sample has been the four-fold address group 5 to 8 assigned to the signal at the right clamp bar.

Via the available 4 signal aspect groups can be max. 16 signal aspects selected. As the FS-signals contain only 11 signal aspects is the fourth signal aspect group not required.

## SIGNAL COMBINATIONS AT THE LS-DEC-FS

During programming of addresses can be individual selected if two 3- and 4-aspect signals or one 11-aspect signal shall be controlled via this particular clamp bar. The next sample connection shows a possible combination of signals on one Light-Signal Decoder LS-DEC-FS.

There is one 3- and one 4-aspect signal connected to the left clamp bar. Via the right clamp bar can be one 11-aspect signal digital controlled:

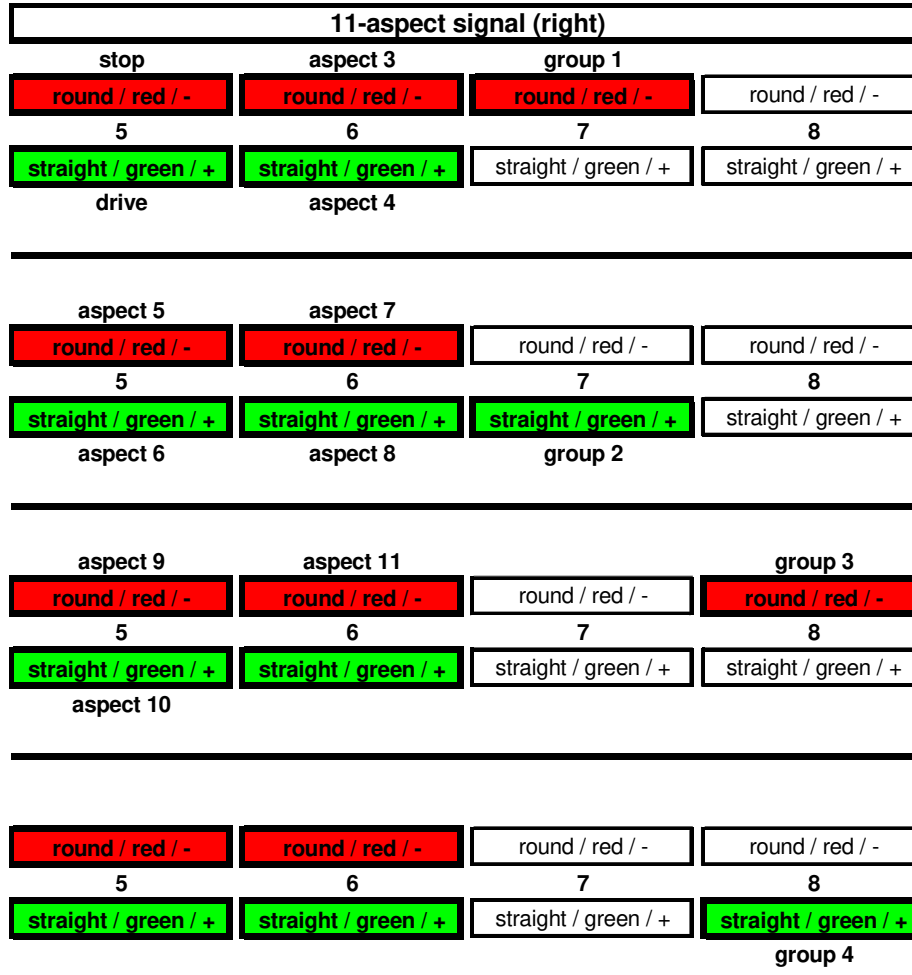


The 3-aspect signal will be exemplary controlled via the two addresses 1 and 2. The 4-aspect signal will be controlled via the addresses 3 and 4.

| upper 3-aspect signal |                      | lower 4-aspect signal |                      |
|-----------------------|----------------------|-----------------------|----------------------|
| stop                  | stop                 | stop                  | aspect 3             |
| round / red / -       | round / red / -      | round / red / -       | round / red / -      |
| 1                     | 2                    | 3                     | 4                    |
| straight / green / +  | straight / green / + | straight / green / +  | straight / green / + |
| drive                 | aspect 3             | drive                 | aspect 4             |



Via the addresses 5 to 9 will be the 11-aspect FS-signal at the right clamp bar of the Light-Signal Decoder *LS-DEC-FS* controlled. There will be the signal aspect group selected via address 7 and 8. The actual signal aspect will be selected via address 5 and 6.



## PROGRAMMING

From version 4 the Light-Signal Decoder contains a third Jumper (J3) which has to be inserted for programming the unit.

The Jumper J3 can be removed after successful programming.

This action will protect the memory of the Light-Signal Decoder *LS-DEC-FS* against overwriting.

The assigning (learning) of digital addresses has to be done for each module individually. After activating the decoder programming key S1 two light emitting diodes at the left clamp bar will lighten-up at a 1.5 sec. interval. The module has now been set into the learning mode. Now is it required to activate one key of the wanted group of four (1 - 4, 5 – 8 etc.) at the command station. The module takes over those four addresses and confirms this by flashing the light emitting diodes a little faster.

By activating again the programming key S1 the two light emitting diodes will flash at the right clamp bar of the module. Again is it required to activate a key of a group of four at the command station. The decoder will confirm again the addressing by a faster flashing. The third activation of the programming key S1 will complete the learning process. The addresses are now being stored permanently at the decoder and all signals will be switched automatically to red.

■  
Important  
information

If the Light-Signal Decoder *LS-DEC-FS* shall control on one clamp bar two 3- and 4-aspect signals or one 11-aspects signal has to be selected together with the decoder address. If the decoder address will be programmed with the command turnout **straight** or signal **green** you should arrange the clamp bar so that the control of two 3- and 4- aspect signals will be possible. For the other case (turnout **round** or signal **red**) you should program the clamp bar that an 11-aspect signal can be controlled.

■  
General Note

Our recommendation at this point: Carry out the programming of decoder addresses before you install the decoder module below your layout. It is obvious that it is much easier to handle the module with all the connection on a workbench instead overhead below the layout. After completing the programming please mark the particular module with the assigned digital addresses (e.g. label with pencil letters “5 – 8” for the second group of four).

A first functional test of the decoder has now already been completed. Eventually possible failures (e.g. module defect) will be excluded in advance. After complete assembly of the module at the layout it would be very difficult to undertake this procedure.

## ADDITIONAL INFORMATION

Additional Information about installation and operation of our digital components and various helpful sample connections are available with-in our operation instructions, which will be supplied with each module and are available at our Internet Site. All shown sample connections can be loaded down as PDF-files (e.g. page\_1244.pdf) and printed at an A4 format.

Internet: [www.ldt-infocenter.com](http://www.ldt-infocenter.com)

**Authors: Harry Kellner / Peter Littfinski**

Subject to technical changes and errors.  
© 12/2019 by LDT