To be a Digital-Professional!

Swedish State Railway (SJ) Light-Signals digital controlled by the Light Signal-Decoder LS-DEC-SJ

Realistic digital controlled detail constructed light signals 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 phases as in reality.

The Light Signal-Decoder *LS-DEC-SJ* supports two- to seven aspect light signals of the Swedish State Railway (SJ).
The advance signals Fsi2 and Fsi3 as well as the main signals Hsi2, Hsi3, Hsi4 and Hsi5 will be supported.

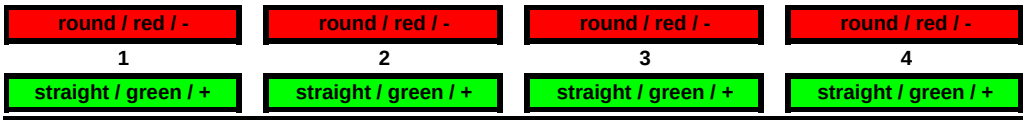
The reed-in of the directly assigned decoder addresses is possible via the programming key S1 as on all our other accessory decoders.

BASICS

Up to 4 light signals can be controlled by one Light-Signal-Decoder. Max. two signals on each 11-poles clamp bar. 2 signal aspects can be assigned to each decoder address and max. 8 signal aspects can be indicated via each clamp bar. One Light-Signal Decoder occupies therefore 8 decoder addresses (4 addresses on each clamp bar).

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.



The decoder address has been indicated at the centerline between two keys. 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, DiCoStation, ECoS, EasyControl, Commander, KeyCom-DC, ZIMO, Märklin Digital= or Central Station 2) as well as for the MOTOROLA-format (e.g. Märklin Digital~ [Control Unit, Central Station 1 and 2] Intellibox, DiCoStation, ECoS, EasyControl, 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 to18Volt ~ (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

LED – Light Emitting Diode

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!

General Note

On all our Light-Signal Decoders 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!

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 LED`s will be to 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.

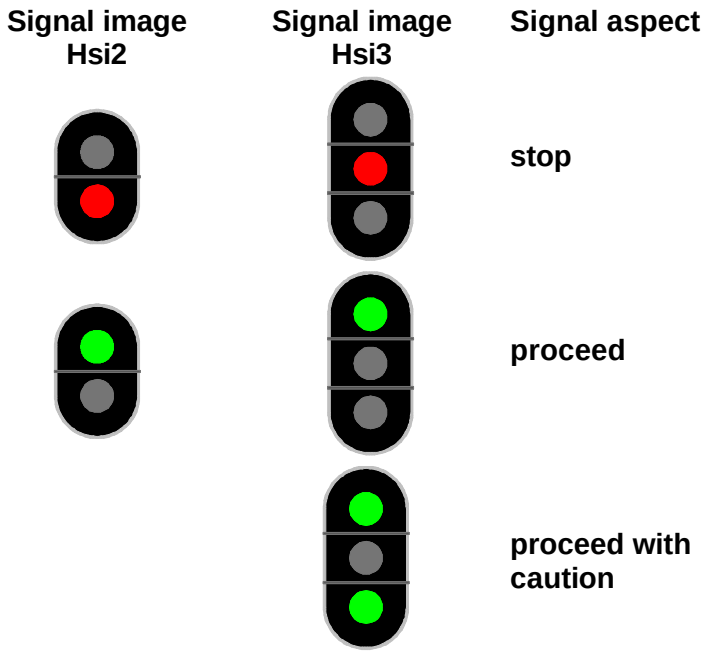
The different SJ-signal types allow various connection possibilities. The following paragraphs shall explain exemplary these connection samples. As the two 11-poles connection clamps are wired identical the explanation of the corresponding signal aspects refer mostly to one clamp bar only.
To assure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

Important Tip

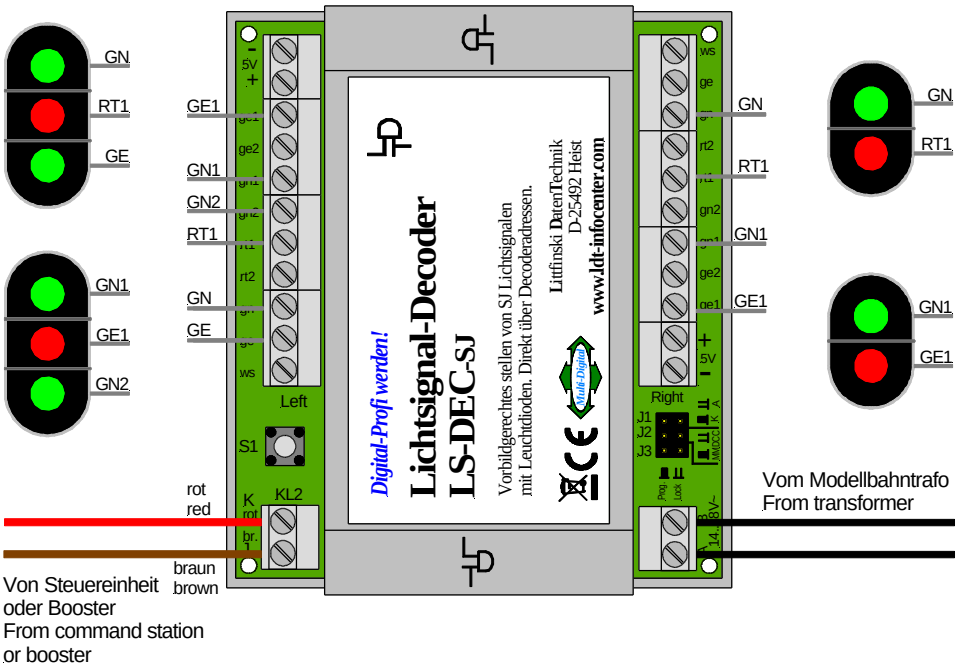
Please notice that the Light Signal-Decoder does not simply switchover the signal aspects but is dimming the light emitting diodes realistic up- and down. Additionally there will be a dark phase of about 0,4 sec. between the signal aspects. During the dark phase is it not possible for the decoder to 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.

The following sample connections refer to the different light signals of the Swedish State Railways (SJ). Within our delivery range we offer as well Light Signal-Decoders for signals of the German Railways (DB and KS), the German National Railways (DR), the Austrian Federal Railways (OEBB), the Swiss Federal Railways (SBB), the Nederlandse Spoorwegen (NS), the National Maatschappig of the Belgium Spoorwegen (NMBS) and the British Railway (BR). The connections of those signals will be explained within separate Digital-Compendiums.

TWO 2- OR 3-ASPECT SIGNALS (HSI2 OR HSI3) ON EACH CLAMP BAR



At our first sample connection are 2 three-aspect Hsi3-signals with three lamps connected to the left clamp bar and to the right clamp bar 2 two-aspect Hsi2-light signals with 2 lamps:

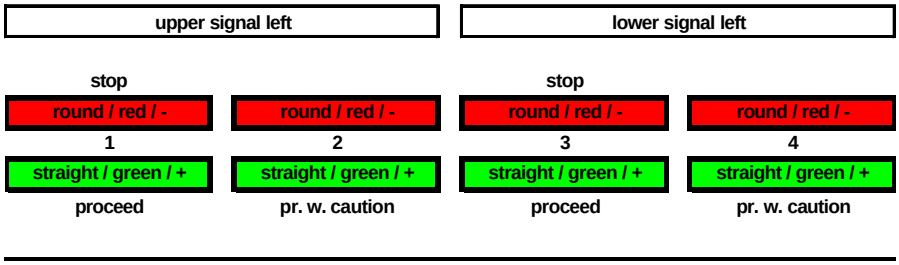


Sample connection with two- and three aspect Hsi2-Hsi3 light signals (page_1249)

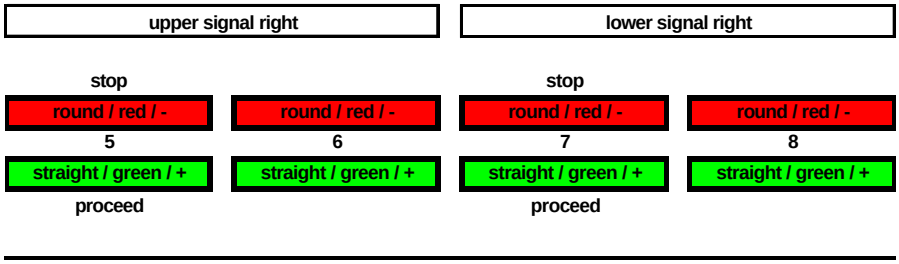
The signals connected to the left side occupy e.g. the decoder addresses 1 to 4. The addresses 5 to 8 will be used by the right signals. Each of the signals at the left clamp bar occupy therefore 2 decoder addresses and the two signals at the right clamp bar one decoder address each. All four signals 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 with 3 lamps at the left clamp bar to green (drive/proceed) you have to activate the key **green** of the address 1. The following key-table shows the relation of keys to the corresponding digital addresses:

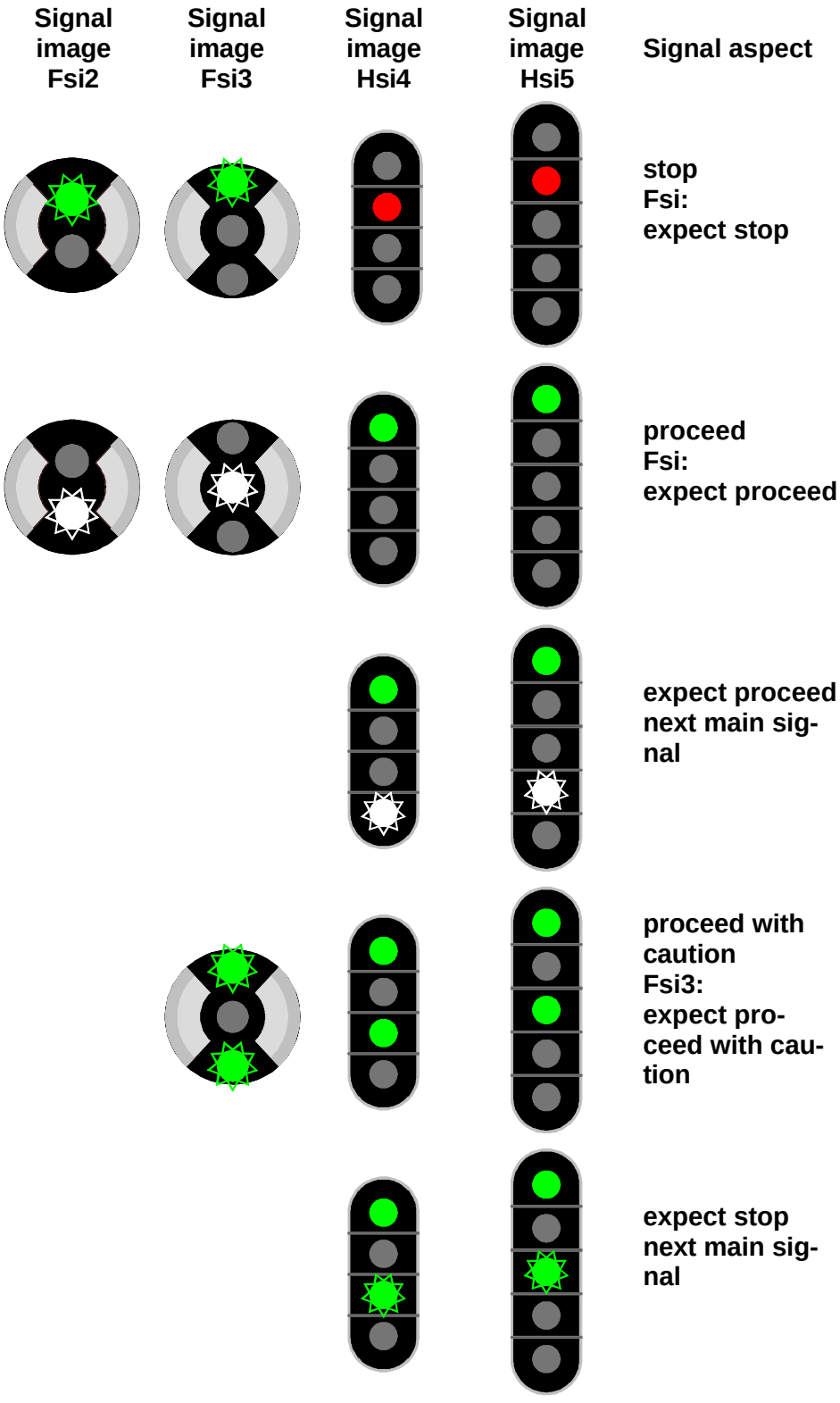


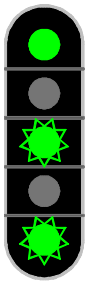
To switch e.g. the lower signal with 2 lamps of the right clamp bar to green (proceed) you have to activate the **green** key of the address 7. The following table shows the setting of keys and the assignment of digital addresses:



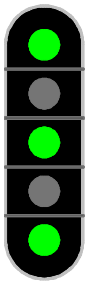
One 2- to 7-aspect Signal (Fsi2, Fsi3, Hsi4 or Hsi5) on each Clamp Bar

By programming the decoder addresses is it possible to set up one clamp bar for the control of one two- to seven-aspect Fsi2, Fsi3, Hsi4- or Hsi5-signal. At the next section “programming” this set-up procedure will be described in detail under “Important Information”.





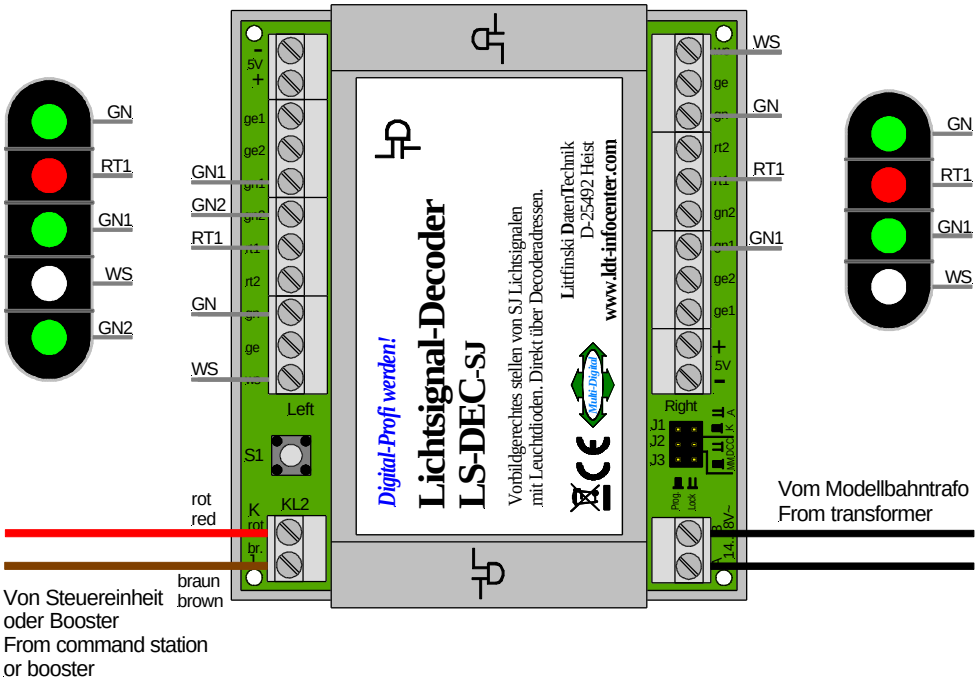
expect proceed with caution next main signal



proceed with caution

short distance to next main signal.

The following sample connection shows one seven-aspect Hsi5-signal at the left clamp bar and at the right clamp bar the connection of one five-aspect Hsi4-signal:



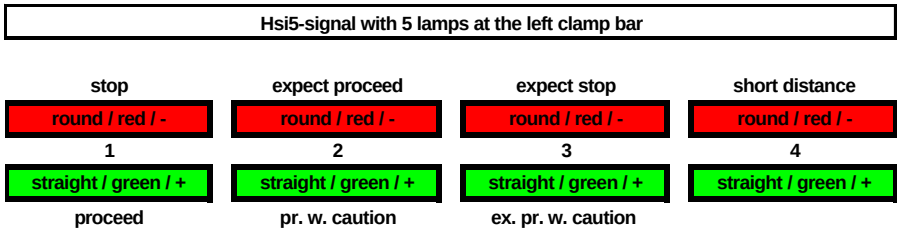
Sample connection with five- and seven aspect Hsi4- and Hsi5-aspect light signals (page_1247)

The Hsi5-lightsignal connected to the left clamp bar shows the occupancy of the decoder address 1 to 4.

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

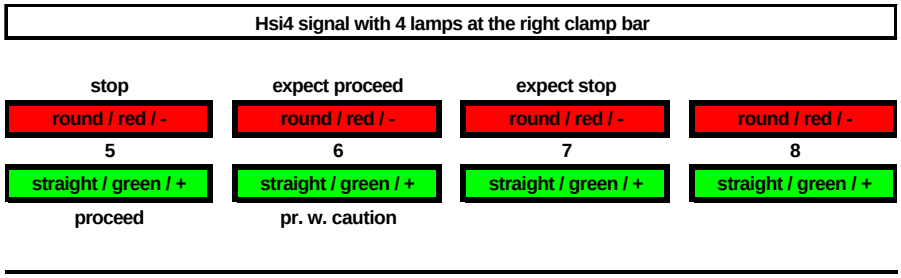
For switching the Hsi5-signal at the left clamp bar the signal aspect “expect stop next main signal” you have to activate the key red of the address 3.

The following key-table shows the assignment of digital addresses respectively signal aspects to the particular keys:

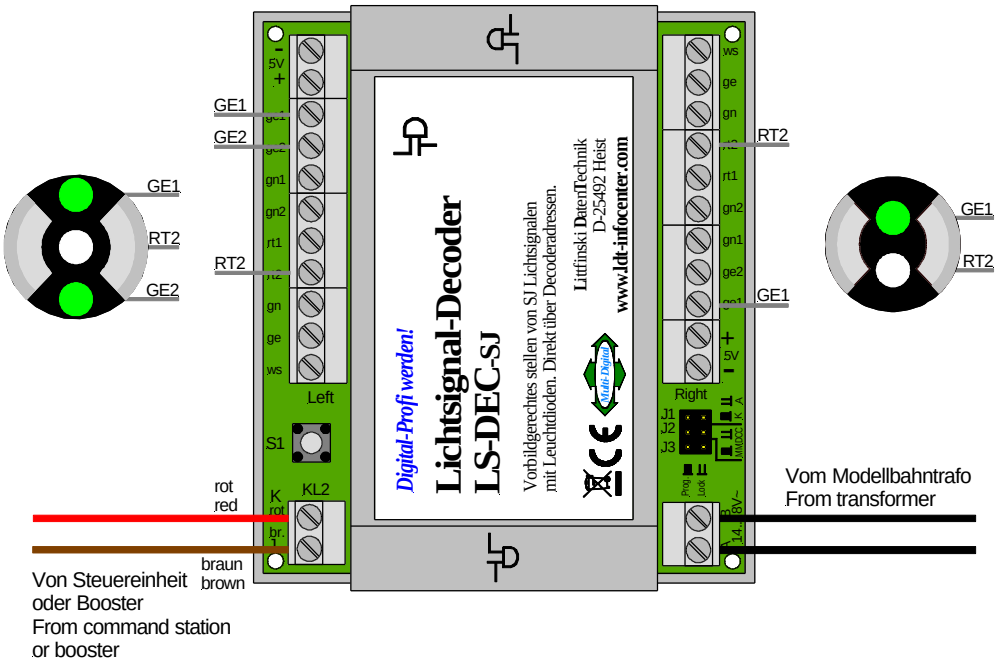


Via the right clamp bar will be a Hsi4-signal with 4 lamps controlled which occupy the decoder addresses 5 to 8.

For switching the Hsi5-signal of the right clamp bar to the signal aspect “proceed with caution” you have to activate the key **green** of the address 6.
The following key-table shows for this signal the assignment of the single keys respectively digital addresses:

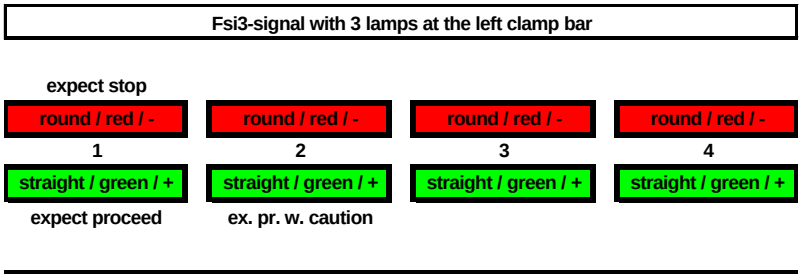


The next sample connection shows the digital switching of one Fsi3-signal via the left clamp bar and one Fsi2-light signal via the right clamp bar.

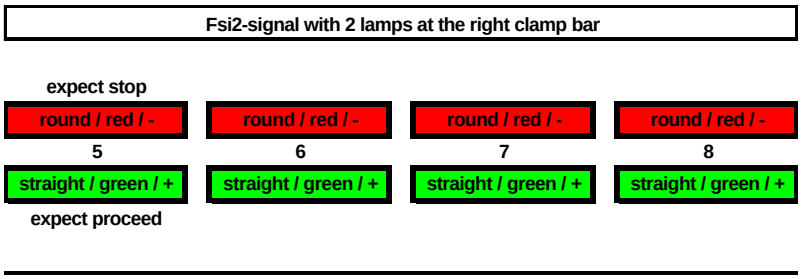


Sample connection with Fsi2- and Fsi3-light signals (page_1248)

The Fsi3-light signal with 3 lamps occupies at the left clamp bar the decoder address 1 and 2.



The next the sample connection shows on the right clamp bar one Fsi2-signal with 2 lamps controlled via the address 5.

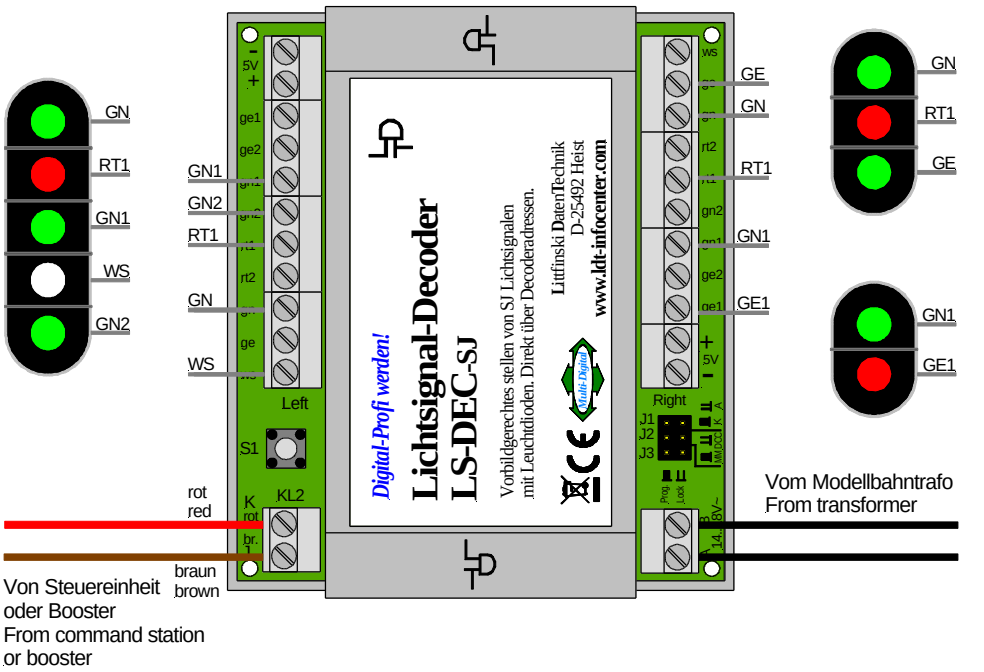


After switching-on the layout the light signal-decoder will switch at first both signals to the aspect “expect stop”. On both signals the green LED will flash.

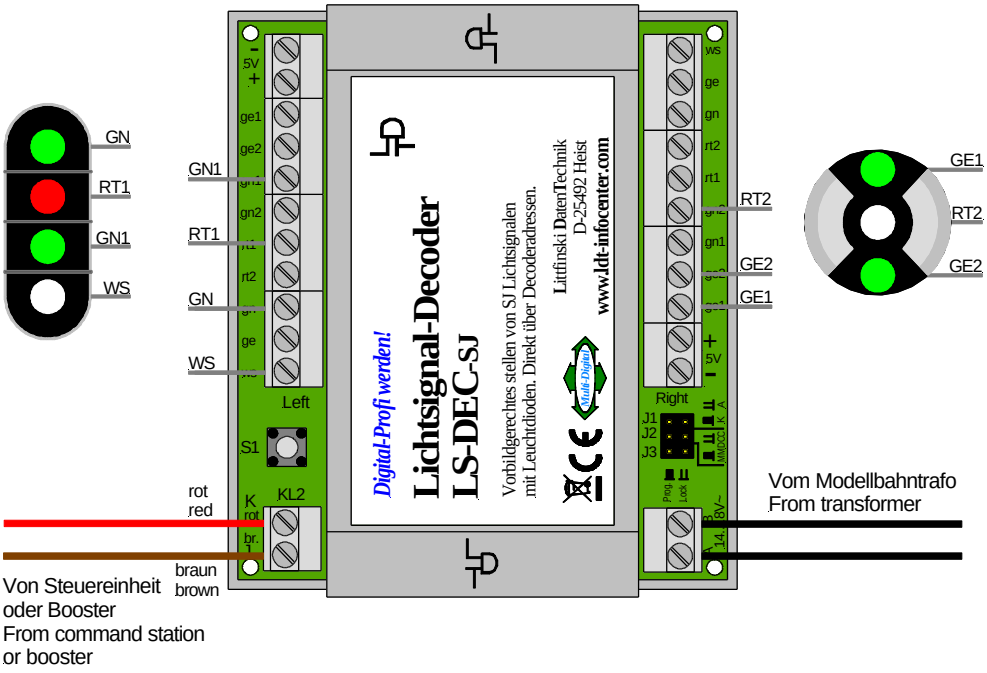
The three signal aspects of the Fsi3-light signal will be switched via the first two decoder addresses of the programmed fourfold group of this clamp bar.
The two aspect signal Fsi2 requires only one address. The remaining three addresses of the fourfold group on this clamp bar will remain vacant.

During programming the decoder addresses of each clamp bar of the light signal-decoder is an individual assignment possible if two Hsi2- or Hsi3-signals or one Fsi2-, Fsi3-, Hsi4- or Hsi-5 shall be digital controlled.
Therefore is it e.g. possible to realize signal combinations as shown within the following sample connections.

sample connection with Hsi5-, Hsi2- and Hsi3-signals (page_1250)



sample connection with Hsi4- and Fsi3-signals (page_1251)



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-SJ* 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.

If the Light-Signal Decoder *LS-DEC-SJ* shall control on one clamp bar two Hsi2- or Hsi3-signals or one Fsi2-, Fsi3-, Hsi4- or Hsi5-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 arrange the clamp bar for the control of two Hsi2- or Hsi-3-signals.
For the other case (turnout **round** or signal **red**) you program the clamp bar that one Fsi2-, Fsi3-, Hsi4- or Hsi5-signal will be controlled.

■ Important informa-tiont

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).

■ General Note

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

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Internet:
http://www.ldt-infocenter.com

Additional Information about installation and operation of our digital components and various helpful sample connections are available within 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_1249.pdf) and printed at an A4 format.

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