

To be a Digital-Professional!

DR Light-Signals digital controlled by the Light-Signal Decoder LS-DEC-DR

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 a short dark phase as in reality.

All this advantages will be offered within our Light-Signal Decoder *LS-DEC-DR*. The read-in of the directly assigned decoder addresses is possible via the programming key S1 as on all our other accessory decoders.

BASICS

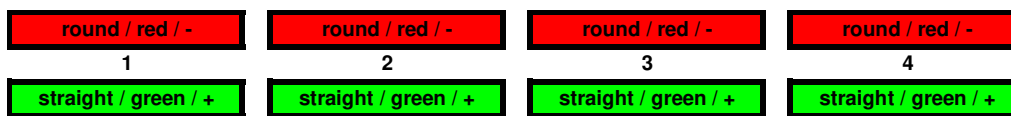
According to the used operation mode is it possible to connect either 2 advance- and home signals each or 2 HI-home signals to one Light-Signal Decoder *LS-DEC-DR*. How to select one of the two operation modes will be described within the paragraph "PROGRAMMING".

A complete 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 4 addresses and 8 adjustment possibilities on each clamp bar can control either 8 signal aspects if one advance- and one home signal will be controlled or even 14 signal aspects by using one HI-home signal.

The following sample connections show how the fourfold address-group can be set by use of 8 keys of the push button panel for setting the turn-outs or signals.



The centerline between two keys indicates the decoder address. 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 model railway layout 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 ... 18 Volt ~ (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 decoder by the digital current (directly connection of clamp KL1 to 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 3 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 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 that 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 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 DR-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 will be the explanation of the corresponding signal aspects refer mostly to one clamp bar only.

To assure that you are able to assign the wires of the light emitting diodes of the light signals correctly to the clamps of the light signal-decoder you should attend to 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*.

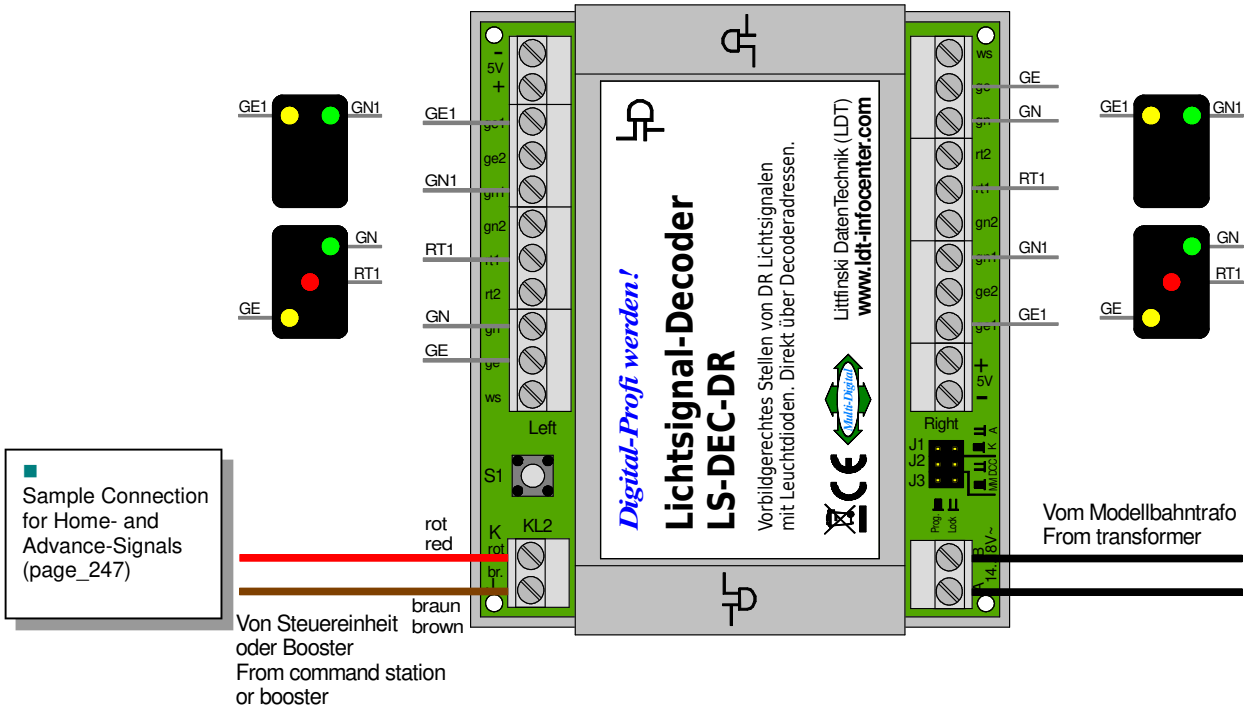
Please notice that the Light-Signal Decoder does not simply switchover the signal aspects but is dimming the light emitting diodes realistic up and down. Additionally there will be a dark phase of about 0.4 sec. between the signal aspects. During the dark phase is it not possible for the decoder to process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

■ Important Tip

The following sample connections refer to the different light signals of the German National Railways (DR). Within our delivery range we offer as well Light-Signal Decoders for signals of the German Railway (DB and KS), the Austrian Federal Railways (OEBB), the Swiss Federal Railways (SBB), the Dutch National Railways (Nederlandse Spoorwegen – NS), the Belgian National Railways (National Maatschappig of the Belgian Spoorwegen –NMBS) and furthermore. The connection of these signals will be explained within separate pages of our Digital-Compendium.

HOME- AND ADVANCE-SIGNALS WITHOUT LIGHT BAR

The first operation mode of the Light-Signal Decoder *LS-DEC-DR* contains the control of two home- and two advance signals. The below picture shows the connection of one home- and one advance signal on each of the two clamp bars:



The signals at the left clamp bar occupy e.g. the decoder addresses 1 to 4. The addresses 5 to 8 will be used by the signals connected to the right clamp bar.

When switching-on the layout the Light-Signal Decoder *LS-DEC-DR* will switch at first all signals to red (HI 13 “train stop” / HI 10 “awaiting train stop”). The green key of the address 1 has to be activated for switching the left home signal to green (HI “proceed”).

The following table shows the relation of keys to the corresponding digital addresses:

home signal (left)		advance signal (left)	
HI 13	HI 3a / 3b	HI 10	HI 7
round / red / -	round / red / -	round / red / -	round / red / -
1	2	3	4
straight / green / +	straight / green / +	straight / green / +	straight / green / +
HI 1	HI 2 / 3a	HI 1	HI 4

The home signal at the right clamp bar will be switched to “proceed” by the address 5 (**green** key).

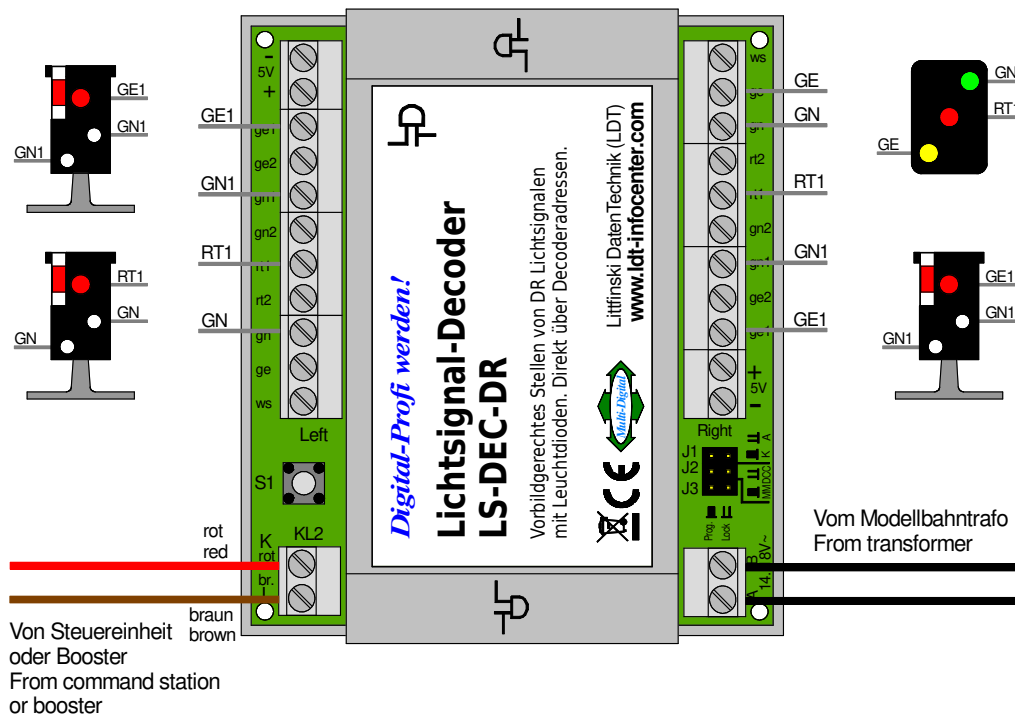
home signal (right)		advance signal (right)	
HI 13	HI 3a / 3b	HI 10	HI 7
round / red / -	round / red / -	round / red / -	round / red / -
1	2	3	4
straight / green / +	straight / green / +	straight / green / +	straight / green / +
HI 1	HI 2 / 3a	HI 1	HI 4

Important Tip

For this operation mode is it important to confirm both times with the green key during the programming. More information is available at the paragraph “PROGRAMMING”.

MAIN- AND MAIN-CLOSE-SIGNALS

With the Light-Signal Decoder *LS-DEC-DR* is a digital control of two main-close-signals or one main- and one main-close-signal possible as shown within the following sample connection:



Sample connection of main and main-close-signals (page_479)

The two main-close-signals at the left clamp bar will occupy exemplary again the decoder addresses 1 to 4. The addresses 5 to 8 will be used for the main signal and the main-close-signal of the right clamp bar.

After switching-on the layout the Light-Signal Decoder *LS-DEC-DR* will switch at first all signals to red (HI 13 “stop”). For example for switching now the left lower main-close-signal to white (Ra 12 “shunting drive proceed”) you have to activate the **green** key of the address 1.

The following key-table shows the signal aspect assignment of the single keys respectively the digital addresses. As the main-close-signals are 2-aspect-signals those can be controlled by one decoder address. Therefore will the addresses 2 and 4 not be used.

main-close-signal (left bottom)		main-close-signal (left top)	
HI 13		HI 13	
round / red / -	round / red / -	round / red / -	round / red / -
1	2	3	4
straight / green / +	straight / green / +	straight / green / +	straight / green / +
Ra 12		Ra 12	

The main-signal at the right clamp bar occupies the address 5 and 6 and will be switched to “proceed” with the address 5 (key **green**). With the key **green** of the address 7 is it possible to switch the main-close-signal to white (RA 12 “shunting drive proceed”).

main signal (right)		main-close-signal (right)	
HI 13		HI 13	
round / red / -	round / red / -	round / red / -	round / red / -
5	6	7	8
straight / green / +	straight / green / +	straight / green / +	straight / green / +
HI 1	HI 2 / 3a	Ra 12	

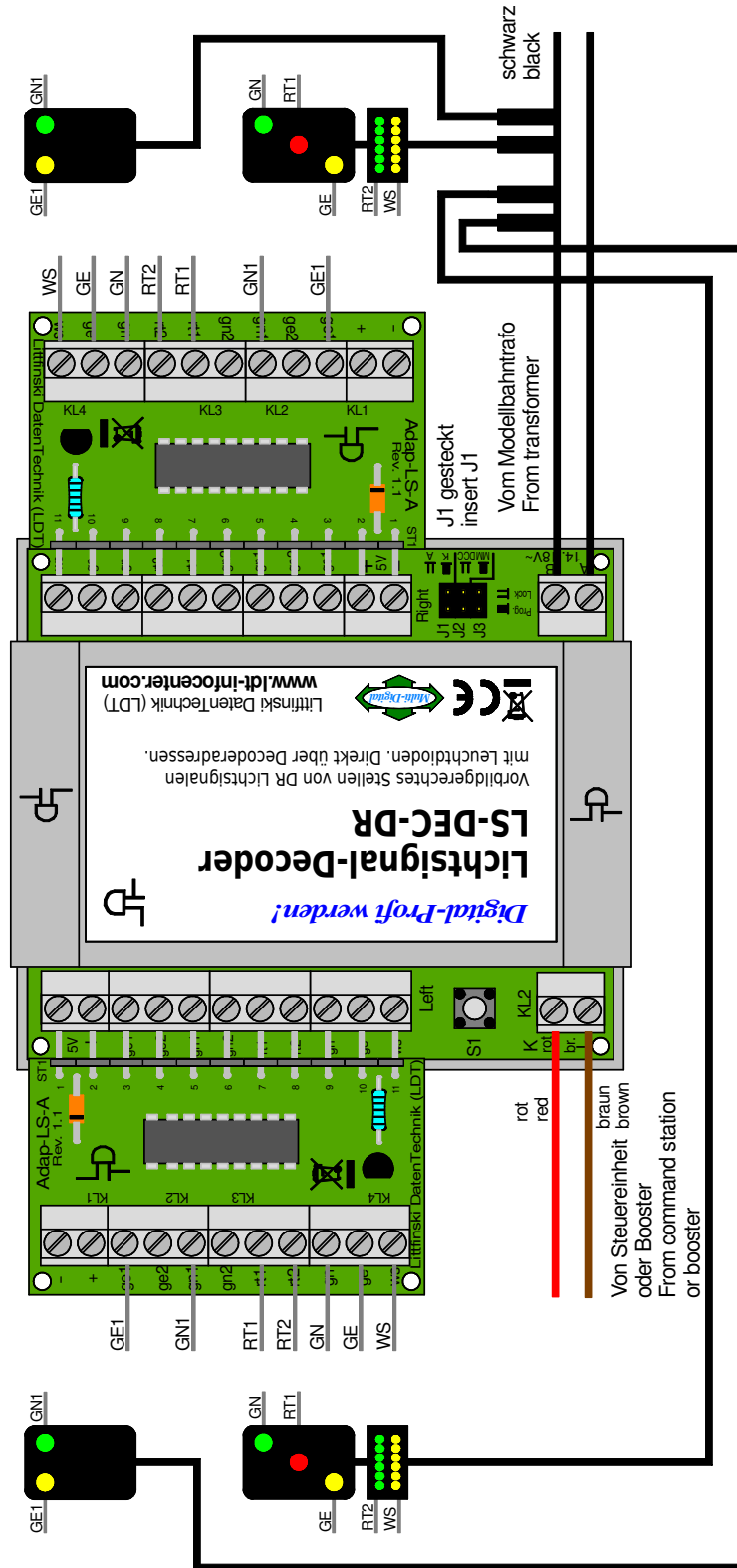
■ Important Tip

As well for this operation mode is it important to activate a green key for both programming operation. More to this issue under the headline “PROGRAMMING“.

HOME- AND ADVANCE SIGNALS WITH LIGHT BAR

The Light-Signal Decoder *LS-DEC-DR* supports as well signals with light bar. It is within your option to connect the green light bar to indicate HI 2 (proceed with 100 km/h) or leave this display and use HI 3a (proceed with 40 km/h) instead. You can as well connect the yellow light bar for HI 3b (proceed with 60 km/h) or leave this display for the indication with HI 3a (proceed with 40 km/h).

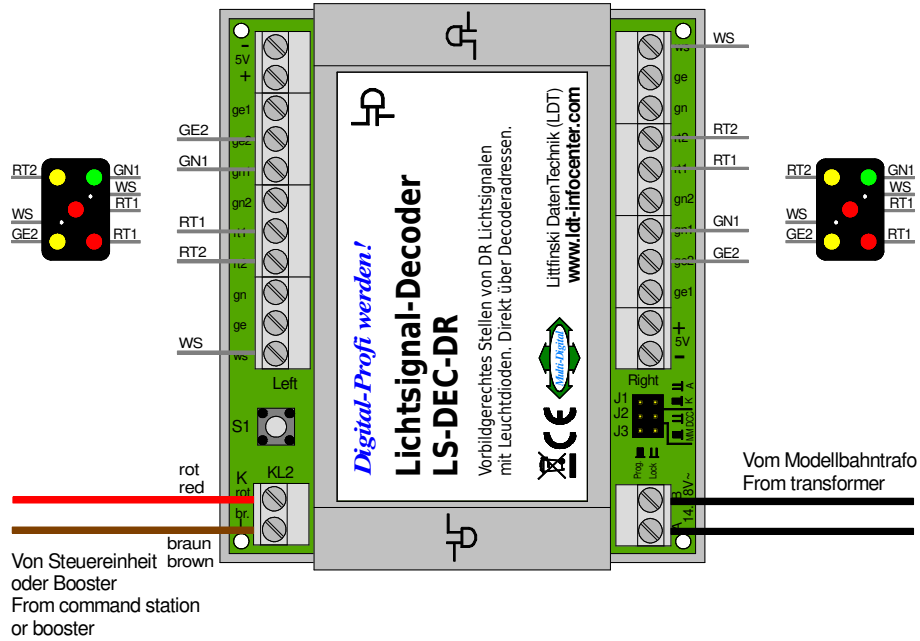
If the DR-signal is equipped with a light bar with light emitting diodes in series (e.g. models of manufacturer Erbert) our adapter *Adap-LS-A* is required as amplifier.



■ Sample connection of Home- and Advance Signals with Light bar page_248)

HL-HOME LIGHT SIGNALS WITHOUT AND WITH LIGHT BARS

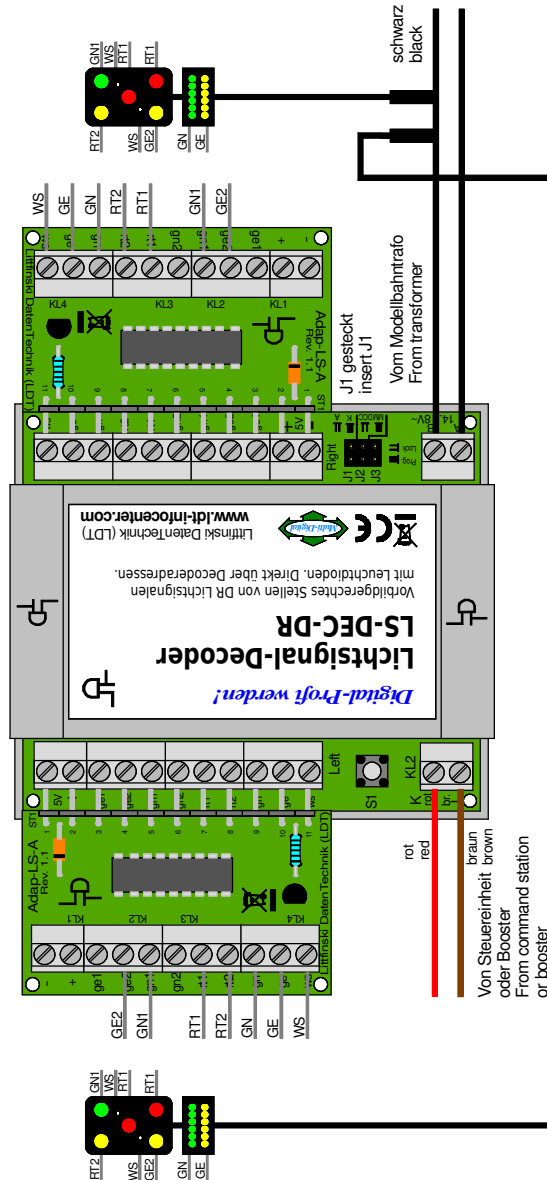
The second operation mode contains the connection of one HI-home signal on each clamp bar of the Light-Signal Decoder LS-DEC-DR. For each HI-signal are fourteen signal aspects possible. For this operation are the keys of the first two addresses four-fold occupied.



Sample Connection of HI-Home signals (page_250)

For the control of light bars with light emitting diodes assembled in series (e.g. manufacturer Erbert) is our adapter *Adap-LS-A* required.

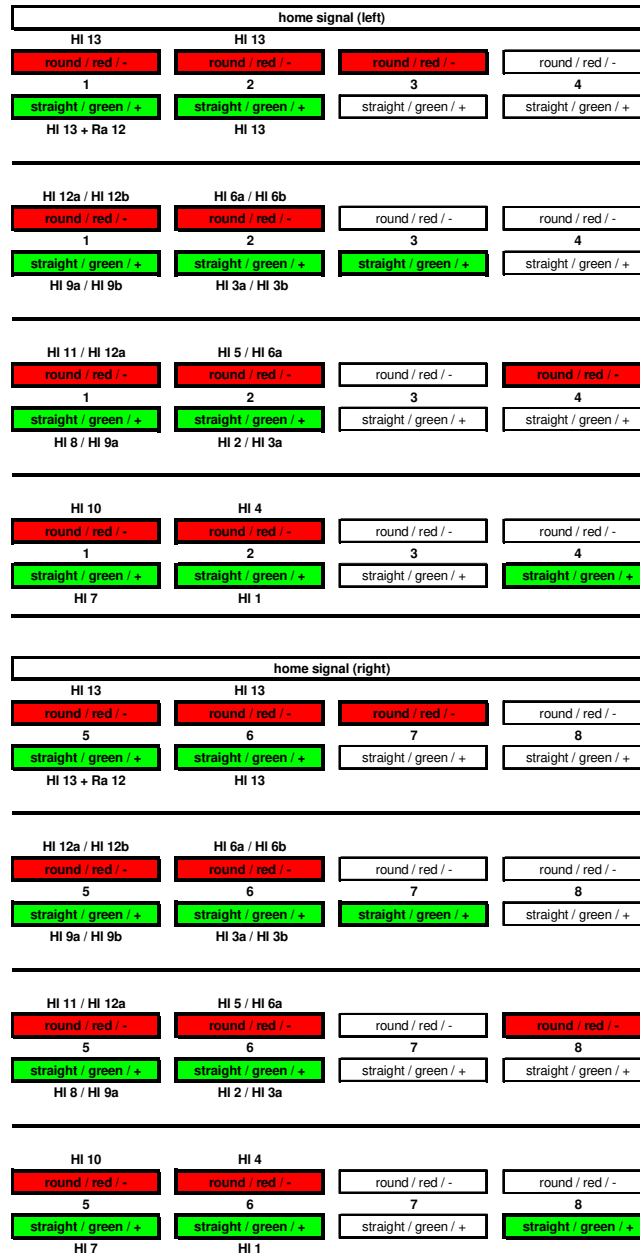
Sample Connection of HI-Home signals with Lightbars (page_150)



After switching-on the layout the Light Signal-Decoder will switch all signals to red (HI 13 “train stop”). For switching on the left side “proceed shunting” (HI 13 + Ra 12) you have to activate the green key of the address 1 and the green key of the address 5.

If now e.g. the left signal shall indicate HI 1, at first the occupancy of the first two addresses have to be changed with the address 4 key **green**. Then the address 2 key **green** for the signal aspect HI 1 has to be activated.

Only the colored keys will be required for the shifting of signals:



Also for this operation mode is it required to activate both times a red key for both programming operation.

The HI-home signal is with the possible 14 signal aspects a very complex signal. Comparing this with home or advance signals is it very difficult to switch this signal by activating the relevant keys. This will be rather a case for a PC-supported model railway layout.

■ Important Tip

■ Remarks

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-DR* 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 Tip

If the Light-Signal Decoder *LS-DEC-DR* shall switch home- and advance signals or HI-home light-signals shall be adjusted together with the decoder address. If you activate a key of the desired group of four which shall switch a turnout **straight** or a signal to **green** during the programming of an address you have set the decoder for switching home- and advance signals.

If you would activate a key for turnout **round** or a signal to **red** you would select the possibility to switch main-light signals. It is important that you activate for both programming sequences (left and right clamp bar) both times a **green** or both times a **red** key.

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) excluded in advance. After complete assembly of the module at the layout it would be very difficult to undertake this procedure.

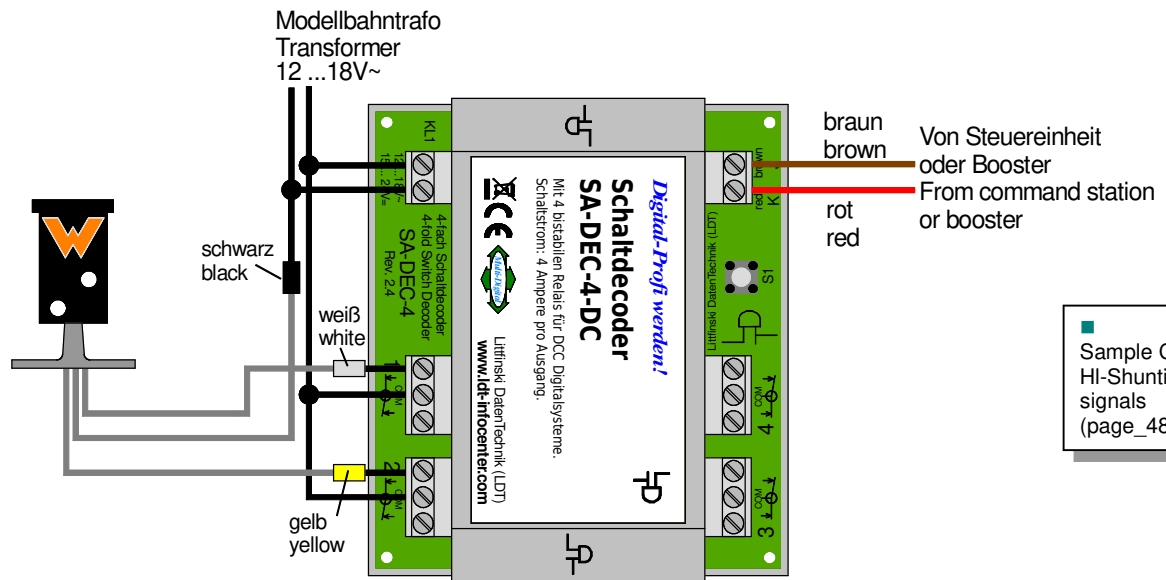
HL-SHUNTING SIGNALS

HI-shunting signals will not be digital switched via the Light-Signal Decoder *LS-DEC-DR* but via the switch decoder *SA-DEC-4*.

The switch decoder contains four outputs with potential-free switch-over contacts. Each contact can be switched to both setting via one digital address. Therefore each switch decoder occupies four digital addresses.

For each HI-shunting signal are two digital addresses respectively two switch decoder outputs required. The sample connection shows at the first output the possible switching on or off (e.g. digital address 1) of the signal aspect Ra 12 “shunting drive proceed”

With the second output (e.g. digital address 2) is it possible to switch the illumination “W”.



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_247.pdf) and printed at an A4 format.

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