LDT Digital-Compendium (LS-DEC-BR-001_11_EN)

To be a Digital-Professional!

British Railway (BR) Light-Signals digital controlled by the Light-Signal Decoder LS-DEC-BR

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 phases as in reality.

The Light-Signal Decoder *LS-DEC-BR* supports two-, three- and four-aspect light signals of the British Railway. If a direction indicator (Feather) is available at the signal, this can be switched individual on or off. The direction indicator (Feather) will glow only if one of the three driving aspects will be indicated.
For the signal aspects of drive slow and drive with medium speed the function flashing can be switched on or off.

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. 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 with 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.

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.

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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 … 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 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-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!

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 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 BR-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 light signals of the British Railways (BR). 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 Nederlandse Spoorwegen (NS), the Nationale Maatschappig of the Belgium Spoorwegen (NMBS) and furthermore. The connection of these signals will be explained within separate pages of our Digital-Compendium.

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TWO 2- TO 4-ASPECT SIGNALS ON EACH CLAMP BAR

At our first sample connection are 2 four-aspect signals with four lamps connected to the left clamp bar and to the right clamp bar 2 three aspect light signals with 3 lamps:

Sample connection for three and four aspect light signals (page_1190)
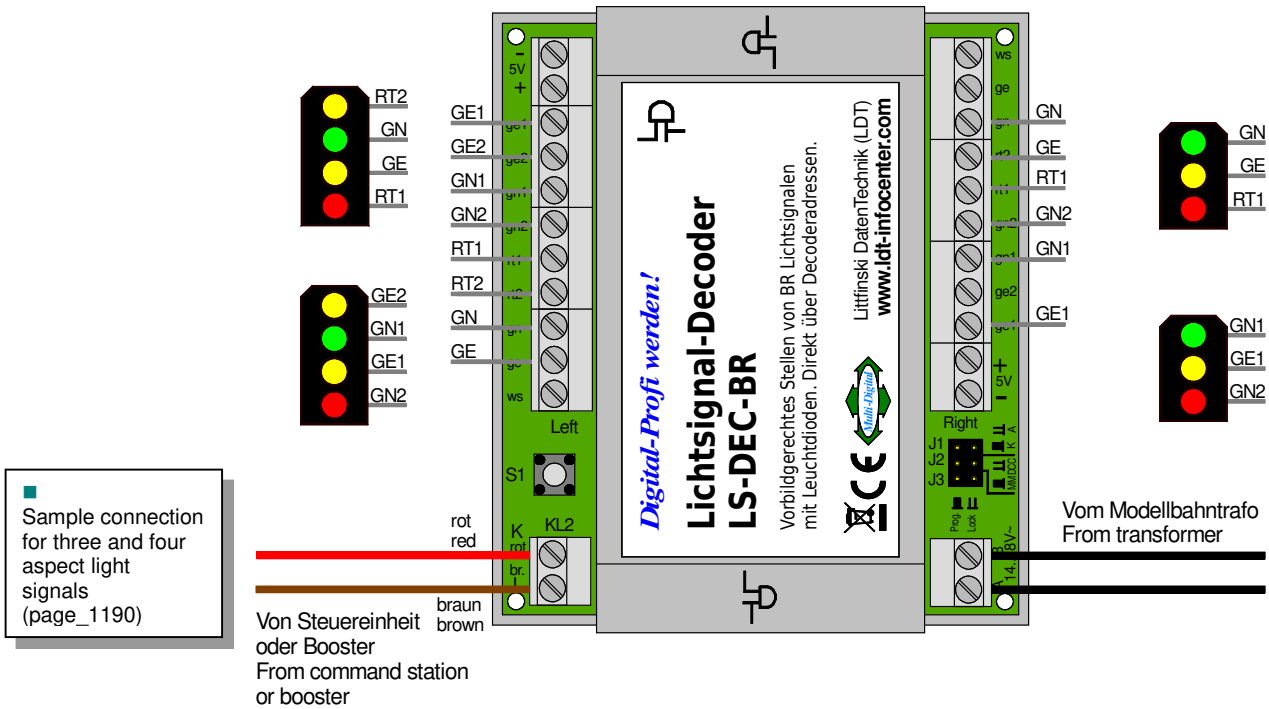
The signals connected to the left side occupy e.g. the decoder addresses 1 to 4. The addresses 5 to 8 will be used by the right signals. Each signal occupies therefore 2 decoder addresses and all signals can be switched independently.

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

For switching the upper signal with 4 lamps 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 keys to the corresponding digital addresses:

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

To switch e.g. the lower signal with 3 lamps 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	drive medium	train stop	drive medium
round / red / -	round / red / -	round / red / -	round / red / -
5	6	7	8
straight / green / +	straight / green / +	straight / green / +	straight / green / +
drive	drive slow	drive	drive slow

The next sample connection shows the possibility to combine light signals with 2, 3 and 4 lamps on one Light-Signal Decoder *LS-DEC-BR.* The two signals with 3 and 4 lamps at the left clamp bar can be switched independently again via the decoder address 1 to 4.

■ Sample connection to combine 2, 3 and 4 aspect light signals (page_1191)
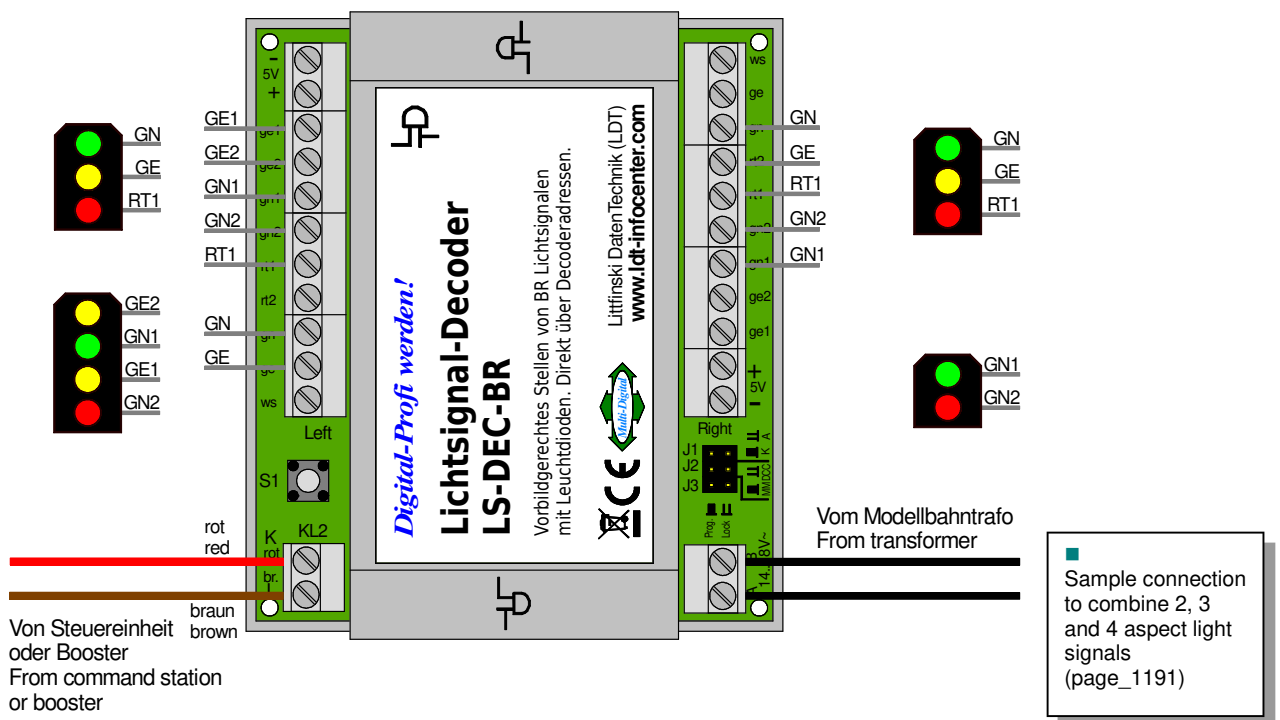
The following key-table shows the setting of keys and the assignment of digital addresses respectively signal aspects:

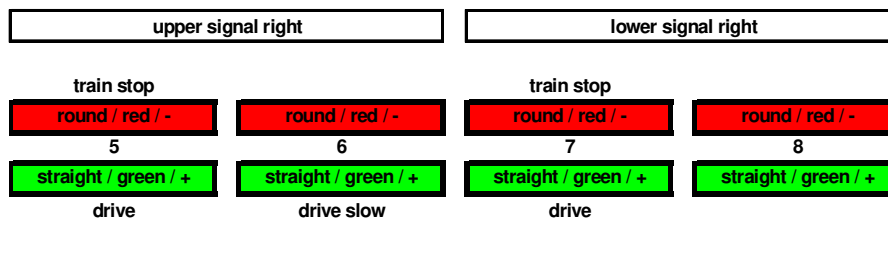| upper signal left		lower signal left	
train stop		train stop	drive medium
round / red / -	round / red / -	round / red / -	round / red / -
1	2	3	4
straight / green / +	straight / green / +	straight / green / +	straight / green / +
drive	drive slow	drive	drive slow
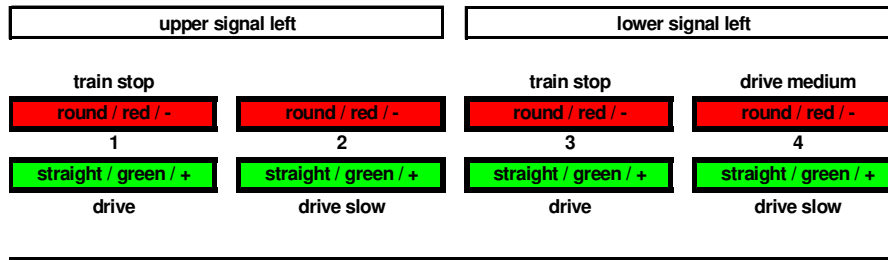
The addresses 5 to 7 will be used from the signals at the right. There is one light signal with 3 lamps combined with one light signal with 2 lamps.
The signal with 3 lamps occupies the decoder addresses 5 and 6 and the signal with 2 lamps the address 7.

upper signal right		lower signal right	
train stop		train stop	
round / red / -	round / red / -	round / red / -	round / red / -
5	6	7	8
straight / green / +	straight / green / +	straight / green / +	straight / green / +
drive	drive slow	drive	

The next sample connection shows one further combination possibility. At the left clamp bar is one signal with 2 and one signal with 4 lamps in combination connected. Via the right clamp bar will be two signals with 2 lamps each digital controlled.

Sample connection of combination of light signals with 2 and 4 lamps (page_1192)
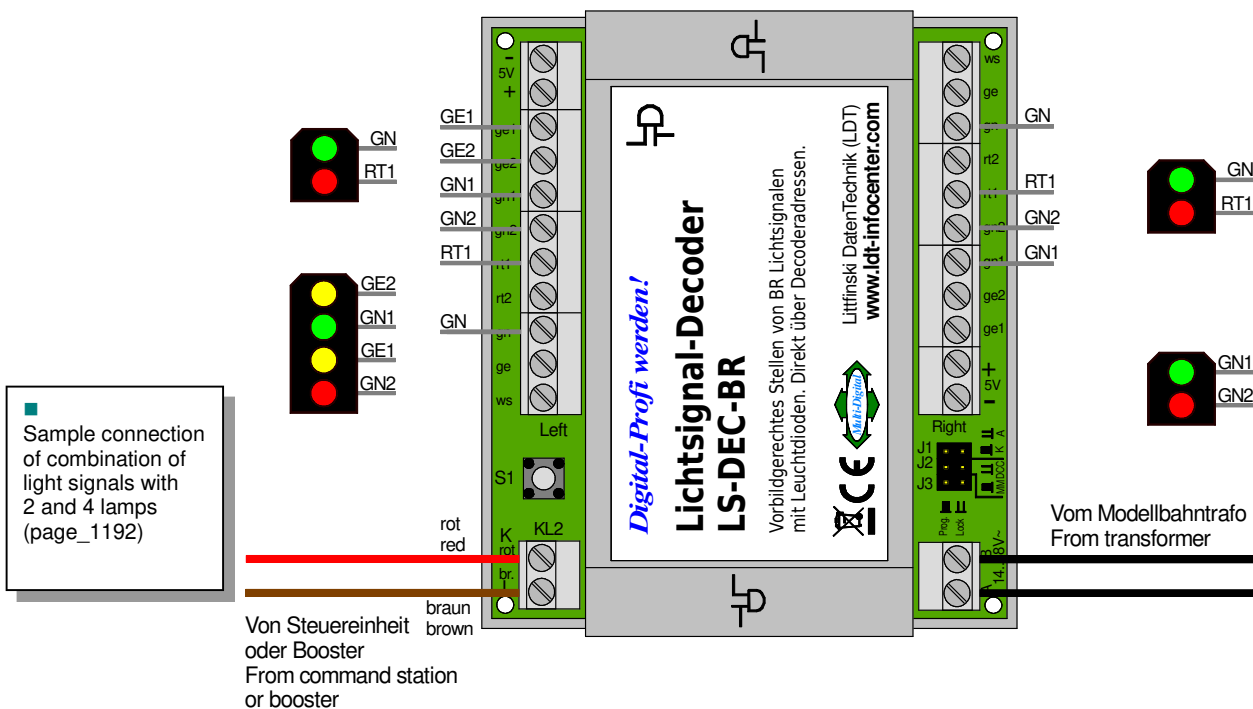
The light signal with 2 lamps occupies at the left clamp bar the decoder address 1 and the signal with 4 lamps the addresses 3 and 4.

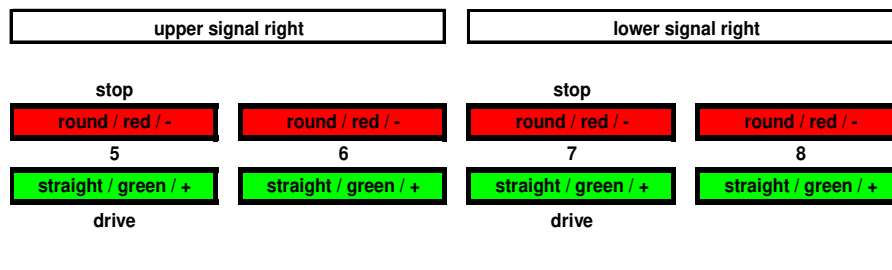| upper signal left		lower signal left	
stop		**stop**	
round / red / -	round / red / -	round / red / -	round / red / -
1	**2**	**3**	**4**
straight / green / +	straight / green / +	straight / green / +	straight / green / +
drive		**drive**	
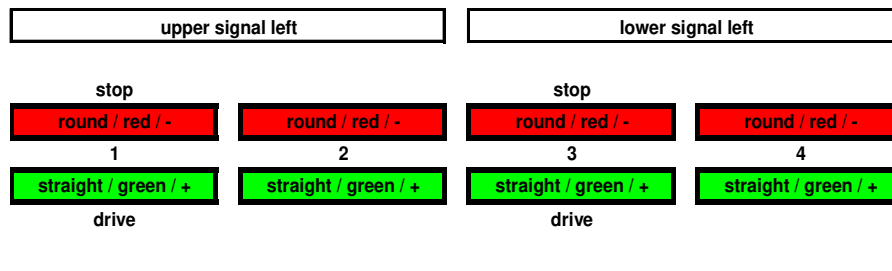
The two signals with 2 lamps each at the right clamp bar can be controlled separately via the decoder addresses 5 and 7:

upper signal right		lower signal right	
stop		**stop**	
round / red / -	round / red / -	round / red / -	round / red / -
5	**6**	**7**	**8**
straight / green / +	straight / green / +	straight / green / +	straight / green / +
drive		**drive**	

ONE 2- TO 4-ASPECT SIGNAL WITH DIRECTION INDICATOR (FEATHER) 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 2- to 4-aspect signal with direction indicator (Feather) 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.

The direction indicator (Feather) can be switched on or off via the third address. It will glow as in reality only if one of the three driving aspects are indicated. If the signal has been switched to stop, the direction indicator will be automatically switched off by the Light-Signal Decoder *LS-DEC-BR*.

For the signal aspect "drive slow" and "drive medium" can be the function "flashing" switched on or off via the fourth address.

The following sample connection shows the connection of one light signal with 4 or 3 lamps and direction indicator (Feather) on each clamp bar:

Sample connection for light signals wit 3 and 4 lamps and direction indicator (Feather) (page_1193)
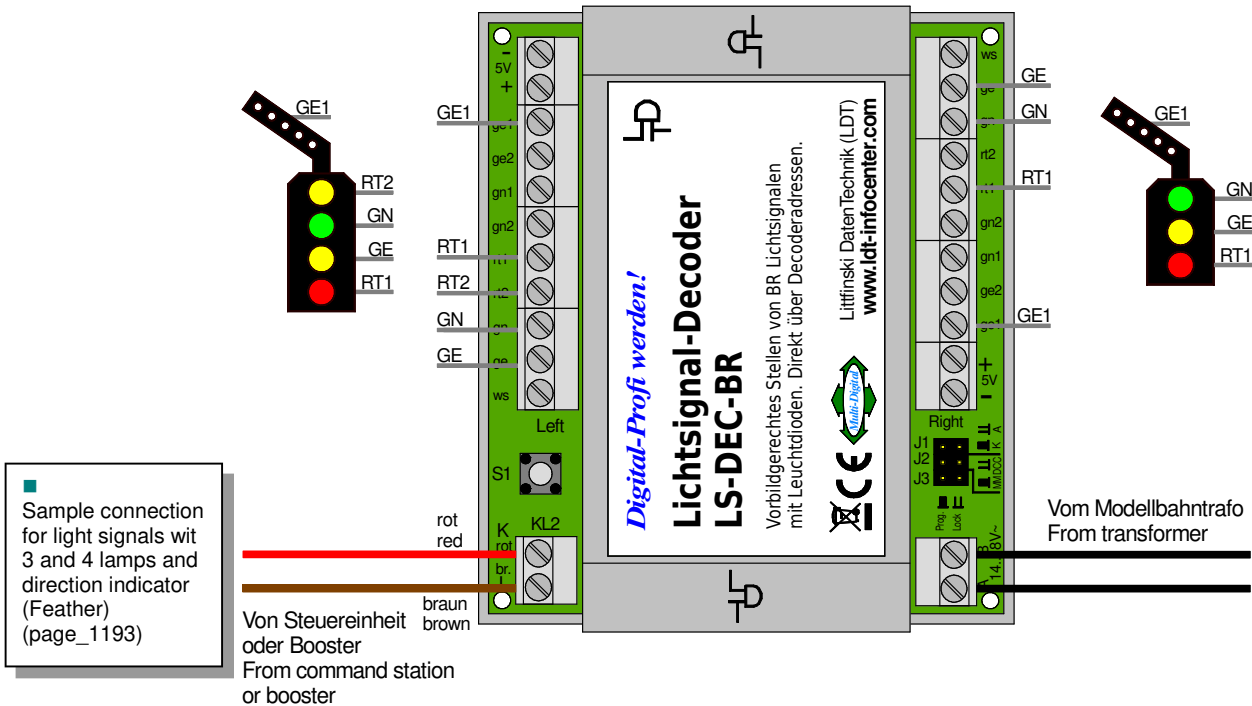
The light signal with 4 lamps and direction indicator occupies exemplary the decoder addresses 1 to 4 at the left clamp bar.

signal with 4 lamps and direction indicator (Feather)			
stop	**drive medium**	**Feather OFF**	**Flashing OFF**
round / red / -	round / red / -	round / red / -	round / red / -
1	**2**	**3**	**4**
straight / green / +	straight / green / +	straight / green / +	straight / green / +
drive	**drive slow**	**Feather ON**	**Flashing ON**

Via the right clamp bar can be a signal with 3 lamps and direction indicator with the addresses 5 to 8 controlled.

signal with 3 lamps and direction indicator (Feather)			
stop		**Feather OFF**	**Flashing OFF**
round / red / -	round / red / -	round / red / -	round / red / -
5	**6**	**7**	**8**
straight / green / +	straight / green / +	straight / green / +	straight / green / +
drive	**drive slow**	**Feather ON**	**Flashing ON**

The next sample connection shows the digital control of one light signal with 2 and 3 lamps and direction indicator (Feather) on each clamp bar:

■ Sample connection of light signals with 2 and 3 lamps and direction indicator (Feather) (page_1194)

The light signal with 3 lamps and direction indicator on the left clamp bar occupy exemplary the decoder addresses 1 to 4.

signal with 3 lamps and direction indicator (Feather)			
stop		**Feather OFF**	**Flashing OFF**
round / red / -	round / red / -	round / red / -	round / red / -
1	**2**	**3**	**4**
straight / green / +	straight / green / +	straight / green / +	straight / green / +
drive	**drive slow**	**Feather ON**	**Flashing ON**

Via the right clamp bar can be a signal with 2 lamps and direction indicator controlled with the addresses 5 to 8.

signal with 2 lamps and direction indicator (Feather)			
stop		**Feather OFF**	**Flashing OFF**
round / red / -	round / red / -	round / red / -	round / red / -
5	**6**	**7**	**8**
straight / green / +	straight / green / +	straight / green / +	straight / green / +
drive		**Feather ON**	**Flashing ON**

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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-BR* 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 informationt

If the Light-Signal Decoder *LS-DEC-BR* shall control on one clamp bar two 2- to 4-aspect signals or one 2- to 4 aspects signal with direction indicator (Feather) 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 2- to 4- aspect signals will be possible. For the other case (turnout **round** or signal **red**) you should program the clamp bar that a 2- to 4 aspect signal with direction indicator (Feather) 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_1190.pdf) and printed at an A4 format.

■ Internet: www.ldt-infocenter.com

Authors: Harry Kellner / Peter Littfinski

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