

To be a Digital-Professional!

Belgian NMBS Light-Signals digital controlled by the Light-Signal Decoder LS-DEC-NMBS

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 phases as in reality.

The Belgian National Railways (National Maatschappig of the Belgian Spoorwegen – NMBS) is using home signals with 4 or 5 lamps. Both will be supported by the *LS-DEC-NMBS* and /-both can be set at four-aspects. Additionally is it possible to switch two aspect-shunting signals.

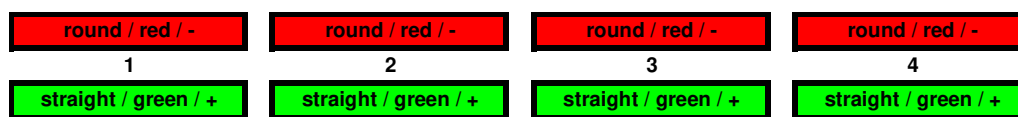
The reed-in of the directly assigned decoder addresses is possible via the programming key S1 as on all our other accessory decoders.

BASICS

Up to 4 light signals can be controlled by one Light-Signal Decoder. Two signals on each identical wired 11-poles clamp. 2 signal aspects can be assigned to each decoder address and 8 signal aspects per clamp bar. A Light Signal-Decoder occupies therefore 8 decoder addresses (4 addresses on each clamp bar).

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

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 turnouts 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 all 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 decoder 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 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 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 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 NMBS-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.

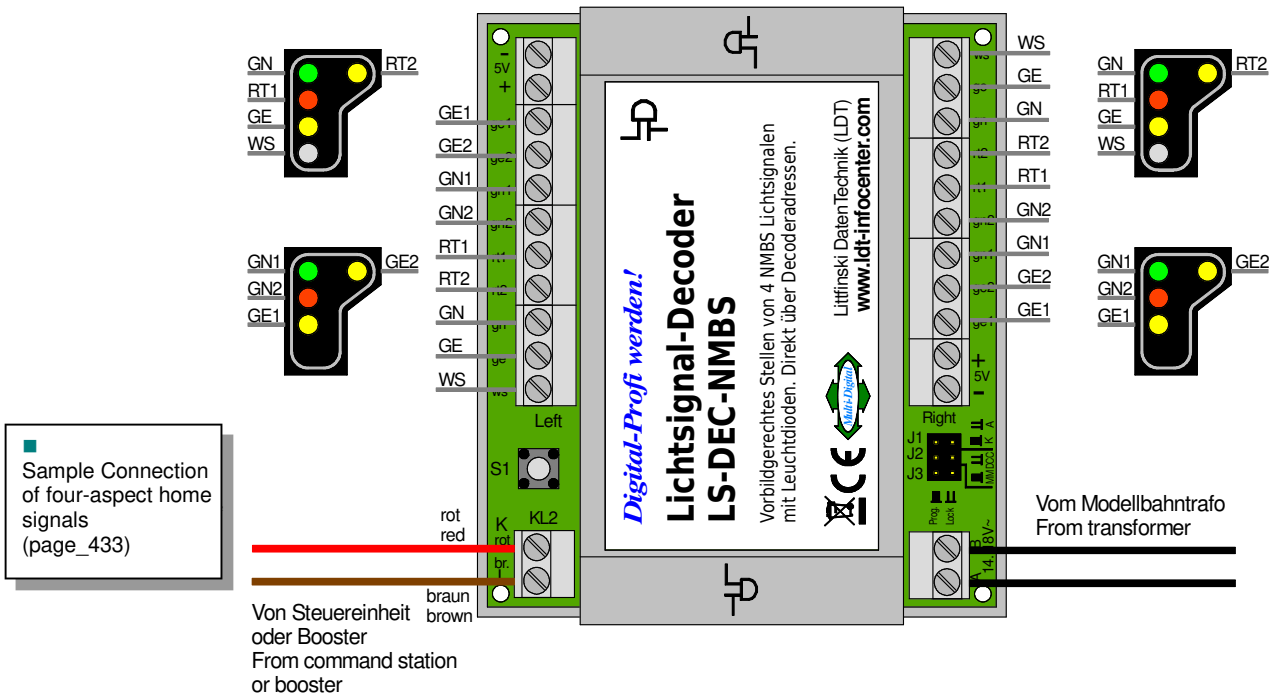
■ Important Tip

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

FOUR-ASPECTS SIGNALS WITH 4 AND 5 LAMPS

At the station area there will be mainly home signals with 4 or 5 lamps used.

At our sample connection we connected at the left and at the right clamp bar two four-aspect home signals each. One signal with 4 and one signal with 5 lamps:



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).

The **green** key of the address 1 has to be activated for switching the upper home signal with 5 lamps at the left clamp bar to green (train proceed). The following table shows the relation of keys to the corresponding digital addresses:

upper signal left		lower signal left	
train stop	shunting drive	train stop	short braking distance
round / red / -	round / red / -	round / red / -	round / red / -
1	2	3	4
straight / green / +	straight / green / +	straight / green / +	straight / green / +
proceed	slow approach	proceed	slow approach

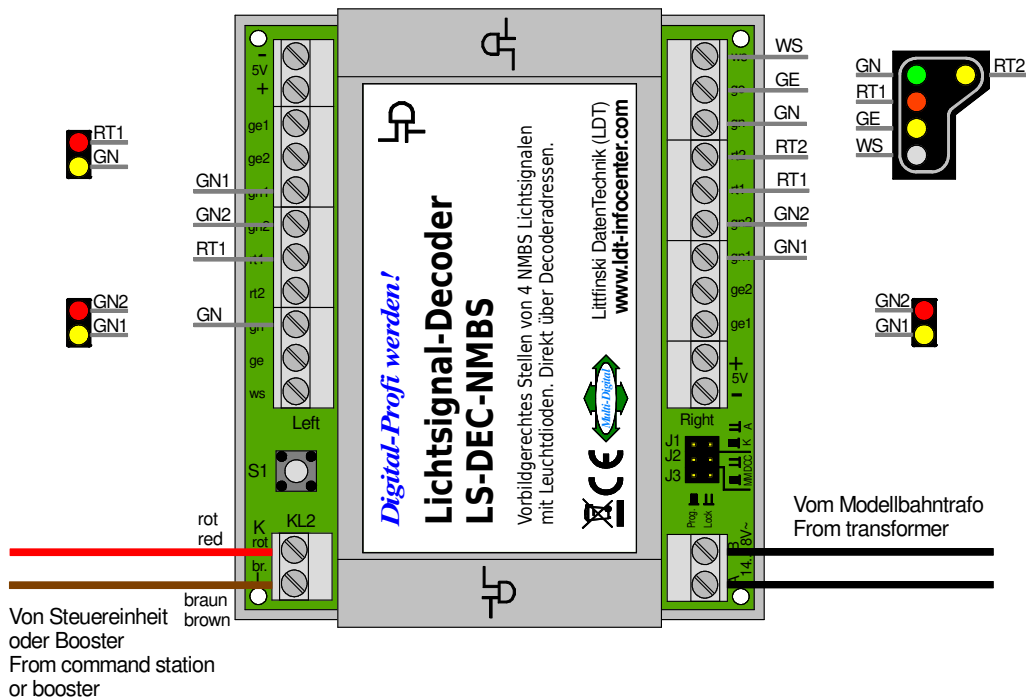
To switch e.g. the lower signal with 4 lamps of the right clamp bar to green (train proceed) you have to activate the **green** key of the address 7. The following table shows the setting of keys and the assignment of digital addresses:

upper signal right		lower signal right	
train stop	shunting drive	train stop	short braking distance
round / red / -	round / red / -	round / red / -	round / red / -
5	6	7	8
straight / green / +	straight / green / +	straight / green / +	straight / green / +
proceed	slow approach	proceed	slow approach

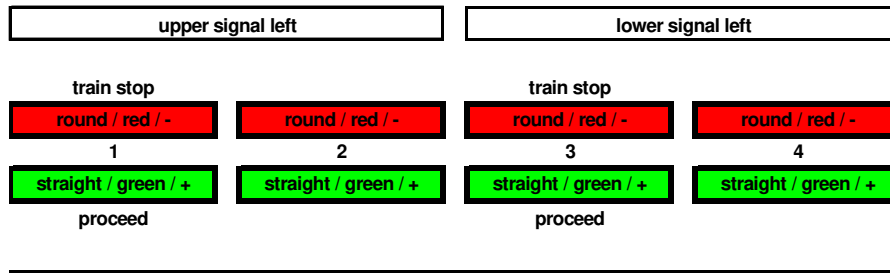
TWO-ASPECTS SHUNTING SIGNALS AND FOUR- ASPECTS HOME SIGNALS

It is as well possible to switch two aspects shunting signals with the *LS-DEC-NMBS*. These can be combined together with home signals within one Light-Signal Decoder.

The first sample connection shows at the left clamp bar two shunting signals, which will be e.g. controlled independently via the decoder address 1 and 3.

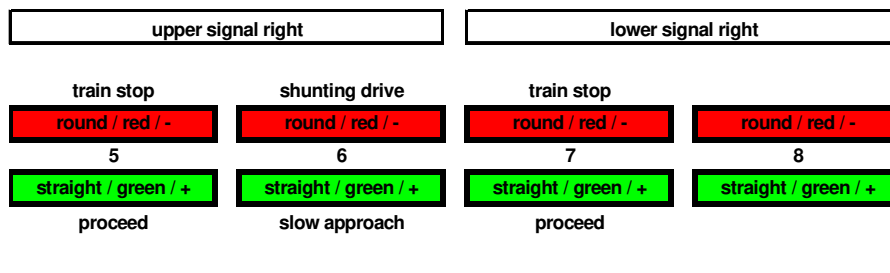


The following table shows the setting of keys and the assignment of digital addresses respectively signal aspects:

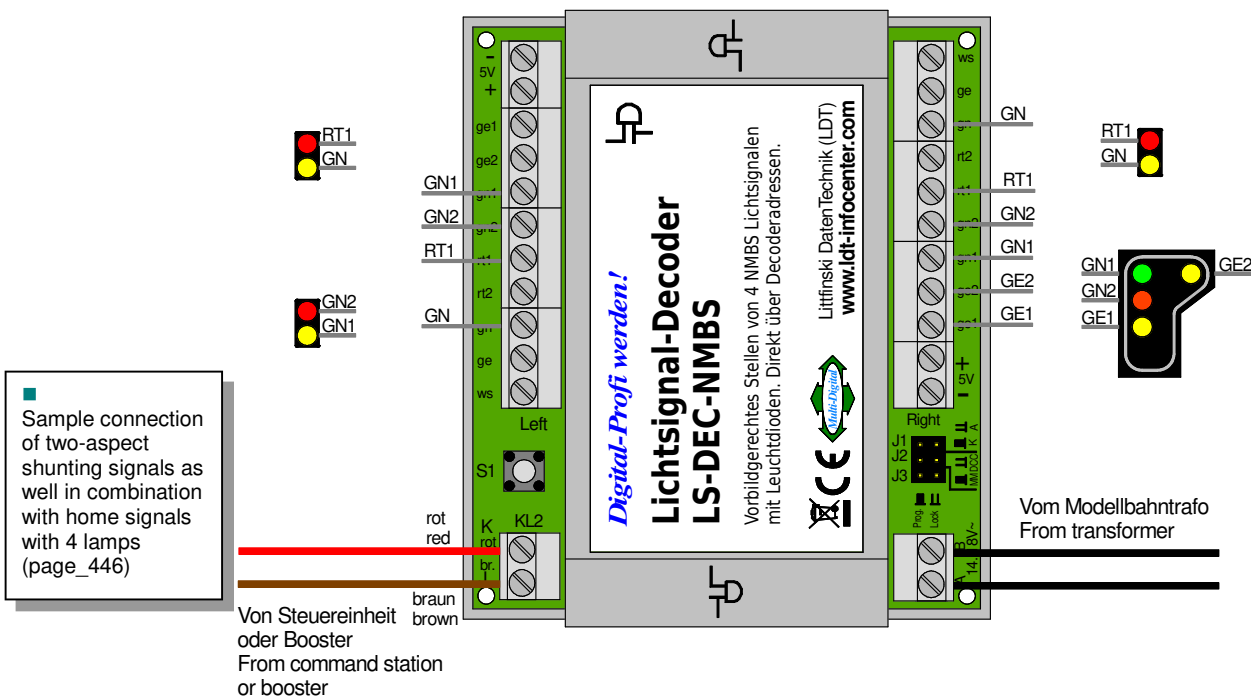


The addresses 5 to 7 will be used from the right hand signals.
 There is one home signal with 5 lamps connected in combination of one shunting signal.

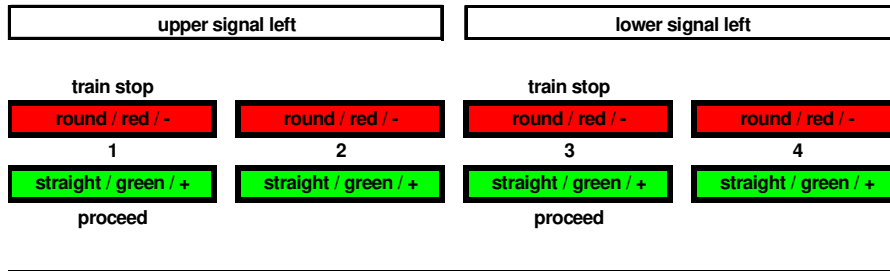
The home signal occupies the decoder addresses 5 and 6 and the shunting signal the address 7.



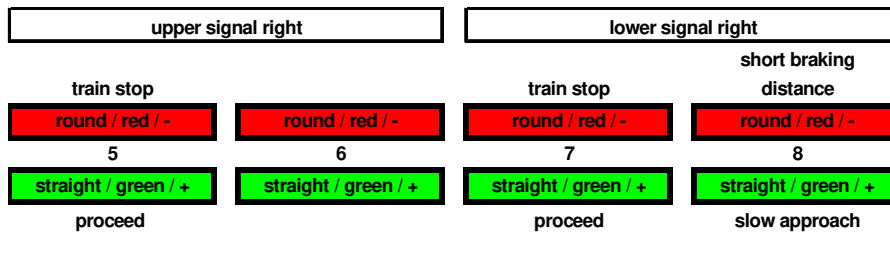
The second sample connection shows at the left clamp bar again two shunting signals and at the right clamp bar one home signal with 4 lamps combined with one shunting signal.



The two shunting signals at the left clamp bar can be e.g. controlled via the decoder addresses 1 and 3 and can be switched independently:



At the right decoder side is one home signal with 4 lamps connected combined with one shunting signal. The shunting signal occupies the decoder address 5 and the home signal with 4 lamps the addresses 6 and 7.



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-NMBS* 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.

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.

ADDITIONAL INFORMATION

■ Internet: www.ldt-infocenter.com

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_433.pdf) and printed at an A4 format.

Authors: Harry Kellner / Peter Littfinski

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