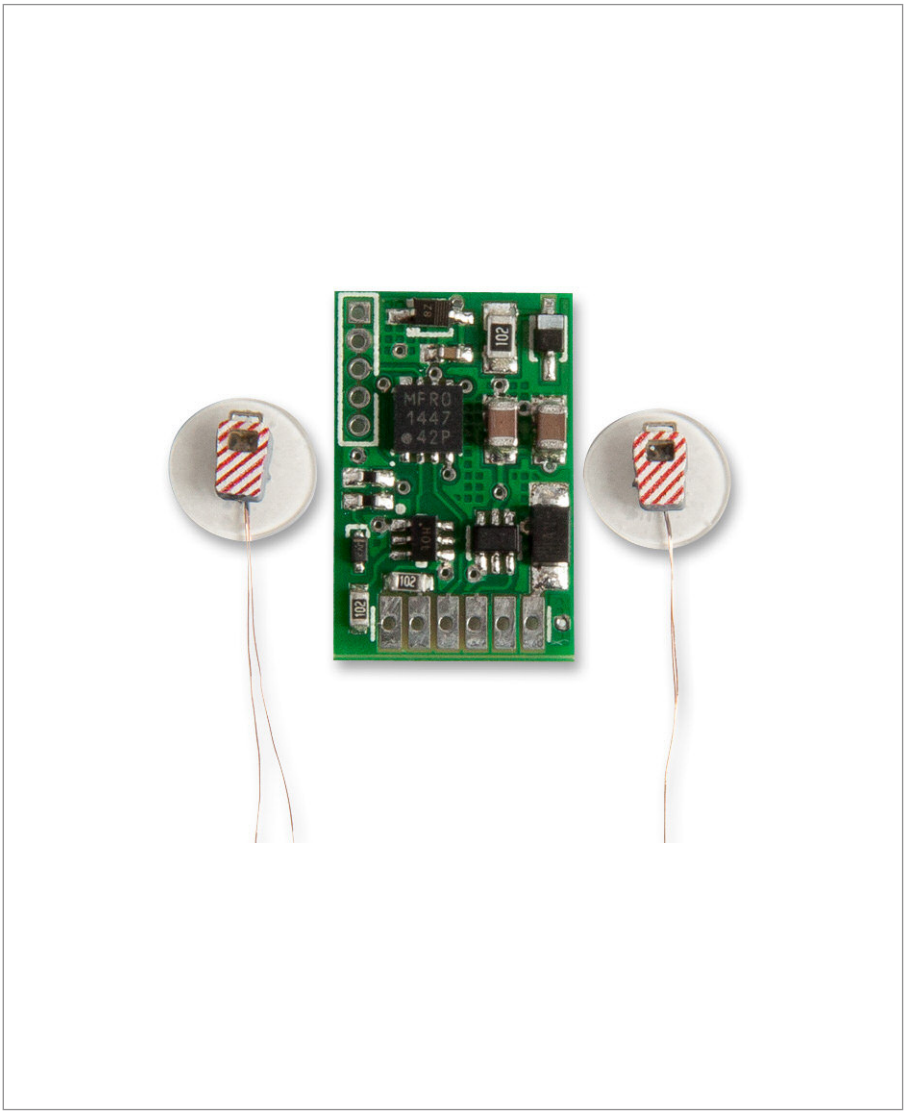
MANUAL

Back led lamp with decoder



Cod. 8-102003
Back led lamp whit decoder

Functionality

This multi-function decoder can work with equipment supporting the NMRA DCC protocol and with traditional analog equipment. It allows the connection of up to 2 led diodes to the respective outlets and is preprogrammed for the management of a pair of back led lamps with asynchronous flashing

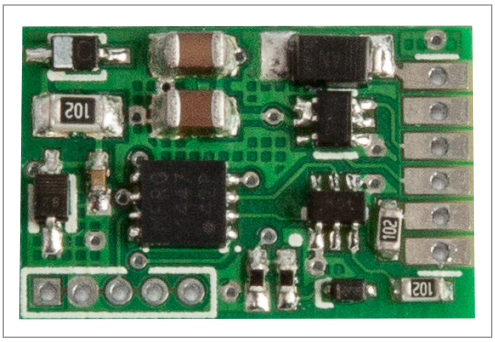
Technical Data

Power supply	**8-18V**
Max current for function output 1 and 2	**50mA**

Installation

The decoder can be installed very simply by connecting the PCB pads to the electric current taken from the voltage pickups on wheel axes and to the wires of the pair of back lamps. The function outlets 1, 2 must be connected to the cathode of the led diode and the anode to the common positive terminal of both led lamps. Boundary resistances are already installed in the circuit for both led diodes.
The PCB includes 7 pads on one side with all external circuit links according to the following diagram:

1) Common positive voltage
2) Not connected
3) Right rail
4) Left Rail
5) Output 1
6) Output 2

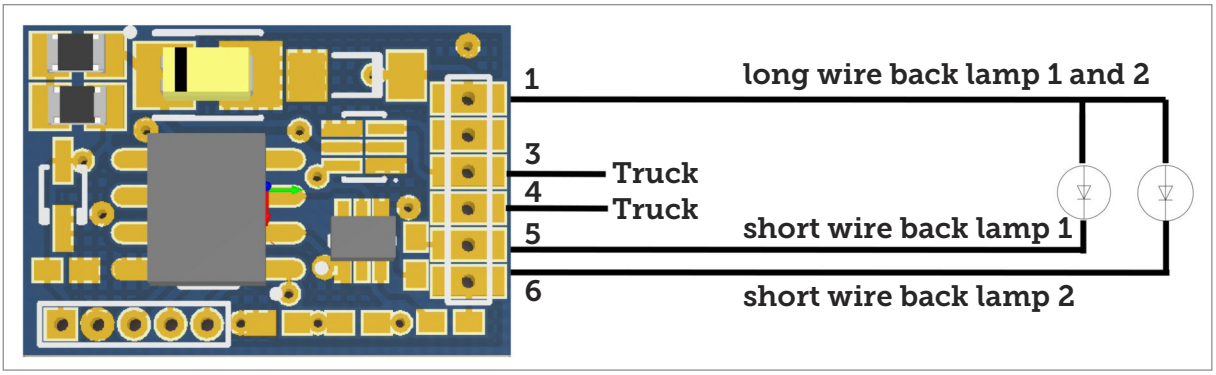


NOTE: given the low circuit absorbance, it may happen that CV contents cannot be read by some stations. However programming will still work and it will be signaled by the flashing of the leds connected to function outlets.
The back lamps connected to function outlets can be turned on/off by pushing any function key (F2 by default), using the function mapping

DM10200 Decoder connection diagram for back lamps.

Solder back lamps longer wires to the pad n. 1
solder the n.1 back lamp shorter wire to the n.5 pad, then solder the n.2 back lamp shorter wire to the n.6 pad

connect the wires coming from the sliding contacts to the pads 3 and 4.



Note:
the end back lights copper wires are tinplate for an easy soldering, is recommended to reduce the wire tinplate end to avoid a short circuit.
Is also recommended to use a minimum amount of tin for soldering, to avoid a short circuit.

The back lamps connected to function outlets can be switched on/off by any function key (default F2), using output mapping.

CV Programming

Each decoder must have a unique address to be driven from the control station. The default address of all decoders complying with the NMRA DCC standard is 3. Configuration variables can be set from any of the control stations available in the market (ZIMO, ESU, etc.).

Configuration Variable

Configuration variables, commonly named CV, allow the decoder operation to be tailored. These settings are stored in a special memory saving its contents also after switching off power supply

Decoder Address

The decoder address is set through CV1 and it can have any address ranging from 1 to 127. If a long address ranging between 128 and 10239 is required, CV17 and CV18 must be used together with bit 5 of CV29.

To calculate the value for CV17 and CV18, the following calculation is needed

CV17 = whole part of (long address / 256) + 19
CV18 = long address –(256 * (CV17 -192))
Example: for long address = 728
CV17 = (728 / 256) + 192 = 194
CV18 = 728 –(256 * (194-192)) = 216
For the address to be active, it is necessary to set bit 5 of CV29 to 1

Calculation of the CV Values

All CV variables are expressed with binary values. In some cases, each bit takes a special meaning and therefore the variable must be calcu-lated based on the value of the individual bits.

For example, if a sequence of bits like the following one is to be set in a CV

the value to write will be: 64 + 32 + 4 = 10

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
128	64	32	16	8	4	2	1

0	**1**	**1**	**0**	**0**	**1**	**0**	**0**

Brightness control

Both function outputs are dimmable and controlled by a mechanism called PWM, by which the voltage of each function outlet is reduced. It is worth repeating that voltage can be controlled with this technique by changing the length of pulses used to drive the outlet. A value between 1 and 31 can be written in CV#50 and #51 allowing the length of pulse to be changed to obtain a voltage range included between 0V and 15/18V with 32 intermediate levels, which changes the led diode brightness.

Flashing

In order to control the flashing of either led independently, the two outlets are driven by two independent timers, each one with its own configuration parameters. The effect is controlled by two pairs of configuration variables: CV61 and 62 for timer 1 and CV63 and 64 for timer 2. CV61 and 63 define the pulse interval (min. 0.01 sec, max. 2.55 sec) with a 0.01 sec. resolution, and CV62 and 64 control the length of pulse (min. 0.01 sec, max 2.55 sec.)

Output mapping

The mapping of function outlets can be used to associate one or more decoder outlets to a special function key in the control station. Outlet 1 can be activated writing 1 in the CV related to the aimed function key; similarly, the value for outlet 2 is 2,and the two values can be summed up to activate them simultaneously. In compliance with NMRA standards, all CVs from #33 to #46 are used to get the mapping of function keys.
The following table reports all possible settings.

CV	NMRA	Output[2]	Output[1]	Value
#33	FL >			0
#34	FL <			0
#35	F1			0
#36	F2	*	*	3
#37	F3			0
#38	F4			0
#39	F5			0
#40	F6			0
#41	F7			0
#42	F8			0
#43	F9			0
#44	F10			0
#45	F11			0
#46	F12			0

Default settings are marked with an asterisk, but the decoder behavior can be fully tailored by writing the value corresponding to the aimed outlet in the CV related to the function to be used.

Recovery

To recover the CV default setting, it is sufficient to write the value 10 in CV252.

CV	Default	Description
1	3	Decoder address
7	35	Version number
8	0	Manufacturer code
33-46	0	Function mapping for function outputs according to NMRA standard:CV36 = 3 (default Function F2)
50	16	Dimming output 1 (Min. 1, Max. 31)
51	16	Dimming output 2 (Min. 1, Max. 31)
61	120	Pulse interval 1 (1/100 sec).120 = 1,2 sec
62	3	Pulse length 1 (1/100 sec)
63	173	Pulse interval 2 (1/100 sec)
64	3	Pulse length 2 (1/100 sec)
252	0	decoder Reset