

The DIGITAL by Lenz LE1000 value-line locomotive decoder is suitable for all DC motors with continuous current draw of 1.0 Amp. or less. The characteristics of the decoder are:

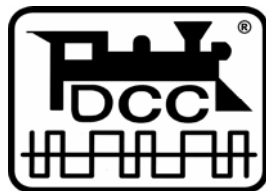
- * Conforms to all NMRA Standards and RPs (NMRA Warrant #04-01)
- * Supports 28 or 128 speed steps.
- * Operation on conventional DC layouts is possible or can be disabled.
- * Provides 1A continuous motor current.
- * One function output, can be optionally dimmed
- * Support for Advanced Consist Control and Extended Addressing
- * Support for programming on the mainline
- * Support for all forms of programming as described in NMRA RP-9.2.3
- * Programmable locomotive address, starting speed, acceleration, brake momentum and configuration.
- * Size: L 0.9" x W 0.63"x H 0.13" L 22.9mm x W 16mm x H 3.2 mm

LE1000W

Value-Line DCC Decoder

Art. No. 10100
Version 10
August 2004

value-line **Digital** *plus*®
by Lenz



Important safety instructions:

Value-line locomotive decoders are intended for use only with Lenz Digital plus or other standard NMRA DCC systems. We strongly recommend systems with an NMRA C&I warrant for carefree operation.

Note: the maximum current-carrying capacity of the motor or function output must not be exceeded. Exceeding this will destroy the decoder! The parts of the locomotive decoder must not touch the metal components of the chassis or the body of the locomotive. This could cause a short-circuit within the locomotive decoder which might destroy it.

Never wrap the locomotive decoder in insulating tape, as this prevents the necessary air circulation around the decoder. Instead, put insulating tape or something similar around the metal components of the locomotive. By doing so you can avoid unintentional short-circuits while allowing air to cool the decoder. Use double-sided adhesive-tape to affix the decoder to the locomotive.

Locomotives equipped with Digital plus decoders must not be run using powered overhead line either on conventional DC control or DCC control. This could subject the locomotive to double the voltage and this would destroy the decoder.

The current carrying capacities noted in the technical data may not be exceeded.

Before installing a value-line decoder, check the loco in normal DC operation to make sure that it works as it should before modifying the locomotive.

Replace worn wheel contacts, motor brushes and blown bulbs. Only a locomotive that is mechanically OK will function properly with a locomotive decoder.

Features:

- * Selectable for operation with 14/27, 28 or 128 speed steps.
- * Operation on conventional DC layouts is possible or can be disabled.
- * One function output
- * Support for Advanced Consist Control and Extended Addressing
- * Support for programming on the mainline
- * Programmable locomotive address, starting speed, acceleration, brake momentum and configuration.

Technical data

Total current carrying capacity of the decoder	1.0 A
motor output	1.0 A
function output	100 mA
addresses	1 – 9999
speed steps	14, 27, 28, 128
dimensions	23 x 16 x 3.2 mm

Installation of the LE1000W

Take note of which motor connection is connected to the right-hand rail and which to the left hand rail. If you do this you will know which wire of the decoder needs to be soldered to which motor connection in order to achieve the desired direction of travel.

After the removal of the original connections to the motor brushes, check to ensure that both of the motor brushes are completely isolated from each rail pickup. This means that they must not be connected in any way to the chassis or to the wheels of the locomotive. Also bear in mind, that shorts are sometimes created when the locomotive shell is put back on!

Please contact a service center/dealer if you are in any doubt as to whether all preconditions for the installation are fulfilled!

Wiring Instructions

First connect the decoder to the pick-ups from the wheels of the locomotive:

- red cable to the wheels, which in relation to the direction of travel, are on the right-hand side of the locomotive
- black cable to the wheels, which in relation to the direction of travel, are on the left-hand side of the locomotive

Then connect the decoder to the motor connections:

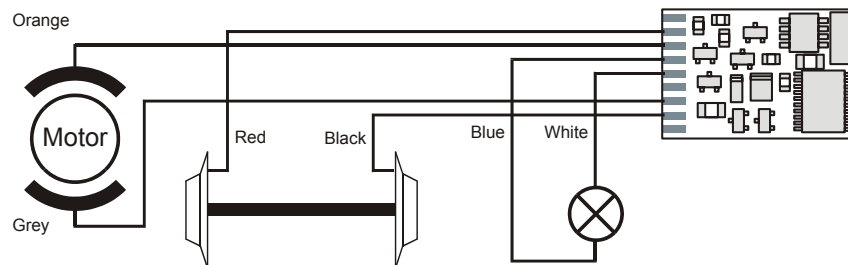
- orange cable to the motor connection previously connected to the right-hand locomotive wheels
- grey cable to the motor connection previously connected to the left-hand locomotive wheels.

Now connect the function:

- function output (white cable) to the bulb of the locomotive.

If the function inside the locomotive (e.g. the bulbs of the light) is not electrically connected to the chassis of the locomotive (i.e; if they are, "potential free") then connect the other pole of the function to the blue cable, as shown in the illustration. If a connection between functions and chassis does exist, then the blue cable remains unused. When connected to the blue cable the bulbs shine somewhat brighter. Which option you choose depends on the design of the locomotive.

For the connection of LEDs note that the blue cable is the positive pole (anode side of the LED) and the function output the negative pole (cathode side of the LED). The voltage at the function output is approximately 16 V. Please do not forget the necessary protective resistor. The value of the resistor can be calculated by the formula $R = V/I$ where I is current rating of the LED and V is the difference between the DCC track voltage and the voltage rating of the LED.



Wiring the LE1000A

Testing the installation

Place the locomotive on the programming track (without its shell) and read the address. If you have installed the decoder correctly, you should now be able to read the address (3= factory default). If you are not able to do so, it is possible that you have made a mistake when connecting the cables.

Do not subject the loco to full running track power until you obtain the correct "03" address read-out.

If you can not read the decoders address, check the cable connections and change them as required. Once you have read the address, you can send your locomotive on its first test run on your layout.

Remember: check and program the address after the shell is replaced, since a wire could be pinched.

Programming the decoder.

The locomotive address, acceleration and deceleration delay, and other features of the locomotive decoder can be changed as often as desired by programming. The features are "stored" permanently and remain the same even when the track voltage is switched off. These settings are called "configuration variables" or simply CV. The configuration of the values is done electronically, which means that it is not necessary to open the locomotive again after the decoder has been installed.

The LE1000 supports all NMRA DCC programming modes and can be programmed by any NMRA DCC programmer. With some entry level systems only a few CVs (such as CV #1, the locomotive address) can be set unless you use a separate programmer. Specific details for reading and writing the decoder's configuration variables can be found in the manuals of the appropriate equipment used for programming.

As delivered, the decoder is programmed for operating with the basic address 03, 28 speed steps and an internal speed table. The decoder can be used immediately on purchase with these basic configurations. Address, acceleration rate, deceleration, etc can all be configured to your preferences.

1.1 The configuration variables and their meaning

The following table lists the various CVs supported in the LE1000 decoder. Both the NMRA DCC CV numbers and the older Register numbers are provided for cross reference.

Please note: Some CVs (such as CV29) have specific meanings

for each bit. The bit assignments in this table use a bit numbering scheme of 0-7 to correspond the NMRA convention for universal bit numbering. Many handhelds (such as the DIGITAL plus LH100 handheld) use a scheme of 1-8 to refer to the individual bits rather than 0-7. (Bit 0 in this table is displayed as a "1" on LH100 handheld, Bit 1 is identified as "2".) The bit numbers in () within these tables contain the LH90 or LH100 bit numbers.

Table 1: LE1014 Configuration Variables

CV	Reg	Description	Range	Factory setting
1	1	Locomotive address: Note: for Digital plus systems the range is from 1-99. For higher address numbers see CVs 17,18.	1-127	3
2	2	Start voltage: This is the voltage applied to the motor in speed step 1. Set this value so that the locomotive just starts moving in speed step 1.	1-31	10
3	3	Acceleration Momentum: Determines the rate of change of speed upon acceleration. A higher value leads to a slower acceleration.	1-255	1
4	4	Brake Momentum: Determines the rate of change of speed upon braking. A higher value leads to longer brake distance.	1-255	1
-	5	Contains CV29 (see CV29 below)	0-39	6
7	7	Version Number: This location stores the version number of the decoder. This location is read only.	-	10
8	8	Manufacturers Identification: Contains the manufacturer ID of the decoder, (Lenz =99). Writing a value of 8 or 33 resets all CVs to their factory default condition	-	99
17	Extended Address High Byte		192-231	0
18	Extended Address Low Byte The two byte address, if used, is contained in CV17+18		0-255	0
19	Consist Address The advanced consist address if used is stored in CV19		0-255	0

**Note: in the factory setting field the numbers in the [] are decimal.

CV	Description	Range	Setting
29	Decoder Configuration, Byte 1: Several decoder properties are set with this CV.	0-63	6
bit 0 (1)	Locomotive direction: Locomotive's relative direction: This bit sets the direction the locomotive will move when told to move forward in digital mode. 0 = locomotive's direction is normal 1 = locomotive's direction is reversed	0,1	0 [1]
bit 1 (2)	Headlight mode: set for 28/128 speed steps	1	1 [2]
bit 2 (3)	Usage on conventional DC layouts: 0 = locomotive operates in digital mode only 1 = locomotive can operate on either conventional DC and on DCC	0,1	1 [4]
bits 3,4 (3) (4)	Not used, always 0	0,1	0
bit 5 (6)	Extended Addressing 0= Normal addressing 1= Four digit extended addressing	0-1	0 [32]
bit 6 bit 7	Not used always 0	0	0
50	Decoder Configuration, byte 2: Similar to CV 29, but other properties are set with this byte:	0-12	4
bits 0,1	Not used, always 0	0	0
bit 2 (3)	Brake momentum on DC operation. Only active if conventional DC control CV29.2 is disabled. (CV 29 bit 2 = 0) 0 = locomotive proceeds with track voltage dependent speed inside the conventional DC section. 1 = locomotive brakes in the conventional DC section with pre set brake momentum.	0,1	0 [4]
bits 3-7	Not used, always 0		
51	Light Dimming for Function Output Each bit corresponds to the functions F1 to F8. Dimming will be activated with the function chosen here. If no bit is set (no function chosen), the dimming value of CV 52 will always apply to the function output. To see a dimmable level change CV52.	0-255	0
52	Dimming CV for Function - contains the value used for dimming. 0 is dark 255 is max brightness	0-255	255
105	User Identification #1	0-255	255
106	User Identification #2	0-255	255
128	Decoder Software Version – read only		07

North American value-line by Lenz Product Warranty

Lenz GmbH does everything it can do to ensure that its products are free from defects and will operate for the life of your model railroad equipment. From time to time even the best-engineered products fail either due to a faulty part or from accidental mistakes in installation. To protect your investment in value-line products, Lenz GmbH offers a Limited Warranty.

This warranty is not valid if the user has altered, intentionally misused the Digital Plus product, or removed the product's protection, for example the heat shrink from decoders and other devices. In this case a service charge will be applied for all repairs or replacements. Should the user desire to alter a Digital Plus Product, they should contact Lenz GmbH for prior authorization.

First 90 days from date of sale: A full repair or replacement will be provided to the original purchaser for any item that has failed due to manufacturer defects. Should the item no longer be produced and the item is not repairable, a similar item will be substituted at the manufacturer's discretion. Please include a \$2 shipping and handling fee to cover return shipping from an authorized Lenz GmbH warranty center.

After 90 days and until 10 years after purchase: A \$10 service charge which includes repair, shipping and handling will be placed on each item that has failed due to manufacturer defects and/or accidental user installation problems. Should the item no longer be produced and the item is not repairable, a similar item will be substituted at the manufacturer's discretion.


Please contact your dealer or authorized Lenz GmbH warranty center for specific instructions and current service charges prior to returning any equipment for repair.

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This equipment complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

 Please save this manual for future reference!

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