

Unleashing the Power of DCC

Digital

plus
by Lenz®

Parallel LV102 Supplement

August 2006



Welcome!

We would like to congratulate you on your acquisition of a **Digital plus by Lenz**[®] NMRA DCC system and we hope you will enjoy working with this model-railway control system. Thank you for being our new customer!


The purpose of this operating manual is to explain how you connect pairs of LV102s together to increase the overall amperage in a single power district

If you still have questions after reading this operating manual, for which you can not find the answers, please contact us. We will be happy to help. There are four different ways of contacting Lenz Elektronik GmbH:

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1 Important information — Please read first!

Your **LZV100** and **LV102** components of your **Digital plus by Lenz**[®] system was submitted to intensive testing before delivery. Your LZV100 has also been awarded an NMRA DCC Conformance and Inspection Warrant certifying that the system faithfully adheres to all the NMRA DCC Standards and Recommended Practices. (The LV102 has been submitted and we are awaiting the warrant,) Lenz Elektronik GmbH guarantees fault-free operation if you follow the advice given below:

 *Do not connect the **LZV100** or **LV102** to any device not addressed in this manual. Even if other devices use the same connectors, you must not operate the **LZV100** or **LV102** with those devices. The fact that the connectors are similar does not automatically mean that you may use them for operation, even if you are dealing with other model railroad control systems.*

Do not expose the **LZV100** or **LV102** to moisture or direct sunlight.

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3 Installing a LZV100 LV102 Pair

There are five plugs on the rear of your LZV100. Each is used to connect a different feature of your system.

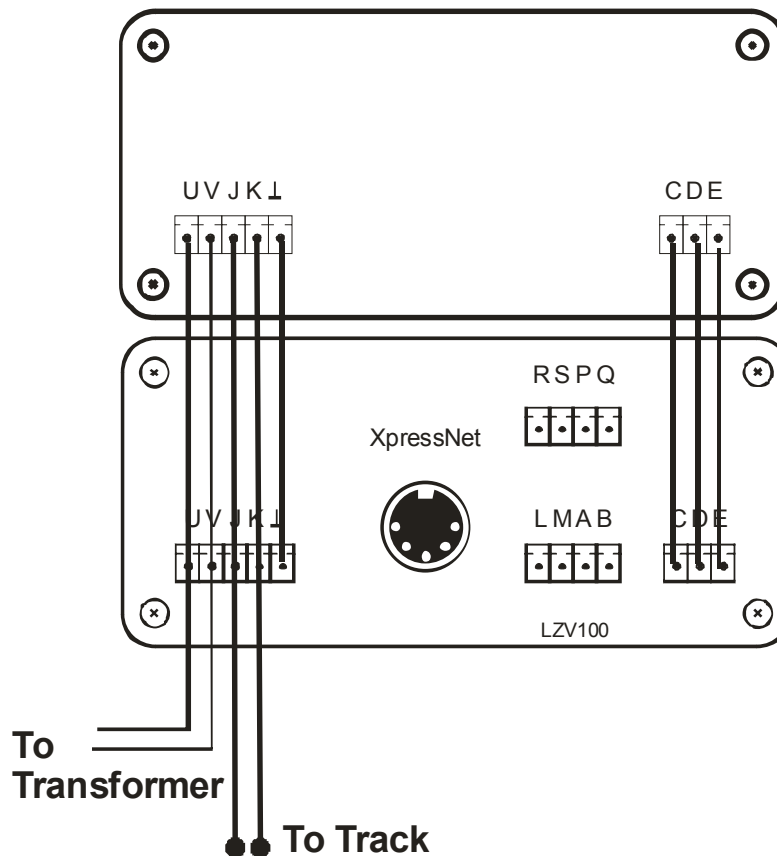


Figure 1: Complete Connections of the LZV100 Command/Power Station

3.1 Power Plug (UVJK⊥)

On the lower left hand side of the LZV100 and LV102 is a 5 pin green connector used for connecting the LZV100 to the transformer and the track.

The LZV100/LV102 pair is connected to the AC or DC output of the same transformer with 2 wires at terminals **U** and **V** (see Figure).

The track is connected to terminals **J** and **K** (see Figure). Use only

wire of sufficient gauge to connect to the tracks (minimum 16 gauge) and either use parallel wires or twist the wires to reduce radio interference.

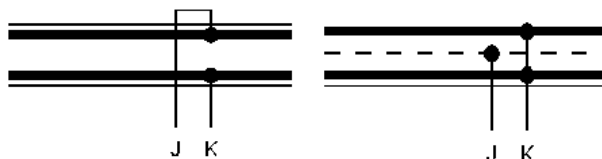


Figure 2: Connecting 2-rail track Connecting 3-rail track

A fifth connection labeled 'L' on the power plug is the power station ground. This connection should be connected between the LZV100 and the LV102. This connection can also be used in some wiring schemes to form a common between power stations. (⇒p. 10)

3.2 Power Station Interface Plug (CDE)

Terminals **C** and **D** transmit the data signal needed should you ever need additional Power Stations (LV102 pairs) to expand your DCC power. It is important that your LZV/LV102 or LV102 pair have **C** and **D** connected together. If no additional power stations are needed then no further connection is needed using this plug. If additional pairs of LV102s are needed for additional power districts, then these terminals are connected with the corresponding terminals on the Power Station with a twisted pair wire (see Figure 2). You can easily make a twisted pair wire from two normal single wires that you twist together. The LZV100 provides up to 300 mA of power for the XpressNet and the power Station Interface allowing you to operate up to 30 Digital plus by Lenz power stations.

The terminal **E** connection between to the LZV100 is optional. Normally the **E** connection is connected between the LZV100/LV102 pair. If terminal **E** on the Command Station is connected to terminal E on the auxiliary Power Station, the Power Station is able to provide feedback about overloads. If an overload occurs and terminal **E** is connected, the Command Station will then turn off all other Power Stations and send the corresponding information to Hand Held Controllers and other input devices. This feature can be disabled on your LZV100 by using POM to set CV7=50, followed immediately by setting CV7=91. If disabled you should not connect the **E** terminals together.

4 Installing a LV102 Pair

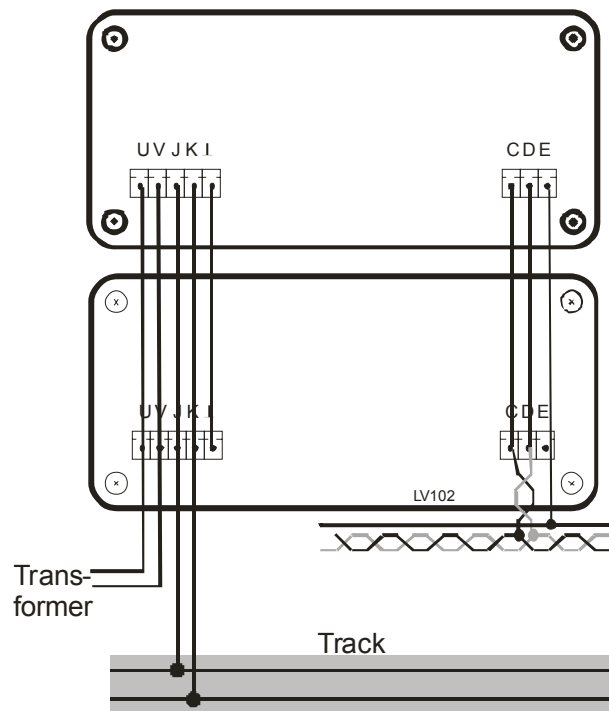


Figure 3: Complete Connections of the LZW100 Command/Power Station

When 2 LV102s are paired together use the same instructions for pairing an LV102 with an LZW100. On the 5 pin plug the U and V connections go to a single transformer for the pair, the J and K connectors are connected together and then connected to the track, and the 'I' connections are connected together. Use a 16 gauge wire to make all the connections between the 5 pin connectors. On the 3 pin plug the C, D and E connections are connected together using a minimum of a 24 gauge wire. Note: even if the E connection is not connected to the LZW100, pairs of LV102s should have their E wire connected together,

Note that you must use a separate transformer for each pair. Of LV102s

5 Connecting a LV102 Pair to a LZV100/LV102 pair

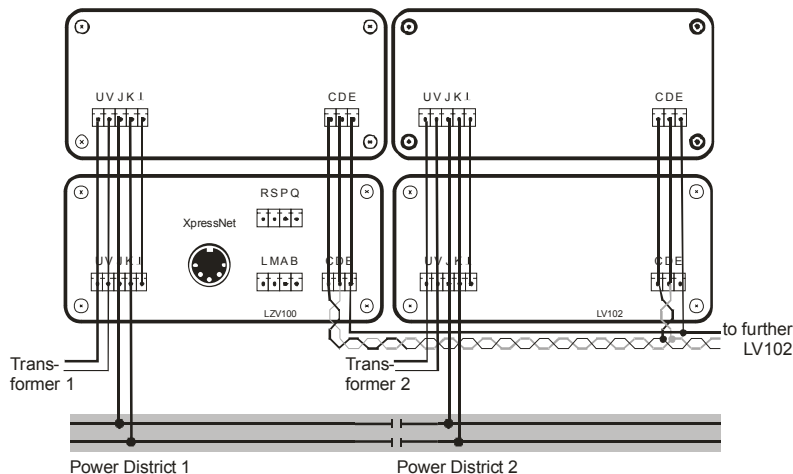


Figure 5: Complete Connections of the LZV100 Command/Power Station

When adding additional LV102 pairs to your system please note that each LV102 pair has its own unique transformer.

6 Achieving the maximum LZV100 DCC track power

There are several protection circuits inside the LZV100 and LV102. These are designed to shut down the track output when a short or overload occurs. If a LZV100/LV102 or LV102 pair has been shut down due to detecting a short or overload, it will check to see if the overload condition has been corrected and restart after a short delay.

1) The fast acting current limiting circuit is designed to very quickly shut down the LZV100 and LV102 track output if a short is detected. This circuit activates at over 5 Amps for each individual unit or 10 amps if paired together..

2) Thermal overload protection. Both the LZV100 and the LV102 have a long term thermal overload circuit designed to shut down if its temperature exceeds its rated capacity or value.

How does this translate to the output power you can expect?

Over temperature is the most common reason that the LZV100/LV102 or LV102 pair shuts down before a short is detected. This shutdown is done for a CE safety concerns as we want to ensure that the case does not get hot to the touch. To maximize the DCC track output current, you need to have a transformer that puts out a voltage that is close to the DCC track voltage under load, because any voltage above the regulated track voltage generates heat. It is normally this heat that limits the output power of the LZV100 or LV102.

In order to achieve the desired output voltage, you must use a transformer with an output voltage that is as high as the desired track voltage. But do not over do it: The transformer voltage should be matched as closely as possible to the desired track voltage. Too high of a transformer voltage just generates unnecessary heat loss in the power station, and this will lead to premature triggering of the thermal overload circuit, before the maximum output power is achieved.

6.1 Selecting the right transformer for your LZV100/LV102 or LV102 pair.

For maximum DCC track current, we recommend using Crest Switching Power Supply CRE55465 Manufactured by a Polk's Modelcraft Hobbies, Inc. to power your LZV100/LV102 or LV102 Pair set to either the 18 volt or 23 volt setting depending on the DCC track voltage you desire. When using a switching power supply the LZV100/LV102 or LV102 pair should be set to its maximum voltage using POM to program CV7 to 50 followed immediately by programming CV7 to 44. In this way the voltage regulation is done by the switching power supply and not the internal circuit within the LZV100 or LV102. This will maximize your current output.

7 Common Rail Wiring

In common rail wiring one rail has the same polarity around the entire layout. If you are using such an approach it is best to have a single common point where all the commons are tied together. For best results and to prevent any possibility of double voltages connect the **J** wires on all connected power stations together and then connect this **J** common to the rail common in a single location.

7.1 Two rail wiring (Direct Home Wiring)

In two rail wiring, both rails are gapped between power districts. Because there is no rail common, a power station common can be used. The LZV100 has the terminal marked '⊥' that can be used for this purpose.

7.2 Common transformer

It is not recommended using a common transformer to power your LZV100/LV102 or LV102 pairs.

8 Radio And Television Interference

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio interference energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet or on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

You may also find helpful the following booklet, prepared by the FCC: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington D. C. 20402.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commissions rules.

9 North American 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 Digital Plus products, Lenz GmbH offers a very aggressive 10 year 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.

Year One: A full repair or replacement will be provided to the original purchaser for any item that has failed due to manufacturer defects or failures caused by 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 manufacturers discretion. The user must pay for shipping to an authorized Lenz GmbH warranty center.

Year 2 and 3: A full replacement for any item will be provided that has failed due to manufacturer defects. A minimal service charge for shipping and handling costs will be imposed. Should the item no longer be produced and the item is not repairable, a similar item will be substituted at the manufacturer's discretion.

Year 4-10: A service charge to include 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 manufacturers discretion.

A return authorization number is necessary for warranty service. Please contact a Lenz Service Center to receive this number and give the required information.

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Warning: This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

FC 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.

CE Please save this manual for future reference!

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