

# INSTRUCTION MANUAL

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## KLUG

### KOMPAKTES LADE- u. UPDATE-GERÄT COMPACT LOADING AND UPDATE DEVICE

Decoder software updates and loading sound projects directly from PC

**NOTE regarding USB-C cable:** A USB-C **data** cable is required for operation; charging cables alone (often not labelled) will not work and will result in no device being found in the ZPP configuration under *Search for update device*.

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### Overview:

The use of the **ZIMO KLUG** requires a connection to a **computer** (with **Windows operating system from XP** onwards and **decoder loading and update programme** installed, see below) via a standard, data-capable USB-C cable (on the computer side also USB-C or USB-A – the 'classic' USB plug, depending on the equipment). This cable also supplies power to the ZIMO KLUG, including the connected decoder or the vehicle with built-in decoder.

A decoder can either be plugged directly into the ZIMO KLUG (interfaces are provided for all "small" decoders commonly used in 2025 – that is, for H0, TT, N, Z, and so on), or – remaining in the vehicle without having to open it – be connected via the track. In addition, the MSTAPK(2) and MSTAPG boards originating from the "MXULF world" can also be used for connection.

Initially, the ZIMO KLUG is intended for use only with the currently produced ZIMO decoders of the MS... series (sound decoders), MN... series (non-sound decoders), and FS... series (function decoders). A later extension to include the older MX series types is likely.

For the decoder loading and update program, three alternatives are available. The first one, "ZPP Config," is actually the intended option, but the alternatives also have their advantages. ...

1. The program **"ZPP Konfig"** provides convenient control of all operations related to the ZIMO KLUG: self-updating, loading of sound projects into decoders via the track (i.e. leaving the decoder installed in the vehicle) or via SUSI (plugging the decoder into one of the available interfaces, or – rarely – connecting it through a SUSI cable), decoder software updates via the track (decoder in the vehicle), CV programming/reading, and test operation using a virtual control desk on the track or together with an MSTAP board.

The program **"ZPP Konfig"** is described in **this operating manual**.

2. The program **"ZSP"** also offers all of the above-mentioned functions; however, its main focus is on the creation of sound projects..

3. The program **"ZCS"** (a program by Matthias Manhart, not developed by ZIMO itself) is a very popular tool among model railway enthusiasts, offering a much wider range of functions than just decoder loading and updating. Its features include, above all, **graphically assisted CV programming** ("ZCS" stands for *ZIMO CV Setting*), as well as the **creation of GUIs (Graphical User Interfaces)** for ZIMO system products such as control panels and apps.

**1. Overview of ZIMO KLUG and ZPP Konfig features**

- Sound load into decoders via track or SUSI, decoder software update via track, CV programming, and test operation via virtual controller together with MSTAP board. Currently (2025) for MS, MN, and FS decoders, later also for MX decoders.  
 'Via rail' means that the decoder remains in the vehicle and the vehicle is placed on an update track connected to the ZIMO KLUG. 'Via SUSI' usually means that the decoder is plugged into the ZIMO KLUG and the SUSI pins there are used for the connection, sometimes with the help of the SUSI plug on the ZIMO KLUG and the SUSI cable to the SUSI interface on the decoder.
- Loading a sound project via SUSI takes only about 1/10 of the time compared to the track, i.e. a maximum of 5 minutes instead of up to an hour.
- Simultaneous sound load of multiple decoders via parallel SUSI interfaces (via multiple test and connection boards MSTAP or MultiTAP).
- CV programming and CV reading via the ZPP Konfig software (or ZSP or ZCS); this also includes editing CV pages (theoretically up to 16 million CVs) and special displays for decoder UIDs and ZIMO load codes.
- Test operation via virtual controller in 'ZPP Konfig' (also in "ZSP" or 'ZCS') on the track or together with MSTAP board, on which the motor, loudspeaker and various LEDs are located as replacements for the actual consumers of a locomotive.
- Self-update of KLUG via ZPP Konfig

For other programme options ('ZPP Konfig', 'ZSP', 'ZCS'), please refer to the separate instructions!

NOTE: Due to ongoing development of the KLUG software, there are sometimes slight differences between the operating instructions and the actual behaviour of the KLUG.

**2. Technical data**

Power Power supply at USB-C input; 5 V, load capacity of at least 900 mA, i.e.: A USB port with a load capacity of at least 900 mA is required for power supply. This is always guaranteed with USB-A 3.0 and USB-C ports. Operation with older USB ports is possible in principle, but is not recommended.

Maximum current output at 'track' output (stabilised at  $V_{out} = 10\text{ V}$ ) ..... 400 mA  
 Dimensions L x W x H ..... 68 x 41 x 7,5 mm

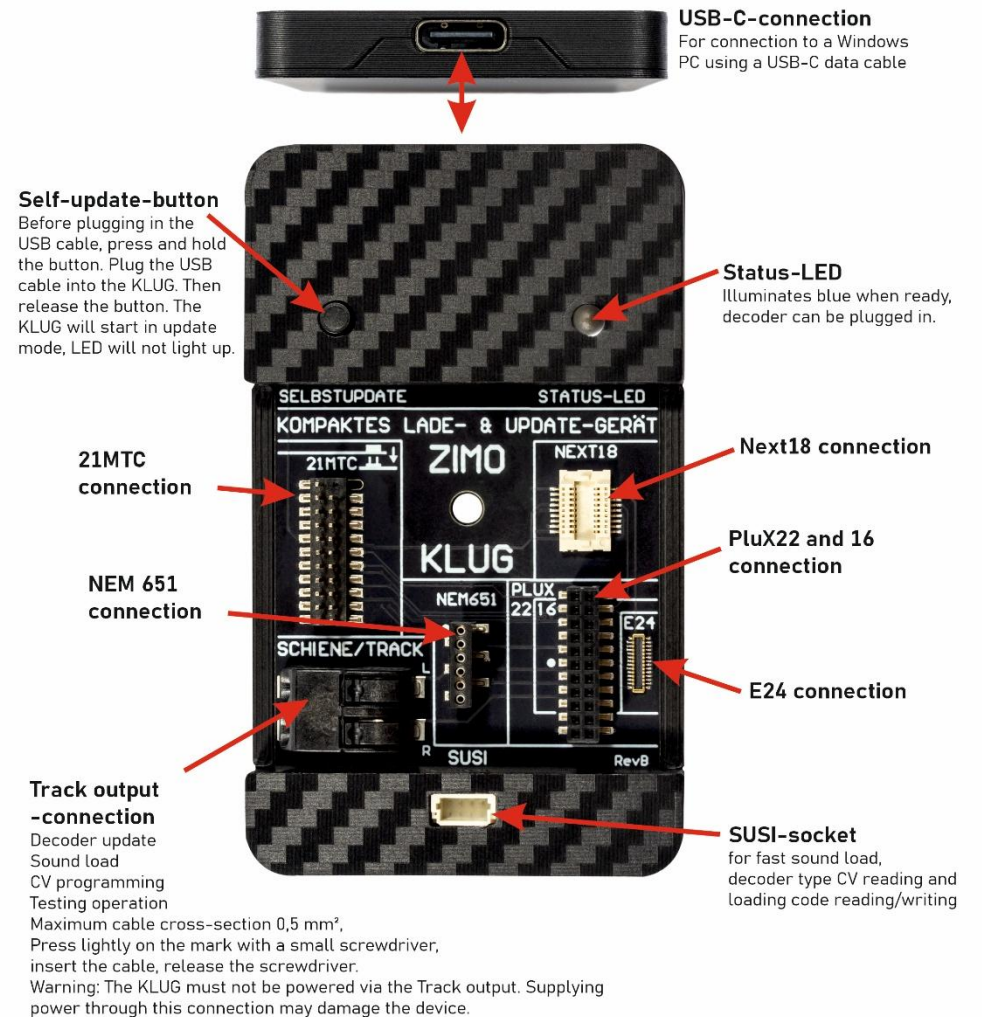
Interfaces for direct connection of decoders: PluX22/16, 21MTC, Next18, E24, NEM651

**Scope of delivery:** 1x KLUG – Compact loading and update device  
 1x SUSI cable

NOT included but needed: USB-C data cable (not a pure power cable) for connection to a Windows PC.

Accessories, optional for use with ZIMO KLUG (from the ZIMO product range): Decoder test and connection boards MSTAPK2, MSTAPK, MSTAPG, MultiTAP

**3. Connection diagram**



## 4. Getting started: USB-C Cable and decoder connection

„Power“: Connect KLUG to a Windows PC using a USB-C data cable.

→ *StatusLED lights up blue*

A decoder can be connected to the ZIMO KLUG in several ways. Only one decoder may be connected directly to the KLUG at any one time. **Connecting or replacing a decoder on the KLUG is possible when the LED is blue or the KLUG is disconnected from the USB.**

### A. ... directly on ZIMO KLUG

The standardised interfaces PluX16/22, 21MTC, Next18, E24, NEM651 can be used directly for the corresponding decoders. This automatically connects the SUSI pins of the decoders, which are used for (fast) sound load via the PluX16/22, 21MTC, Next18, E24 connectors (except for NEM651, where a SUSI cable must be used).

### B. ... to test and connection board MSTAPK2 or MSTAPG

Wire-harnessed decoders, NEM652 decoders and large scale decoders can be connected via a test and connection board MSTAPK ('K' = small) or MSTAPG ('G' = large scale); these boards also enable decoders (all types, even non-ZIMO) to be tested using a kind of simulated locomotive (motor, loud-speaker, LEDs, etc.)

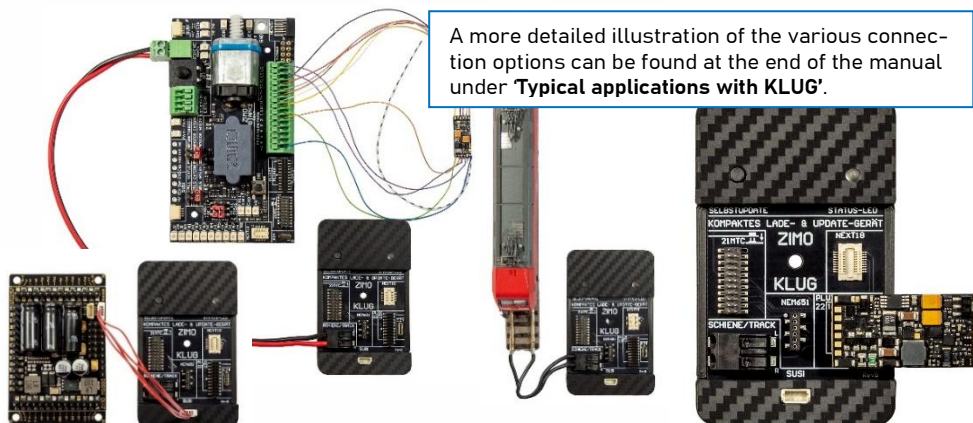
### C. ... at the RAIL output of the ZIMO KLUG (usually left in the vehicle)

The decoder is updated within a vehicle (without opening it) with a software update or a new sound project. To do this, the RAIL output of the ZIMO KLUG is connected to a piece of track separate from the actual layout, the 'programming track'. The transfer of a sound project takes significantly longer via the track connection than via SUSI; approx. 10 times longer.

### D. ... (large scale decoder) via SUSI cable directly to ZIMO KLUG

Large-scale decoders such as MS950 or MS990 (as well as future models, provided they have a SUSI connector) can be connected directly to the ZIMO KLUG using a SUSI cable.

With large scale decoders (e.g. MS950), it may be necessary to wait a few seconds (to charge the built-in energy storage device) before starting to load the update or sound.

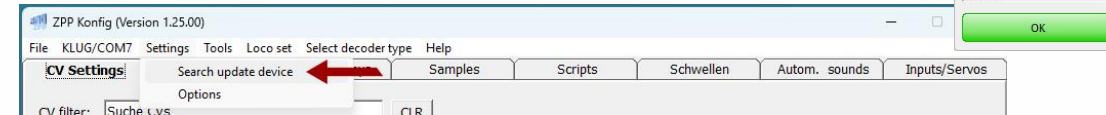


## 5. Preparing the 'ZPP Konfig' programme

To set the programme to ZIMO KLUG:

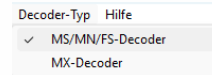
Menu **Settings** – **Search update device**

ZPP Konfig automatically selects the COM port for the KLUG; confirm by clicking OK.



Required when using KLUG for the first time, or when switching between KLUG and MXULF, as well as after reinstalling 'ZPP Konfig'.

In the Decoder Type menu item, select the **MS/MN/FS Decoder** setting.



## 6. Self-update of the KLUG

*NOTE: Regular updates of the KLUG software are recommended, especially when new decoder types or generations are introduced. Since complete compatibility documentation is not available, you should update the KLUG at the latest when problems occur.*

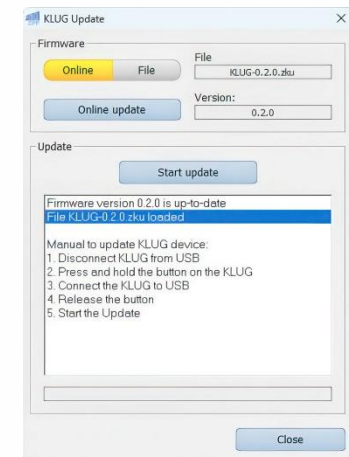
*PLEASE NOTE: KLUG can only be updated via a PC using the ZPP Konfig (or ZSP) application.*

- Use the **online update function** of ZPP-Konfig OR download a new KLUG software from [www.zimo.at](http://www.zimo.at) – Update & Sound – KLUG as a .zip file; unzip the .zip file.
- Prepare KLUG: **Disconnect** the USB cable from **the KLUG**. **Press and hold the self-update button** on the KLUG. **Connect the USB-C data cable from the PC to the KLUG**, then **release the button after about 1 second**.

→ KLUG now in update mode (bootloader) *Status LED is NOT lit!*

- The update is performed in the ZPP Konfig software via the menu item:  
**KLUG/COM - KLUG Update**  
**Firmware:** click on **Online Update** – ZPP Konfig automatically downloads the latest firmware OR click on **File** to select a KLUG update file previously downloaded from [www.zimo.at](http://www.zimo.at) using the file browser.

- Start process with the **Start update** button.
- Once the update is complete, you can close the window by clicking Close or X
- → *Status-LED blue* indicates that the KLUG is ready for use. If not: disconnect the USB cable from the KLUG and reconnect it.



**7. Decoder software update and sound load**

The new decoder software for the update or the desired sound project is loaded directly from the computer into the decoder using one of the programmes 'ZPP Konfig', 'ZSP' or 'ZCS'; see the 'Overview' section for information on the differences.

Starting and monitoring the software update or sound load is done from the computer, there are no controls on the ZIMO KLUG.

See previous chapters regarding the connection of the decoder to be processed.

**Decoder Firmware Update:**

The new software version is always loaded via the rail connections of the decoder (not via SUSI).

- Connect the USB-C data cable from the PC to the ZIMO KLUG.
- Status LED lights up blue continuously.
- Connect decoder (directly to ZIMO KLUG, to MSTAP, via track, etc.)
- Start the selected programme, i.e. 'ZPP Konfig' or 'ZSP'.  
These instructions describe only how to use the 'ZPP Konfig'.

- Select menu 'KLUG/COM' - 'Decoder firmware update', select decoder class 'MS/MN/FS', in future versions also 'MX' (usually MS preset automatically)

- **Online update** searches for the latest decoder software. **File** can be used to access decoder firmware downloaded from [www.zimo.at](http://www.zimo.at).

- **Start Update** begins the update process on the decoder.

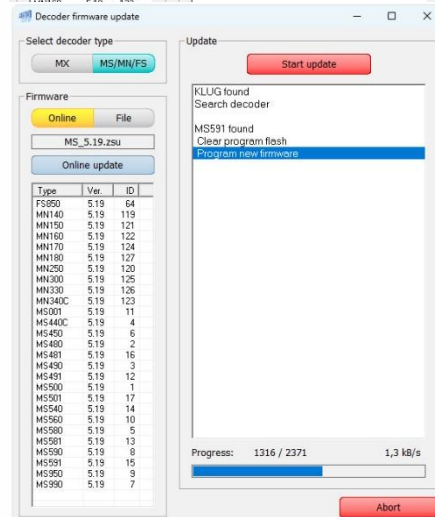
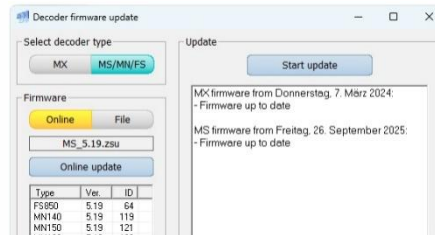
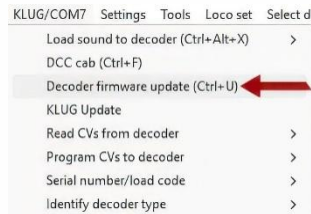
- Status LED flashes yellow during flash erasure
- Status-LED flashes green during Update-process
- After completing the update, click Close.
- Status-LED lights up blue continuously.

or:

- **Remove the decoder and connect the next decoder** select **Start Update** again.

**Note:** During an update or loading process, the decoder should not be touched.

If the decoder is **not** automatically recognised during the update, **manually select** the type from the list on the left. The decoder type can usually still be determined via the query in the COM/KLUG menu.



**Loading a sound project into the decoder:**

Sound projects can be loaded either via the decoder's rail connections (without opening the locomotive, as with a software update) or via the decoder's SUSI pins (takes approx. 1/10 of the time, but requires removing the decoder from the locomotive or doing so before initial installation). In the menu item **Load sound**, select either SUSI or track MS in the extended field.

**Connect the USB-C data cable from the PC to the ZIMO KLUG (if not already done).**

- Status LED lights up blue continuously.
- **Connect the decoder (directly to ZIMO KLUG, to MSTAP, via track, ...)**
- Start the selected programme, i.e. 'ZPP Konfig', 'ZSP' or 'ZCS'.
- These instructions describe only the operation of 'ZPP Konfig'.

- **File** → **Open ZPP Project:** Opens a file browser for selecting the previously loaded sound project, which is then opened in **ZPP Konfig**. Here, changes can also be made to the project before transferring it to the decoder. For more information, see the instructions for ZPP Konfig at [www.zimo.at](http://www.zimo.at).

- Select menu **KLUG/COM - Load sound to decoder**, select between **track and SUSI** (if available, SUSI is faster)

Please note that all data on the decoder will be deleted and overwritten with the settings of the sound project. Sound Flash is deleted → Status-LED flashes yellow then automatically:

- Sound project is being transferred (Flash programming) → Status-LED flashes green

Transfer complete: "Finished" appears in the status, the "Cancel" button turns green → Status-LED lights up blue continuously. Decoder can be removed and window can be closed...

OR:

Plug in a **new decoder** and use the **'R' key** to load the same project into another decoder.

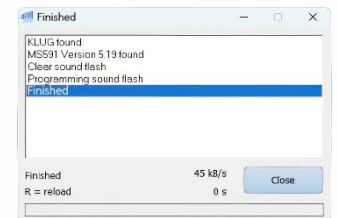
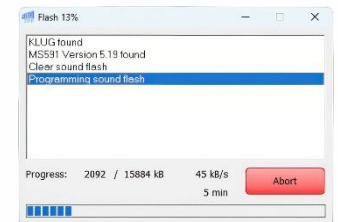
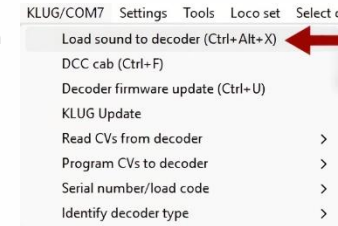
The sound project can also be tested using a ZIMO test board and the virtual controller from ZPP Konfig. See description in the Test mode section.

**Note:** If a loading process is aborted by the user or an error occurs, the **decoder may stop responding**.

**Solution:**

Connect the decoder directly to the KLUG or via track. Open the **KLUG/COM** menu, select **DCC cab** and enter the **address of the decoder**. The KLUG supplies the decoder with power – the **status LED flashes blue**.

After a few seconds (maximum 200 seconds with older decoder software), the **status LED will start flashing magenta**. This means that a **RailCom signal** is being detected again. The decoder will then function normally again.



## 8. CV programming and testing operation

In ZPP Konfig, there are several ways to programme CVs on the decoder with KLUG.

### Programming individual CVs and test operation:

Decoder directly on the KLUG, MSTAP(K2/G) or in the vehicle on the programming track.

Start the controller with **KLUG/COM – DCC cab (Ctrl+F)**.

In the upper section, the address can be set using + / - or by **clicking on the number** and then **entering it directly**.

The **F0–F28 buttons** can be used to test the **functions of the sound project**.

The **MAN** button switches to manual driving mode.

The **drive controller** on the right-hand side is used to set the **drive level**; the current value is **displayed below** it.

The **STOP** button at the bottom can be used to set the drive level directly to 0.

The **arrows above the speed controller** switch between **forward** and **reverse** (changes between green and red).

The field for **reading and programming individual CVs** is located at the **bottom** of the virtual controller.

Enter the CV number in the left field and read it from the decoder using the **'Read'** button.

The right-hand field shows the CV value, which can be adjusted here and programmed in the decoder using **'Write'**.

The **separate 'CV Changes' window** opens and **logs all CVs read and written** in the controller.

A **check mark in the 'Set cv value in project also' field** transfers the last programmed CV value to the open sound project. As long as the check mark remains set, further programmed CVs are also transferred directly to the project.

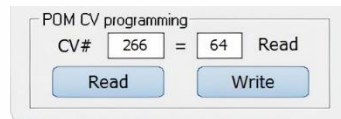
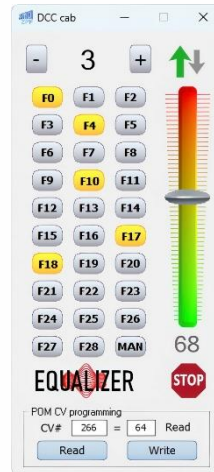
**Note:** A **simplified procedure** for reading and **addressing a decoder** will be **added in a future update**.

Currently, a **short address** (up to 127) can be programmed directly via **CV #1** in the controller.

A short and **long address** can be entered in the **'Locomotive Address'** field of each CV in the list on the left (see next page).

When a long address is entered, the required values are automatically transferred to the corresponding CVs #29, #17 and #18 of the open sound project.

All CVs are transferred to the decoder via the menu item KLUG / COM → **Program CVs to decoder** – including the long address.

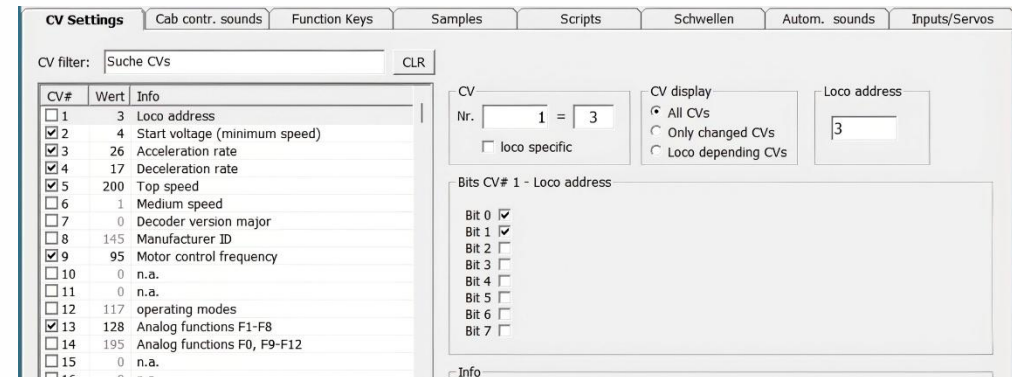


### Programming multiple CVs:

The normal use case is to open a sound project in **ZPP Konfig**, adjust the desired **CVs**, and then load the entire project onto the **decoder**. If changes are made to the CVs in the decoder after loading, they can be imported back into the project using the **'Load CVs from decoder'** function. If, on the other hand, changes are made to the CVs in the project after loading, these can be quickly transferred to the decoder using the 'Import CVs into decoder' function. It should be noted that CVs imported in this way will be lost in the event of a hard reset. This method is therefore only recommended for testing purposes. After completing the tests, the entire sound project should be loaded onto the decoder again. Alternatively, the **ZCS** programme can be used to change CVs in the locomotive retrospectively. This programme also allows sound projects to be configured directly in the locomotive, even if no project file (.zpp) is available.



If possible, the transfer should be carried out using the **SUSI protocol**, as this is significantly **faster**. If a sound project has been opened in ZPP Config, loading from the decoder will overwrite the CVs in the sound project. When **restarting ZPP Config**, the CVs in the **list will be reset to their default values**. If you only want to read all the CVs of the decoder, you should not open a sound project beforehand.



By **clicking on the CV** to be changed in the list on the left, the **corresponding setting options** are displayed in the **right-hand area**. Alternatively, the required CV can be found by scrolling or using the **CV filter**, or it can be entered directly in the **'CV No.'** field.

The **CV value** can either be entered **directly into the field** or adjusted **setting the respective bits**.

**CV view** switches the display of the CV list between **all**, **only changed** and **locomotive-specific CVs**.

The **address of the decoder** can be changed in the **'Loco address'** field (see note on the left-hand side).

You can specify that a CV applies to a **locomotive set** by **checking the 'Locomotive Specific' box** under the CV number.

Menu KLUG/COM – **Program CVs to decoder** programs the adjusted CVs into the connected decoder.

Detailed information on CV programming and customising sound projects can be found in the separate ZPP Konfig manual at [www.zimo.at](http://www.zimo.at). (available soon)

**Caution:** Close the controller (DCC cab) before connecting another decoder to the KLUG. Only connect the decoder when the KLUGs LED is lit blue.

The equalizer on MS decoders allows you to adjust the overall sound of a sound project to the individual characteristics of the respective model. The sound is influenced not only by the type and size of the speaker, but also by its position in the model housing, the material of the housing, the type of mounting, the volume of the sound capsule and other factors. There are seven different filter types available, up to six of which can be applied simultaneously. Changes have an immediate effect on the decoder, are audible straight away and remain stored there until a hard reset is performed or a new sound project is loaded. The set filters can also be transferred to the open ZPP project, read out from a decoder or saved externally as a \*.flt file and imported again elsewhere. Detailed description of the function and respective filters in the ZPP Konfig manual.



**Useful keyboard shortcuts for the controller (dcc cab) in ZPP Konfig:**

Key	Function
<b>Fahren:</b>	
mouse wheel	Change speed
Esc	Toggle F0
F1 - F12	Toggle F1 - F12 (function keys)
Shift + F1 - F10	Toggle F11 - F20
Strg + F1 - F8	Toggle F21 - F28
M	Toggle MAN
R	change of direction
Image up	Moving forward
Image down	Moving backwards
Up/down arrow	Increase/decrease speed by 9 drive levels
Right/left arrow	Raise/lower drive level by 1
S	single stop
<b>Allgemeines und CV Programmierung</b>	
A	Change address
E	Open equaliser window
C	Jump to CV number text field
V	Jump to CV value text field (in a future version of ZPP Konfig)
R	Read CV (in CV field)
W	Write CV (in CV field)
Enter at CV number	Continue to CV value, then press Enter again to write the CV value.

**9. Read/program decoder ID number/loading code**

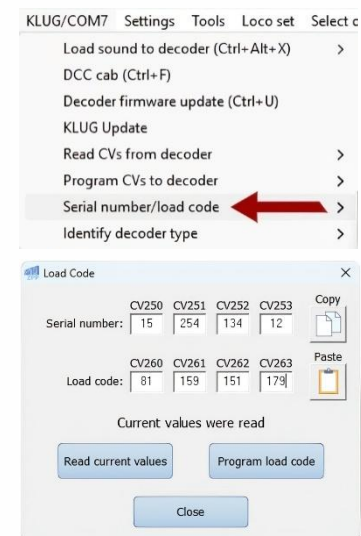
The need for a load code is due to the large number of external 'sound providers' who produce sound projects for ZIMO sound decoders on their own account. In order to load a project onto a decoder, a 'load code' must be purchased from ZIMO or directly from the 'sound provider'. This depends on the author of the sound project (in order to forward the purchase price of the load code to them) and on the identification number of the decoder (because it is only valid for this decoder).

The user must take the following steps:

- Reading the decoder's ID number: CV values #250, 251, 252 and 253.
- Purchasing the load code (from the ZIMO website/[load code shop](#)), retailer, author of the project)
- Programming the loading code (4-digit sequences) into CVs #260, 261, 262 and 263.
- Loading the sound project into the decoder (see chapter Sound load)

In order to read or programme these CVs for ID numbers and load code, ZPP Konfig, together with KLUG, offers a more convenient method in addition to 'normal' CV handling (see previous chapter):

- Prepare KLUG: Connect the USB-C data cable from the PC to KLUG. → *Status-LED lights up blue continuously.*
- Plug in the decoder
- Start the ZPP Konfig software
- Menu **KLUG/COM - serial number/load code**
- Click on Read current values to read the serial number and load code
- Using **Copy**, the serial number can be copied and pasted into an email, for example. Using **Paste** or manual entry, enter the load code into the CV260-63 fields and write it to the decoder using **Program load code**.
- Load the \*.crypt.zpp sound project into ZPP Config and transfer it to the decoder as described in the chapter sound load.



Typical applications / connection variants with KLUG:

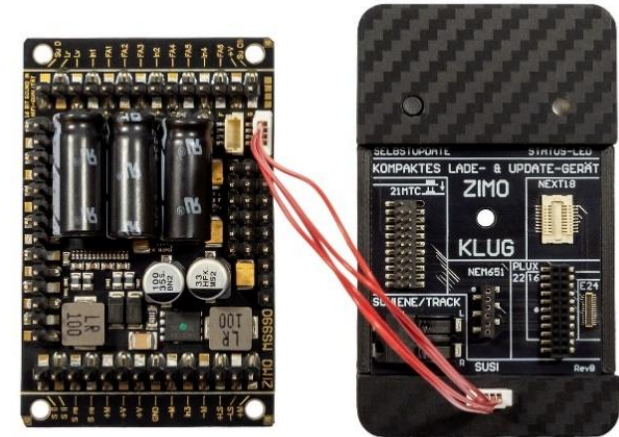
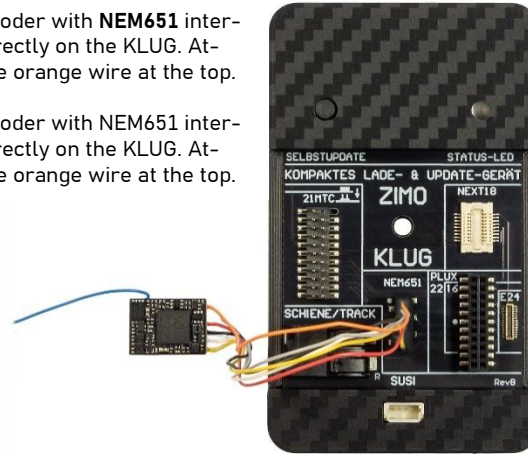


KLUG with decoder connected directly. **Please note:** only one decoder should ever be connected directly to the KLUG; additional decoders should be connected via rail connection or SUSI socket.

Decoder update, sound load, CV read/write possible

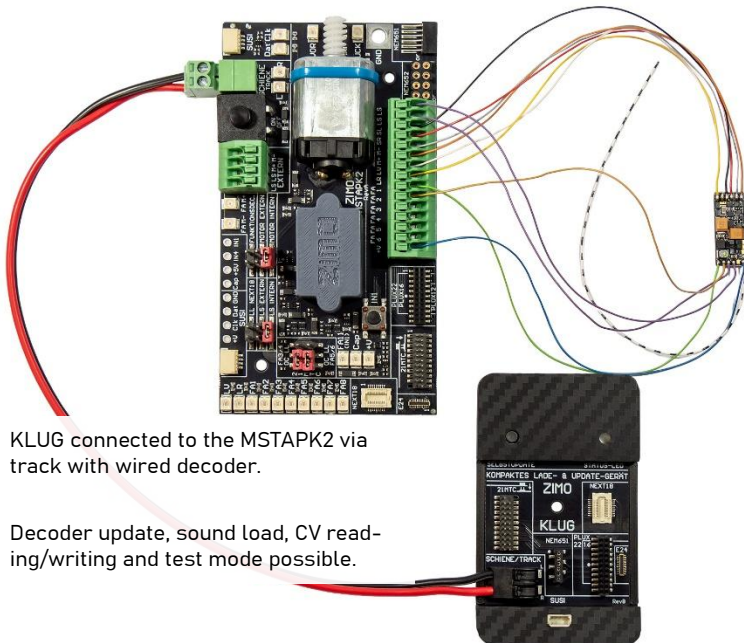
MN decoder with NEM651 interface directly on the KLUG. Attach the orange wire at the top.

MN decoder with NEM651 interface directly on the KLUG. Attach the orange wire at the top.



MS990 large scale decoder via SUSI socket directly on the KLUG.

Sound load, CV reading/writing possible



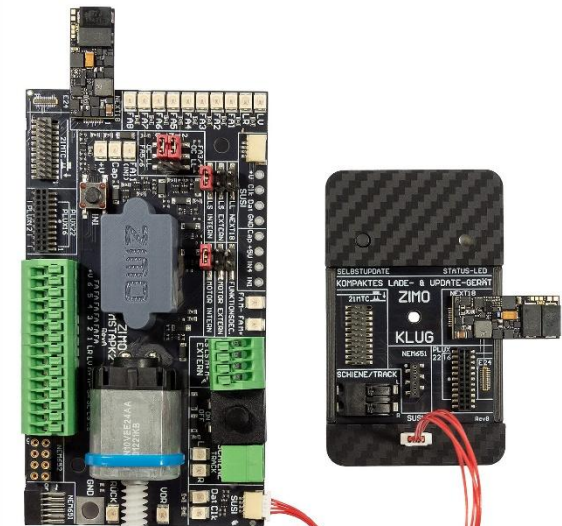
KLUG connected to the MSTAPK2 via track with wired decoder.

Decoder update, sound load, CV reading/writing and test mode possible.



KLUG on the programming track.

Decoder update, sound load, CV reading/writing, and test mode possible.



KLUG via SUSI socket on MSTAPK2

Same decoder type on KLUG and MSTAPK2

Simultaneous loading of the sound onto both decoders is possible.

**Annex: Declaration of Conformity and Warranty**

**24 months warranty:**

Our products are technically sophisticated and are manufactured and tested with utmost care, therefore, ZIMO Elektronik GmbH guarantees its products for 24 months from the date of purchase (with proof of purchase from a ZIMO contractor).

The warranty covers the repair or replacement of defective parts. ZIMO Elektronik GmbH reserves the right to proceed at its own discretion only if the damage is proven to be the result of a design, manufacturing, material or transport fault. A repair does not extend the warranty. Warranty claims can be made with a ZIMO contract partner or ZIMO Elektronik GmbH. Proof of purchase is required.

The warranty does not apply:

- with normal wear and tear
- if devices are not used for the purpose intended by ZIMO Elektronik GmbH and in accordance with its operating instructions
- in case of modifications or alterations not performed by ZIMO Elektronik GmbH.



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ZIMO ELEKTRONIK GmbH, Schönbrunner Straße 188, 1120 Wien, Österreich | [www.zimo.at](http://www.zimo.at) | Änderungen und Irrtümer vorbehalten.

RailCom ist ein Markenzeichen der Lenz GmbH, mfx ist ein Markenzeichen der Märklin & Cie GmbH