# Z21

Steuern in die Zukunft

FLEISCHMANN
PERFEKTION & VIELFALT

Roco
Die Innovation der Modellbahn

# Z21

**Digitalsystem | Digital System | Système numérique**

▶ **Benutzerhandbuch**     ▶ **User Manual**     ▶ **Manuel d'utilisation**

# Legal Notice

*Please note the following cautions before using your Z21 Digital System:*

▶ *When combining Roco or Fleischmann components with third-party products, the warranty for damage or malfunctions lapses.*

▶ *Any warranty claim lapses if the casings of the Z21 Digital Centre and Router are opened.*

▶ *Carry out all cabling works only when the power is switched off!*

▶ *Work carefully and make sure that no shortcircuits can occur when connecting the track system to the mains! Incorrect wiring can destroy the digital components. If necessary, consult your dealer.*

▶ *Positively do not connect an analogue transformer or other digital systems or centres to the same power circuit or neighbouring power circuits in parallel to digital control. This can result in the destruction of the Z21 Digital Centre!*

▶ *Do not use the Z21 Digital Centre with current Roco amplifiers (e.g. Art. Nos. 10761 and 10764).*

CE
Modelleisenbahn GmbH
A-5101 Bergheim

# Thank you for buying the Z21 Digital System of Roco and Fleischmann!

With the Z21 Digital System, model railway control is as easy and exciting as never before: locomotives, switches and digital components of Roco and Fleischmann can be controlled easily and conveniently from your smartphone or tablet PC – ensuring maximum driving fun from the first moment! The Z21 Digital System is made up of three modules:

▶ The Z21 Digital Centre is a high-performing state-of-the-art multi-protocol centre. It integrates perfectly into your model layout and allows controlling locomotives and digital components easily and conveniently by smartphone, tablet PC or multiMAUS.

▶ The Z21 mobile app is a universal control software for Android and iOS-based smartphones and tablet PCs. With this app, you can control all locomotives with DCC or Motorola decoders and program loco libraries, entire locomotives, loco functions and digital components.

▶ The Z21 driver stands are apps with detailed reproductions of actual locomotive driver stands. Become a virtual loco driver – and run your favourite locomotive with your tablet PC from an exact virtual driver stand.

The following pages will explain everything you need to know to connect and operate the Z21 Digital System to your layout. In addition, the manual contains many practical tips for digital operation and you will learn which digital components of Roco and Fleischmann can be combined with the Z21 Digital System.

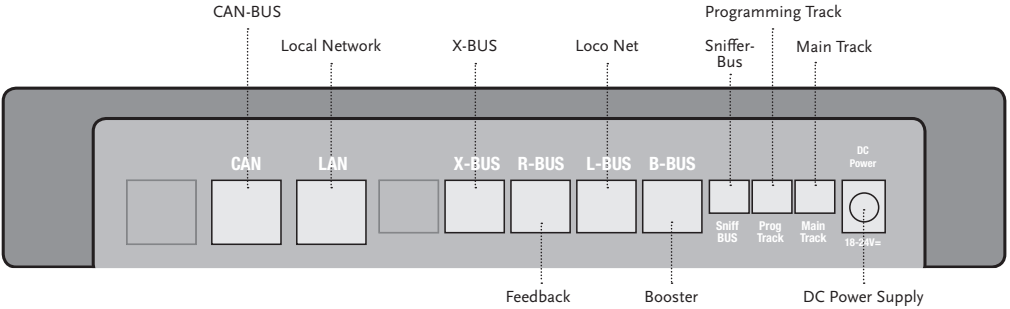**You can see: We still have a lot to do. So let's go!**

English

# Contents

# Z21 Digital Centre Connections

## Front

Stop

X-BUS

Z21

STOP

X-BUS  X-BUS

## Back

CAN-BUS

Local Network

X-BUS

Loco Net

Programming Track

Sniffer-Bus

Main Track

CAN  LAN  X-BUS  R-BUS  L-BUS  B-BUS  DC Power

Sniff BUS  Prog Track  Main Track  18-24V=

Feedback

Booster

DC Power Supply
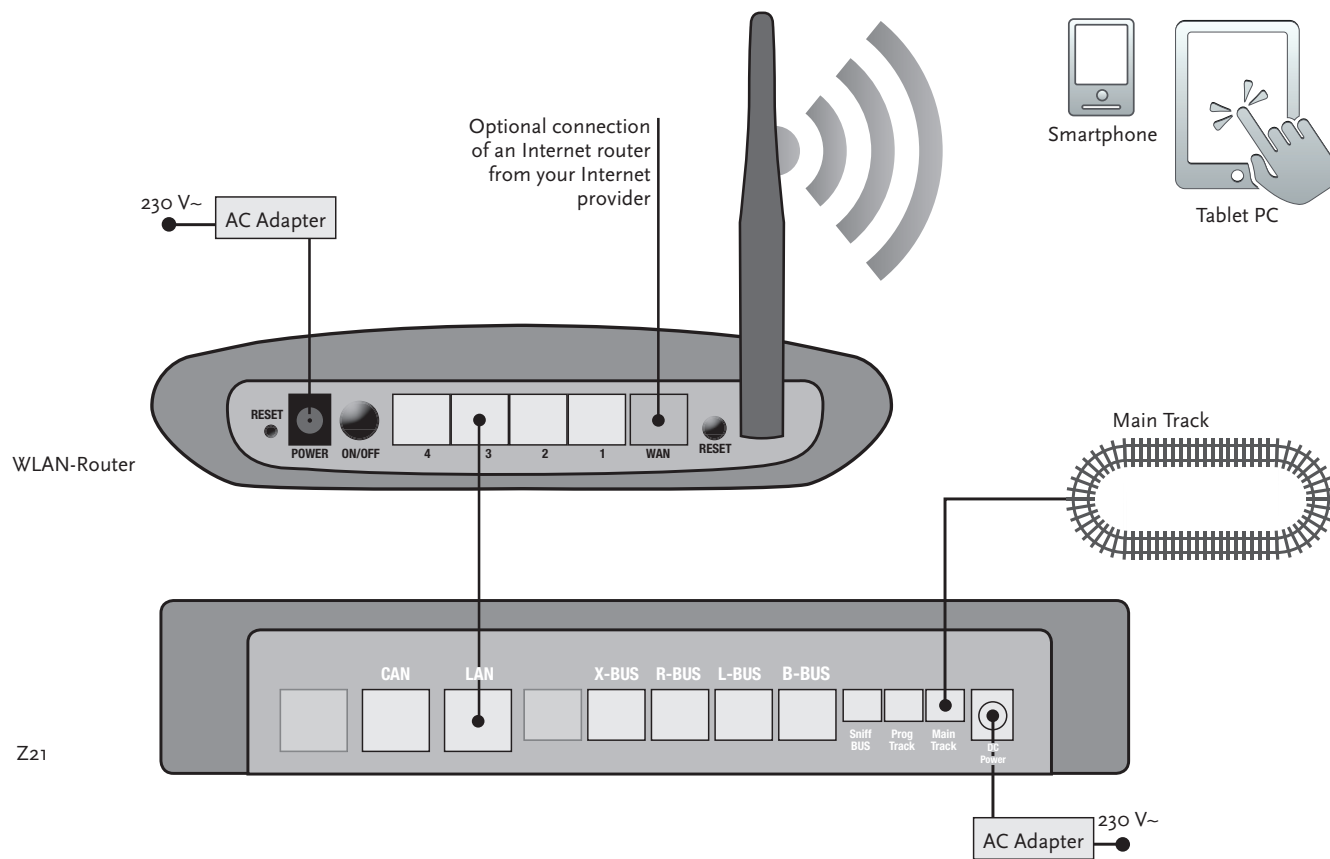
## 1. Unpack, Connect and Go

This manual shows you how to operate your Z21 Digital System and control your layout using the Z21 mobile and driver stand apps. Please prepare the following items:

▶ the Z21 Digital Centre and the supplied AC adaptor
▶ the supplied WLAN router and the supplied AC adaptor
▶ the supplied network cable
▶ your smartphone or tablet PC with Internet access, optionally or additionally the multiMAUS (Art. No. 10810)

In addition, you will also need access to your Roco and Fleischmann layout, ideally prepared with a powered track without capacitor, as e.g. Art. No. 61190 (geoLine), Art. No. 42517 (RocoLine), Art. No. 22217 (Fleischmann N) or Art. No. 6430 (Fleischmann H0).

## 1.1 How to Connect Your Z21 Digital System

1. Place the Z21 Digital Centre into your system for good accessibility.
2. Connect the supplied clamping terminal to the powered track. Ensure good contact.
2. Plug the cable of your powered track into the track socket "Main Track" of the Z21 Digital Centre.
3. Connect the switching adaptor to the DC power socket "DC Power".
4. Connect the switching adaptor of the Z21 Digital Centre to the mains power outlet.

Optional connection
of an Internet router
from your Internet
provider

Smartphone

Tablet PC

230 V~   AC Adapter

RESET   POWER   ON/OFF   4   3   2   1   WAN   RESET

WLAN-Router

Main Track

Z21

CAN   LAN   X-BUS   R-BUS   L-BUS   B-BUS   Sniff BUS   Prog Track   Main Track   DC Power

AC Adapter   230 V~

English

## 1.2 How to Start Your WLAN Router

Connect the Z21 Digital Centre to the supplied WLAN router to allow operating your layout using external peripherals such as a smartphone or tablet PC.

1. Place the WLAN router on top of or next to the controller. Select a location to ensure a trouble-free connection between router and smartphone or tablet PC.
2. Connect the LAN port of the Digital Centre to a LAN port of the WLAN router using the supplied network cable.
3. If you have an Internet connection, you can optionally cable the WLAN router via a WAN port to the router of your Internet provider. This allows accessing the existing connection to the Internet from your smartphone or tablet PC to download updates or information.

Ready! Your Z21 Digital System is now ready for use. Next, you will learn how to install the Z21 mobile control app on your smartphone and how to connect your smartphone or tablet PC with the Z21 Digital Centre.
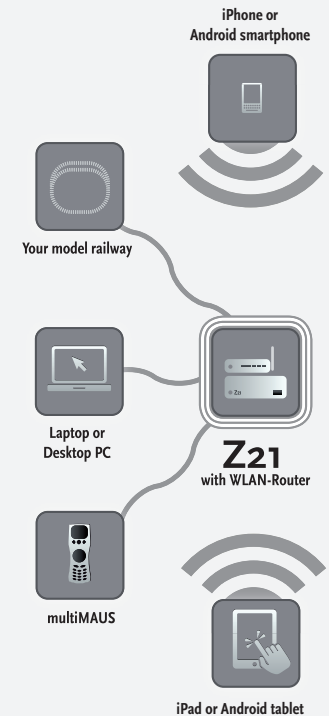
## 1.3 How to Install the Z21 Mobile App

▶ Make sure that your smartphone or tablet PC is connected to the Internet.
▶ Register the smartphone or tablet PC with the Z21 WLAN. To register with Android or iOS systems, consult the manual of your peripheral device.
▶ When using an iPad (as of version 1.3) or an iPhone or iPod (as of iOS 4.2), use the AppStore.
▶ When using an android smartphone or tablet (as of version 2.3) phone, change to Google Play.
▶ Use the search function to look for the "Z21 Mobile". Install the app.
▶ Start the app. The start-up screen displays. Let's go!
▶ More on the operation of the Z21 Mobile App, see Pages 50 and following.

*Refer to pages 16 and following on what other Roco and Fleischmann components can be used with the Z21 Digital Centre.*

*Z21 mobile app system requirements:*
▶ *iPad as of v1.3*
▶ *iPhone and iPod as of iOS 4.2*
▶ *Android devices as of v2.3*

# 2. Z21 Digital Centre

Start out into the future of model railway control with Roco and Fleischmann: with the Z21 Digital Centre, you can control your layout from your smartphone or tablet PC with utmost convenience – maximum driving fun and uncompromising faithfulness to the original.

The state-of-the-art multiprotocol centre is the ideal control system for locos with DCC or Motorola decoder and the perfect control for your digital components. The Centre connects your layout and digital locos by WLAN with your smartphone or tablet PC and the control apps installed in them, or optionally with one of our digital driver stand or the Z21 Mobile App.

▶ Controls up to 9,999 DCC loco decoders
▶ Controls up to 2,048 DCC switch decoders
▶ Adjustable, rectified track voltage (12-24 V, 3A) for smooth driving operation
▶ Compatible with multiMAUS models and Lokmaus 2
▶ Separate programming track connection with ZIMO decoder update
▶ Automatic loco detection and feedback via RailCom©
▶ Many interfaces: LAN, three X buses, loco feedback, Loco Net, CAN and Booster Bus, Sniffer Bus
▶ Software and sound updates via smartphone

iPhone or
Android smartphone

Your model railway

Laptop or
Desktop PC

Z21
with WLAN-Router

multiMAUS

iPad or Android tablet

English

## 2.1 Connection of Additional Control Devices

You will probably prefer to control your Z21 Digital System from your smartphone or tablet PC. But if you want to share control with others or do not have your smartphone at hand, you can also connect your current multiMAUS or local mouse control devices to the X Bus sockets of the Z21 Digital Centre.

Each of these control devices can interface with all locos and digital components. This allows controlling at any time locos controlled by other devices by selecting any function of the corresponding loco or the loco controller from your Z21 mobile app.

## 2.2 Compatibility with Roco and Fleischmann Components

The Z21 Digital Centre can be connected without problem to all Roco and Fleischmann digital devices, based on the RocoNet or the X Bus protocol. These include:
► multiMAUS, Lokmaus 2 and Lokmaus R3 (Art. No. 10760, 10790, 10860 and 10792)
► Keyboard (Art. No. 10770) and RouteControl (Art. No. 10772)
► Roco booster (not RailCom© compatible, Art. No. 10762 and 10765)
► For further information on compatibility, see online www.Z21.eu.

⚠️

*Warning: Positively do not connect an analogue transformer to the power circuit of your digital system! Destruction of the Z21 Digital Centre would be the result!*

## 2.3 Power Supply for the Z21 Digital Centre

As a power supply for the Z21 Digital Centre, please use exclusively the supplied AC adaptor (Art. No. 10851). Positively do not use a wound-core transformer!

With the Z21 Digital System, you can modify the voltage applied to your system at any time by software. For this purpose, change to the menu "Z21 Settings" in the Z21 mobile app. Always make sure to stay in 11 to 23 V range. Typical voltage ranges are from 14 to 18 V (for the gauges H0 and TT) and approx. 12 V (for the gauge N).

Maximum input voltage for the Z21 Digital System is 24 V. The maximum track voltage is always 1 V below the input voltage.

The Z21 Digital Centre is designed for loads of up to 3.2 A. If frequent power cuts occur in the system due to overloads, please install a booster (see Page 46).

Note: To find out the current power consumption of your system, check the menu point "Power Centre" in the "Z21 Settings" menu of the Z21 mobile app.

*Warning:* Positively do not connect the Z21 Digital Centre to Roco amplifiers Art. Nos. 10761 and 10764! Use these components only on electrically separate layout parts connected only by transition tracks.

*Note:* How to compute the power consumption of an H0 system:
► *Stationary locos with light: approx. 100 mA*
► *Travelling locos depending on size and load: 300 – 600 mA*
► *Illuminated coaches: approx. 30 mA per minibulb (expect considerable fluctuations!)*
► *Digital coupling or smoke generator: approx. 100 mA*
► *Digital switch drive or switch decoder: approx. 500 mA as reserve*

English

## 2.4 Operation of Digital Locomotives

The Z21 Digital System is suitable for the control of all locomotives using Roco loco decoders or any DCC-compatible decoders. Your Z21 Digital System can administer up to 9,999 loco decoders.

The preconfiguration by the factory of all Roco and Fleischmann locos is decoder address 3. If you use several locos on your system simultaneously, you need to assign a separate decoder address to each one.

With the Z21 Digital System, this is very simple: put the locomotive as the only loco onto the programming track. Select the locomotive on Z21 mobile app and give it a name and decoder address not yet assigned in the programming mode. That's it!

All magnetic items (switches, decoupling tracks, signal decoders) equipped with a digital decoder can be programmed and controlled with the Z21 mobile app just as easily.

## 2.5 Upgrading of Analogue Locomotives

**Locomotives and components without decoder cannot be used in the Z21 Digital System.**
Due to the entirely different voltage supply, the use of a non-decoder loco results in a highly irritating high-frequency noise. In addition, there is a risk that the motors will be damaged.

However, many analogue models can be refitted with loco decoders and so made suitable for use on your Z21 layout. With locomotives with a free slot and an operational digital interface, this is very simple and easy because as a rule, the decoder merely needs to be plugged into a free socket.

## 2.6 Resetting the Z21 Digital Centre

If your digital system no longer operates flawlessly, please reset your Z21 Digital Centre to the factory setting as follows:
▶ Press the stop key on the front of the unit.
▶ Keep the key depressed for 5 seconds. The LED light starts flashing in purple.
This shows the Z21 Digital Centre has been reset to the factory setting. If the digital system still does not operate flawlessly, contact your dealer.

## 2.7 Update of Z21 Digital Centre

When your smartphone or tablet PC is connected to the Internet, you can search for apps and the Z21 firmware in the "Updates" section of software updates at the AppStore and Google Play.

⚠

*Warning: Locomotives and components without decoder cannot be used on the Z21 Digital System.*

⚠

*Note: You can have your locomotives converted in a professional workshop. For a list of recommended suppliers, see www.roco.cc/en/service-partner.*

English

## 2.8 Programming and Read-Out Track

As long as you wish to program one single loco decoder, you can program it directly on the main track. For this purpose, simply mark the loco in the Z21 mobile app, switch to programming mode and change the desired parameters.
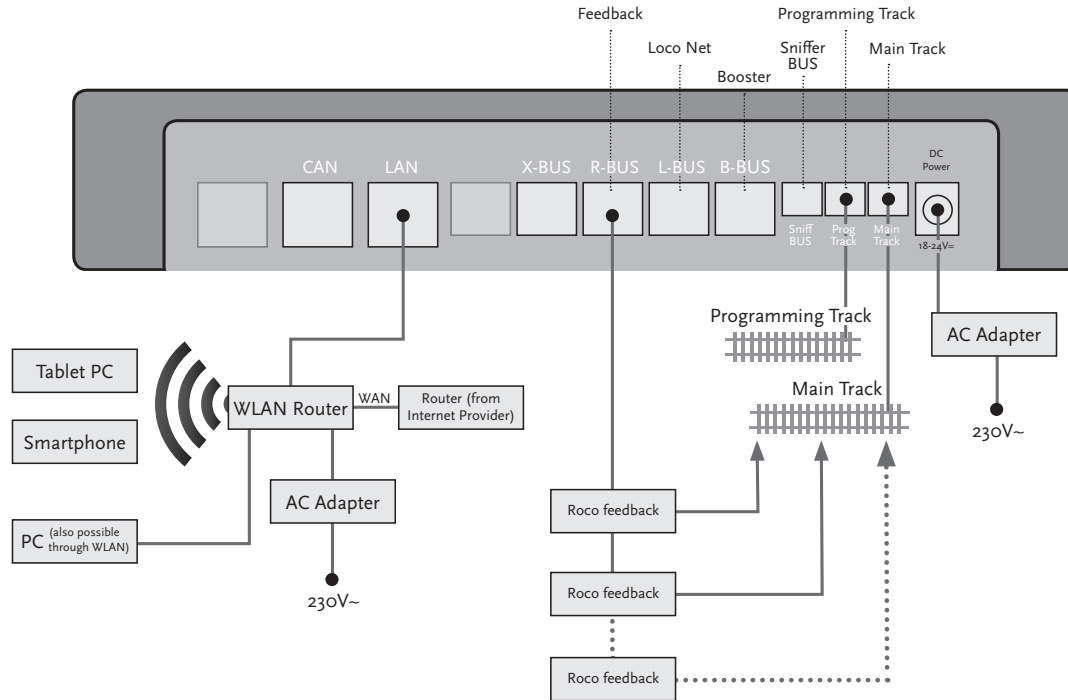
If you want to read the decoder settings or do not know the decoder adress anymore, we recommend the use of a separate programming track.

You can use any partial section of your layout as a programming track – simply isolate it on both ends with insulated rail connectors (Art. Nos. 42611, 61192, 6433 or 9403) or separator rails and then connect it to a power supply element (Art. No. 61190) at the "Prog Track" socket of the Digital Centre.

To program a loco, simply drive it to the corresponding track section. Then change your Z21 mobile app to programming mode (for details, see www.z21.eu). The Z21 Digital Centre now switches the track automatically into programming and read mode.

You can now read the decoder data of the locomotive in the Z21 mobile app via RailCom© and set new CV values for the locomotive. For details, also see www.z21.eu.

# 2.9 Feedback at Programming and Main Track

Feedback

Loco Net

Sniffer
BUS

Programming Track

Booster

Main Track

CAN   LAN        X-BUS  R-BUS  L-BUS  B-BUS

DC
Power

Sniff
BUS

Prog
Track

Main
Track

18-24V=

Tablet PC

Smartphone

WLAN Router

WAN   Router (from
Internet Provider)

PC (also possible
through WLAN)

AC Adapter

230V~

Roco feedback

Roco feedback

Roco feedback

Programming Track

Main Track

AC Adapter

230V~

⚠

*If power consumption exceeds 2.5 A, the section is overloaded and must be divided.*

⚠

***Warning:*** *The booster and the Z21 Digital Centre must not be operated with the same transformer or AC adaptor!*

⚠

*Make sure that at the change-over turnouts, the tracks have the same polarity to avoid shortcircuits when driving over the separating turnouts. Make sure that powered tracks have no capacitors.*
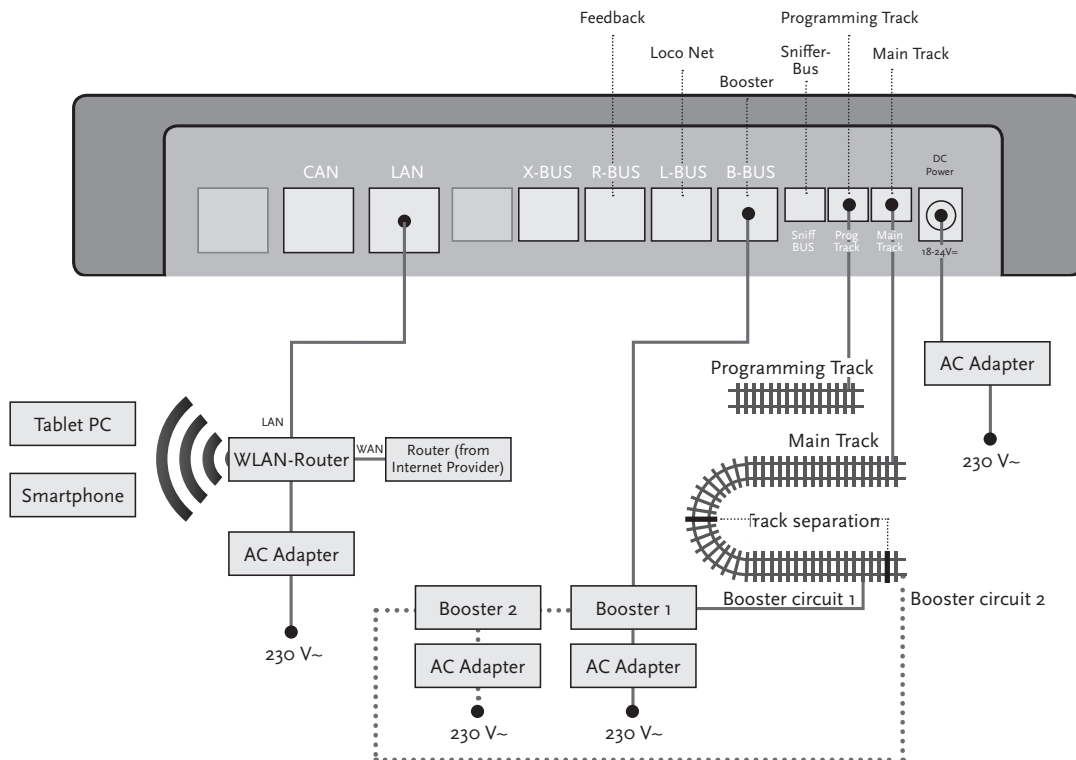
# 3. Driving with a Booster

When your system turns off frequently without a loco or coach having derailed or in the absence of a wiring error, as a rule this suggests an overload due too many power consumers. In this case, a booster (Art. No. 10765) which supplies extra power to the layout via an extra transformer (Art. No. 10718, 10725 or 10850) will help.

Installation is simple:

► Subdivide your system into two supply sections having approximately the same power consumption. Separate the tracks on both sides using insulated rail connectors (Art. No. 42611, 61192, 6433 or 9403) or separator tracks.
► Attach a power supply element to the new supply section (e.g. geoLine Art. No. 61190) or another separator track and connect it to the "Track Out" socket of the booster.
► Now connect the booster to its transformer.
► Connect the "Booster In" socket on the booster with the "B Bus" socket of the Z21 Digital Centre. Use the dedicated cable supplied with the booster for this purpose. A detailed cabling diagram is found on Page 47.

You can connect up to three more boosters to the "Booster Out" socket of the booster when necessary. If more than four boosters are needed for your layout, a brake generator (Art. No. 10779) must be connected in place of the fourth booster. Up to four more boosters can then be connected to the "Booster Out" socket.

Feedback

Loco Net

Programming Track

Sniffer-
Bus

Booster

Main Track

CAN  LAN  X-BUS  R-BUS  L-BUS  B-BUS

Sniff
BUS

Prog
Track

Main
Track

DC
Power

18-24V=

English

Programming Track

Main Track

AC Adapter

230 V~

Tablet PC

LAN

Smartphone

WLAN-Router

WAN

Router (from
Internet Provider)

Track separation

AC Adapter

Booster circuit 1

Booster circuit 2

230 V~

Booster 2

Booster 1

AC Adapter
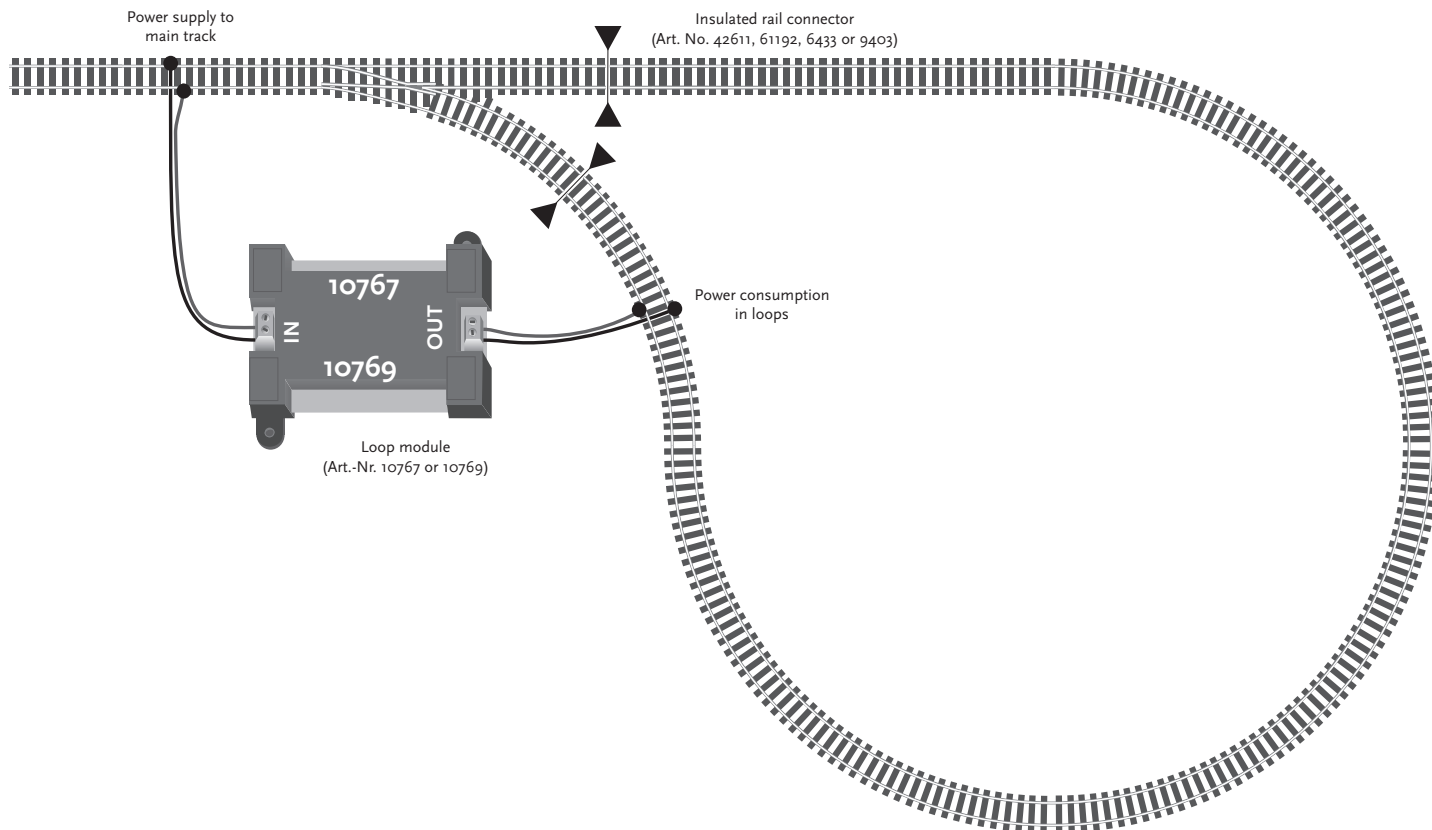
AC Adapter

230 V~

230 V~

⚠️

*Note: To make sure that the loop module responds quickly enough, the sensitivity must be set prior to operation using the potentiometer visible at the side. Observe operating instructions.*

# 4. Loops in Digital Operation

Every DC railway enthusiast knows the following problem: if after a loop, the left rail profile meets the right one, a shortcircuit occurs without the appropriate wiring.

With our loop modules (Art. No. 10767 or 10769), this switching problem in digital operation is elegantly taken care of: simply separate the loop on both sides on two poles and insulate the rest using insulated connectors (Art. No. 42611, 61192, 6433 or 9403) electrically from the remainder of the layout (see Page 49). The separated layout portion within the loop must be longer than the longest train which is to drive through the loop. The power to the loop is supplied by the loop module which is connected either to the track outside the loop or to the Z21 Digital Centre.

And this is how the loop module works: as soon as a train enters the loop regardless of the direction, shortcircuit detection occurs in the module. The polarity in the loop is automatically changed before the shortcircuit detection of the Digital Centre is aware of it or before the trains slows down. The polarity reversal is repeated when the train leaves the loop. Thus, the train can pass through a loop without stopping or operator intervention.

Power supply to
main track

Insulated rail connector
(Art. No. 42611, 61192, 6433 or 9403)

10767

IN

OUT

10769

Power consumption
in loops

Loop module
(Art.-Nr. 10767 or 10769)

English

## 5. Z21 Mobile App: First Steps

On the following pages, you will learn everything you need to know to control your digital loco-motives using the Z21 Mobile App via your smartphone or tablet PC. When you start the Z21 Mobile App, you see the following start-up screen

Everything to control locos and digital components — **Seite 51**

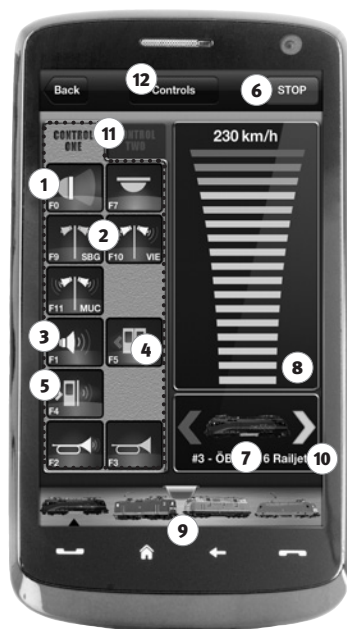Everything for system or library configuration etc — **Seite 52**

Information on software status

Everything to program your locomotives — **Seite 54**

# 5.1 Controls

The registry card "Controls" of the Z21 Mobile App allows controlling all digital locomotives of your layout conveniently by touch. The surface is designed for unambiguous and intuitively comprehensible ergonomically laid out icons:

**Functions (loco-specific):**

1 Front lights on/off

2 Station announcements

3 Locomotive sound on/off

4 Doors opening

5 Door noise

6 Emergency stop

7 Selected loco

8 Speed display

9 Loco library fast access

10 Direction indication/change

11 Function panel

12 Driver stand

**Highlights:**
► *Universal control for all digital locomotives*
► *Convenient access to all loco functions*
► *Quick exchange of locomotives*
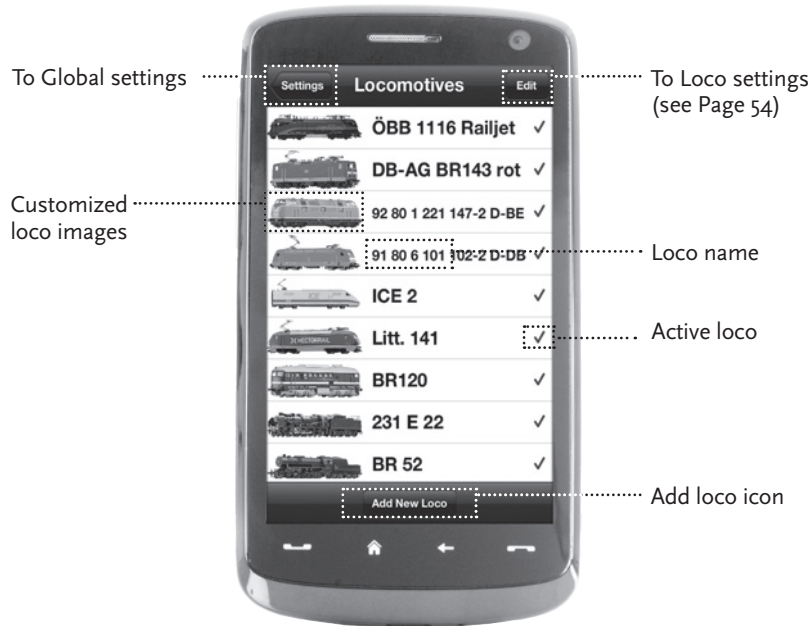► *Precise speed control*

English

## 5.2 Settings

This register card allows entering all major settings into your Z21 Digital System, from basic system configuration via Z21 centre settings up to the definition of customized parameters for your loco library.



To Administration
of your loco library

Administration
of your driver stand

Exchange of loco library
and driver stand

To Configuration
of your Z21 Mobile App

To Configuration
of your Z21 Digital Centre

# 5.3 Locomotive Library

Build yourself a complete library of your locomotives in the Z21 Mobile App. This makes it easy to change trains and guarantees an optimal control of your collection at all times.

To Global settings

Customized
loco images

To Loco settings
(see Page 54)

Loco name
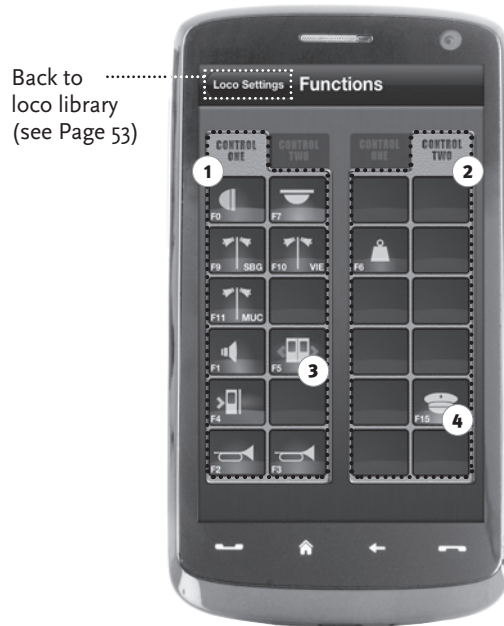
Active loco

Add loco icon

English

# 5.4 Programming Loco Settings

You can lay down the basic settings for each of your locomotives in the register card "Loco Settings". Only the most important parameters are given here. This allows even beginners to quickly find their way.

Back to loco library (see Page 53)

Loco designation

Loco decoder address

Maximum speed

Fade in/out of loco library

DCC/Motorola switchover

To register card "Functions" (see Page 55)

Add images from the loco library or take a new image using a smartphone camera

# 5.5 Access to Loco Functions

Through the register card "Functions", you can access the digital functions of your locomotives easily and quickly. Instead of having to input complicated codes, just touch the unambiguous icons – makes driving trains twice the fun.

Back to loco library (see Page 53)

**Loco Functions:**

(1) Function Panel 1

(2) Function Panel 2

(3) Function icon

(4) Function name

*Highlights:*
► *Quick access to all digital functions of your locos*
► *Activation by touch*
► *Intuitive icons ensure easy handling*
► *Customized arrangement of icons on two panels*
► *Configurable function names help keeping track*

*Notes on Operation:*
► *To create a new function, touch an empty field in the panel.*
► *To relocate functions, drag over to the desired field.*
► *To delete a function, keep it depressed until "X" appears, then touch the "X".*

English

*Highlights:*
► *Fast access to key function parameters*
► *Customized locomotive configuration*
► *Easy programming by touch*
► *Support of individual functions*

# 5.6 Assignment of Digital Functions

This allows you to assign, name and program the digital functions of your locomotives in a few steps.

Back to register card "Functions" (see Page 55)

Function name (optional)

Selection of function parameters

Configuration of function parameters

Test

Function selection. Functions already assigned are no longer displayed.

Functions

Shortcut (3 chars): VIE

Switch  Push-Button  Time

Timeintervall (in sec.): 1.5

Image  Function

8

10

Test:

12

13

# 5.7 Setting and Handling of Magnetic Items

With this menu, you can set up and switch digital magnetized items on the layout quickly and conveniently. Switches, signals and other digital components can be controlled easily with your fingertips.

1. Create background image
2. Create new article
3. Change size
4. Rotate
5. Delete
6. Briefly tap touch magnetized items to configure. Touch magnetized items longer to change sizes and angles.

**Highlights:**

► *Easy control of all magnetized articles on the layout*
► *Switch management by touch*
► *Visualization with customized background images*
► *For switches, signals and all other digital components*

English

# 6. View from the Driver Stand

Get aboard and control your loco from an exactly reproduced virtual loco stand. Maximum driving fun guaranteed!

The model-specific driver stand apps are controlled by simply touching the clearly laid out operating elements. Slide your finger over the virtual accelerator and the locomotive starts putting on speed. Touch the signal horn and the characteristic locomotive sound will appear. The headlights, interior illumination and all other digital functions of our assortment can be operated just as easily.

Photo-realistic driver stands are available in the AppStore or from Google Play. Further driver stand apps will soon follow – for many favourites of our assortment and for all major current novelties.

E-Loco                Diesel loco                Steam loco

# Anmeldung am WLAN

Um Ihr Z21-Digitalsystem mit Ihrem Smartphone oder Tablet zu steuern, müssen Sie das Gerät am WLAN-Router anmelden:
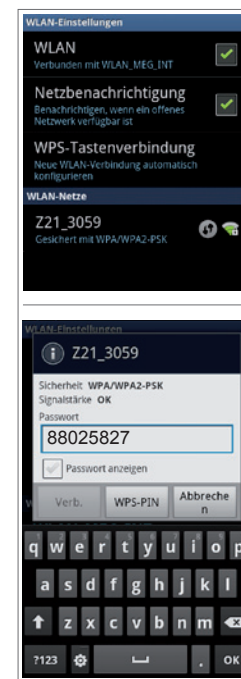
▶ Schließen Sie Router und Zentrale gemäß Quick-Start-Guide an.
▶ Wechseln Sie am Smartphone/Tablet in die Netzwerk-Einstellungen.
▶ Das Z21-WLAN erscheint in der Liste der Netzwerke in Reichweite.
▶ Das Netzwerk heißt „Z21_wxyz", wobei wxyz die Endziffern der Router-Seriennummer (s. Feld „S/N" auf der Router-Unterseite) sind.
▶ Tippen Sie auf den Netzwerknamen.
▶ Geben Sie nun das Passwort für die Netzwerkanmeldung ein. Sie finden es im Feld „PIN" an der Unterseite des Routers.
▶ Fertig!

*Unterseite des Routers / Bottom side of the router / Dessous du routeur*

*Konfiguration iOS / Configuration iOS*

*Konfiguration Android / Configuration Android*

English ▶

Francais ▶

# English

## Connect to WLAN

In order to control your Z21 Digital System via smartphone or tablet PC, connect your device to the supplied WLAN router:

▶ Connect the Z21 Digital Centre and the router as described in the Quick Start Guide.
▶ The Z21 WLAN network appears in the list of all available networks.
▶ The Z21 network is named "Z21_wxyz", with "wxyz" being the final four digits of the serial number of your router (as stated at the bottom side of the router, within the "S/N" box).
▶ Tap the network name.
▶ Enter the PIN to join the network.
▶ Find the PIN at the bottom side of the router, within the "PIN" box.
▶ Done!

# Francais

## Connexion au réseau Wi-Fi

Pour contrôler votre système numérique Z21 avec votre smartphone ou votre tablette, vous devez enregistrer l'appareil sur le routeur Wi-Fi :

▶ Connectez le routeur et la centrale en suivant le Quick-Start-Guide.
▶ Sur votre smartphone/tablette, allez dans les paramètres de réseau.
▶ Le réseau WiFi Z21 apparaît dans la liste des réseaux disponibles.
▶ Le réseau s'appelle « Z21_wxyz », wxyz étant les derniers chiffres du numéro de série du routeur (champ « S/N » au-dessous du routeur).
▶ Touchez le nom du réseau.
▶ Indiquez ensuite le mot de passe pour la connexion au réseau.
▶ Vous le trouverez dans le champ « PIN » au-dessous du routeur.
▶ Terminé !

Z21 **Digitalsystem | Digital System | Système numérique**

▶ **www.z21.eu**