Z21 10837 Single Decoder Instruction Manual

**Single Decoder
Instruction Manual**

**Z21 ist eine Innovation von Roco und Fleischmann.
Model Railway Control Unit**

Contents

10837 Single Decoder

Welcome to the Z21
Many thanks for choosing the Z21 signal DECODER from ROCO and FLEISCHMANN! The following pages will provide you with the information you need to know to connect the Z21 signal DECODER to your system and put it into operation. This manual will also provide you with a number of practical tips. Please read through these instructions and warning notes carefully before putting the equipment into operation. Although the Z21 signal DECODER is of very robust construction, an incorrect connection or incorrect operation can result in permanent damage to the equipment.

Technical data

Input voltage	12 – 20 V DC (power unit) or with DCC rail voltage
Output voltage	is equivalent to the rectified input voltage
Self-consumption	0.16 W
Output power	Per output 400 mA
Output power	Complete module 2 A
Overload protection	Power measurement
Digital system	**DCC** • Signal addresses from 1 to 2040 • DCC Basic & Extended Accessory Decoder Packet Format • DCC POM Accessory Decoder CV Access Instruction
RailCom®	POM read result in RailCom® channel 2, can be deactivated
Dimensions W x H x D	104 mm x 104 mm x 25 mm

Included

- Z21 signal DECODER

- 4 pole plug terminals for track connection and power supply
- Four 5-pole plug terminals for the signal outputs

Important information

- If you combine the 10837 Z21 signal DECODER with products from other manufacturers, no warranty is provided in the event of damage or malfunction.
- The 10837 Z21 signal DECODER may under no circumstances be supplied with alternating voltage.
- Do not use the 10837 Z21 signal DECODER if the mains plug, mains cable or the device itself is faulty or damaged.
- Only perform connection work when the operating voltage has been switched off.
- Opening the 10837 Z21 signal DECODER housing renders any warranty claims null and void.
- Work with care and, during connection work, ensure that no short circuits are produced! An incorrect connection can destroy the digital components. Please contact your specialist dealer for advice if necessary.
- The 10837 Z21 signal DECODER may heat up during operation. Observe an adequate distance from adjacent parts to ensure sufficient ventilation and cooling of the device.
- Never leave your model railway system in operation unsupervised! There is a risk of fire due to heating if a short circuit occurs unnoticed!
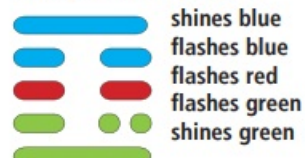
Quick guide

Programming button in normal mode:
- hold down until "Program" flashes (for at least 3 s): Configuration mode
- hold down until all LEDs are shining (for at least 8 s): Reset to factory settings

Programming button in configuration mode:
- press briefly: Change setting (for options 2 and 3)
- hold down until "Status" flashes blue (for at least 3 s): next option

LEDs in normal mode

shines blue	Track signal pending
flashes blue	No 3 track signal
flashes red	Short circuit
flashes green	Data received
shines green	Addressing in conformity with RCN-213

LEDs in configuration mode

flashes white once / shines green	**Option 1:** Set address
flashes white twice / shines green	**Option 2:** Number of signals=2
flashes white twice / shines green and red	**Option 2:** Number of signals=3
flashes white twice / shines green and red and blue	**Option 2:** Number of signals=4
flashes white 3 times / shines red	**Option 3:** Addressing compatible with ROCO or
flashes white 3 times / shines green	**Option 3:** Addressing in conformity with RCN-213

Option 1:
- Switch the magnet accessory (e.g. turnout command) with the desired address
- Address is adopted from the Z21 signal DECODER
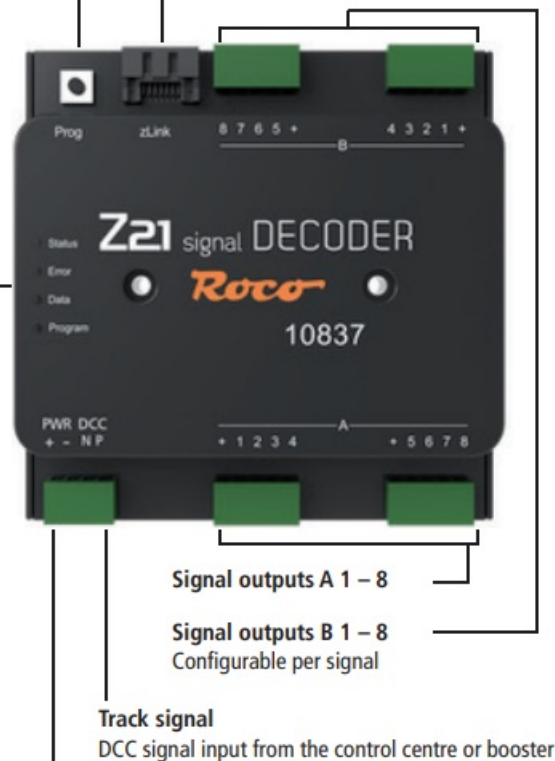
Option 2:
The number of signals can be changed by briefly pressing the programming button.

Option 3:
The addressing mode can be changed by briefly pressing the programming button.

zLink
Interface for configuration and firmware update

Prog   zLink   8 7 6 5 +   4 3 2 1 +   B

Z21 signal DECODER
Roco
10837

Status
Error
Data
Program

PWR DCC
+ – N P   + 1 2 3 4   A   + 5 6 7 8

Signal outputs A 1 – 8

Signal outputs B 1 – 8
Configurable per signal

Track signal
DCC signal input from the control centre or booster

Supply
from **track** or **power unit**
12 – 20 V DC or DCC rail voltage
min. 2 A e.g.: ROCO 10850

Determination of use and function

The Z21 signal DECODER has been developed for use on model railway systems with DCC control centres for switching light signals, each equipped with up to 8 LEDs with a series resistor and common plus pole.
The Z21 signal DECODER has been specifically designed for use with the Z21 product range but is also compatible with older ROCO control centres as well as with DCC control centers from other manufacturers. In the latter case, however, the addressing mode should be set to "RCN-213", see also section Operation on control centers from other manufacturers.

Features

- 2 to 4 signals can be independently configured and operated
- Over 40 predefined signal configurations from different countries can be selected
- Programmable with RailCom® on the main track (POM)
- Controls switching commands for basic and extended accessory commands
- Signal addresses 1 to 2040 programmable (in groups of four)

- Can be configured and updated via link
- Optional power supply
- Secured against overload and short circuit

Installing the Z21 signal DECODER

Install the Z21 signal DECODER at an easily accessible location with adequate ventilation to facilitate the carry-off of waste heat. The Z21 signal DECODER should never be placed close to strong sources of heat such as radiators or places subject to direct sunlight. This Z21 signal DECODER has been developed exclusively for dry interior spaces. For this reason, do not operate the Z21 signal DECODER in areas subject to major temperature and air humidity fluctuations.

TIP: Use screws with a round head for installation of the Z21 signal DECODER, e.g. 3 x 30 mm.

Connecting the Z21 signal DECODER

4.1. Power supply and control center
The power supply to the Z21 signal DECODER is provided via the terminals "PWR +" and "PWR -". You can either connect the DCC digital voltage from the track or alternatively a switching power supply with DC voltage output.

INFORMATION: Using the terminals, you can simultaneously determine the voltage on the output terminals for the signals.

This decoder may under no circumstances be supplied with AC voltage such as that for example from a conventional transformer.

The power supply via a separate power supply unit is recommended above all for larger systems because the energy for the signals does not need to be taken from the control centre or booster. In addition, the outputs remain active even if the rail voltage fails (e.g. during an emergency stop), which can be highly practical for lighting and signals.

Then connect inputs "DCC N" and "DCC P" to the corresponding track signal outputs of the control center or booster. Please note the correct polarity of N and P, above all if you also want to use RailCom® in your Z21 system.

Switching power supply:
Voltage: 12 – 20 V DC
Output current: min. 2 A
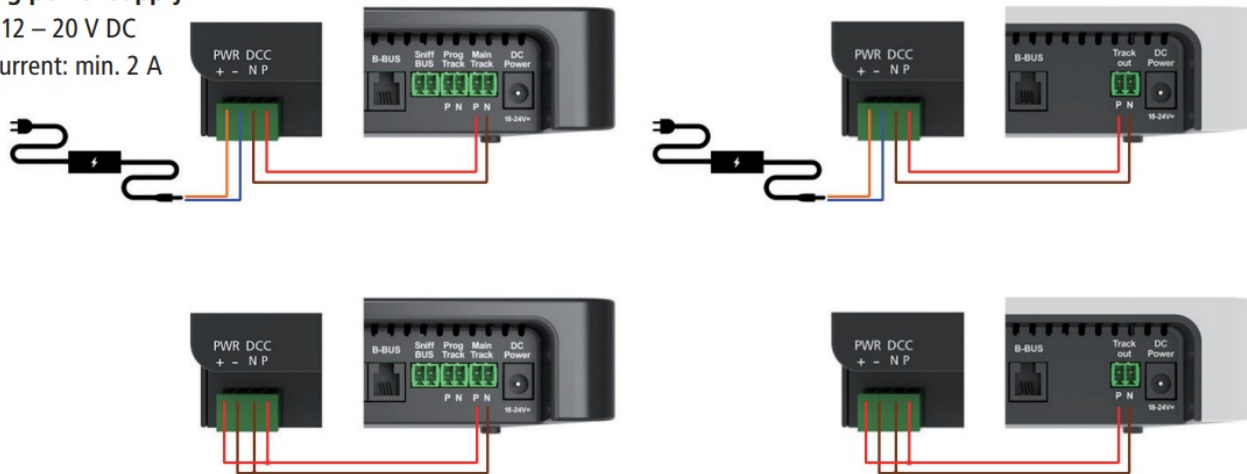
Before first use, the signal decoder must be programmed so that it knows which decoder addresses and signal addresses to respond to. If you are operating the Z21 signal DECODER on a control center from another manufacturer, please observe the information in Operation on control centers from other manufacturers.
The programming of the address is explained in detail in the section Option 1 – Programming addresses.

4.2. Light signals

The lamps for the signals are connected to the outputs A1 to A8 and B1 to B8. At the ports, each "+" terminal refers to the common plus pole.

⚠️ **WARNING:** Please note that LEDs may generally only be connected to the decoder with a series resistor for current limitation, regardless of whether they are dimmed or operated at full brightness. The resistance value depends greatly on the LED type actually used, meaning no accurate data can be provided here. However, commercially available LEDs can normally be operated with a series resistor of approx. 2.2 – 10 kΩ. If in doubt, start with a higher resistor value.

2 to 4 signals can be connected to the Z21 signal DECODER. The Number of signals can be set via the programming button (see Option 2 – Set number of signals) or CV #40. This is even simpler using the Z21 per LINK, where the number of signals can be directly selected in the "Settings" menu.
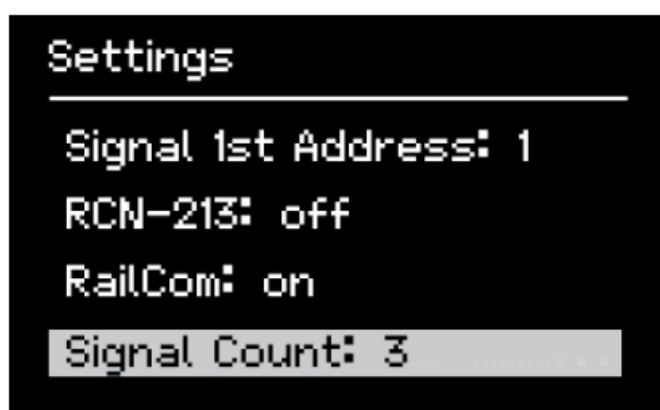

Depending on the set number of signals, the signals are distributed as follows on the terminals:

- 2 signals: Up to 8 outputs are available per signal, namely A1 to A8 and B1 to B8.
- 3 signals: For the first signal, up to 8 outputs (A1 to A8) can be used. Two further signals can also be connected to 4 outputs respectively, namely B1 to B4 and B5 to B8.
- 4 signals: Up to 4 outputs are available per signal, namely A1 to A4, A5 to A8, B1 to B4 and B5 to B8.
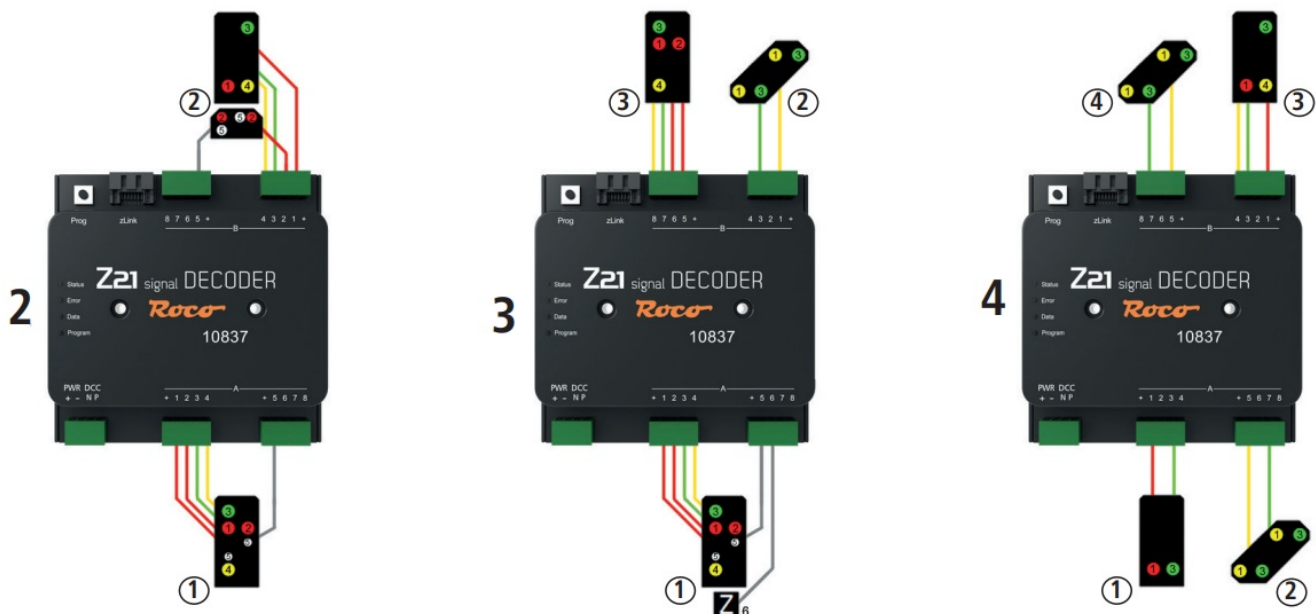
Examples with 2, 3 and 4 signals using the standard signal configuration ("Universal").

In delivery conditions, the standard signal configuration "Universal" with the Signal-ID=71 is preset for all signals. This is a highly flexible configuration, using which different light signal types of simpler construction from different countries can be operated. In the diagram, there is a small number on each lamp that describes to which terminal each lamp should be connected.
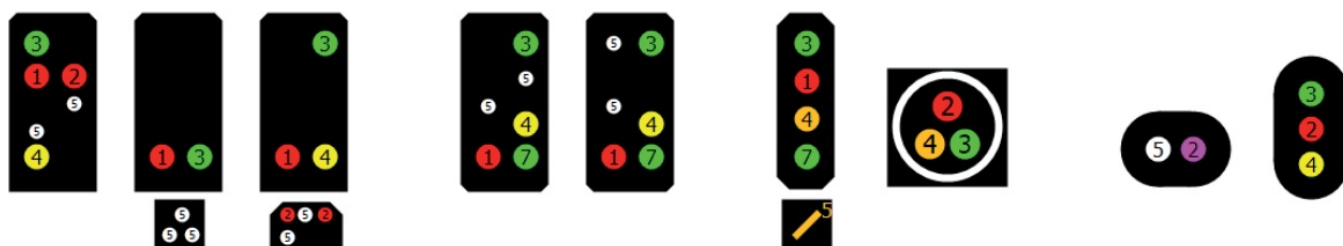
In addition to this all-purpose standard signal configuration, numerous other predefined signal configurations from different countries are available in the Z21 signal DECODER. You can select these signal configurations via CV #41 to #44. You can find an overview of the predefined signal configurations, the respective assignments on the connection terminals, and the respective signal aspects in Appendix A – Signal configuration "Universal" and Appendix B – Signal configurations. There you can also find the unique Signal ID for each signal configuration. You can find all details on: **https://www.z21.eu/en/products/z21-signal-decoder/signaltypen**.
Should you require a different signal configuration for your signal, then proceed as follows:

1. Write down the required Signal-ID
2. Write this Signal ID for the first signal in CV #41 or for the second signal in CV#42, and if applicable for the third signal in CV #43 or for the fourth signal in CV #44.

This is even easier with the Z21 per LINK: simply first select in the "Settings" menu the first, second and if applicable the third or fourth signal ("Number"), then select the required country ("Country"), and finally the required signal configuration ("Config") – everything is menu-driven and shown in plain text. No CV has to be programmed.

```
Settings
_____

Signal
Number: 2
Country: D
Config: DB H/V Vorsignal
```

Please observe that the images are shown in Appendix A – Signal configuration "Universal" and Appendix B – Signal configurations often only show examples of a few signal screens. It is not usually possible to depict the drawings for all feasible configuration possibilities for reasons of space. However, the logic is always the same within a signal configuration, and of course, signal screens can also be connected and operated with a reduced number of lamps. The same applies to the prototype: do not switch a signal aspect if this is in principle available in the selected signal type, but cannot be correctly displayed by the signal actually connected because the lamp is not equipped! The SignalDecoder cannot automatically detect missing lamps, but rather must always assume that the signal type variant is fully-equipped. Therefore, the user is responsible for only using expedient signal aspects which can actually be presented.

It has been ensured for all prepared signal configurations that the most important main lights (usually red, green, and yellow) are located as far as possible on the first four terminals and that additional lights or additional signals are located on the rear terminals. This makes it possible to operate several highly complex signal systems even with only four terminals if the signal screens are only partially equipped, as is often the case with the prototype. This ensures that the connection possibilities on the Z21 signal DECODER can be optimally and highly flexibly utilized. Here is an example with SBB signals:
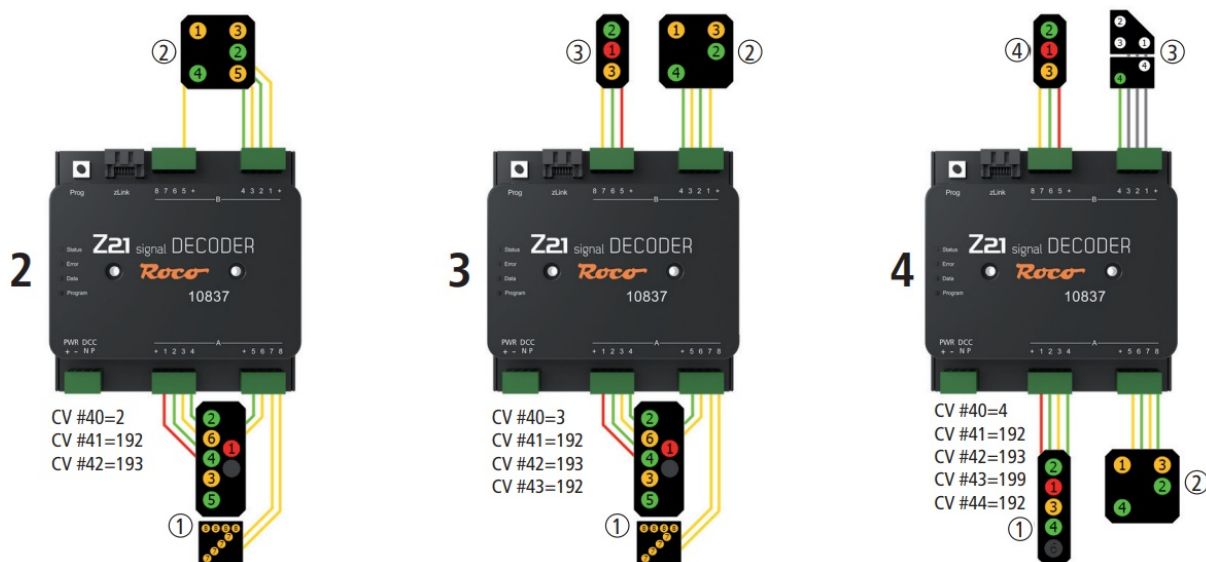
- On the left is a complex SBB main signal System L, and a fully-equipped SBB distant signal.
- In the middle image, the distant signal only uses four lamps, and therefore there is still space for another, partially-equipped SBB main signal System L.
- On the right, two partially-equipped SBB main signals System L can be operated, and there is even still space for a distant signal and an SBB dwarf signal with departure permission.

All the main signals shown in the example work using the same signal configuration (Signal-ID 192 "SBB System L main signal") and merely differ in the number of lamps available. All three connection variants shown require max. five CV variables for the configuration, namely CV #40 for the number of signals and CV #41 to #44 for the

selection of the required signal configurations. This is of course even easier using the Z21 per LINK, namely with no CV programming at all. Conversely, the Z21 signal DECODER can also be used to present highly complex and unusual signal screens through the creative combination of several single signals. Example: In Graz Hbf., several single signals were combined on one screen 2. This can also be presented using the Z21 signal DECODER. On the left-hand side of the screen is the main signal including the substitution signal and the shunting signal. The distant signal is positioned in the center, and on the right is the brake test and departure signal (small green lamp).
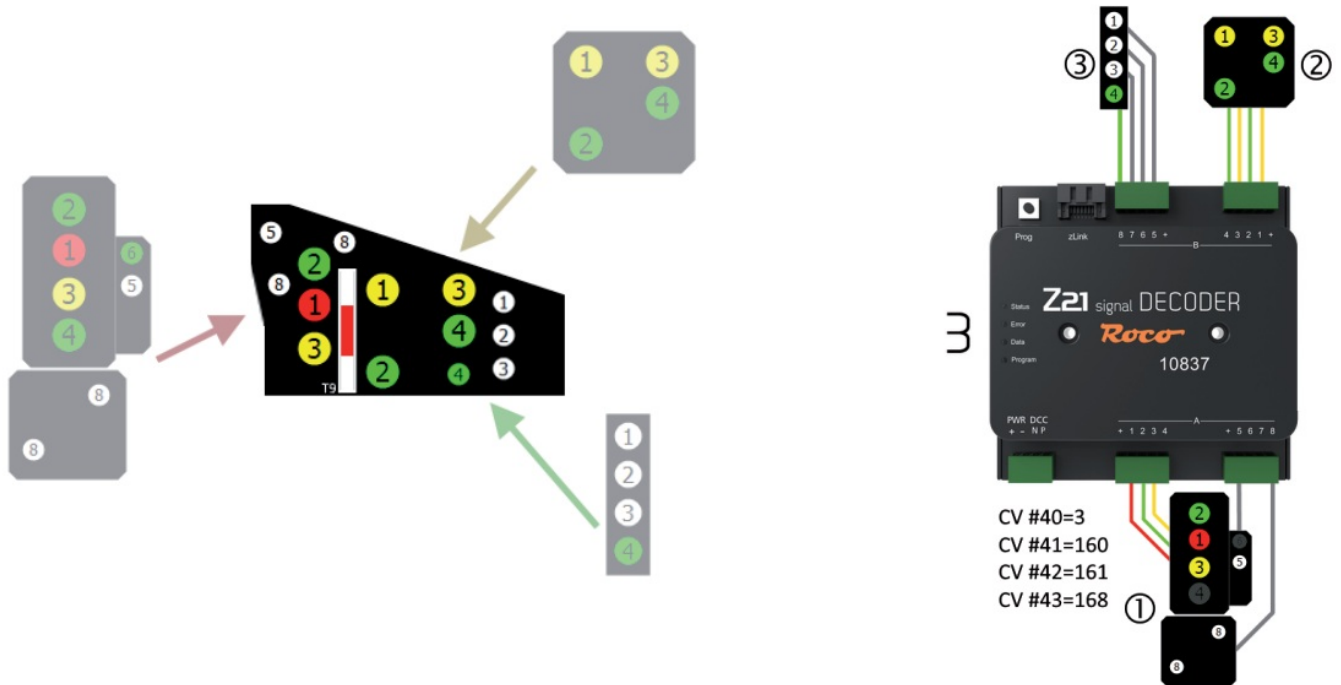
4.3. Semaphore signals with magnetic drive
Although the Z21 signal DECODER has primarily been constructed for operation with light signals, semaphore signals can also be connected if they fulfill the following conditions:

- Drives with limit switching
- Current consumption < 400 mA per drive
- Common anode
- One control line per signal aspect

For operation with semaphore signals, exclusively use those signal configurations which have expressly been designed for semaphore signals. These are:

- Signal-ID: 162 (Hexadecimal: 0xA2) ÖBB semaphore main signal
- Signal-ID: 163 (Hexadecimal: 0xA3) ÖBB semaphore distant signal
- Signal-ID: 210 (Hexadecimal: 0xD2) DB semaphore main signal
- Signal-ID: 211 (Hexadecimal: 0xD3) DB semaphore distant signal
- Signal-ID: 213 (Hexadecimal: 0xD5) DB stop signal

Operation on DCC control centers

This chapter describes how the Z21 signal DECODER can be operated with the Z21 and other DCC control centers, and how to switch a certain signal aspect.
5.1. Switching commands in conventional DCCbasic format
Model signals are still usually switched via turnout commands in the so-called DCC "Basic Accessory Command".

To simplify this rather cumbersome name, we have abbreviated it in these instructions as the "DCCbasic" switching command. This is the switching command which has long been used by almost all DCC control centers in order to switch a turnout to "straight" or "branch". In connection with signals, the command for the turnout position "straight" is also designated as "green", and for "branch" also as "red". However, only two signal aspects are possible. For multi-aspect signals, multiple turnout addresses must therefore be combined.

INFORMATION: The Z21 signal DECODER reserves four consecutive turnout numbers per signal. In this way, up to 16 signal aspects per signal are possible. If four signals are used on the Z21 signal DECODER, then the decoder even assigns 4 signals 4 turnout numbers =16 consecutive turnout numbers. Using the programming button on the decoder, you can set the first * turnout number of the signal decoder, see also section Option 1 – Program address and the process is even easier with the Z21 per LINK.

If a signal only recognizes up to max. 8 aspects, then it can be uniquely switched in the Z21 signal DECODER using only one command ("Trigger"): the first to fourth turnout number, either "red" or "green" results in eight possible combinations: 1R, 2R, 3R, 4R and 1G, 2G, 3G, 4G. Here the notation functions as follows:

- The numbers 1 to 4 stand for "first to fourth turnout number", which are assigned to the signal.
- The letters "G" and "R" stand for "green" (straight) and "red" (branch).

  1R is equivalent to "first turnout number, red (branch)", 1G is equivalent to "first turnout number, green (straight)", etc.
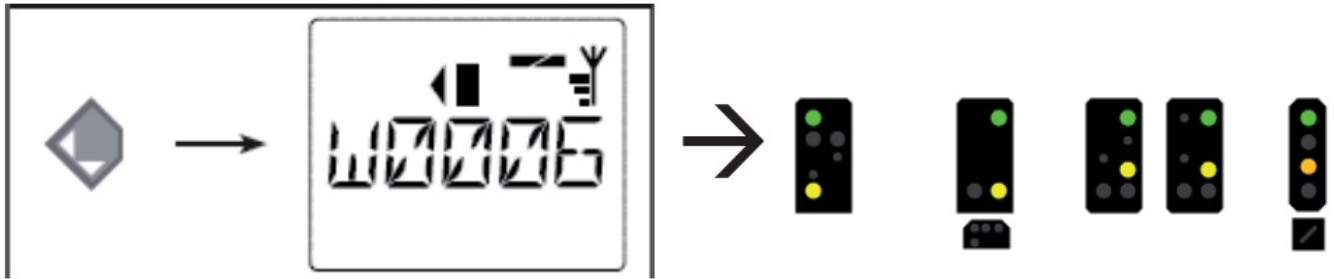
Example 1: The signal decoder is configured to address 1, and the standard signal configuration (Signal-ID=71 "Universal") is set. Now send the switching command 1G with the WLANMAUS or multiMAUS in order to display Clear to proceed on the first signal.
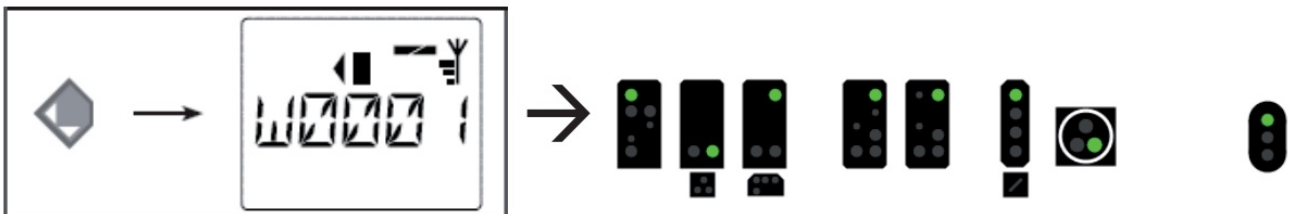
Example 2: The signal decoder is configured to address 5, and the standard signal configuration (Signal-ID=71 "Universal") is set. Now send the switching command 1R in order to display "Stop" on the first signal. The first turnout number which is assigned to the signal is 5.
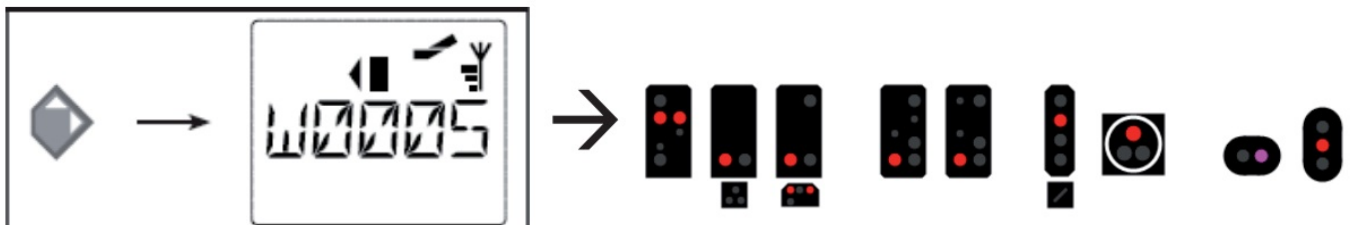

Example 3: The signal decoder is configured to address 5, and the standard signal configuration (Signal-ID=71 "Universal") is set. Now send the switching command 2G in order to display "Proceed with 40 km/h" on the first signal. The second turnout number which is assigned to the signal is 6.

This procedure can also be used in the Z21 App.

Example 4: The signal decoder is configured to address 1, and the standard signal configuration (Signal-ID=71 "Universal") is set.
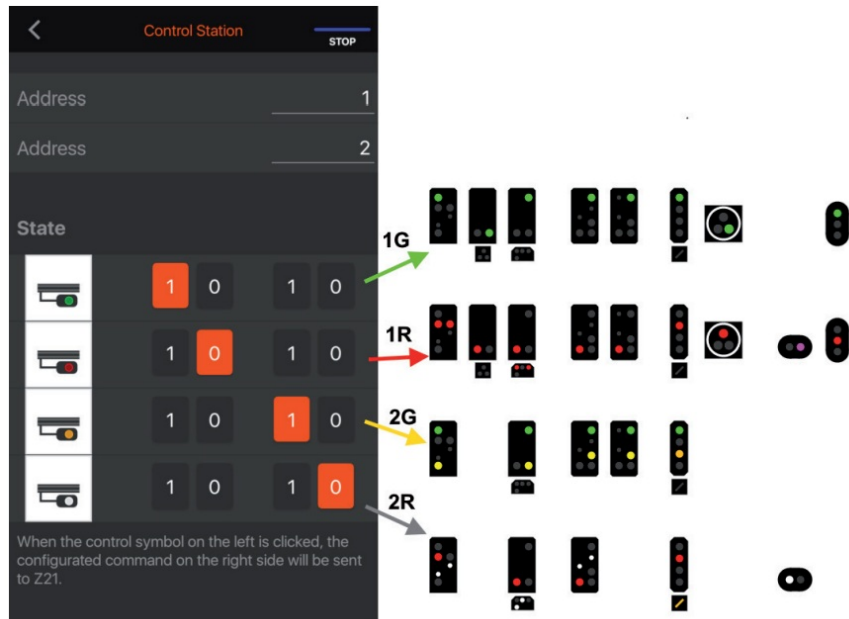
Configure the signal in the Z21 App as shown in order to switch the appropriate signal aspects with the commands 1R, 1G, 2R or 2G.

The same signal can be set in a similar manner in TrainController.

However, if a signal recognizes more than 8 aspects, then two commands are required:

First, a switching command is sent, using which a certain group of up to four signal aspects is preselected ("Mode").

Then a second switching command is sent, with which one of the four signal aspects mentioned is selected and displayed ("Trigger").

The Z21 signal DECODER uses the first two turnout numbers (1R, 2R, 1G, 2G) as triggers and the last two turnout numbers (3R, 4R, 3G, 4G) for the mode. In this way, up to 4*4=16 different signal aspects can be switched.

It is clear that such complex signals are less suitable for manual operation and better for use in set routes and PC control programs.

Example: SNCF main signal (Signal-ID 240 "SNCF Carré C [CFH]") in rain.

Signal properties   ✕

Name: F0_SNCF_CFH_Carre_C

Description: Carré C [CFH] (SNCF)

Type: SNCF : Home Signal G   Initial State: Carré

Interface: N Z21

Protocol: DCC   ☑ Default

Activation time: 250 ms ↕   ☑ Default

Address: Range (1..N)

1: 1 ↕   N: 4 ↕

State mapping | Options | Relay | Configuration | Comment

Enabled	State	Output	Output	Output	Output
☑	Carré	6 = 3 : Red	2 = 1 : Red	-	-
☑	Sémaphore	6 = 3 : Red	4 = 2 : Red	-	-
☑	Voie libre	6 = 3 : Red	1 = 1 : Green	-	-
☑	Avertissement	6 = 3 : Red	3 = 2 : Green	-	-
☑	Ralentissement 30	5 = 3 : Green	3 = 2 : Green	-	-
☑	Rappel de ralentissement 30	5 = 3 : Green	4 = 2 : Red	-	-
☑	Rappel de ralentissement 30 + Avertissement	5 = 3 : Green	2 = 1 : Red	-	-
☑	Ralentissement 60 ✳	7 = 4 : Green	3 = 2 : Green	-	-
☑	Rappel de ralentissement 60 ✳	8 = 4 : Red	4 = 2 : Red	-	-
☑	Rappel de ralentissement 60 ✳ + Avertissement	7 = 4 : Green	2 = 1 : Red	-	-
☑	Feu blanc	5 = 3 : Green	1 = 1 : Green	-	-

OK   Cancel

In Appendix A – Signal configuration "Universal" or under the link provided in Appendix B – Signal configurations, you will find next to each signal aspect the required DCCbasic switching commands under "Trigger" and "Mode" respectively. If the "Mode" column is empty, then this is a signal configuration that does not need a "mode".

5.2. Switching commands in new DCCext format and Z21

Combining multiple turnout addresses for multi-aspect signals has in the meantime become common, but is not particularly convenient. For this reason, all Z21 control centers (black. white) from Firmware V1.40 are able to handle DCC commands for the switching of signals, namely the DCC "Extended accessory command" from the RCN-213 standard, simplified in this text to "DCCext " switching command. The "ext" stands for "extended". Using this command, a value between 0 and 255 which precisely describes the required signal aspect is sent to a unique signal address.

The benefits are clear:

- It is no longer necessary to combine several different switching commands in a certain temporal sequence, but rather it is sufficient to use one single, unique command for the required signal aspect.
- No limit of max. 16 signal aspects. There are in fact signal systems that recognize more than 16 different signal aspects: HI system, SNCF Châssis-Écran H, …
- Now only one single unique address is required per signal. If four signals are used on the Z21 signal DECODER, then the decoder will only assign 4 consecutive DCCext signal addresses.

INFORMATION: The first DCCext signal address is identical in the Z21 signal DECODER with the first DCCbasic turnout number (see above), and is therefore also configured in the same manner via the programming button or the Z21 per Link. The only difference is that, although up to 16 consecutive DCCbasic turnout numbers are assigned, only max. 4 consecutive DCCext signal addresses are assigned in the common address space.

In Appendix A – Signal configuration "Universal" or under the link provided in Appendix B – Signal configurations,

you will find next to each signal aspect the respective appropriate value for the DCCext switching command under "DCCext ". The valid value range is strongly dependent on the actual signal; common values are, for example:

- 0 … Absolute stop aspect
- 4 … Proceed with a speed limit of 40 km/h
- 6 … Proceed with a speed limit of 60 km/h
- 16 … Clear to proceed
- 65 (0x41) … Shunting allowed
- 66 (0x42) … Dark switching (e.g. light distant signals)
- 69 (0x45) … Substitution signal (permits trains to pass)

The Z21 signal DECODER can interpret both DCCbasic and DCCext switching commands. This means it need not be specially reconfigured. At the time these operating instructions went to print, work was being conducted on the appropriate extension in the Z21 App, so that you can utilize this innovation as quickly as possible, and operate your signals more conveniently. Until this feature is ready, you can try out the new commands in the Z21 Maintenance Tool V1.15, which can be found in the menu Options / Signal box / DCCext signal.

5.3. Operation on control centers from other manufacturers

INFORMATION: When using control centers from other manufacturers, set the addressing mode of the Z21 signal DECODER to "RCN-213"! To configure the addressing mode, see the section Configuration and firmware update via zink or Option 3 – Set addressing mode.

The addressing mode defines the method used to calculate the turnout numbers from the accessory decoder address: Each DCC accessory decoder address is assigned precisely 4 turnout numbers in accordance with the DCC standard. The 10837 Z21 signal DECODER even assigns up to four consecutive accessory decoder addresses for the DCCbasic switching commands internally, depending on the configuration (2,3,4 signals), and thus up to 4*4=16 turnout numbers. Most user interfaces only display the turnout numbers and not the actual accessory decoder address. This accessory decoder address is still only used in the background for communication between the DCC control center and the signal decoder. For this to function without problems, however, both sides, the control center, and decoder must use the same type of addressing mode. Unfortunately, due to a weak spot in the older DCC specifications, different methods for calculating the turnout numbers from the accessory decoder address have arisen over time. Only the RailCommunity standard RCN-213 ("DCC protocol operating commands for accessory decoders") has defined 2014 the calculation of the turnout numbers from the decoder address in a unique manner.

To be backward-compatible with existing systems, as well as conformant with the RCN-213 standard, the Z21 signal DECODER offers an adjustable addressing mode:

- Addressing mode "ROCO" for the purpose of backward compatibility with Z21, multiZENTRALEpro, and multiMAUS with a booster. This is the factory setting.

TIP: Visual inspection on the 10837: The green "Data" LED is switched off in normal operation and only lights up briefly whilst the signal decoder is receiving data or commands.

- Addressing mode "RCN-213" for the purpose of better compatibility with the current RCN-213 standard and with control centers from other manufacturers.

TIP: Visual inspection on the 10837: The green "Data" LED is inverted, meaning that it remains switched on in normal operation, and only goes off briefly whilst the signal decoder is receiving data or commands.

TIP: This setting even functions with the Z21 if it has also been set to "RCN-213" in advance using the "Z21 Maintenance Tool" (PC) or WLANMAUS.

The setting of the addressing mode relates primarily to …
• … switching commands: correct and consistent assignment of the signal addresses to the internal accessory decoder address.
• … POM configuration commands: the POM programming commands only function correctly for accessory decoders with control centers from other manufacturers when the "RCN-213" setting is used.
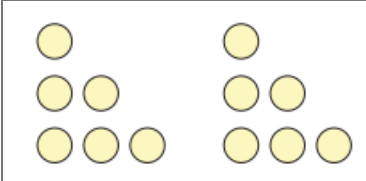
Configuration

The Z21 signal DECODER can be configured in three different ways:

1. Via the programming button in configuration mode
2. Via the link interface using the Z21 per LINK (recommended method).
3. Via POM programming commands

6.1 Configuration via the programming button
If you do not have a Z21 per Link, the most important Z21 signal DECODER settings can also be set via the programming button in the so-called configuration mode.
To access this configuration mode, the button must be pressed for at least 3 seconds until the white "Program" LED begins to flash.
Then release the button again.
The "Program" LED then displays the currently selected option:

⚪ ⚪	Flashes once in white, option 1: Program address
⚪⚪ ⚪⚪	Flashes twice in white, option 2: Set the number of signals
⚪⚪⚪ ⚪⚪⚪	Flashes three times in white, option 3: Set addressing mode

Press and hold the button again for at least 3 seconds to accept the setting and jump to the next option. This is indicated by the blue LED lighting up. After accepting the last option, configuration mode is exited and all settings are saved.

6.1.1 Option 1 – Program address
This option is used exclusively to program the first signal address and therefore also the internal decoder address.

1. Keep the programming button held down for at least 3 seconds until the white "Program" LED begins to flash. Then release the programming button.
2. The white "Program" LED will then flash normally once (short, pause; short, pause; etc.), and the green LED will light up continuously. The signal decoder is then in "Configuration mode, Option 1".
3. Now switch a magnet accessory or signal of your choice. The magnet accessory or signal can be switched via the Z21 App or another input terminal, such as the multiMAUS. As soon as the switching command has been interpreted by the signal decoder, the new address is applied and the configuration mode is exited automatically. The white LED goes out and the blue LED indicates the normal mode.

The addresses are programmed together for all signals, always in ascending groups of four. Each group of four consists of exactly four consecutive turnout numbers, beginning with 1 to 4, 5 to 8, 9 to 12, 13 to 16, etc. The last programmable group of four ranges from 2037 to 2040.

Decoder address	Signals (group of four)			
1	1	2	3	4
2	5	6	7	8
3	9	10	11	12
4	13	14	15	16
…		…		
509	2033	2034	2035	2036
510	2037	2038	2039	2040

Example 1: Switch turnout number 1 during the programming process. All signals of the signal decoder are then programmed in ascending order to turnout numbers starting with 1.
Example 2: Switch turnout number 2 during the programming process. All signals of the signal decoder are also programmed in ascending order to turnout numbers starting with 1, because turnout number 2 is in the same group of four as turnout number 1 from the first example.
Example 3: Switch turnout number 10 during the programming process. All signals of the signal decoder are then programmed in ascending order to turnout numbers starting with 9, see the table above. The following applies for DCCbasic (see also Switching commands in conventional DCCbasic format): Each signal is always numbered at the beginning of a group of four. The beginning of the groups of four is calculated automatically when programming the signal decoder. Each signal occupies 4 turnout numbers. If two signals are used on the signal decoder, then it occupies 2*4=8 consecutive turnout numbers; if three signals are used, then 3*4=12 turnout numbers, and if four signals are used, 4*4=16 consecutive turnout numbers. The following applies to DCCext (see also Switching commands in the new DCCext format and Z21): the first signal is always numbered at the beginning of a group of four. The beginning of the groups of four is calculated automatically when programming the signal decoder. Each signal occupies just one signal address. The signal decoder, therefore, occupies a maximum of four consecutive DCCext signal addresses.
The first DCCbasic turnout number and the first DCCext signal address are identical on the Z21 signal decoder. Factory setting: numbered in ascending order from 1.

6.1.2 Option 2 – Set the number of signals
This option is used to program the number of signals which can be connected to the signal decoder.

1. Keep the programming button held down for at least 3 seconds until the white "Program" LED begins to flash. Then release the programming button. The white "Program" LED will then flash normally once (short, pause; short, pause; etc.), and the green LED will be lit continuously. The signal decoder is then in "Configuration mode, Option 1".

2. Keep the programming button held down for at least 3 seconds again until the blue "Status" LED and white "Program" LED begin to flash together. Then release the programming button again. The white "Program" LED will then flash normally twice (short, short, pause; short, short, pause; etc.). The signal decoder is then in "Configuration mode, Option 2".

3. The current number of signals is then shown through the other LEDs:
   • Number = 2: The green LED lights up; the red and blue LEDs are off
   • Number = 3: The green + red LEDs light up; the blue LED is off
   • Number = 4: The green + red + blue LEDs light up

4. The number of signals can now be changed as often as desired by pressing the programming button briefly. The LEDs change accordingly.

5. After you have selected the desired number, hold down the programming button for at least 3 seconds until the blue "Status" LED and white "Program" LED begin to flash together. Then release the programming button. You will then find yourself in "Configuration mode, Option 3", see next section, step 4.

Factory setting: 2 signals.

6.1.3 Option 3 – Set addressing mode
This option is used to select between the "ROCO" or "RCN-213" addressing modes.
Preparation, if not already carried out:

1. Keep the programming button held down for at least 3 seconds until the white "Program" LED begins to flash. Then release the programming button. The white "Program" LED will then flash normally once (short, pause; short, pause; etc.), and the green LED will be lit continuously. The signal decoder is then in "Configuration mode, Option 1".

2. Keep the programming button held down for at least 3 seconds again until the blue "Status" LED and white "Program" LED begin to flash together. Then release the programming button again. The white "Program" LED will then flash normally twice (short, short, pause; short, short, pause; etc.). The signal decoder is then in Configuration mode, Option 2".

3. Keep the programming button held down for at least 3 seconds again until the blue "Status" LED and white "Program" LED begin to flash together. Then release the programming button again.
   Changing the configuration mode:

4. The white "Program" LED will then flash normally three times (short, short, short, pause; short, short, short, pause; etc.). The signal decoder is then in "Configuration mode, Option 3". The current addressing mode is displayed by the red LED for "ROCO" or the green LED for "RCN-213".

5. The mode can now be switched over by briefly pressing the programming button. The LEDs change accordingly.

6. After you have selected the desired addressing mode, hold down the programming button for at least 3 seconds until the blue "Status" LED and white "Program" LED begin to flash together. Then release the programming button.
   The new setting is then applied and configuration mode is exited. The white LED goes out and the blue LED

indicates the normal mode.

Factory setting: "ROCO".
INFORMATION: Use the "RCN-213" setting for operation on control centers from other manufacturers, see also the section Oper- action on control centers from other manufacturers.

6.2 Configuration and firmware update via link
The most convenient way to configure the Z21 signal decoder is using the 10838 Z21 per LINK at the link interface. In this case, you will not need either the programming button with the blink codes, nor do you have to deal with CV tables. Settings are made menu-driven via the display and the Z21 per LINK keys.

```
Settings
─────────────────────
Signal 1st Address: 5
RCN-213: off
RailCom: on
Signal Count: 2
```

You can reach the decoder settings under the "Settings" menu item. There you can select the first signal address. Using the arrow keys, you can get to the next line respectively.

```
Settings
─────────────────────
Signal 1st Address: 1
RCN-213: on
RailCom: on
Signal Count: 2
```
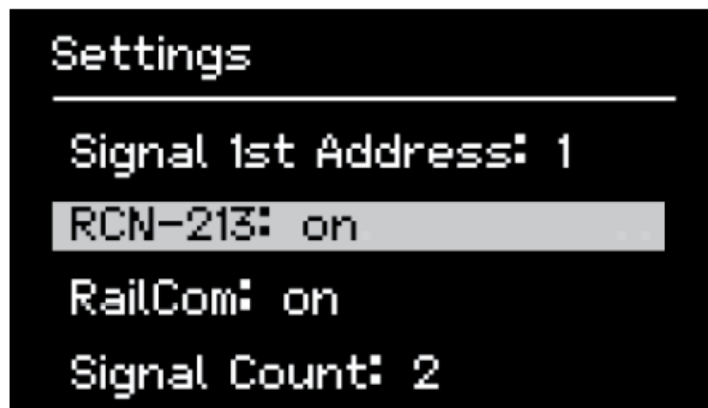
On the next lines, you can activate or deactivate the option "RCN-213" (see also Operation on control centers from other manufacturers) and RailCom®.

```
Settings
─────────────────────
Signal 1st Address: 1
RCN-213: off
RailCom: on
Signal Count: 3
```
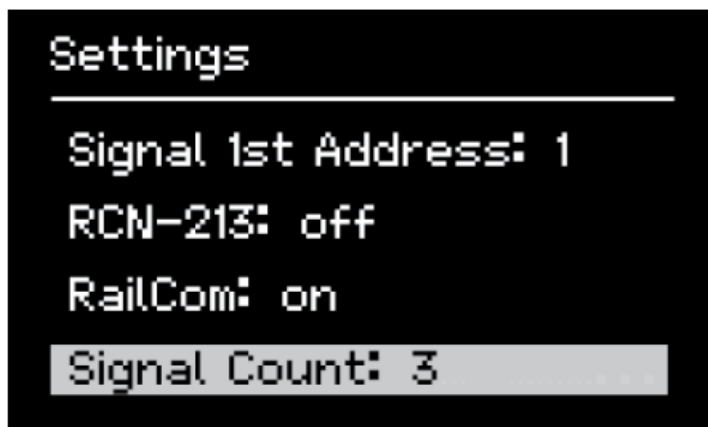
Of course, you can also change the number of signals.

The required signal configuration can be selected per signal in plain text.

1. First, select the first, second or if applicable the third or fourth signal under "Number":.
2. Then select the required country, for example, D, A, CH, NL, F or "-" for "International" (standard configuration "Universal", lighting, …) under "Country:".
3. Finally, select the required signal configuration from a list under "Config:".

You can check these settings and more in the "Status" menu item on the Z21 per LINK.
The Z21 per LINK also permits a connection with the PC or the Z21 App. In this way, the signal decoder can then also be configured or, if applicable, the decoder firmware can be updated via the Z21 Maintenance Tool. You can also find further information in the operating instructions for the Z21 per LINK.

6.3 Confi guration via POM
The Z21 signal DECODER can be configured for your applications on the main track via POM programming commands and CVs. "POM" stands for "programming on the main" (programming on the main track), and "CV" stands for "configuration variable", which are described in detail in the section CV list. No programming track is required.
If the DCC control center and the Z21 control centers have a RailCom® receiver, these CVs can not only be written on but also read.
When using the Z21 Single or Dual BOOSTER (10806, 10807) and the CAN-Bus, POM reading is also possible in the booster section.

INFORMATION: Before POM programming with control centers from other manufacturers, set the addressing mode of the Z21 signal DECODER to "RCN-213", see also section Operation on control centers from other manufacturers.
When programming on the main track, a distinction must be made between POM programming commands for accessory decoders alias accessory decoders) and for loco decoders.

6.3.1 Configuration via POM programming commands for accessory decoders
When using POM programming commands for accessory decoders, the Z21 signal DECODER can be configured using the Z21-Maintenance Tool at any time even when installed.

It is essential to ensure here that the correct "turnout number" (= signal address) / decoder address has been selected before reading or writing so that the desired signal decoder is also actually actuated with the programming commands.

6.3.2 Configuration via POM programming commands for loco decoders

Most control devices, such as the multiMAUS, only provide POM programming commands for loco decoders. So that the Z21 signal DECODER can also be configured using these types of control devices, the following option is available here: In the so-called "Configuration mode" (and only then!) the Z21 signal DECODER will, as an exception, also respond to POM programming commands for loco decoders if these are directed to the "loco address" 9837.

TIP: Memory aid: Article number 10837 → Pseudo "loco address" 9837

The configuration mode can only be activated via the Programming button on the Z21 signal DECODER. This excludes the risk of the signal decoder being incorrectly adjusted accidentally if in the future an actual loco should be programmed to that address via POM. (On the other hand, if a loco is to be assigned precisely this address, but you want to program the signal decoder, then please remove this loco temporarily from the track if necessary, until you have finished configuring the signal decoder. This will ensure that nothing can go wrong.)

To then configure the Z21 signal DECODER using POM programming commands for loco decoders as well, proceed as follows.

1. Put the Z21 signal DECODER in configuration mode by holding down the programming button for at least 3 seconds until the white "Program" LED begins flashing. Release the programming button again. The white "Program" LED will then flash regularly for a brief time. The signal decoder is then in "Configuration mode". Incidentally, it does not matter for the POM programming whether option 1, 2 or 3 is active.

2. You can now configure the signal decoder by using a WLANMAUS, multiMAUS or another input device of your choice to write a CV variable via POM on the pseudo "loco address" 9837.

TIP: For multiMAUS and WLANMAUS, first select the loco address 9837 before the POM programming, as well as the POM programming mode:

If applicable: SHIFT+MENU → LOCO → MODE → ADDRESS → OK → STOP SHIFT+OK → numbers 9 8 3 7

→ OK SHIFT+MENU → PROGRAMMING → MODE → POM → OK → STOP

👍 **TIP:** In the current Z21 APP (2020), you can find the POM programming for the loco decoder under "CV programming" → "Man- dual" → and "Program On Main".

3. As soon as the POM write command has been interpreted by the signal decoder on a valid CV, the new value is applied and the configuration mode is exited automatically. The white LED goes out and the blue LED indicates the normal mode.

6.3.3 CV list

CV	Description	Range	Default
#1	First decoder address, lower 6 bits (bits 0 – 5) Together with CV #9, this generates the first decoder address for outputs 1 to 4. This CV can only be read. You can change the decoder addresses via the programming button. See section Option 1 – Prof ram address. This can be carried out even more con- conveniently using the Z21 per LINK. **INFORMATION:** Please ensure that the decoder address is never confused with the resulting signal addresses. The signal addresses and CV values can be calculated from the decoder address, but the process is rather complicated and is described in more detail in the RailCommunity standards RCN-213 and RCN-225.	1 – 63 read-only	1
#7	Manufacturer firmware version number	read-only	110
#8	Manufacturer identification Writing the value 8 resets all CVs to the factory settings.	8	161
#9	Decoder address, upper 3 bits (bits 6 – 8) Together with CV #1, this generates the decoder address. This CV can only be read. You can change the decoder addresses via the programming button, see section Option 1 – Program address. This can be carried out even more conveniently using the Z21 per LINK.	0 – 7 read-only	0
#28	Mailcoms configuration Bit 1 = enable RailCom® channel 2 (decimal value 2) **INFORMATION:** RailComs channel 2 is required for POM reading.	0, 2	2
#29	Decoder configuration Bit 3 = RailComs activation: 0 = Deactivated (decimal value 0) 1 = Activated (decimal value 8) **INFORMATION:** RailComo is required for POM reading. Bit 7 = actuation type: 1 = Actuation as accessory decoder (decimal value 128, cannot be changed)	128,136	136

CV	Description	Range	Default
#39	DCC addressing mode Assignment of the signal addresses to decoder address and output. 0 = backwards-compatible with ROCO control centres Z21, multiZENTRALEpro and multiMAUS with booster 1 = DCC addressing mode conforms to RCN-213 See also section Operation on control centers from other manufacturers. **TIP:** This setting is recommended when using control centers from other manufacturers.	0, 1	0
#40	Number of signals Determines the number of signals which can be connected to the signal decoder. See also section light signals. Factory setting: 2 signals	2, 3, 4	2
#41	Signal-ID for signal 1 When this CV is written, one of the predefined signal configurations is selected. You can find more information on the available signal configurations in Appendix B – Signal configurations. Factory setting: Signal-ID 71 (0x47) "Universal"	0 – 255	71

CV	Description	Range	Default
#42	Signal-ID for signal 2, see CV #41	0 – 255	71
#43	Signal-ID for signal 3, see CV #41	0 – 255	71
#44	Signal-ID for signal 4, see CV #41	0 – 255	71
#45	Initialisation signal 1 Determines the signal aspect which should be displayed when the decoder is switched on. 255 = **Restore last signal aspect** Displays the signal aspect again which was presented before the decoder was switched off. 0 = **Display standard signal aspect** Displays the default signal aspect of the signal (safe condition "Stop"). 1, 2, 3 … 24 = **Explicit specification** Displays the first, second, third etc. signal aspect. Invalid values lead to specification 0 (standard signal aspect). You can find more information on the available signal aspects in Appendix A – Signal con- figuration "Universal" or under the link provided in Appendix B – Signal configurations. **Factory setting:** Restore last signal aspect.	0 – 255	255
#46	Initialization signal 2, see CV #45	0 – 255	255
#47	Initialization signal 3, see CV #45	0 – 255	255
#48	Initialization signal 4, see CV #45	0 – 255	255

CV	Description	Range	Default
#61	Current DCCext value from signal 1 This is the DCCext value which corresponds with the signal aspect currently being displayed. This CV is not a "configuration", but rather a live value that for example can be used for tests during commissioning. This variable can also be written, whereby invalid values are ignored. You can find the valid DCCext value range in Appendix A – Signal configuration "Universal" or under the link provided in Appendix B – Signal configurations.		
#62	Current DCCext value of signal 2, see CV #61	0 – 255	–
#63	Current DCCext value of signal 3, see CV #61	0 – 255	–
#64	Current DCCext value of signal 4, see CV #61	0 – 255	–
#65	Current number of the signal aspect from signal 1 This is the number of the signal aspect currently being displayed. This CV is not a "configuration", but rather, similar to CV #61, a live value that for example can be used for tests during commissioning. This variable can also be written, whereby invalid values are ignored. You can find more information on the signal aspects in Appendix A – Signal configuration "Universal" or under the link provided in Appendix B – Signal configurations.	1 – 24	–
#66	The current number of the signal aspect from signal 2, see CV #65	1 – 24	–
#67	The current number of the signal aspect from signal 3, see CV #65	1 – 24	–
#68	The current number of the signal aspect from signal 4, see CV #65	1 – 24	–

CV	Description	Range	Default

#211	DCCbasic/DCCext mapping for **1R, Signal 1** This CV can be used to set which signal aspect should be displayed after a DCCbasic swit- ching command **"1 Red"** on signal 1. 255 = **Specification in accordance with the signal configuration** The DCCbasic switching commands display the signal aspects as predefined in the signal configuration of the signal decoder selected via CV #41. 0 … 254 = **Explicit specification through user** If you wish to avoid specifications in the selected signal configuration, then you can enter the DCCext value here which accords with the required signal aspect. An explicit specification by the user may be expedient if, for example, the DCC system used does not yet handle any DCCext switching commands, and/or any switching sequences already available for signals that deviate substantially from those in the Z21 signal DECODER. In this case, the Z21 signal DECODER can be adapted highly flexibly to the existing system. **Example:** CV #211 = 16 ("Clear to proceed") … Signal 1 then displays, after a DCCbasic switching command "1 Red" the signal aspect "Clear to proceed to". You can also find the valid DCCext value range as well as the predefined assignment for the DCC basic switching commands of your signal in <u>Appendix A – Signal configuration "Universal"</u> or under the link provided in <u>Appendix B – Signal configurations</u>. For explanations on the DCCbasic and DCCext switching commands, see also the section <u>Operation on DCC control centers</u>. **Factory setting:** Specification in accordance with the signal configuration	0 – 255	255
#212	DCCbasic/DCCext mapping for **1G, Signal 1** Corresponding with CV#211 for the DCCbasic switching command **"1 Green"**.	0 – 255	255
#213	DCCbasic/DCCext mapping for **2R, Signal 1** Corresponding with CV#211 for the DCCbasic switching command **"2 Red"**.	0 – 255	255
#214	DCCbasic/DCCext mapping for **2G, Signal 1** Corresponding with CV#211 for the DCCbasic switching command **"2 Green"**.	0 – 255	255
#221 to #224	DCCbasic/DCCext mapping for **Signal 2** Corresponding with CV #211 to #214 for signal 2.	0 – 255	255
#231 to #234	DCCbasic/DCCext mapping for **Signal 3** Corresponding with CV #211 to #214 for signal 3.	0 – 255	255
#241 to #244	DCCbasic/DCCext mapping for **Signal 4** Corresponding with CV #211 to #214 for signal 4.	0 – 255	255
#250	Decoder type 37 = ROCO 10837 Z21 signal DECODER	read-only	37

6.4 Resetting to factory status

If you want to set all settings back to the original status condition, keep the programming button held down until all LEDs are lit and the blue LED is flashing. This means that all settings are reset and the reset has been initiated. Alternatively, the value 8 can be written back to CV#8.

Meaning of the LEDs

Normal operation

Colour	Status	Meaning
Blue (status)	on	**Track signal** present on input DCC.
Blue (status)	flashes	No track signal is present on input DCC. (The decoder still also accepts switching commands from the link interface.)
Red (Error)	flashes	**Short circuit** or overload detected.
Green (Data)	off	**"ROCO"** addressing mode.
Green (Data)	on	**"RCN-213"** addressing mode.
Green (Data)	flashes briefly	A decoder processes data/commands from the track or from the zLink interface.
Blue Red Green White	flashes on on on	Resetting to **factory status.** (Hold down the programming button for longer than 8s.)

Configuration mode (button programming)

Colour	Status	Meaning
Green White	on flashes white once (short, pause)	**Option 1:** Program address. (Decoder waits for switching command or long button press for the next option.)
Green White	on flashes white twice (short, short, pause)	**Option 2:** Number of signals = 2. • Press the programming button briefly: Increase the number. • Press the programming button for a long time: save
Red GreenWhite	on on flashes white twice (short, short, pause)	**Option 2:** Number of signals = 3. • Press the programming button briefly: Increase number. • Press the programming button for a long time: save
Blue Red Green White	on on on flashes white twice (short, short, pause)	**Option 2:** Number of signals = 4. • Press the programming button briefly: Reset number. • Press the programming button for a long time: save
Red White	on flashes white x 3 (short, short, short, pause)	**Option 3: "ROCO"** addressing mode. • Press the programming button briefly: Change over mode • Press the programming button for a long time: save
Green White	on flashes white x 3 (short, short, short, pause)	**Option 3: "RCN-213"** addressing mode • Press the programming button briefly: Change over mode • Press the programming button for a long time: Save mode
Blue White	flashes flashes	**Next option** (When pressing the programming button for a long time) After the last option: Save the setting and return to normal operation.

Bootloader mode (e.g. during firmware update)

Colour	Status	Meaning
Blue Red Green White	on on on on	Wait for data/commands from link. Bootloader mode is active.
Blue Red Green White	on on flashes briefly on	Data/commands are processed by the sink. Bootloader mode is active.

Troubleshooting

Error flashes red:
The outputs of the Z21 signal DECODER are electronically protected against overload and short circuits. The total switching capacity per output totals 400 mA, and the maximum total current of all outputs 2A. In case of overload, all outputs are switched off and the red "Error" LED flashes for several seconds. During this time, the decoder does not accept any new switching commands. The decoder then resumes normal operation.

Signal addresses are shifted by four:
Check that the set addressing mode matches your control center. See section Operation on control centers from other manufacturers.

POM read (RailCom®) is not functioning:
Check the correct connection on the Z21 (P and N). See the section Connecting the Z21 signal DECODER.
See also section Operation on control centers from other manufacturers.
It may be that the control centers used are not compatible with RailCom®.

Connected LED is not lit:
Ensure that the polarity is correct. See the section Connecting the Z21 signal DECODER.

Appendix A – Signal configuration "Universal"

Signal-ID: 71 (Hexadecimal: 0x47)
Using this standard signal configuration (delivery condition), the following signals can for example be operated:

- DB exit signal

- DB block signal

- DB entry signal

- DB stop signal

- ÖBB main signals and protection signals

- SBB main signals System L and System N

- SNCF shunting signal: Cv + M + (M)

- SNCF main signal Châssis-Écran A: S + A + VL

This is a highly flexible configuration, using which different light signal types of simpler construction from different countries can be operated. For reasons of space, we can only show a few examples here. Signal aspects for stop, proceed, proceed with various speed limits and even the cancellation of a movement forbidden can be presented. However, should you wish to present even more and more specific signal aspects on your signal, then you can deviate at any time to the numerous other preconfigured signal configurations, see Appendix B – Signal configurations.

Example of signals from left to right: 3 x DB, 2 x ÖBB, 2 x SBB, 2 x SNCF … numerous other variants are possible.
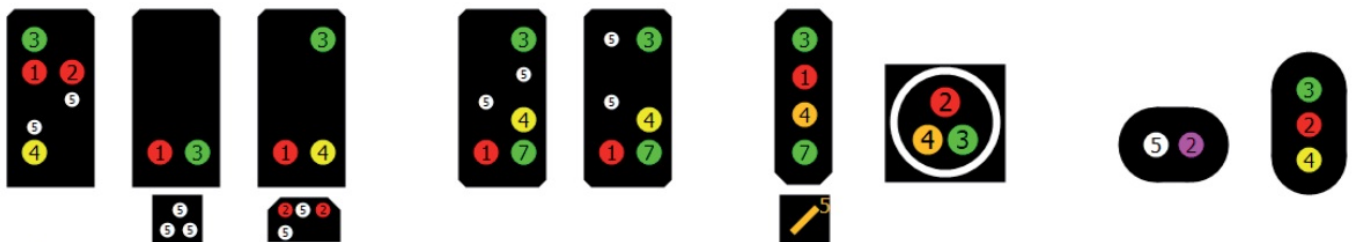
Assignment

Terminal	Assignment	Note
1	red	Red light for stop
2	red	Second red stop light (optional, depending on the connected signal type) SNCF: red = Sémaphore S / violet = Carré voilet Cv
3	green	Green light for proceeding
4	yellow orange	Yellow light for proceeding with speed limit (optional) SNCF: Avertissement A SBB: Warning (System N), FB2 (System L, together with green)
5	white orange	Additional lamps for cancellation of the movement or shunting are forbidden (optional). They are switched on together with signal aspect numbers 2 to 4. SNCF: Feu blanc M SBB: orange auxiliary signal L
6	white	Possibility for the connection of a speed or direction display (optional), switched on together with signal aspect numbers 6 to 8. See below.
7	green	Second green light (or speed display) for proceeding with speed limit 60 km/h (optional)
8	reserved	

Signal aspects

No.	Image	DCCext	DCCbasic Trigger	DCCbasic Mode	Name	Description
1		0 0x00	1R		**Stop**	Stop SNCF: red Sémaphore S, violet = C arré voilet Cv
2		65 0x41	2R		**Shunt go**	Shunting signal (Sh1) Shunting forbidden canceled Permission to pass by a signal indic ating "Stop" SBB: Auxiliary signal L. SNCF: Feu blanc M
3		69 0x45	3G		**Substitutio n**	Movement forbidden canceled, and the red main lights are switched off.
4		70 0x46	4G		**Blink**	Flashing substitution signal, Zs8,… SNCF: Feu blanc clignotant (M)
5		68 0x44	4R		**Warning**	Announces a stop aspect SNCF: Avertissement A
6		4 0x04	2G		**Go 40**	Proceed with a speed limit (40 km/h) Using terminal 6, an optional directi on (Zs2) or speed display (Zs3) can be switched on as well.
7		6 0x06	3R		**Go 60**	Proceed with speed limit (60 km/h) Second green light, or speed dis- pl ay on terminal 7.
8		16 0x10	1G		**Go**	Clear to proceed Using terminal 6, an optional directi on (Zs2) or speed display (Zs3) can be switched on as well. SNCF: Voie Libre VL

For the columns, DCCbasic, see Switching commands in conventional DCCbasic format, and for the column DCCext, see Switching commands in the new DCCext format and Z21.

The diagrams shown here only display a selection of possible signal screens. The examples are intended to explain the logic within this signal configuration, and of course, signal screens can also be connected and operated with a reduced number of lamps. The same applies to the prototype: do not switch a signal aspect if this is in principle available, but cannot be correctly displayed by the signal actually connected because the lamp is not equipped. The user is responsible for only using expedient signal aspects which can actually be presented.

Appendix B – Signal configurations

The following signal configurations are included on delivery condition FW V1.10 in the Z21 signal DECODER and can be selected via the Z21 per LINK or CV #41 to #44. See also Connecting the Z21 signal DECODER, Operation on DCC control centers, Configuration, and firmware update via link.
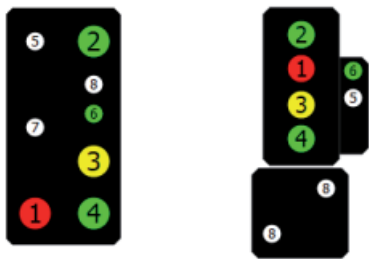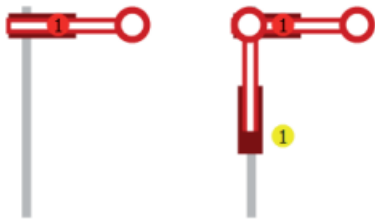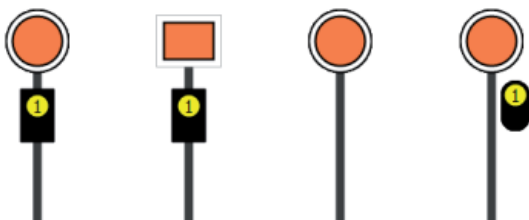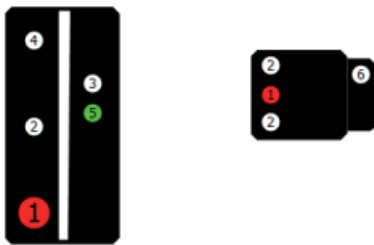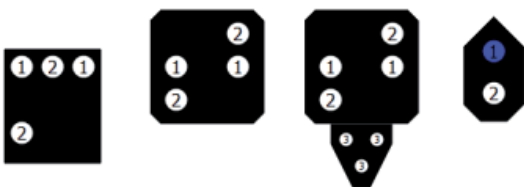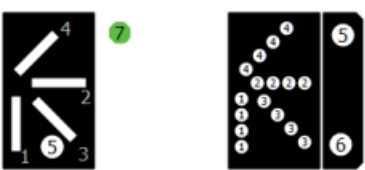
INFORMATION: You can always find all the latest details on the individual signal configurations online at: **https://www.z21.eu/en/products/z21-signal-ecoder/signaltypen.**
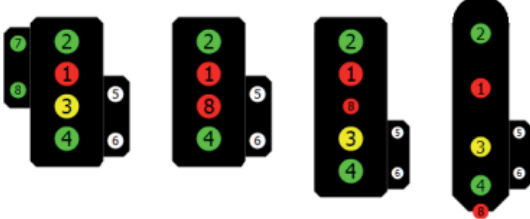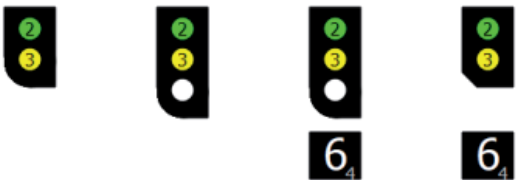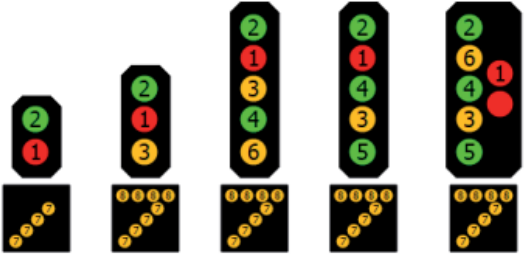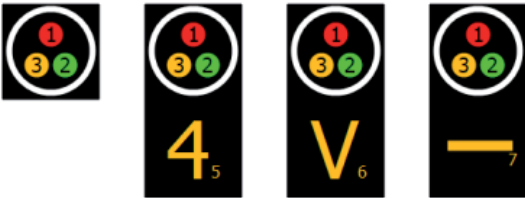
In addition to country-specific signals, you can also find internationally-applicable configurations in the following table, for example, the highly flexible signal configurations "Universal" or "Railway crossing". There are also configurations that can be used for general lighting purposes.

Signal-ID		Name	Image
decimal	hex		
64	0x40	4 single LEDs 4 single lamps, individually switchable.	
65	0x41	4 fading LEDs 4 single lamps, individually switchable with light bulb simulation (gentle fade-up and fade-down).	
67	0x43	4 running lights 4 warning lamps for construction sites (guiding light system) Running light Illuminated advertising Warning light for emergency vehicles (blue light)	
71	0x47	Universal Highly flexible configuration for light signals of simpler construction from different countries. *INFORMATION:* This is the factory setting.	
72	0x48	Universal #2 Like Universal, but with a red flashing light for "Substitution" (for SBB, SNCF).	
73	0x49	Railway crossing Internationally-applicable alternate flash for railway crossings, optionally with a white operational readiness display and yellow trackside signal for the traction unit driver.	
77	0x4D	10777 Similar to ROCO 10777.	

Signal-ID			
		Name	Image

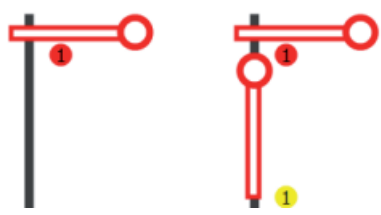| decimal	hex		
160	0xA0	ÖBB main signal Ep 4-6 The main signal of modern construction, with substitution signal, movement forbidden canceled, shunting for-bidden canceled, and departure signal.	
161	0xA1	ÖBB distant signal Four-aspect distant signal, with dark switching.	
162	0xA2	ÖBB semaphore main signal Two or three-aspect semaphore main signal with light- ing and double-assigned outputs for the coil drives. Observe the information on semaphore signals under **https://www.z21.eu/en/products/z21-signal-decoder/signaltypen**	
163	0xA3	ÖBB semaphore distant signal Two-aspect semaphore distant signal with lighting. Observe the information on semaphore signals under **https://www.z21.eu/en/products/z21-signal-decoder/signaltypen**	
164	0xA4	ÖBB protection signal Ep 4-6 Protection signal of modern construction with substitution signal and departure signal (optional).	
165	0xA5	ÖBB protection signal Ep 3-4 Protection signal, older construction with additional outputs for substitution signal or 29b.	
166	0xA6	ÖBB shunting signal of more modern or older construction with additional output for the proceed signal.	
167	0xA7	ÖBB signal emulator Signal emulator with additional outputs for su bstitu- tion signal or 29b, as well as departure signal.	

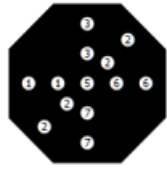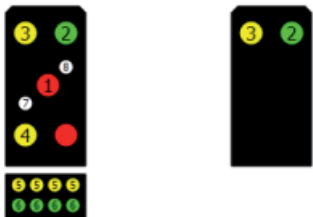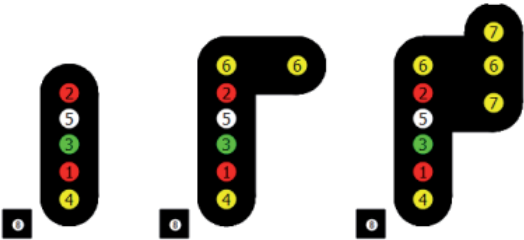| Signal-ID		Name	Image
decimal	hex		
168	0xA8	ÖBB brake test, departure The brake test signal and departure signal can be used together or separately.	

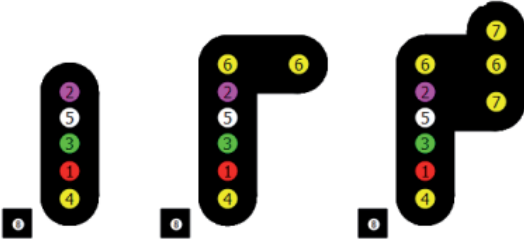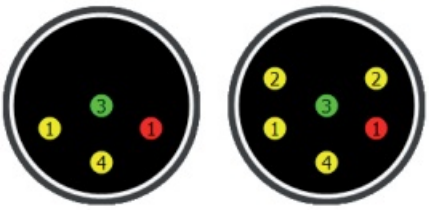| Signal-ID		Name	Image
decimal	hex		
169	0xA9	ÖBB railway crossing Railway crossing with a set of lights for road traffic and the trackside signal on the railway line.	
170	0xAA	ÖBB main signal Ep 3 Main signal, older construction with alternate flash 29b and 30b or Emergency red.	
176	0xB0	NS Hoofdsein Main signal with 3 lights and optional speed limit.	
177	0xB1	NS Voorsein Distant signal with 2 lights and optional speed limit.	
192	0xC0	SBB System L main signal Main signal with auxiliary signal L and occupied signal.	
193	0xC1	SBB System L distant signal Five-aspect distant signal, with dark switching.	
194	0xC2	SBB System N main signal with additional outputs for additional si- signals.	

| 195 | 0xC3 | SBB System N distant signal
Distant signal with additional signal speed. | |
| 197 | 0xC5 | SBB shunting service
Stop signal Shunting stop signal Shunting stop signal Extraction signal | |

Signal-ID		Name	Image
decimal	hex		
198	0xC6	SBB hump yard signal	
199	0xC7	SBB dwarf signal Dwarf signal with departure permission (optional). Mini-main signal with and without dwarf signal.	
200	0xC8	SBB brake test, departure Brake test with departure permission.	
204	0xCC	SBB System L Comb. small Combined signal with square signal screen and up to 8 lamps.	
205	0xCD	SBB System L Comb. large Combined signal with large signal screen and up to 8 lamps.	
208	0xD0	DB H/V main signal Main signal with optional additional signals Zs1, Zs2, Zs3 or with stop signal.	

209	0xD1	DB H/V distant signal Distant signal or distant signal repeater, with optional additional signal Zs2v or Zs3v as well as dark switching.	
210	0xD2	DB semaphore main signal Two or three-aspect semaphore main signal with lighting and double-assigned outputs for the coil drives. Observe the information on semaphore signals under **https://www.z21.eu/en/produ cts/z21-signal-decoder/signaltypen**	
211	0xD3	DB semaphore distant signal Two or three-aspect semaphore distant signal with lighting and double-assigned outputs for the coil drives. Observe the information on semaphore signals under **https://www.z21.eu/en/produ cts/z21-signal-decoder/signaltypen**	

Signal-ID		Name	Image
decimal	hex		
213	0xD5	DB stop signal Light stop signal or semaphore stop signal with light- ing. Observe the information on semaphore signals under **https://www.z21.eu/en/produ cts/z21-signal-decoder/signaltypen**	
214	0xD6	DB shunting signal	
216	0xD8	DB train staff signal Train staff signal for brake test, departure, close doors (optional).	
217	0xD9	DB railway crossing Railway crossing with set of lights for road traffic and trackside signal for the traction unit driver.	
219	0xDB	DB Ks main signal Main signal or multiple section signal with Zs 1 or Zs7, Zs2 and Zs3 additional lights for "shortened braking path" and "distant signal repeater".	

220	0xDC	DB Ks distant signal Distant signal with simplified assignment to the termi- nals and simplified operation.	
221	0xDD	DR HI signal HI multiple section signal or HI distant signal for the DR and DB-AG.	
240	0xF0	SNCF Carré C [CFH] Main signal with 2 red lights (Carré C) for Châssis- Écran C, F and H with up to 9 lamps and white ad- ditional light (Oeilleton).	
241	0xF1	SNCF Carré violet [CFH] Main signal with violet light (Carré violet Cv) for Châs- sis-Écran C, F and H with up to 9 lamps and white additional light (Oeilleton).	

Signal-ID		Name	Image
decimal	hex		
242	0xF2	SNCF Écran A Main signal with up to 3 lamps for Châssis-Écran A or shunting signal (Carré violet type bas), with simplified assignment on the terminals and simplified operation.	
243	0xF3	SNCF Disque	
244	0xF4	SNCF Indicateur de dir. Direction display (Indicateur de direction) with up to 6 lamps.	

We reserve the right to change the construction and design!

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0,42€ pro Minute inkl. MwSt. / local tariff for landline,
mobile phone max. 0,42€/min. incl. VAT / prix d'une
communication locale depuis du téléphone fixe, téléphone mobile maximum 0,42 € par minute
TTC)

https://www.z21.eu/de/impressum

Documents / Resources

	Z21 10837 Single Decoder [pdf] Instruction Manual 10837, Single Decoder, 10837 Single Decoder, Decoder

References

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