

Z21 switch DECODER

Welcome to the Z21

Many thanks for choosing the Z21 switch DECODER from ROCO and FLEISCHMANN! The following pages will provide you with the information you need to know to connect the Z21 switch 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 switch DECODER is of a 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
Self-consumption	0.95W
Output voltage	per output 2 A (2.5 A for 100 ms)
Output voltage	total module 2 A (2.5 A for 100 ms)
Overload protection	Power measurement
Digital system	DCC <ul style="list-style-type: none"> • Turnout numbers 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 switch DECODER
- 4 pole plug terminal for track connection and power supply
- eight 3 pole plug terminals for outputs 1 to 8

Important information

- If you combine the 10836 Z21 switch DECODER with products from other manufacturers, no warranty is provided in the event of damage or malfunction.
- The 10836 Z21 switch DECODER is not permitted to be supplied with alternating voltage.
- Do not use the 10836 Z21 switch 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 10836 Z21 switch 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 10836 Z21 switch 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!

Table of Contents

Welcome to the Z21.....	23
Technical data.....	23
Included.....	23
Important information.....	23
1. Quick guide.....	25
2. Determination of use and function.....	26
3. Installing the Z21 switch DECODER.....	29
4. Connecting the Z21 switch DECODER.....	29
5. Operation on control centres from other manufacturers.....	32
6. Configuration.....	33
6.1 Configuration via the programming button.....	33
6.1.1 Option 1 – Program addresses for outputs 1 to 8.....	33
6.1.2 Option 2 – Program address for outputs 5 to 8.....	34
6.1.3 Option 3 – Set addressing mode.....	34
6.2 Configuration via POM.....	35
6.2.1 Configuration via POM programming commands for accessory decoders.....	35
6.2.2 Configuration via POM programming commands for loco decoders.....	36
6.2.3 CV list.....	37
6.3 Resetting to factory status.....	42
7. Meaning of the LEDs.....	42
8. Troubleshooting.....	43

RailCom® is a technology developed by Lenz Elektronik GmbH for transmitting data from the decoder to the digital control centre.

1. 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):
Resetting to factory settings









Programming button in configuration mode:

- press briefly:
To change the setting (for option 3 only)
- 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 track signal
	flashes red	Short circuit
	flashes green	Data received
	shines green	Addressing in compliance with RCN-213

LEDs in configuration mode:

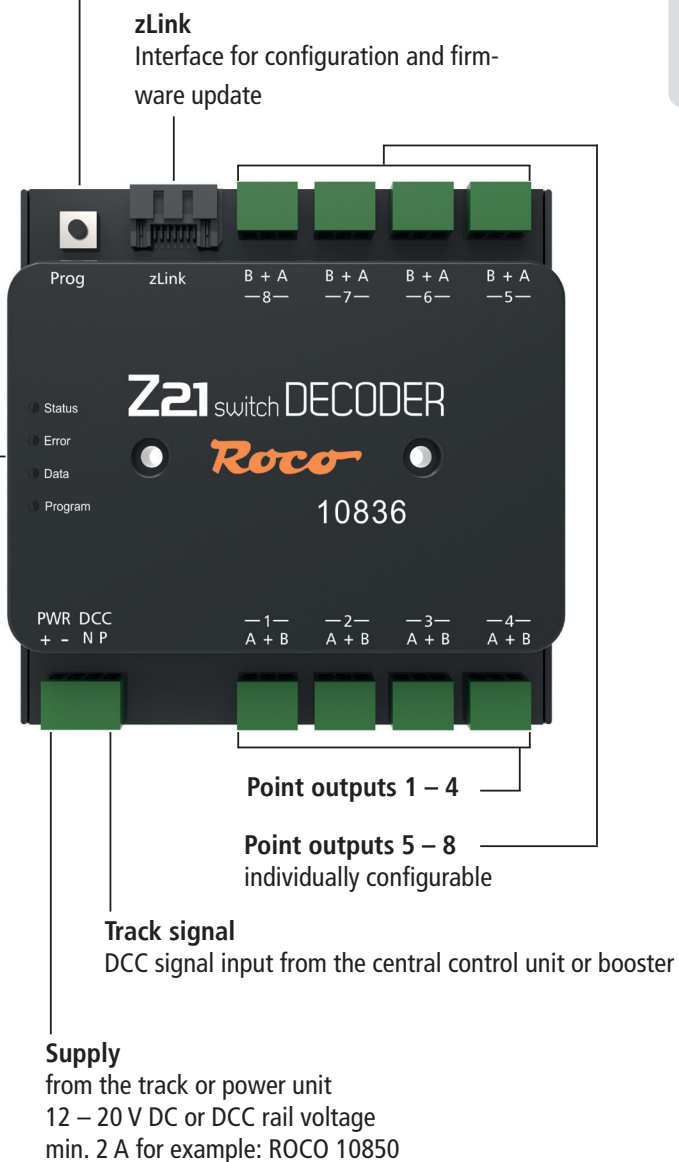
	flashes white once	option 1: Addr. for set outputs 1 to 8
	shines green	
	flashes white twice	option 2: Addr. for set outputs 5 to 8
	shines red	
	flashes white 3 times	option 3: Addr. compatible with ROCO
	shines red	
	flashes white 3 times	option 3: Addressing in conformity with RCN-213
	shines green	

Option 1 and option 2:

- Switch the magnetic item (e.g. point command) with the desired address
- Address is adopted from the Z21 switch DECODER

Option 3:

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



2. Determination of use and function

The Z21 switch DECODER has been developed for use with DCC control centres for switching twin coil drives, relays, lights and simpler light signals with a common plus pole.

For more complex, multi-aspect light signals, please use the Z21 signal DECODER with article number 10837.

The Z21 switch DECODER has been specifically designed for use with accessories from ROCO and with the Z21 product range, but is also compatible with older ROCO control centres as well as DCC control centres from other manufacturers. In the latter case, however, the addressing mode should be set to "RCN-213" where necessary, see also section [Operation on control centres from other manufacturers](#).

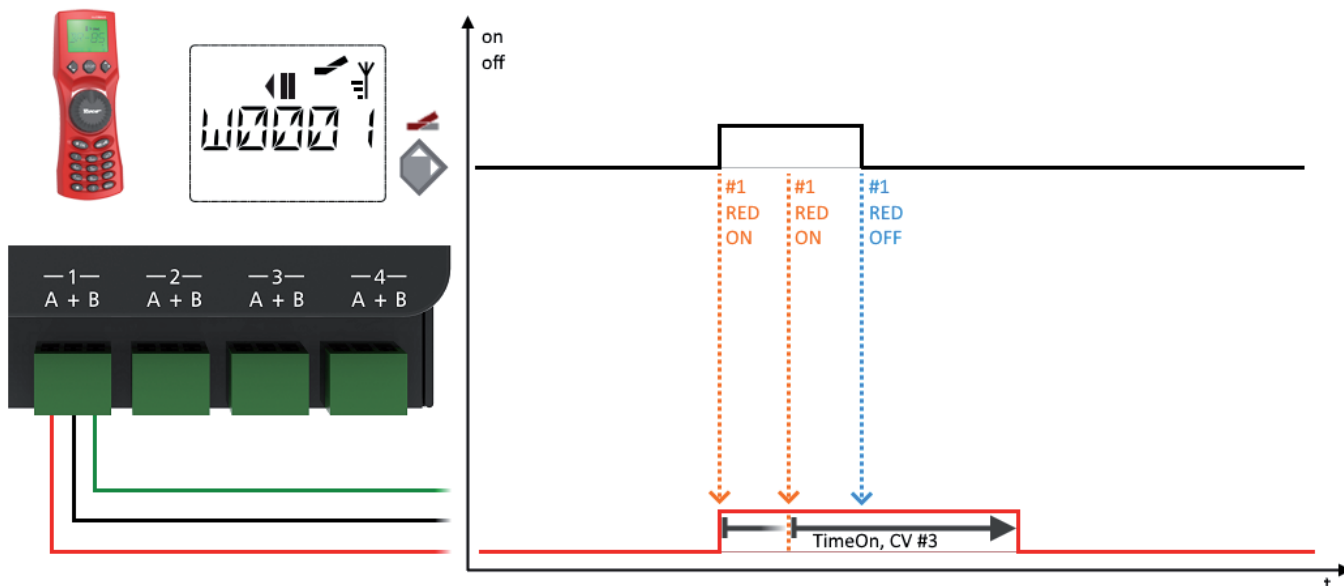
Features

- 8 output pairs can be set independently
- Optional power supply
- Programmable with RailCom® on the main track (POM)
- Turnout numbers 1 to 2040 programmable (in groups of four)
- Secured against overload and short-circuit
- Can be configured and updated via zLink

Operating modes

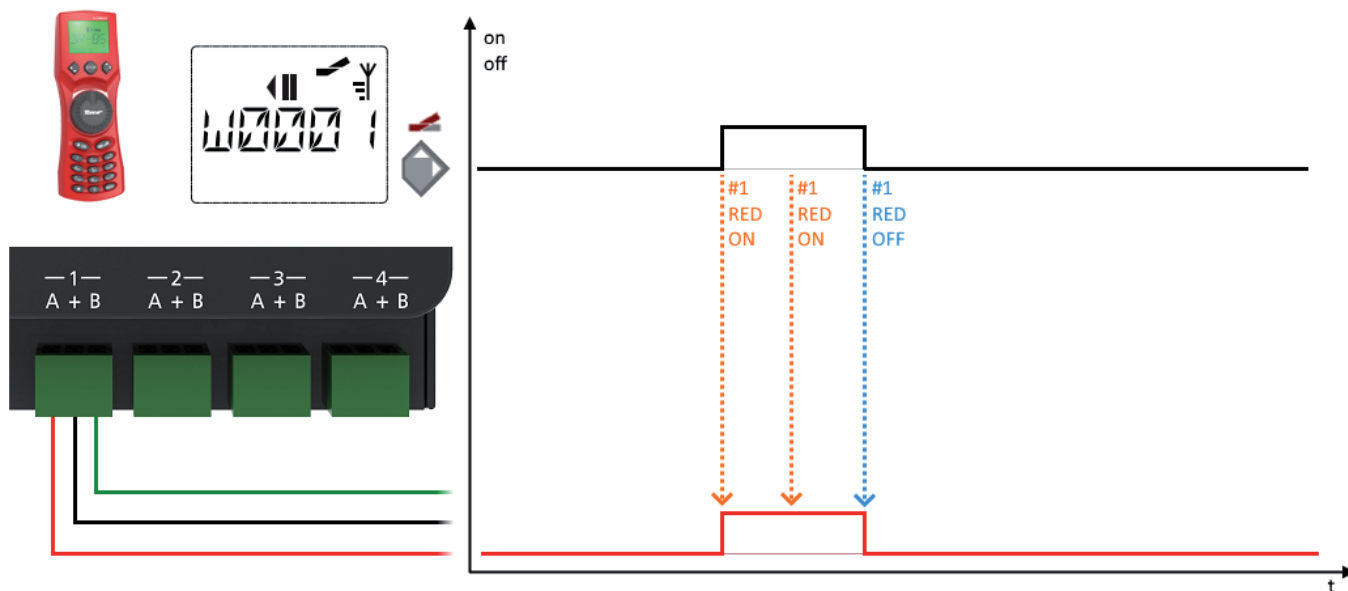
Each output pair can be configured individually for your particular application.

- **Pulse mode** (default setting) Ideal for turnout control via Z21 multiMAUS, Z21 wlanMAUS, Z21 app and automated operation. Configurable cut-in time, suitable for twin coil motors.



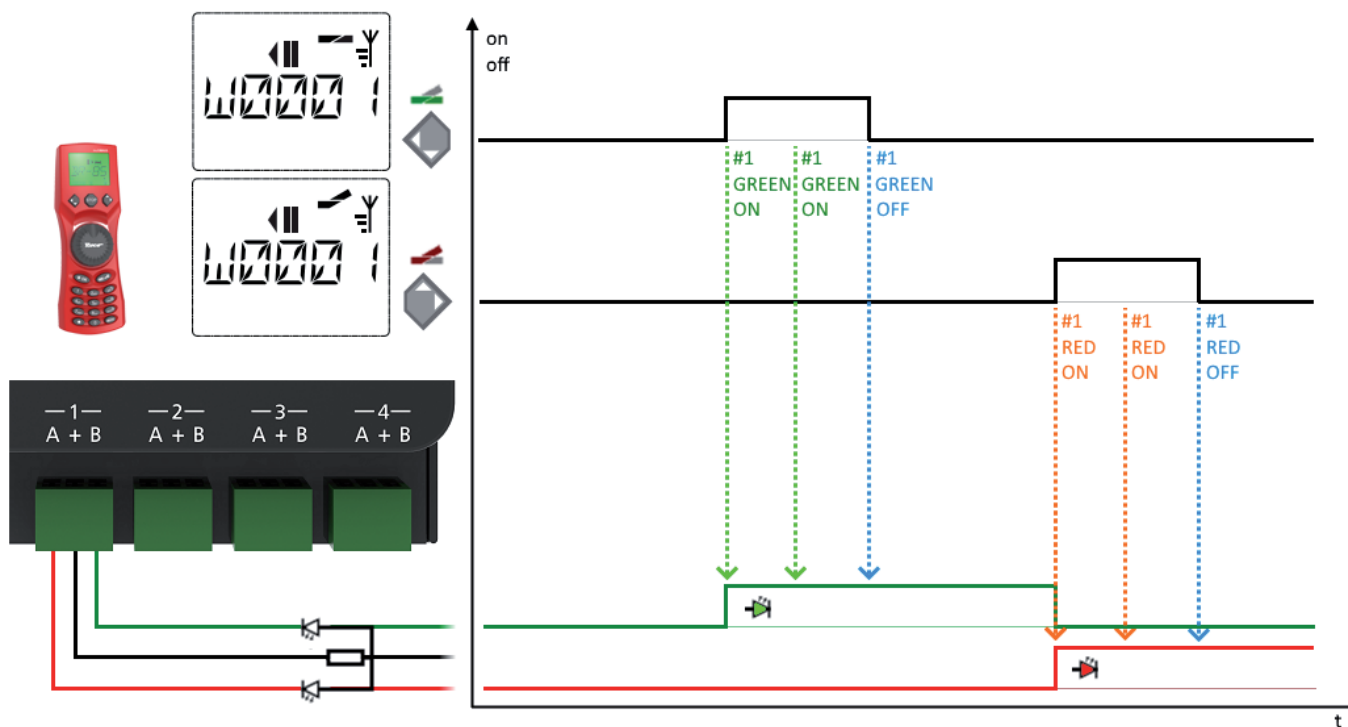
Instantaneous operation

Response as with ROCO 10775. The output remains active until the button on the multiMAUS is pressed. Can be used for turnout drives with limit switching and for uncouplers.



Bi-stable continuous operation

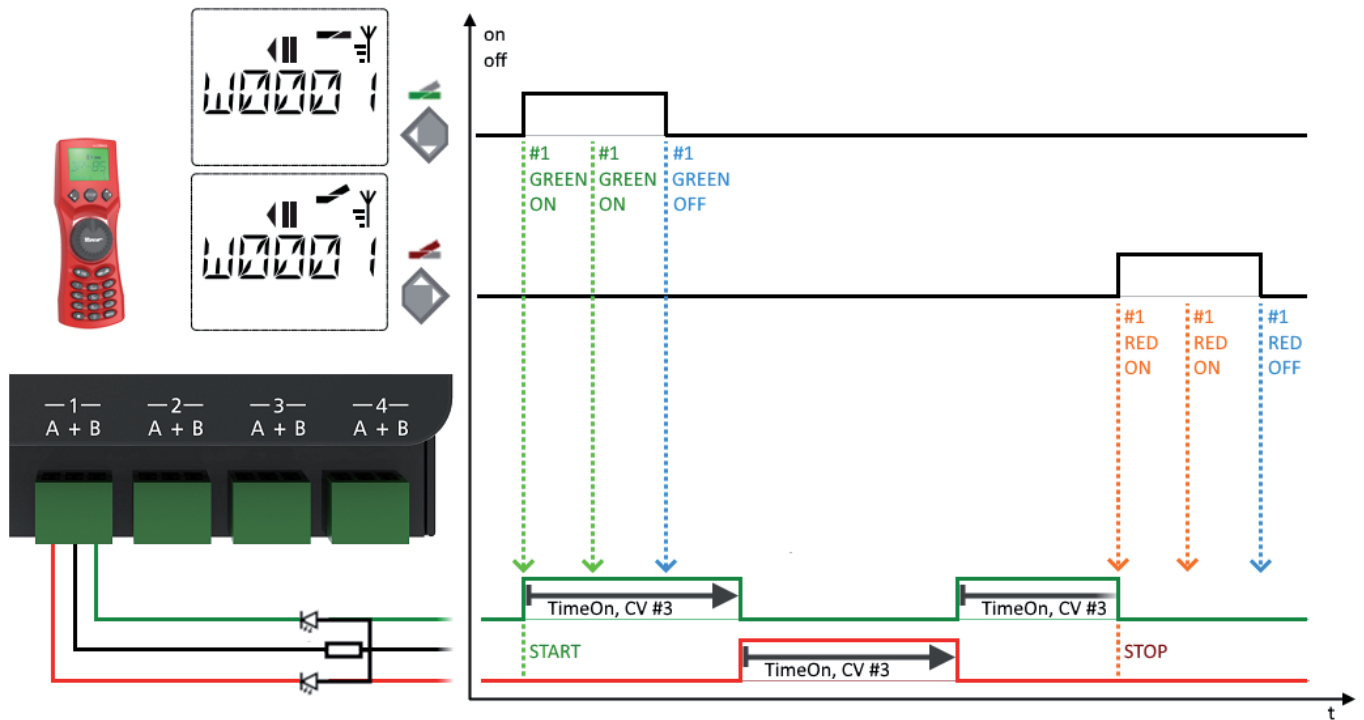
Alternate switching on or switching over, suitable for lighting and simpler light signals.



Optionally also available with slow fade-up and fade-down (light bulb simulation).

- Alternate flash**

Flashing effects for level crossings, etc. with adjustable flashing frequency. The alternate flash is started using the "straight/green" command and stopped with the "branch/red" command.



Optionally also available with slow fade-up and fade-down (light bulb simulation).

3. Installing the Z21 switch DECODER

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



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

4. Connecting the Z21 switch DECODER

The power supply to the Z21 switch DECODER is provided via 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. This decoder may under no circumstances be supplied with AC voltage such as that for example from a conventional transformer.

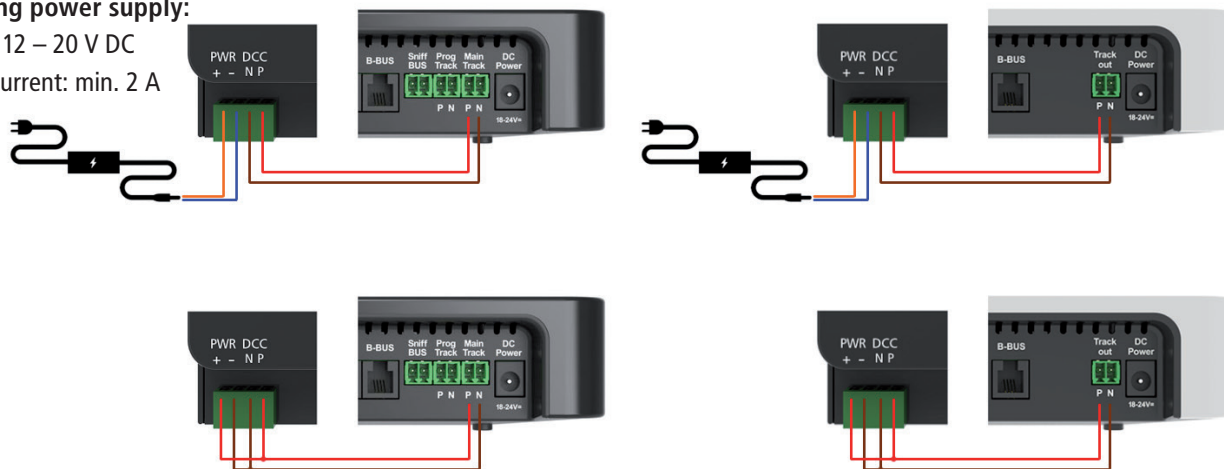
The power supply via a separate power supply unit is recommended above all for larger systems because the energy for switching the motors does not need to be taken from the control centre or booster. In addition, the outputs remain active even if the rail voltage fails (e.g. during an emergency stop),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

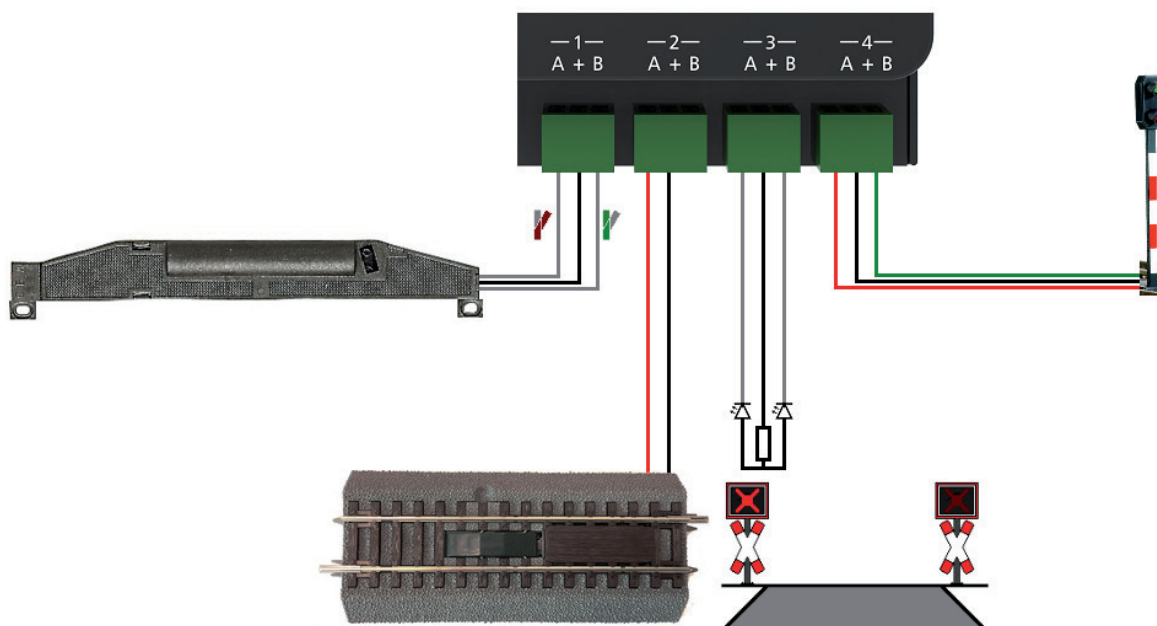


Before first use, the switch decoder must be programmed so that it knows which decoder addresses and switch numbers to respond to. If you are operating the Z21 switch DECODER on a control centre from another manufacturer, please observe the information in [Operation on control centres from other manufacturers](#).

The procedure for programming the decoder addresses using the programming button is explained in detail in the [Option 1 – Program addresses for outputs 1 to 8](#).

The consumers, such as coil motors etc, are connected to outputs 1 to 8. In the centre, the “+” terminal refers to the common plus pole in each case. The “A” terminal corresponds to the “branch / red” position, and the “B” terminal to the “straight / green” position. Each of the 8 outputs can be set as necessary via CV #41 to #48 to an individual operating mode. This can be configured either via the zLink or via “POM” programming on the main track, see also section [Configuration via POM](#).

More information on the comprehensive configuration options of the outputs can be found in section [CV list](#). Given here are just a few examples for common applications:



1. The turnout drive connected to output 1 can be operated directly using the default settings: Operating mode 0 (pulse mode). Terminal 1A is connected using the cable for the branched position and terminal 1B using the cable for the straight position of the turnout. The precise assignment of the cable colours for the "branch" and "straight" positions depends on the turnout drive in question and where applicable also on the installation situation. If you would like a shorter or longer switching time on the coil motor, this can be set for output 1 via CV #3.
2. The electrical decoupling track on output 2 can be operated in operating mode 0 (pulse mode) or also 3 (instantaneous operation). Only use mode 3 instantaneous operation if you want the same response as for 10775 and you are using a ROCCO control centre.

For the decoupling track you can use either terminal 2A or alternatively terminal 2B. This only works to the extent that the decoupler is then activated using the command for the "branch" or "straight" turnout position.

3. The flashing light of a level crossing can be operated on output 3 in this example, if it has been configured to operating mode 1 (alternate flash) or 2 (alternate flash with slow fade-up and fade-down, light bulb simulation). The alternate flash is activated using the "Turnout straight/green" command and deactivated again with the "Turnout branch/red" command. Both the flashing speed and the brightness can be adjusted in the adjustable frame: For output 3, the flashing speed is set via CV #5 and the brightness is set via CV #63.



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.

4. The dual-aspect signal on output 4 is operated in operating mode 4 (continuous operation) or 5 (continuous operation with slow fade-up and fade-down, bulb simulation). The signal is set to green with the "Turnout straight" command and set to red with the "Turnout branch" command. The brightness can also be set here in the adjustable frame. On output 4, this is CV #64. The basic position of the signal when switching on the supply voltage of the switch decoder can be configured via CV #49. Operating modes 4 and 5 cannot be used for light signals, however, but are also used for Street and Building lights on your model railway system. The corresponding series resistors for the LEDs should also be ensured here. Standard signals often have these already integrated, but the instructions from the manufacturer in question should be observed.



TIP: Multi-aspect signals can also be operated by combining multiple outputs as appropriate, but we nevertheless recommend the 10837 Z21 signal DECODER for more complex signals.

5. Operation on control centres from other manufacturers



INFORMATION: When using control centres from other manufacturers, set the turnout addressing of the Z21 switch DECODER to "RCN-213"! To configure the addressing mode, see section [Option 3 – Set addressing mode](#).

The **Turnout addressing** defines the method used to calculate the **turnout numbers** from the switch decoder address: Each **switch decoder address** is assigned precisely 4 turnout numbers. The 10836 Z21 switch DECODER even occupies two switch decoder addresses internally to be able to control $2 \times 4 = 8$ turnouts.

Most user interfaces only display the turnout numbers and not the actual switch decoder address. This switch decoder address is still only used in the background for communication between the DCC control centre and the turnout decoder, however. For this to function without problems, however, both sides, control centre and decoder, must use the same type of turnout addressing. Unfortunately, due to a weak spot in the older DCC specifications over time, different methods for calculating the turnout numbers from the switch decoder address have arisen. Only the **RailCommunity standard RCN-213** ("DCC protocol operating commands for accessory decoders") has defined since 2014 the calculation of the turnout number from the decoder address in a unique way.

To be backwards-compatible with existing systems, as well as conform to the standard RCN-213, the Z21 switch DECODER offers adjustable turnout addressing:

- **Turnout addressing "ROCO"** for the purposes of backwards compatibility with Z21, multiZENTRALEpro and multiMAUS with booster. This is the factory setting.

TIP: Visual inspection on the 10836: The green "Data" LED is switched off in normal operation and only lights up briefly whilst the switch decoder is receiving data or commands.



- **Turnout addressing "RCN-213"** for the purposes of better compatibility with the current standard RCN-213 and with control centres from other manufacturers.

TIP: Visual inspection on the 10836: The green "Data" LED is inverted, meaning in normal operation it remains switched on and only goes out briefly whilst the switch decoder is receiving data or commands.



TIP: This setting also 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 turnout-addressing relates primarily to ...

- ... **switch commands:** correct and consistent allocation of the turnout numbers to switch decoder address and output.
- ... **POM configuration commands:** the POM programming commands function correctly for switching accessory decoders with control centres from other manufacturers when the "RCN-213" setting is used.

6. Configuration

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




1. Via the programming button in configuration mode
2. Via POM programming commands

In the interest of ongoing development, we reserve the right to improve and expand the settings and features.

6.1 Configuration via the programming button

To access 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 addresses for outputs 1 to 8
-  Flashes twice in white, option 2: Program address for outputs 5 to 8
-  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 addresses for outputs 1 to 8

This option is used to program both the first decoder address for outputs 1 to 4, and the second decoder address for outputs 5 to 8.

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 switch decoder is then in **"Configuration mode, option 1"**.
2. **Now switch a magnet accessory of your choice.**
The magnet accessory can be switched via the Z21 app or another input terminal, such as the multiMAUS.
3. As soon as the switching command has been interpreted by the switch decoder, the new address is applied and configuration mode is exited automatically. The white LED goes out and the blue LED indicates normal mode.

Die Programmierung der Decoder-Adressen erfolgt gemeinsam für die Ausgänge 1 bis 4 und 5 bis 8 immer in aufsteigenden Vierergruppen. Jede Vierergruppe besteht aus exakt vier aufeinanderfolgende Weichennummern, beginnend mit 1 bis 4, 5 bis 8, 9 bis 12, 13 bis 16, et cetera. Die letzte programmierbare Vierergruppe reicht von 2037 bis 2040.

Decoder address	Turnout numbers (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: You switch turnout number 1 during the programming process. All eight outputs of the switch decoder are then programmed in ascending order to turnout numbers 1 to 8.

Example 2: You switch turnout number 2 during the programming process. All eight outputs of the turnout decoder are also programmed in ascending order to turnout numbers 1 to 8, because turnout number 2 is in the same group of four as turnout number 1 from the first example.

Example 3: You switch turnout number 10 during the programming process. All eight outputs of the turnout decoder are then programmed in ascending order to turnout numbers 9 to 16: first the group of four from 9 to 12 for the first four outputs, followed by the group of four 13 to 16 for the next four outputs.

The first output is therefore always numbered at the beginning of a group of four. The beginning of the groups of four is calculated automatically when programming the switch decoder.

Factory setting: numbered in ascending order from 1.

6.1.2 Option 2 – Program address for outputs 5 to 8

This option is used exclusively to program the second decoder address for outputs 5 to 8. Outputs 1 to 4 remain unchanged. Only use this option when you do not want to number all 8 outputs of the decoder consecutively.

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 switch 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.), and the red LED will be lit continuously.
The switch decoder is then in "**Configuration mode, option 2**".
3. **Now switch a magnet accessory of your choice.** The magnet accessory can be switched via the Z21 app or another input terminal, such as the multiMAUS.
4. As soon as the switching command has been notified by the switch decoder, the new address is applied to outputs 5 to 8 and configuration mode is exited automatically. The white LED goes out and the blue LED indicates normal mode.
The turnout numbers for outputs 5 to 8 are programmed here again exclusively set up in groups of four.

Factory setting: numbered automatically consecutively again from output 4.

6.1.3 Option 3 – Set addressing mode

This option is used to select between "ROCO" or "RCN-213" turnout addressing mode.

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 switch decoder is then in "Configuration mode, option 1".

- 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.), and the red LED will be lit continuously.

The switch decoder is then in "Configuration mode, option 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 **three times** (short, short, short, pause; short, short, short, pause; etc.).

The switch 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"**.
The mode can now be switched over by briefly pressing the programming button.
- 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 normal mode.

Factory setting: "ROCO".



INFORMATION: Use the "RCN-213" setting for operation on control centres from other manufacturers, see also section [Operation on control centres from other manufacturers](#).

6.2 Configuration via POM

The Z21 switch DECODER can be configured for your applications on the main track via POM programming commands and CVs. "POM" stands for "programming on the main" 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 centre and the Z21 control centres have a RailCom® receiver, these CVs can not only be written to, 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.

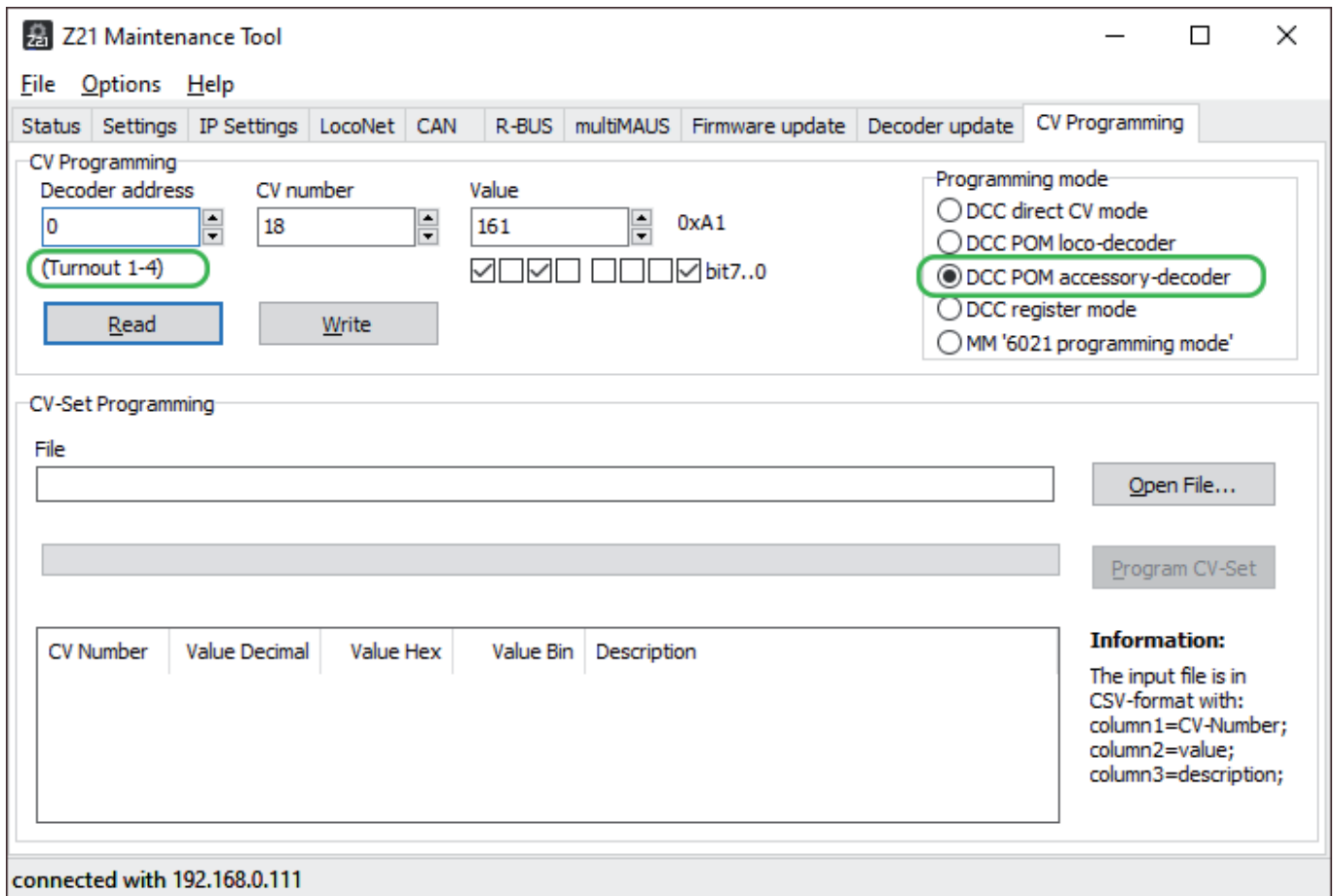


INFORMATION: Before POM programming with control centres from other manufacturers, set the turnout addressing of the Z21 switch DECODER to "RCN-213"! To set the turnout addressing, see section [Option 3 – Set addressing mode](#).

When programming on the main track, a distinction must be made between POM programming commands for accessory decoders and for loco decoders.

6.2.1 Configuration via POM programming commands for accessory decoders

When using POM programming commands for accessory decoders, the Z21 switch 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 address/decoder address has been selected before reading or writing so that the desired switch decoder is also actually actuated with the programming commands.

6.2.2 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 switch DECODER can also be configured using these types of control devices, the following option is available here: In what is known as “**Configuration mode**” (and only then!), the Z21 switch DECODER as an exception also listens to POM programming commands for loco decoders if directed at the “loco address” **9836**.



TIP: Memory aid: Article number 10836 → pseudo “loco address” 9836

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

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

1. Put the Z21 switch DECODER in configuration mode by holding down the **programming button** for at least 3 seconds until the white “Program” LED begins flashing. Then release the programming button again.

The white "Program" LED will then flash regularly for a brief time.

The switch decoder is then in "Configuration mode". It does not matter for the POM programming, incidentally, whether option 1, 2 or 3 is active.

- You can now configure the switch decoder by using a wlanMAUS, multiMAUS or another input device of your choice to write a CV variable via POM to the pseudo "loco address" 9836.



TIP: For multiMAUS and wlanMAUS, first select the loco address 9836 as well as the POM programming mode, before the POM programming:

Where applicable, SHIFT+MENU → LOCO → MODE → ADDRESS → OK → STOP

SHIFT+OK → numbers 9 8 3 6 → OK

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



TIP: In the current Z21 APP (2019), the POM programming for loco decoder can be found under "CV programming" → "Manual" → "Program On Main".

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

6.2.3 CV list

CV	Description	Range	Default
#1	<p>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 – Program addresses for outputs 1 to 8.</p> <p>INFORMATION: Ensure that the decoder address is never confused with the resultant turnout numbers. The turnout numbers and CV values can be calculated from the decoder address, but the process is rather complicated and is described in more detail in the Rail-Community standards RCN-213 and RCN-225.</p>	<p>1 – 63 read only</p>	
#3	<p>Time output 1 active 0 = instantaneous operation similar to k83 After receiving an activation command for an output, this remains active until the control centre sends the deactivation command. For the Z21, this means that the output remains active, such as when the button on the multiMAUS is pressed. Similar to operating mode 3, see CV #41 to #48.</p> <p>WARNING: Some control centres from other manufacturers do not send any deactivation commands. The correct functioning of instantaneous mode is therefore only provided in combination with ROCO control centres.</p> <p>1 to 255 = pulse mode Cut-in time in 100 ms increments, see also CV #37. The factory setting is 500 ms. After receiving an activation command for an output, it remains active until no further activation commands are sent and the time period defined here has passed.</p>	0 – 255	5
#4	Time output 2 active, see CV #3	0 – 255	5
#5	Time output 3 active, see CV #3	0 – 255	5
#6	Time output 4 active, see CV #3	0 – 255	5

CV	Description	Range	Default
#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	First decoder address, upper 3 bits (bits 6 - 8) Together with CV #1, 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 – Program addresses for outputs 1 to 8 .	0 – 7 read only	0
#28	RailCom® configuration Bit 1 = enable RailCom® channel 2 (decimal value 2) INFORMATION: RailCom® channel 2 is required for POM reading.	0, 2	2
#29	Decoder configuration Bit 3 = RailCom® activation: 0 = deactivated (decimal value 0) 1 = activated (decimal value 8) INFORMATION: RailCom® is required for POM reading. Bit 7 = actuation type: 1 = actuation as accessory decoder (decimal value 128, cannot be changed)	128, 136	136
#36	Inversion of red/green for outputs 1 to 8 Bit 0 inverts output 1, ..., Bit 7 inverts output 8	0 – 255	0
#37	Time basis for CV #3-#6 and CV #53-#56 ("Time output n active") This time basis [ms] is multiplied in the decoder by the values from CV #3 to #6 and CV #53 to #56 to calculate the timeout in ms for the corresponding output. Longer or shorter switching pulses can be achieved by changing the time basis. The factory setting is 100ms.	10 – 255	100
#39	DCC turnout addressing Allocation of the turnout numbers to decoder address and output. 0 = backwards-compatible with ROCO control centres Z21, multiZENTRALEpro and multiMAUS with booster 1 = DCC turnout addressing conforms to RCN-213 See also section Operation on control centres from other manufacturers . TIP: This setting is recommended when using control centres from other manufacturers	0, 1	0

CV	Description	Range	Default
#41	<p>Operating mode output 1</p> <p>0 = pulse operation with user-defined cut-in time</p> <p>Settings in accordance with CV #3-#6 and CV #53-#56, where the corresponding switch duration can be configured.</p> <p>1 = alternate flash</p> <p>The flashing speed can be set via CV #3-#6 and CV #53-#56.</p> <p>INFORMATION: <i>This function is only useful for light signals.</i></p> <p>2 = alternate flash with bulb simulation</p> <p>The flashing speed can be set via CV #3-#6 and CV #53-#56. The speed of fade-in and fade-out can be changed as necessary via CV#71 and CV#72.</p> <p>WARNING: <i>This function is only suitable for light signals and lighting.</i></p> <p>3 = instantaneous operation similar to ROCO 10775 or k83</p> <p>After receiving an activation command for an output, this remains active until the control centre sends the deactivation command. For the Z21, this means that the output remains active, such as when the button on the multiMAUS is pressed. CV #3-#6 and CV #53-#56 are not taken into account.</p> <p>WARNING: <i>Some control centres from other manufacturers do not send any deactivation commands. Correct operation in mode 3 is therefore only ensured in combination with ROCO control centres.</i></p> <p>4 = continuous operation similar to k84</p> <p>Bi-stable continuous operation, either output A or output B active.</p> <p>CV #3-#6 and CV #53-#56 are not taken into account.</p> <p>WARNING: <i>This setting is NOT suitable for magnetic drivers if these do not have any limit switching!</i></p> <p>5 = continuous operation as for mode 4 with bulb simulation</p> <p>When switching over the outputs, this is first faded out and then faded in. The speed of fade-in and fade-out can be changed as necessary via CV#71 and CV#72.</p> <p>WARNING: <i>This function is only suitable for light signals and lighting.</i></p>	0 - 5	0
#42	Operating mode output 2, see CV #41	0 - 5	0
#43	Operating mode output 3, see CV #41	0 - 5	0
#44	Operating mode output 4, see CV #41	0 - 5	0
#45	Operating mode output 5, see CV #41	0 - 5	0
#46	Operating mode output 6, see CV #41	0 - 5	0
#47	Operating mode output 7, see CV #41	0 - 5	0
#48	Operating mode output 8, see CV #41	0 - 5	0

CV	Description	Range	Default
#49	<p>Initialisation of outputs 1 to 4</p> <p>Activation status for continuous operation and alternate flash outputs when switching on the decoder power supply.</p> <p>Bits 1.0 = output 1: 0.0 = off (decimal value 0) 0.1 = red (decimal value 1) 1.0 = green (decimal value 2) 1.1 = reserved (decimal value 3)</p> <p>Bits 3.2 = output 2: 0.0 = off (decimal value 0) 0.1 = red (decimal value 4) 1.0 = green (decimal value 8) 1.1 = reserved (decimal value 12)</p> <p>Bits 5.4 = output 3: 0.0 = off (decimal value 0) 0.1 = red (decimal value 16) 1.0 = green (decimal value 32) 1.1 = reserved (decimal value 48)</p> <p>Bits 7.6 = output 4: 0.0 = off (decimal value 0) 0.1 = red (decimal value 64) 1.0 = green (decimal value 128) 1.1 = reserved (decimal value 192)</p>	0 - 255	0
#50	<p>Initialisation of outputs 5 to 8</p> <p>Activation status for continuous operation and alternate flash outputs when switching on the decoder power supply.</p> <p>Bits 1.0 = output 5: 0.0 = off (decimal value 0) 0.1 = red (decimal value 1) 1.0 = green (decimal value 2) 1.1 = reserved (decimal value 3)</p> <p>Bits 3.2 = output 6: 0.0 = off (decimal value 0) 0.1 = red (decimal value 4) 1.0 = green (decimal value 8) 1.1 = reserved (decimal value 12)</p> <p>Bits 5.4 = output 7: 0.0 = off (decimal value 0) 0.1 = red (decimal value 16) 1.0 = green (decimal value 32) 1.1 = reserved (decimal value 48)</p> <p>Bits 7.6 = output 8: 0.0 = off (decimal value 0) 0.1 = red (decimal value 64) 1.0 = green (decimal value 128) 1.1 = reserved (decimal value 192)</p>	0 - 255	0

#51	<p>Second decoder address, lower 6 bits (bits 0 - 5) Together with CV #52, this generates the second decoder address for outputs 5 to 8. If the second decoder address is set to 0, the first decoder address plus 1 is then used for outputs 5 to 8 automatically. This is also the recommended setting.</p> <p>This CV can only be read. You can change the decoder addresses via the programming button. See section Option 2 – Program address for outputs 5 to 8.</p>	0 – 63 read only	0
#52	<p>Second decoder address, upper 3 bits (bits 6 - 8) Together with CV #51, this generates the second decoder address for outputs 5 to 6. This CV can only be read. You can change the decoder addresses via the programming button. See section Option 2 – Program address for outputs 5 to 8.</p>	0 – 7 read only	0
#53	Time output 5 active, see CV #3	0 – 255	5
#54	Time output 6 active, see CV #3	0 – 255	5
#55	Time output 7 active, see CV #3	0 – 255	5
#56	Time output 8 active, see CV #3	0 – 255	5
#61	<p>Dimming output 1 Reduction in brightness of lamps using PWM (pulse width modulation). 0 = dimming is deactivated, i.e. full brightness at the output. 1 to 100 = brightness in percent of the adjustable frame.</p> <p>WARNING: This function is only suitable for light signals and lighting with a low connection load less than 1 A.</p> <p>WARNING: LEDs also need a series resistor on the dimmed output.</p>	0 - 100	0
#62	Dimming output 2, see CV #61	0 - 100	0
#63	Dimming output 3, see CV #61	0 - 100	0
#64	Dimming output 4, see CV #61	0 - 100	0
#65	Dimming output 5 see CV #61	1 - 100	0
#66	Dimming output 6, see CV #61	1 - 100	0
#67	Dimming output 7, see CV #61	1 - 100	0
#68	Dimming output 8, see CV #61	1 - 100	0
#71	<p>Fade-In Duration of the slow fade-in in 10ms increments for operating mode 2 (alternate flash) and 5 (continuous operation) with bulb simulation. See also CV#41-48 and CV#72. The factory setting is 100ms.</p>	1 - 100	10
#72	<p>Fade-Out Duration of the slow fade-out in 10ms increments for operating mode 2 (alternate flash) and 5 (continuous operation) with bulb simulation. See also CV#41-48 and CV#71. The factory setting is 200ms.</p> <p>TIP: For the alternate flash, ensure that the total of the times of Fade-In plus Fade-Out should be smaller than the desired cut-in time achieved by CV #3-#6 and CV #53-#56. Otherwise, the total cut-in time would be extended accordingly, which would then result in a lower alternate flashing frequency.</p>	1 - 255	20
#250	<p>Decoder Typ 36 = ROCO 10836 Z21 switch DECODER</p>	read only	36

6.3 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.

7. Meaning of the LEDs

Normal operation

Colour	Status	Meaning
Blue (status)	on	Track signal present on input DCC.
Blue (status)	flashes	No track signal present on input DCC. (The decoder still also accepts switching commands from the zLink interface.)
Red (Error)	flashes	Short circuit or overload detected.
Green (Data)	aus	"ROCO" addressing mode.
Green (Data)	on	"RCN-213" addressing mode.
Green (Data)	flashes briefly	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 programming button for longer than 8s.)

Configuration mode (button programming)

Colour	Status	Meaning
Green White	on flashes 1 x white (short, pause)	Option 1: Program addresses for outputs 1 to 8. Decoder waits for switch command, or long button press for next option.
Red White	on flashes 2 x white (short, short, pause)	Option 2: Program address for outputs 5 to 8. Decoder waits for switch command, or long button press for next option.
Red White	on flashes 3 x white (short, short, short, pause)	Option 3: "ROCO" addressing mode. <ul style="list-style-type: none"> • Press the programming button briefly: Change over mode • Press the programming button for a long time: save
Green White	on flashes 3 x white (short, short, short, pause)	"ROCO" addressing mode.
Blue White	flashes flashes	Next option (When pressing the programming button for a long time) After last option: Save 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 zLink. Bootloader mode active.
Blue Red Green White	on on flashes briefly on	Data/commands are processed by the zLink. Bootloader mode active.

8. Troubleshooting

Error flashes red:

The outputs of the Z21 switch DECODER are electronically protected against overload and short circuits via permanent measurement of the total current. The maximum switch output of the decoder is 2.0 A. In the short term, even up to 2.5 A are permitted for ≤ 100 ms. If the total current of all outputs permanently exceeds 2.0 A, all outputs are switched off and the red "Error" LED flashes for 3 seconds. During this time, the decoder does not accept any new switch commands. The decoder then resumes normal operation. The outputs are not switched back on automatically here, however, to simplify troubleshooting: Then manually switch the outputs on individually (multiMAUS, App, ...) to find the actual cause of the short circuit.

Track numbers are shifted by four:

Check that the set addressing mode matches your control centre. [Operation on control centres from other manufacturers.](#)

POM read (RailCom®) is not functioning:

Check the correct connection on the Z21 (P and N). See section [Installing the Z21 switch DECODER.](#)

It may be that other control centres are not compatible with RailCom®.

Connected LED is not lit:

Ensure that the polarity is correct. The central connection to the corresponding output is the common plus. See section [Installing the Z21 switch DECODER.](#)