

CV table

CV	Description	Area	Value*
1	Decoder address (low)	0 - 63	1
2	Outputs active → A1G value 1, A1R value 2, A2G value 4, A2R value 8*	0 - 15	15
3	Output Switch-on time A1G (in steps of 32 ms, 0= permanently on)*	0 - 255	20
4	Output Switch-on time A1R (in steps of 32 ms, 0= permanently on)*	0 - 255	20
5	Output Switch-on time A2G (in steps of 32 ms, 0= permanently on)*	0 - 255	20
6	Output Switch-on time A2R (in steps of 32 ms, 0= permanently on)*	0 - 255	20
7	firmware version (updatable)	-	various
8	manufacturer identification (Decoder reset CV8 = 8)	-	162
9	Decoder address (high)	0 - 7	0
15	Decoder programming lock	0 - 255	1
16	Decoder programming lock index number	0 - 255	1
28	Bidirectional communication RailCom®	0, 2	2
29	Decoder Configuration Bit3 → RailCom®, 0=off, 1=on) Bit7 → 0=Control as vehicle decoder, 1=Control as switch decoder	0 - 136	136
30	Error memory for outputs and temperature monitoring 2 = Temperature exceeded, 4 = Output error*	0 - 6	-
33	Reporting on the current switch position (read only)	-	-
34	Configuration Output pair 1; Bit0&1 - subaddress, Bit2 - invert*, Bit3 - light mode*	0 - 15	0
35	Configuration Output pair 2; Bit0&1 - subaddress, Bit2 - invert*, Bit3 - light mode*	0 - 15	1
36-39	Brightness of Outputs A1G - A2R*	0 - 63	32
40-43	Effect numbers for the Outputs A1G - A2R*	0 - 3	0
44	Bit0= 1 Only for users of the ECoS (ESU) digital control centre for CV programming	0, 1	0

* These functions are not available on the RD 4000+ switch decoder for electrical consumers #55033.

8. Update

PIKO switch decoders can be updated. To perform an update, you will need either the PIKO SmartProgrammer (#56415) or the PIKO SmartControl_{wlan} digital system (#55821)..

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Warranty Statement

Each component is checked for full functionality before delivery. Should a fault nevertheless occur within the 2-year warranty period, we will repair the component free of charge upon presentation of the proof of purchase. The warranty claim is void if the damage was caused by improper handling.

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Switch decoder for: SD 2000 Electromagnetic accessories #55032 RD 4000+ Electric units #55033



For DCC with RailCom® and Motorola Digital systems

1. Function of switch decoders

If locomotives are controlled digitally on a model railway layout, it makes sense to also switches (points or turnouts, signals, lighting and other consumers digitally.

To do this, these products must be connected to a switching decoder, which converts the digital control information into voltage pulses for magnetic devices or into switching pulses for potential-free relays (for electrical units).

2. Electromagnetic accessories

Magnetic items are switches, signals and other products that perform a function via an electromagnet (Spool).

3. Electric units

Electrical units are lamps, motors or other products that consume electricity continuously when switched on.

4. Technical description

The switch decoders can be controlled in DCC digital systems such as **PIKO SmartControl_{wlan}** via addresses 1 - 2048, or in Motorola systems via addresses 1 - 320. In DCC systems, the switch decoders are also RailCom® compatible. This can be used, for example, for main track programming for accessory decoders (POM) and for feedback on a switch position, provided that the digital control centre, such as the **PIKO SmartControl_{wlan}**, can evaluate this. NOTE: For control centres from Roco, the address range may be offset by 4 addresses.

5. SD 2000 for electromagnetic accessories #55032

This decoder can switch two independent double Spool drives. In DCC format, the two magnetic items can be assigned an address within a block of four (1-4, 5-8, 9-12, etc.). This corresponds to addressing according to the RCN-213 standard. The address can be assigned via button programming or CV. In Motorola format, any address can be assigned to each of the two magnetic items..

For the four outputs, further settings such as switch-on times, dimming of the outputs, and 'light mode' with effects (output flashes) are possible via CV programming. If a connected turnout switches in the opposite direction, the switching direction can be inverted via CV programming. Thanks to its RailCom® capability, the switch decoder can report the current turnout position of the outputs to suitable digital control centres.

The connection of digital voltage and magnetic devices is shown in Figure 1

Technical data:

Input: Digital voltage 12 - 20V

Outputs: 2 double outputs for (switch) spool drives or 4 single outputs for simple units, addressable as a group or individually, maximum current consumption 2A (short-circuit proof).

6. RD 4000+ for electric units #55033

This relay decoder has two potential-free changeover contacts (changeover switches). These contacts can switch external voltages to up to 4 controllable loads, whereby the respective changeover switch always closes one contact at a time while the other is open. When switching load groups, the maximum current carrying capacity of the contacts must be observed.

Each changeover contact can be assigned a DCC address within a block of 4 according to RCN-213 or any Motorola address.

The connection of digital voltage and electric units to be switched is shown in Figure 2.

Technical data:

Input: Digital voltage 12 - 20V

Outputs: Two switches with two addresses, maximum current consumption of the units 1A.

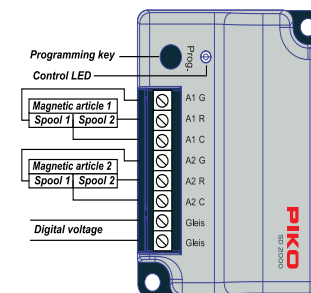


Figure 1 #55032

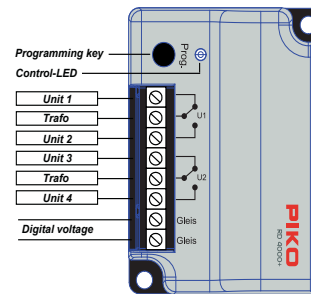


Figure 2 #55033

7. Programming

After correct connection, two addresses must be assigned to the switch decoder, via which the corresponding magnetic items or electrical units are to be switched (factory settings 1 & 2). This can be done by programming via buttons or CV programming (DCC only).

Button programming:

When the digital voltage is switched on, please proceed in the order described and note that the assignment must always be made for all outputs of a switch decoder: Each short press switches one state further, each long press cancels the current state and switches to the idle state.

IMPORTANT: Once an address has been assigned, the programming automatically jumps to the next step. This means that the button does not need to be pressed again.

- 1. Press the programming button briefly → LED lights up continuously → Programming initiated
- 2. Press the programming button briefly → LED flashes 1x long, 1x short → Switch DCC address for output 1
- 3. Press the programming button briefly → LED flashes 1x long, 2x short → Switch DCC address for output 2
- 4. Press the programming button briefly → LED flashes 1x short, 1x short → Switch Motorola address for output 1
- 5. Press the programming button briefly → LED flashes 1x short, 2x short → Switch Motorola address for output 2
- 6. Press the programming button briefly → LED off -> Programming complete.

NOTE: If the second address in DCC format does not match the 4-digit block of the first address → LED flashes 4x short.

Additional features and conditions:

- 1. If the button is pressed and held during programming state 1, the state is exited and the currently stored DCC address is used again.
- 2. If the button is pressed and held during programming state 2-3, DCC programming is cancelled. The decoder can still be addressed with DCC signals.
- 3. If the button is pressed and held during programming state 4-5, Motorola programming is cancelled. The decoder can still be addressed with Motorola signals.
- 4. The second DCC address to be programmed must be in the same decoder address range as the first programmed DCC address. Decoder addresses form groups of 4 turnout addresses, in accordance with RCN-213. The decoder address is also used to evaluate main track commands and read CVs via RailCom®.

Decoder 1 manages switch addresses 1-4, decoder 2 switch addresses 5-8, decoder 3 switch addresses 9-12, etc.

It is permissible, for example, to freely distribute DCC addresses 1-4 to both outputs, but not address 4 and address 5, as address 5 is in a different group of four.

If an incorrect second address is programmed, the LED flashes 4x short. If the button is then pressed briefly, a new first and second DCC address can be programmed.

The assignment of the two addresses with Motorola track signal is free and not bound to any grouping.

It is possible to program both the second DCC address and the second Motorola address separately. In this case, the first address remains unchanged. Only when the second address is programmed correctly are the first and second addresses restored.

CV-Programming:

The switch decoder can be programmed in a similar way to a locomotive decoder in DCC format using CVs. CV programming can be carried out via the programming track output of the DCC control centre or as [main track programming for accessory decoders](#).

NOTE: ECoS users should set CV44 to 1 as early as possible before assigning decoder addresses via CV programming. According to RCN-213, a switch decoder has a decoder address that is stored in CVs 1 (0-63) and 9 (0-7). The combination of these two CVs results in the decoder address. Each decoder address has a block of 4 switching addresses (1-4, 5-8, 9-12, etc.). The assignment of the CVs and switching addresses is as follows.

Dec.Adr.	CV1	CV9	Switch-adr. 1	Switch-adr. 2	Switch-adr. 3	Switch-adr. 4
1	1	0	1	2	3	4
2	2	0	5	6	7	8
3	3	0	9	10	11	12
...						
63	63	0	249	250	251	252
64	0	1	253	254	255	256
65	1	1	257	258	259	260
...						
127	63	1	505	506	507	508
128	0	2	509	510	511	512
129	1	2	513	514	515	516
...						
511	63	7	2041	2042	2043	2044
0	0	0	2045	2046	2047	2048

Since the switching decoders have two output pairs for only two switching addresses, the switching addresses to be used for the blocks of four are assigned to the outputs in two additional CVs 34 (output pair 1) and 35 (output pair 2) as subaddresses. Furthermore, the outputs can be inverted (bit 2) and the light mode (bit 3) can be switched on in these configuration CVs.

Output pair	Bit0/1 = 0/0 1. Switch-adr. from a block of 4	Bit0/1 = 1/0 2. Switch-adr. from a block of 4	Bit0/1 = 0/1 3. Switch-adr. from a block of 4	Bit0/1 = 1/1 4. Switch-adr. from a block of 4	Bit2=1 Output inverted.	Bit3=1 light mode
1 (valueCV34)	0	1	2	3	4	8
2 (valueCV35)	0	1	2	3	4	8

Example: The two outputs of the decoder with decoder address 1, which results in a block of 4 switching addresses 1-4, are to be switched with switching addresses 1 and 2. To do this, CV34 is programmed with the value 0 and CV35 with the value 1.

However, if the two outputs of this decoder are to be switched with switching addresses 4 for output 1 and 2 for output 2, CV34 = 3 and CV35 = 1 must be programmed.

If switching addresses from a block of 4 (253 - 256, decoder address 64) are to be switched, the decoder is first programmed with CV1 = 0, CV9 = 1 for decoder address 64.

Now, for example, output 1 is to be switched with switching address 253 and output 2 with switching address 254. This results in the programming of CV34 = 0 (1st address in the block of 4) and CV35 = 1 (2nd address in the block of 4).

Additional settings:

Switch-on times: Switch-on times can be set for each output in CVs 3 - 6 in a value range from 0 - 255 (*32ms). The **value 0** switches the **output on permanently**.

Invert outputs: The outputs of an output pair can be inverted via bit 2 of CVs 34 and 35.

Light mode: If the output pairs are set to 'light mode' (bit 3 = 1 in CV34 or CV35), the outputs can be switched on and off individually on a permanent basis. The first output of an output pair is switched on and off (toggled) via the assigned switching address 'green' and the second output via the switching address 'red'. If light mode is activated, the outputs can be dimmed and flashing effects can be applied.

Brightness: For each output, the brightness can be set in CVs 36 - 39 in a range from 0 - 63.

Effects: Two flashing effects are available for the outputs, which can be assigned to the respective output in CVs 40 - 43. The value 1 causes the relevant output to flash at approx 1 Hz. The value 2 also causes the relevant output to flash at approx 1 Hz, but in the opposite rhythm.

Reporting the switch position:

The current switch position is stored in CV33 of the switch decoder. If the switch position is changed manually, for example, the decoder detects this change and writes the new value to CV33. A suitable digital control centre, such as the **PIKO SmartControl_{wlan}**, periodically reads the value of CV33 and, if necessary, displays a corresponding message about the changed switch position..