

9. Technical Specifications

Track entrance:

- DCC/Motorola also input 8V - 24V <10mA average load
- Programming track ACK Puls 60mA @12V
- RailCom® answer 30mA

Transformer input:

- 10V - 24V AC or DC
- 2A max.

Output current:

- Maximum servo current: 2A per output
- Total load max. 2A

Motorola® is a registered trademark of Motorola Inc. Tempe-Phoenix (Arizona/USA)

RailCom® is a registered trademark of Lenz Elektronik GmbH

ECoS® is a registered trademark of ESU electronic solutions ulm GmbH & Co. KG, 89231 Neu-Ulm, DE

NOTE: This product is not a toy and is not suitable for children under 14 years of age. We accept no liability for damage of any kind resulting from improper use or failure to follow these instructions.

EU Declaration of Conformity

PIKO Spielwaren GmbH hereby declares that the product, in terms of its design and construction, as well as in the version placed on the market by us, complies with the essential safety, health and compatibility requirements of the aforementioned directives and regulations. The full text of the EU Declaration of Conformity is available at the following web address: <https://www.piko.de/konform>

If you have any questions, we're here to help!

Internet: www.piko.de

E-Mail: info@piko.de

hotline: Tuesday and Thursday 4.00–6.00 pm, Tel.: +49(0)3675 897255

Service: In the event of a complaint regarding the item, please send it to us together with proof of purchase (a copy) and the completed returns form, which you can find in our online shop under 'Cancellation and Returns'.

Warranty Statement

Each module is checked to ensure it is fully functional before dispatch. Should a fault nevertheless occur within the 2-year warranty period, we will repair the module free of charge upon presentation of the proof of purchase. The warranty claim will be void if the damage was caused by improper handling.

Subject to changes and printing errors. As at 07/26.

Transcription and reproduction are permitted only with the publisher's consent.



PIKO Spielwaren GmbH · Lutherstr. 30 · 96515 Sonneberg, GERMANY
hotline@piko.de

55276-90-7001_2026

#55276

dsa 4000 - Decoder for servo machines

for operating up to 4 servo drives



For DCC- with RailCom® and Motorola- digital systems and analogue operation



1. Features

- For DCC- and Motorola- digital systems or analogue operation
- Switchable like a decoder for electromagnetic accessories
- Adjustable holding positions
- Adjustable rotation speed
- Adjustable effects, e.g. bounce-back function
- Adjustable oscillation mode
- Dynamic acceleration/deceleration (ABV)
- Reporting the final position via RailCom®
- Assigning switch addresses according to RCN-213 (DCC)
- The switching address for each servo can be set freely (Motorola)
- Adjustment via the digital system's switch buttons, via DCC CV programming or analogue programming via the control panel #55262
- DCC main track programming for accessory decoders
- Power supply via the track (digital operation) or via a separate 10V–24V DC or AC voltage
- Servo outputs with adjustable overload protection



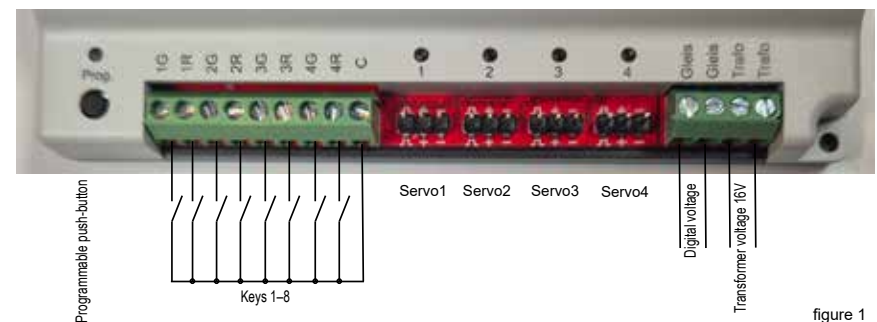
2. Technical description

The switch decoder for servo machines 'dsa 4000' is a servo decoder designed to operate up to four model-making servos. These can be used to operate points (e.g. the PIKO #55272 underfloor points drive) or other moving elements on a model railway layout.

It can be controlled using DCC digital control units, such as the **PIKO SmartControl^{wlan}**, via addresses 1–2048, or using Motorola digital control units via addresses 1–320. In DCC systems, the servo decoder is also RailCom®-compatible. This can be used, for example, for main track programming for accessory decoders (POM), provided that the digital control unit being used, such as the **PIKO SmartControl^{wlan}**, supports this method.

NOTE: For Roco control units, the address range may be offset by 4 addresses.

3. The pin configuration



The servo connectors are plugged into the corresponding pin headers on the decoder so that the ground wire of the connection cable (usually black or brown) is on the right-hand side (-).

The push-buttons (1–8), which are to be used for analogue operation only, are connected to terminals 1G–4R and the common return conductor C.

Power can be supplied via an external transformer or via the digital voltage. If the digital voltage is to be used only, there must be a connection from the 'Track' terminals to the 'Transformer' terminals e.g. via two wires. However, it is recommended that an external transformer be used so as not to place a load on the digital voltage of the control unit or the booster.

4. dsa 4000 in analogue mode

The decoder can control four independent servo drives using buttons 1–8. The four servos can be adjusted using button-based programming in accordance with the menu structure (see below)

Programming in analogue mode regarding end stops and operating speed, using Servo 1 as an example:

Note: Pressing and holding the programming button exits programming mode without saving the settings you have just made. Pressing the button briefly takes you to the next programming step.

1. Press the 'Prog.' button until the 'Prog.' LED lights up, then release it
(the 'Prog.' LED lights up for a long time with a brief interruption)
2. 'Prog.' button short → adjusting the left-hand stop
3. Button 1G and 1R to adjust the left stop
4. 'Prog.' button short → adjustment of the right-hand stop
5. Button 1G and 1R to adjust the right stop
6. 'Prog.' button short → saving the keystrokes and setting the speed
7. Button 1G and 1R to adjust the speed
8. 'Prog.' button short → saving the speed and ending programming

The servos 2–4 are adjusted in the same way using buttons 2G–4R.

5. dsa 4000 in digital mode

The decoder can control four independent servo drives. In DCC format, the four outputs can be assigned an address within a block of four (1–4, 5–8, 9–12, etc.).

This corresponds to addressing in accordance with the RCN-213 standard. The decoder address can be learnt by the control unit via switching operations or assigned via CV programming. In Motorola format, each of the four outputs can be addressed as required.

For the four outputs, CV programming allows for further settings such as a bounce-back function, cyclic oscillation at an adjustable speed, limit switches plus a third position as a rest position (e.g. for a swing), as well as acceleration and braking delays. Thanks to its RailCom® capability, the servo decoder can be read and programmed via the [main track programming for accessory](#) decoders (POM) when used with compatible digital control units.

6. Programming in digital mode

First, the switch addresses via which the servo drives are to be switched are assigned to the servo decoder.

Note: Pressing and holding the programming button exits programming mode and saves the settings made previously. A short press or a switching command takes you to the next programming step.

In **DCC format**, any address within a block of four can be selected for programming the addresses, and the decoder automatically distributes the four addresses in that block across its four outputs in ascending order. If, for example, the four outputs are to be programmed with switch addresses 5–8, any one of the addresses 5–8 can be used during the programming of the switch addresses in step 3.

1. 'Prog.' button short → ,Prog.' LED is lit continuously

Note: In this mode, the decoder temporarily 'listens' to DCC address 1. This can be used to programme the decoder via the main track programming for accessory decoders (POM) if the actual decoder address is unknown.

2. 'Prog.' button short → ,Prog.' LED flashes slowly (DCC learning mode)
3. Set the DCC switching address to 'red' or 'green' in the desired block of four → ,Prog.'-LED expires.

In the **Motorola format**, any address between 1 and 320 can be assigned to each output.

1. 'Prog.' button short → ,Prog.'-LED lights up continuously
2. 'Prog.' button short → ,Prog.'-LED flashes slowly
3. 'Prog.' button short → ,Prog.'-LED flashes once and once
4. Motorola control address for servo 1: set to 'red' or 'green' → ,Prog.'-LED flashes once and twice
5. Motorola control address for servo 2: set to 'red' or 'green' → ,Prog.'-LED flashes once and three times
6. Motorola control address for servo 3: set to 'red' or 'green' → ,Prog.'-LED flashes once and four times
7. Motorola control address for servo 4: set to 'red' or 'green' → ,Prog.'-LED expires.

If the programming button is pressed briefly between steps 3 and 7, the programming process moves on to the next step without altering the settings already made in the previous steps. This allows, for example, the switching address of servo 4 to be changed specifically without altering the addresses already programmed for servos 1–3.

CV programming:

The servo decoder can be programmed via CVs in a similar way to programming a locomotive decoder in DCC format.

CV programming can be carried out via the DCC control unit's programming track output or as [main track programming for accessory](#) decoders.

Adjustable current thresholds: To protect sensitive servo drives from damage in the event of a mechanical obstruction, it may be advisable to limit the output current of the servo outputs. This is configured using CV161–CV164. The maximum output current can be set from 1 to 255 in 10 mA increments. A value of 0 disables the current threshold (factory default).

7. CV-Table

CV	description	area	value*
1	Decoder address (low)	0 - 63	1
2	Outputs active → Servo1 value 1, Servo2 value 2, Servo3 value 4, Servo4 value 8	0 - 15	15
7	Firmware version (can be updated)	-	different
8	Manufacturer code (Decoder reset CV8 = 8)	-	162
9	Decoder address (high)	0 - 7	0
15	Decoder programming lock (only DCC)	0 - 255	1
16	Decoder programming lock index number (only DCC)	0 - 255	1
28	Two-way communication RailCom®	0, 2	2
29	Decoder configuration Bit3 → RailCom®, 0=off, 1=on Bit5 → Decoder type (read-only) Bit6 → Addressing (read-only) Bit7 → 1 = Control via an accessory decoder (read-only)	8 32 64 128	0 - 232 136
33	Servo limit end position: Bit 0 -7 → Servo 1G (left) - Servo 4R (right)	0 - 255	0
41-44	Servo 1 - 4 → Sub-address Bit 0, 1; Reverse direction Bit2 = 1	0-7	0
49-52	Servo 1 - 4 → Speed	0 - 255	30
65 - 66	Servo 1 → Position: left stop / right stop	0 - 255	30 / 225
67 - 68	Servo 2 → Position: left stop / right stop	0 - 255	30 / 225
69 - 70	Servo 3 → Position: left stop / right stop	0 - 255	30 / 225
71 - 72	Servo 4 → Position: left stop / right stop	0 - 255	30 / 225
81 - 84	Servos 1 - 4 Effect Configuration Bit0 → Effect on the right 0 – Bounce Bit3 → Effect on the left: 0 – Bounce Bit6 → Commuting Bit7 → Dynamics (acceleration and deceleration, ABV)	1 8 64 128	0 - 255 0
89 - 90	Servo1 → Effect amplitude left / right	0 - 255	15 / 15
91 - 92	Servo2 → Effect amplitude left / right	0 - 255	15 / 15
93 - 94	Servo3 → Effect amplitude left / right	0 - 255	15 / 15
95 - 96	Servo4 → Effect amplitude left / right	0 - 255	15 / 15
113 - 114	Servo1 → Effect: Number left / right (0 = always on, 1–255 = interval)	0 - 255	5 / 5
115 - 116	Servo2 → Effect: Number left / right (0 = always on, 1–255 = interval)	0 - 255	5 / 5
117 - 118	Servo3 → Effect: Number left / right (0 = always on, 1–255 = interval)	0 - 255	5 / 5
119 - 120	Servo4 → Effect: Number left / right (0 = always on, 1–255 = interval)	0 - 255	5 / 5
129 - 130	Servo1 → Effect Speed left / right	0 - 255	60
131 - 132	Servo2 → Effect Speed left / right	0 - 255	60
133 - 134	Servo3 → Effect Speed left / right	0 - 255	60
135 - 136	Servo4 → Effect Speed left / right	0 - 255	60
145 - 148	Servo1 - 4 → Oscillation – resting position (e.g. the resting position on a swing)	0 - 255	128
153 - 156	Servo1 - 4 → Commuting – Number	0 - 255	3

8. Update

The PIKO servo decoders support firmware updates. To perform a firmware update, you will need either the PIKO SmartProgrammer (#56415), the PIKO SmartProgrammer Stick (#55830), or the **PIKO SmartControl^{wlan}** digital system (#55821).

NOTE: If an ESU ECoS® digital control centre is used for programming, CV108 on the decoder should be set to 1 as early as possible, before any address is written to the decoder.

According to RCN-213, an accessory decoder has a decoder address which is stored in CVs 1 (0–63) and 9 (0–7). The combination of these two CVs determines the decoder address. Each decoder address is associated with a block of four switching addresses (1–4, 5–8, 9–12, etc.). The mapping of the CVs and switching addresses is as follows:

Decoder address	CV1	CV9	Switching address 1	Switching address 2	Switching address 3	Switching address 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

Decoder addresses therefore form groups of 4 switching addresses, in accordance with RCN-213. The decoder address is also used to process main track commands and to read CVs via RailCom®.

Decoder 1 manages switching addresses 1–4, decoder 2 manages switching addresses 5–8, decoder 3 manages switching addresses 9–12, and so on.

Examples:

Servos 1–4 should be switched using switch addresses 1–4 (decoder address 1). This results in the following CV settings: CV1 = 1 and CV9 = 0.

Servos 1–4 should be set to switching addresses 257–260 (decoder address 65). This results in the following CV settings: CV1 = 1 and CV9 = 1.

Further settings:

Once the four control addresses have been set via the decoder address, the order can be distributed as required across the servo outputs using so-called sub-addresses. Bits 0 and 1 of CVs 41 (Servo 1) to 44 (Servo 4) are available for this purpose for each of the four servo outputs.

Value = 0 → 1. address from the four-address block

Value = 1 → 2. address from the four-address block

Value = 2 → 3. address from the four-address block

Value = 3 → 4. address from the four-address block

Example:

Servo 1 is to be assigned to address 3, Servo 2 to address 4, Servo 3 to address 1, and Servo 4 to address 2. The decoder has already been programmed with CV1 = 1 and CV9 = 0 for decoder address 1 (switch addresses 1–4).

Servo 1 → CV41 = 2, Servo2 → CV42 = 3, Servo3 → CV43 = 0, Servo4 → CV44 = 1

TIP: It is also possible to assign the same switch address to two or more servos. To do this, enter the same value in CV41 to CV44 for each servo that is to respond to the selected switch address.

Inverting the outputs: Setting Bit 2 in CV41–CV44 reverses the direction of rotation and swaps the assignment of the end positions for the corresponding servo.

Reporting the Servo End Positions:

The current servo end positions are stored in CV33 of the servo decoder. The decoder keeps CV33 at its previous value until the servo reaches its new end position, then writes the current value for the corresponding servo to CV33.

A compatible DCC command station, such as the **PIKO SmartControl^{wlan}**, can periodically read the value of CV33 and, if necessary, indicate that the turnout position has changed.

Effects: Each of the four servo outputs supports the following effects: an overtravel oscillation function with adjustable number of oscillations, amplitude and speed; an oscillating mode with adjustable rest position and number of oscillation cycles; and dynamic acceleration and deceleration behaviour. The required effects are enabled in CV81–CV84. For detailed parameter settings of each effect, please refer to the CV table.

Menu structure – configure via the programming button

When the decoder is in the configuration menu, its outputs can be set using the analogue buttons or the red/green buttons for the respective switching addresses.

1K → press the programme button briefly, 1L → press and hold the programme button

You can exit the settings in the left-hand path by pressing 1L to return to the operating state.

