

Servo Decoder 67810

With switch contacts for connecting 4 Servos

Characteristics

- For Märklin and DCC Digital systems
- Switched like a solenoid decoder
- Fully configurable switch address for each Servo
- Configurable stop positions
- Configurable angular speed
- 4 stop positions via 2 addresses in DCC operations
- Relay outputs e.g. for frog polarization
- Configured by digital system's turnout keys
- Or by DCC CV Programming
- Power supplied from the track or a separate transformer
- Very low power consumption by use of an integrated regulator
- All outputs are provided on plug connectors

Description

The servo decoder serves to control Servos, commonly employed in modeling, to solve mechanical control problems on the model railway layout. For example, with the appropriate mechanics, the Servos can change turnout positions, move water cranes in, open doors of locomotive sheds, operate boom gates and much more.

Up to four Servos can be connected to a servo decoder and operated independently of each other. The servo decoder works like a turnout decoder and in a digital system is assigned a solenoid address for each servo. By using the digital system's solenoid control the servo can be brought to two stop positions. The servo decoder operates with all DCC and Motorola Digital systems. In addition the decoder has 4 switched outputs which operate in parallel with the respective servo. This is a change over switch which changes its state with the servo position. In this way switching tasks are done e.g. changing the polarity of turnout frog or cutting the track power at signals.

The servo's stop positions for the two solenoid states "red" and "green" can be configured independently. The speed at which the servo moves between the two end positions can also be configured. For special applications each of the connected servos can be stopped at two additional stops by an additional solenoid address. This way mechanical items like water cranes can be moved between four positions via two solenoid addresses.

For optimal use of the change over switch, which is operated with the servo motion, the time at which the switch is to change over can be configured. The change-over can occur at the start, end or middle of the movement. The switching time can be independently configured for each servo movement.

1 Address, both stops and the rotating speed for each servo are separately setup with simple key programming from Motorola and DCC centers.

When using a DCC center like the Intellibox all parameters can be programmed by CV programming. That way, 2 addresses, their stops, the rotating speed and the rocker function can be separately setup for each servo.

Installing the Servo decoder 67810

Connecting the Servo decoders

For the “track”, “Trafo” and the relay contacts, 16 small push-on covers are included in the contents. The wires are stripped approx. 5mm, held into the slot from the underside and fixed with a push-on cover. The slot in the push-on cover points toward the wire's isolation.

The “track” connections are connected with the track connector of a DCC or Motorola digital center. In this instance the decoder is powered via the track.

Note: *Since most Servos move uncontrolled when supply voltage is switched on (this is a servo characteristic and is not produced by the servo decoder), we recommend, to connect the “Trafo” terminals to a 16V model railway transformer. This will ensure that the uncontrolled movements of the Servos will only occur when the entire layout is switched on.*

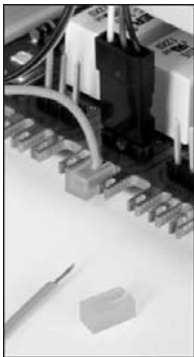
Connecting the Servos to the Servo Decoder

Each servo decoder has four 3-pin headers for connecting a maximum of four Servos. The Servo's plugs are plugged onto the appropriate header so the earth wire (usually black or brown) is at the front edge of the circuit board.

Header pin assignment

Earth - PCB front edge, 5V – middle, Control wire - back

Tip: *If the distance from the servo to the servo decoder is too far you can extend the lead without any difficulty. Servo cables with plug and socket are available in specialized electronics outlets.*



Programming

From a DCC center the decoder can be programmed by keys and solenoid instruction or by using CV programming.

With key programming not all items can be used.

Item	Key Programming	CV-Programming
Data format	x	x
Switching Addresses	1	2
Stop positions	2	4
Switching time	x	x
Relay Switching time	-	x
Selection whether the servo is always to be switched on or only during servo movement	-	x

Programming by Key and Solenoid Command

The desired servos should be connected to the outputs that are to be programmed and should be attached, since the servo decoder acknowledges the setting of the servo parameters during programming with a movement of the respective servo.

1. Activating Programming Mode

Press the key on the decoder and keep it pressed. The control LED blinks.

2. Selecting Data Format

The LED blinks alternately at flashing rate A and flashing rate B for 5 seconds in each case.

Meaning:

Blinking rate A = = selection DCC format

Blinking rate B = = selection Motorola format

If the key is released during the appropriate blinking rate then the appropriate data format is selected.

Note: *If the decoder no longer reacts to key inputs from the input device the wrong data format was selected! Programming must be repeated.*

3. Specify servo output to program

When the key is released the servo on connector 1 briefly moves back and forth. If the key is pressed again the servo at connector 2 briefly moves back and forth. Further operation changes to output 3 and 4. If the key is then operated again, programming mode is terminated.

Operate the key repeatedly until the servo on the output to be programmed moves briefly.

4. Specifying the solenoid address for the selected servo output

On the digital center or another control device which can switch solenoids, operate one of the two keys (red or green) which are to move this servo later. The servo decoder acknowledges the key press by the servo briefly moving back and forth.

5. Selecting solenoid keys for [+] and [-] keys

In order to be able to set up stops and the speed of the servo during programming two keys must be specified to be used as [+] and [-] key.

From the digital center or another control device which can switch solenoids, press the key which is to be used as [+] -key. The solenoid address of this key must not be the same as the previously selected solenoid address. The servo decoder acknowledges the key press by briefly moving the servo back and forth.

In the same way the key which is to be the [-]-key is determined.

Note: *After programming this allocation is deleted so that these keys can be used on the layout as normal.*

6. Setting the stop positions of the Servos

Using the address setup in step 4 the servo can now be moved to stop position "red" with the red solenoid key. With the help of the [+] and [-] keys, specified in step 5, the stop position of the Servos is adjusted accordingly. For this press the [+] or [-]-key is repeatedly pressed as until the desired retaining position is reached. With the green solenoid move the servo to the stop position "green" as described above.

When desired positions are fixed the servo must be switch to the "red" and "green" stop positions 3 times (thus red-green-red-green-red-green) without changing the setting, in order to go to the next programming step (keys in accordance with step 4).

7. Setting the speed of the Servos

The servo now moves independently back and forth with the set speed between the two stop positions. The speed of the movement can be increased or decreased with the [+] and [-] keys, as specified in step 5.

8. Terminate Programming

When the desired speed is adjusted one of the two keys which change the servo position is operated, (keys in accordance with step 4).

Programming for this servo output is complete and the servo decoder is ready for the programming of the next output. The selected settings are permanently stored.

Note: *If the programming is terminated prematurely, as in the track power is switched off, then the selected settings are stored.*

CV Programming with DCC Devices

The decoder can be programmed with the Intellibox and any DCC center that permits 3 digit numerical values. Use the programming menu of your DCC center to select and program the decoder CVs. The exact process will be outlined in the center's manual.

Note: If the Servo decoder is not programmable by CV Programming (because it is being operated in Motorola Format) steps 1-8 for an output must be carried out by key programming. For this the DCC format must be selected in step 2.

Connection of the servo decoder for programming

For programming the servo decoder it must be **individually** connected to a programming track. The desired servos are connected to outputs which are to be programmed.

Configuring the Servo decoder

CV119 determines various settings of decoder:

If the power on the different servo outputs is always switched on, or only during servo operation and if the operating mode is Motorola or DCC.

The entered value is calculated from the CV table in which the values of the desired functions are added.

Example

Output 1 power always on value = 1

Output 2 power always on value = 2

Output 3 power always on value = 4

Output 4 power always on value = 8

Operating mode DCC value = 0

Sum of all values is always 15.

This value is preset in CV 119 by the factory.

Bit	Function of CV119	Wert
0	Power output 1 only switched on during servo operation always switched on	0 1*
1	Power output 2 only switched on during servo operation always switched on	0 2*
2	Power output 3 only switched on during servo operation always switched on	0 4*
3	Power output 4 only switched on during servo operation always switched on	0 8*
7	Operating Mode DCC Motorola	0* 128

Configuring the Servo Outputs

Address 1 and 2 (CV 120 und 121, 160 und 161)

The addresses for each servo output can be freely selected. The valid range of address is 1-2048.

The servo is brought to the stop by the Address 1 in accordance with CV122 (red) and CV123 (green).

Address 2 brings the servo to stop positions in accordance with CV162 (red) and CV163 (green).

Note: Address 2 can be configured by CV programming.

Addresses to 255 can be entered directly as values in the CV for the Low byte (e.g. CV121). CV for the High byte (e.g. CV 120) remains at value 0 (factory setting).

Addresses from 256, values for the High byte and the Low byte must be calculated. For example, programming of the address 2000 is as follows.

- Divide the address value by 256 ($2000/256 = 7$ remainder of 208).
- Register the integer result (7) as value in CV for the High byte (e.g. CV 120).
- Register the remainder (208) as value in CV for the Low byte (e.g. CV 121).

Setting Stop positions (CV 122 and 123, 162 and 163)

The setting of the stops is done by numerical values between 0 and 127.

Setting time (CV 124)

Time constant for a Servo step.

Process time = (difference between "red" and "green" values) * setting time * 1 ms

$$\text{Setting time} = \frac{\text{desired procedure time in seconds} * 1000}{\text{difference between "red" and "green" values}}$$

Switching point time of the Relay contacts (CV 125, 126)

The switching point time for the relay change-over can only be set for the first address in each servo output. The switching point time for the second address is always in the middle of the servo movement.

The values in the CV 125 and CV 126 have the following meaning:

0 = switching point time in the centre of the movement

1 = switching point time at the servo "red" end position

2 = switching point time at the servo "green" end position

CV125 (135, 145, 155): Switching point time with switching command "red" for outputs 1-4

CV126 (136, 146, 156): Switching point time with switching command "green" for outputs 1-4

Technical Data

Switch addresses:	2
Address range:	1-2048
Digital format:	DCC, Motorola
Servo output:	each 700mA
Total load:	700mA
Relay contacts:	3A

Accessories

Transformer 70VA Part No. 20070

with an output potential of 16V~ and maximum current of 4.3A.

Mini Servo, Part No. 81410

Used in small spaces, i.e. for situations which don't require a large torque.

Size 20.0 x 17.6 x 8.0mm, Torque 4Ncm.

Standard Servo³⁾ Part No. 81420

For general use, e.g. on turnouts. Size 22.2x20.0x11.1mm, Torque. 13Ncm.

Precision Servo³⁾ Part No. 81430

Very quiet and precise. Size 22.2 x 21.3 x11.1mm, Torque 14Ncm.

³⁾All Servos come with mounting material and 3 control wires of 100mm.

CV Table (Configuration Variables) for Servo decoder 67 810

Configuring the Decoders

CV	Description	Value Range	Factory Default
112	Software version (the processor used can be updated)	-	varies
113	Manufacturer code	-	85
119	Decoder Configuration	Value	0-143
	Power output 1 (Bit 0)		15
	0 = only on during servo movement	0	
	1 = always on	1*	
	Power output 2 (Bit 1)		
	0 = only on during servo movement	0	
	1 = always on	2*	
	Power output 3 (Bit 2)		
	0 = only on during servo movement	0	
	1 = always on	4*	
	Power output 4 (Bit 3)		
	0 = only on during servo movement	0	
	1 = always on	8*	
	Operating Mode (Bit 7)		
	0 = DCC operation	0*	
	1 = Motorola Operation	128	

*The asterisk * denotes the factory default value*

Configuration of Servo outputs

CV for servo output				Description	Value Range	Factory defaults			
1	2	3	4			1	2	3	4
120	130	140	150	1. Address high byte	0-8	0	0	0	0
121	131	141	151	1. Address low byte	0-255	1*	3*	5*	7*
122	132	142	152	Stop position "red" Address 1	0-127	30	30	30	30
123	133	143	153	Stop position "green" Address 1	0-127	95	95	95	95
124	134	144	154	Switchover time	0-255	40	40	40	40
125	135	145	155	Relay Switching point setting "red"	0-2	0	0	0	0
126	136	146	156	Relay Switching point setting "green"	0-2	0	0	0	0
160	170	180	190	2. Address high byte	0-8	0	0	0	0
161	171	181	191	2. Address low byte	0-255	0	0	0	0
162	172	182	192	Stop position "red" Address 2	0-127	0	0	0	0
163	173	183	193	Stop position "green" Address 2	0-127	0	0	0	0

**) When a Motorola center is used the factory programmed addresses are not usable and must be adjusted by the user via key programming.*

Guarantee declaration

Each component is tested for its complete functionality before distribution. If a fault should arise within the guarantee period of 2 years, we will repair the component free of charge upon production of proof of purchase. The warranty claim is void if the damage was caused by inappropriate treatment.

The trade names mentioned are registered trade marks of the respective companies.



02045 If you have any questions call us. Hotline times are:
8583-27 Mon - Tue - Thu - Fri, 14:00-16:00 and Wednesdays 16:00-18:00

Our products are covered by a two year warrantee. If it is defective send decoder along with the receipt of purchase to the following address:

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