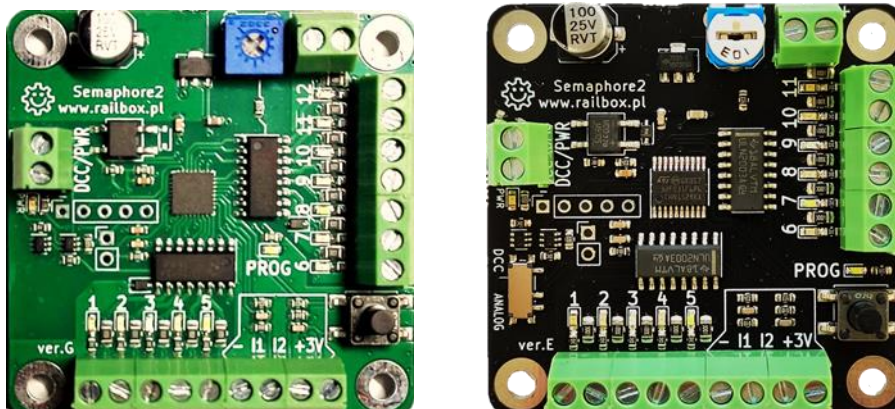


2x Semaphores Decoder RB3122 and RB3124



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Introduction

The RB 312X decoder is designed to control either two semaphores (with 1 to 6 aspects) or five two-aspect shunting signals (up to six in the RB 3124 version). The RB 3124 also allows connection of a distant signal linked to main signal #1. The decoder is compatible with DCC control systems and includes predefined signal patterns compliant with PKP (Polish State Railways) signaling regulations. It operates in digital DCC mode (powered directly from tracks or the command station) and in analog mode (for 5-aspect signals only; requires external power supply and rotary switches with resistor ladders). The decoder features independent brightness adjustment for each signal aspect and supports the Railcom® protocol.



Basic functions:

- Supports 2 five-aspect main signals or 5 (or 6 with RB 3124) two-aspect shunting signals
- Option to connect a distant signal linked to main signal #1 (RB 3124 – details [here](#))
- Operates in digital DCC and analog mode (versions D, E – mode switch on the board)
- Outputs for connecting two 11-position rotary switches (analog mode)
- Easy configuration via [RailBOX: Railroad Control](#) app (versions D and above)
- Supports Railcom® protocol (versions D and above)
- Manual programming via onboard push-button
- Independent brightness adjustment for each signal aspect

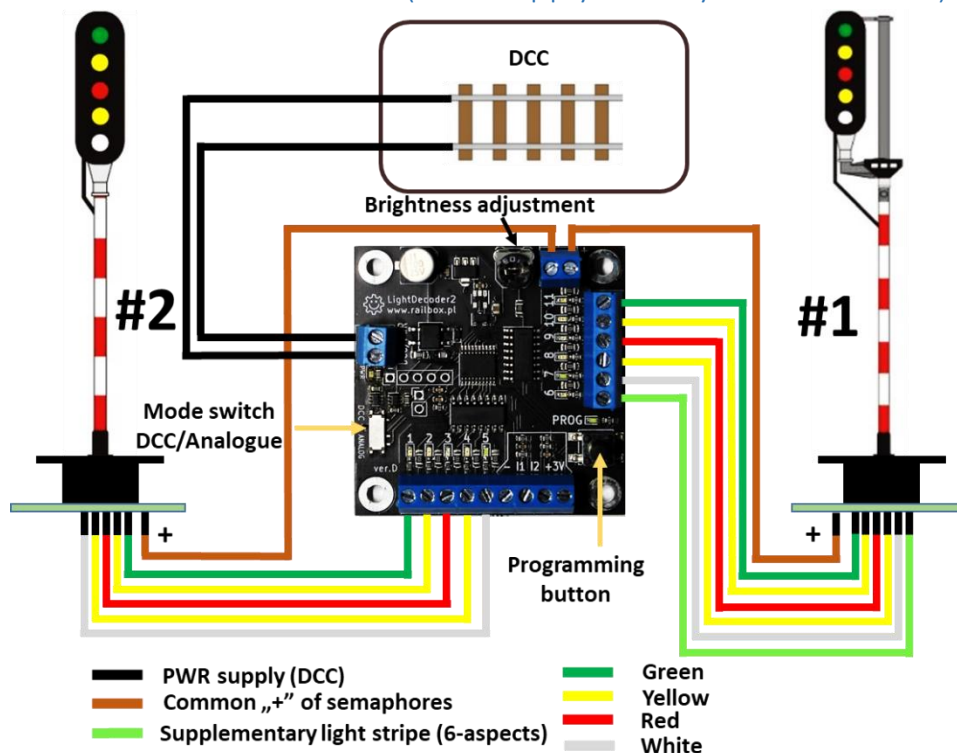
Technical parameters:

- Decoder PCB dimensions - 50 x 50 mm.
- PWR supply - 12 - 20 V AC/DC or DCC.
- Current consumption - 25 mA.

Description of the decoder outputs and connecting semaphores to it

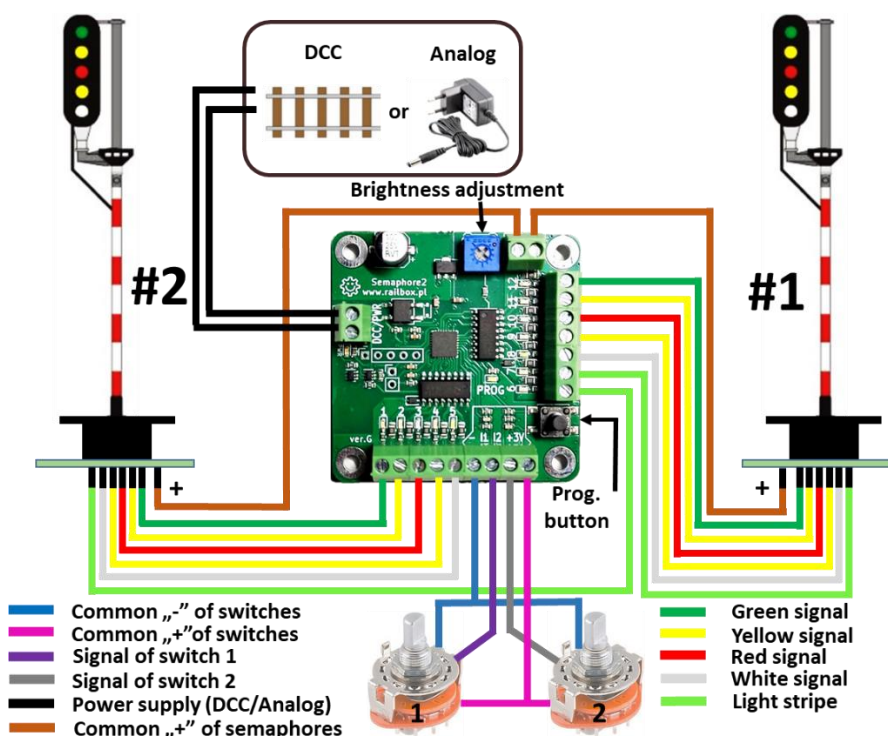
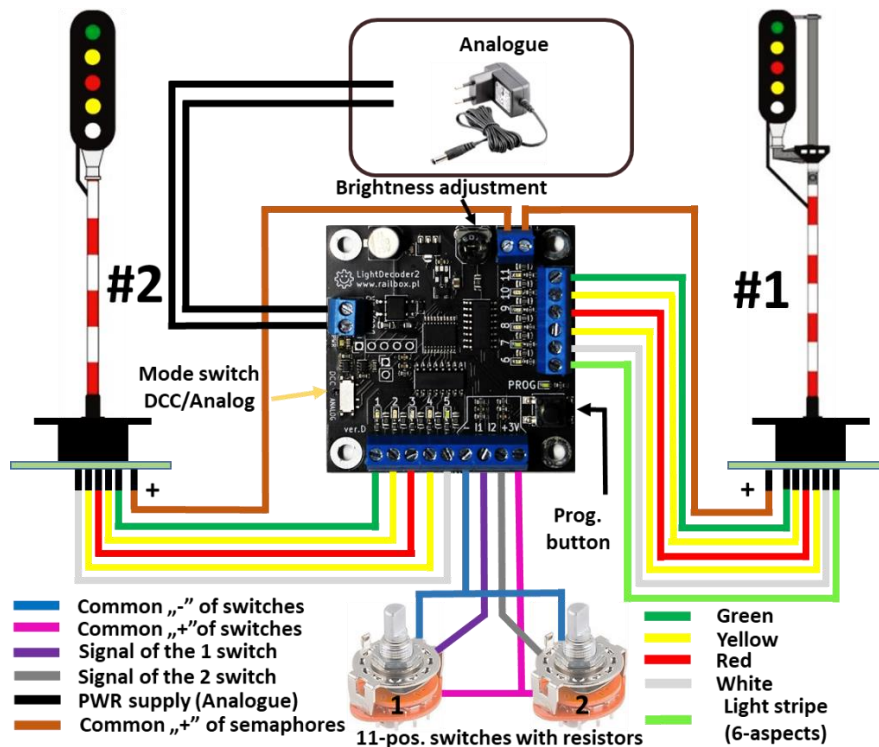
Note: Signal representations in diagrams are illustrative. You can connect any type of semaphore with 1–6 aspects to outputs #1 and 1–5 aspects to outputs #2 (versions below D), or 1–6 aspect or 2-aspect signals in versions G and above. The decoder includes resistors on all signal outputs; however, some signal models may already have built-in resistors on their circuit boards.

Connection in DCC mode (PWR supply directly from the track)

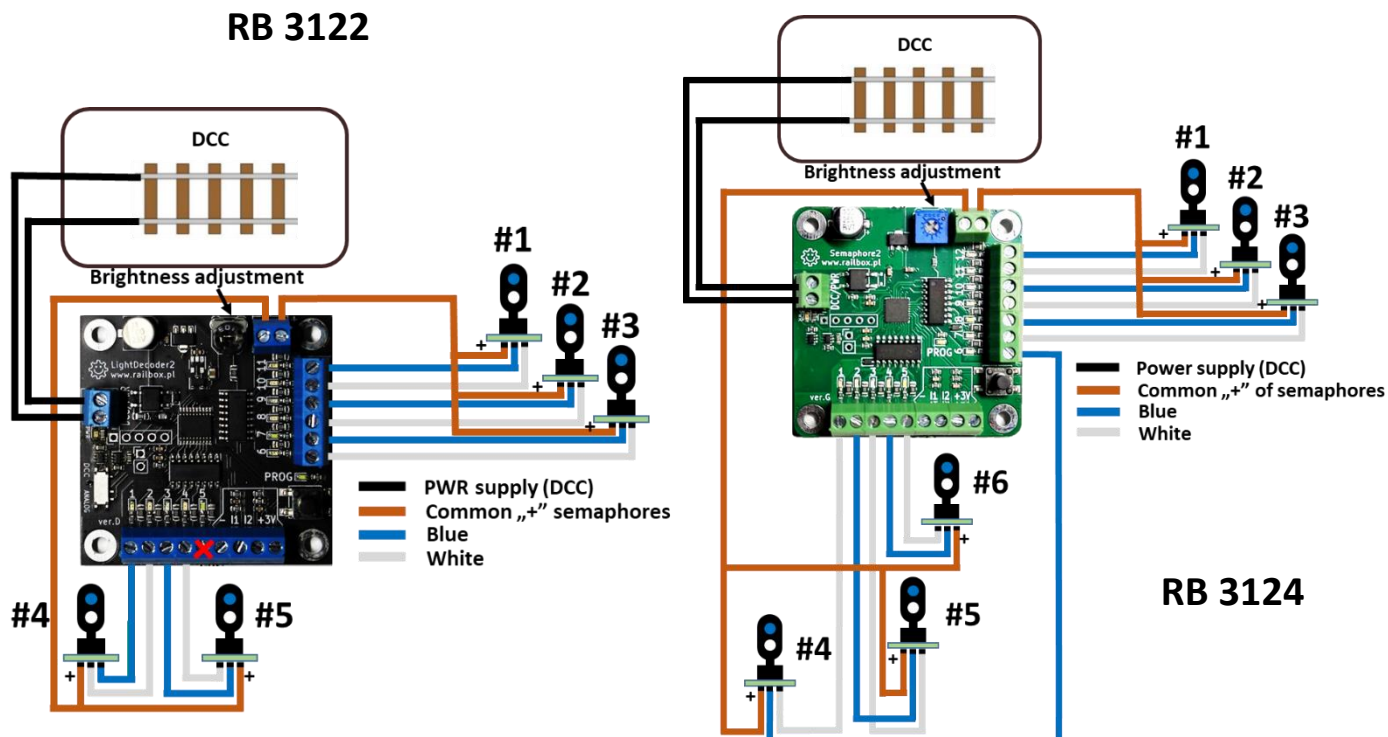


Connection in analogue mode (requires external PWR supply)

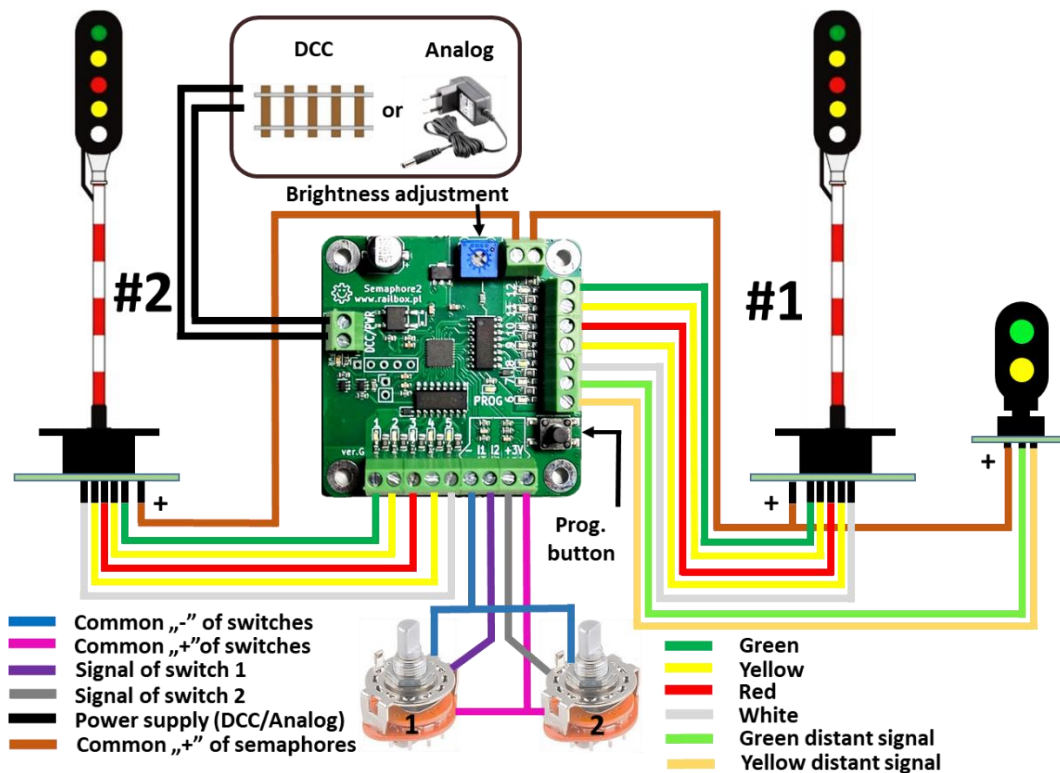
Important: In analog mode, the decoder is powered by an external power supply (up to 20 V) connected via the designated input, as shown in the diagram below. Signal changes are controlled using 11-position rotary switches connected to the appropriate decoder inputs, sharing a common "+" and "-". Each switch must include 10 resistors of 10 kΩ between positions. RB 3122 decoders (versions D and E) feature a switch to select DCC or analog mode; for other versions, this is not required.



Connection of shunting semaphores and distant signals



Note: The connection of the shunting semaphores can be done as shown above. The connection in analogue mode is not possible.



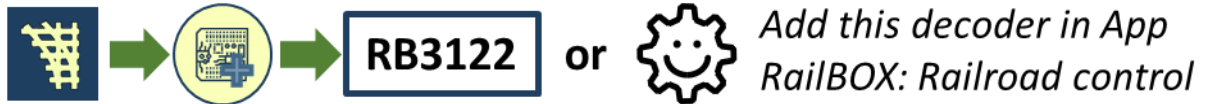
Important: The distant signal assigned to main signal #1 should be connected to the RB 3124 decoder via outputs 6 and 7.





Programming the decoder

Connecting to RailBOX: Railroad Control App



This symbol means “Easy configuration”. All RailBOX products with this ⚙ symbol on the board or sticker on the case allows two-way communication (Railcom ® protocol) with command stations with a Railcom ® receiver:

- Automatic detection of new decoders connected to the tracks and the ability to automatically assign the address to the decoder (only with ⚙ Command station, e.g., WiFi Command Station RB 1110)
- Ability to read and write configuration variables (CV) at any time on the main track (PoM)

Owners of RailBOX decoders with the symbol ⚙ and the RB 1110 Command station no longer have to worry about manual address programming for RailBOX accessory, wagons and loco decoders, just connect a new device to the tracks and the system itself will automatically find the next free address and assign it to the decoder. After that, in the mobile app RailBOX: Railroad Control will automatically appear a new loco, or accessory already with the specified address. In the case of semaphore will only need to move them to the appropriate place on the map in the mobile app RailBOX: Railroad Control. More information about this system [see here](#)



Note: If you do not have the RB 1110 Command station and/or there is no ⚙ symbol on the decoder, you can also quickly add the decoder to the map in RailBOX: Railroad control mobile app. Connect your own command station with attached decoder to it to our mobile app and follow the instructions as on above image and further instructions in the app.

Manual decoder programming

To configure RB 312X decoder DCC address manually, User should repeat the following steps:

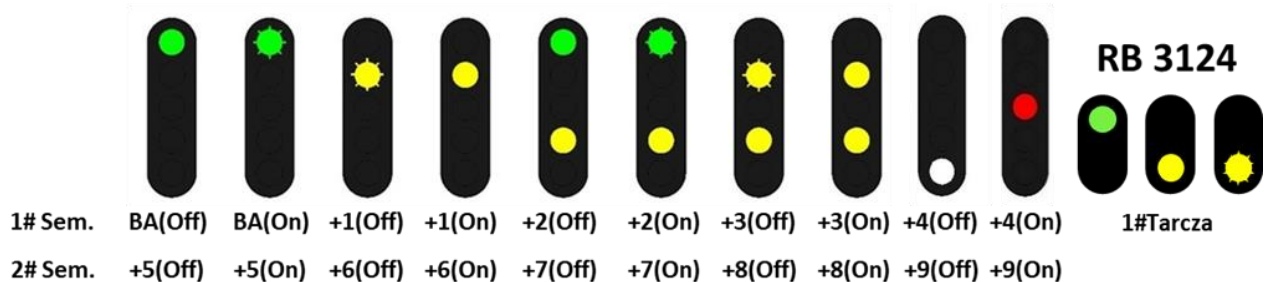
- Press and hold the decoder programming button for 2 seconds (5 seconds for shunting semaphores mode) the device will go into programming mode and the first 5 LEDs (first 2 LEDs for shunting semaphores mode) will start flashing, also the white LED next to the button will be turned ON showing that the programming mode is active. Further programming can be done in 2 ways:



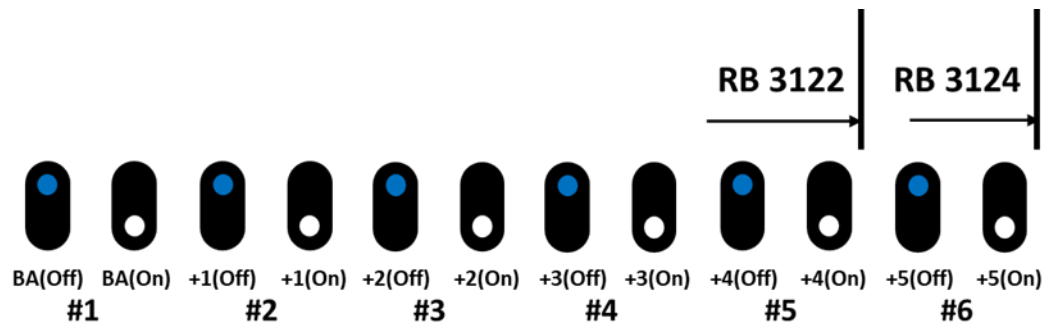


1st way – simple configuration:

- While in the programming mode that corresponds to the connected semaphores, send the accessory command with the selected address from any Command station using a manipulator, e.g., Multimaus in turnout mode (or use smartphone/tablet). Subsequent signals will be automatically assigned to subsequent addresses.
- Note:** You do not need to push button again after entering required programming mode, after successful reception of the DCC command the programming will be finished automatically.
- After successful programming the signals will have offsets from base address (BA) as follow:



- Note:** Programming address for supplementary light stripe could be done by changing CV 121 and 124



2nd way – manual configuration:

- While in the programming mode that corresponds to the connected semaphores first shortly press the programming button again. The first signal will be shown. To assign the address for this signal send the accessory command with the selected address from any Command station using a manipulator, e.g., Multimaus in turnout mode (or use smartphone/tablet).
- Note:** You can skip current signal by pressing the button again.
- Continue programming the signals until the white LED near the button goes OFF. You can exit programming mode at any time by long pressing the decoder programming button. In this case, all current configuration will be lost.

This way gives you possibility to use any addresses.





CV address settings table for the decoder

CV	Value	Default value	Description
1	1..255	0	Address (lower byte): Decoder address (CV1 i CV9)
7	0..255		Software version
8	0..255	172	Manufacturer ID / Decoder reset: Manufacturer code / Write value 1 to reset decoder to factory settings
9		0	Address (higher byte): Decoder address (CV1 i CV9)
110	0..100	31	Product code 1: Product code 1, read only. Value X of the product code in format RBXXYY
111	0..100	24	Product code 2: Same as CV110
28	bit		Railcom Configuration
	1	1	Enabling the second channel CH2: 0-off, 1-on
	7	1	Enable automatic detection system: 0-off, 1-on
29	bit		Decoder configuration 1
	3	1	RailCom: 0-disabled, 1-enabled
	6	1	Address type: 0-Not supported, 1-Output address
	7	1	Accessory decoder: 0-Not supported, 1-yes
71	0..255	255	Maximum brightness, output 12
44	0..255	255	Maximum brightness, output 11
45	0..255	255	Maximum brightness, output 10
46	0..255	255	Maximum brightness, output 9
47	0..255	255	Maximum brightness, output 8
48	0..255	255	Maximum brightness, output 7
49	0..255	255	Maximum brightness, output 6
50	0..255	255	Maximum brightness, output 1
51	0..255	255	Maximum brightness, output 2
52	0..255	255	Maximum brightness, output 3
53	0..255	255	Maximum brightness, output 4
54	0..255	255	Maximum brightness, output 5
68	0..255	10	Light intensity fade in time
113	0..11	10	Common signal #1 setting (Sem#1): Common signal #1 setting for several semaphores: 0 – S2, 1 – S3, 2 – S4, 3 – S5, 4 – S10, 5 – S11, 6 – S12, 7 – S13, 8 – Sz, 9 – MS2, 10 – S1, 11 – OFF





CV	Value	Default value	Description
114	0..255	0	Common signal #1 address setting (Sem#1): Address setting to enable common signal #1 for several semaphores. Set here DCC address, for which common signal from CV 113 will be set. Note: Some DCC Command stations may send accessory addresses that are larger by 4. So if you don't see any action, try typing value that is lesser by 4.
115	0..11	10	Common signal #2 setting (Sem #1): Common signal #2 setting for several semaphores: 0 – S2, 1 – S3, 2 – S4, 3 – S5, 4 – S10, 5 – S11, 6 – S12, 7 – S13, 8 – Sz, 9 – MS2, 10 – S1, 11 – OFF
116	0..255	0	Common signal #2 address setting (Sem#1): Address setting to enable common signal #2 for several semaphores. Set here DCC address, for which common signal from CV 115 will be set. Note: Some DCC Command stations may send accessory addresses that are larger by 4. So if you don't see any action, try typing value that is lesser by 4.
117	0..11	10	Common signal #1 address setting (Sem#2): Common signal #1 setting for several semaphores: 0 – S2, 1 – S3, 2 – S4, 3 – S5, 4 – S10, 5 – S11, 6 – S12, 7 – S13, 8 – Sz, 9 – MS2, 10 – S1, 11 – OFF
118	0..255	0	Common signal #1 address setting (Sem #2): Address setting to enable common signal #1 for several semaphores. Set here DCC address, for which common signal from CV 117 will be set. Note: Some DCC Command stations may send accessory addresses that are larger by 4. So if you don't see any action, try typing value that is lesser by 4.
119	0..11	10	Common signal #2 setting (Sem#2): Common signal #2 setting for several semaphores: 0 – S2, 1 – S3, 2 – S4, 3 – S5, 4 – S10, 5 – S11, 6 – S12, 7 – S13, 8 – Sz, 9 – MS2, 10 – S1, 11 – OFF
120	0..255	0	Common signal #2 address setting (Sem#2): Address setting to enable common signal #2 for several semaphores. Set here DCC address, for which common signal from CV 119 will be set. Note: Some DCC Command stations may send accessory addresses that are larger by 4. So if you don't see any action, try typing value that is lesser by 4.
121	0..255	0	[SM] Light stripe #1 address (lower byte)
122	0..255	0	[SM] Light stripe #1 address (higher byte)
123	0..255	0	[SM] Light stripe #2 address (lower byte)
124	0..255	0	[SM] Light stripe #2 address (higher byte)
112	0..1	0	[SM] Simple configuration type: [SM] Simple configuration type: 1 - mode 2-aspects. 0 - mode 5-aspects

