Manual

Micro - Lokdecoder DCX76z

for Z and TT Scale

0.27 x 0.24 x 0.07 Inch - 6,9 x 6,1 x 1,7 mm (LxBxH)

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Warning!

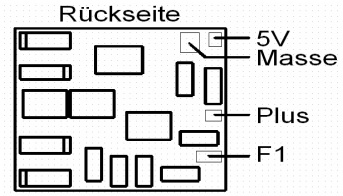
Due to small parts for children under 12 are not suitable. Subject to errors and change of technical progress and choice of materials reserved. Any liability for damage or consequential damage is excluded from improper use, defective devices, unauthorized intervention, overheating and overloading of technical data, operating with not provided for the model train transformers and digital devices.

1. Technical Data and Specifications DCX76z

- Enhanced and tunable load control, even slower and more evenly
- Dimensions: 6.9 x 6.1 x 1.7 mm (+ 0.1 mm maximum tolerance)
- Operating voltage 7-18 volts
- Maximum continuous current motor = 0.8 amps
- Maximum continuous current of all outputs = 250 mA
- 4 strengthened function outputs
- Lighting effects such as blinking, dimming, soft start, US-lighting, etc.
- Automatic clutch, clutch control, time control for digital clutches
- All function outputs in groups of several fully dimmable, dimming frequency 1.2 kHz
- Reliable overload protection for motor and function outputs
- Fully programmable with Roco Lokmaus 2, and values and CVs over 99
- Fully compatible with the NMRA DCC data format
- Full "function mapping" NMRA arrangement, ie free arrangement of the outputs
- Full "CT function mapping"
- full address range 1-10240
- shunting F3 display mode, reduced speed reverse
- Free speed table
- Optimized load balancing (P and I controller)
- High-frequency motor control 16 kHz or 32 kHz, for coreless motors (Faulhaber, Maxon) are ideal
- Low-frequency motor drive, variable from 30 - 150 Hz
- Optional 14, 28 or 128 speed steps
- Digital and analog operation, the possibility, on the fly 'programming
- Hard reset and user CVs
- 2 sets of CV can be chosen (for own account or for third-party applications)
- All Zimo features
- Separately adjustable braking time with HLU (also intermediate steps)
- Signal sensing loco number affect (Zimo HLU, off)
- Train ID (Zimo off)
- Braking by asymmetric signal (4:1 ratio diodes)

1.1 Connections of DCX76z with NEM 651

1.2

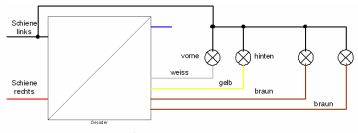


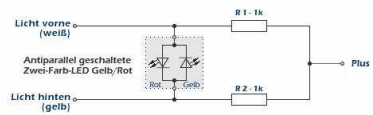
Yellow ..... Rear Headlight
White ..... Front Headlight
Black ..... Left Rail
Red..... Right Rail
Gray ..... Motor (-)
Orange ..... Motor (+)

1.3 8-pin Digital Interface according to NMRA-Standard NEM 652

#	Stecker		#
1	Orange	Red	8
2	Yellow	Blue	7
3	N/C	White	6
4	Black	Gray	5

1.4 Pin assignment with a common rail as positive





Connection for anti-parallel connected LEDs

1.4 Notes and references

Assembly:

The factory setting for the DCX76z shrink tube is not installed. Secure the decoder with double sided tape, there must be no contact between metal parts such as Lokchasis or locomotive body and electronic components of the decoder may be present. Attach instead on metal parts of the locomotives with insulating tape, so we can avoid short circuits. Never wrap the decoder in insulating tape, thereby preventing the air circulation and this can lead to overheating of the decoder.

Improper use will void the warranty!

2. Configuration Variables (CV's)

CV	Description	Default Setting	Range
1	Base Address: This is the stored address decoder, the decoder is addressed with the. This requires CV29, bit 5 = 0 must be set. The addresses from the value 128 are set in CVs 17, 18. It can only be written addresses from the value 1 and read. A complete reset (= hard reset) causes the reset of all CVs to the factory default settings specified here. A reset is triggered by the single letter of CV 1 = 0. A reset should be done if the decoder does not respond or unusual works, or if you have changed many settings and is now no longer cope. Except for the reset of the CV values: the speed table in CV67 to CV94 and all CVs that are deposited in the special group CV109 = 1 are not reset. After the reset, the decoder runs back at address 3	3	1 - 127
2	Minimum speed: This is the voltage applied to the motor at speed step 1 and starts moving with the locomotive.	2	0 - 255
3	Acceleration time: indicates the time it takes for the engine to accelerate from standstill to full speed to accelerate. CV3 is at = 0 continuous acceleration off. The engine responds immediately to changes in the hand controller.	4	0 - 255
4	Braking time: indicates the time it takes for the engine to decelerate from full speed to a stop. When CV4 = 0 continuous brake off. The engine responds immediately to changes in the hand controller.	4	0 - 255
5	Maximum speed: sets the max. Speed at which the engine at max. Gear / drive controller position.	255	0 - 255
6	Middle speed: This CV works in conjunction with the CV2 and CV5. There shall be a characteristic of three points. CV2 determines the starting point of the curve, ie the starting voltage. CV6 determines the center of the characteristic. CV5 sets the end point of the curve, so a maximum speed of the locomotive. A linear characteristic is achieved with CV6 = 0 Then, the characteristic curve consists of only two points, the start point and end point CV2 CV5. With CV 6, you can create a non-linear characteristic, eg: CV 2 = 2 CV 6 = 50 CV 5 = 200 If we require DCC with 28 steps, then the engine speed levels in the 1 - 14 per speed step just a little faster, while driving from level 15, the speed increases then more pro gear. The engine can thus be controlled to drive gear 14 and softer. This is especially useful for shunting and for smooth starting. Applies to these 3 CV settings should be noted that between the respective CVs setting values at least 14 or more. The decoder can not otherwise assign each range on the controller has its own speed value. Example: CV 2 = 2 CV 6 = 60CV 5 = 51 The top speed is chosen to be very low. However, causes the value of CV 5 = 51, the top speed CV 2 = 2 reached the value 51 in gear 15. The result is that you can adjust it while driving levels, but the CV 6 = 37 Decoder to increase the speed of the locomotive any longer. The settings are therefore modify: CV 5 = 51 Further be noted that CV always gets 2 the lower and higher values assigned to the CV 5.	0	0 - 255
7	Version number: The stored software version from the manufacturer, can only be read and used for information purposes. Above a certain the version (version 27 are all made by CT decoder electronics upgradeable) decoders are updatable. The can has the advantage of later detected errors are corrected in the controller.	-	Variable
8	Manufacturer ID: can be read only. Value = 117 means that electronics manufacturers CT	117	117
9	Motor control Period: This determines the frequency at which the motor is driven. For difficult cases, the low-frequency control is recommended with adjustable 30-150 Hz. Normally, one uses the high-frequency control at 16 kHz. This setting is programmed at the factory and also ideal for coreless motors, eg The company Faulhaber and Maxon. For special cases there is the possibility of control at 32 kHz. This is set with bit 7 in CV 137th Value 13-63 adjustable from 30 - 150 Hz, the frequency is calculated as f = 1953 / Value CV9 Value of 134-191 is 16 kHz and the frequency EMF measurement The exact formula for the continuous low-frequency control is: 1953/CV9	134	13 - 63 134-191
13	Analog mode: bits 0-7 defines the output A1 - A8 set that should be turned on when the decoder is direct current (DC). Behind this CV are 8 different bits. Bits are binary only, i.e. shown with value 0 or 1. We program the CVs of the decoder to the decimal system. Da Therefore, always a conversion takes place according to the scheme. Each binary bit is a decimal value assigned. One has for each bit of the possibility the decimal value zero or the assigned To take a decimal number. A value of zero represents off, the decimal value means ON. Bit 0 turns the output A1, which is the light front Bit 1 switches the output A2, which is the light behind Bit 2 sets the output A3. Bit 3 sets the output A4. Bit 4 sets the output A5. Bit 5 sets the output A6. Bit 6 sets the output A7. Bit 7 sets the output A8. Example: In the analog driving mode to the outputs A1, A4 and A6 to be turned on. It must decimal numbers 1, 8, 64 are added together from the adjacent table. The result is 73 Programmed to the value 73 in CV 13, then the above three analog outputs Driving, always on, all other outputs are always off. Bit value calculation for CV 13: Bit 0: value 0 = off or 1 = on Bit 1: value 0 = off or 2 = on Bit 2: value 0 = off or 4 = on Bit 3: value 0 = off or 8 = on Bit 4: value 0 = off or 16 = on Bit 5: value 0 = off or 32 = on Bit 6: value 0 = off or 64 = on Bit 7: value 0 = off or 128 = on Total max. Value = 255	0	0 - 255
17 + 18	Extended address: address decoder is used as if it is set in CV 29, bit 5 = 1. The CV 1 is then switched off. CV29 = actual value of x plus 32 program, if address 128 and used it. The decoder and the center have the same mode (mode for long addresses) work.	0	128 – 10240
19	Composite address: multi-unit address different from CV1 Normally, the central one mode of operation, the "composite mode" or "double header" or "multiple unit" means. This mode gives you the address of the locomotives that you want to share control of a manual control in front of a train. E.G. the E10 with the address 10 and the E40 with the address 40 will pull together a long train. At the center you are under the double header 10 and the address 40, an address, so then do you control these two different engines on a common speed controllers. Is not this a central potential, one uses the 19th CV It's a free unused address here that are different from all addresses in CV1, CV17 and CV18 must also be used in any other decoder, for example the address of the 88th This address is now stored in the E10 and E40 in the 19th in their CV If you now with a manual control, the address 88, then one speaks exactly these two locomotives at the same time, we can go in a double header, without having to have a special operating mode of a control center. Note: In a double header to be from a hand controller, the same information is always sent to both engines. They use the information according to your decoder and programming them to. For a functional double traction, it is therefore important that the decoder of the respective locomotive contain about the same programming, such as the speed and the engines are mechanically similar in structure and similar handling characteristics to create the day. So it makes no sense as a BR 80 to combine with an E103. For more divergent handling of the engines are working against each other, which can cause mechanical damage to the engine due to overload or damage the electronics.	0	1 – 127

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CV	Description	Default Setting	Range
29	Configuration bits: important basic settings influencing various properties. Bit 0: direction: 0 = normal 1 = reversed Here, the direction to be changed. If after installation of the locomotive decoder according to the display on the controller in the wrong direction moves, the cables must not be soldered. This bit is a software-technical change. If you exchange with this bit, the direction the light is behind the front and not replaced. Bit 1: Speed mode: 0 = 14 steps 1 = 28 steps This bit sets the DCC mode determines the number of speed steps. Normally, you work with 28 speed steps. Older centers are working with only 14 steps. This bit can customize the decoder to the effect. According to the factory settings this is the only bit that is usually set to the value 1. Bit 2: Mode: 0 = only digital mode 1 = analog and digital mode Our decoder can be operated with analog DC voltage. What mode of the decoder detects is set here. If the decoder is not used for analog, you should set this bit to zero. It occurs in some centers, that a brake signal is interpreted with a DC voltage as an analog operation. Then, the decoder continues at a steady pace, because he believes in the analog mode to be. Bit 3: not used Bit 4: Speed curve: 0 = CV values of 2, 5, 6 1 = CV values of 67-94 Here are the basic setting is made, the process by which the speed of the individual gears is fixed. A value of 0 selects the 3-point curve. A value of 1 selects the table of free speed curve. For details on the characteristics, read more below their respective CVs. Bit 5: Address range selection: 0 = addr 1-127 from CV1 1 = 128-10240 from CV17 +18 This determines whether 127 addresses or more addresses, the so-called long addresses will work. Bit 6: not used Bit 7: not used Calculation for CV 29: Bit 0: 0 or 1 Bit 1: 0 or 2 Bit 2: 0 or 4 Bit 3: 0 or 8 Bit 4: 0 or 16 Bit 5: 0 or 32 Bit 6: 0 or 64 Bit 7: 0 or 128 Total: up to 255	2	0 - 255
30	Error Analysis: These values can only be read out and give information about 1 = Motor why a decoder turns off during operation, the outputs. 2 = light 3 = light engine and have a short circuit	0	0 - 3
33-46 163-176	Function mapping "function mapping" NMRA arrangement for CV 33 - CV 46, and "CT-function mapping" CV 163 - CV 176 It is the most complex way to assign specific keys on certain outputs. How can all only 7 bits are written to a CV, which implemented the maximum resulting decimal value of 255. About a CV that is more than eight outputs (bit 0 to bit 7 are 8 ways namely) are assigned to a function key. Because this is not very functional running tracks is enough to have the CV 163 - CV 176, the expanded possibilities of mapping. On the other hand, an output a plurality of function keys are assigned. Example: A1, A3 and A7 are to be switched from f1 together. The values according to the table amount to 64, 4, 1 and 69 result ➔ The value 69 is entered in CV 35 Now, in addition to the output A14 and A16 to be off by pressing f1, So then switched from f1 total of 5 outputs simultaneously. The values according to the table are 32, 128 and 160 result ➔ The value 160 is entered in CV 165 In this decoder, as with most other decoders only 4 physical outputs. Accordingly, the assignment, the computational work and programming very easy. Really interesting, the table is very functional with models who have to have an additional function decoder. Its outputs can seamlessly attach to the first 4 outputs in the programming logic, and thus assign differentiated. The settings made here work in both directions. I.e. A7 is programmed to f4 (CV39 = 8) and then the A7 is turned on when the button is on f4 manual control set to "on". The A7 will light output in both directions. If so desired, needs no further adjustments are required. If this output but only light in a certain direction, it is in CVs 154 - 161 For details on Shunting see CV 116	---	0 - 255

CV	Key	Output	A22	A21	A20	A19	A18	A17	A16	A15	A14	A13	A12	A11	A10	A9	A8	A7	A6	A5 Shunting Functions	A4	A3	A2 Lih	A1 Liv		
33	f 0	In front															128	64	32	16	8	4	2	**1**	**1**	0 – 255
163	f 0	In front							128	64	32	16	8	4	2	1										0 – 255
34	f 0	behind															128	64	32	16	8	4	**2**	1	**2**	0 – 255
164	f 0	behind							128	64	32	16	8	4	2	1										0 – 255
35	f 1																128	64	32	16	8	**4**	2	1	**4**	0 – 255
165	f 1								128	64	32	16	8	4	2	1										0 – 255
36	f 2																128	64	32	16	**8**	4	2	1	**8**	0 – 255
166	f 2								128	64	32	16	8	4	2	1										0 – 255
37	f 3	Shunting functions															128	64	32	**16**	8	4	2	1	**16**	0 – 255
167	f 3								128	64	32	16	8	4	2	1										0 – 255
39	f 4													128	64	32	16	8	**4**	2	1				**4**	0 – 255
168	f 4					128	64	32	16	8	4	2	1													0 – 255
40	f 5													128	64	32	16	**8**	4	2	1				**8**	0 – 255
169	f 5					128	64	32	16	8	4	2	1													0 – 255
41	f 6													128	64	32	**16**	8	4	2	1				**16**	0 – 255
170	f 6					128	64	32	16	8	4	2	1													0 – 255
42	f 7													128	64	**32**	16	8	4	2	1				**32**	0 – 255
171	f 7					128	64	32	16	8	4	2	1													0 – 255
43	f 8													128	**64**	32	16	8	4	2	1				**64**	0 – 255
172	f 8					128	64	32	16	8	4	2	1													0 – 255
44	f 9										128	64	32	**16**	8	4	2	1							**16**	0 – 255
173	f 9		128	64	32	16	8	4	2	1																0 – 255
45	f 10										128	64	**32**	16	8	4	2	1							**32**	0 – 255
174	f 10		128	64	32	16	8	4	2	1																0 – 255
46	f 11										128	**64**	32	16	8	4	2	1							**64**	0 – 255
175	f 11		128	64	32	16	8	4	2	1																0 – 255
47	f 12										**128**	64	32	16	8	4	2	1							**128**	0 – 255
176	f 12		128	64	32	16	8	4	2	1																0 – 255

CV	Description	Default Setting	Range
50	Usually influence: the degree of EMF, which is the load regulation for the motor. What is meant is that the engines under load, so at long Trains or uphill, slow down and go downhill quickly. The load control measures, strictly speaking, the Speed of the motor. If this off under heavy load, which is normal at even the sophisticated model , then engages the electronics and controls the motor current so long after, until the desired speed again is set. Mind you, this is all done internally in the decoder, this is no interference from outside, that are most Manual control is required. The adjusted value of 255 means a very fast and accurate readjustment. This is also called a hard Regulation. Cutting away the value, will necessarily increase the bandwidth of the speed, so the speed of the Motor under different loads are no longer kept as constant as 50th in a high value of CV	255	0 - 255
51	P - controller: the engine capacity control influenced Here is an optimum value was found from the factory. Changes should be through their own efforts and with higher be made with lower values. Quickly it will be noticed when the engine characteristics, e.g. improve with lower values. Then should in this direction with various other lower Values continue to be experimented until they found an optimal engine settings by feel.	80	0 – 255
52	I - Control: affected property of the motor control Here is an optimum value was found from the factory. Changes should be through their own efforts and with higher be made with lower values. Quickly it will be noticed when the engine characteristics, e.g. improve with lower values. Then should in this direction with various other lower Values continue to be experimented until they found an optimal engine settings by feel.	40	0 – 255
53	Special CV: Lock and unlock the decoder If you programmed a decoder ready, it can be locked against accidental reprogramming by the value 66 in CV 53 writes. If you want to change again this CVs decoder, lift the lock with a value of 77 to again. Interestingly this lock is especially multiple decoders or additional sound modules in the locomotive. After you finished with the decoder, it can be blocked and work on other modules or decoders. This is one way to electrically separate programming two decoders in one loco at CV overlays. CV programming and report back ➔ 53 = 66 to lock CV programming and report back ➔ 53 = 77 to unlock Especially for users of the Roco Lokmaus: CVs and values higher than 99 with the Roco Lokmaus In order to program values over 99. If CV53 = 1 or 2 is added when writing CVs arbitrary value of 100 or 200 to the programmed value. Users with the central processing units support the full range of values do not need this detour. CV53 = 1 ➔ 100 + programmed value CV53 = 2 ➔ 200 + programmed value Examples: If the CV 50 of the value 167 should be written, must be as follows according to the series can be programmed. 1) CV 53 = 1 (all subsequently programmed values are increased by 100) 2) CV 50 = 67 (through the CV53 = 1 places the value 167 is written to the CV50) 3) CV 53 = 0 (reset to zero!) If the CV 137 of the value 213 should be written, must be as follows according to the series can be programmed. 1) CV 53 = 1 (all subsequently programmed values are increased by 100) 2) CV 7 = 37 (this is set to CV7 137, all of the following programmed values are stored in CV137) 3) CV 53 = 2 (all subsequently programmed values are added together with 200) 4) CV 8 = 13 (this is set CV137 to 213) 5) CV 53 = 0 (reset to zero!)	0	0 – 255
54 Result CV: 57	Dimming of the function outputs: functions, eg Dim lamps or LEDs It reduces the brightness. This is done by pulse width control with a frequency of 1.2 kHz. The pulse width is set in percentage terms, ie value of 50 means half brightness according to the average half-rail voltage of the system. The value set here is applied to all outputs, which are stored in CV 57 Note: Each lamp must be designed in principle to the rail voltage of the system. LEDs have a mandatory Series resistor can be connected. CV 54 is not suitable to apply a voltage of eg 16 volts permanently to 8 volts to reduce. Acknowledgement pulses are always with the full rail voltage, without consideration of the CV54 submitted. Similarly, the value of this lost in a decoder reset CV. CV54 is intended to provide a normal light Lamp to dim slightly.	50	0 – 100
55 Result CV: 56,58	Dimming the output coupling: Coupling dim, reducing the magnetic force of the clutch, It reduces the average voltage. This is done by pulse width control with a frequency of 1.2 kHz. The pulse width is set in percentage terms, ie the value 50 means half the average rail voltage of the system at the coupling outputs. This function is always used when, for example an electric magnetic coupling is used which has been working with 5 volts. Would always here the full rail voltage is applied at the opening of the coupling, it can lead to overheating of the electrical coils are small and thus damage. Therefore, we reduce the voltage on these couplings, as far as possible. The value set here is applied to all outputs, which are stored in CV 58. Note also the function of the 56th CV Note: Each lamp must be designed in principle to the rail voltage of the system. LEDs have a mandatory Series resistor can be connected. CV 54 is not suitable to apply a voltage of eg 16 volts permanently to 8 volts to reduce. Acknowledgement pulses are always with the full rail voltage, without consideration of the CV54 submitted. Similarly, the value of this lost in a decoder reset CV. CV54 is intended to provide a normal light Lamp to dim slightly.	50	0 - 100
56	Switching time of the clutch output: switch for coupling digital Here is the output coupling which is stored in CV58 determines how long they should remain switched on after a keypress. A value of 0 turns it up on time, until the next keystroke of these outputs will be OFF. The time duration is measured in E = 0.1 sec example: The value 60 in CV 56 causes an activation of 60 x 0.1 sec = 6 seconds on	60	0 - 255

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CV	Description		Default Setting	Range
57	Dimming mask 1 for functional outputs: selection of lamps and LEDs for outputs dimmed This determines which outputs will include A1 through Ax to the function outputs for lamps and LEDs. These can be switched with function button fx that were set in CV33 et seq. The bulbs / LEDs burn with a brightness of x% that was set in CV54. As in all CVs can also be written up to 8 bits (bit 0 to bit 7), so therefore, a maximum of 8 function outputs can be selected here for dimming. The selection is done according to the adjacent table, the calculated value is entered in decimal this CV 57th Due to their design, only the first 8 outputs are dimmed. Bit 0 specifies the output A1 as a function of output for dimming mask 1, which is the light front Bit 1. . . . . A2 is the light behind Bit 2. . . . . A3 Bit 3. . . . . A4 Bit 4. . . . . A5 Bit 5. . . . . A6 Bit 6. . . . . A7 Bit 7. . . . . A8	Bit value calculation for CV 57: Bit 0: value 1 = A1 set Bit 1: value 2 = A2 set Bit 2: value 4 = A3 set Bit 3: value 8 = A4 set Bit 4: value 16 = A5 set Bit 5: value 32 = A6 set Bit 6: value 64 = A7 set Bit 7: value 128 = A8 set Total: = 255 max. value	0	0 - 255
58	Dimming mask 2 for coupling two outputs: the outputs are to be selected, the clutch output. This determines which outputs will act as a coupling outputs A1 to Ax. These can be switched with function button fx that were set in CV33. The couplings are working with voltages in the x% of rail voltage, which was set in CV55 and turn only so long as it was set in CV56. As in all CVs can also be written up to 8 bits (bit 0 to bit 7), so therefore, a maximum of 8 function outputs can be defined as the output coupler. The selection is done according to the adjacent table, the calculated value is entered in decimal this CV 58. Due to their design, only the first 8 outputs are defined as output coupler. Bit 0 specifies the output A1 as output coupler for the dimming mask 2, which is the light front Bit 1. . . . . A2 is the light behind Bit 2. . . . . A3 Bit 3. . . . . A4 Bit 4. . . . . A5 Bit 5. . . . . A6 Bit 6. . . . . A7 Bit 7. . . . . A8	Bit value calculation for CV 58: Bit 0: value 1 = A1 set Bit 1: value 2 = A2 set Bit 2: value 4 = A3 set Bit 3: value 8 = A4 set Bit 4: value 16 = A5 set Bit 5: value 32 = A6 set Bit 6: value 64 = A7 set Bit 7: value 128 = A8 set Total: = 255 max. value	0	0 - 255
59	Train control: "L" speed selected for L - section, see also CV137, 96, 97.98		168	0 - 255
60	Train control: "U" speed selected for U - section, see also CV137, 96, 97.98		84	0 - 255
61	Acceleration time: time between release and transfer admission to the HLU - operation unit in Sec. See also CV137, 96, 97.98		1	0 - 255
64	Control reference: Handling characteristics depending on the voltage rail		110	0 - 255
	Speed table: The table below, CV 67 to CV 94 is used when bit 4 is set in CV29 = 1. Internally, the decoder works with 255 speed steps. The minimum rate of CV 2 represents the initial value, the maximum CV of 5 corresponds to the final value of the velocity curve. Leaving the middle speed of CV6 before viewing this outside, so CV6 = 0, then distribute the 254 linear speeds on the 28 individual gears of the manual control. Who wants to pay a certain characteristic in the decoder, works with the following table, which allows hinterlegbar for each of the 28 steps a definite value, freely assignable, fully independent, and individually programmed. 28 steps from the factory have been deposited with nine steps behind.			
67	Speed table	Speed Step 1:	9	0 – 255
68	Speed table	Speed Step 2:	18	0 – 255
69	Speed table	Speed Step 3:	27	0 – 255
70	Speed table	Speed Step 4:	36	0 – 255
71	Speed table	Speed Step 5:	45	0 – 255
72	Speed table	Speed Step 6:	54	0 – 255
73	Speed table	Speed Step 7:	63	0 – 255
74	Speed table	Speed Step 8:	72	0 – 255
75	Speed table	Speed Step 9:	81	0 – 255
76	Speed table	Speed Step 10:	90	0 – 255
77	Speed table	Speed Step 11:	99	0 – 255
78	Speed table	Speed Step 12:	108	0 – 255
79	Speed table	Speed Step 13:	117	0 – 255
80	Speed table	Speed Step 14:	126	0 – 255
81	Speed table	Speed Step 15:	135	0 – 255
82	Speed table	Speed Step 16:	144	0 – 255
83	Speed table	Speed Step 17:	153	0 – 255
84	Speed table	Speed Step 18:	162	0 – 255
85	Speed table	Speed Step 19:	171	0 – 255
86	Speed table	Speed Step 20:	180	0 – 255
87	Speed table	Speed Step 21:	189	0 – 255
88	Speed table	Speed Step 22:	198	0 – 255
89	Speed table	Speed Step 23:	207	0 – 255
90	Speed table	Speed Step 24:	216	0 – 255
91	Speed table	Speed Step 25:	225	0 – 255
92	Speed table	Speed Step 26:	234	0 – 255
93	Speed table	Speed Step 27:	243	0 – 255
94	Speed table	Speed Step 28:	252	0 – 255

CV	Description	Default Setting	Range
96	Train control, "FL" chosen speed between FL (MX9 or HLU) is version 52, see CV 59, 60, 137	212	0 – 255
97	Train control, "LU" chosen speed between LU (MX9 or HLU) is version 52, see CV 59, 60, 137	126	0 – 255
98	Train control, "U-Stop" selected speed between U-Stop (MX9 or HLU) is version 52, see CV 59, 60, 137	42	0 - 255
105	User-CV: This CV has on the properties of the decoder no influence. This CV can be written into and read out. It can for example here the date of purchase will be deposited. It can be written each decimal number between 0 and 255.	0	0 - 255
106	User-CV: This CV has on the properties of the decoder no influence. This CV can be written into and read out. It can for example here the date of purchase will be deposited. It can be written each decimal number between 0 and 255.	0	0 - 255
109	Selection of CVs groups: Bit 0 = 0 ➔ Standard Group Bit 0 = 1 ➔ special group for their own applications This decoder has stored the factory CVs listed in this table in its memory with the appropriate values. These values can all change according to the specifications described in broad ranges and are always stored in the default group 0. These are the basic operating parameters. These values were changed individually, the default values are reset group 0 with a hard reset (for details, see CV 1) to the factory settings in the left column. In addition, to be deposited again completely different values in a special group 1 for all these CVs. This alternative set of CV values, e.g. be set for a club operation (CV109 = 1). Home on your own system is run with the default values (CV109 = 0). With a hard reset (for details, see CV 1), all CV values of the current group will be reset to factory setting, not the CV109, and CV67-CV94, however deleted.	0	0 - 1
111	Intensity of Acknowledgement pulses (ACK): improved programmability, 128 = 50% of max. Acknowledgement pulses (Engine dependent) value of 255 = generally well tolerated	255	0 - 255
114	The dimming effects: lower brightness value for light effects, see CV154 to 161 It reduces the average voltage. This is done by pulse width control with a frequency of 1.2 kHz. The pulse width is set in percentage terms, ie the value 50 means half the average rail voltage of the system at the outputs. The value set here is applied to all effects, which are deposited in CV154 to 161.	0	0 - 100
115	Pause duration of effects: defines the time (duration) between two effects	0	0 - 255
116	Shunting: f3 button is factory-set (CV37), it is unmappable see CV35-42. the effects. Shunting gears are the only active when bit 0 to bit 2 of these are set CV116. Bit 0 = 1 ➔ CV3 (acceleration) and CV4 (deceleration) are turned off, ie with active shunting (f3 is key "On"), whose values are set to 0. The engine then converts each setting of the manual control immediately. Bit 1 = 1 ➔ The max. Speed is halved forward and backward. This allows the engine driven more sensitive be. Bit 2 = 1 ➔ reverse the max. Speed of only 65%. This setting is independent of the key f3 whether the shunting is now switched on or not, just by setting this bit. This feature has for shunting locomotives, which are well done, very successful. For sound decoder driving AND: new bit of software version in CV116 is 40 and on some hardware Bit 3 = 1 ➔ brakes with 4-1 active diode Bit 4 = 1 ➔ brakes with diode directional NOT Bit 5 = 0 ➔ is not used, must always be 0. (Braking mode also allows for slow speed) Bit 6 = 1 ➔ means that the shunting effect as a command button, that is that the train control (Braking diode and / or HLU) is NOT working! (equivalent to the MAN button) Bit 7 = 0 ➔ is not used, must always be 0. Bit value calculation for CV 116: Bit 0: 0 or 1 Bit 1: 0 or 2 Bit 2: 0 or 4 Bit 3: 0 or 8 Bit 4: 0 or 16 Bit 5: always 0 Bit 6: 0 or 64 Bit 7 is always 0	0	0 - 255
117	Number of stop down the function key: Modern rail vehicles have head beam and low beam. The decoder can simulate this function electronically. In CV 117 is set which button the remote light switch is. There can be only one key can be defined. Written is a decimal value from 1 - 12 Value 1 ➔ Button F1 Value 7 ➔ Button F 7 Value 2 ➔ Button F2 Value 8 ➔ Button F 8 Value 3 ➔ Button F3 Value 9 ➔ Button F 9 Value 4 ➔ Button F4 Value 10 ➔ Button F10 Value 5 ➔ Button F5 Value 11 ➔ Button F11 Value 6 ➔ Button F6 Value 12 ➔ Button F12	0	1- 12
118	Mask for preview function: This defines to which output is dimmed with the button is CV117. Several, up to 8 outputs can be defined. Bit 0 switches the output A1 on, which is the light front Bit 1 switches the output A2 on, which is the light behind Bit 2 switches the output A3 on. Bit 3 switches the output A4 on. Bit 4 switches the output A5 on. Bit 5 switches the output A6 on. Bit 6 switches the output A7 on. Bit 7 switches the output A8 on. Bit value calculation for CV-118: Bit 0: value 0 = off or value 1 = on Bit 1: value 0 = off or value 2 = on Bit 2: value 0 = off or value 4 = on Bit 3: value 0 = off or value 8 = on Bit 4: value 0 = off or value 16 = on Bit 5: value 0 = off or value 32 = on Bit 6: value 0 = off or value 64 = on Bit 7: value 0 = off or value 128 = on Total max. Value = 255	0	0 - 255
119	Dimmer for dimming: dimming for low beam, 50 = 50% of full brightness, 100 = 100% ➔ no stopping It reduces the average voltage. This is done by pulse width control with a frequency of 1.2 kHz. The pulse width is set in percentage terms, ie value of 50 means half the average voltage of the rail system for dimmer. The value set here is applied to all outputs, which are stored in CV 118th	0	0 - 100
120	Cycle duration of effects: defines how long to take an effect. Thus the speed of an effect is determined.	0	0 - 255
137	Special CV: several special settings Bit 0: feature selection 0 = 1 = 8 functions 14 functions This is about the MAN bit. The old ZIMO MAN bit controller makes the necessary. If this bit is set incorrectly, then work up the functions from non-f5. Bit 1: Zimo - Loco number 0 = off 1 = on (ACK / off) Bit 2: not used Bit 3: not used Bit 4: Zimo - signal controlled speed influence HLU Bit 5: not used Bit 6: Evaluate the LGB pulses via f4 0 = no evaluation 1 = evaluation 1 f4 = f1 press 2 x press f4 = f2 3 x = f3 f4 press, etc. Calculation for CV 137: Bit 0: 0 or 1 Bit 1: 0 or 2 Bit 2: 0 or 4 Bit 3: 0 or 8 Bit 4: 0 or 16 Bit 5: 0 or 32 Bit 6: 0 or 64 Bit 7: 0 or 128 Total: up to 255	0	0 - 255
137	Bit 7: 32 kHz frequency motor control, it is CV 0 = 9 1 = 32 kHz		

CV	Description	Default Setting	Range
138	Braking time (HLU) Deceleration at the HLU section (MX 9 or HLU module) that is an accurate signal possible before stopping	3	0 - 255
139	Short-circuit threshold 1: immediate shutdown in case of overload of the auxiliary functions	15	0 - 255
140	Short-circuit threshold 2: fast shutdown in case of overload of the auxiliary functions	12	0 - 255
141	Short-circuit threshold 3: slow shutdown in case of overload of the additional functions	10	0 - 255
142	Short-circuit threshold 1: immediate shutdown in case of overload of the motor	90	0 - 255
143	Short-circuit threshold 2: fast shutdown of the motor overload	80	0 - 255
144	Short-circuit threshold 3: slow shutdown in case of overload of the motor	70	0 - 255
147	Discharge of the coupling: speed when pushing back (locomotive runs in the opposite direction)	20	0 – 126
148	Departing from cars: speed when driving away from cars, locomotive moves in the direction of current, 126 = max. speed taking into account the time set in CV 3	50	0 – 126
149	Discharge time: the time for pushing back, that is, unit = 0.1 sec the value 10 = 1 second	10	0 – 126
150	Away time: the time for driving away, that is, unit = 0.1 sec The value 30 = 3 seconds	30	0 – 126
151	Selecting the button for the automatic uncouple: 0 = off Value 1 ➔ Button F1 Value 7 ➔ Button F 7 Value 2 ➔ Button F2 Value 8 ➔ Button F 8 Value 3 ➔ Button F3 Value 9 ➔ Button F 9 Value 4 ➔ Button F4 Value 10 ➔ Button F10 Value 5 ➔ Button F5 Value 11 ➔ Button F11 Value 6 ➔ Button F6 Value 12 ➔ Button F12	0	0 – 12
152	Uncoupling mask forward: the selection function to be used, Value 4 = F2 Value 32 = F5 Value 8 = F3 Value 64 = F6 Value 16 = F4 Value 128 = F7	8	0 - 255
153	Uncoupling mask backwards: the selection function to be used, Value 4 = F2 Value 32 = F5 Value 8 = F3 Value 64 = F6 Value 16 = F4 Value 128 = F7	8	0 - 255
154 - 161 Result CV: 114, 115, 120,	Effects of CV 154-161: *** for CV 154-161, the same values *** Value 0 ➔ no effect Value 1 ➔ Flashing Value 2 ➔ Flashing Alternating Value 3 ➔ Single Pulse Strobe Value 4 ➔ Double Strobe Value 5 ➔ Flashing Headlight (Brightness between maximum and PWM value of CV114) Value 6 ➔ Ditch-Light left (Brightness between maximum and PWM value of CV114) Value 7 ➔ Ditch-Light right (Brightness between maximum and PWM value of CV114) Value 8 ➔ Rotary beacon (Brightness between maximum and PWM value of CV114) Value 9 ➔ Gyralite (Brightness between maximum and PWM value of CV114) Value 10 ➔ Mars Light Value 11 ➔ Soft-Start (slow glimmer of functions) Effect-Nr. + value 64 ➔ the output Ax is active in forward direction (z.B. 3 + 64 = 65 ➔ Flashing alternately in forward drive) Effect-Nr. + value 128 ➔ the output Ax is active only in reverse (z.B. 10 +128 = 138 ➔ Mars light with only reverse) Effect-Nr. + value 0 ➔ the output Ax is active in both directions (z.B. 4 + 0 = 4 ➔ Double Strobe in both directions) At certain outputs determine specific effects, which is a main task of this group CV. The exact nature of these effects can be determined with the CV 114, 115 and 120. This can be done universally in both directions or direction-dependent by adding the values 64 and 128 to the values for the effects. This feature is of particular interest to American models. The assignment of outputs to the function keys on the so-called "function mapping" in CVs 33 ff To award the associated outputs and key from a certain direction CV33 ff function, which is the other main task of this group CV. 161 set to shine also in which direction the exit - you have assigned to the output of a particular key (CV33 ff) can be found the above CVs 154th These effects are having the values 0 - omitted 11th Instead, only the values 64 and 128 in CVs 154 - worked 161st example: The programmed button on f4 A7 output should light up only in the forward direction. It is not a value 0 - 11 filed. For forward motion but the value 64 is stored in CV 160. Well lit, the output turns on when the key A7 f4 and only lights in forward motion. This universal adjustment, which can hardly needs of customization open, we call that "CT function mapping"	---	0 – 139
154	Effects of light front: A1 ➔ see text, for example where Lv is to be written to flash must in CV 154 value of 1	0	0 – 139
155	Effects of light rear: A 2 ➔ see text, for example if Lh is to be written to flash must in CV 155 value of 1	0	0 – 139
156	Effects on output: A3 ➔ see text, for example blink when A3 is to be written must in CV 156 value of 1	0	0 – 139
157	Effects on output: A4 ➔ see text, for example if A4 is to be written to flash must in CV 157 value of 1	0	0 – 139
158	Effects on output: A5 ➔ see text, for example blink when A5 is to be written must in CV 158 value of 1	0	0 – 139
159	Effects on output: A6 ➔ see text, for example A6 should be written to flash when it must in CV 159 value of 1	0	0 – 139
160	Effects on output: A7 ➔ see text, for example A7 should flash if it needs to be written in CV 160 value of 1	0	0 – 139
161	Effects on output: A8 ➔ see text, for example when flashing A8 to be written must in CV 161 value of 1	0	0 – 139

Color Code:

=	Addresses, Speeds, Characteristics
=	„function mapping", Configuration of Outputs
=	Motor Control
=	ZIMO – Features
=	Protection and Fault Analysis
=	Function Effects