CV list - expert search as at Januar 2014

The CV list is in addition to the operating instructions for ZIMO decoder. In the left column, the red section of the Zimo instructions are given, in which the respective CV to read more information!

Below CVs for all travel decoder

Chaper	CV	Designation	Area	Default	Description
3.4	#1	Vehicle address	1-127	3	The "small" (1-byte) address vehicle; This is active, is set when Bit 5 in CV #29 (default settings) to 0
3.6	#2	Starting Voltage	1-252	1	Internal speed step for first external gear (Ie speed step 1). Effective only if Bit 4 in CV #29 to 0 (ie three-point curve for CV 2, 5, 6).
3.7	#3	Acceleration time	0-255	2	The Multiplied by 0.9 to calculate the time in seconds for the acceleration from stop to full speed.
3.7	#4	Braking time	0-255	1	The Multiplied by 0.9 gives the time in seconds for braking from full speed to a standstill.
3.6	#5	Maximum speed	0-252	1 (= 252)	Internal speed step for the highest external gear (ie speed level 14, 28 or 128, depending on the speed steps, which is set in CV #29), "0" and "1" = no effect. Effective only if Bit 4 in CV #29 to 0 (ie three-point curve for CV's 2, 5, 6).
3.6	#6	Middle speed	1, = About 1/3 of the Value in CV #5	1	Internal speed step for mean external gear (gear = 7,14 or 63, depending on the number of speed steps 14, 28 and 128); "1" = default curve (middle rate is a third of the maximum speed, ie: if CV #5 = 255, according to CV #6 = 85, or correspondingly lower). Which are devoted from the CV #2, #5, #6 three-point curve is smoothed automatically, so there is no kink in the middle noticeably! Effective only if bit 4 in CV #29 to 0

3.3	#7	Version number and auxiliary procedure when programming via "Lokmaus-2" and similar "low level - systems". See Appendix to this manual "application with other systems" and auxiliary procedure when programming CV's with higher numbers than "medium level - systems" as Intellibox Lenz, especially for sound sample selection and sound CVs. To e.g. CV #300 = 100	No write access! Always read is version number. ! In conjunction with CV #65!		Here it can be read, which contains the software version present decoder. CV #7 major version number – CV#65 subversion number **Pseudo-Programming** ("Pseudo" = programmed value is not really stored) as an advance action for programming or reading of "higher" (> 99) CV's and / or higher (> 99) values with digital systems that govern only limited CV numbers and ranges. **One place** = 1: Upon subsequent programming programming value is increased by 100. = 2: .... increased by 200 **Tens** = 1: Upon subsequent programming CV number is increased by 100, = 2: .... increased by 200, = 3: .... increased by 300. = 4: ... to 400 ... etc. **Hundreds** = 1: reassessment of the CV number is retained until power down. = 2: .... is maintained until the termination of up to CV #7 = 0
3.3	#8	Manufacturer Identification HARD RESET and	No write access!	145 (Zimo)	Of the NMRA assigned manufacturer ID for Zimo "145" ("10010001") **Pseudo-Programming** ("Pseudo" = programmed value is not saved): **CV #8 = "8" ->**HARD RESET and RESET SOUND (default values of the project sound like when flashing). CV #8 = "9" -> HARD RESET for LGB-operation (14 speed steps, pulse train). CV #8 = "0" -> HARD RESET (default values) CV #8 = "..." -> Load predefined or user-defined CV sets (currently only 47 = Norwegian locomotives)

3.6	#9	Motor control period or frequency and EMF frequency	0 = high-frequency, average sampling 01 to 99 = high frequency with modified sampling algorithm 255-176 = Low frequency	0	= 0: Default smooth motor control using radio frequency Varied (20/40 kHz) and a sampling of the motor EMF measurements, which automatically between 200 Hz (slow speed) and 50 Hz • Tens digit 1 - 4: Reduced sampling rate compared to default (less noise!) • Tens place 6 - 9: Sampling higher than default moderate (as a measure against stuttering!) • A digit 1 - 4: EMF sampling shorter than standard default (well at Faulhaber, Maxxon, .. less noise, more power) • A site 5 - 9: EMF sampling longer than standard default (may be needed or similar for 3-pole motor) • = 255 - 178: Low Frequency. Example values for low frequency: #9 = 255: frequency of 30 Hz, #9 = 208: frequency of 80 Hz, #9 = 192: frequency 120 Hz
3.6	#10	Regulatory cutoff	0 -252	0	Internal speed step at which the Ausregelungskraft should drop to the value defined in CV #113 (together with the CV #58 and #113 a three-point curve). = 0: default course of load compensation.
	#11	-			
	#12	-			
3.5	#13	Functions in analog mode "DISPLAY MODE" Mapping function remains active.	0-255	0	Selecting those functions (F1 - F8) to be turned on in analog mode, each bit corresponds to a function (bit 0 = F1, F2 = bit 1, ..., bit 7 = F8).
3.5	#14	Functions in analog mode "DISPLAY MODE" Accelerated / brakes in analog mode. Mapping function remains active.	0-127	64 (Bit 6 = 1)	Bits 5 to 0: selection of those functions (F12 - F9 FLr, FLV) to be turned on in analog mode, each bit corresponds to a function (bit 0 = front headlight, Bit 5 = F12). Bit 6 = 1: Analog operation without CV #3, #4 set acceleration and deceleration values, hence immediate reaction, like classic analog mode. Bit 6 = 0: Analog mode with Accel values to CV # 3, #4
	#15	-			
	#16	-			
3.4	#17	Extended Address	128-10239	0	The "long" (2-byte) address vehicle (If you want an address from 128), an alternative to the address in CV #1 (which only goes to 127). This is active when Bit 5 in CV #29 (default settings) is set to 1

3.4	#18	Extended Address Values are automatically calculated when using MX2x and MX3X! [E] + [MAN] Address [F]	- "-	0	- "- Calculation: Decimal address in binary convert (eg. with Windows computers), the first (from right) 8Bit are written in CV #18, the rest PLUS Decimal192 is written in CV #17. Example: Address = 1793 Decimal = 1793 binary 11100000001 -> 111 00000001 CV #17 CV #18 I am 111 00000001 Dec Dec 7 1 So: CV #17 = 7 +192 = 199 CV #18 = 1 CV #29 -> Bit 5 = 1
3.4	#19	Consist address	0-127	0	Additional vehicle Address, Which is used to control multiple locomotives in the composite. Value +128 = inverted direction
	#20	-			
3.4	#21	Functions F1 - F8 in interconnected operation Mapping function remains active.	0-255	0	Selecting those functions F1 - F8) that will be controlled by the combined operation of the network address (Bit) responsible for F1, F2 for bit 1, etc. 0 Bit value = 0: function output controlled by a single address Bit value = 1: function output controlled by composite address
3.4	#22	Functions F0 forward., Bwd in interconnected operation Mapping function remains active.	0 -255	0	Selection, whether the headlights are to be operating in conjunction with the single address or the network address and off (bit 0 responsible for front headlight, Bit 1 for rear headlight) Bit2 = F9 .... Bit5 F12 Bit value = 0: function output controlled by a single address Bit value = 1: function output controlled by composite address Bit 6 = nc Bit 7 = F13-F28
3.7	#23	Acceleration variation	0-255	0	One possibility for the temporary adjustment of the acceleration behavior, eg the tensile load or composite operation. Bit 0 - 6: value for acceleration time, which added to the value in CV #3 or to be deducted. Bit 7 = 0: add above, value! = 1: Remove the above, value!

3.7	#24	Braking time variation	0-255	0	One possibility for temporary adjustment of the braking performance, eg the tensile load or composite operation. Bit 0 - 6: value for braking time that added to the value in CV #4 or will be deducted. Bit 7 = 0: add above, value! = 1: Remove the above, value
	#25	-			
	#26	-			
3.10	#27	Position-dependent Stop ("against red signal") By Asymmetrical DCC - signal (method Lenz "ABC")	0,1,2,3	0	Automatic activation of the position-dependent stopping by using the "asymmetrical DCC signal" (Lenz "ABC"). Bit 0 = 1: Stops are when right rail (in direction) voltage higher than left rail. THIS, CV #27 = 1 **THE NORMAL USE for this feature (if decoder is wired correctly with respect pantograph)!** Bit 1 = 1: Stops are when left rail (in direction) voltage higher than right rail. So if one of the two bits is set (but not both), the pumps stopped directional. Bit 0 and 1 = 1 (CV #27 = 3): Stops are independent of the direction of travel in the event of any asymmetry. **See also CV #134!**
3.2	#28	Railcom Active from SW version 20 again!		3	Bit 0 - RailCom Channel 1 (broadcast) Enabled 0 = off 1 = Bit 1 - RailCom Channel 2 (data) Enabled 0 = off 1 =
3.2	#29	Basic Settings Calculating the value for CV #29 is due to addition of the individual bit values, weighted according to their respective position on the basis of the following table Bit 0: 0 or 1 Bit 1: 0 or 2 Bit 2: 0 or 4 Bit 3: value 0 or 8 Bit 4: 0 or 16 Bit 5: 0 or 32 Bit 6: 0 or 64 Bit 7: Value 0 or 128 In ZIMO cabs MX21, MX31, ... the CV presentation is also bitwise, ie calculation of the bit values is no longer necessary!	0 -63	6 Bit 1 = 1 Bit 2 = 1	Bit 0 - direction behavior -> 0 = normal, 1 = reverse Bit 1 - Travel system -> 0 = 14, 1 = 28/128 speed steps Bit 2 - Conventional Automatic switching (analog mode) -> 0 = off, 1 = on Bit 3 - RailCom -> 0 = not active, 1 = active (! CV 28 must be 3!) Bit 4 - the speed table -> 0 = off-Kl. CV #2, #5, #6 1 = on Char. by CV #67 - #94 Bit 5 - Decoder Address: 0 = 1 address as per CV #1 1 = 2-address as per CV #17 and #18 Bits 6, 7 always 0 (bit7 = 1 when turnout decoder)! Example values: #29 = 2: normal direction, 28 speed, no analogue operation, characteristics, CV #2, #5, #6, short address. **#29 = 10 as described above, only with active RailCom**

					#29 = 6 as above, but with automatic. Conventional switching #29 = 22: As above, but with analog mode and individual speed table loudly CVs #67 - #94 #29 = 0: 14 (instead of 28) gear (necessary for some older third-party systems) ATTENTION! Be set when using rail-polarity dependent DC braking sections must CV #29, Bit 2 = 0 and CV #124, Bit 5 = 1!
	#30	-			
	#31	-			Index Page #
	#32	-			Index Page #
3.14	#33	**Function assignment**		1	"Function Mapping" for function outputs according to NMRA standard: #33 - #42 = 1, 2, 4, ... : The outputs are standard default assigned to F0 to F12, ie Switchable directional headlamps and with F0 (key 1 or L) outputs each other at a key.
3.14	#34	- "-		2	
3.14	#35	- "-		4	
3.14	#36	- "-		8	
3.14	#37	- "-		2	
3.14	#38	- "-		4	
3.14	#39	- "-		8	
3.14	#40	- "-		16	
3.14	#41	- "-		4	
3.14	#42	- "-		8	
3.14	#43	- "-		16	
3.14	#44	- "-		32	
3.14	#45	- "-		64	
3.14	#46	- "-		128	- "-
	#47 #48	-			
3.9	#49	Signal-dependent acceleration	0-255	0	The content of this value multiplied by 0.4, the time in seconds is the acceleration from stop to full speed in the "ZIMO signal controlled speed influence" (Zimo track section module MX9) or when the stop function by "asymmetrical DCC signal "(Lenz ABC).

3.9	#50	Signal-dependent braking time	0-255	0	The content of this value multiplied by 0.4, the time in seconds gives the braking from full speed to a standstill during the "ZIMO signal controlled speed influence" (Zimo track section module MX9) or when the stop function by "asymmetrical DCC signal "(Lenz ABC).
3.9	#51	Signal controlled speed limits #52 for "U" #54 for "L" #51, 53, 55 for intermediates	0 -252	20	Thus, for each of the 5 speed limits in the context of "ZIMO signal controlled speed influence" can be created, the applicable internal gear is fixed. These CVs will also come in the event of Ausbaues of "asymmetrical DCC signal" on several speed limits apply.
3.9	#52		- "-	40	
3.9	#53		- "-	70	
3.9	#54		- "-	110	
3.9	#55		- "-	180	
3.6	#56	P and I value the EMF BEMF	0 -199	0 (= 55)	Parameters of PID control (PID = Proportional/ Integral/ Differential) And in certain cases it may be useful to optimize the control characteristics by modifying these values. 0 - 99: "normal" engines (LGB, etc.) 100 - 199: MAXXON, Faulhaber, etc. Tens digit: • Proportional (P) - value, default poor (0) to medium value and automatic adjustment with the aim of as jerk-free driving. • With 1 - 4 and 6 - 10 (instead of 0 = 5) may be modified proportional effect One point: • Integral (I) - value, default is set to moderate medium value. • With 1 - 9 (instead of 0 = 5), the integral value can even be chosen.
3.6	#57	Control Reference	0-252	0	Absolute motor drive voltage in tenths of volts at full speed (speed knob on top) should be present on the motor. #57 = 0: in this case is automatically adapts to the current rail voltage (Relative reference).

3.6	#58	Regulatory influence	0-255	255	Intensity of Ausregelungskraft by EMF load balancing scheme with low speed. In addition, regulatory influence for medium speed CV #10 and CV #113 definable - together then, these three CVs (#58, #10, #113) is a three-point curve for the control. Example values: #58 = 0: no control (such as unregulated decoder) **#58 = 150-180: moderate control times,** #58 = 255: the strongest possible correction max.
3.9	#59	Signal-dependent response time	0-255	5	Time in tenths of a second, in which a signal-dependent acceleration operation after receiving a higher signal-dependent speed limit is introduced as the previously valid. This CV is therefore to effect under ZIMO "signal controlled speed influence" (ZIMO MX9 or TSE or "LenzABC").
3.18	#60	Dimming (Voltage reduction with PWM) for function outputs	0-255	0	Duty cycle to function outputs in the ON state and unable to eg the brightness of the lamps are reduced as necessary (eg high beam!). Example values: #60 = 0 (like 255) full control #60 = 170: Two-thirds brightness #60 = 204: 80-percent brightness
3.14	#61	Special "Zimo function assignments"	0 - 7, 98, 99	0	For applications that are not through the "NMRA function mapping" - are covered, for example (CV #33 #46) Swiss locomotives. = 97: alternative mapping function without left shift. See the chapter Function Mapping in the operations manual for MX640 (for "small decoder" matters!) = 98: starts a flexible function allocation procedure. **See table "ZIMO specifically function mappings"!** **WARNING: DO NOT Applies to function decoder MX680!**
3.21	#62	Light effects modifications (CV #127 - #132)	0-9	0	Change of minimum dimming value ("FX_MIN_DIM")
	#63	Light effects modifications (CV #127 - #132) Or persistence of a stoplight	0-99 0-255	51	Tens digit: the cycle time for effect - or dims (0 9, 5 default) at 001 101 (0 - 0.9 s) One point: Ausschaltezeitverlängerung If brake light (code 001110xx in CV #125 or #126 or #127 ...): Time in tenths-second (total range 0 to 25 sec) in Stilltand after stopping.
3.21	#64	Light effects modifications (CV #127 - #132)	0 -9	5	Modification of the ditch lights off
3.3	#65	SW Version-subversion			Specifies the version number after the decimal point -> See also CV7
3.6	#66	Trim the speed of the direction of travel	0-255	0	Multiplying the current speed by "n/128" (n is the value specified here trim) when moving forward

3.6	#67 to #94	Individual speed table	0-252		Internal speed step for each of the 28 external speed steps (when using 128 speed is interpolated). Effective if bit 4 is set in CV #29 to 1.
3.3	#95	Trim the speed on the direction	0 -255	0	Multiplying the current speed by "n/128" (n is the value specified here trim) when reversing.
	#96	-			
	#97	-			
	#98	-			
	#99	-			
	#100	Reading current ABC asymmetry	0,1,255 Or. 5-15,241-251		Only for debugging purposes! Values are given in units of 0.1 volts. The polarity (value to 10) observed!
	#101	Offsett for ABC asymmetry If no asymmetry is to be present, one can correct the internal asymmetry			If ABC is disabled, a value> 0 and <= 255 is read from CV100 (in both Aufgleisrichtungen with same sign) then you compensate with the CV #101 by the read-out value in CV# 100 CV #101 you schreibt.Wenn a Aufgleisrichtung +2 and Others in the -2 (ie 254) then reads is an asymmetry on the track and the decoder can not help it and do nothing.
	#102	-			
	#103	-			
	#104	-			
	#105	User Data	0-255	0	Memory slots free for the user.
	#106	User Data	0 -255	0	Memory slots free for the user.
3.16	#107	Cab side light suppression Cab 1	0-255	0	> 0 The light is off when button (F0v output and adjustable output is disabled with adjustable button)
3.16	#108	Cab side light suppression Cab 2	0-255	0	> 0 The light is off when button (F0r output and adjustable output is disabled with adjustable button) Calculation: Output (1 for FO1, 2 for FO2, ... to FO7) x 32 + Function key (1-28 for F1-F28, at 0 is suppressed only F0x)
	#109	-			
	#110	-			
	#111	-			
3.1 **3.6** **3.20**	#112	Special ZIMO configuration bits Bit 0: 0 or 1 Bit 1: 0 or 2 Bit 2: 0 or 4 Bit 3: value 0 or 8 Bit 4: 0 or 16 Bit 5: 0 or 32 Bit 6: 0 or 64	0-255	2 (00000010)	Bit 0 - setpoint-dependent (0) or load-dependent noise characteristics (1), characteristic even CV's #137, #138, #139 is defined. Bit 1 = 1: High power acknowledgment pulse (even if you want to program without motor) Bit 2 = 0: Loco number (to prevent turning useful if loco number not in use and eventual cracking sound) ZIMO loco number pulses active: active = 1.

<table>
<tr><td></td><td></td><td>Bit 7: Value 0 or 128
In ZIMO cabs MX21, MX31, ... is
the CV-bit representation and, therefore, no
longer calculation of bit values is necessary!</td><td></td><td></td><td>Bit 3 = 0: reacts only to (new) NMRA-MAN bit on (12-Function Mode) = 1: talking on old MAN bit to (8-function mode)
Bit 4 = 0: Pulse chain = 1: Pulse chain when used in an LGB system
Bit 5 = 0: Motor 20 kHz frequency = 1 ... 40 kHz
Bit 6 = 0: normal (see CV #129) = 1: DC braking independent of direction ("Märklin braking mode")
Bit 7 = 0: no pulse chain generation = 1: Pulse chain generation for LGB sound modules on output FA1.
Only in MOTOROLA format:
Bit 3 = 0: normal (each address, 4 functions) = 1: next address is used to drive another 4 functions, making for a total of 8 locomotive functions.</td></tr>
<tr><td>3.6</td><td>#113</td><td>Regulatory cutoff</td><td>0-255</td><td>0</td><td>Extent of Ausregelungskraft to which these should fall on that gear, which is defined in CV #10, (together with CV #58 and CV #10 is a three-point curve). "0" means actual
Cutoff at speed level 10 CV #</td></tr>
<tr><td>3.18</td><td>#114</td><td>Dimming mask1
See also CV152!</td><td>Bit 0 - 7</td><td>0</td><td>Bits 0 to 7 for one function output
(Bit 0 - front headlight, Bit 1 - rear headlight, Bit 2 - output F1, etc.).
Bit value = 0: Output dimmed on value, which is defined in CV #60th
Bit value = 1: Output not dimmed</td></tr>
<tr><td>3.23</td><td>#115</td><td>Clutch Control Activation time
CV #115 Alternatives as
second dimming value (by tens digit "0"
set) from 0 to 90% (according to one site)</td><td>0 -99</td><td>0</td><td>Effective if in CV #125 ... is set 132 of the functional effect "uncoupling" (with value of "48"):
Tens digit (0 to 9): the time interval (in seconds) according to the following table, in which the clutch is actuated with full voltage:
<table>
<tr><td>Value</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>9</td></tr>
<tr><td>Sec.</td><td>0</td><td>0.1</td><td>0.2</td><td>0.4</td><td>0.8</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
</table>
A digit (0 to 9): a percentage (0 to 90%) of the rail voltage, with which the clutch is actuated during the remaining activation time of the function.</td></tr>
<tr><td>3.23</td><td>#116</td><td>"Clutch Waltz"
Not recommended
if CV273> 5!</td><td>0-99</td><td>0</td><td>Tens digit (0 to 9): Length of time the locomotive
should move away from train; 115th values as in CV #
A digit (0 to 9) = x 4: Internal speed step for
Abandonment (acceleration according to this CV #3)
Hundreds
= 0: no pressing before moving away.
= 1: pressing the clutch relief</td></tr>
<tr><td>3.19</td><td>#117</td><td>Blink</td><td>0 -99</td><td>0</td><td>Duty cycle for flasher function:
Tens digit activation phase (0 = 100 msec, ..., 9 = 1 sec)
One point is switched-off</td></tr>
</table>

3.19	#118	Flashing mask	Bits 0 - 7	0	Bits 0 to 5 for one function output -. (Bit 0 - front headlight, Bit 1 - rear headlight, Bit 2 - output F1, etc.) Bit value = 0: no flasher Bit values = 1: output flashing Bit 6 = 1: "Fourth" flash output inverse! Bit 7 = 1: "Sixth" flash output inverse!
3.18	#119	Low beam mask F6	Bits 0 -7	0	Bits 0 to 5 for one function output -. (Bit 0 - front headlight, Bit 1 - rear headlight, Bit 2 - output F1, etc.) Bit value = 0: no low beam Bit value = 1: output should be in Press F6 value in CV dimmed #60. Bit 7 = 0: normal effect of F6. Bit 7 = 1: inverse effect of F6 -> BEAM FUNCTION**!**
3.18	#120	Low beam mask F7	Bits 0 -7	0	See CV #119, only with F7 as "low-beam function"
3.7	#121	Exponential acceleration curve	0 -99	00	Acceleration time of an exponential function (slower speed increase in the low speed range). Tens digit: Percentage (0 to 90%) of the rate of application, which should be valid for this curve. A location: parameters (0 to 9) for the curvature of the exponential function.
3.7	#122	Exponential braking curve	0 -99	00	Braking profile to an exponential function (slower speed reduction at low speed range). Tens digit: Percentage (0 to 90%) of the speed range. A location: parameters (0 to 9) for the curvature of the exponential function.
3.7	#123	Adaptive acceleration and braking techniques	0-99	0	The increase or decrease the set speed is to take place only after a defined approach to the previously specified set speed. CV #123 includes the driving distance between steps, needs to be reached (the smaller this value, the smoother the acceleration. Tens digit: 0 - 9 for acceleration One point: 0 - 9 for braking Value 0: no adaptive process

3.13	#124	Rangiertastenfunktionen: Accelerate deactivation and mezza speed and LGB ON BOARD interface instead SUSI on the plug (only MX69x)		3	Bit 2 = 0: MAN key for shunting. Bit 2 = 1: F4 (key 5) as Beschleunigngsdeakt. (If desired F4 instead of F3: see bit 5!) Bits 0,1 = 00: the button below no effect = 01: disabled Exponentisl + adaptive = 10:. Addition ACCEL / braking time is reduced to ¼ of CV #3, #4 **= 11: Acceleration disabled** Bit 5 = 1: for "DC holding portions" Be set when using rail-polarity dependent DC braking sections must CV #29, Bit 2 = 0 and CV #124, Bit 5 = 1! Bit 3 = 1: F7 as half speed key Bit 4 = 1: F3 as half speed key Bit 6 = 1: F3 as disabling acceleration (instead of the assignment Bit 2) Bit 7 = 1: (only MX69x) serial interface to on-board LGB sound module via SUSI connector When MX64x: FU outputs instead SUSI
3.21	#125	**Effects** Decoupling, "soft start" (= dims when you turn the function outputs) or American light effects on output "front end", by default fwd with F0. to operate, by "function mapping" also assign different Adjusted and modified the effects of CV #62 - #64 and CV #115 (for coupling). From SW 28.19: **Light Effects** for FA7 and FA8: SEE CV #157 and CV #160		0	The following description of the coding of effects applies to the CV's 125 ... 132 equally, it is exemplified in the line for the function output "face forward" (CV #125) included, although the effects are in practice here is rare (because just to "front end" normally regular headlights are connected). Bits 1,0 = 00: directional (always works) Bits 1,0 = 01: active in forward drive Bits 1,0 = 10: effective only when reversing PLEASE NOTE: CV's #33, #34 ("function mapping" for F0 forward and rev.) May need to be adjusted to make it with the above direction dependency is no contradiction. Bits 7, 6, 5, 4, 3, 2 (bits 1, 0, see above!) =000001xx Mars light =000010xx Random Flicker =000011xx Flashing headlight =000100xx Single pulse strobe =000101xx Double pulse strobe =000110xx Rotary beacon simulation =000111xx Gyralite =001000xx Ditch light type 1, right =001001xx Type 1 left Ditch light, =001010xx Ditch light type 2, right =001011xx Ditch light type 2, left =001100xx Coupling in CV #115

		EXAMPLES: Mars light forward only. - 00000101 = "5" Gyralite indep. of direction - 00011100 = "28" Ditch type 1 left, only forward. - 00100101 = "37" **Clutch Control - 00110000 = "48"** **Soft start of output - 00110100 = "52"** **Auto Brake Light - 00111000 = "56"** Auto Führerstandsabschalt. - 00111100 = "60" Speed. / Load-dependent. Raucherz. - 01001000 = "72" Speed. / Load-dependent. Diesel smoke - 0101 0000 = "80" Slow up-/down dimm =01011000 = 88			=001101xx slow dimming of Funktionsausg. (Soft start) =001110xx Auto brake lights for streets highway, stationary variable persistence, see CV #63. =001111xx Auto power off function of the output at speed> 0 (for example, from the cab lighting in travel). =010010xx speed-or load-dependent generation of smoke **for Steam** According to CV's #137 - #139 (preheating at a standstill, heavy smoke at fast speed or load)). Matching control of the fan as defined in CV #133 =010100xx moving state-dependent smoke generation for diesel engines according to CV's 137 - 139 (preheating at a standstill, heavy smoke when starting the engine sound and acceleration). Matching control of the fan as defined in CV #133, 351.352. = 010110xx slow dimming – Time in CV190/191 Speed for Fans & downtime for smoke -> See CV #351 - #353 smoke effect for sound decoder useful and verfpgbar!
		Special note on the ditch lights: These are active only when the headlights (F0) are turned on, and the function F2, which represents the American model. The "ditch lights" will only work if the corresponding bits are set in CV #33 and #34 (the definition in CV #125 - #128 is not sufficient, but also necessary). **For example, if ditch lights are defined for FA1 and FA2, the bits 2, 3 have in CV #33, #34 to be set accordingly (ie CV #33 = 00001101, CV #34 = 00001110).**			

3.21	#126	Effects See CV #125 on output "back end" (default F0 reverse)		0	Bits 1,0 = 00: directional (always works) Bits 1,0 = 01: active in forward drive Bits 1,0 = 10: effective only when reversing
3.21	#127 #128 #129 #130 #131 #132	Effects such as CV 125 # on FA1 (default F1) FA2 (default F2) FA3 (default F3) FA4 (default F4) FA5 (default F5) FA6 (default F6)		0	See CV #125 / #126
3.23	#133	FA10 (MX690 only) as a sim. Cam sensor for ext. Sound modules. **MX695** has a special FA. NOTE in case CV #133> 0 when MX690: It is not the value set here, but the FA10 output reflects the cam sensor that is used for the internal sound! ZB the rhythmic control of a smoke generator fan **The following applies to MX640/642/645:** CV133> 1 switch the function output FO4 as described on the right, IF one between FA1 and FA FA6 a smoke effect (CV #127ff) is assigned! **MX646! Instead FA4 FA2 is used!** **MX632:** If CV #133 = 20 or = 40, FA2 is used to pulse.	0-255	1	The function output (see explanation left column) is in the set rhythm from pulses, which can be connected to a sound module for the purpose of triggering of the bursts of steam instead of a real Achsstellungs detector. = 0 (default): FA is used as a normal function of output. = 1: FA is fan control Diesel. => 1 FA is sim. Cam sensor = 40 (tpy. setting): Approximately 2 pulses per wheel revolution, in typical LGB locomotive, although the actual incidence is dependent on drive and recruitment. Adjustments: a smaller value in CV #133 gives higher frequency, a higher value results in a slower sequence of pulses. E.G. CV #133 = 20 (instead of 40) is approximately 4 (instead of 2) chuffs per revolution. = 200 - 255: In "pulse-FA" (see left column) vapor emissions fan the smoke generator is connected. If the smoke generator itself (heating) as an "effect" (in one of the CV's #125 - #132) is defined, the fan - Together with the function key of the smoke generator (heating) - that is those that the output of the "effect" is associated - on and off, and - In the case of a steam locomotive with the chuff sound synchronized. - In the case of a diesel engine when starting the engine and sounds (in drive) enabled acceleration-dependent. The timing of the "Start cloud" is defined in the startup sound via ZSP by loop2 marker! The rotational speed of the fan is defined in CV #351 and #352.

3.10	#134	Asymmetrical threshold for stopping by asymmetric DCC - Signal (Lenz ABC)	1 -14 101-114 201-214 From 0.1 to 1.4 volts	105	Hundreds digit: Smooth time, through this, the asymmetry detection reliable (and also slower) or can be made faster. = 0:. Recognition (but higher risk of errors, so rather unreliable stopping) = 1: normal recognition (approx. 0.5 sec), already pretty sure (default). = 2: slow recognition (1 sec), very safe Tens and place: Asymmetrical threshold in tenths of Volts. From this voltage difference between the half-wave of the DCC signal is the asymmetry be registered as such, and the appropriate action will be taken (usually braking and stopping of the vehicle). See CV # 27! = 106 (Default) 0.6 V. This means that is usually to be a more appropriate value, corresponding to the typical generation of asymmetry by a circuit consisting of 4 diodes.
3.8	#135	km / h - speed control - Activation, control and scoping	2-20	0	= 0 km / h - off control, whichever is the "normal" speed control. Pseudo-programming (value is not saved!) CV #135 = 1 -> Introduction of the calibration run 2 to 20: Speed / km / h - factor, eg: = 10: each level (1 to 126) becomes 1 km / h: that is step 1 = 1 km / h, step 2 = 2 km / h, stage 3 = 3 km / h, ... = 20: each step represents 2 km / h, that is step 1 = 2 km / h, step 2 = 4 km / h, up to level 126 = 253 km / h = 5: each step represents 0.5 km / h, ie level 1 = 0.5 km / h, step 2 = 1 km / h, up to level 126 = 63 km / h **See Chapter 4 in the manual, "km / h - control"!**

3.8	#136	km / h - Speed control - control number to read			After calibration run a value can be read out, which is used for the internal calculation of the travel speed. It is interesting in that he (almost) should be independent of the speed during the calibration run. If so, several calibration runs are made, can be made of the uniformity of the resulting values in CV # 136 is closed to the quality of calibration.
3.22	#137	Characteristic PWM control of the heating elementIf assigned on FAx smoke effect. - For standstill	0-255	0	With the three values in CV's # 137 - 139 a characteristic at a function output FA1 FA8 is defined .... If bit 0 in CV #112 = 0; characteristic velocity dependent (setpoint): • CV #137: PWM at standstill • CV #138: PWM at unladen • CV #139: PWM with highest gear and accelerating. • If bit 0 in CV #112 = 1, load dependent characteristic: • CV #137: PWM at rest and during braking • CV #138: PWM at unladen • CV #139: PWM at highest speed level and during acceleration or high load Although ... and for those where in the corresponding CV #127 - #132 an "effect" for Smoke generation of steam or diesel, so Defined or 010010xx 010011xx is. If bit 0 in CV #112 = 0; characteristic Velocity (nominal value) depends on: CV #137: PWM of at standstill CV #138: PWM of at speed level 1 CV #139: PWM of at highest speed level If bit 0 in CV #112 = 1; Characteristic should act last-dependent: CV #137: PWM of at standstill and during braking CV #138: PWM of at speed level 1 CV #139: PWM of at highest speed level, when accelerating, and at high loading. With steam, PWM for auxiliary heating with blower
3.22	#138	Characteristic PWM control of the heating element when it is released on FAx smoke effect. - For unladen			
3.22	#139	Characteristic PWM control of the heating elementIf assigned on FAx smoke effect. - For driving under load and full.			
3.12	#140	Distance controlled stopping - Constant stopping Selecting the braking event and the braking curve	0,1,2,3,11,12,13	0	Activation of the constant braking distance, according down in CV #141 instead of timed deceleration CV #4, for = 1 automatic. Stops with "signal. Influence "or" asym. DCC signal ".

					= 2 manually stop using the cab. = 3: automatic and manual stops. In the above cases (= 1, 2, 3), the braking is initiated delayed from Teilgeschwin speeds to train unnecessary long "creeping" (empohlene choice). However = 11, 12, 13 as above, but braking will always be initiated immediately after entry into the holding portion.
3.12	#141	Distance controlled stopping - constant stopping	0-255	0	By the value in this CV is the "constant stopping distance". The matching of the existing stop sections value must be determined by trial and error, can serve as a guide: CV #141 = 255 is about 1 km in the model (ie 12 m in H0), CV #141 = 50 about 200 m (ie 2.4 m for H0)
3.12	#142	Distance controlled stopping - constant stopping Schenllfahrkompensation using the ABC method	0-255	12	The delayed recognition (see CV #134), but less safe rail contact, affects more at higher speeds on the breakpoint than in slower, but this effect is corrected by CV #142nd = 12: Default usually works fine if CV #134 Def
3.12	#143	Compensation at HLU	0-255	0	Since HLU is fault resistant than ABC, usually no detection delay, and therefore default 0th
3.3	#144	Programming & update lock	Bits 6 and 7	0, 64, 128, 255	This CV was introduced to when needed unintended decoder changes or loss of function due to incorrect entry excluded in the update mode. = 0: no programming and update locks Bit 6 = 1: programming possible in "service mode" is not programmed: protection against accidental erasure and reprogramming) Note: "on-the-main" programming is not locked (because there are changes made in the operating process and may designate a particular address is addressed) Bit 7 = 1: Disables software updates via MXDECUP MX31ZL or agents.
3.15	#145	Alternative methods of motor control	0, 1	0	= 0: normal motor control (DC motor, FAULHABER, Maxxon, etc.) = 1: special control for low DCMotoren (often Maxxon), this control allows the connection of a capacitor (10 or 22 uF) to positive / mass of the decoder, decoder and motor are less stressed.

3.7	#146	Balancing the transmission neutral gear for reversal in order to avoid the start-up jerk. from software version 8.20	0 -255	0	The power transmission between engine and wheels often has an idle gear, and in particular if it is a worm gear. This means that when changing the driving direction of the first motor rotates a piece of blank until it actually drives the wheels, where it is accelerated at this phase. When starting from a standstill, the motor has therefore already be a certain speed when the drive engages, which causes an ugly start-up jolt. This can be avoided by CV #146. = 0: no effect = 1 to 255: the motor rotates in a constant for a certain time to the minimum velocity (CV # 2), and only then begins with the acceleration if the previous direction of travel has been switched. How much time is the empty "path of rotation" depends on various circumstances, and can only be determined by trial and error; Typical values: = 100: the motor turns about revolution, or at most a sec long at minimum speed, then "grab" it should. = 50: about half a turn or max. ½ sec = 200: about two turns or max. 2 sec Important: CV #2 (starting or minimum speed) must be set correctly, ie at the lowest gear (1 of 128 or 1 out of 28) from the throttle of the vehicle should already drive safely. In addition, CV #146 can be used only useful if the load compensation fully or almost fully in operation (ie CV #58 about 200 to 255).
3.6	#147	= EMF measurement timeout, 0 = automatic, 1-255 = manually	EXPERMIMENTAL CV		Useful initial value: 20 is too small adjustment makes the Lok capers; Too large setting, the control is poor at low speeds.
3.6	#148	= Differential value, 0 = automatic, 1-255 = manually	EXPERMIMENTAL CV		Useful initial value: 20 is too small setting, the scheme will be worse (regulates too little / slow, jerky engine (rather slowly)); Too large a setting is adjusted too much and the engine is restless shakes /.
3.6	#149	Adaptive p-value =, 0 = automatic, 1 = off	EXPERMIMENTAL CV		0 = automatic adjustment 1 = P-value fixed in CV # 56 (tens digit)
3.6	#150	= Control times at full speed (see CV #58, #10, #113)	EXPERMIMENTAL CV		Normally, the stabilization is at full speed, always 0 Thus, the control times can be set at full speed in this CV. Example: CV #58 = 200, CV #10 = 100, CV #113 = 80, CV #150 = 40 Ergebnis: control times at speed level 1 = 200 (from 255), compensation at speed 100 255 (252) = 80 (from), compensation at speed 252 (highest gear) = 40 (of 255)

3.5	#151	Engine brake	0-9	0	0 = no engine braking 1-8 =: If in the process of braking desired speed reaches 0, the engine brake is applied slowly (spread over 1, 2, .. 8 seconds to full braking by motor short-circuit on stage) 9 =: immediate full engine brake, i.e. if desired velocity reaches 0), motor is immediately short-circuited through the final stage of the decoder.
3.18	#152	Dim form2 as CV114 (bits 0-5) And SW version 26.8 (MX690) direction bit (bit 6 and 7)	Bit 0 - 7		Bit 0 = FA7 .... Bit 5 = FA12 Bit value = 0: Output dimmed on value, which is defined in CV #60th Bit value = 1: Output not dimmed Bit 6 = 1 -> FA4 active in forward drive Bit 7 = 1 -> FA9 active in forward drive
	#153	Restriction on the driving no digital signal From software version 27.10	0 -255	0	If a vehicle is equipped with condensers, it will run on even when there is no contact with the track - this is the purpose of this measure. If these capacitors are very large (gold caps, Su-percaps, ..), the time of the Next are running very long, for example, by shutting down the plant or in an emergency Voltage OFF. Therefore, the CV was introduced #153, which prevents the "eternal" proceed without external power. CV #153: Time in tenths of seconds (ie 0 to 25 seconds adjustable), after which the vehicle as "No longer receive" a digital signal stops at the latest.
	#154	Special output configurations From software version 27.10 The individual bits of this CV aktvieren certain special measures, which are usually used only in some specific cases.	0-255	0	**Bit 0 = 1:**Panto-operation, Specially designed for use with Roco BR110 locomotive with ZIMO Panto-board (built in 2010 and following) and sound decoder MX643P22. Fu outputs FA4, FA5, FA6, FA7 start Panto movement along with board electronics. PLEASE NOTE: CV "s #119, #120 did not in this case, their normal function (Low beam mask), but to define the Panto upward movement time. CV's # 119, #120 indicate the respective term of the Panto-engines in the upward movement, respective values range from 0 to 20, Default 10th Note: the downward movement is stopped by the end contacts on the abschalte Panto board. **Bit 1 = 1: Retraction is NOT intended to end a loop pass of noise** delayed. Note: "normally" is waited for diesel locomotives, until a loop of noise is played (typically 1 to 2 seconds), and then implemented an interim given run command, ensures a clean sound transition. **Bit 2 = 1: Sound "F1> S" sound Departing on end waiting, 0 = do not wait / Departing immediately** **Bit 3 = 1: The use of "second Motorola-address" is disabled.**

					This episode address is normally used to control other functions of 4, **Bit 4 1 = 1** Random Special mode for 2-Stage Air activate: Z1 = fast air pump. Comes only after stalling. Z1 interval minimum and maximum values in ZSP can set how long the fast air pump should not come if it was being played (set both values equal to) compensate Z2 = slow air pump to pressure drop in the state. Comes only at a standstill **Bit 5 = 1: For the ACK (acknowledgment) on addressing service**mode (programming track) should only motor direction "forward" can be used (otherwise alternately, so that the engine does not move). This is sometimes useful if the motor voltage "sideline" a wiper switch is actuated; typical application: Roco ICN. **Bit 6 = 1: How Bit 5, but motor direction "backwards".** **Bit 7 = 1: the end of the retraction is to "Anfahrpfiffs" delayed.**
3.13	#155	Advanced function button for selecting a half-speed (Shunting I) From software version 27.10	0-19	0	Expanding on the settings of the CV #124, when the local selection (half speed on F3 or F7) is not sufficient, because other key is desired: CV #155: Determination of the function button, with which the half-speed (= highest gear-it's half speed) can be activated. If CV #155> 0 (ie, set a button), a possible assignment in CV #124 is invalid. CV #155 = 0 means "not about F0, but that CV # is the 124th
3.13	#156	Extensive selection of a function key for deactivation of the acceleration and deceleration times (Shunting II) From software version 27.10	0-19	0	Expanding on the settings of the CV #124, when the local selection (acceleration deactivation on F3, F4 or MAN) is not sufficient, because other key is desired: CV #155: Determination of the function key with which the Beschleunigsungs and deceleration timesThat are set to CV 's #3, #4, #121, #122, are disabled or reduced. The settings of the CV #124 on the nature of the deactivation or reduction shall continue to apply, ie: CV #124, Bit 1, 0 == 00: no effect on acceleration times = 01: Button + adaptive exponential disabled. = 10: reduced ACCEL / deceleration time to ¼ of the values in CV 's # 3, #4.. = 11: disabled ACCEL / deceleration time completely.. Typically, therefore, the CV #124 = 3 in order to achieve full activation (unless some other bits in CV # 124 also). The assignment of a button to accelerate deactivation in CV #124, however, is ineffective if CV #156> 0 (ie, a key set here) is.

3.13	#157	Selection of a key for the MAN function = Picked up the "sig-nalabhängigen train control" HLU or signal maintenance with ABC by function key From software version 27.10	0-19	0	The MAN function (Or MAN button on ZIMO cab) is an original created solely for Zimo applications function to release grip and speed limits by the HLU system of "signal controlled speed influence". In later software enhancements this function was also applied for the signal stop by "asymmetrical DCC signal" (Lenz ABC), ie also made there by stopping the MAN key defeasible. In those cases where a Zimo decoders within an external system (ie non ZIMO) is used (often in HLU applications, often with ABC) now with CV # 157 any key used to unlock the train control or stop the signal.
4.0 **5.5** **5.7**	#158	FA1 as a control line External Kondensator-Lade/Entlade-Schaltung if CV158 bit0 is set.		0	**ONLY MX648: Bit0 = 1** FA1 as a control line **Bit 1 = 1: "Between gas" for special projects such as sound VT61, Bully** etc. deactivated. **Bit 2 = 1: NEW** RailCom KMH message active **Bit 3 = 1: when driving away is "Stand" and immediately canceled Sample "as-F1" Sample played** **Bit 4 = 1: lower the rate of increase** steam cuffs at high speeds. **Bit 5 = 1: Reduction of diesel sounds at a level and lowering of turbocharged sound was slowed when last** **Bit 6 = 1: Thyristor sound may be louder when braking** **ONLY MX645:** **Bit 7 = 1: Flash for E-Lok "Switch-works" on FA7**
3.21	#159	Light Effect for FA7, Coupling effects and smoke generator is not possible to FA7!	How CV #125ff		
3.21	#160	Light effect for FA8 Coupling effects and smoke generator is not possible to FA8!	How CV #125ff		
3.25	#161	Servo outputs log and on / off	Bit 0 - 2	0	Bit 0 = 0: Servo protocol with positive pulses. Bit 0 = 1: Servo protocol with negative pulses. Bit 1 = 1 Power output remains active (f SmartServo!) Bit 1 = 0 power output is turned off when they reach the end point in no servo jitter more! Bit 2 = 0 for 2-key operation with center position, when both functions 0 Bit 2 = 1: in the case of two-key operation (CV #161) servo runs only while the button is pressed.
3.25	#162	Servo 1 left end position	0-255	49	Definition of auszunützenden share of total rotation range of the servo's.
3.25	#163	Servo 1 right end position	0-255	205	Definition of auszunützenden share of total rotation range of the servo's.
3:35	#164	Servo 1 center position	0-255	127	Definition of the center position for the case of three-position use.

3.25	#165	Servo 1 orbital period	0-255	10	Rotating speed, time between the end positions defined in tenths of a second (total range of 25 sec). -> 10 = 1 second
3.25	#166 to #169	As above, but for servo 2			
3.25	# 170 to #173	As above, but for servo 3			
3.25	#174 to #177	As above, but for servo 4			
3.25	#181	Servo 1 - Function Assignment	0-13	0	= 0: Servo not in operation = 1: Single-button operation with F1 = 2: Single-button operation with F2 = 3: Single-button operation with F3 ... = 28: Single function key F28 = 90: to operate with servo direction function = 91: Servo-dependent stopped and direction ie: power set right at standstill and direction forward, otherwise turns left = 92: Servo-dependent stopped and direction i.e.: turns right when stopped and direction set to reverse, otherwise turns left = 93: Power depends on loco movement i.e.: turns right when stopped, turns left when driving, direction makes no difference = 101: Two-key operation F1 + F2 = 102: Two-key operation F2 + F3 etc. (on the left - right) = 111: Two-key operation F11 + F12 = 112: Two-key operation F3 + F6 = 113: Two-key operation F4 + F7 = 114: Two-key operation F5-F8
3.25	#182	Servo 2 - Function Assignment	0-13	0	
3.25	#183	Servo 3 - Function Assignment	0-13	0	
3.25	#184	Servo 4 - Function Assignment	0-13	0	

3.25	#185	Special allocation for real steam locomotives	1, 2, 3	0	= 1: A steam locomotive with servo operation, speed and direction using the cab, the center position is stop. = 2: proportional servo 1 Turn the speed control, servo 2 for direction. = 3: as 2, but: direction servo automatically resetting, if speed is 0 and F1 = on; For speed> 0. Direction servo direction on NOTE to CV #185 = 2 or 3: Servo 1 is CV #162, #163 set (final positions), with appropriate values is also possible to reverse the direction. Servo 2 is adjustable with CV #166, #167.
	#190	Up-Dimming Time for FA (see effect)	0-255		
	#191	Down-Dimming Time for FA (see effect)	0-255		
3.3	#250 to #253	Decoder ID and serial number From SW Version 26			The decoder ID (= serial number) is enrolled in the production of the first byte (CV #250) characterizes the decoder type, the other three bytes are the serial number. Requires the decoder ID is mainly for automatic notification of new decoder on a system (using RailCom) and in connection with the loading code for "coded" sound projects (see CV #260 to #263).
	#254				
	#255				

Decoder ID:
200=MX82 | 201=MX620 | 202=MX62 | 203=MX63 | 204=MX64 | 205=MX64H | 206=MX64D | 207=MX680 | 208=MX690 | 209=MX69 | 210=MX640 | 211=MX630-P2520 | 212=MX632 | 213=MX631 | 214=MX642 | 215=MX643 | 216=MX647 | 217=MX646 | 218=MX630-P25K22 | 219=MX631-P25K22 | 220=MX632-P25K22 | 221=MX645 | 222=MX644 | 223=MX621 | 224=MX695-RevB | 225=MX648 | 226=MX685 | 227=MX695-RevC | 228=MX681 | 229=MX695N | 230=MX696 | 231=MX696N | 232=MX686 | 233=MX622 | 234=MX623 | 235=MX687 | 236=MX621-Fleischmann

CV – for Sounddecoder

Below CVs ONLY for sound decoder, Large Scale Decoder and MX633 (CV400)!

Chapter	CV	Designation	Area	INC-step	Default	Description
3.3	#260 to #263	Loading code	0-255		0	Against release of the decoder ID (CV #250 - #253) to ZIMO the user gets a load code that sound for certain projects ("codet", ie protected) is valid.
4th	#265	Choice between STEAM and DIESEL sound sequencing DIESEL or for selection of the locomotive type **DIESEL:** **also see CV #280 for** **Load dependence!**	1-32 101-132		1-32 = steam 101-132 = Diesel	With CV #265 = X Can the particular sound project be changed
5.4	#266	Overall volume	0-255	5	65	The value "65" (default) is (mathematically) the loudest possible distortion-free, but values up to about 100 functioning rather well, because the volume is increased without the distortion would be strongly heard already, also depends the usefulness of sound of the used sound samples from.
5.5	#267	Chuff rate After "simulated cam sensor"	0-255	1	70	CV #267 is only effective if CV #268 = 0: Chuff follow the "virtual cam sensor", Then you need so no real cam sensor the decoder to be connected. The default setting "70" is about 4 or 6 or 8 steam beats per revolution, depending on chuff set, but given that a strong dependence on the engine and transmission there must usually have an individual adjustment to be made to really precisely to the to get desired chuff density; to the CV #267 is: Lowering the value results in higher chuff rate and vice versa.
5.5	#268	Switching to real cam sensor and edge number Achsdetektors for the chuff	0-255	1	0	= 0: "Simulated" cam sensor is active (set by CV #267, see above). = 1: real cam sensor (which must be connected to the "Switch input 3" of the MX690, see Chapter 8) is active, any negative edge gives a chuff. = 2, 3, 4, ... real cam sensor, a plurality of edges in a row (2, 3, 4, ...) provide a steam blow.
5.5	#269	Emphasis on leadership impact	0-255	10	0	For the sound of a passing steam locomotive, it is characteristic that one of the steam blows out of the 4 or 6-group sound louder than the other, but this effect is given in itself in se-lected chuff set, but with the help of CV #270 still to be strengthened

5.5	#270	Creep-impact extension	0-255	10	x	**PROJECT (not yet implemented):** At very low speeds, the chuff of the model are due to the mechanical valve control for a long spout, this effect is accentuated with CV #270, more or less.
5.5	#271	Quick trip-Overlap effect	0-255	1	16	At fast speed should be like the prototype, the individual vapor proposals overlap, as they follow each other tight and not be shorter to the same extent, to finally change to a weakly modulated noise. In the model train operation, this is not always desirable, because it sounds very attractive, and therefore can be adjusted with CV #272, whether the steam blows in quick ride rather accentuated sound or image noise are more likely.
5.5	#272	Dewatering time	0-255	10	50	Opening the cylinder valves for the purpose of dewatering is the prototype individually in the opinion of the engineer. The model railway it is desired rather automatically at start, with CV #272 is fixed, how long is the course of the start-stop the acoustic effect of the open cylinder valves. In CV #272 = time in tenths of a second (50 = 5 sec)! Note: If the blow-off sound is also a function key can be assigned to the appropriate function key, the automatic draining abbreviated or extended at will. Automatic watering and draining function is necessarily the same (according to later successful selection / assignment). **= 0: no blow-off sound**
5.5	#273	Acceleration For steam - Dewatering For diesel - only engine sound Powers up and locomotive runs away with delay Circuit Protection and Only - With electric locomotive	0-255	1	0	The opening of the cylinder valves and the associated noise model starts at most to a standstill. With CV #273, this can be emulated by the start automatically delayed. The effect of the acceleration delay is canceled when a shunting is activated by disabling acceleration (see Assignment of F3 or F4 on CV #124!) = 0: No Acceleration = 1: Special setting dewatering via throttle, no acceleration delay, but lowest speed level (lowest knob position for 0, only 128 steps) means "go yet, but drain"). = 2 .. : Acceleration in tenths of seconds

5.5	#274	Dewatering downtime	0-255	10	30	In shunting (frequent stopping and starting) will be omitted in practice the constant opening and closing the cylinder valves. The CV #274, that the drainage noise is suppressed when the locomotive is not standing still at least for the time defined here. In CV #274 = time in tenths of a second! Note: If you want to ranks with continuously open cylinder valves that may be caused by the dehydration associated function key (function assignment initiated with CV #312 = 2, 3, 4, ..) can be achieved.
5.6	#275	Drive-by- (Dampfschlag.) volume With unloaded slow travel	0-255	10	60	**To set up the load dependency, the following measures are carried out in this order:** "Automatic test run to determine the motor base load" with CV #302 = 75 ... Adjustment or control CV's #275 and #276th CV #277 (this should have been "0" have been) If necessary, CV # 278 and # 279 configure With CV #275 defines how loud the steam hammer at "base load" (ie the same operating conditions as the previously conducted "test drive") should be, namely at a speed of about 1/10 of the maximum speed. Notes: Appropriately (but not necessarily) the way CV #275 when driving slowly through trial and error (ie by "incremental programming") brought to the appropriate value. Since the volume is interpolated between the values depending on the speed in CV #275 and CV #277, it is not necessary when setting a precise speed (but just about 1/10 of the maximum speed) to be observed. Appropriately, this setting, while the CV #277 is set to "0" (the default value), so that the setting for "unencumbered ride" is not affected by stress.
5.6	#276	Driving sound (chuff) volume with no load speed run	0-255	10	80	See CV #275 (see above), but for high-speed travel. With CV #276 is set to be at as "base load", according to the steam hammer, and that at maximum speed so throttle (while set to full speed. All instructions for CV #275 apply here!

5.6	#277	Depending on the driving noise (Chuff) of load	0-255	10	0	When deviating from the basic load (according to "automatic test run to determine the motor base load") to the steam blows are stronger (to disappear entirely, on declines) (in pitch) or weaker. The CV #277 provides for the extent of this dependence is a parameter which can be adjusted by trial and error on the appropriate value must.
5.6	#278	Load change threshold	0-255	10	0	Thus, a reaction of the driving noise suppressed to small changes in load (for example, when cornering), to avoid an excessively turbulent acoustic impression. Appropriate setting can be determined almost exclusively by trial (with "incremental programming").
5.6	#279	Load change response time	0-255	1	0	Thus, the reaction of the vehicles in motion will be delayed to load changes, wherein it is no defined time stamp, but a "load change dependent time" (= the greater the change, the faster the action). Also this CV is designed to avoid too restless acoustic impression. Appropriate setting can be determined almost exclusively by trial (with "incremental programming" in CV #278 and #279 together).
5.7	#280	Load influence for DIESELLocomotives	0-255	10	0	Thus, the reaction of the diesel engine (higher and lower speed and power levels in diesel-hydraulic locomotives, run / idle with diesel-electric, switching from gear trains) set to load (acceleration, pitch, slope). = 0: no effect, engine speed-dependent = 255: big influence. It is necessary to carry out before the test drive with CV #302 = 75

5.6	#281	Acceleration threshold for full Acceleration sound	0-255	1	1	Stronger and louder chuff to accompany the increased power consumption compared to the base load during acceleration. In order to realize that the sound of the model as to hear in advance (that is even before the acceleration is visible even because this is a consequential effect of increased steam supply yes), it is appropriate, the acceleration noise even with increase of a single gear (ie at imperceptible change in velocity) trigger, so as to the throttle control forth the correct sequence may sound acceleration. The "Loführer" can in this way (1 step) but also forward-looking Set the engine noise to an upcoming pitch. = 1: Acceleration sound (chuff) at full volume even at increasing the rate to only 1 step. = 2, 3, ... Acceleration sound only at full volume increase in this number of speed steps, in front of proportional volume.
5.6	#282	Duration of the acceleration noise	0-255	10	30	After increasing the speed to the acceleration noise still for a certain period to stop (otherwise each speed step would be heard individually, which is unrealistic). In CV #282 = time in tenths of a second
5.6	#283	Driving sound (chuff) volume for full acceleration sound	0-255	10	255	With CV #283 is set to how loud the steam hammer at maximum acceleration (default: 255 = maximum volume). If CV #281 = 1 (set the acceleration threshold to 1 step), the volume is defined here at any speed increase (even with only 1 step) to the effect.

5.6	#284	Delay threshold for noise reduction in delay	0-255	1	1	Quieter to completely vanishing steam blows to accompany the reduced power requirement in the delay. The logic of the noise reduction is analogous to the reverse case of the acceleration noise (CV #281 to #283). = 1: the minimum (CV #286) reduced noise (chuff) already at lowering the rate to just 1 step. = 2, 3, ... reduced to minimum sound at lowering by this number of speed steps.
5.6	#285	Duration of the noise reduction with delay	0-255	10	30	After lowering the speed is to the reduced driving noise reduced still remain for a certain time (in analogy to the case of the acceleration). In CV #285 = time in tenths of a second
5.6	#286	Volume the reduced driving noise during deceleration	0-255	10	20	With CV #286 is set to how loud the chuff in delay (default: 20 = very low, but not zero). If CV #284 = 1 (ie, the Delay time for delay threshold -set to 1 step), the volume is defined here for each speed velocity reduction (even at 1 step) to the effect
5.3	#287	Threshold for brake squeal	0-255	10	20	The brake squeal is to use, if at delaying a certain speed level is not reached. It is the achievement of the zero speed (standstill due to EMF - measurement result) stopped automatically (gently faded).
5.3	#288	Brake squeal time spent driving	0-255	10	50	The brake squeal is to be suppressed if the locomotive is driven only a short time, because these are usually only shunting often without cars (in reality mostly screeching car, not the engine itself!) Note: brake squeal noises can also be assigned to a function key (see mapping procedure CV #300 = ...), making them either manually triggered or stopped can be!
5.7	#289	Thyristor for ELECTRIC engines **Stepping effect** pitch	1-255	10	1	The pitch of the thyristorcontrol-noise is in some vehicles (typical example: TAURUS) not rise continuously, but in steps (scale). = 1: no-effect levels, continuous increase 1 - 255: increase the pitch after the corresponding interval of speed levels

5.7	#290	Thyristor for ELECTRIC engines: Pitch at medium speed	0-100	10	40	Percentage by which the pitch of the noise-Thyristorsteuerungs at medium speed should be higher than that of the noise stopped. Definition of "medium speed" in CV #292 = 0: no change, (which affects pitch) compared to a standstill. = 1 - 99: corresponding change in pitch = 100: Double pitch already in "Medium speed".
5.7	#291	Thyristor for ELECTRIC engines: Pitch at maximum speed	0-100	10	100	Percentage by which the pitch of the noise-Thyristorsteuerungs at maximum speed should be higher than that of the noise stopped. = 0: no change, (which affects pitch) compared to a standstill. = 1 - 99: corresponding change in pitch = 100: Double pitch
5.7	#292	Thyristor for ELECTRIC engines: Gear for medium speed	0-255	10	100	Internal speed step as the "average speed" for the pitch applies to CV #290th CV's #290 to #292 thus form a three-point curve for the pitch of Thyristorsteuerungs-noise, starting from rest, wherever the original sample will be played.
5.7	#293	Thyristor for ELECTRIC engines: Volume at steady speed	0-255	10	30	Volume Thyristorsteuerungs-noise with unloaded ride (no acceleration or Braking in progress). Note: Load dependence on CV's #277 ff regulated, but not yet in SW version 4!

5.7	#294	Thyristor for ELECTRIC engines: Volume during acceleration trip	0-255	10	100	Volume during heavier acceleration; usefully be in CV #294 is a larger value can be entered as in CV #293 (so that the locomotive is louder under acceleration). At smaller acceleration will automatically decrease the volume used
5.7	#295	Thyristor for ELECTRIC engines: Volume at delay trip	0-255	10	50	Volume during heavier deceleration (braking); In this CV #295 can be both a greater value and a smaller value than in CV # 293 to be entered, depending on whether the thyristors are charged during braking by the regenerative braking (then noise becomes louder) or not (it is rather quiet).
5.7	#296	Drive motor for ELECTRIC engines: the largest volume	0-255	10	100	Maximum volume of the engine noise, which is achieved at full speed, or speed in CV #298th
5.7	#297	Drive motor for ELECTRIC engines: .. where audible noise begins	0-255	10	30	Internal speed step, the motor sound is heard for the first time, at which speed it begins silently at the speed in CV #298, the maximum volume in CV #296th
5.7	#298	Drive motor for ELECTRIC engines: ... where full volume begins	0-255	10	128	Internal speed step, the motor sound reaches full volume, at this speed engine noise reaches maximum volume in CV # 296th
5.7	#299	Engine noise, depending on the speed of the pitch for ELECTRIC engines	0-255 (> CV #297!)	10	100	The engine noise is according to this CV played faster with increasing speed. = 0: pitch (Abspielgeschw.) is not increased, = 1 .. 100: Intermediate values = 100: doubling the pitch, > 100: currently as 100; reserve for software development.

5.1	#300	Function Mapping ("CV300 procedure"):  				Pseudo programming - Is introduced by CV #300 = 100 -> select the chuff Sets = 128 -> Siedegeräusch = 129 -> change of direction = 130 -> squeal = 132 -> Anfahrpfiff = 133 -> Entwässerngeräusch = 1 sound on F1 = 2 sound on F2 etc. Sound on F0 = 20 Sound = 101 for random generator Z1 = 102 for random sound Z2 = 103 for random sound Z3 etc. (to Z8) = 111 sound for switching input S1 = 112 sound for switching input S2 = 113 sound for switching input S3 **See chapter "Assigning Ampels Sound"!**
5.3	#302	Test drive	75, 76			Initiated by the pseudo-programming **CV #302 = 75** there is an automatic trip to the incorporation of the load data in the forward direction; **WARNING: the locomotive (or train) is moved automatically using a free travel distance of 5 m available in the forward direction must be absolutely no slope and slope, if possible without (tight) curves.** By CV #302 = 76, a measurement can be started journey in the reverse direction if the design of the vehicle differences expected in the base load can (otherwise, in reverse as forward motion treated).
	#303 to #309	-				
5.4	#310	On / Off button for road noise and Random noise	0-28, 255		8	Determination of the function key with which the driving noise (chuff, Siedegeräusch, automatic watering, brakes squealing.) And random noise (air pump, coal shovels, ...) can be turned on and off, when delivered F8. = 255: driving and random sounds are always on = 0: no assigned button (set, when the keys are needed elsewhere), always active. = 29 -> F0

5.4	#311	General On / Off button for functional noise	0-28		0	Defines a function key with which the sounds that the function keys are assigned (eg F2 - whistle, F6 - bell), generally can be turned on and off, when delivered, this is not intended! = 0 does not mean F0, but that the functional noises are always active. = (#310), ie the same record as in CV #310: with the appropriate key, the sound is completely turned on and off. = 1 ... 28: Own General button for functional sounds. **Depending on the sound project!** Default = CV #310 as in steam, = 0 for diesel
5.4	#312	Drainage button **Depending on the sound project!** Default = vapor at 10, Default = at 0 diesel	0 -28		0	Defines a function key with which the drainage-Noise (ie, that noise, which was associated with the selection procedure CV #300 = 133 as an automatic blow-off sound) can be initiated. E.G. for maneuvering with "open valves" = 0: no assigned button (set, when the keys are needed elsewhere). = 29 -> F0
5.4	#313	Mute button	0-28 101-129		8	All sounds Hide and Unhide 0 = no mute button 1, no = mute when F1 is pressed, 2 = no mute when pressed F2, etc. 101 = mute when F1 is pressed, etc.
5.4	#314	Mute fade time	0-255		0	Range in 1/10 seconds 0 is equal to 10 = (= 1Sec)
5.8	#315	Random Z1 minimum interval Special note to the random generator Z1: The random generator Z1 is optimized for air pump (this will automatically start shortly after stopping the train), so the assignment of the delivery status should be maintained or changed to another maximum air pump. CV # 315 also determines the time of onset of the air pump after it stops!	0-255		1	The random number generated at irregular (= random) intervals internal pulses through each of which one of the random number associated with random noise is triggered. CV #315 defines the smallest interval between two successive pulses. Initiated the mapping of sound sample's for random Z1erfolgt through the procedure with CV #300 = 101, see above! When delivered (default), the "air pump" is a stationary vehicle on Z1.

5.8	#316	Random Z1 maximum interval	0-255		60	CV #315 defines the maximum interval between two successive pulses of the random Z1 (ie most of the launch of the air pump stops) fixed; between the two values in CV #315 and CV #316 are distributed the actually occurring pulses equal.
5.8	#317	Random generator Z1 Playback time	0-255		5	The random generator Z1 associated sound sample (ie mostly the air pump) to be played in each of the CV #317 defined duration. = 0: Play sample once (as recorded time)
5.8	#318 #319 #320	As above, but for random Z2	0-255 - "- - "-		20 80 5	When delivered, "STEAM", the "carbon blades is as stationary noise on Z2.
5.8	#321 #322 #323	As above, but for random Z3	0-255 - "- - "-		30 90 3	When delivered, "STEAM" is the "water pump" as stationary noise on Z3.
5.8	#324 #325 #326	As above, but for random Z4	0-255 - "- - "-			As delivered, this random generator is unused.
5.8	#327 #328 #329	As above, but for random Z5	0-255 - "- - "-			As delivered, this random generator is unused.
5.8	#330 #331 #332	As above, but for random Z6	0-255 - "- - "-			As delivered, this random generator is unused.
5.8	#333 #334 #335	As above, but for random Z7	0-255 - "- - "-			As delivered, this random generator is unused.
5.8	#336 #337 #338	As above, but for random Z8	0-255 - "- - "-			As delivered, this random generator is unused.
5.8	#341	Switching input 1 Playback time	0-255		0	The switching input S1 associated sound sample to be played for each of CV #341 defined duration. = 0: Play sample once (as recorded time)
5.8	#342	Switch input 2 Playback time	0-255		0	The switching input S2 associated sound sample to be played for each of CV #342 defined duration. = 0: Play sample once (as recorded time)
5.8	#343	Switch input 3 Playback time	0-255		0	The switching input S3 associated sound sample to be played for each of CV #343 defined duration. = 0: Play sample once (as recorded time)
5.7	#344	Follow-up time for noise FS1 r	0-255		0	0 to 25.5 seconds after standstill is noise (FS1)
5.7	#345	Fast-switchover key (F1 - F28) for the sound of SYSTEM MORE-Lok	1-19		0	This change is only for certain sound projects provided (eg RhB Gem), where the two sound types are summarized in a collection.

5th	#350	Delay of the derailleur sounds after starting for ELECTRIC engines	0 - 255 (0-25sec)		0	The switching mechanism is not to be heard immediately after driving away with certain engines (eg E10), but only a certain, defined here, while later. = 0: Switch comes immediately when starting.
3.23	#351	Lüfterdrehzhal during operation (diesel only)	0-255		0	Fan PWM medium (255 = 100%) (ride)
3.23	#352	Fan Speed at startup. , SW 30.22 speed for auxiliary blower	0-255		0	Fan PWM strong (255 = 100%) (load / start)
3.23	#353	Shutdown RG heater	0-255		0	Off time [25s] (24 = ~ 10 min) (min must be 1)
5.5	#354	Chuff rate at low speed From SW 8.26!	1 -255			less correction value to CV #267 CV # 354 only in conjunction with CV #267! With CV #354 is the non-linearity of the velocity measurement for the "virtual cam sensor" balanced: Ie: during the setting of CV #267 is to be approximately at speed step 10 (ie slow, but not too slowly), can be done with CV #354, a correction for the speed step 1 (ie, for extremely slow speed). = 0: no influence (linear frequency CV #267) = 1 … 127: chuff at speed level 1 (and extremely slow speeds) more frequently than CV #267 = 255 .. 128: chuff less frequently.
3.23	#355	Speed of Lüfers at standstill - From SW 8.26!				Fan PWM at standstill (255 = 100%)
5.7	#357	Thyristor Lowering the volume in faster ride for ELECTRIC engines	0-255		0	Internal speed step at which the thyristor noise should be quieter.
5.7	#358	Thyristor Course of the reduction of the volume in faster ride for ELECTRIC engines	0-255		0	Course, as the noise from the thyristor in CV #257 defined gear to be quieter. = 0: not at all. = 10: is quieter by about 3% per gear. = 255: aborts when defined in CV #257 gear.
5.7	#359	Derailleur noise Playback duration of the derailleur noise at speed change for ELECTRIC engines	0 -255		30	Time in tenths of seconds (ie 0 to 25 seconds adjustable), for which the rear derailleur noise to be heard at each rate change. Only effective if derailleur noise present in the sound project.
5.7	#360	Derailleur noise Playback duration of the derailleur noise after stopping for ELECTRIC engines	0 -255		0	Time in tenths of seconds (ie 0 to 25 seconds adjustable), for which the rear derailleur noise to be heard after stopping. = 0: after stopping at all.
5.7	#361	Derailleur noise Waiting time until the next time you play for ELECTRIC engines	0 -255		20	In rapid succession the following changes in speed derailleur noise would come too often. CV #361: Time in tenths of seconds (ie 0 to 25 seconds adjustable) as a minimum distance between the switchgear-Play.

5.7	#362	Thyristor Umschalteschwelle on second noise for ELECTRIC engines	0-255		0	Speed step is switched from a second which Thyristorgeräusch for higher speeds, which has been introduced on the occasion of the sound for the project "ICN" (Roco OE). = 0: no second thyristor noise
5.7	#363	Derailleur noise Distribution of speed in switching stages for ELECTRIC engines	0-255		0	Number of switching steps over the entire range (standstill to full speed), eg when 10 switching stages are defined, comes with (internal) drive position 25, 50, 75, ... (ie a total of 10 times) the derailleur noise. = 0 is equivalent to 5; i.e. 5 switching steps over the entire operating range.
5.7	#364	Diesel flow minimum speed frequency from power stage 2	0-100			
5.7	#365	Diesel flow rate maximum speed	0-100			
5.7	#366	From SW 30.x: Turbocharger setting (ZSP> = 1.9.5 needed!) Maximum volume of the turbocharger	0-64		64	
5.7	#367	Depending on the frequency of the driving speed	0-255		100	
5.7	#368	Depending on the frequency of the differential set to current speed step (acceleration)	0-255		100	
5.7	#369	Minimum load so the turbocharger will ever hear	0-255		100	
5.7	#370	How fast the turbocharger the frequency increases	0-255		100	
5.7	#371	How fast the turbocharger lowers the frequency	0-255		100	
5.7	#372	Drive electric motor when accelerating volume	0-255		100	
5.7	#373	Volume drive electric motor during braking	0-255		100	
5.4	#374	Button for Coasting	0-28		0	Button with the sound on eg, idling or powering forced regardless of the driving situation.
5.4	#375	Should apply gear from the Coasting	0-10 / 255		0	0 = deactivated 1-10 = gear 255 = speed possible with active Coasting
5.4	#376	Volume for driving sound	0-255		255	
	#380	E-brake from SW32.3: Key definition for electric brake	1-28			F1 - F28
	#381	Electric brake min. Gear	0-255			including sound is not triggered or terminated
	#382	Electric brake max. Gear	0-255			Sound is also not triggered
	#383	Electric brake function of pitch Fahrgeschindigkeit	0-255			(0 = none, 1-255 = playback speed increase)

	#384	Electric brake minimum number of speed levels (scaled to 255 levels) to be slowed down so that the sound will be triggered	0-255			
	#385	Electric brake release threshold by negative engine load	0-255			0 = disabled (only works after Einlernfahrt CV #302 = 75) 255 = 100% negative engine load (whichever is never real), 128 = 50% 64 = 25% 30 = 10% ...
	#386	Electric brake				**Bit 3 = 1** = At the end exit loop and sample sound play until the end instead of fading sound **Bit 2-0** = Term extension (0-7 = 0-7s)
	#394	**ONLY MX645:** Flash for E-Lok “Switch-works”	0-1		0	**Bit 0 = 1 Flash on FA6**
	#395	Max. Vol.	0-255			
	#396	Key down Vol.	1-28			
	#397	Key up Vol.	1-28			
	#398	Coasting Idle	0.255			Here, the number of speed steps are adjusted (255) to within a short time (about 0.5 s) must be braked so that the diesel engine is lowered to "Idle / Stand". With a slow withdrawal of the driving position, this function is not active. The diesel engine remains in "Idle / Stand" is accelerated up again.
	#399	“Rule 17”	0-255		0	0=no function 1-255 = Speed step from the Recorded Shows SEE CV #430ff!
3.18	**#400**	Input Mapping internal function F0 Which F-key switches F0 From SW decoder 1.30	0 1-28 29 30-58 59-87 And 101-128 129 130-158 159-187		0	= 0: function key (ie from the DCC package) will be forwarded to the internal function applied 1:1 - so no mapping. = 1: F1 key is forwarded to internal F0. = 2: F2 is forwarded to internal F0 ..... = 28: F28 key is forwarded to internal F0. = 29: F0 is forwarded to internal F0. = 30: press F1 to F0, but in forward direction = 31: F0 to F2, but only when moving forward .... = 59: F0 to F0, but in reverse direction etc.
3.18	#401 ... #428	Input mapping for internal function F1 to F28	See CV # 400		0	As above **New from SW 30.6:** Is added to the values given 100, the function is inverted -> function key = function, function key = not function.

3.17	#430 #436 #442 #448 #454 #460 #466 #472 #478 #484 #490 #496 #502	Function From SW 32.0 "Swiss Light Mapping"!	0.1 to 29	0	When this button is activated, the terms defined in A1, A2 outputs are switched on. 1-28 for F1-F28, 29 for F0
3.17	#431 #437 #443 #449 #455 #461 #467 #473 #479 #485 #491 #497 #503	Master (Global light button)	1-29 129-157	0	optional, if given the outputs this button does not turn on when the specified F-key is turned on. 0 = not defined for 0.1 to 28 for F1-F28, 29 F0 If bit 7 (value +128): Outputs of the F-key will only be applied if M button is activated. 255 = high beam function for any F-key - ONLY if output "A" and "Dim" (via CV #60, CV #114, CV #152) is!
3.17	#432 #438 #444 #450 #456 #462 #468 #474 #480 #486 #492 #498 #504	A1 Vw	0, 1-12 14-15	0	First The output is to be switched in the direction of travel forward. 0 = no output, 1-12 = FA1-FA12, 14 = FA0v, 15 = FA0r

3.17	#433 #438 #445 #451 #457 #463 #469 #475 #481 #487 #493 #499 #505	A2 Vw	0, 1-12 14-15	0	Second The output is to be switched in the direction of travel forward. 0 = no output, 1-12 = FA1-FA12, 14 = FA0v, 15 = FA0r
3.17	#434 #440 #446 #452 #458 #464 #470 #476 #482 #488 #494 #500 #506	A1 Rw	0, 1-12 14-15	0	First Output to be switched on when the direction of travel backwards. 0 = no output, 1-12 = FA1-FA12, 14 = FA0v, 15 = FA0r
3.17	#435 #441 #447 #453 #459 #465 #471 #477 #483 #489 #495 #501 #507	A2 Rw	0, 1-12 14-15	0	Second Output to be switched on when the direction of travel backwards. 0 = no output, 1-12 = FA1-FA12, 14 = FA0v, 15 = FA0r
	#510				
	#511				
	#512				

	#513				
5.4	#514	Sound function F1	0-255		**volume relative to other sounds**
	#515				
	#516				
5.4	#517	Sound function F2	0-255		**volume relative to other sounds**
	#518				
	#519				
5.4	#520	Sound function F3	0-255		**volume relative to other sounds**
	#521				
	#522				
5.4	#523	Sound function F4	0-255		**volume relative to other sounds**
	#524				
	#525				
5.4	#526	Sound function F5	0-255		**volume relative to other sounds**
	#527				
	#528				
5.4	#529	Sound function F6	0-255		**volume relative to other sounds**
	#530				
	#531				
5.4	#532	Sound function F7	0-255		**volume relative to other sounds**
	#533				
	#534				
5.4	#535	Sound function F8	0-255		**volume relative to other sounds**
	#536				
	#537				
5.4	#538	Sound function F9	0-255		**volume relative to other sounds**
	#539				
	#540				
5.4	#541	Sound function F10	0-255		**volume relative to other sounds**
	#542				
	#543				
5.4	#544	Sound function F11	0-255		**volume relative to other sounds**
	#545				
	#546				
5.4	#547	Sound function F12	0-255		**volume relative to other sounds**
	#548				
	#549				
5.4	#550	Sound function F13	0-255		**volume relative to other sounds**
	#551				
	#552				
5.4	#553	Sound function F14	0-255		**volume relative to other sounds**

	#554				
	#555				
5.4	#556	Sound function F15	0-255		**volume relative to other sounds**
	#557				
	#558				
5.4	#559	Sound function F16	0-255		**volume relative to other sounds**
	#560				
	#561				
5.4	#562	Sound function F17	0-255		**volume relative to other sounds**
	#563				
	#564				
5.4	#565	Sound function F18	0-255		**volume relative to other sounds**
	#566				
	#567				
5.4	#568	Sound function F19	0-255		**volume relative to other sounds**
	#569				
	#570				
5.4	#571	Funktionsssound F0	0-255		**volume relative to other sounds**
5.4	#573	Sound number boiling noise			
5.4	#574	Boiling noise	0-255		**volume relative to other sounds**
5.4	#575	Sound number change of direction			
5.4	#576	Change of direction	0-255		**volume relative to other sounds**
5.4	#577	Sound number squeal			
5.4	#578	Brake squeal	0-255		**volume relative to other sounds**
5.4	#579	Sound number thyristor noise			
5.4	#580	Thyristor noise	0-255		**volume relative to other sounds**
5.4	#581	Sound number Anfahrpfiff			
5.4	#582	Anfahrpfiff	0-255		**volume relative to other sounds**
5.4	#583	Sound number dewatering			
5.4	#584	Drain	0-255		**volume relative to other sounds**
5.4	#585	Sound ID e-motor			
5.4	#586	E-motor	0-255		**volume relative to other sounds**
5.4	#587	Sound number rolling noise			
5.4	#588	Roll-noise	0-255		**volume relative to other sounds**
5.4	#589	Sound number derailleur			
5.4	#590	Derailleur	0-255		**volume relative to other sounds**
5.4	#591	Sound number Thyristor2			
5.4	#592	Thyristor2	0-255		**volume relative to other sounds**
	#593				
5.4	#600	Turbocharger	0-255		**volume relative to other sounds**
5.4	#601	Sound number Dynamic Break			

5.4	#602	Dynamic Break	0-255		**volume relative to other sounds**
	#726	Trigger Sound …	0-255		Soundnumber from Value in CV #513-#570
	#727	… to FO			Functionoutput FO0, FO1-FO12 (1=Lf, 2=Lr, 3=F1 .. 14=FA12 and 255=Blower for Heater)
	#728	Trigger Sound …	0-255		Soundnumber from Value in CV #513-#570
	#729	… to FO			Functionoutput FO0, FO1-FO12
	#730	Trigger Sound …	0-255		Soundnumber from Value in CV #513-#570
	#731	… to FO			Functionoutput FO0,FO1-FO12
	#732	Trigger Sound …	0-255		Soundnumber from Value in CV #513-#570
	#733	… to FO			Functionoutput FO0, FO1-Fo12
	#734	Trigger Sound …	0-255		Soundnumber from Value in CV #513-#570
	#735	… to FO			Functionoutput FO0, FO1-Fo12
	#736	Trigger Sound …	0-255		Soundnumber from Value in CV #513-#570
	#737	… to FO			Functionoutput FO0, FO1-Fo12
5.4	#739	Sound switching input S1	0-255		**Volume setting**
	#740				
5.4	#741	Sound switching input S2	0-255		**Volume setting**
	#742				
5.4	#743	Sound switching input S3	0-255		**Volume setting**
	#744				
5.4	#745	Random Sound Z1	0-255		**Volume setting**
	#746				
	#747				
5.4	#748	Random Sound Z2	0-255		**Volume setting**
	#749				
	#750				
5.4	#751	Random Sound Z3	0-255		**Volume setting**
	#752				
	#753				
5.4	#754	Random Sound Z4	0-255		**Volume setting**
	#755				
	#756				
5.4	#757	Random Sound Z5	0-255		**Volume setting**
	#758				
	#759				
5.4	#760	Random Sound Z6	0-255		**Volume setting**
	#761				
	#762				

5.4	#763	Random Sound Z7	0-255		**Volume setting**
	#764				
	#765				
5.4	#766	Random Sound Z8	0-255		**Volume setting**

CVs for switching decoder

Some CVs at the switch decoder have towards driving decoder different meaning!

CV	Designation	Area	Default	Description
#33 #34 #35 #36 #37 #38 #39 #40 #41 #42 #43 #44 #45 #46	Functional allocations		1 2 4 8 2 4 8 16 0 0 0 0 0 0	"Function mapping" according to NMRA standard: #33 - #42 = 1, 2, 4, ... : The outputs are set by default to F0. ... assigned, i.e. Switchable directional headlamps and with F0 (key 1 or L) outputs each other at a key. There exists only a maximum of 6 function outputs are for Registers from #37, the free on the left bits ") attached, thereby availability of" her lower right "outputs by the" high "functions. See table "NMRA function mapping"
#61				NO effect!
#64	Short SECOND ADDRESS	1-127	0	The "short" (1-byte) second address; This is active when Bit 5 in CV #112 to 0.
#67 + #68	Long SECOND ADDRESS	128-10239	0	The "long" (1-byte) second address; This is active when Bit 5 in CV # 112 to 1. Note: unlike the "long Erstadresse" (CV # 17 + #18) for the secondary address can not be used on the automatic cab procedure for correct coding in the two CV's. Alternatively, the desired address may initially be programmed in Erstadresse, so by reading the CV's #17+#18 detect the encoding, and these values are then used for the CV's #67 +#68.
#69 to #82	Function allocation for secondary address #69 for F0 front #70 for F0 rear #71 for F1 #72 for F2 #73 for F3 #74 for F4 #75 for F5		 1 2 4 8 2 4 8	These 12 CV's form a matrix, determined by means of which is, what features (function keys on Cab) in the case of the operation on the second address the individual function outputs of the decoder control

	#76 for F6 #77 for F7 #78 for F8 #79 for F9 #80 for F10 #81 for F11 #82 for F12		16 0 0 0 0 0 0	
#83	Light effects modifications	0-9	5	Modification of the ditch lights off
#112	Special ZIMO configuration bits	0,8,323,40	2	Bit1 and Bit3 like driving decoder Bit 5 = 0: Choose between "short" and = 1: "long" Second address

NMRA standard (dark gray boxes) and "turned over bits" (light gray):

NMRA function	CV Erstadresse	CV Second address	Funktionsausgängedes MX68x								
			FA6	**FA 5**	**FA 4**	**FA 3**	**FA 2**	**FA 1**	**Front back**	**Front end**	
			7	*6*	*5*	*4*	*3*	*2*	*1*	*0*	*BIT*
F0	#33	*#69*	128	64	32	16	8	4	2	1	VALUE
F0	#34	*#70*	128	64	32	16	8	4	2	1	VALUE
F1	#35	*#71*	128	64	32	16	8	4	2	1	VALUE
F2	#36	*#72*	128	64	32	16	8	4	2	1	VALUE
F3	#37	*#73*	16	8	4	2	1 7	128	64	32	VALUE
F4	#38	*#74*	16	8	4	2	1	128	64	32	VALUE
F5	#39	*#75*	16	8	4	2	1	128	64	32	VALUE
F6	#40	*#76*	16	8	4	2	1	128	64	32	VALUE
F7	#41	*#77*	2	1	128	64	32	16	8	4	VALUE
F8	#42	*#78*	2	1	128	64	32	16	8	4	VALUE
F9	#43	*#79*	2	1	128	64	32	16	8	4	VALUE
F10	#44	*#80*	2	1	128	64	32	16	8	4	VALUE
F11	#45	*#81*	2	1	128	64	32	16	8	4	VALUE
F12	#46	*#82*	2	1	128	64	32	16	8	4	VALUE