Firebox flickering
The outputs light, A1 to A7 can be assigned a random flickering. This effect is used for example for the flickering of a firebox.

CV 181:		Value			Value
Bit 0	Light output with flickering	1	Bit 4	A4 with flickering	16
Bit 1	A1 with flickering	2	Bit 5	A5 with flickering	32
Bit 2	A2 with flickering	4	Bit 6	A6 with flickering	64
Bit 3	A3 with flickering	8	Bit 7	A7 with flickering	128

A combination of (the total of the single values) is of course possible here again.
In CV182, the settings for the flicker rhythm and the brightness change are entered:
Bits 0 - 3 change the flicker rhythm (value range 1 to 15).
Bits 4 - 6 change the brightness (value range 16, 32, 48, 64, 80, 96,112).
With the value 128 the output is always bright, but can be combined with the value range 16 to 112.
As only one value can be programmed in a CV, the flickering results from the sum of the single values of the flicker rhythm plus the sum of the single values of the brightness (sum of bits 0 -3 plus sum of bits 4 - 6).
The combination of all bits leads to different random flicker images. The rule here is "try it out".

Smoke Generator Control
A smoke generator can be connected to outputs A1 to A7, which is controlled by the decoder depending on the load. When stationary, the output of the smoke generator has PWM according to CV133. When the locomotive is running, the output will get PWM=100%. The locomotive engine can be stopped for 0-15 seconds (start-up delay) so that the smoke generator heats up when stationary. After this time has elapsed, the locomotive starts.

Adjustable PWM - Frequency of light and function outputs
The output voltage of a function output is pulse width modulation (PWM) at a given frequency.
The function outputs of the decoder are factory set to a frequency of 156 Hz. This frequency can be increased to 24 kHz for outputs A0 to A5. The frequency switching can be set in the CV50 in bit 3. Bit 3 = 0 -> 156Hz, Bit 3 = 1 -> 24KHz

Control of an electric Coupling
Electrical couplings consist of the finest copper wire windings. As a rule, these react sensitively to continuous current flow because they become relatively hot. With appropriate settings, the decoder can automatically switch off the function outputs after an adjustable time without having to switch off the function key. Furthermore, the decoder can ensure that the clutch is controlled only for a short engagement torque with an adjustable high PWM in order to raise the clutch safely. After this moment, less energy is needed to keep the clutch on top. This lower PWM and the required holding time are also adjustable. If the couplings used are not safely uncoupled during the first attempt, a number of coupling repetitions can also be set. When adjusting the clutch repetitions, “as many as necessary, as few as possible “applies. To ensure that a permanent repetition does not lead to the destruction of the clutch windings, a switch-off time must be entered in steps of 0.1s, which the decoder always waits for before carrying out a further decoupling process.
CV124 = Number of coupling repetitions
CV125 = Switch-on time in 100ms steps with PWM from CV117 (A1) to CV123 (A7)
CV126 = Stopping time in 100ms steps
CV127 = Switch-off time in 100ms steps, (0=no coupling control)
CV128 = Stop PWM
CV129 = Coupling for A1 to A7

CV 129:		Value			Value
Bit 1	A1 for coupling	2	Bit 5	A5 for coupling	32
Bit 2	A2 for coupling	4	Bit 6	A6 for coupling	64
Bit 3	A3 for coupling	8	Bit 7	A7 for coupling	128
Bit 4	A4 for coupling	16			

Shunting tango, automatic decoupling drive
A maneuvering tango can only be activated if the electric clutch control via CV124-129 is activated.
A maneuvering tango is triggered by one of the clutch outputs when the decoder speed = 0:
Function of a shunting tango:
1. The locomotive drives with an adjustable gearing for a certain setting in time /T1) opposite the present direction of travel. (press on)
2. The locomotive stops and changes the direction of travel.
3. Uncoupling procedure and locomotive drives with the same speed step for an adjustable time T2 (press on)
4. The locomotive stops, now the locomotive has the original direction of travel again.

The settings for CV’s are:
CV135 for the shunting tangos (1-255). The value 0 specifies that no shunting tango takes place.
CV136 for pressing time T1 in 100ms steps
CV137 for pressing time T2 in 100ms steps

Shunting tango with automatic coupling and decoupling
Changing the mode of operation for two connected couplings on two outputs:
1. In CV129, always use the least significant output A1 to A7 for the front clutch, so when using A1 and A2, use A1 for the front coupling and A2 for the rear coupling. If more or less than 2 outputs are defined, there is no difference in the sequence of the different travel directions (see automatic decoupling travel).
2. If the front coupling is released by means of a function key and the driving direction is forward at this point in time, the coupling is switched off when the driving direction is reversed in the automatic maneuvering sequence (coupling procedure). If the rear clutch is released and the direction of travel is backwards at this point in time, the coupling process is also triggered now. In the opposite direction of travel, the coupling is controlled according to the setting of the automatic decoupling movement.
3. The entire duration of the coupling control must be adapted to the times of the maneuvering tango in CVs 136 and 137 via CVs 124-127. CV124 * (CV125 + CV126 + CV127) applies, it is bigger than CV136 + CV137.
   Here, encores may have to be made on the right side of the inequality, because in the maneuvering tango the decoder only reverses the direction of travel when it realizes that the motor is really stopped.

Servo Control
Deployment of a serve on the decoder requires expert knowledge in electronics.
In CV166, it is specified via which output a servo is to be controlled. If the corresponding bit is set, a control signal for a model building servo is output at the desired output (A6 and/or A7, or SUSI). The following assignment applies to the connection pins of the SUSI interface: Servo1 = CLK, Servo2 = Data. The wiring of the outputs can be found in the FAQ PIKO in the graphic "Servo connection for operating a servo on SUSI or solder pads for PIKO SmartDecoder 4.1".

CV166		Value
Bit 0	SUSI with servo signal	1
Bit 6	A6 with servo signal	64
Bit 7	A7 with servo signal	128

In CV167 (SUSI Servo1) and/or 168 (SUSI Servo2) the respective function key number F0 - F28 is entered, via which the servos are to be switched.
The servo settings and cycle time can be set with the following CVs:

CV160	Servo 1, position 1 (function key off)	CV163	Servo 2, position 1 (function key off)
CV161	Servo 1, position 2 (function key on)	CV164	Servo 2, position 2 (function key on)
CV162	Servo 1, rotation time in 100ms steps	CV165	Servo 2, rotation time in 100ms steps

Braking Behavior

Märklin Braking Track
The decoder reacts to a Märklin braking distance (brakes with analogue DC voltage on the track) when CV29 bit 2 and CV27 bit 4 or bit 5 are set to 1 (factory setting 1 and 0).
CV27 Bit 4 = 1 -> DC with opposite direction of travel.
CV27 Bit 5 = 1 -> DC with direction of travel.

ABC - Brakes
If the decoder detects a lower amplitude of the digital voltage on one side of the track, a braking process begins.
On which side of the rail the digital voltage should be more positive in order to activate the braking process can be set via CV27:
CV27 = 1, brake when right rail is more positive
CV27 = 2, brake when left rail is more positive
CV27 = 3, brake irrespective of which rail is more positive
The voltage difference can be set in CV97. The desired difference corresponds to the CV value * 0.12V.
If an ABC slow speed signal is detected according to a Lenz BM2 module, the decoder brakes to the internal speed range (0 - 255) which can be set in CV98.

Return to Factory Setting (Reset)
Two CVs (CV8, CV59) can be used in DCC programming and one CV (CV59) in Motorola programming to return the decoder to factory settings. If you do not want to rewrite all available areas, you can decide which areas should be set to default.
The to be programmed value 1-5 places the following CVs into factory setting:

1 = CV0 - 256, as well as CV257 - 512 (RailCom® Bank 7)	CV31=0, CV32=255
2 = CV257 - 512 (RailCom Plus® Banks 5 & 6)	CV31=1, CV32=0 and CV31=1, CV32=1
3 = CV257 - 512 (extended function Mapping Banks 1 & 2)	CV31=8, CV32=0 and CV31=8, CV32=1
4 = CV257 - 512 (PWM-Modulation Function outputs banks 3 & 4)	CV31=8, CV32=3 and CV31=8, CV32=4

Please note! After a reset of the decoder, all default configurations are overwritten! Therefore, please only do a reset in case of an important and urgent emergency. If you still reset your decoder, you eventually have to reprogram the individual function mapping (see FAQ for more information)!

Programming
Configurations variables (CVs) form the basis of all possible settings of the decoder. The decoder can be programmed with DCC and Motorola control panels.

Technical Data

Addresses:	1-9999 (extended DCC address)
Max. motor current / Load:	1,2 A* short-term to 2 A
Function outputs:	0,4 A each
Size:	30,2 x 16 x 3,8 mm

*Continuous load, may vary depending on the installation situation

Note: This product is not a toy and is not suitable for children under the age of 14. Any liability for damages of any kind caused by improper use or not observing these instructions is excluded.

Note:
You can find a detailed instruction manual for the PIKO SmartDecoder 4.1 Sound on the web page of the respective product in our web shop.

Service:
Internet: www.piko.de
E-Mail:info@piko.de
Hotline: Di + Do 16-18 Uhr

In case of a possible defect, please send us the module with the proof of purchase, a short error description and the decoder address.

Warranty Declaration
Each component is checked for its complete functionality before delivery. Should an error nevertheless occur within the warranty period of 2 years, we will repair the module free of charge upon presentation of the proof of purchase. The warranty claim is void if the damage was caused by improper handling. Please note that, according to the EMC law, the module may only be operated within vehicles bearing the CE mark.

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#56427 PIKO SmartDecoder 4.1 Sound PluX22 for diesel locomotives BB 60000 multiprotokoll

Description
The PIKO SmartDecoder 4.1 Sound PluX22 is a powerful multiprotocol sound decoder of the latest generation with 12 bit sounds, high sample frequencies, an output power of 2.5 watts and a significantly larger memory depth for a high-quality sound experience without interferences. It can be used with DCC-, Selectrix and Motorola digital systems and also with analog AC or DC systems. The decoder is RailCom® and RailComPlus® capable, the AC sound versions as are also mfx-capable. The innovative PIKO SmartDecoder 4.1 Sound with its many braking distance functions is capable to automatically recognize the operating mode and has various configurational options for the additional features.

The decoder works on a frequency of 18.75 kHz is therefore not only suitable for DC current but also for bell-shaped armature motors ((e.g. Faulhaber, Maxon, Escap) up to a permanent current of 1.2 A. Temporary higher currents up to 2 A are well tolerated. Setting of the motor characteristics is done via minimum, medium and maximum speed (simple characteristic) or via the extended characteristic with individual adjustments for 28 drive positions. The decoder has two headlight outputs depending upon direction of travel and (depending on decoder version) up to seven additional special function outputs. Over and above that, there are 3 sensor inputs, e.g. Reed Contacts or Hall Type Sensors on the decoder, two are in the SUSI-Interface with one as a solder pad. Slow moving extended shunting operations and the three possibilities in starting out and brake action delays can be set by function keys.

Characteristics
- Suitable for DC current and bell-anchor motors up to 1.2 A.
- Quiet motor running by motor control with 18.75 kHz
- 14, 27, 28, 128 gears, depending upon data format.
- Short (1-127) and long (128-9999) Addresses
- NMRA conformity
- RailCom® and RailCom Plus®
- Adjustable minimum, maximum and medium speeds.
- Extended driving gear characteristics are adjustable.
- Shunting gear (half-speed) adjustable.
- 3 settings for startup and brake delay, individually adjustable via F0 - F28
- Headlight outputs in direction of travel dimmable.
- 7 Special function outputs, dimmable and adjustable in direction of travel.
- 4 logical outputs
- Adjustable activation of the light- and function outputs adjustable for analog operation.
- Second dim function for lights adjustable from A1 to A7.
- Simple function mapping F0 - F12 for lighting A1 to A7, startup, brake delay and shunting operations.
- Extended Function Mapping, F0 - F44 for switching multiple outputs depending on linked conditions
- Train illumination disengageable.
- Function outputs: Blinking with variable shutoff time.
- Function exists: 2 phase for alternative flashers.
- Load dependent smoke generator controls.
- Firebox with adjustment parameters for brightness changes and flicker rhythm.
- Shunting coupling and shunting tango.
- Fading in, or out of the lighting- and function outputs, adjustable.
- Energy saving lighting effect: After attaining maximum brightness after time setting.
- Fluorescent lighting, switching-on effect with adjustable flash time and –number.
- 8 PWM banks with 64 modulation entries each for e. g. American light effects such as Mars Light, Gyra Light, Strobe etc.
- Brakes with DCC braking signal, braking track with DC current or ABC-Brakes.
- ABC-Slow Moving Distance with LENZ BM2
- 2 settings for braking distance in cm, activated by ABC-, DC- and DCC-brake signal, as well with driving speed 0 with adjustable speed level step.
- 2 motor control types for a precise motor control with many control settings
- Motorola with 3 points for the functions F1 - F12 by deploying the Motorola-Centers
- All outputs are secured against short circuits.
- Error memory for motor and function outputs as well as temperature shutoff.
- Conventional AC and DC operation with automatic switch-over to the individual mode of operation.
- All CVs must be programmed with digital devices with DCC formats and Motorola.
- In DCC-operation, programmable per register, CV directly or page programming.
- Main track programming (DCC)
- Decoder programming lock.

Connection of the PIKO SmartDecoder 4.1 Sound
Remove the socket plug from the PluX 22 interface of your vehicle. Stick the locomotive decoder carefully into the same place of the interface socket. Please note code above the missing PIN 11.
Make sure that no conductive connection is possible anywhere. Make sure that no short-circuits can occur even after closing the locomotive. The first start-up should be carried out on the programming track when the programming mode of the control unit is called up. Usually very small currents flow during reading or programming, which do not damage the decoder in the event of a short circuit.

Special Functions A1 to A7
The special functions A1 to A7 of the decoder can only be used when the designated user are already connected to the interfaces PluX22 in the vehicle or on when there are solder pads available on the main circuit board.

A short circuit with the motor, lighting, third rail pickup and wheels can destroy the device and eventually the locomotive electronics!

Decoder Startup (delivered condition)
Enter address 3 into the control unit. The decoder operates depending on the data format used in DCC-Operation with 28 speeds or in Motorola operation. With a RailCom Plus® capable digital center or with an mfx® capable digital center, the decoder is up and running within a few seconds and can be operated immediately. If the decoder is used on conventional systems, it can be controlled with a DC or AC drive unit. The operating mode is automatically recognized by the decoder. The status of functions F0 - F12 can be set for analog operation via CVs 13 and 14.

Analog Operation with AC or DC Voltage
The locomotive decoder is suitable for analogue operation with DC or AC voltage, which is self-detected.
NOTE: In DC operation, your vehicle will only start up at higher voltage (speed controller turned up further) than you might have been used to in operation with analogue vehicles.

Function outputs in analog operation
It is possible to set the decoder in such a way that the function keys F0 - F12, as assigned in Function Mapping, can also be switched on in analog mode. For this purpose, CVs 13 & 14 must first be programmed with a digital control unit. The corresponding values can be found in the CV table.

Motorola
In order to be able to reach the functions F1 - F12 when used with Motorola command stations, the decoder has 3 Motorola addresses, which are stored trinary in CV47-49. These 3 addresses are also used for decoding. If an address is programmed decimal in CV1, the decoder automatically stores the trinary equivalent in CV47 up to address 79. For example, in order to use Motorola locomotive addresses up to 255, CVs 47 - 49 must be programmed directly decimal via Motorola programming.
These CVs can be read but not programmed on the DCC programming track.
If the CV47 is programmed via Motorola, CV1 is not changed and therefore the DCC data format in CV12 is switched off, so that the decoder cannot be accessed by mistake via 2 addresses.
If bit 5 (DCC Long address) is set in CV29, the Motorola data format is switched off except for Motorola programming, so that the decoder cannot react to 2 addresses.

RailCom®, RailCom Plus®
The RailCom® technology developed by LENZ® is based on the transmission of data from the decoder into the specially prepared (CutOut) DCC digital signal on the track. Detectors must be located on the track to evaluate this decoder data and, if necessary, forward it to the control center. The decoder sends, depending on the setting, the decoder address and, when read out via the main track programming, CV values which can be displayed by the digital control panel (depending on the detector and control panel). The CV29 RailCom® can be switched on or off in the decoder via bit 3 of the CV29 RailCom®. Further RailCom® settings can be made in CV 28. There, for example, RailCom Plus® is also switched on via bit 7. If RailCom Plus® is switched on, the decoder will automatically log on to a RailCom Plus® capable control unit (e. g. PIKO SmartControl) with its locomotive symbol, decoder name and special function symbols within a few seconds. Thanks to this RailCom Plus® technology, there is no need to store locomotive data in the central control unit and no locomotive addresses have to be programmed into the decoder.

mfx®
The PIKO SmartDecoder 4.1 for Sound supports the mfx® data format.
If the digital central unit used is mfx-capable, the decoder with its locomotive symbol, decoder name and special function symbols automatically logs in within a few seconds. Due to this mfx® technology, no locomotive data has to be stored in the control center and no locomotive addresses have to be programmed into the decoder.

SUSI Interface
The SUSI Interface of this decoder is executed via the PluX22 Interface.

Configurations-CVs
Besides the decoder address, the configuration CVs of a locomotive decoder are certainly the most important CVs. These are the CVs 29,50 and 51 of the PIKO SmartDecoder 4.1, and a configuration CV usually contains different settings of a decoder, which are displayed in a maximum of 8 bits (0 - 7). The value to be entered for a CV is calculated from the respective CV table by adding the values of the desired functions. The following table shows you the meaning and content of the configuration CVs, as well as an example calculation of the value:

Bit	Configuration CV29	default
0	normal direction reversed travel	0 1
1	14 / 27 speed steps 28 / 128 speed steps	0 2
2	only digital operation automatic analogue / digital switching	0 4
3	RailCom® switched off RailCom® switched on	0 8
4	speed steps from CV2, 5 and 6 speed characteristics from CV67 to 94	0 16
5	short address (CV1) long address (CV 17/18)	0 32

Example (CV 29):

Normal driving direction	Value = 0
28 Speed steps	Value = 2
Auto. Analog/Digital detection	Value = 4
RailCom® off/on	Value = 8
Speed steps using CV 2, 5, 6	Value = 0
Short address	Value = 0

he sum of all the values is 14.
This value is set to CV29 as factory default value.

Bit	Configuration CV50	Value
0	Motorola 2. address not use Motorola 2. address use	0 1
1	Motorola 3. address not use Motorola 3. address use	0 2
2	light output not switch light output switch	0 4
3	Frequenzy Light, A1 to A7 = 156Hz Frequenzy Light, A1 to A5 = 24KHz	0 8
4	FSUSI = SUSI SUSI = A3/A4 Logic level	0 16
5	KSUSI = SUSI SUSI DATA = Input 1, CLK = Input 2	0 32
6	A8 = Output with Logic level A8 = Input 3	0 64

CV	Description	Range	Value
1	**Loco address**	DCC: 1 - 127 Motorola: 1 - 80	03
2	**Minimum speed** (change, until the loco drives with speed step 1)	1 - 63	01
3	**Acceleration** 1 means that every 5ms the actual speed is increased by 1. If the internal maximum speed is set to 200 (CV5=50 or CV94=200), then the accelaration from 0 to Fmx is 1sec.	0-255	15
4	**braking interia** (time factor like CV3)	0-255	15
5	**Maximum speed** (must be greater than CV2)	1 - 63	35
6	**Middle speed** (must be greater than CV 2 and less than CV5)	1 - 63	12
7	**Software version** (the processor can be updated)	-	untersch.
8	**Manufacturer ID** Decoder reset, values as CV59	different	162
17 18	**Expensive loco address** 17 = High Byte 18 = Low Byte	1 - 9999 192 - 231 0 - 255	2000 199 208
30	Error memory for function outputs, motor and temperature monitoring 1 = fault function outputs, 2 = fault motor, 4 = overtemperature	0-7	0
31	1. Marker CV for CV-Banks	0, 1, 8	0
32	2. Marker CV for CV-Banks	0,1,3,4,5,255	255
59	**Reset to factory defaults** (even with CV8) 1 = CV 0 - 256, as well as CV257 - 512 (RailCom® bank 7) 2 = CV 257 - 512 (RailCom Plus® banks 5 & 6) 3 = CV 257 - 512 (extended function mapping banks 1 & 2) 4 = CV 257 - 512 (PWM-Modulation function output banks 3 & 4)	0 - 4	0

Function assignments

F0	Directional lighting	F9	Radio #3	F18	Sanding
F1	Sound on/off	F10	Radio #4	F19	Curve squeal sound on/off
F2	High pitched airhorn	F11	Radio #5	F20	Rail clank sound on/off
F3	Deep pitched airhorn	F12	Radio #6	F21	Train lighting: loco pushes
F4	Lighting drivers cab	F13	Compressed air valve	F22	Train lighting: loco pulls
F5	Locomotive preparation	F14	Coupling / Uncoupling	F23	Volume control
F6	Shunting mode	F15	KVB test	F24	Soundfader (tunnel mode)
F7	Radio #1	F16	Door open/close		
F8	Radio #2	F17	High + deep pitched airhorn		

Function Outputs

Simple Function Mapping
The following settings of the decoder are only possible with simple function mapping (CV 96 = 0).
In the simple function mapping, the assignments of switching tasks such as lighting, special function outputs, shunting gear and switchable starting and braking delay can be freely assigned to the function keys F0 to F12 of the digital control center. The value that is written to a CV of the function mapping determines the functions that can be switched using a function key assigned to the CV. The CVs 33 to 46 serve this purpose according to the following scheme.

Assignment of Function keys to the CVs		Default	Assignment of the Bits		Value
CV 33	Light function key F0 forwards	1	Bit 0	Light function key front	1
CV 34	Light function key F0 backwards	2	Bit 1	Light function key back	2
CV 35	Function key F1	4	Bit 2	Function key A1	4
CV 36	Function key F2	8	Bit 3	Function key A2	8
CV 37	Function key F3	16	Bit 4	Function key A3	16
CV 38	Function key F4	32	Bit 5	Function key A4	32
CV 39	Function key F5	64	Bit 6	Shunting	64
CV 40	Function key F6	128	Bit 7	Starting-/brake delay	128
CV 41	Function key F7	0			
CV 42	Function key F8	0			
CV 43	Function key F9	0			
CV 44	Function key F10	0			
CV 45	Function key F11	0			
CV 46	Function key F12	0			

Example 1: The rear light output should only be switched with the function key F5.
The CV to be programmed is CV39 for function key F5, in which the value 2 (rear light output) is programmed. So that the rear light output is no longer switched backwards in the direction of travel via function key F0, CV34 must also be programmed for function key F0 in the direction of travel backwards to the value 0.
Example 2: The function output A1 and the shunting gear are to be switched together with the function key F10.
The CV to be programmed is CV44 for function key F10, in which the value 4 (function output A1) plus 64 (shunting gear) is programmed, e.g. the value 68. So that the function output A1 is no longer switched via function key F1 and the shunting gear no longer via function key F5, CVs 35 for function key F1 and 39 for function key F5 must also be programmed to the value 0.

Simple and extended Function Mapping
The following settings of the decoder are possible for simple (CV96 = 0) and extended (CV96 = 1) function mapping.

Dimming of Light and Function Outputs
The light and function outputs A1 to A7 can be set to any dimming level. These settings are stored in CVs 116 (Light) and 117 (A1) to 123 (A7).

Softly fade in and out light and function outputs
If the output is switched on or off, it is softly faded in or out.
In CV186, you can specify which output should receive this dazzle function.

		Value			Value
Bit 0	Light output with dazzle function	1	Bit 4	A4 with dazzle function	16
Bit 1	A1 with dazzle function	2	Bit 5	A5 with dazzle function	32
Bit 2	A2 with dazzle function	4	Bit 6	A6 with dazzle function	64
Bit 3	A3 with dazzle function	8	Bit 7	A7 with dazzle function	128

A combination (total of the single values) is individually possible.
The setting of the CV187 determines how fast the glare function should work. The step size is CV value * 1ms.

Blinking of the Light- and Function Outputs
The locomotive decoder has a flashing generator which can be assigned to the outputs. Both the switch-on and switch-off time of the flashing generator can be set separately from each other.
In CV109, you can specify which output is to use the flash generator. In addition, the CV110 can be used to determine which output is to use the blinking generator with 180° phase rotation. For example, a variable flasher can be implemented.

CV 109:		Value	CV 110:		Value
Bit 0	Light output w/ flashing generator	1	Bit 0	Light output w/ flashing generator 180°	1
Bit 1	A1 with flashing generator	2	Bit 1	A1 with flashing generator 180°	2
Bit 2	A2 with flashing generator	4	Bit 2	A2 with flashing generator 180°	4
Bit 3	A3 with flashing generator	8	Bit 3	A3 with flashing generator 180°	8
Bit 4	A4 with flashing generator	16	Bit 4	A4 with flashing generator 180°	16
Bit 5	A5 with flashing generator	32	Bit 5	A5 with flashing generator 180°	32
Bit 6	A6 with flashing generator	64	Bit 6	A6 with flashing generator 180°	64
Bit 7	A7 with flashing generator	128	Bit 7	A7 with flashing generator 180°	128

A combination (total of the single values) is individually possible.
In CV111 the switch-on time can be set in steps of 100ms and in CV112 the switch-off time in steps of 100ms.

Turn-on Effect of a Neon Tube / Fluorescent Tube
The switch-on effect of a defective fluorescent lamp can also be output at the light and function outputs. This effect consists of an adjustable, maximum number of flashes (accidentally a flash up to a maximum number of flashes) and an adjustable flash time, e.g. how fast the flashes should follow each other.

CV 188:		Value			Value
Bit 0	Light output w/ fluorescent lamp effect	1	Bit 4	A4 w/ fluorescent lamp effect	16
Bit 1	A1 w/ fluorescent lamp effect	2	Bit 5	A5 w/ fluorescent lamp effect	32
Bit 2	A2 w/ fluorescent lamp effect	4	Bit 6	A6 w/ fluorescent lamp effect	64
Bit 3	A3 w/ fluorescent lamp effect	8	Bit 7	A7 w/ fluorescent lamp effect	128

A combination (sum of the single values) is of course also possible here.
The flash time is set in 5ms increments via CV 189. The maximum number of flashes in CV 190.

Energy-saving lamp effect when switching on the light and function outputs
When an energy-saving lamp is switched on, it first produces a basic brightness before it slowly reaches its maximum brightness. This effect can be assigned to the outputs of the decoder as follows.

CV 183:		Value			Value
Bit 0	Light output as energy-saving lamp	1	Bit 4	A4 as energy-saving lamp	16
Bit 1	A1 as energy-saving lamp	2	Bit 5	A5 as energy-saving lamp	32
Bit 2	A2 as energy-saving lamp	4	Bit 6	A6 as energy-saving lamp	64
Bit 3	A3 as energy-saving lamp	8	Bit 7	A7 as energy-saving lamp	128

A combination (total of the single values) is of course again possible here.
The basic brightness can be adjusted via CV184. The setting of CV185 determines how fast the final brightness value (PWM1 in CVs 116 - 123) should be reached. The step size is CV value * 5ms. The basic brightness can be adjusted via CV184.