

## CV-Table

CV	Description	Area	Value*
1	Locomotive address	DCC: 1 - 127 Mot: 1 - 80	3
2	Minimum speed (the speed from 0 until the locomotive is running at speed step 1)	0 - 255	1
3	Acceleration delay	0 - 255	30
4	Braking rate	0 - 255	30
5	Maximum speed (must be greater than CV 2)	0 - 255	180
6	Average speed (must be greater than CV 2 and less than CV 5)	0 - 255	150
8	Manufacturer identification decoder reset CV8 = 8	-	162
12	<b>Operating modes</b>	<b>Value</b>	117
	Bit 0=1 DC (analog operation DC) on	*1	
	Bit 2=1 Data format DCC on	*4	
	Bit 4=1 AC (analog operation alternating current) on	*16	
	Bit 5=1 Data format Motorola® on	*32	
Bit 6=1 Data format mfx® on	*64		
17	<b>Long locomotive address</b>	1 - 10239	1000
18	17 = higher value Byte	192 - 231	195
	18 = lower value Byte	0 - 255	232
27	<b>Brake signal settings (automatic stop)</b>	<b>Value</b>	0
	Bit 0 = 1 -> ABC right rail more positive	1	
	Bit 1 = 1 -> ABC left rail more positive	2	
	Bit 4 = 1 -> DC with direction of travel opposite	16	
	Bit 5 = 1 -> DC with direction of travel equal	32	
29	<b>DCC standard configuration</b>	<b>Value</b>	14
	Bit 0=0 Normal direction of travel	*0	
	Bit 0=1 Opposite direction of travel	1	
	Bit 1=0 14 Speed steps	0	
	Bit 1=1 28 Speed steps	*2	
	Bit 2=0 DCC-only mode	0	
	Bit 2=1 Automatic analog/digital recognition	*4	
	Bit 3=0 RailCom® turned off	0	
	Bit 3=1 RailCom® turned on	*8	
	Bit 4=0 Speed steps over CV 2, 5, and 6	*0	
	Bit 4=1 Use the characteristic curve from CV 67 - 94	16	
	Bit 5=0 Short address (CV1)	*0	
Bit 5=1 Long address (CV 17/18)	32		
30	Error codes for function outputs, motor, and temperature monitoring: 1 = fault motor, 2 = overheating, 4 = fault function outputs	0 - 7	0
251	<b>Energy storage</b> Buffer time in 500ms steps Bit 0 - 3, energy storage switched on Bit7 = 1	0 - 143	128

\* factory set values

## Function key assignment

F0	Light	F9	Emergency Brake	F18	Water Pump
F1	Vaporizer	F10	Safety Valve	F19	Lubricator
F2	Whistle	F11	Short Whistle Blast	F20	Firebox Grates
F3	Bell	F12	Conductor's Whistle	F21	Sanding
F4	Traveling Sound	F13	Coupling	F22	Cab Window
F5	Cab Light	F14	Air Pump	F23	Hinged Window
F6	Chassis Lights	F15	Cylinder Steam Release	F24	Air flap
F7	Firebox Flicker / Shoveling Coal	F16	Feed Pump	F25	Curve Squeal
F8	Switching Gear	F17	Injector	F26	Clickety-Clack



## #36521 PIKO SmartDecoder XP Sound G for Steam Locomotives BR 94 G Multiprotocol incl. mfx®- feature



**NOTE: Complete operating instructions for the PIKO SmartDecoder XP Sound G can be found on the PIKO website as a PDF file. Each aspect of the PIKO SmartDecoder XP Sound G is explained in detail.**

### Product Description

The PIKO SmartDecoder XP Sound G is a compact, yet powerful, state-of-the-art multi-protocol sound decoder built specifically for G scale applications. The decoder features a plug-and-play design that installs instantly on a G scale circuit board. This type of interface eliminates the task of having to solder and unsolder wires in the event you want to change out a decoder. The PSD XP Sound G features full 12 bit, 8 channel sound, a high audio sample rate, 128Mbit (480 seconds) memory, and a 7 Watt output; guaranteeing a static-free sound experience. It complies with all current RCN standards and can be used on DCC, mfx® and Motorola® digital systems as well as AC or DC analog layouts. The decoder is RailCom® and RailCom Plus® compatible, meaning it will automatically recognize what type of DCC system it is being used on. The PIKO SmartDecoder XP Sound G recognizes automatic braking track sections (automatic block control), ABC shuttle train operation, and has a wide range of settings that can be configured for maximum realistic train control. Each XP Sound G decoder features load-dependent sound that is governed by a completely new motor control system built to deliver silky smooth running characteristics for DC and bell armature motors that tolerate a continuous current consumption of 5 A. The motor speed curve can be set via minimum, medium, and maximum speed curves or with an extended speed curve of 28 speed steps. The decoder features two directional lighting outputs as well as twelve amplified function outputs that can be activated by function keys from F0 to F68 (in DCC). Up to 10 of those outputs are capable of output logic levels. The decoder has the potential to operate up to four servos that can be attached to the model's circuit board. The XP Sound G features a switching (shunting) gear with extended slow-speed operation, three possible start-up and braking delays, as well as a host of prototype-specific sounds. Sound files can be programmed to control specific function outputs as well as motor characteristics. For example, the headlights of a diesel locomotive can flicker to life when the engine is started. Thanks to advanced power management and sizeable "keep-alive" capacitors, the PIKO SmartDecoder XP Sound G will keep your model running over dirty track or when power is disrupted to the layout.

### Installing the PIKO SmartDecoder XP Sound G

Carefully remove the dummy plug from the model's circuit board. Attach the sound decoder to the circuit board. Due to its design, it can only be attached in the correct position. Nonetheless, please make sure that the pins line-up with the holes. Now install the speaker in its housing as shown in the "Installation instructions" graphic. Make sure there are no crossed wires or short circuits, even when the locomotive shell is reattached to the chassis. The model is now ready for the programming track. Your DCC system's programming mode should now be in operation. When reading out a CV value or programming, very small currents usually flow through the model which in no way affect the decoder.

### Function outputs A1 to A12

Outputs A1 to A12 of the sound decoder can only be activated if their associated functions (sound, light, or mechanical) are connected to the circuit board. Detailed information on all of the circuit board's output connections can be found in the operating instructions.

### First time use of the decoder

Enter address 3 on your DCC system's control panel. Depending on the data format used, the model will run in 28-step DCC mode or Motorola mode. When using a RailCom Plus-compatible® digital control system or an mfx-compatible® digital control system, the decoder will automatically log on to your control system and can be operated immediately.

If the decoder is used on an analog layout, it can be operated with a traditional DC or AC throttle. The decoder automatically senses whether the layout uses digital or analog control.

**NOTE:** In DC analog mode, your model will only start at a higher voltage than you may be used to. The throttle needs to be turned up half-way or more for the model to begin moving.

### Function outputs in analog mode

It is possible to set the sound decoder so that the function keys F0 - F12, as assigned in the function mapping, can also be switched on in analog mode. To do this, CVs 13 & 14 must first be programmed with a digital central unit. The corresponding values can be found in the CV table in the detailed operating instructions. The light function F0 and the driving sound F4 are switched on ex works.



## Motorola® DCC format

It is possible to program the sound decoder so that functions F0 - F12, as assigned in function mapping, can also operate in analog mode. To do this, CVs 13 & 14 must first be programmed with a digital control center. The corresponding values can be found in the CV table of the operating instructions. F0 (headlight), F1 (engine sound), F4 & F5 (interior lighting), F6 & F7 (control stand lights), and F9 (tail lights) are all factory-programmed to operate in analog mode.

## Configuration CVs

In addition to a decoder's address, the configuration CVs are the most important CVs of a decoder. In the PIKO SmartDecoder XP Sound these are CVs 12 and 29. A configuration CV contains basic settings for a decoder such as direction of travel. Detailed information on configuration CVs is found in the operating instructions.

## RailCom®, RailCom Plus®

In the PIKO SmartDecoder XP Sound, RailCom® can be switched on or off in CV 29.

When RailCom Plus® is activated in CV 28, the decoder automatically sends its address, locomotive symbol, and function icons to a RailCom Plus®-capable DCC command center and its function symbols will appear on the control screen within a few seconds. With RailCom Plus® technology, no locomotive data has to be stored in the command center and no locomotive addresses have to be programmed into the decoder.

## mfx®

The PIKO XP SmartSound Decoder is also configured for the mfx® data format. If your DCC system is mfx-capable, the decoder will automatically transmit its locomotive symbol, decoder address, and function icons to your command center. As is the case with RailComPlus®, there is no need to store any locomotive data in the control center or assign an address to the decoder.

## Brake settings

The Sound decoder responds to the following braking techniques:

- Märklin® braking track (train brakes when entering a track fed by analog DC voltage)
- DCC brake signal
- ABC (Automatic Block Control) brakes

The sound decoder can be programmed to bring the train to a stop at a precise point on your layout by setting an adjustable braking distance. More information on the subject of brake settings can be found in the operating instructions.

## Function outputs

A comprehensive list of all possible function outputs can be found in the operating instructions.

## Simple and Extended function mapping

In simple function mapping (controlled by CVs 33 - 46), switchable functions like lighting and sound can be freely assigned to function keys F0 to F12. Switchable functions like acceleration and braking delay can be assigned to any function key by using CVs 156 and 157. More information can be found in the operating instructions.

## Electric coupler control

Digital electric couplers are activated by fine copper wire windings that raise or lower the couplers. The wire windings become relatively hot when exposed to continuous electric current. With the appropriate settings, the decoder will ensure that function outputs A4 and A5 (automatic coupler functions) shut off after a certain amount of time (thus preventing damage to the windings) without having to switch off the function key.

## Switching (shunting) scenario, automatic coupling/uncoupling movement

If the electric coupler function is activated, you can set up a switching scenario.

Here is how it works:

1. The locomotive shoves (pushes) against the cars. The shoving motion is carried out at an adjustable speed step for an adjustable time.
2. The locomotive stops and switches its direction of travel yet does not move.
3. The locomotive's coupler uncouples from the car it was coupled to, and the locomotive backs away from the cars it just uncoupled from. The speed step and running time of this move are both adjustable.
4. The locomotive now stops, and then resumes its original direction of travel.

## Extended Function Mapping

The enormously complex nature of extended function mapping makes it difficult to program each individual CV to achieve proper functioning results. If you want to change settings in extended function mapping, we highly recommend you use the PIKO SmartProgrammer (#56415) and (optionally) the PIKO SmartTester (#56416). For more information on advanced function mapping, please refer to the operating instructions.

## Servo control

The sound decoder allows for direct control of four servo motors via their servo terminals on the circuit board. Servo 1 is located on the top of the board and Servo 2 is located on the bottom. Servo 1 controls the single-arm pantograph on the front of the railcar and Servo 2 controls the scissor pantograph on the rear of the car. Each servo is factory set to the maximum holding positions for each pantograph (value of 128). The setting options for the pantograph holding positions and their respective speed of operation can be found in the CV table. Assigning pantograph control to a certain function key is carried out in extended function mapping.

## Sound settings

The overall volume level can be set using the volume pot located on the model's underbody. Reed contacts #1 and #2 are installed in the lead truck and they trigger the air whistle and horn when traveling over track magnets you can place strategically on your layout.

NOTE: To install a PIKO sound file on the sound decoder, you will need to use the PIKO SmartProgrammer (#56415) and (optionally) the PIKO SmartTester (#56416).

All further information on the PIKO SmartDecoder XP Sound G and its setting options are found in the operating instructions.

## "Keep-alive" capacitor

The "keep-alive" capacitor installed in the decoder can be switched on or off via CV programming. The "keep-alive" run time is adjustable in 500ms steps for up to up to 8 seconds of power after power has been cut to the model. When CV 251 = 128 (Bit 7 = 1), the capacitor is activated and provides additional run time in 500ms segments. Bits 0 - 3 control the additional run time and can be increased in value to support run time up to 8 seconds. In the factory setting, only Bit 7 is set and the support time is approx. 0.5s.

NOTE: If you want to set this value higher, please keep in mind that in case of an "emergency stop" of the control center (the track voltage is switched off), the car will continue to move for this time.

## Resetting to factory settings (reset)

To reset the sound decoder to the factory setting, program CV8 = 8.

## Programming

The configuration variables (CVs) form the basis for all setting options of the decoder. The decoder can be programmed with the PIKO G digital central unit with Navigator or other DCC central units, as well as with Motorola central units.

For more information on the programming options, please refer to the detailed operating instructions.

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Motorola is a registered trademark of Motorola Inc. Tempe, (Phoenix) Arizona / USA  
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**NOTE:** This product is not a toy and is not for children under the age of 14. Any warranty for damages of any kind caused by incorrect use, as well as by non-compliance with these instructions, is excluded.

## Wenn Sie Fragen haben, wir sind für Sie da!

Internet: [www.piko.de](http://www.piko.de)

E-Mail: [info@piko.de](mailto:info@piko.de)

Hotline: Tuesday + Thursday 16-18 Uhr, Tel.: 03675 897255

**Service:** In the event of a defective decoder, please return the decoder module to PIKO along with proof of purchase, the decoder address, and a short description of the problem.

## Warranty Statement

Each decoder module is fully tested before shipment. Nevertheless, should a malfunction occur within the 2-year warranty period, we will repair the module free of charge on presentation of the proof of purchase. This warranty is voided if the unit has been damaged by improper use. Please note that, according to the German Electromagnetic Compatibility Law (EMVGesetz), the decoder module may only be used inside models bearing the CE mark.

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