

CV	Description	Area	Value
1	Locomotive address	DCC: 1 - 127 Motorola®: 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 (time factor like CV 3)	0 - 255	30
5	Maximum speed (must be greater than CV 2)	0 - 255	200
6	Average speed (must be greater than CV 2 and less than CV 5)	0 - 255	100
7	Software version (The processor can be updated)	-	differently
8	Manufacturer identification decoder reset, values like CV 59	-	162
	<b>Decoder operating mode</b>	<b>Value</b>	
12	Bit 0=1 DC (analog operation; direct current) on	*1	0 - 117 117
	Bit 2=1 DCC data format on	*4	
	Bit 4=1 AC (analog 3-rail operation; alternating current) on	*16	
	Bit 5=1 Motorola® data format on	*32	
	Bit 6=1 mfx® data format on	*64	
17	Long locomotive address	1 - 10239	1000
18	17 = Byte should be lower-case: byte	192 - 231	195
	18 = Byte should be lower-case: byte	0 - 255	232
	<b>Brake signal settings (automatic stop)</b>	<b>Value</b>	
27	Bit 0 = 1 -> ABC (Automatic Brake Control) right rail positive	1	0 - 51 0
	Bit 1 = 1 -> ABC left rail positive	2	
	Bit 4 = 1 -> DC; opposite direction of travel	16	
	Bit 5 = 1 -> DC; same direction of travel	32	
	<b>DCC standard configuration</b>	<b>Value</b>	
29	Bit 0=0 Normal direction of travel	*0	0-63 14
	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 digital mode only	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 = function output fault, 2 = motor fault, 4 = overload protection	0-7	0
	<b>Simple function mapping (DCC standard RCN-225)</b>	<b>Assignment of the Fct. outputs</b>	
33-46	Assignment of the function outputs to the CVs		
	CV 33 Light function key (F0) during forward travel	f0v	1
	CV 34 Light function key (F0) during reverse travel	f0h	2
	CV 35 function key F1	A1	4
	CV 36 function key F2	A2	8
	CV 37 function key F3		16
	CV 38 function key F4		4
	CV 39 function key F5		8
	CV 40 function key F6		16
	CV 41 function key F7		32
	CV 42 function key F8		64
	CV 43 function key F9		16
	CV 44 function key F10		32
	CV 45 function key F11		64
	CV 46 function key F12		128

\* factory set values



#56502 PIKO SmartDecoder XP PluX16

multiprotocol, fits mfx® included



**NOTE:** Detailed information on the PIKO SmartDecoder XP is available as a PDF file on our Webshop on the page of the respective item number. The file contains a full description of all functions and operating possibilities for the new SmartDecoder XP.

#### Description

The state-of-the-art PIKO SmartDecoder XP inside in this PIKO locomotive is a compact yet powerful multi-protocol PluX16 decoder. It complies with the current RCN standards in all areas and can be used in DCC, mfx® and Motorola® digital systems. The decoder can be used on DC or AC analog layouts. It automatically senses what operating mode is used on your layout and is RailCom®/RailCom Plus® compatible. The SmartDecoder XP features several programmable braking distance functions in addition to numerous other programmable functions.

The PIKO SmartDecoder XP is load-regulated and features auto-adaptive motor control that works with of a fundamentally newly developed traditional DC motors for a silky smooth ride as well as 1.2 Amp coreless motors. The decoder will also tolerate a temporary current draw up to 2 Amps. The motor speed table can be set using the minimum, median, and maximum motor speed (simple curve), or by the user-programmable 28-speed step extended curve. The decoder features two directional lighting outputs and two additional special function outputs that can be activated using function keys up to F68 (DCC). The switching (shunting) gear, with extended slow speed range, the three possible starting and braking delays, as well as the many vehicle sounds are also switchable via function keys. The sound of a suitable SUSI sound module can control specified function outputs as well as the motor output of the decoder. For example, the lighting of a diesel locomotive flickers when the engine is started. The PIKO SmartDecoder XP is supported by the further developed power management in case of short-term voltage loss.

#### Installing the PIKO SmartDecoder XP

Remove the jumper plug from your model's PluX16 interface. Insert the new decoder into the interface socket. Note that PIN 11 is missing on the new decoder. Check for crossed wires and short circuits before and after reinstalling the shell. Place the model on your programming track with programming mode activated on your DCC system. During programming or when reading the model's DCC address, a small amount of current will flow through the model, which does not affect the decoder, even in the event of a short circuit.

#### Special functions A1 to A2

The decoder's special function outputs A1 and A2 can only be activated if the desired functions are already connected to the model's PluX16 interface or if solder pads are available for the special function outputs on the main circuit board.

**A short circuit in the motor, lighting, pick-up wiper, or wheelsets can destroy the decoder as well as the electronics of the model!**

#### SUSI interface

The decoder's SUSI interface is controlled by the PluX16 interface. If the main circuit board of the model is equipped with a SUSI interface, you can either use a PIKO sound module with SUSI or a suitable single-function decoder. You can find which CV should be programmed for its respective function output in the operating instructions. The decoder is factory set to send data to the PIKO sound module via the SUSI interface.

**CAUTION:** Soldering the decoder itself should only be done by experienced DCC professionals using appropriate equipment. Decoders damaged by improper handling are not covered by the warranty.

#### First-time use of the decoder (state of delivery)

Enter address 3 on your DCC control system. Depending on your DCC system's data format, the decoder will operate using 28 speed steps or in Motorola® mode. When using a RailCom Plus®-enabled DCC system or with an mfx®-capable system, the decoder is recognized in a few seconds and can be operated immediately. If the decoder is used on a conventional analog layout, it can be controlled with a DC or AC power pack. The decoder will automatically detect the layout's operating mode.

**NOTE:** In DC analog mode, your model will only start at a higher voltage than what you may accustomed to when operating analog models. You will need to turn the throttle up for the model to start operating.



### Function outputs in analog mode

It is possible to program the decoder so that function keys F0 - F12 (as they are assigned in the function mapping) can also be activated in analog mode. To do this, CVs 13 & 14 must first be programmed with a DCC central control unit. The corresponding values can be found in the CV table of the detailed operating instructions. The light functions are switched on at the factory via F12.

### Motorola®

The decoder utilizes 4 Motorola® addresses to access functions F1 - F 16, when using a Motorola—based command station. The three sequence addresses for the functions F5 - F16 are ascending to the decoder address and can be activated in CV61 as required by the values 1 (F5 - F8), 2 (F5 - F12), or 3 (F5 - F16).

### Configuration of CVs

In addition to the decoder address, the indexed CVs of a locomotive decoder are the most important CVs. These are the CVs 12 and 29 in the PIKO SmartDecoder XP. As a rule, an indexed CV contains various basic settings of a decoder, such as reversing the direction of travel. CV calculation examples can be found in the detailed operating instructions.

### RailCom®, RailCom Plus®

In the decoder, CV29 (RailCom®) can be turned on or off via bit 3. The decoder is automatically recognized by RailCom Plus® - equipped command stations (like PIKO SmartControl<sup>wlan</sup>) if the RailCom Plus® option is activated in CV 28. The decoder name, locomotive symbol, and special function symbols will appear automatically on your control device's screen. With RailCom Plus® technology, no locomotive data has to be stored in the DCC central control unit and no locomotive addresses have to be programmed into the decoder.

### fits mfx®

The PIKO SmartDecoder XP also masters the mfx® data format and is fits mfx® certified. If the digital command station used is mfx® capable, the decoder automatically registers with its locomotive symbol, decoder name and its complete special function symbols. This mfx® technology means that no locomotive data needs to be stored in the command station and no locomotive addresses need to be programmed into the decoder.

### Braking

The decoder understands the following braking methods:

Märklin® braking section (brakes with analog DC voltage)

DCC braking function

ABC (Automatic Brake Control) braking section

The decoder can stop the model with two adjustable braking distances that are accurate down to the centimeter.

More information on "braking behavior" can be found in the detailed operating instructions.

### Function outputs

A comprehensive description of all options related to the function outputs can be found in the detailed operating instructions.

### Simple and extended function mapping

Easy-to-use **function mapping** allows you to assign functions like lighting and other outputs to any key between F0 – F12. Acceleration, braking delay, and switching (shunting) mode can be assigned to any function keys using CVs 156 and 157.

### Smoke generator control

A smoke generator can be connected to outputs A1 and A2 which are load-sensitive and react to the model's speed. Function key assignment is done using extended function mapping.

### Extended function mapping (CV96=6 factory setting)

Due to its complex nature, extended **function mapping** cannot easily be set by programming individual CVs. To work with extended **function mapping**, you will need the PIKO SmartProgrammer device (#56415) and, if desired, the PIKO SmartTester (#56416). Detailed information on extended function mapping is available in the instruction manual.

### Servo control

The decoder can control up to two servo motors via outputs A1, A2. Function key assignment is done exclusively via extended function mapping.

The use of a servo with the decoder requires electronics expertise.

Further information can be found in the detailed operating instructions.

**ATTENTION:** Soldering on the decoder should only be carried out by experienced specialists with the appropriate tools. Decoders damaged by improper handling will not be covered by the warranty.

### Factory reset

To restore the decoder to its factory settings, program CV8 to a value of 8.

### Programming

Configuration variables (CVs) form the basis of all the decoder's settings. This decoder can be used with the PIKO SmartControl<sup>wlan</sup>, PIKO SmartControl<sup>light</sup>, DCC system, the PIKO SmartControl DCC system, or any other Motorola-based system.

For more information on programming options, please refer to the instruction manual.

### Function assignments

F0	Light white
F1	A1
F2	A2
F3	Switching Gear
F4	ABV
F12	Light white/red A1/A2

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### Service:

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

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

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 (EMV-Gesetz), the decoder module may only be used inside models bearing the CE mark.

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