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
12	**Decoder operating mode** — **Value** Bit 0=1 DC (analog operation; direct current) on — *1 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 Data format mfx® on — *64	0 - 117	117
17 18	**Long locomotive address** 17 = Byte should be lower-case: byte 18 = Byte should be lower-case: byte	1 - 10239 192 - 231 0 - 255	1000 195 232
27	**Brake signal settings (automatic stop)** — **Value** Bit 0 = 1 -> ABC (Automatic Brake Control) right rail positive — 1 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	0 - 51	0
29	**DCC standard configuration** — **Value** 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 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	0-63	14
30	**Error codes for the motor, thermal overload, and function outputs:** 1 = motor error, 2 = thermal overload error, 4 = function output error, 8 = fault sound memory	0-15	0
33-46	**Simple function mapping (DCC standard RCN-225)** — **Assignment of the Fct. outputs** **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	0 - 255	

* factory set values

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#46502 PIKO SmartDecoder XP Next18 Multi-protocol function decoder compatible with fits mfx®

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 Next18 decoder. It complies with the current RC 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 Sound 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 Amp coreless motors. The decoder supports both ABC braking and the ABC shuttle automation. The motor speed table can be set using the minimum, median, and maximum motor speed (simple curve), or by the user-programable 28-speed step extended curve. The decoder has two direction-dependent lighting outputs, as well as six additional special function outputs (including 4x logic level) that can be switched via 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 Next18 interface. Insert the new decoder into the interface socket. Appropriate installation space limitations in the vehicles should ensure torsion resistance. 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

The decoder's special function outputs A1 and A2 can only be activated if the desired functions are already connected to the model's Next18 interface or if solder pads are available for the special function outputs on the main circuit board.
Outputs A3 - A6 provide logic levels and must be wired accordingly on the main board.
For further information on the use of these function outputs with logic level (A3 - A6), please refer to the detailed operating instructions.

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 Next18 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®-compatible or mfx®-compatible digital command station, the decoder registers automatically and is ready for immediate use. 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 function F12 is factory-set to “on.”

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. If RailCom Plus® is turned on, the decoder will be automatically recognized by a RailCom Plus®-enabled DCC control system (i.e. PIKO SmartControl$_{wlan}$) and a locomotive icon, decoder name, and its special function icons will appear on the control system’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 Next18 also supports the mfx® data format and is certified as fits mfx®. If the digital command station in use is mfx®-compatible, the decoder will automatically register with its locomotive icon, decoder name, and complete special function symbols. Thanks to this mfx® technology, there is no need to store locomotive data in the command station or program locomotive addresses 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 function mapping (CV96 = 1)
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 with a maximum current consumption of 250mA can be connected to the outputs A1 and A2, which is controlled by the decoder load-dependently. 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$_{wlan}$, PIKO SmartControl$_{light}$ DCC system or any other Motorola-based system.
For more information on programming options, please refer to the instruction manual.

Update
The PIKO SmartDecoder XP can be updated. To perform an update, you need either the PIKO SmartProgrammer (#56415) or the digital system PIKO SmartControl$_{wlan}$ (#55821).

Function assignments

F0	Headlight	F4	A4 (Logic)	F8	Momentum off
F1	A1	F5	A5 (Logic)	F12	Light white/red
F2	A2	F6	A6 (Logic)		
F3	A3 (Logic)	F7	Switching Gear		

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NOTE: This product is not a toy and is not suitable for children under 14 years of age. Any liability for damage of any kind resulting from improper use or failure to follow these instructions is excluded.

Service:
Internet: www.piko.de
E-Mail:info@piko.de

Service: In the event of a complaint about the item, please send us the item with the proof of purchase (copy) and the completed complaint form, which you can find in our webshop under “Cancellation and returns”.

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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