CV	Description	Area	Value*
1	**Locomotive address**	DCC: 1 - 127 Mot: 1 - 80	4
7	**Firmware version** (The decoder can be updated)	-	differently
8	**Manufacturer's ID** Decoderreset CV8 = 8	-	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 mfx® data format on *64	0 - 117	117
13	**Activating Function Keys in Analog Operation** Bit 0-7 -> F1 to F8; When the Bit =0 the function is off. When the Bit =1 the function is on.	0 - 255	0
14	**Activating Function Keys in Analog Operation** Bit 0 - 5 -> F0v, F0h and F9 bis F12; When the Bit = 0, the function is off. When the Bit = 1, the function is on.	0 - 63	3
17 18	**Long locomotive address** 17 = high Byte 18 = low Byte	1 - 10239 192 - 231 0 - 255	1000 195 232
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 thermal overload and function outputs:** 2 = thermal overload error, 4 = function output error	0 - 7	0
33-46	**Simple function mapping (DCC standard RCN-225)** **Assignment of the** **Assignment of the function outputs to the CVs** **Fct. outputs** CV 33 Light function key (F0) during forward travel f0v CV 34 Light function key (F0) during reverse travel f0h CV 35 function key F1 - CV 36 function key F2 - CV 37 function key F3 A4 CV 38 function key F4 A6 CV 39 function key F5 A3 CV 40 function key F6 A5 CV 41 function key F7 - CV 42 function key F8 - CV 43 function key F9 - CV 44 function key F10 - CV 45 function key F11 - CV 46 function key F12 -	0 - 255	1 2 0 0 32 16 2 8 32 64 16 32 64 128
97	**Function outputs "Off" in forward direction** (simple function mapping) Bit 0-5 -> A1 to A6; Bit = 1 output off	0 - 255	0
98	**Function outputs "Off" in reverse direction** (simple function mapping) Bit 0-5 -> A1 to A6; Bit = 1 output off	0 - 255	0

* set ex works
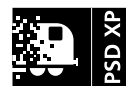
PIKO SmartDecoder XP F
Multi-protocol function decoder
compatible with fits mfx®

NOTE: An extended operating manual for the PIKO SmartDecoder XP F is available as a PDF file at the PIKO webshop under item #56514.

Product description
This PIKO SmartDecoder XP F is for PIKO control cars that are equipped with special plug-in interfaces for connecting this decoder (e.g. SBB EW II).

The PIKO SmartDecoder XP F is a state-of-the-art multi-protocol function decoder that is both compact and powerful. It complies with current RailCommunity standards in all areas and can be used with DCC, mfx® and Motorola® digital systems. It also works in analog mode with DC or AC voltage. The decoder is RailCom® and RailCom Plus® compatible. The decoder automatically senses whether the layout is being operated in digital or analog mode and responds accordingly.

The decoder maintains eight amplified function outputs. Thanks to its extended function mapping, the outputs can be switched via function keys up to F68 (DCC). The decoder's advanced power management keeps the PIKO SmartDecoder XP F running cool and operational in the event of short-term voltage loss.

Connection of the PIKO SmartDecoder XP F with plug
Depending on the lighting board used, plug the 5-pin and 7-pin connectors into the sockets or pin headers provided. Please refer to the instructions for the respective vehicle or the lighting board used for the exact positioning on the interfaces of the vehicle boards, some of which have several poles.

Make sure that no wires are bent and there are no short circuits before you replace the model's shell onto the chassis. The model should now be placed on a programming track to be given a DCC address. When programming or reading CVs, there are small amounts of current that flow which do not damage the decoder.

A short circuit in the area of the lighting, wiper and wheel sets will destroy the module and possibly the electronics of the vehicle!

CAUTION: Soldering on the decoder and on the model should only be done by experienced hobbyists. The warranty does not cover damage done to the decoder by improper soldering.

First-time use of the decoder
Place the model on the programming track and bring up DCC address 3 on your controller. Depending on the data format with which it was addressed, the decoder works in 28-step DCC mode or in Motorola mode. When using a RailCom Plus-compatible® DCC system or an mfx-compatible® DCC system, the decoder logs in automatically and can be operated immediately. If the decoder is used on conventional analog systems, it can be controlled with a traditional DC or AC throttle. The decoder will automatically detect what type of control system is in use.

Function outputs in analog operation
The decoder can be programmed so that functions F0 – F12 operate during analog operation. 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. F0 (light function) is factory-set to ON.

Motorola®
To activate functions F1 - F16 when used with Motorola-format control systems, the decoder has four possible Motorola® addresses for each function key F1 - F16. For example, address 3 would switch functions F1 – F4. Next, address 4 would switch functions F5 – F8. Then, address 5 would switch functions F9 – F12, and so on. The additional addresses can be activated in CV61 as required by the values 1 (F5 - F8), 2 (F5 - F12), or 3 (F5 - F16).

Configuration CVs
Next to the decoder address, configuration CVs are the most important CVs in a digital decoder. With the PIKO SmartDecoder XP F, these are CVs 12 and 29. A configuration CV usually contains basic settings of a decoder, like those that govern headlight behavior relevant to direction of travel. To calculate configuration CV values, consult the extended operating instructions found on the PIKO website.

RailCom®, RailCom Plus®

RailCom® can be switched off or on in CV29. If RailCom Plus® is also switched on in CV28 (Bit7 = 1), the function decoder will automatically log on to a RailCom Plus® - compatible control system (like the PIKO SmartControl$_{wlan}$). It will automatically display the decoder symbol, decoder name, and function symbols. RailCom Plus® technology eliminates the need to store model data in the DCC system or to assign the decoder an address (though you probably will want to change the address from 3).

fits mfx®

The PIKO SmartDecoder XP F also works with the mfx® data format and is "fits mfx®"-certified. When used on an mfx® control system the function decoder will automatically log in with its symbol, decoder name and function symbols. The decoder's mfx® -compatible technology eliminates the need to store model data in the DCC system or assign an address to the decoder (though you probably will want to change the address from 3).

Function outputs

A comprehensive description of all the possibilities of each function output (such as dimming or assigning effects) can be found in the extended operating instructions for the SmartDecoder XP F on the PIKO website.

Easy Function Mapping (Factory Default Setting)

In **simple function mapping** (according to RCN-225 standards, when CV96 = 1), switchable effects like lighting can be freely assigned to function keys F0 to F12. The value written to a CV in function mapping determines the outputs that can be switched with the function key assigned to that CV. CVs 33 to 46 are used for this.

CV / Funtion key	Bit 7 (128)	Bit 6 (64)	Bit 5 (32)	Bit 4 (16)	Bit 3 (8)	Bit 2 (4)	Bit 1 (2)	Bit 0 (1)	Factory setting
33 / F0v	A6	A5	A4	A3	A2	A1	F0h	F0v	1
34 / F0r	A6	A5	A4	A3	A2	A1	F0h	F0v	2
35 / F1	A6	A5	A4	A3	A2	A1	F0h	F0v	4
36 / F2	A6	A5	A4	A3	A2	A1	F0h	F0v	8
37 / F3	A6	A5	A4	A3	A2	A1	F0h	F0v	16
38 / F4	A9	A8	A7	A6	A5	A4	A3	A2	4
39 / F5	A9	A8	A7	A6	A5	A4	A3	A2	8
40 / F6	A9	A8	A7	A6	A5	A4	A3	A2	16
41 / F7	A9	A8	A7	A6	A5	A4	A3	A2	32
42 / F8	A9	A8	A7	A6	A5	A4	A3	A2	64
43 / F9	A12	A11	A10	A9	A8	A7	A6	A5	16
44 / F10	A12	A11	A10	A9	A8	A7	A6	A5	32
45 / F11	A12	A11	A10	A9	A8	A7	A6	A5	64
46 / F12	A12	A11	A10	A9	A8	A7	A6	A5	128

Switch off function outputs depending on the direction (CV96 = 1)

In CVs 97 (forward direction) and 98 (reverse direction), you can specify which function output (A1 – A6) should be shut off. If the particular function output was already switched on, it will automatically be switched off in the desired direction of travel.

CV 97:		Value	CV 98:		Value
Bit 0	A1 forward off	1	Bit 0	A1 backwards off	1
Bit 1	A2 forward off	2	Bit 1	A2 backwards off	2
Bit 2	A3 forward off	4	Bit 2	A3 backwards off	4
Bit 3	A4 forward off	8	Bit 3	A4 backwards off	8
Bit 4	A5 forward off	16	Bit 4	A5 backwards off	16
Bit 5	A6 forward off	32	Bit 5	A6 backwards off	32

Each case may be a combination value (a sum of individual values).

Advanced Function Mapping (CV96 = 6)

Due to it's enormous complexity, **extended function mapping** cannot reasonably be achieved by programming individual CVs. If you want to change **extended function mapping** you will need a PIKO SmartProgrammer device #56415. A Piko SmartTester (#56416) is also helpful in this area. For more information on **advanced function mapping**, please refer to the extended operation instructions on the PIKO website.

Servo control

The decoder allows for the control of up to four servo motors. Assigning function keys to servos is done exclusively via extended function mapping.

Connecting servo circuits to the decoder requires electronics expertise.

For more information, please refer to the extended operating instructions on the PIKO website.

CAUTION: Soldering on the decoder and on the model should only be done by experienced hobbyists. The warranty does not cover damage done to the decoder by improper soldering.

Factory reset

To restore the decoder to factory settings, program CV8 = 8.

Programming

Configuration variables (CVs) form the basis of all decoder settings. This decoder can be programmed with the PIKO SmartControl$_{wlan}$, PIKO SmartControl$_{light}$, or other DCC or Mototola control centers. For more information on programming options, refer to the extended operating instructions on the PIKO website

Updating the decoder

The PIKO SmartDecoder XP F can be updated with either the PIKO SmartProgrammer (#56415) or the PIKO SmartControl$_{wlan}$ (#55821).

Light functions cab car

Taste / Key / Touche	Function / Fonctions / Funktion		
F0	Light (withe / red)	Éclairage (blanc / rouge)	Licht (weiß / rot)
F3	Destination display	Affichage de destination	Zugzielanzeige
F4	Light driver's cab	Éclairage cabine de conduite	Licht Führerstand
F5	High beam	Feux de route	Fernlicht
F6	Light interior	Éclairage l'intérieur	Licht Innenraum

Decoder-address: 4 / Adresse du décodeur: 4 / Decoder-Adresse: 4

NOTE: This product is not a toy and is not suitable for children under the age of 14. Any liability for damage of any kind caused by improper use or failure to observe these instructions is excluded.

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 the conformity of the article is only guaranteed within products bearing the CE mark.