CV	Description		Range	Value*
1	Locomotive address		DCC: 1 - 127 Motorola: 1 - 80	3
7	Software version (The procesor used can be updated)		-	varies
8	Manufacturer code Factory reset; same value as CV 59		-	85
12	Operational mode	Value	0 - 13	13
	Bit 0=0 DC (DC analog operation) off	0		0
	Bit 0=1 DC (DC analog operation) on	*1		*1
	Bit 2=0 DCC data format is off	0		0
	Bit 2=1 DCC data format is on	*4		*4
	Bit 3=0 Motorola data format is off	0		0
	Bit 3=1 Motorola data format is on	*8		*8
	NOTE: If all data formats are switched off, the decoder can only be programmed in digital mode.			
17 18	Long DCC address		1 - 9999	2000
	17 = Higher-value byte		192 - 231	199
	18 = Lower-value byte		0 - 255	208
29	DCC Standard configuration	Value	0-63	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 Digital operation only	0		
	Bit 2=1 Automatic digital/analog switchover	*4		
	Bit 3=0 RailCom® switched off	0		
	Bit 3=1 RailCom® switched on	*8		
	Bit 5=0 Short DCC address (CV 1)	*0		
	Bit 5=1 Long DCC address (CV 17/18)	32		
30	Error memory for the function outputs, the motor, and temperature overload		0-5	0
	1 = Function output error, 4 = Temperature overload			
59	Factory Reset (also can be done using CV 8)		0 - 4	0
	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)			

Technical Specifications

Possible DCC Addresses: 1-9999 (using long DCC addressing)
Maximum operating current load: 0,6 A
Function output current load: 0,6 A
Decoder size: 9,5 x 7,8 x 2,4 mm (0.4" x 0.3" x 0.1")
The decoder is preset to DCC address 3, and 28 speed step operation. It is ready for operation and can be programmed in both DCC and Motorola data formats.

NOTE: This product is not a toy and is intended for use by people over the age of 14. PIKO will not be held liable for damage of any kind caused by improper use and/or not observing these instructions.

Got questions? We're here for you!
Internet: www.piko.de E-Mail:info@piko.de
Hotline: Tuesdays + Thursdays (Central European Time) 4 – 6 PM, Tel.: 03675 897255

Service: In the event of a complaint regarding the item, please send the item to us along with a copy of the proof of purchase and the completed return form, which you can find in our online shop under "Cancellation and Returns."

Warranty

Each decoder is fully tested before leaving the factory. Nonetheless, should your decoder be found defective within the 2 year warranty period, PIKO will repair or replace the decoder free of charge, on presentation of the proof of purchase. This warranty does not cover damage caused by improper use. Please note that according to the German EMC Act, the decoder may only be operated within models bearing the CE mark.

46212 V2 Mini function decoder

Multiprotocol
Decoder controls auxiliary functions like lights, interior lighting, smoke, etc.

PIKO
MODELLBAHNEN & GEBÄUDEMODELLE
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NOTE: A PDF file containing detailed instructions for the PIKO V2 Mini function decoder can be found on the PIKO website.

Decoder properties

- Multiprotocol function decoder for DCC, Motorola, and DC analog operation
- RailCom® and RailCom Plus®-compatible
- 6 Function outputs rated up to 0.6 Amps per output / 0.6 Amp total current load
- Simple function mapping for functions F0 - F12
- Extended function mapping for functions F0 - F44, for linked ouputs
- 3 different Motorola addresses for functions F1 - F12
- All outputs can be configured individually:
  - Direction of travel
  - Time-limited activation of an output
  - Secondary dimming level for lights
  - Blink function with variable on/off timing and 2-phase blink settings for dual blinking lights
  - Fade-in, fade-out settings
  - Firebox lighting settings with adjustible parameters
  - Energy-efficient lighting effect (slow fade-in)
  - Flourescent lighting switch-on effect
  - 8 Modulation settings for outputs like American train lighting (Mars lights, Gyra lights, strobes, etc.)
- All outputs protected from short circuits
- Error memory for function outputs and temperature overloads
- Programable from DCC or Motorola-based command systems
- Decoder programming lock

Connecting the function decoder
The first thing to do is to make sure the decoder can be connected to the model. After the decoder is installed, make sure there are no short circuits or bent wires when replacing the shell on the model. The model should now be placed on a programming track and given a DCC address. When reading the DCC address or programming the decoder, a small amount of current usually flows through it that does not damage the decoder.

Installing the decoder in the model
Use the enclosed adhesive pad to attach the decoder to a suitable location inside the model. The adhesive pad will protect the decoder from coming in contact with a metal surface and hold it securely in-place.

Connecting auxiliary outputs
Auxiliary outputs like a smoke generator, automatic couplers, or cab lighting can be connected to function outputs A1 - A4.

Output connection locations
blue = + (common connection for all special functions)
orange = output A1
purple/grey = output A2
green = output A3
brown = output A4
red = current feed (right)
black = current feed (left)
white = output A0v (forward light)
yellow = output A0h (rear light)

blue +
orange A1
purple or grey A2
A3 green
A4 brown
current feed right red
current feed left black
A0v white
A0h yellow

A short circuit in a lighting output, current feed, or wheelsets can destroy the decoder and possibly ruin the model's electronics!

Connections for a "keep alive" circuit
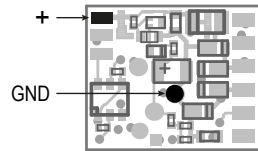
CAUTION: Soldering on the decoder should only be done by experienced hobbyists.
The warranty does not cover damage done to decoders by improper modification.

First time use of the decoder
Enter address 3 on your control unit to access the decoder. Depending on your DCC system's format, the decoder will function in DCC mode with 28 speed steps or in Motorola® mode. The V2 Mini will register automatically on a RailCom Plus-compatible DCC system (like PIKO SmartControl) and can be used immediately. If the decoder is used on a conventional analog system, it can be controlled with a regular DC throttle. The decoder automatically recognizes whether it is being used on a digital or analog layout. Functions F0 - F12 can be set for analog operation using CVs 13 and 14. Programming can be done in DCC or Motorola digital format.

RailCom®, RailCom Plus®
In the V2 Mini function decoder, RailCom® can be switched on or off in CV 29. If RailCom Plus® is activated in CV 28 (Bit 7), the decoder will automatically log on to a RailCom Plus-compatible ® control system (like PIKO SmartControl) with its decoder name and function symbols. Thanks to RailCom Plus® technology, no locomotive data has to be stored in the command center and no locomotive addresses have to be programmed into the function decoder.

Function key assignment

F0	Light	F2	Output A2	F4	Output A4
F1	Output A1	F3	Output A3		

Digital operation

Simple function mapping - assignment of the outputs to function keys
The following setting options can only be done with simple function mapping (CV 96 = 0). In simple function mapping, switchable functions are freely assigned to function keys F0 to F12 of the digital control unit/throttle. The value given to a CV in function mapping determines the functions that can be switched on or off via a function key:

Function key assignment by CVs	Factory-set value	Assignment of individual bits	Value
CV 33 Light function key F0 in forward travel	1	Bit 0 Front light output	1
CV 34 Light function key F0 in reverse	2	Bit 1 Rear light output	2
CV 35 Function key F1	4	Bit 2 Function output A1	4
CV 36 Function key F2	8	Bit 3 Function output A2	8
CV 37 Function key F3	16	Bit 4 Function output A3	16
CV 38 Function key F4	32	Bit 5 Function output A4	32
CV 39 Function key F5	0		
CV 40 Function key F6	0		
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		

For information on **extended function mapping**, please see the detailed instruction manual on the PIKO website.

Lighting effects and other possible applications of the function outputs
A comprehensive presentation on all function output possibilities (as well as how to program them) can be found in the detailed instruction manual available on the PIKO website.

Configuration CVs
In addition to the decoder address, the configuration CVs of a digital decoder are the most important CVs. These are CVs 12, 29, and 50 in the PIKO V2 Mini function decoder. A configuration CV usually contains basic settings of a decoder, such as control of the direction of travel. Examples for calculating configuration CVs can be found in the detailed instruction manual on the PIKO website.

Bit	Configuration CV29	Value
0	Normal direction of travel / Opposite direction of travel	0 / 1
1	14 / 27 Speed steps / 28 / 128 Speed steps	0 / 2
2	Digital operation only / Automatic switchover between digital and analog operation	0 / 4
3	RailCom® switched off / RailCom® switched on	0 / 8
5	Short address (CV 1, Register 1) / Long address (CV 17 and 18)	0 / 32

Bit	Configuration CV50	Value
0	Motorola 2nd address not in use / Motorola 2nd address in use	0 / 1
1	Motorola 3rd address not in use / Motorola 3rd address in use	0 / 2
2	Do not change light outputs / Change light outputs	0 / 4
3	Light frequency, A1 to A4 = 156Hz Light frequency, A1 to A4 = 24KHz	0 / 8

Factory settings
The decoder is factory set to operate in DCC or Motorola digital mode. It will automatically switch between the two formats. The decoder will also operate on conventional analog DC layouts. The function outputs are factory-set as follows:
F0 switches A0v (white) and A0h (yellow) depending on the direction of travel
F1 switches A1 (orange), F2 switches A2 (purple/grey), F3 switches A3 (green), and F4 switches A4 (brown)

Programing
The foundation for all decoder settings are configuration variables (CV's) according to DCC Standards.
The V2 Mini decoder can be programmed with an Intellibox, DCC command systems or Motorola command systems.

Programming with DCC devices
Use the programming menu of your DCC command center to read and program CVs via register mode, page programming, or directly through each CV. The decoder can be programmed on a programming track or directly on the mainline via Programing On the Main (POM). The exact procedures for each method can be found in the owner's manual of the control system being used.

Programming long addresses without a programming menu
If programming is carried out with a command system that does not have an input menu for long addresses, the values for CV 17 and CV 18 must be calculated by the user.

The following example shows how to program a theoretical address of 2000:
- Divide the address value by 256 (2000 / 256 = 7.208).
- Take the result (7) and add 192.
- Enter the result (199) as a value in CV 17.
- Enter the rest (208) as a value in CV 18.
- REMEMBER: Set bit 5 in CV 29 to 1, so the decoder will use the long address.

Programing with a Märklin control unit (6021)
All CV's can be programmed with a Märklin control unit, but they cannot be not read.
1. Turn the control unit off and then on.
2. Select the decoder address and turn on the model's light.
3. While the model is stationary (speed step 0), use the throttle to switch directions 5 times in a row until the model's light turns off.
4. Bring the throttle back to speed step 0. The model's rear lights will flash 4 times slowly.
5. Enter the number of the CV to be programmed into the control unit.
6. Briefly activate the direction changeover. The rear lights will flash 4 times quickly.
7. Enter the desired value for the CV into the command unit.
8. Briefly activate the direction changeover again. The rear lights will now flash 4 times slowly. If you wish to program more CVs, repeat steps 5 – 8.

If you are finished programing, press "STOP" or enter address "80" and briefly switch the direction of travel. Since only numbers from 1 to 80 are possible when programming with a Motorola command center from Märklin, the value "0" must be entered as "80".