LokPilot Standard

✓ Reliable, Dual Mode DCC / DC decoder with B-EMF function
✓ Four powered function outputs (+2 logic level outputs for 21MTC version)
✓ RailComPlus® for automatic Registration at ESU ECoS command station
✓ For all engines equipped with DC- or coreless motors

53611 LokPilot Standard

Digital Decoder
NMRA 8 pin wire harness
DCC & RailComPlus

MADE IN CHINA

4 044645 536117

Specification			
Operational modes	NMRA/DCC with 14, 28, 128 speed steps.		
	2-digit (short) and 4-digit (long) addresses.		
	Analog DC operation (de-selectable).		
	Automatic recognition of operational mode and DCC speed step selection.		
	Supports Lenz® LG 100 braking sections.		
Throttle	Runs DC and coreless motors.		
	0,9 A continuous load. Silent, safe 20,00 kHz pulse width frequency motor regulation.		
	Motor output overload protection; Back EMF (de-selectable).		
Function outputs	4 powered outputs with overload protection.		
	250mA load per output.		
	500mA total load of all function outputs.		
	21MTC connector version has two additional logic outputs.		
	Shunting speed and momentum key selectable.		
Programming	DCC Servicemode & DCC POM (Programming on Main).		
Features	RailCom® Feedback system. RailComPlus® automatic Registration.		
Interface	NEM652 (8 pin)	21MTC	PluX 12
dimensions in mm	25,5 x 15,5 x 4,5	25,5 x 15,5 x 4,5	14,5 x 8,3 x 2,4
dimensions	1.00 x 0.61 x 0.18	1.00 x 0.61 x 0.18	0.57 x 0.33 x 0.09
Item - Number	53611	53614	53616

CE (age 14+)

This product is not a toy. Not recommended for children under 14 years of age.
WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.
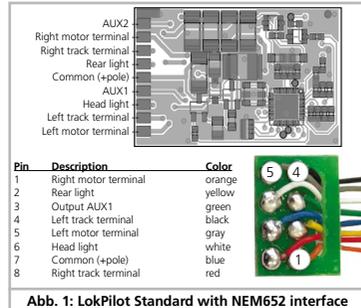
Requirements for Installation

The locomotive must be in perfect operating condition prior to the conversion: Only a locomotive with faultless mechanical properties and smooth running characteristics in analogue mode is worth converting to digital. Check and replace all wear and tear parts such as motor brushes, wheel contacts, light bulbs etc., if necessary.
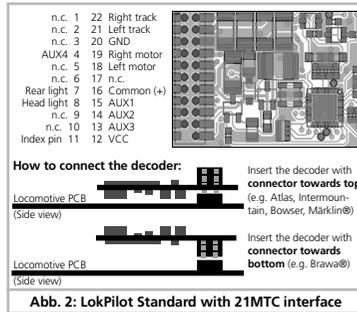
Installing the Decoder

Locomotives with 8-pin NEM 652 interface

Some LokPilot Standard decoders are supplied with an 8-pin interface as per NEM 652 (refer to Fig 1). Remove the dummy plug from the socket and keep it for later use. Insert the plug of the decoder in such a way that pin 1 of the plug (this is the side with the red / orange wires) sits next to the corner of the socket that is usually marked with *, +, •. Make sure that the pins are straight and do not tilt when inserting the plug.
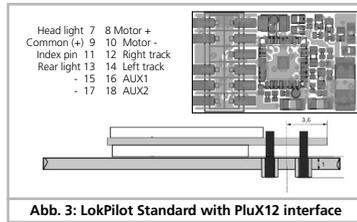

Pin	Description	Color
1	Right motor terminal	orange
2	Rear light	yellow
3	Output AUX1	green
4	Left track terminal	black
5	Left motor terminal	gray
6	Head light	white
7	Common (+pole)	blue
8	Right track terminal	red

Abb. 1: LokPilot Standard with NEM652 interface

Locomotives with 21MTC interface

Some LokPilot Standard decoders are equipped with an 21MTC interface (fig. 2) You can insert the decoder in two ways: either the pins are put through the decoder; the socket of the decoder remains visible after installation (mounting on top) or the decoder is inserted in such a way that the pins go straight into the socket. Once the decoder sits in the socket, the socket is hidden from view. Which of the two mounting positions is the correct one depends solely on the locomotive. The position of the marker-pin is the crucial indicator. Plug the decoder into the socket in such a way that the locomotive interface corresponds with the decoder. Do not apply too much pressure when inserting the plug. The decoder must go in without force.

n.c.	1	22	Right track
n.c.	2	21	Left track
n.c.	3	20	GND
AUX4	4	19	Right motor
n.c.	5	18	Left motor
n.c.	6	17	n.c.
Rear light	7	16	Common (+)
Head light	8	15	AUX1
n.c.	9	14	AUX2
n.c.	10	13	AUX3
Index pin	11	12	VCC

How to connect the decoder:

Insert the decoder with **connector towards top** (e.g. Atlas, Intermountain, Bowser, Märklin®)

Insert the decoder with **connector towards bottom** (e.g. Brawa®)

Abb. 2: LokPilot Standard with 21MTC interface

Locomotives with PluX12 interface

The LokPilot Standard supplied with a PluX12 interface (fig. 3) ist designed for locomotives in gauge TT. Decoders fitted with PluX12 connector also will fit into locomotives with PluX16 or PluX22 interface. Consider the correct seating of the decoder: One position of the multi-pin plug of the decoder has no pin (index pin). This position should be marked in the locomotive.

Head light	7	8	Motor +
Common (+)	9	10	Motor -
Index pin	11	12	Right track
Rear light	13	14	Left track
-	15	16	AUX1
-	17	18	AUX2

Abb. 3: LokPilot Standard with PluX12 interface

Locomotives without interface

Firstly, please cut all wires installed in the locomotive. Take special care to remove any connections to the chassis (ground): the motor leads must be positively potential-free, in other words they may not have any contact to the chassis or body or the wheels and wheel contacts. Figure 4 shows all connections.
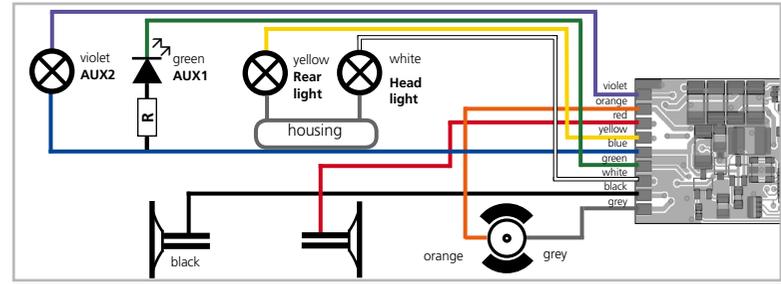
Function outputs

You can wire all kind of load to the function outputs.

⚠️ Please make sure that the load does not exceed the permitted maximum current and there are no short circuits. The outputs of the LokPilot have protection but if an external voltage is applied, the outputs may suffer damage or destruction.

Only install bulbs rated 16V or higher and with a nominal current draw, that does not exceed 50 mA or use suitable smoke generators such as Seuthe No. 11. If you like to use LEDs, a resistor with a rating between 470 Ohms and 2.2 kOhms must be wired in series. Running the LED without resistor will lead to their immediate destruction!

Only the decoders with 21MTC interface have two additional outputs besides the 4 standard outputs, namely AUX3 and AUX4. Since they are pure „logic-outputs", it is not possible to connect any external loads directly. External power transistors are required. Connect AUX3 and AUX4 via the 21MTC interface; there are equal to the other outputs. ESU offers an appropriate adapater board (art.no. 51968) with transistors.

Abb. 4: Wiring diagram for LokPilot Standard (wiring example)

DCC Operation

ℹ️ The LokPilot Standard works with any DCC system.. Remove any capacitors that are wired into the track feeders (e.g. ROCO® feeder track). This could impair the functionality of the decoder.

The address is set to 03 with 28 speed steps.

F1 switches output AUX1
F2 switches output AUX2
F3 switches the switching mode on and off
F4 switches the acceleration an deceleration on /off
F5 switches output AUX3 (if applicable)
F6 switches output AUX4 (if applicable)

DC Operation

The LokPilot Standard are set ex factory to operate on conventional DC layouts as well. No settings are needed to be done.

Decoder Settings (Programming)

A list of all CV parameters ist given later. These can be changes using any DCC command station. LokPilot decoders support all NMRA programming modes as there are the programming track modes (Direct Mode, Register Mode, Paged Mode) and the mode for the main („POM", „Programming on the Main"). With RailCom® you can read CV values on the main.

RailComPlus®

Using RailComPlus®, the decoder will be automaitcelly recognized by a compatible command station. You can disable this feature by deleting Bit 7 of CV 28.

Function Outputs

Each function output can be set to a certain effect. For each physical output one CV (CV113 - CV118, refer table page 4) is provided to define both their behaviour (Mode) and the brightness. Please write the following values into the corresponding CVs to enable the following effects:

Name	Description	Brightness	Mode
Light	Normal light	0-15	+ 0
Blink light Phase I	Output is blinking with defined frequency	0-15	+ 16
Blink light Phase II	like above, but the light is blinking alternating	0-15	+ 32
Strobe	Strobe light	0-15	+ 48
firebox	Flickering light of a fire box or braking lights	0-15	+ 80
Zoom	Light that fades in / out	0-15	+ 112
Marslight	Mars light	0-15	+ 128
Gyra light	Gyra light	0-15	+ 144
Ditch light	Ditch light phase I	0-15	+ 208
Ditch light	Ditch light phase II	0-15	+ 224

Flash rate for blinking lights

You can also set the flash rate for all lighting effects globally. All effects will flash or strobe at the same rate. The desired value should be stored in CV 112.

Function Mapping

All function outputs may be assigned to the available function buttons. Your dcc throttle may not have all function button. Each function button is linked to a CV in which any number of events ma be combined. The number you enter defines the behaviour of the output. Some functions are directional. For F0 Forward, it is CV33, for F0 Reverse it is CV34 and so on. Example: Writing the value 8 into CV36 defines that output AUX2 will listen to Function Button F2.

The following table shows the different possible combinations and also the ex-factory settings (hown in bold numbers):

CV	Function	LV	LR	AUX 1	AUX 2	AUX 3	AUX 4	Shunting	Acc/Dec
33	F0 Forward	**1**	2	4	8	16	32	64	128
34	F0 Reverse	1	**2**	4	8	16	32	64	128
35	F1 Forward	1	2	**4**	8	16	32	64	128
36	F2	1	2	4	**8**	16	32	64	128
37	F3	1	2	4	8	16	32	**64**	128
38	F4 Forward	1	2	4	8	16	32	64	**128**
39	F5 Forward	1	2	4	8	**16**	32	64	128
40	F6 Forward	1	2	4	8	16	**32**	64	128
41	F7 Forward	1	2	4	8	16	32	64	128
42	F8	1	2	4	8	16	32	64	128
43	F9	1	2	4	8	16	32	64	128
44	F10	1	2	4	8	16	32	64	128
45	F11	1	2	4	8	16	32	64	128
46	F12	1	2	4	8	16	32	64	128
47	F1 Reverse	1	2	**4**	8	16	32	64	128
129	F13	1	2	4	8	16	32	64	128
130	F14	1	2	4	8	16	32	64	128
131	F15	1	2	4	8	16	32	64	128
132	F16	1	2	4	8	16	32	64	128
133	F17	1	2	4	8	16	32	64	128
134	F18	1	2	4	8	16	32	64	128
135	F4 Reverse	1	2	4	8	16	32	64	**128**
136	F5 Reverse	1	2	4	8	16	32	64	128
137	F6 Reverse	1	2	4	8	16	32	64	128
138	F7 Reverse	1	2	4	8	16	32	64	128

Refering to the table, locate the intersection of
- The row of the desired function button and
- The column for the desired function output.

There you can find the value that you have to enter into the appropriate CV. If one function button has to control more outputs, simply add the numbers and write the result into the CV (33 - 138).

Decoder Reset

You can reset the decoder to the default settings at any time.

Enter the value 08 into CV 08.

Function outputs for Tillig locomotives

There are specific default settings for the function mapping stored in the decoder in order to make the usage easier for some Tillig TT scale engines. To enable them, you need to write a certain value into CV 8. The following settins do exist:

CV 8	Function	Description
90	Normal default	Refer to table page 3
91	Tillig Diesel- and Electric engines	F0 = Front white / Rear Red directional F1 = No Rear Red lights, directional F2 = Switching light
92	Tillig Diesel- und E-Loks mit Fernlicht	F0 = Front white / Rear Red, directional F1 = Additional High beam light F2 = No Rear Red lights, directional F3 = Switching light (but no High beam lights)

CV	Name	Description			Range	Value
1	Locomotive address	Adress of engine			1 - 127	3
2	Start voltage	Sets the minimum speed of the engine			1 - 64	3
3	Accceleration	This value multiplied by 0.25 is the time from stop to maximum speed			0 - 255	16
4	Deceleration	This value multiplied by 0.25 is the time from maximum speed to stop			0 - 255	12
5	Maximum speed	Maximum speed of the engine			0 - 64	64
6	Medium speed	Medium speed of the engine			0 - 64	22
8	Manufacturer ID	Manufacturer´s ID ESU - Writing value 8 in this CV triggers a reset			151	-
17/18	Extended address	Long address of the engine			128- 9999	192
19	Consist Address	Additional address for consist operation. Value 0 or 128 disables the consist address 1 – 127 Consist address, normal direction 129 – 255 Consist address, reverse direction			0-255	0
27	Brake mode	Allowed brake modes				24
		Bit	Function	Value		
		3	Brake on DC, if polarity against driving direction	8		
		4	Brake on DC, if polarity like driving direction	16		
28	RailCom® Configuration	Settings for RailCom (Set value to 0 to disable an option)				131
		Bit	Function	Value		
		0	Channel 1 Broadcast enabled	1		
		1	Data transmission allowed on channel 2	2		
		7	RailComPlus® automatic loco recognition enabled	128		
29	Configuration register	This CV contains important information to setup your decoder				12
		Bit	Function	Value		
		0	Reverse Direction of travel	1		
		1	28 or 128 speed steps instead of 14 speed steps	2		
		2	Enable analogue operation	4		
		3	Enable RailCom®	8		
		4	Speed curve through CV 67 - 94 (instead of CV 2,5,6)	16		
		5	Long addresses (CV 17+18) instead basic address (CV 1)	32		
33-47	Function mapping	Assignment of function outputs to the function buttons. Part #1			0 - 255	-
49	Extended Configuration	Further settings of the decoder (set value to 0 to disable an option)			0 - 255	17
		Bit	Function	Value		
		0	Enable B-EMF function	1		
		4	Enable automatic DCC speed step detection	16		
53	Control Reference voltage	Defines the Back EMF voltage, which the motor should generate at maximum speed. If the engine does not reach maximum speed, reduce this parameter.			0 - 255	140
54	Load control parameter «K»	«K»-component of the internal PI-controller. Defines the effect of load control. The higher the value, the stronger the effect of Back EMF			0 - 255	50
55	Load control parameter «I»	«I»-component of the internal PI-controller. Defines the momentum (inertia) of the motor. The higher the momentum of the motor (large flywheel or bigger motor diameter), the higher this value has to be set.			0 - 255	100
67-94	Speed table	Defines motor voltage for speed steps.			0 - 255	-
112	Blinking frequency	Blinking frequency for light effects. A multiple of 0.065536 Seconds.			1 - 255	16
113	Head light configuration	Defines brightness and mode of output Head light			0 - 255	15
114	Rear light configuration	Defines brightness and mode of output Rear light			0 - 255	15
115	AUX1 configuration	Defines brightness and mode of output AUX1			0 - 255	15
116	AUX2 configuration	Defines brightness and mode of output AUX2			0 - 255	15
117	AUX3 (21MTC) config.	Defines brightness and mode of output AUX3 (21MTC only)			0 - 255	15
118	AUX4 (21MTC) config.	Defines brightness and mode of output AUX4 (21MTC only)			0 - 255	15
129-136	Function mapping	Assignment of function outputs to the function buttons. Part #2			0 - 255	-