

SwitchPilot 3

Instruction manual

2. Edition, March 2021

From Decoder Firmware 3.0.9

51830 SwitchPilot 3

SWITCH PILOT



1. Declaration of Conformity	3
2. WEEE Declaration	4
3. Important Notes	4
4. Features	5
4.1. General Features	5
4.2. Technical Data.....	5
4.3. Scope of delivery.....	5
4.4. Operating modes	6
4.4.1. Pulse operation	6
4.4.2. Operating PECO turnout drives	7
4.4.3. K83 operation (momentary action mode).....	7
4.4.4. K84 Operation (Bistable continuous operation)	8
4.4.5. Alternate flasher mode	9
4.4.6. Operating mode switch	9
5. Connection to the digital system	10
5.1. Terminals	10
5.2. Power supply by the digital system.....	11
5.3. External power supply	11
5.4. Wiring the outputs	12
5.4.1. Solenoid turnout drives.....	12
5.4.2. Daylight signals with incandescent lamps or LEDs	12
5.4.3. Uncoupling tracks	13
5.5. Wiring the feedback contacts	13
5.6. Connecting the SwitchPilot Extension	14
5.6.1. Relay outputs.....	14
5.6.2. Motorized turnout drives	14
5.6.3. LGB® Turnout drive	15
5.6.4. Turnout frog polarization	15
6. Configuration with OLED	16
6.1. Relationship accessory addresses / turnout numbers ...	16
6.1.1. Assigning turnout numbers.....	17
6.2. Introduction to the operating structure	18
6.3. Address mode for ROCO® command stations	19
6.4. Configuring outputs	19

6.5. Setting fade-in and fade-out times.....	20
6.6. Status information	20
6.6.1. Display software version & track voltage	20
6.6.2. Displaying output states.....	20
6.6.3. Viewing feedback input states	21
7. Configuration with LokProgrammer	21
8. Configuration POM (Programming on the Main) 22	
8.1. Connection to the digital system.....	22
8.2. Reading and writing CVs with POM	22
9. Configuration with the programming track	23
9.1. Connection to the digital system.....	23
9.2. Read & Write CVs	23
10. Learning turnout numbers from command station ..	23
11. RailCom®	24
11.1. RailCom® Configuration	24
11.2. Turnout status feedback with the ECoS.....	24
12. Reset to factory default (decoder reset)	25
12.1. With the programming button.....	25
12.2. With DCC systems.....	25
12.3. With the display.....	25
13. Support	26
14. Menu reference	28
15. Solenoid address & turnout numbers	30
16. List of all supported CVs	32
17. Change history	34
18. Warranty certificate	35

Declaration of Conformity

1. Declaration of Conformity

The manufacturer, ESU electronic solutions ulm GmbH & Co. KG, Edisonallee 29, D-89231 Neu-Ulm, hereby declares under its sole responsibility that the product

Product name: SwitchPilot 3

Type: 51830

complies with all relevant provisions of the Electromagnetic Compatibility Directive (2004/108/EC). The following harmonised standards have been applied:

EN 55014-1:2006 + A1:2009: Electromagnetic compatibility - Requirements for household appliances, power tools and similar electrical appliances - Part 1: Interference emission

EN 55014-2:1997 + A1:2001 + A2:2008: Electromagnetic compatibility - Requirements for household appliances, power tools and similar electrical appliances - Part 2: Immunity.

Copyright 1998 - 2021 by ESU electronic solutions ulm GmbH & Co KG. Irrtum, Änderungen die dem technischen Fortschritt dienen, Liefermöglichkeiten und alle sonstigen Rechte vorbehalten. Elektrische und mechanische Maßangaben sowie Abbildungen ohne Gewähr. Jede Haftung für Schäden und Folgeschäden durch nicht bestimmungsgemäßen Gebrauch, Nichtbeachtung dieser Anleitung, eigenmächtige Umbauten u. ä. ist ausgeschlossen. Nicht geeignet für Kinder unter 14 Jahren. Bei unsachgemäßem Gebrauch besteht Verletzungsgefahr.

Märklin® und mfx® sind eingetragene Warenzeichen der Firma Gebr. Märklin® und Cie. GmbH, Göppingen. RailCom® ist ein eingetragenes Warenzeichen der Firma Lenz® Elektronik GmbH, Gießen.

Alle anderen Warenzeichen sind Eigentum ihrer jeweiligen Rechteinhaber.

ESU electronic solutions ulm GmbH & Co. KG entwickelt entsprechend seiner Politik die Produkte ständig weiter. ESU behält sich deshalb das Recht vor, ohne vorherige Ankündigung an jedem der in der Dokumentation beschriebenen Produkte Änderungen und Verbesserungen vorzunehmen.

Vervielfältigungen und Reproduktionen dieser Dokumentation in jeglicher Form bedürfen der vorherigen schriftlichen Genehmigung durch ESU.

2. WEEE Declaration

Disposal of old electrical and electronic equipment (valid in the European Union and other European countries with separate collection system).



This symbol on the product of the packaging or in the documentation means that this product must not be treated as household waste. Instead, this product is to be taken to the appropriate disposal point for recycling electrical and electronic equipment. If the product is disposed of correctly, you help to prevent negative environmental influences and damage to health that could be caused by improper disposal. Recycling material will preserve our natural resources. For more information about recycling this product, please contact your local citizens' office, household waste collection service or the store where you purchased this product.

3. Important Notes

Congratulations on your purchase of an ESU SwitchPilot 3 decoder. This manual wants to introduce you step by step to the possibilities of the decoder. Therefore, a request:

Please carefully work through this manual prior to commissioning. Although all SwitchPilot decoders are very robust, a wrong connection could destroy the device. If in doubt, avoid „expensive“ experiments.



- The SwitchPilot is intended exclusively for use with electric model railway layouts. It may only be operated with the components described in this manual. Any use other than that described in this manual is not permitted.
- All connection work may only be carried out when the operating voltage is switched off.
- The power supply units must be protected in such a way that in the event of a short circuit, there is no risk of a cable fire. Use only commercially available model train transformers manufactured according to the VDE/EN standards, bearing the CE mark.
- Never operate the SwitchPilot unattended. The SwitchPilot is not a (children's) toy.
- Follow the principles of this manual when connecting the external components. The use of other circuits may cause damage to the decoder.
- The SwitchPilot is not waterproof: outdoor use is not intended and is done at your own risk.
- Do not attempt to open your SwitchPilot module. Improper treatment can destroy it.

4. Features

ESU SwitchPilot 3 decoders are optimized for stationary use on your model train layout and can switch conventional solenoid turnout drives, daylight signals, magnetic uncouplers, incandescent lamps (bulbs) or other stationary electric loads.

4.1. General Features

The SwitchPilot 3 has 8 transistor outputs for switching up to 4 solenoid accessories (e.g.: turnouts) or 8 other electric loads such as uncoupling tracks or incandescent lamps. Each output can be individually programmed for the purpose of use and is electronically protected against overload and short circuit.

The SwitchPilot 3 can receive its power directly from the digital system or an external DC or AC power supply.

SwitchPilot 3 supports multi-protocol operation and can be used with central units supporting the Märklin® Motorola® system (e.g.: 6021, Central Station® or Mobile Station®) as well as DCC enabled command stations. Configuration can be carried out on the main (POM – Programming on the Main) and the programming track. Thanks to RailCom®, CVs can also be read out.



Operation with the Roco® Lokmaus 2 is not possible: The Lokmaus 2 sends only DCC locomotive commands instead of the required accessory commands.

If desired, a SwitchPilot 3 can transmit feedback reporting the turnout status directly to the ECos command station via RailCom®.

For simplifying the rather cumbersome configuration of accessory decoders, the SwitchPilot 3 has an innovative operating concept consisting of a 4-line, illuminated OLED display and three input buttons. All settings can be checked directly on the decoder at any time with the help of the display and changed, if so desired. „Programming“ with the help of your command station is not required. It cannot get any easier.

4.2. Technical Data

	SwitchPilot 3
Input voltage	12V - 20V DC power supply 12V - 16V AC power supply Digital track voltage
Outputs	8 Transistor outputs Maximum load 1.5A each (2.5A for 100msec) arranged in 4 groups as a pair Short-circuit and overload-protected
Output power	Complete module 2A (2.5A for 100msec)
Feedback inputs	8 inputs for turnout status. Query via RailCom® with ECos possible
Operating modes	DCC „Accessory Decoder“ with RailCom® (addressing according to RCN-213 or ROCO®). Turnout numbers 1 - 2048. Märklin® Motorola®. Turnout numbers 1 - 256. K83 and K84 operating modes.
Configuration	0.91" OLED display with 3 buttons
Dimensions	86mm x 86mm x 25mm

4.3. Scope of delivery

The SwitchPilot 3 is supplied with 5 detachable terminal blocks (1x 4-pole for the track connection, 4x 5-pole for the outputs) as well as this operating manual. Under part number 51800.SP.01 a pack of replacement terminal blocks is available from ESU.

Operating modes

4.4. Operating modes

The SwitchPilot 3 has a total of 8 transistor outputs, which are grouped in 4 output pairs 1 to 4. Each output pair contains two outputs (Out A and Out B) and can be configured individually to suit the desired application. The following operating modes are possible:

4.4.1. Pulse operation

If the output is configured for pulse operation, the output is switched on as soon as an appropriate command is received. At the same time, a timer automatically turns off the output as soon as a predetermined time (pulse time) saved in the decoder has elapsed, even if the button (on the command station or control panel) has been released beforehand. If the button is pressed longer than the

pre-determined pulse time, the output will still be switched off. Limiting the switch-on time prevents accessories to blow.

Optionally, the output can also be slowly dimmed up and dimmed down (so-called „zoom“ for incandescent lamp simulation).

The pulse operation is the default setting of the SwitchPilot 3 and is ideal for controlling solenoid turnout drives.



Some DCC command stations (e.g.: by Lenz) repeat the power command in a fixed rhythm until the button is released. With each power-on command received, the SwitchPilot 3 resets the stopwatch. This is shown in Fig. 1.

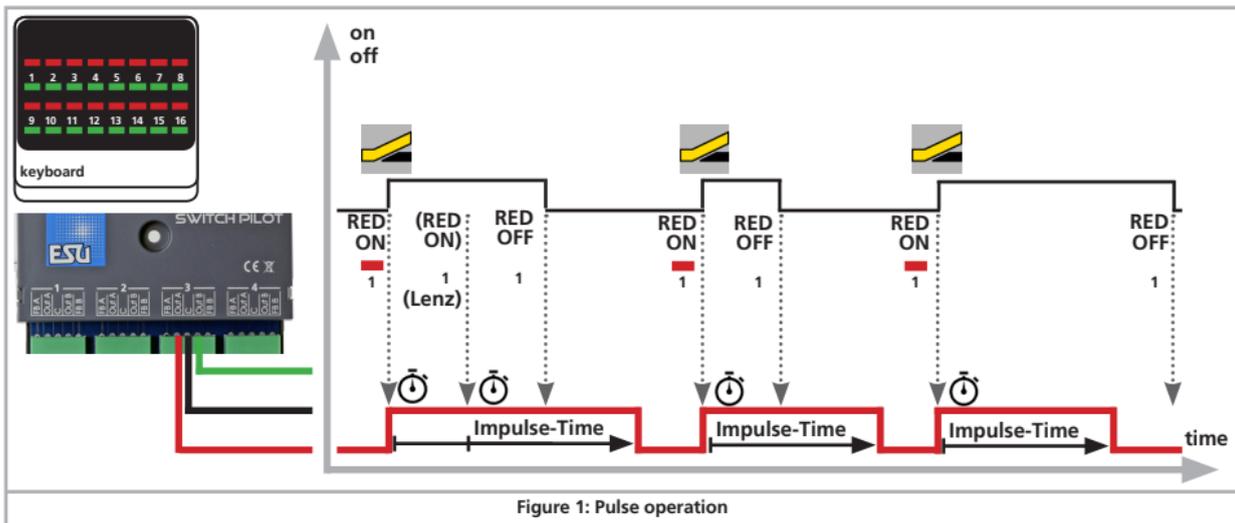


Figure 1: Pulse operation

Operating modes

4.4.2. Operating PECO turnout drives

The PECO mode corresponds to the afore mentioned pulse operation with the exception that to increase the peak current the overcurrent protection of the output pair is switched off and the pulse time is fixed to a relatively short time span. This short current surge is used to optimally control the PECO drives.



Incorrect wiring or a short circuit at an output in PECO mode can destroy the SwitchPilot 3 decoder!

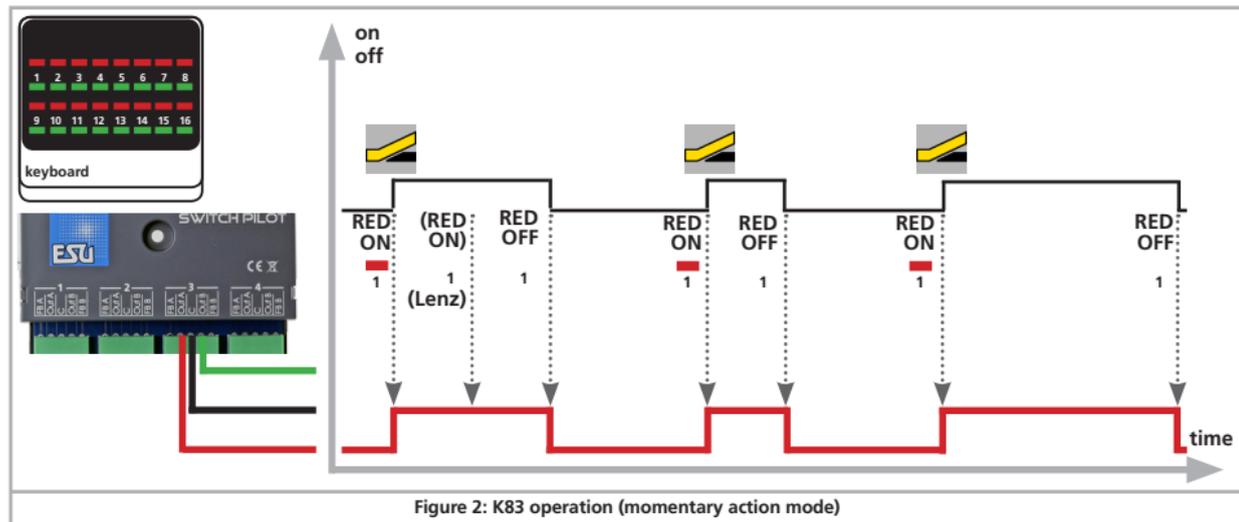
4.4.3. K83 operation (momentary action mode)

In K83 mode, the output remains active until the button on the command station or control panel is released. This operating mode is suitable for turnout drives with end position shutdown or for uncoupling tracks.

Optionally, the output can also be slowly dimmed up and dimmed down (so-called „zoom“ for incandescent lamp simulation).



K83 operation may cause problems with older DCC command stations, because they do not transmit the required „Off“ command (e.g.: older Lenz command stations).



Operating modes

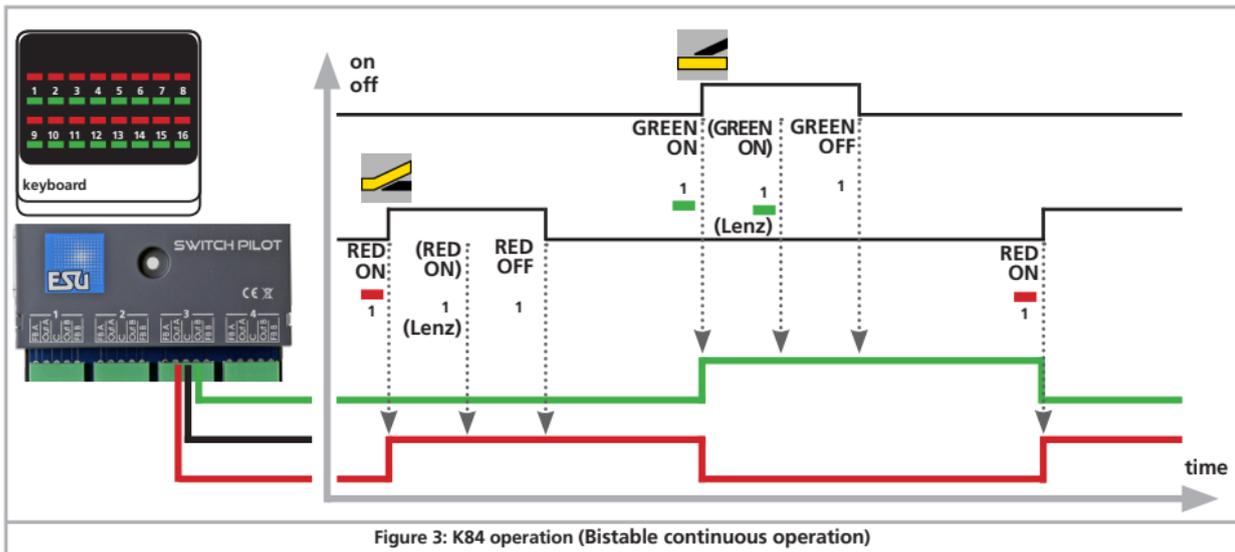
4.4.4. K84 Operation (Bistable continuous operation)

In K84 mode, the two outputs are alternately switched on and off: When pressing the first button (red) on the command station, the Output Out A is turned on. It remains active until pressing the assigned button (green) activates the output Out B of the same output group. Out A and Out B behave like a change-over switch.

Optionally, the output can also be slowly dimmed up and dimmed down (so-called „zoom“ for incandescent lamp simulation).

The K84 operation is well suited for lighting applications or two-aspect daylight signals.

 The logic of this mode of operation corresponds to the Märklin® k84 decoder.



Operating modes

4.4.5. Alternate flasher mode

In this mode, the outputs Out A and Out B of an output pair are switched on alternately with an adjustable flashing frequency. The alternate flasher is started with the command „Straight/Green“ of the assigned button and stopped again with the command „Diverging/Red“.

Optionally, the output can also be slowly dimmed up and dimmed down (so-called „zoom“ for incandescent lamp simulation).

The alternating flasher operation is ideal for illuminating St. Andrew's crosses at level crossings.

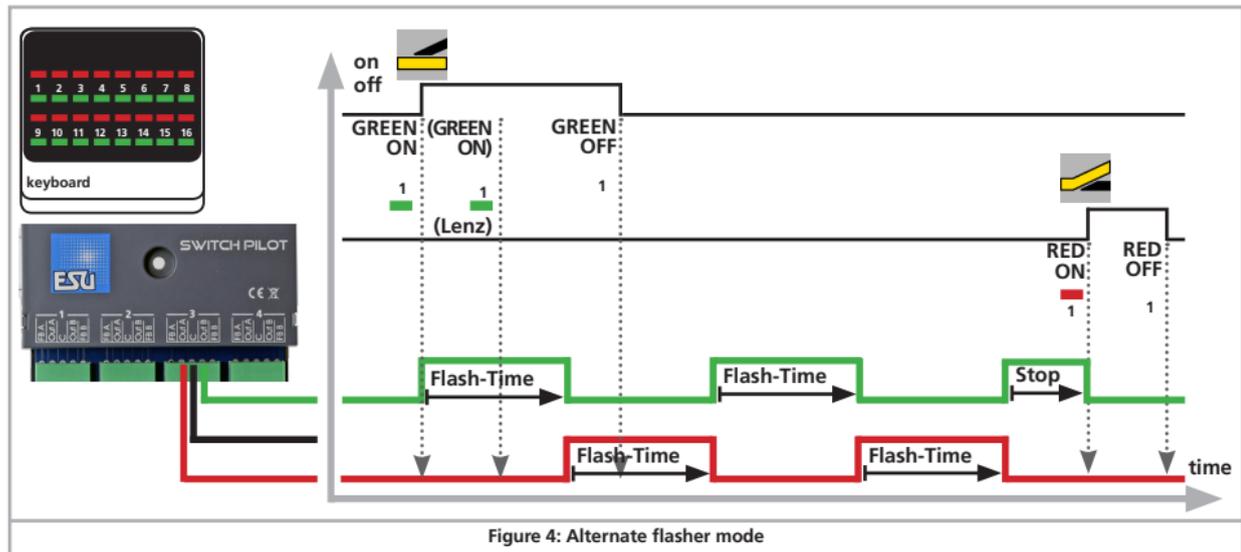
4.4.6. Operating mode switch

With the decoder's mode switch, you can quickly switch all output pairs simultaneously to the „k83“ or „k84“ mode, regardless of how they might be configured.

Only in the center position „USER“ (default setting ex works) the outputs will behave as programmed in the decoder configuration.



Any configured „zoom“ effects are ignored when the mode switch forces the decoder hard into k83 or k84 mode.



Connection to the digital system

5. Connection to the digital system

We recommend that you first configure the SwitchPilot 3 decoder completely and then install it on the layout.

5.1. Terminals

Fig. 5 shows the SwitchPilot 3 with all terminals.

- a) Turnouts, daylight signals, uncouplers and similar electric loads shall be connected to the terminals labelled 1 to 4 for the output pairs 1 to 4. The respective terminals **FB A** and **FB B** are required for providing feedback from the turnout drive to the SwitchPilot 3.
- b) The power supply of the SwitchPilot 3 including all connected loads is realized via the Terminals **Pw A** and **Pw B**. You can either use the track voltage or use an external power supply. We recommend an external power supply, particularly for larger layouts, because then the energy for powering the drives does not add to the load for the command station or booster.
- c) Connect the Terminals **Trk A** and **Trk B** to the track output of the command station (or booster) that controls the SwitchPilot 3.
- d) As described in chapter 4.4.6., the outputs can be configured simultaneously with the operating mode switch.
- e) Input unit. The three buttons **PROG/OK** as well as (+) and (-) serve to configure the decoder, as explained in chapter 6.
- f) The display shows all settings of the decoder including turnout address and status of the outputs. After a few seconds, the screen saver displays the supply voltage.
- g) Extension socket for the SwitchPilot Extension relay module.

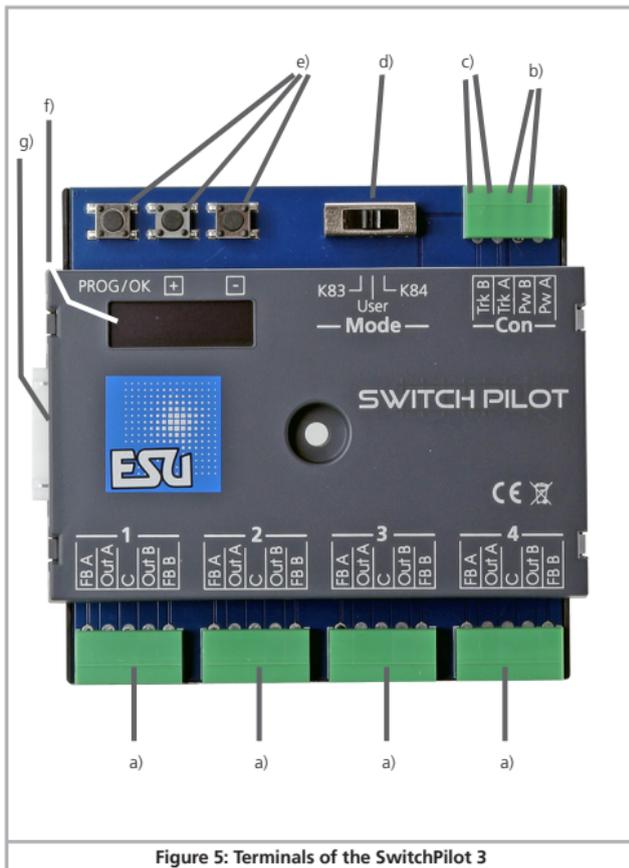


Figure 5: Terminals of the SwitchPilot 3

Connection to the digital system

5.2. Power supply by the digital system

For smaller layouts with only a few electric loads turned on at the same time, the SwitchPilot 3 can be supplied directly from the command station or booster. The terminals Pw A and Pw B are connected parallel to the terminals Trk A and Trk B.

! If accessories (e.g.: Märklin® K track) do not switch at all or only respond with little power, check the track voltage and increase it, if necessary. The SwitchPilot 3 can display the supply voltage as described in chapter 6.8.1. If the voltage cannot be increased, please use an external power supply.

i This wiring scheme must be used if you want to configure the SwitchPilot 3 on the programming track of your command station. For more information, see Chapter 9.

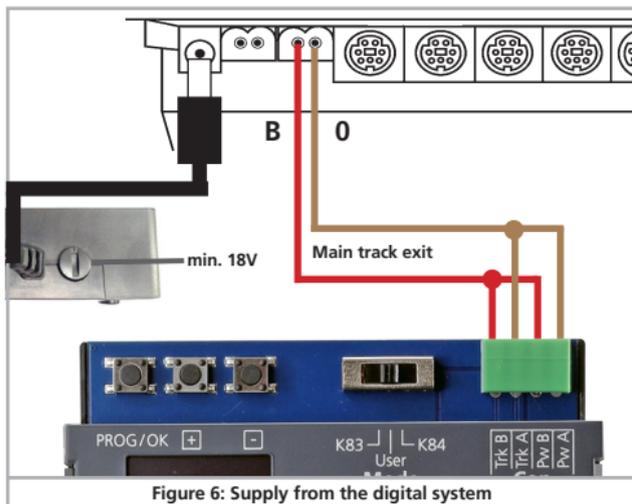


Figure 6: Supply from the digital system

5.3. External power supply

For larger layouts with many electric loads, we recommend the use of an external power supply. DC and AC power supplies are suitable with the specifications described in chapter 4.2. We recommend the use of a stabilized **DC power supply** with at least **18V DC** at least **3A** output power (e.g.: ESU part number 50119).

! For switching Märklin® K track drives a minimum of 18V is required. Keep this in mind when choosing the transformer! The SwitchPilot 3 can display the supply voltage as described in chapter 6.8.1.

! This type of wiring cannot be used for programming on the programming track. In this case, a temporary connection must be established as shown in chapter 5.2.

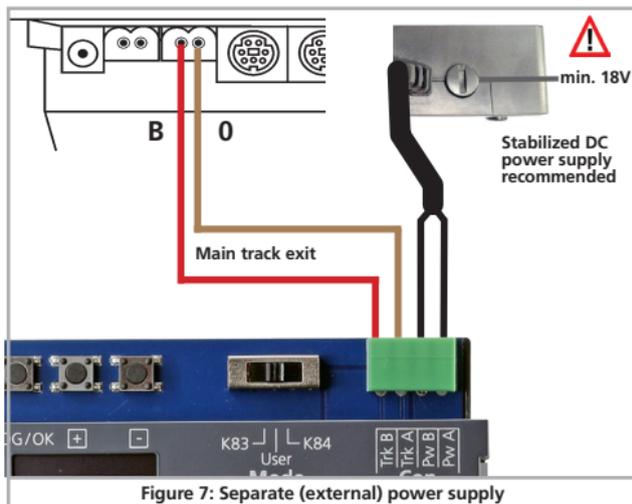


Figure 7: Separate (external) power supply

Wiring the outputs

5.4. Wiring the outputs

5.4.1. Solenoid turnout drives

You may use any of the commercially available solenoid turnout drives from the well-known manufacturers with the SwitchPilot 3. Figure 8 shows the wiring of a turnout at output 1.

- The common wire from the two coils is connected to terminal C.
- Terminal Out A is connected to the wire for the diverging route.
- Terminal Out B is connected to the wire for the straight route.

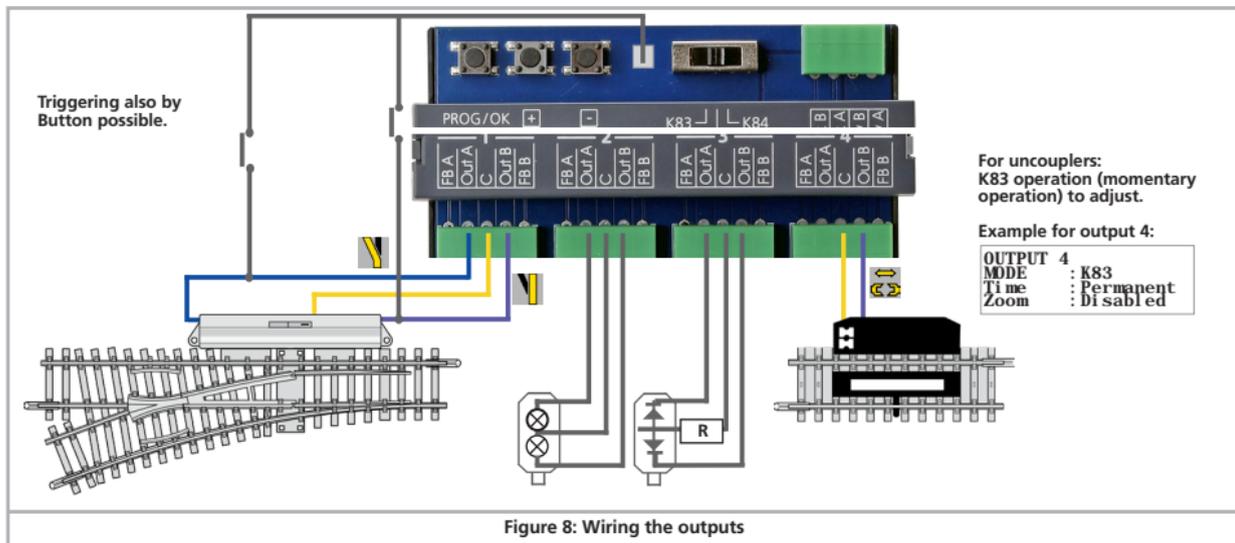
i Should the turnout not be aligned as you intended after pressing the respective button on your command station respectively control panel (diverging and straight route are reversed), please swap the wires at terminals Out A and Out B.

i The power consumption of PECO switch drives is so high that the PECO operating mode must be set.

5.4.2. Daylight signals with incandescent lamps or LEDs

If you are using daylight signals with incandescent lamps (bulbs) or LEDs (light-emitting diodes), the corresponding output must be configured in the K84 mode (Bistable continuous operation).

Incandescent lamps, as shown in Figure 8, Output 2, may be directly connected to the SwitchPilot 3.



Wiring the outputs

If, on the other hand, signals or lighting with LEDs are used (as shown in Figure 8, Output 3), a series resistor must be used to limit the current. The resistance value depends to a large extent on the type of LED used, so no precise statement is possible here. Values between 1 kOhm and 10 kOhm are common. If in doubt, start with a higher value.



The terminal C of the output is the „+“ pole. Therefore, the cathode of the LED must be connected to the terminals Out A or Out B.

5.4.3. Uncoupling tracks

The momentary action mode is suitable for uncoupling tracks, as the coil will be active only until the button is released. The wiring is as shown in Fig. 8, Terminal 4. You can use either Terminal Out A or Out B, depending on whether you want to activate the uncoupler with the „diverging“ or „straight“ turnout button.

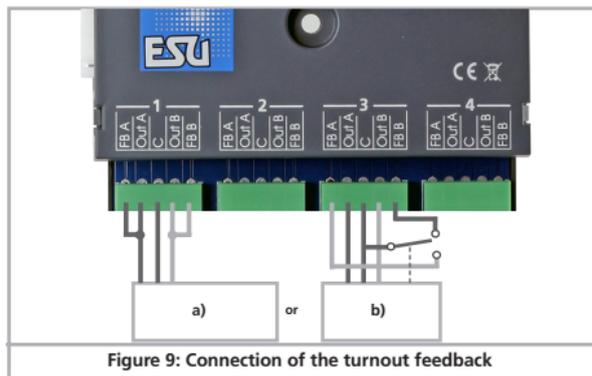
5.5. Wiring the feedback contacts

The SwitchPilot 3 can report the actual turnout status to the ESU ECoS command station via RailCom®. For this purpose, however, the turnout must have appropriate mechanical feedback contacts. Figure 9 illustrates the scenario.

- Connection of a turnout drive with limit stop contacts. Connect terminals Out A to FB A and Out B to FB B.
- Connection to drives with separate feedback contacts: Here you wire the two feedback contacts to the terminals FB A and FB B respectively, and the common wire of the feedback to terminal C.



You will find more information on turnout feedback to the ESU ECoS via RailCom® in chapter 11.



Wiring the outputs

5.6. Connecting the SwitchPilot Extension

The SwitchPilot Extension module is docked sideways to the SwitchPilot 3; press the extension module with the 8-pin plugs against the SwitchPilot 3 until the retaining clips of the plugs snap in. The internal electronics and relay coils of the SwitchPilot Extension module are powered by the SwitchPilot 3.

5.6.1. Relay outputs

Fig. 10 shows the connections:

- a) The outputs 1 to 4 are connected to relay outputs A and B, which are activated jointly (2x change-over contacts, bistable). Each relay output corresponds to the corresponding transistor output of the SwitchPilot 3. If the output **Out A** of the SwitchPilot 3 is active, the terminals **I** and **COM** of the relay output are also active. If the output **Out B** on the SwitchPilot 3 is active, terminals **II** and **COM** are also active.

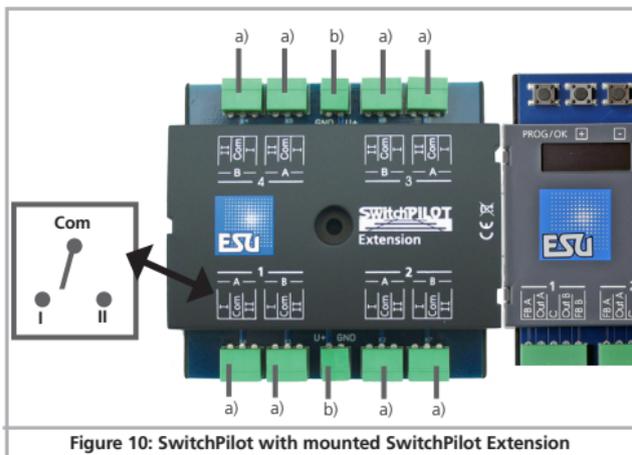


Figure 10: SwitchPilot with mounted SwitchPilot Extension

- b) Terminals for ground and „U+“ (rectified track voltage, supplied by SwitchPilot 3) for powering DC turnout motors.

5.6.2. Motorized turnout drives

Motorized turnout drives can be controlled with the help of the SwitchPilot Extension module. Reversing the operating voltage of the electric motor changes the direction of rotation of the motor, thereby moving the turnout from one position (status) to the other.



Use only turnout drives with limit stop contacts to prevent the motor from burning through, because the relay outputs of the SwitchPilot Extension module are continuously active.

The wiring of the motorized turnout drive is shown in Fig. 11. Please note the maximum supply voltage values specified in the instructions for your drive. The Extension module always delivers the full voltage that is provided to the SwitchPilot 3.

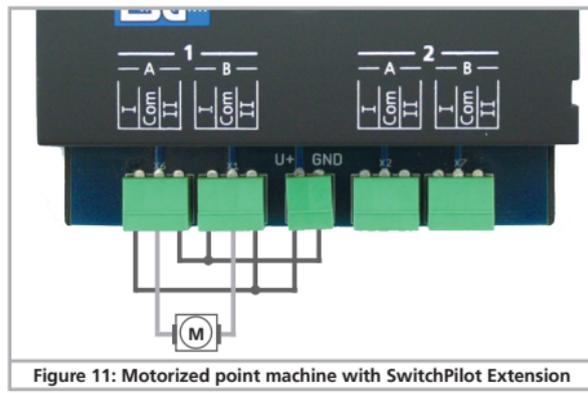
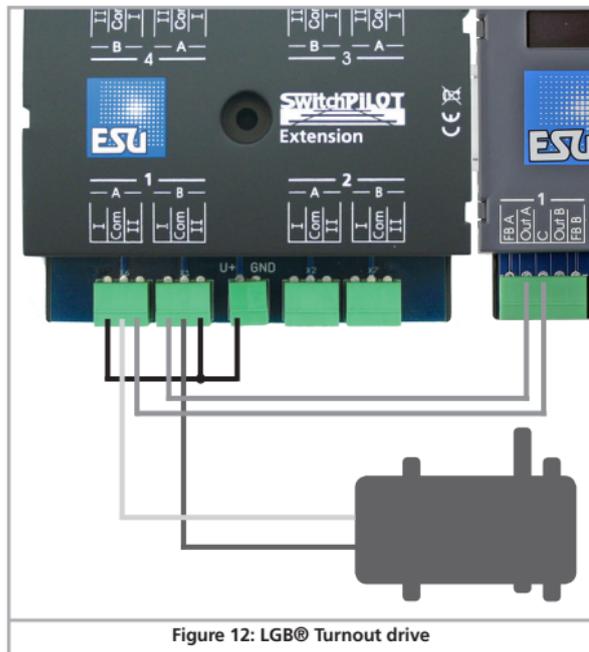


Figure 11: Motorized point machine with SwitchPilot Extension

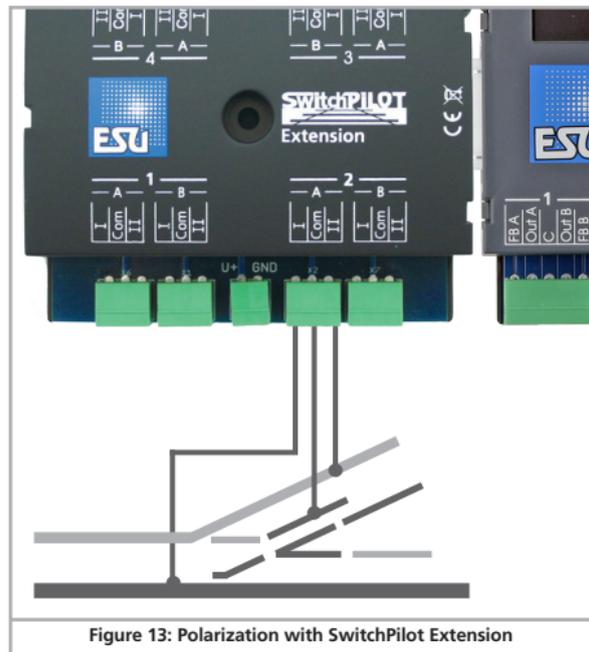
5.6.3. LGB® Turnout drive

The wiring is as shown in Fig. 12. Unless reprogrammed, the motors are supplied with electricity for approx. 520 msec and are then switched off to prevent overheating of the drive.



5.6.4. Turnout frog polarization

With the SwitchPILOT Extension module, turnout frogs can be polarized very easily.



6. Configuration with OLED

The programming of accessory decoders was usually very cumbersome in the past. CV programming with the help of the hand-held throttle often failed due to the missing programming modes (e.g.: only very few command stations and/or throttles respectively central units support „POM for accessory decoders“) or forgotten addresses of decoders installed on the layout. Even assigning the decoder address presented many model railway enthusiasts with major obstacles. Reading the currently assigned decoder address is also quite cumbersome and causes a lot of displeasure.

To avoid such problems, the SwitchPilot 3 is the first accessory decoder on the market working with an innovative operating concept. It consists of an illuminated multi-line OLED display and a 3-button input unit. This allows programming all (!) settings of the SwitchPilot 3 in plain text directly on the decoder, without the need of external programming devices or cumbersome CV programming. In addition, the display shows the currently assigned turnout numbers at any time and can even accurately display the supply voltage (respectively track voltage). A screen saver prevents the OLED display from burning in.

6.1. Relationship between accessory addresses and turnout numbers

For addressing the outputs of the SwitchPilot 3 decoder with the command station, so-called turnout numbers must be assigned to them. The number of turnout numbers is limited and depends on the digital system:

Motorola@: Turnout numbers 0001 to 0256

DCC: Turnout numbers 0001 to 2048
(ROCO command stations 0001 to 2040).

The turnout numbers are arranged into four groups. The first group comprises turnout numbers 1,2,3,4, the second group the turnout numbers 5,6,7,8, the third group the turnout numbers 9,10,11,12, and so forth.

Each SwitchPilot 3 can be assigned such a 4-series group: this is the so-called accessory address.

The accessory address is stored internally in CV 1 and CV 9. The calculation of the turnout numbers from the values saved in the two CVs is regulated in the RCN-213 standard.

The table in chapter 16 lists turnout numbers and corresponding accessory addresses. Only the first 256 turnouts are available when operating with Motorola® central units.



It is not possible to assign turnout numbers outside the group-of-4 limits to a SwitchPilot 3. For example, it would not be possible to assign turnout numbers 4, 5, 6 and 7, as these go beyond the limit of the accessory address groups. Please keep this in mind when assigning turnout numbers.



Due to a weakness in the DCC standard prior to the creation of the RCN-213, some command stations (especially ROCO® Multi-maus or Z21) calculate the turnout numbers differently. In this case please take note of chapter 6.3.

6.1.1. Assigning turnout numbers

Ex works, the 4 double outputs of the SwitchPilot 3 respond to turnout numbers 0001 to 0004. The turnout numbers can be easily changed directly on the SwitchPilot 3.

- a) Check whether the display shows the screen saver (lettering „SP” and the supply voltage):



SP»17.3V

- b) In this case, press the „**PROG/OK**” button only (!) briefly. Now the SwitchPilot 3 should display its current turnout numbers directly in plain text:



ADDRESS
Switch 1-4: 0001-0004

- c) Press the „**PROG/OK**” button. The turnout numbers should now flash (inverse).



ADDRESS
Switch 1-4: 0001-0004

- d) Press the button (+) or (-) to select the desired turnout numbers. The currently selected turnout numbers are displayed flashing.

- e) Press the „**PROG/OK**” button again to confirm the turnout numbers. The indicator no longer flashes.



ADDRESS
Switch 1-4: 0009-0012

Finished! Without programming or cumbersome handling on the handheld throttle or command station.

6.2. Introduction to the operating structure

The configuration with the aid of the OLED display and the 3-button input unit enables you to set all parameters of the SwitchPilot 3 decoder.

All properties are arranged in so-called „panels“. A panel fills in all four lines of the display. The first line displays the name of the panel, and rows two to four display a maximum of three different setting options. With the help of the „+“ and „-“ buttons you can scroll between the individual panels.

- a) Name of the panel
- b) Name of setting option 1
- c) Value of the setting option 1
- d) Name of setting option 2
- e) Value of the setting option 2
- f) Name of the setting option 3
- g) Value of the setting option 3

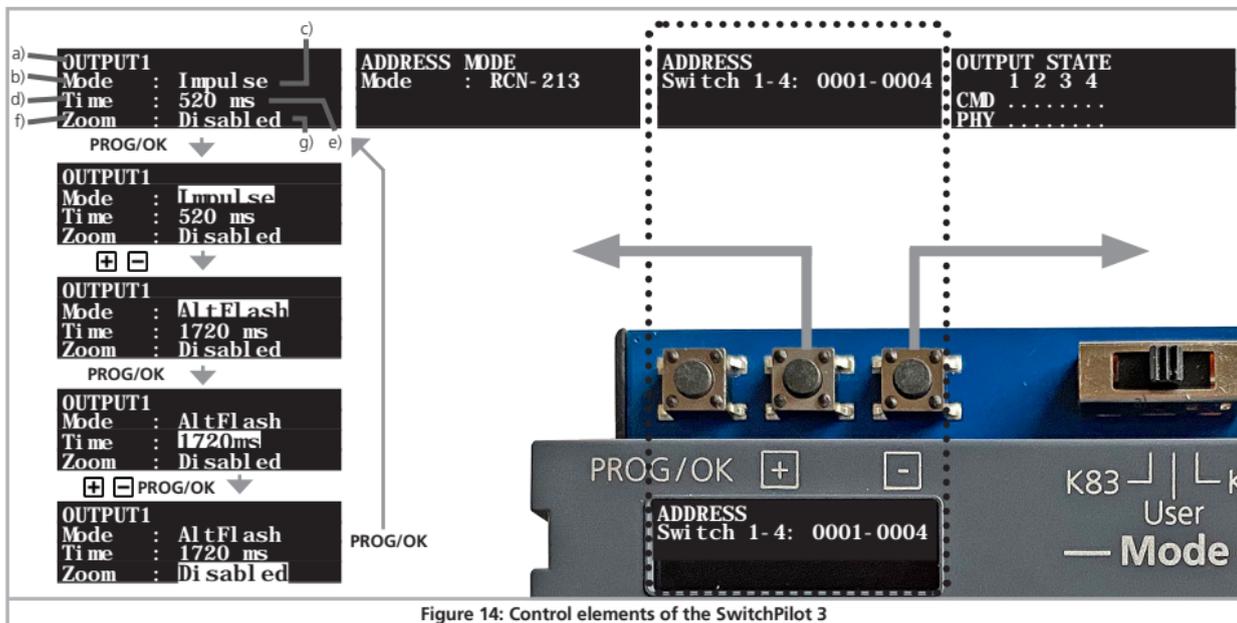


Figure 14: Control elements of the SwitchPilot 3

Introduction to the operating structure

- If you want to change a setting option of the currently selected panel, press the **PROG/OK** button once. The setting option 1 of the screen will now flash as a sign that it can be changed.

- For changing the respective setting

use the (+) and (-) buttons. Press the button until the display shows the desired value. The decoder immediately applies the changes so you can see immediately what is happening.

- Confirm your entry with **PROG/OK**. After that, the next setting option will flash as a sign that it can now be changed.



If you do not want to change a setting option, but only want to proceed to the next one, just press the **PROG/OK** button. Then the current value is not changed.

- After you have changed the last of the three setting options respectively confirmed them by pressing **PROG/OK**, nothing will flash. You are now back in the display mode of the panel and can now either make changes to other setting options of the panel by pressing **PROG/OK** again or select another panel with the (+) and (-) buttons.

For a list of all possible panels and their setting options, see Chapter 15.

6.3. Address mode for ROCO® command stations

As already mentioned in Chapter 6.1, ROCO® command stations (specially the multiMaus, but also the Z21 in the standard setting) use a different computation method to calculate the turnout numbers from the accessory addresses. Set the decoder to "ROCO" to ensure that the SwitchPilot 3 handles instructions from ROCO® command stations correctly.

To do this, select „Mode“ in the „ADDRESS MODE“ panel, and then select the calculation method „ROCO“.

6.4. Configuring outputs

Each output can be configured individually. For this purpose, the panels „OUTPUT 1“ to „OUTPUT 4“ are provided.

You can use the "Mode" option to set the desired output mode:

```
OUTPUT1
Mode   : Impul se
Time   : 520 ms
Zoom   : Di sabl ed
```

```
OUTPUT2
Mode   : PECO
Time   : Permanent
Zoom   : Di sabl ed
```

```
OUTPUT3
Mode   : K83
Time   : Permanent
Zoom   : Di sabl ed
```

```
OUTPUT4
Mode   : Alt-Fl ash
Time   : 1170ms
Zoom   : Enabled
```

- "Pulse" configures pulse operation according to chapter 4.4.1.
- "PECO" configures PECO operating mode according to chapter 4.4.2.
- "K83" configures momentary action mode according to chapter 4.4.3.
- "K84" configures bistable continuous operation according to chapter 4.4.4.
- "Alt Flash" configures the alternating flasher operation according to chapter 4.4.5.

The meaning of the „Time“ option depends on the selected output mode:

- In pulse mode, it is determined here how long the output remains switched on.
- In alternating flasher mode, you specify how fast the two outputs should flash.
- In all other modes, „Time“ has no meaning and cannot be changed respectively is set to „Permanent“.

Configuration

For particularly realistic fade-in and fade-out effects, you can add a „zoom“ function to each output, if so desired

- “Enabled” enables the pair to fade-in and fade-out
- “Disabled” turns off the fade-in and fade-out feature of the output pair.

6.5. Setting fade-in and fade-out times

Here you can choose the time during which the outputs should be dimmed up or down if the „Zoom“ option is active at the corresponding output.

The time can be set from 0 msec to 4160 msec. The value „0 msec“ turns off this feature for all outputs.

```
FADEIN & FADEOUT
Time : 260ms
```

- i** Do not choose exceedingly long durations. Especially in alternating flasher mode, you should make sure that the flashing frequency is selected significantly longer than the fade-in and fade-out times.

6.6. Status information

The SwitchPilot 3 can display extensive status and diagnostic information, which can be particularly helpful, especially for wiring and troubleshooting.

6.6.1. Display software version & track voltage

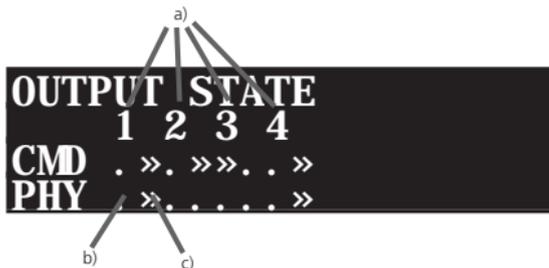
The „Information“ panel displays both the hardware („HW“) as well as the software („SW“) version of the decoder. The supply voltage („Voltage“) of the outputs is also displayed.

```
INFORMATION
HW : 3.0
FW : 3.0.9
Voltage : 17.3V
```

- i** If the SwitchPilot 3 is powered directly by the command station, „Voltage“ displays the digital track voltage, otherwise the voltage of the connected power supply.

6.6.2. Displaying output states

Important information about the output state is provided by the „Output State“ panel



- a) Number of the output
- b) Output terminal „Out A“ active
- c) Output terminal „Out B“ active

The PHY line indicates for each output 1 to 4 whether it is currently active. As soon as the state changes (e.g.: when an alternate flasher is active or because an output is switched off by the timer), this is displayed in real time.

- i** If the fade-in and fade-out feature is active for an output, the output is immediately displayed as active, even if it is still fading-in or -out.

The line CMD shows the latest command received for each output 1 to 4: A bar to the left directly below the number indicates that the command „Red“ was received from the command station, a bar to the right of it indicates that the last command was „Green“. If no valid command has been detected, only dots are displayed. The SwitchPilot 3 saves the most recently detected commands so that the last operating state is restored after a power interruption.

Configuration

6.6.3. Viewing feedback input states

The "Screen Feedback State" is suitable for checking whether the feedback wiring has been connected correctly (see chapter 5.5)

```
FEEDBACK STATE
1 2 3 4
» . » . . » . »
```

For each feedback input, a bar represents that a feedback has been detected.

7. Configuration with LokProgrammer

Please always use the latest PC software for your LokProgrammer, but at least version 5.1.0. To ensure a correct reading, connect the SwitchPilot 3 as shown in Fig. 15 (**Pw A** and **Pw B**).

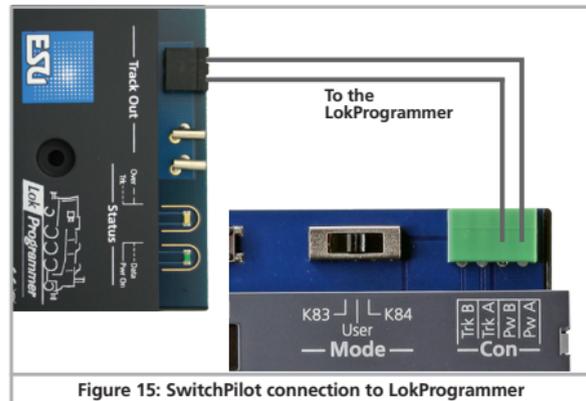


Figure 15: SwitchPilot connection to LokProgrammer

8. Configuration POM (Programming on the Main)

The SwitchPilot 3 may remain installed on your layout during programming. For POM to work, your command station must also support „Programming on the Main (POM)“ for accessory decoders (1). Thanks to RailCom®, ECoS owners can even read out the values (see chapter 11).

8.1. Connection to the digital system

The SwitchPilot 3 does not require any special connections. It may remain wired as shown in chapter 5.2. respectively 5.3.

8.2. Reading and writing CVs with POM

Select “POM” as well as „Accessory decoder” on your command station. Make sure that the correct accessory address is selected.

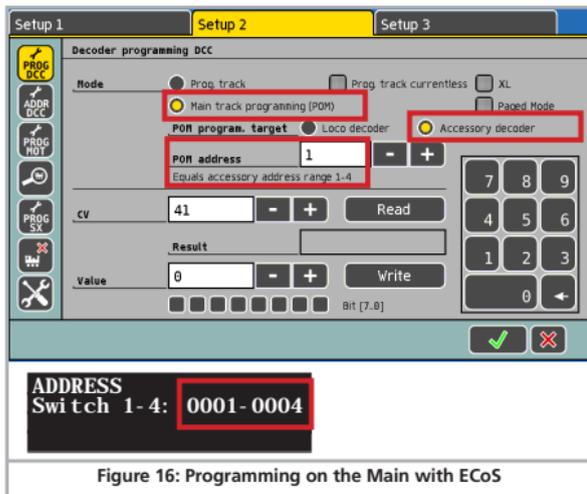


Figure 16: Programming on the Main with ECoS

You can write all the CVs of the SwitchPilot 3 decoder and read them subject to the capabilities of the command station. With the ECoS, this is done as follows:

- Go to the main programming menu of the ECoS.
- Select “POM”, “DCC” and “Accessory decoder”.
- Select the „POM address” of the SwitchPilot 3. Alternately the corresponding turnout numbers are displayed as well.
- Select the CV you want to read or write.
- Press the „Read” or „Write” button.

With the aid of Z21 maintenance tool, the ROCO® Z21 can also read or write the CV values of the SwitchPilot 3.

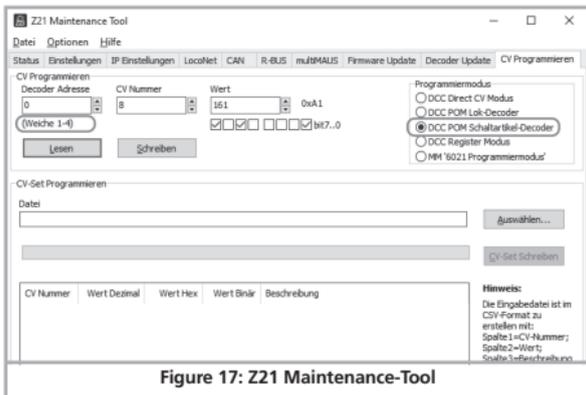


Figure 17: Z21 Maintenance-Tool

For this to work, RailCom® must be active on the SwitchPilot 3. Please also refer to chapter 11.



Unfortunately, many command stations do not support the POM mode for accessory decoders, but only for mobile (locomotive) decoders. In this case, configure the SwitchPilot directly using its display.

9. Configuration with the programming track

In some cases, it may be desirable to change the properties of the SwitchPilot via the programming track of the digital system. There, the CVs can not only be written, but also read. This is conveniently done before the final installation on the layout.

9.1. Connection to the digital system

Wire the SwitchPilot 3 as described in chapter 5.2. Power must be provided by the digital system.

9.2. Read & Write CVs

Reading should work with all DCC compliant command stations. However, some command stations do not provide enough voltage for the programming track or sometimes report an overcurrent. In these cases, POM should be used, or - even better - configure the SwitchPilot directly using its the display.

10. Learning turnout numbers from command station

The accessory address (and thus the assigned turnout numbers) can also be learned directly from the command station. To do this, the SwitchPilot must first be put into ADDRESS mode:

- Press the **PROG/OK** button when the screen saver is displayed.
- Press the **PROG/OK** button, then the previous turnout numbers (factory default: 0001-0004) will flash inversely.



ADDRESS
Switch 1-4: 0001-0004

The decoder is now ready to „learn“ an address as soon as an accessory of the desired group of 4 is switched on at the command station.

- Now turn on an accessory of your choice at the command station. How accessories are switched, you can find out in the manual of your command station or the handheld throttle.
- Once the switch command has been understood by the SwitchPilot, the new address is saved and the numbers no longer flash.



The assignment of the turnout numbers is always carried out in ascending groups of 4. No matter what accessory you switch, the first output will always be aligned at the beginning of the group of 4.

Example 1:

You switch the turnout number 1. All four outputs are then configured in ascending order to turnout numbers 1 to 4.

Example 2:

You switch the turnout number 3. All four outputs are also configured in ascending order to turnout numbers 1 to 4, because turnout number 3 is in the same group of 4 as turnout number 1 from the first example.

Example 3:

You switch the turnout number 11. All four outputs will now receive the turnout numbers 9 to 12 in ascending order.

11. RailCom®

RailCom® is a technique for transferring information from the decoder back to the command station. When RailCom® is switched on, the CV values of the SwitchPilot can be read out directly on the main. From the factory, RailCom® is active on SwitchPilot 3.

11.1. RailCom® Configuration

If necessary, RailCom® can be disabled on the SwitchPilot.

```
RAILCOM
Mode   : Enabl ed
CH2    : Enabl ed
```

In this case „Mode“ must be set to „Disabled“. The value of CH2 is intended for future expansions and should not be changed.

11.2. Turnout status feedback with the ECoS

The ESU ECoS can display the current turnout status and immediately display deviations (e.g.: jammed turnouts or defective drives). Proceed as follows:

- Make sure that the feedback contacts of the turnout drives are correctly connected to the SwitchPilot 3, as shown in chapter 5.5.
- Select the „New Accessory“ menu on the ECoS.
- Select „DCC with RailCom“ in „Data Format“.
- Select the desired turnout symbol and correctly enter the turnout number (here: 1).
- Now link the accessory to an accessory (control) pane, as described in chapter 13.3 of the ECoS Manual.

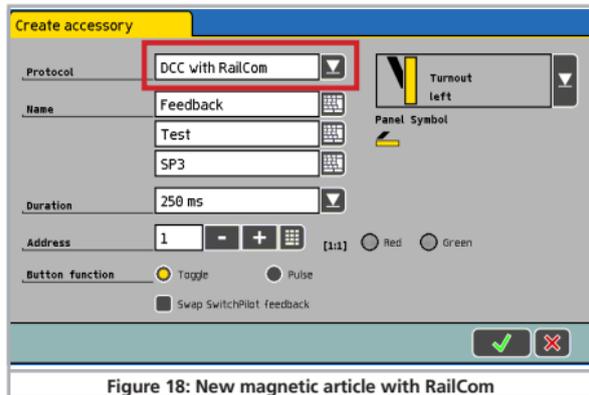


Figure 18: New magnetic article with RailCom

Decoder reset

- Now go to the interlocking (turnout control panel). If the current status does not match the desired status, this will be indicated by a small exclamation point.

Depending on the design of the feedback device, the feedback lines may be reversed. If you cannot or do not want to rewire them, you can activate the „Swap SwitchPilot feedback“.

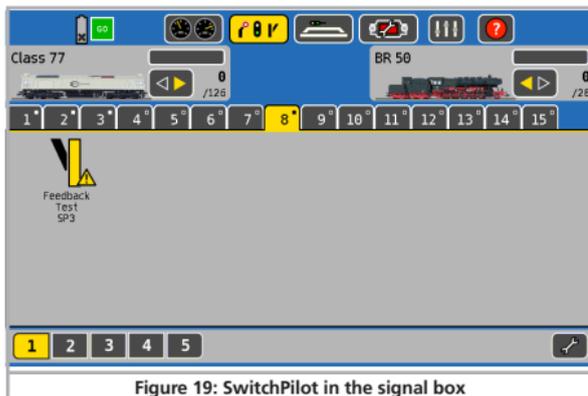


Figure 19: SwitchPilot in the signal box

12. Reset to factory default (decoder reset)

You can restore the decoder's factory default settings at any time.

12.1. With the programming button

- Disconnect the power supply to the SwitchPilot 3 decoder. The display must go out.
- Press and hold the **PROG/OK** button.
- Reconnect the power supply for the decoder. The decoder will be reset to factory default values.
- Release the **PROG/OK** button. The turnout numbers are now flashing because the SwitchPilot 3 expects to assign new turnout numbers (as described in chapter 6.1.).
- Confirm the turnout numbers with PROG/OK or first assign the new turnout numbers with (+) or (-).

12.2. With DCC systems

To do this, write the **value 8 in CV 8** either via POM (wiring as per chapter 8) or on the programming track (wiring as per chapter 9). The display of the SwitchPilot 3 briefly goes dark, after which the factory values are restored.

- Writing in CV 8 is a special case, so some command stations may display an error „err02“ or similar. However, the SwitchPilot will accept the command.

12.3. With the display

The „RESET DECODER“ panel on the display enables you to restore the factory default values directly.

RESET DECODER
Do Reset: **Yes**

- In the “Do Reset” option, select „Yes“ and confirm with PROG/OK. The display will flicker briefly, after which the SwitchPilot will be restored to have factory default values again.

13. Support

Should you have questions regarding your SwitchPilot to which you have not found the right answer in this manual please first contact your hobby shop. The people there are your competent contact for all questions relating to model trains. In difficult cases, you can contact us directly. Look first on our website under «Support / FAQ» to see whether the question has already been answered. If this is not the case, we ask you to make these available to us either in our support forum or to contact us by e-mail. We also provide a telephone hotline, which should only be used in the case of really special requests:

For Germany

by phone: +49 (0) 731 - 1 84 78 - 106
Tuesday & Wednesday
from 10.00 to 12.00 o' clock

by Fax : +49 (0) 731 - 1 84 78 - 299

by E-Mail: www.esu.eu/kontakt

by mail: ESU GmbH & Co. KG
Edisonallee 29
D-89231 Neu-Ulm

www.esu.eu

For USA, Canada, Australia

by phone: +1 570-980-1982
Tuesday & Thursday
from 8am to 4pm (EST)

by Fax : +1 866-591-6440

by E-Mail: support@loksound.com

by mail: ESU LLC
1304 Jordan Ave
Montoursville PA 17754

www.loksound.com



Menu reference SwitchPilot 3

14. Menu reference

No	Screen	Options
01	ADDRESS Switch 1-4: 0001-0004	Switch 1-4: Turnout numbers outputs 1 to 4
02	ADDRESS MODE Mode : RCN-213	Mode: RCN-213: Addressing as RCN-213. Mode: ROCO : Addressing as ROCO.
03	OUTPUT MODE 1 Mode : Impul se Time : 520ms Zoom : Di sabled	Mode: IMPULSE PECO K83 K84 AltFl ash Time: 130 ms 195 ms .. 2015 ms Zoom: Di sabled Enabled
04	OUTPUT MODE 2 Mode : Impul se Time : 520ms Zoom : Di sabled	Mode: IMPULSE PECO K83 K84 AltFl ash Time: 130 ms 195 ms .. 2015 ms Zoom: Di sabled Enabled
05	OUTPUT MODE 3 Mode : Impul se Time : 520ms Zoom : Di sabled	Mode: IMPULSE PECO K83 K84 AltFl ash Time: 130 ms 195 ms .. 2015 ms Zoom: Di sabled Enabled
06	OUTPUT MODE 4 Mode : Impul se Time : 520ms Zoom : Di sabled	Mode: IMPULSE PECO K83 K84 AltFl ash Time: 130 ms 195 ms .. 2015 ms Zoom: Di sabled Enabled
07	FADEIN & FADEOUT Time : 65 ms	Time: 0 ms 65 ms .. 4160 ms
08	RAILCOM Mode : Enabled CH2 : Enabled	Mode: Enabled Di sabled CH2 : Enabled Di sabled

10	<pre>INFORMATION HW : 3.0 SW : 3.0.9 Voltage : 18.4V</pre>	<p>HW: Hardware version of the decoder. SW: Software version of the decoder. Update with LokProgrammer Voltage: Supply voltage of the decoder (if necessary rail tension)</p>
11	<pre>FEEDBACK STATE 1 2 3 4 . » . » . » .</pre>	
12	<pre>OUTPUT STATE 1 2 3 4 CMD . » . » » . » . PHY . » . » . » .</pre>	

Solenoid address & turnout numbers

15. Solenoid address & turnout numbers

CV1 and CV9 follow RCN-213

Turnout numbers				Address	CV1	CV 9
1	2	3	4	1	1	0
5	6	7	8	2	2	0
9	10	11	12	3	3	0
13	14	15	16	4	4	0
17	18	19	20	5	5	0
21	22	23	24	6	6	0
25	26	27	28	7	7	0
29	30	31	32	8	8	0
33	34	35	36	9	9	0
37	38	39	40	10	10	0
41	42	43	44	11	11	0
45	46	47	48	12	12	0
49	50	51	52	13	13	0
53	54	55	56	14	14	0
57	58	59	60	15	15	0
61	62	63	64	16	16	0
65	66	67	68	17	17	0
69	70	71	72	18	18	0
73	74	75	76	19	19	0
77	78	79	80	20	20	0
81	82	83	84	21	21	0
85	86	87	88	22	22	0
89	90	91	92	23	23	0
93	94	95	96	24	24	0
97	98	99	100	25	25	0
101	102	103	104	26	26	0
105	106	107	108	27	27	0
109	110	111	112	28	28	0
113	114	115	116	29	29	0
117	118	119	120	30	30	0
121	122	123	124	31	31	0
125	126	127	128	32	32	0
129	130	131	132	33	33	0
133	134	135	136	34	34	0

Turnout numbers				Address	CV1	CV 9
137	138	139	140	35	35	0
141	142	143	144	36	36	0
145	146	147	148	37	37	0
149	150	151	152	38	38	0
153	154	155	156	39	39	0
157	158	159	160	40	40	0
161	162	163	164	41	41	0
165	166	167	168	42	42	0
169	170	171	172	43	43	0
173	174	175	176	44	44	0
177	178	179	180	45	45	0
181	182	183	184	46	46	0
185	186	187	188	47	47	0
189	190	191	192	48	48	0
193	194	195	196	49	49	0
197	198	199	200	50	50	0
201	202	203	204	51	51	0
205	206	207	208	52	52	0
209	210	211	212	53	53	0
213	214	215	216	54	54	0
217	218	219	220	55	55	0
221	222	223	224	56	56	0
225	226	227	228	57	57	0
229	230	231	232	58	58	0
233	234	235	236	59	59	0
237	238	239	240	60	60	0
241	242	243	244	61	61	0
245	246	247	248	62	62	0
249	250	251	252	63	63	0
253	254	255	256	64	0	1
257	258	259	260	65	1	1
261	262	263	264	66	2	1
265	266	267	268	67	3	1
269	270	271	272	68	4	1
273	274	275	276	69	5	1
277	278	279	280	70	6	1
281	282	283	284	71	7	1

Solenoid address & turnout numbers

Turnout numbers				Address	CV1	CV 9
285	286	287	288	72	8	1
289	290	291	292	73	9	1
293	294	295	296	74	10	1
297	298	299	300	75	11	1
301	302	303	304	76	12	1
305	306	307	308	77	13	1
309	310	311	312	78	14	1
313	314	315	316	79	15	1
317	318	319	320	80	16	1
321	322	323	324	81	17	1
325	326	327	328	82	18	1
329	330	331	332	83	19	1
333	334	335	336	84	20	1
337	338	339	340	85	21	1
341	342	343	344	86	22	1
345	346	347	348	87	23	1
349	350	351	352	88	24	1
353	354	355	356	89	25	1
357	358	359	360	90	26	1
361	362	363	364	91	27	1
365	366	367	368	92	28	1
369	370	371	372	93	29	1
373	374	375	376	94	30	1
377	378	379	380	95	31	1
381	382	383	384	96	32	1
385	386	387	388	97	33	1
389	390	391	392	98	34	1
393	394	395	396	99	35	1
397	398	399	400	100	36	1
401	402	403	404	101	37	1
405	406	407	408	102	38	1
409	410	411	412	103	39	1
413	414	415	416	104	40	1
417	418	419	420	105	41	1
421	422	423	424	106	42	1
425	426	427	428	107	43	1
429	430	431	432	108	44	1

Turnout numbers				Address	CV1	CV 9
433	434	435	436	109	45	1
437	438	439	440	110	46	1
441	442	443	444	111	47	1
445	446	447	448	112	48	1
449	450	451	452	113	49	1
453	454	455	456	114	50	1
457	458	459	460	115	51	1
461	462	463	464	116	52	1
465	466	467	468	117	53	1
469	470	471	472	118	54	1
473	474	475	476	119	55	1
477	478	479	480	120	56	1
481	482	483	484	121	57	1
485	486	487	488	122	58	1
489	490	491	492	123	59	1
493	494	495	496	124	60	1
497	498	499	500	125	61	1
501	502	503	504	126	62	1
505	506	507	508	127	63	1
509	510	511	512	128	0	2
513	514	515	516	129	1	2
517	518	519	520	130	2	2
521	522	523	524	131	3	2
525	526	527	528	132	4	2
529	530	531	532	133	5	2
533	534	535	536	134	6	2
537	538	539	540	135	7	2
541	542	543	544	136	8	2
545	546	547	548	137	9	2
549	550	551	552	138	10	2

List of all supported CVs

CV	Name	Description	Range	Value		
1	Decoder address 1, LSB	Lower 6 bits (bit 0 - 5) of the first decoder address for outputs 1 to 4. Used together with CV 9 to save the address.	1 - 63	1		
3	Configuration Output 1	Defines the properties of decoder output 1.		0 - 64	8	
		Function	Description			Value
		Moment business	K83-compatible: output active as long as the button on the control panel is pressed.			0
		Impulse operation PECO	Impulse operation for PECO drives. Reduces the sensitivity of the overcurrent protections.			1
		Impulse operation	Duty cycle: multiple of 65 ms.			2 - 31
		Alternating indicators	Out A and Out B alternately active. Duty cycle: multiple of 130 ms			32 - 63
4	Configuration Output 2	Defines the properties of decoder output 2.		0 - 64	8	
		Function	Description			Value
		- As CV 3 -				
5	Configuration Output 3	Defines the properties of decoder output 3.		0 - 64	8	
		Function	Description			Value
		- As CV 3 -				
6	Configuration Output 4	Defines the properties of decoder output 4.		0 - 64	8	
		Function	Description			Value
		- As CV 3 -				
7	Version number	Internal software version of the decoder.		193		
8	Manufacturer ID	Manufacturer number (ID) of ESU. Writing the value 8 resets all CV to the factory setting.	-	151		
9	Decoder address 1, MSB	Upper 3 bits (bits 6 - 8) of the first decoder address for outputs 1 to 4. Used together with CV 1 to save the address.	0 - 7	0		

List of all supported CVs

CV	Name	Description	Range	Value		
28	RailCom Configuration	Activation and configuration of the RailCom function	0,2	2		
		Bit			Description	Value
		1			Data transmission on channel 2 No data transmission on channel 2 Data transmission allowed on channel 2	0 2
29	Configuration register	DCC configuration settings for the SwitchPilot	128,136	128		
		Bit			Description	Value
		3			RailCom communication	
					RailCom communication is switched off	0
					RailCom communication allowed	8
7	Decoder is DCC Accessory Decoder (solenoid) (read only, cannot be changed)	128				
34	„Zoom“- Configuration	Determination of which of the outputs 1 - 4 should „zoom“ when switched on / off. „Zoom“ means slowly fading in or out of the function. This can be used to create a prototypical cross-fading of light signals.	0 - 15	0		
		Bit			Description	Value
		0			„Zoom“ function active for output 1	1
		1			„Zoom“ function active for output 2	2
		2			„Zoom“ function active for output 3	4
3	„Zoom“ function active for output 4	8				
37	DCC turnout addressing	Calculation of the turnout numbers from the decoder address	0,1	0		
		Bit			Description	Value
		0			DCC turnout addressing compliant with RCN-213 DCC turnout addressing for ROCO centers	0 1
42	Fadein / Fadeout Time	Duration of the fade-in & fade-out process in 65ms steps, if configured for the output.	0 - 63	2		

17. Change history

1. EDITION DECEMBER 2020

- Initial Document

2. EDITION MARCH 2021

- Spelling mistake corrected

18. Warranty certificate

Dear customer,

Congratulations on purchasing this ESU ECoS command station. This quality product was manufactured applying the most advanced production methods and processes and was subject to stringent quality checks and tests.

Therefore ESU electronic solutions ulm GmbH & Co. KG grants you a warranty for the purchase of ESU products that far exceeds the national warranty as governed by legislation in your country and beyond the warranty from your authorised ESU dealer.

Manufacturer's warranty of 24 months from date of purchase.

Warranty conditions:

This warranty is valid for all ESU products that have been purchased from an authorised ESU dealer.

Any service, repair or replacement under this warranty requires proof of purchase. The filled in warranty certificate together with the receipt from your ESU dealer serves as proof of purchase. We recommend keeping the warranty certificate together with the receipt.

In case of a claim please fill in the enclosed failure report card as detailed and precise as possible and return it with your faulty product.

Please use the appropriate postage when shipping to ESU.

Extend of warranty / exclusions:

This warranty covers free of charge repair or replacement of the faulty part, provided the failure is demonstrably due to faulty design, manufacturing, material or transport. Any further claims are explicitly excluded.

The warranty expires:

- In case of wear and tear due to normal use.
- In case of conversions of ESU – products with parts not approved by the manufacturer.
- In case of modification of parts.
- In case of inappropriate use (different to the intended use as specified by the manufacturer).
- If the instructions as laid down in the user manual by ESU electronic solutions ulm GmbH & Co. KG were not adhered to.

There is no extension of the warranty period due to any repairs carried out by ESU or replacements.

You may submit your warranty claim either with your dealer or by shipping the product in question with the warranty certificate, the receipt of purchase and the fault description directly to ESU electronic solutions ulm GmbH & Co. KG at:

ESU GmbH & Co. KG
- Guarantee Section -
Edisonallee 29
D-89231 Neu-Ulm

Trouble shooting sheet

1. Personal data

(Please write in BLOCK LETTERS)

Name: _____
Street: _____
.....
ZIP/City: | | | | | |
Country: _____
Email: _____
Phone: _____
Date: _____
Signature: _____

2. Error

- | | |
|---|---|
| <input type="checkbox"/> Transistor outputs | <input type="checkbox"/> Short circuit |
| <input type="checkbox"/> Servo outputs | <input type="checkbox"/> No function from the start |
| <input type="checkbox"/> No Function | <input type="checkbox"/> Programming on the Main |

3. Error description

.....
.....
.....

4. Receipt

Please enclose your receipt / invoice. Otherwise no warranty possible!

5. Additional information:

.....
.....
.....
.....
.....

6. Your retailer:

.....
.....
.....
.....
.....

Retailer's stamp or address

