Domburg Train Support

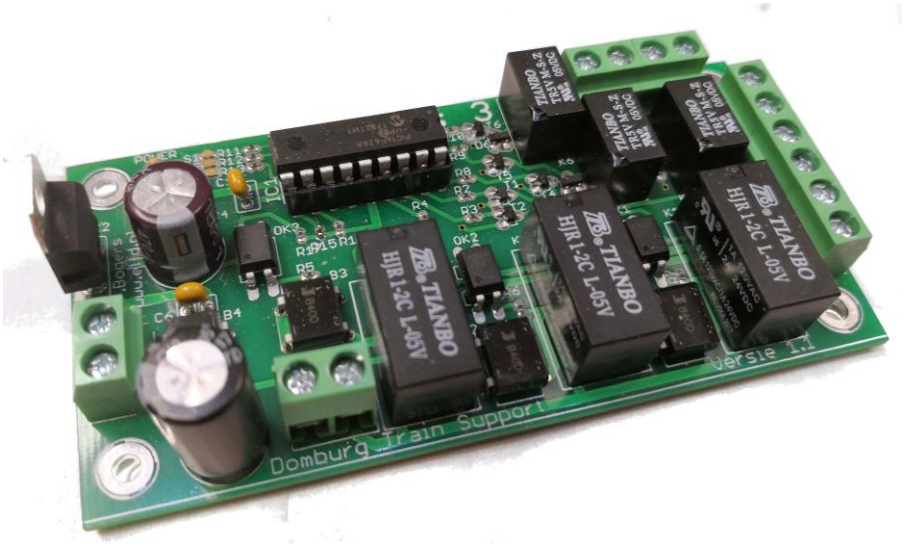
Your partner in model railway technology

DT
S
M
an
ua
l

DTS Manual: KeerPlus3

Reverse loop solution for DCC model railways

Version 2 - 2019



www.domburgtrainsupport.nl

Content

Introduction

Thank you for purchasing the KeerPlus3. This article is specially designed for users looking for a reversing loop solution that is efficient and simple to apply in addition to being cost-effective.

On a digital model railway, a short circuit caused by applying a reversing loop or by creating a differently polarised part of the track is a common problem. These problems are easily solved by applying a reversing loop solution which allows part of the track to change polarity. There are two types of circuit in this, the short circuit method and the current detection solution. The KeerPlus3 only uses the current detection method. In this manual, we explain how the solution works and how it can be applied to your model railway.

I wish you much ease of use with the KeerPlus3, should you have any suggestions for improvement of the product or a critical note. Please let me know by sending an email to info@domburgtrainsupport.nl

Sincerely,

Martin Domburg
Domburg Train Support

Additional accessories that can be ordered separately:

- Printed circuit board mounting kit
- Mounting frame
- Power supply Meanwell GS36E12

Disclaimer:
The KeerPlus3 was commissioned by Domburg Train Support and developed by Vincent Bogers.

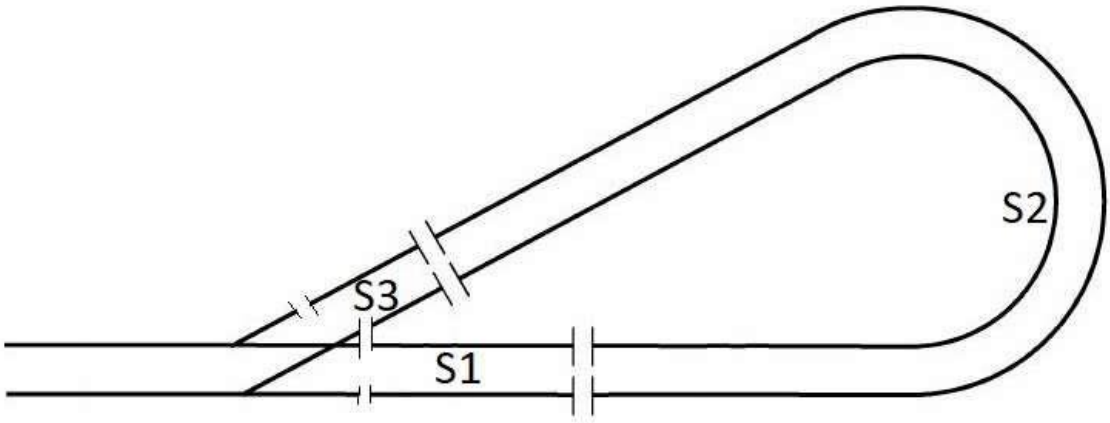
The operation of the KeerPlus3

The functionality of the KeerPlus3

The KeerPlus3 works entirely on the basis of current detection divided into three sections. Current detection means that each section is detected over its entire length for power consumers such as locomotives or carriages with lights. In short, anything that consumes power.

As mentioned, the module uses three sections. As soon as the first section (S1) is activated by detection, the module switches the second section (S2) and the last section (S3) to the same polarity as S1. Section S2 is then driven and as soon as the locomotive activates the last section S3, the module immediately switches S2 and the last section S3 to the opposite polarity. The first section S1 remains unaffected so it can be ridden again.

This works identically when the reversing loop is driven from the other direction. In rest mode, the module "sniffs" for a consumer on sections S1 and S3. As soon as S1 is activated, the module puts S2 and S3 in the same polarity and switches at S3 together with S2. If S3 is switched first, the module puts S1 and S2 in the same polarity and as soon as S1 is activated it switches S1 and S2 to the other polarity. Since S3 then remains in place, a train can simply re-enter there.



.

Requirements of the Turner loop

Because the module does not switch the first section, the rule applies that section S2 must be at least the length of the longest detected train. Should the train not fit in it (e.g. a railcar or a train with a driver's cab), a short circuit would occur as soon as the wagons still in the first section enter the reverse-polarised S2.

Summary: S2 should be the length of the longest detected train.

Besides the middle section S2, we also talk about S1 and S3, the two outer sections. The recommendation is to use about 1.5x a locomotive length. In theory, a length of 5 centimetres would be enough to generate good detection. However, practice shows that contact between the rails and the wheels is still sometimes not guaranteed. To make the reversing loop sections work reliably and stably, we therefore recommend using a longer length for this.

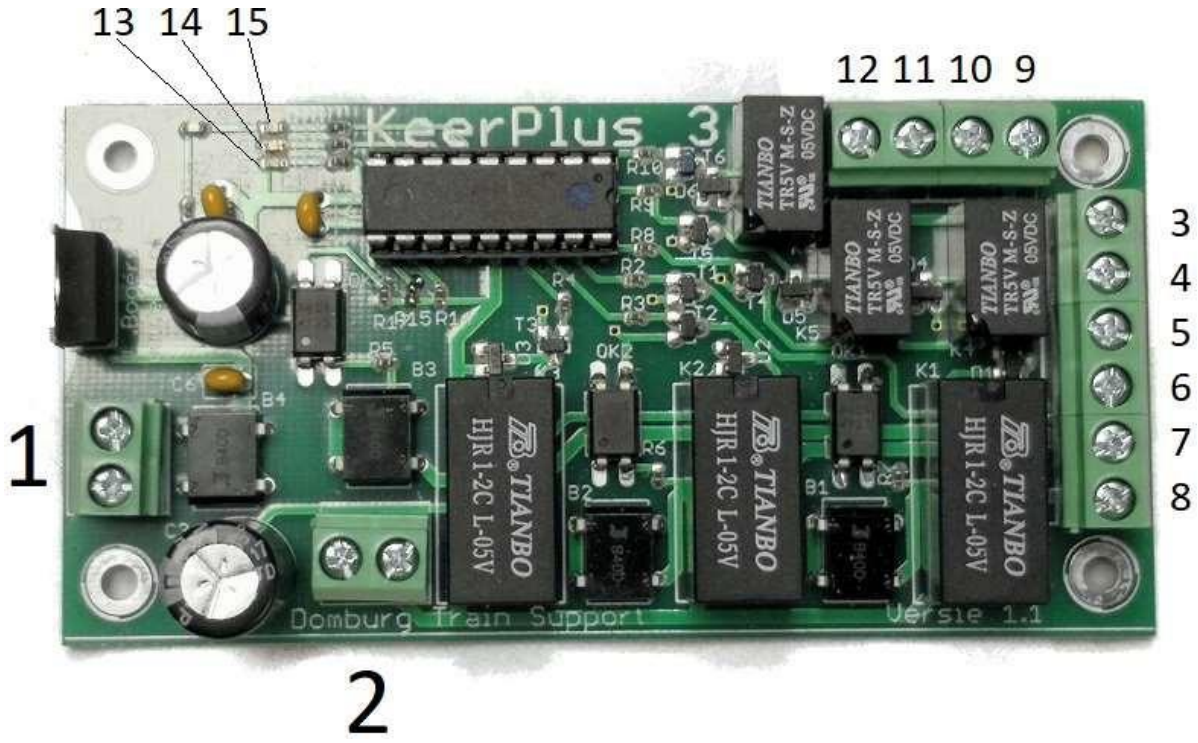
Assembly

The KeerPlus3 has 4 mounting points. It is recommended to mount the board at height because of the heat generation of the voltage regulator. Preferably with the components at the top.

Mounting the module in upside-down or sideways position is also possible as long as you take into account the cooling of the cooling element.

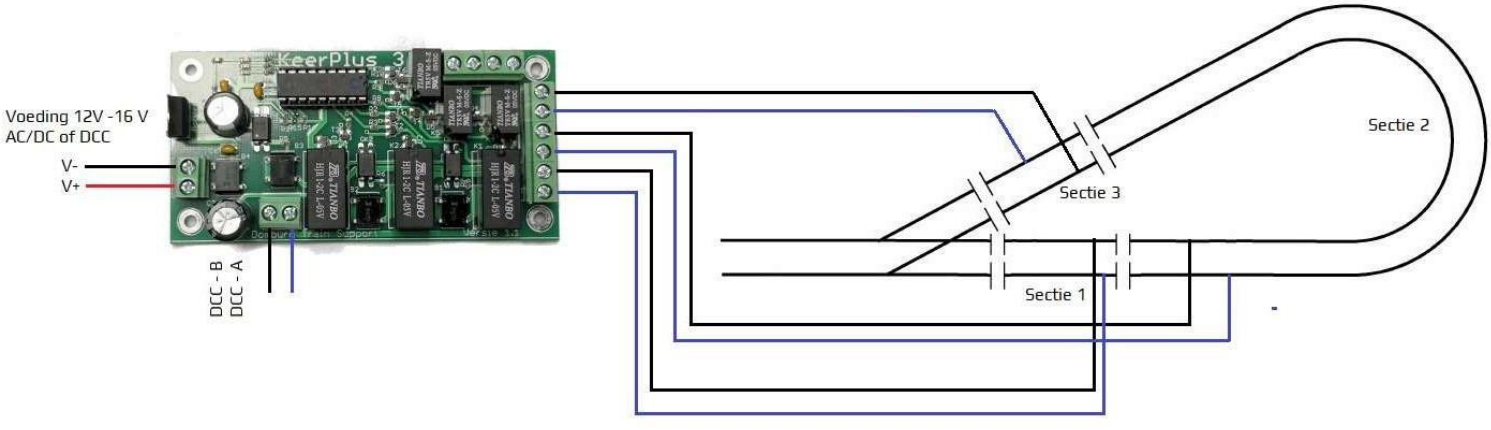
For mounting, you can use the circuit board mounting set which you can find in the web shop.

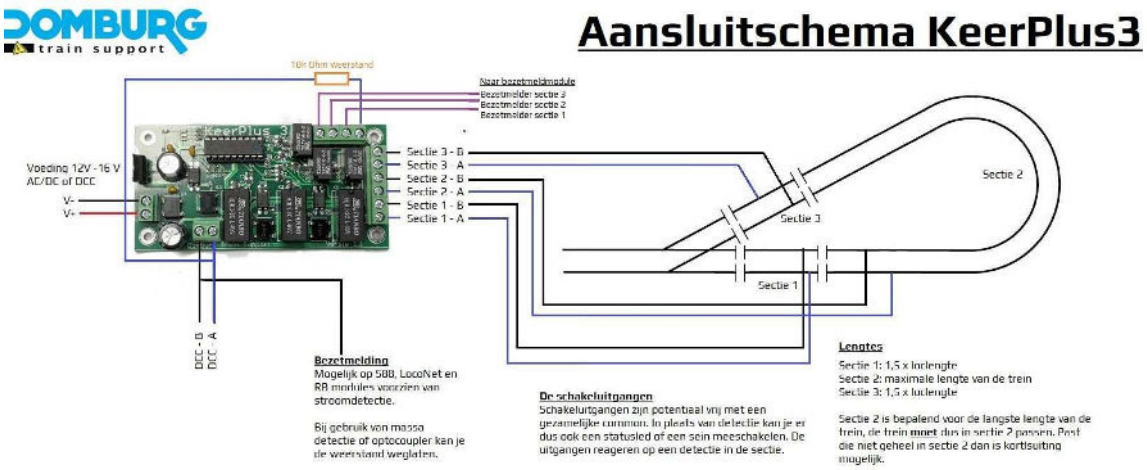
Overview KeerPlus3



1	Power supply voltage (note: always connect)
2	DCC Signal from the central unit (note: always connect)
3/4	Section 3 (S3) A/B
5/6	Section 2 (S2) A/B
7/8	Section 1 (S1) A/B
9	Switching output Common
10/11/12	Switching outputs S1/S2/S3
13	Switch position S1
14	Switch position S2
15	Switch position S3

Aansluitschema DTS KeerPlus 3





Connecting the KeerPlus3

Supply voltage

The supply voltage to be offered to the KeerPlus3 can be provided in three different ways:

1. DC voltage 12-16 VDC
2. AC voltage 12-16 VAC
3. DCC Signal

The DCC signal refers to the Track Output of the central unit. Power supply by a DC voltage supply is preferred, but as not everyone has one, it is also possible to use an AC transformer or the DCC voltage. The module is not polarity sensitive so it does not matter where you connect the plus and minus.

DCC Signal

The illustration shows the DCC input (2) to which you should connect the raw DCC voltage from your central unit. Basically, the left terminal is B and the right terminal is A. In the wiring diagram, we have given the A a blue colour and the B a black colour.

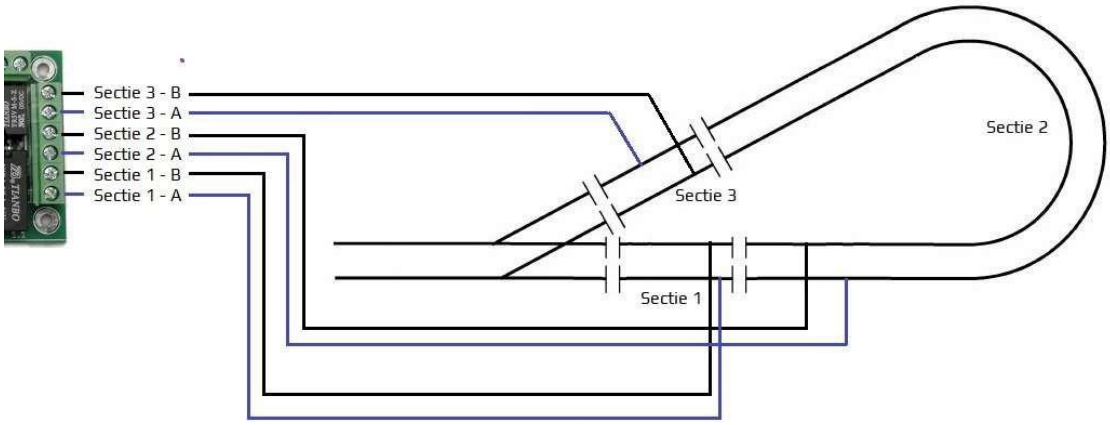
Unfortunately, the output is not the same for every central unit so you need to find out by trial and error which sequence should be applied for you. Another variable is the way you have arranged the polarity on your layout.

If, after connecting the reversing loop, you get a short circuit on your central unit as soon as a locomotive enters the reversing loop, it is an indication that you should swap the A and B connection on terminal 2 of your module.

You should always connect the DCC signal as well as the power supply! So perform both connections, otherwise the KeerPlus3 will not work.

You can also loop the DCC signal to the power input. The KeerPlus3 does not draw power from the DCC input because one has other ways to power the module.

The Turner loop



In the image above, you can see the three sections drawn with their corresponding connection to the module. In this example, you can see that the outer rail is A (blue) and the inner rail is B (black). This may also be the other way around, as long as all three sections are A on the same side and B on the same side. On the terminals, you should also maintain the A and B connection consistently. If you swap the A and B on the terminals of 1 section, you will get a closure in that section.

What is also important is that you do not mix up the order of the sections, otherwise the module will switch incorrectly.

Finally, it is important that all sections are interrupted on both sides in both rails. You can do this by using rail splices or cutting the rails. The sections should therefore not make contact with each other in both A and B. There are three LEDs on the module which indicate the polarisation status of each section. If the LED is off, the polarisation relay of that section is off and if the LED is on, the polarisation relay of that section is on and the section is re-polarised.

Switching outputs

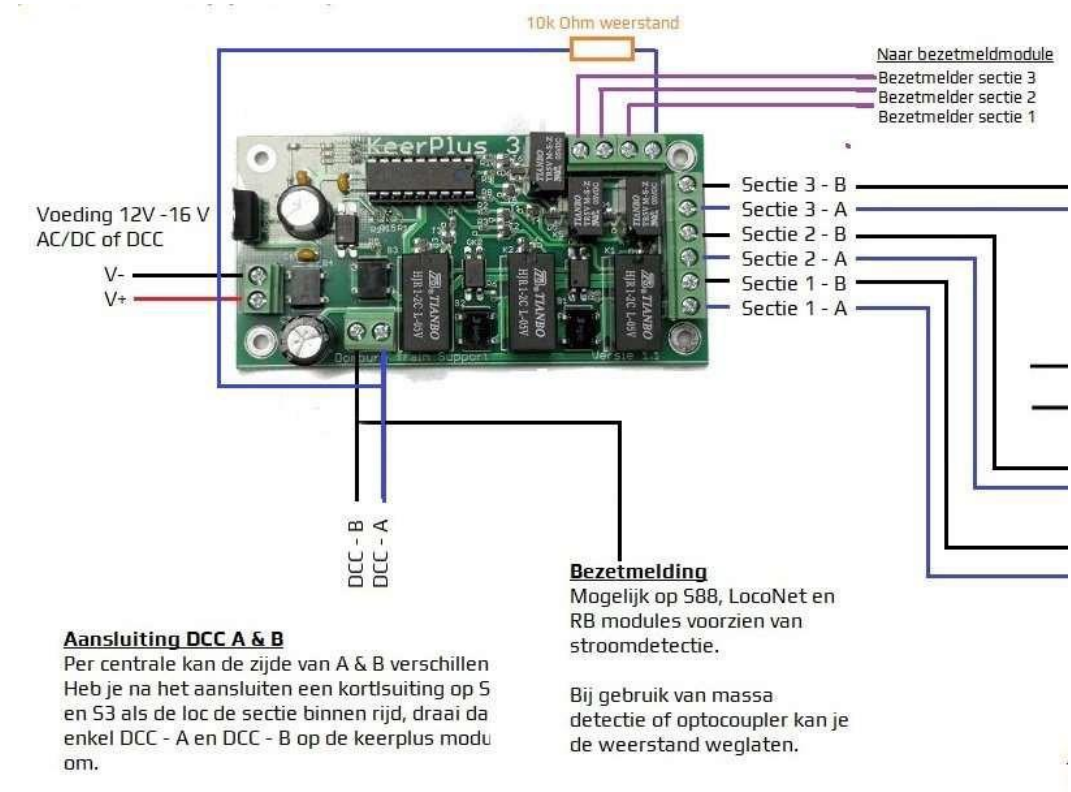
At the top are 4 screw terminals (9 to 12) which switch based on current detection. As soon as current detection is present in a section, a second relay will switch between these terminals. There are three relays in total, one for each section.

Because the contacts are potential-free, you can use them to switch all kinds of things. Think of turnouts, LEDs, signals, relays and so on. Operation is quite simple. You connect any voltage or signal, whatever suits you best, to terminal 9. As soon as section 1 is detected, this voltage will be transferred to terminal 10, in case of detection in S2 the voltage will be transferred to terminal 11 and in case of detection in S3, terminal 13 will receive the voltage from terminal 9.

Note that the relays respond to detection, if you suffer from dirt or poor contact you will hear the relay switching more often than you would expect. The explanation for this is very simple:

Detection present, relay on. Detection absent, relay off.

Occupancy notification



The switching outputs can also be used for a busy signal module for control via software.

As you can see from the bottom of the module in the picture, the black wire (DCC-B) goes to the DR4088LN busy signal module. By the way, this can be any other occupancy module on the market. This is separate from the DCC connection as written in section 3.2. It is required for the operation of the module itself.

However, what is important is that the other wire (DCC-A on the diagram) is brought to terminal 9 on the KeerPlus3. The reason it has to be the other polarity as the one you offer on the busy signal module is because in this case the busy signal module does not feed the section as normal, but only detects it.

You connect this dcc polarity to terminal 9 with a carbon resistor with the value 10 kOhm (10,000 Ohms). Only this value will generate a detection on your busy signal module. The resistor can be optionally ordered with the KeerPlus3 in our webshop. You then wire terminals 10/11/12 (S1/S2/S3 respectively) to one of the outputs on the busy signal module. Incidentally, it is not compulsory to use all 3 detectors, this does not affect the operation of the KeerPlus3 in any way. The outputs are electrically separated from the electronics on the module.

Frequently asked questions

I have connected everything, when the train enters the reversing loop I immediately get closure.

Solution: reverse the A and B on terminal 2.

The train gives a short circuit when it enters section 3 from section 2. (Or from S2 to S1)

Solution 1: You did not keep the polarity of the three section the same Solution

2: You swapped S1 and S3

I get no busy signal on the busy signal module

Solution 1: You have offered the same polarity on the KeerPlus3 terminal 9 as on the COM connection of the busy signal module

Solution 2: Your resistor has the wrong value

It gives a busy signal on S1 while the locomotive is running in S3 .

Solution: The order of the detectors on terminal 10/11/12 is incorrect

Very occasionally I get a closure when he drives one of the sections inside .

This is not always the case but it is when it happens every time at the same transition.

Solution: The chip on the KeerPlus3 has a contact problem on the base. Send the module back for warranty repair

Afterword

I have written this manual for general use. You do not have to pay for this manual and it can be downloaded from our website free of charge. If you would like to copy it for your own or club use please contact us.

I hope this manual will help you connect the KeerPlus3. If you have any comments or remarks, please let me know. I can then incorporate these into a new version. You can report them by sending an email to info@domburgtrainsupport.nl.

Thank you for reading and using this manual.

Kind regards, Martin

Domburg