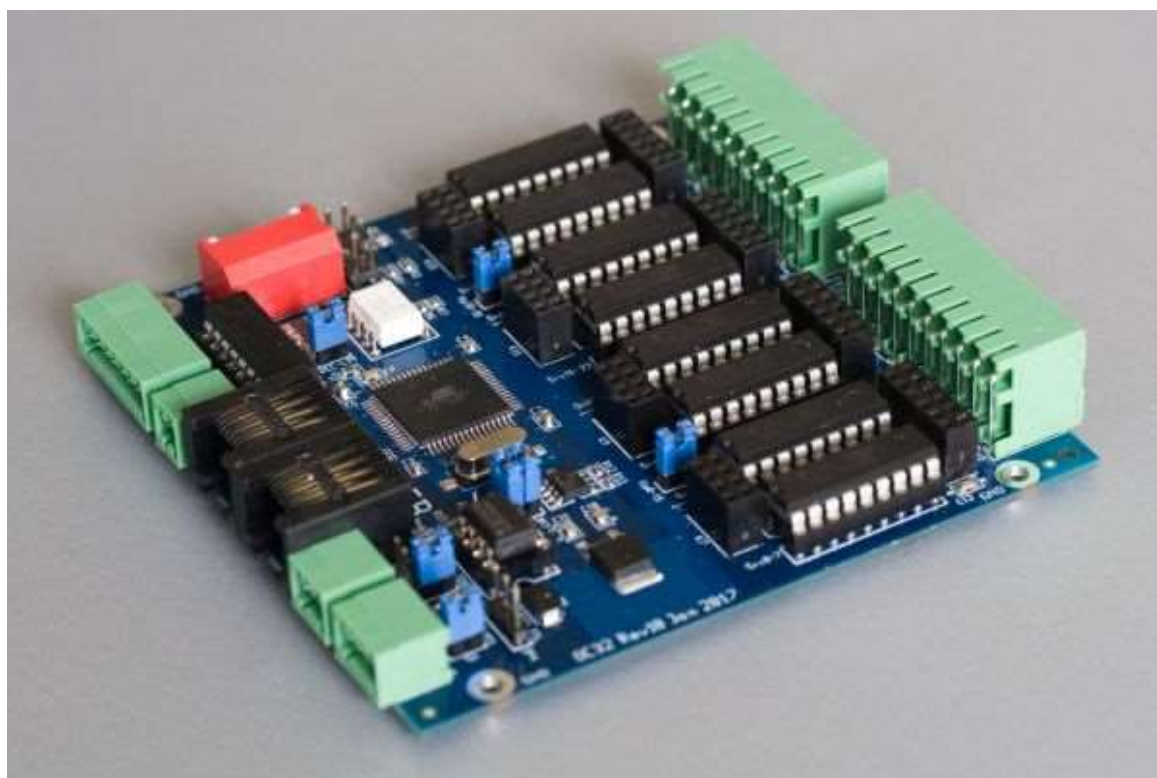


# DTS Tutorial: Installing servo control with OC32



OC32 is a product of VPEB

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## Introduction

Servos are a very popular way to control switches, signals and other moving parts on the model railroad. They are not only cheap to purchase but also many times more reliable as, for example, magnetic coils. In addition, various moving effects and speeds can also be depicted with servos. Now the servo does have one major disadvantage, they need electronics to move. These electronics give the servo a middle position, the various positions and speed. Of all available electronics available in the model railroad world, the OC32 from VPEB is by far the most versatile. Without any restriction on the freedom of movement of the servo, the OC32 provides extremely stable control of almost all brands and types of servos. It does not matter whether the servo is analogue or digital.

I will explain how to set up the Servo on the OC32 in the OC32 Tutorial “Setting up servos with the OC32” which you can download on our website: <https://domburgtrainsupport.nl/informatie/handleidingen>

In this Tutorial we will talk about connecting the servos to the OC32 correctly. If you use this method, you are assured of stable control with almost all servos available on the market.

If you have any questions or comments, you can post them by sending an email to [info@domburgtrainsupport.nl](mailto:info@domburgtrainsupport.nl)

Best regards,  
Martin Domburg

## Analogue or digital servo's

I get that question more often; it does not matter for the OC32 whether you connect an analogue servo or a digital servo to the pin. But you do notice a lot physically, I have listed some advantages and disadvantages below:

### Analogue Servo's

#### Pros

- ✓ Cheap and efficient
- ✓ Price between 1 and 5 euros
- ✓ You hear them moving

#### Cons:

- ✗ More sensitive to malfunctions
- ✗ Gears are poorer in quality
- ✗ They can loose position with a mechanical resistance
- ✗ Coarse movement, still nice and slow, but compared to digital, rather coarse

This does not mean that they are bad, with correct mounting of the servo and transmission, they will continue to function well for years. In our test set-up there are more than 160 analogue servos, in more than 6 years we have had to adjust a total of only 12 servos and 3 have been replaced because they became defective. The defects were all the Towerpro brand.

The best-functioning micro servos are the Turnigy TG9e and the Hextronics HXT900. The HXT900 is somewhat stronger than the TG9e and can better handle tough situations.

### Digital servo's

#### Pros

- ✓ Very stable
- ✓ Less sensitive to malfunctions
- ✓ Very quiet
- ✓ Finer movements
- ✓ Very suitable for special effects

#### Cons

- ✗ More expensive than analog servos starting at just under 8 euros.
- ✗ You do not hear them which is difficult during the adjustment
- ✗ Less universally applicable as analog servos that often have the same housing shape.

Digital servos have been overpriced for years for simple applications such as changing switches. However, since the beginning of 2019, servo manufacturer Turnigy has launched the TG9d. A Microservo in the same housing as its analogue brothers. And with an affordable price tag of € 7.95. From that moment the digital servos started gaining ground from the analogue servos. We have tested the Tg9d against a number of good-looking digital servos ranging between 12 and 25 euros. The Tg9d performed very well and often even better than the more expensive servos.

You can find the various servos in our webshop [www.dtswebshop.nl](http://www.dtswebshop.nl)

## Stable power supply is the key

The OC32 requires a stabilized DC voltage between 7.5v and 16v. We prefer to use switched power supplies because they have no voltage drop as soon as they are loaded, there is some sort of load control in it. These power supplies are also short-circuit protected, which is very pleasant.

The power supplies that we prefer to use at DTS are Meanwell RSP power supplies. These power supplies are also known as computer power supplies. Very stable and the best quality option.



Pay attention:

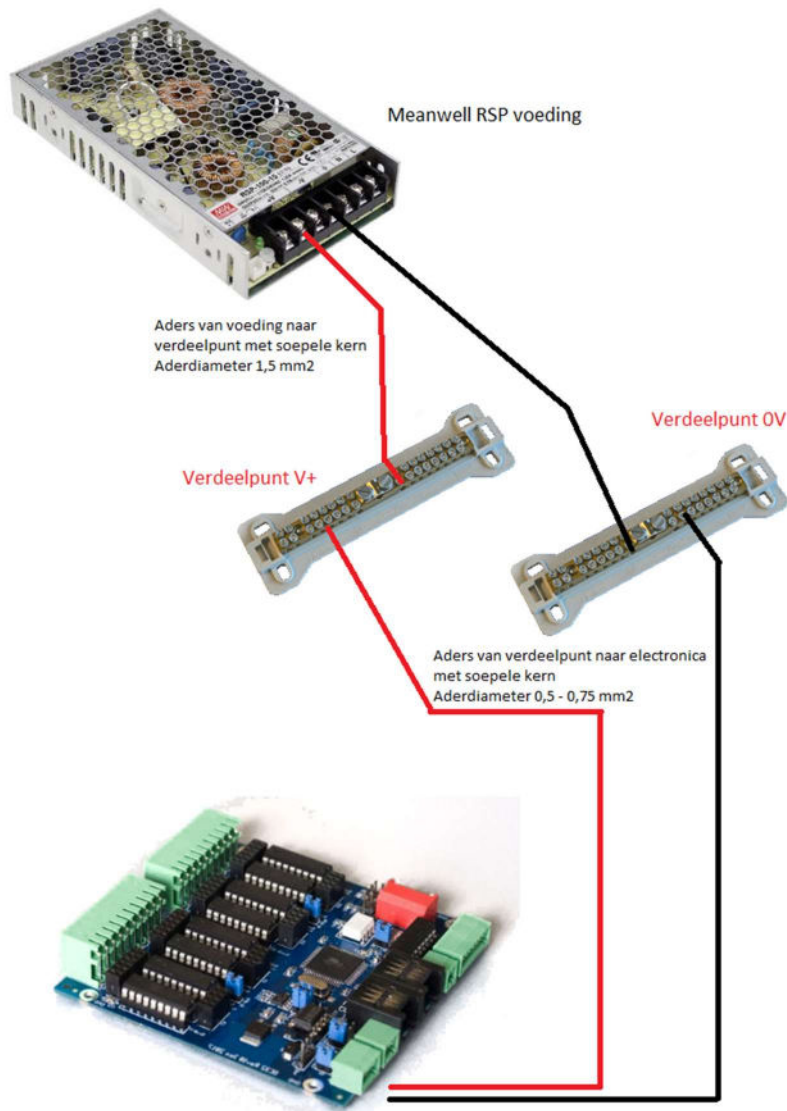
There is a lot of counterfeiting in the market, especially in the Chinese trade. A 100W Meanwell power supply costs between 40 and 45 euros. Everything that is cheaper is not a real Meanwell product but an imitation. The danger of these imitations is considerable. These power supplies do not comply with the European CE quality mark and are of much less safe quality than the real Meanwell power supplies. With a good short circuit or heavy load, the Chinese imitations can catch fire, with all its consequences.

Our advice: Take your installation seriously, ensure safe and high-quality parts. In addition to fire damage, you also greatly prevent the chance of malfunctions and problems.

We also advise not to loop through the wiring or to carry out a loop connection. The best method is to wire the power supply to a distribution point. And then feed each OC32 separately from this distribution point. This method of "star wiring" is preferred because it offers many advantages such as a more stable infrastructure, less chance of malfunctions and fire hazard. Unfortunately, the latter is common.

It is possible to use a power supply between 7.5 and 16VDC, higher is not recommended. You can very well use the standard power supply of Dinamo (15Vdc), or with many DCC drivers, a 12Vdc power supply. Our preferred voltage is a 7.5 V supply. Both the OC32 and the servos operate at a voltage of 5V. Any voltage above this voltage will be converted by the voltage regulators into energy or heat (dissipation voltage). By offering a low voltage, the electronics stay cool and you don't use up unnecessary energy. The voltage regulators also last longer than with a high voltage. It is possible that the length becomes too long for the 7.5v voltage. The Meanwell power supplies can be adjusted to 9V.

What is not drawn here, but is discussed in another chapter, is the power supply of the servos themselves. For convenience, we have separated the part after the OC32 from the part before the OC32. In this case the nutrient side of the OC32. What we advise at DTS to feed the OC32 (but also other electronics):



Meanwell RSP 100W power supply. Available in 7.5V / 12V / 15V. All three options are excellent to use.

The distribution point (verdeelpunt in the picture) is to feed everything on your model railroad.

We also recommend this method for distributing driving voltage at DCC. The central unit is then the power supply module.

The OC32 can be powered on K1, K5a and K5b. Look in the manual for how you do that!

The advantage of these distribution blocks is that you feed every module that you have on your model railroad from 1 place. It is therefore not necessary to loop through. Optionally, you can create several of these distribution points on your model railway. Then choose to feed the main distribution point from the power supply with a 2.5 mm². You can feed the sub distribution points with 1.5 mm² from the main distribution point. These diameters are aimed at the average model railway in the Z to H0 scales.

In the photo we use potential equalization blocks (earth rail). They give virtually no transition resistance and no voltage drop. They also have a large capacity. You can also use other methods such as a crown, advice is to use crown with vein protection. Wago welding clamps are also widely used.

We have found the method on the photo to be the best. Remember that when using multiple power supplies, you always must connect the 0V connection of all power supplies to each other. So that you only have one 0V line on your model railroad. This prevents potential differences and disturbances.



## Installing the servo's

To stabilize the servo on site VPEB makes the SP04r available. This print stabilizes the voltage offered to 5V, suppresses the signal and does even more tricks to keep the servos stable. This allows you to apply any brand and type of servo.



You place the SP04r as close to the servo as possible. 4 servos can be connected to the print. Do not mount the print flat on the wood but do this with spacers. The voltage regulator wants to lose its heat.

To guarantee the operation of the SP04r, we connect this SP04r with the OC32 by a cable with twisted pairs. Due to the twisted nature, the first interference signals are already filtered en route. We prefer to use a Cat5e (UTP) internet cable because it has 4 pairs of wires. Nice and easy and cheap. You can opt for a shielded Cat5 cable (ftp). But this is not very useful if you perform the assembly properly.



In addition to the four servo controls, you also must supply the voltage on the SP04r. For proper operation, it is important that the power supply is supplied from the same point as the control. Thanks to the Cat5e cable, that's no problem.

### Additional information

It is strongly recommended to use the SP04r module. Direct connection of the servo to the OC32 is permitted but can cause malfunctions and strange behaviour of the servo.

Also feeding the OC32, or directly connecting a servo to a 5V power supply sounds cheaper, you don't have to purchase the SP04r. In theory, those thoughts are correct, but the SP04r is not developed for nothing. The disadvantage of a 5V distribution is that it does not remain stable over a length of more than 1 meter. Something small needs to happen and the power drops. If electronics, and a servo, are supplied with less than 5V, this can damage the electronics.

Also do not feed an SP04r from a different point than where the control is coming from, this can also cause malfunctions. It is best to get the power supply of the SP04r from or around the OC32 that controls the servos. We often see that users bring the v + and v- of the SP04r to an external power point.

The big advantage of the SP04r is that it stabilizes the voltage that is offered on site to 5V and suppresses it. The control with an SP04r is also more reliable than without the electronics on an SP04r.

Tip: Voltage regulators require a minimum voltage of 7.2 Vdc to function properly.

### Connecting the SP04r

The Cat5e cable has 4 pairs of wires:

Pair 1: brown and white / brown

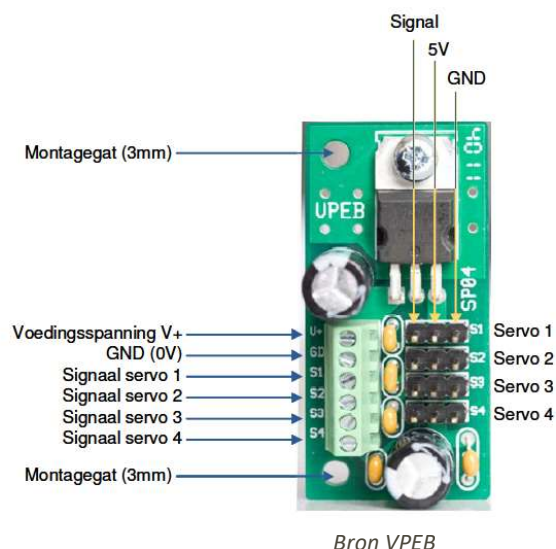
Pair 2: blue and white / Blue

Pair 3: orange and white / orange

Pair 4: green and white / green

On the SP04r side you see six connections on a screw terminal, how you connect the wires you see below in a table:

V+	Brown and white / brown
V-	Blue and white / blue
S1 (Servo 1)	Orange
S2 (Servo 2)	White / orange
S3 (Servo 3)	Green
S4 (Servo 4)	White / green



The reason that we use two conductors for v + and two conductors for v- is to make sure that the resistance of the thin conductors does not lead to too much voltage loss.

You have four pin connections on the OC32. On the one side two 10-pole plug terminals and on the other side also two of those plug terminals. Connect the Cat5e cable to this. The order of the connections looks like this:

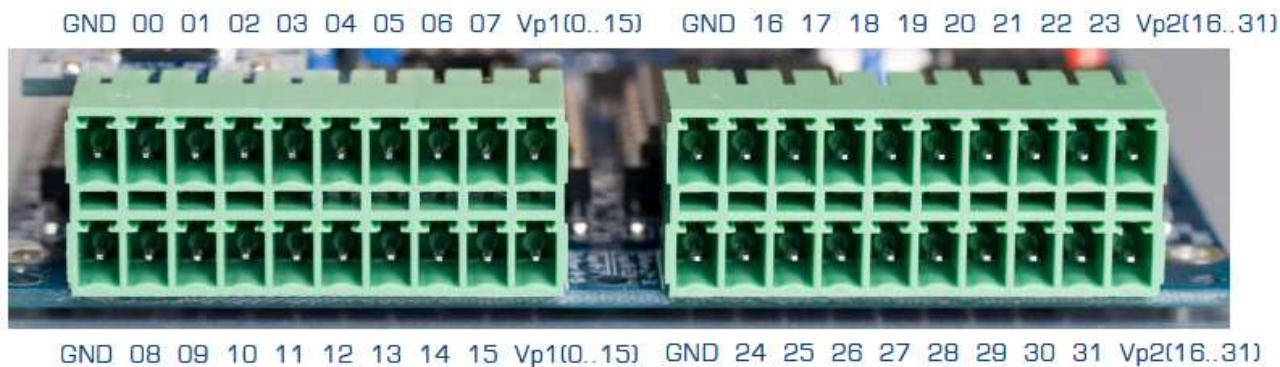


Fig 24: Pinbezetting van connectoren K5A en K5B

Bron: VPEB

As you can see, every terminal has a V + and V- (GND) connection. The two K5a connectors are powered internally from the OC32 power supply via jumper JP1. The two K5b connectors are powered internally from the OC32 power supply via jumper JP2. If you feed the OC32 with the same power that you want to feed the SP04r with, you don't have to do anything about it. If you want to feed the K5a and K5b separately to the OC32, read the manual first. You must then remove the jumpers, failure to properly follow the manual can cause serious damage to the OC32.



In our case, we feed the OC32 on K1 with a 7.5Vdc power supply. The power is supplied to the Vp and GND connections on K5a and K5b. We also assume that the servos are controlled by the first 4 pins of the OC32.

Note:

The pins that you want to use on the OC32 must have a resistance bank in the OC32. Otherwise the OC32 will never work. See also the OC32 manual for this.

**Connection on the OC32**

If we look at the cable that we have connected to the SP04r, it is connected to K5a on the OC32 side as follows

Vp	Brown and white / brown
GND	Blue and white / blue
00 (Servo 1)	Orange
01 (Servo 2)	White / orange
02 (Servo 3)	Green
04 (Servo 4)	White / green

Strip the veins well here, at least 1 centimetre!!

## FAQ

### **The servo isn't moving.**

Check if the plug of the servo is correctly placed on the SP04r. With the orange core in the direction of the screw terminals. It is also possible that the screw terminal on the terminal does not make good contact.

### **Is it allowed to extend the servo wire?**

Absolutely, you can use extension cables with impunity. For distances longer than a meter, it is advisable to use twisted extension cables.

### **None of the servo's are reacting.**

First, check whether the servos are positioned correctly on the SP04r. Then measure with a multimeter on the SP04r whether the full voltage is present on the V + and V- of the SP04r. If this is not the case, there is something wrong with the wiring. If you measure a voltage lower than 7.2V, the voltage regulator does not work properly, increase the voltage or thicken the conductors.

Do you have the full voltage on the v + and v- of the sp04r and is that above 7.2V then check whether the resistor bank is mounted properly.

### **When switching on the power, my servos are stressing!**

Then there is a good chance that the voltage due to voltage drop has become too low for the OC32 and the SP04r to function. The power supply on the furthest mounted SP04r must be above 7.2V. If this is not the case, investigate the reason for the loss in voltage. Increase the voltage to a value that gives a voltage above the threshold of 7.2V.

## Epilogue

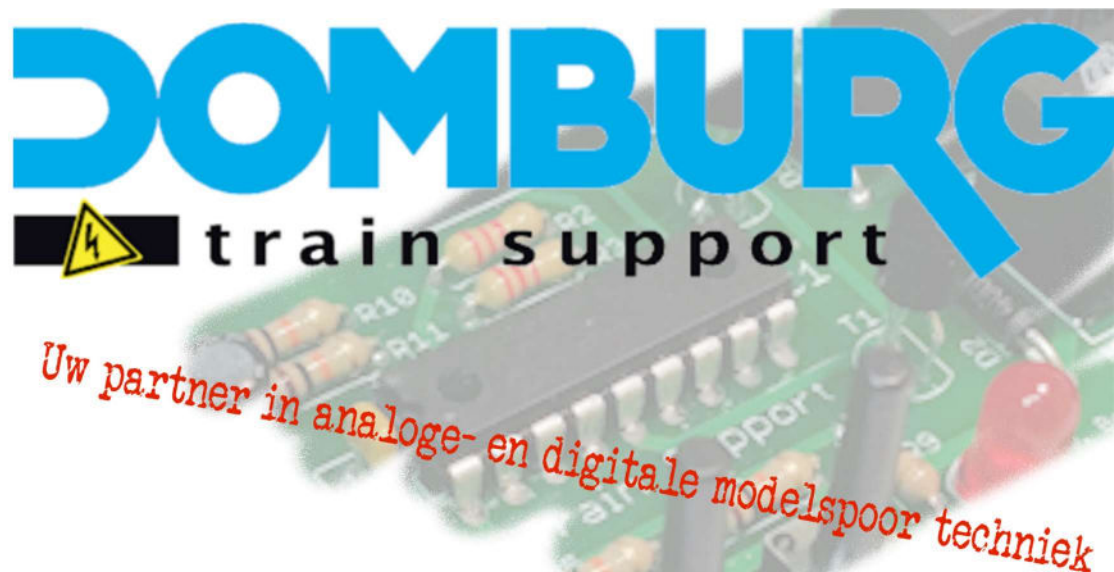
I wrote this tutorial for general personal use. You do not have to pay for this manual and it can be downloaded free of charge on our website. If you want to copy the text for private or club use, please contact us.

Domburg Train Support is an official partner of VPEB and an official reseller of the products. You can also contact Domburg Train Support for advice, support and help at home or via TeamViewer. If this manual does not work with the OC32, please contact us via our website. We have used the photos of the OC32 and SP04r from the VPEB archive.

I hope this tutorial will help you connect the OC32 in combination with servos. If you have any comments or remarks, please let me know. I can then process this in a new version. You can report this by sending an email to [info@domburgtrainsupport.nl](mailto:info@domburgtrainsupport.nl)

Thank you for reading and using this manual.

Sincerely,  
Martin Domburg



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