

# NT Head

## User Manual



Valid for:

NT Head / Nic-O-Tilt Head

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1

Dear customer,

Thank you for purchasing the NT Head from Black Forest Motion. As our customer, you receive our highest attention and we are always there for you, if you have questions or suggestions to our products.

In order to make it as easy as possible for you to start using our product, please read this user manual carefully and familiarize yourself with its safe and efficient operation.

Keep this user manual in a safe place so that it can be accessed at any time if necessary.

The current user manual is also always available for download from our website:

<https://www.blackforestmotion.com/support>

### **Company Address:**

Black Forest Motion GmbH  
Waldstraße 2  
D-78136 Schonach im Schwarzwald  
Tel.: +49 (0) 7722 920203  
E-Mail: [info@blackforestmotion.com](mailto:info@blackforestmotion.com)  
<https://blackforestmotion.com>

Register Court: County Court Freiburg im Breisgau

Register Number: HRB 717974  
CEO: Moritz Huber, Patrick Ketterer

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## 1. Usage of this Manual

This manual serves as a help and reference document for the end user of the Black Forest Motion NT Head. Read this manual thoroughly to familiarize yourself with the function of the device.

In this manual different info fields are used to clarify important points for the reader. These are listed below.

### Important Note



This is an important hint. Please observe it to avoid unexpected behavior of the device.

### Tip



This is a useful tip that will be helpful when using the device.

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## 2. Preface

This work is protected by copyright. The rights based thereby, in particular those of the translation, the reprint, the lecture, the removal of illustrations or tables, the radio transmission, the microfilming or the duplication on other ways and the storage in data processing plants, remain reserved, also with only partial utilization.

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### 3. Introduction

The NT Head (formerly known as Nic-O-Tilt) is a 2-axis pan & tilt head designed for the automated creation of Time-Lapse, camera motions, Giga-pixel panoramas and 360-degree photos.

The device was developed by Nico Engel and is now manufactured and distributed by Black Forest Motion in Germany.

The NT Head consists of two identical motor units. This also makes it possible to use them as single axes. Both motor units can be connected to a complete Pan & Tilt Head via standard Arca-Swiss rails. Additional rails also allow for nodal point alignment of the camera.

Each motor unit contains standard Arca-Swiss profiles which are milled directly into the housing. This allows a very simple and flexible mounting to sliders or tripods. In addition, each unit contains a knurled screw which sits directly on the stepper motor shaft. This allows the turntable plate to be moved manually without the use of a controller. Direct movement of the turntable plate is not possible due to the internal worm gear.

As motor connectors, the units offer high quality and lockable Hirose connectors. They allow the motor units to be connected to the PINE controller via our high-quality connection cables.

In addition, each motor unit contains an integrated water level, with which the unit can be easily aligned. The unit can be mounted via integrated 1/4" and 3/8" threads.



## 4. Safety Instructions

- a) The NT Head is operated at your own risk. The user is liable for damage to property and personal injury resulting from the operation of the NT Head.
- b) The NT Head is designed for indoor use. When using the NT Head in damp rooms and outdoors, appropriate safety regulations must be observed, especially with mains operation.
- c) When operating outdoors, the user is required to provide adequate weather protection.
- d) The NT Head has no end stops for the end positions of the camera positions. To avoid damage, do not operate the unit unattended.
- e) Do not attempt to move the rotary plate of the motor units by hand. The units contain self-blocking worm gears which prevent direct movement. Always use the side-mounted knurled screws to move the turntable plates without a connected controller.
- f) Do not overload the units and try to align a mounted camera at the center of gravity, otherwise the internal gears may be overloaded and damaged.
- g) It is recommended to disassemble a mounted camera after using the NT Head to reduce the load on the motor axes.



By affixing the CE mark, we declare that our device, in accordance with EU Regulation 765/2008, meets the applicable requirements laid down in the Community harmonization legislation on its affixing.

## 5. Technical Specifications

Operating Temperature	-20° to +45°
Storage Temperature	-30° to +60°
Humidity	10%-90% non-condensing
Connectors	Hirose HR10A-7R-4R(73) 4-pin Male
Rail-Profile Standard	Arca-Swiss
Mounting Options	2x 1/4" and 3/8" Thread per Motor Unit
Motor Type	Bipolar Stepper Motor NEMA17
Max. Motor Current	1.6A
Gear Type	Worm Gear
Gear Ratio	1:32
Minimal Step Angle	0.001758 Degree (with PINE Controller)
Max. Payload	3.0 kg (more with optimal payload balancing)
Dimensions	
- Single Axis	L/W/H: ~12 x 9 x 7 cm
- Pan & Tilt	L/W/H: ~20 x 9 x 22 cm
- Pan & Tilt with Nodal Adapter	L/W/H: ~20 x 9 x 30 cm
Weight	
- Single Axis	~1.0 kg
- Pan & Tilt	~2.2 kg
- Pan & Tilt with Nodal Adapter	~2.5 kg



## 6. Setup and Mounting

Connect all units as shown in the picture below. Make sure that all fixing screws are properly tightened before putting the unit into operation.



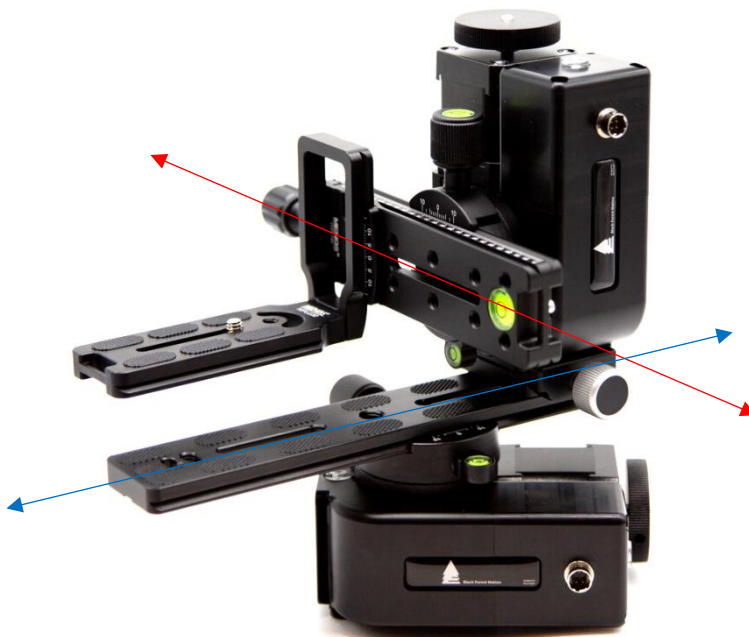
The integrated Arca-Swiss profiles can be used for mounting to sliders and tripods. Alternatively, the 1/4" and 3/8" threads can also be used.

## 7. Mounting of the Camera

First attach your camera to the supplied L-Rail (see picture below). Use the 1/4" thread on the bottom of your camera.



Then attach the L-Rail with the camera mounted to the NT Head. Move the Arca rail as shown below (in red) to center your camera in the center of gravity. Additionally move the lower Arca rail to align your camera with the pivot point of the pan axis (marked in blue).



Always align the camera so that its weight is evenly distributed along the tilt axis. This is the only way to ensure that you use the camera optimally (the built-in motors can move the weight) and that no damage occurs to the gearbox.



Alternatively, you can mount the L-angle directly to the tilt axis without the additional Arca rail. Note, however, that this will place a greater load on the motor axis, especially with heavy lenses, and the motor may have difficulty moving the camera.



## 8. Nodal-Point Adapter

Alignment of the camera to its nodal point is required for Giga-Pixel and 360-degree shots. With the optional Nodal Point Adapter rails, you can convert the NT Head to make this possible.

Mount the Nodal Point Adapter as shown in the picture below.



## 9. Connecting to the Motion Controller

Use our available motor cables (Hirose 6-pin Male to Hirose 4-pin Female) to connect the motor connectors of the NT Head with the PINE Controller.

Information about the operation of the PINE Controller can be found in our separate manual for PINE.



## 10. Mounting of the Controller

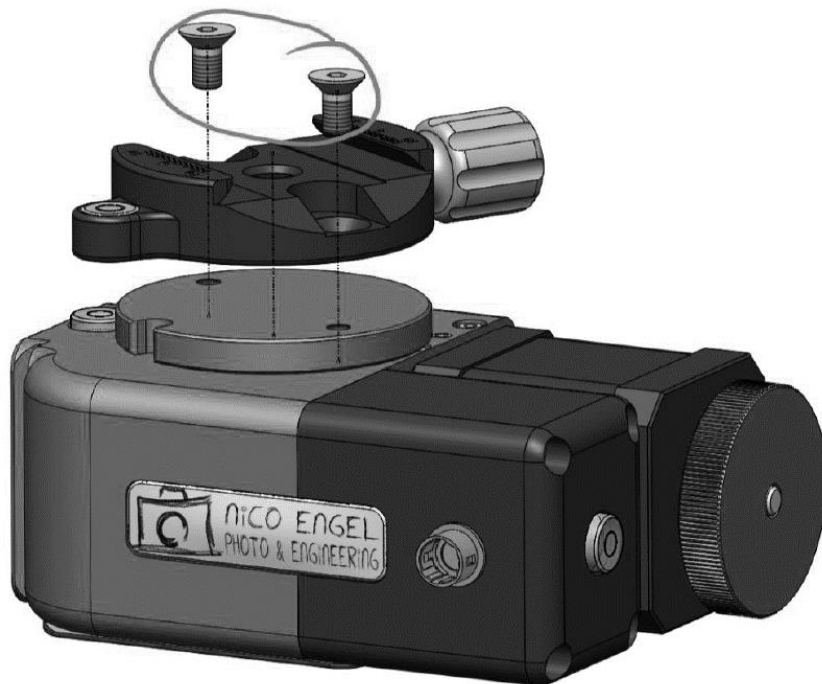
You can attach the PINE Controller to the side of the NT Head using the available Mounting Plate. The built-in magnets will hold it in place without screws.



## 11. Adjusting the Preload of the Worm Gearbox

After the running-in phase or prolonged use of the NT Head, the play in the gearbox may increase. This cannot be avoided mechanically. The following steps are necessary to reduce this play:

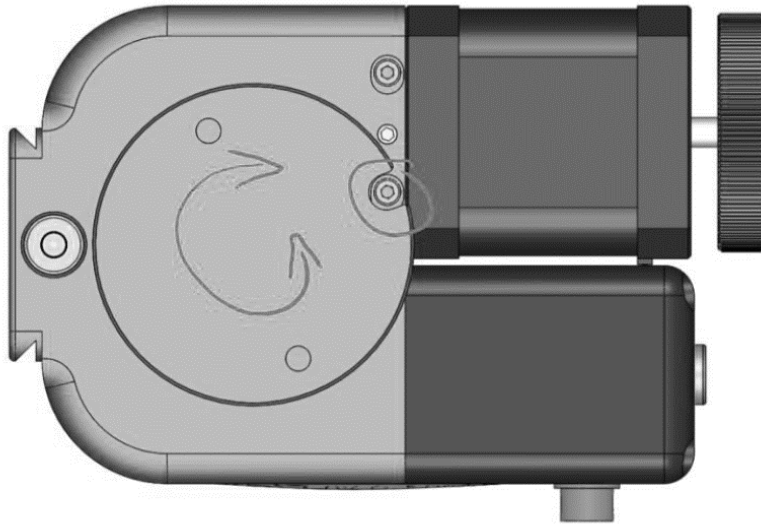
1. Remove the camera angle or extension bar from the turntable.
2. Remove two countersunk screws DIN 7991 - M5x10 (picture 1)



Picture 1

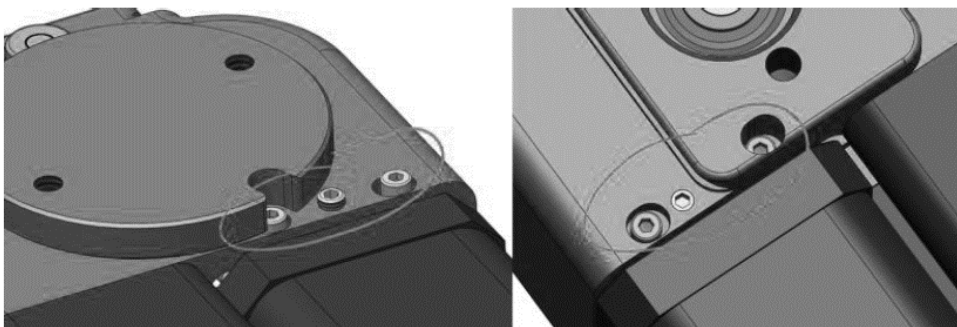


3. Turn the turntable by hand until the clearance of the cheese head screw can be seen (picture 2).



Picture 2

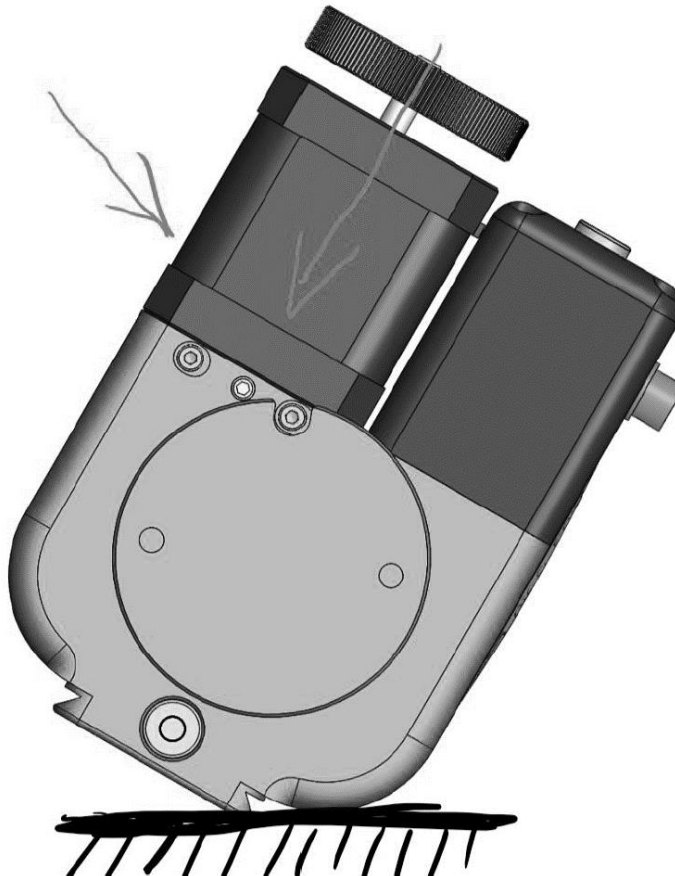
4. Loosen, but do not completely unscrew, all the fastening elements of the motor unit:
  - Four cylinder cap screws DIN 912 - M2.5x6 (picture 3)
  - Two grub screws DIN 916 - M4x4 (picture 3)



Picture 3

5. Press the motor by hand in the direction of the turntable and towards the cover and tighten the two upper cylinder cap screws lightly (hand-tight) on the motor with continued pressure exerted.

**Tip:** Place the NT Head on a suitable surface as sketched and press the motor with one hand (picture 4).



Picture 4

6. Tighten the two lower cylinder cap screws slightly (hand-tight). Force no longer has to be exerted.



7. Now slowly screw in the side grub screw DIN 916 - M4x10 (Fig. 5) to increase the preload.



Picture 5

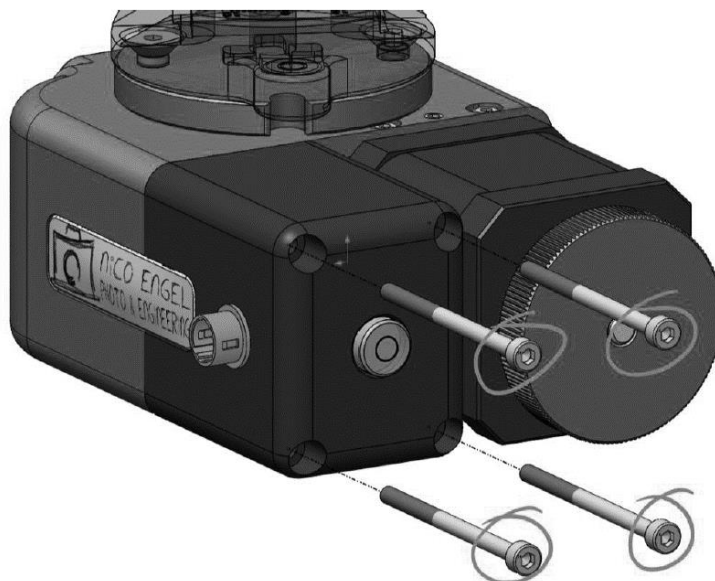
8. Turn the handwheel when turning it in and check that it moves smoothly, do not tighten too much! If too much force is applied, the stepper motor becomes jammed and no longer rotates (strong humming/vibrating).
9. Try to turn the turntable by hand to see if the play is gone. If there is any play, this can be felt quite easily, as the turntable can be turned without noticeable effort (wobbles a few degrees back and forth). If a lot of force is applied, the turntable will twist slightly but swing back again (like a spring). This is due to the plastic gears, which are not infinitely stable and can transmit a large force to the small shaft via the lever.
10. When the play is gone, tighten the four cylinder cap screws (picture 2) to a maximum of 0.5Nm.
11. To secure the position, tighten the two grub screws (picture 2) to a maximum of 2.0Nm.
12. Mount the countersunk screws (figure 1) again and tighten to a maximum of 4.0Nm.

## 12. Troubleshooting: Too much Play on the Turntable

If, under any circumstances, grub screws on the turntable should come loose, you will notice a rather large play on the turntable if it can be turned several degrees without much effort, noticeably more than if there is a pure backlash (see point 5 under chapter 11 of this manual).

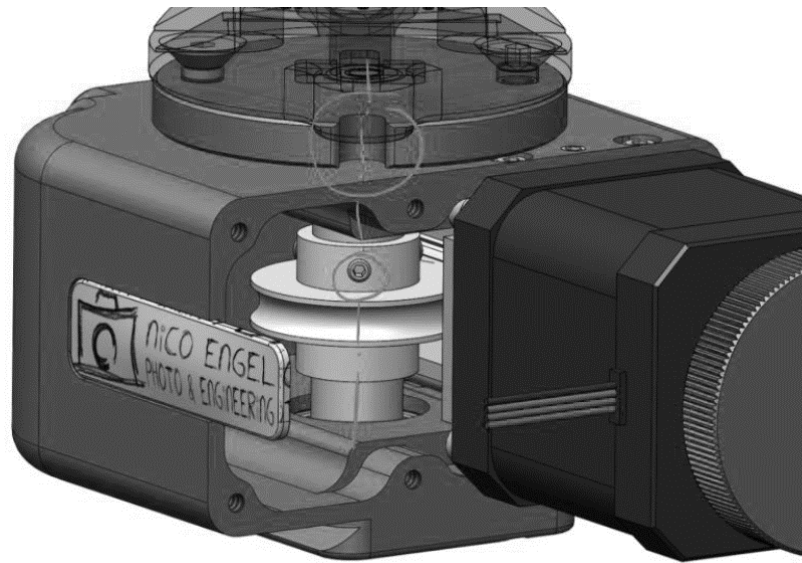
To eliminate this, the following steps are necessary:

1. Loosen four DIN 912 - M3x45 cylinder head screws (picture 6) on the engine cover.



Picture 6

2. Tilt the motor cover in the direction of the attached logo.
3. Carefully remove the logos from the motor cover (still sticks sufficiently well afterwards).
4. Looking inwards, the worm wheel (picture 7) becomes visible on the turntable.



Picture 7

5. Three grub screws DIN 916 - M3x5 are attached to the circumference, each distributed at 120°.
6. Three key surfaces are also milled on the turntable shaft, distributed at 120°. One of them points exactly in the direction of the clearance on the top of the turntable (picture 7).
7. Align the worm wheel with a grub screw and tighten it hand-tight.
8. Turn the motor further with the handwheel and hand-tighten the next two grub screws.

## 13. Troubleshooting and FAQs

### My connected motors are not rotating but make some noise

There are probably wrong motor profiles selected which results in the motor not receiving enough output current.

Make sure you select the "NT Head" Profiles in the Motor Quick Setup Window or under the Motor Settings.

The Controller outputs a default current of 0.4A. This is also the current the Default Profile in the App outputs. You either have to go to the Motor Settings and increase the motor current, or select a proper profile, which will set a usable output current for the selected device. The NT Head requires an output current of 1.0A

### The NT Head cannot lift/tilt my Camera

You can try setting a higher motor current for the tilt axis. You can go up to 1.2A under the Motor Settings section of the PINE Motion App.

Also, make sure to have your camera mounted to the Tilt axis so it is balanced and the weight on either side of the axis is roughly the same. Especially when using a heavy lens, a balanced setup is crucial and important. Otherwise you can damage the motor units.

In some cases, it can be possible that you need to recalibrate the motor units. You will find instructions for this in the NT Head user manual in our support section.

There are 2 test you can do to find out if you need to recalibrate the motors:

1. Units have a lot of play -> needs calibration
2. When you rotate the knurl screws, the stepper motor rotates heavy at some locations and lighter on other locations -> needs calibration

## The Motor Units have too much Play

This can be normal under heavy loads and extended use (especially for the Tilt axis) but can be corrected by the user. Please have a look in our NT Head user manual in our support section where you find instructions on how to recalibrate your units.

Instructions on how to correct the play and recalibrate the motor units are found in chapter 11 and 12 of this manual.

Always handle the NT Head with care. It is built sturdy, however, when you have additional rails connected to it, it is very easy to put a lot of stress to the internal gears when you pull or push at the end of the rails.

Never try to rotate the axes by hand. This will damage the internal worm-gears. Always use the knurl screws at the side of the unit which are connected directly to the stepper motor when you need to rotate the axes.

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