NOTE: THIS MODEL (SPH-1) HAS BEEN DISCONTINUED AND ALL WARRANTIES HAVE EXPIRED.
WE ARE NO LONGER ABLE TO OFFER SUPPORT OR REPLACEMENT PARTS.

Nodal Ninja SPH-1 User Manual

Nodal Ninja SPH-1 is a professional spherical bracket (360 degree pano bracket) for taking panoramic still images or virtual tours. It supports cameras with tripod mount under the lens axis such as SLR and DSLR and also most cameras with tripod mount off the lens axis such as most consumer / prosumer cameras in the current market.

It has all the import features to allow you to rotate your camera about the entrance pupil position (commonly mistaken as the nodal point) of the lens. These include horizontal adjustment, axial adjustment (along the lens axis) and adjustment for off-axial tripod mount.

Warranty

All Nodal Ninja comes with one year of warranty. We guarantee every unit we shipped has been thoroughly tested to offer full functionality. Any part broken in this period will be repaired or replaced free of charge. However, this warranty does not cover any accidental damage. In any case, replacement parts can be ordered at minimal cost.

Specifications

The following specifications will determine whether Nodal Ninja SPH-1 is compatible with your camera or not. In case your camera is incompatible, a special adapter may be made to extend the compatibility. Contact us for details.

Max loading:	3kg for tripod mount 9 cm away from entrance pupil position, i.e., a torque of 27N/cm. Notice that this value is obtained indoor. External factors such as winds may reduce the stability. Long lens may reduce stability. If the center of mass of the camera is far away from tripod mount, stability will be impaired. You need a heavy rigid tripod for good stability.

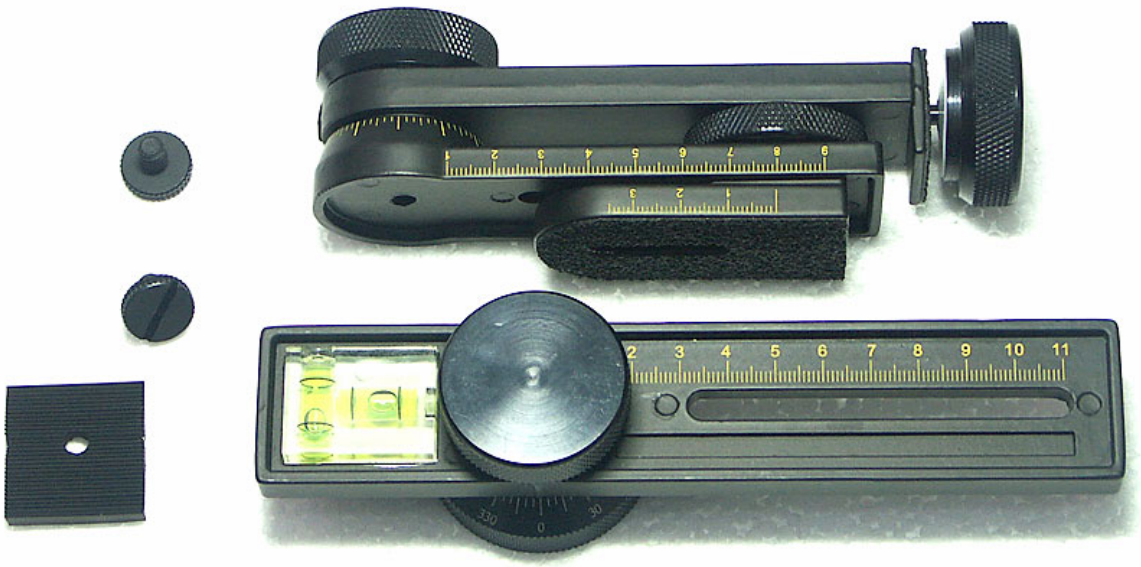
Horizontal adjustment*:	1.4cm – 7.4cm from entrance pupil position, with off-axial adapter plate. 2.0cm – 8.0cm from entrance pupil position, with EPDM polymer adapter plate.
Axial Adjustment**:	0.5cm – 12.0cm from entrance pupil position, with off-axial adapter and cameras with tripod mount under the lens axis 3.9cm – 8.5cm from entrance pupil position, with off-axial adapter and cameras with tripod mount off the lens axis 3.9cm – 9.0cm from entrance pupil position, with EPDM polymer adapter plate and cameras with tripod mount under the lens axis.
Off-axial Adjustment:	1.3cm – 3.7cm away from the lens axis.
Vertical Headroom***:	9.6cm vertical clearance from entrance pupil position.

*This value corresponds to the height of your camera-lens combination from the camera base to the lens axis. The maximum value of the horizontal adjustment will be extended by 0.5cm with future modified parts.

**This value corresponds to the distance of your tripod mount away from the entrance pupil position. The minimum value of the axial adjustment will be reduced from 3.9cm to 2.8cm with future modified parts for cameras with tripod mount off the lens axis or when the EPDM adapter is used.

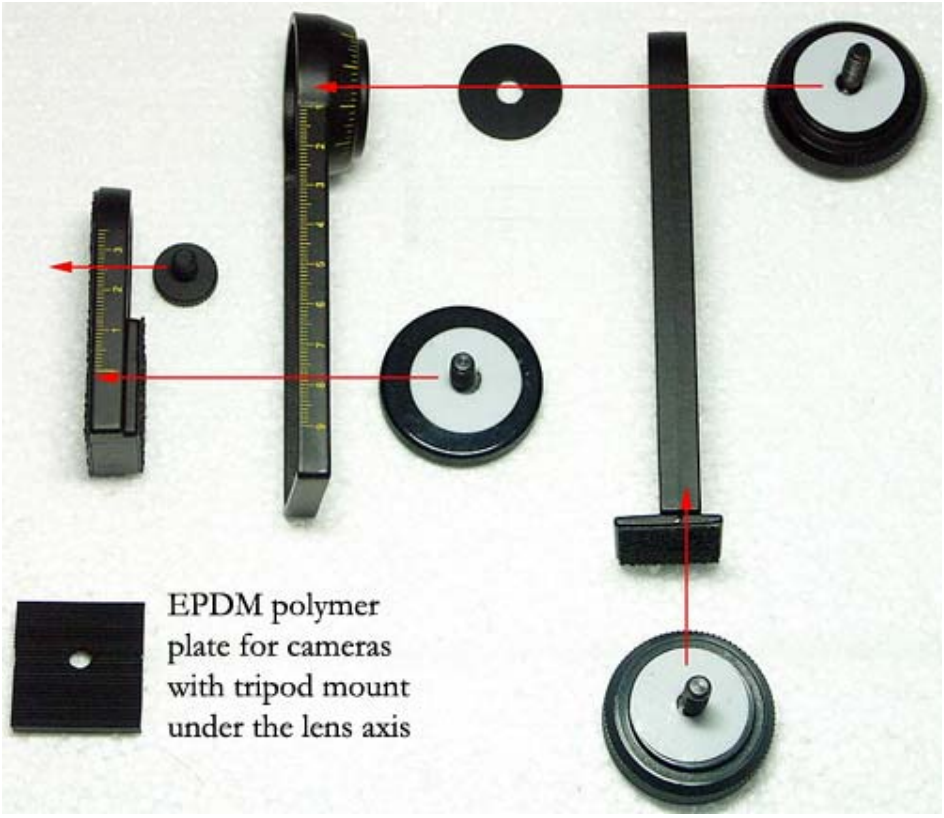
***This value limits the maximum size of the camera to be mounted on the bracket. For certain camera-lens combinations, there may not be enough clearance for the lens to point straight upwards or downwards. This will limit the vertical field of view of your final panoramic images and prevent you from getting a full 360 degree spherical image or virtual tour. The actual effect of this limitation depends on the size of your camera-lens, the field of view of your lens and hence the focal length in use and also the entrance pupil position. Other factors being constant, the wider the field of view of the lens, the less the problem is. But typically, you can get a vertical field of view exceeding 150 degree in the final panoramic image.

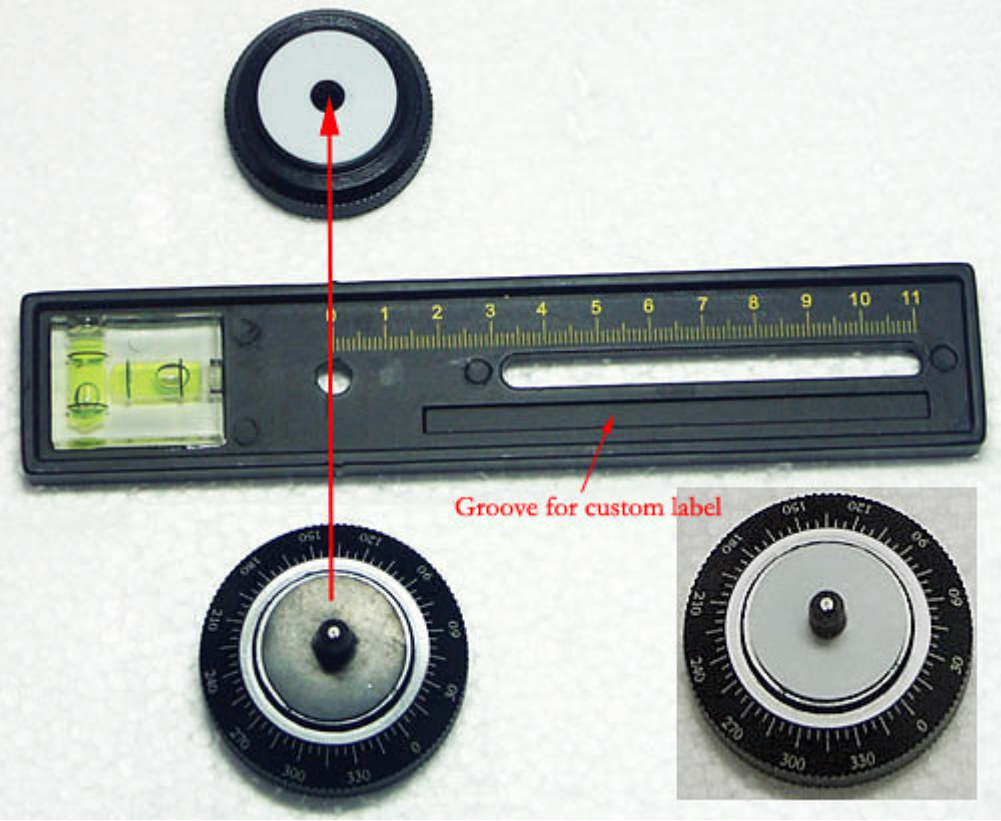
The package



Nodal Ninja is shipped in a semi-assembled form as in the picture above. It includes 2 tightening bolts, one EPDM polymer adapter for cameras with tripod mount under the lens axis and other two pre-assembled units.

Parts in details





The pictures above show all the parts before assembly. The red arrows show the order of assembly. Every tightening knob has a Teflon spacer (white rings) to reduce friction and to protect the paint of the bracket. Between horizontal and vertical turntables are rubber gaskets (black rings) to increase friction and prevent unwanted rotation. Two Teflon spacers are supplied for the horizontal turntable. In case, you want to rotate the horizontal arm without loosening and tightening the knob every time, you can place one of the Teflon spacer between the rubber gasket and the horizontal arm, so that the horizontal arm is sandwiched by 2 Teflon spacers. This reduces the friction. By adjusting the tightening knob above, you can create an adjustable tension around the horizontal turntable. So you can rotate the horizontal arm smoothly while still getting enough tension to hold the bracket steadily. Note that you MUST rotate in CLOCKWISE manner; otherwise, the tightening knob will be loosened by the friction. And the whole assembly may fall down!

EPDM polymer is a high quality and durable rubber. The EPDM adapter plate allows you to mount your camera (with tripod mount under the lens axis) directly to the vertical rotator arm without using the off-axial adapter. This gives you extra convenience without the hassle to lock your camera to the off-axial adapter first. However, the off-axial adapter is important to extend the range of axial adjustment and it is a must for off-axial tripod mount.

The off-axial adapter is covered with a high quality rubberized slip-resistant material. This protects your camera from scratches and keeps it in proper position. Other sliding/ movable parts are also covered with the same material.

Along each adjustment is laser engraved scale in 1 mm interval just like a standard ruler. The grooves of the scales are filled with water resistant paint to increase clarity. For the axial and off-axial adjustments, scales are engraved on both sides of the arm or plate. On the end of

the off-axial adapter, there is a mark to indicate the mid-point of the adapter, and hence the position of the tripod mount.

The horizontal turntable is engraved with marks in 5 degrees intervals, with long marks at each 15 degree interval. Numerical values from 0 – 330 degrees are engraved in 30 degree intervals in an anti-clockwise manner. Similar marks are also found on the vertical turntable. But numerical values are not available.

There is also a groove on the horizontal rotator arm for you to stick a custom label for your particular cameras, with and without vertical grip. So you don't have to memorize the numerical values for the horizontal adjustments. You can also put your name or any other details on the label.

Installation

Installation is very easy as there are just a few parts and they come in semi-assembled form. What you need to do is determine some dimensional constants of your camera-lens combination, such as the entrance pupil position, height from base to the lens axis and the tripod mount off-set distance. All these will determine the values of various adjustment of the bracket.

Horizontal Adjustment

For this you need to determine the height of your camera-lens combination from base of camera to the lens axis.

where height = $h_1 + 1/2\ \Phi$

Then you record this value so that you don't have to do it again. For a Dimage 7, the height is 45 mm. For Dimage A1, it is 32.5mm without BP-400 and 77mm with BP-400. For E20, it is 35.5mm without the vertical grip.

Now, you look at the scale on the horizontal adjustment. For example, the picture below shows a value of 8.0 cm or 80mm from the center of the horizontal turntable, i.e., the horizontal position of the entrance pupil. However, this value does not correspond directly to the height

measured above. **You need to add to the height 9.5mm if you use the EPDM adapter plate and 15.5mm if you use the off-axial adapter.**

So, for a Dimage 7, you slide the vertical arm to 60.5mm because you must use the off-axial adapter for it. For an E20, you slide it to 51mm if you use the off-axial adapter or to 45mm if you use the EPDM adapter plate.

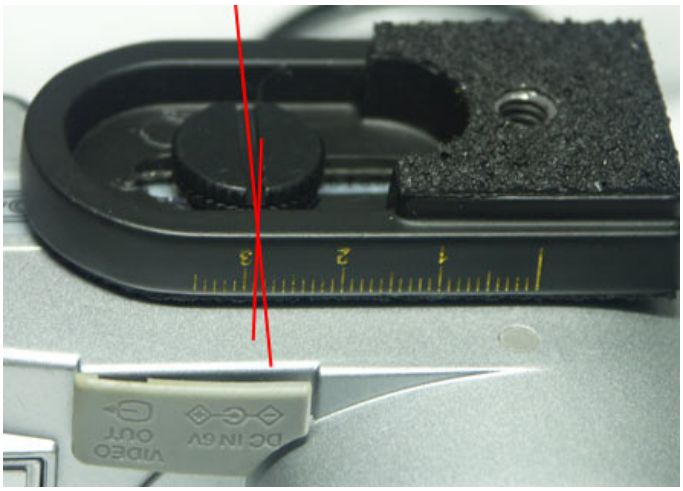
Off-axial Adjustment

If your camera has a tripod mount off the lens axis, you need to use the off-axial adapter. But before you use it, you need to determine the amount of off-set.

Using the Dimage 7 as an example, first, you need to determine the lens axis. This can sometimes be difficult. But most of time, there are reference point that lies on the lens axis. For example, the 2 screws under the lens of Dimage 7 lie exactly on the lens axis. Try to find some similar reference points on other cameras. If there is none, draw a line (with pencil) that bisects the lens as accurately as possible. Then measure the distance from the center of tripod socket to

this line (the lens axis). On a Dimage 7 the off-set is 29mm. The same value is true for Dimage 5 and other cameras in the 7 series.

After you determined the off-set, you can mount your camera to the off-axial adapter.



First fully tighten the bolt and then loosen it until slot of the bolt is perpendicular to the rim of the adapter. Try to position the adapter so that its rim is perpendicular to the lens axis. Try to find lines on the camera as references. Usually the front side and / or the rear side of the camera is perpendicular to the lens axis. In this case, you place the adapter parallel to this side. Then you slide the adapter until the center of the bolt has the desired amount of off-set, i.e. 29mm on a Dimage 7. You may need a ruler or any straight object to help you access the accuracy of the positioning. Finally, you tighten the bolt fully. You may need a coin for this. At this stage, you probably want to mark the position of the bolt to save your effort next time.

Use a marker or even a sharp object to scratch the paint if you want the mark to stay forever.

After you mount the adapter to the camera, you can now mount the camera to the vertical rotator arm, where you do the axial adjustment.

Note that the off-axial adapter can correct tripod mount from either side of the lens axis.

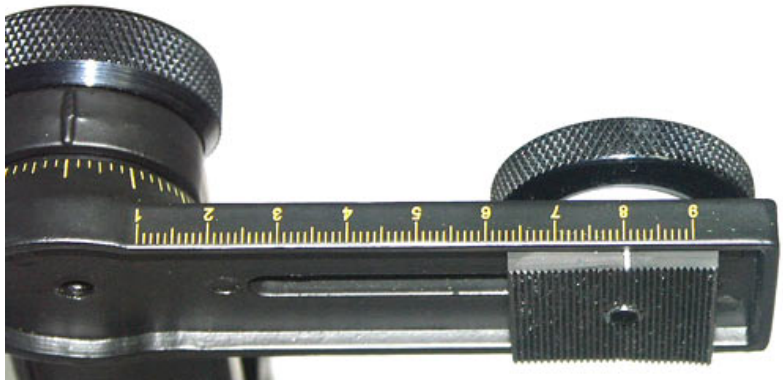
Axial Adjustment for Cameras with Tripod Mount off the Lens Axis

After you have corrected the tripod mount off-set. You need to determine the axial adjustment, i.e., the distance from the tripod mount to the entrance pupil position. You can find the values for most camera-lens combination on the internet. If the value is not available, you have to determine it yourself. There are various tutorials on this subject across the internet. But most of time, the entrance pupil position is mistakenly referred as the nodal point. So you would like to search for "nodal point determination" or something like that. You can also read my tutorial "Locating the Entrance Pupil—a systematic approach" at the end of this manual. This new approach is particularly easy to use for digital cameras with a live video out function.

Assuming you know the entrance pupil position, e.g., 41mm in front of tripod mount for Dimage 7 series at 28mm focal length, what you need to do is mount the camera onto the vertical rotator arm through the off-axial adapter. There is a mark at the back of the off-axial adapter which corresponds to the center of the tripod mount. So you slide the adapter to 41mm by reading the scale on the vertical rotator arm. Check that the surfaces of the adapter and the vertical rotator arm are parallel before you fully tightened the knob. You can mount your camera with the handle up or down (if your camera is not too bulky), as there are scales on both sides of the vertical rotator arm. Mounting the camera with handle down helps to lower the center of mass and hence increase stability. Now, you are ready to take as many panoramas as you like. But before you fire the first shot. You should level the whole assembly first. Adjust your tripod head until the bubbles in the spirit level remain at the center. The spirit level in the bracket has been calibrated against engineering grade spirit level during assembling.

Axial Adjustment for Cameras with Tripod Mount under the Lens Axis

If your camera has a tripod mount at correct position, i.e., under the lens axis, you can simply use the EPDM adapter if you tripod mount lies within the range of axial adjustment. Note that the horizontal adjustment is affected by the choice of the adapter in use.



On the adapter, there are white marks that correspond to the center of tripod mount. So you simply mount your camera on it and adjust its position so that the white mark corresponds to the distance of the tripod mount from the entrance pupil position.

Check that the lens axis is parallel to the vertical rotator arm then tighten the knob. Check if the whole assembly is leveled. Then you can start taking photos at various angles of elevation and rotation.

If you need to extend the range of the axial adjustment, you must use the off-axial adapter. Depending on which side of the range you want to extend, you can mount the off-axial adapter in 2 orientations.

Either way, you need to record accurately the position of the bolt. You need to add/ minus this value when you do the axial adjustment. To make life simple, you may want to mount the adapter to the nearest cm, say 3 cm from the adapter socket. Remember this distance is measured from the center of the bolt. So you may want to wind / unwind the bolt till the slot of the bolt is perpendicular to rim of the adapter. Then check the accuracy of the position with a straight object. Again, you can mark the position of the bolt on the adapter for future use. Then mount your camera to the vertical rotator arm.

Slide the camera to the correct position, taking the off-set by the adapter into account. Again take the choice of the adapter into account for the horizontal adjustment. Level the assembly and start shooting.

The entrance pupil position is usually in front of the tripod mount for wide angle lens or zoom lens at the wide end; and behind the tripod mount for telephoto lens or zoom lens at the

tele end. The wide end is usually the choice to reduce the number of shots to take for the pano, especially for the 360 degree virtual tour. However, you can use the tele end to reduce distortion and increase the resolution of the final image.