Kenko Single-Axis Tracking Mount

SKYMEMO RS

Instruction Manual

*** Camera, ball-head and tripod are sold separately.**

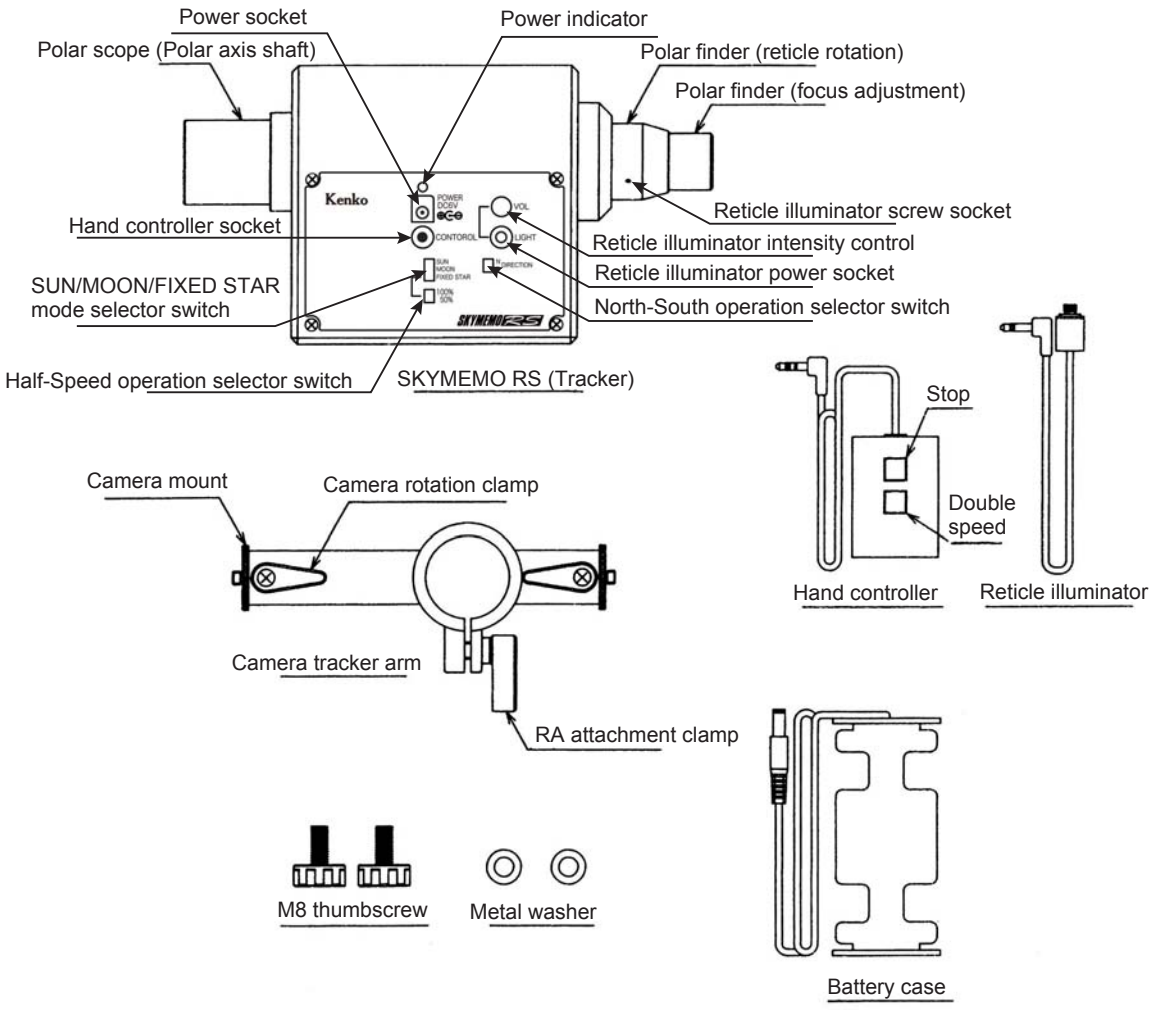
<Precaution>

Test photographing

Check if the Skymemo RS works normally by taking a test shot in advance.

No Compensation for Photographing

Name of Each Part



Other necessities

- **2 sets of camera and lens**
  1 set is applicable if the Skymemo Balance Weight (sold separately) and Skymemo Weight Shaft (sold separately) are used together.
- **Ball head or similar**
- **Tripod**
- **Power C-cell x 4pcs.**
- **Remote switch**

●Camera and Lens

Supported Cameras

1. The camera with a bulb setting or having a function to make an adjustment for setting a desired exposure time
2. The camera that can be mounted using a 1/4 tripod screws (conforming to the JIS standard)

Any camera that meets the above two conditions can be used. Generally, a digital single-lens reflex camera, film-type single-lens reflex camera or lens-shutter camera with a mechanical bulb function is used.

A new digital camera with a power-operated bulb and other recent models (digital cameras) can also be used, but a majority of such cameras are subject to significant battery consumption in the bulb mode or require dedicated cables (electromagnetic release, cable switch, etc.). Read your camera's manual and check the applicability beforehand.

This product is a portable equatorial telescope for observing stars, so the use of a super-telephoto lens may not be suitable. As a rough guide, telephoto lenses of up to 300 mm (35 mm in full size) are usable. If a telephoto lens is to be used, use the tripod mount ring on the lens side to mount the lens. Do not combine a camera or lens that would result in an extreme front-rear balance. (The use of a zoom lens or a telephoto lens without a tripod mount ring is not recommended.)

●Tripod

For the tripod, our Skymemo Tripod II WH is recommended. It can be installed easily using two finger screws, and adjustment of the polar alignment is simple. If a photographic tripod is to be used, use a sturdy one of medium size or larger. A tripod with a ball-head is not suitable.

●Power source

The Skymemo RS uses four C batteries. For normal conditions, alkali manganese dry batteries or manganese dry batteries are recommended. Nickel cadmium (NiCd) batteries and nickel hydrogen batteries are also usable, but such batteries only provide low voltage (1.2 V x 4 = 4.8 V), which may not be enough to illuminate the pilot lamp. Either way, the battery capacity will drop significantly when the outside air temperature is low, especially when it drops to below 0°C. Therefore, take proper measures to keep the batteries at appropriate temperatures.

Do not use with any other power (e.g. AC adapter or lead battery). Otherwise, electronic circuit might be damaged by reverse voltage or overvoltage.

Setup

First, confirm that the DIRECTION switch on the main panel is set to the correct position. S indicates the Southern Hemisphere, while N represents the Northern Hemisphere.

Next, confirm that the SUN/MOON/FIXED STAR mode selector switch is set to the correct position.

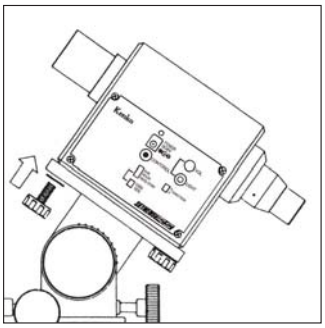


Fig.1

1.Securing the Skymemo RS on a tripod

When the Skymemo Tripod II WH is used, use two of the supplied M8 finger screws and fix the mount through the two screw holes provided at the front and rear on the bottom face of the Skymemo RS. Fig.1

If a normal photographic tripod is used, use the 1/4 tripod screw hole provided at the center of the bottom face of the tracker. Fig.2

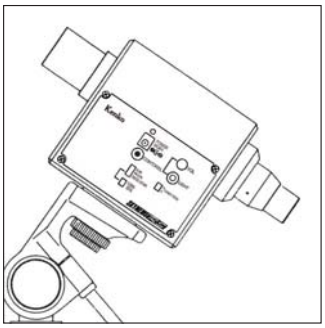


Fig.2

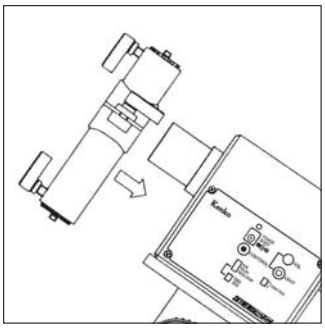


Fig.3

2.Placing the camera tracker arm

Loosen the RA attachment clamp on the camera tracker arm, insert the camera tracker arm into the polar axis shaft on the tracker, and tighten the RA attachment clamp to secure the camera tracker arm.

Install the camera tracker arm in such a way that the camera rotation clamps come to the front side, as shown in the figure 3.

New Functions on the main panel

●Tracking mode

The Skymemo RS offers a new function whereby you can select the FIXED STAR mode, SUN mode or MOON mode using a switch on the main panel. Check the tracking mode before shooting.

●Half-speed mode

In this mode the tracking speed is half that of the FIXED STAR mode.

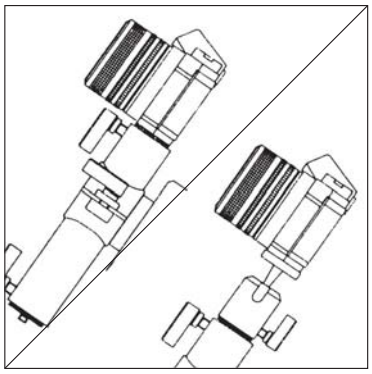


Fig. 4

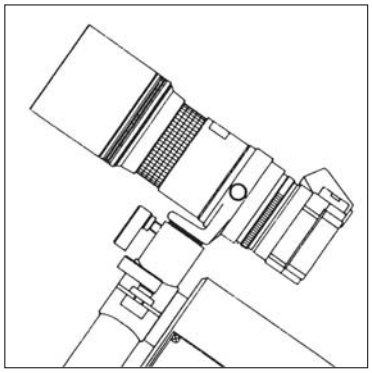


Fig. 5

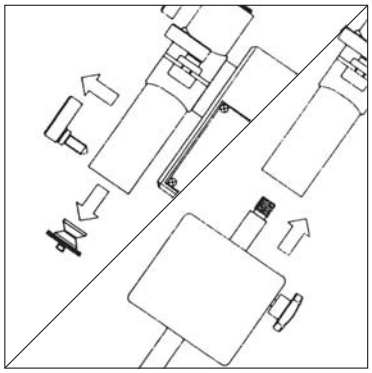


Fig. 6

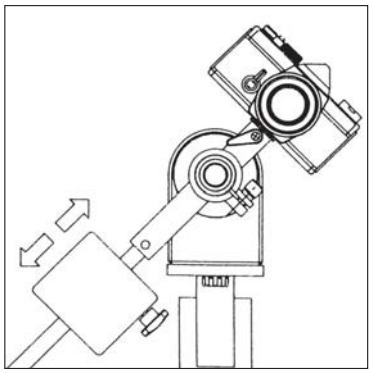


Fig. 7

3.Placing a camera

Loosen the camera rotation clamps slightly and turn the camera mount to install the camera.
The flexibility of layout adjustment increases when a ball-head, etc., is used. Fig. 4
If a lens with a tripod mount ring is used, remember to use the tripod mount ring of the lens unless there is a reason to do otherwise. As the tripod mount ring rotates, you can flexibly adjust the layout and optimize the front/rear balance. Fig.5

If a single camera is used with the Skymemo Balance Weight (sold separately) installed, remove one camera rotation clamp and take out the camera mount. Screw the Skymemo Weight Shaft (sold separately) into the screw hole, which is now accessible. Fig.6

CAUTION : Due to balance weight is so heavy, please pay attention to handle it not to injury yourself and damage equipments.

4.Balancing the camera tracker arm

Loosen the RA attachment clamp and balance the polar axis shaft. If two cameras are used, adjust the balance by using the different lengths of the arms. If one camera is used, the balance should be adjusted using the Skymemo Balance Weight (sold separately). When balancing the polar axis shaft, be sure the east side of the shaft is slightly heavier. This will prevent negative impact from a backlash of the gears. Fig.7

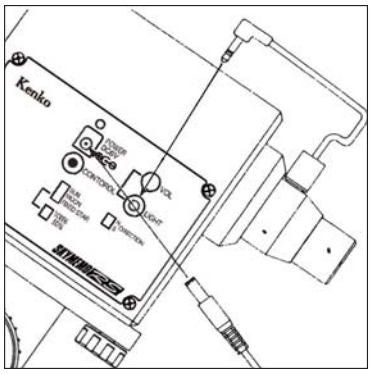


Fig. 8

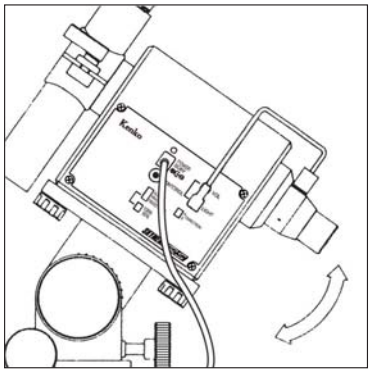


Fig. 9

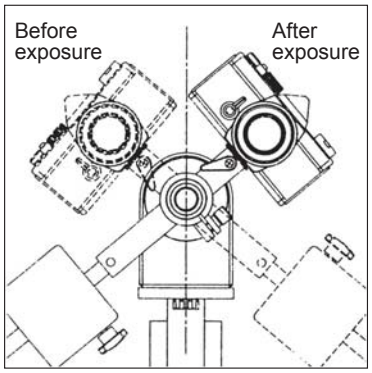


Fig. 10

5.Adjusting the polar axis

Follow the instructions on the battery case to install the batteries correctly, and insert the plug on the cable into the power socket on the Skymemo RS. The LED on the tracker should turn on and the motor should actuate.
Screw the reticle illuminator into the polar scope and insert the plug on the cable into the reticle illuminator power socket on the tracker. Fig.8
Turn the polar finder (focus adjustment) part of the polar scope until the reticle pattern is clearly visible. The brightness of reticle illumination can be adjusted by inserting a precision screwdriver into the reticle illuminator intensity control in the tracker.

Move the tracker up/down and to the left/right to adjust the polar axis. Fig.9 After the adjustment, tighten the clamps.

For details on how to adjust the polar axis, refer to the detailed explanation on the page 8 and 9.

Remember to look into the polar scope before and after shooting to confirm that the accurate polar alignment has been maintained. The failure to do so may result in undesirable results.

You can use the above method to check the operation of the tracker, but another way to check its operation is to put your ear to the tracker and see if you can hear the motor sound.

6.Framing and Shooting

Loosen the RA attachment clamp and camera rotation clamps, point to the target, and lock the clamps. To turn the view field, use the rotation of a ball-head or the tripod mount ring attached to the lens.

Also, remember not to use any setting that will change the balance of the polar axis before and after the exposure, as shown in the figure 10. Otherwise, shooting problems are likely to occur.

AF camera lenses and telephoto lenses using ED or fluoric are not adjusted for infinity (∞). If any such lens is used, make adjustments in advance using a fixed star, etc., found near the shooting field.

Also note that, with an AF camera lens, even a very small force can operate the focus ring. Accordingly, secure the ring using tape, etc., before use.

Hand controller

Normally with the Skymemo RS, it isn't necessary to touch the unit upon shooting. However, if a guide telescope is used, insert a hand controller plug into the hand controller socket on the tracker.

Stop and speed control is performed using the hand controller, but half-speed is set with the half-speed operation selector switch on the main panel.

Polar alignment

1.What the polar alignment is

Stars rise from the east and set in the west every day. This is due to a phenomenon called “diurnal motion,” which results from the rotation of the earth. The center of this motion is located around the North Star, as viewed from the earth. Therefore, stars appear to rotate around the North Star. The equatorial telescope can track this diurnal motion with ease because it has a polar axis that simulates the same motion as the rotational axis of the earth. For proper tracking, however, the polar axis must be set so that it's parallel with the rotational axis.

Strictly speaking, the earth is a rotating ellipsoid that bulges slightly in the direction of the equator. As the gravitational pull of the sun, moon, etc., acts upon the mass of this bulged part of the earth, the earth moves like a pivoting top by changing its direction periodically. As a result, we the star watchers see the north and south poles of the skies move along a large arc of 23.4° in radius around the pole of the ecliptic (precessional circle) in periods of approximately 25,800 years. This translates into 50.27” per year. From the viewpoint of observation of star positions--essentially nutation, polar motion, aberration of light, annual inequality, atmospheric refraction, etc.--should also be considered. However, because these deviations are minor, correcting a general change of precession is considered enough for the amateur sky watcher. The Skymemo lets you make this correction simply by shifting the positions of reference stars.

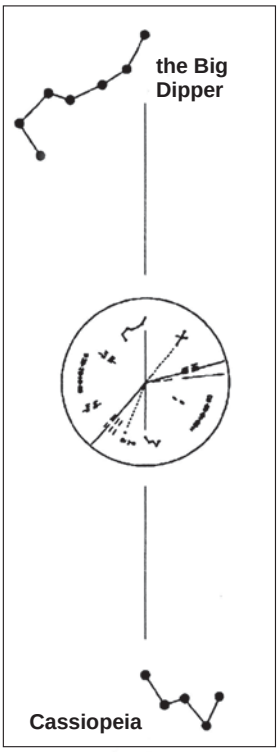
2.Placing the reticle illuminator

Screw the reticle illuminator into the polar scope and insert the plug into the reticle illuminator power socket on the Skymemo RS. The brightness of illumination can be adjusted through the reticle illuminator intensity control using a precision screwdriver. Next, turn the polar finder (focus adjustment) part of the polar scope until the reticle pattern is clearly visible.

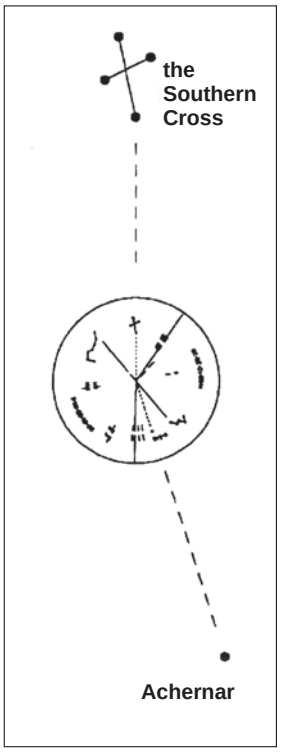
Polar finder reticle for both the Northern and Southern Hemispheres

Actual starry sky

The Northern Hemisphere



The Southern Hemisphere



3.Polar alignment in the Northern Hemisphere

Position of Equatorial Telescope

First, install the tripod so that one of its legs faces the North Star, and install the Skymemo RS with its polar axis oriented roughly toward the North Star. Next, adjust the orientation of the tracker accurately so that it faces the North Star directly when viewed either from the top or the side.

Introduction of Reference Stars

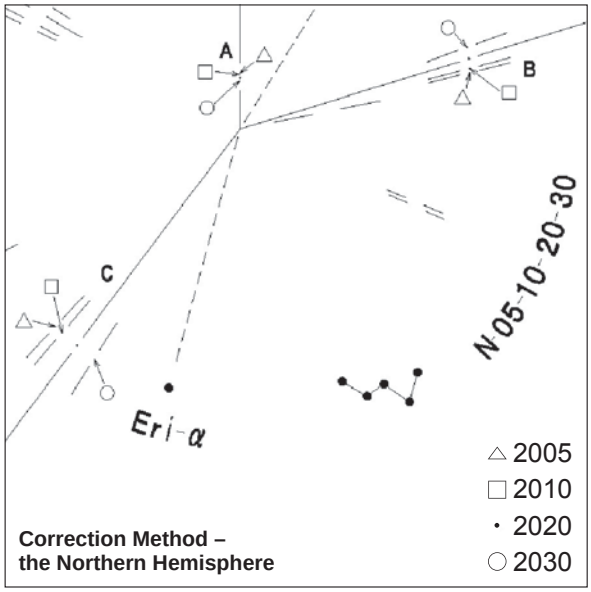
Find the actual “North Star,” “Big Dipper” and “Cassiopeia” in the northern sky.

Next, look into the polar scope and turn the polar finder (reticle rotation) until the actual directions of the Big Dipper and Cassiopeia match the corresponding directions on the reticle pattern. (One can't actually see both the Big Dipper and Cassiopeia in the view field of the polar scope. Depending on the location and time of observation, only one of them can be seen). By adjusting the polar finder (reticle rotation) as mentioned above, you should see the reference stars in the view field of the polar scope. The brightest star in the view field is the North Star, so move the North Star up/down and to the left/right by a small amount at a time until it enters gap A in the line on the reticle pattern. This way the two remaining reference stars are automatically adjusted in such a way that they're near B and C.

The North Star (“Little Dipper α”) at position A is abundantly bright. However, the “Little Dipper δ” at position C is a type of double star in that it's a star of the 4.4th magnitude having another star of about the sixth magnitude moving with it at a distance of 24'. Therefore, one shouldn't have any trouble finding the “Little Dipper δ” The Cepheus 51” at position B is a dark star that isn't otherwise easy to spot, but it can be found effortlessly based on its positional relationship with other stars. Once these two stars have been identified, simply repeat the adjustments until both enter their respective introduction positions.

Correction Method

The reticle pattern has auxiliary graduations for use in correcting the change of precession for reference stars B and C. Use these graduations to introduce the stars into their respective positions as shown in the figure. For any other year, introduce the reference stars into their appropriate positions, which are determined by prorating the intervals among the auxiliary graduations.



Correction Method – the Northern Hemisphere

The North Star is always introduced into gap A in the line on the reticle pattern, but it will be introduced closer toward center with the passage of years.

4.Polar alignment in the Southern Hemisphere

Position of Equatorial Telescope

There is no bright star near the South Pole of the sky, so use a compass and celestial map as a reference to set the polar axis.

Introduction of Reference Stars

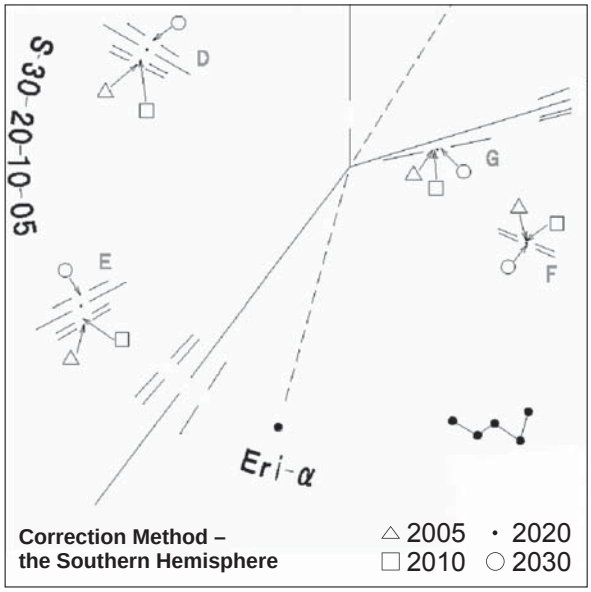
Find the “Southern Cross” and “Achernar” in the southern sky.

Next, look into the polar scope and turn the polar finder (reticle rotation) until the actual directions of the Southern Cross and Achernar match the corresponding directions on the reticle pattern. (One can't actually see both the Southern Cross and Achernar in the view field of the polar scope. Depending on the location and time of observation, only one of them can be seen).

Unfortunately, there is no star as bright as the North Star near the South Pole of the sky, so the “Octans 7 G, 10G, χ and σ” are used as reference stars. Introduce the 7G in position D, 10G in position E, χ in position F and σ in position G. All are dark, inconspicuous stars of the fifth or sixth magnitude, so use their mutual positional relationships and reference a celestial map, etc., to introduce each star in the correct position. As a tip, confirm that the positions in which the stars have been introduced do not change after operating the Skymemo for a while. Once the reference stars have been identified, simply repeat the adjustments until each of them enters its respective introduction position.

Correction Method

The reticle pattern has auxiliary graduations for use in correcting the change of precession for reference stars D and E. Use these graduations to introduce the stars into their respective positions as shown in the figure. For any other year, introduce the reference stars into their appropriate positions, which are determined by prorating the intervals among the auxiliary graduations.



Correction Method – the Southern Hemisphere

The Sigma Octantis is always introduced into gap G in the line on the reticle pattern, but it will be introduced gradually outward with the passage of years.

Troubleshooting

Condition	Cause	Remedial action
The polar axis shaft has play.	This isn't a problem because a slight amount play is needed for the gears to operate.	
The reticle pattern isn't visible (not very clear).	The view field isn't properly adjusted.	Turn the polar finder (focus adjustment) to adjust the view field.
	The reticle illuminator is too dark (bright).	Adjust the brightness (VOL: reticle illuminator intensity control).
Starts appear blurry.	One of the clamps is loose.	Be sure to check the clamps before shooting.
	The polar alignment is off.	Check the polar scope before and after shooting.
	The lens is deflected.	If a telephoto lens is used, pay attention to the front-rear balance. If the altitude is low, use guided shooting.
	This is a negative effect of atmospheric refraction.	Confirm after shooting that the Skymemo RS is operating.
	The Skymemo RS stopped operating due to the drop in battery voltage.	If the temperature is low, keep the batteries at the proper temperature.
	The camera or lens has contacted the fixing part.	Check before shooting whether contact would occur after exposure. The arm moves by 15° per hour.
Image is out of focus.	The focus ring has moved.	Secure the focus ring with tape beforehand.
	In the case of IF focusing, a significant change in Skymemo RS position may bring the image out of focus.	Adjust the focus with the Skymemo RS positioned close to the shooting position.
	In conditions of high temperature or humidity, or when the Brownie size is used, the film will float/move.	Shorten the exposure time. Try using a different film.

Specifications

Operation	Northern or Southern Hemisphere (switchable)
Weight	Approx. 3 kg – tracker plus camera arm
Dimensions - LxWxH	240mm x 90mm x 130 mm
Load capacity	Approx. 2.5kg at each end Total 5kg
Camera mount	1/4 tripod screws (conforming to the JIS standard)
Polar scope	Magnification: 4X Actual field of view: 10 degrees Reticle illuminator and reticle pattern Accuracy: better than 5’ Filter thread: M30.5 P:0.5
Motor type	Stepper
Gears	1:500, 1:2, Worm: 1:144
Tracking mode	FIXED STAR, SUN or MOON
Hand controller	2X or stopped
Power source	6VDC (C-cells x 4pcs.)
Battery life	>24 hours (manganese batteries @ 20 degrees C in internal test)

★Exposure times for unguided tracking

Focal length (35mm full size equivalent)	Max. exposure (minutes)
50	70
100	40
135	35
200	30
300	15

* Measured values in our internal tracking test. (These are not guaranteed values.)

* APSC size: If you are using a micro four-thirds camera, etc., the corresponding focus distances should be calculated.

 # The maximum exposure time for unguided tracking varies depending on the shooting environment (strength of the legs, accuracy of adjustment of the polar axis, atmospheric refraction, lens deflection, etc.). Use the values in the table above only as rough guidelines.

 # When a long-focus lens is used or when the exposure time is long, perform guided shooting by linking a guiding scope.

Specifications and appearance are subject to change without notice.

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