M-zero

SINGLE ARM MOUNT
(Made in Italy)

USER MANUAL
Version 1.6.3 June 2014

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SAFETY STANDARDS AND WARNINGS

- Read carefully the manual before installing and using the mount.
- To make easy the document reading on the field, it is recommended to copy all documentation files from the supplied USB pen to a smartphone or, even better, to a tablet.
- Use the power cable supplied with the mount or instead a 12V-3A stabilized power supply as suggested in the manual.
- Connect the power cable correctly and securely to the power socket.
- Do not bend, pull or press the cable as this may damage it.
- For any assistance or repair, please contact only the manufacturer.
- Be sure to remove the power supply at the end of its use or before any cleaning or maintenance.
- This mount must be used exclusively by adults, do not allow use to children or to people with reduced mental capacity.
- Avoid to operate the mount except as strictly indicated in the manual.
- Modifying or altering in any way the characteristics of the mount, will void the manufacturer's limited warranty.
- Never modify the tension of the belts (by dedicated screw), these is set in the factory and any unauthorized change will void the manufacturer's limited warranty.
- After using it, avoid to store the mount in areas exposed to sunlight or in wet places.
Summary

Technical Specifications.................................................................................................................................................. 4
Foreword........................................................................................................................................................................ 5
Packing Content .......................................................................................................................................................... 5
1. Set the M-zero to operating conditions .................................................................................................................. 6
   1.1 Tripode Mounting.................................................................................................................................................. 6
   1.2 Mount installation on the Tripod ......................................................................................................................... 7
   1.3 Motor Cable Connections ..................................................................................................................................... 7
   1.4 Latitude regulation range setting ....................................................................................................................... 8
   1.5 Optical Tube Mounting ......................................................................................................................................... 9
   1.6 Choosing the Telescope ....................................................................................................................................... 9
2. Telescope Balancing Operations ............................................................................................................................ 14
   2.1 Declination Axis Balancing .................................................................................................................................. 14
   2.2 Right Ascension Axis Balancing ......................................................................................................................... 15
3. M-zero alignment in Equatorial mode ....................................................................................................................... 17
   3.1 Latitude regulation ................................................................................................................................................ 17
   3.2 Azimuth regulation ............................................................................................................................................. 18
   3.3 Precise Polar Alignment ...................................................................................................................................... 18
   3.3.1 Polar Kit Installation ..................................................................................................................................... 18
   3.3.2 Polar alignment with a Skywatcher Polarscope ............................................................................................... 19
   3.3.3 Polar Alignment with a Losmandy polar scope .............................................................................................. 20
   3.3 External programs for Polar Finding ................................................................................................................... 21
4. M-zero Use for “Time Lapse” Photography ............................................................................................................... 22
5. StarGO installation and use – Quick user Guides .................................................................................................... 233
<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Equatorial / Alt-azimuth Single-Arm mount with Fast-Reverse technology</td>
</tr>
<tr>
<td>Weight</td>
<td>5.5 kg (12.1 lbs.)</td>
</tr>
<tr>
<td>Capacity</td>
<td>For photographic use 8 kg (17.6 lbs.) – For visual use 10 kg (22.05 lbs.)</td>
</tr>
<tr>
<td>Transmission</td>
<td>Four-step reducer via pulley-tooth belt system on ball bearing, with no plays on the axes</td>
</tr>
<tr>
<td>Tracking error</td>
<td>+/- 5-7 arc seconds, average</td>
</tr>
<tr>
<td>Construction material</td>
<td>Anodized aluminium, worked out from single blocks with high precision CNC machines</td>
</tr>
<tr>
<td>Motion system</td>
<td>Pulleys made with special glass fiber polymer and high precision tooth belts</td>
</tr>
<tr>
<td>Polar finder</td>
<td>Skywatcher model</td>
</tr>
<tr>
<td>Goto system</td>
<td>Avalon StarGO GOTO System - Bluetooth</td>
</tr>
<tr>
<td>Counterweight bar</td>
<td>= 16 mm (0.63 inch) / L = 80 mm (3.15 inch)</td>
</tr>
<tr>
<td>Counterweight</td>
<td>0.5 kg (1.1 lbs.)</td>
</tr>
<tr>
<td>Scope Plate</td>
<td>Vixen style</td>
</tr>
<tr>
<td>Warranty</td>
<td>2 years from the purchase date, extended to 5 years for the transmission system</td>
</tr>
</tbody>
</table>
Foreword

The present manual describes the mounting operation and the correct setup of the Avalon M-zero single arm mount including the proper installation of a suitable optical tube.

Please read with attention this manual to be guaranteed that you can use the M-zero mount in a full safety and with the maximum satisfaction.

The instructions related to the StarGO control system and related software are reported in this Instruction Manual:

**Avalon Instruments - StarGO Control System**

The instructions for using the M-zero with third part software are contained in the following Instruction Manual:

**Avalon Instrument – Avalon StarGO: Third Part Software Use**

Both the above manuals are included in the supplied pendrive.

The images published in the manual refer to the first version of the mount and therefore small differences could exists between the pictures and your own mount. Furthermore, the design and the configuration of the mount can be subject to modifications without prior information, based on design decisions due to continuous improvements and on the requests of the mount owners.

Packing Content

Open the box take all the content out. Extract all the components from the small cardboard box and from the mount bag side pocket putting them on a clean, flat surface..

Component List

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Component List</th>
</tr>
</thead>
<tbody>
<tr>
<td>StarGO Keypad</td>
<td>Counterweight 0.5 kg</td>
</tr>
<tr>
<td>Aluminium tripod with StarGO control box</td>
<td>Polar scope completed with support</td>
</tr>
<tr>
<td>Keypad – Control Box connecting cable (HDMI)</td>
<td>Power cable</td>
</tr>
<tr>
<td>Motor’s connecting cable</td>
<td>Warranty Certificate &amp; Testing Certificate</td>
</tr>
<tr>
<td>Mount Head</td>
<td>Declaration of Conformity</td>
</tr>
<tr>
<td>Mount Head and accessory transport bag</td>
<td>Allen screw tool</td>
</tr>
<tr>
<td>Tripod transport bag.</td>
<td>Azimuth regulation pin</td>
</tr>
<tr>
<td>Counterweight rod</td>
<td>Pendrive USB with manuals and software</td>
</tr>
</tbody>
</table>
1. **Set the M-zero to operating conditions**

The M-zero may work at a latitude range from about 24° to about 90°. For packing reason it is shipped with a 90° latitude setting and therefore the first operation to be performed is the range regulation for the latitude at which it will be used. The same operations must be performed when the mount is moved to a site with latitude outside the range actually set.

The described operations require that the M-zero is firmly set on the T-Pod tripod and therefore the first paragraph of this chapter will describe the operation needed to mount the tripod and to install the mount over it.

A key feature of the M-zero is the possibility to use it in Alt-Azimuthal mode, especially for visual observations and terrestrial photos taken with the Time Lapse method. To set the mount in Alt-Az mode is sufficient to set it to 90° longitude as described in the following sections.

1.1 **Tripode Mounting**

For shipment compactness purpose, the T-Pod is boxed completely closed with the StarGO control box already mounted on one leg.

**Note:** If the StarGO control system is used for other purposes, i.e. to control other brand of mounts, it is possible to detach it from the tripod simply unscrewing the fixing screws in the inside of the tripod leg.

The tripod mounting is very simple. The operations to perform are the following:

- Take the T-Pod tripod keeping it head up and with the legs toward the ground and, after unscrewed the knobs on the terminal part of the legs, regulate the leg length to the wanted height.

- Pull the legs toward the external by extending the three tie-rods until their click in fully opened position.

- Loosen the three couple of knobs and extend each leg extracting the cylindrical tubes to reach the wanted height. This will depend upon the type of telescope to be used: a Newtonian tube will require a minimum height whereas if the tube is a refractor or a Schmit-Cassegrain is better to reach the full height.

- Firmly screw the knobs of each leg to fix their the leg eights.

- Mount the Azimuth regulation pin.
1.2 **Mount installation on the Tripod**

The operation to perform to install the mount on the tripod are summarized in the following step by step procedure:

- Unscrew of some turns the two knobs (1) for the Azimuth regulation.
- Put the mount on the tripod plate making the contrast pin (2) enter the gap between the two Azimuth regulation screws.
- Firmly screw the knob located under the tripod plate to keep the mount in position.
- Screw the Azimuth regulation screws to touch the contrast pin.

1.3 **Motor Cable Connections**

After the mount installation on the tripod it is necessary to connect the electrical cables from the StarGO to the motors and to the Polar Scope illuminator when used. The cable for those connections is provided of a 9 pin serial type male connector from which three cables exit. The two cables with a RJ11 type connector shall be connected to the RA and Dec motors whereas the third, which is provided of a female pin-jack, shall be connected to the illuminator. The needed operations to make the connections are the followings:

- Insert the 9 pin connector on the correspondent plug on the top of the StarGo box, as indicated in the picture.
- Insert the two motor cables into the central hole of the mount.
- Connect the RJ11 type connector the the respective RA and Dec plugs. The two cables have different length so that any misplacement is impossible.
- Connect the illuminator pin-jack to the third cable plug.
1.4 Latitude regulation range setting

As already said, the M-zero can be used on an extended range of latitudes from about 24° to 90°. The total amplitude of the operating range of about 66° is subdivided in 4 sub-intervals as follows:

- First interval: 24° --- 40°
- Second interval: 40° --- 57°
- Third interval: 57° --- 74°
- Fourth interval: 75° --- 90°

It is to be underlined that to the upper extreme the mount is set with the declination axis perfectly vertical. This is the position that define the Alt-Azimuthal Mode of mount operation, whereas in all other configuration the mount operates in Equatorial Mode.

The following procedure starts with the mount in the 90° position, which is that of the packing. It is obvious that all the other regulation after the first will start with the mount already in Equatorial Mode.

The following are the steps to regulate the mount operative latitude range:

1. Completely unscrew the screw (1).
2. Completely unscrew, from both sides, the knobs indicated by (3).
3. Rotate, if needed, the regulation cylinder (2) around its own axis until its hole is coaxial to the hole closer to the chosen latitude.
4. Insert and firmly screw the screw (1) extracted in step 1 on the hole. Eventually regulate the cylinder (2) to bring its hole in the right position.
5. The precise latitude regulation is performed as described in chapter 3.
6. If it is required to use the mount in Alt-Azimuth mode, repeat the previous steps choosing the lower hole (4) fix the regulation cylinder.

7. Acting on the teethed wheel (5) bring the arm to a perfectly vertical position with the help of the spherical bubble level (6).

1.5 Optical Tube Mounting

To mount an optical tube on the M-zero it is necessary that it is provided of a male Vixen type dovetail bar (standard width 50 mm – see picture).

- Take the mount arm in horizontal position. Turn the DEC axis latch knob (1) and rotate the female dovetail plate coaxial to the mount arm.
- Firmly lock both axis latch knobs. Open the dovetail plate clamp using the knob (2). Insert the dovetail bar of the optical tube in the plate clamp and, while safely keeping the tube with the other hand, firmly lock the knob (2). If the tube is particularly heavy and/or oversized, help by another person could be necessary to perform this operation.
- Before to release the tube, verify that the clamping of the telescope dovetail bar is optimal.

1.6 Choosing the Telescope

The M-zero is an extremely versatile mount. It can be used in equatorial or alt-azimuthal configuration and can carry several telescopes and, in particular, in equatorial configuration, it can be set for continuous operation without the need to perform the “meridian flip”. This can be achieved by an appropriate telescope choice. As further advantage, using a simple optional tool, it is possible to mount on M-zero two parallel telescopes with all the imaginable
advantages, such as simultaneous autoguiding and exposition with different filters.

In order to mount a parallel telescope, it is necessary to take out the plastic plug with the Avalon logo (fig. a) simply pressure inserted on the mounting flange (fig. b) on which it is possible to mount the Dual-DEC accessory to use the Vixen type dovetail (fig. c) or the X-Guider (fig. d).

The latter, being moveable in the two directions allows the perfect alignment of the two telescopes or the misalignment required to search a suitable guide star in the case the second telescope is used for autoguiding.

The figures below show the optional kit components afore described.
In the following table the M-zero mount several configurations (operating mode – telescope type) are summarized:

<table>
<thead>
<tr>
<th>Operating mode</th>
<th>Telescope type</th>
<th>Picture</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equatorial</td>
<td>Any type of optical tube</td>
<td><img src="image" alt="Equatorial setup" /></td>
<td>This setup allows to use whatever telescope type (respecting the allowed weights) including medium length refractors because the arm position permits the telescope rotation without obstacles. In this arrangement it could be necessary to do the meridian flip. The used counterweight is 0.5 kg.</td>
</tr>
<tr>
<td></td>
<td>Typically up to 8” RCs and SCs and up to 6” Newtonian tubes.</td>
<td><img src="image" alt="Equatorial setup" /></td>
<td>In this setup the side L shape brackets have been mounted in reversed position to allow the repositioning of the arm in a more external position, obtaining a better telescope balancing, permitting, even in this case its rotation without obstacles. As seen in the picture, it is possible to balance an 8” SC with a counterweight of only 1.5 kg.</td>
</tr>
<tr>
<td>Two parallel telescopes: 106 mm f/5 refractor weighting about 9 kg and a 60 mm secondary refractor weighting about 3 kg.</td>
<td>In this setup a suitable length secondary tube is mounted on the optional tool. It can be used for autoguiding, for taking simultaneous picture with different FOVs or different filter, etc. In this case the second telescope constitutes an active counterweight allowing the mount to obtain performances that should require much higher loading capacity mounts. Counterweights used 2 kg total.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two parallel tubes: 8” f/10 SC weighting about 7 kg and 70 mm secondary refractor weighting about 3 kg.</td>
<td>In this setup the secondary tube is mounted on the optional X-Guider allowing a precise alignment between the two optics.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSLR Camera</td>
<td>A DSLR camera can be installed on the M-zero mount, allowing to perform wide and extra-wide field expositions. It can be mounted standalone or in parallel with a telescope. In this case the telescope can be used as guidescope for longer expositions. With this setup a counterweight is not necessary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alt-Azimuthal</td>
<td>Any type of optical tube</td>
<td>About the Alt-azimuthal operational mode, the telescopes setup does not change (see previous figures)</td>
<td>The telescope in installed on the mount external part as explained in the previous paragraph 1.5.</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Binocular</td>
<td></td>
<td>Using an optional tool is also possible to install binoculars of adequate dimensions.</td>
</tr>
<tr>
<td></td>
<td>DSLR Camera</td>
<td></td>
<td>Using a short Vixen bar it is possible to install on the M-zero mount a DSLR Canon camera. In such manner ti is possible to perform terrestrial time laspse pictures.</td>
</tr>
</tbody>
</table>
2 Telescope Balancing Operations.

To correctly balance the telescope it must be freely manually moveable around both rotation axes. The M-zero mount is provided of latch lock knobs in both axes. To allow the telescope to freely manual move, rotate the knobs in counter clockwise direction, until the axis are unlocked.

In Equatorial mode, if the telescope is not balanced, mainly on the DEC axis, be sure to keep the tube with the hands before to unscrews the latch knobs. A significantly unbalanced mount can cause the telescope to move quickly with potential damages to the tube or to the mount itself.

2.1 Declination Axis Balancing

To guarantee a correct and reliable mount tracking we need to balance the telescope in both rotation axes. Even if the telescope should not track in Declination, the optical tube must be balanced also in this axis to avoid sudden movements when the Dec latch is loose and, mainly, to guarantee the absence of vibrations and a prompt response during autoguided photographic sessions.

In the M-zero mount is better to balance the DEC axis first because that of RA will be automatically almost balanced.

Balancing the telescope in DEC:

1. Put the telescope in horizontal position.
2. Loose the latch knob and leave the tube to move – GRADUALLY – to verify in what side it tends to move.
3. Slightly loose the knob in the dovetail plate that keeps the telescope fixed to the mount and slide the tube forward or backward until it remain fixed horizontal even with the DEC axis latch completely loosen. **DO NOT** leave the tube until the dovetail plate fixing knob is not firmly tight.
4. Tighten the dovetail plate fixing knob to lock the telescope in the reached position.
2.2 Right Ascension Axis Balancing:

The M-zero mount has a system of RA axis balancing which is different from that of German Equatorial Mounts but still very simple. The balancing is performed in two phases, raw and precise. The raw balancing, which is performed more rarely, requires some working on the mount and it is better to carry it out at home. The precise balancing can be performed on the field.

**Raw Balancing**

To raw balance the mount in the RA axis:

1. The optical tube, if present, must be removed from the mount.
2. Put the mount in Alt-Azimuthal mode.
3. Unscrew and extract the Allen screws (1a) and (1b) on both the L shaped lateral bracket. This operation make the vertical arm completely free from the rest of the mount and therefore it is necessary to keep the arm by hand during the second bracket removal.

The picture shows the drilling plan of the horizontal arm to position the vertical one at different distances from the RA rotation axis, to modify roughly the approximate balancing of the whole system (The picture shows the two arms without the bracket. However it is not necessary to completely remove the bracket that can be left attached to the vertical arm).

The position of the hole couple (A-a) corresponds to the maximum distance from the axis and is used for heavier telescopes. The couple (C-c) corresponds to the minimum distance and is used for lighter telescopes.

Choose the hole couple that is more suitable to the telescope you intend to use and fix, using this holes, the brackets previously removed using the same Allen screws.

Tighten firmly all bracket to guarantee the maximum rigidity of the mount during operations.
**Precise balancing**

The fine balancing is carried out by loosening the latch (1) and attaching the counterweight bar to the dovetail (2) fixing it by tightening the knob (3). The equilibrium point is reached by moving the counterweight (4). At the end tighten the knob (5).

**NOTE:** It must be underlined that th M-zero, on the contrary of the mounts based on toothed wheel – worm that must be slightly unbalanced in the celestial movement direction to obtain a regular tracking, must be well balanced to guarantee, in every position, the absence of hysteresis and pendulum effects around the meridian. This difference, due to the toothed belt transmission system, prove to be a significant advantage because, once balanced, it is not more necessary to change the weight position, which is a precious feature for long term Astrophotography around the meridian and it is essential for the remote use of the mount.
3. **M-zero alignment in Equatorial mode.**

The mount alignment in equatorial mode consists in the regulation of the mount altitude and latitude such that its declination axis points exactly to the celestial North Pole.

To perform such a regulation it is needed to describe the actions necessary to set the altitude and the latitude of the mount to those of the observation site, and for the precise alignment, using the provided polascope or the different type optional polascope.

3.1 **Latitude regulation**

To correctly use the mount it is necessary to make the mount Dec axis parallel to the Earth rotation axis. The raw setup regulation of the latitude have been described in chapter 1. In this section it is assumed that the mount has been raw regulated to the observation site latitude.

The first operation to perform (after a good levelling of the mount using the ball level present on the mount base) consists on regulating the mount polar axis of an angle equal to the latitude of the observation site (for example Paris is about 49°, London about 51.5°, San Francisco about 38° and Tokio about 35°) using the toothed regulation wheel (1) and the latitude scale (2) on the mount side.

To increase the latitude (raising) of the mount polar axis, the wheel (1) must be turned clockwise. To decrease the latitude, the wheel must be rotated counter-clockwise.

The latitude regulation range is between 10° and 90°.

**NOTE:** In general it is preferable to perform the fine latitude regulations moving the mount in contrast with the gravity, i.e. raising the mount polar axis.
3.2 Azimuth regulation

To regulate the mount azimuth it is needed to use the two knobs (1a) and (1b) working in contrast against the pin (2). The regulation is performed using both hands: when a knob is rotated in one direction it is necessary to rotate at the same time the other one in reverse direction of the same number (or fraction) of turns. To move the mount in one direction or in the other, the two knobs must be rotated together forward or backward.

Remember that this operation must be performed only during the polar alignment procedure. Once the wanted alignment has been performed, DON'T MOVE ANY MORE THE MOUNT following the instruction of this chapter. All the movements in RA and DEC shall be performed manually after unlocking the axes latches of using the keypad and/or the StarGO software commands.

3.3 Precise Polar Alignment

3.3.1 Polar Kit Installation

The precise polar alignment of the mount shall be performed using the polar scope mounted on the M-zero.

The standard kit for the precise polar alignment is made up the following components:

1. Polarscope stand provided of scope fixing knobs and dovetail attack with fixing grip knob.
2. Polascope completed of graduated scale
3. Illuminator cap provided of red LED and connection cable to the StarGO.

The kit can be provided with a Losmandy type polar scope. In this case the item 1 shall be of the type suitable to the Losmandy scope in which the graduated scale is not provided.

Another option that greatly facilitates the polar alignment operations is the special star diagonal. This optional component allows to perform the observations through the polar scope in a more comfortable position. This option is available for both types of polar scopes.
To use the polar scope is necessary to install the provided stand on the small dovetail bar used also for the installation of the counterweight shaft (see previous chapter).

To install and regulate the polar scope, carry out the following operations:

- Mount the polar scope stand (1) on the dovetail bar (2) and tight the fixing knob (3).
- Insert the polar scope (4) into the stand hole
- Centre the polar scope by means of the two regulating knobs (5) rotating the arm around the DEC axis a verifying the centring of the scope on a fixed terrestrial target (poles, TV or TC antennas, etc.).

3.3.2. Polar alignment with a Skywatcher Polarscope

Looking though this scope, with the reticle well internally lighted, it is possible to see a reticle layout similar to this.

As is well known the Polaris is several tens of seconds from the Celestial Pole and therefore it appears to orbit around the pole at a given distance every about 24 hours. The small circle in the reticle represent the position of the Polaris. The problem here is to turn the reticle to put the circle in the position where the Polaris is seen from a given observation site, at a specified date and time. In the past this position was obtained using several types of graduated circular scales.

Presently the most adopted method to get the exact Polaris position is the use of one of the several computer programs or mobile devices applications. These programs provide the Polaris position both visually and in the hour form.

Once the Polaris position has been determined the following operations are performed:

1. Slightly loosen the knob that keep the mount fixed to the tripod base to allow its Azimuthal rotation, still keeping it safely on the tripod.
2. Slightly loosen the side knobs to allow the Latitude movement.
3. Put the polar scope in a position which is comfortable enough and tight all latches in this position.
4. Rotate the polar scope around its axis until the small circle related to the Polaris is oriented at the hour angle previously determined. To make this operation more precise,
the circular scale of the polar scope can be used. As a final check verify that the Ursa Major and Cassiopeia are oriented like the same asterisms in the sky.

5. Once confident the polar scope is correctly oriented, operate on the Azimuth regulation knobs and the teethed wheel for the latitude regulation, to centre the Polaris star exactly in the centre of the correspondent small circle of the polar scope.

6. At the end firmly tight again the altitude, Azimuth and mount to tripod fixing knobs. The mount is now aligned to the celestial North Pole.

3.3.3 Polar Alignment with a Losmandy polar scope.

The Losmandy polar scope allows an more precise alignment because it is based upon the coincidence of three star (Polaris, ℞UMi e OV Cep ) position with the correspondent locations in the scope reticle which has the following aspect:

The dotted axes shall be neglected because they belong to the Southern Hemisphere.

The alignment operations with this kind of polar scope are the following:

1. Slightly loosen the knob that keep the mount fixed to the tripod base to allow its Azimuthal rotation, still keeping it safely on the tripod.

2. Slightly loosen the side knobs to allow the Latitude movement.

3. Put the polar scope in a position which is comfortable enough and tight all latches in this position.

4. Rotate the polar scope around its axis until gap related to the Polaris is oriented at the hour angle previously determined. To make this operation more precise, the circular scale of the polar scope can be used. As a final check verify that the Ursa Major and Cassiopeia are oriented like the same asterisms in the sky.

5. Operate alternatively on the Azimuth regulation knobs, on the teethed wheel for the latitude regulation and to the rotation of the polar scope, to bring all three stars, the Polaris, the ℞UMi and OV Cep, exactly in the center of the correspondent gaps of the reticle.

6. At the end firmly tight again the altitude, Azimuth and mount to tripod fixing knobs. The mount is now aligned to the celestial North Pole.
3.3 External programs for Polar Finding

“Polar Align” Ver. 4.0 is a iOS app running on Apple’s iPhones and iPADs. This program uses the internal GPS to evaluate the geographical coordinates of the observation site to calculate the exact position of the Polaris Star around the celestial North Pole. It provides also some additional information that can be useful for a correct telescope setup.

The Polaris position is represented by a yellow small circle on a larger circular reticulum. To effectively use this app it is needed to evaluate the angle under which is the Polaris and rotate the Polarscope reticule of the same angle to bring the Polaris circle in the correct position. It should be noted that the reticule reproduce exactly the type of optical inversion caused by the Polarscope optics.

For the Android environment, for both smartphone and tablet of different brands, it is available, among others, the “Polar Finder” app that, on the contrary of the iOS app, reproduce with a good fidelity the reticula of the Polarscope (provided with the M-zero and of the Losmandy available as an option. This app is characterised by a particularly complete setup form to define the Northern or Southern Hemisphere, the type of reticule to use among the more commons, including those available for the M-zero.

The three following figures represent the setup, Polarscope and Losmandy reticule screenshots.

This app also takes the observation site geographical coordinates from the internal GPS if available, otherwise it is needed to manually insert them, for the Android devices not provided of GPS. The additional information provided by the app are similare to those provided by the iOS app but the reticula are more easily usable being them similar tho those available for the M-zero.
4. M-zero Use for “Time Lapse” Photography

Using a small optional accessory the M-zero is capable to mount a small auxiliary telescope or a photographic camera in parallel to the main telescope. This feature makes greatly easier to use the mount for long exposure pictures guiding with the auxiliary telescope, with the guarantee of a superior rigidity in comparison to that provided by tubes in parallel mount “piggyback” over the main telescope. Alternatively, a DSLR camera can be directly mounted in the place of the auxiliary tube, as shown in figure, provided of a suitable objective lens suitable for wide field or “Time Lapse” photographs. This last feature is also facilitate by the fact that the StarGO control system is designed to directly control DSLR camera for the mentioned type of photographs. In this section only the mounting of the camera on the M-zero and its electrical connection to the StarGo is described. More detailed information of the DSLR use with the StarGO are dealt in the StarGo manual.

Mechanical installation

Mount the optional accessory with the dovetail female bar (1) on the opposite site of the main telescope.

Mount a male dovetail Vixen type bar (3) under the DSLR (2) camera using a photographic pitch screw.

Insert the male dovetail bar inside the female one and firmly tighten the Knob (4)

The electrical connection of the DSLR to the StarGO panel is performed as follows, having care of switching of both devices.

On the camera:

Rise le rubber tab (1) on the DSLR side to expose the plugs.

Insert the jack (2) of the cable (not provided) in the plug (3) for the external command of the camera.
On the StarGO side:

Insert the jack in in the extreme of the cable into the plug (2) of the StarGO panel labelled DSLR.

Switch on both camera and StarGO: The DSLR is now ready to be controlled by the StarGO.

To upload the pictures to the PC it can be necessary to use a specific USB cable.

5. StarGO installation and use – Quick user Guides

As regards the installation and use of the StarGO system and related software, please read the dedicated document inside the “StarGO” folder of the supplied USB pen.

If third part software should be used for the mount management and, in case of astrophotography, to managed the specific operations, please read the dedicated document, which is located inside the “Installer – Tutorial – Software” of the USB pen.

Furthermore, to guide the operator for a quick setup of the mount and the other accessories, a set of Quick Guided have been prepared to synthetize, step by step, the operations to perform to start in a quick and efficient manner the visual and/or photographic activities. These guides are located inside the “Quick Guides” folder of the USB pen.

It is warmly reccomended once again to install all the supplied documentation files on a smartphone or a tabled to get the possibility to have ready all the informations in case of needs.