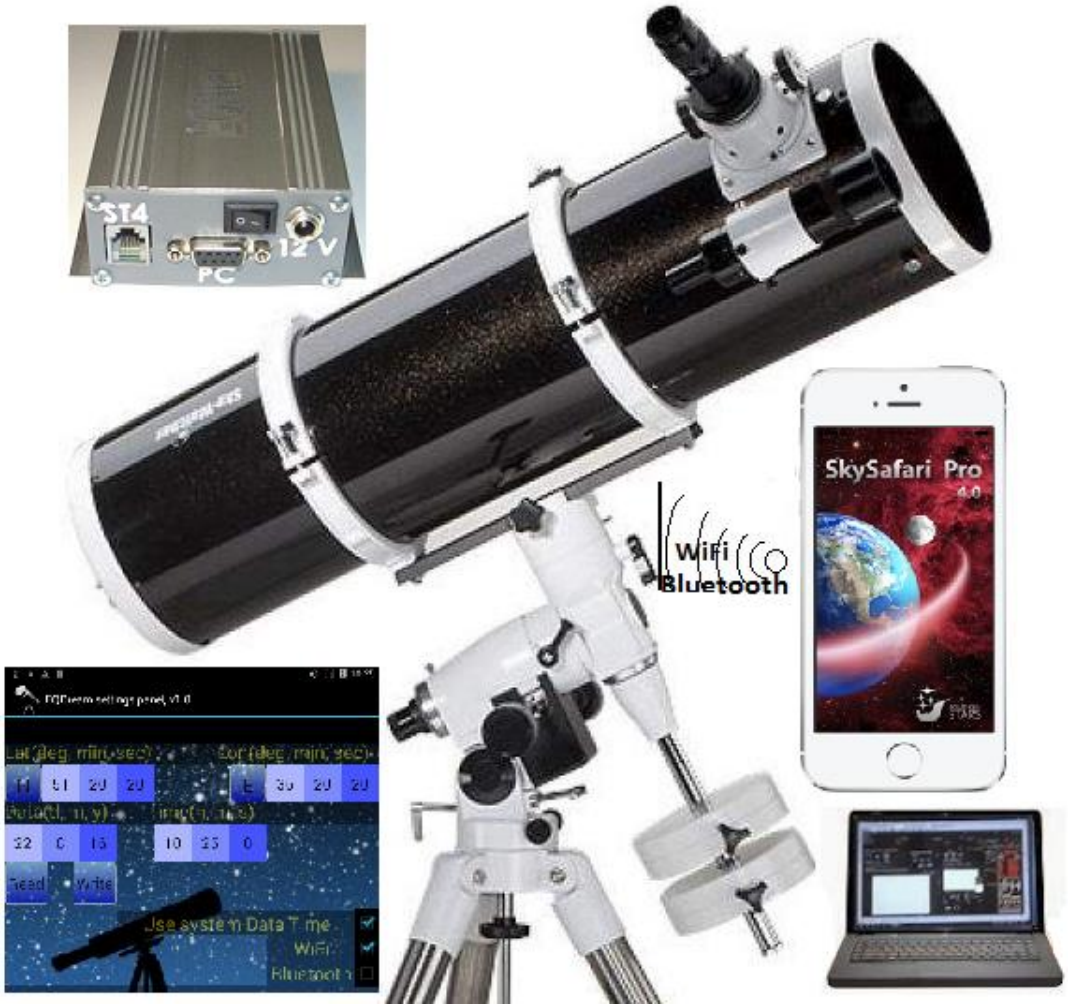
EQStar +

Equatorial mount control system

User guide



AstroGadget 2018

1. PURPOSE AND OPPORTUNITIES

EQStar control system, further CS, designed to automate the control of the equatorial mount, and can be used in stand-alone mode and in a control mode using a computer or mobile device (phone, tablet, etc.).

On a PC, then the CS works with any astronomical programs that support the ASCOM platform (http://www.ascom-standards.org/). For example, with planetarium Stellarium, Cartes de Ciel, StarCalc and others. Among the programs for astrophotography and guiding, CS supports MaximDL, Guidemaster, PHDGuiding and others. When you work with a PC, the CS can automatically find sky objects, and track them automatically (guiding) during the astro photography with long exposure. Also, when working with a PC, you must install EQMOD ASCOM-application (http://eq-mod.sourceforge.net/).

telescope control with mobile devices, further MD, can automatically find sky objects. In the program the planetarium at MD as a control of the telescope should be chosen or Celestron or SynScan, as well as a mount - German equatorial mount. The following programs for MD works with CS include SkySafary, Orion StarSeek, DSOPlaner and others.

CS communication with the PC is via a cable from the standard kit and with the MD over WiFi.

A variety of platforms, drivers, and applications that can work CS, gives the opportunity to create a particularly comfortable for the user mount the control conditions, depending on the tasks.

For example, an astro photographer generally uses a laptop or PC to search, targeting and guiding the object during a long exposure. Such opportunities are mostly programs running under Windows. But for an amateur visual astronomy much more convenient to control the mount with a compact MD, smartphone or tablet, rather than using a PC or laptop.

The CS is supplied with a universal joystick for manual control. It allows you to manage mount autonomously without a computer, smartphone or tablet.

The following schematically shows the basic configuration when working with CS.

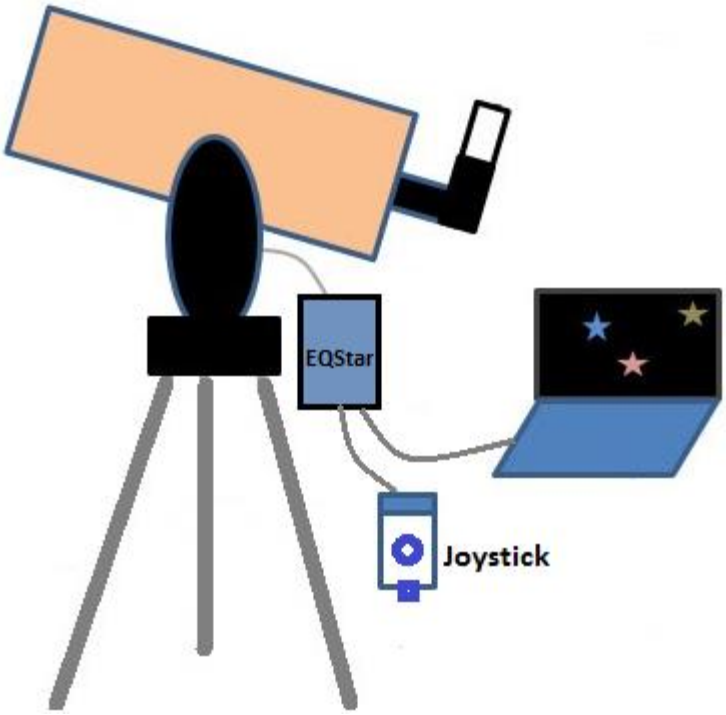


Fig.1 CS in the PC control mode.

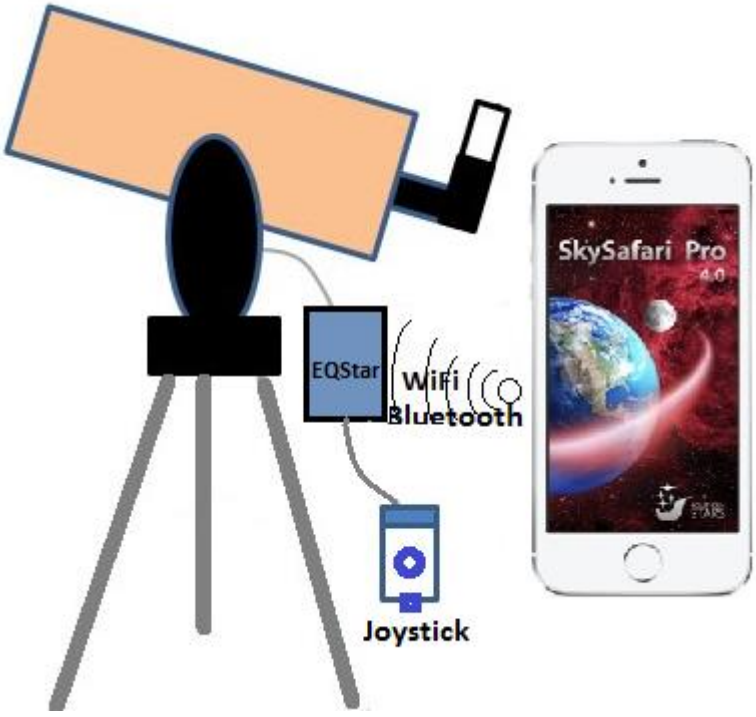


Fig.2 CS in the MD control mode.

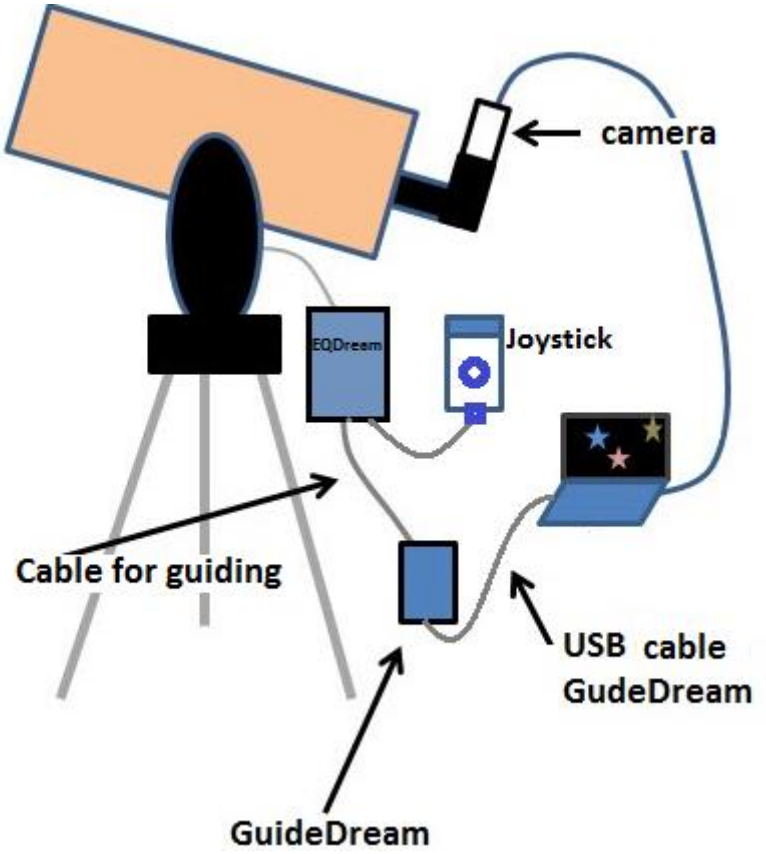


Fig.3 CS in astrophotography mode.

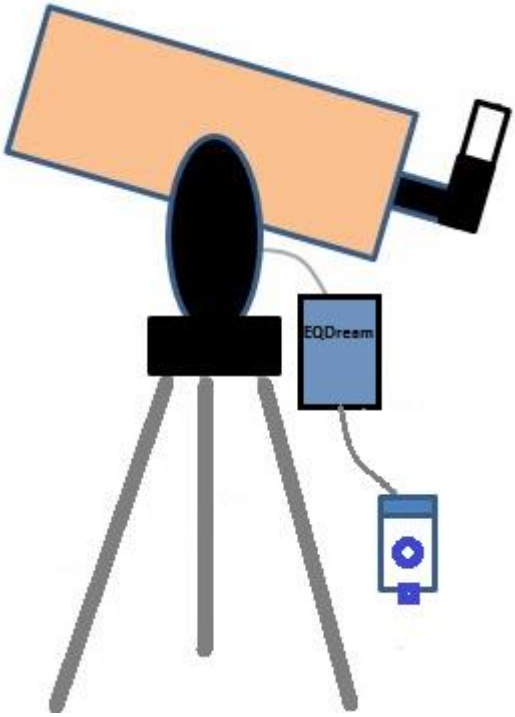


Fig.4 CS in offline mode.

2. KIT

Packages contains:

- EQStar equatorial mount control unit
- Joystick for a stand-alone mount control
- DB9-USB cable for connection of EQStar to PC
- Set of cables for the motors connection
- Wi-Fi adapter for mount control from the mobile device
- CD with software and user manual

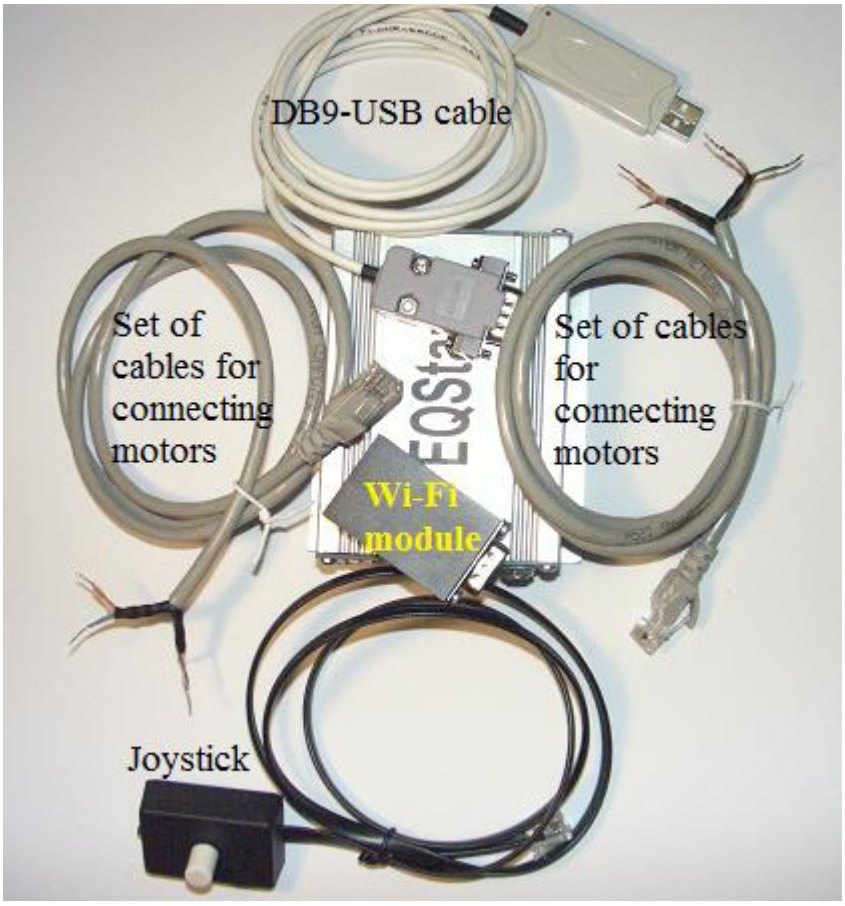


Fig. 5

3. GETTING STARTED ON THE EXAMPLE MOUNT EQ5

3.1. PC control

Install as shown in Fig. 6, the drive motors of the axes on the mount.

Fig. 6

3.2 Connect the motors with standard cables to CS as shown in Fig. 6a

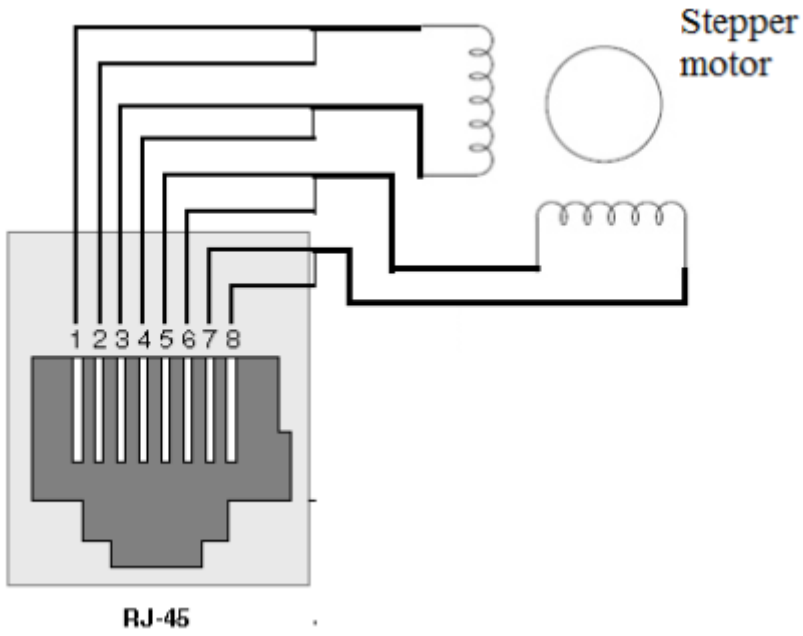


Fig. 6a

3.3 Install the driver virtual com-port from a CD software

After you install the equipment in system will be new device - Silicon Labs CP210x USB to UART Bridge (COMx).

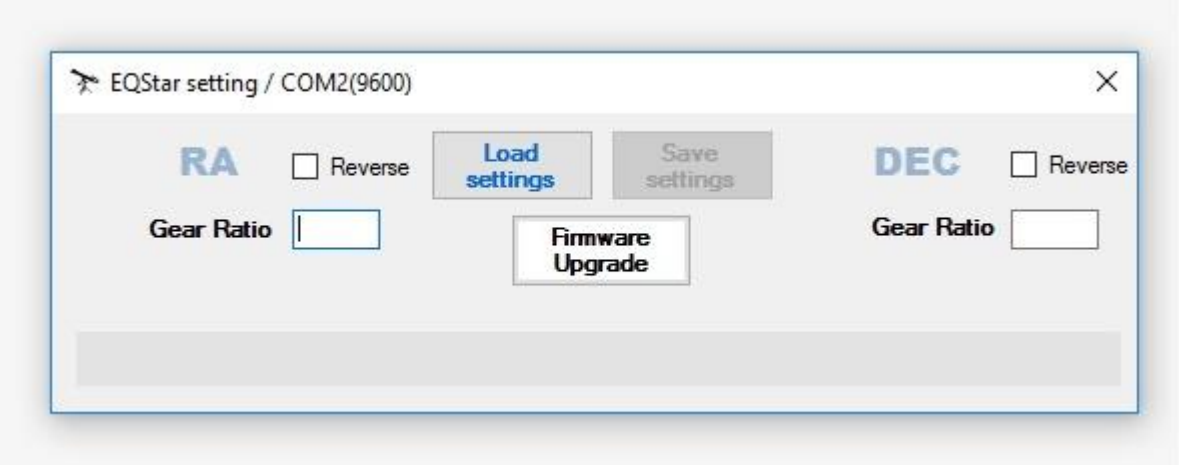
3.4 Install a platform ASCOM Platform 6.x. (http://www.ascom-standards.org).

3.5 Install EQMOD Ascom driver located on the CD software.

3.6 Connect the DB9-USB cable to your computer's USB port

3.7 After turning on the power, you will hear a beep that shows the readiness of the CS to control from the PC.

3.8 Read the settings of the control unit using the EQStar setting application, which is located on the CD with the software. If they do not match the required settings for the mount, change and save the correct settings.



Caution: The EQStar setting may not work if you do not have the Framework 4.0 and vs2013 redistributable x86 installed on your computer.

3.8 In order to control the mount with MD on it should set planetarium program. For example SkySafary, Orion StarSeek, DSOPlaner or the like.

4. PC control

4.1 AUTOMATIC OBJECT SEARCH (GoTo)

Before beginning work , the on PC must be installed ASCOM platform and EQMOD driver telescope.

Mount must be properly exhibited in the level and relative to the direction to polar star.

Next to a planetarium program on your PC, select Menu ASCOM telescope EQMOD, and in his installations, select the COM port. COM port number can be identify by name CP210x USB to UART Bridge (COMx) at manager Windows hardware. Now you can connect to the planetarium CS. After successful connections must be made to align to the telescope according to the instructions on the application EQMOD (http://eq-mod.sourceforge.net/tutindex.html). The telescope is now "knows" the object on which he directed. At this telescope is align completed and you can snap produce guidance on the desired object. To do this, you need to specify the mouse in planetarium program search object and clicking the right mouse button to select click "Goto" menu. After the end of the movement to be followed by the search object sound signal. Now the desired object in the field of view of the telescope and you can proceed to his observation.

4.2 ASTRO PHOTOGRAPHY WITH LONG EXPOSITIONS

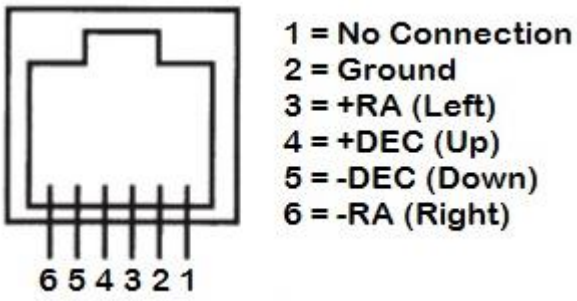
For photographing space objects with long exposures, compensation for telescope tracking errors is required. For this, the CS supports two options for guiding:
through the port Autoguide ST-4 - AutoGuider Port, and pulse guide - ASCOM PulseGuide from EQMOD.

The parameters of the guiding in both modes are set from the panel
EQMOD Applications
(http://eq-mod.sourceforge.net/docs/EQASCOM_Guiding.pdf).

For the ASCOM PulseGuide mode, not required additional blocks and cables. Enough as an auto guide, use ASCOM EQMOD app.

Further actions for guiding follow the documentation for EQMOD.

It is also possible to stand-alone guide through the ST-4 port without using a PC. For example, if a camera is used for astrophotography, then a laptop or PC is not needed. Photos can be saved on the flash memory of the camera. In this case, Skywatcher SynGuider - Stand Alone Autoguider can be used as an auto-guide. At the same time, the EQStar must have stand-alone guided mode enabled via the ST-4 port. To enable stand-alone guided mode, first connect the joystick to the EQStar. Press and hold the MODE button for 5 seconds until a long beep sounds. EQStar has now switched to stand-alone mode guided via the ST-4 port. By default, the guiding speed is set to x0.5 for each axis. The RA + button allows you to set 3 guiding speeds for the RA axis - x0.5, x0.75 and x1.0. With the DEC + button you can set 3 guiding speeds for the DEC – x0.5, x0.75 and x1.0 axes. Moreover, each press will lead to a change in speed in a big direction, and will be accompanied by corresponding sound signals. To deactivate the autonomous powering mode, also press and hold the MODE button for 5 seconds.



Pinout port ST-4 EQStar

5. MOUNT CONTROL FROM MOBILE DEVICES.

5.1 Follow steps 3.1, 3.2.

5.2 Connect the mount control unit to the WiFi module using the DB9 connector. After turning on the power a signal will sound, indicating that the CS is ready to mounting control with MD. Mount the telescope should be correct align a level and relative to

the direction of the polar star. Trumpet the telescope should be directed to the area of the polar star.

5.3 Check the date, time and location of the observation position using the utility EQStar settings panel, which must be installed before the start observations at MD.
The installation file is on the original CD.
If necessary, data on the time and place of observation can be adjusted and saved in the CS. If the data on time and the place of observation will not correspond to the actual one, the telescope pointing may be in error.

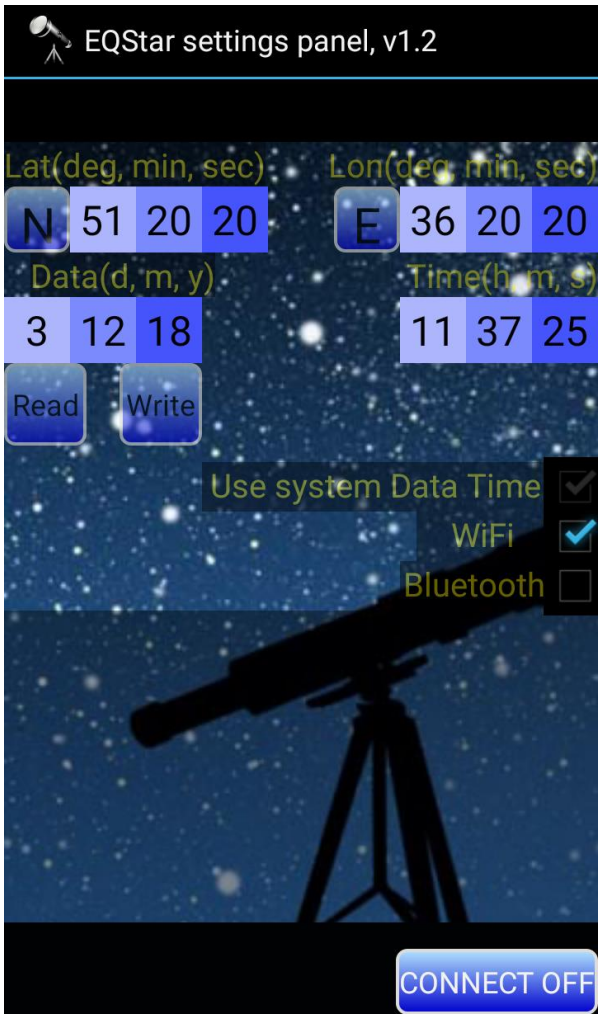


Fig. 7 Utility to set the time and place of observation.

5.4 For WiFi connection between the MD and the CS, use the following parameters: SSID - EQStar, password - 12345678. Parameters connections for programs of planetariums: ip address - 192.168.0.1, port - 1234.

The settings of the WiFi module can be changed from the WEB interface as shown in the figure 7a.

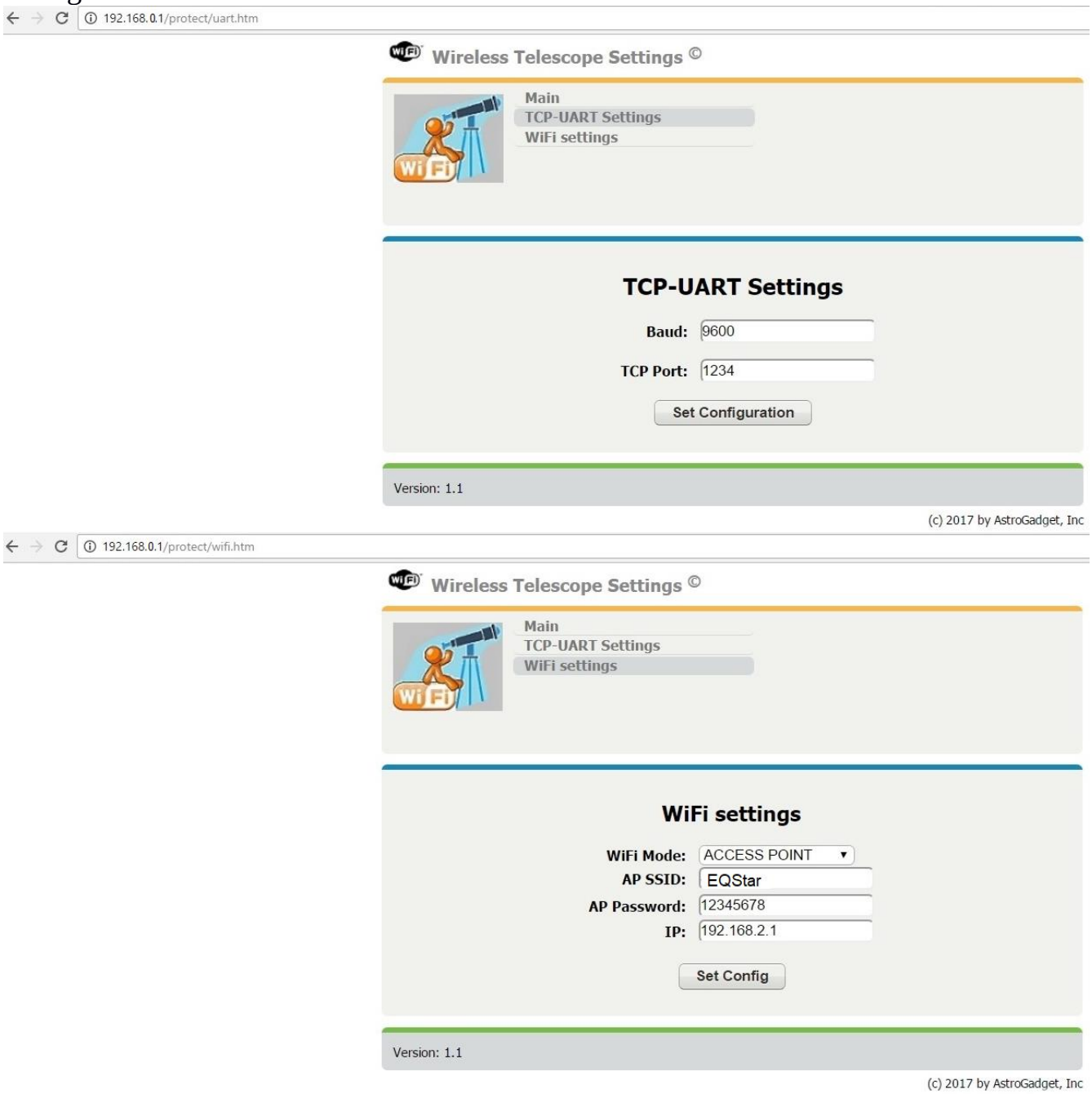
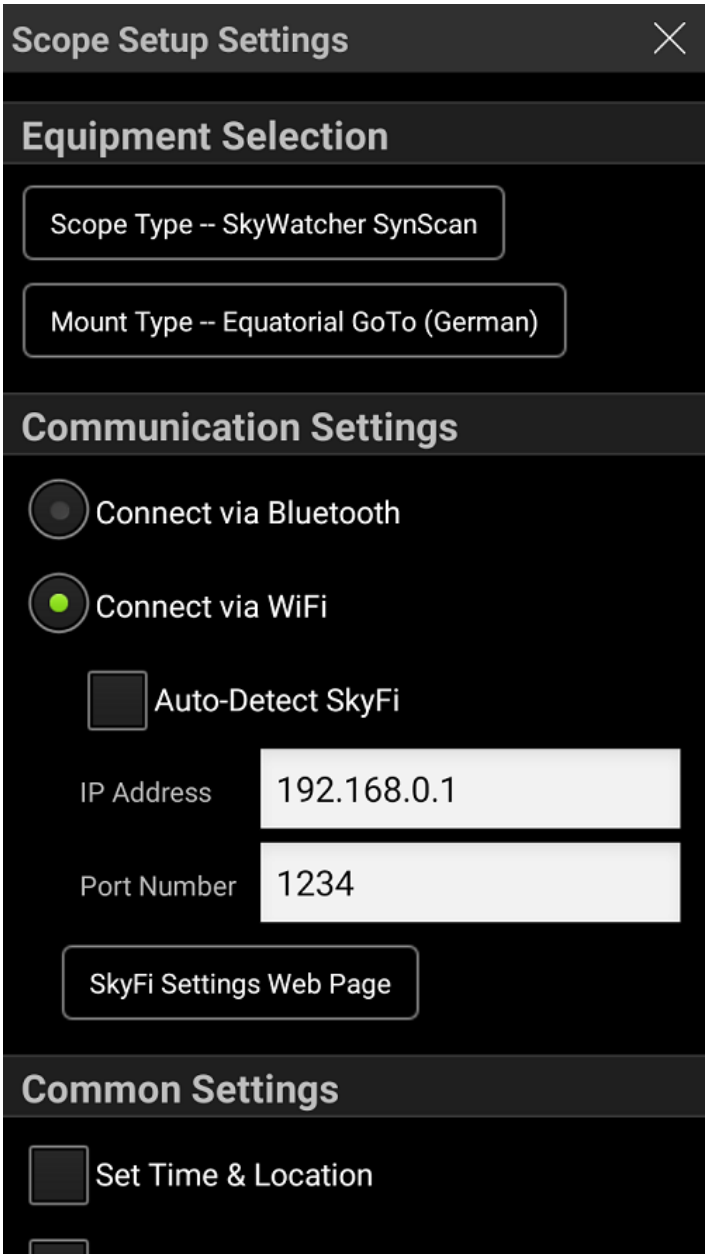


Fig. 7a

In the planetarium program on the mobile device (for example in SkySafari) , select the connection method by "WiFi", and write down the ip address and port in the required fields. Connect the planetarium to the CS.



After a successful connection, you must bind the telescope to the visible star. To do this, select the star of the binding by touching its image on the screen and press the "Goto" button on the control panel of the planetarium program. The CS will begin the process of pointing at the selected star. After finishing the movement of the telescope, center the image of the star in the crosshair of the finder, and then in the center of the eyepiece with the buttons of the regular control panel. If the star in the crosshairs of the planetarium finder corresponds to a star in the center of the telescope's eyepiece, click "Align" on the control panel of the program. Now the telescope "knows" the object to which it is directed. At this point the telescope's binding is complete and you can make an aim at the desired object. To do this, you need to select a search object in the planetarium program, on the MD, by touching its image. Then click "Goto" button on the control panel of the program. The CS will start moving the telescope to the selected object. After the end of the movement, an audio signal will follow, and the crosshairs of the planetarium program finder will point to the search

object. The very same object will be in the field of view of the telescope and now you can proceed to its observation. In the process of guidance from the object to the object, the accuracy of the guidance may be lost. The reason for this may be the errors of the polar axis, errors in the mechanics of the telescope, etc. Therefore, it is recommended to periodically tie the telescope on a visible star, as described above.

6. CONTROL STAND-ALONE (OPERATION joystick)

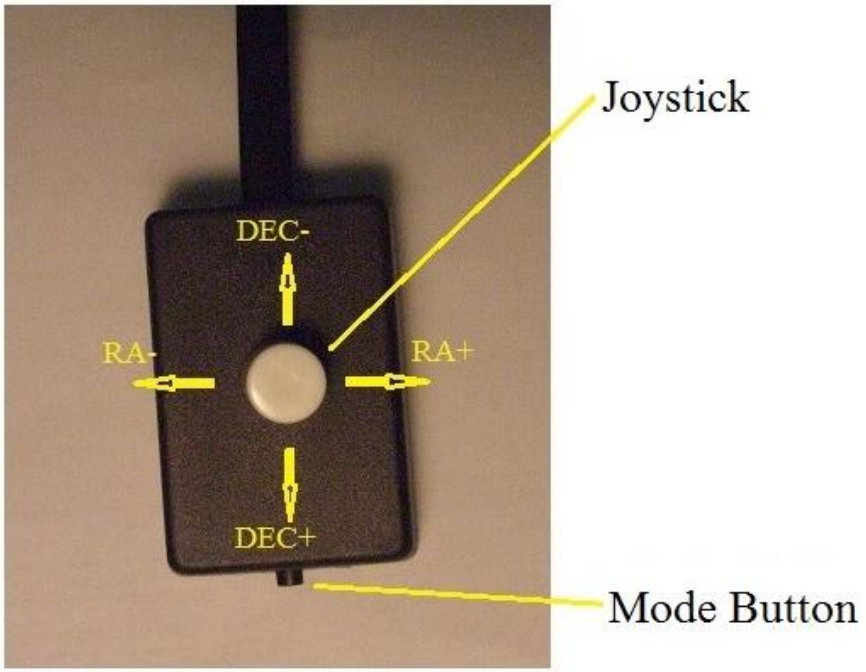


Figure 8

6.1. Follow steps 3.1, 3.2.
6.2 Connect the control unit to the mount with the joystick of the manual control.
6.3 After switching on the power, beeps will sound, that indicates that the CS is ready for operation and will begin tracking with a stellar speed.
6.4 The switching speed of the mount is made using the joystick positions Ra + and Ra- while holding down the Set button. Each speed selection Is confirmed by a short sound signal according to the following scheme: 1 beep -stop, 2 - siderial, 3 - lunar, 4 - solar speed.
6.5 Switching speed correction of the mount is made with using the joystick positions Dec + and Dec- while holding down the Set button. Every choice speed is confirmed by a long sound signal according to the following scheme: 1 beep - x20, 2- x65, 3- x200, 4- x500.

Technical characteristics:

- Mount type: equatorial
- Power supply requirements: 12V, 3A, 5.5mm 2.1mm plug
- The center pin of the power connector is positive
- Compatible type of stepper motor (not included in the KIT): bipolar
- Current of the winding of the stepper motor: adjustable, 0.8 A (max)
- RA and DEC reduction ratio: adjustable (from 1:100 to 1:1300)
- Smooth acceleration and braking of the stepper motor