SimpleDreamEQ2

Upgrade kit equatorial mounts Synta EQ2, Celestron CG3

User guide

Micro GoTo system

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1.   **DESCRIPTION**

The kit consists of a control unit and a set of drives consisting of a direct drive for the RA axis and a complete set for replacing the standard drive of the DEC axis with a worm drive.

The SimpleDreamEQ2 mount control system, hereinafter simply the SD, is designed to automate equatorial mountings of Synta EQ2 or Celestron CG3 and their analogs, and can be used both in stand-alone mode and in control mode from a PC or mobile device.

The set of worm drive drives the declination axis, designed to replace the standard drive with a worm.

This SD, thanks to the Micro GoTo function, has the ability to automatically, quickly and accurately find objects of space within a given sector of the celestial sphere and accompany them at different speeds.
With the Guide function, you can create astro photographs with large exposures.
Thanks to the built-in WiFi access point, it allows wireless control of the mount from the programs of planetariums running Windows, Android or iOS.

Speeds modes of SD:
Tracking speeds - sidereal, moon and solar.
Slewing speeds - x10, x30 and x60 stellar speed.
Guiding correction speeds - x0.5, x.75 and 1.0 stellar speeds.
The speed of slewing in Micro GoTo mode is x60 sidereal speed.

For the Windows OS, in Micro GoTo mode, the SD can work with any astronomical programs that support the ASCOM platform. For example, with the planetariums Stellarium, Cartes de Ciel, StarCalc, etc. At the same time, the ASCOM platform and the Meade Generic LX200 telescope driver should be installed on the PC.
When working in the Guiding mode, the SD can work with programs for astrophotography. For example, with such as MaximDL, Guidemaster, PHDGuiding, etc. At the same time, the ASCOM platform and GuideDream driver should be installed on the PC, and the ST-4 port on the SD must be connected to the GuideDream (optional) with a special cable, and the unit itself is guiding with a PC USB cable.

For the Android and iOS OS, in Micro GoTo mode, the SD works with SkySafary, OrionStarSeek, and others programs, while the telescope Meade Classic LX200 is selected as the telescope in the programs.

The variety of platforms, drivers and applications with which the SD can work, makes it possible to create for the user particularly comfortable conditions for controlling the mounting depending on the tasks assigned.

For example, an astro photographer generally uses a laptop or PC to search, targeting and guiding the object during exposure. Such features are mostly programs running on Windows. But for a lover of visual astronomy, for searching and pointing at objects, it is much more convenient to control the mount using a compact smartphone or tablet, rather than using a computer or laptop.

1. PREPARATION FOR THE WORK OF SD

Install according to **Fig. 1**, axle drive motors for mounting.
Connect the motor control unit with motor cables from of the complete set.

Fig. 1

IMPORTANT: For reliable and long-term engine operation, clamping of worm screws to gears must have a slight backlash. In the absence of this backlash, the worm screws will be strongly pressed against the gears, which can lead to missing the steps and even engine failure!

In **Fig. 1a** red marked screws (bolts) for adjusting the clamping of worm screws to gears for RA and DEC axes.


Fig. 1a

IMPORTANT: After installing the drive on the declination axis, the standard brake screw of this axis (in Fig. 1b is highlighted in yellow) must be in the released state during the operation of the mount. Otherwise, the declination axis drive motor may be damaged. The fixation of the declination axis during operation is carried out by clamping the screw to the pinion. To unlock the declination axis for manual rotation, it is necessary to disengage the pinion and the worm screw by rotating the spring-loaded handle marked in **Fig. 1b**, in red.

 The standard brake screw of the declination axis can serve to fix it only during transport.

Fig. 1b
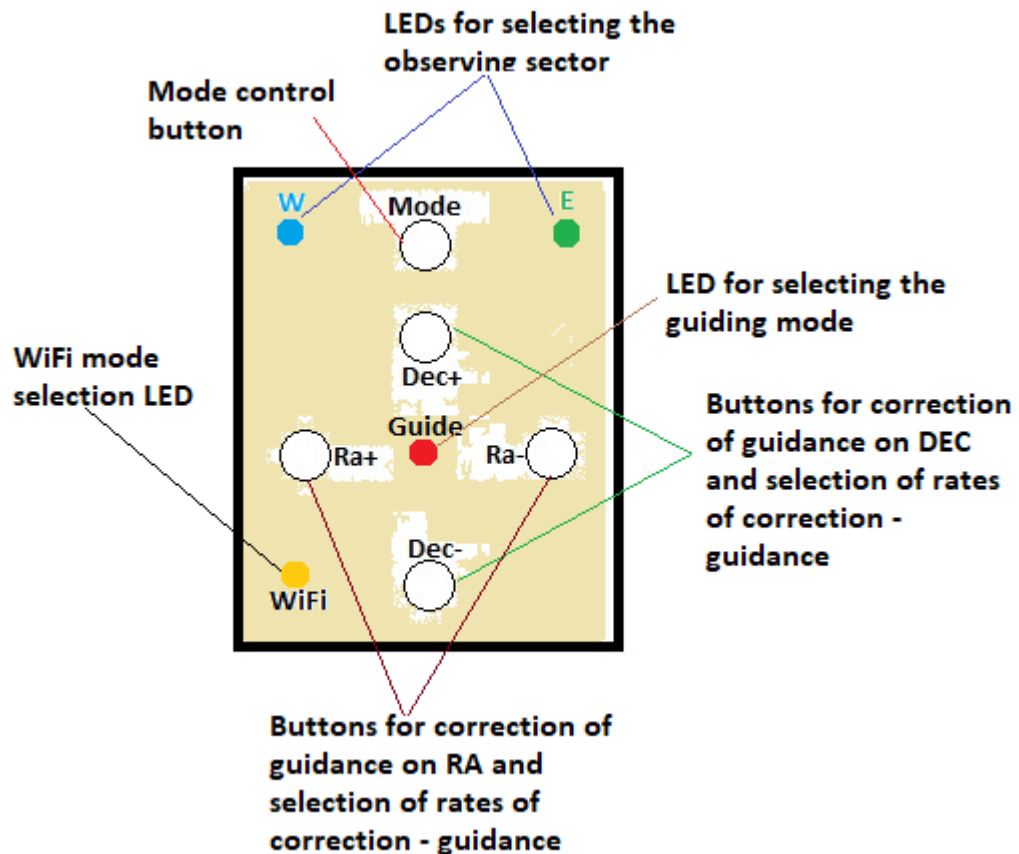
Fig.2 Purpose of buttons and LEDs

1.1 Standalone mode.

Turn on the DS by connecting the power cord. After the beep (... -), the DS will be in the following default modes:
The tracking speed - sidereal.
The slewing speeds is x10 sidereal speed.
WiFi mode- off.
Guiding mode - off.

1.2 Micro GoTo mode, control from PC or mobile devices.

While holding down the Mode button on the remote, connect the power cord to the the keyboard unit.
After a beep (... -) and a yellow light
LED, the SD will be ready to connect via WiFi to the PC, to the smartphone or a tablet as an access point.

WiFi connection settings: SSID - SimpleDreamEQ2, password - 1234.
Connection parameters for planetarium programs: ip adress-
192.168.0.1, port - 1234.
After the power is supplied, the SD will be in the following
default:
The tracking speed - sidereal.
The slewing speeds is x10 sidereal speed.
WiFi mode - enabled.
Guiding mode - off.

2. Work in standalone mode.

Before starting the observations, the mount must be correctly positioned
by the level and relative to the direction to the polar star. To the selected
The telescope object can be guided manually by loosening the mount brakes
and moving the hands of the tube until the object appears in the field of view of the
eyepiece or crosshairs of the finder. Further fixing the brakes, bring the object into
center of the eyepiece using the buttons on the control panel. After this, selecting
the necessary speed of reference can go to observation. During
Observation object can slowly escape from the field of view, because of errors
setting the polar axis. Having established a convenient correction speed, you can
compensate for this withdrawal with the correction buttons.
Also, the telescope can be directed to the desired object using the buttons
console, while setting one of the speed of slewing. But with this
slewing over distances of more than 15 degrees will require more
time, than when moving the telescope tube manually. This is due to the fact,
that the maximum guidance speed does not exceed x60 sidereal speed.

## 3. Operation in the mode Micro GoTo.

The automatic search mode of Micro GoTo objects works by the principle:
"snap to star - slewing - snap to star - slewing - etc.", and the distance from
star binding to the object of guidance should not exceed 15 degrees.
It is also necessary to choose an area east or west, in which there will be
observations. To do this, press the button momentarily
"Mode". The observational sector will correspond to the color of the LED: west
blue, east green.
Before starting the observations, the mount must be correctly positioned
by the level and relative to the direction to the polar star

Initial the direction of the telescope tube should be in the vicinity of the polar star.
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3.1 Control from mobile devices.
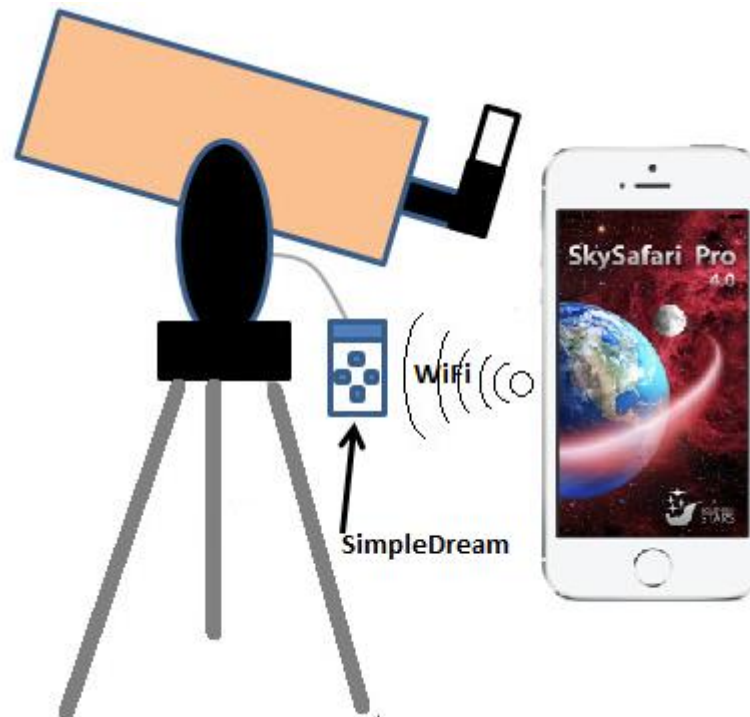
Fig.3 SD in the control mode from mobile devices.

Establish a WiFi connection between the mobile device and the SD using the parameters in section 2.2. In the planetarium program on the mobile device, select the connection method by "WiFi", and write in the necessary fields ip address and port from p.2.2. Connect the planetarium to the SD. After a successful connection, you must bind the telescope to the visible star, which is at a distance of no more than 15 degrees from the search object. To do this, manually or from the keyboard, aim the telescope at the selected star, select the same star in the planetarium program on the mobile device by touching its image, and press the "Align" button on the control panel of the program. The crosshairs of the planetarium seeker move to the binding object. 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, select a search object in the planetarium program on the mobile device by touching its image, and press the "Goto" button on the control panel of the program. If the distance to the search object does not exceed 15 degrees, the telescope will move to the search object. Otherwise, the error signal will be followed by a long beep. That means exceeding the distance from the binding object to the search object. After the end of the movement, a short beep will follow, and the crosshairs of the planetarium program finder will point to the search object. Now the desired object is in the field of view of the telescope and you can proceed to its observation in the eyepiece.

4.2 Control from PC.
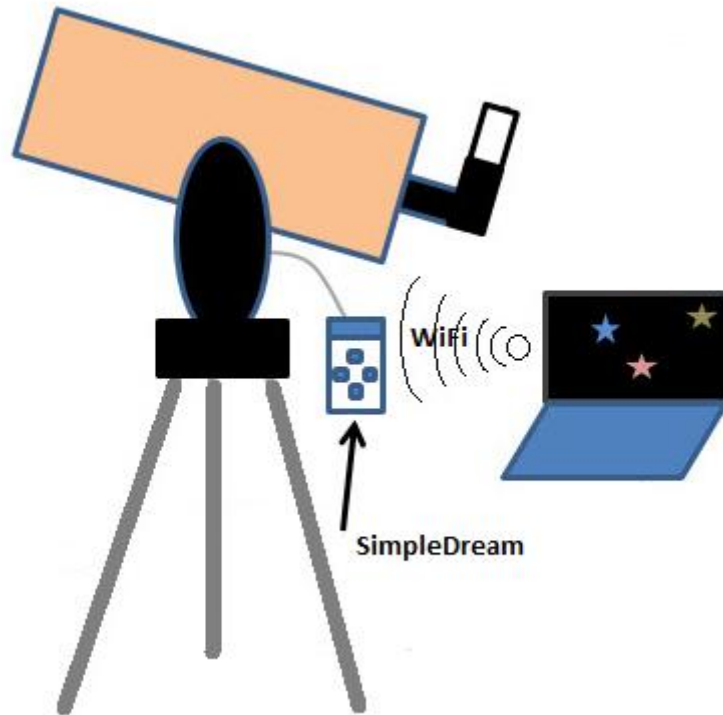
Fig.4 SD in control mode from PC.

Before you start working in this mode, you need to install it on your PC ASCOM platform 6.x (http://www.ascom-standards.org/) from the folder
drive: \ TelescopDriver \, located on the original CD drive, install the driver of telescope Meade Generic LX200.
Connect the PC via WiFi to the SD using the parameters from item 2.2. The planetarium program on the PC uses the COM port connections and does not support WiFi connections. Therefore, you will need to create a software bridge WiFi <-> virtual COM port. To do this, copy the folder: \ Tcp-Com Bridge \ folder from the original CD to any disk on your PC. Then from this folder run the file USR-VCOM.EXE, and register the bridge settings as in the example in Fig 5.
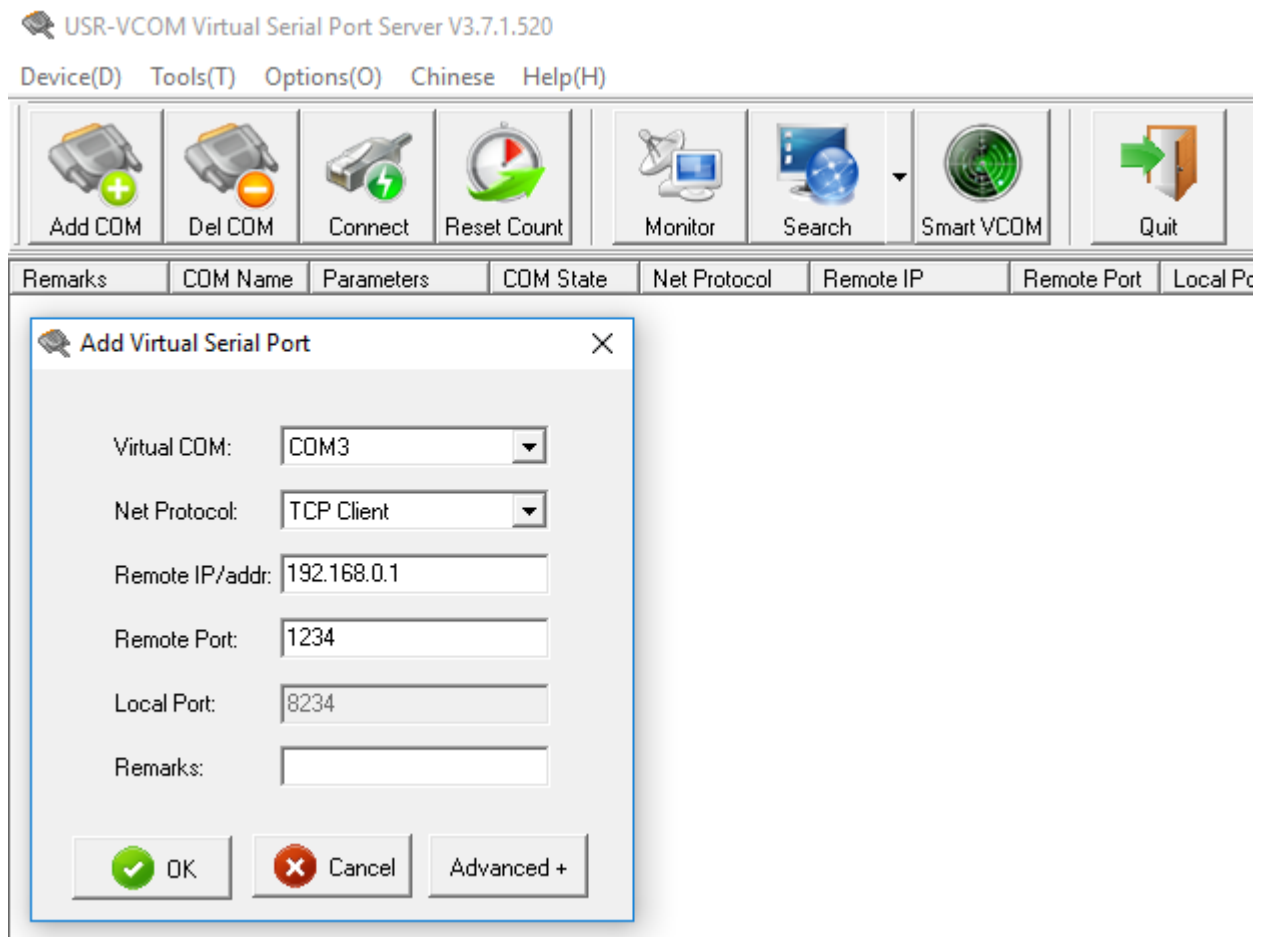
Fig.5 Settings for creating the WiFi - COM port of the bridge.

Further in the program of the planetarium on the PC, select in the ASCOM menu the telescope Meade Generic LX200, and in the settings of this telescope, the virtual COM port. Now you can connect the planetarium to the SD. After a successful connection, you must bind the telescope to the visible star. To do this, manually or from the keyboard, aim the telescope at the selected star, select the same star in the planetarium program with the mouse, and select the "Synchronize" menu item by pressing the right mouse button. The crosshairs of the planetarium seeker must move to the binding object. 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 must specify the search object in the planetarium program with the mouse, and select the "Goto" menu item by pressing the right mouse button. If the distance to the search object does not exceed 15 degrees, the telescope will move to the search object. Otherwise, an error signal will be output in the form of five long beeps. That means exceeding the distance from the binding object to the search object. After finishing the movement, a short beep will follow the search object. Now the desired object is in the field of view of the telescope and you can proceed to its observation in the eyepiece.

5. WORKING IN THE MODE Guide.
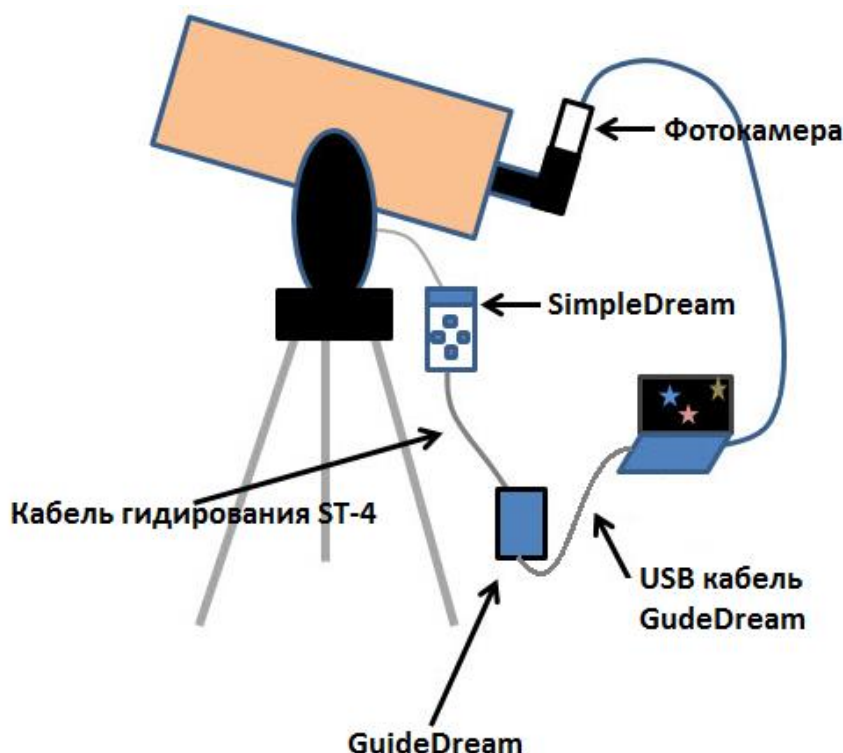
Fig. 6 SD in the astrophotography control mode.

This mode is designed to compensate for the errors of tracking during photographing at long exposures. To work in this mode, you need an additional unit GuideDream (optional), (GD) which converts the commands from the PC to the corrective pulses for SD. To the PC, the GD is connected via USB, and to the SD via the ST-4 port. When working in the Guiding mode, the SD can work with programs for astrophotography such as MaximDL, Guidemaster, PHDGuiding, etc., which support the ASCOM platform.

Before starting work in this mode, you need to install ASCOM platform 6.x (http://www.ascom-standards.org/) on the PC. Next, install the GD driver and the USB-COM port driver. The ST-4 port located on the SD must be connected by means of a special cable with the GD unit, and that in turn with a PC, USB cable. Drivers GD and USB-COM ports are located in the drive: \ GuideDrem \ folder on the original CD. After installing all the drivers, in the ASCOM menu of the guiding program you need to select GuideDream ASCOM driver, and in its properties the COM port of the connection to the GD block. The COM port number can be identified by the driver name in the Windows Hardware Manager. Next, you need to establish a connection between the guiding program and the GD block by pressing the corresponding button in the program for the guiding program. After that, using the Micro GoTo mode, hover over the object for astrophotography. Center it in the center of the frame. Then hold for 2-3 seconds. button Mode on the SD switch to the

Guide mode, which will be signaled by a red LED. Further actions for guiding according to the documentation for the guiding program.

6. COMPLETE SET

1. Keyboard and control unit for mount.
2. A set of parts and brackets with motors for two axles.
3. CD disk with software and user manual SD.

Fig. 7 COMPLETE SET

7. APPENDIX

a. Sound alarm.

For the convenience of describing the tuning of the SD, we introduce a brief notation for combinations of audio signals:

(.) is one short.
(-) is one long.
For example, after the power is applied, the following combination sounds: (... -),
which corresponds to three short and one long signal.

b. Assigning buttons and their combinations.

Each of the set modes corresponds to a certain audible alarm, which is indicated
in parentheses.

Button "Mode" = short press: (.) Select the search sector - observations. Color
signaling: west - blue, east - green.

Button "Mode" = long press :(..) on / off. the Guide mode.
Color alarm: on. - red led lit, off. – red led extinguished.

Button "Ra +" = correction, slewing .
Mode & Ra + = choice of speed of tracking:

          siderial (.)
          lunar (..)
          solar (…)

In the guiding mode (red LED lit):
Button "Mode & Ra +" = speed selection guiding ascending:
          x0.5 (.-)
          x0.75 (.- -)
          x1.0 (.- - -)

Button "Ra -" = correction, slewing .
Button "Mode & Ra" - = choice of tracking speed:
          solar (…)
          lunar (..)
          siderial (.)

In the guiding mode (red LED lit):
Button "Mode & Ra" - = select the speed of the guiding in descending order:
          x1.0 (.- - -)
          x0.75 (.- -)
          x0.5 (.-)

Button "Dec +" = correction, slewing .
Button "Mode & Dec" + = selection of hover speed in ascending order:
         x10 (-)
         x30 (- -)
         x60 (- - -)

Button "Dec-" = correction, slewing .
Button "Mode & Dec-" = hover speed selection in descending order:
         x60 (- - -)
         x30 (- -)
         x10 (-)