# Nexus DSC
# Quick Setup Guide

NGC2808

← 82.2  ↓ 49.4

21:57:21  75%
9h 12m 3s
-64° 51' 46"

GLOBULAR IN CARINA

| 7 | 8 | 9 | ESC | OK |
| 4 | 5 | 6 | 0 | ▲ |
| 1 | 2 | 3 | ◀ | ▶ |

OFF ⬜ ON    Nexus DSC    ▼

astro
DEVICES

# Nexus DSC - Quick Setup Guide

## Copyright

## Precautions and Safety

Electricity

**Nexus DSC contains a rechargeable Lithium-ion battery. Lithium-ion batteries can explode or cause a fire if they are used incorrectly or if they are defective. Therefore, you are recommended to read the following instructions very carefully:**

NEVER leave Nexus DSC where it is subjected to extremes in temperatures. This includes low levels as well as high.

DO NOT leave Nexus DSC where it is in direct sunlight or in an enclosed space, such as a car, that can become extremely hot very rapidly.

Do not drop or subject the Nexus DSC to impact.

Use only approved power adapter to charge your Nexus DSC.

Do not handle power plug and adapter with wet hands. Electrical shock may result. Immediately power off the product and unplug the DC adapter and/or batteries if smoke or odours emit from the product. Immediately power off the product and unplug the DC adapter if water or other liquids are present.

Product

Keep it away from harsh environments including humid, dusty, and smoky areas.

Do not use excessive force on the connectors or attempt to disassemble the device without prior consultation with Astro Devices.

Do not place heavy objects on the product. Damage to your products may result from improper use.

## Technical Support

# Thank you

Thank you for purchasing Nexus DSC digital setting circles telescope computer. We hope you enjoy it! This Guide will get you started with your Nexus DSC.

# Introduction

Nexus DSC is a digital setting circles computer with optional WiFi interface for your telescope. It works with most popular telescopes – on equatorial or Alt-Azimuth mounts.

Nexus DSC is a very sophisticated device for locating celestial object in the sky. Only two rotary encoders are required to be fitted to your telescope in order to be able to locate celestial object with Nexus DSC.

# System Requirements

Nexus DSC uses a an optional WiFi communication module and may be connected to one of the following:
- iOS devices (iPhone, iPad, iPod touch) running iOS 3.0+
- Android devices with WiFi support
- PCs with WiFi support (running Windows XP or Windows 7/8).
- Apple computers with WiFi support (running Mac OS X).

Please also refer to the system requirements for your favourite planetarium software.

# Package Content

The package contains:
- Nexus DSC
- Quick setup guide and User manual
- DC 2.1mm to cigarette lighter power cable
- USB to DC 2.1mm cable
- *Optional* power adapter

# Unpacking

Nexus DSC has a protective film covering the front panel. Please peel it off to be able to see the display clearly.

# Controls

All controls are situated on front panel of Nexus DSC:
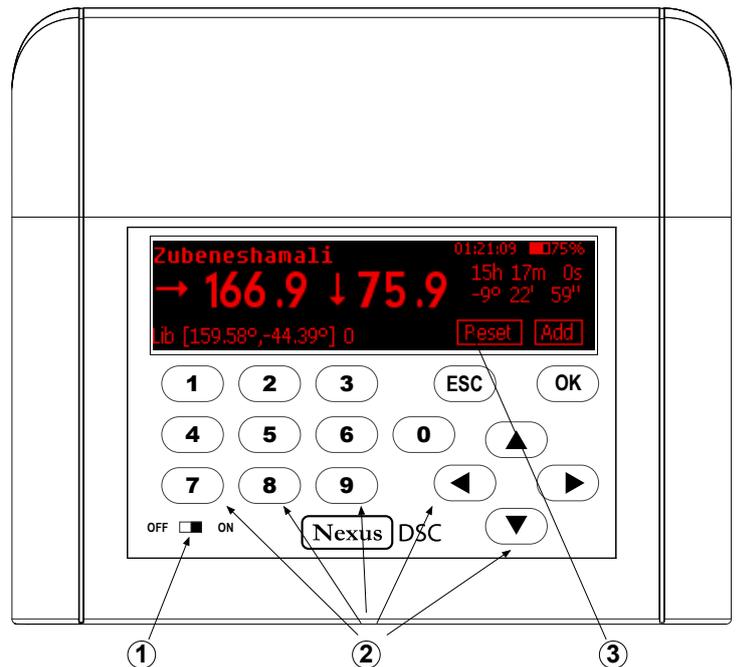


① – power switch
② – keypad
③ – display
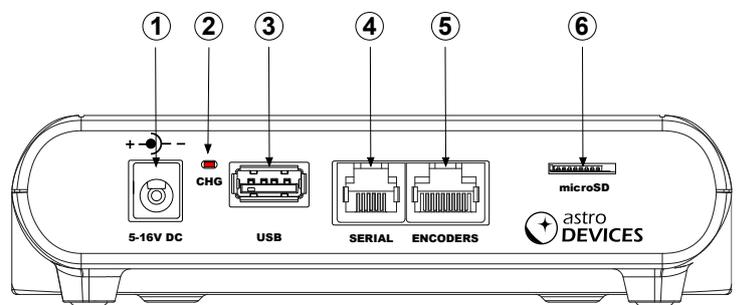


① – external power connector (DC 2.1mm)
② – charging status LED
③ – USB connector
④ – Serial (RS232) port
⑤ – Encoders port
⑥ – Micro SD socket

# Charge the battery

The battery may not be fully charged at first. It is advised to fully charge the battery first.
Please use either the provided power adapter or one of the recommended power adapters to charge the battery.

It is also possible to use the supplied USB to DC 2.1mm cable to charge the battery from a power adapter with a USB socket. The power adapter must be capable of supplying at least 1.5A at 5V.

Connect the power adapter to Nexus DSC and plug the adapter into a power point.

It is recommended to keep Nexus DSC turned off during charging to reduce charging time.

**WARNING:**

Do not connect Nexus DSC to an external power source that is not within the specified voltage range. Nexus DSC has internal over-current protection but it is safer to use it with the power source specified.

The internal Lithium battery can only be charged at a temperature range of 0 $^o$C to +30 $^o$C (32 $^o$F to 86 $^o$F)

The charging status LED reports different states:

| Blinking type | Description |
|---|---|
| Solid ON | The internal battery charging is in progress |
| OFF | The internal battery has been fully charged |
| Flashing | Flashing LED is indicating an error (power source is not supplying sufficient voltage and or current) |

# User interface

The main screen consists of a status bar, horizontal menu with icons and a text description of the currently selected menu item:



① – Status bar

② – Main menu

③ – Menu description

The status bar has the following elements:
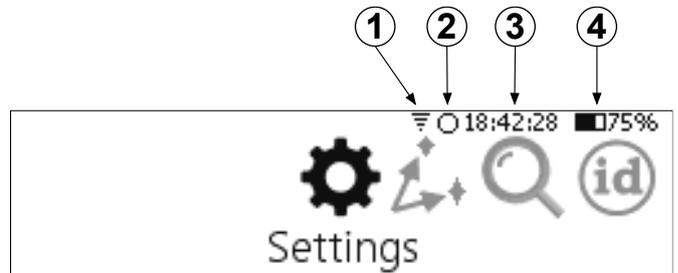


① – WiFi status

② – GPS fix status

③ – Current time

④ – Battery charge level

◀ and ▶ keys on the keypad move between previous and next menu items, they are also used to move between control fields (edit value, list, check box, on-screen buttons) in a dialogue screen. The ◀ key also acts as a backspace when editing a value in edit fields. The OK key activates the selected menu item. The ESC key goes back to the previous menu level/screen.

▲ and ▼ keys are used to select an item from a list, to adjust value in numeric fields with predefined steps (like 'Time Zone') or to change a character in an edit field; they can also be used to go to the previous/next menu level.

On-screen buttons have a flashing border when selected – in that case pressing the OK key generates a button press event.

# Initial Setup

In order to be able to use Nexus DSC for locating celestial object it is necessary to set a few parameters first:

- Time and date
- Mount Type
- Encoders' resolution

# Setting the time and date

Please select 'Settings' from the main menu:



Then select *Time and Date*:

It will show the current time and date that can be changed:
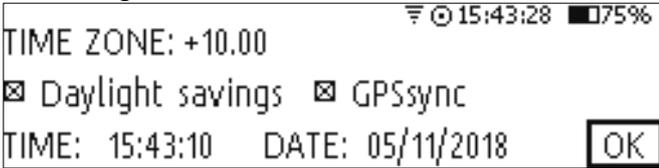


If all parameters are set correctly then pressing the ⌈ESC⌋ key can be used to avoid changing any parameter.

If the time zone, time and date need to be changed then ◀ and ▶ keys can be used to select the parameter that needs to be adjusted. ▲ and ▼ keys are used to change the value.

Setting the time and date is only required if time synchronisation with GPS is disabled. However the time zone and date needs to be set for Nexus DSC to show the local time correctly.

📎 The easiest way to set the time and date is to set the date and time zone and then step outside to allow the GPS receiver to get a fix and thus synchronise time from GPS.

📎 It usually takes 30 to 60 seconds for the GPS receiver to get a fix on the location (under open sky conditions). Nexus DSC will update the internal real time clock with the time received by the GPS receiver at this time. The GPS receiver will automatically be switched into a power saving mode after it acquired the location to conserve the battery power.

## Connecting to your telescope

Please plug the encoder cable into 'Encoders' port on Nexus DSC.

To make sure that encoders are functioning correctly Nexus DSC has a test mode. Selecting 'Test' from the main menu activates it:



Then selecting 'Encoders':



will show the current encoder steps and angles:
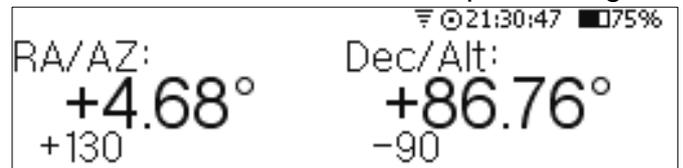


In order for Nexus DSC to function correctly it is required to adjust the encoder steps now to make sure that:

- the RA/AZ current position in degrees is increasing when rotating the telescope clockwise around RA/AZ axis
- the Dec/Alt current position in degrees is increasing when moving the telescope up in declination/altitude

If either of those values is not increasing then set the sign in front of the encoder steps for that axis to a negative sign in the Telescope Settings.

## Telescope Settings

Nexus DSC needs the mount type and encoder steps to be set correctly before it can be used to locate celestial object precisely.

The mount type and encoder steps are set in the Telescope Settings that can be accessed by selecting 'Setting' from the main menu:



then by selecting 'Telescope':



Then you need to select the telescope:
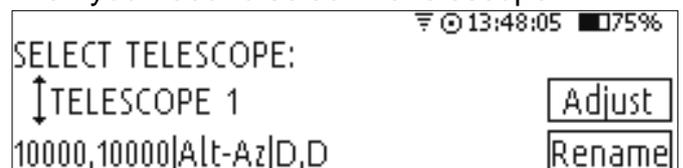


Nexus DSC allows to have up to five different telescope configurations. You can also rename **TELESCOPE 1** to your telescope name. You just need to activate the *Rename* button by

using (▶) and then press the (OK) key. A text cursor now appears under the name:

SELECT TELESCOPE:
  T̲ELESCOPE 1                        | Adjust |
10000,10000|Alt-Az|D,D               | Rename |
(status bar: 13:49:10  75%)
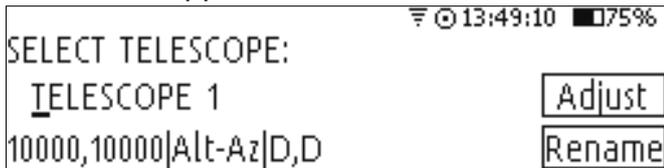
You will now be able to edit the name and change it to your telescope name:

SELECT TELESCOPE:
  18" Obsession_                     | Adjust |
10000,10000|Alt-Az|D,D               | Rename |
(status bar: 13:50:18  75%)
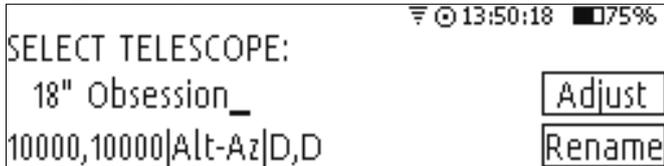
Now you need to set other parameters for your telescope:

MOUNT TYPE:↕ALT-AZ
AZ ENC. STEPS: +10000      DEFAULT ARROW
Alt ENC. STEPS: +10000     DEFAULT ARROW
(status bar: 00:39:16  75%)
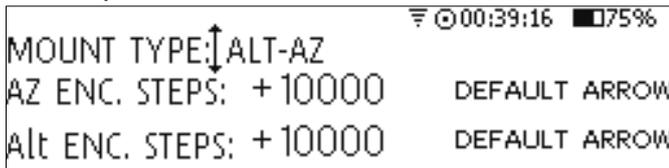
where the mount type can be selected by using (▲) and (▼) keys. The encoder steps are set to 10000 steps by default and should be set to the number of steps corresponding to the number of steps installed on your telescope. Encoder steps can be set by using the numeric keys on the keypad. Please change the sign in front of the encoder steps to a negative sign if required as described previously:

MOUNT TYPE: ALT-AZ
AZ ENC. STEPS: ↕10000      DEFAULT ARROW
Alt ENC. STEPS: +10000     DEFAULT ARROW
(status bar: 00:28:23  75%)
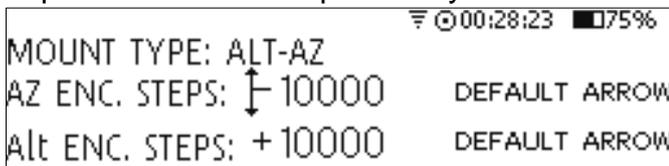
# Two star alignment

Nexus DSC needs to be aligned on two stars before it can locate celestial objects.

The two star alignment can be performed using two methods:
- Using Nexus DSC itself
- Using SkySafari Plus/Pro

## Two star alignment using Nexus DSC

📎 The telescope does not need to be levelled for Nexus DSC to locate celestial objects accurately.

The two star alignment is performed in three steps.
Please go to the Align menu:

Align
(status bar: 18:43:21  75%)

Then select Altitude Reference:

Altitude Reference
(status bar: 18:44:03  75%)

Adjust the altitude reference angle if required:

Altitude angle:    90°
Telescope coordinates:358.74°,-88.20°
                                      | OK |
(status bar: 21:43:04  75%)
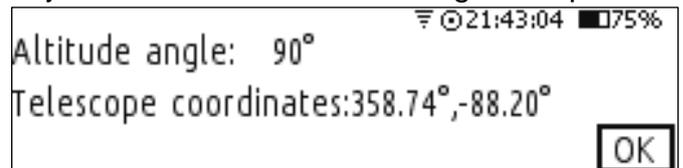
Now move the telescope into position depending on the mount type (for 90 degrees reference):
Telescopes on Alt-Azimuth mount should be positioned vertically:

The same rule applies to telescopes installed on equatorial platforms. Please note that the telescope should be at 90 degrees to the ground board, not the ground.
For equatorial mounts 0 degrees altitude reference is more convenient.
Telescopes on an Equatorial Fork for a 0 degrees altitude reference then be positioned as below:

The telescope does not have to be positioned exactly at the angle specified, but it should be within ±10°. You can also set the altitude reference to any angle between -180° and +180° by selecting **Custom** from the list and by adjusting the angle:

```
                        ⚡☉22:24:50  ■□75%
Altitude angle: Custom⬍060.00
Telescope coordinates:  0.00°,-90.00°
                                      OK
```
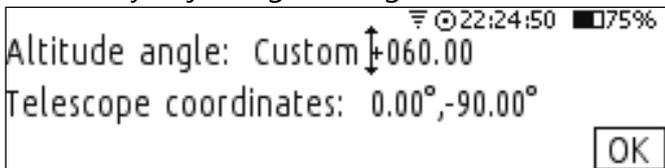
Please note that the altitude reference angle is individual for each telescope configuration – this angle will be stored in the settings for the currently selected telescope.

Nexus DSC will automatically switch the screen to the selection of first alignment object:

```
 ALIGN I                ⚡☉21:43:26  ■□75%
CAT⬍Named Stars    AZ:218.31°  16h 6'18"
OBJ:Acrab          Alt:-26.00° -19°50'43"
info:β Sco           [0.00°,90.00°]   OK
```
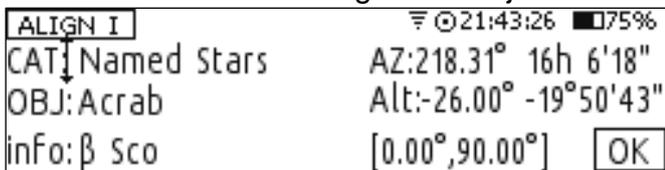
While Nexus DSC can be aligned on any object in its database it is best to use objects form either **Named Stars** catalogue or **Bright Stars** catalogue.

It is time to select the first alignment object – by pressing (◀) to go to the object selection list and then using (▲) and (▼) to change to another star:

```
 ALIGN I                ⚡☉21:43:35  ■□75%
CAT: Named Stars    AZ:117.67°  2h58'50"
OBJ⬍Acamar          Alt:73.35° -40°14'44"
info:θ Eri           [0.00°,90.00°]   OK
```
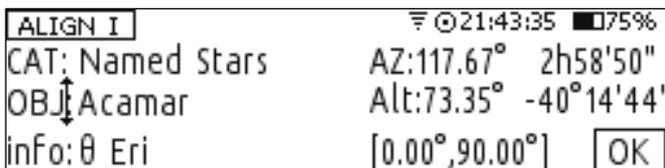
*Acamar* was selected as it is well above 30 degrees. Now the telescope should be pointed at **Acamar** using an eyepiece with a reticle/crosshair or a very high magnification

eyepiece. Press the (OK) button once the telescope is pointing at the star.

Nexus DSC will now switch to the selection of a second alignment object:

```
 ALIGN II               ⚡☉21:45:51  ■□75%
CAT: Named Stars    AZ:5.35°    1h52'12"
OBJ⬍Baten Kaitos    Alt:66.18° -10°15'42"
info:ζ Cet           [0.43°,73.58°]   OK
```
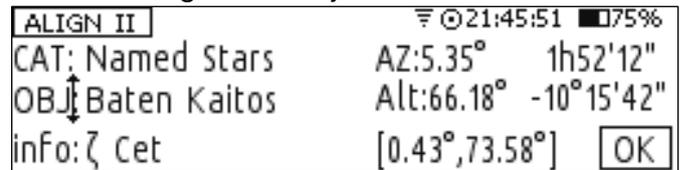
Please follow the procedure described above to change the selection of the second alignment object if necessary.

Press the (OK) button once the star is in the centre of the eyepiece.

Now Nexus DSC will show the alignment error:

```
                        ⚡☉21:46:29  ■□75%
Alignment:  Successful
Alignment error:  0.02
                                      OK
```
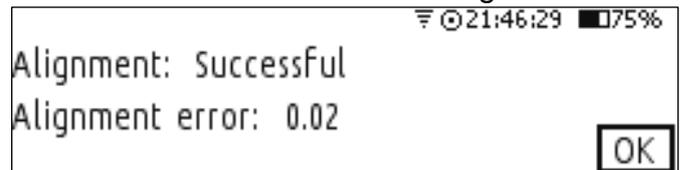
Now you can press either the (OK) button or the (ESC) key to go to the previous menu.

You can go back to align on first or to align on second object at any time in case the alignment error is too big.

## Two star alignment using SkySafari Plus/Pro

Please refer to the *SkySafari Setup* section in this guide to start using Nexus DSC with SkySafari.

Perform the Altitude reference alignment first – as described above.

Touch the *Connect* button on the telescope control panel in SkySafari.

SkySafari will show where the telescope is pointing but the position will most likely be incorrect as the two star alignment has not yet been performed.

In this example the altitude reference was 90º:
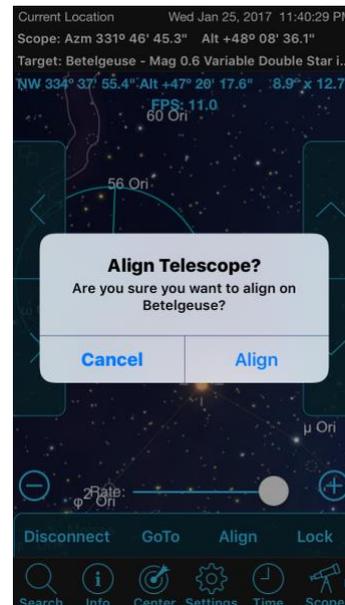
Now select a star and point the telescope at the selected star. *Betelgeuse* was selected in this example. The telescope cursor will most likely be quite far from the selected star unless the telescope is levelled and pointing north when the altitude reference was performed. The telescope cursor does not have to be over the selected star:



Once the star is precisely in the centre of the field of view touch the *Align* button. A popup window will appear to confirm the alignment:



Touch the *Align* button to confirm. Nexus DSC will produce a short beep if sounds are enabled. The telescope cursor will now be located precisely over the selected star:



Select another star and perform the same procedure for the second star.

You can check if the alignment was successful by going to *Alignment Status.*
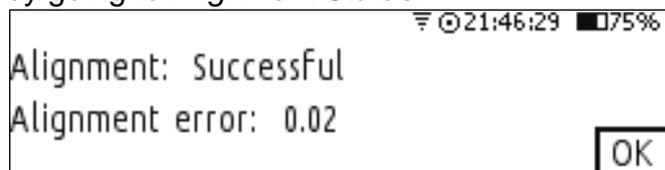


## Alignment object screen

Alignment object screen presents the following information:
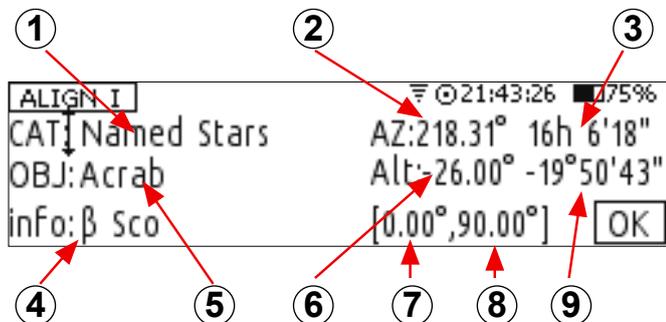
where:

① – Currently selected catalogue

② – Currently selected object's azimuth

③ – Currently selected object's RA

④ – Object's information

⑤ – Currently selected object

⑥ – Currently selected object's altitude

⑦ – Telescope's AZ/RA

⑧ – Telescope's Altitude/Declination

⑨ – Currently selected object's declination

## Pointing accuracy

Pointing accuracy depends on a number of factors:

- Quality of the telescope mount
- Choice of alignment stars
- Accuracy in pointing on alignment objects

To achieve the best pointing accuracy with an Altitude-Azimuth mount it is recommended that:

- The alignment stars chosen should always be at 30 to 80 degrees in altitude and separated by at least 70 degrees in azimuth.
- Alignment stars should ideally have at least a few degrees separation in altitude
- Polaris can be used as one of the alignment stars

To achieve the best pointing accuracy on an Equatorial mount it is recommended that:

- Polaris should never be used as one of the alignment stars
- Alignment stars with a declination greater than 80 degrees should be avoided
- The alignment stars chosen should always be at 30 to 80 degrees in altitude and separated by at least 70 degrees in RA.

## Locating an object

Once the two star alignment is performed Nexus DSC can locate celestial object in the sky.

The following steps describe a basic location of celestial objects.

Go to the top menu and select *Find*:



Select *From Catalogues*:



Select a catalogue by using the (▲) and (▼) buttons:
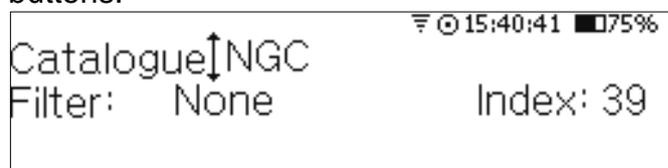


And just leave the *Filter* as *Disable* for now:
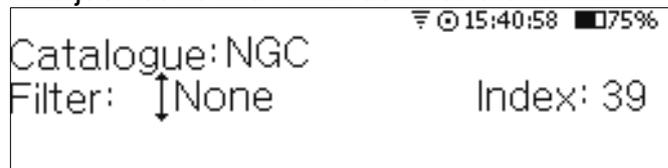


The display will show the last selected object:
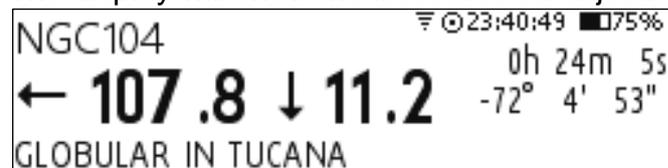


Suppose we would like to find NGC55. Just press the ( 5 ) key and the display will prompt to continue typing the object number:
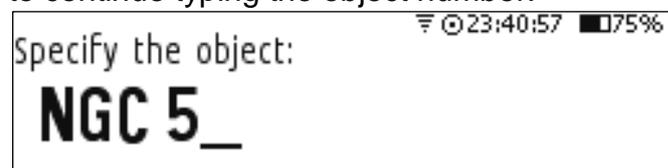


Now press the ( 5 ) key again and then press ( OK ):
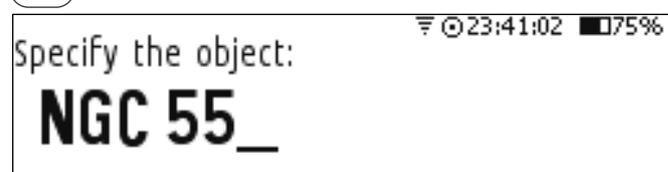


Nexus DSC will now show where to move the telescope to aim at NGC55:

It shows that the telescope needs to be moved down by 6.9 degrees and counter clockwise by 59.7 degrees. As you start moving the telescope the numbers will start updating. Continue to move until both numbers are close to 0s:



If you look through the eyepiece then you will see NGC55 there now.

To display additional information about the object just press (◀) or (▶) key:
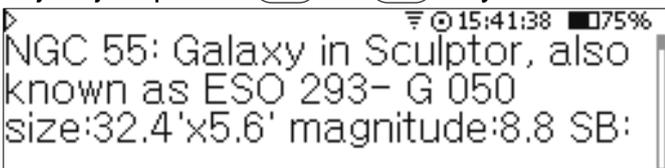


Pressing (◀) , (▶) or (ESC) will take you back to the previous screen.

 Please refer to the Nexus DSC User Manual for advanced topic on objects' selection.

## Using Nexus DSC with SkySafari

If your Nexus DSC has the optional WiFi card then you can connect it to SkySafari Plus/Pro running on iOS, Android or Mac OS X. The following steps describe how to set everything up on iPhone but the procedure is very similar for Mac OS X and Android.

### Nexus DSC setup

Please go to the top menu on Nexus DSC and select **Settings** and then **WiFi**:



Make sure that **WiFi Mode** is set to **Access Point**:



Press (OK) until the second page of setting appears and make sure that **Protocol** is set to **LX200**:
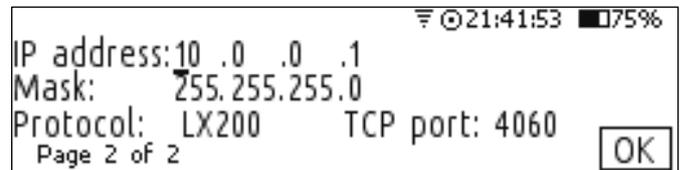


### SkySafari Setup

Next please go to Settingg->WiFi on your iPhone: and join NexusDSC's network:



The next steps is to set SkySafari's settings. Please start SkySafari on your iPhone and go to **Settings->Telescope->Setup**:
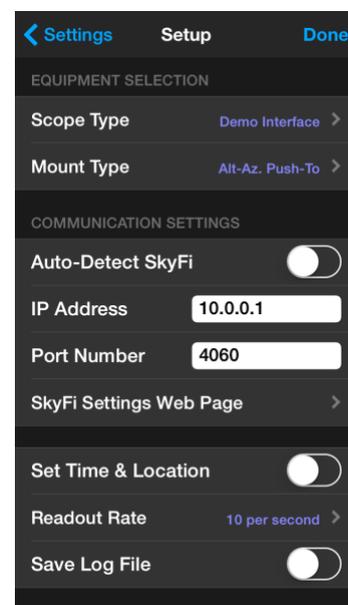
Nexus DSC is emulating LX200 protocol when used with a planetarium application. Change the **Scope Type** to **Meade LX200 Classic**:
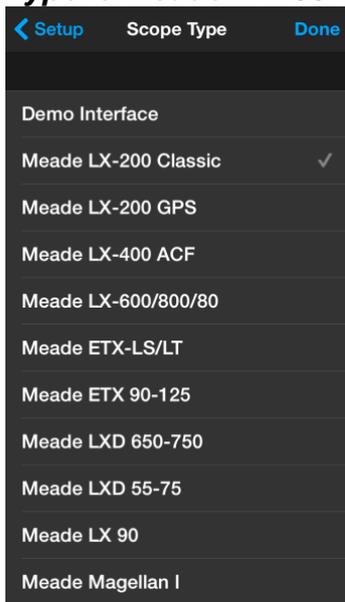


The next step is to set the WiFi network parameters. Assuming default Nexus DSC's settings were not changed:

- set **Mount Type** to Alt-Az GoTo
- **IP Address** should be set to 10.0.0.1
- **Port Number** should be set to 4060
- **Readout Rate** can be set to 10 per second
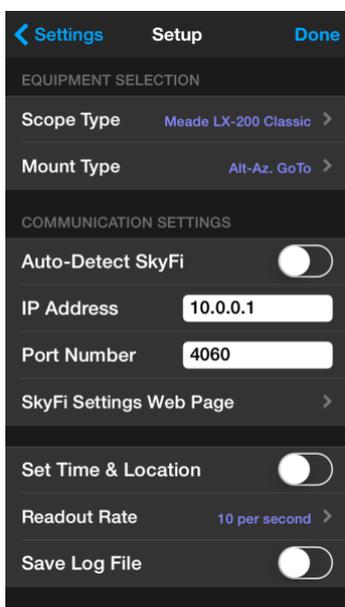


Now the telescope control panel can be activated by touching the **Scope** icon. Then touch **Connect**.

**Please refer to Nexus DSC User Manual for additional details on using your Nexus DSC**

If the telescope is still aimed at NGC55 then SkySafari will show the telescope cursor on the screen and NGC55 will be in the centre of the screen:



## Locating objects with SkySafari

Please go to the top menu on Nexus DSC and then select **Find** and then **From Planetarium**:



To locate an object selected in SkySafari you need to touch **GoTo** on the telescope control panel – Nexus DSC will now show where to move the telescope to locate the object: