Companion Instrument to Mintaka STAR

STARX
STARXG

mintaka INNOVATIONS

INNOVATORS OF PRECISION BAROGRAPH SYSTEMS

USER'S GUIDE

mintakainnovations.com • 206.484.7387

Mintaka STAR**X** / STAR**XG** User's Guide

v2.3

This *User's Guide* does not create any legally binding obligations for Barber Creations, LLC / Mintaka Innovations towards the customer or end user. All legally binding commitments and agreements are included exclusively in the appropriate supply contract or Conditions of Sale.

Mintaka STAR**X** and Mintaka STAR**XG** is sold & distributed exclusively by Barber Creations, LLC DBA Mintaka Innovations.

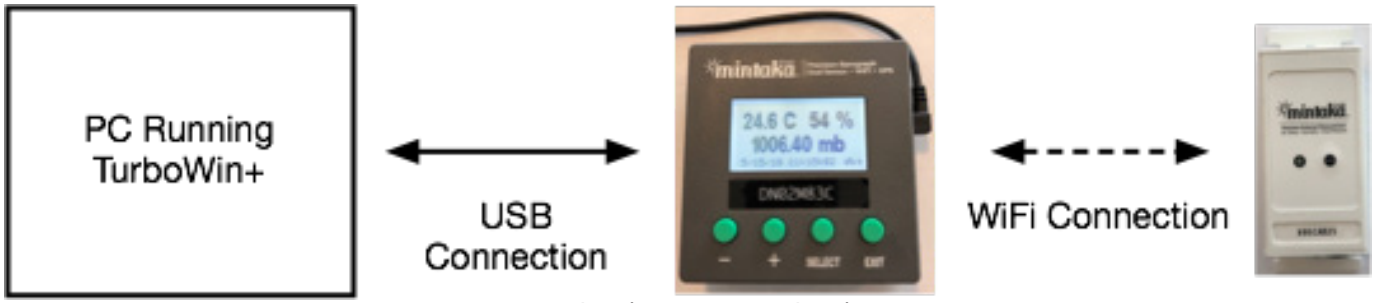
Contact Jerry @ jerrybarber@mac.com, (206) 972-6364, or
Susan @ susan.barber@mintakainnovations.com, (206) 484-7387.

TABLE OF CONTENTS

INTRODUCTION

PRODUCT DESCRIPTION

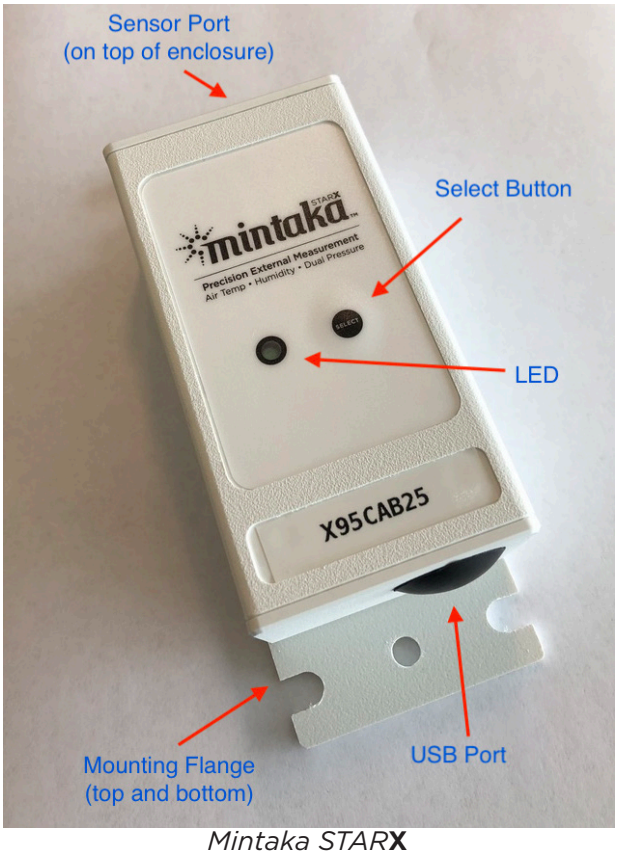
Mintaka STAR**X** and STAR**XG** (STAR**X** with GPS) are companion instruments to the Mintaka STAR electronic barograph. They measure external barometric pressure, air temperature, relative humidity and GPS position (STAR**XG**). That data is communicated to the STAR via WiFi.



*Computer, Mintaka STAR & Mintaka STAR**X***

The connection between the Mintaka STAR**X/XG** and the Mintaka STAR is called pairing. Pairing will be described in detail in later sections of this User's Guide.

Mintaka STAR**X/XG** is designed for external use, sheltered in some way, such as by the thermal radiation shield GUARD**X** (available separately). Like the Mintaka DUO and STAR electronic barographs, the STAR**X/XG** has two independent precision pressure sensors. The relative humidity sensor is protected by a hydrophobic barrier which allows accurate measurements while protecting it from water. The USB connector is protected by a rubber blind grommet. The LED light and [SELECT] button are protected by a membrane label. The case, which can be opened to replace the lithium battery, is screwed shut against a rubber gasket.



*Mintaka STAR**X***

Mintaka STAR**X/XG** is configured using a computer connected to the instrument using MintakaCommander. STAR**X/XG** data can be viewed on the paired STAR Home Page.

The Mintaka STAR**X/XG** NOAA (weather service) standard package includes the instrument, Tadiran Size D 3.6 V lithium battery (not installed), a USB cable, and this User's Guide.

STAR - STARX/XG AUTO-PAIR AKA WEATHER SERVICE (WXSERVICE) MODE

The STAR**X/XG** and weather service STARs are configured at the factory to be in Weather Service Mode.

On the STAR side this means the instrument will create an (AP mode) WiFi network named "MintakaWx" and its network and configuration settings are protected by a PIN. On the STAR**X/XG** side it will, by default, search for and broadcast its weather reports via a "MintakaWx" WiFi network connection. As a result, there is no need to pair (or unpair) a STAR with a STAR**X/XG**. Any STAR in WxService mode within range can receive the reports.

To validate a STAR - STAR**X/XG** pairing, view the STAR StarX status page either on the STAR (EXIT -> GPS, WiFi, StarX -> StarX Summary screen) or on the STAR's Web page. Alternatively, connect to the STAR**X/XG** with Mintaka Commander and choose the Pairing option under the Commands menu.

Note: the first report will be available at the selected reporting interval (e.g 5 minutes). Until then, a "no reports" message will display.

QUICK START USING MINTAKA COMMANDER

For STAR**X/XG**s not in Weather Service mode, Quick Start is used for STAR-STAR**X/XG** pairing, and/or adjusting the pressure offset.

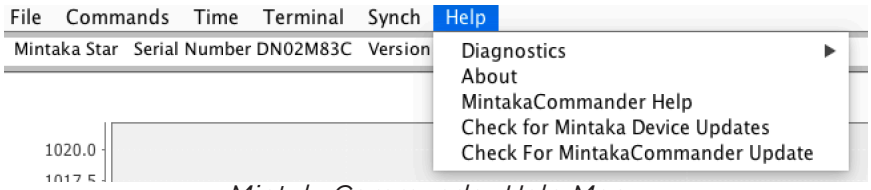
STEP 1 Install or update MintakaCommander. Only the latest versions of MintakaCommander supports the STAR**X/XG**. If you are setting up multiple STAR-STAR**X/XG** pairs, you only need to do this once.

To install: Enter or paste the appropriate address in a browser address window:

Windows: http://mintakainnovations.com/downloads/MintakaCommander.exe

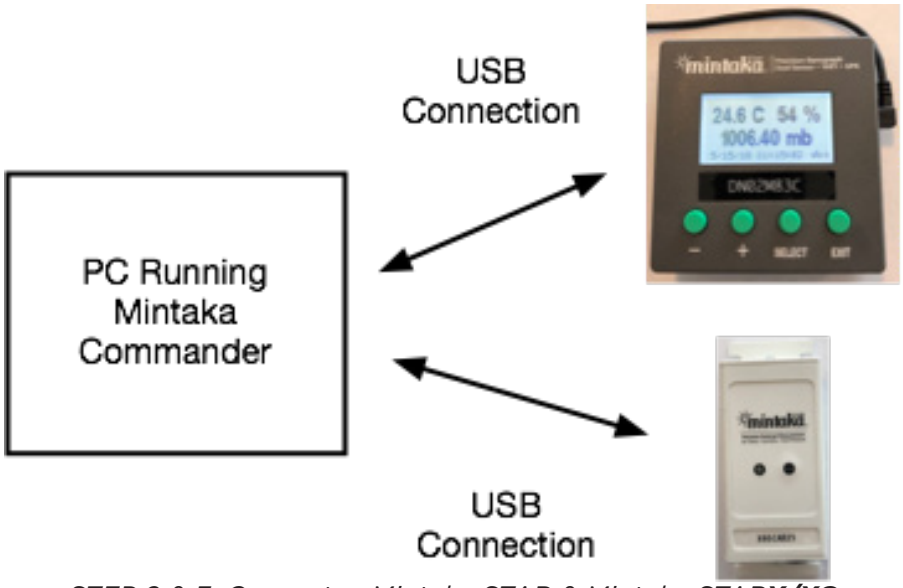
Mac: http://mintakainnovations.com/downloads/MintakaCommander.zip

To update: Run MintakaCommander. Select "Check for MintakaCommander Update" from the Help Menu.



MintakaCommander Help Menu

When the update process is complete, Quit MintakaCommander. Move the application from the browser downloads folder to the desired location on your computer.

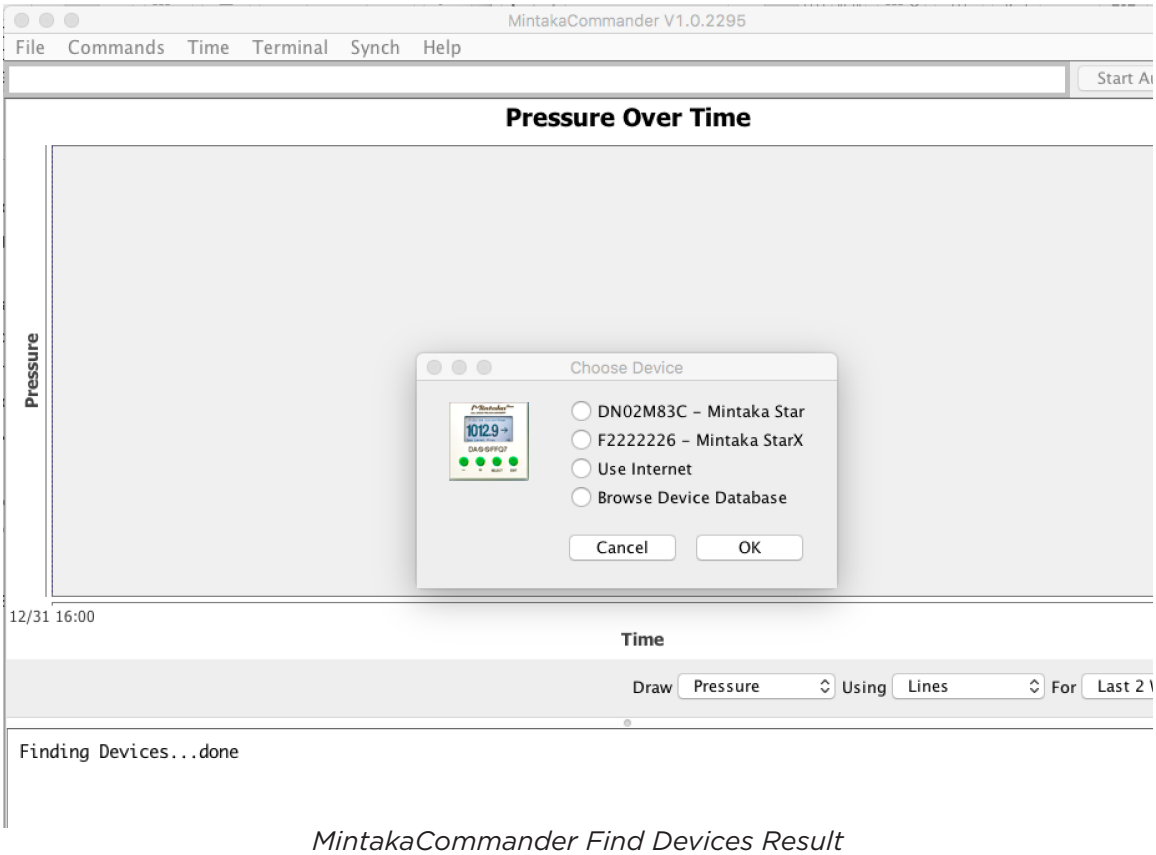


*STEP 2 & 3: Computer, Mintaka STAR & Mintaka STAR**X/XG***

STEP 2 Connect the STAR**X/XG** to a computer using the USB cable. The USB connector is located at the bottom of the STAR**X/XG**, behind the black rubber blind grommet.

STEP 3 Connect the intended STAR pair to the same computer using its USB cable.

STEP 4 Run MintakaCommander. MintakaCommander will find the connected devices.

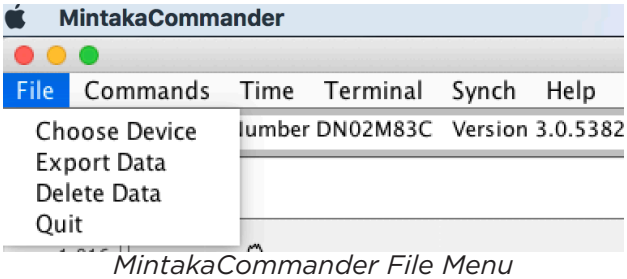


MintakaCommander Find Devices Result

STEP 5 The serial numbers for the connected devices will show up in the Choose Device dialog box. Select the Mintaka STAR. Press [OK]. After it syncs its data, update the instrument. Only the latest version of STAR firmware supports the STAR**X/XG**.

Select “Check for Mintaka Device Updates” from the Help Menu. (See STEP 1 Help Menu)

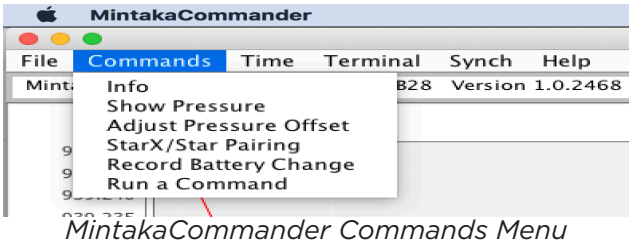
STEP 6 Select “Choose Device” from the File Menu. MintakaCommander will again find connected devices.



MintakaCommander File Menu

STEP 7 Select the STAR**X/XG**. Press [OK]. After it syncs its data, update the instrument as you did in STEP 5 with the STAR. Note: the STAR**X/XG** may not have data to sync and it may not need an update, however it is good practice to make sure the instrument has the most current version.

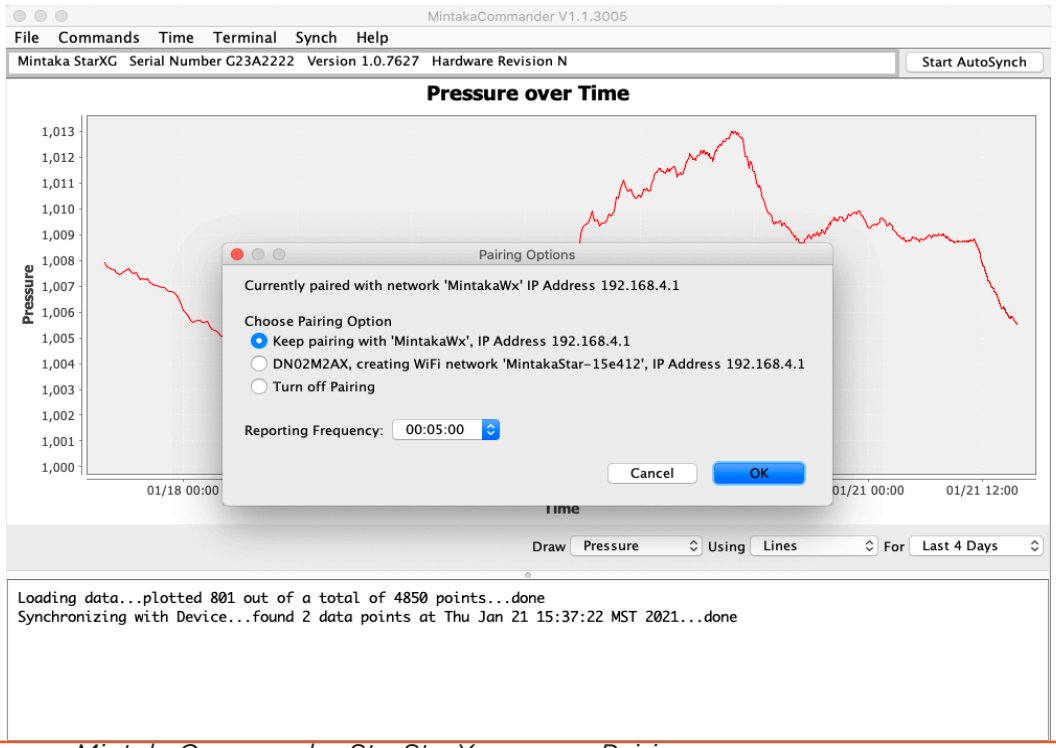
STEP 8 Pair the STAR and STAR**X/XG**. Select “StarX/Star Pairing” from the Commands menu.



MintakaCommander Commands Menu

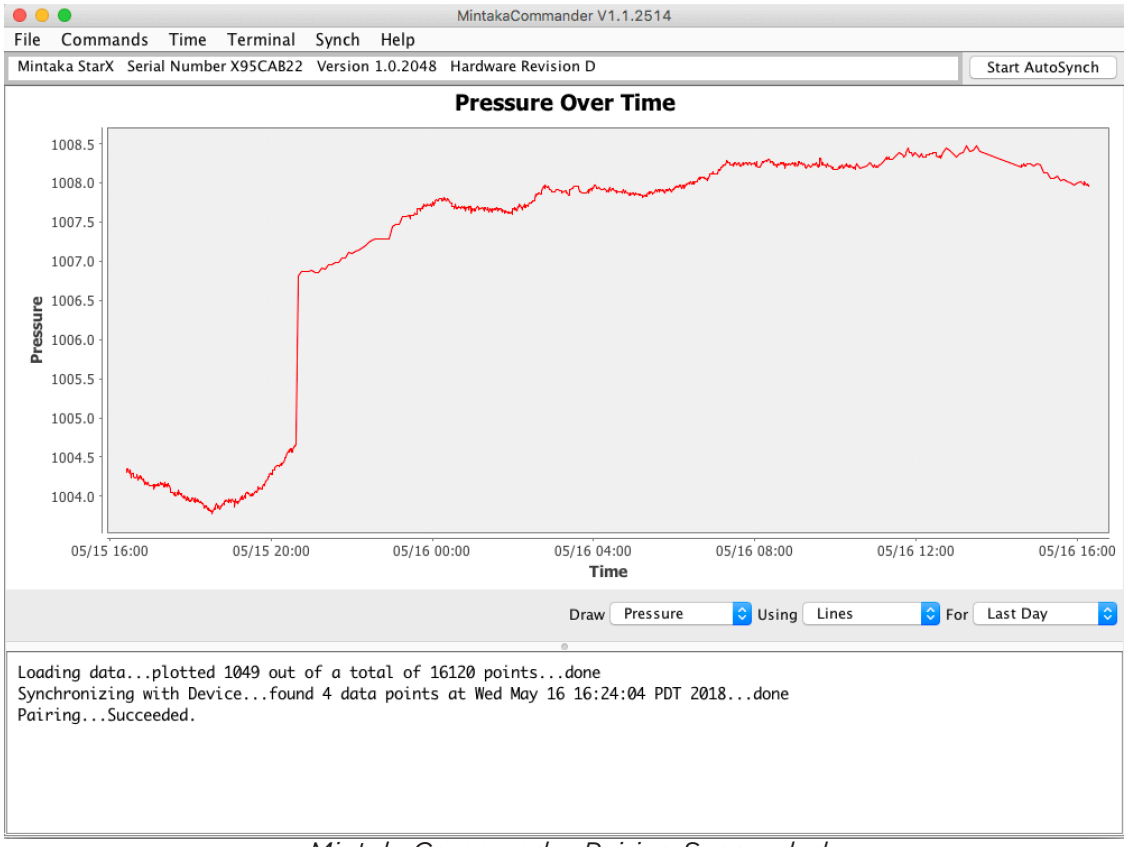
STEP 9 Select a pairing option. Choose the desired reporting interval; default is 5 minutes. Note: a reporting interval of less than 5 minutes is not recommended as it will significantly reduce the life of the battery. Press [OK].

Note: If pairing with a STAR that is in Weather Service Mode, it is not necessary to connect it to the computer because the STAR**X/XG** will always provide an option to pair (or maintain pairing) with a “MintakaWx” WiFi network. In the example below, select “Keep Paring with…”



MintakaCommander StarStarX Pairing

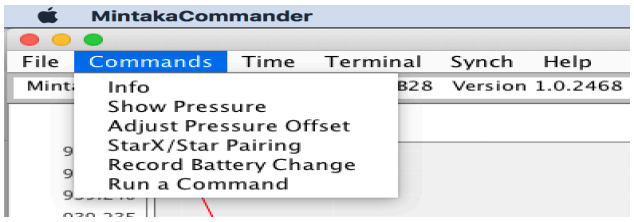
A “Pairing Succeeded” message will appear in the bottom portion of the screen.



MintakaCommander Pairing Succeeded

Now that the two instruments are paired, the STAR**X/XG** will send reports to the STAR via the STAR’s WiFi network. The first report will be sent at the selected reporting interval (default 5 minutes).

STEP 10 If needed, adjust the pressure offset. Select “Adjust Pressure Offset” from the Commands menu.



MintakaCommander Commands Menu

STEP 11 Install the battery when the STAR**X/XG** is ready for external installation. The section CONFIGURATION & OPERATIONS / INSTRUMENT POWER - LITHIUM BATTERY includes details on how to install or change the lithium battery.

Note: When installing a new battery it is good practice to execute the “Record Battery Change” option. This records in the STAR**X/XG** the date and time a battery was installed or changed, and can then be used to determine how long a battery has been in use.

INSTALLATION

For accurate measurements the instrument must be protected from direct exposure to the elements (wind, rain, sun, etc.). If mounted directly on an outside railing, install the STAR**X/XG** upside-down to protect the hydrophobic barrier from direct rain/water intrusion. (Installing without a Mintaka GUARD**X** is not recommended).

For best protection, install the STAR**X/XG** in the Mintaka GUARD**X** and secure the cover. Install the GUARD**X** on an outside railing.

Insert into GUARD**X** Thermal Shield:

GUARD**X**Thermal Shield closed:

The STAR**X/XG** must be installed within WiFi range of the paired STAR. Note: WiFi will not connect through metal barriers.

CONFIGURATIONS & OPERATIONS

SELECT BUTTON & STATUS LED

Select Button

The [SELECT] button is used to wake up the STAR**X/XG** and to restart the STAR**X/XG**.

Press once to wake the instrument or to determine if it is awake. Once awake, it will remain awake for one (1) minute. Each time an interaction occurs, either through the [SELECT] button or via its Web pages described in the MINTAKA STAR HOME PAGE and STARX/XG STATUS PAGE sections, it will reset its timer to remiain awake for one (1) minute.

To restart the STAR**X/XG**, press and hold the [SELECT] button for 5 seconds (then release) when awake**.** The STAR**X/XG** will acknowledge the restart instruction by displaying one long green blink.

Status LED - STAR**X**

One (1) green blink: Acknowledges the push of the [SELECT] button. If this occurs immediately, the STAR**X** is awake. If there is a 2-4 second delay, the STAR**X** was woken up. An additional, 1 green blink indicates a report was successfully posted to a STAR.

Two (2) green blinks: If awake, and a push of the [SELECT] button, 2 green blinks indicates the instrument is awake and communicating with a STAR.

Multiple green blinks: A series of three (3) quick green blinks means the STAR**X** could not communicate with the STAR. A continuous sequence of blinks a few seconds apart means the battery is too weak for the STAR**X** to run.

Status LED - STAR**XG**

The STAR**XG** has red, green and blue lights; the STAR**X** has only a green light.

One (1) purple blink: The STAR**XG** has awoken, either by the push of the [SELECT] button or by Reporting Interval schedule.

It will be followed by one of the below:

One (1) blue blink: indicates a report including GPS coordinates was successfully posted to a STAR.

One (1) green blink: indicates a report without GPS coordinates was successfully posted.

One (1) red blink: indicates the STAR**XG** could not establish a WiFi connection with a STAR.

When the STAR**XG** is awake, with a push of the [SELECT] button two quick blinks will occur:

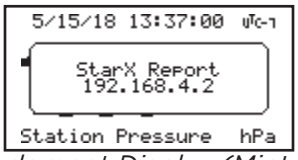
The first blink indicates whether it was able to connect with a STAR: green = yes, red = no.

The second blink indicates whether it has a GPS fix: blue = yes, red = no.

Multiple purple blinks: A continuous sequence of purple blinks a few seconds apart means the battery is too weak for the STAR**XG** to run. What's happening: the first blink occurs at the very start of the wake up process. Later in the process the WiFi radio attempts to connect with a STAR; the radio draws a lot of power so if the battery is weak, the instrument will shut down and then attempt to restart. Eventually the battery will be completely dead and no blinks will occur.

MISSED REPORTS

Each time the STAR receives a report from the paired STAR**X/XG**, an acknowledgment will briefly (2 seconds) display on the STAR.



Report Acknowledgment Display (Mintaka STAR screen)

When a STAR**X/XG** report is not received by the paired STAR, it is a missed report. This can occur for a couple of reasons, most commonly because the STAR**X/XG** cannot communicate with the STAR, or the STAR**X/XG** battery needs to be replaced. After four (4) missed reports, a notification will display on the STAR. This display will persist until it is acknowledged by pressing the [SELECT] button on the STAR or a report is received from the STAR**X/XG**.

Missed Report Acknowledgment Display (Mintaka STAR screen)

If a communication issue is suspected, power cycle (unplug / plug back in) the STAR. If the STAR still does not receive a report from the STAR**X/XG** after 20 minutes, do the following:

Wake the STAR**X/XG** (press [SELECT] once).

When it blinks, press and hold the [SELECT] button 5 seconds to restart the STAR**X/XG**.

If a low or dead battery is suspected, check the STAR**X/XG** battery status on STAR Home Page / StarX Status. Details are in the section, MINTAKA STAR HOME PAGE. The section INSTRUMENT POWER - LITHIUM BATTERY includes battery voltage recommendations, and instructions on how to change the battery.

INSTRUMENT POWER - LITHIUM BATTERY

Designed for external use, the STAR**X/XG** is powered by Tadiran Size D 3.6 V lithium battery. This specific battery is recommended as it is the one that provides the longest life per long-term testing.

To increase the lifetime of the battery the STAR**X/XG** spends most of its time in “sleep mode” where it consumes minimal battery power. During normal operation, at the selected Reporting Interval, the STAR**X/XG** will:

Wake up,

Connect to a WiFi network created by a STAR

Take sensor readings,

STAR**XG** acquires GPS satellite fix,

Send a report of the sensor readings (1 green blink STAR**X**, 1 blue blink STAR**XG**)

Go back to sleep.

This process usually takes around 10 seconds.

Battery Lifetime

Estimating the lifetime of the battery is difficult because there are a number of unknowns.

The environment in which the unit operates has a large impact. Although the operational temperature range of the battery is large (-55 degrees C to 85 degrees C) operating the battery below -20 degrees C degrades the lifetime of the battery (however this battery will perform better at low temperatures that most other batteries). Given the unit will operating at various temperatures its not possible to quantify the impact. Operating the battery at higher temperatures does not degrade its performance.

The installed location of the STAR**XG** in particular is perhaps the largest impact on the operational lifetime of the battery. If the STAR**XG** is installed where the GPS can acquire and hold its fix, the wake time for each report is on average 10 seconds. However if the GPS has difficulty acquiring a fix, it will remain awake for 60 seconds attempting to acquire one before sending its report without the GPS information. This additional 50 seconds of wake time during some or all of the reporting intervals can drastically reduce battery lifetime.

The storage time of the battery is also a factor. These batteries have a very low self-discharge rate so they will last longer in storage than most other batteries. Based on the manufacturer's specifications we recommend using the batteries within two (2) years of purchase, however the battery should work with minor degradation after five (5) years of purchase.

Estimated operational lifetime of the battery should be about one (1) year for the STAR**X**, 3 (three) to six (6) months for the STAR**XG** if the system is set to wake up and send reports every 5 minutes. Estimated battery life is approximately double at 10 minute reporting intervals.

Tracking Battery Status

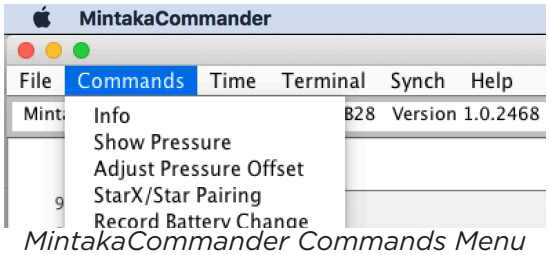
Tools are provided to allow tracking of the battery status:

Battery voltage is reported every time the STAR**X/XG** communicates with the STAR,

The length of time the battery has been in use is tracked (this does not include "sleep mode" time),

The date the battery was changed is saved if every time the battery is changed, the STAR**X/XG** is told that a battery change has occurred. To do this:

Connect to the STAR**X/XG** to a computer and start MintakaCommander. Connect to the STAR**X/XG**. Select "Record Battery Change" under the Commands menu.



MintakaCommander Commands Menu

Changed battery information is available by accessing the paired STAR's web page and choosing the StarX Status menu item.

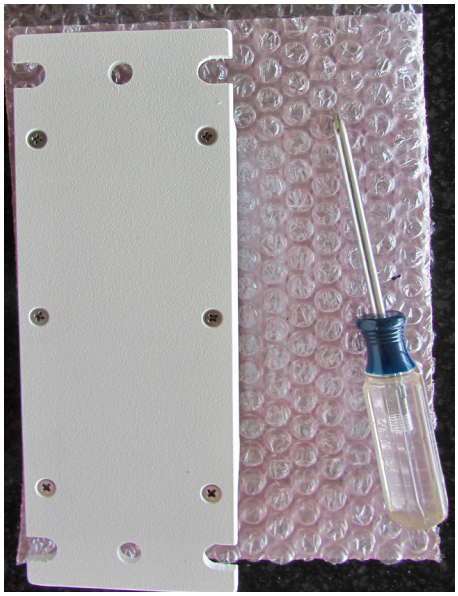
When to Change the Battery

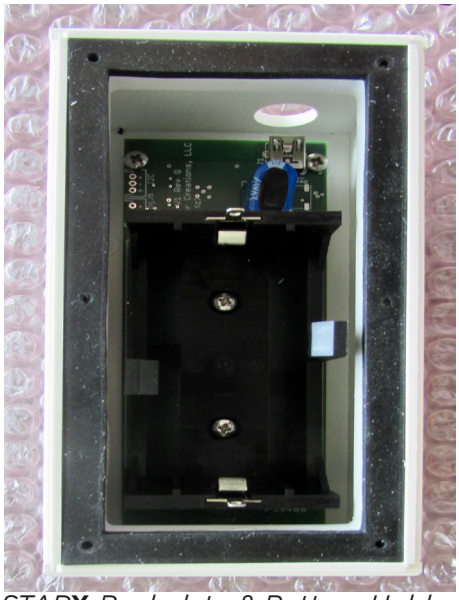
The one (1) year battery voltage should be around 3.3 Volts for the STAR**X**, same at 3 (three) to six (6) months for the STAR**XG** at 5 minute reporting intervals. This time doubles at 10 minute reporting intervals**.** When the voltage drops to around 3 volts a battery change should be considered.

How to Install or Change the Battery

Place the instrument face-down on a soft surface to protect the [SELECT] button.

Unscrew the six (6) screws. Remove the battery if there is one there then install / reinstall the battery, making sure the polarity (+/-) is correct. (The plus (+) side of the battery should point to the USB connector.)





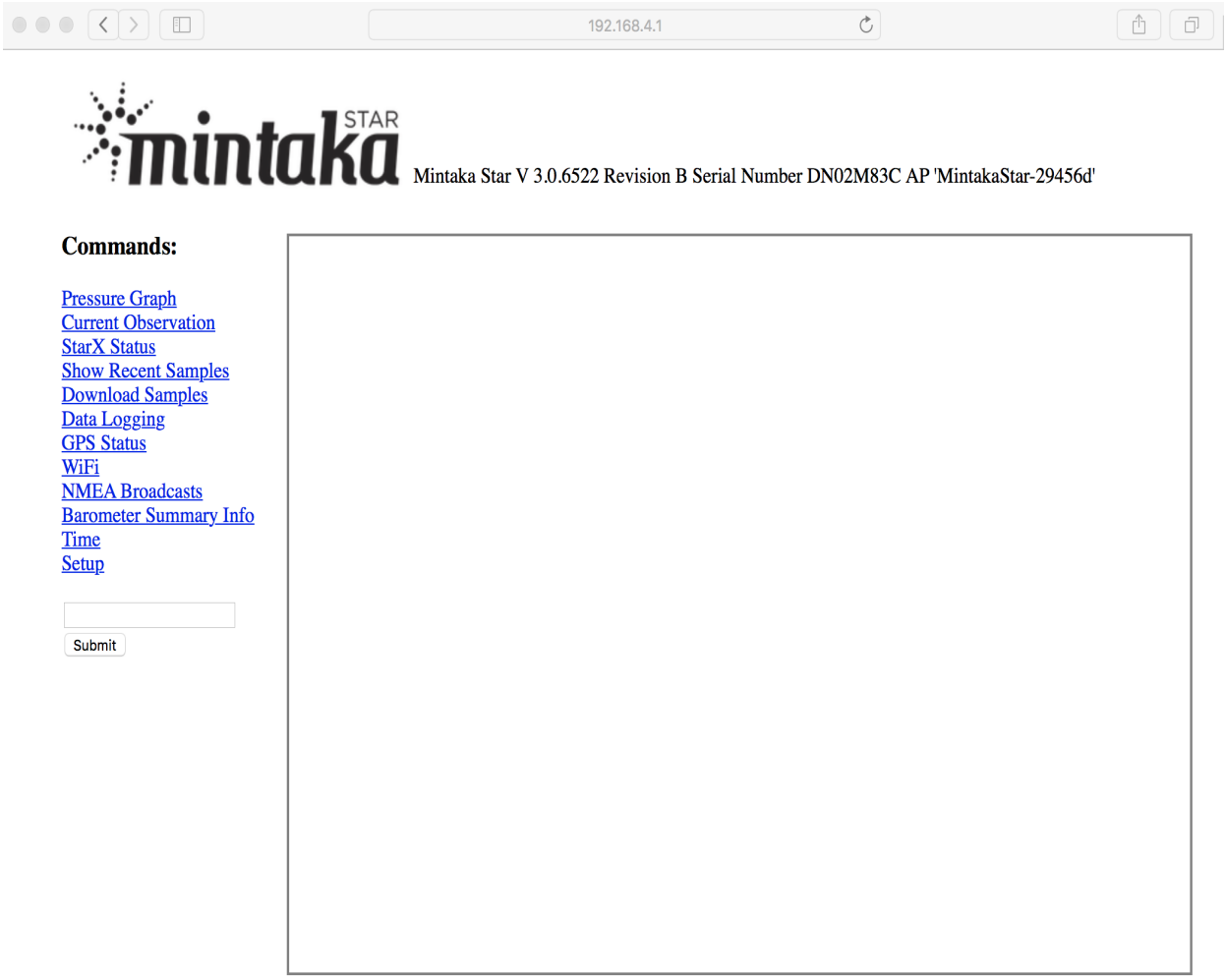
*STAR**X** Backplate & Battery Holder*

Then position the backplate over the instrument and screw it back on. Note: Slight pressure will be needed to get the screw through the rubber gasket, yet be careful to not strip the screw head.

Be sure to document the battery change as noted in Tracking Battery Status.

MINTAKA STAR HOME PAGE

The Mintaka STAR Home Page supports the STAR**X/XG.** Access the Home Page as before: Connect to its network, open a new internet browser window, enter the default IP address, 192.168.4.1, into the address window and press enter.

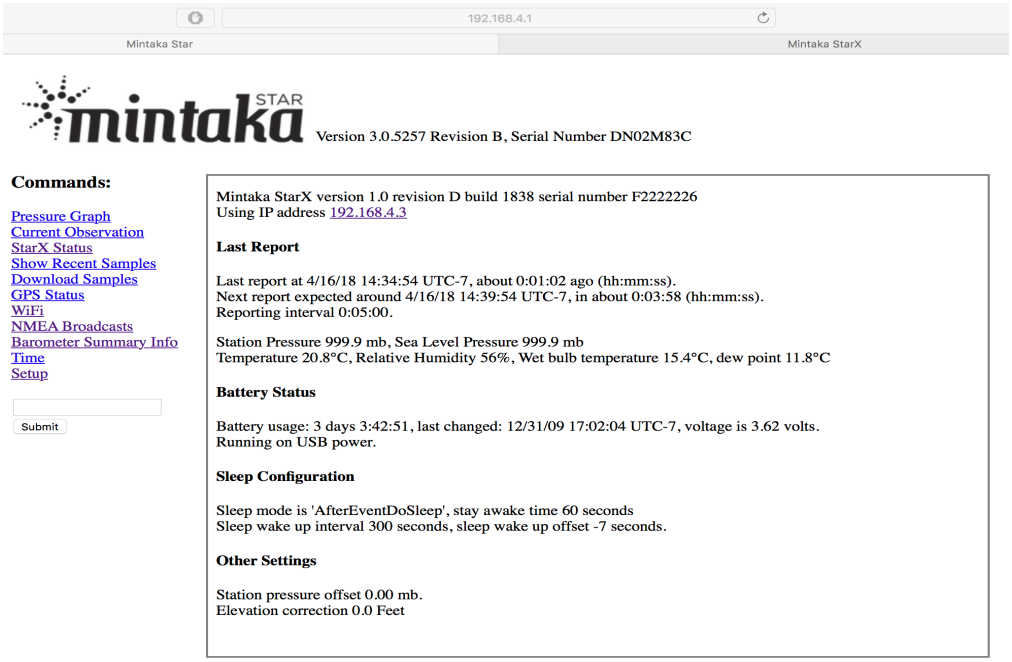


Mintaka STAR Home Page Default Screen

Please consult the Mintaka DUO / STAR User's Guide for information on each command. That said, an especially useful command is StarX Status, which is described in the next section.

STARX/XG STATUS PAGE, STARX/XG WEB PAGES

StarX Status displays information about the paired STAR**X/XG**. Select the "StarX Status" command to view its page.

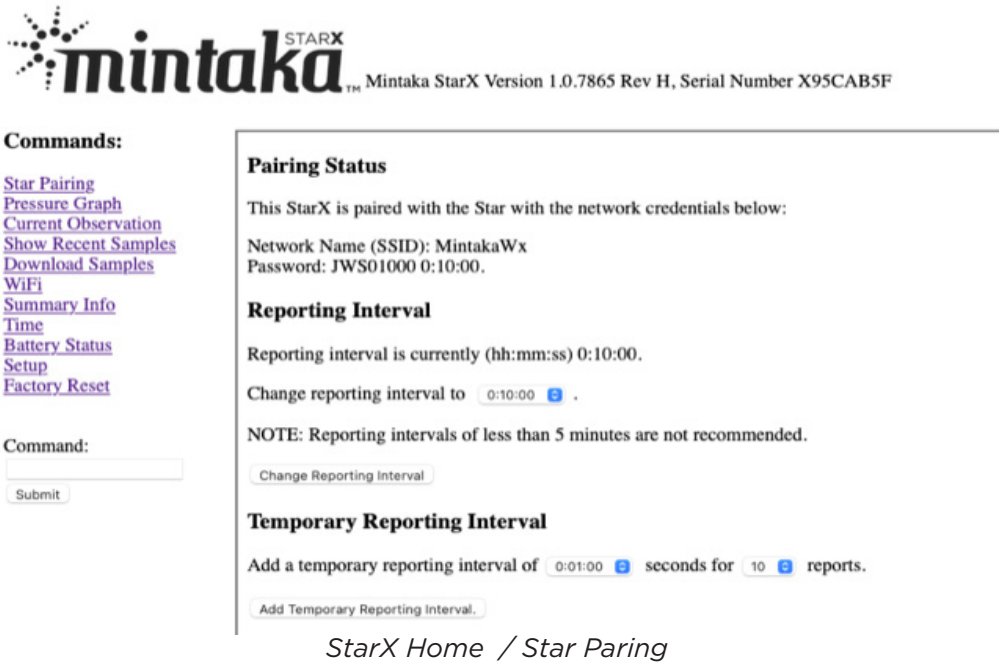


StarX Status Display

Note the instrument's IP address on the 2nd line. From here, it is easy to access the instrument's Home Page.

Press the [SELECT] button on the STAR**X/XG** and when it blinks once to indicate it has woken up, click on the instrument's IP address link (in the example above, 192.168.4.2).

The first command listed is "Star Paring". Select it to view or change the instrument Reporting Interval or set a Temporary Reporting Interval.



StarX Home / Star Paring

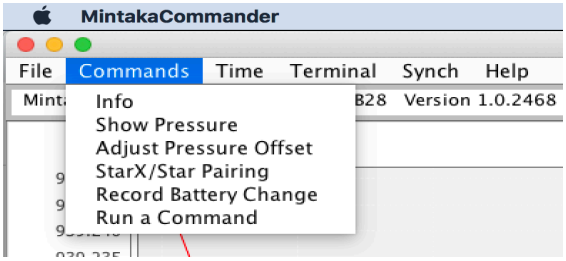
A Temporary Reporting Interval can, for example, tell the instrument to perform 10 reports at 1 minute intervals and then return to the Reporting Interval set when it was paired to a STAR (or set / changed here). This can minimize the time required to validate initial setup or to test for a GPS fix on the STAR**XG.**

The other commands display information about the paired STAR**X/XG** referred to in prior sections or are similar to those documented in the Mintaka DUO / STAR User's Guide.

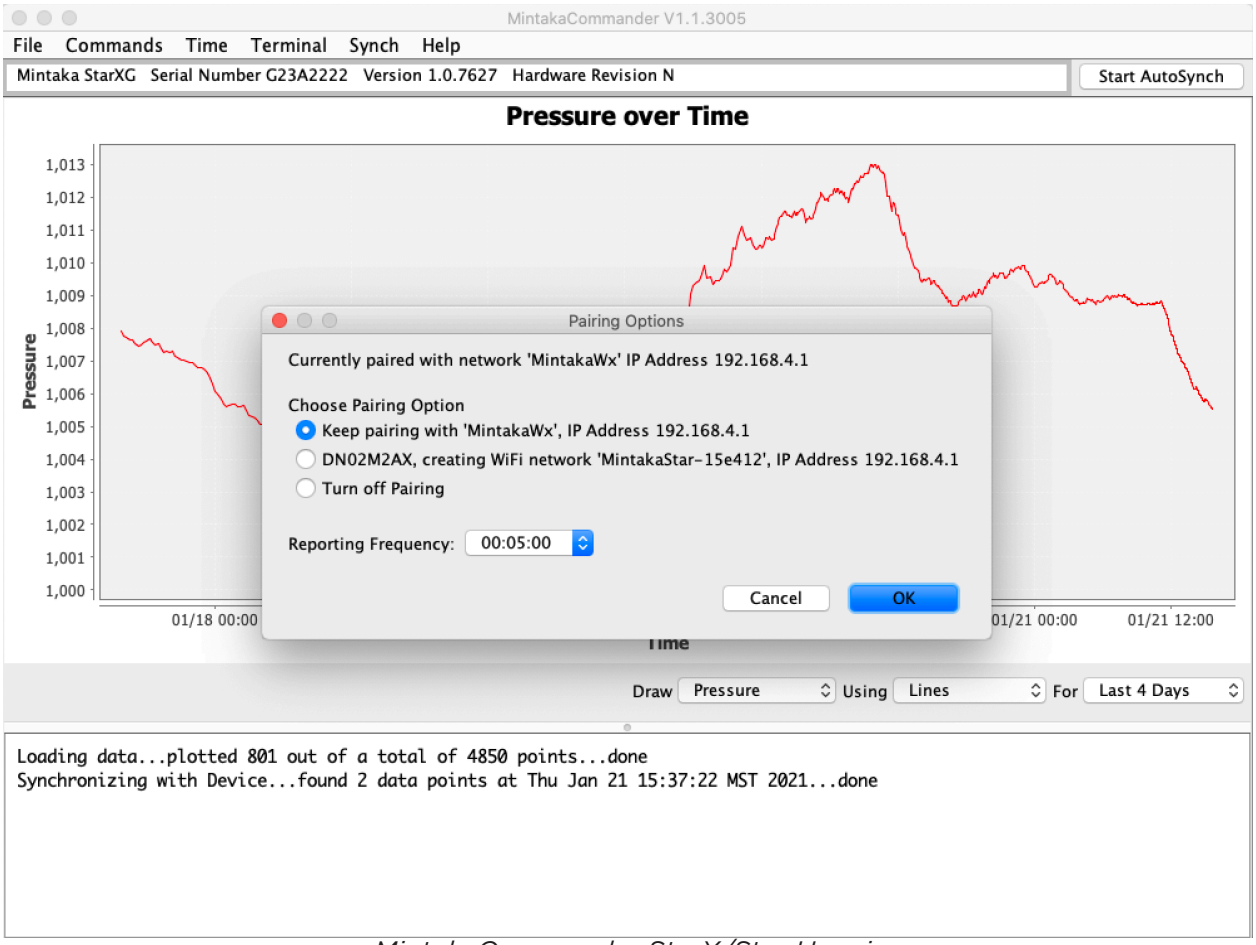
UNPAIRING A STARX/XG

To turn off pairing of a STAR -STAR**X/XG** use MintakaCommander.

Run MintakaCommander. Connect to the STAR**X/XG**. Select "StarX/Star Pairing" from the Commands menu.



MintakaCommander Commands Menu



MintakaCommander StarX/Star Unpair

Select Turn Off Pairing and [OK] to turn off pairing. A confirmation message will appear in the message window.

MAINTENANCE

The Mintaka STAR**X/XG**, like the Mintaka DUO / STAR precision barographs, requires no regular maintenance. The case can be cleaned with a damp cloth and mild soap.

The USB rubber blind grommet fits tightly for enclosure integrity. A small amount of petroleum jelly around the inner circle helps ease it on / off, and improve it's sealing properties. This has been applied during manufacturing however it can be reapplied as needed.

LIMITED WARRANTY

Barber Creations, LLC / Mintaka Innovations products are warranted to be free of defects in materials and construction and, when properly installed and operated, will be free of defects for a period of one (1) year from the date of purchase, subject to noted exclusions. Liability is limited to repair or replacement of the defective item.

Warranty exclusions - damage attributable to: improper installation; lack of reasonable care; improper use: acts of nature; abuse; to opening/closing the enclosure backplate; ordinary wear and tear; and being repaired or altered by others than our authorized representatives.

SPECIFICATIONS SUMMARY

Dimensions (L x W x H): 6.875" x 2.5" x 2" (174mm x 64mm x 55.25mm)

Power: 3.6V Lithium Battery and 5V via Mini-B USB connector.

Pressure Sensors:

- Operating pressure range 500 to 1080 mb
- Operating elevation 18,000 ft (5,500 m) above sea level to 1,800 ft (550 m) below sea level.
- Accuracy <1 mb over full pressure range at -20C to +50C
- Long term drift <1.0 mb/year, at -20C to +50C

Relative Humidity Sensor:

- +/- 2% (from 0 to 100%)
- Operating range of -40 to 125 degrees C

Air Temperature Sensor:

- +/- 0.5 degrees C
- Operating range of -40 to 125 degrees C

GPS sensor (STAR**XG**):

- Built on high performance, low power Sony CXD5603GF chip set
- Ultra high track sensitivity -165dBm
- Extremely fast TTFF at low signal level
- Built-in high gain LNA
- Low power consumption (10ma@3.3v)
- NMEA 0183 compliant protocol
- 66 search channels and 22 simultaneous tracking channels
- CE Marking