Stickstation

Overview

The Blue Astro USB stick weather station is a complete sensor package specifically designed for the serious astro imager. It delivers barometric pressure, temperature, relative humidity and dew point with high precision, and comes in a very compact package in the form of a USB stick.

Today's modern mounts require access to meteorological data in the form of temperature and barometric pressure in order to properly compensate for atmospheric refraction. The information needs to be local and affects both pointing and tracking. It is important to have good sensor data both when operating in an observatory and when going portable. For fixed observatories a number of options are available in the form of various weather station packages, but none of these lend themselves to portable use. Naturally, the Blue Astro USB stick weather station can be used in a permanent setup as well.

Housed in a small package similar to a USB memory stick, the Stickstation draws very little power and does not require any exotic device drivers on your system, be it Microsoft Windows, Linux or OSX. For Microsoft Windows users, the Stickstation application stores your data in a SQL database and can also generate data files for various astro imaging software packages. Additionally, if you use the ASCOM Platform, the Stickstation is available via the Observing Conditions Interface for both the Windows application and other astro applications at the same time.

1 What Stickstation delivers

Stickstation contains an accurate and reliable sensor package from one of the world's leading manufacturer of embedded sensors, Bosch Sensortek. The sensor delivers ambient barometric pressure, temperature and relative humidity to the Stickstation processor, which in turn calibrates the readings and calculates the dew point.

2 Using the Stickstation

The Stickstation can be used either with a direct connection or via the ASCOM Platform's Observing Conditions Interface.

For direct usage, just plug the Stickstation device into a free USB port of your computer. If all is well it should be detected as a USB to Serial port and be assigned a COM-port number (Microsoft Windows).

The Stickstation Windows application automatically finds your device and you can unplug and re-plug it while the application is running when not using ASCOM. If you want to use the Stickstation from any other direct communications software package you will need to find out which COM-port number your system has assigned to it. This is done in device manager.

If you use a Mac you may have to disable Apple's own driver for the type of USB to Serial converter that is in the Stickstation, and then install FTDI's driver.

On Linux, the Stickstation is usually detected correctly and works like a serial device.

Please note that there are, as of yet, no specific application for the Stickstation on Mac or Linux, but the device is nonetheless usable for users with scripting knowledge.

3   The Stickstation Windows Application

For Microsoft Windows users, we have developed a weather station application that handles the device, stores the data and makes it available in a user interface.
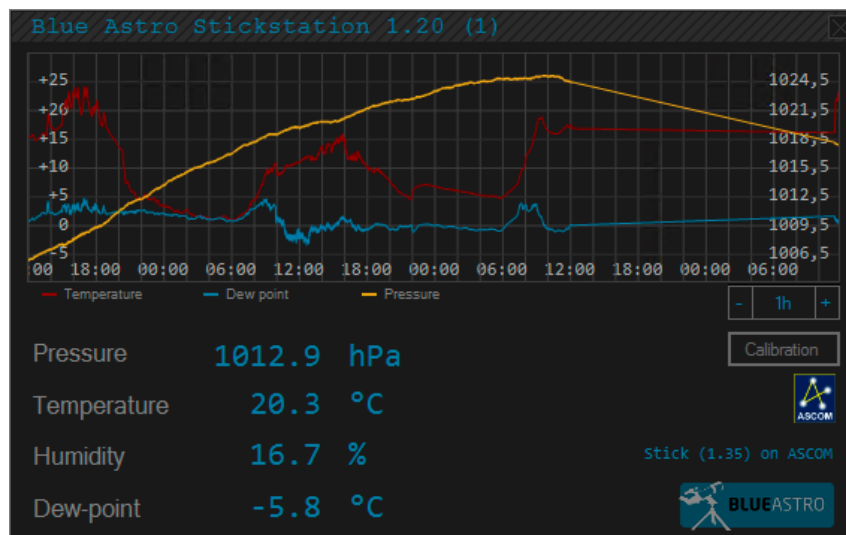
The Stickstation software is "fire and forget" with no per start configuration necessary. In direct mode it will search your computer for a device and hook up to it if it is available. During the search the application may be slow to respond to clicks but this is normal as it is searching through com ports and tries to reset a Stickstation should it be connected.

For ASCOM usage, the software will need some initial configuration, and due to the ASCOM Platform's structure, unplug and re-plug is not yet available (may come later).

3.1 User interface

You may note that the Stickstation application does not exactly follow the normal look-and-feel of Microsoft Windows. This is on purpose, and instead of using standard design elements, the application has been written to a certain look-and-feel that Blue Astro finds appealing. We hope you like it too. There is a close button at the top right – the one with an X in it. If you double-click the hatched top bar the application will minimize itself.

The top bar can also be used to move the window, just like a normal Windows application. Window position is retained by the application and restored at each start, even on multi-monitor systems.

3.2 Graph window

The graph portion of the application shows the temperature and dew point from now (right side) to either 1, 3, 6, 12, 24, 48, 72 or 96 hours back in time. The data in the graph is read from the database every time you change the time length of the graph with the + and – buttons, and new data is added to the graph as it comes in without the need to consult the database.

The Y-axis of the graph automatically scales so that all data requested to be shown fits.

Ambient pressure is plotted in the same graph window (in yellow) with scaling to match the temperature lines.

3.3 Calibration

Stickstation is a very accurate device in relative terms, and has good linearity. Should you find that some other device that you trust is more correct than your Stickstation, a linear offset can be added or subtracted to the pressure, temperature and humidity readings (dew point is calculated from temperature and humidity, so calibration follows those two).

To enter an offset, the Stickstation needs to be direct connected to the application. Simply click the calibrate button. This will turn red whilst the existing values are read from the stick and when this turns green, number entry boxes will appear, allowing you to change these offset values. Simply press the calibrate button again to store these values in the stick. It is also fine to read the existing values without storing new values.

Pressure	1011,1	hPa	+0,0
Temperature	23,0	°C	+0,0
Humidity	24,7	%	+0,0
Dew-point	1,7	°C	

3.4 Data storage

The Stickstation application stores data in a SQLite database. SQLite is a freeware SQL database engine that is included with the Stickstation application, so there is no need to install anything, and SQLite is not installed on your system per se, only included as a DLL for the Stickstation application.

When the application is started the first time on your system it will create the database in your My Documents folder. The name of the database file is "Stickstation.db3".

There are many tools with which to access the data, and you may be interested in installing the SQLite Browser (http://sqlitebrowser.org/). This lets you browse the database and perform operations on it. Make sure you do not modify the structure of the database!

3.5 10Micron mount support

If you own a 10Micron mount and use Frejvall's ASCOM driver, you can have your mount's refraction parameters updated automatically and continuously. Note that in order for this to work, the Stickstation application needs to be running, the driver must be version 6.6.5.0 or better, and you need to check the "Update refraction continuously" checkbox. The driver will update refraction parameters at the onset of each slew, and every two minutes when the mount is not tracking. That way, no tracking disturbances will occur and your imaging is safe.
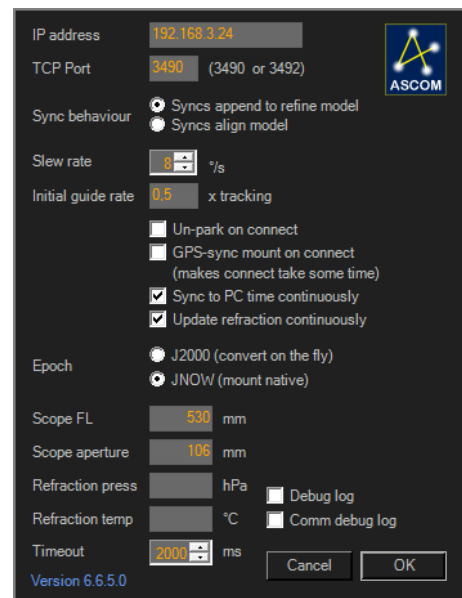
3.6 Boltwood file support

The Stickstation Windows application automatically creates a Boltwood II compatible single line file in your My Documents folder. The file can be used by CCD Autopilot and other packages, but should not be consulted if a Boltwood or compatible sensor is in use, or you will lose your Boltwood data. The file created by the Stickstation Windows application is called "Stick_boltwood.txt" and is only valid for timestamps, ambient temperature, dew point temperature and relative humidity. All other field that are present in the file, such as sky sensor, wind, roof status and more, are faked at good or absent data. You will find the file in your "My Documents" folder.

3.7 Connection to the Stickstation

The Windows application needs to know how to talk to your Stickstation. This is configured by left-clicking on the Blue Astro Logo at any time. This will bring up the main configuration dialog.

You have three choices for connecting to the Stickstation:

- Direct to COM-port with auto-search
- Direct manual setting to specified COM-port
- ASCOM Observing Conditions Interface
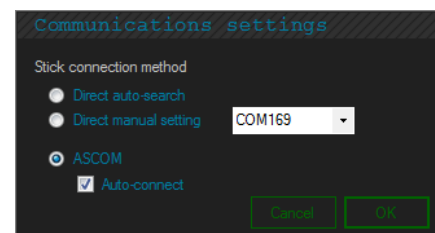
Due to quirks in the .NET Framework's serial port handling, reliable release of the serial port is not possible. Therefore, you must exit the Windows application and restart it if you change from COM to ASCOM or vice versa. Also note that the ASCOM option is only selectable (and the ASCOM logo only visible) if both the ASCOM Platform 6.2 and the ASCOM driver are present on your system.

For your night vision preservation, the rather bright logotype in the user interface will dim as soon as a valid stick is found, and brighten again if the stick is lost. The logotype brightness can thus be seen as an indicator of stick health.

3.7.1 AUTO SEARCH

In order to find your Stickstation, the application will have to first obtain a list of all available COM-ports in your system, then query them simultaneously in separate threads. This procedure relies on letting the COM-ports time out upon each request, and the timeout is 2 seconds. Alas, it takes three seconds to query all serial ports for the Stickstation, and up to four seconds before data is detected.

As soon as your Stickstation is found, the application starts storing data and displays it in the user interface. Should you unplug your device while the application is running, it will simply enter the search mode again until you re-plug your Stickstation.

NOTE!

Each test of a COM-port involves trying to open the port and asserting DTR. If you have an Arduino product connected physically to your PC and no application has that port open, the Arduino will reset. If this is a problem, either disconnect the Arduino or make sure an application has the port open, or simply choose to use a specified COM-port connection instead of auto-search.

3.7.2 DIRECT MANUAL COM-PORT

When using this setting, you specify the COM-port to use and the application will always try to connect to that port. It will still support hot unplug and re-plug, but it will only search the specified COM-port.

3.7.3 ASCOM OBSERVING CONDITIONS INTERFACE

Starting with the ASCOM Platform version 6.2, an interface for observing conditions has been introduced. Through this interface, various sensors can be connected, and there is also an Observing Conditions Hub that can act as a consolidator for several different sensor devices.

The ASCOM driver for the Stickstation is fully compliant and uses the local server template, which in non-ASCOM jargon means that several ASCOM client applications can connect to the Stickstation simultaneously. When using ASCOM, the Stickstation Windows application connects to the stick via the ASCOM driver, and at the same time you can have your other applications connected to the stick. Presently, Sequence Generator Pro has full support for the Observing Conditions Interface, and many more astronomy applications are slated for support in the near future.

With ASCOM connection, you can also ask the application to automatically connect to the last known ASCOM configuration upon start-up. After you have chosen to use ASCOM as the method of connection, you need to tell the ASCOM driver where the Stickstation actually is. You configure the ASCOM driver by clicking the ASCOM logo, which is only available if ASCOM is installed on your computer, and which is bright due to ASCOM being selected as the communications method.

When you click the ASCOM logo, you will be presented with a simple dialog for selection of COM-port. The drop-down will be populated with the ports available on your computer.

NOTE!

ASCOM dialog handling has a feature (also known as a quirk) that sometimes makes the dialog for COM-port selection end up behind the main application window. If you feel that nothing happens when you click the logo, look for an additional icon in your task bar and click that to find the dialog.

3.8 Two instances of the Windows Application

From version 1.20, the Windows application supports running in two instances connected to different Stickstations. If you have two devices and want the application running for both you have to:

- Use ASCOM on only one
- Use specified COM-port for any non-ASCOM connected Stickstation
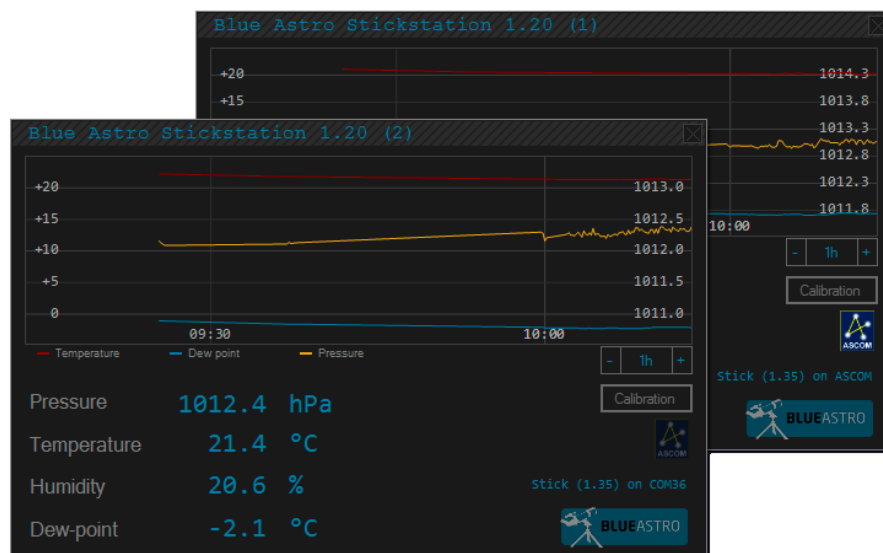
Obviously, some mechanism for not mixing the data up must be present, so the following applies:

- Only instance 1 writes the 10Micron refraction and Boltwood files
- Instance 2 uses the same SQLite database, but writes to table "usbws2", while instance 1 writes to "usbws" as before

When you start the Stickstation Windows application, it will check if there is already an instance running. If that is the case, it will check whether that instance is a "1" or a "2" and adjust itself accordingly.

All settings used by the application are duplicated in two sets, so each instance remembers its own settings, which by the way are:

- Window position
- Com settings
- Graph settings

4 Other operating systems or your own software

If Stickstation is to be used on Mac OSX, Linux or another operating system, all which is required is support for FTDI's FT231XS USB to Serial chip. Stickstation can be used with just a terminal, or you can write scripts in any scripting language that supports communication with a serial port.

Please consult section 5.4 for a full description of the command protocol used.

5 Technical description

This section describes the Stickstation from a very technical standpoint. It is not necessary to read it in order to use the device.

5.1 Hardware

The Stickstation is based on an Atmega 328P processor that handles all the sensor readings and data processing required to deliver accurate results. On the USB side, Stickstation uses and FTDI FT231XS USB to Serial chip that is widely supported out of the box on most operating systems.

The sensor itself is a Bosch Sensortek BME280 device that delivers absolute barometric pressure, temperature and relative humidity. The BME280 stores 18 different calibration parameters in read-only memory, parameters that are used by the stick firmware to adjust the raw sensor readings. Although capable of delivering readings hundreds of times per second, the Stickstation firmware reads the sensor with over-sampling so that the highest accuracy can be obtained.

A small LED at the outer end of the Stickstation blinks briefly whenever a sensor reading is made and delivered to the host computer. If you find that the LED is too much when you are in your observatory, you can change the firmware to a "No LED" version (see section 5.7 for update procedures).

The circuit board of the Stickstation has been designed to minimize thermal transfer from the USB connector. The major part of this reduction comes from using a thin PCB and from having a large cut-out between the inner and the outer parts of the board. Also, the sensor has been placed as far away from the connector as possible.

The clear see-through case of the Stickstation has ventilation holes over and under the sensor part of the PCB in order to stimulate airflow over the sensor.

5.2 Firmware

The firmware in the Stickstation is written in C++ using Microsoft Visual Studio, VisualMicro plugin for Arduino in Visual Studio, and the Arduino development environment. As such, it is actually Arduino code that is targeted at hardware compatible with an Arduino Nano. The boot loader used is, however, special as the Stickstation processor uses the internal 8MHz oscillator in order to reduce power consumption and component count.

The Stickstation firmware reads the sensor upon start-up, delivers the results and then goes to sleep for four seconds. During sleep, the current consumption of the processor is in the order of 4 µA, while the USB to Serial converter still uses some 2-4 mA. Active, the processor uses between 12 and 16 mA. The reason for putting the processor to sleep is to minimize internal heat generation in the device so that temperature measurements remain accurate.

The firmware allows for entering linear offset calibrations to the pressure, temperature and humidity measurements. The dew point is calculated from the temperature and the humidity, so no offset calibration is necessary for that. Linear offsets are used as the

relative accuracy of the sensor is very high, while the absolute is less so, a situation common for most MEMS sensors.

5.3 Specifications

The Bosch Sensortek BME280 device in the Stickstation is an accurate and high performance device. The table below lists the most important specifications.

Pressure sensor accuracy	±1.0 hPa absolute ±0.12 hPa relative
Temperature sensor accuracy	±1.0°C
Humidity sensor accuracy	±3 % RH

5.4 Command protocol

The Stickstation firmware uses standard NMEA 0183 (IEC-61162) command sentences of the same kind that are used with navigational equipment on-board ships for all data delivery. For historical reasons, the commands going to the device from the computer follow a different standard.

Any application that can read a serial port can be used to communicate with Stickstation. The baud-rate is 38400, 8 data bits and no parity. Note that a low to high change of the DTR pin will reset the Stickstation (harmless, but nonetheless).

5.4.1 NMEA sentence structure

A standard NMEA sentence is comprised of the following elements:

`$TTXXX,data,data,…,data*CS<cr><lf>`

`$`	A dollar sign is used to indicate the start of a sentence
`TT`	Talker ID. For many ship instruments this is clearly defined. Stickstation uses the single character P, which is defined as a proprietary talker.
`XXX`	Sentence type. This can be things like GLL for a GPS position, HDT for ship heading etc. Stickstation used the XDR type, which is used for transducer readings.
`Data`	The data from the talker, an arbitrary number of fields separated by commas.
`*`	An asterisk ends the data payload part of the sentence and signifies the start of the checksum.
`CS`	An NMEA checksum is the 8-bit XOR of all bytes from the start of the sentence up to the asterisk, not including the $ and the asterisk. The number is expressed as two hexadecimal digits.
`<cr><lf>`	A standard carriage return line feed pair ends the sentence.

USB stick weather station

5.4.2 STICKSTATION SENTENCE STRUCTURE

5.4.2.1 PRIOR TO FIRMWARE 1.35

```
$PXDR,P,100550,P,0,C,23.8,C,1,H,25.3,P,2,C,2.7,C,3*3F

$PCAL,0,50,-80*64
```

$	Start of sentence
P	Talker: proprietary
XDR	Sentence type, transducer readings
P	Sensor type, P for pressure
100550	Sensor reading, in Pascal (this is 1005.5 hPa)
P	Sensor units, P for Pascal
0	Sensor ID, 0
C	Sensor type, C for temperature
23.8	Sensor reading, in °C
C	Sensor units, C for °C
1	Sensor ID, 1
H	Sensor type, H for humidity
25.3	Sensor reading, per cent relative humidity
P	Sensor units, P for per cent
2	Sensor ID, 2
C	Sensor type, C for temperature
2.7	Sensor reading, in °C
C	Sensor units, C for °C
3	Sensor ID, 3
*3F	Checksum lead-in and checksum, 3F hexadecimal

$	Start of sentence
P	Talker: proprietary
CAL	Sentence type, calibration data
0	Pressure calibration in 1/100
50	Temperature calibration in 1/100 (this is +0.5°C)
-80	Humidity calibration in 1/100 (this is -0.8%)
*64	Checksum lead-in and checksum, 64 hexadecimal

5.4.2.2 FIRMWARE 1.35 AND ON

```
$PXDR,P,100550,P,0,C,23.8,C,1,H,25.3,P,2,C,2.7,C,3,1.35*3F
```

```
$PCAL,0,50,-80*64
```

`$`	Start of sentence
`P`	Talker: proprietary
`XDR`	Sentence type, transducer readings
`P`	Sensor type, P for pressure
`100550`	Sensor reading, in Pascal (this is 1005.5 hPa)
`P`	Sensor units, P for Pascal
`0`	Sensor ID, 0
`C`	Sensor type, C for temperature
`23.8`	Sensor reading, in °C
`C`	Sensor units, C for °C
`1`	Sensor ID, 1
`H`	Sensor type, H for humidity
`25.3`	Sensor reading, per cent relative humidity
`P`	Sensor units, P for per cent
`2`	Sensor ID, 2
`C`	Sensor type, C for temperature
`2.7`	Sensor reading, in °C
`C`	Sensor units, C for °C
`3`	Sensor ID, 3
`1.35`	Firmware version
`*3F`	Checksum lead-in and checksum, 3F hexadecimal

`$`	Start of sentence
`P`	Talker: proprietary
`CAL`	Sentence type, calibration data
`0`	Pressure calibration in 1/100
`50`	Temperature calibration in 1/100 (this is +0.5°C)
`-80`	Humidity calibration in 1/100 (this is -0.8%)
`*64`	Checksum lead-in and checksum, 64 hexadecimal

5.5 Boot-up and reset

The processor on-board the Stickstation resets on power application. In the USB world this means immediately when the stick is plugged in. In addition, and in order to accommodate the Arduino standard boot sequence, the processor resets immediately when DTR goes active. Windows, and most other operating systems, asserts DTR on port open, so the

Stickstation will reset every time you connect to the port. If you connect a standard terminal to the COM-port of Stickstation, it resets and presents the following:

```
Blue Astro Weather Dongle 1.35, free RAM is 856
Serial number is BA-00-02-00007
Sensor OK!
Calibration data: P-1.00, T0.00, H0.00
$PXDR,P,101791,P,0,C,22.5,C,1,H,20.6,P,2,C,-1.2,C,3,1.35*3D
$PXDR,P,101791,P,0,C,22.5,C,1,H,20.6,P,2,C,-1.2,C,3,1.35*3D
```

This information is useful for fault-finding and should be gathered as diagnostic information before anything else. If the Stickstation presents this to you in a terminal window it is working perfectly.

5.6 Manual calibration

Should you want to enter new calibration parameters into your Stickstation device without using the Windows application, you will have to use a terminal application or write your own software or script.

The commands to Stickstation need to be entered relatively quickly, so best is to write them in a text editor or paste them into the terminal window. Of course, if you write a script or copy the command to the device port, this is not an issue.

There are four commands that you can issue as per the table below. The commands do not need a line termination, and all result in a report being issued as per section 5.4.1.

`:cal,00*`	Requests calibration parameters to be reported
`:calp,35,00*`	Sets pressure calibration to +0.35 hPa
`:calt,-120,00*`	Sets temperature calibration to -1.2°C
`:calh,0,00*`	Sets humidity calibration to ±0 % RH

## 5.7 Firmware upgrade

The Stickstation device firmware can be upgraded by means of the Stickstation Windows application. To do this, first make sure your Stickstation device is running and is being displayed in the application, then right click the Blue Astro logo in the lower right corner.

This will bring up a dialog for updating the firmware as seen on the right.

Click the browse button and navigate to your HEX-file containing the new firmware, then click "Program".
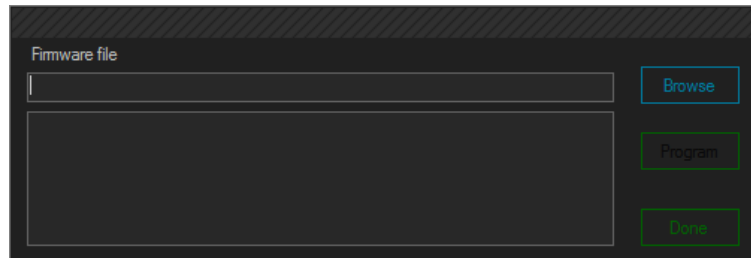
The firmware update process will open a command window with lots of information zooming by, a window that will close automatically and that you can ignore.

If you want the "No LED" firmware, that file will have "NL" in the HEX file name.

6 Installation and download notes

The Stickstation Windows application can be downloaded from:

http://download.blueastro.se/Setup_Stickstation.exe

It is a self-contained EXE file that installs the application on your system. If you want to uninstall it, just go to the control panel, "Programs and Features" (on Windows XP "Add or Remove Programs"), locate "Stickstation" in the list of installed applications and click "Uninstall" ("Remove" on Windows XP).

We have tested the Stickstation application on Windows XP (32-bit), Windows 7 (32- and 64-bit), Windows 8, Windows 8.1 and Windows 10.

In order to use the Stickstation Windows application on your system, please consult the operating system specific information below.

6.1 Windows XP

Microsoft Windows XP is now completely unsupported and retired from Microsoft. The Stickstation application has been targeted at the most modern version of the .NET Framework that is available for Windows XP as many users in the astro community still use Windows XP. It does require some installation to work on XP, as outlined below.

You can install the Stickstation application first, and if any of the pre-requisites are missing it will simply throw an error message when you start. Here are the requirements:

- Windows XP Service Pack 3
- Windows Installer 3
- Windows Imaging Component
- .NET Framework 4.0
- FTDI FT231XS Virtual Serial Port driver (FTDI VCP)

We have prepared a complete package with these pre-requisites, available at
http://download.blueastro.se/Stickstation_XP.zip

The package also contains the Stickstation installer itself.

All the files were downloaded from Microsoft and FTDI in March of 2015.

If you do use Windows XP, you have will have to update the Windows application
separately for 1.0 and up.

6.2 Windows 7

If your Windows 7 installation has been updated properly the Stickstation application
should run as is after installation. The USB-to-Serial driver from FTDI will be automatically
loaded and the Stickstation should show up as a COM-port in device manager.

6.3 Windows 8 and 8.

As Windows 7.

6.4 Windows 10

The Windows 10 update process may over-write the FTDI USB-to-Serial drivers that the
Stickstation relies on. Should this happen, you need to re-install drivers from the FTDI site
(http://www.ftdichip.com/Drivers/VCP.htm)

6.5 ASCOM Platform

You need ASCOM Platform 6.2 or later in order to use the ASCOM features. Furthermore,
you need the Stickstation ASCOM driver from the Blue Astro download page.

7 Notes and known issues

7.1 Graph window

When the relative humidity is 100 percent, the dew point will be the same as the temperature. The graph window currently draws the temperature first, then the dew point. This will result in the temperature's red graph-line being hidden behind the dew point's blue line. This may be addressed in a future release.

7.2 Firmware detection

Reporting on firmware version on command was added in Stickstation firmware 1.31. If you plug in a Stickstation device that has firmware prior to version 1.31, the Stickstation Windows application will assume that the device is firmware 1.22 (no other versions have been released). Application versions higher than 1.0 detects firmware more reliably, and when using Stickstation devices with firmware 1.35 and on the firmware detection will never fail.

7.3 Lost My Documents

If you have your My Documents folder on a network drive and that drive is disconnected for whatever reason, the Stickstation Windows application may hang. This is a rare occurrence and the practice of non-offline My Documents folders is not recommended. The Stickstation Windows application may be immune to this in a future release.

7.4 Pressure data

In the initial release firmware for the Stickstation device, a brain lapse caused the pressure unit calculation to be reversed. Instead of delivering in Pascal as intended, the data was actually in hundreds of Hektopascals. Alas, 1023.45 hPa was delivered as 10.2345, while the correct delivery should have been 102345.

This has been corrected in version 1.31 of the device firmware. The Windows application will handle both data deliveries from version 0.85.

You can use any Stickstation firmware with Windows application 0.85 and up, but you cannot use firmware 1.31 with Windows application versions prior to 0.85. In other words, update your firmware to 1.31 or later.

7.5 Boltwood file

If you choose to configure your astro imaging software to use the Stickstation Boltwood compatible file you will not be able to use your Boltwood or compatible sensor at the same time from the same application if you want the Stickstation data. There may be a way to combine the files in your other software packages, but the Stickstation Windows application cannot do that for you.

7.6 Changing connection method and restart of application

Due to limitations in .NET Framework, changing between ASCOM and direct or vice versa requires an application close and restart.

7.7 Two instances of the Windows application

As described in section 3.8, you can run two instances of the Windows application, each connected to its own Stickstation device. Make sure you read section 3.8 and note that only instance "1" will write the 10Micron and Boltwood files.

When setting up for two Stickstations, use specified com-ports, and use only one through ASCOM (this is an ASCOM driver limitation that is stupid to work around). Auto detect of Stickstation devices is not a good idea when you have two of them – for obvious reasons.

7.8 ASCOM not on your machine

The ability to connect to the Stickstation device via ASCOM obviously requires both the ASCOM Platform 6.2 and the Stickstation local server ASCOM driver. Up to and including version 1.20, the application actually required ASCOM Platform 6.2 to be present or the application would throw an exception.

Version 1.21 and on works even if you do not have the ASCOM Platform 6.2 installed.

The ASCOM logo is only visible, and the option to connect via ASCOM are only enabled, when BOTH the Platform and the driver are detected.

8 Change log

8.1 Application

Version 0.75

This was the initial release of the Stickstation Windows application.

Version 0.85

- The stick version is shown in the status field
- Pressure is plotted in the graph
- Stickstation device firmware can be upgraded
- Stick detection rests between failures (beneficial on systems with no other ports)

Version 0.87

- Graph legends added
- Support for CCD Autopilot weather data via a Boltwood II file

Version 0.88

- Pressure graph scaling fixed so that the values at the horizontal lines are alwaus aligned to 0.5 hPa

Version 0.91

- Several smaller sanity checks added
- Better stick detection
- Graph improvements

Version 1.13

- Further improvements to stick detection
- Introduction of ASCOM Observing Conditions interface
- Introduction of communications settings
- Introduction of manual com-port selection

Version 1.20

- Support for running two instances of the application, each connected to its own Stickstation device
- Bug fixes

Version 1.21

- Implemented late binding support for ASCOM so that the application is usable even if the ASCOM Platform 6.2 is not installed.

8.2 Device firmware

Version 1.22

Initial release firmware for Stickstation.

Version 1.31

- Corrected pressure reporting
- Support for reporting of firmware version and serial number

Version 1.33

- Corrected sanity checks for sensor data to allow operation above 2000 m above sea level

Version 1.35

- Change of I^{2}C library for communication with sensor
- Inclusion of firmware version in the standard data reporting in the communications protocol

9 Contact

Please address any e-mail correspondence to info@blueastro.se