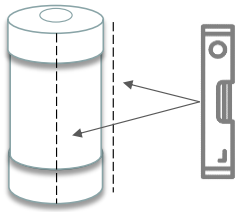**DARK SKY LAB**

Quick User Guide of the Ninox Z2 and Z2 MkII Systems

Positioning

The Ninox Z2 tube (or the Ninox Z2 MkII case) must be positioned vertically so that the SQM lens behind the top window is directed towards the zenith (use, if possible, a spirit level).

It is important to make sure that there is no close light source directly visible from the Ninox window (lamp post, private lighting, …).

The Ninox system can be positioned high or near the ground, the only constraint being that a solid angle of roughly 30° must be clear vertically above the Ninox window at the top.

Power Supply

The Ninox Z2 system must be powered with a 5V / 3A power supply (make sure the power supply can deliver enough amps otherwise the Ninox Z2 system will not power up). Use the mini-USB to USB type A cord which is provided with the Ninox. The mini-USB plug can be secured with a screw thread on the bottom of the Ninox system. A male / female type A USB extension cord can be used to connect the Ninox to a standard USB power supply or a battery. This extension must be long enough in order not to expose the power supply to bad weather (humidity, rain, …).

Caution! Before powering up the Ninox Z2 system, please make sure that the physical switch that allows acquisitions to be performed is positioned on the « **off** » position. This switch is located at the bottom of the Ninox Z2 tube or the Ninox MkII case.

Connection to the Ninox Z2 System

The Z2 version of Ninox can be connected to a wired Ethernet network using the provided Ethernet adapter. The Z2 MkII version of Ninox can be connected to a wired Ethernet network using a standard Ethernet cable. This is the **preferred method** to access the Ninox device. Once the Ninox is powered up, wait for one minute and figure out which IP address is allocated to the Ninox system by connecting to your router. Then, you can use a standard web browser to access the Ninox system using the URL `http://192.168.x.y/` where `192.168.x.y` is the local IP address allocated to the Ninox by your router.

The Ninox Z2 can also be accessed through its embedded Wi-Fi access point. Once the Ninox is powered up, it takes a couple of minutes to initialize and have the Wi-Fi hotspot SSID visible. Ninox will broadcast a Wi-Fi network with an SSID having the format `Ninox<nnn>` where `<nnn>` is a 3-digit identifier, for example 057, which corresponds to the Ninox serial number visible on the tube or case. All what is needed then is to get connected to the Ninox Wi-Fi network one wants to access, for instance `Ninox057`, from a computer, a digital tablet or a smartphone. The password to connect to the Wi-Fi network is:

`ninoxstar`

Once connected to the Wi-Fi access point, a standard web browser must be used to access the Ninox system using the URL `http://ninox<nnn>/`

Here again, `<nnn>` represents the serial number on 3 digits of the Ninox system one wishes to access. As an example, the URL to be used in the Web browser would be: `http://ninox057/` for a connection to the Ninox057 system. In case of a problem with this URL format, it is possible to use the fixed URL `http://192.168.42.1`.

Starting Acquisitions

A physical switch with 2 positions « **on** » and « **off** » is available at the bottom of the Ninox Z2 tube or Ninox Z2 MkII case. It allows you to activate or de-activate the acquisitions, for instance before moving the Ninox Z2. When the switch is on the « off » position, the status LED (also present on the bottom of the tube) is turned on permanently. It shows that the acquisitions are not activated. When the switch is put on the « on » position, the LED performs a slow blink until a GPS fix is achieved. Once the GPS fix is done (successfully or not), the LED turns off and measures can start (assuming the Sun is 8° or more below the horizon). In case of failure of the GPS fix, the LED blinks very quickly for 5 seconds then turns off. New attempts to perform a GPS fix is then performed on a regular basis but the LED is not turned on during these attempts.

Checking the Ninox Status

Acquisition	Software switch state
Waiting for nighttime	On
GPS	SQM
GPS position and time OK	SQM device found

In the Home page of the Ninox, check that the acquisition switch is green with the label « *On* » and that the SQM detector has been correctly found (message « *SQM device found* » in the SQM zone). The GPS zone must also report that the GPS position and time have been correctly obtained. The Ninox is now ready to acquire measures as soon as the Sun is 8° below the horizon.

Downloading Measures

► Measures

Download records

Measures: 13232

Download the records from the Ninox database under the form of a ZIP file

Measure downloading can be performed from the management zone « *Ninox Management* » (use the password **`goninox`** to access the management zone from the Home page). You can download all the records present in the Ninox database using the "Download records" button. Downloading the measures can take some time depending on the number of records to be processed.

Measures are sent by the Ninox system under the form of a ZIP file which is stored into the Download folder of the computer or smartphone which has been used to perform the transfer. The downloaded ZIP files contain CSV files with all the measure as well as various information about the location, the Ninox system used and the connected SQM. When sending measures to DarkSkyLab, please send the full ZIP file without trying to modify its contents.

Stopping the Ninox System

► System Management

Stop Ninox   Restart Ninox

It is important to properly stop the Ninox system before removing the power supply. In order to do that, go into the Ninox management page (see above) and click the button « *Stop Ninox* ». Confirm the action and wait at least for 20 seconds before removing the power supply.

Status LED States

Off	Acquisitions are possible	On	Acquisitions are stopped
Slow blink	GPS fix under way	Fast blink	Initialization
Very fast blink	Failure of the GPS fix		

Using the REST API

The Ninox Z2 integrates an API which allows you to access the measures performed by the system remotely on a network. This API will evolve over time and according to the needs.

It is advised to use the API only when the Ninox Z2 is connected to a local network using the wired Ethernet interface. It is not advised to use the REST API through the Ninox Wi-Fi access point for stability and availability reasons.

The API exposed by the Ninox system is a **REST** (*Representational State Transfer*) API. The dialog with the Ninox system using the REST API is done by simply using a URL that contains the IP address, the port number used for the API, a « resource » that describes the requested information and possibly some additional parameters:

- The **IP address** is simply the one allocated by the router the Ninox is connected to. If the Ninox Z2 is accessed through its Wi-Fi access point, one must use the IP address `192.168.42.1` as described above;
- The **port** to be used is port `5000`;
- The **resources** have the form `/api/v1/<object>` where `<object>` represents the information which is requested to the server;
- **Parameters** are key/value couples that can specify a context. If several parameters are used, they must be separated with the character « & ».

A request to the Ninox Z2 system through the REST API must therefore have the following format:

`http://<IP>:5000/api/v1/<object>?<param1>=<val1>&<param2>=<val2>`

- `<IP>` is the server IP address
- `<object>` is the name of the resource that one wants to access
- `<param1>` and `<param2>` are names of the useful parameters to specify the context of a request
- `<val1>` and `<val2>` are the values given to the parameters

The request URL can have 0, 1 or several parameters.

The following table summarizes the resources available through the REST API.

Resource	Method	Parameter	Parameter Type	Parameter Value	Description
/	GET				Return a help message about the API
/api/v1/nsb	GET	count	Integer	>= 1	Optional parameter to specify the number of NSB measures to be returned (starting with the most recent one). If omitted, only the most recent measure is returned.
		format	String	'json' or 'list'	Optional parameter that can take the value 'json' (the returned information is in a JSON format) or 'list' (it is returned as a simple list). If omitted, the JSON format is used by default.

When requesting NSB information, the following keys are returned in the JSON string:

sqm_mag   NSB value expressed in mag/arcsec^2.
jd_utc   Date and time of the measure in UTC Julian Day
measure_id   Unique ID that identifies the measure

The returned NSB records are **always sorted by increasing measure date and time**. The last record is always the **most recent one**.

In case more records are requested than what is available into the Ninox database, all the available records are returned. Note that when requesting records in the list format, the order of the parameters in the list is 'unique ID', 'UTC date', 'NSB value'.

Here are some examples of queries to the REST API:

```
http://192.168.1.29:5000

API Usage:
- GET / Return this help message
- GET /api/v1/nsb?count=N Return the N latest NSB values
- GET /api/v1/nsb?count=N&format=F Format the message as JSON (F=json) or as a list (F=list)
```

```
http://192.168.1.29:5000/api/v1/nsb
```
```
[ { "sqm_mag": 20.910000000000004, "jd_utc": 2458674.5402862183, "measure_id": 100264 } ]
```
```
http://192.168.1.29:5000/api/v1/nsb?format=json
```
```
[ { "sqm_mag": 20.910000000000004, "jd_utc": 2458674.5402862183, "measure_id": 100264 } ]
```
```
http://192.168.1.29:5000/api/v1/nsb?format=list
```
```
[ [ 100264, 2458674.5402862183, 20.910000000000004 ] ]
```
```
http://192.168.1.29:5000/api/v1/nsb?count=3
```
```
[ { "sqm_mag": 20.910000000000004, "jd_utc": 2458674.538896453, "measure_id": 100262 }, {
"sqm_mag": 20.910000000000004, "jd_utc": 2458674.5395912006, "measure_id": 100263 }, {
"sqm_mag": 20.910000000000004, "jd_utc": 2458674.5402862183, "measure_id": 100264 } ]
```
```
http://192.168.1.29:5000/api/v1/nsb?count=3&format=list
```
```
[ [ 100262, 2458674.538896453, 20.910000000000004 ], [ 100263, 2458674.5395912006,
20.910000000000004 ], [ 100264, 2458674.5402862183, 20.910000000000004 ] ]
```