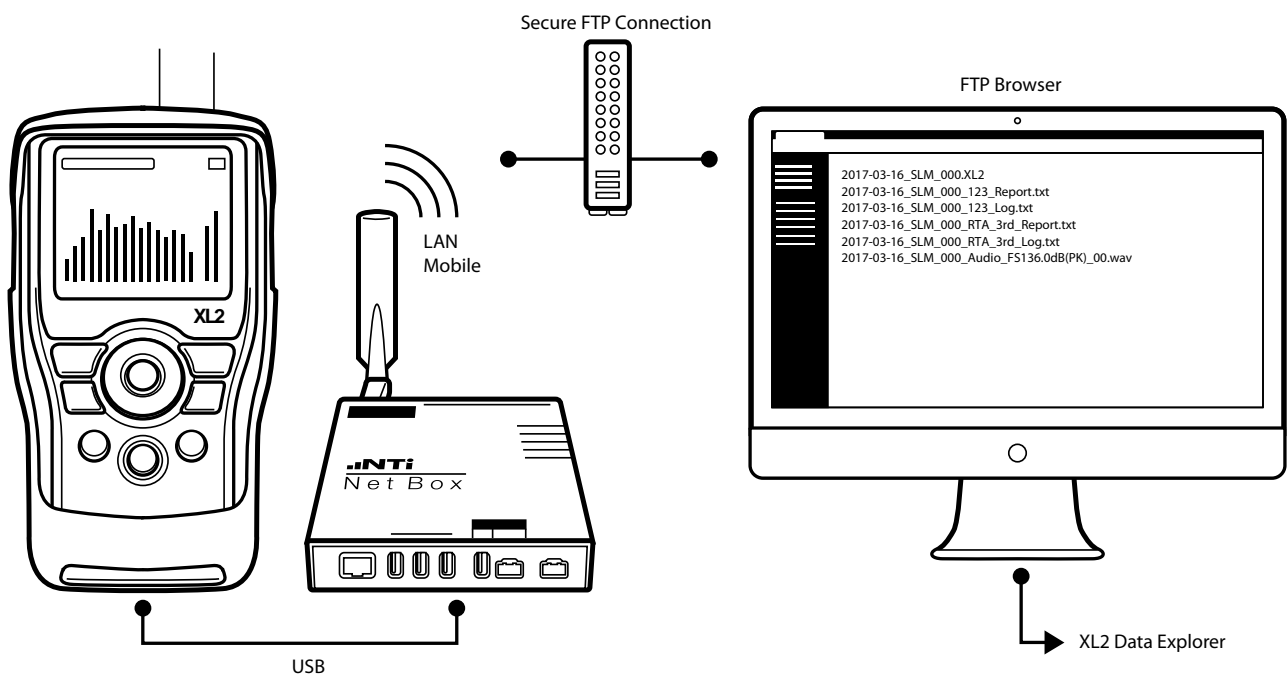


Gateway Mode

Remote Access the XL2 Sound Level Meter

This document describes how to remotely access the XL2 Sound Level Meter via the NTi Audio Gateway.

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Configuration in NoiseScout Gateway Mode



XL2 Sound Level Meter

Minimum Requirements 3G, LAN or Wi-Fi

- XL2 Sound Level Meter
- NetBox - Communication Hub for XL2
- Computer with internet connection

Minimum Requirements 4G or 5G

- XL2 Sound Level Meter
- NetBox - Communication Hub for XL2
- Computer with internet connection
- Teltonika TRB140 Gateway or RUT240 Router

Connect an external 4G or 5G gateway/router to the NetBox via LAN. The TRB140 gateway and the RUT240 router from Teltonika have been tested in this way. Devices that support RNDIS or a virtual network interface via USB, such as the TRB140 or NetGear AirCard 790, can be connected to the NetBox via USB to save energy.

First Steps

- Login at My NTi Audio <https://my.nti-audio.com>.
- Register the NetBox using the Serial Number on the front of the NetBox (format xxxxx-xxxxx).
- Login at <https://www.noisescout.com> using your personal My NTi Audio username and password.
- 👉 The NetBox is listed under “My Noise Monitors”
- Switch the Noise Monitor to “Gateway” Mode. (Ensure that the Noise Monitor is not assigned to a Location in Managed Mode.)

My Noise Monitors

Serial #	Name	LAF Live	🔋	📶	🌡️	Mode	Job	Location
UDCD4-7VVJL	Test	0.0	12.2 V	Ethernet 100 %	25.0 °C	Gateway		Visit ✕

List of your registered Noise Monitors on the dashboard of www.noisescout.com



NetBox with 3G modem

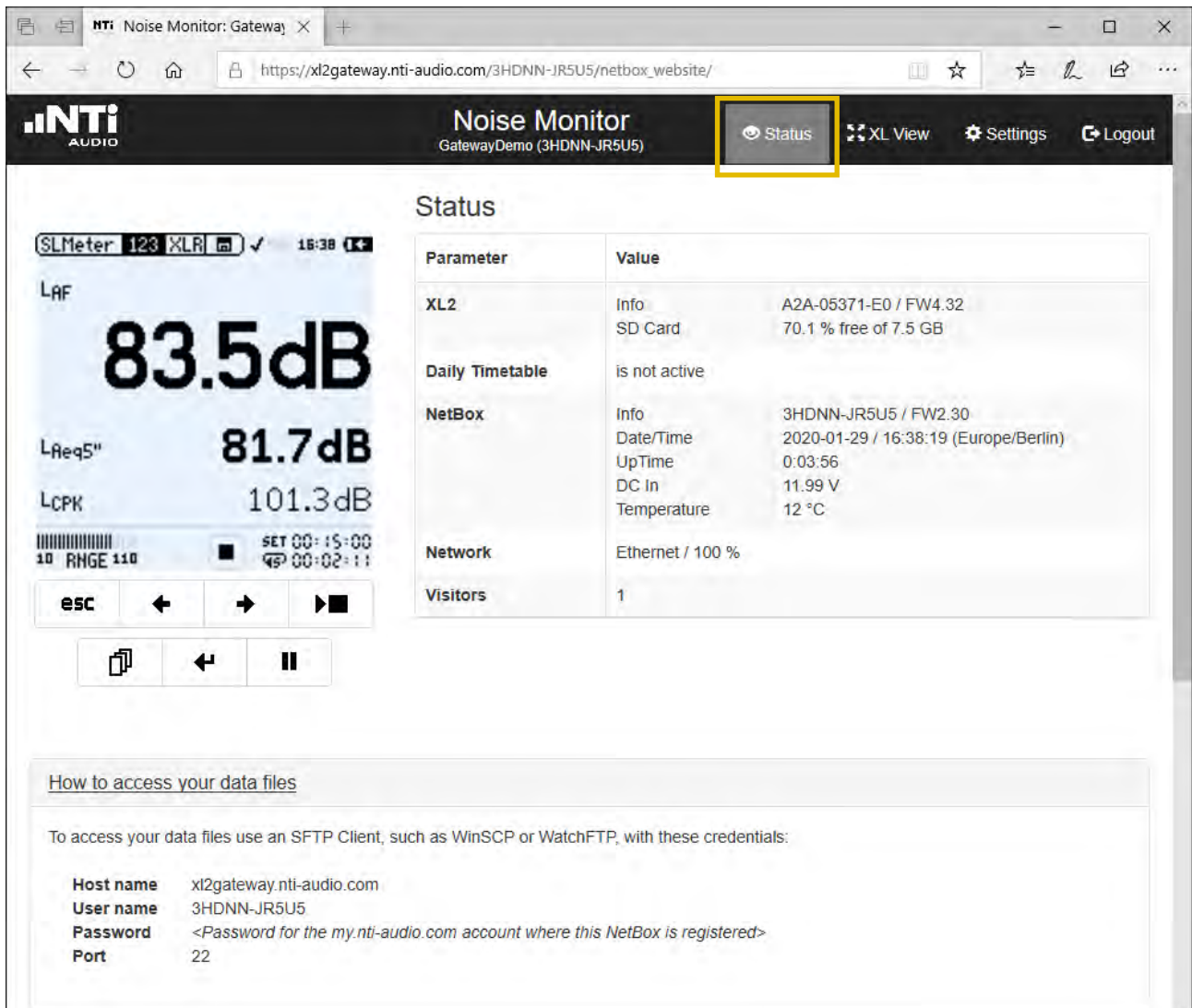
Connecting the remote XL2 Sound Level Meter

- Connect the XL2 Sound Level Meter to the NetBox.
- Connect mains power to the NetBox.
- 👉 The NetBox and XL2 power up within approx. two minutes.

- Press the “Visit” button in the dashboard.
- Enter your personal My NTi Audio password again.
- 👉 The browser window “Noise Monitor Status” is displayed.

- Control the remote XL2 from the browser.

- Select the Status View or XL View



The screenshot shows a web browser window with the URL `https://xl2gateway.nti-audio.com/3HDNN-JR5U5/netbox_website/`. The page title is "Noise Monitor GatewayDemo (3HDNN-JR5U5)". In the top navigation bar, the "Status" button is highlighted with a yellow box. The main content area is titled "Status" and features a large digital display on the left showing sound level readings: "83.5dB" (LAF), "81.7dB" (LReq5"), and "101.3dB" (LCPK). To the right of the display is a table with system parameters and their values.

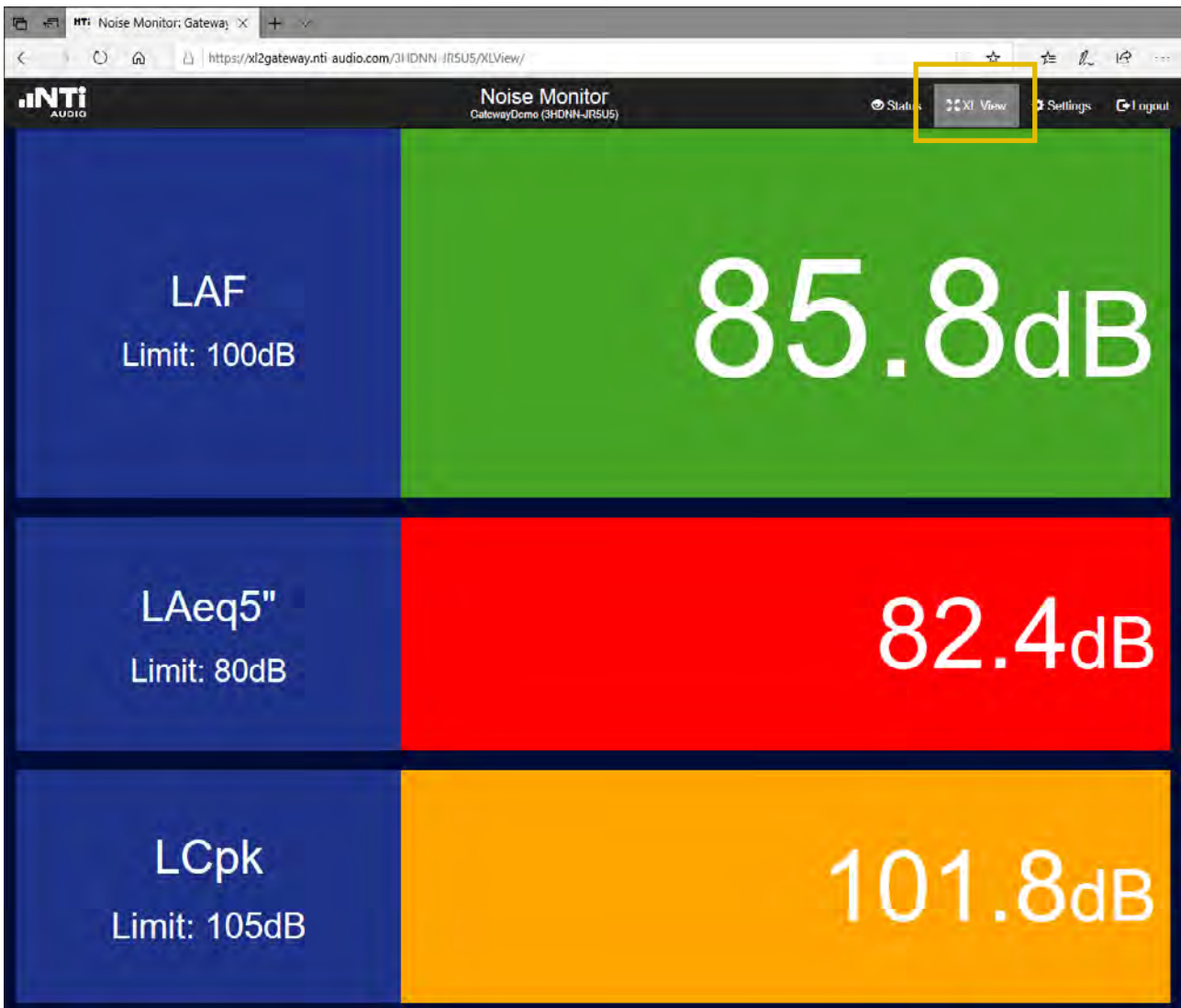
Parameter	Value
XL2	Info: A2A-05371-E0 / FW4.32 SD Card: 70.1 % free of 7.5 GB
Daily Timetable	is not active
NetBox	Info: 3HDNN-JR5U5 / FW2.30 Date/Time: 2020-01-29 / 16:38:19 (Europe/Berlin) UpTime: 0:03:56 DC in: 11.99 V Temperature: 12 °C
Network	Ethernet / 100 %
Visitors	1

Below the table, there is a section titled "How to access your data files" which provides SFTP credentials:

```

Host name  xl2gateway.nti-audio.com
User name  3HDNN-JR5U5
Password  <Password for the my.nti-audio.com account where this NetBox is registered>
Port      22
    
```

Status View



XL View - Big Screen

Settings

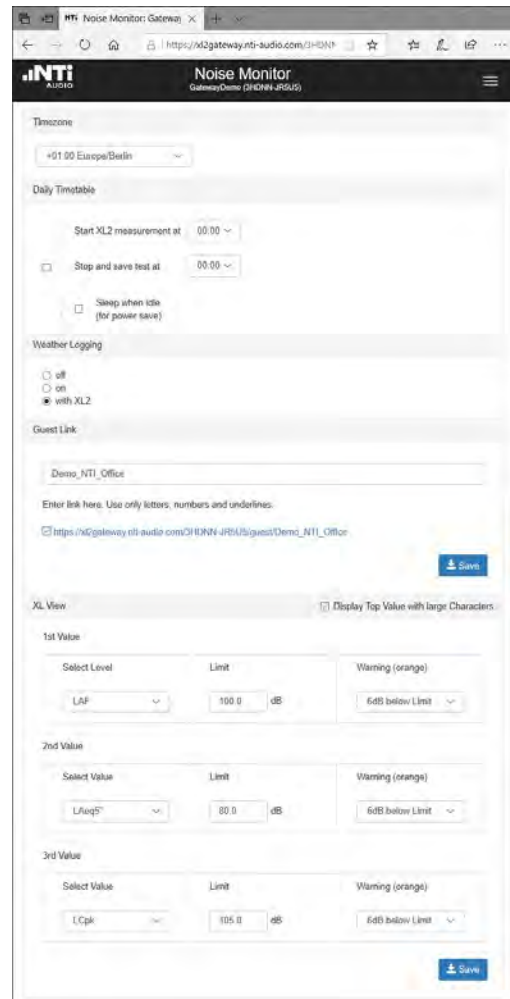
Select “Settings” in the menu.

- **Time Zone**
Set your time zone.
- **Daily Timetable**
Activate the Daily Timetable for repeated measurements. For 24-hour measurement, choose the same Start and Stop time. In this case, the measurement stops 20 seconds before the Stop time, synchronizes the clock and begins again exactly at the Start time.

If, for example, measurement is set between 7:00 and 22:00, you can check the “Sleep when idle” checkbox to reduce power consumption during the time when no measurements are taking place. The XL2 turns itself off and wakes up again shortly before the next measurement Start time (prerequisite: XL2 serial number ending with “E0”).

Using the “Digital I/O Adapter PCB” (an XL2 accessory) the XL2 can also turn off the NetBox, making power consumption negligible during idle periods.
- **Weather Logging**
Choose when you would like weather station data to be logged.
- **System Self-test (CIC)**
Periodic test of the complete signal chain. See next chapter “Automated System Self-Test” for details.
- **Guest Link**
Activate a view-only Guest link if required. Third parties can then view the ongoing measurement, but not change the settings. The last part of the link name can be edited.
- **XL View**
Choose the level and limits for the XL View - Big Screen. Levels that exceed the limits are shown in warning amber or an alarming red.

Click “Status” to return to the measurement. Now, the NetBox, controls the measurement according to the updated settings - no online connection is required.



Settings View

Automated System Self-Test

The measurement microphone of a noise monitor is permanently exposed to the weather. This might impair the microphone capsule and its performance. Therefore, NoiseScout offers an automated system self-test (CIC). The complete signal chain may be verified periodically, remotely, and without removing the microphone from site. Thus, precise sound level measurements are ensured. This test also produces an alarm in case of any unexpected issues, like cable or microphone defects.

The automated system self-test is supported by the XL2 Sound Level Meter with the M2340 Measurement Microphone. The microphone preamplifier has a built-in dedicated signal generator for the self-test, which is activated from NoiseScout via the XL2 Sound Level Meter through the ASD communication. This generator produces a square wave signal with the fundamental frequencies 31.25 Hz and 1000 Hz and the corresponding harmonics for the self-test. The generated test signal spectrum is measured by the XL2 and stored as a reference. Later on, NoiseScout repeats the same test, e.g. daily, and the resulting one-third octave spectrum is compared against the reference.

One-Third Frequency Band [Hz]	Description	Typical reference spectrum [dB]
31.25	fundamental square wave	101.5
100	harmonic	91.5
160	harmonic	87.0
200	harmonic	83.4
315	harmonic	82.2
400	harmonic	79.5
500	harmonic	79.9
630	harmonic	78.4
800	harmonic	77.6
1000	fundamental square wave	100.9
3150	harmonic	91.5
5000	harmonic	87.3
6300	harmonic	83.2
8000	harmonic	81.8
10000	harmonic	83.4
12500	harmonics	80.8
16000	harmonics	80.9
20000	harmonics	79.3

The maximum deviation in each frequency band is specified at 1 dB supporting the specified range of environmental conditions. Unexpected issues, like cable defects, loose capsule mounting, or a missing microphone capsule cause a higher deviation and trigger an automated alarm.

High ambient noise may affect the self-test. Therefore, the ambient noise level is measured prior to performing the self-test. All is fine as long as the ambient noise effect is less than 0.2 dB during the self-test – this requires the ambient noise to be 13.3 dB below the reference spectrum of the self-test. High ambient noise levels will be reported in combination with a failed self-test.

The following workflow is carried out by NoiseScout

- Measure ambient noise level and compare result with reference spectrum
- Generate 31.25 Hz square wave signal and measure actual noise spectrum
- Generate 1000 Hz square wave signal and measure actual noise spectrum
- Compare results with the reference one-third octave spectrum

This workflow takes approximately 7 seconds.

Self-Test Method

The system self-test uses the charge injection check method, in short CIC. A dedicated square wave signal is capacitively coupled to the input of the MA230 PreAmplifier and attenuated by the capacitance of the microphone capsule.

Physical changes in capsules can influence their capacitance, which ultimately leads to a changed level read from the test signal. The test signal passes through the preamplifier and the cable to the XL2 Sound Level Meter for evaluation. This allows any changes in the microphone capacitance, e.g. caused by damages of the microphone capsule or a loose capsule mounting to be detected.

Additional periodic manual calibration using a Sound Calibrator is recommended in combination with a visual inspection of the noise monitor.

Direct File Access to the XL2

- Install your favorite SFTP client software on your computer (such as WinSCP, <https://winscp.net> or similar).
- Enter these settings in the SFTP client software:
 - Host: xl2gateway.nti-audio.com
 - Username: <xxxxx-xxxxx> (NetBox serial number)
 - Password: <your my.nti-audio.com password>
 - Port: 22

👉 The direct file access to the XL2 is enabled

- Download the required data for
 - completed measurements from the folder "Projects"
 - any ongoing measurements from "Projects/.Unsaved/SLM"

How to Setup an automated Data Download via FTP

Commercial programs like WatchFTP, www.watchftp.com, can be used to automatically access and download the available data from the XL2 and delete the data from the XL2 SD-Card if required. This solution allows you to download the data files from many remote noise monitors to your local drive.

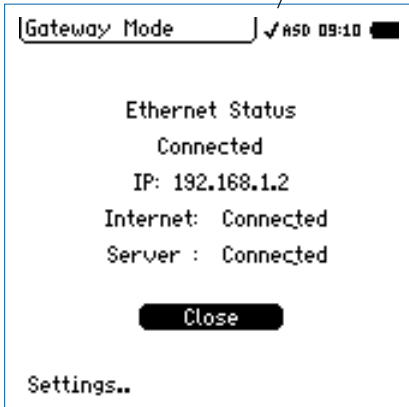
Programming your own Remote Application

You may program a customized measurement application for remote sound level monitoring, audio analysis or automated measurement tasks.

All remote measurement commands are available once the Remote Measurement Option is installed on your XL2. The measurement data may be captured in real time into a PC application, e.g. C# or LabView.

See the Remote Measurement Manual for more details.

Status Symbol



IP Address of the Noise Monitoring Station

Connecting the XL2 within a local Network

The XL2 may also be remotely operated within a local network using the IP address of the connected NetBox.

- Verify the IP address by selecting the Status Symbol on the top line of the XL2 display.
- Confirm your selection with the enter button.
- 👉 The XL2 displays the IP address of the NetBox within the local network.

- Type this IP address into your preferred browser.
- Enter your personal My NTi Audio password.
- 👉 "Noise Monitor Status" is displayed in the browser window.

File Access to the XL2 within a local Network

- Install your favorite SFTP client software on your computer (such as WinSCP, <https://winscp.net> or similar).
- Enter these settings in the SFTP client software:
 - Host: <IP address of the NetBox>
 - Username: ftpuser1
 - Password: <your my.nti-audio.com password>
 - Port: 22

👉 The direct file access to the XL2 is enabled

- Download the required data for
 - completed measurements from the folder "Projects"
 - any ongoing measurements from "Projects/.Unsaved/SLM"

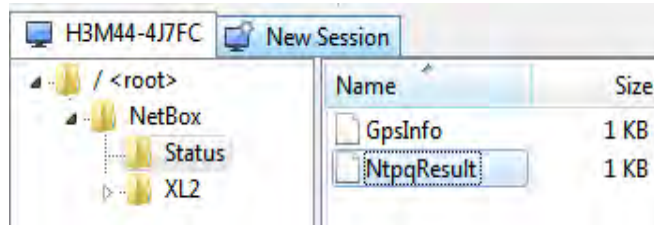


IP Address of the Noise Monitoring Station

Connecting the XL2 in an Intranet without Internet

- Follow the chapter "First Steps" in this Quick Guide for the initial configuration.
- In case a precise XL2 clock is required with GPS time synchronization, then an NTP server (Network Time Protocol) is required. The NetBox connects to the following NTP servers:
 - 0.debian.pool.ntp.org
 - 1.debian.pool.ntp.org
 - 2.debian.pool.ntp.org
 - 3.debian.pool.ntp.org

This communication has to be re-routed to an existing server. Debugging the NTP is supported by the result of the "ntpq -pn" command (<https://linux.die.net/man/8/ntpq>) available using sftp.



Sample output of the NtpqResult File:

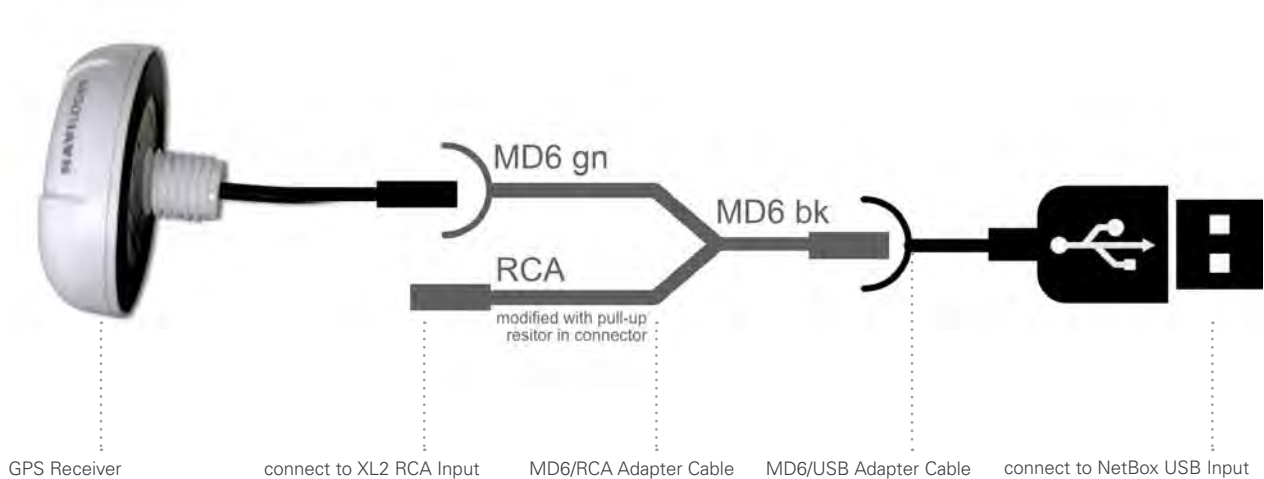
remote	refid	st	t	when	poll	reach	delay	offset	jitter
127.127.28.0	.GPS.	0	l	-	16	0	0.000	0.000	0.000
*213.172.105.106	213.172.96.14	2	u	93	128	377	9.094	0.439	0.095
+5.34.248.225	251.4.108.178	3	u	85	128	377	1.459	0.490	0.067
+5.34.248.224	251.4.108.178	3	u	10	128	377	1.337	0.157	0.190

Connecting a GPS Receiver

The XL2 Analyzer can synchronize the start time precisely with a GPS signal. The measurement start matches the GPS time with an accuracy of +/- 0.7 ms (+/- 32 samples @ 48 kHz).

This requires the specially-adapted GPS Receiver, NTi Audio # 600 000 357. Connect the GPS Receiver to the NetBox using one of the USB inputs, and to the XL2 RCA input. The NetBox detects the GPS Receiver automatically and the GPS location data is presented on the website.

Connection Diagram:



The incidents table lists the actual status of measurement start synchronization with GPS:

- XL2 measurement started ... synced to GPS
- XL2 measurement started ... NOT(!) synced to GPS

The initial detection of the correct GPS time is listed in the incidents table

- XL2 GPS Info: XL2 synced to GPS

The actual status of the time synchronization is noted in the status table

- Unlocked
- Locked
- Locked (xx:xx:xx ago)
(with xx:xx:xx indicating the duration since the last successful GPS time synchronization)

The screenshot shows the NTI Noise Monitor Gateway web interface. The main display area is divided into several sections:

- SLMeter:** Shows noise levels: LAF at 80.0 dB, LReq5" at 77.4 dB, and LCpk at 95.1 dB. It also includes a battery level indicator (100%), signal strength (110), and a timer (00:02:04).
- Status:** A table of system parameters:

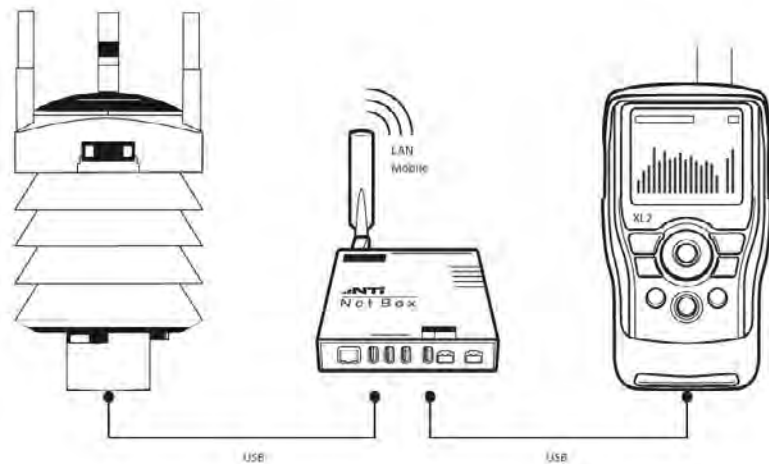
Parameter	Value
XL2	Info: A2A_05371_E0 / FW4.32
	GPS SYNC: Locked
	SD Card: 70.2 % free of 7.5 GB
Daily Timetable	is not active
NetBox	Info: 3HDNN-JR5U5 / FW2.30 Date/Time: 2020-01-23 / 16:35:22 (Europe/Berlin) UpTime: 1:13:50 DC In: 11.91 V Temperature: 1 °C
Network	Ethernet / 100 %
GPS	47.174374° 9.513838° 447m (3D lock) Show on Google
Weather	Logging: with XL2 Current Wind: 0.3 m/s @ 121°
Visitors	1
- How to access your data files:** A section with a link to access data files.
- Incidents in the past week:** A table of recent incidents:

Date Time	Incident	Add. Info
2020-01-23 15:22:59	Weather Device detected	Vaisala SN R3741038 found
2020-01-23 15:22:59	XL2 GPS Info	XL2 synced to GPS

Status View with GPS and Wind Data

Connecting a Weather Station

Rain, strong wind and the wind direction can influence the measured outdoor sound pressure level. Connect a weather station to your noise measurement station to simultaneously record the noise level and the weather data. Depending on the weather station model used, air pressure, temperature, air humidity, rain, wind speed and wind direction are documented. NoiseScout supports the Vaisala models WXT532, WXT533 and WXT536.



The weather station is connected to the NetBox via a 1.4 m USB cable. Alternatively, the weather station can also be purchased with a 10 m cable and the WSP152 surge protector to bridge longer distances between the weather station and the NetBox. The connection from the WSP152 to the NetBox is again with the 1.4 m USB cable.

Which weather stations are supported?

NoiseScout supports Vaisala models WXT532, WXT533 and WXT536 (www.vaisala.com).

- WXT532: Wind
- WXT533: Rain and wind
- WXT536: Air pressure, temperature, humidity, rain, and wind

Which weather data can be recorded?

- Wind speed in [m/s] or [mph]
- Wind direction in [°]
- Rain intensity [mm/h] or [in/h]
- Hail intensity [hits/cm²h] or [hits/in²h]
- Temperature [°C] or [°F]
- Relative humidity [%]
- Air pressure [hPa]

The following settings for weather data logging are supported:

- off: no weather data logging
- on: continuous weather data logging
- with XL2: log weather data when XL2 is measuring



Weather Logging Settings

Weather data is stored for 365 days in Gateway Mode (starting from firmware version 2.89 and later). Older data is overwritten.

Archiving Completed Measurements

By connecting a USB mass storage device (SSD, HDD, Stick) to the NetBox, the data storage capacity of the XL2 can be expanded by up to 2 terabytes.

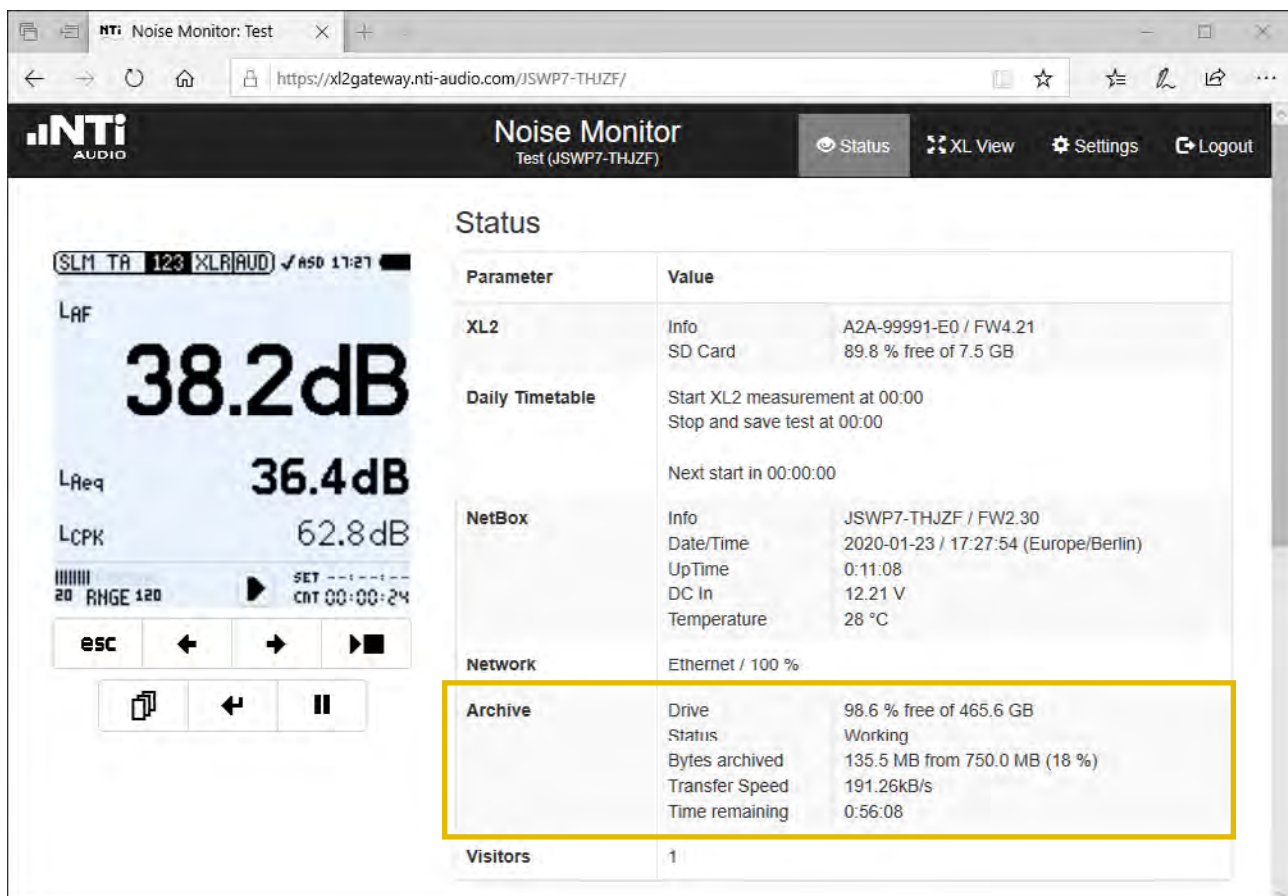
Completed measurements are then automatically archived from the XL2 SD-card to the external storage. This is controlled locally by the NetBox - no online connection is required.

The external storage can, as with the XL2, be accessed via a secure FTP connection. The data is downloaded from the external storage up to four times faster than with direct access to the SD-card of the XL2.

Formatting the Storage Device

The storage device must be FAT32-formatted. To format you can use a tool such as "fat32format":

<http://ridgecrop.co.uk/index.htm?guiformat.htm>



Parameter	Value
XL2	Info A2A-99991-E0 / FW4.21
	SD Card 89.8 % free of 7.5 GB
Daily Timetable	Start XL2 measurement at 00:00
	Stop and save test at 00:00
	Next start in 00:00:00
NetBox	Info JSWP7-THJZF / FW2.30
	Date/Time 2020-01-23 / 17:27:54 (Europe/Berlin)
	UpTime 0:11:08
	DC In 12.21 V
	Temperature 28 °C
Network	Ethernet / 100 %
Archive	Drive 98.6 % free of 465.6 GB
	Status Working
	Bytes archived 135.5 MB from 750.0 MB (18 %)
	Transfer Speed 191.26kB/s
	Time remaining 0:56:08
Visitors	1

Automatic Archiving of XL2 Measurement Results

Archiving

Completed measurement files are moved to the external storage device. The files are deleted from the XL2 only after they are successfully copied. The archiving status is shown on the Status Page of the NetBox website.

The “Daily Timetable” allows you to schedule a daily measurement period. This is described in the “Settings” section on page 5.

In case of power failure, the data generated in the “RESTORE_AFTER_POWERFAIL” folder is also archived.

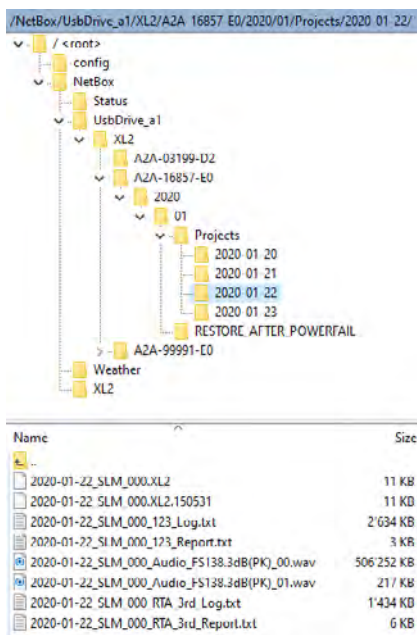
Removing the External Storage Device

In principle, the storage medium may be removed at any time without risk of data loss. However, we recommend that you wait until any active archiving has been completed.

Naming Conventions in the Archive

Data is stored by XL2 serial number, year and month. When controlled by the Daily Timetable, a folder is created for each day.

If several measurements are started per day while archiving is switched on, the XL2 assigns the same file name several times because past measurements have already been archived. In this case, file names in the archive are supplemented with an additional extension:



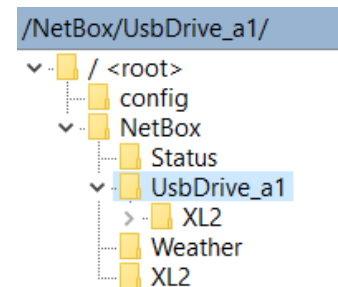
Archive Folder Structure

- 2020-01-29_SLM_000.XL2.171123
- 2020-01-29_SLM_000_123_Log.txt.171123
- 2020-01-29_SLM_000_123_Report.txt.171123
- 2020-01-29_SLM_000_Audio_FS131.7dB(PK)_00.wav.171123
- 2020-01-29_SLM_000_RTA_3rd_Log.txt.171123

Such measurements can be grouped with “Sort by extension”

Remote Access via sFTP

During remote access, the external storage medium can be accessed through the name UsbDrive_xx.



Location of drive in sFTP

Sleep when idle (for Power Save)

The XL2 can switch itself and the NetBox off during non-measurement times. This reduces the power consumption of the entire system to a few mA (prerequisite: XL2 serial number ends with "E0").

The power supply to the NetBox must be routed via Out4 of the "Digital IO Adapter" (NTi Audio # 600 000 380) and "Sleep when idle" must be activated in the settings.

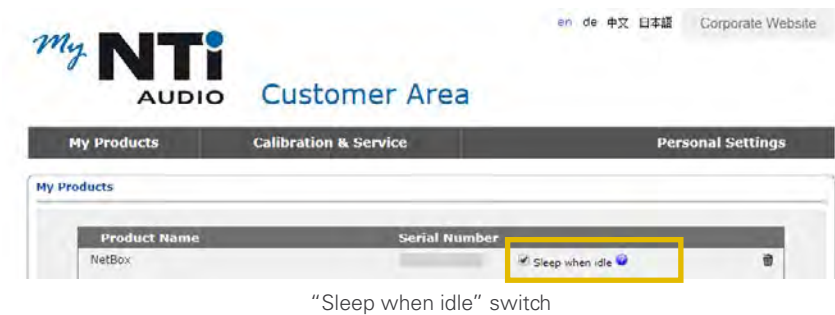
Pin4on.txt

If the XL2 finds a file with the name Pin4on.txt on the SD card when starting, it closes the relay to Out4. This starts the NetBox. The NetBox automatically installs Pin4on.txt on the XL2, but when starting up for the first time it may be necessary to create the file manually (the content of the file is irrelevant).



Note:

"Sleep when idle" can also be deactivated in the customer portal my.nti-audio.com. You can thus prevent a NetBox from being switched off again after the next time it wakes up.



Manual Override

By using the power button on the XL2 to turn it on, the "Sleep when idle" settings can be manually reset. The system remains on for a period of 5 minutes before the settings in "Sleep when idle" are considered again.



Do not manually turn the XL2 off when "Sleep when idle" is active. Otherwise the system will remain turned off until it is manually turned on again.



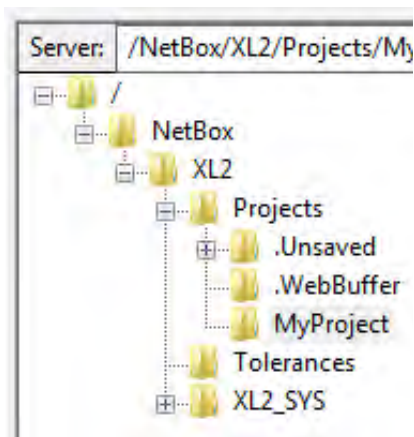
Warning against manually switching off

Server Verification

SFTP protocol versions use different host keys. When your SFTP client connects to the server for the first time you may be asked to trust the host key. To confirm that you are actually connected to the correct server (xl2gateway.nti-audio.com), your SFTP Client should show one of the following fingerprints:

Algorithm	Key length [bit]	Key Fingerprint
ED25519	256	SHA 256: KPr/08XsmkNmhYyVP1ta+21z7lvp48ZGksjlCyc4YJA MD5: 82:f4:d5:c1:f6:94:d3:09:ee:f2:15:69:a0:d8:2c:1e
ECDSA	256	SHA 256: tt2S3pUICyu19uLPtO11E+IC/khuJwXijGEjeR3zpHU MD5: 4a:2b:3c:18:ca:7c:68:7b:82:e0:cb:fa:c2:4b:51:cc
DSA	1024	SHA 256: j74iOEBG3mbkx+zT4AvihsVKG81hky1sOfZ5sukmsNw MD5: fe:d8:2f:51:9e:7b:d4:0f:84:76:dd:a9:80:b7:0a:e6
RSA	2048	SHA 256: YoH4hFprpwtQ58yfPL5apRxubpNV3acghEcMykmgkIU MD5: 33:c7:43:72:81:16:de:98:91:a1:ec:42:ec:fb:cb:e6

Table of Key Fingerprints confirming the trusted Connection



Folder Structure

Troubleshooting

The root directory of your login contains the subdirectory /NetBox. This contains the XL2 root directory of the SD card.

- NetBox offline
In case the NetBox is not connected to the server, the /NetBox directory contains a file named "NetBox is Offline.txt"
- XL2 not connected
In case the XL2 is not connected to the NetBox, the /XL2 subdirectory contains a file named "XL2 not mounted.txt". Verify that your XL2 is powered on, an SD-Card is inserted in the XL2 and the XL2 is connected via USB to the NetBox.

During ongoing measurements, all data is stored in temporary files in the folder '/Projects/.unsaved/SLM/'. As soon as the measurement is completed these files are moved to the current Project folder and renamed to their given filename. Reading the temporary files provides access to the latest measurement data. Kindly be aware of the following details:

- There might be a delay between the time that values are measured and the time that the data is available in the temporary file.
- Due to latency in writing, you may possibly miss the last 10 seconds of audio data.

Irregular Behaviour

In case of any irregular behaviour, the noise monitor may be re-started remotely. This will reboot the NetBox. The actual noise monitoring continuous without any interrupts (based on an internal battery pack or an alternative individual power supply to the XL2 Sound Level Meter is available)

- Press the button below to reboot the NetBox.

Reboot the NetBox here



Serial # Firmware Version	Name	Live Values				Mode	Job	Location	
3Q9LR-LXNUW V2.50.12	Demo Managed 2	LAF 49.5 dB	12.1 V	6 / %	13.5 °C	Managed	NTi Audio Demo	Residential West	
525JE-X9ST5 V2.50.12	Demo Managed 1	LAS 32.9 dB LCeq5" 53.9 dB	12.3 V	100 %	25.5 °C	Managed	NTi Audio Demo	Residential South	

List of registered Noise Monitors on the dashboard of www.noisescout.com