Protocols are updated regularly, please check this is the latest version before proceeding. This protocol is for research only.

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MinIT

What is MinIT?

What is MinIT?

MinIT (MinION IT) is a preconfigured, small-footprint computer that allows running of a single MinION, and removes the need for additional IT infrastructure in a sequencing experiment. It removes the variability generated by a range of IT hardware platforms that are utilised in the field, but not necessarily optimised for MinION. MinIT guarantees throughput and performance, by supporting MinION through all types of available experimentation.

Figure 1. Shows the MinIT, meaning: The MinION IT. It's minimal size but maximal capacity, relative to a standard laboratory computer in terms of basecalling, fits the need for a MinION under the most data-rich assays.

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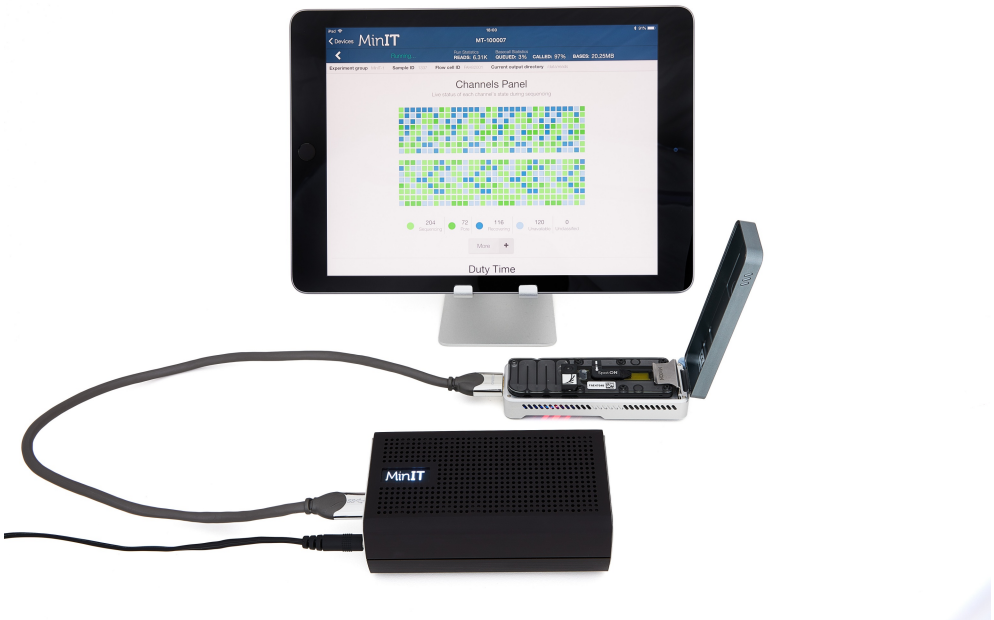

Figure 2. Integration of MinIT. Shows the simple, yet fundamental configuration of the MinIT with MinION and hardware, to control these respective elements e.g. connected via wireless or Bluetooth™.

Hardware

MinIT comes with an advanced GPU, with optimised capacity, to run the range of MinION experiments; this operates as a 'basecalling accelerator' to drive through the experimental data at an optimal rate. The MinIT is capable of reading the bases in real-time over the length of a run (see the example in *How MinIT works*).

In addition, the 512 GB SSD storage provides an average capacity of roughly 30 Gbases, stored in FASTQ and/or .fast5 format.

As shown below in Figure 3, and Table 1, the interface for the MinION can be either the USB 2.0 or USB 3.0 port. The presentation hardware i.e. laptop, tablet or smartphone, for the GUI element of MinKNOW, can be linked via Bluetooth* or wireless connections. The device is powered by 15 VDC from an AC/DC adapter supplied with a MinIT. The ethernet port is a plated RJ45 for 10, 100 and 1000 MB data transfer ethernet cables.

*Subject to change

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Figure 3. The ports of MinIT.

Below outlines the hardware specification of MinIT that allows high throughput and optimised performance sequencing runs with a MinION.

Table 1. Table of Technical Specification:

Technology	Details and Type
Graphics Processing Unit (GPU):	*'Basecalling accelerator'*
Ram:	8 GB
Memory:	512 GB Solid State Device (SSD) Storage
Interfaces:	1 x USB 2.0 port
	1 x USB 3.0 port
	1 x RJ45 Ethernet port (1 Gbit capacity)
	1 X 5.5 X 2.1 mm pin, 15 VDC port for AC/DC adaptor (max. 2 A)
Wireless:	Peer to Peer; 2.4 GHz/5 GHz 802.11 b/g/a/n; 2x2 MIMO
Bluetooth:	2.4 GHz Bluetooth 4.1*

*Subject to change

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Software

MinIT is installed with a Linux OS, and the integral software, containing all functional elements to produce basecalled data, namely: MinKNOW™

The MinKNOW Graphical User Interface (GUI) can control and configure the MinION to co-ordinate an sequencing assay. Furthermore, it can be presented through three types of hardware: computer/laptop, tablet or Smartphone. The GUI has internal features that allow the user to monitor and define parameters in a sequencing experiment.

MinKNOW Core operates the MinION 'behind the scenes' of the MinKNOW GUI. It performs: data acquisition, real-time analysis and feedback, basecalling (through integrated Guppy), data streaming, providing device control, and ensuring that the platform chemistry is performing correctly to run the samples. Please see the Technical Document for MinKNOW below, here.

MinIT

How MinIT works

How it works

The MinIT is an advanced computational device with the necessary features to co-ordinate basecalling in real-time, via integrated Guppy placed in MinKNOW. Real-time basecalling is governed by the 8 GB RAM for manipulation of sequence data and the 'basecalling accelerator', i.e. the GPU, drives the basecalling through its significantly powerful, small-footprint processing abilities.

With integration of the real-time basecalling we anticipate MinIT will provide real-time data into EPI2ME in the cloud. It is also destined that an eventual local installation of EPI2ME for linear and efficient work flows, from experimental initiation to basecalled results to biologically relevant interpretations, will be realised in the near future.

The SSD storage is sufficient for temporary storage of data from a sequencing experiment; we advise the data is moved and managed on a server or larger storage system, due to the capacity of data generated by a MinION run.

MinIT

What is needed

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What is needed for a sequencing run

MinIT comes with all the essential elements of running a MinION. To perform a sequencing experiment, the following essential and optional items should be used:

Essential:
- A MinION
- A MinION flow cell
- A tablet/laptop/Smartphone
- An USB 3.0 cable
- A Configuration Test Cartridge (CTC)

Optional
- A 2.4 GHz or 5 GHz wireless router
- A SSD storage device (in-field testing)
- An USB 2.0/3.0 cable for SSD storage device (not provided)

MinIT

Safety

Manufacturing information

The MinIT is made by:

Oxford Nanopore Technologies
Gosling Building
Edmund Halley Road
Oxford Science Park
OX4 4DQ
United Kingdom

The product is protected by the patents and patents pending in the website below:
https://nanoporetech.com/patents

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Intended use

Oxford Nanopore Technologies® MinIT™ device is an electronic analysis system for use in scientific research. The core technology is built around a nanopore that is able to detect single molecule events including nucleic acids (DNA/RNA), proteins and small molecules.

The MinIT can be used for research use ONLY. It must not be used for *in vitro* diagnostic or therapeutic use.

Electrical information

Parameter	Values
Supply voltage	14 – 17 VDC input. 90 – 264 VAC – wall adapter input, 47 – 63 Hz – wall adapter input
Operating current	up to 2A (dependent on basecalling load)
Maximum power	30W

The purpose of the MinIT safety information

The safety information provides the user with the details needed to install and use the system safely.

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Safety notices MinIT

Warning - WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury. It is important not to proceed until all stated conditions are met and clearly understood.

Caution - CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. It is important not to proceed until all stated conditions are met and clearly understood.

Advisory - ADVISORY indicates instructions that must be followed to avoid damage to the product or other equipment.

Note - A Note is used to indicate information that is important for trouble-free and optimal use of the product.

Critical step - A Critical step is used to indicate information that is essential for trouble-free and optimal use of the product.

Tip - A Tip contains useful information that could improve or optimise your procedure.

The safety notices below are intended to supplement, not supersede, the normal safety requirements prevailing in the user's country.

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Material Safety Data Sheets (MSDS) MinIT

- The MSDSs for any chemicals supplied by Oxford Nanopore Technologies are available on request to support@nanoporetech.com.
- Read and understand the MSDSs before handling, working with or storing the chemicals being used within the Oxford Nanopore Technologies® sequencing device.
- Minimise contact with the chemicals by wearing protective clothing, safety glasses and gloves. The MSDS will carry specific requirements.
- Minimise inhalation of chemicals by using appropriate and adequate ventilation. The MSDS will carry any specific requirements. Continuously check for any spills or leakages. If a spill or leak occurs, follow the clean-up guidelines provided on the MSDS.
- All components of the sequencing device should be handled, stored and disposed of in accordance with local, state/provincial or national laws and regulations.

General precautions MinIT

- When handling toxic, radioactive or pathogenic samples as defined by the WHO Laboratory Biosafety Manual, observe the safety regulations of the specific local in question.
- Do not use the sequencing device if it has suffered any damage, e.g. to power cables, data transfer cables, power supplies or flow cells.

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Personal protection MinIT

- Specimens and reagents containing materials from humans should be treated as potentially infectious. Use safe laboratory procedures as outlined in publications such as Biosafety in Microbiological and Biomedical Laboratories (http://www.cdc.gov/biosafety/publications/bmbl5/index.htm).

- The operator has to take all necessary actions to avoid spreading hazardous biological agents in the vicinity of the system. The facility should comply with the national code of practice for biosafety.

- Samples being loaded into the flow cell should be used, stored and disposed of according to the required safety regulations and laws. Consult the responsible body for safety in your lab for local regulations.

- Samples containing infectious agents should be handled with the greatest of care and in accordance with the required safety regulations and laws.

- It is good laboratory practice to always wear safety glasses, gloves (2 pairs if working with infectious agents) and a lab coat. There may be other locally advised items which add to this recommendation.

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Use of the MinIT, flow cells and reagents

- When handling toxic, radioactive or pathogenic samples as defined by the WHO Laboratory Biosafety Manual, observe the specific local regulations.

- Loading excess buffer, sample or de-ionised water to the flow cell will cause an overflow of the waste compartment. Absorbent material should be used to capture sample and buffer which will come out through the waste port. All material should be disposed of in line with local regulations for biological waste.

- In the unlikely event that the sequencing device is found to be hot during use, terminate use of the device from the operating computer and refer to troubleshooting guidelines.

Maintenance MinIT

- Repairs must only be performed by Oxford Nanopore Technologies, and no components should be replaced. Contact support@nanoporetech.com in the event of damage to the sequencing device or the flow cells.
- Before using cleaning or decontamination methods other than those stipulated by the manufacturer, contact the manufacturer to ensure that the intended method will not damage the sequencing device and/or flow cell.
- When returning sequencing devices and/or flow cells, ensure that they are fully decontaminated and do not present any kind of health risk to our staff.

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Disposal and recycling instructions MinIT

- Used plasticware, such as reagents, tubes and pipette tips, must be collected and disposed of properly in accordance with local safety regulations and laboratory procedures.

- The flow cell buffer, the sample preparation kit buffers and wash kit buffers must not be mixed and must be kept away from strong acids and alkalis.

- The flow cell buffer, wash kit buffers and sample preparation kit buffers must be disposed of according to the local regulations. They must not be disposed of down a sink.

- The Terms and Conditions for the use of sequencing devices stipulate any flow cells that have been used with or otherwise been in contact with materials of Biohazard Level 3 or higher ("Contaminated Flow Cells") must not be returned. Proof of legal and appropriate destruction of any Contaminated Flow cells will be required.

- The sequencing device shall be decontaminated before decommissioning, and all local regulations for electronic and electrical waste shall be followed with regard to disposal of the components if they are not being returned to Oxford Nanopore Technologies.

- The flow cell shall be disposed of as hazardous biological waste, and all local regulation for such waste shall be followed if they are not being returned to Oxford Nanopore Technologies.

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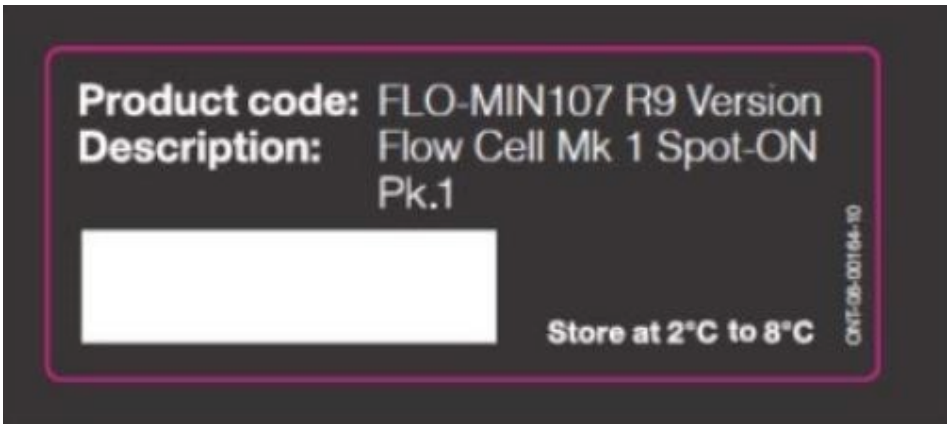
Labels on the instrument

The labels on MinIT:

Labels on the flow cell



IMPORTANT

Emergency procedures

In case of emergency, switch the MinIT off at the power source and unplug the power cable from the back of the device.

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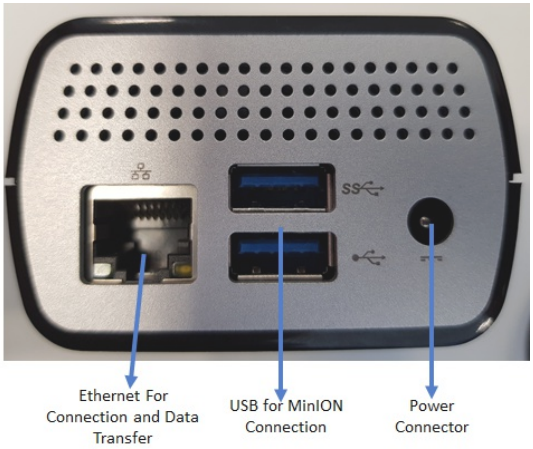
Technical specification

Component	Specification
Size	(W x L x D) 65 x 120 X 40 mm
Weight	290 g
Compute specification	512 GB SSD Storage, 8 GB RAM, GPU embedded compute
Pre-loaded software	Linux OS, MinKNOW, Guppy, EPI2ME
Thermal Management	Tested to function at 0° C to +40° C Do not cover vents on the top or sides of the device

Connections to the device



MinIT

Regulations

FCC disclaimer for MinIT: MNT-001

FCC Dislcaimer

FCC ID: 2ARGS-MNT-001
Product Name: MinIT
Model Number: MNT-001

FCC ID

This product contains **FCC ID: VOB-P3310**

In the case where the host and module combination has been re-certified the FCCID shall appear in the product manual as follows:

FCC ID: 2ARGS-MNT-001

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Warning statement for modifications

WARNING: The FCC requires that you be notified that any changes or modifications to this device not expressly approved by *Oxford Nanopore Technologies Limited* could void the user's authority to operate the equipment.

It must be noted that the ferrite on the power adapter cable to the mains power supply MUST NOT be changed or removed.

FCC Part 15 Statement

Note: This equipment has been tested and found to comply with the limits for a *Class B* digital device, pursuant to Part 15 of the FCC rules.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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