Magnis NGS Prep System, G9710AA

Quick Reference Guide

For Research Use Only. Not for use in diagnostic procedures.

Before You Begin

Product Description

The Magnis NGS Prep System is an automated liquid handling system for next generation sequencing library preparation and/or target enrichment of human nucleic acid samples.

Principle of the Procedure

The Agilent Magnis NGS Prep System is a liquid handler that offers start-to-finish automation of library preparation and target enrichment protocols for next generation sequencing (NGS). The starting material is fragmented genomic DNA (gDNA) purified from a cell or tissue sample, blood sample, or formalin-fixed paraffin-embedded (FFPE) sample. The end result is a target-enriched DNA library ready for sequencing.

The hardware components make up the instrument. See **"Instrument Components"** on page 4 for a list of these components.

The instrument is controlled through the software component of the system, which is displayed and operated through the LCD touchscreen.

Limitations of Use

The Magnis NGS Prep System has been validated for use with Agilent Magnis NGS kits.

Materials Provided

Table 1   Materials provided with the Magnis NGS Prep System

Materials
Magnis NGS Prep System instrument and preloaded touchscreen software
Power cord
Functional test certificate
USB disk with PDFs of the User Guide and Quick Reference Guide

Safety Precautions

The Magnis NGS Prep System is designed for safe operation when it is used in the intended manner. Using the system for purposes other than those intended may impair those safety protections.

Installation

- The system must be installed by an Agilent engineer or Agilent authorized service provider.
- Do not attempt to manually lift the instrument. To move the instrument, use an automated forklift or lift table that can lift at least 100 kg.
- When adjusting the placement of the instrument on the laboratory bench, take care to avoid pinching hazards on the instrument.
- Retain the locking jigs that secure the gantry during shipment. Anytime the instrument is moved, secure the gantry using the jigs.

Electrical

Standard electrical safety precautions should be applied, including the following:

- Per North American and IEC requirements, install the instrument in a location where branch circuit protection is available in the power network.
- Install the instrument with the Agilent supplied power cord that is compatible with the electrical outlets in your region. Do not substitute with a power cord from another source.

- Install the instrument in a location where the power cord can be easily reached for quick disconnection of the power supply.
- Install the instrument away from any flammable sources.
- Make sure that the ventilation slots of the instrument are free to vent at all times. Maintain
- 10 cm of cleared space on each side of the instrument and 18 cm of cleared space at the back of the instrument.
- Connect the power cord to a wall output that provides 100–240 VAC, 1000 W.
- Make sure that proper voltage is supplied before turning on the instrument for the first time.
- Connect the instrument to a grounded socket. Do not operate the instrument from a power outlet that has no ground connection.
- Do not connect the instrument to the same circuit as other devices with a high current draw (e.g., freezers, centrifuges). If possible, connect the instrument to an independent or dedicated AC circuit.
- Do not touch any switches or outlets with wet hands.
- Before disconnecting the power cord, turn off the instrument at both the power button on the front and the power switch on the back.
- Unplug the instrument before you clean any major liquid spills and before servicing any of the electrical or internal components.
- Do not operate the instrument in a hazardous or potentially explosive environment.
- *Do not service the electrical components unless you are qualified to do so*.

Fluids and Reagents
- Never process reagents not intended for use with the Magnis NGS Prep System.
- Observe the relevant safety regulations when handling pathogenic material, radioactive substances or other substances hazardous to health.
- Do not submerge the instrument in any liquid.

Danger of Ultraviolet (UV) Light Exposure

Although exposure to UV light is minimal, the following precautions are still needed.
- During decontamination of the instrument deck with UV light, do not look directly or indirectly at the UV light source.
- Always perform decontamination with the instrument door closed and locked. The instrument door is programmed to remain locked while the UV light is on.
- Replacement UV tubes must be provided by Agilent and must be installed by an Agilent engineer or Agilent authorized service provider.

Danger of Burns
- During protocol runs, the thermal block and other components of the thermal cycler module quickly attain temperatures of greater than 50°C. Keep the instrument door closed during runs. The instrument door is programmed to remain locked while protocol runs are in progress.
- Use only Agilent materials (plates, adhesive seals, foils, mats) intended for use on the Magnis NGS Prep System. These materials are sufficiently temperature-stable (up to 120°C).

Equipment Ratings
- Pollution degree 2
- Installation category II
- Altitude 2000 m
- Humidity 30 to 70%, non-condensing
- Electrical supply 100–240 V, 50/60 Hz, 1000 W
- Temperature 15°C to 25°C
- For Indoor Use Only

Electrostatic Discharge

The Magnis NGS Prep System is static sensitive. Electrostatic discharges greater than 8000 volts may interfere with the normal operation of the USB ports on the instrument. Handling precautions are required when working in high static environments. Wear a grounded wrist strap and take other anti-static precautions prior to making contact with the instrument in high static environments. ESD STM5.1-1998 Class 3B.

Environmental Requirements

Operating temperature

Keep the ambient temperature between 15°C and 25°C.

Operating humidity

Keep the humidity levels between 30% and 70% non-condensing.

Instrument Components

Front and sides of instrument

- Instrument door
- Waste bin drawer containing disposable tip waste bin
- LCD touchscreen for display of the firmware software
- Power button
- USB ports (2)
- Side vents (1 on each side)

Figure 1   Instrument front, door closed

Back of instrument

- Power switch
- Ethernet port
- Inlet for power cord

• Back vent

Power switch

Power cord inlet

Back vent

Ethernet port

Figure 2   Instrument back

Instrument interior
• Instrument deck consisting of the following modules:
• Thermal cycler module for incubation and PCR steps
• Heater/shaker/magnet (HSM) module for various processing steps
• Chiller module for reagent storage
• Tube holders for liquid reagents (6 total)
• Platforms to hold tip boxes (4)
• Platform to hold Beads/Buffers Plate
• Opening to tip waste bin
• LED indicator lights (2)
• Micropipettor for liquid transfer
• Barcode scanner for labware verification and sample tracking
• Gantry for positioning of the micropipettor and barcode scanner
• UV tube for decontamination of surfaces of the instrument deck with UV light
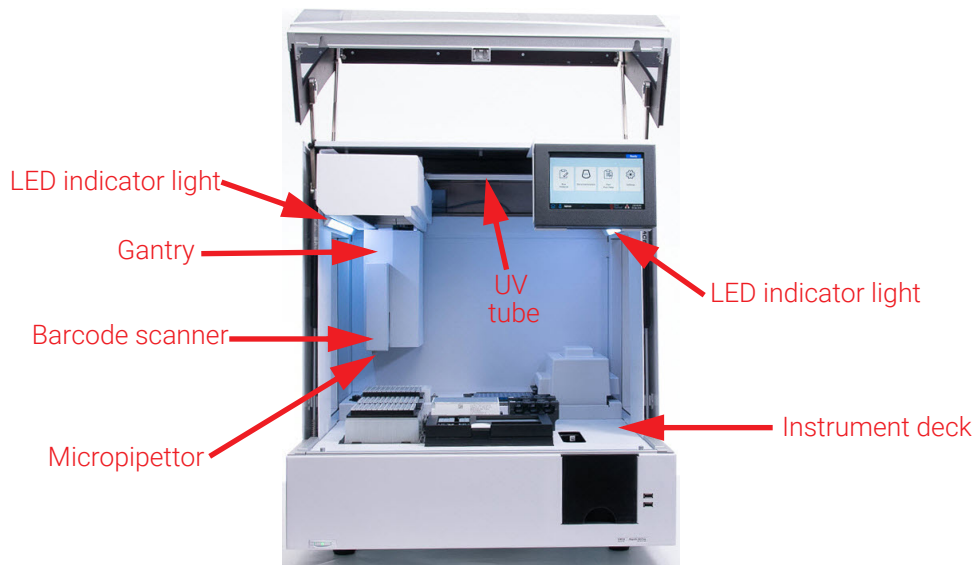
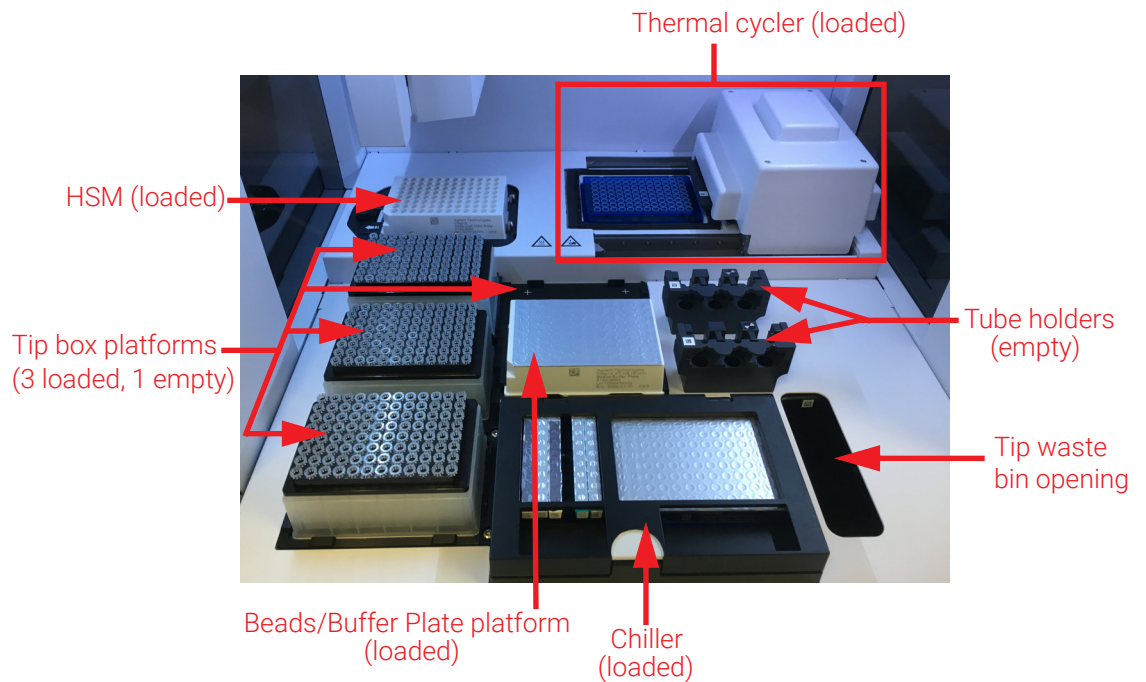**Figure 3**   Instrument interior

Figure 4   Instrument deck

Indicator Lights   You can quickly and easily check the status of the instrument based on the color of the LED indicator lights that illuminate the entire plate filling area.

Table 2 Colors and descriptions of the LED indicator lights in the plate filling area

LED Color	Instrument Status	Description
White	Ready	The lights are illuminated white when the system is idle but the door is open, when the system is performing auto-teaching or teach-point verification, and when a user is setting up a protocol run.
Blue	Ready	The lights are illuminated blue anytime the system is idle and the door is closed, including at completion of a protocol run. The lights are also blue when the system is performing diagnostic tests.
Green	Running	The lights are illuminated green when the system is running a protocol.
Red	Error	The lights are illuminated red when the system has encountered an error. Check the touchscreen for an error message containing further details.

WARNING During UV decontamination, the indicator lights are off and the instrument deck is illuminated by the UV light. Do not look directly at the UV light.

Starting Up the Magnis NGS Prep System

Turn on the instrument

The power button on the front of the instrument is to toggle the instrument on and off.

1 Press the power button on the front of the instrument.

The light on the power button turns green, the instrument turns on, the LED indicator lights inside the instrument illuminate, and the software launches on the touchscreen.

If pressing the power button fails to turn on the instrument, verify that the power switch on the back of the instrument is in the ON position.

Log in to the system

If you do not yet have your own personal user account, use the user name and password provided by the Agilent engineer or service provider who installed your system.

1 Access the Login screen of the software.

The Login screen opens automatically after the turning on the instrument.

If another user is already logged in, press the user name at the bottom of the screen then press **Log Out**. The previously logged in user is logged out and the Login screen opens.

2 Type the user name and password for your account into the provided fields.

The Agilent engineer or Agilent authorized service provider creates a user account during system installation that has advanced user access.

3 Press **Login**.

You are now logged in to the software.

Stand by as the system performs the series of preparatory activities described in **Table 3**.

Table 3   Preparatory steps

Step	Description
Hardware initialization	During hardware initialization, the system returns all motorized parts (i.e., the gantry, HSM module, and thermal cycler) back to their home positions. Additionally, the system checks for the presence of any tips on the micropipettor and, if necessary, disposes of those tips in the tip waste bin.
Instrument Health Check (IHC)	The system performs an IHC each time it is powered on (after login) and each time a protocol run is initiated. The checks performed during the IHC ensure that the hardware is functioning within specifications.
Teach-point verification	Auto-teaching is a process in which the system locates and records the positions of markers (called teach points) that are printed on the instrument deck. Auto-teaching ensures that, during a run, the micropipettor is accurately aligned with the tubes or wells at each deck position. You can configure the system settings to include teach-point verification as part of the initial IHC that is performed after powering up the instrument. During teach-point verification, the current teach-point locations are compared to those that were previously recorded during the most recent auto-teaching run to ensure that the values are sufficiently within range of each other. If the values do not fall within the expected range, the system prompts you to rerun auto-teaching.

Creating User Accounts

About user access levels

The access level assigned to a user account − *Standard* or *Advanced* − determines the user's access to certain software settings and functions. The table below summarizes the differences in privileges between the two access levels.

Table 4   Actions permitted for Standard and Advanced user account

Action	Permitted by Standard users?	Permitted by Advanced users?
Set up and run protocols	Yes	Yes
View data from their own protocol runs	Yes	Yes
View data from protocol runs of other users	No	Yes
Update the number of PCR cycles during run setup	No	Yes
Edit user accounts of other users	No	Yes
Edit chiller temperature setting	No	Yes
Install firmware and protocol updates	No	Yes
Edit protocol and email alert settings	No	Yes
Delete diagnostic reports	No	Yes
Change default protocol version	No	Yes

Add new user accounts

Each user who uses the system needs an account.

1 From the Home screen, press **Settings**.

2 Press **User Management**.

The User Management screen opens listing the available user names and corresponding access levels and statuses.

3 Press **Add**.

The Add New User screen opens.

4 In the User Name field, enter a user name for the new account.

User names can contain a combination of letters and numbers, but numbers are only permitted at the end of the user name (e.g., abc123). Do not include special characters in the user name.

5 Next to **Access Level**, select the access level (Standard or Advanced) for the new user. The default selection is *Standard*.

See **Table 4** for a summary of the differences between the two access levels.

6 In the Password and Confirm Password fields, enter a password for the account.

7 In the Email address(es) field, enter one or more email addresses to associate with the user account.

Separate multiple email addresses with a space. You can enter up to five email addresses.

When the system needs to send an email alert to the user, it sends it to all email addresses listed in the Email address(es) field.

8 Mark the check box labeled **Email alert on run complete** if you want the system to send an email alert to the user when it completes a protocol that was initiated by that user.

9 Mark the check box labeled **Email alert on error occurs** if you want the system to send an email alert to the user when it encounters an error during a protocol run that was initiated by that user.

10 Press **OK** to save the user account.

The Add New User screen closes and you are returned to the User Management screen. The new user name appears in the list on the User Management screen.

Decontaminating the System

The Magnis NGS Prep System includes a UV tube that can be used to decontaminate the surfaces of the instrument deck. The *quick cycle* is a 30-minute decontamination. Agilent recommends running the quick cycle before each protocol run. The 2-hour *extended cycle* is recommended in the event of a spill or leak on the deck surfaces.

Instructions for running a quick cycle are provided below. For instructions on running an extended cycle, see the full-length *Magnis NGS Prep System User Guide* (publication K1007-90000).

WARNING   **Do not look directly at the UV light while decontamination is in progress.**

Run a quick cycle
Agilent recommends running the decontamination quick cycle before each protocol run.

1 Verify that the instrument deck is cleared of all labware, then make sure that the instrument door is closed.

2 From the Home screen, press **Decontamination**.
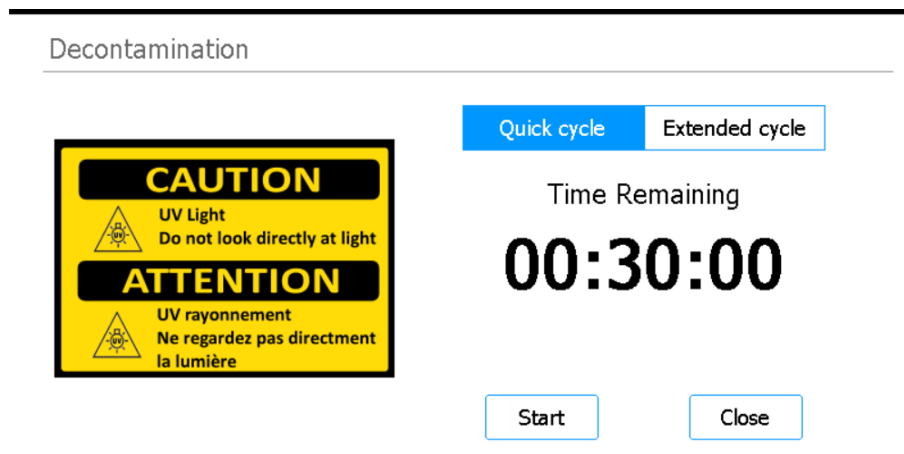
The Decontamination screen opens.

Figure 5 Decontamination screen with Quick cycle selected

3 At the top of the screen, select **Quick cycle**, as shown in **Figure 5**

4 Press **Start**.

The decontamination cycle begins and the screen displays a countdown of the time remaining.

At the completion of the cycle, the UV light turns off and the instrument remains idle.

If needed, press **Abort** at any time to stop the decontamination cycle.

Running Protocols

1) System prep
Prepare the Magnis NGS Prep System so that it is ready to run a protocol.

1 Verify that the instrument deck is cleared of all labware from previous runs.

2 Turn on the instrument and close the instrument door.

See **"Turn on the instrument"** on page 7 for instructions.

3 At the Login screen, enter the credentials for your user account.

Each time the system is turned on, it performs a series of start up activities (see **Table 3** on page 8) immediately after login. These activities may take several minutes to perform. Make sure the instrument door remains closed for the duration of these activities. After completion of the start up activities, the software opens to the Home screen and the system's LED light is blue, indicating that it is ready for use.

4 (Optional) Perform the 30-minute UV decontamination quick cycle to decontaminate the surfaces of the instrument deck. See **"Decontaminating the System"** on page 9.

You can begin **"2) Reagent prep"** while the decontamination is running.

For instructions on manually decontaminating the surfaces of the instrument deck, consult the full-length *Magnis NGS Prep System User Guide* (publication K1007-90000).

2) Reagent prep

Prepare the samples, target enrichment reagents, and other materials needed for the protocol run according to the user manual for your specific Magnis Target Enrichment Kit. The user manual contains details on the materials required to run a protocol and instructions on loading your DNA samples into the Magnis Sample Input Strip.

The image below describes the orientation of the Magnis Sample Input Strips. Make sure to track the locations of your samples as you load them into the strip.
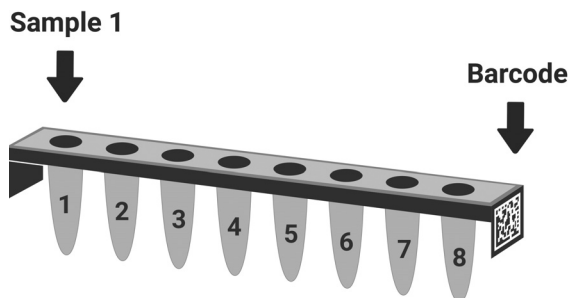

Figure 6 Orientation of the Magnis Sample Input Strips

CAUTION Do not add any writing or labels to the strips, plates, and other labware that may obscure the barcodes.

3) Protocol set up and run

For detailed instructions on running a protocol for your particular sample type, refer to the user manual for your Magnis Target Enrichment Kit.

1 From the Home screen, press **Run Protocol**.

The system locks the instrument door and performs an IHC. At completion of the IHC, the Enter Run Info step opens.

2 Complete the Run Setup steps and start the protocol run, as instructed in the user manual for your Magnis Target Enrichment Kit.

The software walks you through the individual Run Setup steps (**Figure 7**), starting with the Enter Run Info step. Press the forward and back arrow buttons to navigate through the steps (or, if using a USB-connected mouse, click the arrow buttons with the cursor). Because the steps vary depending on the type or target enrichment you are running, you will need to refer to the instructions and screen images provided in the user manual for your Magnis Target Enrichment Kit.

After you start the run, the system's LED light turns green, indicating that a protocol run is in progress. The LED changes from green to blue upon completion of a the run. Additionally, if your account is set up to receive email alerts, the system sends you an email when the run is complete.

If the system encounters an error during the protocol, the LED light changes to red and, if your account is configured for alerts, the system sends you an email notifying you of the error.
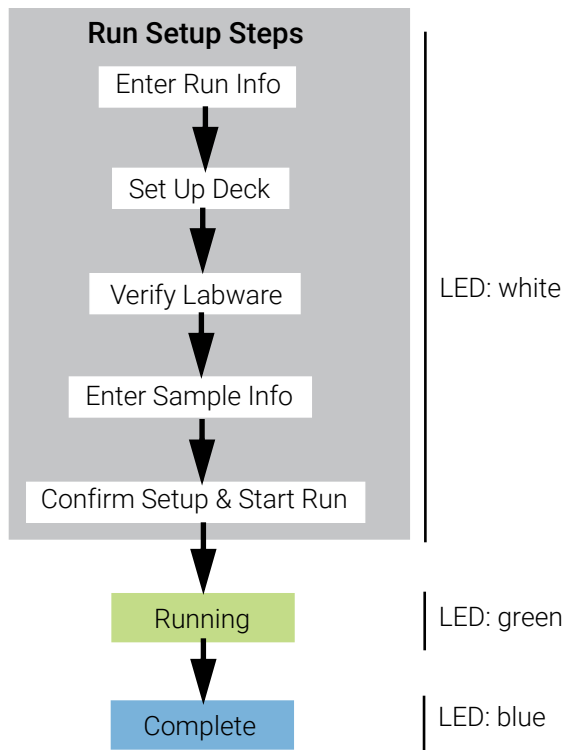
Run Setup Steps

```
┌─────────────────────────────────┐
│   Enter Run Info                │
│         ↓                       │
│   Set Up Deck                   │
│         ↓                       │
│   Verify Labware                │         LED: white
│         ↓                       │
│   Enter Sample Info             │
│         ↓                       │
│   Confirm Setup & Start Run     │
└─────────────────────────────────┘
              ↓
        Running                            LED: green
              ↓
        Complete                           LED: blue
```

Figure 7   Protocol workflow, with corresponding color of LED status indicators lights

4) Collection and clean up

At the completion of the run, the system keeps the prepared library solutions in the PCR plate on the thermal cycler module, which is held at 12°C for up to 72 hours. Collect the samples within that 72-hour period.

1 Wait until the touchscreen indicates that the run is complete. Press **OK** when you are ready to collect the library samples from the instrument.

The system transfers the libraries from the PCR plate to the green library strip tube in the chiller. Allow the instrument-mediated transfer process to complete before continuing.

2 At the completion of the transfer process, open the instrument door and collect the final library samples (i.e., the green library strip tube) from the chiller module.

3 Re-seal the wells of the strip tube using a fresh foil seal strip, then store at the temperature recommended in the user manual for your Magnis Target Enrichment Kit.

4 If the optional pre-capture library QC samples were collected for the run, remove the blue QC sample strip from the chiller module. Process and store the samples as recommended in the user manual for your Magnis Target Enrichment Kit.

5 Remove all remaining consumables from the instrument deck and dispose of them according to local guidelines. Close the instrument door.

6 Log out of the software or turn off the instrument.

To log out, press the user name at the bottom of the screen then press **Log Out**.

To turn off the instrument, press the power button on the front of the instrument.

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