

KingFisher™ Apex Purification System

USER GUIDE

and BindIx Software version 1.1

Catalog Numbers 5400910, 5400920, 5400930, 5400940

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The information in this guide is subject to change without notice.

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Product information

Product description

The Thermo Scientific™ KingFisher™ Apex Purification System is intended for automated transfer and processing of magnetic particles in a microplate format. The system utilizes magnetic rods covered with a disposable, specially designed tip comb, and plates. The instrument functions without any dispensing or aspiration parts or devices. Before the run, samples and reagents, including magnetic particles, are dispensed into the plates according to default protocols that are downloaded from Thermo Fisher Connect or [thermofisher.com/kingfisher](https://www.thermofisher.com/kingfisher). Custom protocols can be created using the instrument interface or with BindIx™ software.

Product type

The KingFisher™ Apex Purification System consists of the , and one of four different magnetic heads and associated heating blocks.

Instrument	Catalog No.
KingFisher™ Apex Purification System with 96 PCR Head	5400910
KingFisher™ Apex Purification System with 96 Combi Head	5400920
KingFisher™ Apex Purification System with 96 Deep Well Head	5400930
KingFisher™ Apex Purification System with 24 Combi Head	5400940

Ordering configurations

The contents of the KingFisher™ Apex Purification System are listed in the following table.

Component	Cat. No. 5400910	Cat. No. 5400920	Cat. No. 5400930	Cat. No. 5400940
Instrument				
KingFisher™ Apex Purification System	1	1	1	1
Accessory tray (See the KingFisher™ Apex Purification System Installation Guide)				
KingFisher™ Apex Magnetic Head	1	—	—	—
96 PCR Head	—	1	—	—
96 Combi Head	—	—	1	—
96 Deep Well Head	—	—	—	1
24 Combi Head	—	—	—	1
PCR Heating Block	1	—	—	—
96 Heating Block	1	1	1	—
96 Deep Well Heating Block	—	—	1	—
96 Storage Tube Heating Block Nunc, Matrix	—	—	—	—
24 Storage Tube Heating Block	—	—	—	—
KingFisher™ Apex 24 Deep Well Heating Block	—	—	—	1
KingFisher™ Apex demo package (Contains plastic consumables)	1	1	1	1
USB Drive containing KingFisher™ Apex user manuals, BindIx™ Software, and Certificate of conformance	1	1	1	1
UV Lamp	2	2	2	2
3 mm flat-tip screwdriver	1	1	1	1
Packing list	1	1	1	1

Product overview

Instrument overview

The KingFisher™ Apex Purification System consists of an instrument with touch screen control and a process chamber with lid to protect samples against environmental contamination.

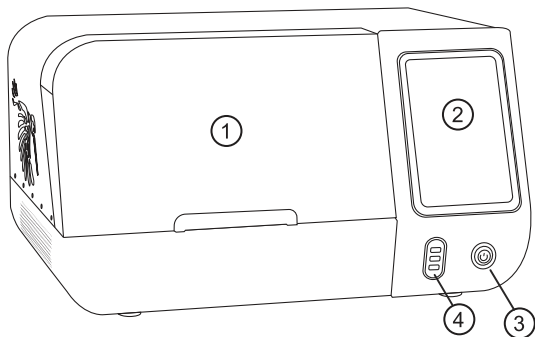


Figure 1 KingFisher™ Apex instrument front view

- ① Front lid
- ② Touch screen
- ③ On/off button
- ④ USB port × 3 (Device)

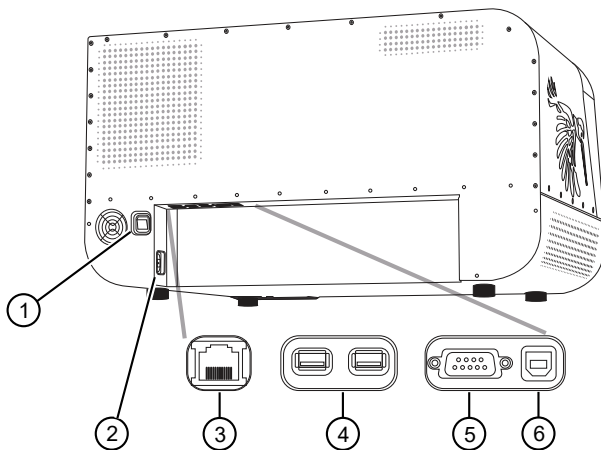


Figure 2 KingFisher™ Apex instrument rear view

- ① Power switch
- ② Power inlet
- ③ Ethernet/LAN port
- ④ USB port (Host) × 2
- ⑤ RS-232 serial port
- ⑥ USB port (Device)

Internal layout

The process chamber of the KingFisher™ Apex instrument consists of a turntable with eight plate stations. The loading position has an illuminated display, while the processing position is situated over the heating block (there are two heating block stations that can be selected for the processing position), and underneath the processing head.

The processing head consists of two vertically moving platforms—the magnetic head holder, and the tip comb holder. The magnetic head holder is used to attach up to two magnets composed of 24 or 96 magnetic rods, while the tip comb holder is used to hold plastic tip combs with 24 or 96 tips.

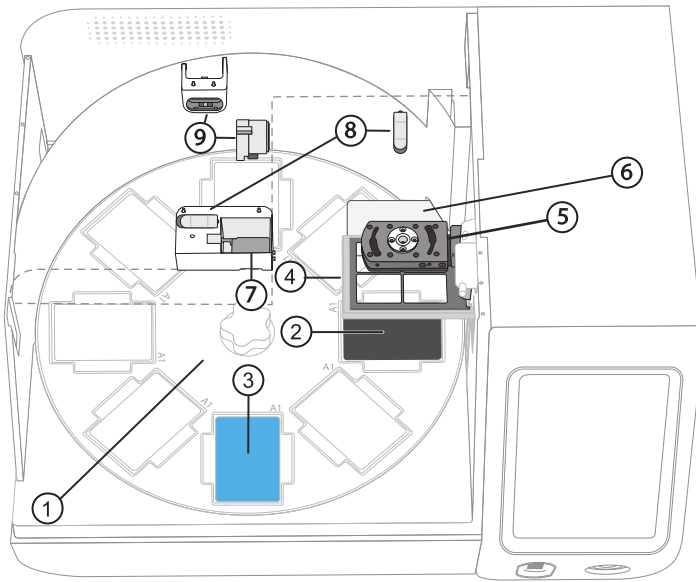






Figure 3 Process chamber layout

- ① Turntable with plate stations (1–8)
- ② Processing position
- ③ Loading position
- ④ Tip comb holder
- ⑤ Magnetic head holder
- ⑥ Shield plate
- ⑦ Barcode reader
- ⑧ UV light clip × 2
- ⑨ UV light socket × 2

User interface overview

Symbol	Function
Open Notifications screen (See page 48 for more details)	
	<p>Swipe down from the top of the touch screen</p> <p>Displays the following information:</p> <ul style="list-style-type: none"> • Notifications • Internet status • Storage devices
Open Menu screen (See page 49 for more details)	
	<p>Select Menu</p> <p>Gives access to the following items:</p> <ul style="list-style-type: none"> • Home • Protocol editor • Protocol library • Run history • Import/Export • Settings • Instrument
Open Settings screen (See page 51 for more details)	
	<p>Select Menu ▶ Settings</p> <p>Gives access to the following items:</p> <ul style="list-style-type: none"> • Localization • Protocols • Sound • Loading position display • Connect • Network share • About • Reset factory settings • Troubleshoot • View EULA
Open Instrument screen (See page 58 for more details)	
	<p>Select Menu ▶ Settings</p> <p>Gives access to the following items:</p> <ul style="list-style-type: none"> • Tools • Magnets • Heating blocks

Users and roles

There are four different user roles, each with different rights:

- **Administrator:** The administrator has no limitations for instrument use. The administrator can create, modify, and delete other roles. The administrator can change the network share and software settings.
- **Scientist:** The scientist can run, view, and create new protocols. The scientist can't edit Thermo Fisher™ Connect Platform, shared network settings, or reset the factory defaults (e.g. change instrument name or modify users).
- **Personal Administrator:** The personal administrator can do same things as Scientist; however, protocols created by the personal administrator can only be modified by the same user.
- **Operator:** The operator can run, view the protocols and reports, and can export a troubleshooting package. The operator cannot access the protocol editor or protocol library, delete run reports or protocols, access the Import/Export view, or edit the settings.

Scientists, personal administrators, and administrators can create new protocols.

Technology overview

Principle of magnetic particle processing

The KingFisher™ Apex instrument operates on inverse magnetic particle processing (MPP) technology. Instead of transferring reagents in and out of plates, as might occur with an external magnet method, the magnetic particles are moved through a series of plates containing specific reagents with the aid of magnetic rods covered with a disposable, specially designed plastic tip comb.

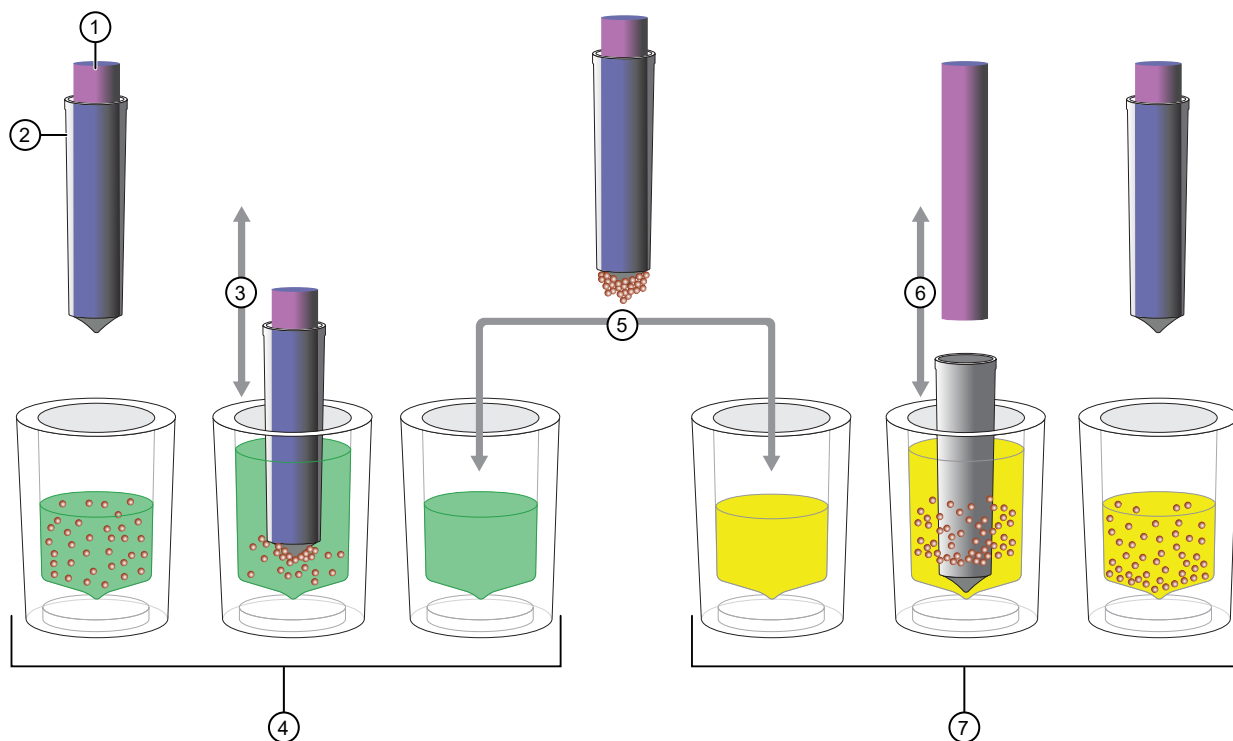


Figure 4 Inverse magnetic particle processing

- ① Magnet
- ② Tip
- ③ Slow up and down collecting movement
- ④ Well 1: Reagent 1 and magnetic particles
- ⑤ Transfer
- ⑥ Fast up and down releasing movement
- ⑦ Well 2: Reagent 2 and magnetic particles

Working with magnetic particles can be divided into five separate processes:

- Collecting magnetic particles
- Releasing magnetic particles
- Washing magnetic particles
- Incubation
- Concentration

Collecting magnetic particles

During the collection of the magnetic particles, the magnetic rod is fully inside the tip. The magnetic rods together with the tip comb move slowly up and down in the plate and the magnetic particles are collected onto the edge of the tips. The magnetic rods together with the tip comb, having collected the magnetic particles, can be lifted out of the plate and transferred into the next plate.

Releasing magnetic particles

After collection of the magnetic particles, the magnetic rods together with the tip comb are lifted from the plate, the magnetic rods are lifted off and the tip comb is lowered into the next plate containing a reagent.

Magnetic particles are released by moving the tip comb up and down several times at considerably high speed until all the particles have been mixed with the substance in the next reaction.

Washing magnetic particles

Washing the magnetic particles is a frequent and an important processing phase. Washing is a combination of the release and collection processes in a plate filled with washing solution.

To maximize washing efficiency, the magnetic rods together with the tip comb are designed to have minimized liquid-carrying properties.

Incubation

The temperature of the reaction mixture is elevated to obtain a sufficient level of specific binding. To keep the magnetic particle suspension evenly mixed in long-running reactions, the tip comb can be moved up and down in the solution.

Concentration

Magnetic particle processing allows changes in volume to be performed during the procedure. Transferring the magnetic particles from a plate with a larger volume to a plate with a smaller volume concentrates the sample.

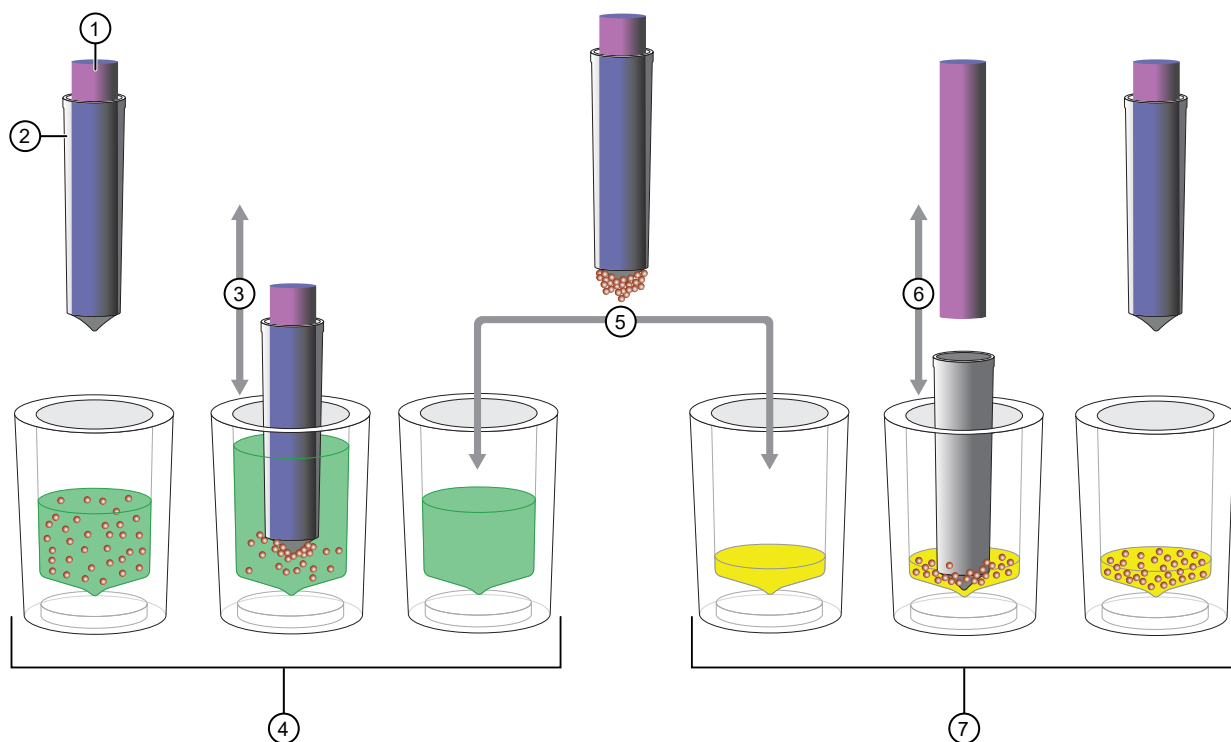


Figure 5 Concentration step during magnetic particle processing

- ① Magnet
- ② Tip
- ③ Slow up and down collecting movement
- ④ Well 1: Collection of magnetic particles from a large-volume well
- ⑤ Transfer
- ⑥ Fast up and down releasing movement
- ⑦ Well 2: Release of magnetic particles into a low-volume well

Upon receiving the device

- Check the enclosed packing list against order.
- Visually inspect the shipping package, the instrument and the accessories for any damage incurred during transit.
- If the carton has been damaged in transit, it is particularly important that you retain it for inspection by the carrier in case there has also been damage to the instrument.

- Any damage claims must be filed with the carrier. Neither the manufacturer nor its agents can be held responsible for any damage incurred in transit, but the manufacturer will make every effort to help obtain restitution from the carrier. Upon receipt of the carrier's inspection report, arrangements will be made for repair or replacement.

Precautions for use



CAUTION! PHYSICAL INJURY HAZARD. Do not remove the instrument cover. There are no components inside the instrument that you can safely service yourself. If you suspect a problem, contact technical support.



CAUTION! PHYSICAL INJURY HAZARD. The instrument weighs 56 kg (123 lbs) and requires at least two people to lift. Use the proper precautions when lifting the instrument to avoid injury.



CAUTION! PHYSICAL INJURY HAZARD. During instrument operation, the heating block temperature can reach 100°C. Allow it to cool to room temperature before handling.



CAUTION! Before using a cleaning or decontamination method other than those recommended by Thermo Fisher Scientific, confirm with Thermo Fisher Scientific that the proposed method will not damage the instrument. See “Decontaminate instrument” on page 87.

Magnetic heads



WARNING! This product contains very strong permanent magnets. People wearing a pacemaker or metallic prosthesis should not use this product. A pacemaker or prosthesis may be affected or damaged if it comes in close contact with a strong magnetic field.

There are four kinds of interchangeable magnetic heads with corresponding disposable plastic tip combs available for the instrument. The magnetic head holder has two positions that can be used to hold different types of magnetic heads.

IMPORTANT! Keep magnetic heads away from each other and other magnets at all times. Clashing of the magnets can cause serious damage to the magnets.

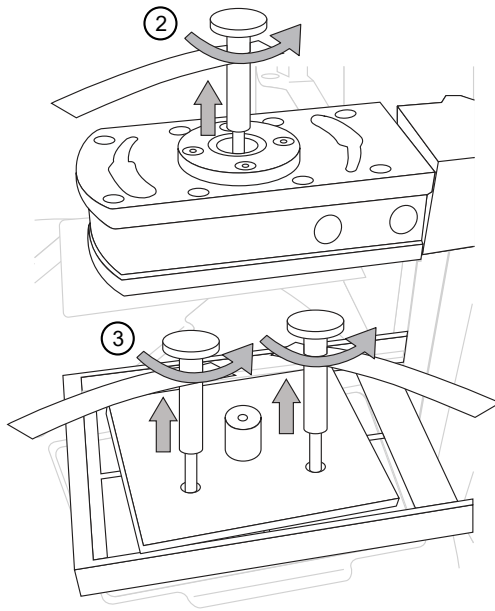
- Do not place the magnetic head on top of the instrument or on any metal surfaces.
- Do not use metal tools when handling magnetic heads.
- Do not place the magnetic head in close proximity to magnetic tapes, computer discs or other magnetic storage systems, such as credit cards, as damage can occur due to the strong magnetic field of the magnetic heads.
- Do not place the magnetic heads near a PC display, as this may cause damage to the display.
- When not in use, keep the magnetic heads in their respective storage boxes.
- For details on changing a magnetic head, see “Magnetic head” on page 27.

Guidelines for unpacking the instrument

- Make sure to place the instrument on firm table and allow min 5 cm (2 in.) free space around instrument.
- To prevent condensation, the instrument should be left in its protective, antistatic plastic wrapping until the ambient temperature has been reached.
- The instrument weighs 56 kg (123 lbs) and requires at least two people to lift. Use the proper precautions when lifting the instrument to avoid injury.
- Retain the original packaging and packing material for future transportation. The packaging is designed to assure safe transport and minimize transit damage. Use of alternative packaging materials may invalidate the warranty. Also retain all instrument-related documentation provided by the manufacturer for future use.
- Refer to the installation guide for detailed instructions on how to unpack the instrument.

First time instrument setup

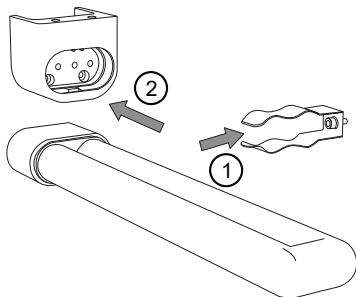
1. Connect the power supply cable to the power inlet.
The instrument operates at voltages of 100–240 VAC and the frequency range of 50/60 Hz. Ensure that the local supply voltage in the laboratory conforms to that specified on the type label on the back of the instrument
2. Remove the transport lock screw from the magnet holder.
3. Remove the transport lock screws from the transport lock plate over the tip comb holder.



4. Remove the upper transport lock plate, then lift the tip comb holder and remove the lower transport lock plate.
Do not discard the parts of the transport lock. The lock is required in case of future transportation of the instrument (see “Store the Transport Lock” on page 86).

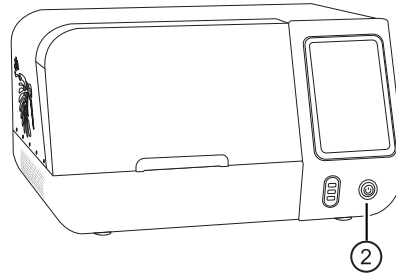
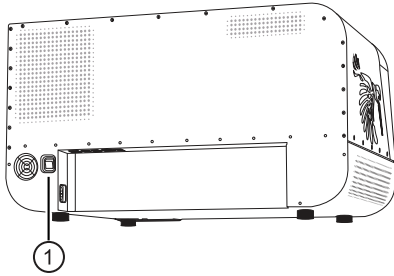
Install the UV light bulbs

1. Insert the UV light bulb into the light clip.
2. Slide the light bulb back and into the light socket.



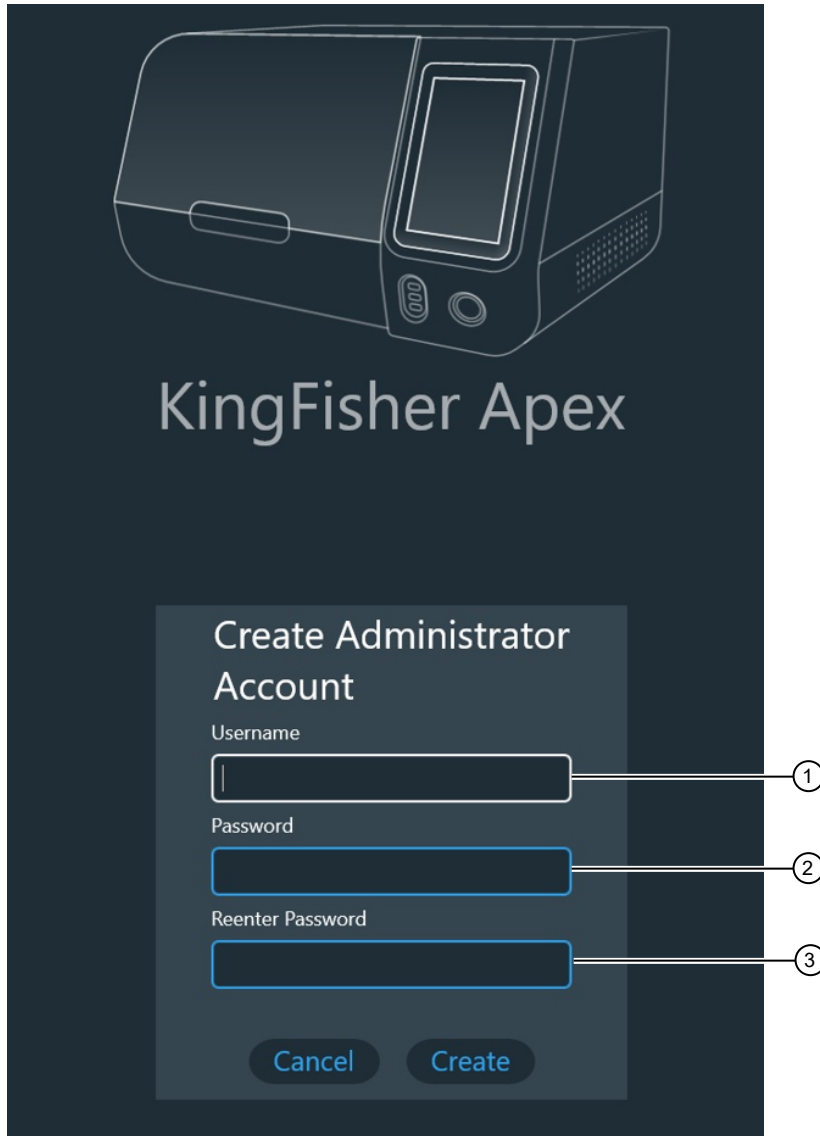
Turn on the instrument

1. Turn on the power switch at the rear of the instrument.
2. Press the on/off button to turn on the instrument.



Create username and password for administrator local user profile

1. At initial login, create username and password for administrator local user profile.



- ① Username
- ② Password
- ③ Reenter Password

Note: Create a username and password that contains at least six characters, and may contain upper- and lower-case letters, numbers, and special characters. Not all characters are supported.

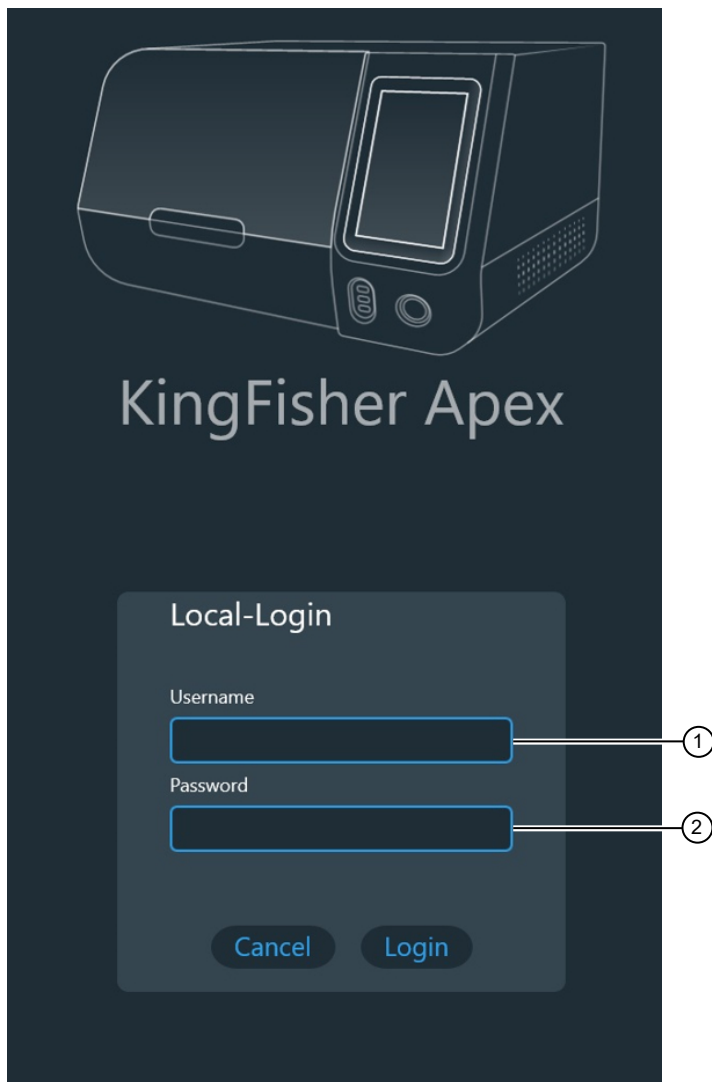
Note: The password will be needed for use of the instrument.

IMPORTANT! Only the administrator can create and modify the other user roles. See “Users and roles” on page 46.

2. Select **View EULA** to see licensing information for use of the instrument operating software. Read the end-user license agreement (EULA), then select accept.
3. Choose region.
4. Set date, time, and other selectable options.

IMPORTANT! The time set here will be applied in the logging and reporting functions.

User login



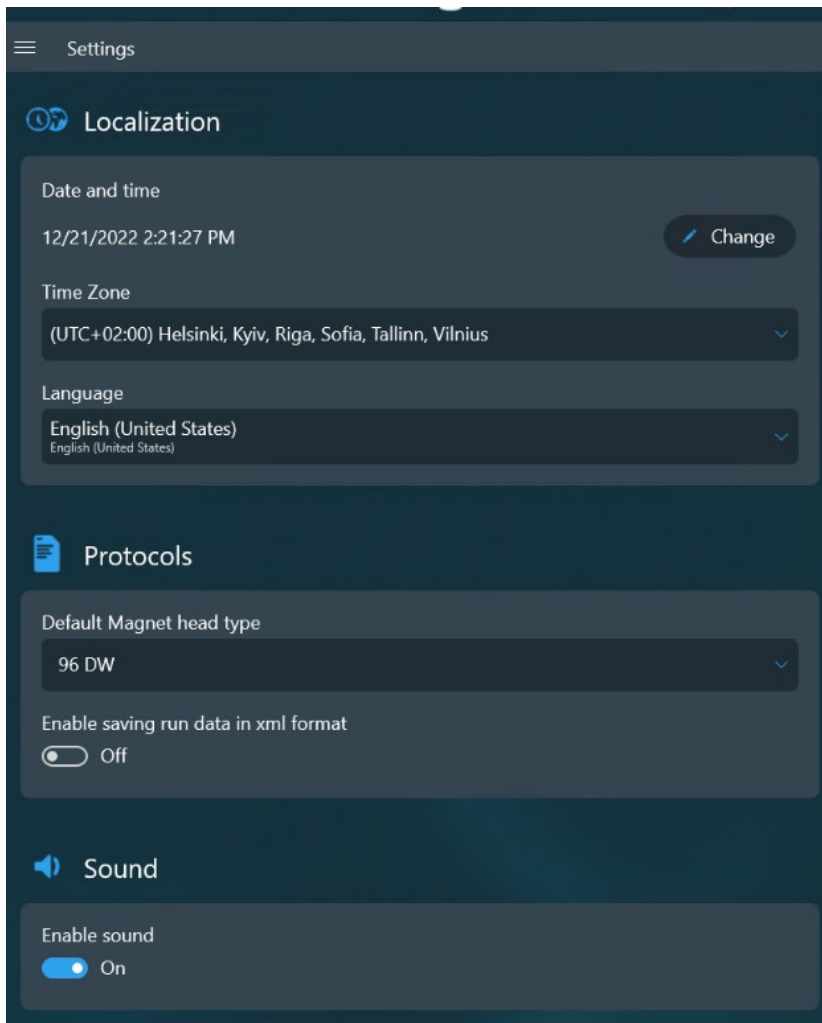
① Username

② Password



Localization settings

The administrator and the scientist user can modify these settings:

- Date and time
- Language
- Select the default magnet head type
- Enable/Disable saving run data in xml format
- Sound on/off
- Setting the logout time in minutes



Set date and time

1. Select  **(Change)** under **Date and time**
2. Scroll through the numerical menus to select the time and date.
3. Select .

Set time zone

1. Select the **Time zone** field to open the drop down menu.
2. Scroll to the desired time zone.
3. Select ✓.

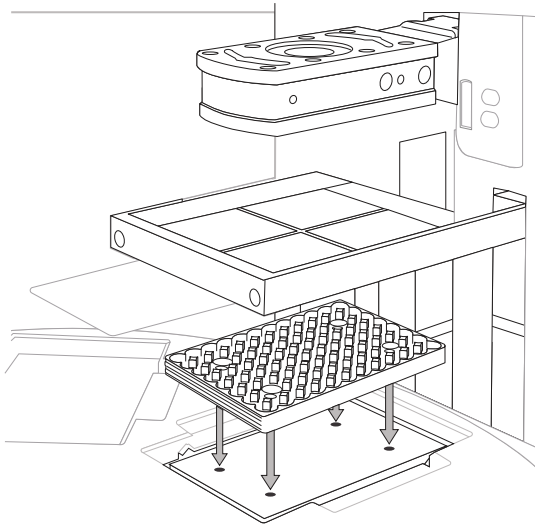
Set language

1. Select the **Language** field to open the drop down menu.
2. Select the desired language (English, Spanish, French, German, Portuguese, Italian, Russian, Japanese, Chinese).
3. Select ✓.

Install heating block

1. Select **Menu** ▶ **Instrument**. See “Menu screen” on page 49.
2. Select **Insert** for the position (1 or 2) to install the heating block.
3. Scan the heating block to be installed with the barcode reader or perform manual selection with the menu.
4. Place the heating block on the heating platform. Fit the pins on the block into the slots in the platform. Press the block until it clicks properly in position.

Note: Select **Information** for details on heating block installation.

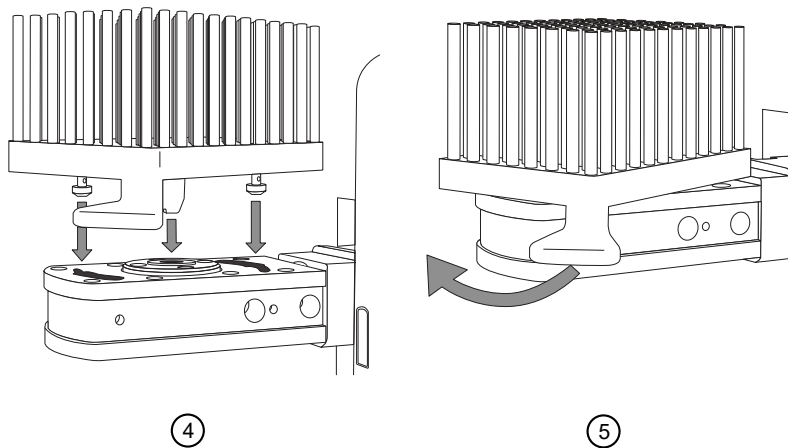


5. Select **Next**

Install magnetic head

1. Select **Menu** ▶ **Instrument**.
2. Select **Insert** for the position (1 or 2) to install the magnet.
3. Scan the magnetic head to be installed with the barcode reader or perform manual selection with the menu.
4. Place the magnetic head onto the holder. Fit the pins on the head into the slots in the holder.
5. Turn the handle to lock the magnet in place.

Note: Select **Information** for details on magnetic head installation.



6. Select **Next**

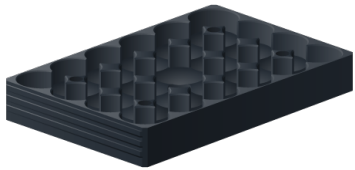
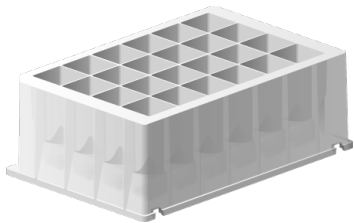
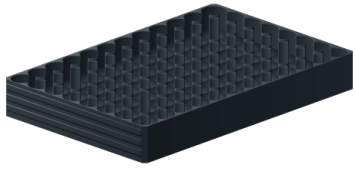
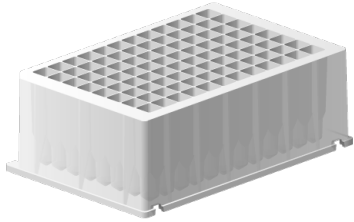
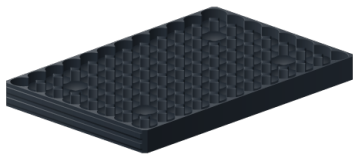
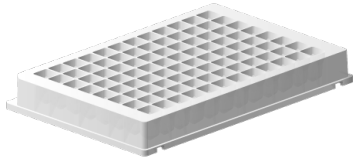
System components

Heating block and corresponding plate

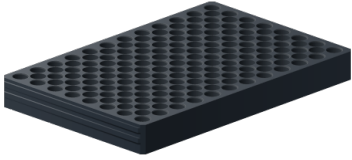

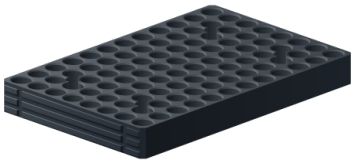
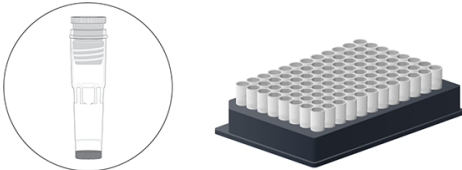

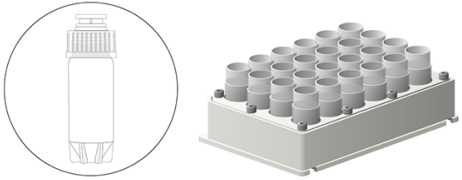
The instrument uses specially designed barcoded plates for optimal processing. Use of other types of plates may damage the instrument and compromise the warranty, as well as result in below optimal performance.

The heating blocks are specifically designed for the plates listed in the following table to ensure even heating during sample processing.

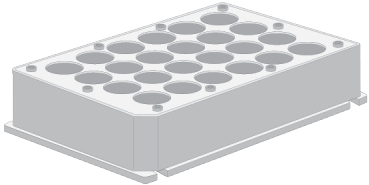
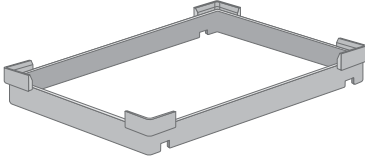
See “Change heat block/magnetic head” on page 44 for details on changing a heating block.

Heating block	Plate
	
<p>KingFisher™ Apex 24 Deep-Well Heating Block, barcoded (Cat. No. 24075940)</p>	<p>KingFisher™ 24 deep well plate, barcoded (30 μL to 5 mL ^[1]) (Cat. No. 95040470B)</p>
	
<p>KingFisher™ Apex 96 Deep-Well Heating Block, barcoded (Cat. No. 24075930)</p>	<p>KingFisher™ 96 Deep-Well Plate, barcoded (15–1000 μL, Cat. No. 95040450B)</p>
	
<p>KingFisher™ Apex 96 Heating Block, barcoded (Cat. No. 24075920)</p>	<p>KingFisher™ 96-Well Microplate, barcoded (15–200 μL, Cat. No. 97002540B)</p>

(continued)

Heating block	Plate
	
	
	
<p>KingFisher™ Apex PCR Heating Block, barcoded (Cat. No. 24075910)</p>	<p>PCR plate (10–80 µL ^[1]), Skirted PCR Armadillo™ (Cat. No. AB2396), Semi-Skirted PCR Armadillo™ (Cat. No. AB2496), MicroAmp™ EnduraPlate™ Optical 96-Well Full-Skirted Plates with Barcode, Clear (Cat. No. A31728), MicroAmp™ EnduraPlate™ Optical 96-Well Fast Clear Reaction Plates (Cat. No. A36930), or MicroAmp™ Fast Optical 96-Well Reaction Plate (Cat. No. 4346907)^[2]</p>
<p>KingFisher™ Apex 96 Storage Tube Heating Block, barcoded 24075950 or KingFisher™ Apex 96 Storage Tube Heating Block, Matrix (Cat. No. 24075970)</p>	<p>96 Storage Tube (Nunc™, Cat. No. 374086), 30–200 µL or Matrix™ 500µL ScrewTop Tubes (Cat. No. 3744)</p>
<p>KingFisher™ Apex 24 Storage Tube Heating Block, barcoded (24075960)</p>	<p>24 Storage Tube (Nunc™ 364323), 200–1000 µL</p>

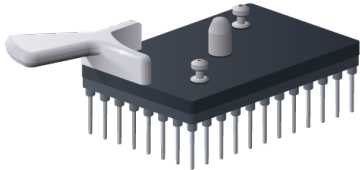
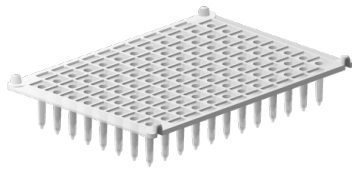
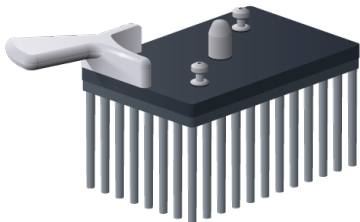
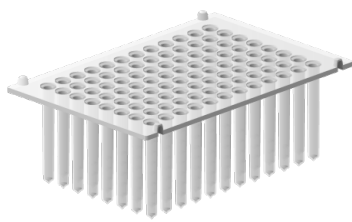
(continued)

Heating block	Plate
Adapter	
	
<p>KingFisher™ Apex 24 Storage Tube Adapter (Cat. No. N21445) for use with tube 374086 Nunc.</p>	<p>KingFisher™ Apex 96 PCR Semiskirted Plate Adapter (Cat. No. N21446) for use with Semi-skirted PCR Armadillo™ (Cat. No. AB2496), Semi-skirted MicroAmp™ EnduraPlate™ Optical 96-Well Fast Clear Reaction Plates (Cat. No. A36930), or MicroAmp™ Fast Optical 96-Well Reaction Plate (Cat. No. 4346907)</p>

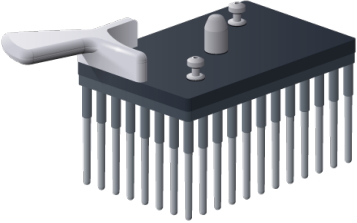
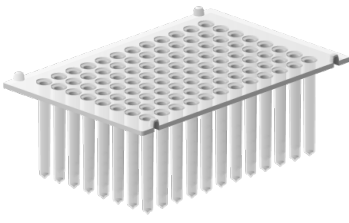
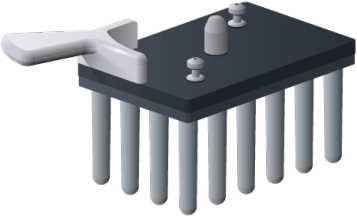
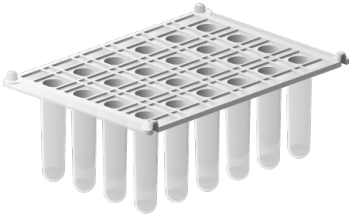
^[1] The fill volume depends on the type of tip comb being used.

^[2] Recommended PCR plates

Magnetic head

Magnetic head	Tip comb
	
<p>KingFisher™ Apex 96 PCR Head, barcoded (Cat. No. 24079910)</p>	<p>KingFisher™ Apex 96 PCR Tip Comb, barcoded (Cat. No. 97002560)</p>
	
<p>KingFisher™ Apex 96 Deep-Well Head, barcoded (Cat. No. 24079930)</p>	<p>KingFisher™ 96 Tip Comb for Deep-Well Magnets, barcoded (Cat. No. 97002534B)</p>

(continued)

Magnetic head	Tip comb
	
<p>KingFisher™ Apex 96 Combi Head, barcoded (Cat. No. 24079920)</p>	<p>KingFisher™ Apex 96 Combi Tip Comb, barcoded (Cat. No. 97002570) (also KingFisher™ 96 Tip Comb for Deep-Well Magnets)</p>
	
<p>KingFisher™ Apex 24 Combi Head, barcoded (Cat. No. 24079940)</p>	<p>KingFisher™ Apex 24 Combi Tip Comb, barcoded (Cat. No. 95040470B) (also KingFisher™ 24 Deep-Well Tip Comb, barcoded)</p>

Tip comb and plate compatibility


Tip comb	Compatible plates
KingFisher™ 96 Tip Comb for Deep Well Magnets (Cat. No. 97002534B)	KingFisher™ 96 Deep Well plate (Cat. No. 95040450B) KingFisher™ 96-Well Microplate (Cat. No. 97002540B)
KingFisher™ 96 Combi Tip Comb (Cat. No. 97002570)	KingFisher™ 96 Deep Well plate (Cat. No. 95040450B) KingFisher™ 96-Well Microplate (Cat. No. 97002540B) 96 storage tube
KingFisher™ 24 Deep Well Tip Comb (Cat. No. 97002610B)	KingFisher™ 24 Deep Well plate (Cat. No. 95040470B)
KingFisher™ 24 Combi Tip Comb (Cat. No. 97002580)	24 storage tube KingFisher™ 24 Deep Well plate (Cat. No. 95040470B)
KingFisher™ 96 PCR Tip Comb (Cat. No. 97002560)	Skirted PCR Plates Armadillo™ (Cat. No. AB2396 , A31728) Semi-skirted PCR Plates Armadillo™ (Cat. No. AB2496 , A36930 , 4346907) KingFisher™ 96-well Microplate (Cat. No. 97002540)

Protocol access overview

There are several ways to access KingFisher™ protocols.

- Download protocols from the KingFisher™ Apex Protocol Library directly from the instrument (requires an internet connection, but does not require setting up a Connect account).
- Upload protocols from a USB memory device (These protocols can be downloaded from a Connect account or created with BindIx™ Software).

Download protocols through the instrument

1. Select **Protocol library** from the **Home** or **Menu** screen to access the Protocol Library directly from the instrument.
2. Select protocol(s) to download.
3. Select  (**download**).

About the Thermo Fisher™ Connect Platform

The Thermo Fisher™ Connect Platform is part of a full suite of digital capabilities for management of Thermo Fisher™ instruments. A web browser or mobile device can be used to connect the KingFisher™ Apex instrument to InstrumentConnect. InstrumentConnect is a device monitoring application within our Connect cloud-based platform. This cloud-based tool allows the user to perform the following functions whenever the instrument is connected to the service.

- Monitor real-time instrument status.
- Download protocols from the KingFisher™ Apex Protocol Library to run the instrument. Protocols in the Protocol Library are optimized for kits from Thermo Fisher Scientific.
- Upload your custom protocols to **My Protocols** in your Connect Platform account.
- Securely store, access, and manage personal protocols and the Protocol Library.
- Share protocols within a research team or with colleagues in another laboratory, location, or country.
- Automatically or manually upload run report from the instrument to your Connect Platform account.
- Manage multiple KingFisher™ Apex instruments remotely from a web-based dashboard.
- Upgrade instrument software automatically, without hardware or manual updates.


Create a Connect Platform account

1. Go to thermofisher.com/connect from your web browser.
2. Click **Sign up now** and follow the prompts to create an account.
Your e-mail address is used as your username.
3. When signed in, click **Update PIN number**.
4. Enter a PIN number in the **new** and **confirm** fields.
The PIN number is necessary to sign in to Connect Platform from the instrument.

Connect the instrument to the Internet

1. Connect your instrument to the Internet.
 - Connect through the instrument Ethernet port using a cable.
 - Connect via wireless connection with a USB-enabled Wi-Fi dongle.
2. Swipe down on the touchscreen to confirm that the instrument has an active network connection.

Create a PIN number

1. Log in to your Connect Platform account using a web browser.
2. Navigate to  (**InstrumentConnect**).
3. Select **Update PIN number**.
4. Confirm the PIN number.

Generate a link code from the instrument



1. Open the **Notifications** screen on the instrument.
2. Select **Connect** to generate a link code and QR code.
3. Copy down the link code generated by the instrument, or take a picture of the QR code with your mobile device if you have a QR code scanner app installed.

Add an instrument to your Connect Platform account

The Connect Platform supports access to the instrument with the InstrumentConnect application on your mobile device or from a web browser. When the instrument is connected, real-time instrument status can be viewed from the InstrumentConnect application.

IMPORTANT! The first Connect Platform account that links to the instrument becomes Administrator by default. If the first user needs to be unlinked from the instrument, a new user must be assigned the Administrator role beforehand. Failure to do so will result in the loss of instrument connectivity for all other linked users. For instructions on how to setup a new Administrator see “Set up a new administrator” on page 33.

Add an instrument to your Connect account (PC)

1. Log in to your Connect account using a web browser.
2. Select  (**InstrumentConnect**) from the left navigation strip.
3. Select  (**Add an Instrument**) from the top navigation strip.
4. Select from the **Instrument type** drop down menu, then click **Next**.
5. Enter the linking code generated by the instrument in the text box, then click **Send**.
Upon successful authentication, the instrument is linked to Connect.

Add an instrument to your Connect account with linking code (mobile device)

1. Open the InstrumentConnect application on a mobile device.
2. Select **+**.
3. Select **Linking code**.
4. Enter the linking code obtained from the instrument.
5. Select **Send**.

Add an instrument to your Connect account with QR code (mobile device)

Install a QR code scanner app on your mobile device to connect to the instrument using the QR code.

1. Open the InstrumentConnect application on a mobile device.
2. Select **QR code**.
3. Take a picture of the QR code on the **Notifications** screen of the instrument with your mobile device.

Access your Connect account from an instrument

1. Swipe down to open the **Notifications** screen.
2. Select **Sign in**.



Note: If another user account is displayed, select the **username** to sign out and connect a different user account.

3. Select your username from the list of linked accounts.
4. Enter your Connect PIN number.
If you do not have a PIN number, set the PIN number in the dialog box.
5. Select **OK**.

Set up a new administrator

1. To set up a new administrator, log in to current administrator Connect Platform account.
2. Select **Instruments**
3. Select the instrument for the current administrator.
4. Select **Manage users**.
5. Assign the administrator role to another user linked to the same instrument.

Download protocols from Connect

1. Sign in to your Connect account and go to <https://apps.thermofisher.com/apps/kingfisher/#/protocol-library>.
Link the instrument to your Connect account (see “About the Thermo Fisher™ Connect Platform” on page 30).
2. Select  (**InstrumentConnect**) from the left navigation strip.
3. Select protocol(s) to download.
4. Click  (**Transfer to instrument**).
5. Select the instrument where you want to transfer the protocol, then click **Transfer**.

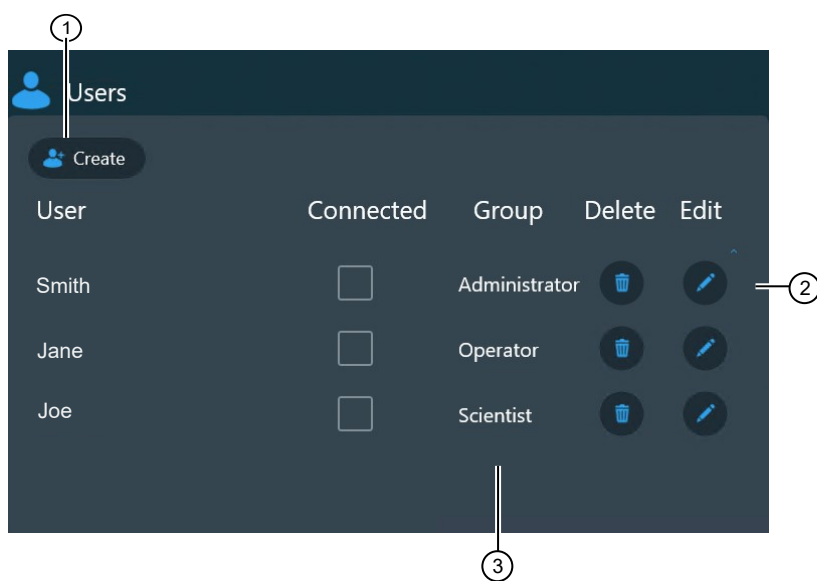
Change password

1. Select **User Settings** from Menu.
2. Click the **Change the password** tab.
3. Enter your current password, then enter the new password twice.
4. Click **Confirm** or exit without changing the password.

Create, edit, or delete users

To create a new user, you must be logged in as Administrator.

1. Select **User Settings** from Menu.
2. Click **Create** tab and select the user role from a drop-down menu.
3. To delete or edit the user, click the icons.
4. The **Groups** window shows the privileges of the three user groups. Click the icon to view the privileges for each group (see “Users and roles” on page 46).




Access protocol

To access protocols:

- Select **Open protocol**
- Select a protocol from **Recent protocols**
- Search for a protocol by manually entering a catalog number or using the barcode reader.

Run purification kit

1. Prepare reagents and samples and place them in the appropriate plates according to the instructions for your kit of choice.
2. Select a protocol and press  on the **Home** screen.

Note: A new window will open.

3. Click **Add Lot information** to select and insert a Tip Plate.






① Add lot information

4. (Optional) Enter lot information for reagent, plates, and sample notes. See “Import well notes” on page 38.

Note: All data entered at this step will appear in the run report.

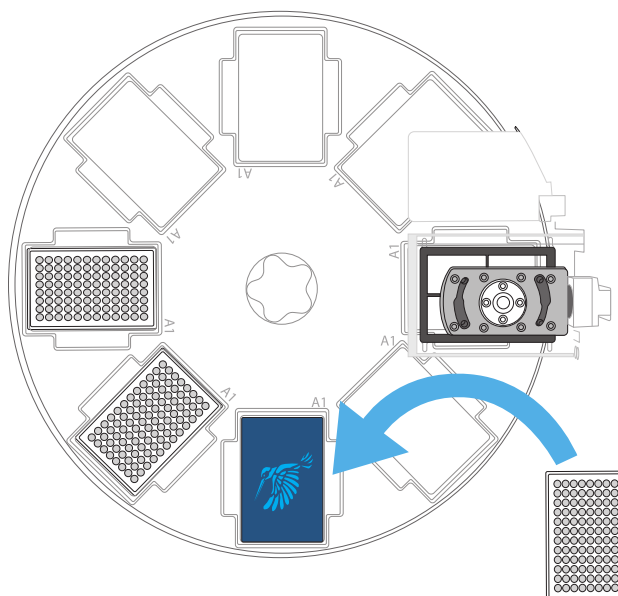
5. (Optional):

- Select  to hide (if protocol run has been started) or cancel (if protocol run has not yet been started) protocol run, then return to the selection screen.
- Select  to cancel the run once it has been started.
- Select  to end the run completely.

6. Load the appropriate plates into the instrument on the lighted loading position as prompted by the instructions displayed on the touch screen.

IMPORTANT! When loading plates, ensure that the A1 position of plate aligns with the A1 position indicated on the plate stations of the turntable in the instrument.

Note: Color can be selected for each plate which is then shown in the loading screen for each plate. See “Define plate” on page 66



7. After each requested plate is loaded into the instrument, press **Next**.

8. If a barcode of the plate is not detected, manually select the plate.

Note: The run starts automatically after all the required plates are placed in the instrument.

9. Close the front lid to protect the instrument against environmental contamination.

10. Wait for the instrument to complete the RUO protocol.




Note: The instrument will prompt the user to unload the plates.

11. Open the front lid and unload the processing plates from the turntable following the instructions provided by the instrument.

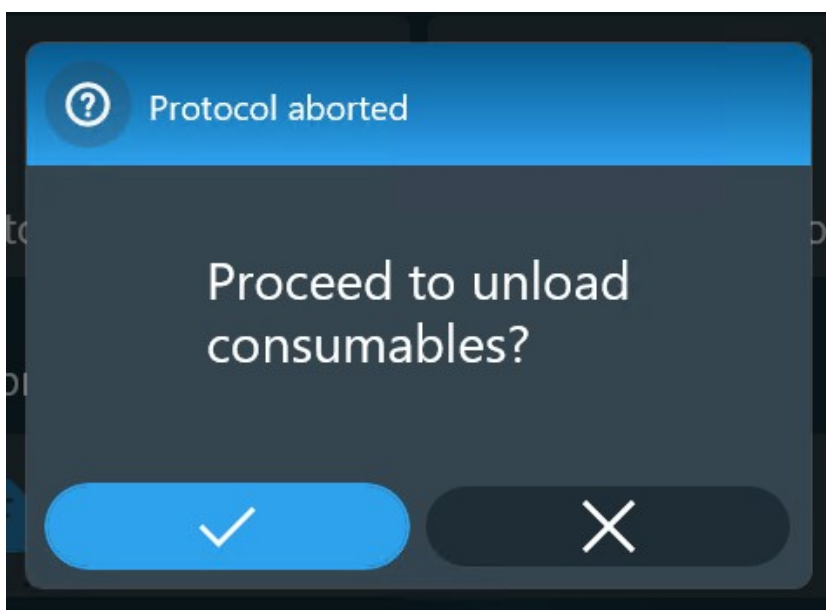
12. (Optional) Review the run report (see “Run history overview” on page 78).
13. (Optional) Export the report to a USB memory device (see “Export protocol to a USB memory device” on page 78).
14. (Optional) Use the UV lamp to decontaminate the process chamber.
15. (Optional) Run protocol from BindIx™ software by connecting PC to instrument.

Pause or abort run

In some cases, it may be necessary to pause a run. If the run is paused, it can be restarted again from that point. In addition, if a power outage occurs, the instrument retains the information on the step it was on and can be restarted to continue from that point.


Icon	Function
	Pause a protocol that is in progress.
	Continue a paused protocol.
	Abort a protocol that is in progress.

If the user ends the run, the **Protocol aborted** window appears:



If the user selects ✓, the **Tools view** appears.

Import well notes

1. Select a protocol to add well notes to then press  on the **Home** screen.

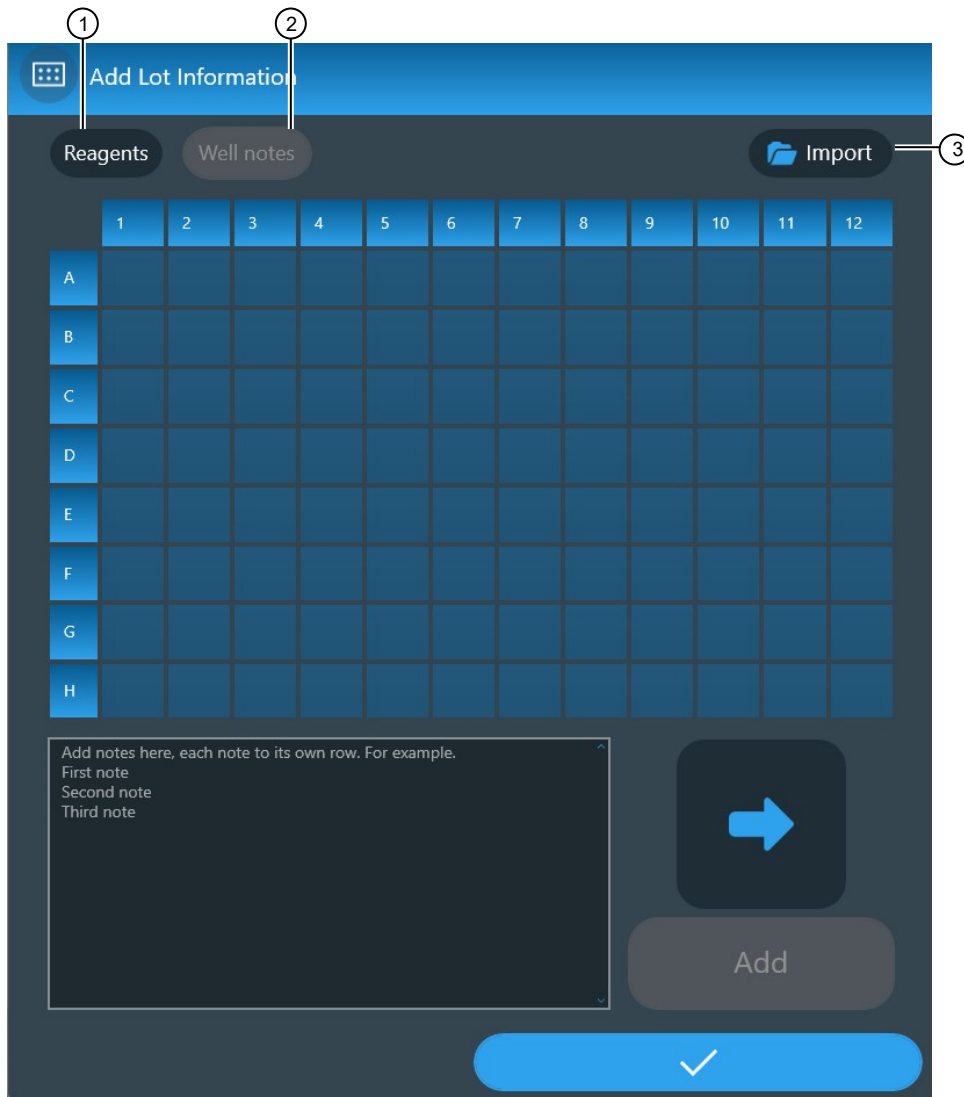
Note: A new window will open.

2. Click **Add Lot information**.



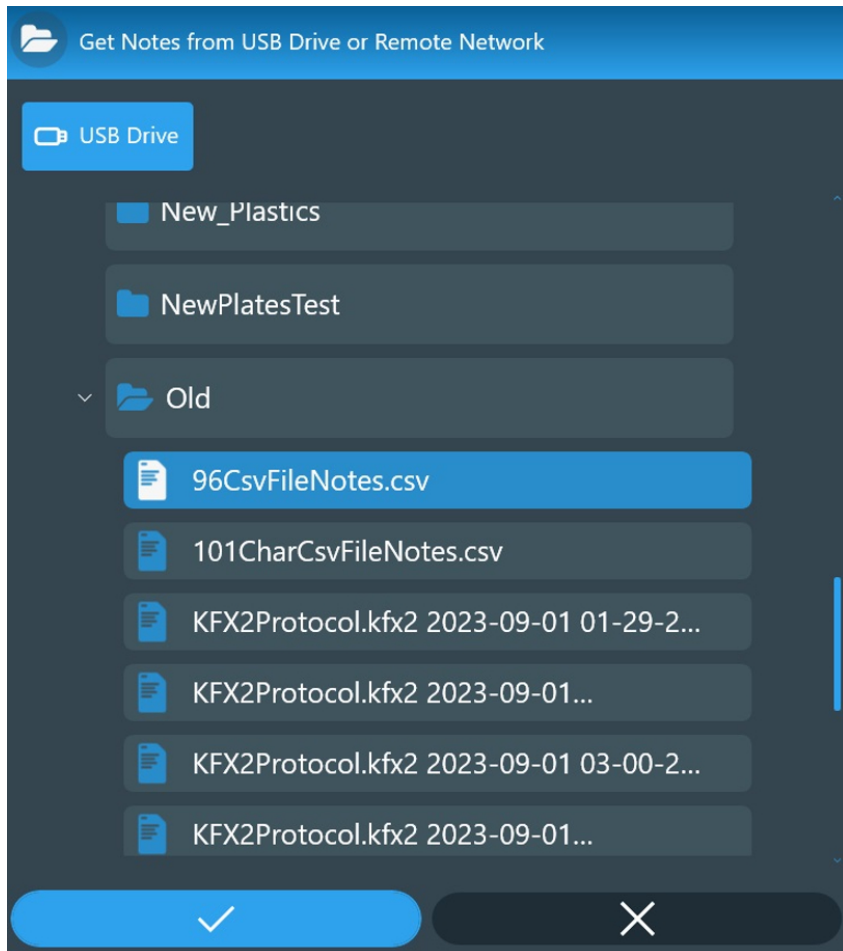
① Add lot information

3. Click **Well notes** to add notes or **Reagents** to add reagent lot information. To import notes from csv file click **Import**.



- ① Reagents
- ② Well notes
- ③ Import

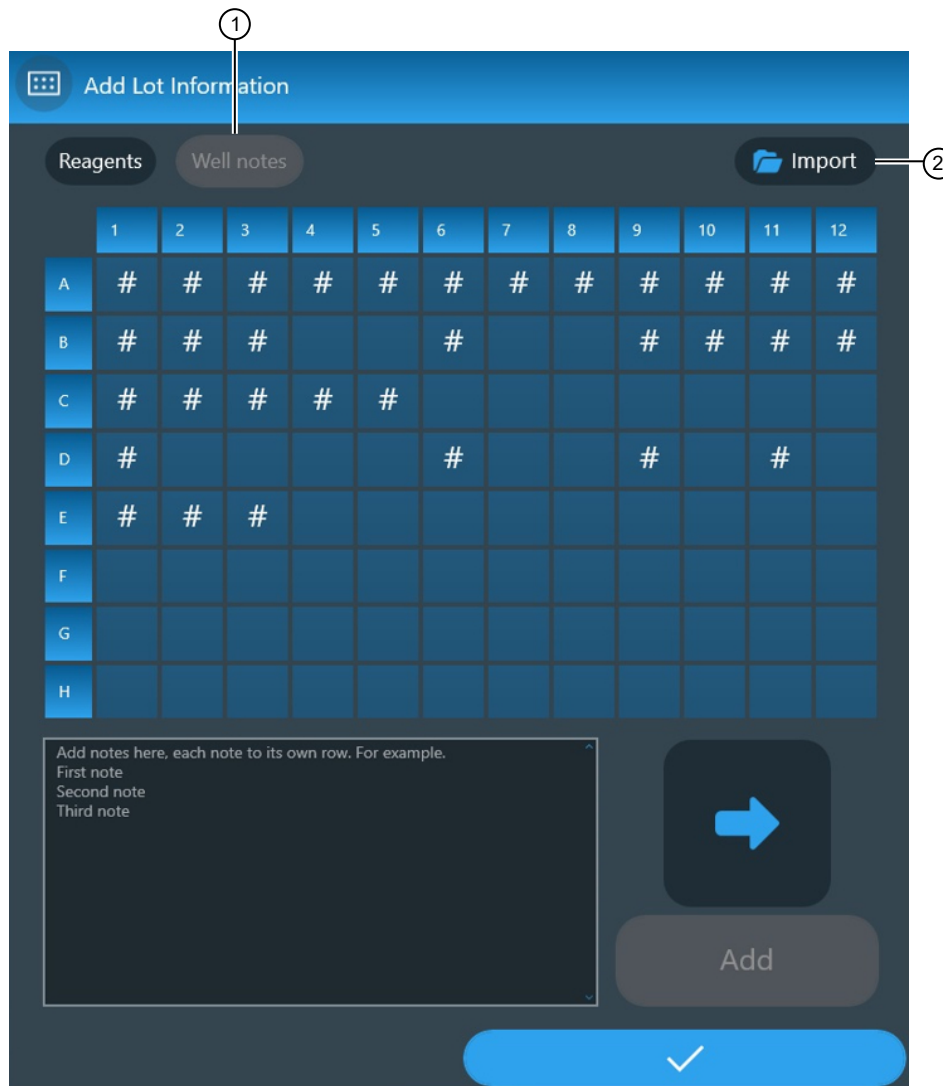
4. Locate .csv file and select .csv file then select ✓.



Edit well notes

Once well notes are imported, a filled well note is presented with the # symbol. This can be edited.


1. Well notes can be edited by, selecting the well note in the grid then editing the note.



- ① Well notes
- ② Import

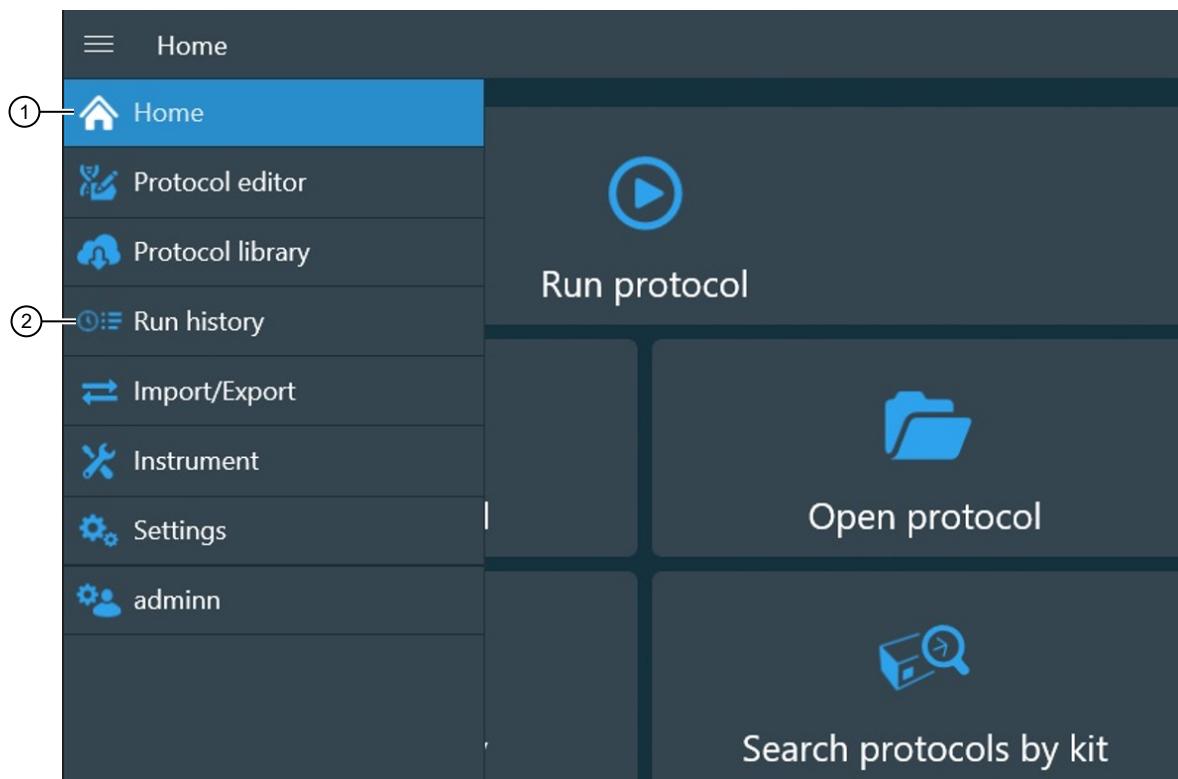
2. Alternatively, well notes can be edited by adding a note in the white text box on the bottom left.

Note: Each note to its own row.

3. Select  on the bottom right.
4. Select **Add**.

Export well notes

1. Navigate to **Run history** screen from **Home** screen.



- ① Home screen
- ② Run history screen

2. Select Run that had well notes then export.

Note: This will export report in pdf, XML format, and well notes only in csv format.

Create .csv file

The .csv file format needs to be in the format of "Coordinates, WellNote" on first row. Each consecutive row needs to be in the format "Cell, Note". Empty rows are dismissed. The order of elements does not matter.

Table 1 Examples of .csv file format

Coordinates, Well
<ul style="list-style-type: none"> • A1, note for A1 • A2, note for A2 • B1, note for B1 • A3, note for A3

Turn off instrument

1. On the Home screen, select **User Settings**, then click **Logout** to log off from the instrument.
2. Return to the Local-Login screen.
3. Press the power switch and wait for the instrument to shut down.
4. Power off the instrument with the on/off button.

Change heat block/magnetic head

Heat blocks and magnetic heads can be changed depending upon the needs of the protocol. Access the **Instrument** screen (see “Instrument screen” on page 58) to unload an existing heat block/magnetic head, and install a different heat block/magnetic head in their place.

Unload heating block

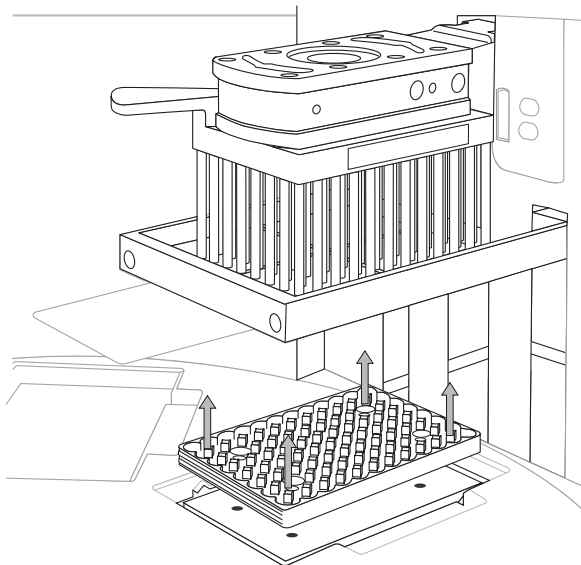
1. Select **Menu** ▶ **Instrument**.
2. Select **Unload** for the position (1 or 2) you want to remove the heating block from.



WARNING! The heating block surface may be hot during operation. Use caution to avoid risk of burns.

3. Lift the heating block up to remove it from the heating platform.

Note: Select **Information** for details on heating block removal.

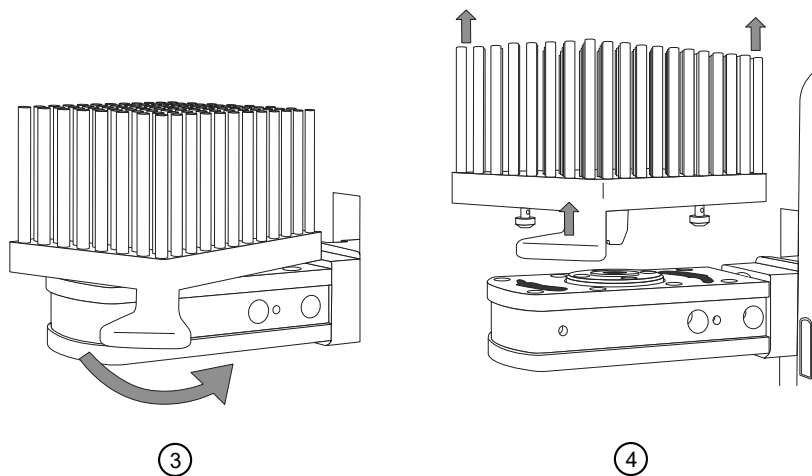


4. Select **Next**

Unload magnetic head

1. Select **Menu** ▶ **Instrument**.
2. Select **Unload** for the position (1 or 2) you want to remove the magnet from.
3. Turn the handle to release the magnet.
4. Lift the magnetic head from the holder.

Note: Select **Information** for details on magnetic head removal.



5. Select **Next**



Software applications

About the user interface

The user interface for the KingFisher™ Apex instrument and BindIx™ Software allows the user to perform the following actions:

- Create a plate layout
- Create, modify, run, save, and delete existing protocols
- View protocol status reports

The protocols and run report files are stored in the file system of the instrument or they can be stored in a cloud service (see “Run history overview” on page 78).

Users and roles

There are four different user roles, each with different rights:

- **Administrator:** The administrator has no limitations for instrument use. The administrator can create, modify, and delete other roles. The administrator can change the network share and software settings.
- **Scientist:** The scientist can run, view, and create new protocols. The scientist can't edit Thermo Fisher™ Connect Platform, shared network settings, or reset the factory defaults (e.g. change instrument name or modify users).
- **Personal Administrator:** The personal administrator can do same things as Scientist; however, protocols created by the personal administrator can only be modified by the same user.
- **Operator:** The operator can run, view the protocols and reports, and can export a troubleshooting package. The operator cannot access the protocol editor or protocol library, delete run reports or protocols, access the Import/Export view, or edit the settings.

Scientists, personal administrators, and administrators can create new protocols.

Install BindIx™ Software

The BindIx™ Software can be obtained from the following locations.

- The USB drive supplied with the instrument
- The Thermo Fisher Scientific website
- The Microsoft™ Store

Install software from supplied USB device

1. Place the USB device supplied with the instrument into a USB port on a computer.
2. Navigate to the BindIx™ Software.
3. Run the .exe file to install the software.

Download and install software from the Thermo Fisher Scientific website

1. Go to thermofisher.com/kingfisher.
2. Select **Software and protocols**.
3. Select the **BindIx™** tab and download the software.
4. Run the .exe file to install the software.

Download and install software from the Microsoft™ Store

Requires Windows 10 version 17763.0 or newer.

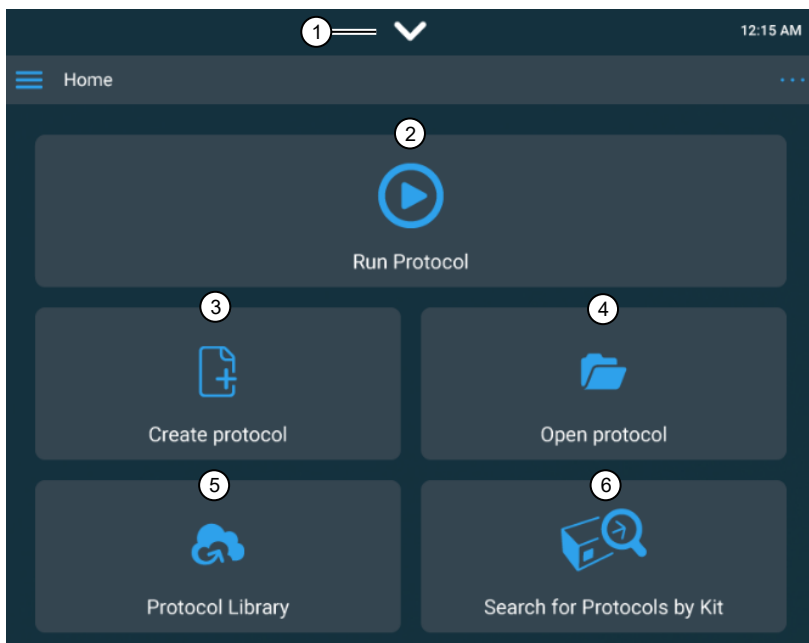
1. Create a Microsoft™ account
2. Sign in to your account.
3. Go to microsoft.com/store/apps/9NDGKHMNSTLJ and download the software.
4. Click **Install**.

Overview of user interface controls

Home screen

The **Home screen** on the KingFisher™ Apex instrument is used to select or run protocols. Several options are available for accessing protocols.

For a description of the **Home screen** for the BindIx™ Software, see the “Menu screen” on page 49.



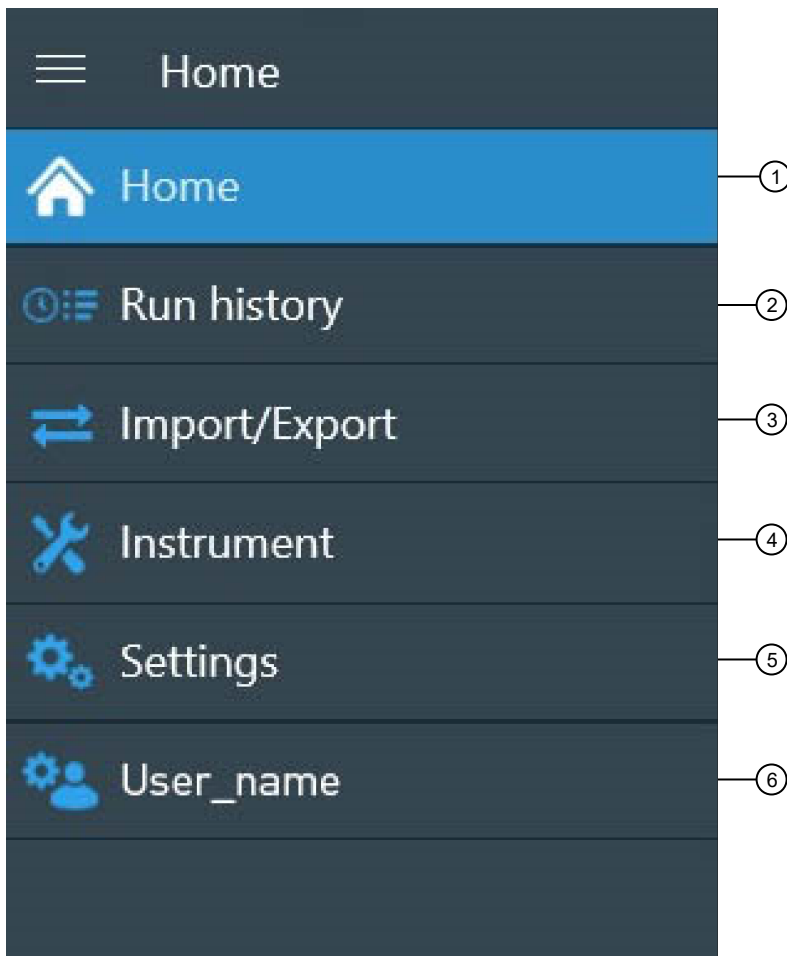
- ① The **Notification screen** displays notifications, internet status, and a list of any USB storage devices plugged into the USB device ports of the instrument.
- ② Run a protocol.
- ③ Create a new protocol using the protocol editor.
- ④ Open an existing protocol from the instrument.
- ⑤ Download a protocol using the KingFisher™ Apex Protocol Library.
- ⑥ Search for protocol using the kit catalog number.

Menu screen

The **Menu screen** is the primary means of navigation between screens for the different applications on the instrument.

Use the **Menu screen** to exit from, or return to a screen.

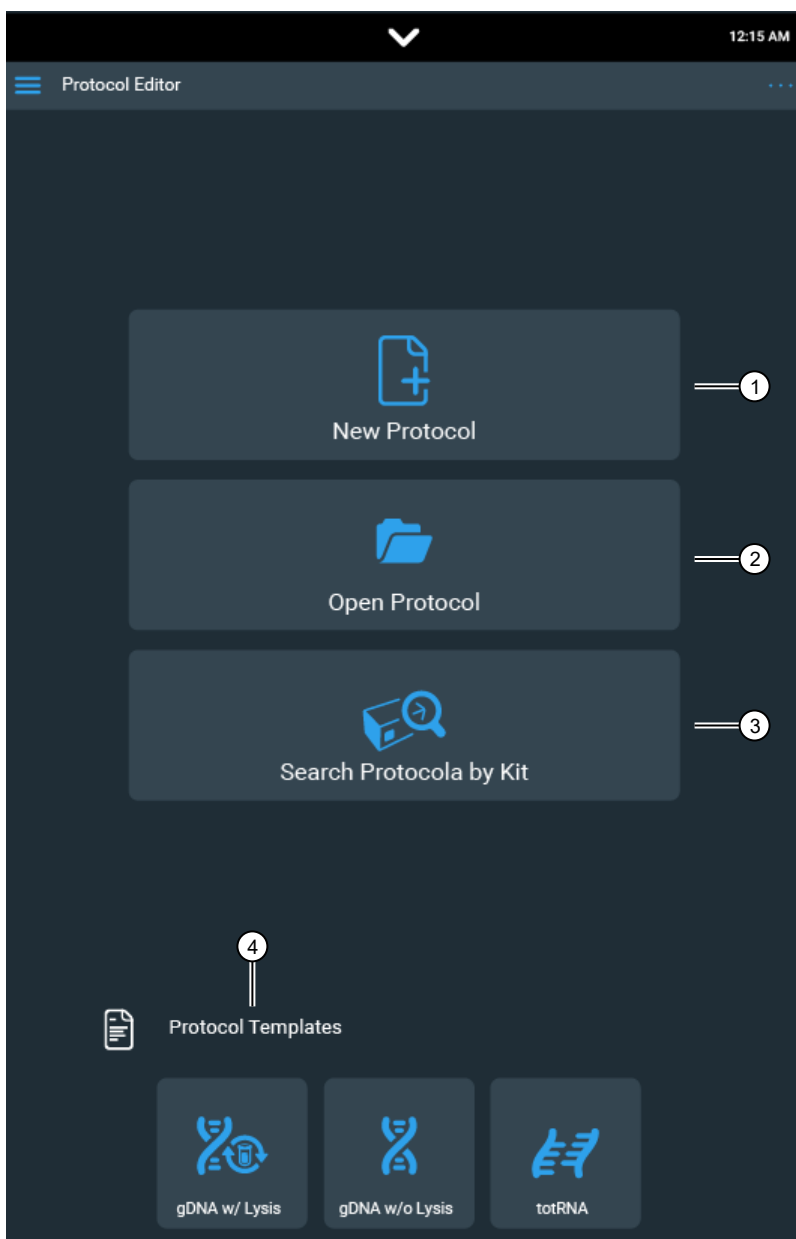
The **Menu screen** of the instrument (left) is analogous to the **Home screen** for the Bindix™ Software (right).



- ① Return to **Home screen**.
- ② Access **Run history screen**
- ③ Access **Import/Export screen**
- ④ Access **Instrument screen**
- ⑤ Access **Settings screen**
- ⑥ Access **User name screen**

Protocol editor screen

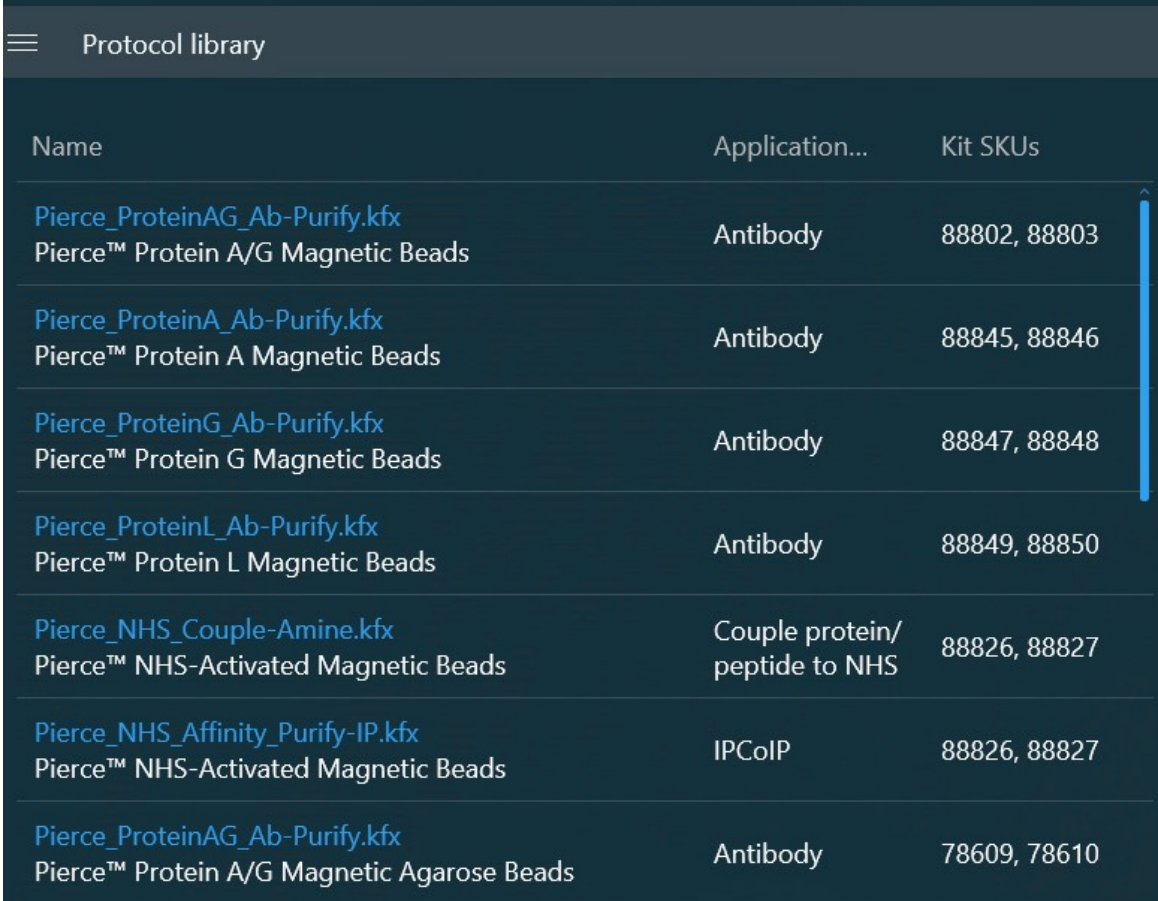
The protocol editor screen is used to create a new protocol or modify an existing protocol.



- ① Create a new protocol.
- ② Open an existing protocol.
- ③ Search for protocol by manually entering a catalog number or using the barcode reader.
- ④ Open protocol template
 - gDNA lysis in (sample lysis to be performed by instrument protocol)
 - gDNA lysis out (sample lysis already performed before starting instrument protocol)
 - Total RNA lysis out (sample lysis already performed before starting instrument protocol)

Protocol library screen

Users can search and select the available protocols in the **Protocol library**. Users can also arrange protocols in different orders by selecting either the **Name**, **Application**, or **Kit SKUs** icons.



The screenshot shows a mobile application interface titled "Protocol library". It features a table with three columns: "Name", "Application...", and "Kit SKUs". The table lists seven different protocols, each with a link to its details (e.g., "Pierce_ProteinAG_Ab-Purify.kfx") and a description of the protocol. The "Kit SKUs" column lists two SKUs for each protocol.

Name	Application...	Kit SKUs
Pierce_ProteinAG_Ab-Purify.kfx Pierce™ Protein A/G Magnetic Beads	Antibody	88802, 88803
Pierce_ProteinA_Ab-Purify.kfx Pierce™ Protein A Magnetic Beads	Antibody	88845, 88846
Pierce_ProteinG_Ab-Purify.kfx Pierce™ Protein G Magnetic Beads	Antibody	88847, 88848
Pierce_ProteinL_Ab-Purify.kfx Pierce™ Protein L Magnetic Beads	Antibody	88849, 88850
Pierce_NHS_Couple-Amine.kfx Pierce™ NHS-Activated Magnetic Beads	Couple protein/ peptide to NHS	88826, 88827
Pierce_NHS_Affinity_Purify-IP.kfx Pierce™ NHS-Activated Magnetic Beads	IPCoIP	88826, 88827
Pierce_ProteinAG_Ab-Purify.kfx Pierce™ Protein A/G Magnetic Agarose Beads	Antibody	78609, 78610

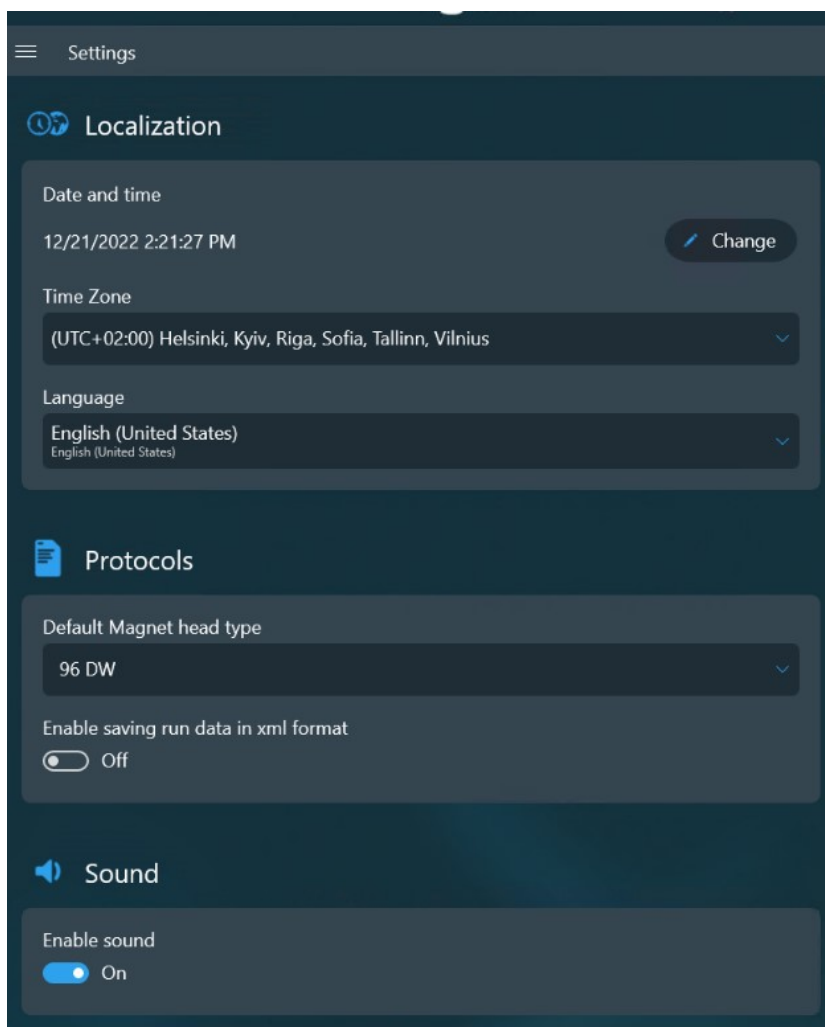
Settings screen

The **Settings screen** is used to set or change instrument settings, enable network sharing, and view information about the instrument.



Localization settings

The administrator and the scientist user can modify these settings:


- Date and time
- Language
- Select the default magnet head type
- Enable/Disable saving run data in xml format
- Sound on/off
- Setting the logout time in minutes



Set date and time

1. Select  (**Change**) under **Date and time**
2. Scroll through the numerical menus to select the time and date.
3. Select .

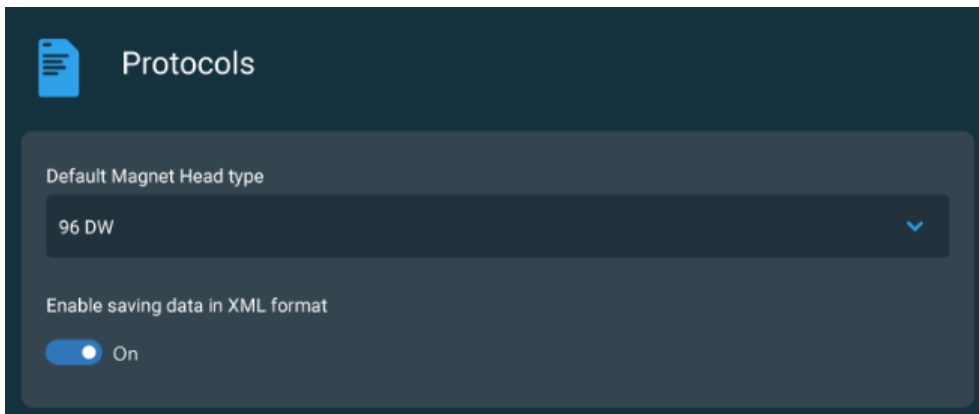
Set time zone

1. Select the **Time zone** field to open the drop down menu.
2. Scroll to the desired time zone.
3. Select .

Set language

1. Select the **Language** field to open the drop down menu.
2. Select the desired language (English, Spanish, French, German, Portuguese, Italian, Russian, Japanese, Chinese).
3. Select ✓.

Protocol settings



Set default magnetic head type

1. Select the **Default magnet head type** field to open the drop down menu.
2. Select the desired magnetic head (96 DW, 96 Combi, 24 Combi, 96 PCR).
3. Select ✓.

Enable saving run data in extensible markup language (XML) format

When enabled, a report in structured xml format is saved in addition to the portable document format (PDF) report. The structured XML format can be used for purposes such as LIMS integration.

Switch the toggle to allow run data to be saved in XML format.

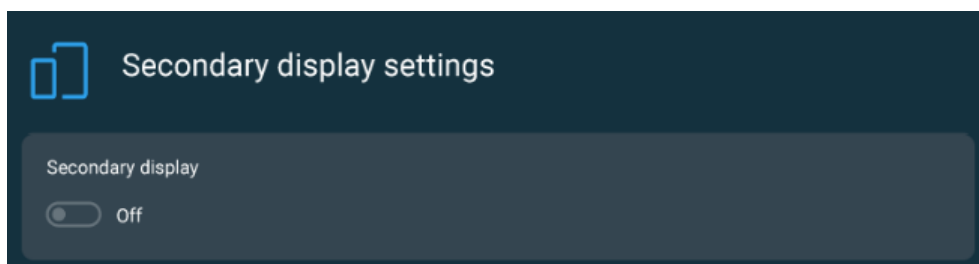
Sound settings



Enable sound

Switch the toggle to turn instrument sound on or off.

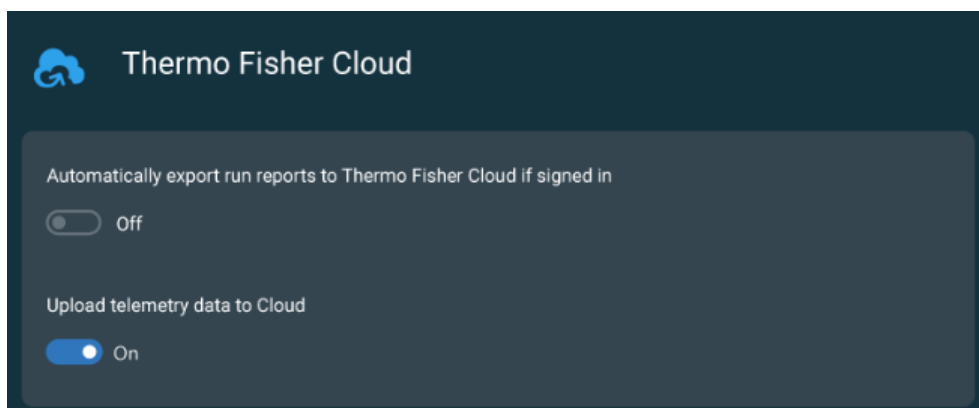
Secondary display settings



Loading position display setting

Switch the toggle to turn the display light under the loading position on or off.

Connect settings



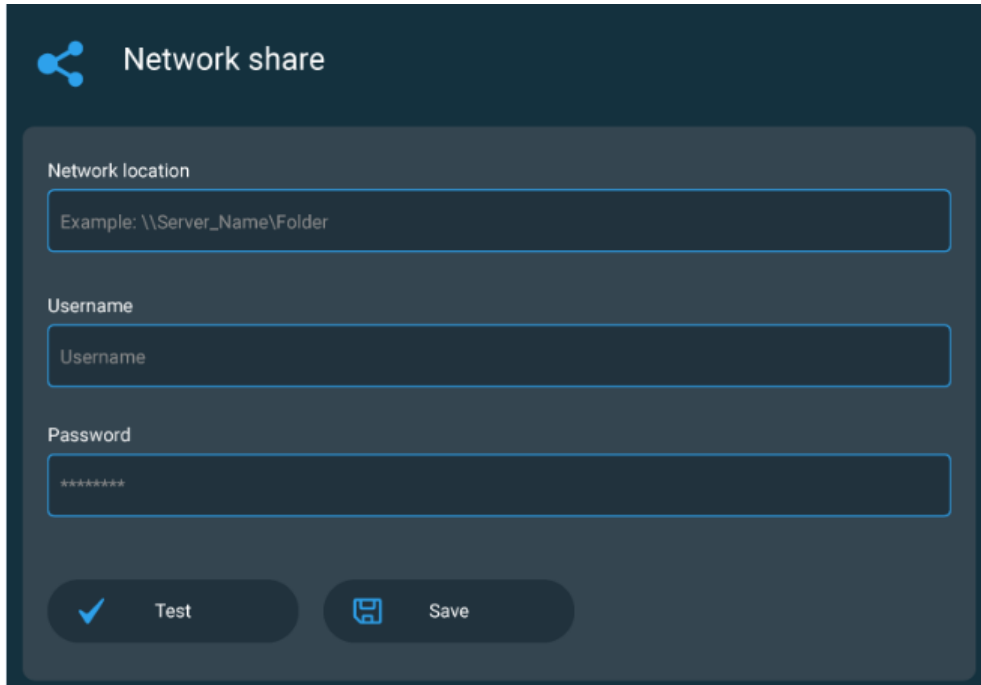
Automatically export run reports to Connect if signed in

Switch the toggle to turn automatic export function on or off.

Upload telemetry data to cloud

Switch the toggle to turn automatic telemetry export function on or off (see “Telemetry data” on page 80).

Network share settings



The screenshot shows a dark-themed interface titled "Network share" with a share icon. It contains three input fields: "Network location" with the example text "\\Server_Name\Folder", "Username" with the placeholder "Username", and "Password" with masked characters "*****". At the bottom, there are two buttons: "Test" with a checkmark icon and "Save" with a floppy disk icon.

Enable network sharing

1. Select the **Network location** field to access the keyboard.
2. Enter the pathway to a local network share folder.
3. Enter Username.
4. Enter Password.
5. Select **Test** (✓).
6. Select **Save** (💾).

About

Settings

Network location
Example: \\Server_name\Shared_folder

Username

Password

✓ Test Save

? About

Instrument name
714-800 ✓ Set


Logout time in minutes
- 5 + ✓ Set

Reset factory settings Troubleshoot

[View EULA](#)

KingFisher Apex

Serial number:	714-SVT804
UI version:	1.1.2.0
ESW version:	1.1.12
IP Address:	10.32.198.125
MAC Address:	80:6D:97:39:BC:5B
UV lamp usage:	0 hours
Magnet head usage:	72 hours
Estimated service date:	4/7/2024






About (?) displays instrument information, including instrument serial number, software versions, usage information, IP address, MAC address. and service date.

Set instrument name



1. Select the **Instrument name** field to access the keyboard.
2. Enter a name for the instrument.
3. Select ✓.

Reset factory settings

Performing a reset will restore all setting parameters to the factory defaults. All Connect user and instrument links are removed, but locally stored protocols and run reports are retained.

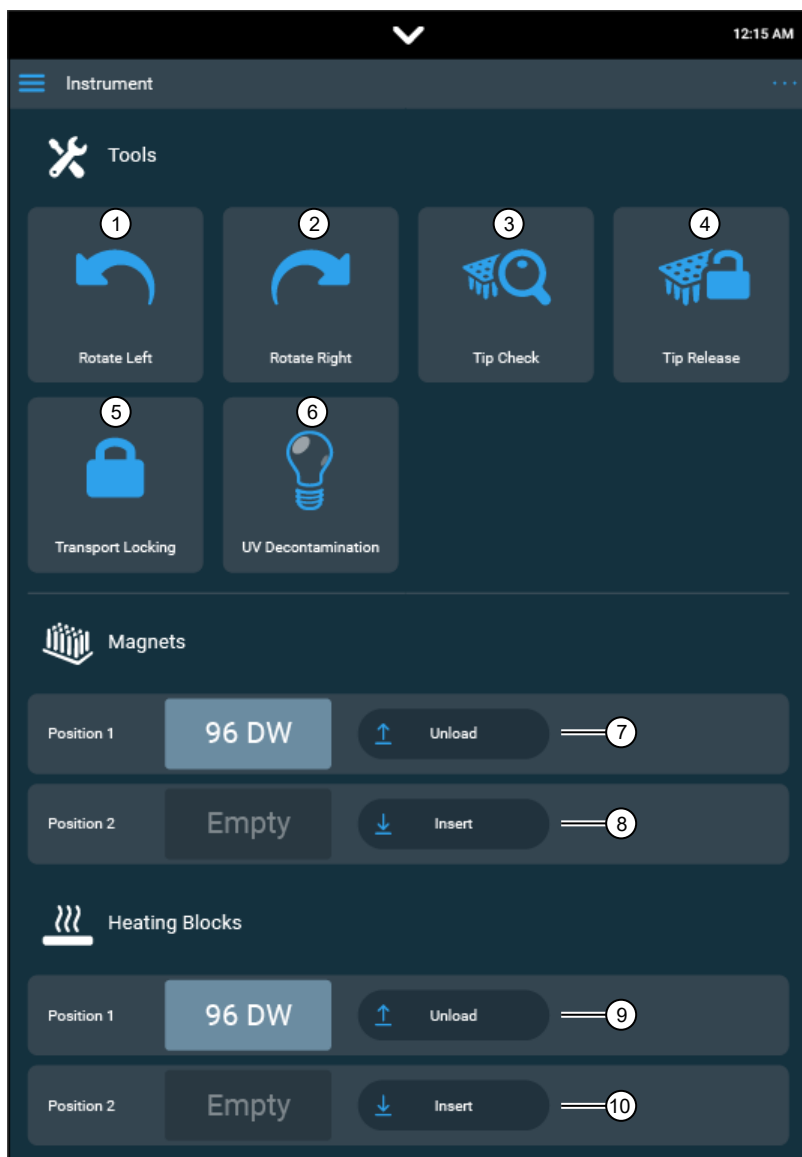
1. Select  **Reset factory settings**.
2. Select  to reset, or  to cancel.

Download instrument data to troubleshoot

1. Select  **Troubleshoot**.
2. Place a USB memory device into a USB device port.
3. Select  to download data.

Instrument screen

The **Instrument screen** is the main control panel for manual operation of the instrument.



- ① Move the turntable counterclockwise.
- ② Move the turntable clockwise.
- ③ Perform check to ensure that tip combs are properly aligned with magnetic head.
- ④ Manually release tip comb from magnetic head.
- ⑤ Enable installation of transport lock.
- ⑥ Turn UV light on/off.
- ⑦ Unload magnetic head (See “Unload magnetic head” on page 45).
- ⑧ Insert magnetic head (See “Install magnetic head” on page 24).
- ⑨ Unload heating block (See “Unload heating block” on page 44).
- ⑩ Insert heating block (See “Install heating block” on page 23).

Protocol overview

A protocol is a set of instructions that the instrument uses to perform a sample processing procedure. The protocol is a collection of information regarding the layout with reagent data and procedure steps done in a session as well as the instrument used. This information is also used to create a run report (see “Run history overview” on page 78).

You can create a new protocol, open an existing protocol, search for a protocol in the Protocol Library, or search for protocols by a specific kit.

The new protocols appear as a file with a .kfx2 file extension while old protocols appear as a .kfx file extension. BindIx™ software can be used to select .kfx2 or .kfx editor.

Protocols information can be locked to prevent accidental modification. A locked protocol cannot be opened, but a new copy of it can be created.

Create a protocol

Create or modify Protocols using the onboard protocol editor, or the BindIx™ Software application.

1. From the **Home** or **Menu** screen, select **Protocol editor** (🔧).
2. From the **Protocol editor** window, select **Create protocol** (📄).
3. Proceed to “Enter protocol information”.

Enter protocol information

1. Enter the name of the kit to be used with the protocol in the **Kit used** field.
2. Select the type of procedure the protocol is used for from the **Application type** drop down menu.
3. (Optional) Enter comments into the **Description** field (e.g., sample type).

Protocol overview > Magnet heads > Protocol steps

General

1 Kit used
Write kit name here Unlocked protocol

2 Application type
-- Select --

3 Description
Write description here

4. Proceed to “Select magnetic head”.

Select magnetic head

1. Select **Magnet heads** (📊).
2. Select the checkbox next to the magnetic head(s) to be used in the protocol.
One or two magnetic heads can be chosen, but only combinations of compatible heads are possible (i.e., 24-well magnetic heads cannot be combined with 96-well magnetic heads).




3. Proceed to “Add protocol steps”.

Add protocol steps

1. Select **Protocol steps** (☰).
2. Select **Add step** to add a step to the protocol.
 - a. Select **Define step** to define the **Step type** and enter step parameters.
See “Step types” on page 64 for details.
 - b. Select **Define plate** to assign reagent name and define reagent parameters.
See “Define plate” on page 66 for details.
3. (Optional) Select **Add tip** to add an additional cycle with a new tip comb. You can add as many tip combs to the protocol as necessary.
4. Select **Hold temperature** to keep the plate at a predetermined temperature at the end of the run.
When hold temperature [°C] is selected, the heating block retains the defined temperature until either another step changes the temperature or the protocol ends.



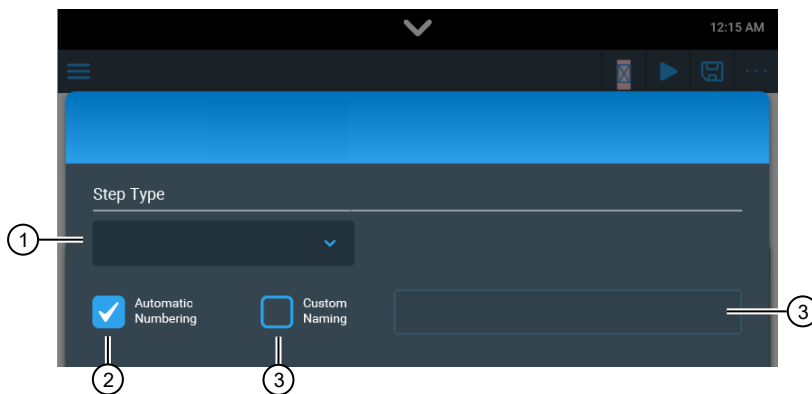
5. (Optional) Move step location up or down.
6. (Optional) Access additional controls (see “Step options”).

7. Select  to validate the protocol.
The **Total time estimate** is created for the protocol if it is valid.
8. After completing the protocol, select **Save** (see “Save a protocol” on page 78).

Define protocol steps





To create or modify a protocol, it is necessary to add steps and define the parameters related to the step.

The first step is always a **Pick Up Tip** step, and the last step is a **Leave Tip** step. Additional steps for a protocol are added between the first and the last steps.











- ① The **Step type** identifies the step.
- ② **Automatic numbering** enables automatic numbering of steps within the protocol (recommended).
- ③ **Custom naming** is used to add a custom name for the step in the text box.





Step options

	Delete a step
	Add a duplicate step at the bottom of the protocol. Change the name of the step and edit the fields as required.
 Enabled	Use the toggle to enable a disabled step in a protocol.
 Disabled	Use the toggle to disable a step in a protocol without having to delete it.

Step types

Icon	Step parameters	Corresponding plate type
Step		
 Lysis	Perform sample lysis without beads. <ul style="list-style-type: none"> • Heating & cooling • Mixing • Postmix 	Sample plate
 Bind	<ul style="list-style-type: none"> • Precollect beads • Release beads • Heating & cooling • Mixing • Postmix 	Sample plate
 Lysis and bind	Perform combined sample lysis and binding on beads. <ul style="list-style-type: none"> • Precollect beads • Release beads • Heating & cooling • Mixing • Postmix • Collect beads 	Sample plate
 Wash	<ul style="list-style-type: none"> • Precollect beads • Release beads • Heating & cooling • Mixing • Postmix • Collect beads 	Wash plate
 Elute	<ul style="list-style-type: none"> • Precollect beads • Release beads • Heating & cooling • Mixing • Postmix • Collect beads 	Elution plate
 Mix	<ul style="list-style-type: none"> • Precollect beads • Release beads • Heating & cooling • Mixing • Postmix • Collect beads 	Any plate type
 Collect beads	<ul style="list-style-type: none"> • Count • Collect time <p>This step can be repeated as many times as necessary.</p>	Any plate type
 Release beads	<ul style="list-style-type: none"> • Duration 	Any plate type

(continued)

Icon	Step parameters	Corresponding plate type
Step		
 Pick up tip	Select tip comb type. Use Add tip to add an additional cycle with a new tip comb. You can add as many tip combs to the protocol as necessary.	Tip plate
 Leave tip	Define position to leave tip comb at the end of the protocol.	Tip plate
Pause		
Wait	Pauses the protocol for manual handling. This step can be repeated as many times as necessary.	—
 Dispense	Pauses the protocol, and moves the plate to the loading position for manual handling. <ul style="list-style-type: none"> • Reagent name • Reagent volume • Reagent color code 	Any plate type
 Dry	<ul style="list-style-type: none"> • Release time • Release speed 	Any plate type

Define plate

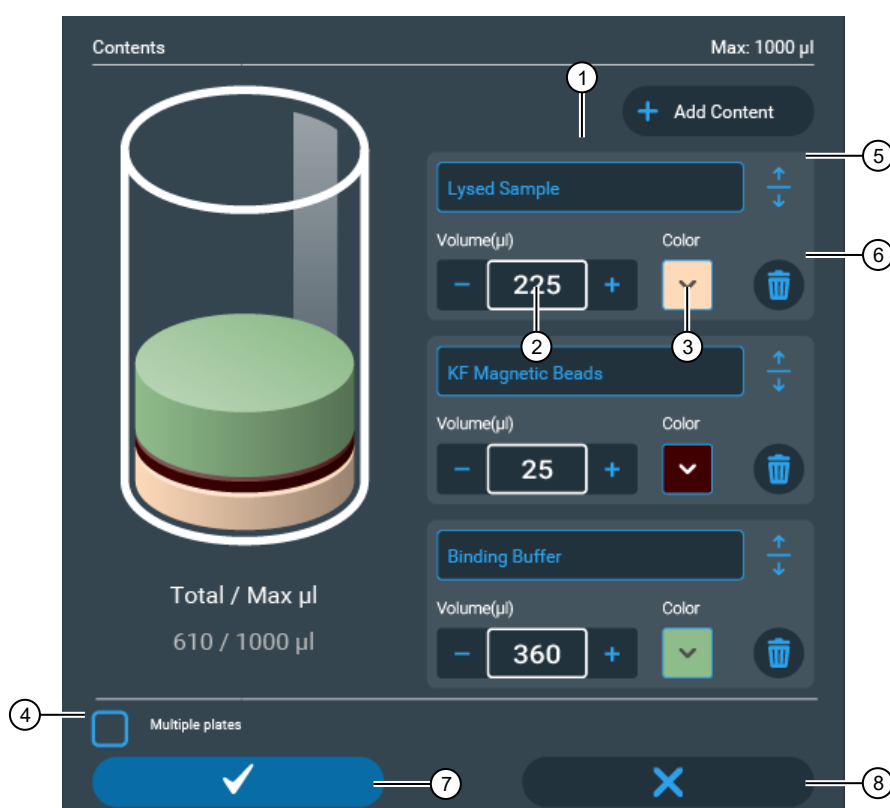
A plate must be defined for each protocol step. Choose either a low or a deep well plate. The tip comb gives you a default value.

Select the plate type from the drop down menu.

- Elution plate
- Sample plate
- Tip plate
- Wash plate
- Custom plate

The magnetic head type determines the type of plate.

Select **Multiple plates** to add another plate (e.g., if a sample is to be divided between two wells).



- Enter reagent name.
- Enter reagent volume (the software calculates how much liquid is added and indicates when you have reached the maximum amount).
- Define reagent color.
- Add another plate.
- Move reagent up/down.
- Delete reagent.
- Confirm plate selection.
- Cancel plate selection.

Pick up tip step

This is the default first step of a protocol. The step instructs the instrument to pick up a tip comb from the tip plate.

Tip type is used to select the appropriate tip comb type for your magnet from a drop down menu.

Precollect beads step

Precollect beads is enabled to make the tip comb and the magnetic rods go to the bottom of the well to collect the particles. Use the **Precollect beads** step if the beads are sedimented at the bottom at the beginning of the step.



- 1 Toggle to enable bead precollection.

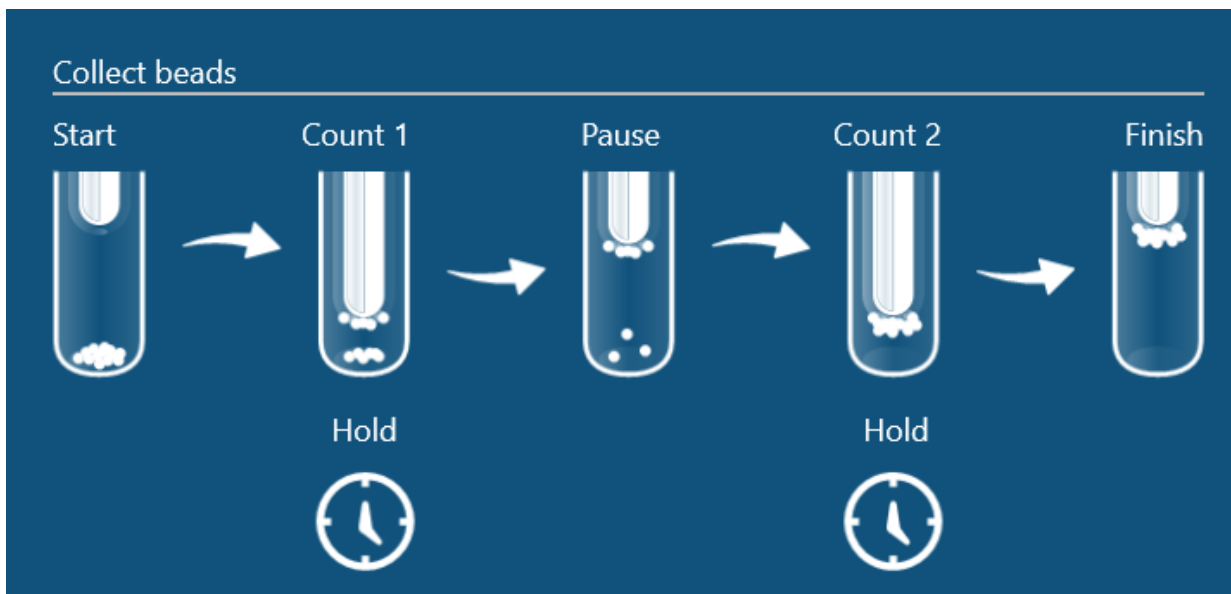
Collect beads

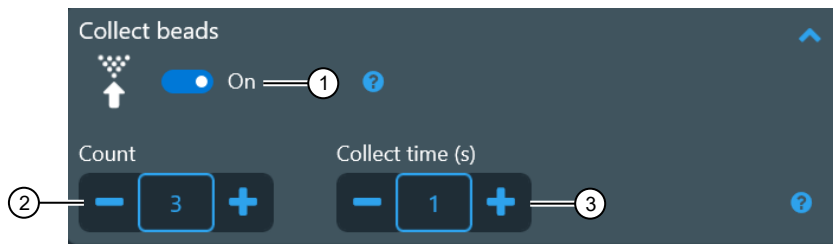
This step is used for collecting the magnetic beads from the wells of the plate. The default values are recommended.

Set the number of times the beads are collected and how long the magnetic rod stays in the well. This step can be repeated as many times as necessary. If beads remain in the well, create a new release step and a new collection step.

Count sets the number of times the tip moves with the magnetic rod in the reagent in order to collect all the beads. A default value is set automatically. There is a pause following the count.

Collect time [s] sets the duration that the magnetic tip stays at the bottom of the well to collect bead.





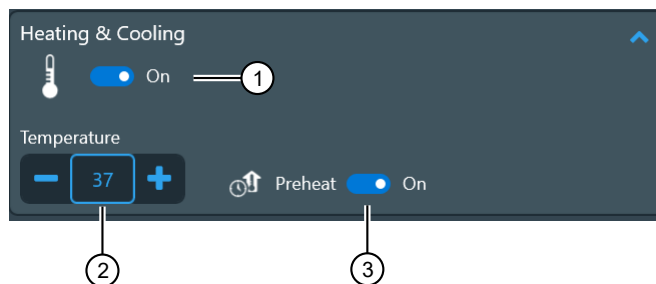
- ① Toggle to enable bead collection.
- ② Set the number of counts.
- ③ Set the collect time.

Heating & Cooling step

Heating & Cooling is enabled to heat or cool reagents during a step. Plates can be heated or cooled as many times as necessary during a protocol, but cooling sequences can create condensation.

Temperature [°C] is used to set the temperature of the heating block during the time defined in Mix time [hh:mm:ss]. The maximum value is 100°C. The minimum value is 4°C.

Preheat is enabled so that the plate is already heated to the temperature required for the step. If **Preheat** is not enabled, the heating block is cold when the mixing starts, and is heated during the Mix time interval.



- ① Toggle to enable heating.
- ② Set the heating block temperature.
- ③ Toggle to enable preheating.

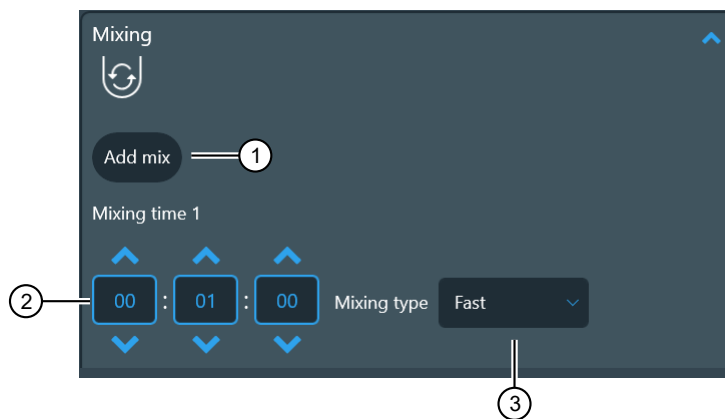
Mix step

This step is used to mix beads or reagents.

Mixing time [hh:mm:ss] sets the amount of time that the tip oscillates up and down in the reagent in order to mix the reagent with or without the beads. A default value is set automatically. Select **Add mix** to add another mixing time. The maximum is 3 mixing times.

Looping can be enabled when additional mixing times are added to a mixing sequence. Looping sets the number of times a mixing sequence is carried out for multiple mixing times.

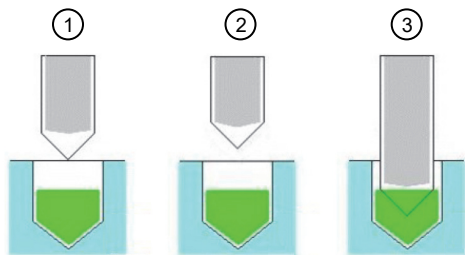
Mixing type is used to select the tip speed for mixing from a drop down menu (**Slow, Medium, Fast, Bottom mix, Half mix, Paused, None**). All available speeds and speed combinations can be selected. The most effective speeds are **Fast, Half mix, and Bottom mix**. These mixing types can be looped for very effective results. Consider the following recommendations when selecting **Mixing type**.



- ① Add an additional mix step in a mixing sequence.
- ② Set the mix time.
- ③ Select the mix type.

Paused causes the process to stop for the duration of the **Mixing time** [hh:mm:ss].

Pause tip position is used to set the tip position in any of the following positions while paused.



- ① Above well: The plastic tip is above the well or tube (at the well or tube surface but not touching the liquid).
- ② Outside well: The plastic tip is outside of the well or tube.
- ③ Tip edge in liquid: The end of the plastic tip is in the liquid.

Tip speed

There are two types of speeds for the plastic tip movement in the well: full-length speed (**Slow**, **Medium**, and **Fast**) and bottom mix speed (**Bottom mix** and **Half mix**). At full-length speeds, the tip moves throughout the length of the well, whereas at bottom mix speeds, the tip moves only at the bottom of the well.

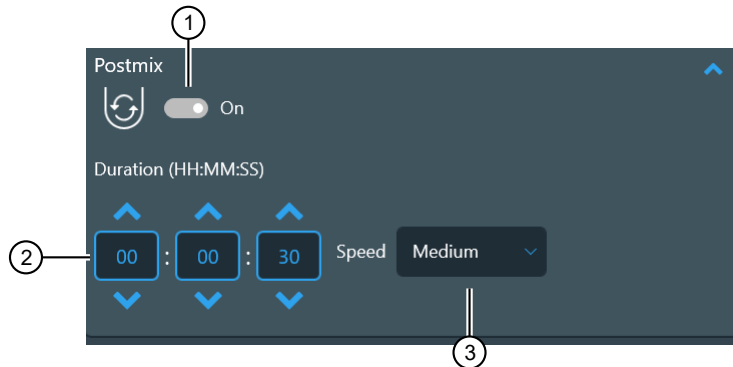
As a general rule, **Medium** tip speed is half of **Fast** speed, while **Slow** speed is one tenth of **Medium** tip speed.

- Use **Medium** as a starting point if you are unsure of speed selection. If the beads do not seem to mix, try a higher speed or different speed combinations.
- For **Bottom mix**, the tip has a rapid and short movement close to bottom of the well. **Bottom mix** is effective for small volume mixing and for dispersing any possible magnetic bead clumps.
- If the beads stay at the bottom of the well, the speed is too low. If the sample and the particles form a clump, it can be dissipated by selecting **Bottom mix**. Continue with **Half mix** or **Fast** to mix the beads in suspension.
- For **Half mix**, the tip moves approximately half the height of the reagent column. The movement is fast and suitable, for example, for efficient mixing of large volumes or in a combined loop with the fast or bottom mix speeds.
- Use **Slow** or **Medium** for heating during mixing, so the liquid heats up faster and does not cool down during the step.
- To wash the beads with water (for example, after washing them with ethanol), use **Slow** and do not release the beads.
- Use **Fast**, **Medium**, or **Slow** for Elution. Test different speeds to find the most suitable one for the protocol.
- The length of the movement and the tip speed varies according to the volume of the liquid in the well to prevent splashing.
- Make sure that the selected liquid, volume and speed combination does not cause splashing, which can lead to cross-contamination.

Postmix step

Postmix is enabled to have the tip (without the magnetic rod) mix the reagent. **Postmix** is often used after a heating step.

Speed is used to select the tip speed for mixing from a drop down menu (**Slow**, **Medium**, **Fast**, **Bottom mix**, **Half mix**). The default speed is **Medium**.



- ① Toggle to enable postmix.
- ② Set the mix time.
- ③ Select the mix type.

Pause step

This step is used to pause protocol execution. During the pause, handling can be selected from the three options of **Wait**, **Dispense**, or **Dry**.

Wait step

The wait step is used to pause protocol execution. The plastic tips are raised to the highest position. The instrument continues with the protocol after you press **Start** on the touch screen.

If selected, the protocol is stopped, for example, to dispense new reagents, transfer the plate to a heating block, or force a plate change.

Dispense step

Select a plate and add a new reagent. The plate is moved to the loading position for manual handling. A plate change can be forced after this step.

Aspirate step

Dry step

The Dry step dries the magnetic beads above or inside a specific well or tube. During the step the beads remain attached to the tip surface, and the magnetic rod remains inside the tip.

The beads can be dried inside the well or tube above the liquid level (**Above well**) or with the tip completely lifted from the well or tube (**Outside well**). This step can be repeated as many times as necessary.

Dry time sets the duration of the drying time.

Tip position sets the position of the tips.

Duration (HH:MM:SS)

Dry type

① 00 : 00 : 00

② Above well
 Outside well

① Set duration of drying.

② Set tip location during drying.

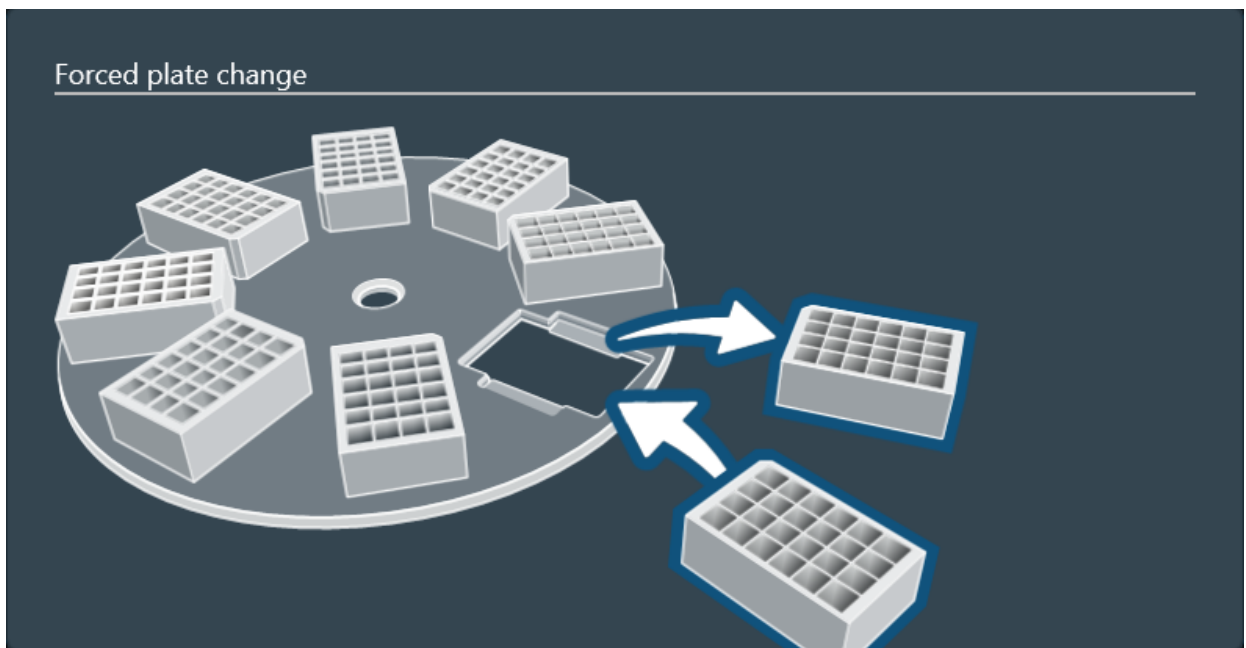
Guidelines for changing plates

The instrument has a turntable with eight plate stations, but a protocol can be created for using more than eight plates by using the following rules.

- The instrument prompts you to load the plate from which it will pick up the tips.
- The plate that is used in the first step is the last one to be loaded onto the turntable at the beginning of protocol execution.
- At the end of the run, the plate from the last step is handed out first.
- If more than eight different plates are used in the protocol, the tip comb is picked up before the other plates are required.

When a pause is selected to forced plate change, the protocol to allow one plate to be changed for another. After the plate is changed, continue with the protocol.

When there are more than 8 plates, the user can overrule suggested change and define new position for additional plates.



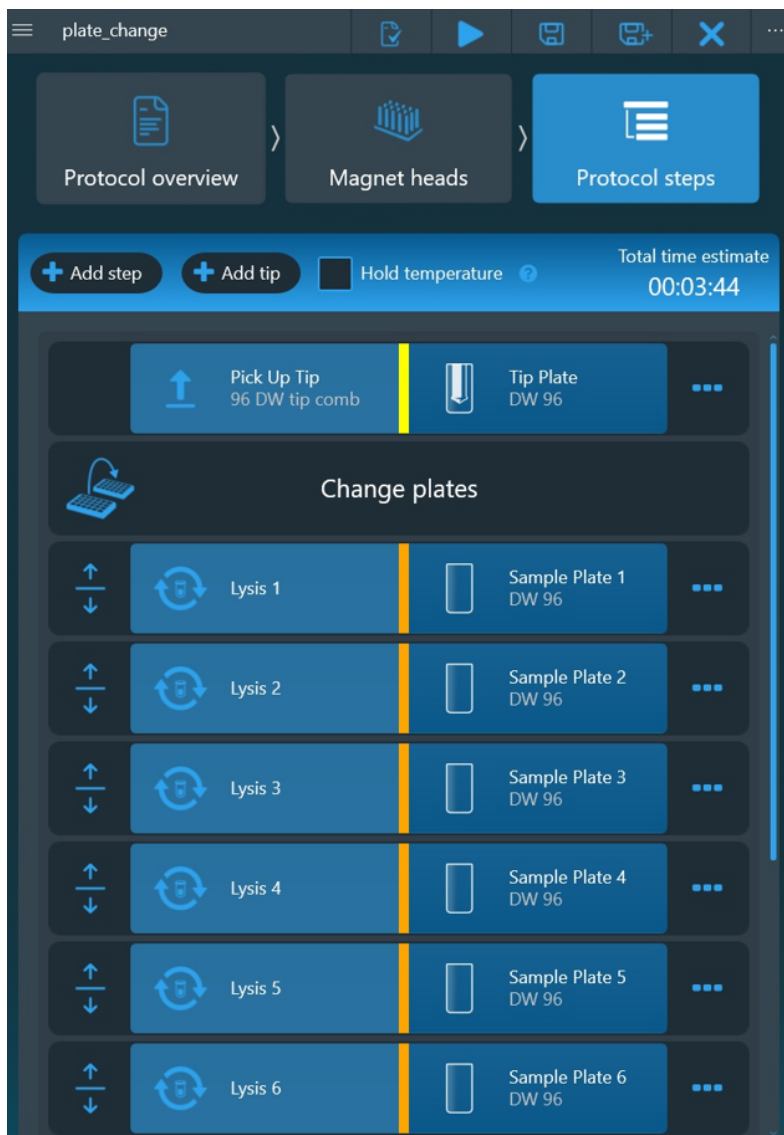


Figure 6 Plate change in Protocol Editor

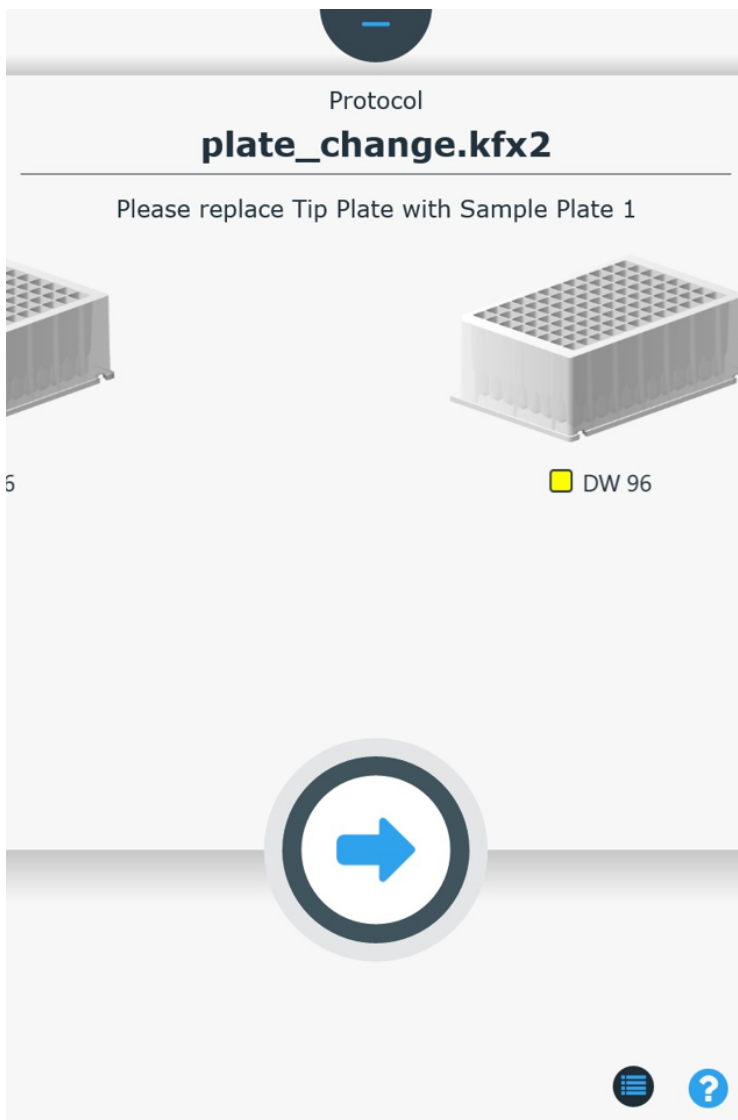


Figure 7 Plate change in Protocol Execution

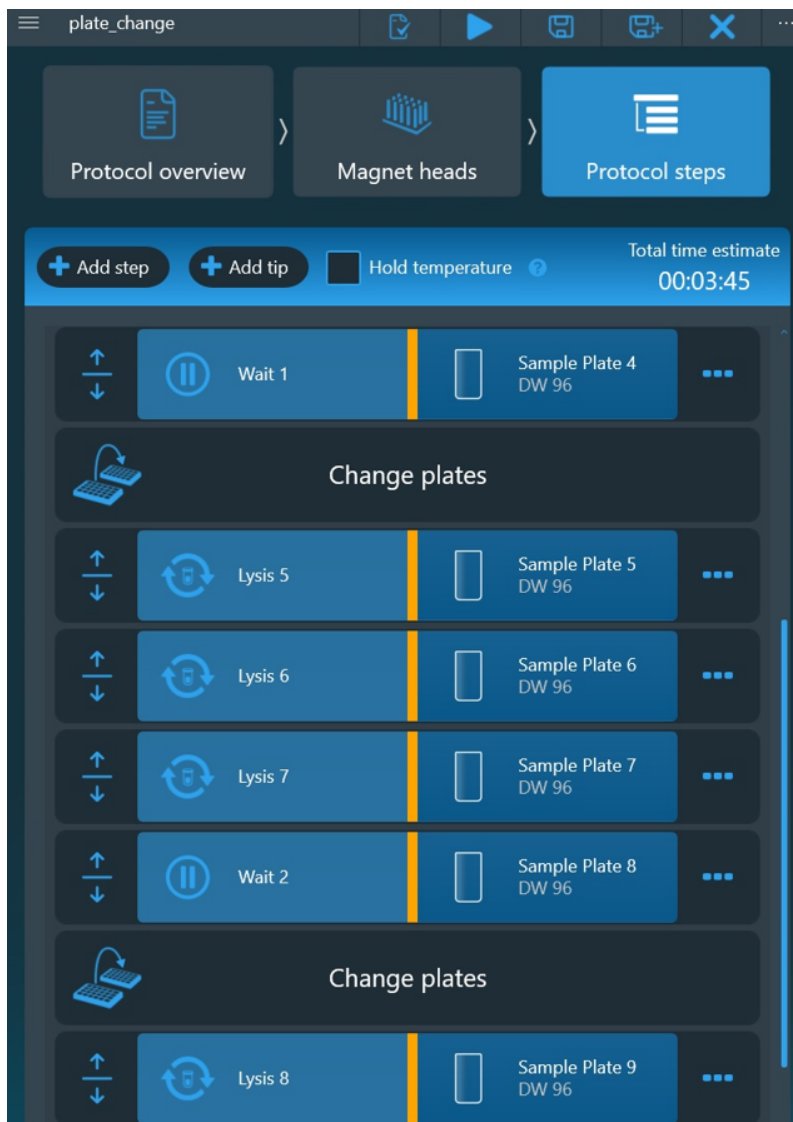
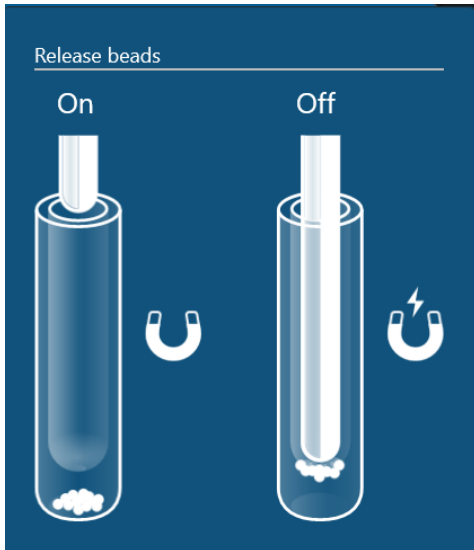


Figure 8 Plate change in Protocol Editor, Forced

Note: The wait step always precedes the forced plate change in protocol tree. When creating the protocol, the user adds the wait step and makes plate change selection available options.

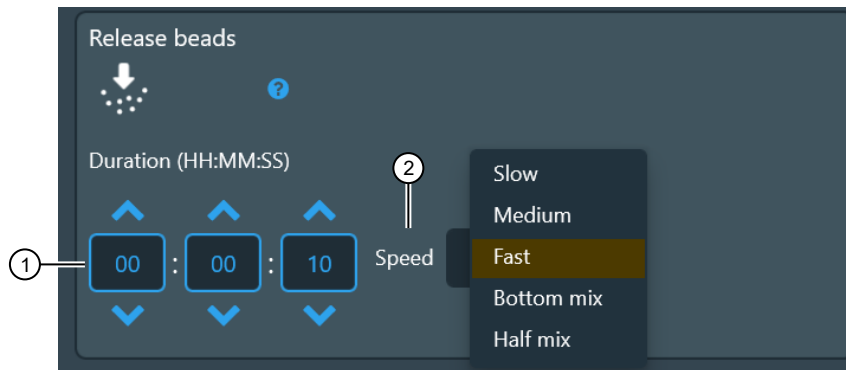
Release beads step

This step releases collected magnetic beads into the wells of the plate. If this step is not added, the magnetic particles remain attached to the tip.



Duration [hh:mm:ss] sets the amount of time that the tip oscillates in the reagent in order to release all the beads. A default value (10 seconds) is set automatically.

Speed sets the speed of the mixing action during the release step. The default speed is **Fast**. The other options are Slow, Medium, Bottom mix, and Half mix.



① Set duration.

② Set speed.

Leave tip step

The default last step of a protocol. The step instructs the instrument to place a tip comb into the tip plate with which it is paired at the beginning of the protocol

Save a protocol

1. Select **Save** or **Save as**.
2. Enter a name for the protocol.

Import/Export protocols

The **Import/Export** function is used to import protocols to, and export protocols from the instrument using a USB memory device.

For instructions on importing or exporting protocols to Connect, see the online help documentation for the Protocol Library.

This function can be used to create copies of instrument protocols for data backup purposes.

Import protocol from a USB memory device

1. Insert a USB memory device containing your protocol into a USB port on the instrument.
2. Select the protocol that you want to import to the instrument.
3. Select **↑** to import the protocol.

Export protocol to a USB memory device

1. Insert a USB memory device into a USB port on the instrument.
2. Select the protocol that you want to export from the instrument.
3. Select **↓** to export the protocol.

Run history overview

The **Run history** function is used to manage the run history data stored on the instrument.


When a protocol is executed, a run report with run-specific information is created. User provided run information must be entered before protocol execution, and includes such information as sample data and consumable lot numbers.

After the protocol has been executed, you can view the run log. The report also contains information on individual steps and the plate layout.



You can save the exported report in xml or pdf format.

For instructions on importing or exporting reports to Connect, see the online help documentation for the Protocol Library.




Export run report to a USB memory device

1. Insert a USB memory device into a USB port on the instrument.
2. Select the run report that you want to export from the instrument.
3. Select  to export the protocol.




Delete run report

1. Select the row containing run report that you want to delete.
2. Select  to delete the protocol.
3. Select  to confirm deletion.



Delete multiple run reports

1. Select  to add checkboxes next to the run reports.
2. Select the checkbox next to every report to be deleted.
3. Select  to confirm deletion.
4. Select  to delete the protocol(s).

Delete run report by date

1. Select  to open a date menu.
2. Scroll through the numerical menus to select the date for the report(s) to be deleted.
3. Select  to confirm deletion.
4. Select  to delete the protocol(s).

Delete run report by name

1. Select the text window to bring up the keyboard.
2. Enter the name of the run report to be deleted.
3. Select  to confirm deletion.
4. Select  to delete the protocol(s).

Telemetry data

Statistical data is collected so that the instrument can be developed to better serve the actual needs of the users. The collected data is not connected to single users, and users do not have access to the statistical data.

When the instrument is connected to the cloud, all the statistical data that has been collected until that time is sent to Thermo Fisher Scientific.

To prevent the sending of statistical data, go to **Settings ▶ Thermo Fisher Cloud** and set **Upload telemetry data to cloud** to off.

Note: Other data might be collected by Thermo Fisher Scientific, as stated in its Terms of Use.

When the instrument is connected to Connect, the following data is collected.

- Executed protocol count with after cooling [integer]
- Executed protocol heat block configuration
 - single block count [integer]
 - dual block count [integer]
- Executed protocol magnet configuration
 - single magnet count [integer]
 - dual magnet count [integer]
- Executed protocol application type (count of each type [integer])
- Plate usage count [integer]
 - 96 well standard plates
 - 96 well deep well plates
 - 24 well deep well plates
 - AB2396 skirted PCR plates
 - AB2496 semi-skirted PCR plates with frame
 - 24 storage tubes
 - 96 storage tubes
- Tip comb usage count [integer]
 - 96 tip comb for deep well magnets
 - 24 tip comb for deep well magnets
 - 96 KF tip comb
 - 96 combi tip comb
 - 24 combi tip comb
 - 96 PCR tip comb
- Export count of run report files [integer]
 - to USB
 - to network share
 - to Connect

- Export count of protocol files [integer]
 - to USB
 - to network share
 - to Connect
- Import count of protocol files [integer]
 - from USB
 - from network share
 - from personal Connect storage
 - from Protocol Library
- Power on count [integer]
- Selected language [string]
- Connection type [none | wired | wireless | both]
- Magnet head mileage [timespan]
- UV-lamp usage hours [timespan]
- Interrupted protocol recovery accepted count [int]
- Interrupted protocol recovery rejected count [int]

Update software

When the instrument is connected to Connect, a prompt with available software updates appears.

IMPORTANT! Disconnect the instrument from BindIx™ Software and remove all external equipment from the USB ports before you install the software update.

IMPORTANT! Do not switch the instrument off during the software installation. The installation time depends on the software update. During the installation, the instrument may re-boot several times. The installation is complete when the **Home** screen re-opens.

Select **Update** to install the new software version.

Note: Software updates can also be performed using a USB memory device.



Troubleshooting

Troubleshooting

Table 2 Actions taken against error messages and warnings

Code	Error message	Action
4	Head position error	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
5	Magnets position error	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
6	Turntable position error	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
7	Turntable nest counting mismatch when rotating	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
8	Heater unit 1 position error	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
9	Heater unit 2 position error	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
10	Heater track position error	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
11	Tip motor 1 position error	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
12	Tip motor 2 position error	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
13	Flip position error	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
14	Tip shield position error	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
15	Lock position error	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
21	Protocol memory is full	Remove some protocols from the device and try again.

Table 2 Actions taken against error messages and warnings (continued)

Code	Error message	Action
36	Cannot do head cycles from unknown starting position	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
37	Cannot drive current heater from unknown sledge position	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
42	Tips are not installed	Make sure that tips are loaded as guided.
43	Magnetic head is missing	Make sure that correct Magnetic head is installed.
44	Tips are not expected to be installed	Remove tip if it is attached to instrument.
55	Motor logic can't resolve how to drive the motors	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
59	Lamp current not detected	Make sure that lamps are correctly in place. If repeated, change the lamp.
60	Plate mixing sensor has detected a collision with tip head	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
62	Instrument configuration does not match to detected parts	Make sure that heating blocks and magnetic heads are installed correctly.
63	Head and magnets collision detected	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
64	Heater 1 Too high temperature measurement offset	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
65	Heater 1 Temperature measurement failed	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
66	Heater 1 Temperature is not changing	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
67	Heater 1 Heater not working	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
68	Heater 2 Temperature measurement failed	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
69	Heater 2 Temperature is not changing	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
70	Heater 2 not working	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
71	Magnets are not expected to be installed	Make sure that magnetic heads are installed correctly.

Table 2 Actions taken against error messages and warnings *(continued)*

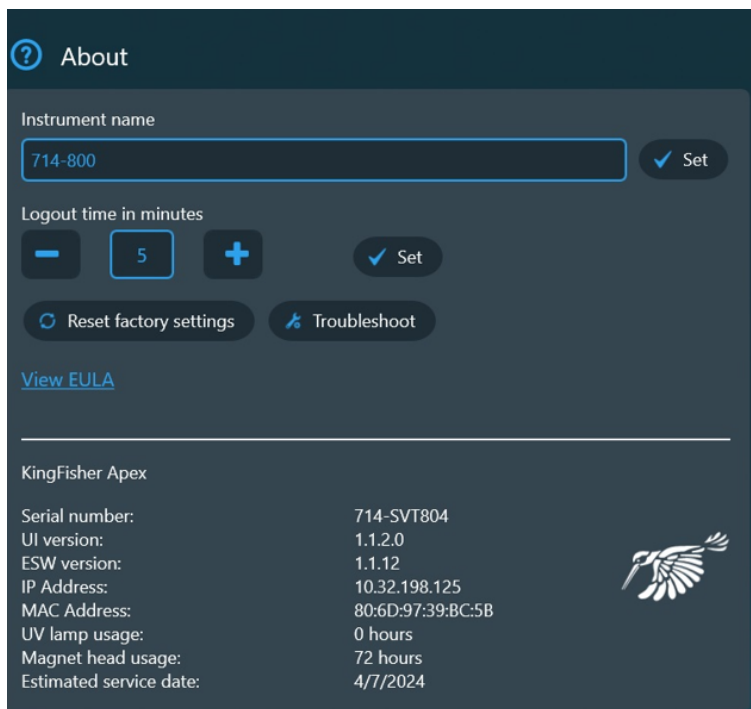
Code	Error message	Action
72	Heaters ambient temperature not measured yet	Switch the instrument OFF and ON, then try again. If the error appears during initialization or is otherwise repeated, contact service.
73	Wrong tip comb.	Check that right tip comb used.
74	Cover opened during UV decontamination.	Start UV decontamination again after closing the door.
-	Any other error	Record error number and contact authorized technical service.



Maintenance

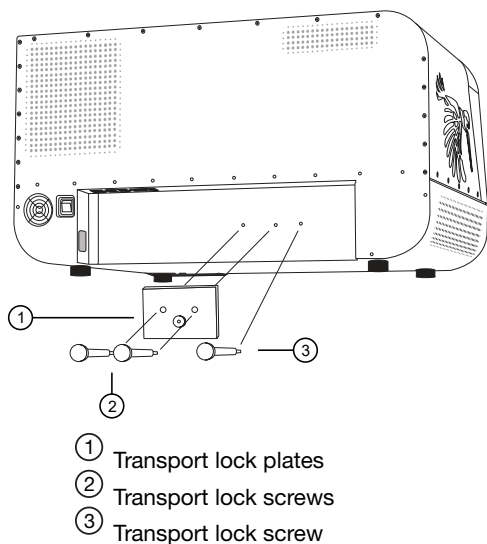
Regular and preventive maintenance

- Preventative maintenance by Service is recommended to be done yearly. There is a service counter which shows estimated next service date. Thirty days before next estimated service date there will be a warning to order service. As the service is due the message changes, this does not prohibit the instrument to be used.
- Keep the instrument free of dust and liquid spills.
- Immediately wipe away spilled saline solutions, solvents, acids or alkaline solutions from outer surfaces to prevent damage.
- Use a mild sterilizing solution to clean any surfaces are contaminated with biohazardous material.
- Clean the outside of the instrument and the turntable with clean low-pressure compressed air or a cloth dampened with water or a mild detergent when necessary.
- Clean the display areas with a mild laboratory detergent.
- Plastic covers and surfaces can be cleaned with a mild laboratory detergent or alcohol.
- Periodically clean the instrument case with a soft cloth dampened in a warm, mild detergent solution to maintain its appearance.
- Painted surfaces can be cleaned with most laboratory detergents. Dilute the cleaning agent as recommended by the manufacturer. Do not expose the surfaces to concentrated acids or concentrated alcohols for prolonged periods of time as damage may occur.
- Abrasive cleaning agents are not recommended, because they can damage the paint finish.



Store the Transport Lock

Use the transport lock screws to secure the transport lock to the rear of the instrument.



Magnetic head maintenance

If necessary, wipe the magnetic rods using a soft cloth or tissue paper soaked in a mild detergent solution (SDS), soap solution, or alcohol.

Decontamination procedure



WARNING! The decontamination procedure should be performed by authorized trained personnel in a well-ventilated room wearing disposable gloves, protective glasses and clothing.

If you have spilled infectious agents, carry out the decontamination procedure.

Perform decontamination in accordance with normal laboratory procedures. Any decontamination instructions provided with the reagents used should be followed.

It is strongly recommended to perform the complete decontamination procedure before relocating the instrument from one laboratory to another. The complete decontamination procedure is required if the instrument is being sent out for service.

After performing this decontamination procedure, enclose a signed and dated Certificate of Decontamination (see [thermofisher.com/TFS-Assets/GSD/Reference-Materials/instrument-part-decontamination-form.pdf](https://www.thermofisher.com/TFS-Assets/GSD/Reference-Materials/instrument-part-decontamination-form.pdf)) both inside the transport package and attached to the outside of the package.

Example of decontaminants:

- Ethanol 70%
- Virkon™ solution 1–3%
- Glutaraldehyde solution 4%
- Chloramine T
- Microcide SQ™ 1:64
- Decon™ 90 min. 4%

Decontaminate instrument

1. Prepare the decontaminant: 200 mL 4% glutaraldehyde solution (or another agent recommended by your safety officer).
2. Empty the turntable.
3. Switch OFF the power and disconnect the power supply cable.
4. Disinfect the outside of the instrument using a cloth dampened with 70% ethanol.
5. Place the instrument in a large plastic bag.
6. Place a cloth soaked in the prepared solution into the bag. Ensure that the cloth does not make contact with the instrument.
7. Close the bag firmly and leave the instrument in the bag for at least 24 hours.
8. Remove the instrument from the bag.
9. Clean the instrument using a mild detergent.
10. Remove any stains using 70% ethanol.

UV decontamination procedure

The UV lamps can be used to decontaminate the process chamber. If the front lid is opened, the UV lamps shut down.

UV radiation is useful in decontamination because of its ability to inactivate biological molecules. The instrument is equipped with two UV lamps that can be used to treat the interior of the instrument with UV light to help with decontamination after cleaning.

IMPORTANT! UV treatment is not a substitute for cleaning. For cleaning instructions, see “Decontamination procedure” on page 87.

UV treat process chamber

1. Go to **Menu ▶ Instrument ▶ Tools ▶ UV light**.
2. Set the decontamination time.

Note: The default is 1 h. However, the user can set a default time as needed. The maximum time setting is 23 h 59 min.


3. Select **OK**.

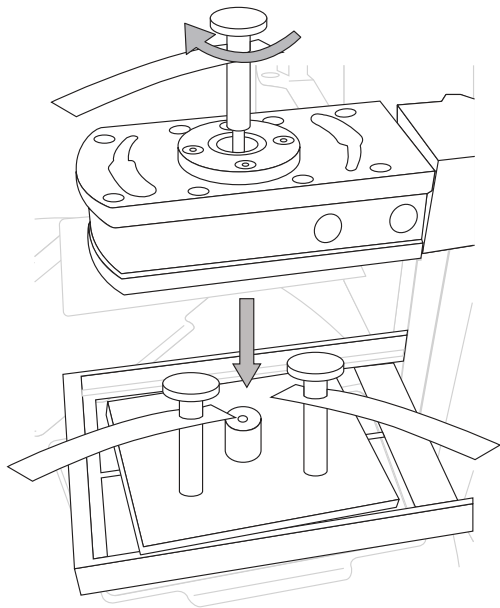
Note: To abort the procedure, select **X** or open the front lid. To restart the procedure, select **OK**.

Prepare instrument for transport

If it becomes necessary to relocate or ship the instrument, install the transport lock to secure tip comb holder and magnetic head holder.

Refit the transport lock

1. Select  **Transport locking** to move the magnetic holder to the correct position.
2. Turn the power off.
3. Place the lower transport lock plate on top of the heating platform.
4. Lower the tip comb holder to the lower transport lock plate.
5. Place the upper transport lock plate over the tip comb holder and fasten the screws to hold the plates together.
6. Lower the magnetic head holder to the upper transport lock plate and fasten the magnetic head holder to the transport lock with the screw.





Specifications

Physical dimensions

Parameter	Instrument	Transport package
Width	78 cm (31 in.)	99 cm (39 in.)
Depth	59 cm (23 in.)	77.5 cm (30.5 in.)
Height	45 cm (18 in.)	83.5 cm (33 in.)
Weight	56 kg (123 lb)	58 kg (128 lbs) ^[1]

^[1] Weight including instrument.

Instrument specifications

Technical specifications	
Operating conditions (indoor use only)	Ambient temperature range should be between +4°C (39°F) and +35°C (95°F) Ambient humidity should be no more than 80% at temperatures up to 31°C (88°F) decreasing linearly to 50% relative humidity at +35°C (95°F)
Transportation conditions	-40°C to +70°C, packed in transport packaging
Storage conditions	-25°C to +50°C, packed in transport packaging
Mains power supply	100–240 Vac, 50/60 Hz (nominal), automatic voltage detection
Power consumption	280 VA max.
Heat dissipation	545 BTU max.
Data connectivity	USB (Device) for PC, LAN or USB Wi-Fi adapter for network, RS-232 for automation
Display/Touch screen	10" touch display
Customizable protocols	Yes, created with instrument user interface or BindIx™ PC Software
Instrument memory	~30 GB
Normal use	10 runs/day, 250 days/year (using 40 min. protocols on medium speed setting at room temperature)



(continued)

Technical specifications	
Ultraviolet light	2 UV lamps 18 W (can be set to run for up to 23h 59 min)
Internal barcode reader	1D

Performance specifications

Table 3 Performance specifications

Performance specifications	
Capacity	96 samples/run max.
Collection efficiency of the particles (indoor use)	> 95%, KingFisher™ 96 plate, neutral wash buffer containing detergent, 2.8 µm particles, 3 collections, at room temperature ^[1]
Magnet rods	24- or 96-well format in one frame Four options as interchangeable KingFisher™ Apex magnetic heads
Plate types (polypropylene – disposable, barcoded)	<p>24- or 96-well plates:</p> <ul style="list-style-type: none"> KingFisher™ 24 deep well plate (30 µL to 5 mL ^[2]) KingFisher™ 96 deep well plate (15–1000 µL ^[1]) KingFisher™ 96 plate (15–200 µL^[1]) PCR plate (10–80 µL^[1]), AB2396 and AB2496 <p>PCR plates:</p> <p>Skirted PCR plates</p> <ul style="list-style-type: none"> Skirted PCR Plates Armadillo™ (Cat. No. AB2396) MicroAmp™ EnduraPlate™ Optical 96-Well Full-Skirted Plates with Barcode, Clear (Cat. No. A31728) <p>Semi-skirted PCR plates</p> <ul style="list-style-type: none"> Semi-skirted PCR Plates Armadillo™ (Cat. No. AB2496) MicroAmp™ EnduraPlate™ Optical 96-Well Fast Clear Reaction Plates (Cat. No. A36930) MicroAmp™ Fast Optical 96-Well Reaction Plate (Cat. No. 4346907) <p>Storage tubes:</p> <ul style="list-style-type: none"> 96 (30–200 µL^[1]), Nunc 374086 24 (200–1000 µL^[1]), Nunc 374323 Matrix™ 500µL ScrewTop Tubes (Cat. No. 3744)



Table 3 Performance specifications (continued)

Performance specifications	
Tip combs (polypropylene – disposable, barcoded)	24- or 96-well format in one frame <ul style="list-style-type: none">• KingFisher™ Apex 96 Combi tip comb• KingFisher™ Apex 24 Combi tip comb• KingFisher™ Apex 96 PCR tip comb• KingFisher™ 96 tip comb for deep well magnets• KingFisher™ 96 tip comb for KingFisher™ 96 magnets• KingFisher™ Flex 24 tip comb
Collection efficiency of the particles (indoor use)	Minimum > 95% using KingFisher™ 96 deep well plate, KingFisher™ 96 tip comb for deep well magnets, neutral wash buffer containing detergent, 2,8 µm particles (Dynabeads™ magnetic beads) with 3 standard collections, instrument at room temperature
Magnetic particle size	approximately > 1 µm
Heating/Cooling temperature range	From +4°C to +100°C, instrument at room temperature
Heating block accuracy	±2°C (cooling), ±1°C up to +80°C, ±3°C, up to +100°C, instrument at room temperature, except ±4°C around ambient

[1] 21°C to 24°C

[2] Processing volume



Ordering information

Accessory products

Product	Cat. No.
Magnetic heads	
KingFisher™ Apex 96 PCR Head	24079910
KingFisher™ Apex 96 Deep Well Head	24079930
KingFisher™ Apex 96 Combi Head	24079920
KingFisher™ Apex 24 Combi Head	24079940
Heating blocks	
KingFisher™ Apex PCR Heating Block	24075910
KingFisher™ Apex 96 Heating Block	24075920
KingFisher™ Apex 96 Deep Well Heating Block	24075930
KingFisher™ Apex 24 Deep Well Heating Block	24075940
KingFisher™ Apex 96 Storage Tube Heating Block	24075950
KingFisher™ Apex 24 Storage Tube Heating Block	24075960
Plastics for 96-well plate and PCR plate formats	
KingFisher™ Apex 96 PCR Tip Comb	97002560
KingFisher™ 96-well Microplate, barcoded	97002540B
PCR Plate, 96-well, skirted	AB2396
PCR Plate, 96-well, semi-skirted	AB2496
KingFisher™ 96 Tip Comb for KingFisher™ Magnets, barcoded	97002524B
Plastics for 96 deep well format	
KingFisher™ Apex 96 Combi Tip Comb	97002570
KingFisher™ 96 Deep Well Plate	95040450B
KingFisher™ 96 Deep Well Plate, sterile	95040460B



(continued)

Product	Cat. No.
KingFisher™ 96 Tip Comb for Deep Well Magnets	97002534B
KingFisher™ 96 Deep Well Tip Comb and Plate, sterile	97002820B
96 storage tube	Nunc 374086
Plastics for 24 deep well format	
KingFisher™ Apex 24 Combi Tip Comb	97002580
KingFisher™ 24 Deep Well Plate, barcoded	95040470B
KingFisher™ Flex 24 Deep Well Plate, barcoded, sterile	95040480B
KingFisher™ Flex 24 Deep Well Tip Comb and Plate, barcoded	97002610B
KingFisher™ 24 Deep Well Tip Comb and Plate, barcoded, sterile	97002620B
24 storage tube	Nunc 364323
Other consumables	
KingFisher™ Apex 24 Storage Tube Adapter	N21445
KingFisher™ Apex 96 PCR Semiskirted Plate Adapter	N21446
KingFisher™ Apex UV Lamp	N21447



WARNING! GENERAL SAFETY. Using this product in a manner not specified in the user documentation may result in personal injury or damage to the instrument or device. Ensure that anyone using this product has received instructions in general safety practices for laboratories and the safety information provided in this document.

- Before using an instrument or device, read and understand the safety information provided in the user documentation provided by the manufacturer of the instrument or device.
- Before handling chemicals, read and understand all applicable Safety Data Sheets (SDSs) and use appropriate personal protective equipment (gloves, gowns, eye protection, and so on). To obtain SDSs, visit thermofisher.com/support.

Safety compliance

The instrument design and manufacture complies with the following standards and requirements for safety, electromagnetic compatibility and Environmental WEEE.






Reference	Description
EU Directive 2014/35/EU	European Union “Low Voltage Directive”
IEC 61010-1 EN 61010-1 UL 61010-1 CAN/CSA C22.2 No. 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements
IEC 61010-2-081 EN 61010-2-081	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 2-081: Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes

Symbols on this instrument

Symbols may be found on the instrument to warn against potential hazards or convey important safety information. In this document, the hazard symbol is used along with one of the following user attention words.

- **CAUTION!**—Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.
- **WARNING!**—Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.
- **DANGER!**—Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

Standard safety symbols

Symbol and description	
	CAUTION! Risk of danger. Consult the manual for further safety information.
	CAUTION! Hot surface.
	CAUTION! Potential biohazard.
	CAUTION! Ultraviolet light.
	<p>WEEE (Waste Electrical and Electronic Equipment) symbol indicates that this product should not be disposed of in unsorted municipal waste. Follow local municipal waste ordinances for proper disposal provisions to reduce the environmental impact of WEEE.</p> <p>This instrument meets European requirement WEEE Directive 2012/19/EU.</p>



Electromagnetic compatibility (EMC) standards

Class B notice

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 instruction manual, 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.

EMC compliance

Reference	Description
Directive 2014/30/EU	European Union “EMC Directive”
IEC 61326-1 Class B EN 61326-1 Class B The equipment is intended for use in a basic electromagnetic environment. Conducted emission: CISPR 11 Class B Radiated emission: CISPR 11 Class B	Electrical Equipment for Measurement, Control and Laboratory Use – EMC Requirements – Part 1: General Requirements
FCC Part 15 Subpart B (47 CFR)	U.S. Standard Radio Frequency Devices



Electrical safety

The following information on electrical safety must be observed, failing to follow these instructions may result in electric shock, fire and/or serious personal injury or death.

In the event of an equipment malfunction, it is the responsibility of the customer to report the need for service to Thermo Fisher Scientific or to one of the authorized agents. For service information, contact Technical Support (page 101).

Servicing of this device is to be performed by trained service personnel only.

- Plug the system into a properly grounded receptacle with adequate current capacity.
- Prior to switching on the product, ensure that the nominal voltage setting on the product matches the nominal voltage of the AC supply network.
- This product should be connected to the power mains using a 3-wire (two conductors and ground) power cable and plug. Use this power cable with a properly grounded electrical outlet to avoid electrical shock.
- Never operate the instrument with the ground disconnected. Grounding continuity is required for safe operation of the instrument.
- If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.
- Never use the product if the power cable is damaged. Check the power cable on a regular basis to ensure that it is in proper operating condition. By taking appropriate safety measures and carefully laying the power cable, you can ensure that the cable will not be damaged and that no one can be hurt by, for example, tripping over the cable or suffering an electric shock.
- Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise, sparks that result in fire and/or injuries may occur.
- Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
- To fully disconnect power either detach or unplug the power cord, positioning the instrument such that the power cord is accessible.
- Ensure that the connections with information technology equipment, e.g., PCs or other industrial computers, comply with the IEC60950-1/EN60950-1 or IEC61010-1/EN 61010-1 standards that apply in each case.
- Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the person operating the product will be exposed to the danger of an electric shock.
- The overvoltage protection should limit the magnitude of the overvoltage surge to 1 kV between the any of the power line and ground.
- Unless expressly permitted, never remove the cover or any part of the housing while the product is in operation. Doing so will expose circuits and components and can lead to injuries, fire or damage to the product.
- Any object that is not designed to be placed in the openings of the housing must not be used for this purpose. Doing so can cause short circuits inside the product and/or electric shocks, fire or injuries.

Chemical safety



WARNING! GENERAL CHEMICAL HANDLING. To minimize hazards, ensure laboratory personnel read and practice the general safety guidelines for chemical usage, storage, and waste provided below. Consult the relevant SDS for specific precautions and instructions:

- Read and understand the Safety Data Sheets (SDSs) provided by the chemical manufacturer before you store, handle, or work with any chemicals or hazardous materials. To obtain SDSs, see the "Documentation and Support" section in this document.
- Minimize contact with chemicals. Wear appropriate personal protective equipment when handling chemicals (for example, safety glasses, gloves, or protective clothing).
- Minimize the inhalation of chemicals. Do not leave chemical containers open. Use only with sufficient ventilation (for example, fume hood).
- Check regularly for chemical leaks or spills. If a leak or spill occurs, follow the manufacturer cleanup procedures as recommended in the SDS.
- Handle chemical wastes in a fume hood.
- Ensure use of primary and secondary waste containers. (A primary waste container holds the immediate waste. A secondary container contains spills or leaks from the primary container. Both containers must be compatible with the waste material and meet federal, state, and local requirements for container storage.)
- After emptying a waste container, seal it with the cap provided.
- Characterize (by analysis if needed) the waste generated by the particular applications, reagents, and substrates used in your laboratory.
- Ensure that the waste is stored, transferred, transported, and disposed of according to all local, state/provincial, and/or national regulations.
- **IMPORTANT!** Radioactive or biohazardous materials may require special handling, and disposal limitations may apply.



WARNING! HAZARDOUS WASTE (from instruments). Waste produced by the instrument is potentially hazardous. Follow the guidelines noted in the preceding General Chemical Handling warning.

Biological hazard safety



WARNING! Potential Biohazard. Depending on the samples used on this instrument, the surface may be considered a biohazard. Use appropriate decontamination methods when working with biohazards.



WARNING! BIOHAZARD. Biological samples such as tissues, body fluids, infectious agents, and blood of humans and other animals have the potential to transmit infectious diseases. Conduct all work in properly equipped facilities with the appropriate safety equipment (for example, physical containment devices). Safety equipment can also include items for personal protection, such as gloves, coats, gowns, shoe covers, boots, respirators, face shields, safety glasses, or goggles. Individuals should be trained according to applicable regulatory and company/ institution requirements before working with potentially biohazardous materials. Follow all applicable local, state/provincial, and/or national regulations. The following references provide general guidelines when handling biological samples in laboratory environment.

- U.S. Department of Health and Human Services, *Biosafety in Microbiological and Biomedical Laboratories (BMBL)*, 6th Edition, HHS Publication No. (CDC) 300859, Revised June 2020
www.cdc.gov/labs/pdf/CDC-BiosafetymicrobiologicalBiomedicalLaboratories-2020-P.pdf
- Laboratory biosafety manual, fourth edition. Geneva: World Health Organization; 2020 (Laboratory biosafety manual, fourth edition and associated monographs)
www.who.int/publications/i/item/9789240011311



Documentation and support

Customer and technical support

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- Order and web support
- Product documentation
 - User guides, manuals, and protocols
 - Certificates of Analysis
 - Safety Data Sheets (SDSs; also known as MSDSs)

Note: For SDSs for reagents and chemicals from other manufacturers, contact the manufacturer.

Limited product warranty

Life Technologies Corporation and/or its affiliate(s) warrant their products as set forth in the Life Technologies' General Terms and Conditions of Sale at www.thermofisher.com/us/en/home/global/terms-and-conditions.html. If you have any questions, please contact Life Technologies at www.thermofisher.com/support.

