

QuantStudio™ 5 Real-Time PCR System

INSTALLATION, USE, AND MAINTENANCE

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For descriptions of symbols on product labels or product documents, go to [thermofisher.com/symbols-definition](https://www.thermofisher.com/symbols-definition).

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Contents

■	CHAPTER 1	Product information	8
		Network and password security requirements	8
		Network configuration and security	8
		Password security	8
		Perform internal validations before software upgrades	8
		Instrument hardware description	9
		Instrument overview	9
		Parts of the instrument	12
		Software description	13
		Instrument, desktop, and cloud software features	13
		Folders, templates, experiments, and projects	14
		Third-party software	15
		Network connection options	16
		Types of runs	16
■	CHAPTER 2	Start, sign on, and configure the instrument	19
		Installation and instrument verification	19
		Precautions for use	20
		Power on the instrument	20
		Parts of the home screen	21
		Use the instrument without signing in	23
		Create a new instrument profile	23
		Sign in	23
		Sign out	24
		Configure instrument settings	24

■	CHAPTER 3	Create and run experiments on the instrument	27
	Workflow		28
	Options for running an experiment		29
	Create and run an experiment from a template		29
	Run an experiment from a saved file		29
	Repeat the last instrument run		30
	Edit an experiment before starting a run		31
	Enter or edit template properties		31
	Edit the run method		32
	Define, assign, and view well details		35
	Load and unload the plate		36
	Load and unload a plate in the instrument		36
	Load and unload a plate in the instrument with a compression pad		37
	View, pause, or stop a run		39
	View real-time data and plots on the instrument touchscreen		39
	Pause or stop an instrument run		40
	Adjust the display of real-time plots on the instrument touchscreen		40
	Lock the touchscreen during a run		40
	Transfer, view, or manage files and results		41
	Transfer EDS files from the instrument home screen		41
	View run history and delete or transfer files from the instrument		41
	Manage templates (EDT files)		41
■	CHAPTER 4	Calibrate and verify instrument performance	43
	Calibration and verification schedule		43
	Calibration descriptions		44
	View the calibration status and set reminders		45
	View calibration status and set reminders in the instrument		45
	View calibration status and set reminders in Thermo Fisher™ Connect Platform		45
	Perform ROI/uniformity, background, and dye calibrations		46
	Workflow: Calibration		46
	Prepare a calibration plate		47
	Perform calibrations		48
	View calibration images and transfer results to USB		51
	Troubleshoot calibration failure		52
	Identify contamination		52
	Create a background plate (<i>optional</i>)		53
	Perform instrument verification using RNase P plates		54
	Instrument verification description		54
	RNase P instrument verification plate		54
	Performance specifications pass criteria		56
	Prepare an RNase P plate		56

Perform RNase P verification	57
Troubleshoot verification failure	58
Calibrate custom dyes	60
Custom dyes overview	60
Use a dilution series to determine an optimal custom dye concentration	60
Calibrate the custom dye	63
Calibrate for a custom melt curve experiment	66
■ CHAPTER 5 Maintain the instrument	69
Backup or restore the instrument	69
Decontaminate the sample block	70
Materials required	70
Clean the sample block	70
Detailed procedures for cleaning the sample block	72
Replace the instrument fuses	73
Materials required	73
Replace the fuses	73
Power on or off, store, and move	74
Enable sleep mode	74
Power on the instrument	74
Power off the instrument	74
Prepare the instrument to store, move, or ship	75
Move the instrument	75
Return the instrument for service	75
■ CHAPTER 6 Configure the instrument and manage instrument profiles	77
Initial start-up	77
Manage profiles	78
Create an administrator instrument profile during initial start-up	78
Manage all instrument profiles (Administrator only)	78
Edit an instrument profile	79
Link an instrument profile to Thermo Fisher™ Connect Platform	79
Link an existing instrument profile to Thermo Fisher™ Connect Platform	80
Create a new instrument profile and link to Thermo Fisher™ Connect Platform	80
Thermo Fisher™ Connect Platform instrument profile roles and functions	80
Change the PIN for a Thermo Fisher™ Connect Platform profile	81
Enable SAE mode (Administrator only)	81
Require instrument profile sign-in (Administrator only)	82
Enable remote instrument monitoring (Administrator only)	82
Update instrument software (Administrator only)	82
Restore factory defaults	83

Configure the network	83
Set up a wired connection	83
Set up a wireless connection	84
Select a region for the Thermo Fisher™ Connect Platform (Administrator only)	84
Manage the instrument name (Administrator only)	84
Set the date and time (Administrator only)	85
Manage the signout timer (Administrator only)	85
■ APPENDIX A Install and connect the instrument to a network	86
Workflow: Install and connect to a network	86
Before you begin	87
Unpack and install the instrument	87
Power on and follow the startup wizard	88
Connect the computer to the instrument directly or to a LAN	88
Instrument and computer connections	89
Download and install the desktop software	90
Computer requirements for the desktop software	90
Download the desktop software	91
Install the desktop software	91
Networking	91
Supported options for instrument and computer connections	91
Control and monitor networked instruments	93
Ethernet port overview	93
Firewall ports that must be open	93
Networking guidelines and best practices	94
■ APPENDIX B Troubleshooting	95
■ APPENDIX C Parts and materials	97
Kits, consumables, accessories, and reagents	97
Consumables (96-well, 0.2-mL format)	97
384-well consumables	98
Consumables (96-well, 0.1-mL format)	99
Accessories	100
General-use materials and consumables	100

■	APPENDIX D Instrument specification and layout	101
	Configured system dimensions	102
	Instrument clearances	103
	Electrical requirements	103
	Environmental requirements	104
	Network requirements	104
■	APPENDIX E Safety	106
	Symbols on this instrument	106
	Conformity symbols	108
	Safety alerts on this instrument	108
	Location of safety labels on the instrument	109
	Safety information for instruments not manufactured by Thermo Fisher Scientific	109
	Instrument safety	109
	General	109
	Physical injury	110
	Electrical safety	111
	Cleaning and decontamination	111
	Safety and electromagnetic compatibility (EMC) standards	111
	Safety compliance	112
	EMC	112
	Environmental design	112
	Chemical safety	114
	Biological hazard safety	115
■	APPENDIX F Documentation and support	116
	Related documentation	116
	Customer and technical support	116
	Limited product warranty	116
	Index	117



Product information

- Network and password security requirements 8
- Perform internal validations before software upgrades 8
- Instrument hardware description 9
- Software description 13
- Network connection options 16
- Types of runs 16

Network and password security requirements

Network configuration and security

The network configuration and security settings of your laboratory or facility (such as firewalls, anti-virus software, network passwords) are the sole responsibility of your facility administrator, IT, and security personnel. This product does not provide any network or security configuration files, utilities, or instructions.

If external or network drives are connected to the software, it is the responsibility of your IT personnel to ensure that such drives are configured and secured correctly to prevent data corruption or loss. It is the responsibility of your facility administrator, IT, and security personnel to prevent the use of any unsecured ports (such as USB, Ethernet) and ensure that the system security is maintained.

Password security

Thermo Fisher Scientific strongly recommends that you maintain unique passwords for all accounts in use on this product. All passwords should be reset upon first sign in to the product. Change passwords according to your organization's password policy.

It is the sole responsibility of your IT personnel to develop and enforce secure use of passwords.

Perform internal validations before software upgrades

IMPORTANT! If you have a validated workflow, you must perform all internal validations as required by your organization's standard operating procedures before performing a software upgrade.

Instrument hardware description

Instrument overview

The QuantStudio™ 5 Real-Time PCR System uses fluorescence-based polymerase chain reaction (PCR) reagents to perform:

- Quantitative detection of target nucleic acid sequences (targets).
- Qualitative detection of targets (endpoint analysis, genotyping experiments, and presence/absence experiments).
- Qualitative analysis of the PCR product (post-PCR melt curve analysis).



The following fixed-block configurations are available:

- 96-Well VeriFlex™ 0.2-mL Block (6 Color De-coupled)
- 384-Well Block (5 Color)
- 96-Well VeriFlex™ 0.1-mL Block (6 Color De-coupled)

The instrument can be run directly from the touchscreen to create and start experiments. To design experiments or to analyze data, the instrument can be integrated with the QuantStudio™ Design and Analysis Software.

An optional barcode scanner and optional wireless adapter can be purchased separately.

Instrument filters and supported dyes

System dyes

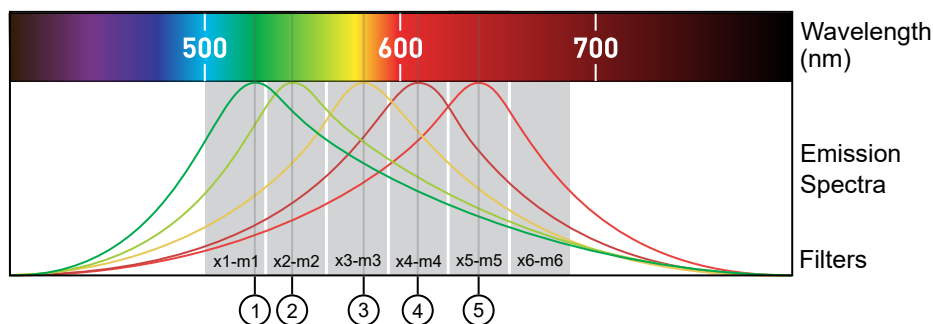
The instruments use a coupled four-color, coupled five-color, or de-coupled six-color filter set that supports the dyes shown in the following table and figure. For more information about available spectral dye calibration kits, contact Support.

Peak filter	Color	Filter wavelength (nm) ^[1]		Factory-calibrated dyes	Example custom dyes
		Excitation	Emission		
x1-m1	Blue	470 ± 15 nm	520 ± 15 nm	FAM™ dye, SYBR™ Green dye	SYT09
x2-m2	Green	520 ± 10 nm	558 ± 12 nm	VIC™ dye	JOE™ dye, HEX™ dye, TET™ dye ^[2]
x3-m3	Yellow	550 ± 10 nm	587 ± 10 nm	NED™ dye, TAMRA™ dye, ABY™ dye	Cy [®] 3 dye
x4-m4	Orange	580 ± 10 nm	623 ± 14 nm	ROX™ dye, JUN™ dye	Texas Red™ dye
x5-m5	Red	640 ± 10 nm	682 ± 14 nm	MUSTANG PURPLE™ dye, Cy [®] 5	LIZ™ dye, Alexa Fluor™ 647 dye
x6-m6	Deep-Red	662 ± 10 nm	711 ± 12 nm	None ^[3]	Cy [®] 5.5 dye

^[1] The central wavelengths are the optimized wavelengths.

^[2] The HEX™ and TET™ dyes from Thermo Fisher Scientific fall within the emission wavelength range of the system, therefore they can be added and adapted for use on the instrument.

^[3] This filter set currently does not support any dyes supplied by Thermo Fisher Scientific.



- ① x1-m1 — FAM™ dye, SYBR™ Green dye
- ② x2-m2 — VIC™ dye
- ③ x3-m3 — ABY™ dye, NED™ dye, Cy[®]3 dye, TAMRA™ dye
- ④ x4-m4 — JUN™ dye, ROX™ dye, Texas Red™ dye
- ⑤ x5-m5 — Cy[®]5 dye, MUSTANG PURPLE™ dye

Custom dyes

The instrument can run assays designed with custom dyes.

Custom dyes include:

- Dyes that are not supplied by Thermo Fisher Scientific.
- Dyes or formulations of dyes that are not system dyes for the instrument.

To use a custom dye on the instrument, review the following requirements.

- Calibrate the instrument for the custom dye (see “Calibrate custom dyes” on page 60).
- Ensure that the custom dye excites between 455 – 672 nm and emits between 505 – 723 nm.
- Select a custom dye that does not overlap with other dyes used in the run (see the filter-wavelength table in “System dyes” on page 10).
- The custom dye must be attached to the 5' end of a short DNA oligonucleotide consisting of the first two bases of the probe sequence without a quencher at the 3' end.

About data collection

The instrument collects raw fluorescence data at different points during the PCR cycle, depending on the type of run performed.

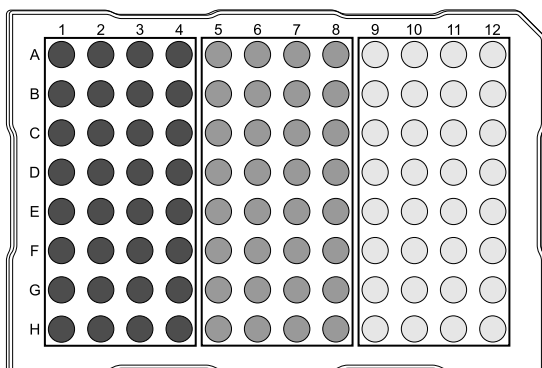
When you create an experiment template (EDT file) in the software, you can customize the optical filter channels through which the instrument collects data. You can specify a filter channel set for all PCR thermal protocols and, optionally, a different filter set for the melt curve stages.

Run type	Experiment type	Data collection point
Real-time	<ul style="list-style-type: none"> • Standard curve • Relative standard curve • Comparative C_T ($\Delta\Delta C_T$) • Melt curve 	<p>During the thermal cycling protocol.</p> <p>Typical timing is to collect data at each cycle of a PCR stage or continuously during a melt stage.</p>
Post-PCR (endpoint)	<ul style="list-style-type: none"> • Genotyping • Presence/ Absence 	<ul style="list-style-type: none"> • After thermal cycling is completed. For Presence/Absence and Genotyping experiments, data collection before the PCR cycle is optional, but recommended. • (Optional) Before thermal cycling starts. Collecting data during the run can confirm genotyping results by viewing traces in allelic discrimination plots or viewing genotyping calls at earlier cycles.

Blocks with VeriFlex™ Zones

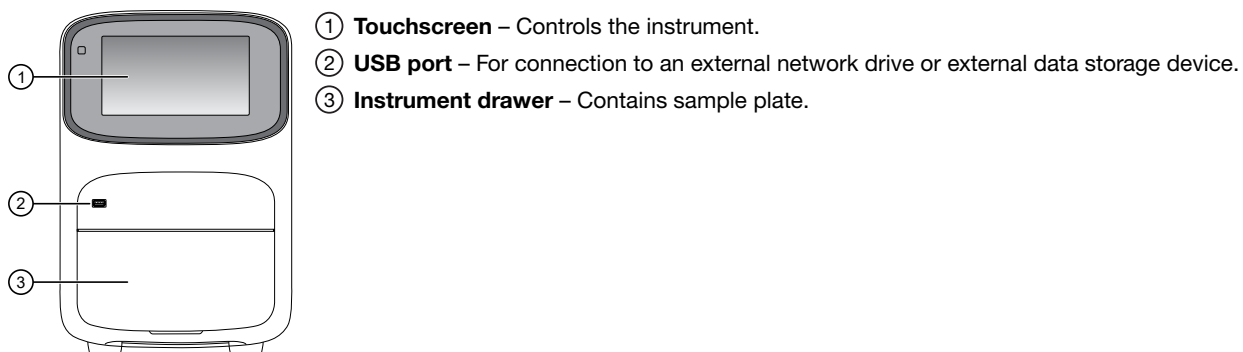
Applied Biosystems™ VeriFlex™ technology provides independent temperature zones that offer enhanced functionality and precise control over your real-time PCR runs. The QuantStudio™ 5 Real-Time PCR System has six programmable VeriFlex™ Zones.

Note: The VeriFlex™ Zones are only applicable for 96-well 0.2-mL and 96-well 0.1-mL blocks.



These independent zones are ideal for real-time PCR optimization or the ability to run multiple experiments in the same run. Unlike standard gradients which give a sigmoidal temperature curve across the columns, blocks with VeriFlex™ Zones help deliver accurate temperatures across every zone.

Parts of the instrument



The instrument includes three additional USB ports on the back of the instrument.

Note: The instrument recognizes only one external storage device at a time for data transfer.

Software description

Instrument, desktop, and cloud software features

The instrument software and the QuantStudio™ Design and Analysis Software (desktop and Thermo Fisher™ Connect Platform) include the features described below.

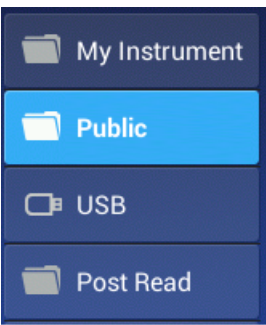


Feature	Instrument	Desktop	Thermo Fisher™ Connect Platform
Use as guest (no sign in)	✓	✓ [1]	—
Create templates (unlocked or locked)	—	✓	✓
Edit unlocked templates	✓	✓	✓
Edit locked templates (password assigned by template creator required)	—	✓	✓
Load system or user-created templates (EDT file) to instrument	✓	✓	—
Change experiment settings in template (EDT file) loaded on the instrument Settings that can be changed in a locked template (no password required): <ul style="list-style-type: none"> • Properties: All settings • Method: No changes allowed • Plate: Sample names Settings that can be changed in an unlocked template: <ul style="list-style-type: none"> • Properties: All settings • Method: All settings • Plate: Sample names 	✓	—	—
Load plate in instrument	✓	—	—
Start run	✓	✓	—
View real-time data during a run	✓	✓	✓
View instrument status (running, calibration needed, and so on)	✓	—	✓
Analyze results	—	✓	✓

(continued)

Feature	Instrument	Desktop	Thermo Fisher™ Connect Platform
Set calibration reminders	✓	—	✓
Review exported calibration or RNase P verification results	—	✓	✓ (only RNase P)

[1] Login required if the Security, Audit, and e-Signature (SAE) module is enabled (QuantStudio™ 5 System only)

Folders, templates, experiments, and projects

Term	Definition	Supported in
Folders in Load Experiment 	Location in which you can store templates (EDT files) on the instrument: <ul style="list-style-type: none"> • My Instrument – Displayed if you are signed in • Public – Location in which all experiments run by guest users are stored • USB – USB for manual transfer to and from a computer • Post Read – If you run an endpoint experiment, the pre-read experiment is automatically saved in this folder for post-read analysis 	Instrument
Experiment Template File (EDT)  	Default settings for an instrument run, can be modified before instrument run. Two types: <ul style="list-style-type: none"> • Factory-provided, accessed from Open Template (instrument) or Create Experiment (desktop or Thermo Fisher™ Connect Platform) • User-created, accessed from Load Experiment 	Instrument Desktop Thermo Fisher™ Connect Platform
Experiment Run File (EDS)	Settings and data for a completed instrument run.	Instrument Desktop Thermo Fisher™ Connect Platform

Template and experiment components	Instrument	Desktop	Thermo Fisher™ Connect Platform
Properties	<ul style="list-style-type: none"> Experiment file name Reagent information (Reagent barcode, Lot#) Plate barcode Data destination (location for auto-transfer of data) Comments (Tags are not used at this time) 	<ul style="list-style-type: none"> Experiment file name Plate barcode User name Instrument type Block type Experiment type Chemistry (reagent information) Run mode Comments (Thermo Fisher™ Connect Platform only) Notifications 	
Method	Thermal cycling conditions	Thermal cycling conditions	
Plate	Sample names You cannot edit targets/SNP assays or tasks on the instrument.	Define and assign samples, targets or SNP assays, and tasks in the Quick Setup and Advanced Setup panes of the Plate tab.	
Run	Start and monitor a run in progress View: time remaining and temperature, method, plots Pause, resume, stop a run	Start and monitor a run in progress View: time remaining and temperature, method, plots	Monitor a run in progress (link to Thermo Fisher™ Connect Platform Instrument Details) View: time remaining and temperature, method, plots
Results	Not applicable	Review plots	
Export	Not applicable	Export results	


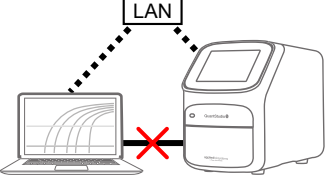
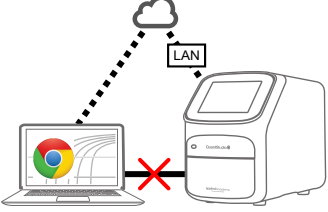
Third-party software

Before installing third-party software on the computer running QuantStudio™ Design and Analysis Software, confirm that the third-party software will not do the following:

- Restrict Ethernet communication.
- Interfere with instrument or computer operation.

Network connection options

You can connect an instrument to a network or computer in the configurations listed below. For specific information on networking, see “Networking” on page 91.

Direct connection	Local area network (LAN) connection	Thermo Fisher™ Connect Platform connection
wired	wired or wireless	wired or wireless
		

Types of runs

Purpose	Description
Standard curve run	
Determines absolute target quantity in samples.	<ol style="list-style-type: none"> 1. The software measures amplification of the target in a standard dilution series and in test samples. 2. The software generates a standard curve using data from the standard dilution series. 3. The software uses the standard curve to interpolate the absolute quantity of target in the test samples.

Purpose	Description
Relative standard curve run	
<p>Determines relative target quantity in samples.</p>	<ol style="list-style-type: none"> 1. The software measures amplification of the target of interest and of an endogenous control target in a standard dilution series, in a reference (calibrator) sample, and in test samples. The endogenous control is a target that is expressed equally in all samples; examples of endogenous controls are β-actin, GAPDH, and 18S ribosomal RNA. The software can algorithmically incorporate multiple endogenous control targets in relative quantification calculations. The reference sample is used as the basis for relative quantification results (or 1× sample). For example, in a study of drug effects on gene expression, an untreated control is an appropriate reference sample. 2. The software generates standard curves for the target of interest and the endogenous control using data from the corresponding standard dilution series. 3. The software uses the standard curves to interpolate the quantities of the target of interest and the endogenous control in each sample. The target quantity in each sample is then normalized to the sample's endogenous control quantity. 4. To determine the relative quantity of the target in test samples, the software divides the normalized target quantity in the sample by the normalized target quantity in the reference sample.
Comparative C_t ($\Delta\Delta C_t$) run	
<p>Determines relative target quantity in samples.</p>	<ol style="list-style-type: none"> 1. The software measures amplification of the target of interest and of an endogenous control target in a reference (calibrator) sample and in test samples. The endogenous control is a target that is expressed equally in all samples; examples of endogenous controls are β-actin, GAPDH, and 18S ribosomal RNA. The software can algorithmically incorporate multiple endogenous control targets in relative quantification calculations. The reference sample is used as the basis for relative quantification results (or 1× sample). For example, in a study of drug effects on gene expression, an untreated control is an appropriate reference sample. 2. The measurements for the target of interest are normalized to the endogenous control. 3. To determine the relative quantity of the target in test samples, the software compares the normalized ΔC_q (ΔC_t or ΔC_{rt}) for the sample to the normalized ΔC_q (ΔC_t or ΔC_{rt}) for the reference sample.

Purpose	Description
Genotyping run	
Detects single nucleotide polymorphism (SNP) variants of a target nucleic acid sequence.	<p>Genotyping runs use preformulated TaqMan™ SNP Genotyping Assays that include the following components:</p> <ul style="list-style-type: none"> • Two sequence-specific primers for amplification of sequences containing the SNP of interest • Two allele-specific TaqMan™ probes for Allele 1 and Allele 2 <ol style="list-style-type: none"> 1. The software normalizes the fluorescence of the reporter dyes to the fluorescence of the passive reference dye in each well. 2. The software plots the normalized reporter dye signal of each sample well on an Allelic Discrimination Plot, which contrasts the reporter dye intensities of the allele-specific probes. 3. The software algorithmically clusters the sample data, and assigns a genotype call to the samples of each cluster according to its position on the plot.
Presence/absence run	
Determines the presence or absence of a target nucleic acid sequence in a sample.	The software calls the target present or absent based on an algorithmically determined call threshold. (The call threshold is different from the C_t threshold; the C_t threshold is not used to make calls.)
Melt curve run	
Determines the melting temperature (T_m) of the amplification products of a PCR that used intercalating dyes.	<p>In the software, melt curve analysis is included in the default run method for any run type that uses intercalating dyes.</p> <ol style="list-style-type: none"> 1. The software plots a melt curve based on the fluorescence of the dye with respect to change in temperature. 2. Using the melt curve, the software calculates the melting temperature (T_m).



Start, sign on, and configure the instrument

■ Installation and instrument verification	19
■ Precautions for use	20
■ Power on the instrument	20
■ Parts of the home screen	21
■ Use the instrument without signing in	23
■ Create a new instrument profile	23
■ Sign in	23
■ Sign out	24
■ Configure instrument settings	24

Installation and instrument verification

Before the first use of the instrument, complete the following tasks:

- Install the instrument (see “Unpack and install the instrument” on page 87).
- Verify instrument performance (see “Perform instrument verification using RNase P plates” on page 54).

Note:

- Instruments are factory calibrated, so no calibration is necessary at installation. However, we recommend that you verify instrument performance before using the instrument.
 - Regular calibration and verification should be performed according to the calibration and verification schedule (see “Calibration and verification schedule” on page 43).
-

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! FIRE HAZARD. For continued protection against the risk of fire, replace fuses only with listed and certified fuses of the same type and rating as those currently in the instrument.



CAUTION! PHYSICAL INJURY HAZARD. During instrument operation, the sample 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.




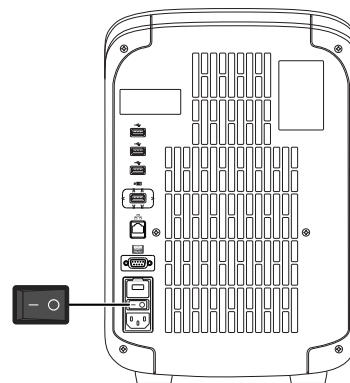
CAUTION! Use flat caps for tubes. Rounded caps can damage the heated cover.

Power on the instrument

1. Touch anywhere on the touchscreen to determine if the instrument is in sleep mode. If the home screen is displayed, the instrument is already powered on.
2. If the home screen does not display, power on the instrument by pressing the switch on the rear panel.

If left unattended, the instrument automatically enters sleep mode (enabled by default) to conserve power.

Note: To customize the sleep mode setting, touch  **Settings** ▶ **Instrument Settings** ▶ **Sleep Mode**.



Parts of the home screen



- ① Avatar and Instrument name
- ② Eject icon
- ③ Help icon
- ④ Status dial
- ⑤ Current user name; instrument block type
- ⑥ **Settings** button
- ⑦ Buttons for accessing EDT files
- ⑧ Connectivity icons
- ⑨ **Sign In** (or **My Profile**) button

Table 1 Parts of the home screen

Element of the home screen	Function	For more information, see...
Avatar and Instrument name	Set by the administrator to uniquely identify instrument.	"Manage the instrument name (Administrator only)" on page 84.
Eject icon	Touch to open or close the instrument drawer.	—
Help icon	Touch to launch the touchscreen Help system to access step-by-step instructions.	—

Table 1 Parts of the home screen (continued)

Element of the home screen	Function	For more information, see...
Status dial	<ul style="list-style-type: none"> When the instrument is in use – Displays the sample block temperature, the elapsed run time, and the run status. You can swipe the dial to the left or touch > to access real-time views of the run. When the instrument is not in use – Displays Set up run. You can start a run by touching the status dial. When the instrument is locked – Displays a lock icon (🔒) within the status dial. 	—
Current user name and block type	<p>Displays the user name of the current signed-in user and the instrument block type.</p> <p>Note: If no user is signed-in, the instrument defaults to the Guest profile.</p>	—
Settings button	Touch ⚙️ Settings to configure, calibrate, or learn about the instrument.	“Configure instrument settings” on page 24.
Buttons for accessing experiment and template files	Load Experiment – Touch to open a user-created EDT file from a Thermo Fisher™ Connect Platform account, USB, instrument folder, or network drive.	“Run an experiment from a saved file” on page 29.
	Open Template – Touch to open a system EDT template file.	“Create and run an experiment from a template” on page 29.
	Run Last – Touch to open the last EDT file run on the instrument. <ul style="list-style-type: none"> If you are signed-in, the file opened will be the last file you ran when signed-in. If you are not signed-in, the file opened will be the last file the guest profile ran. 	“Repeat the last instrument run” on page 30.
Connectivity icons	<ul style="list-style-type: none"> 🌐 – The instrument is connected to a wired network. 📶 – The instrument is wirelessly connected. 🔌 – A USB drive is plugged into the instrument. ☁️ – The instrument is linked to a Thermo Fisher™ Connect Platform account. 	—
Sign In button (My Profile button when a user is signed in)	<ul style="list-style-type: none"> Touch 👤 Sign In to sign into an instrument profile and link to a Thermo Fisher™ Connect Platform account. Touch 👤 My Profile to change instrument profile settings, link to a Thermo Fisher™ Connect Platform account, or lock the instrument during a run. 	“Sign in” on page 23.


Use the instrument without signing in

If the instrument is configured by an Administrator to allow guest access (⊛ **Settings** ▶ **Manage Users** ▶ **Sign In Required** set to off), you can use the instrument without signing in.

The following limits are in place if you do not sign in to the instrument:

- All actions are recorded to **Guest** user profile.
- You have access only to the **Public** folder for selecting and storing experiments.
- You cannot transfer data to Thermo Fisher™ Connect Platform (only to USB or network drive).

Create a new instrument profile

1. In the home screen, touch  **Sign In**, then touch **Get Started**.
2. Touch **Name**, enter a username, then touch **Done**.
3. Touch **PIN Code**, enter a four-digit numerical password, then touch **Enter**.

Note: Touch the **Show PIN** checkbox to switch PIN display on or off.


4. Touch **Confirm PIN**, then repeat step 2.
5. Touch **Create profile**.
6. Sign in to the profile you just created.

Note: To enable access to Thermo Fisher™ Connect Platform, see “Link an instrument profile to Thermo Fisher™ Connect Platform” on page 79.

Sign in


Create an instrument profile before signing into the instrument. See “Create a new instrument profile” on page 23.

Note: An instrument profile is a user account specifically for the instrument. It is not related to any other user account for the system or software.

1. In the home screen, touch  **Sign In**.
2. Touch **Sign In**, then select your username.
3. Enter your PIN, then touch **Enter**.

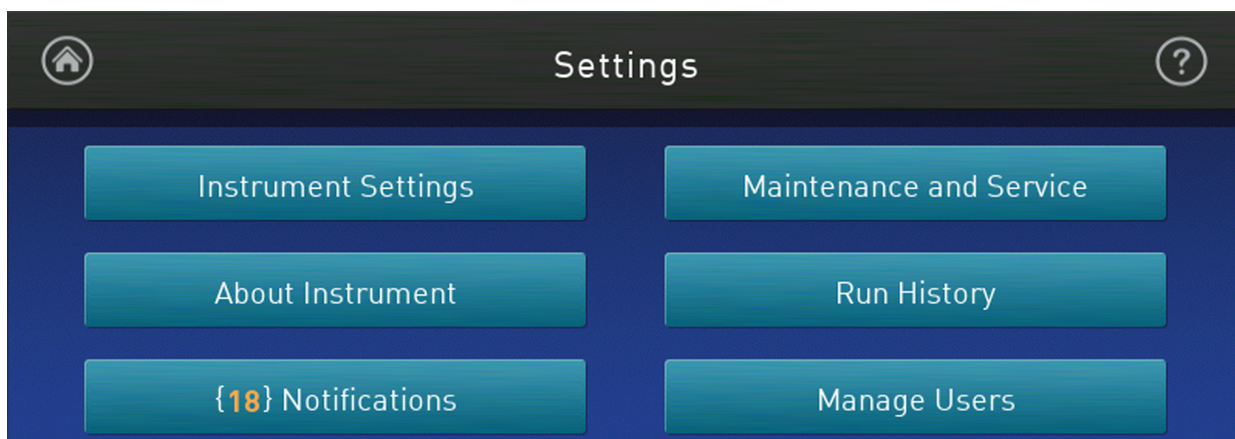
Note: To enable access to Thermo Fisher™ Connect Platform, see “Link an instrument profile to Thermo Fisher™ Connect Platform” on page 79.

Sign out

1. In the home screen, touch  **My Profile**.
2. Touch **Sign Out**.

Configure instrument settings

Touch  **Settings** in the home screen to configure settings as needed.



Touch  for step-by-step instructions on configuring settings.

Options	Description
Instrument Settings	
Instrument Name (Administrator only)	Instrument name. If connected to a network, the instrument name must be unique. <i>(Optional)</i> Add an avatar image for the instrument (JPG, PNG, or GIF) from a USB.
Sleep Mode	Enable the instrument to enter a standby mode after a set length of inactivity.
Heated Cover Temperature	Set the temperature of the heated cover for instrument operation and standby mode. Enable heated cover to automatically turn off during standby mode.
Network Drive	Specify a default network location for the signed-in user.
Insert Plate Reminder	Enable a reminder to insert a plate before starting a run from the instrument.
OEM Connection Only (Administrator only)	Required for API access to the instrument. When enabled, the desktop cannot connect to the instrument. API access to the instrument is exclusive to authorized OEM partners.
Cloud Region (Administrator only)	Specify the regional server location to access Thermo Fisher™ Connect Platform. Note: Once you set a region for the cloud platform, restore factory defaults to change the region.

Options	Description
Date/Time	Set time zone and date and time formats.
Network Connection	Set wired or wireless network connection for the instrument.
Restore Factory Defaults	<p>Restore the instrument to the factory settings.</p> <p>IMPORTANT! Back up the instrument before restoring factory defaults (see “Backup or restore the instrument” on page 69).</p> <p>Note: When you restore an instrument to its factory defaults:</p> <ul style="list-style-type: none"> • User profiles and files stored on the instrument are deleted, including all user-created EDT and EDS files and any custom dye and custom melt calibrations. • System templates and factory calibrations remain on the instrument.
SAE Mode (Administrator only)	<p>When enabled the following items apply:</p> <ul style="list-style-type: none"> • The home screen displays SAE mode. • Runs must be started from the desktop software. The instrument locks out access to load experiments, open templates, repeat the last run, start a run, change the instrument name, and change the date/time. • Only an administrator can perform calibrations. • A user can monitor a run and view the method from the instrument touchscreen.
About Instrument	
About Instrument	Displays the instrument Model Name , Block Serial Number , and Firmware Version .
License Agreement	Displays the End User Software License Agreement and the Limited Product Warranty. You can export the License Agreement to a USB drive.
Notifications	
—	<p>Enable home screen notifications of instrument errors and software updates. This function is not related to the Notifications function in the cloud software.</p> <p>The number of new, unviewed notifications displays over Settings in the home screen.</p>
Maintenance and Service	
Software Update (Administrator only)	Update the instrument software.
Monitoring (Administrator only)	<p>Enable:</p> <ul style="list-style-type: none"> • Remote Monitoring Service to automatically send critical device statistics to Thermo Fisher Scientific (does not monitor or send data). • Thermo Fisher Scientific Cloud Monitor to allow real-time monitoring of instrument runs from a Cloud account.
Instrument Statistics	Displays instrument usage information: Block Cycle Count and LED Life .

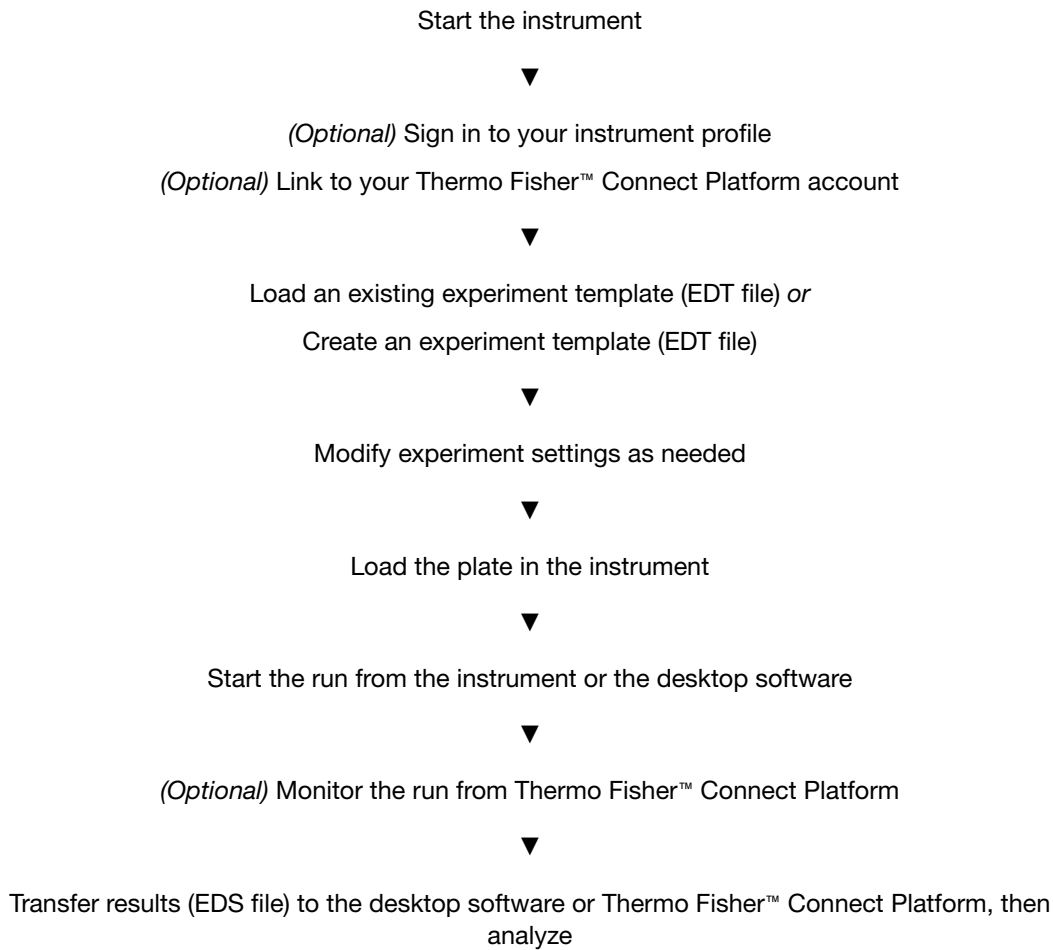
Options	Description
Calibrations	<ul style="list-style-type: none"> • Perform calibrations <ul style="list-style-type: none"> – ROI and Uniformity – Dye – Custom (including Background calibration) • View calibration history and set calibration reminders in History and Reminders
RNase P Verification	Perform instrument verification using an RNase P plate.
Self Verification Test	Check the instrument hardware functions.
Log	View and export Instrument Log.
Backup / Restore	<ul style="list-style-type: none"> • Backup Instrument • Restore a Backup (Administrator only)
Ship Prep Mode	Place the instrument in a safe state for shipping, moving, or long-term storage.
Run History	
—	<p>Displays the experiments run on the instrument and whether the data was transferred.</p> <p>Note: Experiments run while a user is signed-in can only be viewed or transferred by that user or an administrator.</p> <p>Touch an experiment to view experiment run details and to transfer or delete EDS file.</p>
Manage Users	
Sign In Required (Administrator only)	Enable the restriction of instrument use to only signed-in users (disables Guest profile use).
Sign Out Timer (Administrator only)	Set the duration of inactivity before a user is automatically signed out.
Manage Profiles (Administrator only)	<ul style="list-style-type: none"> • Instrument • Cloud • All Profiles <p>Displays the profile information for the instrument and the associated Thermo Fisher™ Connect Platform account.</p>



Create and run experiments on the instrument


- Workflow 28
- Options for running an experiment 29
- Edit an experiment before starting a run 31
- Load and unload the plate 36
- View, pause, or stop a run 39
- Transfer, view, or manage files and results 41

Workflow



Options for running an experiment






Create and run an experiment from a template

1. In the home screen, touch  **Open Template**.
2. *(Optional)* Touch a category in the left column.
3. Touch the file name.
4. *(Optional)* Enter or edit template properties, including **Run File Name** (EDS file name), **Plate Barcode**, **Reagent Information**, and **Data Destination** (see “Enter or edit template properties”).
5. *(Optional)* Edit the run method (see “Edit the run method” on page 32).
 - Add, remove, or edit a step, stage, melt curve, or data collection point.
 - Adjust the heated cover temperature, sample volume, or number of cycles.
 - Configure VeriFlex™ Zones, ramp rate, and pause settings.
6. *(Optional)* Define plate wells with sample names and view **Well ID**, **Targets**, or **Dyes** (see “Define, assign, and view well details”).
7. Load a plate into the instrument (see “Load and unload the plate” on page 36).
8. Touch **Start Run**.
When prompted, confirm that you inserted a plate.

Note: To disable this reminder, select **Do not show again** or select  **Settings** ▶ **Insert Plate Reminder** in the home screen.

Run an experiment from a saved file

In the home screen:

1. Touch  **Load Experiment**.
2. Touch the appropriate icon to navigate to your file location.
 - For files saved to the guest profile, touch  **My Instrument** ▶ **Public**.
 - For pre and post read files, touch  **My Instrument** ▶ **Post Read**.
3. Touch the file name.
4. *(Optional)* “Manage templates (EDT files)” in either  **USB** or  **My Instrument**.
5. *(Optional)* Enter or edit template properties, including **Run File Name** (EDS file name), **Plate Barcode**, **Reagent Information**, and **Data Destination** (see “Enter or edit template properties”).


6. (Optional) Edit the run method (see “Edit the run method” on page 32).
 - Add, remove, or edit a step, stage, melt curve, or data collection point.
 - Adjust the heated cover temperature, sample volume, or number of cycles.
 - Configure VeriFlex™ Zones, ramp rate, and pause settings.
7. (Optional) Define plate wells with sample names and view **Well ID**, **Targets**, or **Dyes** (see “Define, assign, and view well details”).
8. Load a plate into the instrument (see “Load and unload the plate” on page 36).
9. Touch **Start Run**.
When prompted, confirm that you inserted a plate.

Note: To disable this reminder, select **Do not show again** or select  **Settings** ▶ **Insert Plate Reminder** in the home screen.

Repeat the last instrument run

This feature applies only to runs started from the instrument and is not available for runs started from the desktop software. If you are signed-in, this feature applies to the last run from your instrument profile.

In the home screen:

1. Touch  **Run Last**.
2. (Optional) Enter or edit template properties, including **Run File Name** (EDS file name), **Plate Barcode**, **Reagent Information**, and **Data Destination** (see “Enter or edit template properties”).
3. (Optional) Edit the run method (see “Edit the run method” on page 32).
 - Add, remove, or edit a step, stage, melt curve, or data collection point.
 - Adjust the heated cover temperature, sample volume, or number of cycles.
 - Configure VeriFlex™ Zones, ramp rate, and pause settings.
4. (Optional) Define plate wells with sample names and view **Well ID**, **Targets**, or **Dyes** (see “Define, assign, and view well details”).
5. Load a plate into the instrument (see “Load and unload the plate” on page 36).
6. Touch **Start Run**.
When prompted, confirm that you inserted a plate.

Note: To disable this reminder, select **Do not show again** or select  **Settings** ▶ **Insert Plate Reminder** in the home screen.



Edit an experiment before starting a run

Enter or edit template properties

Access a template (EDT file). For more information, see the following sections:

- “Create and run an experiment from a template” on page 29.
- “Run an experiment from a saved file” on page 29.
- “Repeat the last instrument run” on page 30.

In the **Properties** screen, touch **Edit** to enter or edit template properties.

- Edit the file name for the EDS file for the run.
 - a. Touch the **Run File Name** field.
 - b. Enter the name for the EDS file, then touch **Done**.
- Enter a plate barcode.
 - a. Touch the **Plate Barcode** field.
 - b. Enter or scan the plate barcode, then touch **Done**.
- Record reagents and their expiration dates.
 - a. Touch  **Reagent Information**.
 - b. Touch **Add**, or touch an existing reagent, then touch **Edit** or **Delete**.
 - c. Touch the **Name**, **Type**, **Lot #**, **Reagent Barcode**, **Part #**, or **Expiration Date** field to enter individual reagent information.
 - d. Touch **Done**.
- Automatically transfer run data (EDS file) when an instrument run ends.
 - a. Touch  **Data Destination**.
 - b. Touch the appropriate icon to select a data destination.
 - c. Under the desired data destination, select **Automatically transfer experiment**.
 - d. Touch **Done**.
- Enter a comment.
 - a. Touch **Comments**.
 - b. Enter text, then touch **Done**.

Scan a barcode using the optional barcode scanner

The instrument is compatible with an optional Handheld Barcode Scanner (Cat. No. 4488442, purchased separately). The barcode scanner reads Code 128 (alphanumeric), which supports 128 ASCII character barcodes.

1. Click the **Barcode** field.
2. Hold the scanner 20–30 cm away from a plate or container label and aim at the center of the barcode, then press the trigger.
3. Slowly move the scanning beam across the barcode until the scanner emits a high-pitched tone.

When the scanner scans a barcode, it automatically transmits the following information:

- Transmits the alphanumeric equivalent of the barcode to the barcode field.
- Transmits other reagent information (Lot #, Part #, Expiration Date, etc.)

For more information about the hand-held barcode scanner, see the user documentation provided with the barcode scanner.

Edit the run method

Access a template (EDT file):

- “Create and run an experiment from a template” on page 29.
- “Run an experiment from a saved file” on page 29.
- “Repeat the last instrument run” on page 30.

For an overview of the method as it is graphically represented on the touchscreen, see “Method elements” on page 33.

In the **Method** screen:

1. Touch **Edit**.
2. Touch a field, enter changes, then touch **Enter**.

Note: Touch–drag ≡ to quickly increase or decrease a step temperature.

3. Touch **Manage Steps** to add or remove a step, stage, melt curve, or data collection point.

Note: The **Manage Steps** screen also provides access to configuring **VeriFlex™ Zones**, **Ramp Rates**, and **Add Pause** settings (see “Configure VeriFlex™ Zones, ramp rates, and pause settings” on page 35).

Method elements



- ① Method tab
- ② Heated cover temperature
- ③ Reaction volume
- ④ Stage of thermal protocol
- ⑤ Step within a stage
- ⑥ Number of cycles for the stage
- ⑦ Temperature for the step
- ⑧ Hold time for the step
- ⑨ Data collection point


Manage steps, stages, melt curves, and data collection points

Add or remove a step, stage, melt curve, or data collection point using the **Manage Steps** option. You can also configure ramp rates and pause settings from the **Manage Steps** screen (see “Configure VeriFlex™ Zones, ramp rates, and pause settings” on page 35).

- In the **Method** screen, touch **Edit ▶ Manage Steps**.



Option	Procedure
Add a step	<ol style="list-style-type: none"> 1. Touch Add/Remove steps ▶ Add steps. 2. Touch + on the left or right border of a step to add a step before or after the step, respectively. 3. Enter parameters for the new step, then touch Enter. 4. Touch Done.
Remove a step	<ol style="list-style-type: none"> 1. Touch Add/Remove steps ▶ Remove steps. 2. Touch — on the step to be removed, then touch Done.

(continued)

Option	Procedure
Add a stage	<ol style="list-style-type: none"> 1. Touch Add/Remove stages ▶ Add stages. 2. Touch + on the left or right border of a stage to add a stage before or after the stage, respectively. 3. Edit parameters of the new stage in the Method screen. See “Edit the run method” on page 32. 4. Touch Done.
Remove a stage	<ol style="list-style-type: none"> 1. Touch Add/Remove stages ▶ Remove stages. 2. Touch — on the stage to be removed, then touch Done.
Add a melt curve	<ol style="list-style-type: none"> 1. Touch Melt curves ▶ Add melt curve. 2. Touch + on the left or right border of a step to add a melt curve before or after the step, respectively. 3. Select Continuous or Step and hold. 4. Touch melt curve parameters to edit, then touch Done. 5. Touch Done. <p>Note: Depending on the experiment type, there can be restrictions on the addition or placement of melt curves.</p>
Remove a melt curve	<ol style="list-style-type: none"> 1. Touch Remove melt curve. 2. Touch — on the melt curve to be removed, then touch Done.
Add or remove data collection points	<ol style="list-style-type: none"> 1. Touch Data collection location. 2. Touch  to switch data collection on or off.

Configure VeriFlex™ Zones, ramp rates, and pause settings




- In the **Method** screen, touch **Edit ▶ Manage Steps ▶ Advanced Options**.

Option	Procedure
Use VeriFlex™ Zones (96-well blocks only)	<ol style="list-style-type: none"> 1. Touch VeriFlex™ Zones. 2. Touch  on the step to apply VeriFlex™ Zones. 3. Touch each zone to edit the temperature, then touch Enter. The background colors of the VeriFlex™ Zones change with the temperature edit. Zones with higher temperatures display a background brighter than those with lower temperatures. 4. (Optional) Apply additional VeriFlex™ Zones. 5. Touch Done.
Edit ramp rates	<ol style="list-style-type: none"> 1. Touch Ramp Rates. 2. Touch the ramp rates fields. 3. Touch Enter. 4. (Optional) Edit additional steps, then touch Done.
Add a pause into the method	<ol style="list-style-type: none"> 1. Touch Add Pause. 2. Touch  in a stage. 3. Enter the pause temperature, and the cycle after which the pause will occur. 4. Touch Enter. The pause is represented by a P in the corner of the stage. 5. Touch Done.

Define, assign, and view well details

1. Access a template (EDT file). For more information, see the following sections.
 - “Create and run an experiment from a template” on page 29.
 - “Run an experiment from a saved file” on page 29.
 - “Repeat the last instrument run” on page 30.

- In the **Plate** screen, define, assign, and view well details.

Option	Procedure
Define and assign samples in the plate layout view	<ol style="list-style-type: none"> Touch  . Touch Manage or touch an individual well. Touch the Samples subtab. Select one or more wells, then touch Edit. Enter sample names for the selected wells, then touch Done.
Define and assign samples in the well table view	<ol style="list-style-type: none"> Touch  . Touch Edit to edit sample names for individual wells. Touch a sample name field, enter a new name, then touch Done.
View target information	<ol style="list-style-type: none"> Touch  . Touch Manage or touch an individual well. Touch the Targets subtab. Touch Details to view target information, then touch Done.

- Touch **Done** to return to the **Plate** tab.

Load and unload the plate

If a compression pad is not used, see “Load and unload a plate in the instrument” on page 36.

A compression pad is needed for some applications with a 96-well 0.2-mL MicroAmp plate.


See your product documentation to confirm if the use of a compression pad is required.

To load and unload the plate, see “Load and unload a plate in the instrument with a compression pad” on page 37.

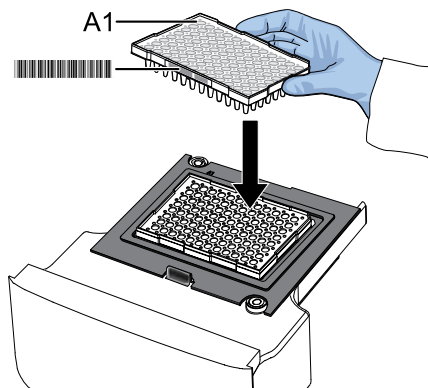
Load and unload a plate in the instrument



CAUTION! Use flat caps for 0.2-mL tubes and 0.1-mL tubes. Rounded caps can damage the heated cover.

- Load the plate.
 - Touch  to eject the instrument drawer.




- b. Load the plate onto the plate adaptor so that the following criteria are met.
 - Well A1 of the plate is positioned in the top-left corner of the plate adaptor.
 - The barcode faces the front of the instrument.



IMPORTANT! The instrument should be loaded and unloaded by trained operators who have been warned of the moving parts hazard.

Note: (For 96-well 0.2-mL blocks only) Do not remove the black plate adaptor before loading a plate or tube strips. If used, tube strips can fit loosely in the adapter, but the heated cover will apply the appropriate pressure to seat the tube strips securely in the adapter.

Note: The 384-well and 96-well Fast (0.1-mL) block configurations do not require a plate adaptor.

- c. Touch  to close the instrument drawer.
2. When the run ends, unload the plate.
 - a. Touch  to eject the instrument drawer.
 - b. Remove the plate.
 - c. Touch  to close the instrument drawer.




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

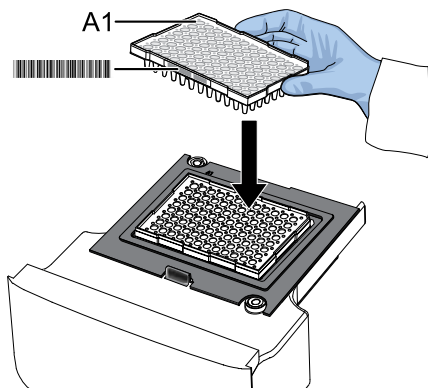
Note: If the instrument does not eject the plate, contact Support.

Load and unload a plate in the instrument with a compression pad

Some applications use a compression pad for a 96-well 0.2-mL MicroAmp plate.

1. Load the plate.
 - a. Touch  to eject the instrument drawer.

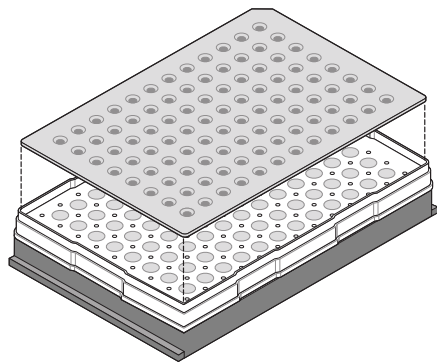
- b. Load the plate onto the plate adaptor so that the following criteria are met.
- Position well A1 of the plate in the top-left corner of the plate adaptor.
 - Ensure that the barcode faces the front of the instrument.





IMPORTANT! The instrument should be used by trained operators who have been warned of the moving parts hazard.


Note: (For 96-well 0.2-mL blocks only) Do not remove the black plate adaptor before loading a plate or tube strips. If used, tube strips can fit loosely in the adapter, but the heated cover will apply the appropriate pressure to seat the tube strips securely in the adapter.

- c. Before loading the plate in the drawer, place the MicroAmp™ Optical Film Compression Pad with the gray side down on the surface of the plate to help ensure a proper seal between the instrument and the adhesive film.



IMPORTANT! Be careful to place the compression pad with the brown side up and the gray side down, centered on top of the plate. Ensure that the compression pad is free from wrinkles and signs of deterioration prior to use.

- d. Touch  to close the instrument drawer.
2. When the run ends, unload the plate.
- a. Touch  to eject the instrument drawer.
 - b. Remove the plate.

- c. Touch  to close the instrument drawer.
- d. Remove the MicroAmp™ Optical Film Compression Pad from the plate and store it inside the pack.

IMPORTANT!

- If the compression pad becomes stuck inside the instrument, call service to clean the heated cover.
 - Between each use, place the pad back in the pouch so that it does not dry out.
 - Each compression pad may be used up to 20 times before discarding. Do not use more than 20 times.
-





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


Note: If the instrument does not eject the plate, contact Support.

View, pause, or stop a run

Do any of the following actions during an instrument run.

- View real-time data and plots (see “View real-time data and plots on the instrument touchscreen” on page 39).
- Adjust the display of real-time plots (see “Adjust the display of real-time plots on the instrument touchscreen” on page 40).
 - Touch  or swipe left once to view real-time run method information or to edit the number of cycles.
 - Touch  or swipe left twice to view real-time data and plots.
- Pause or stop an instrument run (see “Pause or stop an instrument run” on page 40).

View real-time data and plots on the instrument touchscreen

1. In the instrument home screen, during an instrument run, touch  or swipe left twice.
2. Touch **Well details**.
3. Touch **Samples**, **Targets**, or **Tasks** to select a graphical representation of each selection.
4. Touch **Close** to return to the home screen.

Pause or stop an instrument run

In the home screen, during an instrument run:

1. Touch **>** or swipe left once to view real-time run method information.
2. Stop or pause the run.
 - Touch **Stop Run**.
 - Touch **Pause**, then enter a pause temperature.



CAUTION! PHYSICAL INJURY HAZARD. During instrument operation, the plate temperature can reach 100°C. If you want to access the plate during a run pause, enter room temperature as the pause temperature and allow the plate to cool to room temperature before handling.

3. (Optional) After pausing a run, touch **Edit** to change the number of cycles.

Adjust the display of real-time plots on the instrument touchscreen

1. In the instrument home screen, during an instrument run, touch **>** or swipe left twice to view real-time data and plots.
2. Touch **Zoom**.
3. Touch **🔍** or **🔍** to zoom in or out.
4. Touch the arrows to pan left, right, up, or down on the graph.
5. Touch **Close** to return to the default view.

Lock the touchscreen during a run

After you have started a run, you can lock the touchscreen so that other users cannot interfere with instrument operation.

Note: You must be signed-in to use this feature.

1. Lock the touchscreen.
 - a. In the home screen, touch **👤 My Profile**.
 - b. Touch **Lock Screen**, then touch **Lock**.
2. Unlock the touchscreen.
 - a. Touch anywhere on the touchscreen.
 - b. Touch the **PIN Code** field, then enter your PIN.

Note: The touchscreen automatically unlocks when the run is complete.

Transfer, view, or manage files and results

Transfer EDS files from the instrument home screen

1. In the home screen, when a run ends, touch **Transfer File**.
2. Select the data destination for the EDS file.
3. Navigate to and select a folder.
4. Touch **OK**.
5. Touch **Transfer**.

Note: Touch  **Settings** ▶ **Run History** to transfer EDS files at any time.

View run history and delete or transfer files from the instrument

In the home screen, touch  **Settings** ▶ **Run History**.



- Touch an individual run record to view its details, then complete one of the following actions:
 - Touch **Delete** to delete the run record.
 - Touch **Transfer** to export the run data.
- Touch **Manage** to select multiple run records for simultaneous viewing, deletion, or transfer.




Note:

- Guests (users not signed-in) can only view guest run records.
- Users signed into their instrument profiles can also view their own run records.
- Administrators can view all run records.

Note: If the connection between the instrument and the desktop software is interrupted during the run, the instrument still completes the run. However, the run data (EDS file) must be transferred from the instrument to the desktop software using a USB drive or a network drive.

Manage templates (EDT files)

This feature applies to templates (EDT files) on a  **USB** or in  **My Instrument**. To manage run results files (EDS files), see “Transfer EDS files from the instrument home screen” on page 41.

1. In the home screen, touch  **Load Experiment**.
2. Touch  **USB** or  **My Instrument**.
3. Touch **Manage Files**.
4. (Optional) Navigate through the **My Instrument**, **Public**, **USB**, and **Post Read** folders to access an EDT file. Folder availability depends on your sign-in status.

5. Touch one or more files to select for managing.
6. Delete or copy the files.
 - Touch **Delete Files**, then confirm deletion.
 - Touch **Copy Files**, select a file destination, then touch **Paste Files**.
7. Touch **Done**.

4

Calibrate and verify instrument performance

- Calibration and verification schedule 43
- Calibration descriptions 44
- View the calibration status and set reminders 45
- Perform ROI/uniformity, background, and dye calibrations 46
- Perform instrument verification using RNase P plates 54
- Calibrate custom dyes 60
- Calibrate for a custom melt curve experiment 66

Calibration and verification schedule

The instrument is factory-calibrated and does not require calibration at installation. To help ensure optimal performance, perform calibrations at the recommended frequency.

Note: After instrument installation, we recommend performing instrument verification using the provided RNase P plate.

IMPORTANT! Perform calibrations and instrument runs under the environmental conditions that are specified in “Environmental requirements” on page 104. Exposure to extreme temperatures can adversely affect the instrument performance and shorten the life span of the instrument components.

To set the calibration frequency for the instrument, touch **⊕ Settings ▶ Maintenance and Service ▶ Calibrations ▶ History and Reminders ▶ Edit ▶ Exp interval field.**

Calibration	Recommended frequency
ROI/Uniformity	<ul style="list-style-type: none"> Every two years (recommended) Always perform new Background and Dye calibrations after an ROI/Uniformity calibration. <p>Note: Performing an ROI/Uniformity calibration invalidates all other calibrations.</p>

(continued)

Calibration	Recommended frequency
Background	<ul style="list-style-type: none"> • Every two years (recommended) • Background calibration can also be performed, as needed: <ul style="list-style-type: none"> – To check for contamination (depends on usage and laboratory conditions). – To obtain the most accurate data for the removal of background fluorescence. <p>Note: Performing a Background calibration does <i>not</i> invalidate any other calibration.</p>
Dye	<ul style="list-style-type: none"> • Every two years (recommended) • During a Dye calibration, only the dyes on the given spectral calibration plate are calibrated. <p>Note: Performing a Dye calibration for a given dye plate does <i>not</i> invalidate any other calibration.</p>
RNase P instrument verification	<ul style="list-style-type: none"> • After installing or moving the instrument • After performing instrument calibrations (recommended) • As needed to confirm instrument performance

Note: To prepare custom dye plates and to perform custom calibrations, see “Calibrate custom dyes” on page 60.

Calibration descriptions


Calibration description and purpose	Pass Criteria
ROI/Uniformity	
<ul style="list-style-type: none"> • The software captures images for each optical filter. • The software uses calibration data to map the increase in fluorescence to the plate wells during subsequent runs and to evaluate well-to-well consistency of the signals. 	<p>The image for each filter distinguishes all wells of the plate.</p> <p>Each well in the image is distinct.</p>
Background	
<ul style="list-style-type: none"> • The software captures background images for each optical filter in the absence of sample and reagent, and it checks that the fluorescence from each well is below a fluorescence threshold. • The software uses calibration data to remove background fluorescence during a run. <p>Note: You can also run this calibration to determine if contamination is related to the sample block or the plate.</p>	<p>The plate images for all filters are free of abnormal fluorescence.</p>

(continued)

Calibration description and purpose	Pass Criteria
Dye	
<ul style="list-style-type: none"> The software extracts a spectral profile for each dye standard, then produces a set of spectral profiles plotted as fluorescence vs filter. The software uses calibration data to characterize and distinguish the individual contribution of each dye in the total fluorescence signals collected by the instrument. 	Dye spectra peak within the same filter as their group.


View the calibration status and set reminders

View calibration status and set reminders in the instrument

- In the home screen, touch  **Settings** ▶ **Maintenance and Service** ▶ **Calibrations** ▶ **History and Reminders**.
- In the **Calibration Reminders** screen, view the status of each calibration type.
- (Optional) Touch a calibration row to view the history of that specific calibration type, then touch **Done**.
- Touch **Edit** to set the calibration reminder settings. For each calibration type:
 - Slide the control **On** to enable the calibration reminder.
 - Edit the **Exp interval** and **Remind me** fields.
 - Touch **Save**.
- (Optional) To transfer the calibration report, touch **Export** then follow the directions on the screen.
- Touch **Done**.

View calibration status and set reminders in Thermo Fisher™ Connect Platform

Note: The calibration reminders feature requires a connection between the instrument and a computer network.

- In Thermo Fisher™ Connect Platform, click  for the **Instrument Connect** page.
- Select any of your registered instruments.

3. In the **Summary** tab:


- Click **+ Calibrations** to view the status of each calibration type.
- *(Optional)* Click **+ Calibration Reminders** to set the calibration reminder time table and enter the notification email address(es).

Note: More than one email address can receive the calibration reminders.

Note: The settings are automatically saved.

- *(Optional)* In the **Downloads** section, click **Maintenance Summary.pdf** to download the calibration status report.

4. In the **Calibrations History** tab:

- View the history of each calibration type.
- *(Optional)* Click  to download the calibration history report.

Perform ROI/uniformity, background, and dye calibrations

Workflow: Calibration

Note: The ROI and uniformity calibrations use the same calibration plate.

Perform an ROI calibration



Perform a uniformity calibration

You are automatically prompted to perform background calibration.



Perform a background calibration

Perform any time that ROI calibrations are current.



Perform system dye calibrations

Perform any time that ROI and background calibrations are current.



(Optional) Perform custom dye calibrations (“Calibrate custom dyes” on page 60)

Perform any time that ROI and background calibrations are current.

Prepare a calibration plate

Materials required for calibration plate preparation

- Plate(s) for the calibration that you are performing:
 - ROI plate (the same plate is used for ROI and uniformity calibrations)
 - Background calibration plate
 - Dye calibration plates

Note: We recommend calibrating with all Spectral Dye Calibrations Plates available for your block configuration even if you are not using all the dyes in the plates.

Note: Do not discard the packaging for the calibration plates. Each calibration plate can be used up to 3 times if the following conditions are met:

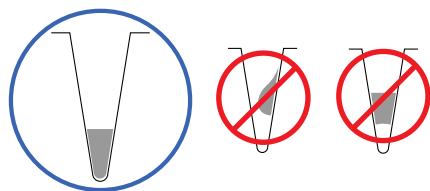
- The plate is stored in its packing sleeve at -15 to -25°C .
 - The plate is used within 6 months after opening.
 - The plate is used before the plate expiry date
-
- Centrifuge with plate adapter; buckets cleaned before use
 - Powder-free gloves
 - Safety glasses

Thaw, vortex, and centrifuge a calibration plate

1. Remove the calibration plate from the freezer, then thaw the plate in its packaging. Keep plates protected from light until you perform the calibration.
 - Thaw each plate for 30 minutes.
 - Use each plate within 2 hours of thawing.

IMPORTANT! Do not remove the plate from its packaging until you are ready to use it. The fluorescent dyes in the wells of calibration plates are photosensitive. Prolonged exposure to light can diminish the fluorescence of the dyes.

2. While wearing powder-free gloves, remove the calibration plate from its packaging and retain the packaging. Do not remove the optical film.
3. Vortex the plate for 5 seconds, then centrifuge at $750\text{--}1,000 \times g$ for 2 minutes.
4. Confirm that the liquid in each well is at the bottom of the well and free of bubbles. If it is not, centrifuge the plate again.



IMPORTANT! Keep the bottom of the plate clean. Fluids and other contaminants on the bottom of the plate can contaminate the sample block and cause an abnormally high background signal.

Perform calibrations

1. In the instrument home screen:


Calibration	Touch
ROI/Uniformity ^[1]	⊗ Settings ▶ Maintenance and Service ▶ Calibrations ▶ ROI and Uniformity
Background ^[2]	⊗ Settings ▶ Maintenance and Service ▶ Calibrations ▶ Custom ▶ Background
Dye	⊗ Settings ▶ Maintenance and Service ▶ Calibrations ▶ Dye

^[1] Automatically followed by Background calibration.

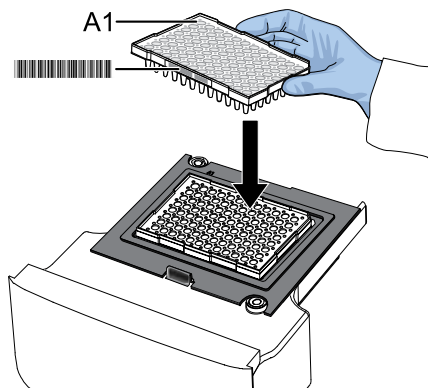
^[2] Initiate via this route if performing Background calibration only.

2. Follow the instructions on the screen to start the calibration.

Note: *Dye calibration only:* Select the **Dye Plate** to run, then touch **Next**.

3. Load the plate.
 - a. Touch  to eject the instrument drawer.


- b. Load the plate onto the plate adaptor so that the following criteria are met.
- Well A1 of the plate is positioned in the top-left corner of the plate adaptor.
 - The barcode faces the front of the instrument.



IMPORTANT! The instrument should be loaded and unloaded by trained operators who have been warned of the moving parts hazard.



Note: (For 96-well 0.2-mL blocks only) Do not remove the black plate adaptor before loading a plate or tube strips. If used, tube strips can fit loosely in the adapter, but the heated cover will apply the appropriate pressure to seat the tube strips securely in the adapter.

Note: The 384-well and 96-well Fast (0.1-mL) block configurations do not require a plate adapter.

- c. Touch  to close the instrument drawer.
4. Touch **Start**.
5. When the run is complete and the screen displays **Calibration Complete**, touch **View Results** to check the calibration status.

Calibration status	Action
Passed	Touch Next to proceed to the next required calibration.
Failed	See “Troubleshoot calibration failure” on page 52.

Note: You can view the calibration images only after the ROI/Uniformity and Background calibrations pass.

6. When the run ends, unload the plate.
- Touch  to eject the instrument drawer.
 - Remove the plate.
 - Touch  to close the instrument drawer.



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

Note: If the instrument does not eject the plate, contact Support.

7. Return the plate to its original packaging.

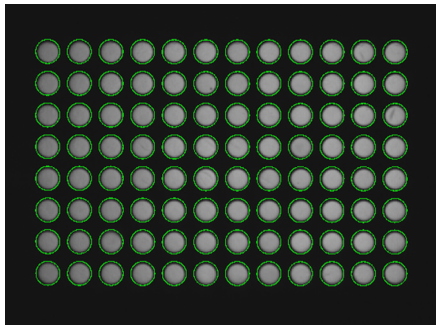
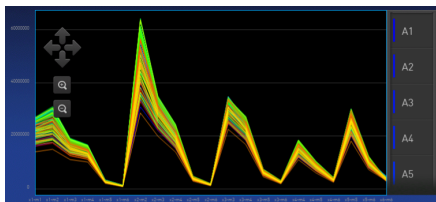
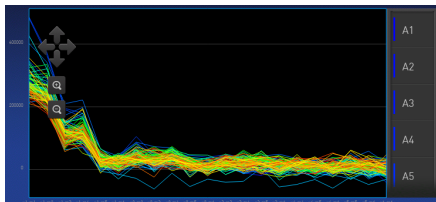
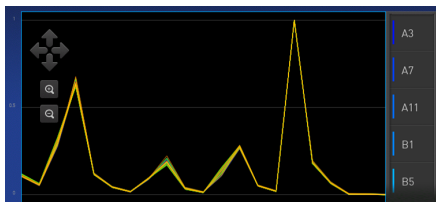
Note: Each calibration plate can be used up to 3 times if the following conditions are met:

- The plate is stored in its packing sleeve at -15 to -25°C.
 - The plate is used within 6 months after opening.
 - The plate is used before the plate expiry date
-

View calibration images and transfer results to USB

The instrument performs the ROI, Uniformity, and Background calibrations in sequence. You can view the calibration images after the Background calibration is complete.

1. In the **Calibration Status** screen, touch **Details**.
2. In the **Details** screen, touch a calibration type to view its images and plots.

Calibration	Example results indicating successful calibration
ROI Note: Select the desired filter combination from the Filter Set dropdown list.	Green circles around all wells and bright well centers. 
Uniformity	Signals from each well following a uniform trend. 
Background	Few, if any, signals with abnormally high fluorescence. 
Dye	Signals from each well following a uniform trend, and each dye peaks at the correct filter. 

3. In the **Calibration Status** screen, touch **Accept Results** or **Reject Results**.
 Accepting the results saves the calibration data to the instrument and overwrites existing data.
4. (Optional) Touch **Transfer EDS** to transfer the calibration data to a USB.

Troubleshoot calibration failure

Observation	Possible cause	Recommended action
Calibration failed	The plate was improperly prepared.	Ensure the following: <ul style="list-style-type: none"> • The correct plate was used for the calibration performed. • The plate was properly thawed. • The plate was properly centrifuged. • The plate was properly sealed.
	The plate is damaged or contaminated.	Check for damage, improper plate seal, or contamination.
		Order a replacement plate. If the replacement plate fails, contact Support.
High fluorescence signal in individual wells	Signals that exceed the limit of normal fluorescence may indicate fluorescent contaminants on the plate or the sample block.	See “Identify contamination” on page 52.
Calibration failed but plate is undamaged	The incorrect plate was used for calibration performed.	Use the plate that matches the calibration performed.
	The plate was improperly prepared.	Repeat the calibration with the plate properly prepared.
		If the calibration fails again, order a replacement plate. If the replacement plate fails, contact Support.

Identify contamination

Signals that exceed the limit of normal fluorescence may indicate fluorescent contaminants on the calibration plate or the sample block. Common contaminants include ink residue from permanent pens, powder from disposable gloves, and dust.

1. View the calibration data and note the wells that failed the calibration.
2. Remove the plate from the instrument, rotate the plate 180°, then perform the calibration again.

- Determine the location of the failed wells again as in step 1.

Position of failed wells	Action
Identical	The sample block is contaminated. Decontaminate the sample block (see page 70).
Reversed	The plate is contaminated. Discard the plate, then perform the calibration using a new calibration plate.

- If the calibration fails after you decontaminate the sample block and replace the plate, contact Support.

Create a background plate (optional)

Whenever possible, use a background plate listed in Appendix C, “Parts and materials”. These plates contain a buffer that accurately simulates the reagents used for PCR, and, therefore, produces high-quality calibration data.

If a background plate is not available, you can create one as described below.

Required materials:

- MicroAmp™ optical 96-well reaction plate
- Optical adhesive cover or optical flat caps
- Pipettor, 200- μ L (with pipette tips)
- Powder-free gloves
- Safety glasses
- Deionized water

IMPORTANT! Wear powder-free gloves while creating the background plate.

- Remove a reaction plate from its box and place it on a clean, dry surface.
- Aliquot deionized water to each well of the reaction plate.
 The recommended volume for a 96-well plate is 10-20 μ L.
 The recommended volume for 384-well plate is 5 μ L.
- Seal the plate using an optical adhesive cover or optical flat caps.
- Use the plate for background calibration.

Perform instrument verification using RNase P plates

Instruments are factory-calibrated, so calibration is not necessary for initial installation. However, perform instrument verification:

- After installation and before first use of the instrument.
- After performing instrument calibrations. (recommended)
- As needed to confirm instrument performance after calibrations, repair, preventative maintenance, or change to the system.

The instrument requires valid ROI/uniformity, background, and dye calibrations to perform instrument verification.

Instrument verification description

Purpose	Description	Pass criteria
Confirms the performance of the instrument.	Quantifies the number of copies of the human RNase P gene in samples with known concentrations of the corresponding DNA template.	<p>The instrument passes performance specifications if the following inequality is true and the instrument successfully distinguishes between unknown populations A and B.</p> $[(C_{tA}) - 3(\sigma_{C_{tA}})] > [(C_{tB}) + 3(\sigma_{C_{tB}})]$ <p>where:</p> <ul style="list-style-type: none"> • C_{tA} = Average C_t of unknown population A • $\sigma_{C_{tA}}$ = Standard deviation of unknown population A • C_{tB} = Average C_t of unknown population B • $\sigma_{C_{tB}}$ = Standard deviation of unknown population B

RNase P instrument verification plate

The RNase P plate contains the reagents necessary for the detection and quantitation of genomic copies of the human RNase P gene (a single-copy gene encoding the RNase moiety of the RNase P enzyme). Each well contains: PCR master mix, RNase P primers, FAM™ dye-labeled probe, and a known concentration of human genomic DNA template.

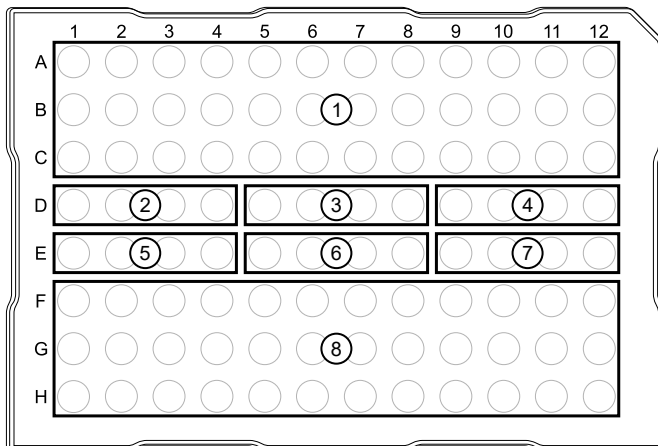


Figure 1 96-well RNase P plate

- | | |
|-----------------------------|----------------------|
| ① Unknown A (5,000) | ⑤ STD 5,000 copies |
| ② NTC (no template control) | ⑥ STD 10,000 copies |
| ③ STD 1,250 copies | ⑦ STD 20,000 copies |
| ④ STD 2,500 copies | ⑧ Unknown B (10,000) |

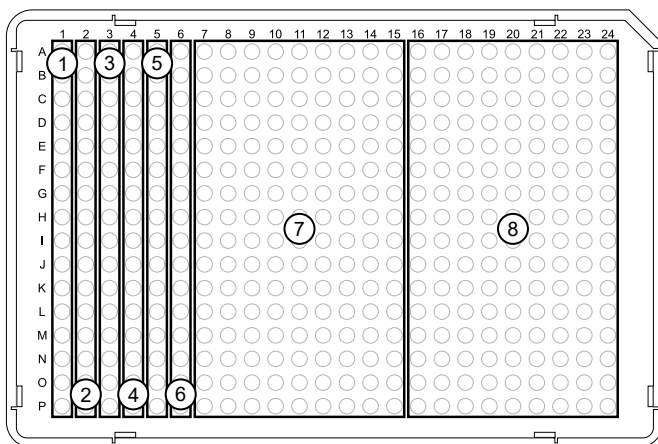


Figure 2 384-well RNase P plate

- | | |
|-----------------------------|----------------------|
| ① NTC (no template control) | ⑤ STD 10,000 copies |
| ② STD 1,250 copies | ⑥ STD 10,000 copies |
| ③ STD 2,500 copies | ⑦ Unknown A (5,000) |
| ④ STD 5,000 copies | ⑧ Unknown B (10,000) |

Performance specifications pass criteria

After the run, the software calculates average copy number values and standard deviation values. The instrument passes performance specifications if the following inequality is true and the instrument successfully distinguishes between unknown populations A and B.

$$[(C_{tA}) - 3(\sigma_{C_{tA}})] > [(C_{tB}) + 3(\sigma_{C_{tB}})]$$

- C_{tA} = Average C_t of unknown population A
- $\sigma_{C_{tA}}$ = Standard deviation of unknown population A
- C_{tB} = Average C_t of unknown population B
- $\sigma_{C_{tB}}$ = Standard deviation of unknown population B

The software automatically adjusts the threshold and omits a defined number of wells from the unknown populations to meet the performance specifications. To view any omitted wells, open the EDS file for the verification in the desktop software.

Prepare an RNase P plate

Materials required for RNase P plate preparation

- RNase P instrument verification plate
- Centrifuge with plate adapter; buckets cleaned before use
- Powder-free gloves
- Safety glasses

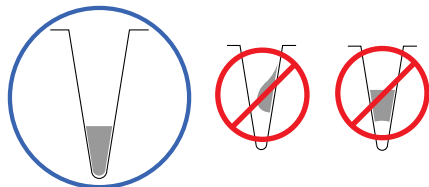
Thaw, vortex, and centrifuge an RNase P plate

IMPORTANT! Expose the RNase P plate to room temperature for no more than 45 minutes, inclusive of thawing and preparation time.

After thawing, the RNase P plate cannot be refrozen.

1. Remove the RNase P plate from the freezer, then thaw the plate in its packaging.
 - Thaw the plate for approximately 5 minutes.
 - Use the plate within 30 minutes of thawing.
2. Confirm that the bench, vortex, and centrifuge are clean. Before use, wipe the vortex and centrifuge using a lint-free tissue.
3. While wearing powder-free gloves, remove the plate from its packaging.
4. Vortex the plate for 5 seconds, then centrifuge at 750–1,000 × g for 2 minutes.

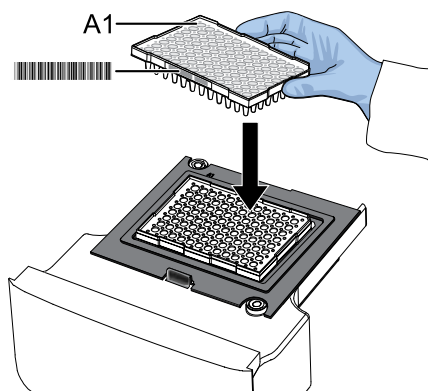
5. Confirm that the liquid in each well is at the bottom of the well and free of bubbles. If it is not, centrifuge the plate again.



IMPORTANT! Keep the bottom of the plate clean. Fluids and other contaminants on the bottom of the plate can contaminate the sample block and cause an abnormally high background signal.

Perform RNase P verification

1. In the home screen, touch **Settings** ▶ **Maintenance and Service** ▶ **RNase P Verification**.
2. Load the plate.
 - a. Touch to eject the instrument drawer.
 - b. Load the plate onto the plate adaptor so that the following criteria are met.
 - Well A1 of the plate is positioned in the top-left corner of the plate adaptor.
 - The barcode faces the front of the instrument.



IMPORTANT! The instrument should be loaded and unloaded by trained operators who have been warned of the moving parts hazard.



Note: (For 96-well 0.2-mL blocks only) Do not remove the black plate adapter before loading a plate or tube strips. If used, tube strips can fit loosely in the adapter, but the heated cover will apply the appropriate pressure to seat the tube strips securely in the adapter.

Note: The 384-well and 96-well Fast (0.1-mL) block configurations do not require a plate adapter.

- c. Touch to close the instrument drawer.

3. Touch **Start**.
4. When the run is complete and the screen displays **Verification Complete**, touch **View Results** to confirm the status of the run.

Calibration status	Action
Passed	Instrument is ready for use.
Failed	See “Troubleshoot verification failure” on page 58.

5. In the **RNase P Verification Status** screen, touch:
 - **Accept Results** to save the results to the instrument
 - **Reject Results** to delete the RNase P verification results
 - **Export Results** to export the calibration results to a USB
6. When the run ends, unload the plate.
 - a. Touch  to eject the instrument drawer.
 - b. Remove the plate.
 - c. Touch  to close the instrument drawer.



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

Note: If the instrument does not eject the plate, contact Support.

Troubleshoot verification failure

Observation	Possible cause	Recommended action
Verification failed	The plate was improperly prepared.	Ensure the following: <ul style="list-style-type: none"> • The correct plate was used for the verification performed. • The plate was properly thawed. • The plate was properly centrifuged. • The plate was properly sealed.
		Open the data file for the verification in the desktop software or the Thermo Fisher™ Connect Platform to view the flags and troubleshooting details for failed wells.
	The plate is damaged or contaminated.	Check for damage, improper plate seal, or contamination.
		Order a replacement plate. If the replacement plate fails, contact Support.

Observation	Possible cause	Recommended action
High fluorescence signal	The reaction volume is not correct.	Ensure that reaction volumes in the plate are correct and match the volume that is entered in the Method tab.
	Signals that exceed the limit of normal fluorescence may indicate fluorescent contaminants on the plate or the sample block.	<p>Examine the bottom of the reaction plate. If there is contamination, prepare a new plate and run the experiment again.</p> <p>Identify the location of contamination on the plate or sample block.</p> <ol style="list-style-type: none"> 1. Obtain a background plate. 2. Follow the procedures that are described in “Identify contamination” on page 52.
Verification failed but plate is undamaged	The incorrect plate was used for verification.	Use the correct RNase P plate for verification.
	The plate was improperly prepared.	Repeat the verification with a new properly prepared plate. Note: The verification procedure is an experiment run, so each RNase P plate can only be used once.
		Open the data file for the verification in the desktop software or the Thermo Fisher™ Connect Platform to view the flags and troubleshooting details for failed wells.
		If the verification fails again, order a replacement plate. If the replacement plate fails, contact Support.

Calibrate custom dyes

Custom dyes overview

The instrument can run assays designed with custom dyes. Custom dyes include:

- Dyes that are not manufactured by Thermo Fisher Scientific.
- Dyes or formulations of dyes that are not system dyes for the instrument.
- For custom dye requirements, see “Custom dyes” on page 11.

Workflow: Custom dye calibration

For each custom dye, determine the optimal dye concentration. Use this concentration to prepare all subsequent dye calibration plates.

Use a dilution series to determine an optimal custom dye concentration

Prepare a custom dye dilution plate



Run the dilution plate as an experiment



Determine the optimal dye concentration



Calibrate the custom dye using the optimal concentration

Create a custom dye calibration plate



Add a custom dye to the instrument



Perform a custom dye calibration

Use a dilution series to determine an optimal custom dye concentration

Custom dye dilution guidelines

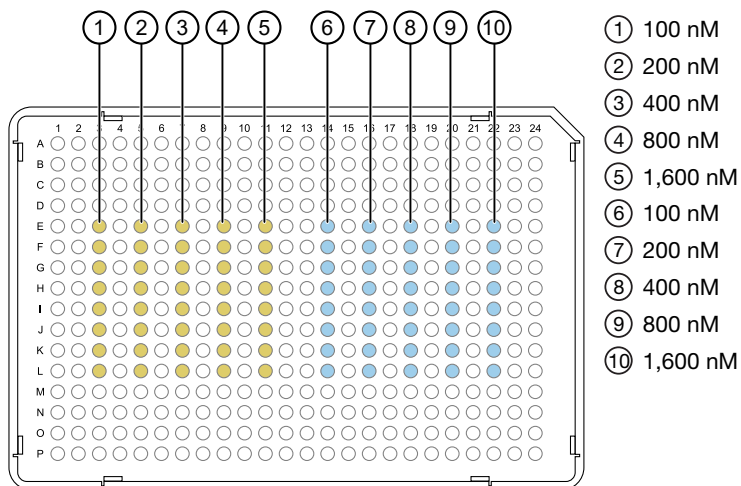
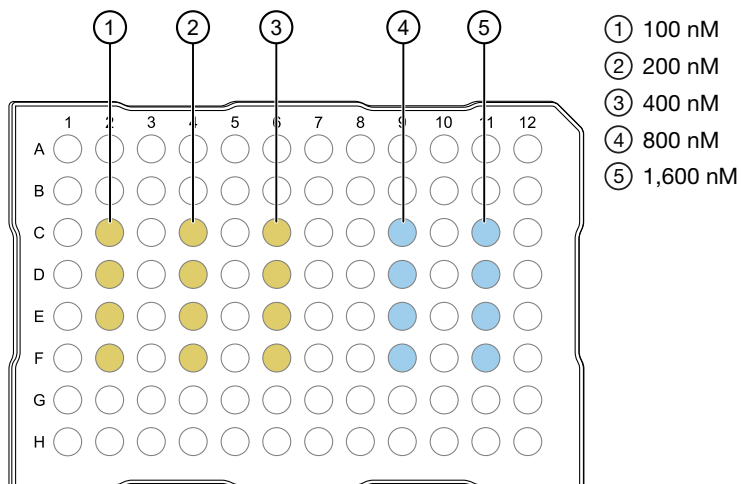
Prepare a dilution series for each custom dye.

- Target several dye concentrations within a range of 100–2,000 nM.
- Choose a 2- or 3-fold difference in dilution points.
- Dispense 10–20 μL per well for 96-well plates or 5 μL per well for 384-well plates.
- Dilute the dye in buffer compatible with your master mix.
- (*Intercalating dyes only*) Add the appropriate amount of amplified PCR product to generate fluorescence.

Prepare a custom dye dilution plate

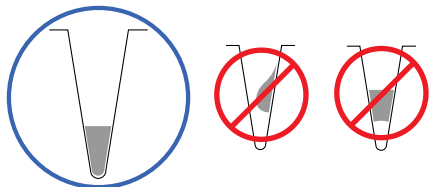
IMPORTANT! Wear powder-free gloves throughout the procedure.

1. Prepare a 2- or 3-fold dilution series of the custom dye.
2. Dispense aliquots of each dilution into the center of a reaction plate, then seal the plate.
 A full plate is not needed. See the following figures for suggested replicates.



3. Vortex the plate for 5 seconds, then centrifuge at 750–1,000 × *g* for 2 minutes.

4. Confirm that the liquid in each well is at the bottom of the well and free of bubbles. If it is not, centrifuge the plate again.



IMPORTANT! Keep the bottom of the plate clean. Fluids and other contaminants on the bottom of the plate can contaminate the sample block and cause an abnormally high background signal.

Run the dilution plate as an experiment

1. Load the plate into the instrument.



CAUTION! The instrument should be used by trained operators who have been warned of the moving parts hazard.

2. Set up a genotyping experiment on the instrument.
 - Load an experiment created in the desktop or cloud software.
 - a. In the home screen, touch **Load Experiment**.
 - b. Select the experiment location, then the experiment file.
 - Create a new experiment on the instrument touchscreen.
 - a. In the home screen, touch **Open Template** ▶ **Genotyping** ▶ **Genotyping Post**.
 - b. (Optional) In the **Properties** tab, edit the experiment properties.
 - c. In the **Method** tab, set the hold temperature to 60°C with a 2 minute hold and enter the appropriate reaction volume.
 - d. In the **Plate** tab, enter the dilution series information for the appropriate wells.
3. Touch **Start Run**.
4. When the run is complete, download the results for analysis.
5. Unload the plate from the instrument.



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

Note: If the instrument does not eject the plate, contact Support.

Determine the optimal dye concentration

Review the dye signal data and select the dilution to use for dye calibration.

1. In the **Results** tab of the desktop or cloud software, select **Raw Data Plot**.
This plot displays the raw fluorescence signal of each optical filter, for individual wells.

Note: The **Raw Data Plot** cannot be viewed on the instrument touchscreen.

2. For each replicate population of dilutions, select the wells in the **Plate Layout** to view in the plot.
3. Examine the raw data to identify the wells yielding signals according to the ranges shown in the following table.

Plate type	Acceptable signal range ^[1]
96-well	800,000 to 3,200,000
384-well	400,000 to 2,000,000

^[1] Signal range for the optical filter where the dye is brightest.

4. (Optional) Export the raw data, then calculate the average fluorescence value for each concentration.
5. Select the lowest (optimal) dye concentration that falls within the acceptable signal range.

Calibrate the custom dye

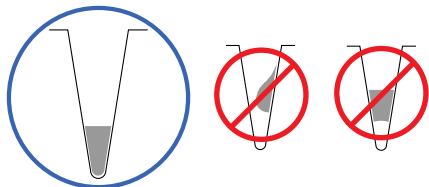
Create a custom dye calibration plate

IMPORTANT! Wear powder-free gloves while creating the dye plate.

Create a full plate of the custom dye diluted to the optimal concentration:


1. Dilute the custom dye to the optimal concentration in buffer.
Prepare an adequate volume, using a volume range of 10–20 μL /well for a 96-well plate or 5 μL /well for a 384-well plate.
2. Pipet the appropriate volume of the diluted custom dye to the plate wells.
3. Seal the plate.
4. Vortex the plate for 5 seconds, then centrifuge at 750–1,000 $\times g$ for 2 minutes.

- Confirm that the liquid in each well is at the bottom of the well and free of bubbles. If it is not, centrifuge the plate again.



IMPORTANT! Keep the bottom of the plate clean. Fluids and other contaminants on the bottom of the plate can contaminate the sample block and cause an abnormally high background signal.

Add a custom dye to the instrument

- In the instrument home screen, touch  **Settings** ▶ **Maintenance and Service** ▶ **Calibrations** ▶ **Custom** ▶ **Custom Dye**.
- Touch **Add Custom Dye**.
- Enter the dye information:

Field/option	Action
Custom Dye Name	Enter a name for the custom dye. IMPORTANT! <ul style="list-style-type: none"> Do not use a system dye name for a custom dye name. Dye names are spacing sensitive and cannot contain special characters.
Type	Select: <ul style="list-style-type: none"> Reporter—The dye works in conjunction with a quencher dye to report an increase of PCR product. Quencher—The dye suppresses the fluorescence of a reporter dye until amplification of PCR product. Both—The dye can be used as a reporter or quencher dye.

- Touch **Save**.

IMPORTANT! You must also add the custom dye to the desktop software dye library before creating, running, or analyzing experiments that use the custom dye. For detailed information, see the documents for the desktop software.

Perform a custom dye calibration

- Load the plate into the instrument.

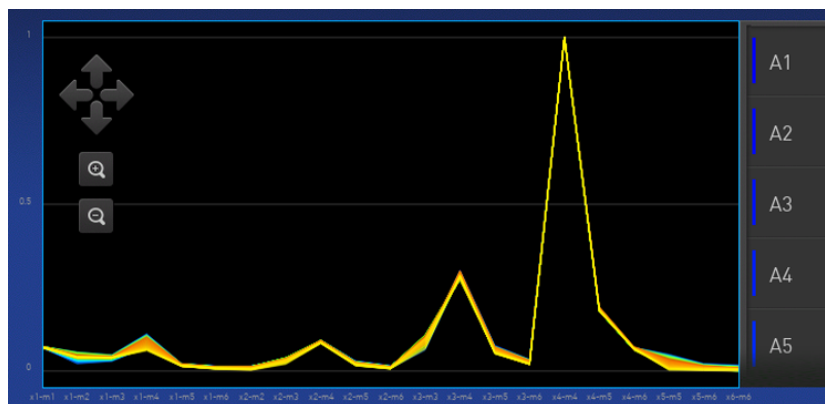


CAUTION! The instrument should be used by trained operators who have been warned of the moving parts hazard.

2. In the instrument home screen, touch **⊛ Settings ▶ Maintenance and Service ▶ Calibrations ▶ Custom ▶ Custom Dye**.
3. Touch the custom dye to calibrate.
4. Review the custom dye information, (*optional*) make changes, then touch **Update**.
5. Enter the calibration temperature.
6. (*Optional*) Touch **Reagents**, then enter reagent information.
7. Touch **Start**.
8. When the run is complete and the screen displays **Calibration Complete**, touch **View Results ▶ Details**.
9. Review the plot. Passing calibration results show uniform signals with peaks that are aligned with the dye wavelength.

Peak filter	Filter wavelength (nm) ^[1]	
	Excitation	Emission
x1-m1	470 ± 15 nm	520 ± 15 nm
x2-m2	520 ± 10 nm	558 ± 12 nm
x3-m3	550 ± 10 nm	587 ± 10 nm
x4-m4	580 ± 10 nm	623 ± 14 nm
x5-m5	640 ± 10 nm	682 ± 14 nm
x6-m6	662 ± 10 nm	711 ± 12 nm

[1] The central wavelengths are the optimized wavelengths.



Note: Example dye calibration plot.
 The peaks for your dye may align with a different filter set.

10. Select an action depending on whether the custom dye calibration passed or failed.

Calibration status	Action
Passed	<ul style="list-style-type: none"> • Touch Accept Results or Reject Results. <p>Note: Accepting the results saves the calibration data to the instrument and overwrites existing data.</p> <ul style="list-style-type: none"> • (Optional) Touch Transfer EDS to transfer the calibration data to a USB.
Failed	<ul style="list-style-type: none"> • Perform the calibration again using a new custom dye plate. • See “Troubleshoot calibration failure” on page 52.

11. Unload the plate from the instrument.




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

Note: If the instrument does not eject the plate, contact Support.


Calibrate for a custom melt curve experiment

Note: A custom melt calibration calibrates a custom dye and a melt calibration at the same time.

Before running the custom melt calibration:

- Ensure that all calibrations are current (touch  **Settings** ▶ **Maintenance and Service** ▶ **Calibrations** ▶ **History and Reminders**).
- “Add a custom dye to the instrument” on page 64.

In the home screen:

1. Touch  **Settings** ▶ **Maintenance and Service** ▶ **Calibrations** ▶ **Custom** ▶ **Custom Melt**.
2. Touch **PCR + Melt** or **Melt only** as appropriate for the kit you are using.
3. Load the plate into the instrument.

4. Select or add a dye, then select a filter set appropriate for your dye's wavelength (see filter-wavelength table below).

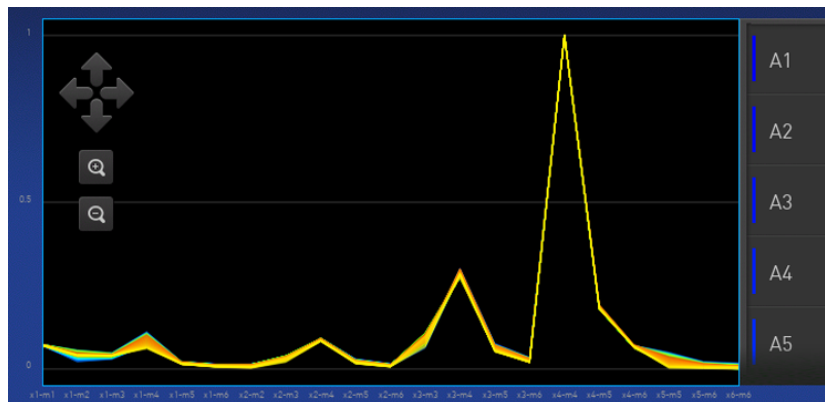
Note: Refer to your reagent kit documentation for dye name and wavelength information.

Peak filter	Filter wavelength (nm) ^[1]	
	Excitation	Emission
x1-m1	470 ± 15 nm	520 ± 15 nm
x2-m2	520 ± 10 nm	558 ± 12 nm
x3-m3	550 ± 10 nm	587 ± 10 nm
x4-m4	580 ± 10 nm	623 ± 14 nm
x5-m5	640 ± 10 nm	682 ± 14 nm
x6-m6	662 ± 10 nm	711 ± 12 nm

^[1] The central wavelengths are the optimized wavelengths.

IMPORTANT! If the selected filter set does not match your reagent kit documentation, then the incorrect wavelength may be collected during a run.

5. (Optional) Touch **Reagents**, then enter reagent information.
6. Touch **Start**.
7. When the run is complete and the screen displays **Calibration Complete**, touch **View Results ▶ Details**.
8. Review the plot. Passing calibration results show uniform signals with peaks that are aligned with the dye wavelength.



Note: Example dye calibration plot.
 The peaks for your dye may align with a different filter set.

9. Select an action depending on whether the custom dye calibration passed or failed.

Calibration status	Action
Passed	<ul style="list-style-type: none">• Touch Accept Results or Reject Results. <p>Note: Accepting the results saves the calibration data to the instrument and overwrites existing data.</p> <ul style="list-style-type: none">• (Optional) Touch Transfer EDS to transfer the calibration data to a USB.
Failed	<ul style="list-style-type: none">• Perform the calibration again using a new custom dye plate.• See “Troubleshoot calibration failure” on page 52.

10. Unload the plate from the instrument.

Note: You must also add the custom dye to the desktop software dye library before creating, running, or analyzing experiments that use the custom dye. For detailed information, see the documents for the desktop software.

Note: To perform a custom melt experiment, you can either create a Standard Curve or a Custom experiment with melt, then specify the data points per degree in the method.

5

Maintain the instrument

- Backup or restore the instrument 69
- Decontaminate the sample block 70
- Replace the instrument fuses 73
- Power on or off, store, and move 74

IMPORTANT! This chapter contains user maintenance procedures for the instrument. Procedures other than those described in this document must be performed by a qualified Thermo Fisher Scientific service representative.

Backup or restore the instrument

In the home screen, touch  **Settings** ▶ **Maintenance and Service** ▶ **Backup/Restore**.

To	Action
Backup	<ol style="list-style-type: none"> 1. Touch Backup Instrument. 2. Select a location to store the backup settings for your instrument. 3. If backing up to a USB drive, insert a USB drive into the front-panel USB port. 4. Enter a backup file name, then touch Done. 5. Select the elements to back up, or leave them all selected. 6. Touch Backup.
Restore (Administrator only)	<ol style="list-style-type: none"> 1. Touch Restore a Backup. 2. Select the storage location of the backup settings. 3. If restoring from a USB drive, insert a USB drive into the front-panel USB port. 4. Select the backup file, then touch Restore.

Decontaminate the sample block

Perform this procedure to eliminate fluorescent contaminants from the instrument sample block. Contamination is generally evident in failed background calibrations where one or more wells consistently exhibit abnormally high signals.



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 Support.



CAUTION! PHYSICAL INJURY HAZARD. During instrument operation, the sample 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 equipment.

Materials required

- Safety glasses
- Powder-free gloves
- Tissue, lint-free
- Cotton or nylon swabs and lint-free cloths
- Pipette (100- μ L) with pipette tips
- Deionized water
- Ethanol, 95% solution
- Na-hypochlorite, (0.1% v/v) solution

Clean the sample block




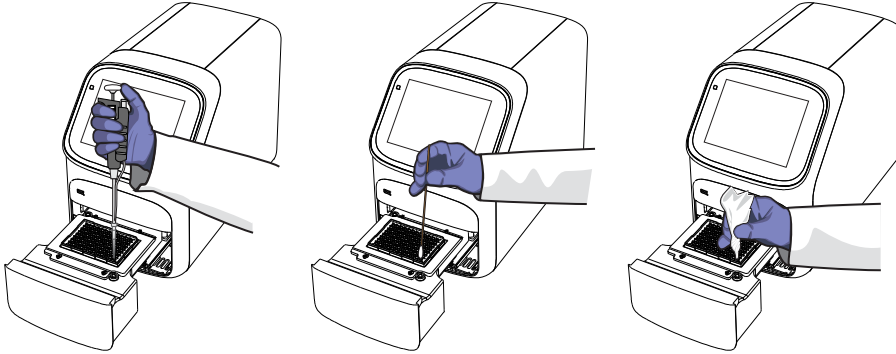
CAUTION! PHYSICAL INJURY HAZARD. During instrument operation, the sample block temperature can reach 100°C. Allow it to cool to room temperature before handling.

IMPORTANT! Wear powder-free gloves when you perform this procedure.

IMPORTANT! Always use deionized water to rinse wells after cleaning with bleach or ethanol solution.

1. Identify the contaminated wells of the sample block (see “Identify contamination” on page 52).
2. Prepare the instrument and access the sample block:
 - a. Power off and unplug the instrument, then allow it to cool for 15 minutes.

- b. Touch  to eject the instrument drawer.
3. Rinse the contaminated wells with deionized water (see “Detailed procedures for cleaning the sample block” on page 72).



- a. Push the instrument drawer back in to the instrument.
 - b. Plug in, then power on the instrument.
 - c. Perform a background calibration to confirm that you have eliminated the contamination.
4. Close the drawer and test the sample block for contamination:
 - a. Push the instrument drawer back in to the instrument.
 - b. Plug in, then power on the instrument.
 - c. Perform a background calibration to confirm that you have eliminated the contamination.
5. If the contamination remains, clean the contaminated wells using a 95% ethanol solution:
 - a. Repeat step 2 – step 3.
 - b. Clean the contaminated wells using a 95% ethanol solution (see “Detailed procedures for cleaning the sample block” on page 72).
 - c. Repeat step 3 – step 4 to rinse the sample block with deionized water and to confirm that you have eliminated the contamination.

IMPORTANT! Always use deionized water to rinse wells after cleaning with bleach or ethanol solution.

- a. Repeat step 2 – step 3.
 - b. Clean the contaminated wells using a Na-hypochlorite (0.1% v/v) solution (see “Detailed procedures for cleaning the sample block” on page 72).
 - c. Repeat step 3 – step 4 to rinse the sample block with deionized water and to confirm that you have eliminated the contamination.
6. If the contamination still remains, clean the contaminated wells using a Na-hypochlorite (0.1% v/v) solution:
 - a. Repeat step 2 – step 3.
 - b. Clean the contaminated wells using a Na-hypochlorite (0.1% v/v) solution (see “Detailed procedures for cleaning the sample block” on page 72).
 - c. Repeat step 3 – step 4 to rinse the sample block with deionized water and to confirm that you have eliminated the contamination.

IMPORTANT! Always use deionized water to rinse wells after cleaning with Na-hypochlorite or ethanol solution.

7. If the contamination continues to remain, contact Support.

Detailed procedures for cleaning the sample block

IMPORTANT! Use these cleaning procedures *only* in conjunction with the complete decontamination procedure (see “Clean the sample block” on page 70).

- Rinse the sample block with deionized water.
 - a. Pipet a small volume of deionized water into each contaminated well.
 - b. In each well, pipet the water up and down several times to rinse the well.
 - c. Pipet the water to a waste beaker.
 - d. Use a cotton swab to scrub inside of each contaminated well.
 - e. Use a lint-free cloth to absorb the excess deionized water.
- Clean the sample block with 95% ethanol.
 - a. Pipet a small volume of 95% ethanol solution into each contaminated well.
 - b. In each well, pipet the solution up and down several times to rinse the well.
 - c. Pipet the ethanol solution to a waste beaker.

IMPORTANT! Always use deionized water to rinse wells after cleaning with bleach or ethanol solution.

- Clean the sample block with Na-hypochlorite (0.1% v/v) solution.
 - a. Pipet a small volume of Na-hypochlorite (0.1% v/v) solution into each contaminated well.
 - b. In each well, pipet the solution up and down several times to rinse the well.
 - c. Pipet the bleach solution to a waste beaker.

IMPORTANT! Always use deionized water to rinse wells after cleaning with bleach or ethanol solution.

Replace the instrument fuses



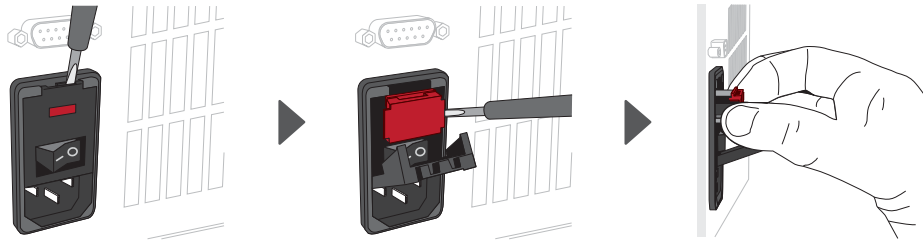
CAUTION! FIRE HAZARD. For continued protection against the risk of fire, replace fuses only with listed and certified fuses of the same type and rating as those currently in the instrument.

Materials required



- Fuses (2) – 10A, Time-Lag T, 250VAC, 5 × 20mm
- Safety glasses
- Powder-free gloves
- Screwdriver, flathead

Replace the fuses

1. Power off and unplug the instrument, then allow it to cool for 15 minutes.
2. Using a flat-head screwdriver, unscrew and remove the fuse holder.



3. Remove each fuse from its fuse holder and inspect it for damage. Carbon typically coats the inside of failed fuses.

Good	Failed
	

4. Replace each failed fuse.


Note: The voltage and amperage ratings are on the fuse holder.

5. Install the fuse holder back into the instrument.
6. Plug in, then power on the instrument.
The installation is successful if the instrument powers on.

Note: Fuse failure can result from fluctuations in the supplied power to the system. To prevent further failures, consider installing an electrical protective device, such as a UPS or a surge protector. If issues with the fuse persist, contact Support.

Power on or off, store, and move


Enable sleep mode

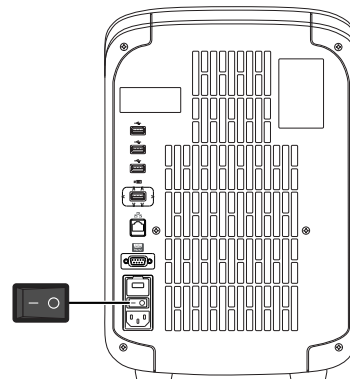
1. In the home screen, touch  **Settings** ▶ **Instrument Settings** ▶ **Sleep Mode**.
2. Slide the control **On** to enable sleep mode.
3. Touch **Edit Time**, then enter the time length of inactivity before the instrument enters sleep mode.
4. Touch **Enter**, then touch **OK**.

Power on the instrument

1. Touch anywhere on the touchscreen to determine if the instrument is in sleep mode. If the home screen is displayed, the instrument is already powered on.
2. If the home screen does not display, power on the instrument by pressing the switch on the rear panel.

If left unattended, the instrument automatically enters sleep mode (enabled by default) to conserve power.

Note: To customize the sleep mode setting, touch  **Settings** ▶ **Instrument Settings** ▶ **Sleep Mode**.



Power off the instrument




The instrument operates in low-power mode when not in use. However, the instrument can be powered off completely so that the components use no power.

Note: To power off the instrument for >1 week, see “Prepare the instrument to store, move, or ship” on page 75.

1. Power off the instrument using the power switch on the back of the instrument.
2. Power off the computer.

Prepare the instrument to store, move, or ship

In the home screen:

1. Touch  **Settings** ▶ **Maintenance and Service** ▶ **Ship Prep Mode** ▶ **Next**.
2. Touch  to eject the instrument drawer.
3. Load the packing plate or an empty plate, then touch  to close the drawer.
4. Touch **Lock Block**.
5. Power off the instrument using the power switch on the back of the instrument.

The instrument is now ready to store, move, or ship.

Move the instrument



CAUTION! PHYSICAL INJURY HAZARD. Do not attempt to lift the instrument or any other heavy objects unless you have received related training. Incorrect lifting can cause painful and sometimes permanent back injury. Use proper lifting techniques when lifting or moving the instrument. At least two people are required to lift it.

IMPORTANT! Moving your instrument can create subtle changes in the alignment of the instrument optics. Recalibrate the instrument if necessary.


- Ensure that the surface on which you place the instrument can support at least 35 kg (77 lbs).
- Ensure that the path to transport the instrument is clear of obstructions.
- At least two people are needed to lift and carry the instrument.
- Keep your spine in a good neutral position.
- Bend at the knees and lift with your legs.
- Do not lift an object and twist your torso at the same time.
- Coordinate your intentions with your assistant before lifting and carrying.

IMPORTANT! After moving the instrument, perform an RNase P instrument verification run. If the run fails, perform ROI/ uniformity, background, and dye calibrations.

Return the instrument for service

The service process requires 2 to 3 weeks.

Before returning the instrument for service, perform the following tasks.

1. Back up the instrument (see “Backup or restore the instrument” on page 69).
2. In the home screen, touch  **Settings** ▶ **Instrument Settings** ▶ **Reset Factory defaults**.
3. Set the instrument to **Ship Prep Mode** (see “Prepare the instrument to store, move, or ship” on page 75).

To return the instrument for service, perform the following tasks.

1. Contact your local customer care center or technical support group to obtain a copy of the Certificate of Instrument Decontamination, a service notification, a service call number, and packaging materials (if required).
2. Follow the instructions in the form to decontaminate the instrument.

IMPORTANT! The instrument must be decontaminated before packing it for shipping.

3. Complete and sign a copy of the Certificate of Instrument Decontamination.
4. Fax the Certificate of Instrument Decontamination to the customer care center.
5. Pack the instrument in the provided packaging and follow the instructions in the table below.

Prepare	Include	Exclude
<ol style="list-style-type: none"> 1. Transfer any data files from the instrument. 2. Load an empty plate in the sample block. 3. Use the touchscreen to place the instrument in ship mode. <p>Note: The empty plate and ship mode protects the internal components of the instrument during transport.</p>	<ul style="list-style-type: none"> • Instrument • Completed and signed Certificate of Instrument Decontamination <p>Note: The instrument will not be accepted for service without a hard copy of the Certificate of Instrument Decontamination.</p>	<p>Any accessories, including:</p> <ul style="list-style-type: none"> • Power cord • Ethernet cable • USB drive • Wireless adapter <p>Note: If included with the instrument, these items will be disposed of during service and not returned.</p>

6. Attach the postage provided with the Certificate of Instrument Decontamination to the box, then ship the instrument to the designated facility.



Configure the instrument and manage instrument profiles

■ Initial start-up	77
■ Manage profiles	78
■ Link an instrument profile to Thermo Fisher™ Connect Platform	79
■ Enable SAE mode (Administrator only)	81
■ Require instrument profile sign-in (Administrator only)	82
■ Enable remote instrument monitoring (Administrator only)	82
■ Update instrument software (Administrator only)	82
■ Restore factory defaults	83
■ Configure the network	83
■ Select a region for the Thermo Fisher™ Connect Platform (Administrator only)	84
■ Manage the instrument name (Administrator only)	84
■ Set the date and time (Administrator only)	85
■ Manage the signout timer (Administrator only)	85

Initial start-up

Perform these tasks during initial instrument start-up or after you restore factory defaults (see “Restore factory defaults” on page 83).

1. (Optional) Select one of the following options.
 - Configure the instrument for either wired connection or wireless network connection (see “Configure the network” on page 83).
 - Touch **Neither/Decide Later**.
2. (Optional) Enter an instrument name (see “Manage the instrument name (Administrator only)” on page 84).
3. Set the date and time (see “Set the date and time (Administrator only)” on page 85).
4. Select one of the following options.
 - Select a region for the Thermo Fisher™ Connect Platform.
 - Touch **Next** to continue.

5. Create an administrator profile (see “Create an administrator instrument profile during initial start-up” on page 78).
6. Select one of the following options.
 - Link the instrument profile to the Thermo Fisher™ Connect Platform (see “Link an existing instrument profile to Thermo Fisher™ Connect Platform” on page 80).
 - Touch **Skip**.

Manage profiles

To	See
Create a profile	<ul style="list-style-type: none"> • “Create an administrator instrument profile during initial start-up” on page 78 • “Create a new instrument profile” on page 23
Configure a profile	<ul style="list-style-type: none"> • “Link an instrument profile to Thermo Fisher™ Connect Platform” on page 79 • “Edit an instrument profile” on page 79
View or manage all profiles	<ul style="list-style-type: none"> • “Manage all instrument profiles (Administrator only)” on page 78

Create an administrator instrument profile during initial start-up

During initial start-up, the user is automatically prompted to create an administrator instrument profile. See “Initial start-up” on page 77.



- The first instrument profile that is created during installation is given administrator privileges.
- Administrators can grant administrative privileges to other users. See “Manage all instrument profiles (Administrator only)” on page 78.

1. Touch **Name**, enter a username, then touch **Done**.
2. Touch **PIN**, enter a four-digit numerical password, then touch **Enter**.

Note: Touch the **Show PIN** checkbox to switch PIN display on or off.

3. Touch **Confirm PIN**, then repeat step 2.
4. Touch **Create profile**.

Manage all instrument profiles (Administrator only)

1. In the home screen, access the **All Profiles** tab.
 - Touch  **My Profile** ▶ **All Profiles**.
 - Touch  **Settings** ▶ **Manage Users** ▶ **Manage Profiles** ▶ **All Profiles**.

A list of users, the date the profile was created, and the user type displays.


2. Select the instrument profile to edit.
3. Edit the profile.
 - To delete the profile, touch **Delete profile** ▶ **Delete**.
 - To reset the PIN, touch **Reset PIN** ▶ **Reset**.


Note:

- The user will be directed to enter a new PIN at the next sign in.
- The PIN can be reset on the instrument for a local instrument profile. It cannot be reset on the instrument for a Thermo Fisher™ Connect Platform profile. The PIN for a Connect Platform profile is reset on the Connect Platform.

-
- To enable or disable administrative privileges, slide the control to **Administrator** or **Standard**, respectively.
4. Touch **Done**.

Edit an instrument profile

1. In the home screen, touch  **My Profile**.

Note: Administrators can also navigate to this screen by touching  **Settings** ▶ **Manage Users** ▶ **Manage Profiles**.

2. Touch **Edit**.
3. Select the fields to edit, then make changes.
4. Touch **Done**.

Link an instrument profile to Thermo Fisher™ Connect Platform


Linking your instrument profile to Thermo Fisher™ Connect Platform cloud-based platform allows you to access the following functions:

- View an instrument status from the cloud.
- Download templates from your cloud storage to the instrument.
- Transfer run data from the instrument to your cloud storage.

To link an instrument profile to Thermo Fisher™ Connect Platform, see the following sections:

- “Link an existing instrument profile to Thermo Fisher™ Connect Platform” on page 80
- “Create a new instrument profile and link to Thermo Fisher™ Connect Platform” on page 80

Link an existing instrument profile to Thermo Fisher™ Connect Platform

1. Sign in to your instrument profile. See “Sign in” on page 23.
2. Touch  **My Profile**.
3. Touch **Thermo Fisher™ Connect**.
4. Enter your username and password, then touch **Link Account**.
5. Touch **Done**.

Your instrument profile is linked to Thermo Fisher™ Connect Platform.

Create a new instrument profile and link to Thermo Fisher™ Connect Platform

1. Select an option to create a new instrument profile.
 - Create an administrator profile (see “Create an administrator instrument profile during initial start-up” on page 78).
 - Create an instrument profile (see “Create a new instrument profile” on page 23).
2. In the **Get Started – Thermo Fisher Connect** screen, enter your username and password.
3. Touch **Link Account**.

Your instrument profile is linked to Thermo Fisher™ Connect Platform.

Thermo Fisher™ Connect Platform instrument profile roles and functions

The first user who links their local instrument profile to their Thermo Fisher™ Connect Platform account is assigned a Connect Platform profile with the administrator role.

Instrument profile	Location	Functions allowed
Standard	Connect Platform	<ul style="list-style-type: none"> • Create, save, open, import, and run template files • Create and modify run settings • View and export data files
Administrator	Connect Platform	<p>All the permissions of a local administrator profile, plus the following functions performed in the Connect Platform:</p> <ul style="list-style-type: none"> • See a list of all the Connect Platform profiles that are linked to the instrument • Assign Connect Platform administrator roles to one or more users • Remove a user from an instrument • Disconnect the instrument from the Connect Platform • Change the instrument name

Change the PIN for a Thermo Fisher™ Connect Platform profile

This section describes changing a PIN for a Thermo Fisher™ Connect Platform profile. To change a PIN for a local instrument profile, see “Manage all instrument profiles (Administrator only)” on page 78.


1. Sign in to the Thermo Fisher™ Connect Platform on a browser.
2. Click **Update PIN number**.
3. In the **Update PIN number** dialog box, enter a new PIN, then enter the new PIN a second time to confirm it.
4. Click **Send**.

The 4-digit PIN to sign in to instruments with your Thermo Fisher™ Connect Platform profile is updated. This change applies to all of the instruments that you access with your Thermo Fisher™ Connect Platform profile.

Enable SAE mode (Administrator only)

The SAE module works with the instrument and desktop software to record and restrict various user activities. Audits and e-Signatures are tracked in the desktop software.

In the home screen:

1. Touch  **Settings** ▶ **Instrument Settings** ▶ **SAE Mode**.
2. Slide the control **On** to enable SAE on the instrument.
3. Touch **OK**.

The following instrument functions are disabled in SAE mode.

- Start a run from the instrument.

Note: All instrument runs must be started from desktop software that has SAE functions enabled.

- Edit an instrument name.
- Edit an instrument date or time.
- Restore to factory defaults.
- Perform a software update.

Require instrument profile sign-in (Administrator only)

1. In the home screen, touch ⓘ **Settings** ▶ **Manage Users** ▶ **Sign In Required**.
2. Slide the control **On**.
Only signed-in users are allowed to access the instrument for any task, including access to **Settings**.
3. Touch **Done**.

Enable remote instrument monitoring (Administrator only)

Enabling the **Remote Monitoring Service** allows the instrument to automatically notify Thermo Fisher Scientific support teams in real time of potential instrument issues. The service monitors and sends general *instrument* data, but the service does not monitor or send *customer* data.

1. In the home screen, touch ⓘ **Settings** ▶ **Maintenance and Service** ▶ **Monitoring**.
2. Slide the control **On** to enable the **Remote Monitoring Service**.
3. Touch **OK**.

Update instrument software (Administrator only)


Before updating the instrument software, see “Perform internal validations before software upgrades” on page 8.

1. In the home screen, touch ⓘ **Settings** ▶ **Maintenance and Service** ▶ **Software Update**.
2. Select the location of the update files.
3. When prompted, confirm your request to update the software.

Restore factory defaults

This procedure can only be performed by an Administrator.

IMPORTANT! Back up the instrument before restoring factory defaults (see “Backup or restore the instrument” on page 69).


1. In the home screen, touch  **Settings** ▶ **Instrument Settings** ▶ **Restore Factory Defaults**.
2. Touch **Restore Factory Defaults**.
3. Power **Off**, then power **On** the instrument to apply the change.
 - Instrument profiles and files stored on the instrument are deleted, including all EDS files and any custom dye calibrations.
 - The most recent valid ROI/Uniformity, Background, and system dye calibrations are not deleted.

After restoring factory defaults, perform initial start-up tasks. See “Initial start-up” on page 77.



Configure the network

IMPORTANT! Configure the instrument for either wired connection or wireless connection but not both.

 “Set up a wired connection” on page 83

 “Set up a wireless connection” on page 84

Set up a wired connection

1. In the home screen, touch  **Settings** ▶ **Instrument Settings** ▶ **Network Connection** ▶  **Wired**.
2. In the **Network Configuration** screen, touch a radio button to connect to a network either by **DHCP** or by a **Static IP** address.

Option	Action
Automatic	Touch DHCP .
Manual	<ol style="list-style-type: none"> 1. Touch Static IP. 2. Enter the IP address for the instrument, the Subnet Mask, the Default Gateway, and <i>(optional)</i> the Primary DNS Server and the Secondary DNS Server. Addresses are in the form of X.X.X.X, where each X is a number from 0 to 255.

Note: Ask your system administrator if the IP address is assigned statically or dynamically. For static addresses, you need to know the **IP address** for the instrument, the **Subnet Mask**, and the **Default Gateway**.

3. Touch **OK**.

Set up a wireless connection

1. In the home screen, touch **Settings** ▶ **Instrument Settings** ▶ **Network Connection** ▶ **Wireless** to display a list of the available networks.
2. Select a network or touch **Join other network**, enter the network password, then touch **Enter**.
If you select **Join other network**, enter the network name and security type.
3. Touch **Join** to continue.
4. In the **Network Connection Complete** screen, touch **Next**.
5. Touch **OK**.
6. In the **Network Configuration** screen, edit the Network details or touch **Done**.

Select a region for the Thermo Fisher™ Connect Platform (Administrator only)


During the initial startup, you are automatically prompted to select a region for the Thermo Fisher™ Connect Platform. Return to the selection through **Settings**, if necessary.

1. In the home screen, touch **Settings** ▶ **Instrument Settings** ▶ **Thermo Fisher Connect Region**.
2. Touch a region.
The server used to store your data is located in this region.
3. Touch **OK**.


Manage the instrument name (Administrator only)

1. In the home screen, touch **Settings** ▶ **Instrument Settings** ▶ **Instrument Name**.
2. Touch the **Instrument Name** field, enter an instrument name, then touch **Done**.
3. (Optional) Touch **Add Avatar** to associate an avatar with the instrument.
Insert a USB drive with image files to use this option.
4. Touch **OK**.

Set the date and time (Administrator only)

1. In the home screen, touch  **Settings** ▶ **Instrument Settings** ▶ **Date/Time**.
2. Select a time zone from the dropdown list.
3. Select a date format.
 - a. Touch **Date Format**, then select the preferred date format.
 - b. Touch **Next**, touch the date field, then enter the date.
 - c. Touch **Enter**, then touch **Done**.
4. Select a time format.
 - a. Touch **Time Format**.
 - b. Slide the control to select a 12-hour or 24-hour clock.
 - c. Touch **Next**, touch the time field, then enter the time.
 - d. Touch **Enter**, then touch **Done**.
5. Touch **Done**.

Manage the signout timer (Administrator only)

1. In the home screen, touch  **Settings** ▶ **Manage Users** ▶ **Sign Out Timer**.
2. Touch the **Edit Time** field, then enter the desired duration of inactivity before automatic user sign out.
3. Touch **Enter**, then touch **Done**.



Install and connect the instrument to a network

- Workflow: Install and connect to a network 86
- Before you begin 87
- Unpack and install the instrument 87
- Power on and follow the startup wizard 88
- Connect the computer to the instrument directly or to a LAN 88
- Instrument and computer connections 89
- Download and install the desktop software 90
- Networking 91

Workflow: Install and connect to a network

Perform all steps in “Before you begin” on page 87



“Unpack and install the instrument” on page 87



“Power on and follow the startup wizard” on page 88



“Perform instrument verification using RNase P plates” on page 54



“Connect the computer to the instrument directly or to a LAN” on page 88

Before you begin

This section provides instructions for customer installation of the computer and the instrument. For installation by a field service engineer (FSE), contact Support to order a service call.

Before starting the installation, complete the following tasks:

- Determine the configuration for your instrument and obtain the network information you need (see “Networking” on page 91).
- Review site requirements (see *QuantStudio™ 5 Real-Time PCR System Site Preparation Guide* (Pub. No. MAN0028413)).
- Review instrument and computer connections (see “Instrument and computer connections” on page 89).

Unpack and install the instrument

1. Prepare the installation site as described in the *QuantStudio™ 5 Real-Time PCR System Site Preparation Guide* (Pub. No. MAN0028413).
2. Follow the pre-printed instructions on the instrument box to unpack the instrument, accessories, and reference documentation. Save the packing material for future use or recycle it.

The instrument box contains:

- Reference documentation: Welcome note, unpacking and set up instructions card, system documentation insert
- One instrument
- Accessories: power cable, Ethernet cable, USB drive, reaction tube retainer
- Shipping plate

Note: Save the shipping plate but do not use it to operate the instrument.

If you ordered the wireless adapter, it is provided separately.

3. Place the instrument on the bench.
4. Plug the power cable into the power port on the back panel of the instrument, then plug the cable into an electrical receptacle.
5. Connect your instrument as required by your network configuration (see “Supported options for instrument and computer connections” on page 91 and “Instrument and computer connections” on page 89).
 - Connect an Ethernet cable to the Ethernet port on the back panel of the instrument, then connect the cable to a computer or a networking port.
 - or*
 - Connect wirelessly via the wireless adapter.

Note: Do not connect the High Power USB WiFi Module (Cat. No. A26774) to the instrument if it is connected to a network by an Ethernet cable. Configuring the instrument for both wired and wireless connection can interfere with instrument operation.

Power on and follow the startup wizard

1. Power on the instrument.
2. Follow the startup wizard through the following tasks:
 - Select the language for the instrument.
 - Accept the license agreement.
 - Select a **Wired** or **Wireless** networking option, as needed for your configuration (see “Supported options for instrument and computer connections” on page 91).
 - Configure the instrument date and time.
 - Create an administrator instrument profile.

Note: You can perform any of the steps above at a later time if you do not have the information needed to complete the startup screens. See “Configure instrument settings” on page 24.

IMPORTANT! Before using the instrument for the first time, we recommend that you perform instrument verification using RNase P plates (see “Perform instrument verification using RNase P plates” on page 54).

Connect the computer to the instrument directly or to a LAN

This section describes the direct wired connection of the computer to the instrument or to a LAN.

1. Connect an Ethernet cable from the instrument or a LAN to the computer.
2. Power on the computer, then log in using a Windows™ Administrator account.
3. Open the **Control Panel**, then open the **Network and Sharing Center**.
4. In the left pane of the **Network and Sharing Center** window, click **Change Adapter Settings**.
5. Right-click on **Broadband Connection**, then select **Properties**.
6. In the **Networking** tab, select **Internet Protocol Version 4 (TCP/IPv4)**.
7. Click **Properties**.

8. In the **Internet Protocol Version 4 (TCP/IPv4) Properties** dialog box, select one of the following options.
 - **Obtain an IP address automatically**
 - **Use the following IP address**
9. If **Use the following IP address** was selected, enter the *IP address*.
10. Close all dialog boxes by clicking **OK**, then re-start the computer.

Instrument and computer connections

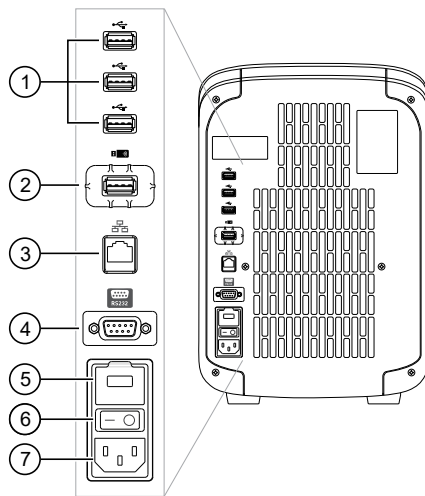


Figure 3 Instrument back panel

- | | |
|---|-----------------------------------|
| ① USB ports | ④ RS232 Port—For service use only |
| ② WiFi USB port—Connect USB wireless adapter for wireless network access (ordered separately) | ⑤ Fuse Cover |
| ③ Ethernet Port—RJ45 port for 100/1,000 Mbps Ethernet communication with the instrument | ⑥ Power Switch |
| | ⑦ Power Port—100 to 240 VAC |

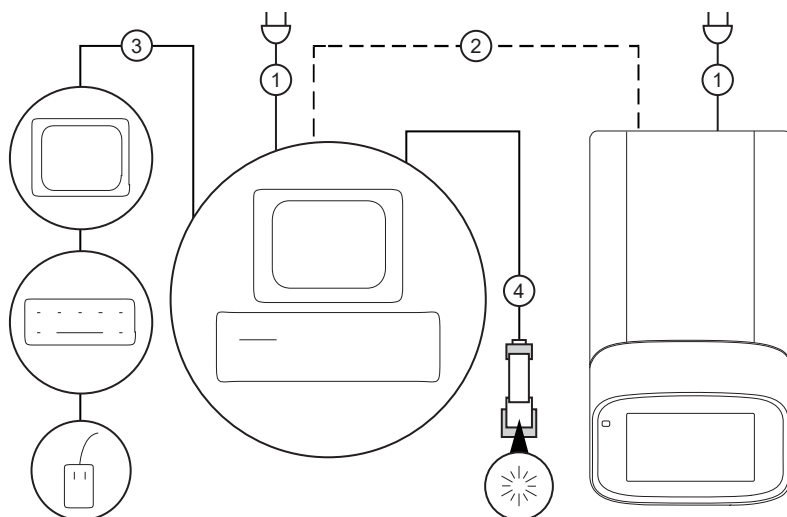


Figure 4 Instrument-to-computer connections (barcode scanner connected to the computer)

Minitower configuration

- ① Detachable power supply cord compatible with local power supply receptacle.
- ② Connection between the computer and the instrument.
- ③ Connection between the computer and the monitor, keyboard, and mouse.
- ④ Connection between the computer and the (optional) handheld barcode scanner.

Download and install the desktop software

Computer requirements for the desktop software

If you purchased a computer provided by Thermo Fisher Scientific, you can install the desktop software and use it to control the instrument.

This instrument uses QuantStudio™ Design and Analysis Software v1.x. QuantStudio™ Design and Analysis Software v2.x can also be used to set up and analyze files.

Thermo Fisher Scientific does not provide technical support for customer-provided computers. Thermo Fisher Scientific provides limited support for Thermo Fisher Scientific-supplied computers that have been altered from their default configuration.

You can install the desktop software on a customer-provided computer and use the software to create templates and analyze data. Minimum requirements for a customer-provided computer are:

- Operating system—Windows™ 10 (64-bit)
- Processor—Intel™ Core™ or compatible
- Memory—4 GB RAM
- Hard drive—20 GB free space
- Monitor—1280 × 1024 resolution

Download the desktop software

1. Sign in to your account at thermofisher.com.

Note: If you do not have an account, create an account.

2. Go to thermofisher.com/quantstudio3-5softwaredownloads.
3. Download the software and the example files.

Install the desktop software

1. Use a Windows™ Administrator account to log in to the computer on which you are installing the desktop software.
2. Unzip the downloaded software and example files.
3. Double-click **setup.exe**.
4. Follow the **InstallShield Wizard** prompts to install the software.
5. Accept the License Agreement.
6. Select **Typical** as the setup preference, then click **Next**.
7. If you are installing the software on a computer provided by Thermo Fisher Scientific, install the software on the D:\ drive. If you are installing on a customer-provided computer, install the software in your preferred location.
8. Click **Finish**.

Networking

IMPORTANT! This section provides general networking information. It *does not* provide adequate detail to integrate the instrument into all possible network architectures. Because a network may contain advanced features (such as a firewall or network domains), we recommend that you consult a network administrator before connecting the instrument to your laboratory network.

Supported options for instrument and computer connections

We support the following direct, networked (LAN–local area network), or Thermo Fisher™ Connect Platform configurations. Configurations other than those listed are not recommended. Select a configuration that meets the needs of your laboratory's instrument, software, and workflow requirements.

IMPORTANT! Do *not* connect *both* an Ethernet cable and the Wi-Fi module (Cat. No. A26774) to the instrument. Configuring the instrument for both wired and wireless connection can interfere with instrument operation.

Note: For detailed information about networking your instrument, see the *QuantStudio™ 5 Real-Time PCR System IT Checklist* (Pub. No. MAN0029720).

Direct configuration option

- A computer provided by Thermo Fisher Scientific with the QuantStudio™ Design and Analysis Software

- Computer-to-instrument connection:

- Direct, wired connection between the computer and the instrument using an Ethernet cable

IMPORTANT! A direct instrument-to-computer connection *cannot* be combined with the LAN or the Thermo Fisher™ Connect Platform configurations.



Networked configuration option

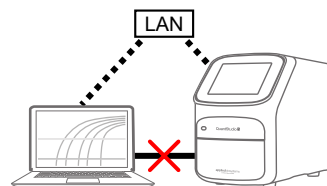
- A computer provided by Thermo Fisher Scientific with the QuantStudio™ Design and Analysis Software
- The computer and instrument must have the same subnet mask within the same network.

- Computer-to-LAN connection (*select an option*):

- Wired connection to the network using an Ethernet cable –or–
- Wireless connection to the network

- Instrument-to-LAN connection (*select an option*):

- Wired connection to the network using an Ethernet cable –or–
- Wireless connection to the network using the instrument Wi-Fi module



Connect Platform configuration option

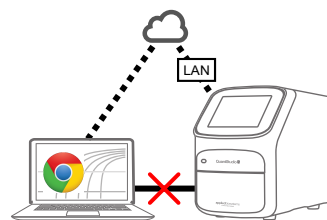
- Internet access and a computer with the Chrome™ web browser to access the Thermo Fisher™ Connect Platform

- Computer-to-Thermo Fisher™ Connect Platform connection (*select an option*):

- Wired connection to the internet using an Ethernet cable –or–
- Wireless connection to the internet

- Instrument-to-Thermo Fisher™ Connect Platform connection (*select an option*):

- Wired connection to the network using an Ethernet cable –or–
- Wireless connection to the network using the instrument Wi-Fi module



Control and monitor networked instruments

When the instrument is connected to a network:

- Computers on the network that are running the desktop software can control the instrument. Networked instruments can be controlled by only one computer at a time.
- Instruments linked to Thermo Fisher™ Connect Platform cannot be controlled remotely. However, you can perform the following functions:
 - Remotely access Thermo Fisher™ Connect Platform to create (and analyze) experiments.
 - From the instrument, download the experiments and start a run.
 - Monitor a run from Thermo Fisher™ Connect Platform in real time.

Ethernet port overview

The Ethernet port of the instrument supports:

- Static IP network service with subnet mask, primary and secondary data network service (DNS), and default gateway settings, or dynamic host configuration protocol (DHCP) network service.
- mDNS/DNS for local domains.

Note: Because mDNS is limited to direct network connections, an instrument configured for mDNS may not be visible to other nodes that are separated by a router, hub, or another network device.

- IPv4 link-local (IPv4LL) in the RFC (also known as Automatic Private IP Addressing [APIPA] or Internet Protocol Automatic Configuration [IPAC]).

Note: When an instrument is set for DHCP, APIPA is automatically enabled, and the instrument provides an IP address when no address is supplied by the DHCP server.

Firewall ports that must be open

Ports	Condition
80/443	Standard ports for instrument-to-Thermo Fisher™ Connect Platform and computer-to-Thermo Fisher™ Connect Platform connections
mDNS, 7443	Instrument-to-computer connection
mDNS, 5353	Instrument discovery

Networking guidelines and best practices

- Consult a network administrator before connecting the instrument to a network.
- To enable the full functionality of the software, the computer requires a network connection.
- Open the firewall port for the instruments to be discovered. See “Firewall ports that must be open” on page 93.
- Observe the restrictions to mDNS and Autodiscovery.

The instrument supports mDNS but only when the instrument and computer share a direct network connection and are within the same subnet. Network computers that are separated from the instrument by a router, hub, or another network device may not be able to access the instrument by its host name.
- Confirm the uniqueness of the instrument name.
 - The instrument name must be unique within the subnet. The desktop software can automatically discover instruments on the link-local network.
 - The instrument does not test the uniqueness of the instrument name within the subnet when it is set.



Troubleshooting

Observation	Possible cause	Recommended action	
Inconsistent communication between instrument and computer or instrument and Thermo Fisher™ Connect Platform	The instrument is configured for <i>both</i> wired and wireless network connection.	Ensure only one connectivity option is plugged into the instrument (either an Ethernet cable <i>or</i> a wireless adapter, but not both). Configure for wired <i>or</i> wireless network connection.	
	Weak or unstable internet connection, especially if configured for wireless.	Change the configuration to a wired connection. Use a wireless network with a stronger or more consistent signal.	
	The connection between the instrument and the computer is not recognized	The connection is not fully established.	Power the instrument off, then power it on again.
		If using a networked configuration, the instrument and computer are not on the same subnet mask.	Contact your information technologies department to have them ensure that the instrument and computer are on the same subnet mask.
Insufficient disk space message	If using a networked configuration, the instrument or computer has an invalid IP address.	Contact your information technologies department to have them ensure that the IP addresses are valid.	
	Insufficient disk space to save a run.	<ol style="list-style-type: none"> In the home screen, touch  Settings ▶ Run History ▶ Manage. Delete or transfer experiments from the instrument. 	
The touchscreen is black	The instrument is in sleep mode.	Touch anywhere on the instrument touchscreen.	
	The instrument is not powered on.	If you touch the instrument touchscreen and it remains black, check if the instrument is powered on. The power switch is located on the rear panel of the instrument.	
		If the instrument does not power on, check that the instrument is properly plugged in.	
		If the instrument does not power on and the instrument is properly plugged in, contact Support.	
Forgot PIN for instrument profile	Non-administrator forgot instrument profile PIN.	See “Manage all instrument profiles (Administrator only)” on page 78.	

Observation	Possible cause	Recommended action
Forgot PIN for instrument profile <i>(continued)</i>	Administrator forgot instrument profile PIN.	Have another administrator reset the PIN for the forgotten-PIN profile (see “Manage all instrument profiles (Administrator only)” on page 78).
		If there is not another administrator profile on the instrument, you must restore factory defaults (see “Restore factory defaults” on page 83).



Parts and materials

- Kits, consumables, accessories, and reagents 97
- Consumables (96-well, 0.2-mL format) 97
- 384-well consumables 98
- Consumables (96-well, 0.1-mL format) 99
- Accessories 100
- General-use materials and consumables 100

Kits, consumables, accessories, and reagents

Unless otherwise indicated, all materials are available through thermofisher.com.

Store all calibration and RNase P plates at -20°C. All other items can be stored at 15–30°C. Use all materials by the expiration date on the packaging.

Catalog numbers that appear as links open the web pages for those products.

Consumables (96-well, 0.2-mL format)

Consumable	Amount	Cat. No.
MicroAmp™ Optical 8-Cap Strips	300 strips	4323032
MicroAmp™ Optical 8-Tube Strip, 0.2 mL	125 strips	4316567
MicroAmp™ Optical Tube without Cap, 0.2 mL	2,000 tubes	N8010933
MicroAmp™ 96-Well Tray/Retainer Set for Veriti™ Systems	10 trays	4381850
MicroAmp™ Optical 96-Well Reaction Plate	10 plates	N8010560
	500 plates	4316813
MicroAmp™ Optical 96-Well Reaction Plate with Barcode	20 plates	4306737
	500 plates	4326659
MicroAmp™ EnduraPlate™ Optical 96-Well Clear Reaction Plates with Barcode	20 plates	4483354
	500 plates	4483352
MicroAmp™ EnduraPlate™ Optical 96-Well Clear GPLE Reaction Plates with Barcode	20 plates	4483348



(continued)

Consumable	Amount	Cat. No.
MicroAmp™ EnduraPlate™ Optical 96-Well Clear GPLE Reaction Plates with Barcode	500 plates	4483351
MicroAmp™ Optical Adhesive Film Kit	1 kit	4313663
MicroAmp™ Optical Film Compression Pad (<i>Optional, used for some applications</i>)	5 each	4312639

Instrument verification or calibration plate	Cat. No.
TaqMan™ RNase P Instrument Verification Plate, 96-Well 0.2-mL	4432382
Region of Interest (ROI) and Background Plates, 96-Well 0.2-mL (2 plates)	4432364
QuantStudio™ 3/5 10-Dye Spectral Calibration Kit, 96-Well 0.2-mL (contains all 3 spectral calibration plates listed below)	A26343
QuantStudio™ 3/5 Spectral Calibration Plate 1, 96-Well 0.2-mL (FAM™, VIC™, ROX™, SYBR™ dyes)	A26331
QuantStudio™ 3/5 Spectral Calibration Plate 2, 96-Well 0.2-mL (ABY™, JUN™, MUSTANG PURPLE™ dyes)	A26332
QuantStudio™ 3/5 Spectral Calibration Plate 3, 96-Well 0.2-mL (TAMRA™, NED™, Cy [®] 5 dyes)	A26333

384-well consumables

Consumable	Contents	Cat. No.
MicroAmp™ Optical 384-Well Reaction Plate with Barcode	50 plates	4309849
	500 plates	4326270
	1000 plates	4343814
MicroAmp™ EnduraPlate™ Optical 384-Well Reaction Plate with Barcode (clear)	20 plates	4483285
	500 plates	4483273
MicroAmp™ Optical Adhesive Film Kit	1 kit	4313663



Calibration or instrument verification plate	Cat. No.
384-Well Region of Interest (ROI) and Background Plates (2 plates)	4432320
QuantStudio™ 3 or 5 10-Dye Spectral Calibration Kit, 384-Well	A26341
384-Well Spectral Calibration Plate 1 (containing FAM™, VIC™, ROX™, TAMRA™, and SYBR™ dyes)	A26334
384-Well Spectral Calibration Plate 2 (containing ABY™, JUN™, MUSTANG PURPLE™, NED™, and Cy®5 dyes)	A26335
384-Well TaqMan™ RNase P Instrument Verification Plate	4455280

Consumables (96-well, 0.1-mL format)

Consumable	Contents	Cat. No.
MicroAmp™ Optical 8-Cap Strip	300 strips	4323032
MicroAmp™ Optical Fast 8-Tube Strip (0.1 mL)	125 strips	4358293
MicroAmp™ Optical Fast Tube with Cap (0.1 mL)	1000 tubes	4358297
MicroAmp™ 96-Well Tray for VeriFlex™ Block	10 trays	4379983
MicroAmp™ Optical 96-Well Fast Reaction Plate (0.1 mL)	10 plates	4346907
MicroAmp™ EnduraPlate™ Optical 96-Well Fast Reaction Plate with Barcode (clear) (0.1 mL)	20 plates	4481194
	500 plates	4483494
MicroAmp™ Optical Adhesive Film Kit	1 kit	4313663

Calibration or instrument verification plate	Cat. No.
96-Well Fast Region of Interest (ROI) and Background Plates (2 plates)	4432426
QuantStudio™ 3 or 5 10-Dye Spectral Calibration Kit, 96-Well 0.1-mL	A26342
96-Well 0.1-mL Spectral Calibration Plate 1 (containing FAM™, VIC™, ROX™, and SYBR™ dyes)	A26336
96-Well 0.1-mL Spectral Calibration Plate 2 (containing ABY™, JUN™, and MUSTANG PURPLE™ dyes)	A26337
96-Well 0.1-mL Spectral Calibration Plate 3 (containing TAMRA™, NED™, and Cy®5 dyes)	A26340
96Well Fast TaqMan™ RNase P Instrument Verification Plate	4351979



Accessories

Item	Amount	Cat. No.
MicroAmp™ Multi Removal Tool	1 tool	4313950
MicroAmp™ Cap Installing Tool (handle style)	1 tool	4330015
MicroAmp™ Optical Adhesive Film	25 films	4360954
	100 films	4311971
MicroAmp™ Adhesive Film Applicator	5 applicators	4333183
RT-PCR Grade Water	10 × 1.5 mL tubes	AM9935
Handheld Barcode Scanner	1 scanner	4488442
High Power USB WiFi Module	1 module	A26774

General-use materials and consumables

The following general-use materials and consumables are required to calibrate, maintain, and operate the instrument.

Unless otherwise indicated, all materials are available through thermofisher.com. "MLS" indicates that the material is available from fisherscientific.com or another major laboratory supplier.

Material/Consumable	Source
Centrifuge with 96-well plate buckets	MLS
Cotton or nylon swabs and lint-free cloths	MLS
Ethanol, 95% solution	MLS
Optical clear adhesive film for PCR	MLS
Na-hypochlorite, 0.1% v/v solution	MLS
Pipettors, 100- μ L and 200- μ L (with pipette tips)	MLS
Powder-free gloves	MLS
Safety glasses	MLS
Screwdriver, flathead	MLS
Tissue, lint-free	MLS
Deionized water	MLS



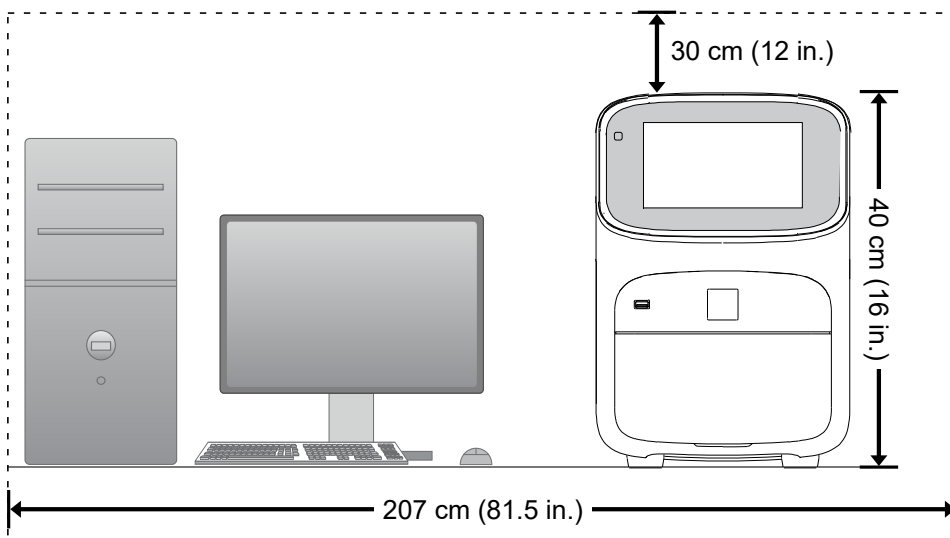
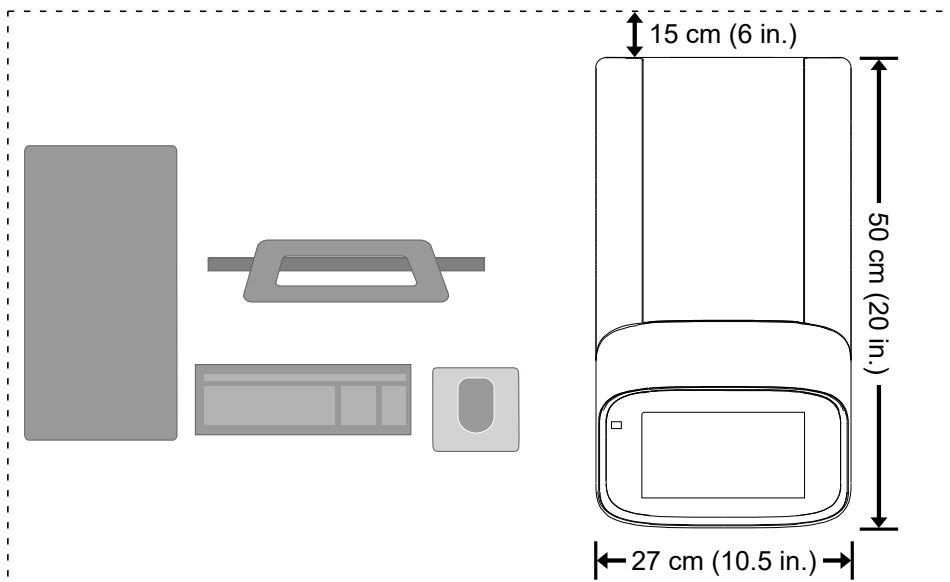
Instrument specification and layout

- Configured system dimensions 102
- Electrical requirements 103
- Environmental requirements 104
- Network requirements 104

Configured system dimensions

Allow space for the configured instrument. A typical setup with a co-located minitower computer is shown below.

Note: Dimensions are rounded to the nearest whole or half unit.



Instrument clearances

During instrument installation and maintenance, it is necessary to access the back of the instrument. If the back of the instrument faces a wall, ensure that there is sufficient clearance on the bench to rotate the instrument for access.

IMPORTANT! For safety, the power outlet for the instrument must be accessible.

Component	Top	Front	Sides	Back
Instrument	30 cm (12 in.)	30 cm (12 in.)	15 cm (6 in.)	15 cm (6 in.)
Computer ^[1]	—	15 cm (6 in.)	—	15 cm (6 in.)

^[1] Co-locating the computer with the instrument is optional.

Electrical requirements



WARNING! For safety, the power outlet used for powering the instrument must be accessible at all times. See “Instrument clearances” on page 103 for information about the space needed between the wall and the instrument. In case of emergency, you must be able to immediately disconnect the main power supply to all the equipment. Allow adequate space between the wall and the equipment so that the power cords can be disconnected in case of emergency.



WARNING! Use of accessories, transducers, and cables other than those specified or provided by the manufacturer of the equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.

- Electric receptacle with grounding capability
- Maximum power dissipation: ~960 W (not including computer and monitor)
- Mains AC line voltage tolerances must be up to ± 10 percent of nominal voltage

Device	Rated voltage	Circuit required	Rated frequency	Rated power
Instrument	100–240 $\pm 10\%$ VAC ^[1]	10 A	50/60 Hz	960 W
Computer (laptop)	100–240 $\pm 10\%$ VAC	10 A	50/60 Hz	90 VA
Computer (desktop)	100–240 $\pm 10\%$ VAC	10 A	50/60 Hz	125 VA
Monitor				65 VA

^[1] If the supplied power fluctuates beyond the rated voltage, a power line regulator may be required. High or low voltages can adversely affect the electronic components of the instrument.

Environmental requirements

Table 2 Environmental requirements

Condition	Acceptable range
Installation site	Indoor use only
Electromagnetic interference	Do not use this device in close proximity to sources of strong electromagnetic radiation (for example, unshielded intentional RF sources). Strong electromagnetic radiation may interfere with the proper operation of the device.
Altitude	Between sea level and 2000 m (6500 ft) above sea level
Operating conditions	<ul style="list-style-type: none"> Humidity: 15–80% relative humidity (noncondensing) Temperature: 15°C to 30°C (59°F to 86°F) <p>Note: For optimal performance, avoid rapid or extreme fluctuations in room temperature.</p>
Storage and transport conditions	<ul style="list-style-type: none"> Humidity: 20–80% relative humidity (noncondensing) Temperature: –30°C to 60°C (–22°F to 140°F)
Thermal output	During operation, the net thermal output, based on the actual current draw of the instrument, is expected to be approximately 960 W (3275 Btu/h).
Vibration	Ensure that the instrument is not adjacent to strong vibration sources, such as a centrifuge, pump, or compressor. Excessive vibration will affect instrument performance.
Pollution degree	<p>The instrument has a Pollution Degree rating of II. The instrument may only be installed in an environment that has nonconductive pollutants such as dust particles or wood chips. Typical environments with a Pollution Degree II rating are laboratories and sales and commercial areas.</p> <p>The noise output of the instrument is ≤ 60 dB when running.</p>
Other conditions	<p>Ensure the instrument is located away from any vents that could expel particulate material onto the instrument components.</p> <p>Avoid placing the instrument and computer adjacent to heaters, cooling ducts, or in direct sunlight.</p>

Network requirements

The instrument:

- Is factory-configured for IPv4 TCP/IP communication and includes an Ethernet adapter (100/1,000 Mbps) with an RJ45-type connector for integrating the device into a local area network (LAN).
- Can alternatively be configured for wireless networking (High Power USB WiFi Module required, sold separately as an optional accessory).

The instrument can be configured for *either* wired or wireless networking, not both.

If a Thermo Fisher Scientific service representative is to install the instrument:

- If the instrument will be connected to a LAN, an active, tested network jack must be in place before the scheduled installation date.
- A representative from your information technologies department must be available during the installation to help connect the instrument to your network.

Required materials to network the instrument:

- Wired—Ethernet cable of sufficient length with RJ45 connectors
 - CAT5 cable for a 100 Mbps network connection
 - CAT5e or CAT6 cable for a 1,000 Mbps network connection
- or–
- Wireless—High Power USB WiFi Module (Cat. No. A26774, sold separately)



- Symbols on this instrument 106
- Safety alerts on this instrument 108
- Safety information for instruments not manufactured by Thermo Fisher Scientific 109
- Instrument safety 109
- Safety and electromagnetic compatibility (EMC) standards 111
- Chemical safety 114
- Biological hazard safety 115




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.















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.

Symbol	Description
	Caution, risk of danger Consult the manual for further safety information.


(continued)

Symbol	Description
	Caution, risk of electrical shock
	Moving parts
	Caution, hot surface
	Potential biohazard
	Ultraviolet light
	Potential slipping hazard
	On
	Off
	On/Off
	Standby
	Earth (ground) terminal
	Protective conductor terminal (main ground)
	Terminal that can receive or supply alternating current or voltage
	Terminal that can receive or supply alternating or direct current or voltage

(continued)



Symbol	Description
	Do not dispose of this product in unsorted municipal waste  CAUTION! To minimize negative environmental impact from disposal of electronic waste, do not dispose of electronic waste in unsorted municipal waste. Follow local municipal waste ordinances for proper disposal provision and contact customer service for information about responsible disposal options.

Conformity symbols

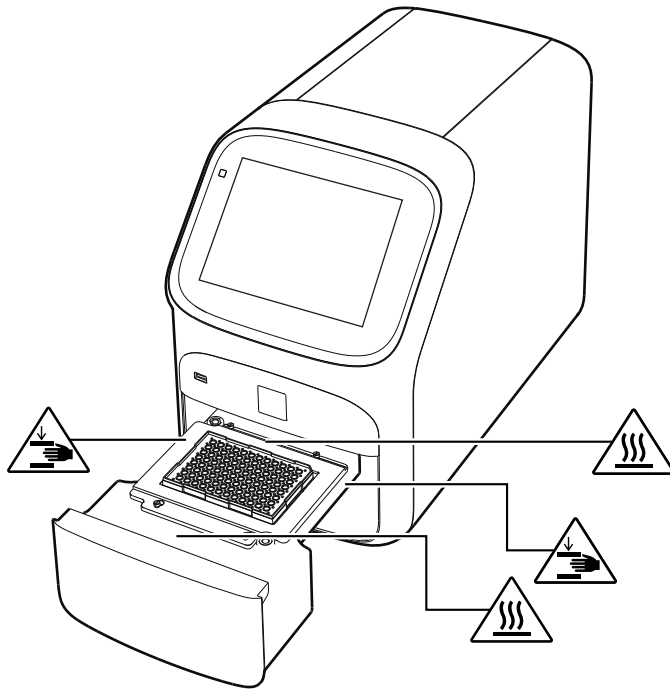
Conformity mark	Description
	Indicates conformity with European Union requirements for safety and electromagnetic compatibility.

Safety alerts on this instrument

Additional text may be used with one of the symbols described above when more specific information is needed to avoid exposure to a hazard. See the following table for safety alerts found on the instrument.

Safety alerts	
	CAUTION! Hazardous chemicals. Read the Safety Data Sheets (SDSs) before handling.
	CAUTION! Hazardous waste. Refer to SDS(s) and local regulations for handling and disposal.

Location of safety labels on the instrument



Safety information for instruments not manufactured by Thermo Fisher Scientific

Some of the accessories provided as part of the instrument system are not designed or built by Thermo Fisher Scientific. Consult the manufacturer's documentation for the information needed for the safe use of these products.

Instrument safety

General



CAUTION! Do not remove instrument protective covers. If you remove the protective instrument panels or disable interlock devices, you may be exposed to serious hazards including, but not limited to, severe electrical shock, laser exposure, crushing, or chemical exposure.

Physical injury



CAUTION! Moving and Lifting Injury. The instrument is to be moved and positioned only by the personnel or vendor specified in the applicable site preparation guide. Improper lifting can cause painful and permanent back injury.

Things to consider before lifting or moving the instrument or accessories:

- Depending on the weight, moving or lifting may require two or more persons.
- If you decide to lift or move the instrument after it has been installed, do not attempt to do so without the assistance of others, the use of appropriate moving equipment, and proper lifting techniques.
- Ensure you have a secure, comfortable grip on the instrument or accessory.
- Make sure that the path from where the object is to where it is being moved is clear of obstructions.
- Do not lift an object and twist your torso at the same time. Keep your spine in a good neutral position while lifting with your legs.
- Participants should coordinate lift and move intentions with each other before lifting and carrying.
- For smaller packages, rather than lifting the object from the packing box, carefully tilt the box on its side and hold it stationary while someone else slides the contents out of the box.



CAUTION! Moving Parts. Moving parts can crush, pinch and cut. Keep hands clear of moving parts while operating the instrument. Disconnect power before servicing.



WARNING! Do not attempt to lift or move the instrument without the assistance of others. Use appropriate moving equipment and proper lifting technique, improper lifting may result in serious injury.

Electrical safety



WARNING! Fuse Installation. Before installing the instrument, verify that the fuses are properly installed and the fuse voltage matches the supply voltage. Replace fuses only with the type and rating specified for the unit. Improper fuses can damage the instrument wiring system and cause a fire.



WARNING! Ensure appropriate electrical supply. For safe operation of the instrument:

- Plug the system into a properly grounded receptacle with adequate current capacity.
- Ensure the electrical supply is of suitable voltage.
- Never operate the instrument with the ground disconnected. Grounding continuity is required for safe operation of the instrument.



WARNING! Power Supply Line Cords. Use properly configured and approved line cords for the power supply in your facility.



WARNING! Disconnecting Power. To fully disconnect power either detach or unplug the power cord, positioning the instrument such that the power cord is accessible.

Cleaning and decontamination



CAUTION! Cleaning and Decontamination. Use only the cleaning and decontamination methods specified in the manufacturer's user documentation. It is the responsibility of the operator (or other responsible person) to ensure the following requirements are met:

- No decontamination or cleaning agents are used that could cause a HAZARD as a result of a reaction with parts of the equipment or with material contained in the equipment.
- The instrument is properly decontaminated a) if hazardous material is spilled onto or into the equipment, and/or b) prior to having the instrument serviced at your facility or sending the instrument for repair, maintenance, trade-in, disposal, or termination of a loan (decontamination forms may be requested from customer service).
- Before using any cleaning or decontamination methods (except those recommended by the manufacturer), users should confirm with the manufacturer that the proposed method will not damage the equipment.

Safety and electromagnetic compatibility (EMC) standards

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



Safety compliance

Reference	Description
EU Directive 2014/35/EU	European Union “Low Voltage Directive”
IEC 61010-1 EN 61010-1 GB 4793.1	<i>Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements</i>
IEC 61010-2-010 EN 61010-2-010 GB 4793.6	<i>Safety requirements for electrical equipment for measurement, control and laboratory use – Part 2-010: Particular requirements for laboratory equipment for the heating of materials</i>
IEC 61010-2-081 EN 61010-2-081 GB 4793.9	<i>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</i>

EMC

Reference	Description
Directive 2014/30/EU	European Union “EMC Directive”
EN 61326-1 IEC 61326-1 GB/T 18268.1	<i>Electrical Equipment for Measurement, Control and Laboratory Use – EMC Requirements – Part 1: General Requirements</i>

Environmental design

Reference	Description
Directive 2012/19/EU	European Union “WEEE Directive” – Waste electrical and electronic equipment
EU Directive 2011/65/EU & Commission Delegated Directive (EU) 2015/863	European Union “RoHS Directive” – Restriction of hazardous substances in electrical and electronic equipment
Directive 2006/66/EC	European Union “Battery Directive”
UN 38.3	United Nations standard for the transportation of lithium metal and lithium-ion batteries

China EEP Hazardous Substances Information						
Component Name	QuantStudio™ 5 Real-Time PCR System					
	Hazardous Substances					
	(Pb)	(Hg)	(Cd)	(Cr(VI))	(PBB)	(PBDE)
PCBA	X	O	O	O	O	O
<p>SJ/T11364. This table is compiled according to SJ/T 11364 standard.</p> <p>O: GB/T26572.</p> <p>Indicates that the concentration of the hazardous substance in all homogeneous materials for the part is below the relevant threshold of the GB/T 26572 standard.</p> <p>X: GB/T26572.</p> <p>Indicates that the concentration of the hazardous substance in at least one homogenous material of the part is above the relevant threshold of the GB/T 26572 standard.</p>						

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.



WARNING! 4L Reagent and Waste Bottle Safety. Four-liter reagent and waste bottles can crack and leak. Each 4-liter bottle should be secured in a low-density polyethylene safety container with the cover fastened and the handles locked in the upright position.

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

Related documentation

Document	Publication number
<i>QuantStudio™ 5 Real-Time PCR System Site Preparation Guide</i>	MAN0028413
<i>SAE Administrator Console v2.1 User Guide</i>	MAN0028414
<i>QuantStudio™ Design and Analysis Desktop Software User Guide</i>	MAN0010408

Note: For additional documentation, see “Customer and technical support” on page 116.

Customer and technical support

Visit thermofisher.com/support for the latest service and support information.

- Worldwide contact telephone numbers
- Product support information
 - Product FAQs
 - Software, patches, and updates
 - Training for many applications and instruments
- 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.

A

- accessories 100
- administrator instrument profile 78
- Administrator profile 80

B

- background calibration
 - create plate 53
 - description 44
 - plate, prepare 47
- Background calibration
 - run 48
 - when to perform 43
- backup instrument 69
- barcode scan 32
- biohazard safety 115

C

- calibration
 - reminders 45
 - Background 48
 - custom dye. *See* custom dye
 - custom melt 66
 - Dye 48
 - plate, prepare 47
 - reminders 45
 - ROI/Uniformity 48
 - schedule 43
 - status 45
 - transfer results 51
 - view images 51
 - workflow 46
- calibration failure, troubleshoot 52
- Change password 81
- Change PIN 81
- Cloud server, select location 84
- comparative Ct runs 16
- computer
 - connection to instrument or LAN 91
 - connections 89
 - requirements for desktop software 90
 - set up 88

Connect

Roles

- Administrator 80
- Standard 80

- connect to network, workflow 86
- connection, not recognized
- consumables
 - 384-well 98
 - 96-well 0.1-mL 99
 - 96-well 0.2-mL 97
- contamination, identify 52
- custom dye
 - add to the instrument 64
 - calibration plate, create 63
 - calibration, perform 64
 - description 11
 - dilution guidelines 60
 - optimal concentration 63
 - wavelength requirements 60
- custom dye calibration, workflow 60
- custom dye dilution plate, prepare 61
- custom melt calibration 66

D

- data collection 11
- data collection points, add to method 33
- date and time 85
- delete files 41
- desktop software
 - download 91
 - download and install 90
 - install 91
- disk space message
- documentation, related 116
- download desktop software 91
- dye calibration
 - description 44
 - plate, prepare 47
- Dye calibration
 - run 48
 - when to perform 43
- dyes
 - custom 11, 60
 - system 10

E

- Edit profile 81
- EDS files, transfer 41
- EDT files, copy or delete 41
- Ethernet port 93
- experiment
 - create from template 29
 - edit 31
 - run from saved file 29
 - run last 30

F

- factory defaults 83
- firewall ports 93
- fluorescence high
- fuses, replace 73

G

- genotyping runs 16
- guest profile
 - disable 82
 - limits 23

H

- home screen, parts of 21

I

- install, desktop software 91
- installation
 - before you begin 87
 - desktop software 90
 - workflow 86
- instrument
 - profile, create 23
 - avatar 84
 - connections 89
 - enable for monitoring 82
 - move 75
 - name 84
 - overview 9
 - parts of 12
 - power off 74
 - power on 20, 74
 - prepare to store or move or ship 75
 - return for service 75
 - touchscreen black
- instrument filters 10
- instrument layout 101
- instrument settings 24

- instrument specification 101
- instrument verification. See RNase P verification

L

- limited product warranty 116
- link with the Cloud 80
- load plate 36, 37
- lock the touchscreen 40

M

- maintenance 69
- melt curve runs 16
- melt curves, add to method 33
- method
 - add melt curves 33
 - add stages 33
 - add steps 33
 - data collection points 33
 - edit 32
 - parts of 33
 - pause 35
 - ramp rate 35
 - VeriFlex Zone 35

N

- network
 - configurations supported 91
 - guidelines and best practices 94
 - wired connection set up 83
 - wireless connection set up 84
- network configuration and security 8
- networking 91

P

- Password, Change 81
- password security 8
- pause run 40
- performance verification. See RNase P verification
- PIN, Change 81
- PIN reset 78
- presence/absence runs 16
- Profile, Edit 81
- profiles
 - administrator 78
 - delete 78
 - edit 79
 - guest, disable 82
 - instrument 23
 - link with the Cloud 80
 - require sign-in 82

- reset PIN 78
- sign in 23
- Profiles
 - Connect
 - Administrator 80
 - Standard 80
- properties, enter or edit 31
- protocol. See method

R

- real-time plots
 - view on instrument touchscreen 39
 - zoom 40
- related documentation 116
- relative standard curve runs 16
- Replace with index term
- require sign in 82
- restore instrument 69
- RNase P verification
 - pass criteria 56
 - plate description 54
 - run 57
- RNase P verification, plate, prepare 56
- ROI/uniformity calibration
 - description 44
 - plate, prepare 47
- ROI/Uniformity calibration
 - run 48
 - when to perform 43
- run
 - pause or stop 40
 - post-PCR 11
 - real-time 11
- run data, transfer 41
- run history 41
- run last experiment 30
- run protocol. See method
- runs, types 16

S

- SAE mode (Security, Audit, and e-Signature) 81
- safety, biohazard 115
- sample block
 - clean 70
 - decontaminate 70
- settings 24
- sign in, require 82
- sign out
 - profile 24

- timer, set 85
- sleep mode 74
- software features 13
- software updates 82
- stages, add to method 33
- standard curve runs 16
- Standard profile 80
- standby mode 74
- startup wizard 88
- steps, add to method 33
- stop run 40
- support, customer and technical 116
- supported dyes 10
- symbols, safety 106
- system dyes 10

T

- template properties. See properties
- terms and conditions 116
- thermal protocol. See method
- Thermo Fisher Connect profile, Edit 81
- third-party software 15
- transfer files 41
- troubleshooting 95

U

- uniformity calibration
 - description 44
 - plate, prepare 47
- unload plate 36, 37
- unpack instrument 87
- use the instrument, workflow 28

V

- verification failure, troubleshoot 58
- VeriFlex Zone, add to method 35

W

- warranty 116
- well details
 - define, assign, view 35
 - view on instrument touchscreen 39
- workflow, use the instrument 28

Z

- zoom 40

