



Thermo Scientific

KingFisher Duo Prime

Technical Manual

Rev. 1.0, Cat. no. N16621

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Release history:

March 2015: First release for KingFisher Duo Prime

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

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Preface

About This User Manual

This user manual is written for the actual end user, for example, research scientist or laboratory technician. This manual provides information on the Thermo Scientific™ KingFisher™ Duo Prime magnetic particle processor, including the installation and operating instructions.

This document aims to give you the information you need for:

- Reviewing safety precautions
- Installing the KingFisher Duo Prime
- Using the KingFisher Duo Prime in routine jobs – the processing step
- Performing basic cleaning and maintenance procedures
- Troubleshooting the instrument performance

This user manual also describes the features and specifications of the KingFisher Duo Prime instrument as well as ordering information.

Note that simulated data appears in the screen captures.

Read the manual in its entirety before operating the instrument.

Keep the user manual for future reference. The user manual is an important part of the instrument and should be readily available during the use of the instrument.

Related Documentation

In addition to this guide, Thermo Fisher Scientific provides the following documents for KingFisher Duo Prime:

- *Thermo Scientific KingFisher Duo Prime Brief User Manual (Cat.no. N16622)*
- For PC software related issues, see Thermo Fisher Scientific™ BindIt™ Software User Manual (Cat. no. N07974)

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Safety and Special Notices

Make sure you follow the precautionary statements presented in this guide. The safety and other special notices appear in boxes.

Safety and special notices include the following:



WARNING Risk of electric shock.



WARNING Biohazard risk.



WARNING Risk of injury to the user or users.



WARNING Strong magnetic fields.



CAUTION Risk of damage to the instrument, other equipment or loss of performance or function in a specific application.

Note Marks a hint, important information that is useful for the optimum operation of the system, or an item of interest.

Tip Highlights helpful information that can make a task easier.

Safety Symbols and Markings on KingFisher Duo Prime

The following symbols and markings appear on the type label and the instrument itself:



WARNING UV light



WARNING This product contains very strong permanent magnets.



WARNING Risk of burns. The heating block and/or the elution block surface can be hot. The warning lights are lit if the temperature rises too high.



WARNING Risk of injury because of moving parts.

Instrument Safety and Guidelines for Use

Take into account the following instrument safety considerations and guidelines for correct use:

- Before operating the instrument, read this user manual in its entirety. Failure to read, understand, and follow the instructions in the manual may result in damage to the instrument, injury to laboratory and operating personnel, or poor instrument performance.
- Always follow basic safety precautions and local safety guidelines when using the KingFisher Duo Prime to reduce the risk of injury, biohazardous contamination, fire, or electric shock.
- Before operating the instrument, read this user manual in its entirety. Failure to read, understand, and follow the instructions in the manual may result in damage to the instrument, injury to laboratory and operating personnel, or poor instrument performance.
- Observe all “Warning”, “Caution”, and “Note” statements as well as safety symbols and markings on the instrument and in the documentation.
- The device is allowed to be operated only with software specifically designed for the device.

Preface

Contacting Us

- Never open any other covers of the KingFisher Duo Prime than the front lid or the maintenance door (see [Figure 2](#) on [page 3](#)) while the instrument is plugged into a power source.
- Never force a microplate onto the instrument.
- The KingFisher Duo Prime is intended for laboratory research use only. Observe proper laboratory safety precautions, such as wearing protective clothing and following approved laboratory safety procedures.
- Preventative maintenance instructions should be followed closely to keep the instrument in the best condition for maximum reliability. A poorly maintained instrument does not give the best results.

Contacting Us

For the latest information on products and services, visit our website at:

www.thermoscientific.com/kingfisher

Contents

	Preface	iii
	About This User Manual	iii
	Related Documentation	iii
	Safety and Special Notices	iv
	Safety Symbols and Markings on KingFisher Duo Prime	v
	Instrument Safety and Guidelines for Use	v
	Contacting Us	vi
Chapter 1	Introduction to KingFisher Duo Prime	1
	Intended Use	1
	Operation Principle	1
Chapter 2	Functional Description	3
	Instrument Layout	3
	Front View	3
	Back and Internal View	5
	King Fisher Duo Prime Magnetic Particle Processor	6
	Principle of Magnetic Particle Processing	7
	Working with Magnetic Rod	8
	Collecting Magnetic Particles	8
	Releasing Magnetic Particles	8
	Washing Magnetic Particles and Incubation	8
	Changing Volume During Magnetic Particle Processing	9
	Magnet Heads	9
	Heating Blocks	12
	Elution Blocks	13
	Shield Plate	13
	USB Port for PC	13
	USB Ports for Memory Devices and Barcode Reader	13
	Consumables	13
	Reagents	14
Chapter 3	Installation	15
	Checking Delivery	15
	Unpacking Instrument	15
	Removing Internal Cushions	16
	Operating Conditions	17

	Precautions and Limitations	17
	Installing KingFisher Duo Prime	18
	Releasing Transport Lock	19
	Connecting Power Supply Cable	20
	Installing Heating Blocks and Magnets Heads	21
	Operational Check	23
Chapter 4	Operation	25
	Control Panel	25
	Keypad	25
	Keys	26
	Using KingFisher Duo Prime PC Software	32
	Using Internal Software	32
	Viewing and Defining Instrument Options and Settings	39
	Switching UV Lamp On	40
	Exporting Device Report	41
	Exporting Run Log	42
	Importing Protocols	43
	Exporting Protocols	44
	Selecting Maintenance Protocol	45
	Viewing Instrument Data	46
	Setting Internal Software Language	47
	Setting Buzzer On or Off	48
	Defining Date and Time Settings	49
	Handling Consumables	50
	Tip Combs	50
	Plates	52
	Elution Strip	53
	Starting KingFisher Duo Prime	54
	Stopping	57
	Emergency Situations	57
Chapter 5	Maintenance	59
	Regular and Preventive Maintenance	59
	Cleaning Turntable	60
	Cleaning Magnetic Rods	60
	Cleaning Shield Plate	60
	Disposal of Materials	60
	Decontamination Procedure	61
	Packing Instrument for Transportation or Service	62
	Refitting Transport Lock	62
	Placing Internal Cushions	63
	Service Contracts	64
	Maintaining System Log	64
	Disposal of Instrument	64
Chapter 6	Technical Specifications	67
	General Specifications	67
	Performance Specifications	68

	Safety Specifications	69
Chapter 7	Troubleshooting	71
Chapter 8	Ordering Information	75
	KingFisher Duo Prime	75
	Accessories and Consumables	76
	Spare Parts	77
	KingFisher Pure Kits	77
Chapter 9	Appendix A	79
	Certificate of Decontamination	79
Chapter 10	Appendix B	81
	System Log	81

Contents

Introduction to KingFisher Duo Prime

Intended Use

The KingFisher Duo Prime magnetic particle processor (see Figure 1) is intended for professional research use by trained personnel. The instrument is intended for automated transfer and processing of magnetic particles in a microplate format. Use for self-testing is excluded. It is recommended that Good Laboratory Practice (GLP) is followed to guarantee reliable analyses.

For technical information on the instrument, see “[Technical Specifications](#)” on [page 67](#).

Operation Principle

The patented technology of the KingFisher Duo Prime system is based on the use of magnetic rods covered with a disposable, specially designed tip comb and plates. The instrument functions without any dispensing or aspiration parts or devices.

Samples and reagents, including magnetic particles, are dispensed into the plates according to the corresponding instructions. The protocol that you have selected with the keypad and display has already been transferred onto the onboard software. You can use the Thermo Scientific™ BindIt™ Software to create and run protocols.

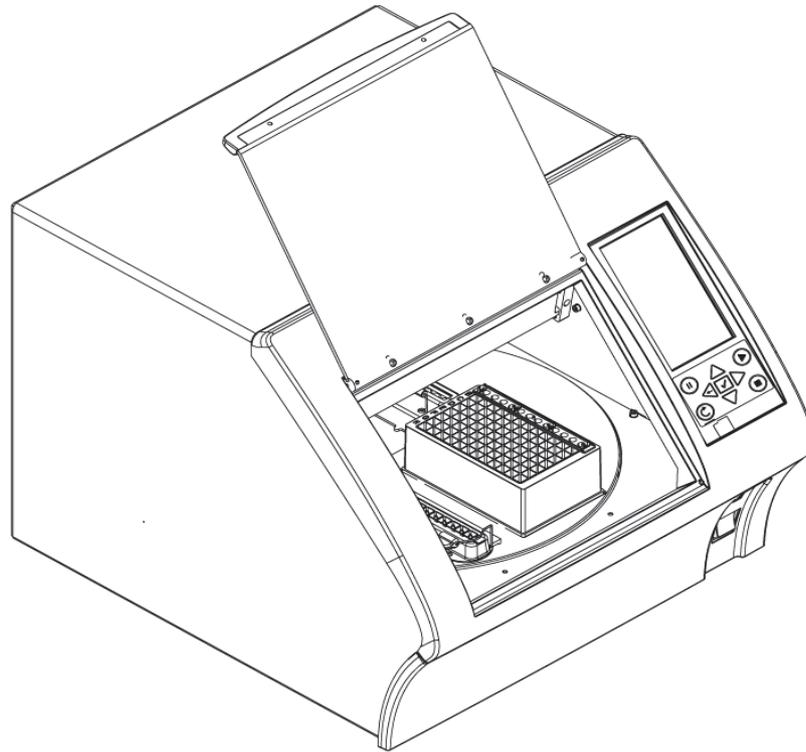


Figure 1. KingFisher Duo Prime magnetic particle processor

To keep the instrument in the best condition for maximum reliability, follow the preventative maintenance instructions. A poorly maintained instrument does not give the best results. For more information on maintenance, see chapter

Functional Description

Instrument Layout

This section shows the front, back and internal views of the KingFisher Duo Prime instrument.

Front View

The following figure illustrates the KingFisher Duo Prime instrument and its parts (listed in the table that follows).

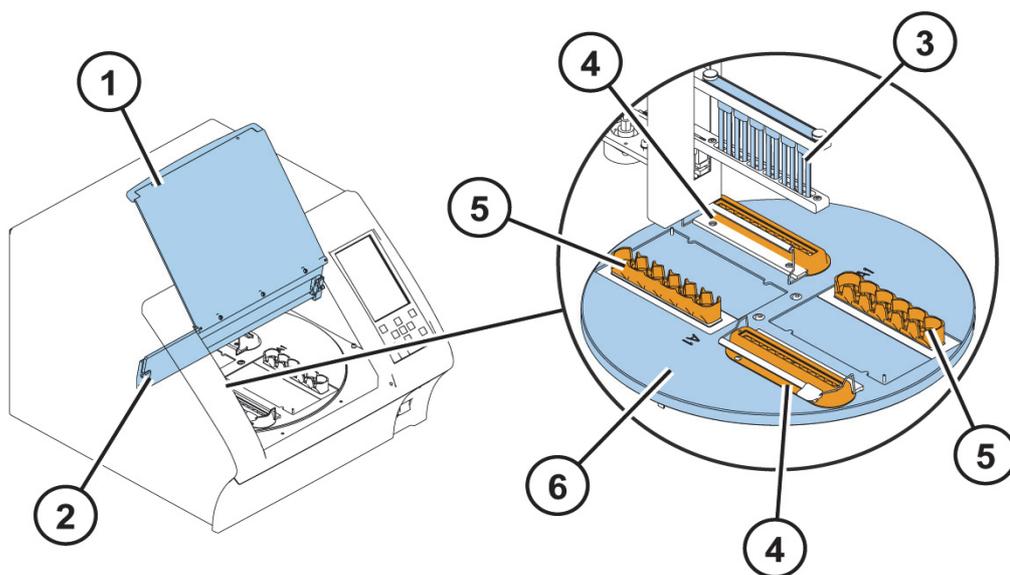


Figure 2. KingFisher Duo Prime front view with front lid open

Item number	Description	Item number	Description
1	Front lid open	4	Elution block (fixed)
2	Maintenance door	5	Interchangeable heating block
3	Interchangeable KingFisher Duo Prime head	6	Turntable

The following figure shows the KingFisher Duo front view with plates and front lid and the maintenance door closed.

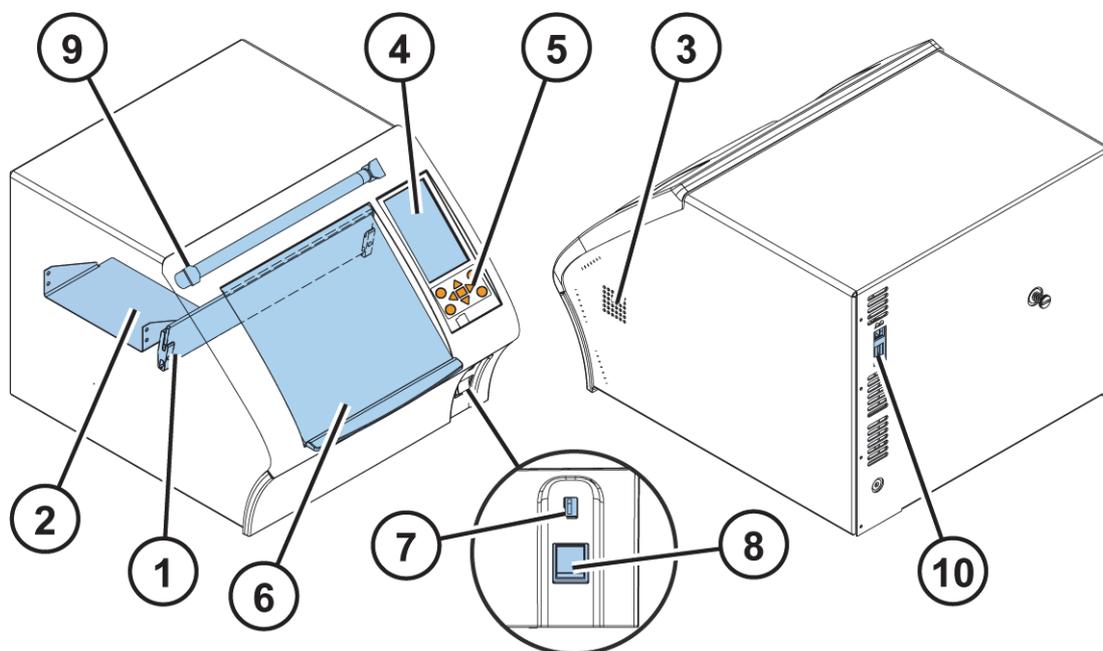


Figure 3. KingFisher Duo Prime front view with plates and front lid closed

Item number	Description	Item number	Description
1	Maintenance door	6	Front lid (closed)
2	Shield plate	7	USB port for memory stick or barcode reader. USB port also at the back of the device.
3	Cooling air outlet	8	ON/OFF switch
4	Display	9	UV lamp
5	Keypad	10	USB port and barcode reader connection (preferred location)

Back and Internal View

The back view of the KingFisher Duo Prime instrument is shown in Figure 4 and the internal view in Figure 5.

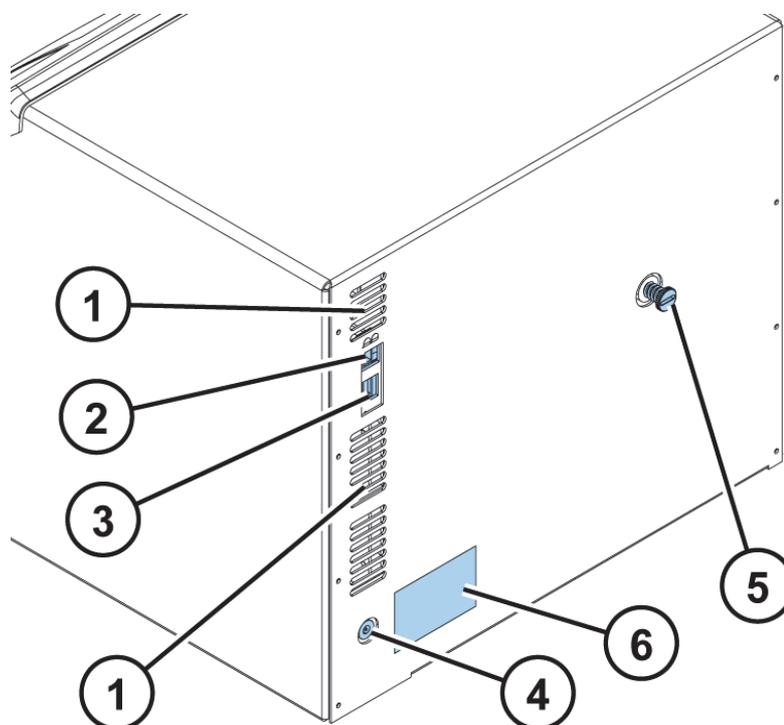


Figure 4. KingFisher Duo Prime back view

Item number	Description
1	Cooling air inlet
2	USB port for PC
3	USB port for memory stick or barcode reader
4	Mains power supply connector
5	Transport lock
6	Type label

The following figure shows the KingFisher Duo Prime internal view from the front processing position.

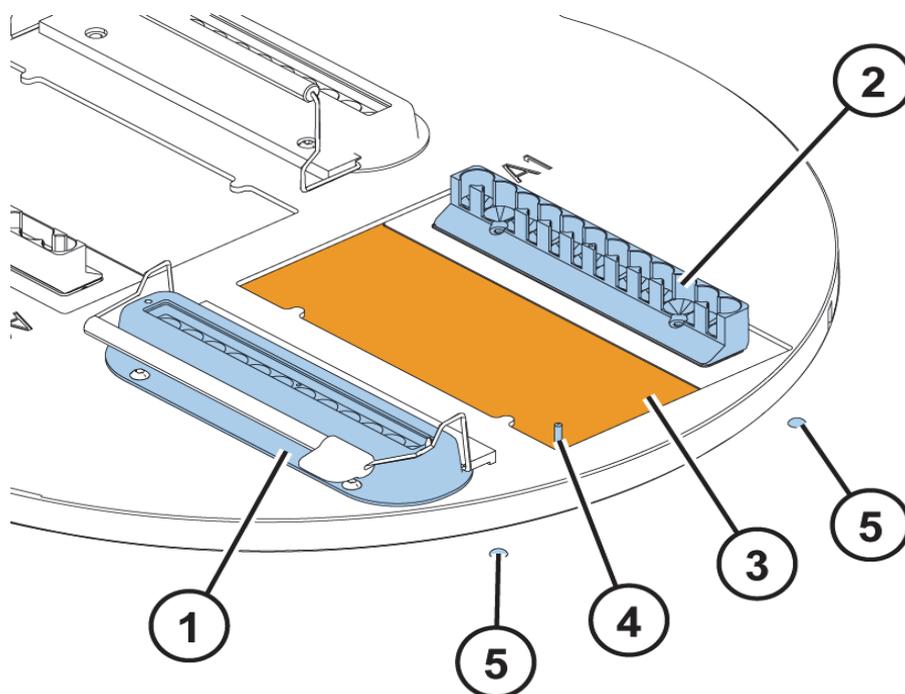


Figure 5. KingFisher Duo Prime internal view

Item number	Description
1	Elution block (fixed, two pieces) and elution strip holder on top
2	Interchangeable heating block
3	Plate position
4	Positioning pin (to place the sample plate in the correct position)
5	Warning LEDs to indicate if there is a risk of burn

King Fisher Duo Prime Magnetic Particle Processor

The KingFisher Duo magnetic particle processor has room for two plates and two elution strips. The tip combs which protect the magnets during processing are compatible with the plates. During the individual steps, the plates are kept stationary, and the only moving assembly is the processing head with tip comb and magnetic rods. The head consists of two vertically moving platforms. One is needed for the magnetic rods (12 or 6 pieces) and the other one for the plastic tip comb. For more detailed information, see “Magnet Heads” on page 9, “Heating Blocks” on page 12, and “Elution Blocks” on page 13.

You can place up to two plates simultaneously on the turntable and have them processed automatically one after another. The processing of two sequential runs is started with the 1st plate with samples in a 96-well plate. Prepare the second sample plate while the first plate is still being processed, select the protocol and place the plate onto the turntable. The processing of the second plate starts automatically when the first one is completed. 24 samples at most can be purified continuously without an interruption by the user, and in this case, the samples are processed in 96 deep well (DW) plates. When using large-volume configurations on 24-well plates, usually two plates are used in a run.

Before starting the magnetic particle processing with the keypad and display, the samples and reagents are dispensed into the plate(s)/strip(s) and the tip comb is placed onto the preset row of the sample plate, default row B, from which it is automatically loaded. The plate(s) are placed onto the turntable into the corresponding plate position according to the protocol instructions. During the operation, the front lid can be closed or open (see Figure 2 on page 3 and Figure 3 on page 4). The closed door protects the processing against environmental contamination.

Principle of Magnetic Particle Processing

The operating principle employed is inverse magnetic particle processing (MPP) technology (see Figure 6). Rather than moving the liquids, the magnetic particles are moved row wise on the plate(s) or strip(s) containing specific reagents, in contrast to the external magnet method. Magnetic particles are transferred using magnetic rods covered with a disposable, specially designed plastic tip comb.

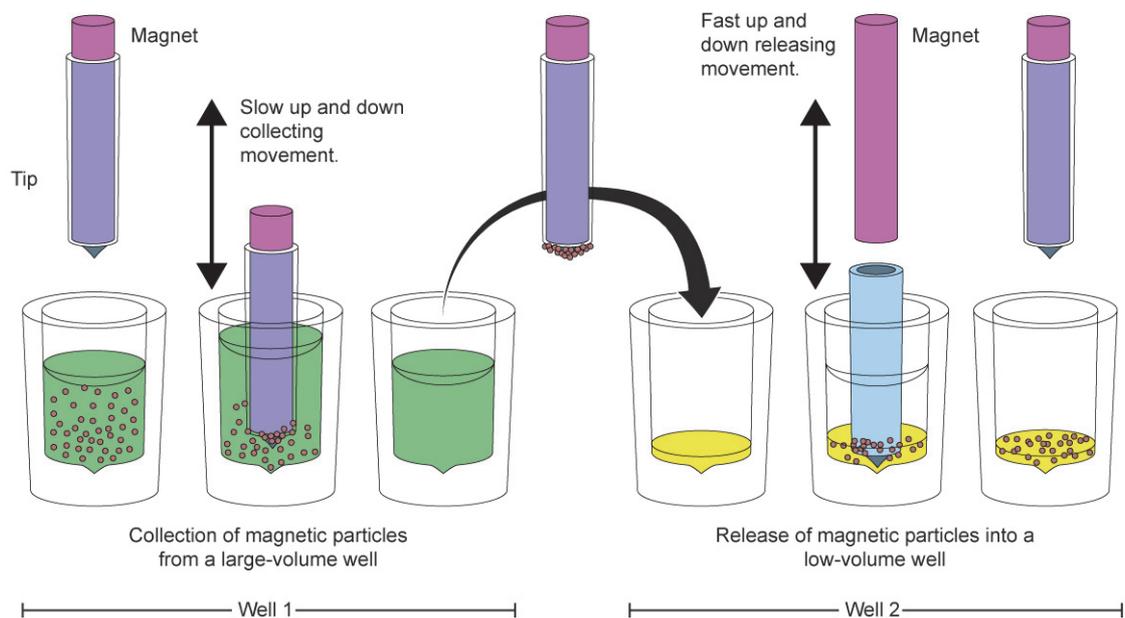


Figure 6. Inverse magnetic particle processing

Working with Magnetic Rod

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

1. Collecting magnetic particles
2. Releasing magnetic particles
3. Washing magnetic particles
4. Incubation
5. Concentration

Collecting Magnetic Particles

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

Releasing Magnetic Particles

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

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

Washing Magnetic Particles and Incubation

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

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

To keep the magnetic particle suspension evenly mixed in incubating long-running reactions, the tip comb can be moved up and down in the solution.

Changing Volume During Magnetic Particle Processing

The volume of the first row of the plate can be larger than the volume of the next row, and this can be used, for example, to eluate the sample in a smaller volume to get a more concentrated end-product (see the following figure).

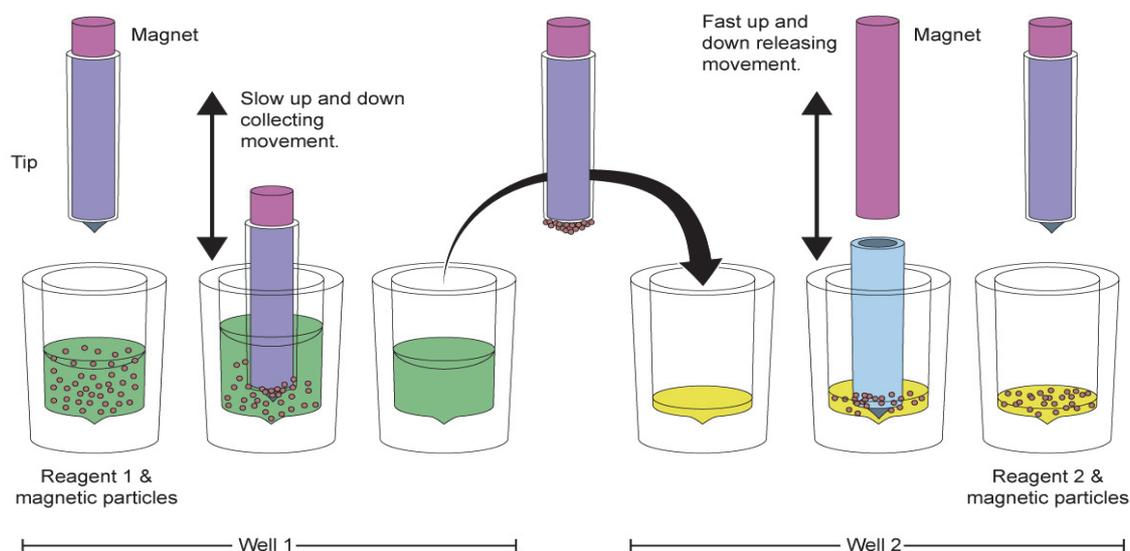


Figure 7. A concentration step during magnetic particle processing

Magnet Heads

The KingFisher Duo Prime can be used with one processing head at a time. The instrument comes equipped with two different kinds of interchangeable KingFisher Duo Prime magnet heads, a 12-pin magnet head for Microtiter deep well (DW) 96 plates and a 6-pin magnet head for KingFisher Flex 24 DW plates. The magnet head options have been designed for different volume needs. Both KingFisher Duo Prime heads have corresponding disposable plastic tip combs (see Table 1 on page 10).

The 12-pin magnet head is used with a corresponding plastic 12-tip comb and a Thermo Scientific™ Microtiter™ DW 96 plate and an optional 12-well Thermo Scientific™ KingFisher™ Duo Prime elution strip.

- 12-pin magnet head
 - One to 12 samples per run
 - Eight processing positions including the elution strip
 - Up to 1 ml processing volume

2 Functional Description

Magnet Heads

The 6-pin magnet head is used with a corresponding plastic 6-tip comb and a Thermo Scientific™ KingFisher™ Flex 24 DW plate.

- 6-pin magnet head
 - One to six samples per run
 - Three processing positions (optionally with two plates up to seven positions)
 - Up to 5 ml processing volume

Note The tip comb uses one processing position from the plate in both cases (12-pin and 6-pin).



CAUTION Do not place the KingFisher Duo Prime heads on top of the instrument or any metal surfaces.

Keep the KingFisher Duo Prime heads always in their respective plastic boxes when not in use (see Figure 8).

It is very important to keep the KingFisher Duo Prime heads away from each other and other magnets at all times. If the magnets clash together, this may cause serious damage to the magnets.

Table 1. Magnet head and tip comb

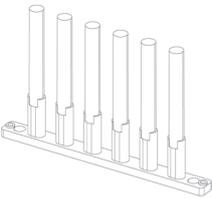
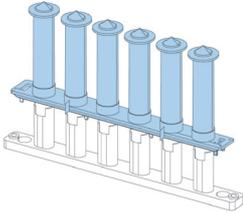
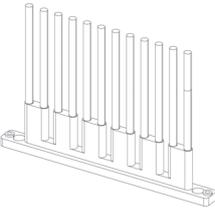
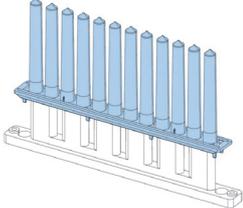
Magnet head	Description	Tip comb	Description
	KingFisher Duo Prime head for 24 DW plate		KingFisher Duo Prime 6-tip comb
	KingFisher Duo Prime head for 96 DW plate		KingFisher Duo Prime 12-tip comb



Figure 8. KingFisher Duo Prime magnet head in its storage box



CAUTION Do not keep the KingFisher Duo Prime head in close proximity to magnetic tapes, computer discs or other magnetic storage systems such as credit cards. These items can be damaged by the strong magnetic field of the KingFisher Duo Prime heads. Do not hold the KingFisher Duo Prime heads close to a PC display as this may cause damage to the display. Do not use metal tools when handling KingFisher Duo Prime heads.



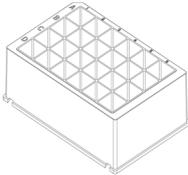
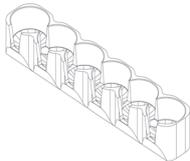
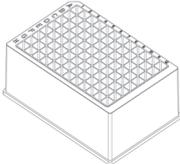
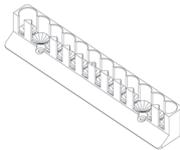
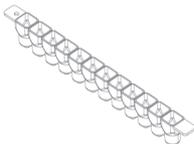
WARNING This product contains very strong permanent magnets. People wearing a pacemaker or metallic prostheses should not use this product. A pacemaker or prostheses may be affected or damaged if it comes in close contact with a strong magnetic field.

For more information, see section [“Inserting or changing the magnet heads”](#) on [page 22](#).

Heating Blocks

KingFisher Duo Prime is equipped with two different kinds of interchangeable KingFisher Duo Prime heating blocks with two pieces each, a 12-well heating block for Microtiter DW 96 plates and a 6-well heating block for the KingFisher Flex 24 DW plates (see Table 2). You can add a heating step of +10°C to +75°C to a protocol. Row A of the above-mentioned 24 and 96 DW plates can be heated. You can also heat the elution strip position.

Table 2. Plates and heating adapter(s)

Plate	Description	Heating adapter(s)	Description	Heating/cooling temperature range
	KingFisher Flex 24 deep well (DW) plate (200–5,000 µl)		KingFisher Duo Prime heating block for 24 DW plate	+10 to 75°C
	Microtiter deep well 96 plate (50–1,000 µl)		KingFisher Duo Prime heating block for 96 DW plate	+10 to 75°C
	KingFisher Duo Prime elution strip (30–130 µl)		KingFisher Duo Prime heating block for elution strip (fixed)	+4 to 75°C

Note If the filling volume is not followed (it is below or above the given value), adequate performance is not guaranteed.



WARNING Risk of burns. The heating block and/or the elution block surface can be hot. The warning LEDs have a red light when they are over 50°C. When the protocols are run, the heating block and the elution block surface cools off.



CAUTION The heating block is specifically designed for the plates listed below to ensure even heating during the sample process (see Table 1 on page 10). Using other plates than those recommended may damage the instrument and diminish the application performance.

You can only use the following 24- and 96-well plates and strips for heating:

- KingFisher Flex 24 DW plate (200–5,000 µl*)
- Microtiter DW 96 plate (50–1000 µl*)
- Elution strip

* = recommended filling volume

For more information, see section “[Installing Heating Blocks and Magnets Heads](#)” on [page 21](#).

Elution Blocks

There are two parallel fixed 1 x 12-well elution blocks (see [Figure 2](#) on [page 3](#)) with a heating and cooling option. The elution blocks can only be used with a 12-pin magnet head. A plastic KingFisher Duo Prime 1 x 12 elution strip can be placed onto the block.

Following the process, the elution block can be set to cool and act as a cooling block to preserve the samples better.

Shield Plate

Always when the turntable rotates as well as at the end of each protocol, the tip moves on top of the fixed shield plate that serves as a protective cover (see [Figure 3](#) on [page 4](#)).

USB Port for PC

There is a USB port for PC located on top of the USB port for memory stick on the back panel (see [Figure 4](#) on [page 5](#)). A USB cable is supplied with the instrument.

USB Ports for Memory Devices and Barcode Reader

There are two parallel USB ports, one on the back panel and one on the front panel (see [Figure 3](#) on [page 4](#)). The USB ports are intended to be used with a memory stick for transferring (import and export) protocols, and for exporting run log files for traceability. PC connection is not necessary.

You can use either one of the ports to attach a barcode reader to the equipment but for better usability, the port on the back panel is preferred (if the connection in the front is used for the memory stick).

It is recommended to use FAT16 or FAT32 formatted USB memory devices. It is not recommended to use multiple drive USB memory devices that contain virtual CD drives.

Consumables

For more details and ordering information on plastic consumables, such as plates, tip combs, and elution strips used with the KingFisher Duo Prime instrument, see “[Accessories and Consumables](#)” on [page 76](#).

Reagents

There is a wide selection of optimized Thermo Scientific™ KingFisher™ Pure Kits for low or medium throughput available for purification of DNA or RNA. The versatile kit selection is intended for a large variety of starting materials, such as blood, cells, tissues, or cell-free body fluids. The DNA or RNA purified with the KingFisher Pure Kits is of high quality and free of proteins, nucleases, and other contaminants or inhibitors. Therefore, the kits are suitable for direct use in many different downstream applications.

The KingFisher Pure Kits are the following:

- KingFisher Pure DNA Blood Kit (Cat. no. 98010196 for 96 samples, Cat. no. 98010496 for 384 samples)
- KingFisher Pure RNA Blood Kit (Cat. no. 98020196 for 96 samples)
- KingFisher Cell and Tissue DNA Kit (Cat. no. 97030196 for 96 samples, Cat. no. 97032496 for 24 x 96 samples)
- KingFisher Pure RNA Tissue Kit (Cat. no. 98040196 for 96 samples, Cat. no. 98040496 for 384 samples)
- KingFisher Pure DNA Plant Kit (Cat. no. 98050196 for 96 samples, Cat. no. 98050496 for 384 samples)
- KingFisher Pure RNA Plant Kit (Cat. no. 98060196 for 96 samples, Cat. no. 98060496 for 384 samples)
- KingFisher Pure Viral NA Kit (Cat. no. 98070196 for 96 samples, Cat. no. 98070496 for 384 samples)
- KingFisher Pure Plasmid Kit (Cat. no. 98080196 for 96 samples, Cat. no. 98080496 for 384 samples)

For more detailed information, see “[KingFisher Pure Kits](#)” on [page 77](#)” or visit www.thermoscientific.com/kingfisher.

Thermo Scientific™ Pierce™ Protein Research Products are available for protein applications. For more information on available kits, visit www.thermoscientific.com/pierce.

The KingFisher Duo Prime is an open system, which gives an opportunity to use also other magnetic particle kits. The optimal magnetic particle size for the KingFisher Duo Prime is 0.8–10 µm.

Installation

This chapter describes the delivery, unpacking, and installation of the KingFisher Duo Prime instrument. For instruction on how to pack the instrument for transportation or service and on how to refit the transport lock, see chapter “[Packing Instrument for Transportation or Service](#)” on page 62.

Checking Delivery

When you receive the instrument, check the enclosed packing list and compare it with the order. Visually inspect the transport package, the instrument and the accessories for any possible transport damage. If any parts are damaged, contact your local Thermo Fisher Scientific representative or Thermo Fisher Scientific Oy.

Unpacking Instrument

Move the packed instrument to its site of operation. To prevent condensation, the instrument should be left in its protective, antistatic plastic wrapping until the ambient temperature has been reached. Unpack the KingFisher Duo Prime instrument and accessories carefully with the arrows on the transport package pointing upwards. Remove the instrument from the package and place it on a level surface.

The following notes and instructions are sent with the instrument and are immediately available when you open the package:

- BindIt Software for KingFisher Instruments CD including the BindIt™ Software User Manual
- KingFisher User Manuals CD:
 - KingFisher Duo Prime Technical Manual (this manual)
 - Thermo Scientific™ KingFisher™ Duo Prime Brief User Manual and translations into French, German, Italian, Spanish, Portuguese, Russian, Japanese, and Chinese.
 - Thermo Scientific User Awareness of Symbols
 - Declaration of Conformity document

Note Do not touch or loosen any screws or parts other than those specifically designated in the instructions. Doing so might cause misalignment and will void the instrument warranty.



CAUTION The KingFisher Duo Prime weighs approximately 17 kg [37,5 lbs.] without the transport package and must be lifted with care. It is recommended that two persons lift the instrument together, taking the proper precautions to avoid injury.

To lift the instrument, place your fingers under the device on both sides and lift it with your back straight. Retain the original packaging and packing material for future transportation. The packaging is designed to assure safe transport and minimize transit damage. Use of alternative packaging materials may invalidate the warranty. Also retain all instrument-related documentation provided by the manufacturer for future use.

Removing Internal Cushions

When you have opened the package, open the front lid of the instrument and remove the two internal cushions. First remove the larger cushion in the middle, and then remove the smaller cushion which protects the UV lamp. To remove the smaller cushion, carefully pull it down and out. For illustration on the cushions, see the following figure.

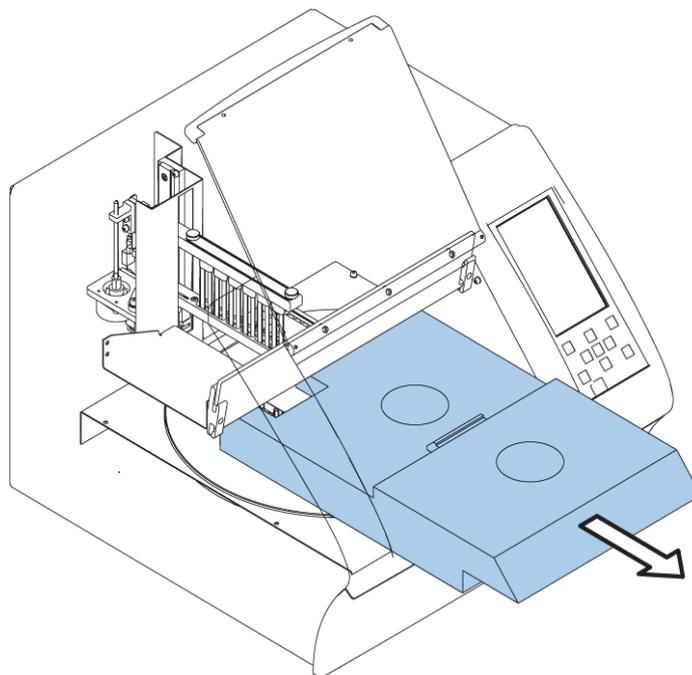


Figure 9. Removing internal cushions

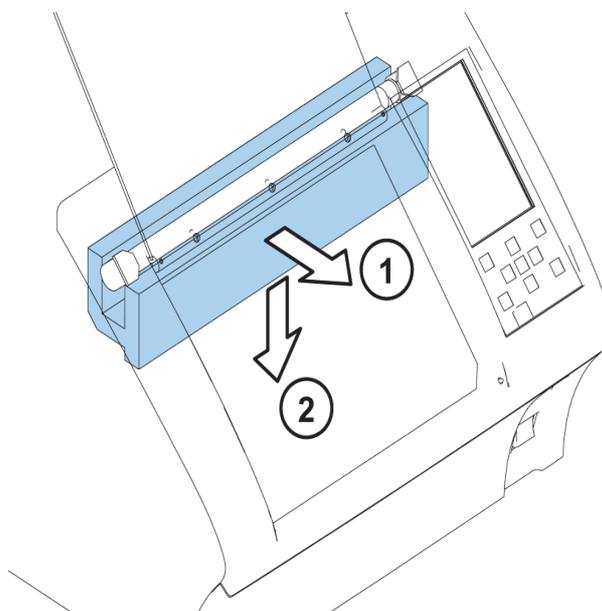


Figure 10. Removing the UV lamp protection

Operating Conditions

When you set up the KingFisher Duo Prime, avoid sites of operation with excess dust, vibrations, strong magnetic fields, direct sunlight or UV light, draft, excessive moisture or large temperature fluctuations. Place the instrument on a normal laboratory bench. Make sure that the following requirements are met:

- The working area is flat, dry, clean and vibration-proof and leaves additional room for accessories, cables, and reagent bottles.
- There is at least 10 cm (approximately 3,9 inches) of free space around the instrument for ventilation on the laboratory bench.
- Ambient air is clean and free of corrosive vapors, smoke, and dust.
- The ambient temperature range is between +4°C (39,2°F) and +40°C (104°F).
- To make sure that condensation does not occur, the humidity is low (relative humidity is between 10% and 80%).

Install the KingFisher Duo Prime in a protected location where no one can step on or trip over the power cord, and where the power cord remains accessible if the unit needs to be unplugged.



WARNING Do not operate the instrument in an environment where potentially damaging liquids or gases are present.

Precautions and Limitations

Take into account the following risks and limitations of use:

3 Installation

Installing KingFisher Duo Prime

- Always make sure that the local supply voltage in the laboratory conforms to that specified on the type label on the back of the instrument (see [Figure 4](#) on [page 5](#)).
- Do not smoke, eat or drink while using the KingFisher Duo Prime.
- Wash your hands thoroughly after handling test fluids.
- Observe normal laboratory procedures for handling potentially dangerous samples.
- Wear proper protection clothing, such as disposable gloves and laboratory coats, according to good laboratory practice.
- Ensure that the working area is properly ventilated.
- Never spill fluids in or on the equipment.



WARNING This product contains very strong permanent magnets. People wearing a pacemaker or metallic prostheses should not use this product. A pacemaker or prostheses may be affected or damaged if it comes in close contact (10 cm or 3,9 inches) with strong magnetic field.



CAUTION Do not place the KingFisher Duo Prime heads on any metal surfaces. Keep the KingFisher Duo Prime heads always in their respective plastic boxes when not in use. It is very important to keep the KingFisher Duo Prime heads away from each other and other magnets at all times. Clashing of the magnets together may cause serious damage to the magnets.



CAUTION Do not keep the KingFisher Duo Prime in close proximity to magnetic tapes, computer discs or other magnetic storage systems, such as credit cards. These type of items can be damaged by the strong magnetic field of the KingFisher Duo Prime heads. Do not hold the KingFisher Duo Prime heads close to a PC display as this may cause damage to the display. Do not use metal tools when handling KingFisher Duo Prime heads.

Installing KingFisher Duo Prime

This section describes the installation setups that you must carry out before operating or relocating the instrument.

When you have opened the package, open the front lid of the instrument and remove internal cushions. For instructions, see [“Removing Internal Cushions”](#) on [page 16](#).

Releasing Transport Lock

The instrument is equipped with one transport lock (see the following figure). Make sure the transport lock is released before you put the instrument into operation.

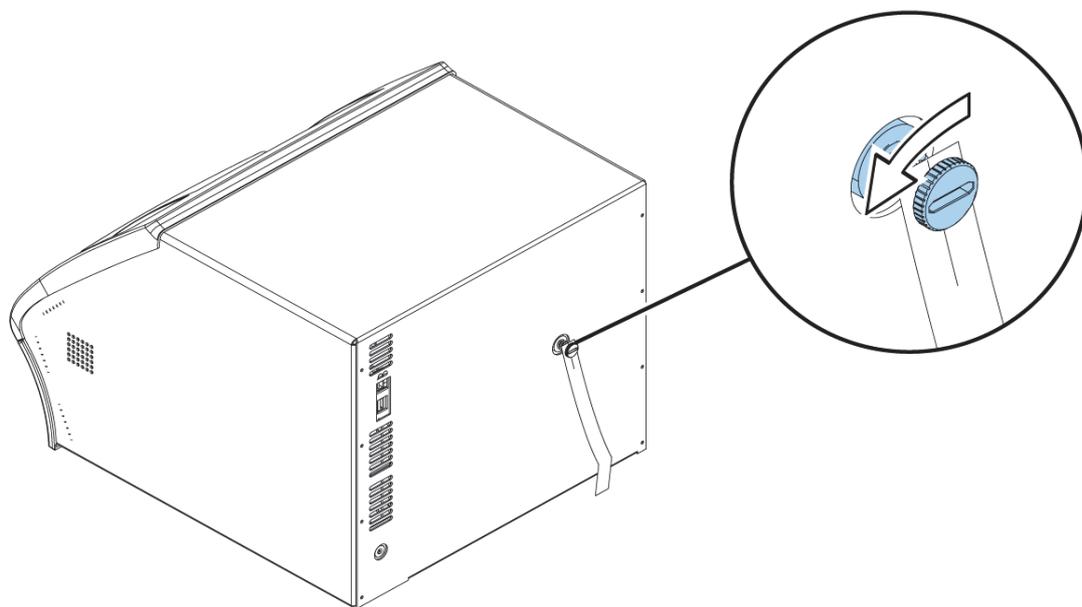


Figure 11. KingFisher Duo Prime transport lock fitted

To release the transport lock, unscrew the transport lock finger screw with spring suspension counterclockwise. The loosened finger screw stays in the same location by spring force. It is possible to use a suitable tool, such as a screwdriver or a coin to unscrew the transport lock.

Connecting Power Supply Cable



CAUTION Check that the mains switch on the front panel is in the OFF position. Never operate your instrument from a power outlet that has no ground connection. Never use a power supply cable other than the Thermo Scientific power supply cable designed for your region.

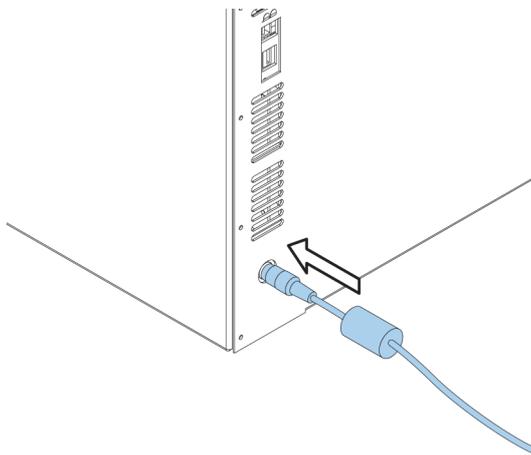


Figure 12. Mains supply cable connected

❖ **To connect the power supply cable:**

1. Connect the power supply cable to the power supply connector and plug in the instrument (see Figure 10).
2. Connect the power supply to a correctly installed line power outlet with a grounded conductor.

Turn the power switch to the ON position to perform the next task. The instrument performs initialization tests and adjustments.

Installing Heating Blocks and Magnets Heads

This section describes the installation setup of the interchangeable KingFisher Duo Prime heating blocks and magnet heads.

Inserting or changing the heating blocks

❖ **To insert the heating blocks:**

1. Insert the first heating block by setting it into the plate position and snapping it into place (see the following figure).

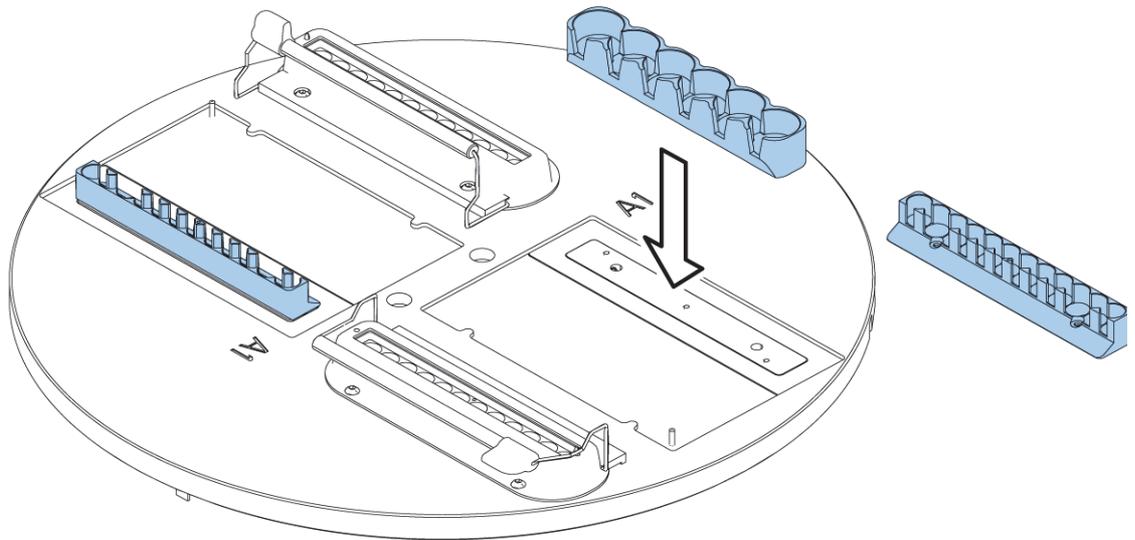


Figure 13. Changing the heating block

2. Press the **ROTATE** button to get the other heating block in the front.
3. Insert the second new heating block by setting it and snapping it into place.
4. To change the heating blocks, take away the heating block by lifting it and repeat Steps 1–3.

Inserting or changing the magnet heads

❖ To insert the magnet head:

1. Open the maintenance door by lifting it up and turning it to the front (see the following figure).

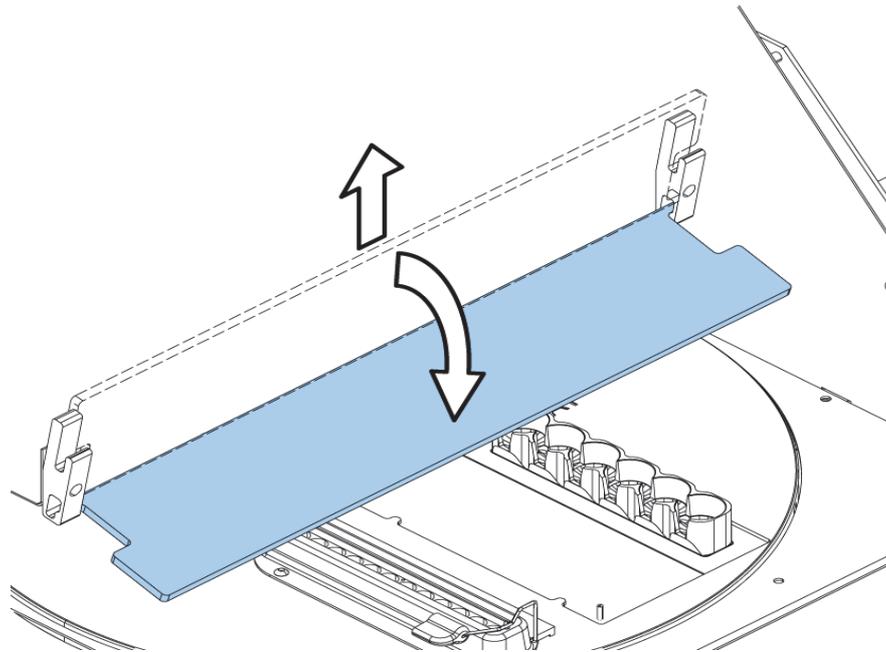


Figure 14. Opening the maintenance door

2. To fit the magnet head, choose the `Change_magnet_head` protocol under the **Maintenance** menu using the Up and Down arrow keys.
3. Press the **START** key. The procedure stops to a pause.
4. Insert the magnet head by slotting it into the tip comb holder and by fitting the two finger screws on top of the magnet head.

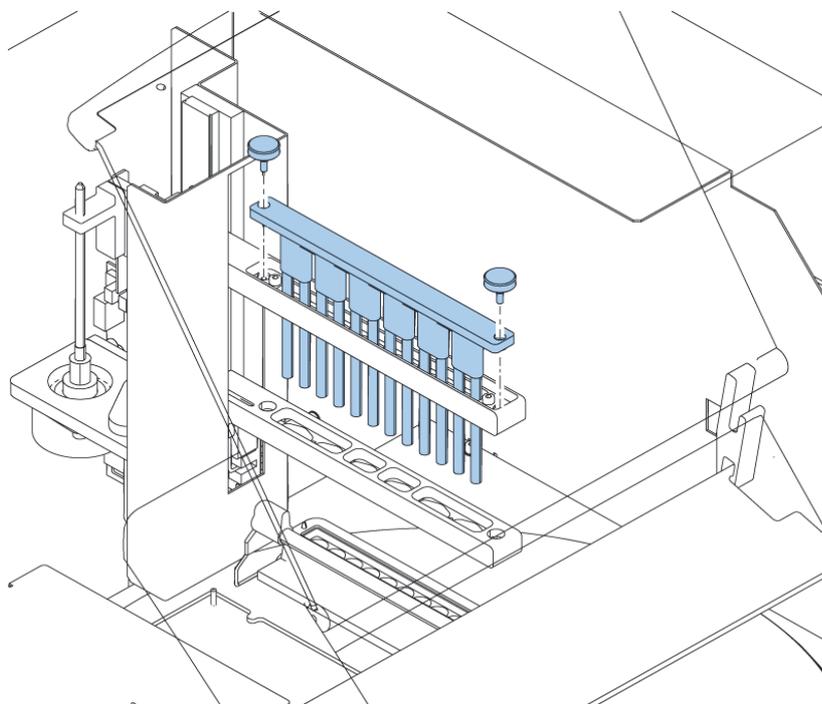


Figure 15. Inserting the KingFisher Duo Prime head

5. Continue the process. The magnets move on top of the shield plate at the end of the changing process.
6. Close the maintenance door by lifting it up to and push it to its slot.

When you change the magnet head, take away the magnet head by turning the two finger screws on top of the magnet head counterclockwise when instructed (see “[Opening the maintenance door](#)” on [page 22](#)). When you remove the KingFisher Duo Prime head, be careful not to damage the magnet rods against the tip comb holder frame.

Note When changing the magnet head, run the `Change_magnet_head` protocol under **Maintenance**.

Operational Check

To do the operational check, first switch the instrument the ON position. The instrument performs initialization tests and adjustments.

The display briefly shows the internal software version. This happens when the initialization tests and adjustments have been completed.

To verify proper instrument operation, it is recommended that you do a check run using a maintenance protocol. Run the check protocol (`Check_12-tip` or `Check_6-tip`) under the **Maintenance** menu according to the KingFisher Duo Prime head and plastics you are using. Ensure that the correct magnet head is attached. If the check result is in order, proceed with your own runs.

Operation

This chapter describes the routine operations done with the KingFisher Duo Prime and the control panel of the device,

Before you switch on the KingFisher Duo Prime instrument, make sure that the voltage on the type label at the bottom left of the back panel (see [Figure 4](#) on [page 5](#)) corresponds to the local voltage.



WARNING Never operate your instrument from a power outlet that has no ground connection.

Control Panel

This section describes the KingFisher Duo Prime control panel and internal software.

Keypad

The keypad is shown in the following figure.

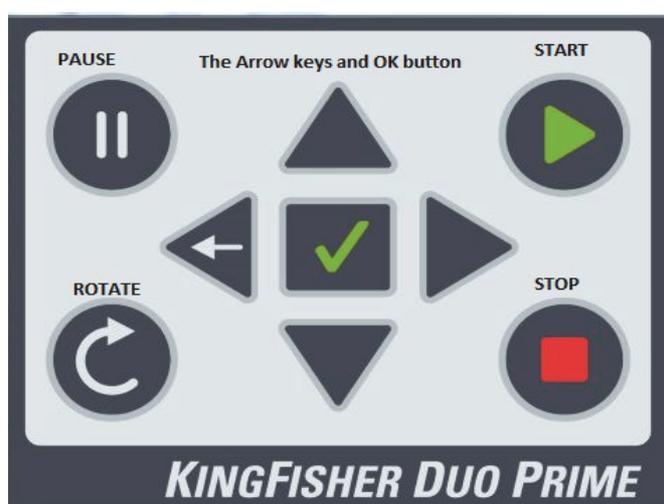


Figure 16. KingFisher Duo Prime keypad

Keys

Use the keys and control buttons as described in the following table.

Table 3. Keys and control buttons

Key	Description
	Use the Up, Down, Left and Right arrow keys to select a protocol and to navigate on the display.
	Use the OK button to accept the selection and to confirm a performed step in the protocol (for example, plate loading or removal).
	Use the Start button to initiate the run.
	Use the Stop button to terminate the protocol(s).
	Use the Pause button to stop the run. The run pauses at the end of the ongoing processing step. When the Pause button has been pressed, you can continue the run.
	Use the Rotate button to rotate the turntable.

Display

The liquid crystal display is a 5" 480 x 800 pixel display. The main view in the display is shown in the following figure.

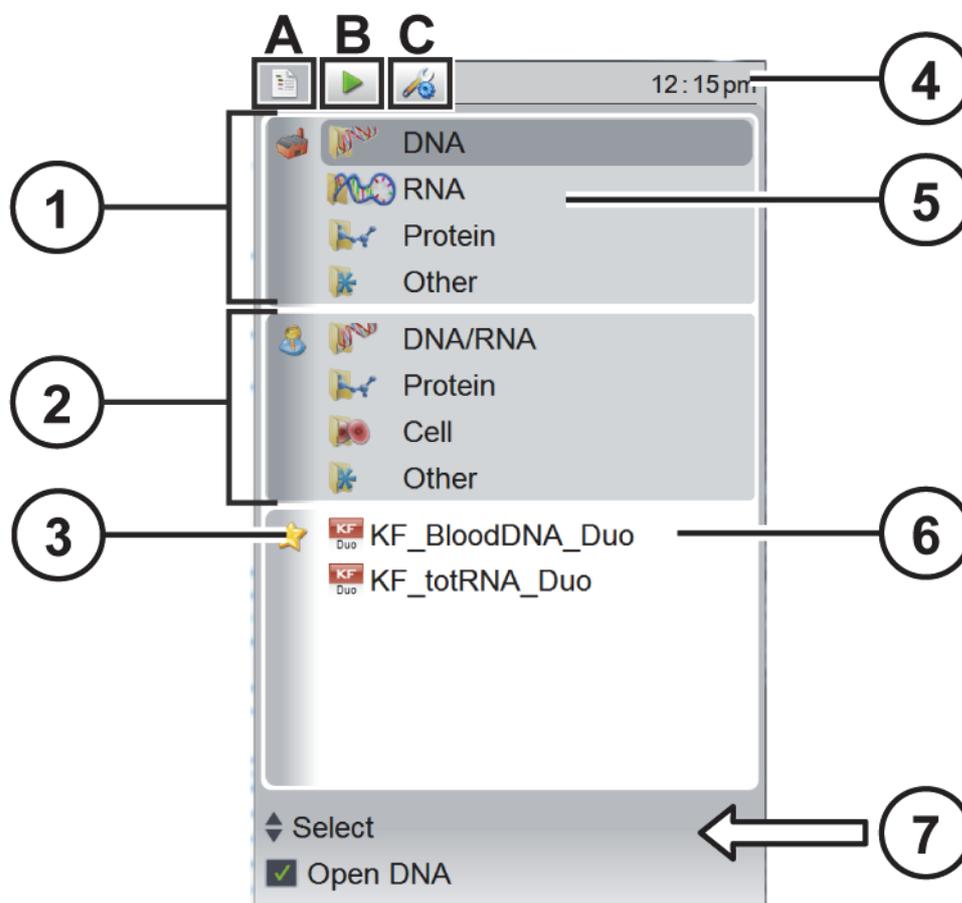


Figure 17. Main view on the display of the KingFisher Duo Prime

In the previous figure, the following items are shown:

Item number	Description	Item number	Description
1	Factory protocols folder	5	Protocol tabs row
2	User protocols folder (optional)	6	Last used protocol(s)
3	Icons and options	7	Info text bar
4	Menu bar		

There are three menus in the KingFisher Duo Prime user interface (see the previous figure): **Protocols** (point A in the figure), **Run** (point B in the figure) and **Maintenance** (point C in the figure). In routine use, you mainly navigate in the **Protocols** or **Run** menu. You can navigate between the menus using the Left and Right arrow keys.

The clock on the menu bar shows real time (if set in the beginning).

The *factory protocols* are arranged into folders according to the type of analyses.

The *protocols tab row* is either colored (active) or uncolored/different colored (inactive).

All the descriptive icons used in the main views are shown in the following table.

Table 4. Icons

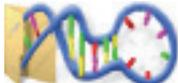
Menu or folder	Icon	Description
		The Protocols menu for exporting device reports. See “Exporting Device Report” on page 41.
	 	Selecting the protocol. See “Selecting Protocol” on page 32. DNA (Factory) or DNA/RNA (User)
		RNA (Factory)
		Cells (user)
		Other
		Last used protocols
	 	Opening the Run menu, see “Viewing Run Menu” on page 34.
		Viewing the Run log
		

Table 4. Icons

Menu or folder	Icon	Description
		The Maintenance menu for viewing and defining instrument options and parameters. See “Viewing and Defining Instrument Options and Settings” on page 39.
		Switching on the UV lamp. See “Switching UV Lamp On” on page 40.
		Exporting device reports. See “Exporting Device Report” on page 41.
		Exporting the Run log. See “Exporting the instrument report” on page 42.
		Importing protocol. See “Importing Protocols” on page 43.
		Exporting protocol. See “Exporting Protocols” on page 44.
		Maintenance protocol
		Viewing software information. See “Viewing Instrument Data” on page 46.
		Selecting the software language. See “Setting Internal Software Language” on page 47.
		Setting the buzzer on or off. See “Setting Buzzer On or Off” on page 48.

Table 4. Icons

Menu or folder	Icon	Description
		Viewing and defining date and time settings. See “ Defining Date and Time Settings ” on page 49.
		Viewing the barcode reader settings. Available when the barcode has been connected to the device.

Last used protocol(s) are shown below the factory and user protocols folders. The number of displayed protocols is limited by the available space.

The info text bar shows explanatory information on how to proceed and which keys to use.

Navigating

This section describes navigation in the KingFisher Duo Prime user interface.

The main view changes according to the selections you make either with the Up or Down arrow keys or the **OK** button. To move into the submenus, use the **OK** button. The available buttons and their function are shown on the info text bar.

The color of the items in the main view, for example, the icon and main view row, change when they are selected (active or inactive).

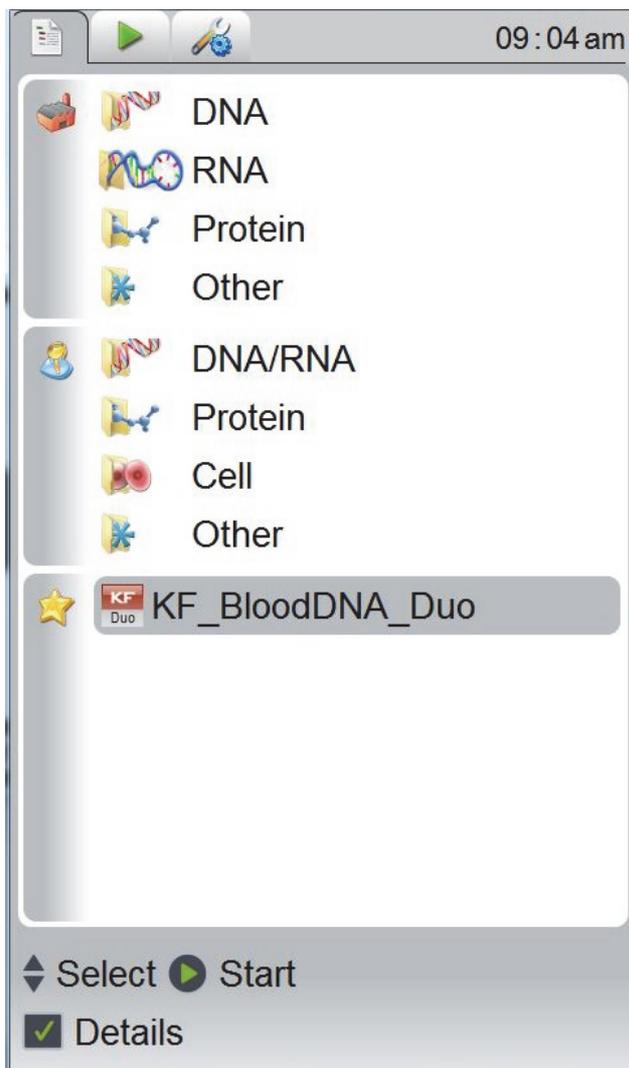


Figure 18. Active row

To move from one menu to another, make sure you are in the main view of one of the menus and use the Left and Right arrow keys. To return from the submenus to the main views, use the Left-arrow key.

The main views of each menu tab are shown in the following figure.



Figure 19. Main views

Using KingFisher Duo Prime PC Software

You can also control the operation of the KingFisher Duo Prime magnetic particle processor by an external computer and run on the BindIt Software. In addition to the KingFisher Duo Prime internal software features, you can download protocols to the instrument or back up protocols from one instrument and transfer them to another.

For more information, see the BindIt Software User Manual (Cat. no. N07974).

Using Internal Software

This section describes procedures concerning the KingFisher Duo Prime internal software.

Factory or User Protocols

This section describes the factory or user set protocols found in the Protocols menu. Factory protocols are protocols which are created by Thermo Fisher Scientific and preloaded into the instrument internal memory in the factory (for example, Thermo Scientific™ KingFisher™ Pure Kit protocols) or downloaded from the KingFisher website (www.thermoscientific.com/kingfisher). User protocols are protocols which are created by the user and transferred using BindIt Software.

Selecting Protocol

❖ To select a protocol:

1. Go to the **Protocols** menu. Select, for example, the DNA row of the factory protocols and press the **OK** button.

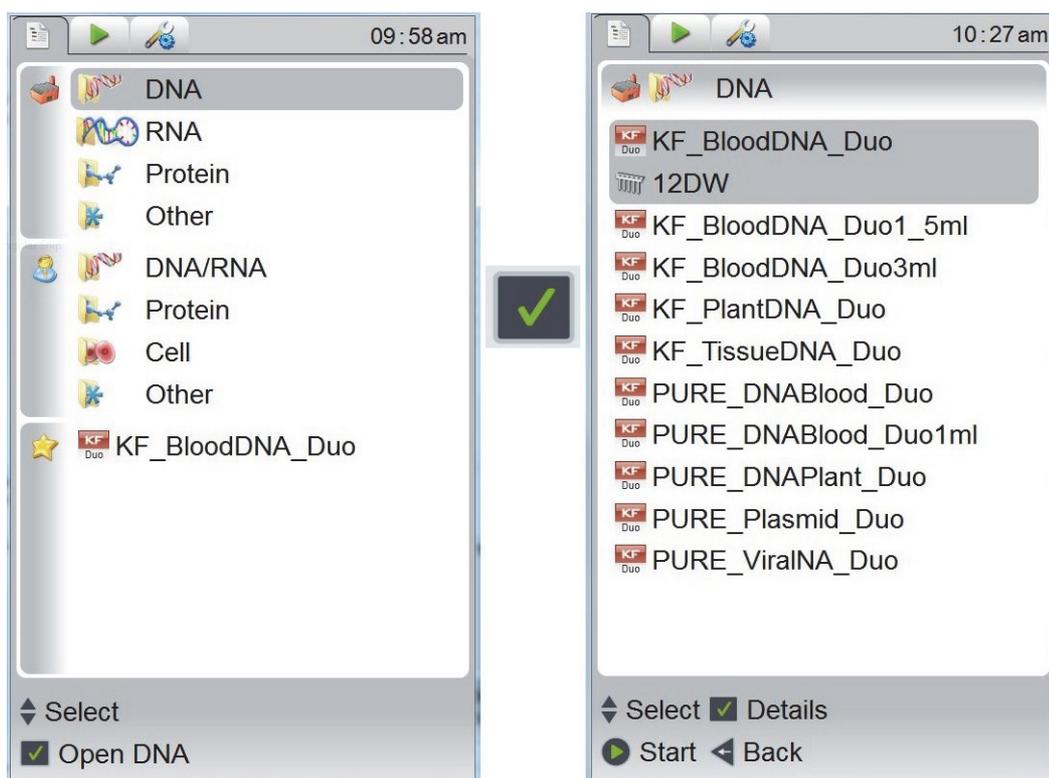


Figure 20. Selecting a protocol

2. Use the Up and Down arrow keys to select the protocol.
3. Press the **OK** button to see the protocol details.

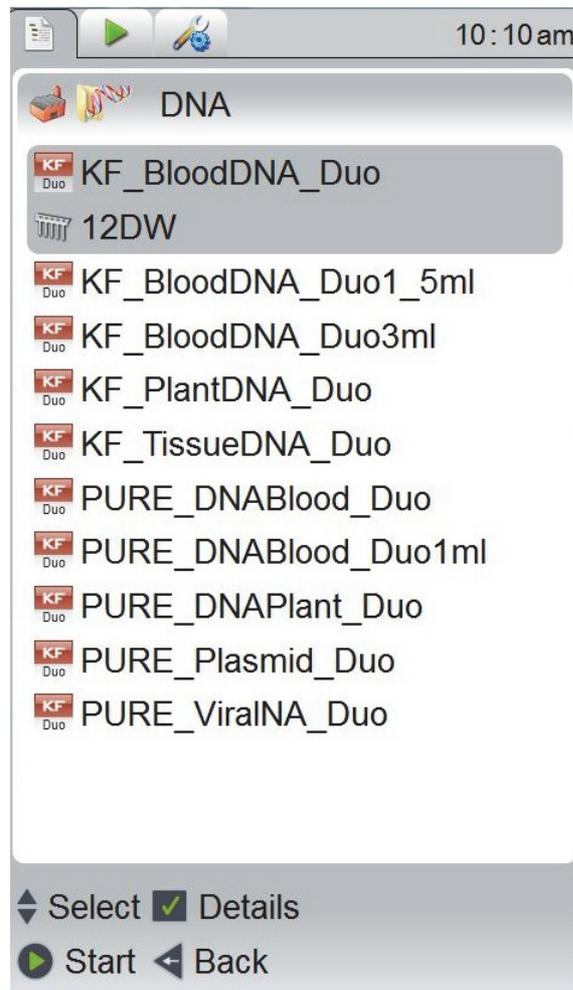


Figure 21. Viewing protocol details



4. To run the protocol, press the **Start** button either from the details view or from the view shown in Figure 4.
5. To return to the Protocols menu, press the Left-arrow key.

Viewing Run Menu



In the **Run** menu, the **Run Log** view is shown when there is no ongoing run. When a protocol run is on, the Run view is shown.

❖ **To view the run log:**

1. Go to the **Run Log** menu.
2. Select the protocol for which you want to see the run log.

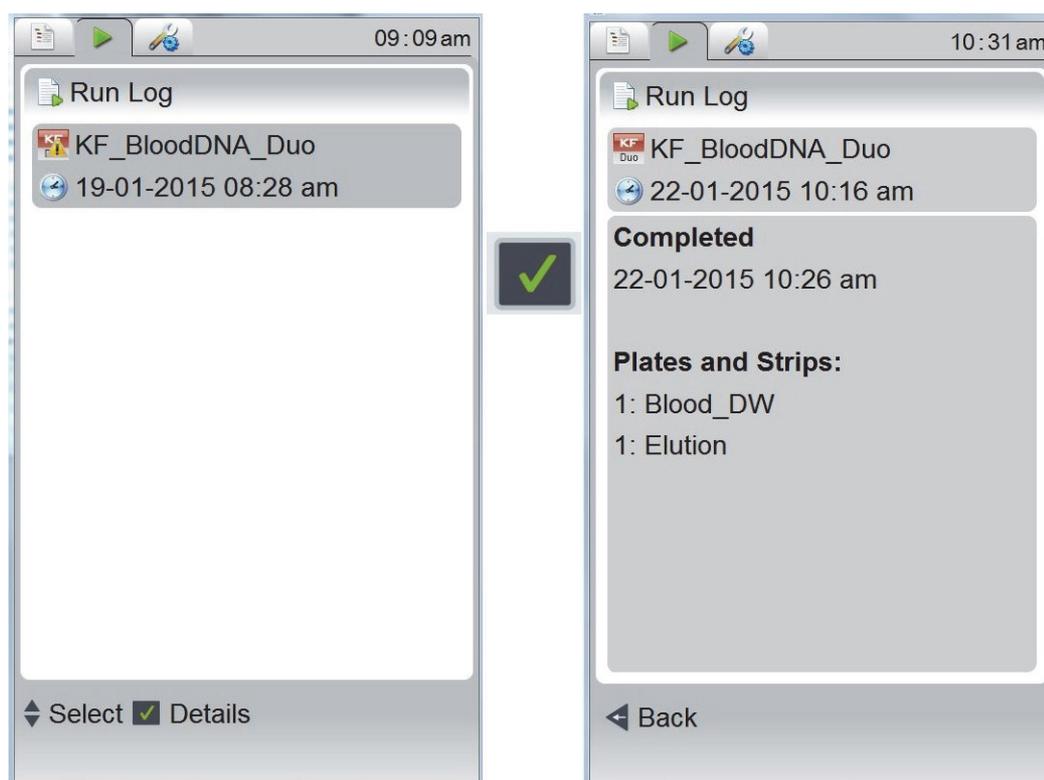


Figure 22. Viewing the run menu

3. To view the details, press the **OK** button.
The time shown refers to the time when this protocol was last started. Used plates and strips, and the time when the protocol was last run are also shown.
4. To return to the **Run Log** menu, press the Left-arrow key.

When a protocol run has been started from the **Protocols** menu, you can see the progress of the selected protocol as shown in the following figure. For more information, see section “[Selecting Protocol](#)” on page 32.

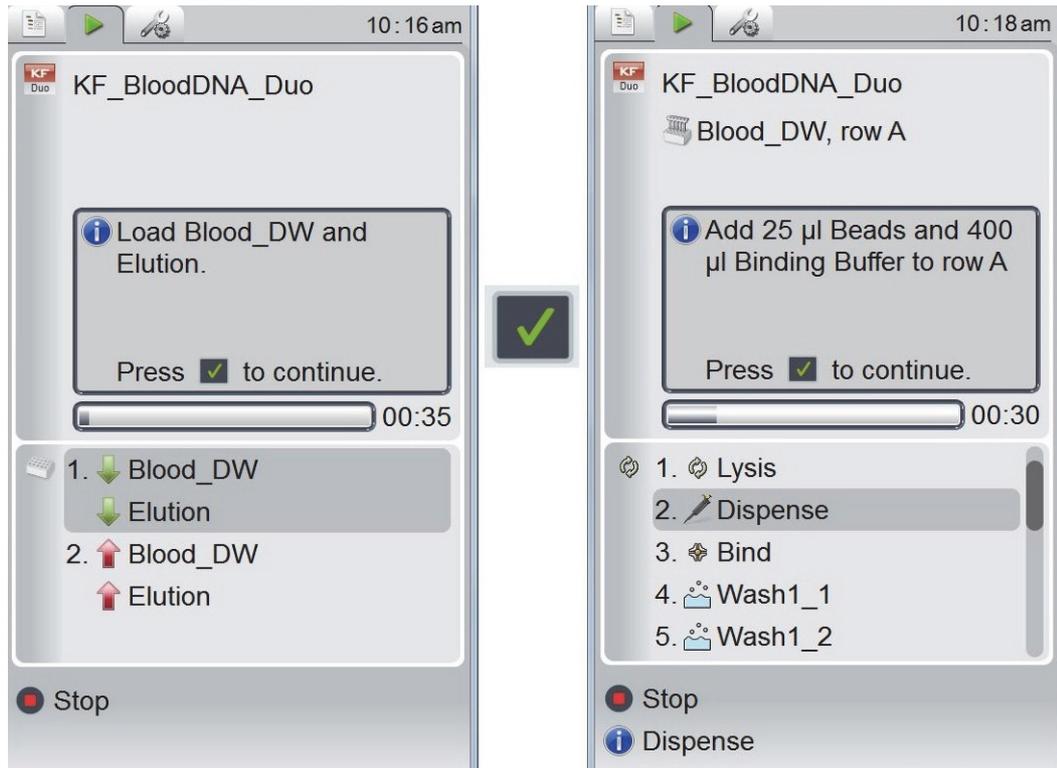


Figure 23. Viewing the progress of the protocol



- To terminate the run, press the **Stop** button. You are asked to confirm the termination or to continue.
- Note that when you pause the operation by pressing the Pause button during a run, the Pause icon flashes on the menu bar after the Pause message appears on the display.
- In addition, the run can include pauses created by the protocol itself, such as a pause to change plates, load a plate, unload a plate, and dispense.
- Press the **OK** button to continue.



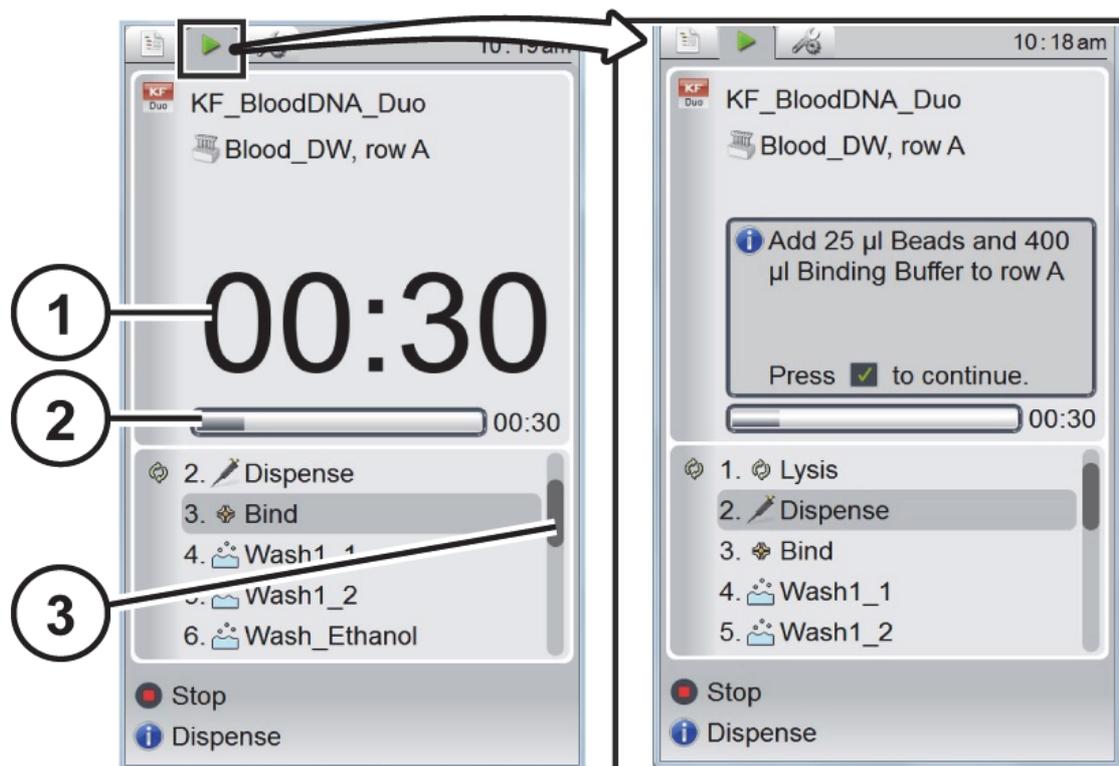


Figure 24. Viewing protocol status

In the previous figure, the following items are shown:

Item	Description
1	Time left before the next pause
2	Remaining run time shown on the time bar.
3	Steps bar.

During the run, the remaining run time is shown in smaller numerals on the time bar. The time shown in bold and larger numerals in the middle of the window indicates the time remaining until the following pause. During the pause, you must be prepared, for example, to load the plate, dispense, or unload the plate and elution strip.

On the right-hand margin of the window, you can see how the steps bar progresses.

When the protocol is completed, the **Run Log** view appears (see the following figure).

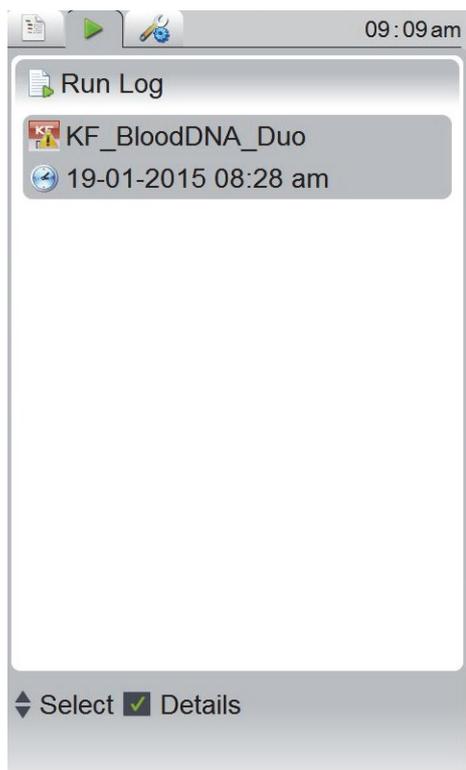


Figure 25. Run Log

When a protocol is started in the **Protocol** menu, a small Run icon is superimposed on the protocol symbol of the active protocol. You can start two protocols at the same time (see the following figure).



Figure 26. Two ongoing runs

Viewing and Defining Instrument Options and Settings



This section describes the instrument parameters which are set in the **Maintenance** menu. The values shown in the **Maintenance** menu remain in the instrument memory and are instrument specific, not protocol specific.

Note If you export device reports, run logs and/or protocols to a blank USB device, the exported items go to the KingFisher Duo Prime folder which is automatically created on the USB memory device. If you transfer protocols from the USB memory device to the instrument, they must already be in the correct folder named KingFisher Duo Prime.



When the USB memory device is plugged in, a small memory stick icon appears at the bottom right corner of the window.

You can also transfer protocols using the BindIt Software. For more information, see the BindIt Software User Manual (Cat. no. N07974).

Switching UV Lamp On

You can use the UV lamp to decontaminate the process chamber. If you open the front lid, the UV lamp shuts down.

UV radiation is useful in decontamination because of its ability to inactivate biological molecules. KingFisher Duo Prime is equipped with a UV lamp that can be used to treat the interior of the instrument with UV light to help with decontamination after cleaning. Note that UV treatment is not a substitute for cleaning. Using the UV lamp treatment alone may not provide sufficient decontamination. For cleaning instructions, see “[Decontamination Procedure](#)” on [page 61](#).

❖ To switch on the UV lamp:

1. Go to the **Maintenance** menu.
2. Select the **UV Lamp** row and press the **OK** button.



Figure 27. Switching on the UV lamp

3. To set the time of the UV lamp, select the **Set time** row and press the **OK** button.
4. Use the Up and Down arrows to set the wanted duration. To accept the setting and to move to the minute setting, press the **OK** button. You can set the duration in hours between 00 and 16 and the duration in minutes between 00 and 59. When you open the setting, the time shown is the last used duration for the UV lamp usage. The default time is 00:30.

Exporting Device Report



The KingFisher Duo Prime device report includes the serial number, software versions, motor offsets and accelerations, temperature control parameters, the startup status, statistics, the run user, factory and maintenance protocols, error logs, settings as well as miscellaneous information.

You can export the instrument report. To do this, a USB memory device has to be plugged in to the instrument (see the following figure).

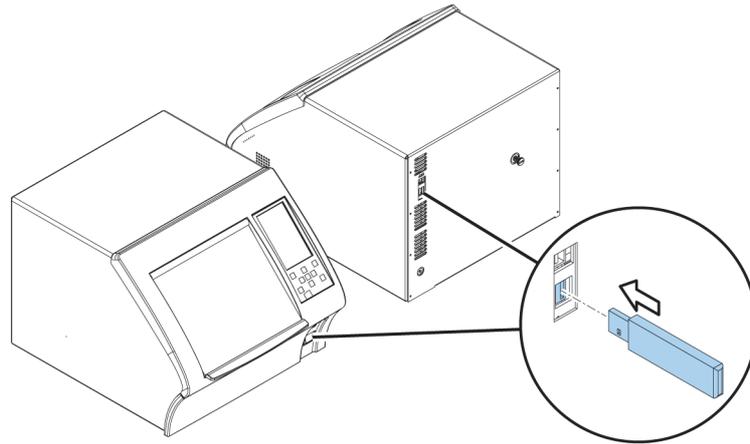


Figure 28. Plugging USB memory device

❖ **To export the device report:**

1. Go to the **Maintenance** menu.
2. Select the **Export Device Report** row and press the **OK** button.
3. Attach the USB memory device or press the Left-arrow key to cancel. The following messages are shown when the export is successful or unsuccessful.

4 Operation

Viewing and Defining Instrument Options and Settings



Figure 29. Exporting the instrument report

Exporting Run Log

The serial number of KingFisher Duo Prime is in the header of the run log. The report includes the protocol name, the time when the protocol was started and stopped, and the plates and strips used of the all the user and factory protocol runs as well as those of all the UV protocol and maintenance protocol runs.

You can export the run log. To do this, a USB memory device has to be plugged into the instrument. Run reports are exported in .CSV format which can be opened in excel. All runs from the export time are included as well as all fields from each run.

❖ To export the run log:

1. Go to the **Maintenance** menu.
2. Select the **Export Run Log** row and press the **OK** button. The following figure illustrates the messages shown when the export is successful or unsuccessful.



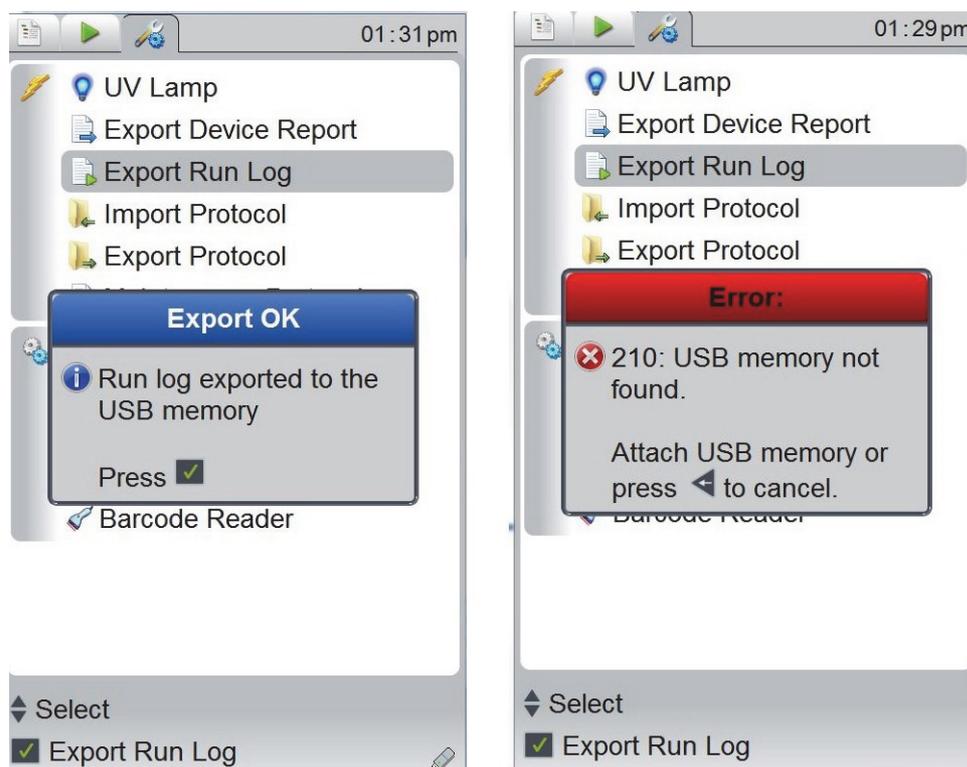


Figure 30. Exporting the run log

3. Attach the USB memory device or press the Left-arrow key to cancel.

Importing Protocols

You can import a protocol, for example, a BindIt protocol file (.bdz) from the BindIt Software or another instrument. To do this, a USB memory device has to be plugged in to the instrument. If the USB device is not plugged in, the following message is shown.



Figure 31. Error message

You can import a protocol into the KingFisher Duo Prime using a USB memory device. For the import, the protocol must be in a folder named `KINGFISHER DUO PRIME`. If you export protocols or run information from the instrument to the USB memory device, the folder is automatically created

4 Operation

Viewing and Defining Instrument Options and Settings

❖ To import a protocol:



1. Go to the **Maintenance** menu.
2. Select the **Import Protocol** row and press the **OK** button.
3. Attach the USB memory device or press the Left-arrow key to cancel.

Exporting Protocols

You can export a protocol, for example, a BindIt protocol file (.bdz) to the BindIt Software or to another instrument. To do this, a USB memory device has to be plugged in to the instrument.

❖ To export a protocol:



1. Go to the **Maintenance** menu.
2. Select the **Export Protocol** row and press the **OK** button.
3. Use the Up and Down arrow keys to select the protocol group.
4. To continue, press the **OK** button.
5. Attach the USB memory device or press the Left-arrow key to cancel.

Selecting Maintenance Protocol

The maintenance protocols include, for example, the protocols needed to refit the transport lock, to change the magnet head, to change the heating block, or run the operational check protocol. You can define which protocol is automatically selected as the default maintenance protocol when the KingFisher Duo Prime is switched on.

❖ **To select the maintenance protocol:**

1. Go to the **Maintenance** menu.
2. Select the **Maintenance Protocols** row and press the **OK** button.

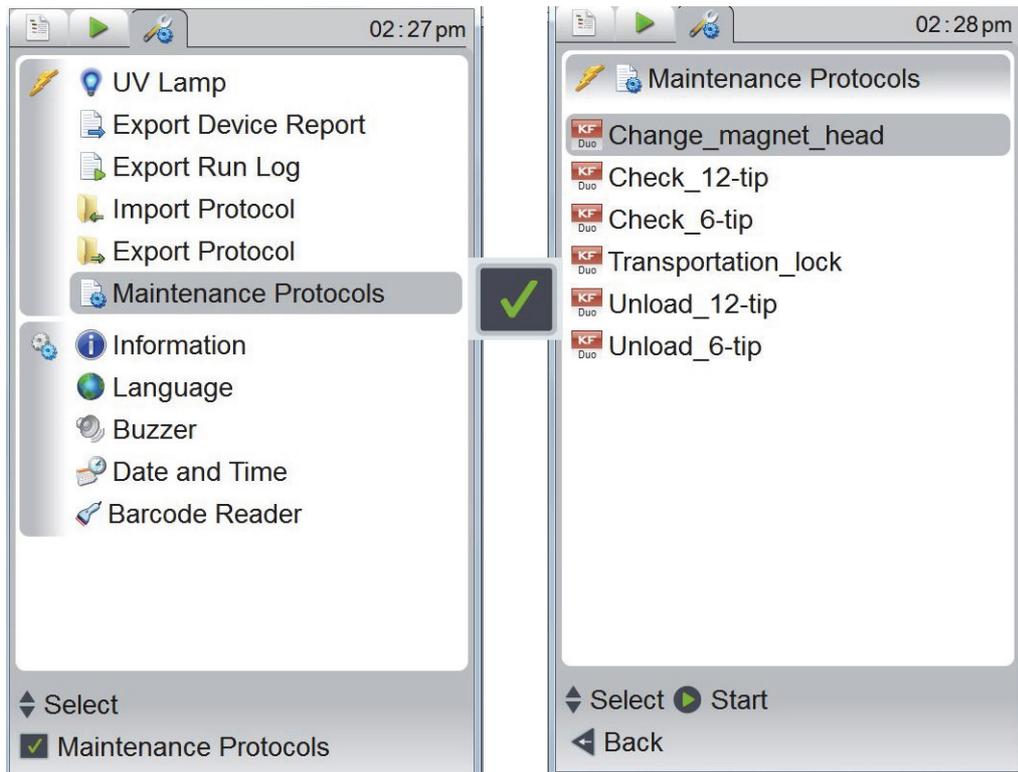


Figure 32. Selecting the maintenance protocol

3. All available maintenance protocols are displayed. Use the Up and Down arrow keys to select the wanted maintenance protocol.
4. Press Start to run the selected protocol.
5. To return to the **Maintenance** menu, press the Left-arrow key.

Viewing Instrument Data

The device information shows the name of the instrument, the internal software version, the manufacturer and the serial number of the instrument unit.

❖ **To view instrument data:**

1. Go to the **Maintenance** menu.
2. Select the **Information** row and press the **OK** button.

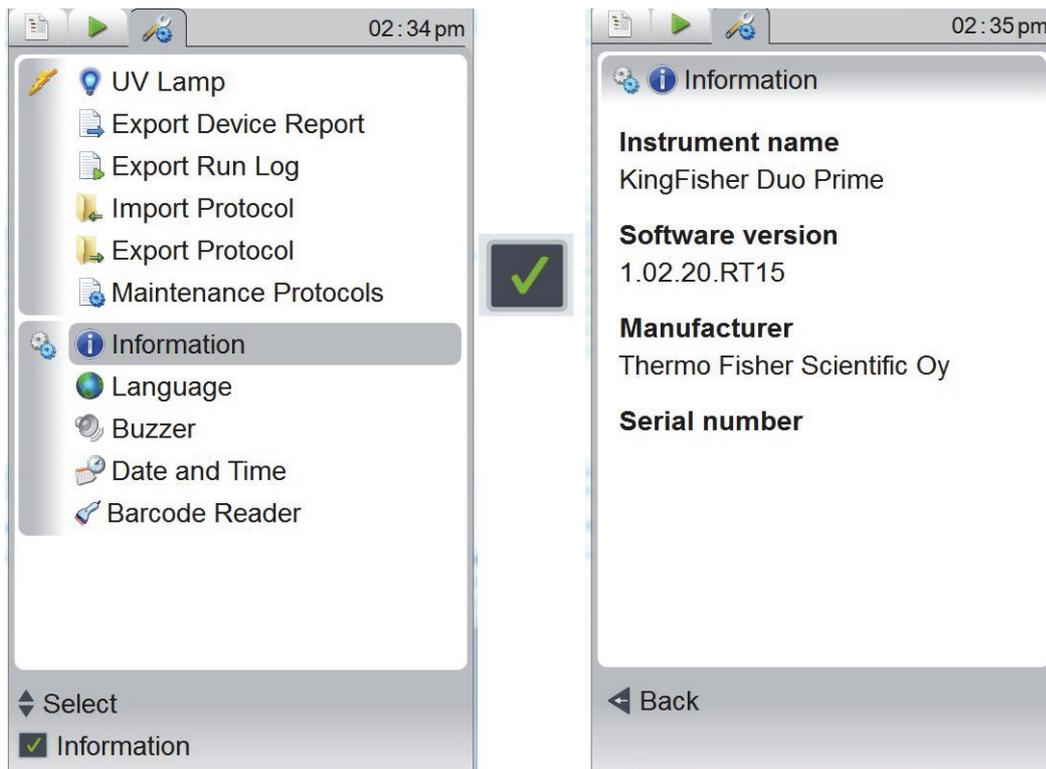


Figure 33. Viewing instrument data

3. To return to the **Maintenance** menu, press the Left-arrow key.

Setting Internal Software Language

You can set the language of the internal software.

❖ **To set the language:**

1. Go to the **Maintenance** menu.
 - Select the **Language** row and press the **OK** button.

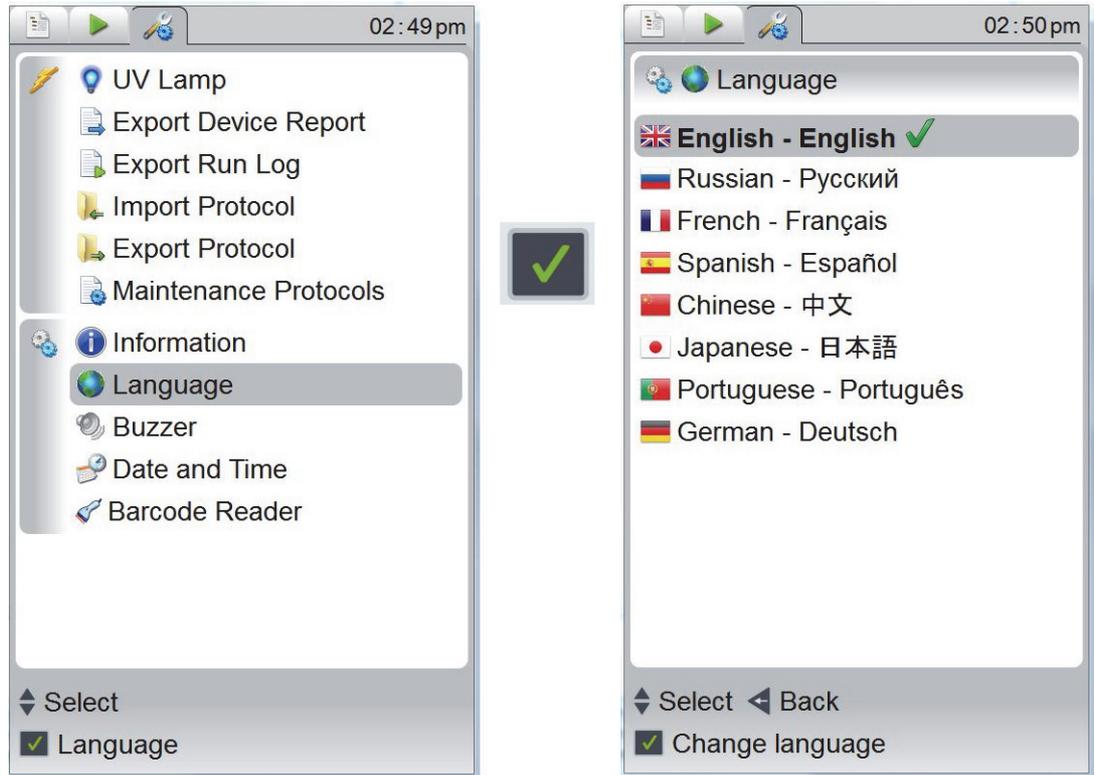


Figure 34. Defining language settings

2. Use the Up and Down arrow keys to select the wanted language. The available languages are English, Russian, French, Spanish, Chinese, Japanese, Portuguese, and German. The default language is English.
3. To change the language, press the **OK** button.
4. To return to the **Maintenance** menu, press the Left-arrow key.

Setting Buzzer On or Off

You can choose whether or not the instrument produces a sound for different functions. Note that all functions make a certain sound.

❖ **To set the buzzer on or off:**

1. Go to the **Maintenance** menu.
2. Select the **Buzzer** row and press the **OK** button.

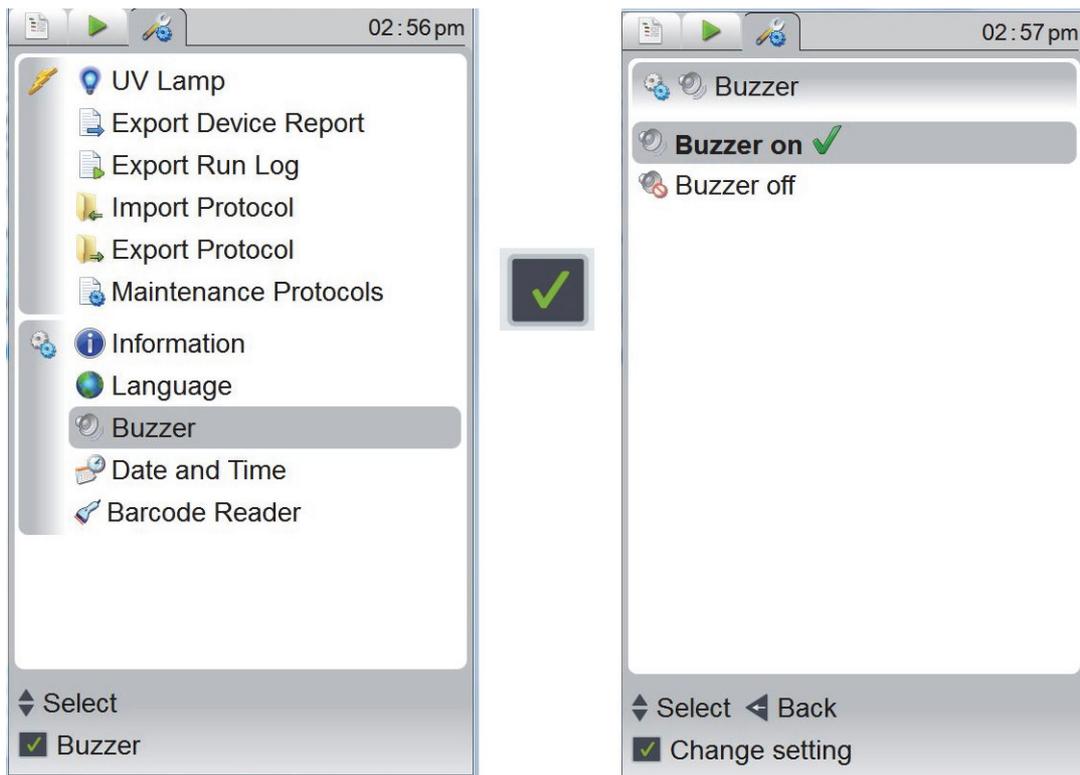


Figure 35. Setting the buzzer

3. Use the Up and Down arrow keys to select whether the buzzer (audible sound) is on or off. The default setting is Buzzer on.
4. To accept the selection, press the **OK** button.
5. To return to the **Maintenance** menu, press the Left-arrow key.

Defining Date and Time Settings

You can set the date and time of the instrument.

❖ **To set the date and time:**

1. Go to the **Maintenance** menu.
2. Select the **Date and time** row and press the **OK** button.

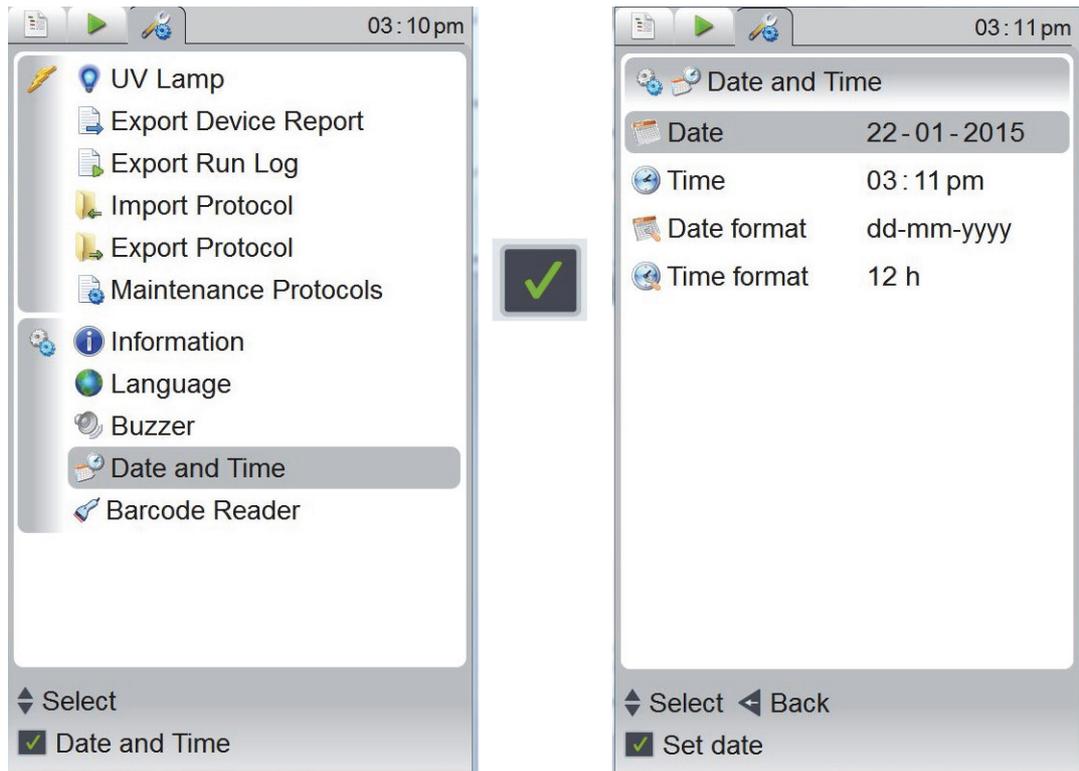


Figure 36. Setting date and time

3. Use the Up and Down arrow keys to select the date, the time, the date format, or the time format, and then press the **OK** button.
 - To set the correct day, month, and year, use the Up and Down arrow keys. When you have the correct value for each, press the **OK** button.
 - To define the correct time, use the Up and Down arrow keys. When you have the correct value, press the **OK** button.
 - To select the desired date format, use the Up and Down arrow keys. The available date formats are: *dd.mm.yyyy*, *ddlmm/yyyy*, *dd-mm/yyyy*, *mm/dd/yyyy*, and *yyyy-mm-dd*. The default is *dd.mm.yyyy*. When you have the correct value, press **OK**.
 - To select the wanted Time format (12h or 24h), use the Up and Down arrow keys. When you have the correct value, press the **OK** button.
4. To cancel or to return to the **Maintenance** menu, press the Left-arrow key.

Handling Consumables

This chapter advises on how to handle the KingFisher Duo Prime consumables, such as tip combs, plates and elution strip. For more information, see chapter “[Ordering Information](#)” on [page 75](#).

Tip Combs

Specially designed tip combs that protect the magnets during the process are available for different plate types and applications.

❖ **To handle KingFisher Duo Prime 12-tip combs correctly:**

1. Take an individual KingFisher Duo Prime 12-tip comb from the package (see the following figure).

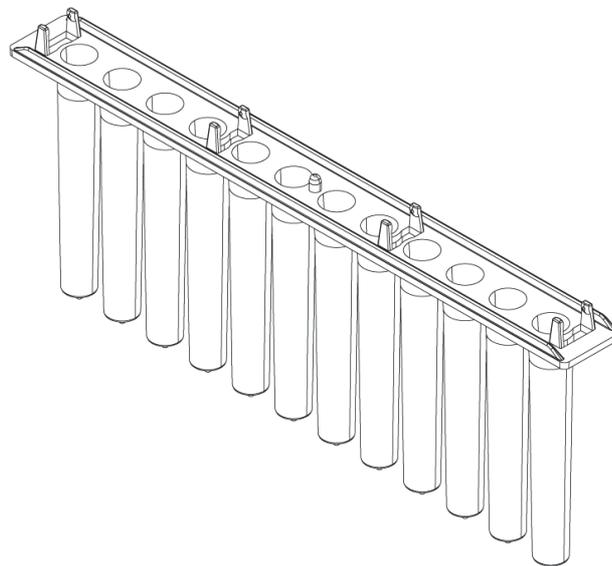


Figure 37. KingFisher Duo Prime 12-tip comb

2. Unpack the plastic bag and place one of the tip combs onto the tip row B of the KingFisher 96 deep well plate (see the following figure). Avoid bending the tip combs to ensure proper instrument operation. If the tip comb is bent during storage, bend it slightly to straighten it.

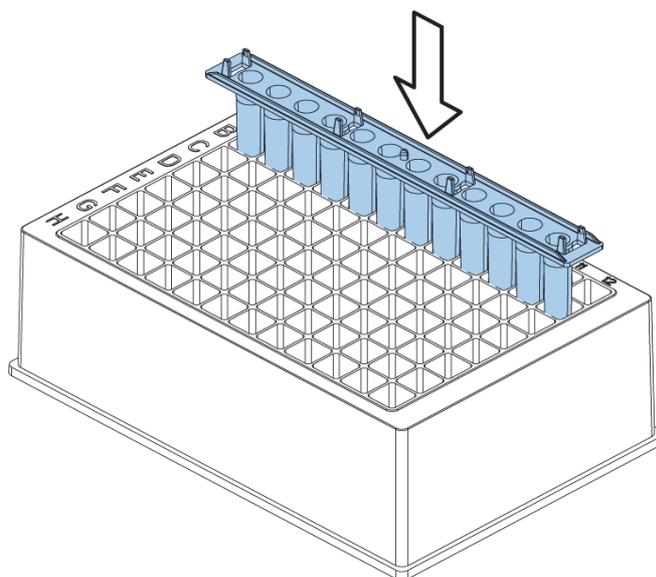


Figure 38. Pacing the KingFisher Duo Prime 12-tip comb

❖ **To handle KingFisher Duo Prime 6-tip combs correctly:**

1. Take a KingFisher Duo Prime 6-tip comb package where four unattached tip combs are packed onto a KingFisher Flex 24 deep well plate.
2. Place one of the tip combs onto the tip row (row B) of an empty KingFisher Flex 24 deep well plate (see the following figure).

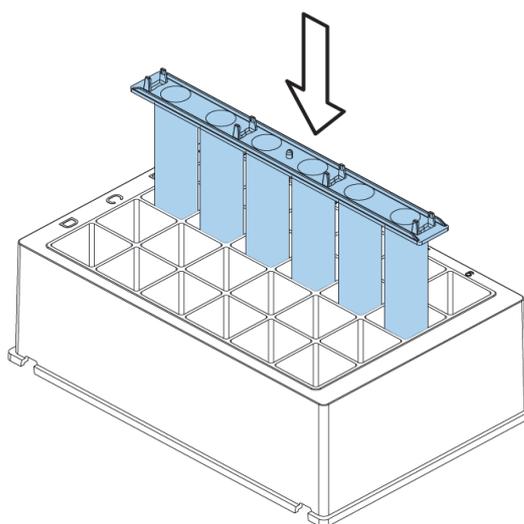


Figure 39. KingFisher Duo Prime 6-tip comb inserted

3. Before you use the tip comb, press the tip comb evenly by hand against the enclosed 24 deep well plate.

Plates

The KingFisher Duo Prime is only compatible with two deep well plates, KingFisher Flex 24 deep well plates and Microtiter deep well 96 plates.

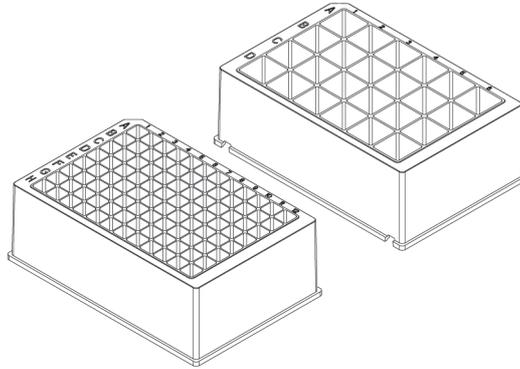


Figure 40. KingFisher Duo Prime plates



CAUTION Only use plates that are listed in the following table. Other plates may not be compatible with the KingFisher Duo Prime heating blocks. They may also cause unexpected problems, such as cross-contamination due to the divergent well volume and bottom height of the plate.

Table 5. Processing volumes vs. plate types and magnet heads

Head/Plate	KingFisher Flex 24 deep well plate	Microtiter deep well 96 plate	KingFisher Duo Prime elution strip
KingFisher Duo Prime head for 24 DW plate	200-5000 μ l	-	-
KingFisher Duo Prime head for 96 DW plate	-	50-1000 μ l	30-130 μ l

Elution Strip

The KingFisher Duo Prime elution strip can only be used with a KingFisher Duo Prime instrument installed with a 12-pin magnet head.

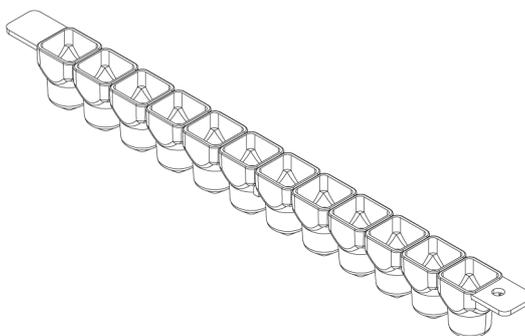


Figure 41. KingFisher Duo elution strip

The elution strip is typically used to perform the elution step that concentrates the purified sample. It is easy to pipette small volumes into the elution strip due to its low design. The eight elution strips are also convenient for storage and can be collected onto the 96 elution frame.

The special KingFisher Duo Cap for elution strip (97003540) can be used to close the elution strips for storage. The elution strip holder holds the elution strip in place. To release the holder, lift to open it. To close the holder, turn it on top of the elution strip. For illustrations on the elution strip holder, see the following figures.

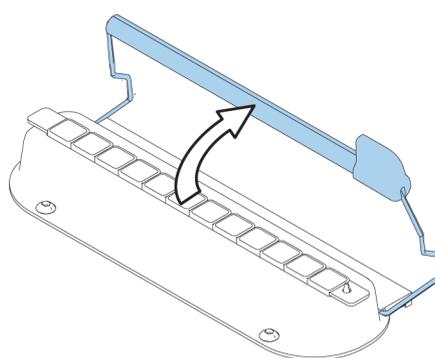


Figure 42. Releasing the elution strip holder

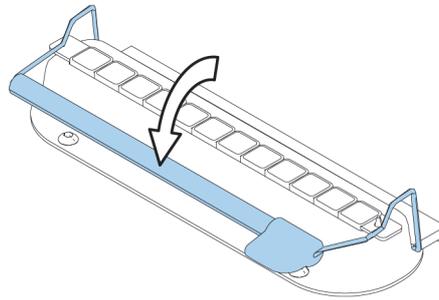


Figure 43. Closing the elution strip holder

Starting KingFisher Duo Prime

You can have two runs ongoing at the same time.

❖ **To start the instrument:**



1. Select a protocol by using the arrow keys and press the **START** button or use the BindIt Software to run the desired protocol on the PC. If you have the 2D barcode reader for KingFisher (N16640) connected (see [Figure 3](#) on [page 4](#)), use the barcode reader to read the barcode of consumables and/or samples. To check the barcode reader status, select the **Maintenance** menu and then click the **Barcode Reader** row.

For more information on how to connect the barcode reader, see “[Instrument Layout](#)” on [page 3](#).

- Use the Up and Down arrows to select the wanted row and to read the respective barcode.

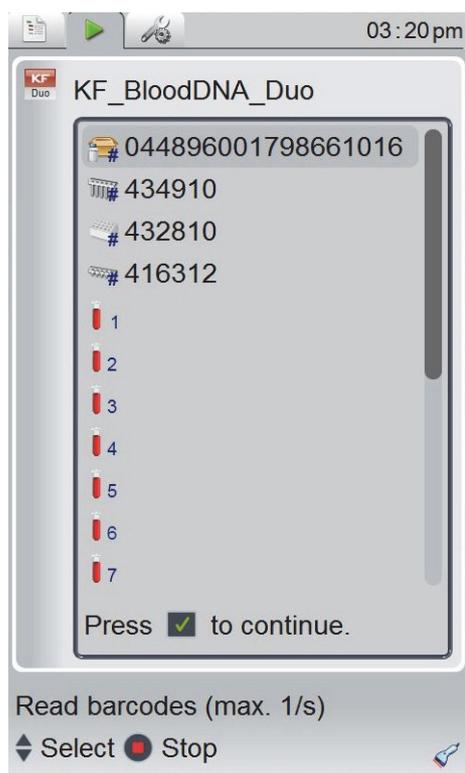


Figure 44. Using the barcode reader to read barcodes



- The information is stored to the run report which can be exported (see section “Exporting the instrument report” on page 42).
 - Press the **OK** button.
2. Make sure that the front lid is open.
 3. Load the plate(s) and the elution strip(s) in the order that the protocol requests.
 - Place the plate into the device so that the A1 corner is in the inner circle in the upper right corner (see the following figure).
 - Use the elution strip holder to hold the strip in place. There is a tap that helps placing the elution strip correctly (see the following figure).

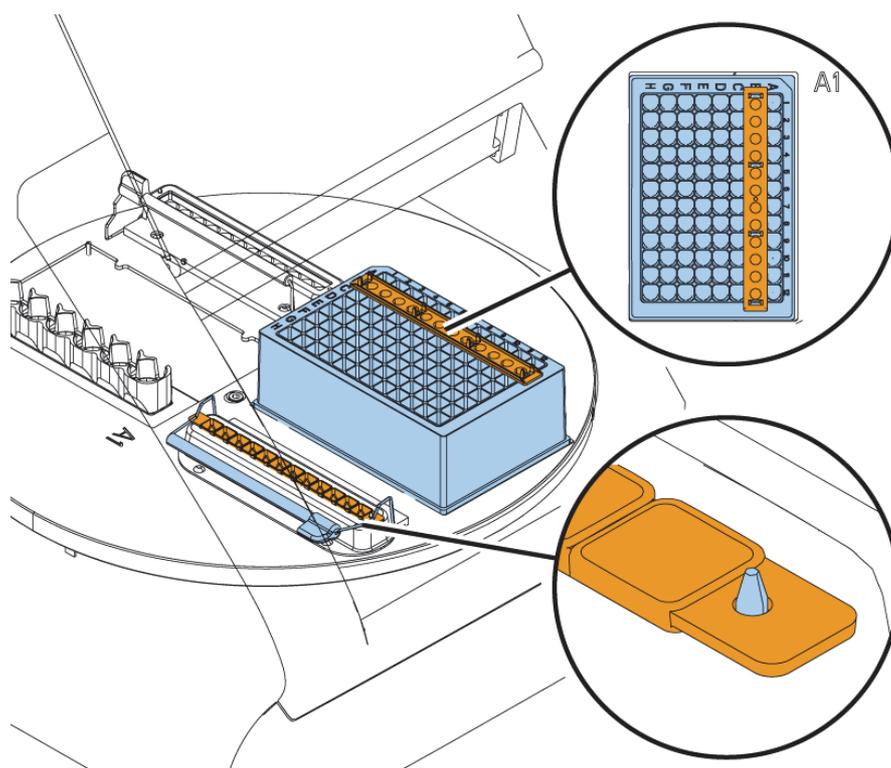


Figure 45. Loading the plate

4. When you have loaded the requested plates into their respective plate positions, press the **OK** button.
 - The instrument functions with either one or two plates depending on the number of steps.
 - The tip comb always has to be placed manually onto a KingFisher DW plate row B (see the previous figure).

Note You can place only one tip comb onto the KingFisher plate for one run.

- The two plate positions and the A1 positions of the two plate positions are clearly marked on the turntable. When the instrument is in its basic position, plate position 1 is under the KingFisher Duo Prime head.
- Note that at the end of a protocol run, the turntable may stop in a different position than the starting position. Loading the plate and elution strip is shown in the following figures. Make sure that the elution strip is placed in the correct direction into the elution block. Check that the perforated end is facing you. The tap also helps placing the strip correctly.
- The tip comb automatically locks onto the tip comb holder from the plate.
- When the turntable rotates, the magnet head moves on top of the fixed shield plate that forms a protective cover.

5. Close the front lid. The front lid protects the instrument against environmental contamination.

Note You can leave the front lid open if desired. This action does not break the run.

6. When the run is finished, remove the plate(s) and strip according to the protocol request. Confirm each plate removal by pressing the **OK** button.

Tip You can start another run normally while the previous run is ongoing.

Stopping

It is recommended to shut down the instrument for the night and weekends.

❖ To shut down the KingFisher Duo Prime:

1. Switch the instrument to the OFF position. .



WARNING Remove any plates, strips or tip combs still in the instrument. Dispose of all microplates, strips and tip combs as biohazardous waste.

2. Wipe the turntable surface and the adjacent instrument surface with a soft cloth or tissue paper moistened with distilled water, a mild detergent (SDS, sodium dodecyl sulfate) or soap solution.
3. If you have spilled infectious agents on the turntable, disinfect it with 70% ethanol or another disinfectant (see “[Decontamination Procedure](#)” on [page 61](#)).

Emergency Situations

If an abnormal situation occurs during operation, do the following:

1. Switch the instrument to the OFF position.
2. Unplug the instrument immediately from the power supply.
3. Take the appropriate corrective measures, for example:
 - If fluids have spilled inside the instrument, wipe the turntable surface and the adjacent instrument surface with a soft cloth or tissue paper moistened with distilled water, a mild detergent (SDS, sodium dodecyl sulfate) or soap solution.
 - If you have spilled infectious agents on the turntable, disinfect it with 70% ethanol or another disinfectant (see “[Decontamination Procedure](#)” on [page 61](#)).

Note Do not disassemble the instrument.

4. If the corrective measures taken do not help, contact authorized technical service or your local Thermo Fisher Scientific representative. See also chapter “[Maintenance](#)” on [page 59](#) and “[Troubleshooting](#)” on [page 71](#).

4 Operation

Emergency Situations

Maintenance

This chapter describes the regular and preventive maintenance and other maintenance tasks for the KingFisher Duo Prime instrument.

Regular and Preventive Maintenance

For reliable daily operation, keep the instrument free of dust and liquid spills.

Do not use abrasive cleaning agents, because they are likely to damage the paint finish.

It is recommended that you clean the case of the instrument periodically to maintain its good appearance. A soft cloth dampened with a warm, mild detergent solution is sufficient.

Clean the outside surfaces of the instrument and the turntable with clean low-pressure compressed air or a cloth dampened with water or a mild detergent when necessary.

Although KingFisher Duo Prime is constructed from high-quality materials, you must immediately wipe away spilled saline solutions, solvents, acids or alkaline solutions from outer surfaces to prevent damage.



CAUTION Painted surfaces can be cleaned with most laboratory detergents. Dilute the cleaning agent as recommended by the manufacturer. Do not expose the surfaces to concentrated acids or concentrated alcohols for prolonged periods of time as they may cause damage.

Clean the display areas with a mild laboratory detergent. The keypad has a wipe-clean surface.

Plastic covers and surfaces can be cleaned with a mild laboratory detergent or alcohol.



WARNING If any surfaces are contaminated with biohazardous material, apply mild sterilizing solution to the surface.



CAUTION Do not autoclave any part of this instrument.

Cleaning Turntable

Keep the turntable surface clean to prevent dust and dirt from entering the instrument. Clean the turntable surface at least once a week using a soft cloth or tissue paper soaked in a mild detergent solution (SDS), soap solution or alcohol.

If you have spilled infectious agents on the turntable, clean it with a cloth dampened with water, mild bleach or a mild detergent.

The turntable can only be detached for service purposes, and not for cleaning purposes.

You can gently rotate the turntable while the instrument is switched off.

Cleaning Magnetic Rods

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



CAUTION Do not keep the KingFisher Duo Prime close to magnetic tapes, computer discs or other magnetic storage systems, such as credit cards, as they can be damaged by the strong magnetic field of the KingFisher Duo Prime heads. Do not hold the KingFisher Duo Prime heads close to a PC display, as this may damage the display. Do not use metal tools when handling KingFisher Duo Prime heads. Be careful not to break the magnets while cleaning.



WARNING This product contains very strong permanent magnets. People wearing a pacemaker or metallic prostheses should not use this product. A pacemaker or prostheses may be affected or damaged if it comes in close contact (10 cm or 3,9 inches) with a strong magnetic field.

Cleaning Shield Plate

If required, wipe the shield plate using a soft cloth or tissue paper soaked in a mild detergent solution (SDS), soap solution or alcohol. The shield plate is shown in Figure 1 in chapter “[Instrument Layout](#)” on [page 3](#).

Disposal of Materials

Follow laboratory and country-specific procedures for the disposal of biohazardous or radioactive waste. Refer to local regulations for the disposal of infectious material.



WARNING The samples can be potentially infectious. Dispose of all used disposable plates, strips and tip combs, disposable gloves, syringes, disposable tips, and such as biohazardous waste.

Decontamination Procedure

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



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

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

It is strongly recommended to perform the complete decontamination procedure before relocating the instrument from one laboratory to another or before sending it to service.

Example of decontaminants:

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



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

1. Prepare the decontaminant: 200 ml 4% glutaraldehyde solution (or another agent recommended by your safety officer).
2. Empty the turntable.
3. Switch OFF the power and disconnect the mains supply cable.
4. Disinfect the outside of the instrument using a cloth dampened with 70% ethanol.
5. Place the instrument in a large plastic bag. Ensure that the front lid is open.
6. Place a cloth soaked in the prepared solution into the bag. Ensure that the cloth does not come into contact with the instrument.
7. Seal the bag and leave the instrument in the bag for at least 24 hours.
8. You can use the UV lamp to decontaminate the process chamber. For more information, see section “[Switching UV Lamp On](#)” on page 40.

Packing Instrument for Transportation or Service

To pack the instrument for service, follow the guidelines presented in this chapter.



CAUTION It is important that the instrument is thoroughly decontaminated before it is removed from the laboratory or any servicing is performed on it.

When you ship the instrument for service, do the following:

- Inform about the use of hazardous materials.
- Decontaminate the instrument beforehand.
- Remove the KingFisher Duo Prime head and place it into its transport package. Also remove the heating blocks.
- Before packing the instrument and before turning the power off, keep the power switched on and run the head to the correct location, and then install the transport lock. For more specific instructions, see section “[Refitting Transport Lock](#)” on [page 62](#).
- Pack the instrument according to the enclosed packing instructions.
- Use the original packaging to ensure that no damage will occur to the instrument during shipping. Any damage causes additional labor charges.
- Enclose a dated and signed Certificate of Decontamination (see “[Appendix A](#)” on [page 79](#)) inside and attached to the outside of the package, in which you return your instrument (or other items).
- Enclose the return goods authorization number (RGA) given by your Thermo Fisher Scientific representative.
- Indicate the fault after you have contacted your local Thermo Fisher Scientific representative or Thermo Fisher Scientific’s technical service department.

For more information on storage and transportation temperatures, see “[General Specifications](#)” on [page 67](#).

Refitting Transport Lock

❖ **To refit the transport lock:**

1. Choose the `Transportation_lock` protocol under the **Maintenance** menu using the Up and Down arrow keys.
2. Press the **START** key.
3. Switch off the power.
4. Refit the transport lock into place by screwing the finger screw with spring suspension clockwise (see the following figure). There is only one possible position for the finger screw to lock when the processing head is correctly located after Steps 1 to 2.

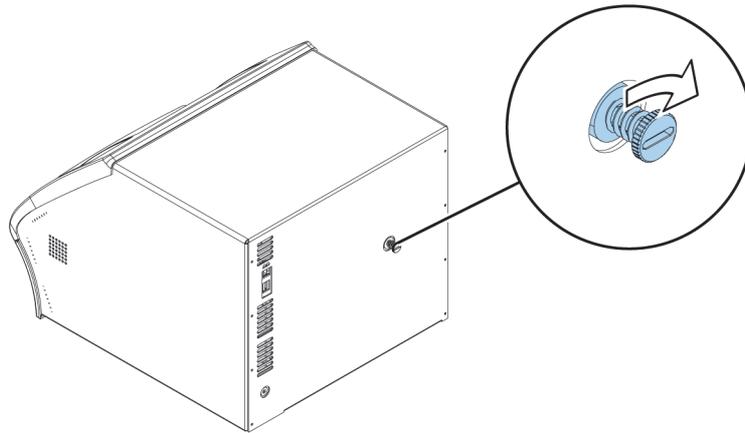


Figure 46. Refitting the transport lock

Placing Internal Cushions

To protect the instrument during transport, place back the internal cushions that were removed when unpacking and installing the instrument.

First place the smaller cushion which protects the UV lamp, and then place the larger cushion in the middle. For illustrations, see the following figures.

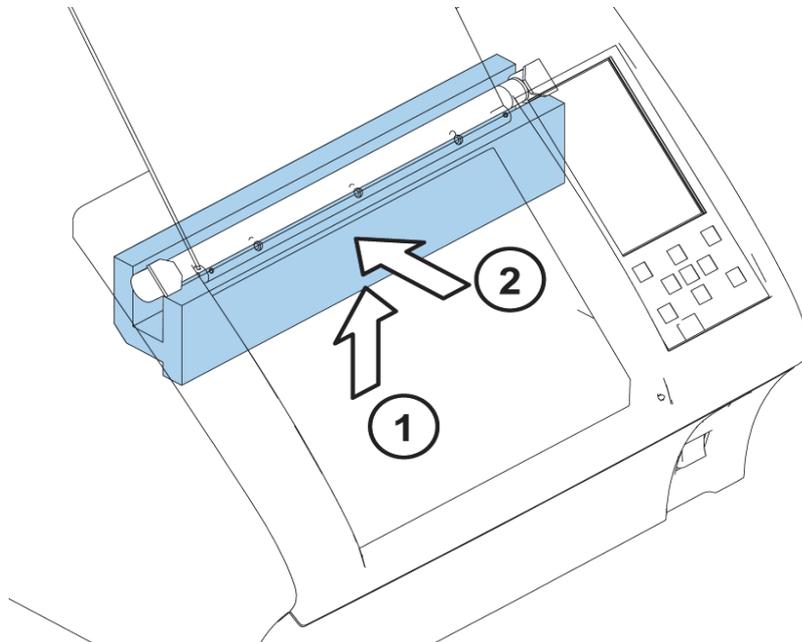


Figure 47. Placing the UV lamp protection

5 Maintenance

Packing Instrument for Transportation or Service

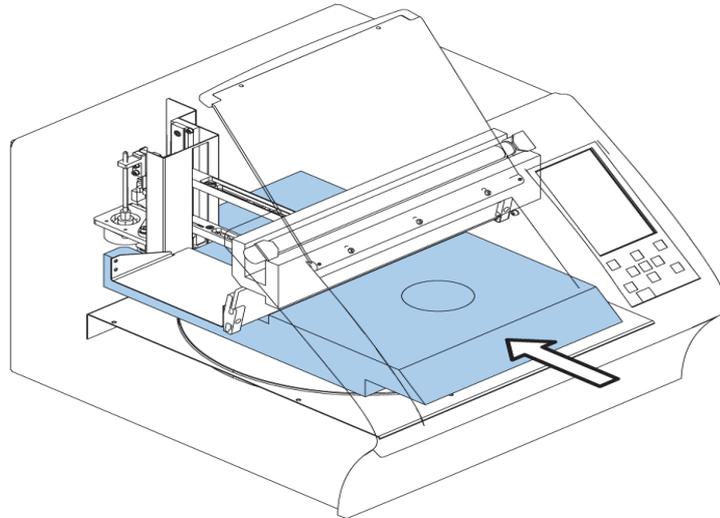


Figure 48. Placing internal cushions

Service Contracts

It is recommended to maintain and service the instrument regularly every 12 months on a contract basis by the manufacturer's trained service engineers. This ensures that the product is properly maintained and gives trouble-free service. For more information, contact the Thermo Fisher Scientific technical service department.

Maintaining System Log

To properly maintain the system, the system log is useful. It contains a short summary of the use, maintenance procedures, error messages and other information on the use of the system. For more information, see “[Appendix B](#)” on [page 81](#). Copy the table as many times as necessary but leave the blank original inside the user manual.

Disposal of Instrument

If the KingFisher Duo Prime has to be disposed of, follow the guidelines given in this section.



WARNING Decontaminate the instrument before disposal. For more information, see “[Decontamination Procedure](#)” on [page 61](#). Follow laboratory and country-specific procedures for biohazardous or radioactive waste disposal.



WARNING The used lithium (Li) battery is regulated waste and must be disposed of according to local regulations. The Li battery has to be changed by an authorized service technician only. Instructions for changing the Li battery are described in the service manual.



WARNING Dispose of the instrument according to the legislation stipulated by the local authorities concerning take-back of electronic equipment and waste. The procedures vary by country.

Pollution degree	2 (for more information, see Safety specifications in Chapter Technical Specifications)
Method of disposal	Electronic waste
	Contaminated waste
	(Infectious waste)

Regarding the original packaging and packing materials, use the recycling operators known to you.

For more information, contact your local Thermo Fisher Scientific representative.

5 Maintenance

Packing Instrument for Transportation or Service

Technical Specifications

General Specifications

Thermo Fisher Scientific reserves the right to change any specifications without prior notice as part of our continuous product development program. The general specifications are presented in the following table. For information on accessories, see “[Accessories and Consumables](#)” on [page 76](#).

Table 6. General specifications

Item	Value
Overall dimensions	
• instrument	• <i>ca.</i> 400 mm (W) x 460 mm (D) x 340 (H) [15.7” (W) x 18.1” (D) x 13.4” (H)]
• transport package	• 520 mm (W) x 570 mm (D) x 540 mm (H) 20.5” (W) x 22.4” (D) x 21.3” (H)
Weight	
• instrument	• <i>ca.</i> 17 kg [37,5 lbs]
• instrument with transportation package	• <i>ca.</i> 21 kg [46 lbs]
Operating conditions (indoor use)	+4°C to +40°C; the maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C Indoor use only
Transportation conditions	-40°C to +70°C, packed in transport packaging
Storage conditions	-25°C to +50°C, packed in transport packaging
Mains power supply	100–240 Vac, 50/60 Hz, nominal Automatic voltage detection
Power consumption	96 VA max.; 10 VA standby
Heat dissipation	328 BTU max.
UV lamp	8W; duration is up to 16 hours
Internal memory	Space for <i>ca.</i> 200 protocols
Protocol import	Using PC or USB memory device
BindIt Software compatibility	Yes
Computer interface	USB

Table 6. General specifications

Item	Value
Robot compatibility	No
Normal use	10 runs/day, 250 days/year, with 40 min protocols having a medium speed setting, RT

Performance Specifications

The performance specifications are presented in the following table.

Table 7. Performance specifications

Item	Value
Processing volume	96 DW plate, 12-pin magnet head: 50–1,000 µl Elution strip, 12-pin magnet head: 30–130 µl 24 DW plate, 6-pin magnet head: 200–5,000 µl 200–5,000 µl performance may vary depending on the mixing speed and liquid
Capacity (samples per run)	12-pin magnet head: up to 12 6-pin magnet head: up to 6 24 uninterrupted if two runs are ongoing at the same time with a 12-pin magnet head
Collection efficiency of the particles (indoor use)	≥ 95%, Microtiter deep well 96 plate, neutral wash buffer containing detergent, 2.8 µm particles, 3 collections, RT
Magnetic particle size	ca. > 1 µm
Magnet rods	12 or 6, interchangeable KingFisher Duo heads
Plates per deck	2
Plate types (disposable) * Recommended filling volume	Microtiter deep well 96 plate (50–1,000 µl*) KingFisher Flex 24 deep well plate (200–5,000 µl*)
Elution strip	Special design, 1 x 12 format
Tip combs (polypropylene – disposable)	12 / 6 in one frame for Microtiter deep well 96 plate or KingFisher Flex 24 deep well plate
Automatic tip load	Yes
Heating/cooling temperature	<ul style="list-style-type: none"> plate row block elution strip block <ul style="list-style-type: none"> From +10°C to 75°C, instrument in RT From 4°C to 75°C, instrument in RT
Heating block accuracy	± 1°C, up to +75°C, instrument in RT
Keypad / Display	START / PAUSE / STOP / OK / ROTATE / four arrow keys & BACK (Left-arrow key) / LCD 5" 480 x 800 pixel color display

Safety Specifications

This section describes the safety specifications for the KingFisher Duo Prime instrument which are in conformity with the requirements.

KingFisher Duo Prime bears the following markings:

- Type 706
- +15 VDC/6 A
- CE mark

KingFisher Duo Prime conforms to the following requirements:

- 2006/95/EC (Low Voltage Directive)
- 2004/108/EC (Electromagnetic Compatibility Directive, EMC)
- FCC Part 15, Subpart B/Class B (July 2004)
- 2012/19/EC (Waste of Electrical and Electronic Equipment)
- 2011/651/EC (RoHS Directive – Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment)
- 2006/42/EC (Machinery Directive)

The safety specifications are also met under the following environmental conditions in addition to or in excess of those stated in the operating conditions:

Table 8. Environmental requirements

Condition	Requirement
Altitude	Up to 2000 m
Temperature	4°C to +40°C
Humidity	Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C
Mains supply fluctuations	± 10% from nominal
Installation category (overvoltage category)	II according to IEC 60664-1 (see Note 1)
Pollution degree	2 according to IEC 60664-1 (see Note 2)

Note 1: *The installation category (overvoltage category)* defines the level of transient overvoltage which the instrument is designed to withstand safely. It depends on the nature of the electricity supply and its overvoltage protection means. For example, in CAT II, which is the category used for instruments in installations supplied from a supply comparable to public mains, such as hospital and research laboratories and most industrial laboratories, the expected transient overvoltage is 2500 V for a 230 V supply and 1500 V for a 120 V supply.

Note 2: *The pollution degree* describes the amount of conductive pollution present in the operating environment. Pollution degree 2 assumes that normally, only non-conductive pollution, such as dust, occurs with the exception of occasional conductivity caused by condensation.

Troubleshooting

Note Do not use the instrument if it appears not to be functioning properly.

When an error is detected, terminate the current operation. After an error occurred, abort the current run and restart from the beginning when the problem is fixed. The following table provides a troubleshooting guide for the KingFisher Duo Prime instrument.

Table 9. Troubleshooting guide

Code(s)	Description	Action
2, 3, 260	The command was not recognized as a valid command.	Contact authorized technical service.
4	The tip comb holder lifting mechanism is out of position.	Switch the instrument to the OFF and ON position and try again. If the error appears during initialization or is otherwise repeated, contact service.
5	The track mechanism is out of position.	Switch the instrument to the OFF and ON position and try again. If the error appears during initialization or is otherwise repeated, contact service.
6	The turntable rotating mechanism is out of position.	Switch the instrument to the OFF and ON position and try again. If the error appears during initialization or is otherwise repeated, contact service.
7	The magnet head holder lifting mechanism is out of position.	Switch the instrument to the OFF and ON position and try again. If the error appears during initialization or is otherwise repeated, contact service.
8	The requested head movement is not allowed.	Press the STOP button.
9	The requested head movement is not allowed.	Press the STOP button.
10	The requested head movement is not allowed.	Press the STOP button.

Table 9. Troubleshooting guide

Code(s)	Description	Action
11	The plastic tip comb is not attached to the holder.	Check if the tips are placed correctly. If the equipment seems to be in order, turn the instrument to the OFF and ON position, and run the check protocol according to the KingFisher Duo Prime head and plastics you are using.
12, 21, 23-24	Error in temperature control.	Contact authorized technical service.
13	Permanent parameters lost.	Contact authorized technical service.
0-1, 15-20, 50-58, 104, 200, 288-289	Error	Switch the instrument to the OFF and ON position and try again. If the error appears during initialization or is otherwise repeated, contact service.
22, 102	Target temperature not reached.	Make sure that the target temperature difference to ambient temperature is within the operational range. If yes, contact authorized technical service.
103	Cooling power has been limited to prevent condensation.	No action needed. Information only.
100-101	Protocol timing is inaccurate.	No action needed. Information only.
201	Performing memory maintenance...	No action needed. Information only. If the error is repeated, contact service.
210	USB memory not found.	Attach the USB memory device.
211	No protocols found from USB memory.	Copy the protocol to the USB memory device.
212	USB memory is detached.	Attach the USB memory device.
213	Import failed.	Try another USB memory device. If the error still appears, contact service.
214	Export failed.	Try another USB memory device. If the error still appears, contact service.
215	Attached USB memory is not supported.	Possible NTFS-formatted USB memory. Change the memory or reformat to FAT.
220-235, 261, 270-271, 285	File system error.	Contact authorized technical service.
250-251	Corrupt transfer file.	Contact authorized technical service.
280-284	Corrupted settings.	Contact authorized technical service.
286-287, 290	Invalid value	Contact authorized technical service.
300-308	Software update failed	Contact authorized technical service.
59, 309-310	Unrecoverable error: Switch power off.	Switch the instrument OFF and ON, and try again. If the error appears during initialization or is otherwise repeated, contact service.
320	Front cover open, close cover.	Close the front cover.

Table 9. Troubleshooting guide

Code(s)	Description	Action
321	Protocol aborted by user.	No action needed. For information only.
322	Clock battery is empty.	Contact authorized technical service.
323	Aborted because there was an error in another protocol.	No action needed. For information only.

Ordering Information

Contact your local Thermo Fisher Scientific representative for ordering and service information. Ordering information codes are presented in the following tables.

KingFisher Duo Prime

The following configurations of the KingFisher Duo prime system are available:

Table 10. Codes for products

Code	Instrument/System
5400110	KingFisher Duo Prime

Accessories and Consumables

The following accessories and consumables are to be used with the KingFisher Duo prime instrument:

Table 11. Codes for accessories and consumables

Code	Item	Quantity (pieces)
N16640	2D Barcode reader for KingFisher for 1D and 2D barcodes Supported codes for 1D barcode Symbologies: Code 39(*), Code 128 (GS1-128)(*), EAN/UPC(*), Codabar, Code 11, Code 93/93i, GS1 DataBar Limited, GS1 Composite (linear only), GS1 DataBar Expanded, GS1 DataBar Omnidirectional, Interleaved 2 of 5, Matrix 2 of 5, MSI, Plessey, Standard 2 of 5, Telepen Supported 2D barcode symbologies: DataMatrix(*), QR Code(*), PDF417(*), Micro QR, Micro PDF417, Aztec, Maxicode, Han Xin, Codablock A, Codablock F, GS1 Composite, TLC 39, and many Postal Codes (*) Default setting. Others may need configuration of Barcode reader	1
5189009	BindIt Software	1
97003500	KingFisher Duo 12-tip comb, for Microtiter deep well 96 plate	50
97003510	KingFisher Duo 6-tip combs and KingFisher Flex 24 deep well plate (12 pieces of 24 DW plates, each including four tip combs)	48
97003520	KingFisher Duo elution strip	40
97003540	KingFisher Duo cap for elution strip	40
97003530	KingFisher Duo Combi pack for Microtiter deep well 96 plate (tip combs, plates, elution strips, and caps for elution strips for 96 samples)	1
95040450	Microtiter deep well 96 plate	50
95040460	Microtiter deep well 96 plate, sterile	50
95040470	KingFisher Flex 24 deep well plate	50
95040480	KingFisher Flex 24 deep well plate, sterile	50

Spare Parts

The following spare parts are to be used with the KingFisher Duo prime instrument:

Table 12. Codes for spare parts

Code	Item	Quantity (pieces)
N12459	KingFisher Duo head for 96 DW	1
N12460	KingFisher Duo head for 24 DW	1
N12461	KingFisher Duo heating block for 96 DW plate	1
N12462	KingFisher Duo heating block for 24 DW plate	1
N16539	Lamp UV-C Germicidal T5 16x288 mm 8W	1
2305290	Serial cable F9/F25 (for RS-232C port)	1
N04001	USB A-B device cable 1.8 m ^a	1

^aLonger USB cables available from PC stores

KingFisher Pure Kits

The following optimized DNA/RNA purification kits for the KingFisher Duo Prime are available:

Table 13. Codes for purification kits

Code	Item	Quantity (pieces)
98010196	KingFisher Pure DNA Blood Kit	96
98010496	KingFisher Pure DNA Blood Kit	384
98020196	KingFisher Pure RNA Blood Kit	96
97030196	KingFisher Cell and Tissue DNA Kit	96
97032496	KingFisher Cell and Tissue DNA Kit	24 x 96
98040196	KingFisher Pure RNA Tissue Kit	96
98040496	KingFisher Pure RNA Tissue Kit	384
98050196	KingFisher Pure DNA Plant Kit	96
98050496	KingFisher Pure DNA Plant Kit	384
98060196	KingFisher Pure RNA Plant Kit	96
98060496	KingFisher Pure RNA Plant Kit	384
98070196	KingFisher Pure Viral NA Kit	96
98070496	KingFisher Pure Viral NA Kit	384
98080196	KingFisher Pure Plasmid Kit	96
98080496	KingFisher Pure Plasmid Kit	384

Appendix A

Certificate of Decontamination

Name: _____

Address: _____

Tel./Fax: _____

Instrument: _____ Serial no.: _____

A) I confirm that the returned items have not been contaminated by body fluids, toxic, carcinogenic or radioactive materials or any other hazardous materials.

B) I confirm that the returned items have been decontaminated and can be handled without exposing the personnel to health hazards.

Materials used in the unit: Chemicals + Biological •Radioactive *)

Special information about contaminants:

Decontamination procedure¹:

Date and place: _____

Signature: _____

Name (block capitals): _____

*) The signature of a Radiation Safety Officer is also required when the unit has been used with radioactive materials.

This unit is certified by the undersigned to be free of radioactive contamination.

Date and place: _____

¹ Please include decontamination solution used.

9 Appendix A

Certificate of Decontamination

Signature: _____

Name (block capitals): _____

PHOTOCOPIABLE

