

# IDEXX **Filta-Max**<sup>®</sup>

## **Operator's Guide**

Protocol for Use with the Manual Wash Station



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## Filta-Max® Health and Safety Data

**Please read this guide thoroughly before using the Filta-Max system.** We recommend that you perform your own safety assessments of the Filta-Max system and follow your in-house health and safety guidelines.

Make sure that the connections between the housing and the supply lines, or any monitoring equipment, are secure and capable of withstanding operating pressure.



### CAUTION

When the wash station is not in use, return the handle to its lowest position. It may drop suddenly if left at its highest position.

## Equipment and Reagents

The following additional equipment and reagents, not supplied by IDEXX, are necessary for filter processing. A list of part codes for the Filta-Max components appears on pages 18–19.

### Equipment

- 50-mL centrifuge tubes
- 1–5-mL pipette and disposable tips
- Membrane forceps
- Magnetic stirrer plate

### Reagents

- Phosphate-buffered saline (10 mM PBS)
- Tween 20
- High-vacuum silicon lubricant
- Reagent-grade water

## Setting Up the Wash Station

### Attaching the Rack Guard

The rack guard is supplied separately from the main body of the wash station. Attach the rack guard using the two (M5) hex-head bolts provided.




**NOTE:** To prevent accidental injury, make sure the rack-guard is secured to the wash station prior to operation.

### Securing the Wash Station

Secure the wash station to the bench with the clamp set provided, or by inserting bolts (not provided) in the predrilled holes of the wash station base.

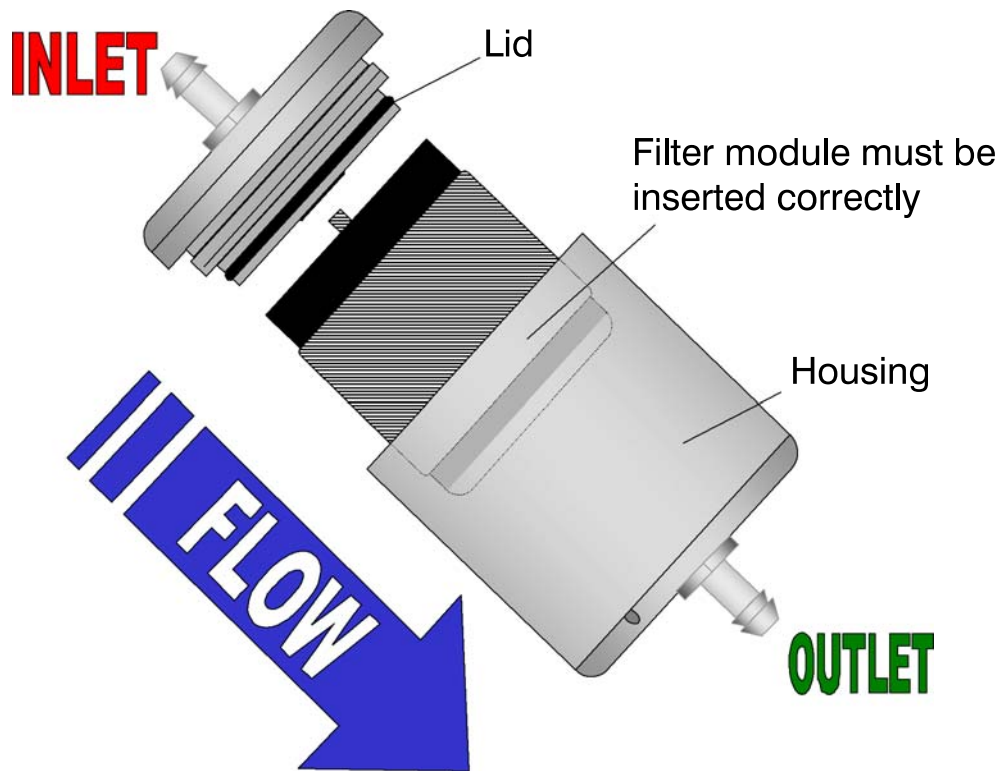
Secure the clamps to the wash station base using the large bolts and Allen wrench provided. Slide the clamps under the work surface as far as possible and secure the base tightly.


 **NOTE:** We recommend a work surface of no more than 3 cm thickness.

## Inserting the Filter Module

Place the filter module (bolt-head down) into the housing and secure the lid.

**Figure 1: Filter Module and Housing Orientation**



 **NOTE:** The lid is always the inlet, regardless of the housing type.

## Operating Pressure

A head pressure of 0.5 bar (7.5 psi) is required to create a flow through the filter. The recommended operating pressure of 5 bars (75 psi) should create a flow of 3–4 liters per minute. We recommend that the operating pressure not exceed 8 bars.


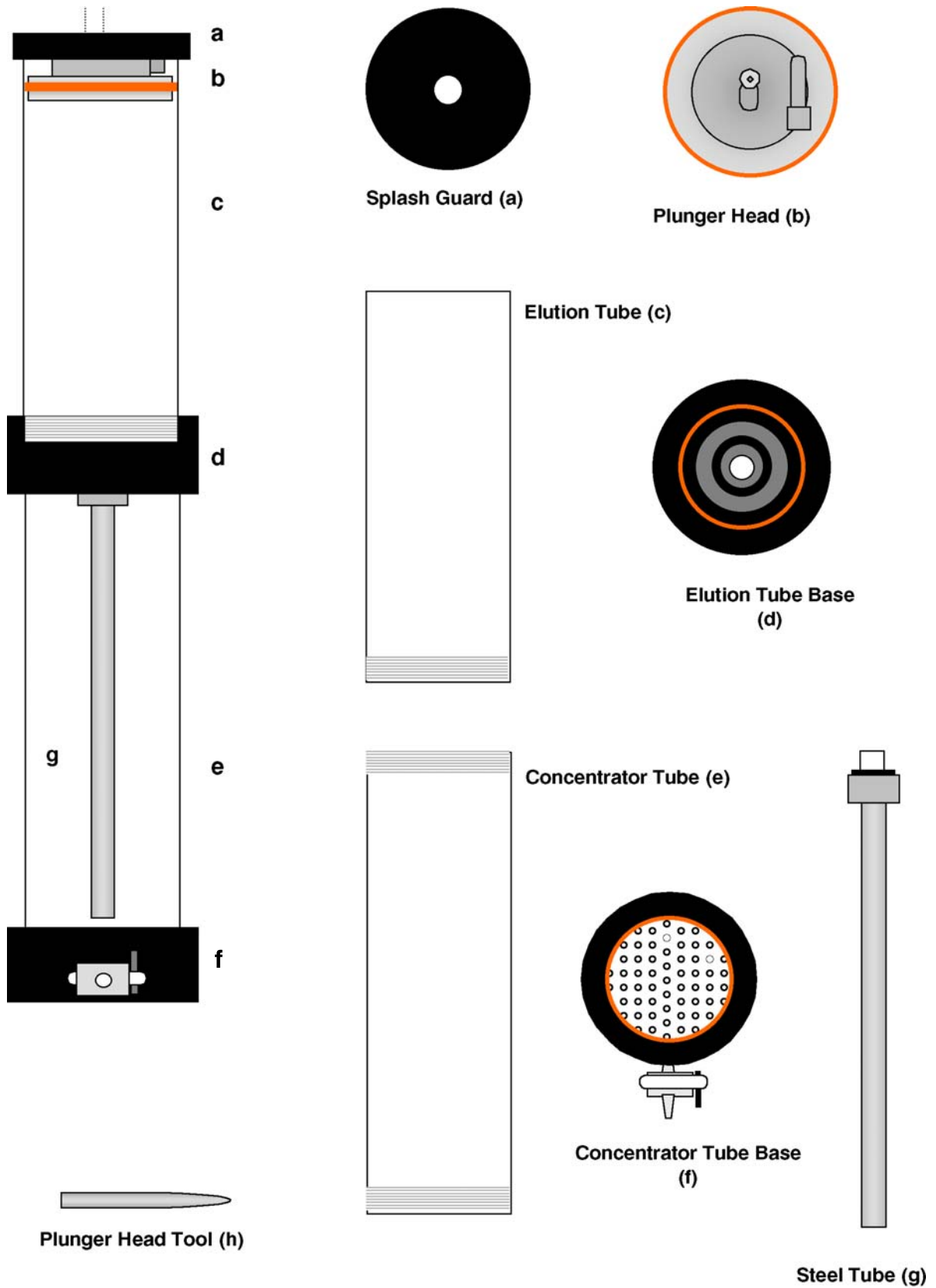
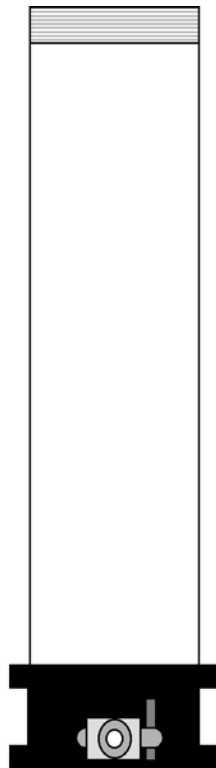
 **NOTE:** If a pump (diaphragm, peristaltic, etc.) is used to supply water to the filter, it should be installed upstream of the filter.

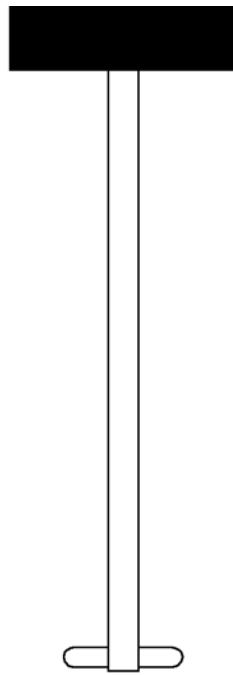
Figure 2: Wash Station Components



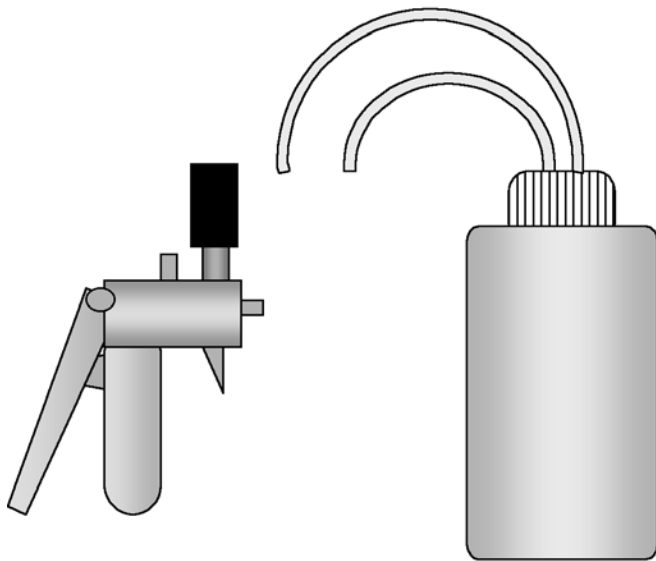
**Figure 3: Vacuum Set**



**Assembled Concentrator  
Tube (i)**

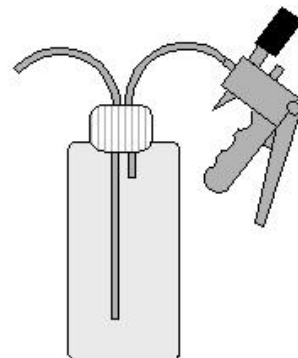


**Magnetic Stirrer Bar (j)**



**Hand Pump (k) and Liquid Trap (l)**

Be sure to attach  
the hand pump to  
the shorter tube.



# The Filtering Process

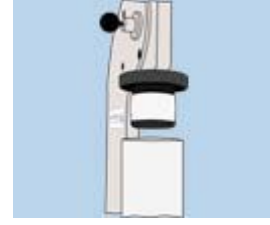
## Overview



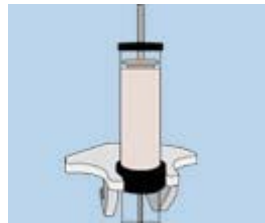
1. Place the filter module in the filter housing.



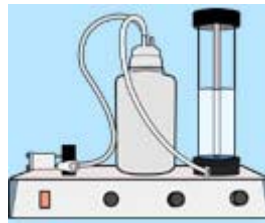
2. Connect the filter housing to the required water source for sampling.



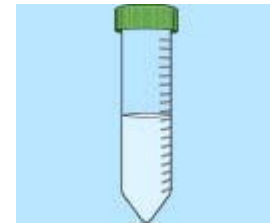
3. Attach the filter module to the wash station plunger head.



4. Wash the sample with elution buffer.



5. Concentrate.




6. Repeat steps 4 and 5 to concentrate the final sample to 25 mL.

## A. First Wash

1. Detach the removable plunger head (b) using the tool (h) provided and ensure that high-vacuum silicon lubricant is applied to the outside of the plunger head O-ring and within the groove in which the O-ring sits.
2. Remove the splashguard (a).
3. Ensure that the porous support is in place in the concentrator tube base (f) and place one 73-mm membrane flat in the concentrator base (f) with the rough surface facing up.
4. Place the concentrator base (f) in the jaws of the wash station. Ensure that the plunger handle is locked at its highest position.
5. Screw the concentrator tube (e) into the base (f), creating a tight seal at the membrane, and then remove the assembled concentrator tube (i) from the wash station.
6. Replace the splashguard (a), attach the plunger head (b) using the tool (h) provided and ensure that the plunger pin handle is fully locked down.
7. Remove the filter module from the housing or transportation container and pour the liquid into the assembled concentrator tube (i).
8. Rinse the housing or container with distilled water, adding the rinse water to the assembled concentrator tube (i).
9. Lock the plunger head (b) at its highest position and screw the filter module into the plunger head (b).





10. Place the elution tube base (d) into the jaws of the wash station and screw the elution tube (c) firmly into place.
11. Pull the plunger handle down until the filter module sits at the bottom of the elution tube (c). The locking pin (at the top left of the wash station) should click to lock the module into position.
12. Insert the Allen wrench through the hole in the elution tube base (d) and remove the filter module bolt.
13. Attach the stainless steel tube (g) (without the rubber stopper) to the elution tube base (d).
14. Add 600 mL of PBST (phosphate-buffered saline, 0.01% Tween 20) to the assembled concentrator tube (i). If more than 50 mL of liquid has been recovered from the shipped filter module, reduce the volume of PBST accordingly.
15. Screw the assembled concentrator tube (i) into the base (d) beneath the elution tube (c) and release the locking pin on the wash station.
 

 **NOTE:** You may need to apply pressure on the plunger handle while pulling on the locking pin.
16. Wash the filter module by moving the plunger fully up and down 20 times—move the plunger very smoothly to avoid generating excess foam.
17. Detach the assembled concentrator tube (i) and hold it directly below the stainless steel tube (g).
18. Expel the remaining liquid from the elution tube (c) by compressing the foams five times.
19. Place the rubber stopper in the end of the stainless steel tube (g).

## B. First Concentration

1. Stand the assembled concentrator tube (i) on a magnetic stirring plate, attach the magnetic stirrer bar (j) and begin stirring.
2. Connect the liquid trap bottle (l) and hand pump (k) to the tap on the concentrator base (f).
3. Open the tap.
4. Increase the vacuum using the hand pump (k) (a mains-driven pump may also be used).
 

 **NOTE:** The force of the vacuum should not exceed 30 cm Hg.
5. Allow the liquid to drain until it is level with the follower and then close the tap.
 

 **NOTE:** Do not drain away all liquid. Oocysts and cysts should be suspended in the liquid above the membrane.
6. Detach the hand pump (k) from the tap, remove the magnetic stirrer (j) and rinse it, over the assembled concentrator tube (i), with distilled water to recover all oocysts.
7. Decant the concentrate from the assembled concentrator tube (i) into a 50-mL tube.
8. Rinse the inside of the assembled concentrator tube (i) with distilled water and add the water to the 50-mL tube.






**NOTE:** The 73-mm membrane used in the concentration step is there only to facilitate the reduction in volume of the wash buffer without the need for centrifugation. It is not used to capture the target organisms, which must remain suspended in the buffer above the membrane.

### C. Second Wash

1. Add 600 mL of PBST to the assembled concentrator tube (i).
2. Remove the stopper from the end of the steel tube (g).
3. Screw the assembled concentrator tube (i) into the elution tube base (d).
4. Wash the filter module by moving the plunger fully up and down 10 times—move the plunger very smoothly to avoid generating excess foam.
5. Detach the assembled concentrator tube (i) and hold it directly below the stainless steel tube (g).
6. Expel the remaining liquid from the elution tube (c) by compressing the foams five times.
7. Place the rubber stopper in the end of the stainless steel tube (g).
8. Add the concentrate retained from the first wash to the 600-mL eluate from the second wash.

### D. Second Concentration

1. Stand the assembled concentrator tube (i) on a magnetic stirring plate, attach the magnetic stirrer bar (j) and begin stirring.
2. Connect the liquid trap bottle (l) and hand pump (k) to the tap on the concentrator base (f).
3. Open the tap.
4. Increase the vacuum using the hand pump (k) (a mains-driven pump may also be used).  
 **NOTE:** The force of the vacuum should not exceed 30 cm Hg.
5. Allow the liquid to drain until it is level with the follower and then close the tap.  
 **NOTE:** Do not drain away all liquid. Oocysts and cysts should be suspended in the liquid above the membrane.
6. Detach the hand pump (k) from the tap, remove the magnetic stirrer (j) and rinse it, over the assembled concentrator tube (i), with distilled water to recover all oocysts.
7. Decant the concentrate from the assembled concentrator tube (i) into a 50-mL tube (the same 50-mL tube used to retain the first concentrate can be used).
8. Rinse the inside of the assembled concentrator tube (i) with distilled water and add the water to the 50-mL tube.
9. Detach the concentrator tube (e) from the concentrator base (f).  
 **NOTE:** If you have difficulty removing the concentrator tube (e), insert the concentrator base (f) into the jaws of the wash station.

10. Using forceps, remove the membrane and place it in the bag provided.
11. Add 5 mL of PBST, seal the bag and rub the surface of the membrane between your finger and thumb for approximately one minute.
12. Using a pipette, remove the liquid and add it to the concentrated sample in the 50-mL tube.



**NOTE:** For highly turbid waters, more than one membrane can be used. If additional membranes are used for the concentration step, they can be placed into the concentrator base, smooth side up.

## Maintenance and Cleaning

Filta-Max components must be cleaned and maintained correctly to avoid contamination and to ensure longevity of the equipment.

### Maintenance

- Check all rubber O-rings for wear or deterioration prior to each use—order replacement O-rings as required from IDEXX.
- Lubricate the plunger head O-ring inside and out with silicon before each use.
- Lubricate all other O-rings (concentrator tube set, filter housing) regularly in order to preserve their condition.

### Cleaning

All components of the Filta-Max system can be cleaned using warm water and laboratory detergent. After washing, rinse all components with reagent-grade water and dry them. Relubricate all O-rings. Alternatively a mild ( $\leq 40^{\circ}\text{C}$ ) dishwasher cycle without bleach or rinse aid can be used.

#### Wash the detachable plunger head as follows:

1. Slide the locking pin out.
2. Using warm water and laboratory detergent, wash the plunger head and the locking pin.
3. Rinse the plunger head and the locking pin with reagent-grade water and dry them.
4. Lightly lubricate the locking pin and reassemble the plunger head.
5. Lubricate the plunger head O-ring inside and out.

### Cleaning (US EPA 1623 Compliant)

**The following protocol complies with the procedure for detection/clarification of *Cryptosporidium* and *Giardia*, using Filta-Max, as approved by US EPA.**

1. Dismantle the plunger head (see above), the filter housing and the tubing sets.
2. Rinse all components thoroughly in tap water and then immerse them in 6%(w/v) sodium hypochlorite solution for 30 minutes.

3. Remove all components from the sodium hypochlorite and rinse them thoroughly with tap water.
4. Using a bottle brush and hot, soapy water, wash all components and then rinse them with tap water.
5. Rinse all components a final time with sterile reagent water.



**WARNING—DO NOT AUTOCLAVE ANY FILTA-MAX COMPONENTS.**

Exposure to high temperatures may cause the tubing sets to become opaque and deformed.

## Storage and Transportation

**When storing or shipping whole filter modules, keep these points in mind:**

- Filters should be processed within 24 hours of sampling.
- After sampling, filters should be refrigerated.
- The filter must be kept wet during storage.
- If stored or transported in the filter housing, the inlet and outlet should be securely plugged with the rubber stoppers provided.
- The filter module may be removed from the housing and aseptically placed in an airtight bag along with several milliliters of additional buffer or reagent-grade water.

## Troubleshooting

**PROBLEM:** No flow or reduced flow through the housing

**SOLUTION:** Ensure that the pump is placed upstream of the filter. Blockage of the filter or housing is usually due to environmental material.

**SOLUTION:** Replace the filter.



**NOTE:** Always vent back pressure before opening the housing.

**PROBLEM:** Difficulty in moving the wash station plunger

**SOLUTION:** Raise the plunger head and lubricate the O-ring and the groove in which it sits.

**SOLUTION:** Remove the rubber stopper from the steel tube.

**PROBLEM:** The plunger head becomes detached from the rack

**SOLUTION:** Ensure that the plunger head is seated correctly on the rack and that the locking handle is fully depressed. Ensure that the screw at the top of the plunger head is tightened securely.



**NOTE:** If problems persist, or you are unsure of which action to take, please contact IDEXX Technical Services.

## Technical Service Contacts

IDEXX Laboratories, Inc.  
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Fax: 207-856-0630

Office Location	Telephone	Fax
Australia	612-9898-7300	612-9898-7302
France	1-34-32-62-00	1-34-30-02-08
Germany	06732-94420	06732-62693
Japan	81-422-71-5369	81-422-71-4922
Taiwan	886-2-2836-1913	81-422-71-4922
United Kingdom	01638-723011	01638-723012

For countries not listed above, please visit our Web site at [www.idexx.com](http://www.idexx.com).

## Frequently Asked Questions

**Q: What types of water may be filtered through Filta-Max?**

**A:** Raw and treated waters may be filtered through Filta-Max. When using higher turbidity waters, a pressure of 5 bars (75 psi) is recommended.

**Q: What approval has Filta-Max received?**

**A:** Filta-Max has been validated and approved in the US for *Cryptosporidium* and *Giardia* sampling using the US EPA 1623 equivalence method. In the UK, Filta-Max is the only DWI-approved filter for regulatory *Cryptosporidium* testing.

**Q: How can washed foams be contained when the plunger head has been raised?**

**A:** Place a disposal bag over the end of the tube as you raise the plunger head. The tubing set can then be inverted to discard the foams.

**Q: How do I prevent the membrane from lifting during the concentration step?**

**A:** The membrane must be clamped tightly by the tubing. Placing the concentrator base in the jaws of the wash stand while tightening the tube will help, as will regularly lubricating the O-ring and threads.

**Q: What diameter are the inlet and outlet connections on the Filta-Max housings?**

**A:** The inlet and outlet housings each has a diameter of 0.46 inches (11.6 mm).

**Q: Are there any flow vs. pressure-drop plots available for Filta-Max?**

**A:** A British government study has shown a pressure drop of 0.3 bar (4 psi) over 60,000 L of finished tap water at a flow rate of 1L min<sup>-1</sup>.

**Q: Why do some filter module foams only expand very slightly?**

**A:** There are two probable causes:

1. Time lapse between collection and processing exceeds 24 hours.
2. Certain particulates in water can affect foam expansion. This issue may be worse with high-volume samples.

**Q: What level of foam expansion is needed for efficient recovery?**

**A:** We have found that even if only minimal expansion is observed, full recovery of captured oocysts and cysts can be achieved

## Further Reading

Bukhari Z. (2000) Method 1623: Validation of Genera technologies Filta-Max foam filters and 50 L sample volumes under the US EPA performance based measurements system. *Clancy Environmental Consultants, Inc.* PO Box 314, St Albans, VT 05478, USA.

US EPA Office of Water. (1999) US EPA Method 1623: *Cryptosporidium* and *Giardia* in water by filtration/IMS/FA. US EPA Office of Water, Washington, DC 20460. April 1999. EPA-821-R-99-006. ([www.epa.gov/nerlcwww](http://www.epa.gov/nerlcwww))

US EPA Office of Water. (1999) US EPA Method 1622: *Cryptosporidium* in water by filtration/IMS/FA. US EPA Office of Water, Washington, DC 20460. January 1999. EPA-821-R-99-001. ([www.epa.gov/nerlcwww](http://www.epa.gov/nerlcwww))

Sartory DP, Parton A and Parton AC. (1998) Recovery of *Cryptosporidium* oocysts from small and large volume water samples using a compressed foam filter system. *Letters in Applied Microbiology*. 27, 318–322.

Parton A, Mendez F and Sartory D P. (1997) Evaluation of a novel filter for the rapid capture and concentration of *Cryptosporidium* oocysts from drinking waters. *Proceedings of the 2<sup>nd</sup> UK Symposium on Health Related Water Microbiology*, International Association on Water Quality, Warwick, UK, 1997. 185–191.



## Filta-Max® Catalog Numbers

### Filta-Max Equipment

#### Starter Kit

Includes manual wash station with clamp set, tubing set, vacuum set, MKII filter housing with hose-tail fittings and green housing tools

### Product Code

FMC 11002

#### Manual Wash Station

Wash station with clamp set, Allen wrench and plunger head kit with tool

FMC 10101

#### Manual Wash Station for Left-Handed Operator

Standard manual wash station with handles located on left side

FMC 10106

#### Automatic Wash Station 220V

Includes five plunger head kits

FMC 10103

#### Automatic Wash Station 110V

Includes five plunger head kits

FMC 10104

#### Tubing Set

Elution tube and base, concentrator tube and base with line tap and steel tube

FMC 10301

#### Quick Connect Kit (for Tubing Set)

Allows rapid connection of tubing set

FMC 10305

#### Vacuum Set

Includes metal hand pump, waste bottle with tubing and magnetic stirrer bar

FMC 10401

#### MKII Filter Housing (No Fittings)

Includes washers to attach fittings (instructions provided)

FMC 10503

#### MKII Filter Housing (Hose-Tail Fittings 1/4" BSP)

FMC 10504

#### MKII Filter Housing (UK DWI Reg. Compliant)

Includes Swageloks complying with DWI regulation

FMC 10505

### Filta-Max Consumables

#### Filter Module (10-pack)—UK Only

Packaged in foil pouch, does not include membranes

### Product Code

FMC 10602

#### Filter Module (10-pack)—All Other Countries

Packaged in individual foil pouches, does not include membranes

FMC 10603

#### Filter Membranes (100-pack)

73-mm membranes

FMC 10800

### Filta-Max Stoppers and O-rings

#### Rubber Stopper, Large (10-pack)

10.5-mm diameter at widest point, for use with hose-tail fittings

### Product Code

FMC 10508

#### Rubber Stopper, Small (10-pack)

8-mm diameter at widest point, for use with steel tube

FMC 10302

#### O-ring for Plunger Head/Quick Connect Kit (10-pack)

Orange O-ring, 67-mm diameter, for use with automatic and manual plunger heads, and Quick Connect Kit

FMC 10105

#### O-ring for Filter Housing, Large (10-pack)

Black O-ring, 65-mm diameter, seals lid to base

FMC 10507



O-ring for Filter Housing/Elution Tube Base, Small (10-pack)	FMC 10509
Black O-ring, 21-mm diameter, to fit center of lid, base of filter housing and hole in elution tube base	
O-ring for Elution Tube Base/Concentrator Tube Base (10-pack)	FMC 10303
Orange O-ring, 78-mm diameter, fits the magnetic stirrer, elution tube base and concentrator tube base	
O-ring for Steel Tube (10-pack)	FMC 10304
Black O-ring, 14-mm diameter, fits below thread of steel tube	
<b>Filta-Max Accessories</b>	<b>Product Code</b>
Wash Station Handle and Grip	PC 101004
Splash Guard for Manual Wash Station	PC 101005
Allen Wrench, Chrome-Plated	PC 101007
Plunger Head Kit (Manual)	FMC 12001
Includes tool	
Plunger Head Kit (Automatic)	FMC 12002
No tool required	
Plunger Head Tool (for Use with Manual Plunger Head)	PC 13002
Elution Tube	PC 103007
Short tube, 240-mm long, with thread on one end	
Elution Tube Base	PC 103009
Steel Tube	PC 103010
Concentrator Tube	PC 103006
Long tube, 300-mm long, with threads on both ends	
Concentrator Base (with new style tap)	PC 104007
Middle section of tubing set, threads on both sides	
Two-Way Line Tap (New Style)	PC 103008
Line Tap (Old Style)	PC 103002
Magnetic Stirrer Bar	FMC 10901
Includes stirrer and magnet	
Magnet for Vacuum Set	PC 104004
Fits magnetic stirrer	
Metal Vacuum Hand Pump	PC 104009
Plastic Vacuum Hand Pump	PC 104003
Tubing for Hand Pump	PC 104005
Vacuum (Waste) Bottle	PC 104006
Filling and Venting Closure	PC 104002
Lid for vacuum bottle	
Green Housing Tools (Pair)	FMC 10506
Hose-Tail Fittings (Pair)	FMC 10510

For additional information, visit [www.idexx.com/water](http://www.idexx.com/water).

## Filta-Max® Protocol Checklist

1. Record filter number and collection site.
2. Attach plunger head and raise. Attach filter module.
3. Attach elution tube and base.
4. Lower plunger and lock.
5. Remove filter module bolt and attach steel tube.
6. Attach concentrator tube with 600 mL PBST.
7. Release lock and wash (20 cycles).
8. Detach concentrator and purge.
9. Attach stirrer bar, apply vacuum and concentrate.
10. Retain concentrate (50-mL tube).
11. Replenish buffer and wash (10 cycles).
12. Attach stirrer bar, apply vacuum and concentrate.
13. Add to previous concentrate.

Operator Signature: \_\_\_\_\_