

AVIDITY

SCIENCE

Alto™ Range

Ultrapure Water System

**with Total Organic Carbon Monitoring and
Ultra Filtration**

**ALTO / ALTO-T / ALTO-R / ALTO-T-R / ALTO-UF /
ALTO-UF-T / ALTO-UF-R / ALTO-UF-T-R**

Series 5

Operation Manual

OP-000111

Revision A

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Important Safety and Service Information

The customer should comply with their organization's Electrical Safe Practices as recommended by the Occupational Safety and Health Administration (OSHA), or local and national safety codes.

This equipment must be operated by qualified persons who are knowledgeable and trained in its operation, and its associated hazards.

Use caution when operating, or servicing this equipment. It is the user's responsibility to read and understand the content of this manual before operating this equipment.

SAVE THESE INSTRUCTIONS

RoHS/WEEE Statement

Edstrom water treatment, automated watering, environmental monitoring, and access control systems specified within this manual are manufactured in compliance with the RoHS Directive (EU Directive 2011/65/EU and subsequent amendments).

Hazard and Special Safety Notice Definitions

Below is a list of definitions of hazard symbols used on this product.



WARNING! Risk of electrocution or electrical shock resulting in death or severe personal injury.



WARNING! Could result in death or serious personal injury or equipment damage.



CAUTION! Minor or moderate injury or equipment damage

This manual may contain the following types of special notices.

IMPORTANT: Indicates information that is necessary to understanding a topic or performing a procedure.

NOTE: Indicates information that may be helpful in understanding a topic or performing a procedure.

Product Warnings



WARNING! Electrical shock. Install this equipment on a ground fault interrupting circuit. Not installing this equipment on a ground fault interrupter circuit can cause electrical shock resulting in severe personal injury or property damage.



WARNING! Electrocutation. Never stand in water when handling electrical equipment. Water is a conductor of electricity. Standing in water while operating this equipment can cause electrical shock or electrocution resulting in severe personal injury.



WARNING! Electric Shock. Disconnect the main power before servicing any electrical components. Failure to do so can cause electrical shock resulting in personal injury.

Product Caution



CAUTION! Equipment damage. Follow all nationally and locally approved electrical codes when installing this equipment. Failure to do so can result in equipment damage.

Contacting Technical Support

For up to one year after your system installation date, you may contact Avidity Science for free technical support. All contact information appears in the tables below.

UK Support

Phone	E-mail	Web Site
01844 201142 Option 2	UK.TechSupport@AvidityScience.com	AvidityScience.com

US Support

Phone	E-mail	Web Site
833 898 3420	US.TechSupport@AvidityScience.com	AvidityScience.com

China Support

Phone	E-mail	Web Site
(86) 189 1852 9537	CN.TechSupport@AvidityScience.com	AvidityScience.com



Certificate No: FS 558309



Introduction

The Alto Ultra-Pure Water System dispenses Type 1 (18.2 MΩ-cm) water at a rate of 2 liters [0.53 gallons] per minute, utilizing ultraviolet (UV) technology and fitted with Total Organic Carbon (TOC) monitoring. Type 1 water is fed from a pretreatment source and dispensed from the unit using a hand-held dispense controller on the system, or an optional remote dispenser fitted with an standard filter or an ultra filter. The dispense system features volumetric dispense. All recorded data, warning messages, and dispensing information are displayed on the dispense controller and the optional remote dispenser.

All components of the system are assembled in a metal chassis and protected by a plastic housing that is designed for bench or wall-mounting. The front panels are secured with magnets and can be removed for easy access to consumables. The back panel is secured on the top and bottom with screws.



Alto Models

The content of this manual applies to these models. Some models include a submersible ultraviolet (UV) light for sterilization.

Table 1. Alto Models

Model	Product Water Quality	Product Water Flow Rate	Model	Product Water Quality	Product Water Flow Rate
ALTO-UF Ultra-filter, UV	Type 1	2 liters/minute [0.53 gal/min]	ALTO-UF-R Ultra-Filter, Remote Dispenser only	Type 1	2 liters/minute [0.53 gal/min]
ALTO-UF-T Ultra-Filter, Tank-Fed, UV	Type 1	2 liters/minute [0.53 gal/min]	ALTO Standard Filter, UV	Type 1	2 liters/minute [0.53 gal/min]
ALTO-UF-T-R Ultra-Filter, Tank-fed, Remote Dispenser	Type 1	2 liters/minute [0.53 gal/min]	ALTO T Tank-Fed, Standard Filter, UV	Type 1	2 liters/minute [0.53 gal/min]
ALTO-T-R Tank-fed, Standard Filter	Type 1	2 liters/minute [0.53 gal/min]	ALTO-R Standard Filter, Remote Dispenser, UV	Type 1	2 liters/minute [0.53 gal/min]

Purification Process

In normal operation, RO or DI feed water enters the Alto system from the inlet solenoid valve (**V2**). On **Alto -T** models, the feed water from an external storage tank first passes through the booster pump. The Conductivity of the feed water is measured by the feed water conductivity sensor (**Q1**) before passing through the flow sensor.

The water is then pushed through the first Endure Purification Pack (**TC009**) which contains mixed bed ions-exchange resins. The de-ionization process occurs and the water quality is measured by the post-treatment conductivity sensor (**Q2**).

When the dispense request is initiated, the circulation pump (**PUMP00002**) activity is increased and processes the RO or DI water over the integral UV light (**TC003**), at which point the conductivity and total organic carbons are measured by the sensor (**Q3**).

The water then passes through the second Endure Purification Pack (**TC009**) to reach the optimum resistivity of 18.2 MΩ. The resistivity is verified (**Q4**) as it leaves the pack and the temperature is then verified by the temperature sensor.

The dispense solenoid valve is opened and the Type 1 water is dispensed according to the programmed setting. Attached to the dispenser is an optional Ultra Filter (**TC004**) that provides water with reduced levels of endotoxins and viruses, or a Standard Filter (**TC011**).

Should the water temperature measure outside the set limits, the flushing solenoid valve engages and diverts the water to drain. The relevant warning is shown on the controller display. The water will continue to flush to drain until the temperature is within the required limits.

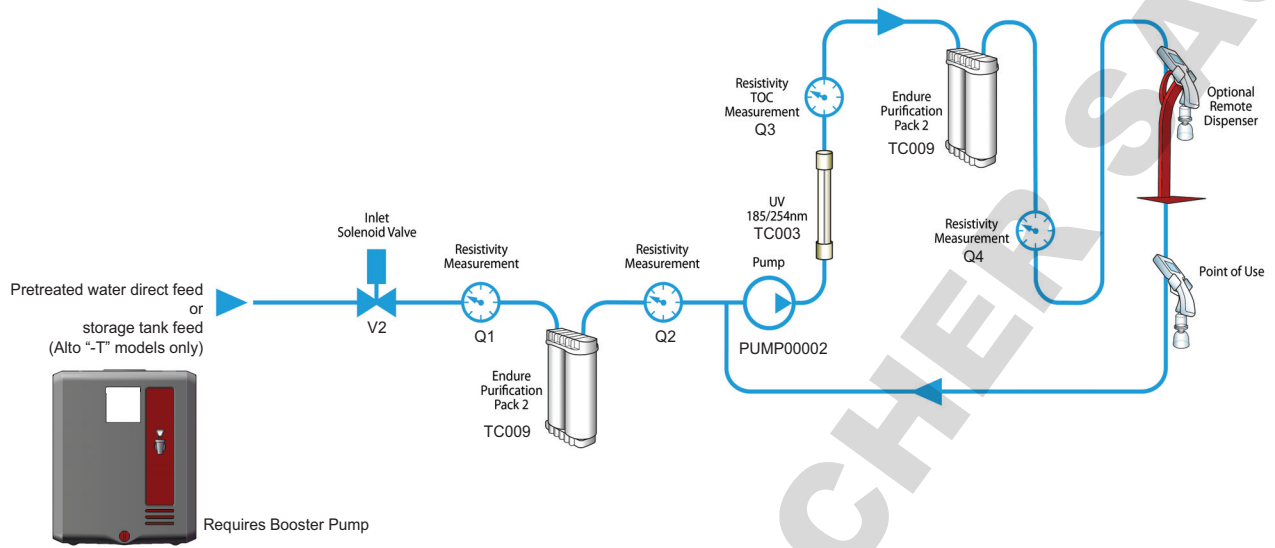


Table 2. Purification Process component descriptions

Component	Description	Component	Description
V2	Inlet Solenoid Valve	TC003	UV Light
Q1	Pre-treated Feed Water Conductivity Sensor	Q3	Conductivity and Total Organic Carbon Sensor
TC009	Endure Purification Pack	Q4	Post-treatment Conductivity Sensor
Q2	Permeate Water Conductivity Sensor	DISP00001	Dispense (Point-of-Use) Controller
PUMP00002	Circulation Pump	REMOTE	Remote Dispenser

Feed Water Requirements

The feed water used must meet these requirements.

Pressure: 0.1 to 6 bar [1.5 to 87 psi]

Maximum Flow: 2.0 lpm at 0.1 bar [0.22 gpm at 1.5 psi]

Maximum Feed Water Conductivity: 30 μS per cm

Free Chlorine: less than 0.1 mg per liter

Maximum Carbon Dioxide (CO₂): 15 mg per liter

Maximum Silica: 15 mg per liter

Silt Density Index (SDI): less than 3

Langelier Index (LI): less than zero

Iron: less than 0.1 mg per liter

Manganese: less than 0.05 mg per liter

pH: 3 to 9

Temperature: 5 to 35 degrees C [45 to 90 degrees F]

Product Water Specifications

Product (Type 1) Water Flow: 2 Litre/min

Conductivity at 25° C: 0.055 $\mu\text{S}/\text{cm}$

Resistivity at 25° C: 18.2 M Ω/cm

Total Organic Carbon (TOC): 1 to 5 ppb

DNase, RNase, DNA: Free

Rejection Rate for Bacteria: greater than 90 percent

Rejection Rate for Particles: greater than 90 percent

Dispense Controller Primary Operation Menus and Sub-menus

	<p>Access Main menu. (red)</p>	<p>View Active Alarms</p>	
<p>Main Menu</p>			
<p>Remote Dispenser Menu</p>	<p>Available only on the primary dispense controller</p>		<p>Turn off the unit. (green)</p>
	<p>Access information related to the displayed screen.</p>	<p>Access Main Menu</p>	
	<p>Access factory settings. password required</p>	<p>Change the current language</p>	<p>Sleep mode.</p>

The Dispense Controller function also applies to the Remote Dispenser.

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Dispenser Controller Operation

Information Screen

When power is applied to the unit, an information screen appears displaying this information:

Alto Model

Disp software version (Display)

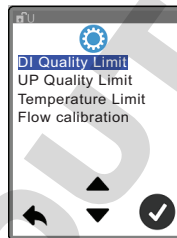
Base software version (Controller)

Manufacturer contact information

User Settings

NOTE: A password is required to access the user settings

These are the **User Settings** for the Alto unit.



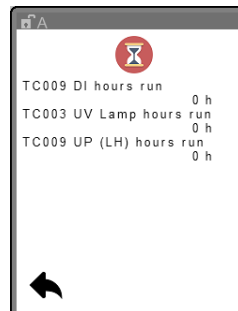
DI Quality Limit. Post-treatment water conductivity setting

UP Quality Limit. Ultra-pure water conductivity setting

Temperature Limit. Ultra-pure water temperature setting

Flow calibration. Calibrate the volume of water dispensed

Consumable Timers



Displays the number of hours since these components were installed:


- UV lamp TC003
- Dispenser Ultra-filter TC004 (-UF units only)

- Dispenser Standard Filter TC011
- Two Endure Purification Pack TC009

Alarms (Warnings)







Displays active alarms. Alarms will automatically display as they occur. Touch the alarm name to display details.



Touch  to acknowledge the alarm. The alarm will stay in the list until the associated issue has been fixed.

Change Language











Follow this procedure.

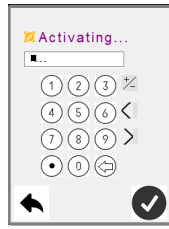
1. On  or  touch , then on , touch .
2. Touch the desired language and touch .


Configure User Settings

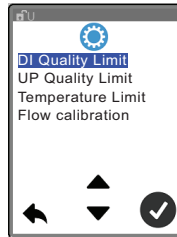
Follow this procedure.







1. Take one of these actions:

- On  or  touch , then on , touch .
- On , touch , then touch , and then on , touch .



2. Enter the required password and touch .



3. Touch the applicable setting and touch .
4. Touch  or  until the desired value is displayed.
5. Touch .
6. Touch  to return to the **User Settings**.
7. Repeat steps 3 through 6 until all applicable user settings are configured.
8. Touch  to return to the Dispense home screen.

Dispensing Type 1 Water

Type 1 water is drawn from the external storage tank using the dispense controller or the remote dispense controller. The Dispense menu screen is displayed during normal operation.









The factory settings can be modified by the user as necessary. Below are the tasks required to set up the Alto for dispensing Type 1 water.

NOTE: For Type 1 water, the storage tank may be equipped with an **Ultraviolet (UV) Light (TC008)** to maintain bacteria sterilization in the stored water. See section *Purification Process* on page 2 for an explanation of how Type 2 water is converted to Type 1 water.

Setting the Dispense Speed

Follow this procedure.

1. On , select .
2. Touch  or  until the desired speed is displayed.
3. Touch  to return to .

Setting the Dispense Volume and Dispensing Water


Set the required volume of water to release before activating the dispense controller.

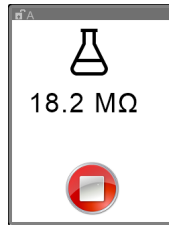
Follow this procedure.

1. On , touch .
2. Touch  or  until the desired number of litres is displayed.




NOTE: Unit can dispense up to 25 litres.

3. Touch  to start dispensing water.



NOTE: The water flow will automatically stop when the programmed volume are dispensed.

- Touch  to stop the water flow sooner.

Calibrating the Dispense Volume

If the volume of water dispensed does not match the programmed volume, calibration is required.

IMPORTANT: You will need a container that measures in litres and is large enough to hold the required volume of water.

Follow this procedure.

1. Place a graduated cylinder below the dispense controller.

2. On  , touch  :



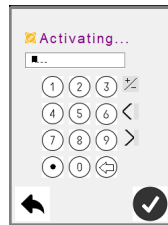
3. Touch  . The programmed volume of water is dispensed.


4. Touch .

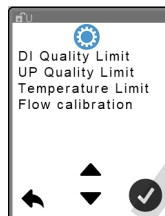
5. Touch .


6. On  , touch .

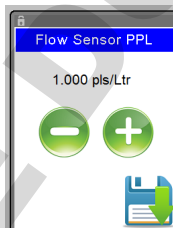
7. On , touch 









8. Enter password and touch 



9. Touch **Flow Calibration** and touch .



10. Observe the volume of water in the graduated cylinder and take one of these actions.

If the volume in the cylinder is...	Then,...	And then,...
The required volume	Touch 	---
Less than required,		Touch  to increase the volume of water dispensed. Touch  . Repeat steps 1 through 8 until the required volume is dispensed into the graduated cylinder.
More than required,	Touch  and empty the container.	Touch  to decrease the volume of water dispensed. Touch  . Repeat steps 1 through 8 until the required volume is dispensed into the graduated cylinder.

Active Alarms and Warning Messages

Below is a sample screen of alarms that may be active in the Alto system.

Table 3 describes the warning messages that may appear for the Alto system and solutions to correct the issues.

Table 3. Active Alarms and Warning Messages

Error Number	Description	Parameter	Solution
60	Water leak System shuts down	If greater than the programmed set point	Correct the leak. Dry the leak sensor located on the floor of inside the cabinet. Contact Technical Support if necessary.
42	Loop Resistivity	If less than the programmed set point	Follow on-screen instructions
43	Loop Temperature	If greater than the programmed set point	Follow on-screen instructions
64	Temperature Sensor fault: HIGH	If greater than the programmed set point	Contact Technical Support.
65	Temperature Sensor fault:LOW	If less than the programmed set point	Contact Technical Support
66	Total Organic Carbon Conductivity sensor fault: LOW	If less than the programmed set point	Contact Technical Support.
4	Internal UV filter run time hours have expired	If greater than maximum programmed time	Contact Technical Support.
3	Endure Purification Pack (TC009) run time has expired	If greater than maximum programmed time	Replace the Purification Pack. Contact Technical Support if necessary.
24	Inlet conductivity is HIGH	If greater than the programmed set point	Check feed water
69	Pressure sensor fault: HIGH	If greater than the programmed set point	Contact Technical Support
70	Pressure sensor fault: LOW	If less than the programmed set point	Contact Technical Support
71	Pressure: HIGH	If greater than the programmed set point	Follow on-screen instruction. Contact Technical Support if necessary.

Routine Maintenance

Below is a schedule of routine maintenance intervals required to keep the Alto Ultra-Pure Water System operating.

Table 4. Schedule of Routine Maintenance

Maintenance Required	Frequency
Preventive maintenance by an Authorized Technician	6 months
Sanitize the system	6 months
Replace both Endure Purification Packs	6 months ^a
Replace Point-of-Use Standard Filter or Ultra Filter	6 months ^a
Replace UV Lamp in Alto unit	12 months by an Authorized Technician

a. Recommended frequency depend on usage and applies to the stated model only, without modification.

Sanitize the System

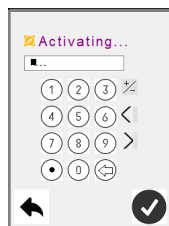
The Alto system must be sanitized once a year. You will need a new **Sanitization cartridge TC010**.





WARNING! Severe personal injury. The sanitization cartridge contains chlorine. Chlorine causes severe eye and skin irritation or burns. Avoid contact with eyes, skin, and clothing. Wear protective glasses during the sanitization process. Wash hands thoroughly at the completion of the process.

IMPORTANT: Endure Purification Pack TC009 must be replaced after sanitizing.

1. Remove the left-front panel.



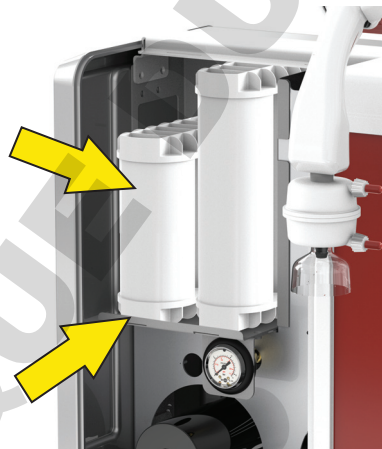
4. Enter the User password and touch

5. On , select **UP Sanitisation** and touch . Sanitizing begins.

6. Remove the packaging from the **Sanitization Cartridge**.
7. Wearing protective gloves, remove the covers from the receptacles on the **Sanitization Cartridge** shown below.



8. Insert the Sanitization Cartridge into the position of the **Endure Purification Pack**.
9. Be sure the pack is resting against the inside lip of the bracket and not on top of it as shown below.



NOTE: You may take off the protective gloves at this time to operate the front panel display.

10. When prompted, wearing protective gloves, remove the old sanitizing cartridge TC010.
11. Remove the packaging from the new **Endure Purification Pack TC009**.

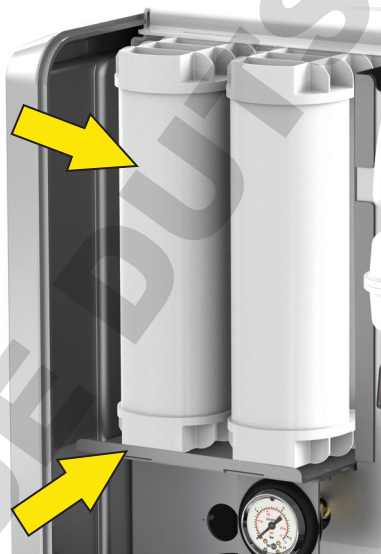
12. Remove the covers from the receptacles on the back of the pack, shown below.





13. Place the **Endure Purification Pack TC009** in its defined location.

14. Lift up on the back of the pack to slide the receptacles over the tubes on the back wall.

15. Be sure the pack is resting against the inside lip of the bracket and not on top of it as shown below.




16. Touch . The message **DI cartridge rinsing WAIT** appears.

17. When the message **DI cartridge rinsing Complete** appears, touch .

18. Take off the protective gloves; they are no longer required.

19. When **Maintenance complete** is displayed, touch .

20. Touch  until



appears.

21. If the site maintenance schedule indicates that it is close to the time to replace the **Endure Purification Pack 1 TC002**, go to procedure *Replace Endure Purification Pack* on page 18. If not, go directly to step 22.

NOTE: Refer to the routine maintenance schedule in Table 4 on page 15.

22. Replace the left front panel.

23. Replace the Dispense Controller ultra filter or standard filter. Refer to section *Replace Dispense Controller Standard Filter or Ultra Filter* on page 21.

Replace Endure Purification Pack

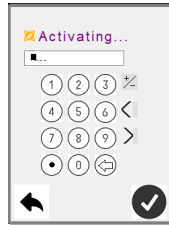
Follow this procedure to replace either **Endure Purification Pack TC009**.




1. If you have not already done so, remove the left front panel.

2. On , touch 

3. On , select .



4. Enter the User password and touch 

5. On , touch **TC009 (UP) Change**

NOTE: Follow the prompts on the display.

6. Remove the packaging from the applicable **Endure Purification Pack**.
7. Remove the covers from the receptacles on the back of the pack shown below.





- Place the applicable purification pack in its defined location.



- Lift up on the back of the pack to slide the receptacles over the tubes on the back wall.
- Be sure the pack is resting against the inside lip of the bracket and not on top of it as shown below.



- On the **TC009 (UP) Replacement** screen, touch .
- When **Maintenance complete** is displayed, touch .
- Repeat steps 5 through 12 to replace the second purification pack (TC009 DI).

- Touch  until  appears.

- Replace the left front panel.
- Dispose of the used purification packs following your site requirements for disposal.

Autoclave Dispense Controller Ultra Filter (optional)

On Alto Ultra Filter models only, the Ultra Filter attached to the point-of-use dispenser or the Remote Dispenser can be autoclaved. If the Ultra Filter is not going to be autoclaved, it must be replaced annually.



CAUTION! Equipment damage. Do not autoclave the Standard filter. Autoclaving will damage the filter material.

Follow the autoclaving guidelines included with the Ultra Filter.



CAUTION! Equipment damage. Autoclave at 125° C for 30 minutes. Do not inline-steam sterilize. Failure to follow these guidelines will damage the Ultra Filter.

Replace Dispense Controller Standard Filter or Ultra Filter



Follow this procedure.

1. Unscrew the existing filter.
2. Remove the filter from its packaging.
3. Wrap 5 turns of pipe tape around the filter threads.
4. Screw the filter into the bottom of the Dispense Controller.
5. Remove the plastic cap from the clear plastic filter shroud.

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Consumables and Replacement Parts

These are the consumables and parts for replacement on the Alto unit.

Consumables

Below is a list of items used in the Alto system that requiring regular replacement.

Table 5. Consumable items.

US Part Number	European Part Number	Description
7120-4000-204	TC009	Endure Purification Pack (two are required)
7120-4000-205	TC010	Sanitization Cartridge
7120-4000-201	TC003	UV Lamp
7120-3500-102	TC005	Air Filter, External Storage Tank
7120-4000-202	TC004	Dispenser Ultrafilter NOTE: Applies to Point-of-Use Dispenser and Remote Dispenser
7120-4000-203	TC011	Dispenser Standard Filter (non-Ultrafilter units only) NOTE: Applies to Point-of-Use Dispenser and Remote Dispenser

Replacement Parts

Below are the replacement parts that are available. Parts will be replaced by an Authorized Technician as necessary or as part of a Preventive Maintenance program.

Table 6. Replacement parts.

US Part Number	European Part Number	Description	Recommended Stock Quantity
7120-4000-207	HOUS00006	UV Housing	1
7120-4000-208	THIM00001	UV Thimble	1
7120-4000-209	UVBA00001	UV Ballast	1
7120-3000-111	SENS00003	Total Organic Carbon Conductivity Sensor	1
		Ultra Pure Permeate Conductivity Sensor	1
		Post-Treatment Conductivity Sensor	1
7120-3500-103	SENS00002	Temperature Sensor	1
7120-4000-211	DISP00001	Dispense Gun Assembly	1
7120-4000-212	STRA00001	Strainer	1
7120-4000-213	VALV00001	Dispense Solenoid Valve	1
7120-2200-107	VALV00004	Ring main Solenoid Valve	1
		Inlet Solenoid Valve	1
7120-4000-214	VALV00011	Pressure Control Valve	1
7120-2200-118	CONT00001	Main Control Board	1

Table 6. Replacement parts. (Continued)

US Part Number	European Part Number	Description	Recommended Stock Quantity
7120-2200-119	BATT00001	Main Control Board Battery (CR2430, 3V Lithium)	1
7120-2200-120	CONT00002	Display Controller, Point-of-User Dispenser	1
7120-3500-104	SENS00007	Leak Detector	1
7120-2200-126	ADAP00002	Power Supply Unit	1
7120-2200-105	VALV00003	Pressure Reducing Valve	1
7120-2200-106	VALV00002	Inlet Check Valve	1
7120-2200-111	SENS00005	Inlet Conductivity Sensor	1
7120-2200-108	PUMP00001	RO Pump	1
7120-4000-206	SENS00004	Flow Sensor	1
7120-4000-210	SENS00008	Pressure Sensor	1
7120-2200-109	PUMP00002	Circulation Pump	1
7120-2200-121	DISP00006	Display Touchscreen	1
7120-4000-215	WIRE00001	UV Lamp to UV Ballast Wiring Harness	1
7120-4000-219	WIRE00007	UV Fault Wiring Harness	1
7120-2200-124	WIRE00014	Power-In Wiring Harness	1
7120-4000-220	LOOM00001	Wiring Loom for Sensors	1
7120-4000-221	LOOM00002	Wiring Loom for Solenoids	1
7120-2200-128	LEAD00001	Power Cord (UK)	1
7120-2200-129	LEAD00002	Power Cord (EU)	1
7120-2200-127	LEAD00004	Power Cord (US)	1
7120-2200-131	LEAD00005	Power Cord (China)	1
7120-4500-205	DISP00016	Dispense Gun Complete	1
7120-4500-206	DISP00017	Dispense Gun Complete, Remote	1
7120-4500-204	DISPENSEGUNKIT	Dispense Gun Kit	1