Fisherbrand™
QUALITY. RELIABILITY. VALUE.

Instruction Manual

Accu20

Ultrapure Water System

USER MANUAL

Fisherbrand™
QUALITY. RELIABILITY. VALUE.

Instruction Manual

This Manual Is Applicable to the Following Fisher Scientific Accu20 Models

15489689	Accu20 Water System 230V
15499689	Accu20 Water System, UV SET 230V

Table of Contents

1 INTRODUCTION

This manual describes in detail about system performance characteristics, installation, operation, and routine maintenance. Please read this manual thoroughly for its instruction on installation, use and maintenance. Proper installation and maintenance guarantee the continuous flow of high quality pure water.

Please contact us or your local distributor if you encounter any issues during installation and use. Professional engineers are fully trained to support you.

Safety Information

WARNING!

To avoid electrical shock, always:

1) Use with a properly grounded electrical outlet of correct voltage and current handling capacity.
2) Replace fuses with those of the same type and rating.
3) Disconnect from the power supply prior to maintenance and service.
4) Refer servicing to qualified personnel.

1.1 Product Features

The small footprint Accu20 lab water system is an ideal choice for users who need up to 20 liters of ultrapure water per day. Quality of ultrapure product water meets or exceeds ASTM, CLSI, CAP, and ISO Type I water standards.

This system has the following characteristics:

- The compact system provides an easy way to produce Type I ultrapure water and RO water on demand directly from tap water.
- The system installation and maintenance are very easy to perform by a trained lab technician.
- The system is equipped with a Safeguard AccuDuo P Pack cartridge and a dual-column AccuDuo U Pack ultra-purification cartridge to ensure optimum quality of the final product water.
- No storage tank is required, which eliminates the risk of potential contamination and bacteria growth inside a tank.
- The fully automatic controlled and maintained system contains automatic cleaning cycles and self-maintenance functions for the RO membrane, which increases the lifetime and efficiency of the RO membranes as well as the cartridges.
- Automatic hourly system recirculation in the loop prevents bacterial growth and maintains water purity at all times.
- System status and key quality parameters are clearly displayed on a large LCD screen for easy monitoring of system performances.

1.2 Main Applications

Pure water can be used in many areas. Here are some typical applications.

- HPLC mobile phase preparation
- Preparation of reagent blank solutions
- As sample diluents for GC, HPLC, AA, ICP-MS and other analytical techniques
- Preparation of buffer and culture media for mammalian cell culture

Preparation of molecular biology reagents, etc.

1.3 Specifications

Operating Voltage	110 V or 230 V
Power	< 150 W
System Dimensions Width × height x depth	12 × 19 × 20 in 30 × 48 × 51 cm
Water Production Rate at 25□	Ultrapure water (Type I): 0.5 L/min RO water: 0.5L/min
RO Rejection Rate	> 95%
Resistivity of Ultrapure Water	18.2 MΩ.cm
TOC Ultrapure Water	< 10 ppb, or < 5ppb (with a dual wavelength UV lamp)
Particles in Ultrapure Water (> 0.2 µm)	< 1 /mL (with a 0.2 µm final filter)
UV lamp (optional)	185/254 nm dual wavelength
Microorganism	< 0.1 cfu/mL (with a 0.2 µm final filter)
Pyrogen Content	< 0.001 EU/mL (with a final ultrafiltration filter)

1.4 Operation

Accu20 water systems produce ultrapure water and RO water directly from tap water. Tap water is pretreated through a Pretreatment Cartridge (AccuDuo P Pack) to reduce free chlorine, larger particles and water hardness. Then most particles, ions and organic compounds are removed through the RO membrane. RO water flows through an ultraviolet UV light chamber (optional) to kill bacteria and destroy trace organic pollutants in water. Then water flows through a polishing cartridge U pack to remove the last traces of ions, finally, a 0.2 µm filters to the outlet.

After powering-up, press START button to initiate the system. After a 180-second automatic RO flush, the system goes into READY mode. Press the RO button to start a 60-second cleaning cycle and dispense RO water. Press the RO button again to stop the dispensing. Press the UP button to start a 60-second cleaning cycle and dispense ultrapure water. Press the UP button again to stop the dispensing.

1.5 The Control Panel

Main features of the control panel are:

- MCU technology is used to measure water conductivity with automatic temperature compensation to 25°C.
- Backlit 12864 LCD displays RO conductivity, UP resistivity, temperature and system operation status.
- System is menu driven, and displays status of auto-run programs.

Technical Specifications

Measurement Range	Channel A (RO): 0 ~ 99.9 µS/cm; Channel B (UP): 0~18.2 MΩ·cm
Temperature Compensation Range	Automatic temperature compensation of readings Temperature compensation range: 0 ~ 60°C to 25°C
Range of temperature compensation coefficient	Channel A: compensation coefficient setting range: 0 ~ 5% /°C Channel B: non-linear temperature compensation
Display	Dot-matrix backlit LCD display
Conductivity (or resistivity) alarm output	Can set output upper limit alarm for conductivity (RO) and lower limit alarm for resistivity (UP)
Communication Interface Output	Standard RS-232C serial port. System can be connected to devices with RS-232C interface to export data or print records
Power Supply	AC230 V ± 10%, frequency (50 ± 0.5) Hz; or AC110 V ± 10%, frequency (60 ± 0.5) Hz
Maximum working temperature for conductivity meter	60°C
UV lamp	185/254nm dual wavelength (optional)

2 INSTALLATION

2.1 Preparation for Installation

2.1.1 Power Supply

Power supply must be properly grounded

2.1.2 Feed Water

Water type	Municipal water TDS <500 ppm
Water temperature	5 - 35^{o}C
Water pressure	1.0 - 6.0 bar / 15 - 90 psi

2.1.3Tools Needed (Not Included)

Scissors or a box opener to open packages and cut water tubing.

A wrench to fasten the tubing connection.

2.2 Items Included

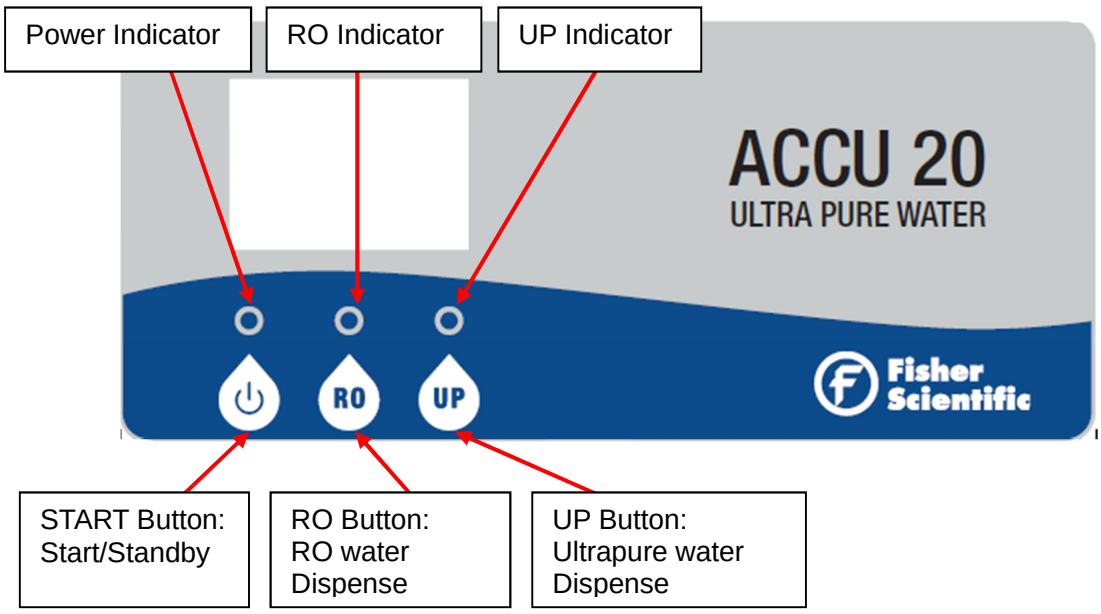
Accu20 main system includes the following items:

1) One User Manual
2) Quality Certificate
3) Accessories Pack, including one power cord, one 3-way ball valve (1/2 inch NPTF INLET&NPTM Outlet, 3/8 inch quick connect), 2 meters of 3/8 inch (9.53 mm) PE tubing, 2 meters of 1/4 inch (6.35 mm) PE tubing, fittings and one roll of Teflon tape

2.3 System Structure and Flow Diagrams

2.3.1 System Front View

2.3.2 System Control Panel



Main Buttons:

START: Start system. Push once after system power up to initiate the system.

RO: Controls RO water dispensing. Press once to dispense RO water and RO indicator light is on. Press again to stop dispensing.

UP: Controls ultrapure (UP) water dispensing. Press once to dispense UP water and UP indicator light is on. Press again to stop dispensing.

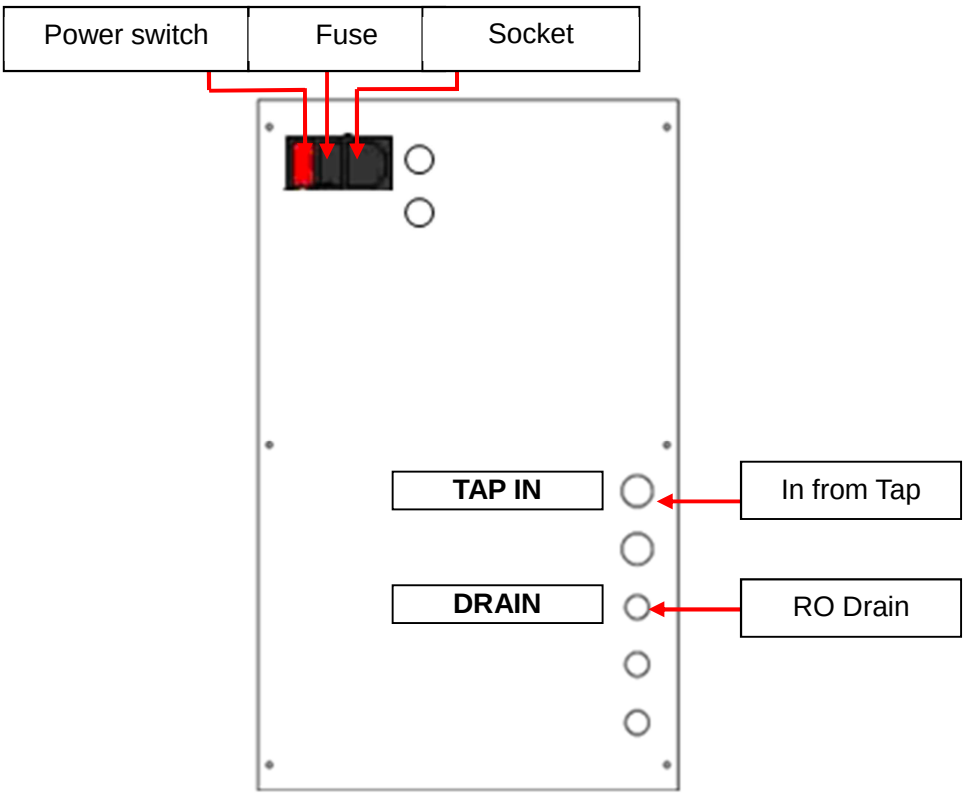
Indicator Lights:

Power indicator: Above START Button. Turns RED after power is turned on.

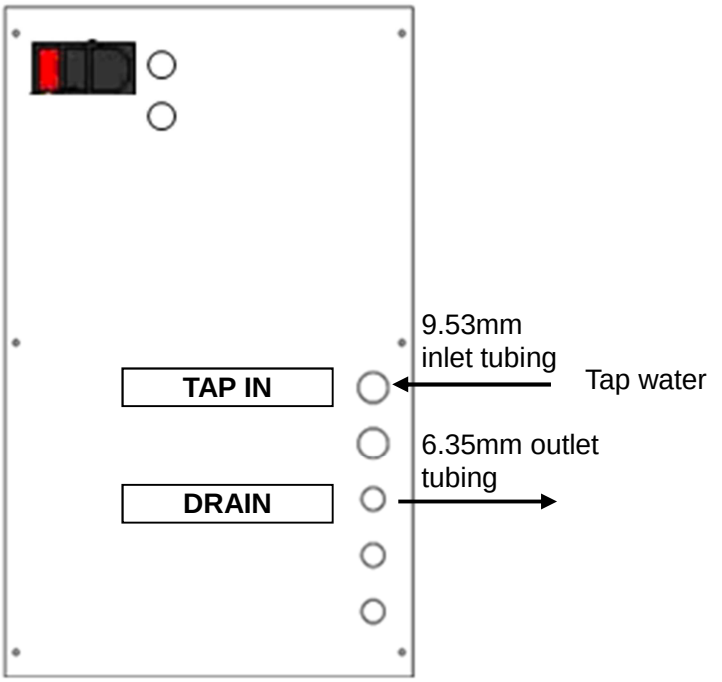
RO indicator: Above RO Button. It turns solid GREEN when dispensing ultrapure water. If RO water does not meet quality standards, this light BLINKS.

UP indicator: Above UP Button. It turns solid GREEN when dispensing ultrapure water. If UP water does not meet quality standards, this light BLINKS.

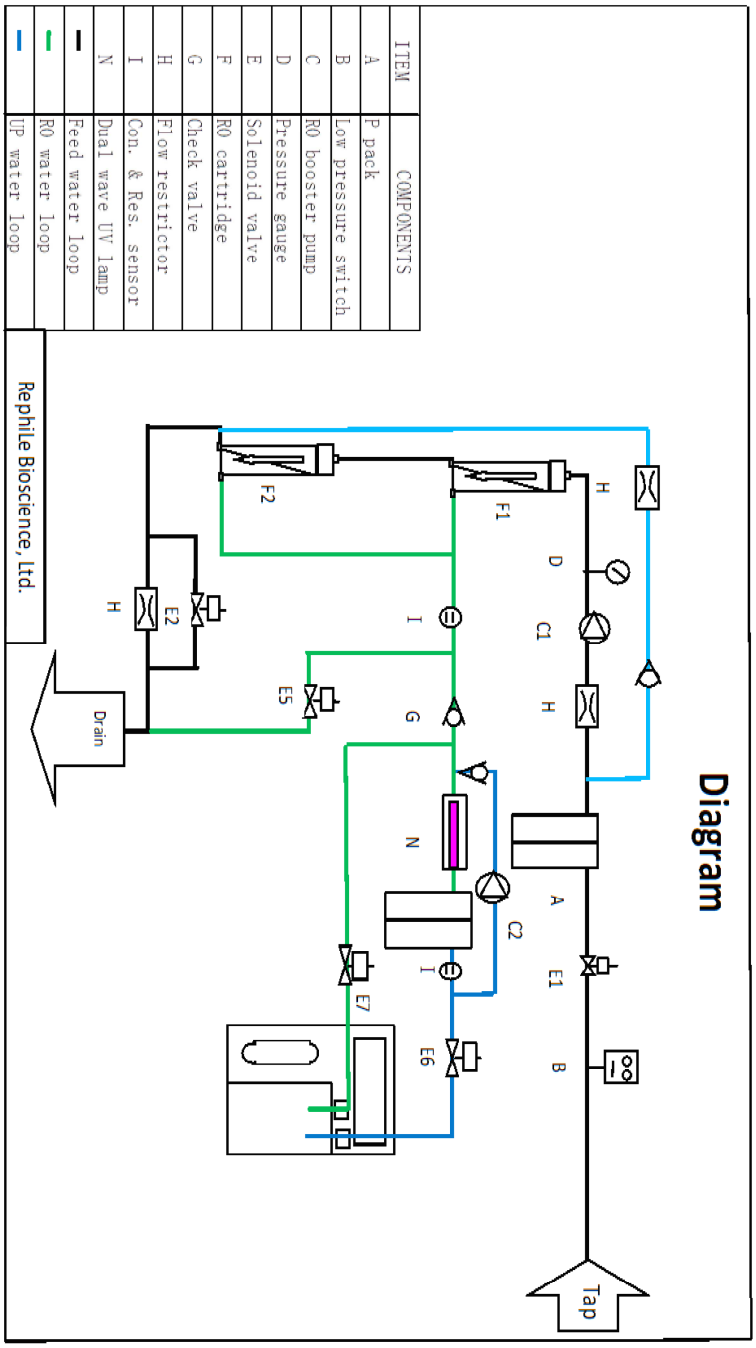
2.3.3 System Back Side View



2.3.4 Accu20 External Connection Diagram



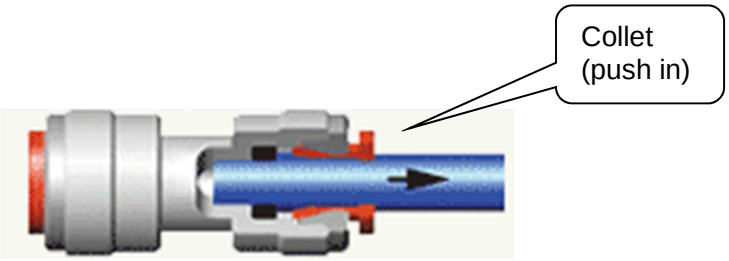
2.3.5 Accu20 Water Flow Diagram



2.4 Installation

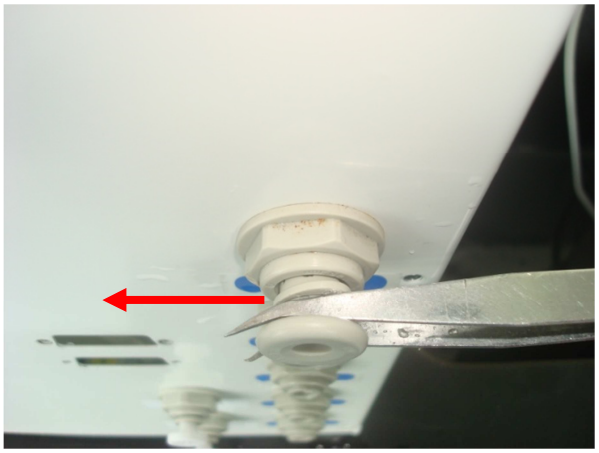
Attention

The connectors of the system are protected by stoppers. DO NOT attempt to pull the stoppers out from the ports without unlocking the connector first or use excessive force to pull the stoppers out as this will damage the connector, rendering it useless.



Please follow the instruction below to remove the stoppers

A. Insert the tweezer to the gap between the stopper and the collet.
B. Pinch the tweezer and push it as the picture indicated to remove the stoppers.



2.4.1 Installing AccuDuo P Pack and U Pack purification cartridges

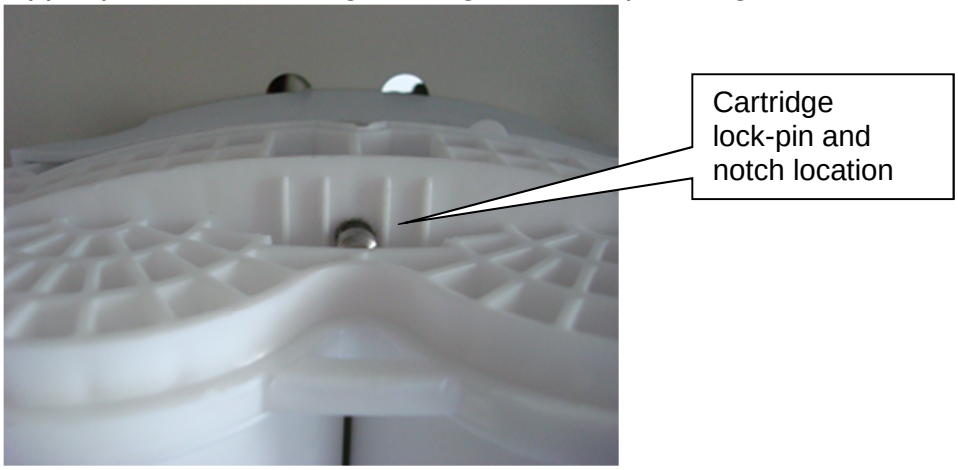
Attention!

These two cartridges work in sequence to ensure high quality of water. These two packs must be installed in a proper sequence as indicated in the picture below. **Never reverse the positions of these packs.**

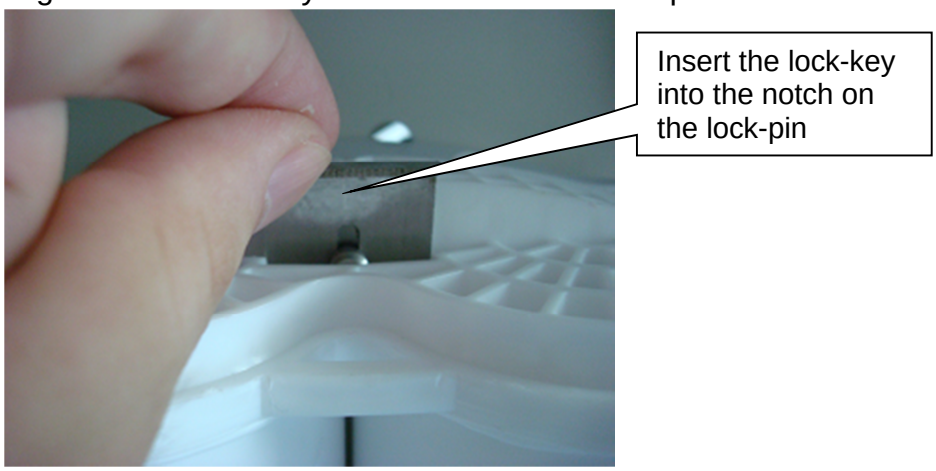
1) Open the right side panel of the system.
2) Remove blue caps on the new cartridges.
3) Install **P Pack to the LEFT** side position, and the **U Pack to the RIGHT** side.

4) Install **P pack to the LEFT** side position. Wet the O-rings on the cartridge with pure water, gently insert the lower end first into the opening on the system frame, then down to let the cartridge sit into its slot

5) Push the upper part of the cartridge through the lock-pin till tight



6) Lock the cartridge with the lock-key to the notch on the look-pin



7) Install the **U Pack cartridge to the RIGHT side** of the P Pack in the same procedure as that for P Pack

2.4.2 Connecting the tubing to the tap water

Cut appropriate length from the provided 3/8 inch tubing. Then connect one end of the tubing to the ball valve, the other end to the TAP IN at the back of the system.

2.4.3 Connecting the Tubing to the Drain

Cut appropriate length from the provided 1/4 inch tubing. Then connect one end of the tubing to DRAIN at the back of the system, the other end into a sink.

Note: DO NOT install the final capsule filter!
The attached final filter will be installed after system initial start-up and degassing in the next chapter.

End of System Installation
Proceed to "System Start up and Operation"

3 SYSTEM START UP AND OPERATION

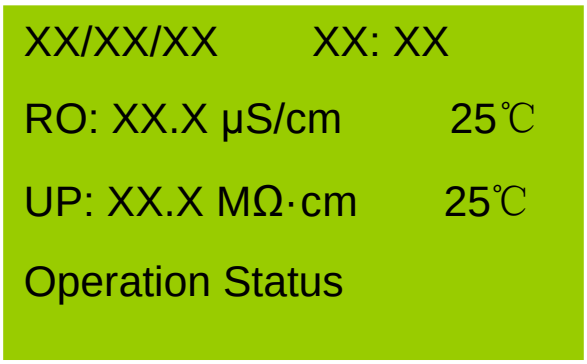
3.1 Check List Prior to System Start Up

Prior to system start up, use the table below to make sure all parts have been installed and connected, and the quality of tap water meets minimal requirements.

Check List	Results
Water quality Municipal water: TDS < 500 ppm, Water temperature: 5 - 45^{o}C, Pressure: 1.0 - 6.0 bar / 15 - 90 psi If water hardness is greater than 100 ppm, Fisher Scientific suggest you to use an external water softening device to protect the RO membrane	
Tap Water connected and turned on	
P Pack cartridge installed	
U Pack cartridge installed	
Drain tubing installed and laid to the sink	

3.2 System Start Up and Time Setting

3.2.1 Panel Display



System display panel shows four rows of information:

First row: Time.

XX / XX / XX XX: XX

In the following order: Year / Month / Day then Hours / Minutes

Second row: RO status.

XX.X µS /cm 25^{o}C

RO Water conductivity compensated to 25^{o}C

Third row: UP status.

XX.X MΩ·cm 25^{o}C

Ultrapure (UP) water resistivity compensated to 25^{o}C

Fourth row: System status.

It displays system operation information and error messages. All messages scroll in sequence.

System status messages:

Message	Meaning
READY	Normal operation mode. 4-hour interval RO flush, countdown
FLUSH	In RO flush mode, 180 seconds countdown
CLEANING	In Cleaning mode, 60/1800 seconds countdown
LOW PRESSURE	System feed water pressure is too low to operate
UP Dispense	UP water dispense mode, time displayed is the preset time of dispensing (if set), countdown
RO Dispense	RO water dispense mode, time displayed is the preset time of dispensing (if set), countdown
RO > SET POINT	RO water conductivity is above preset level **(failure)**. The green light above the RO button will blink. **Need to replace the RO membranes.**
UP < SET POINT	UP (ultrapure) water resistivity is below preset level (failure). The green light above the UP button will blink.
Exch. P PAK	P Pack cartridge has reached its expected useful life. Exchange the cartridge.
Exch. UV Lamp	UV lamp reached their expected useful life. Check ultrapure water quality or replace the lamp.

This water system has the following alarms. If the system is not working properly, the corresponding warning message will appear at the fourth row on the display panel.

- **Low Water Pressure**: System monitors inlet water pressure at all time. If system water inlet has no water, or water pressure is below 0.05 MPa, system displays "**Low Pressure**" and automatically goes to **Standby** to protect the system.
- **RO Failure**: When RO water conductivity is above a preset upper limit, system displays "**RO > Set Point**", the **RO indicator light blinks**. It is normal that RO water is above the upper conductivity limit at the first few seconds of the RO flush. This message disappears after RO reaches quality standard, and the green light stops blinking. If the blinking of RO indicator light continues, replace the RO membrane.
- **UP Failure**: When UP water resistivity is below the set limit, **UP indicator light blinks**. It is normal that UP water is below the set limit at the first few seconds of the Cleaning. This message disappears after UP reaches quality standard, and the green light stops blinking. If the blinking of UP indicator light continues, replace the U pack cartridge.
- **Cartridge Life Reminder**: System has preset cartridge usage timers (countdown) for both P Pack and UV lamp. System reminds you to replace them when these consumables are about to run out or have been exhausted.

3.2.2 System Start Up

3.2.2.1 Plug in the Power Cord, Turn on Power

After turning on the power, system displays system type, serial number (S / N) for 5 seconds. At this point, system runs self-testing programs in the background.

System automatically checks water pressure, determines the water supply situation.

System displays “Press Start”. Press Start button to let system into flush mode, then it will go to Ready mode,

Attention!

In the following two situations, you need to perform the extra 1800 seconds RO cleaning procedure. Hold the UP button for 3 seconds to initiate the procedure.

a) For newly installed system, perform the 1800-second cleaning to clean up preservatives in the RO membranes.

b) For newly installed RO membrane, also perform the 1800-second cleaning to clean up the preservatives in the RO membranes.

If no water is supplied, or inlet pressure is too low, the monitor displays "**Low Pressure**" as shown below, and system goes to standby.

3.2.2.2 Degassing the System

1) Press the **UP** button to start a 60-second cleaning cycle countdown. The UP indicator light blinks if UP water quality does not meet the preset standard.
2) After the cleaning cycle, the system begins dispensing water. During the cleaning, RO indicator light blinks; indicating water quality does not meet the preset standard. Once the cleaning is completed, RO indicator light stops blinking and water quality reaches the standard.
3) Discharge the initial 5 - 10L of water (about 10 - 15 minutes) after installing a new purification cartridge. Press the **UP** button again to stop dispensing.

3.2.3 Installing the Final Filter

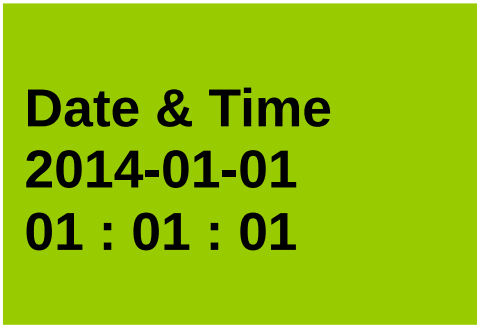
1) Open the attached 0.2 µm final filter package.
2) Screw the final filter onto the outlet till finger tight (no leaking at dispensing). Do not over tighten it as it may damage threads.
3) Press the UP button to flush out gas in the filter.
4) Press the UP button again to stop dispensing.

If a final ultrafiltration filter for pyrogen removal is needed, install the device the same way as the final filter.

3.2.4 Setting up System Clock

System default time is preset. If you need to change system time, follow the procedure below.

1) Press down **START** and **UP** buttons simultaneously to display system time. Format is Year-Month-Date , and Hour:Minute:Second



2) Press the **RO** button to move the cursor, the corresponding number will blink. Press the **UP** button to increase, or press the **RO** and **UP** buttons simultaneously to decrease values.
3) After editing, press the **START** button twice to exit the editing mode.

3.3 Routine Operations

Fisher Scientific recommends users to keep the system in Ready mode to get top quality ultrapure water. Do not turn off the power under normal conditions.

Dispensing Water

1) Press the **UP** button. Ultrapure water will be dispensed after a 60-second cleaning cycle. Press the **UP** button again to stop dispensing.
2) If you dispense ultrapure water again within 1 minute after the previous dispense, the 60-second cleaning cycle will not re-initiate. UP water is dispensed immediately after pressing the UP button. Press the UP button again to stop dispensing.
3) Press the **RO** button. RO water will be dispensed after a 60-second cleaning cycle. Press the **RO** button again to stop dispensing.

If the START button is pushed when the system is in Ready mode, the system will go to **Standby. No water will be dispensed.** Press the START button again to put the system back into Ready mode.

4 MAINTENANCE

Recommended replacement frequency is listed in the table below.

Consumables		Replacement Frequency	Performance Indicator
AccuDuo P Pack	Protects the system	Every 6 months	Scaling and oxidation of RO
AccuDuo U Pack	Produce ultrapure water	Every 12 months or spent	Resistivity decreases below 18 MΩ.cm
UV lamp		12 - 18 months	Increase in TOC
Final Filter	Remove bacteria and particles	Change with the U Pack purification cartridge	Reduce in flow rate
		When needed	Flow rate is less than 0.5 liter per minute
Prefilters			
Polypropylene (PP) Prefilter	Remove particles	2 - 4 weeks	Reduced feed water flow
Softening Cartridge	Remove Ca and Mg ions	2 - 4 weeks	Scaling and clogging of the RO membrane, reducing RO production rate
Activated Carbon Prefilter	Remove chlorine and organics	2 - 4 weeks	Oxidation and clogging of RO membranes, reducing RO production rate and rejection

4.1 Replacing the AccuDuo P Pack, U Pack Cartridges and the Final Filter

Attention!

Do not mix up cartridge positions!

These two cartridges work in different ways. These two packs must be installed in its proper position as indicated in the picture below. **Never reverse the positions of these packs.**

1) Press the **START** button to put system into Standby. Power off the system.
2) Screw off the final filter and remove the system right side panel
3) Remove the used cartridges by lifting up the lock chip, and then pull the cartridges out.
4) Remove blue caps on the new cartridges.
5) Install P pack and U pack as the procedures described in **2.4.1**.
6) Degassing the system and check system leakage
   a) Power up the system, then press the START button.
   b) Press the UP button to degas the system and check for system leakage. If there is a leak, turn off the system and reinstall the cartridge.
   c) Press the UP button to put system into Ready.

d) Install the system side panel.

7) Continue to dispense 5 - 10 L UP water (10-15 minutes) until the UP indicator light stops blinking and no bubbles come out of the spout. Water resistivity should reach 18.2 MΩ·cm by then.

8) Press the **UP** button again to stop dispensing.

9) Install 0.2 µm final filter or an ultrafiltration filter as procedures described in **3.2.3**.

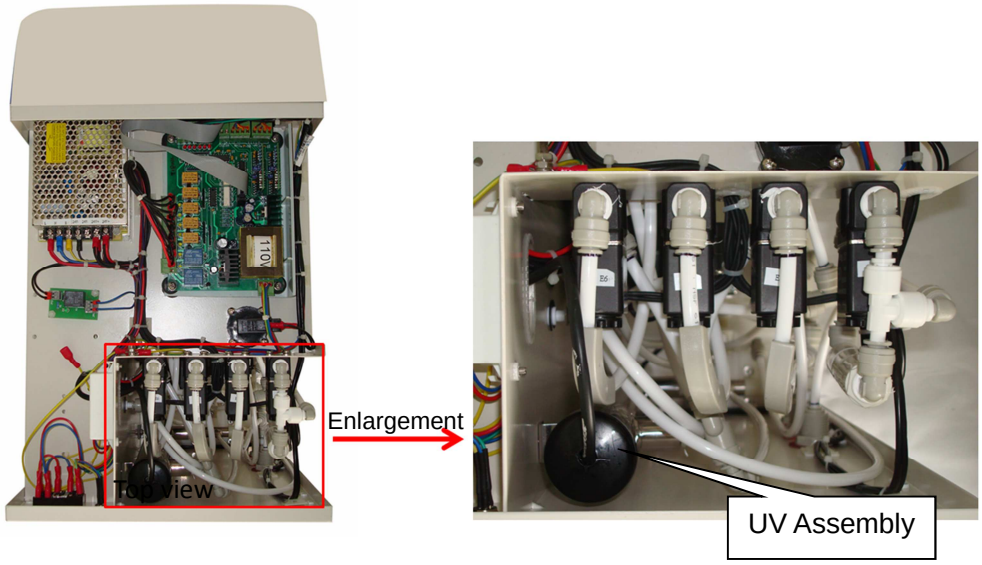
4.2 Replacing the UV Lamp (For UV Models)

Warning!

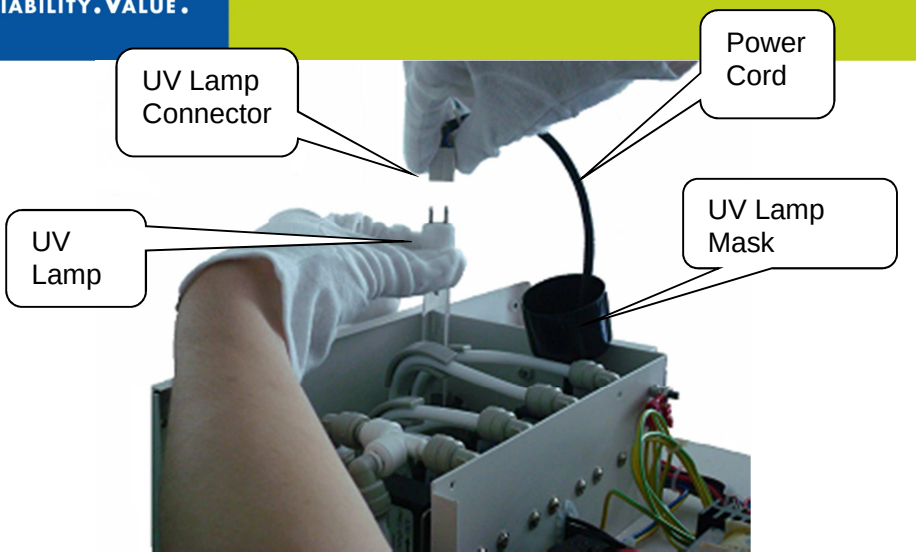
Ultraviolet (UV) radiation is harmful to the eyes and skin. Do not observe the lamp directly when it is illuminated. This system equipped with a lamp cover to prevent UV light leakage. This cover must be on ALL TIME when a UV lamp is installed.

Caution!

Keep the UV lamp straight in and out of the stainless steel chamber during its installation to avoid any action that could cause the lamp to break.



1) Switch off the system power, unplug the power cord.
2) Remove the system top cover.



3) Find the UV lamp chamber (see picture). Remove the UV lamp cover to expose the UV lamp.
4) Unplug the UV lamp from its power cord. Carefully remove the old UV lamp.
5) Wear gloves included in the new UV lamp package. Avoid direct skin contact with the quartz glass of the UV lamp.
6) Carefully insert the new UV lamp into its chamber. When about 2/3 of the lamp is inserted, hold the UV lamp and connect it to the ballast cable connector (4-pin connector) as shown in the picture, and then gently insert the UV lamp completely into the chamber.
7) Cap the UV chamber with the black mask (see picture).
8) Reinstall the system top cover and tighten the screws.

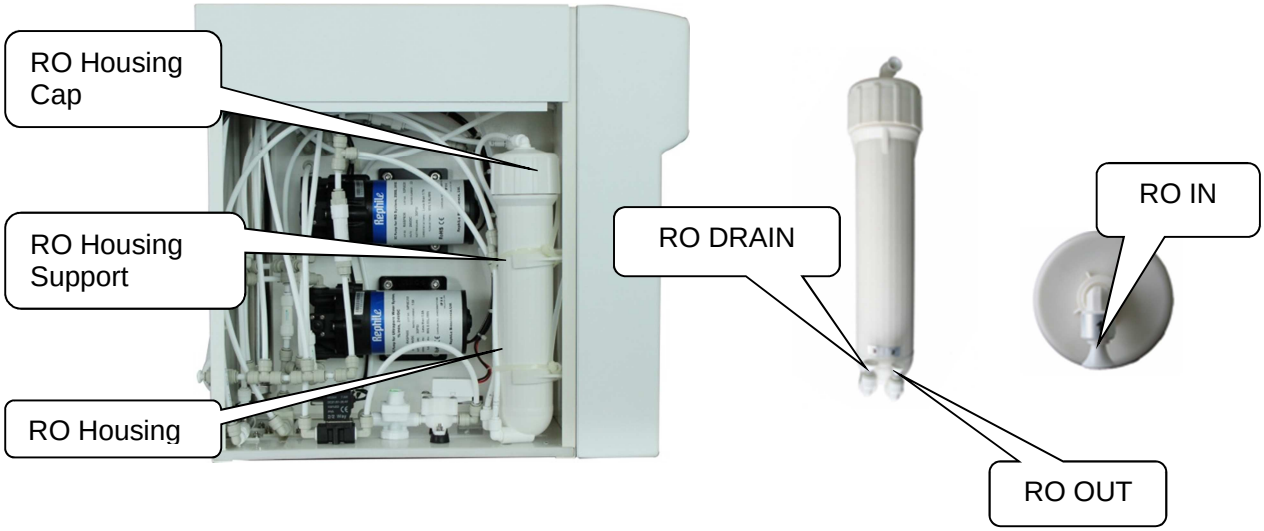
4.3 Replacing the RO Membrane

Warning!

RO membrane contains $NaHSO_3$ as preservative. It may cause irritation to the mucus membrane. Be careful not to get into the eyes! If solution inadvertently gets into the eyes, immediately flush eyes with a large amount of water. If you still feel uncomfortable, please seek medical attention!

Caution!

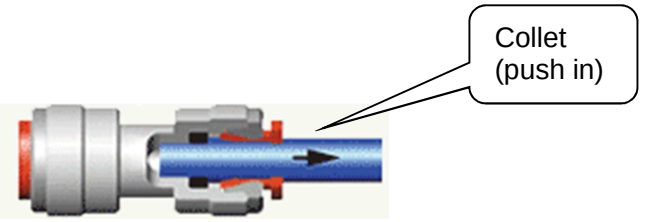
RO reverse osmosis membrane should be replaced by a fully trained professional technician.



1) Switch off the system power, unplug the power cord.
2) Remove the system left side panel. RO membrane housing is indicated in the picture above.
3) Remove the RO membrane housing from its support.

Attention!

DO NOT attempt to pull the tubing out from the RO housing without unlocking the connector first or use excessive force to pull the tubing out as this will damage the connector, and render it useless.



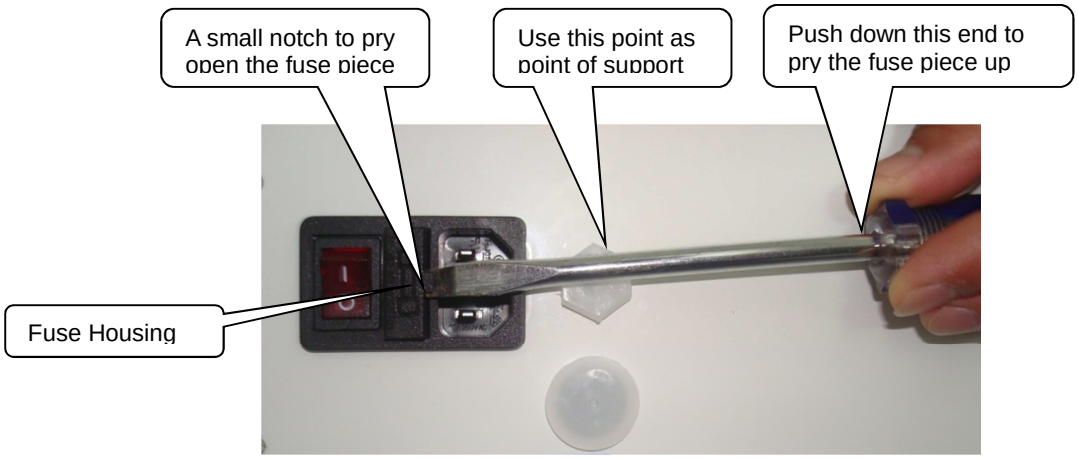
4) Press down the collets at joints with water tubing and then pull tubing out in a gentle manner.
5) Connect labeled tubing inside the system to the matching labels (RO IN, RO OUT and RO DRAIN) on the new membrane housing
6) Install the assembled RO membrane onto the support rack.
7) Power up the system, then press the **START** button.
8) Check system leakage. If there is a leak, reconnect the cartridge.
9) Press the START button to put system into Standby.
10) Install the system side panel.

Additional cleaning of the RO membranes

11) Press the START button to start a 180 second Flush, then the system will enter READY mode, press the UP button for 3 second to initiate the 1800 second cleaning procedure. The System will go back to READY mode after cleaning.

4.4 Replacing the Fuse

The fuse is located in-between the power switch and the power cord receptacle. The fuse housing has a small notch in the middle of the housing piece. Use a small head screw driver to pry open the housing. A spare fuse is inside the fuse housing as indicated in the picture below.



1) Unplug the power cord from the system
2) Put the head of a small-head screw driver in the notch
3) Use the back wall of the power cord receptacle as the point of support to pry the housing open
4) Slide the fuse out
5) Replace the blown fuse with the spare fuse located inside the fuse housing
6) Slide the fuse housing back into its original place

5 BASIC TROUBLESHOOTING

Problem	Possible Cause	Solution
No Water	Water supply stopped	Restore water supply
	Booster Pump not working	Contact a ULS agent
	Pressure at the tap water too low	Call service to have an external booster pump installed by a professional engineer
	Solenoid valve RO dispensing failure	Replace solenoid valve. Contact a ULS agent
Water flow slow	AccuDuo P Pack clogged	Replace AccuDuo P Pack
	Reverse osmosis (RO) membrane clogged	Replace RO membrane
	Final filter clogged	Replace final filter
UP Resistivity dropped at dispensing	AccuDuo U Pack cartridge is exhausted	Replace accuDuo U Pack cartridge
	RO water failure	Wait till RO water passes quality parameter If RO indicator light blinks for a long period of time, then RO membrane needs to be replaced.
	Resistivity sensor or meter failure	Replace relevant parts
Water leakage	Leak from connections	Shut off power and water supply. Remove system side panels, turn on water supply and check leaking points. Reconnect or replace leaking parts.

6 PARTS AND ORDER INFORMATION

Fisher Scientific Accu20 Systems

Catalog Number	Accu20 System
15489689	Accu20 Water System 230V
15499689	Accu20 Water System, UV SET 230V

Commonly Used Consumables

Catalog Number	Product Name	Description	Unit
15449669	Reverse osmosis membrane with housing	RO membrane, 1/pk	Each
15449719	Pretreatment Water Cartridge	AccuDuo P Pack cartridge	Each
15489729	Ultrapurification Cartridge	AccuDuo U Pack cartridge	Each
15499729	Ultrapurification Cartridge and final filter	AccuDuo U Pack cartridge with a 0.2 µm final capsule filter	Set
15409739	Ultrapurification Cartridge	AccuDuo U Pack cartridge (Low TOC)	Each
TBD	Ultrapurification Cartridge and final filter	AccuDuo U Pack cartridge with a 0.2 µm final capsule filter (Low TOC)	Set
15469689	UV lamp	185/254 nm dual -wavelength UV lamp	Each
15419659	Final filter	0.2 µm final capsule filter, 1/pk	Each
15419669	Leak Protector with Auto Water Shutoff Valve	Leak Protector with Auto Water Shutoff Valve	Set

Other Maintenance Spare Parts

Please contact Fisher Scientific for ordering information.

Main control panel (230V, 50 Hz)

Main control board (110V, 60 Hz)

RO Booster Pump

UP circulation pump

Resistivity Sensor

Conductivity Sensor

Low Pressure switch

Pressure Gauge

Pressure relief pump

Commonly Used Connector Package

Check Valve

Flow Restrictor

UV lamp ballast

RO membrane housing (with connectors)

Power Switch

Fuse

3/8" PE tubing (5 meters)

1/4" PE tubing (5 meters)

7 WARRANTY INFORMATION

Conditions of Sales

Thermo Fisher Scientific manufactures and sells various kinds of water systems that meet quality specifications. When used and maintained as instructed in this manual, these systems can produce ultrapure water that meet or exceeds quality standards set forth by all international standardization bodies.

Thermo Fisher Scientific is committed to improve its products and services. As a result, the information contained in this manual may be changed without further notice. Thermo Fisher Scientific assumes no responsibility for any errors that may appear in this manual.

The plant's quality management system where this Accu20 system was manufactured has passed the ISO9001:2008 quality management system.

Water System Limited Warranty

Thermo Fisher Scientific warrants the water system against defects due to materials and workmanship when used in compliance with instructions and operating conditions specified in this manual. Fisher Scientific warrants the system for 24 months from the earlier of

1. The date of installation, or
2. The 183th day of shipment from manufacturing's warehouse.

Within the warranty period, Fisher Scientific will provide replacement for the defected parts at no charge. Such service must be conducted by Thermo Fisher Scientirfic or its authorized distributor.

This warranty does not include cartridges.

Other than the warranty expressed above, Fisher Scientific disclaims any other warranty, express or implied, including marketability and suitability of use. Fisher Scientific shall under no circumstance be liable for incidental or consequential damages.

Fisherbrand™

QUALITY. RELIABILITY. VALUE.

Instruction Manual

Austria: (0)800-20 88 40 **Belgium:** +32 (0)56 260 260 **Denmark:** +45 70 27 99 20
Germany: +49 (0)2304 9325 **Ireland:** +353 (0)1 885 5854 **Italy:** +39 02 950 59 478
Finland: +358 (0)9 8027 6280 **France:** +33 (0)3 88 67 14 14 **Netherlands:** +31 (0)20 487 70 00
Norway: +47 22 95 59 59 **Portugal:** +351 21 425 33 50 **Spain:** +34 902 239 303
Sweden: +46 31 352 32 00 **Switzerland:** +41 (0)56 618 41 11 **UK:** +44 (0)1509 555 500

Fisher Scientific

A Thermo Fisher Scientific Brand