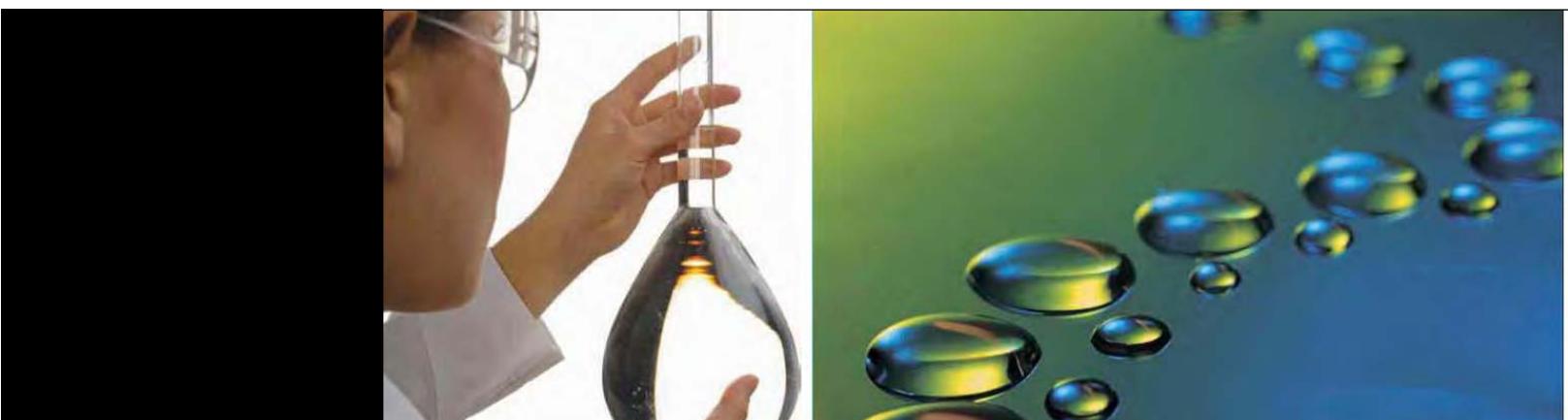


B-pure Pressure Cartridge System

Series 583

Operating Manual and Parts List LT583X1 Rev. 0



Models covered in this manual	
Model number	Voltage
D4505 (7112)	
D4511 (7113)	
D4521 (7114)	120V
D4522-33 (7115)	230V
D4524 (7116)	120V
D5831 (7122)	120V
D5833 (7124)	120V
D5839 (7125)	

MANUAL NUMBER LT583X1 (7007112)

0	--	5/26/10	Transfer to Marietta (was LT583X1 4/5/05)	ccs
REV	ECR/ECN	DATE	DESCRIPTION	By



Important Read this instruction manual. Failure to read, understand and follow the instructions in this manual may result in damage to the unit, injury to operating personnel, and poor equipment performance. ▲

Caution All internal adjustments and maintenance must be performed by qualified service personnel. ▲

Material in this manual is for information purposes only. The contents and the product it describes are subject to change without notice. Thermo Fisher Scientific makes no representations or warranties with respect to this manual. In no event shall Thermo be held liable for any damages, direct or incidental, arising out of or related to the use of this manual.

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Important operating and/or maintenance instructions. Read the accompanying text carefully.



Potential electrical hazards. Only qualified persons should perform procedures associated with this symbol.



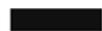
Equipment being maintained or serviced must be turned off and locked off to prevent possible injury.



Hot surface(s) present which may cause burns to unprotected skin, or to materials which may be damaged by elevated temperatures.



Marking of electrical and electronic equipment, which applies to electrical and electronic equipment falling under the Directive 2002/96/EC (WEEE) and the equipment that has been put on the market after 13 August 2005.



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- ✓ Always follow good hygiene practices.
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Section 1 Safety Information

Your Thermo Scientific B-pure Pressure Cartridge System has been designed with function, reliability, and safety in mind. It is the user's responsibility to install it in conformance with local electrical codes. For safe operation, pay attention to Notes, Cautions, and Warnings throughout the manual.

This manual contains important operating and safety information. The user must carefully read and understand the contents of this manual prior to the use of this equipment.

Note Do not use this product for anything other than its intended usage.

Warnings

To avoid electrical shock, always:

1. Use a properly grounded electrical outlet of correct voltage and current handling capacity.
2. Do not mount your B-pure directly over equipment that requires electrical service. Routine maintenance of this unit may involve water spillage and subsequent electrical shock hazard, if improperly located.
3. Disconnect from the power supply prior to servicing.

To avoid personal injury:

1. Depressurize system prior to attempting to remove canisters, or meter and cell assembly.
2. Avoid splashing disinfecting solutions on clothing or skin.
3. Ensure all piping connections are tight to avoid leakage of chemicals.
4. Always depressurize chemical lines before disassembly.
5. Follow carefully the manufacturers' safety instructions on labels of chemical containers and Material Safety Data Sheets (M.S.D.S.).
6. Refer servicing to qualified personnel.

Section 2 Technical Specifications

Feedwater Requirements

Types Tap, RO, DI, distilled
 Maximum pressure 7 kg/cm² (100 psig) maximum
 Temperature 4-49°C (40-120°F)

Installation

Mounting	Wall mount, with bracket provided		
Dimensions, mm (in.)	Dual B-pure	Single B-pure	1/2 size Holder
Width	381 (15)	178 (7)	178 (7)
Depth	171.5 (6.75)	171.5 (6.75)	171.5 (6.75)
Height	673 (26.5)	591 (23.25)	368 (14.5)
Op. weight, kg (lb)	12.7 (28)	5.9 (13)	5 (11)
Plumbing Connections			
Inlet	1/2" NPTF	1/2" NPTF	1/2" NPTF
Outlet	1/2" NPTF	1/2" NPTF	1/2" NPTF
	1/4" NPTF		
	5/16" OD		
	Hose barb		

Resistivity Measurement

Range 0.1 - 18.3 megohm-cm (temp compensated to 25°C/77°F)
 Accuracy 3% Full Scale
 Cell 0.1 constant

Electrical Requirements

120 VAC, 50/60 Hz 108-132 VAC, 47-63 Hz, 5 Watts
 240 VAC, 50/60 Hz 216-264 VAC, 47-63 Hz, 5 Watts

Declaration of Conformity

We hereby declare under our sole responsibility that this product conforms with the technical requirements of the following standards (230 volt models only):

EMC:

EN 50081-1Generic Emission Standard

EN 50082-1Generic Immunity Standard

Safety:

IEC 1010-1-92 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use; Part I: General Requirements

per the provisions of the Electromagnetic Compatibility Directive 89/336/EEC as amended by 92/31/EEC and 93/68/EEC, and per the provisions of the Low Voltage Directive 73/23/EEC, as amended by 93/68/EEC.

Copies of the Declaration of Conformity are available upon request.

Environmental Conditions

Operating:

4°C - 49°C; 20% - 80% RH, non-condensing

Installation Category II (over-voltage) in accordance with IEC 664

Pollution Degree 2 in accordance with IEC 664

Altitude limit: 2,000 meters

Storage: -25°C - 65°C; 10% to 85% RH

Section 3 Unpacking and Installation

Unpack the B-pure carefully. B-pure units come completely assembled. A spare head interconnector (P/N 15853) is supplied as a loose part with the single B-pure D4511 and the 1/2 size B-pure D4505 and D5839. Retain this item for possible later use in expansion.

Installation

The cartridge holders that make up the B-pure family are designed for a wide range of applications and configurations. It is not possible to include specifics in this manual for the broad application range. We recommend that you contact your local representative or Technical Services for guidance. Knowing the correct cartridges or filters for your specific application will assure you of the most efficient and economical use of your B-pure System.

All individual members of the B-pure family can be interconnected to form custom water treatment systems. If you are constructing a custom system, be sure to read the Mix & Match section before mounting the system. The mounting hole patterns will vary depending on the particular configuration that you choose.

The B-pure system requires expendable pretreatment, prefilters, deionization cartridges and final filters which are not supplied with the unit. They must be purchased separately. Descriptions, applications and catalog numbers of filters and cartridges are located in the “Maintenance and Servicing” section of this manual. When ordering, please state catalog number, description and quantity required. Screws and fasteners required for wall mounting are not supplied with the unit.

System Location

Warning Do not mount B-pure directly over equipment that requires electrical service. Routine maintenance of this unit may involve water spillage and subsequent electrical shock hazard if improperly located. ▲

Caution Wall and mounting hardware must be capable of supporting the full operational weights as outlined in the technical specifications section of this manual. Inadequate support or fasteners may result in damage to mounting surface and/or equipment. Use adequate hardware for the job. If you are unsure of the hardware, consult your building maintenance group or contractor. ▲

The B-pure should be mounted at a convenient height for routine operation. Adequate front access will be required for cartridge or filter exchange and reading of the resistivity meter, if used. The following clearances are necessary:

Left and right side clearance - 4" minimum

Free space below canisters - 4" minimum

Free space above center of wall bracket:

- B-pure products without meter, 4" minimum
- B-pure products with meter, 8" minimum

The recommended dimensions for mounting hardware to support your equipment are:

- Body Diameter, 1/4" maximum
- Head Diameter, 3/8" maximum
- Length, 1" typical

Note If you are constructing a custom water treatment system using B-pure components, read the Mix and Match section of this manual before proceeding further. ▲

Mounting and Utility Connections

All B-pure installations require a user supplied shutoff valve in the incoming water service line. In some installations, it may be desirable to provide an outlet shutoff valve. A draw-off valve assembly is provided on the Dual Holders as a standard and may be ordered as an optional extra for other B-pure products (see exploded view drawing for part numbers).

Mounting and Utility Connections (cont.)

Mount the B-pure unit using the following steps:

1. Remove the wall bracket from the unit by removing the two securing screws on the left and the right bottom portion of the bracket. Slide bracket downward to release.
2. Using the wall bracket as a template, mark the hole locations on the wall.
3. Drill holes in wall suitable for the selected fasteners.
4. Mount wall bracket and secure with fasteners.
5. Re-secure B-pure on bracket and refasten securing screws.

Caution Do not overtighten this connection; excessive tightening will crack the adapter. Do not thread a metal fitting into inlet or outlet adapter. ▲

6. Connect feedwater service to the left side of the head assembly using adapter provided. Use PTFE tape on threads to ensure a leak-free connection.
7. Make outlet connections as required by your specific application.

Section 4 Initial Operation

Various types of filters and cartridges are used in B-pure systems; 10” nominal particulate filters and cartridges are used in the halfsize canisters and nominal 17” water treatment cartridges used in the full size canisters.

Warning Depressurize system prior to attempting to remove canisters. ▲

Note An extra set of head-to-canister o-rings are supplied to replace any o-rings that may have been damaged or deformed in shipment. ▲

Installing Water Treatment Cartridges

1. Remove the cartridge from the bag.
2. Remove the canister from the head by depressing the thumb lever and rotating the hand ring 1/4 turn to the left.
3. Check to ensure that the small o-ring inside the head is in place. This is important because water will bypass the cartridge if this o-ring is not in place.
4. Place cartridge(s) in canister with the large opening down.
5. Wet canister o-ring before installation. Install canister by depressing thumb lever and rotating 1/4 turn to the right, until the locking pin is in the appropriate position (see Figure 4-1).

Caution Secure locking pin before operating. Locking pin on canister must be fully released into hole in head before system is operated. ▲

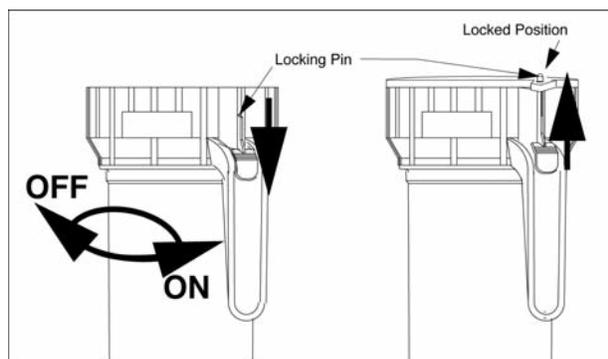


Figure 4-1. Locking Pin

Installing Particulate Filters

Two types of particulate filters are used in the half-size canisters.

Warning Depressurize system prior to attempting to remove canisters. ▲

Prefilters

These devices are string-wound filters designed to prevent large particulates from entering a water treatment system.

Final Filters

These devices are pleated membrane filters designed to remove particulates as small as 0.2 micron. These filters are supplied with gaskets which are not used for B-pure installations. Install filters as follows:

1. Remove filter and adapters from package.
2. Remove canister from head by pressing the thumb lever and rotating the ring 1/4 turn to the left.
3. Lubricate the o-rings on the adapters using pure water, then install adapters into filters by turning the adapter as you push it into the filter's open end.
4. Lubricate the o-rings on the head with pure water, then secure the filter (including adapter) onto the head by gently pushing and turning the filter.
5. Insert the canister vertically upward over the filter and tighten 1/4 turn to the right.

Caution Secure locking pin before operating; locking pin must be fully released into hole on head before the system is operated. ▲

Filling Procedure

After every cartridge exchange, some air will be trapped in the system. Air should be purged before routine use by the following procedure:

1. Place a container or suitable drain under the outlet valve.
2. Open all inlet valves and the outlet valve.
3. Depress vent button on top of head to remove air.
4. When there is a steady flow from the outlet valve, close the outlet valve.
5. If using a resistivity meter, plug into electrical service.
6. Open the outlet valve and allow water to flow through the system until desired purity is reached.

Note When using a submicron filter, hold purge button (red button on holder head) down until a steady flow of water is observed. Check all fittings for leaks and tighten as necessary. ▲

Section 5 Operation

Prior to withdrawing water for use, it is recommended that you allow some water to run to drain to rinse up the system. If using a resistivity meter, the display will register a gradual improvement of water quality.

Resistivity Meter/Puralite

The resistivity measurement in the dual holder B-pure is accomplished with an in-line digital readout meter and integral cell. The resistivity meter measures the specific resistance of the water on a scale of 0.1 to 18.3 megohm-cm. The resistivity measurement is automatically temperature compensated to 25°C regardless of system water temperature.

Other systems may include a Puralite. These lights are go/no-go indicators. The light will illuminate green when the purity of the water exiting the system is above the value of the individual light. When the purity drops below that value, it will illuminate red, indicating the need for cartridge replacement.

Section 6 Maintenance and Servicing

Warning Disconnect from power supply before servicing. Refer servicing to qualified personnel. ▲

Warning Depressurize system prior to attempting to remove canisters. ▲

Cartridge and Filter Replacement

Depending on your particular usage, cartridges must be periodically replaced. The need for replacement of water treatment cartridges designed to remove ionized impurities can be determined by a drop in resistivity of the water. For 10” particulate filters, replacement can be determined by a significant drop in pressure or a decrease in flow rate. Change all cartridges as follows:

1. Close the customer-supplied shutoff valve on the inlet side of the system.
2. Place a suitable container under the outlet and open the outlet valve to depressurize the system.
3. Press vent button on top of B-pure head.
4. Place a container under the cartridge canister to collect any spillage.
5. Remove the canister from the head and drain into container.
6. Remove old cartridge and discard.
7. Inspect the o-rings in the canister and replace if worn.
8. Install a new cartridge or filter as explained in “Initial Operation.”

System Sanitizing

Frequency of cleaning is difficult to determine because of the wide variety of feedwater supplies, however the need for cleaning can be easily determined. Whenever a cartridge is replaced, always examine the inside of the canister for any residual deposits. If any are observed, clean the system as follows:

1. Disconnect power to system where appropriate.
2. Close the shutoff valve on the inlet side of the system.
3. Relieve pressure by opening the outlet valve.
4. With the cartridge(s) out of the canister(s), wash the inside of the head(s) and canister(s) with soap or detergent, using a sponge or clean cloth. Rinse out the canister(s) and head(s) with clean water several times to remove the detergent residues.
5. Make up the following disinfecting solution: add 230 milliliters of household bleach (5.25% sodium hypochlorite) to 3.8 liters of water to make a 0.3% solution.

Note The sanitizing solution noted in Step 5 is sufficient for one large canister. Prepare a sufficient amount of solution to fill all of the canisters in your system. ▲

6. Fill the canister to within 2" of the top with the above disinfecting solution, and reassemble the canister(s) on the unit.
7. Open the shutoff valve on the inlet side of the system.
8. Open the outlet valve, draw off approximately 200 ml of solution and discard it.
9. Close inlet and outlet valves.
10. Allow the disinfecting solution to stand for one half hour.
11. Open the inlet and outlet valves and flush the system for 10 minutes.
12. Close the shutoff valve on the inlet side of the system and open the outlet valve to depressurize the system.
13. Carefully remove the canister(s) from the system, and discard the solution remaining from the canister(s). Do not rinse the canister(s).
14. Install fresh cartridge(s) in the system as explained in Initial Operation.
15. Turn to the Operation section of this manual for filling procedure and normal operation.

Cleaning the Resistivity Cell

Warning Depressurize system prior to attempting to remove meter and cell assembly. ▲

Caution The cell electrodes are etched to improve wetting characteristics. Do not mechanically abrade or damage this surface. ▲

Caution Do not immerse the entire cell assembly in the cleaning solution, only the electrode portion. ▲

Caution Do not overtighten cell. Excessive tightening will crack head. ▲

Clean the resistivity cell as follows:

1. Disconnect power to the system.
2. Close the shutoff valve on the inlet side of the system.
3. Open the outlet valve.
4. Remove meter and cell assembly from the head.
5. Wash the cell in a mild detergent solution or a 10% inorganic acid solution (follow chemical manufacturer's recommended handling procedure). This may be done in an ultrasonic cleaner or with a soft brush. The cell must be thoroughly rinsed in deionized water following the detergent or acid cleaning.

After cleaning, remove old PTFE tape from the head and cell threads and apply a new wrap of PTFE tape to cell body threads. Install the meter assembly in the B-pure System.

General Cleaning Instructions

Wipe exterior surfaces with a lightly dampened cloth containing a mild soap solution.

Storage

If the B-pure System is to be shut down for an extended period of time, the system should be completely drained and the cartridges removed to prevent the growth of bacteria. If the system has remained inactive and full of water, then the system should be drained, cleaned, and sanitized before new cartridges are installed.

Mix and Match

All B-pure products are designed for interconnection to form a variety of water systems. Individual applications will determine the correct sequence of B-pure components. After the sequence is determined, the various parts can be easily arranged and connected. In this section, we describe the general procedure for constructing a custom system and detail the procedures for constructing two commonly used configurations. We recommend you read the entire section before proceeding.

Tools and Accessories

Constructing a custom system will require the following tools:

- Small screwdriver for drive pin removal.
- A small mallet or hammer for re-seating the drive pins.

General Procedure

After carefully unpacking B-pure components, place them on a table in the desired order. As a general rule, if you are using a dual holder B-pure, it should be located as far to the right as possible. This will reduce the number of changes that need to be made.

Next, remove all of the fastener pins in the canister heads where two heads touch each other and remove the adapters or assemblies retained by the fastener pins. Fastener pins are removed by gently tapping them up with a screwdriver. Set the fastener pins and other parts aside. If you have a dual holder B-pure, it is not necessary to remove the factory installed fastener pins that join the heads.

Locate the head interconnectors (BR550X4), supplied as loose parts, and install these wherever heads need to be joined. Make sure that the o-rings are still in the recesses of the heads. Re-install fastener pins and tap gently with a hammer until they are seated. You should now have a rigid assembly of heads and wall brackets in your desired sequence. Inlet and outlet adapters or assemblies can now be installed to suit your particular requirements. Turn to the “Mounting and Utility Connections” section of this manual for mounting instructions.

Three Holder B-pure Unit

A common configuration built from B-pure components is the three holder unit. This unit allows the use of two water treatment cartridges and a final filter at the outlet. This will require one dual B-pure and a 1/2 size B-pure filter holder (D5839). Disassemble the units as follows:

1. Position the dual holder on the left and the 1/2 size filter holder to its right.
2. Remove all the canisters.
3. Remove the draw-off valve assembly from the dual holder by driving up the fastener pins.
4. Remove the end fitting on the inlet and outlet of the 1/2 size filter holder.

Reassemble the units as follows:

1. Install the head interconnector into the outlet port of the dual holder. Be sure o-ring is in place. Install and seat fastener pins.
2. Connect the 1/2 size filter holder head into the dual holder head so that the interconnector from the Dual Holder is in the inlet port of the 1/2 size filter holder. Be sure o-ring is in place. Install and seat fastener pins.
3. Install draw-off valve assembly, including meter, into the 1/2 size filter holder outlet port. Be sure the o-ring is in place. Install and seat fastener pins.

Turn to the Mounting and Utility Connections section of this manual for mounting instructions.

Three Holder B-pure System

A common configuration built from B-pure components is a Three-Holder System. This system will utilize three water treatment cartridges in series. This will require a Dual Holder and a single holder B-pure (D4511).

Disassemble the unit as follows:

1. Position Dual Holder on right and single holder on left on top of table.
2. Remove the canisters from all units.
3. Drive up fastener pins from the outlet of the single holder and the inlet of the dual holder and remove end fittings. This is accomplished by gently tapping from the bottom with a small screwdriver and a hammer - excessive force will damage the pins.
4. Connect the two units together using the head interconnector supplied. Ensure that the o-ring is present in both openings. Install and seat fastener pins.

Note Refer to Figure 6-1 for assembly order. ▲

5. Turn to the “Mounting and Utility Connections” section of this manual for mounting instructions.

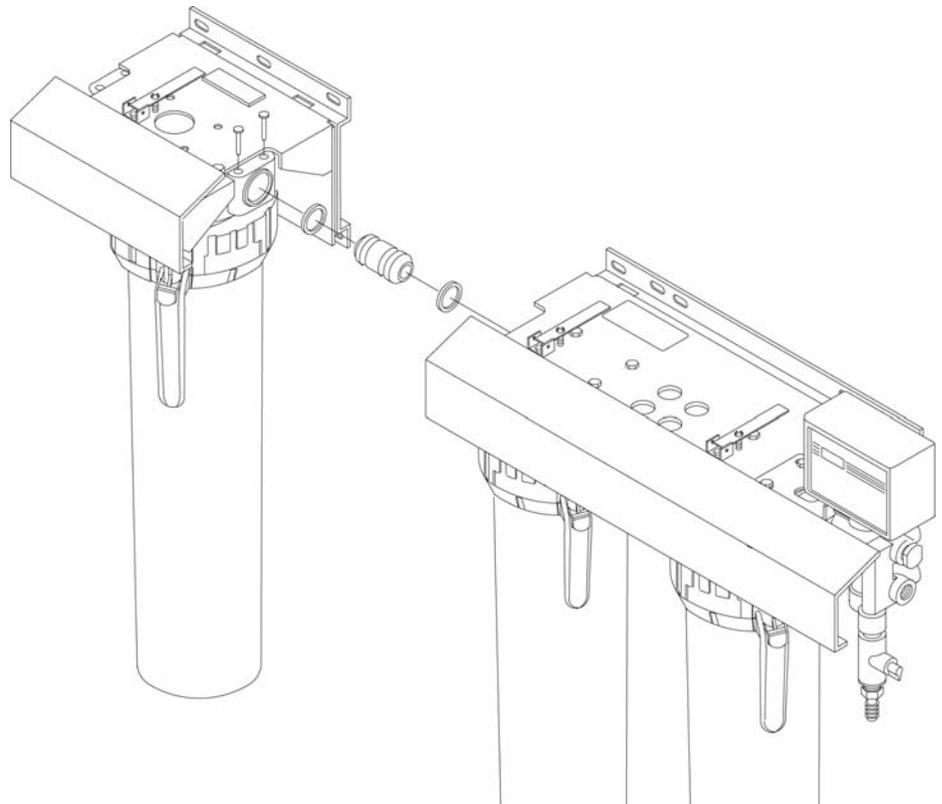


Figure 6-1. Three Holder System (3 Water Treatment Cartridges)

Cartridges

Description	Half Size Catalog no.	Full Size Catalog no.	Application
Macropure	N.A.	D0836	Effectively removes colloids, bacteria, chlorine and organics, increases filter life.
Pretreatment	N.A.	D0835	Effectively removes colloids, bacteria organics and chlorine.
Still Pretreatment	D50217	D0832	Removes ionized impurities and has a layer of activated carbon to remove chlorine and organics.
Organic Removal	D50215	D0813	Removes organics and chlorine.
Cation	N.A.	D0815	Converts ionized salts to the acid form resulting in a product water that is low in pH, ideal for precious metal or isotope recovery.
Anion	N.A.	D0760	Effective removal of anion impurities, raises the pH of solutions, recovers precious metal complexes.
High Capacity	N.A.	D0803	Removes ionized impurities, produces a larger quantity of water than that of the Ultrapure, however at a lower resistivity.
Ultrapure	D50213	D0809	Removes ionized impurities to produce high resistivity water with a neutral pH.
Oxygen Removal	D50214	D0811	Maintains low oxygen content to prevent corrosion in cooling water loops, etc. The feed-water should contain less than 10 ppm of ionized solids.

Section 6

Maintenance and Servicing

Prefilters

15 micron FL583X3

10 micron FL583X2

5 micron FL583X1

Final Filters

0.45 micron FL583X5

0.2 micron FL583X6

Section 7 Troubleshooting

Problem	Possible Causes	Solutions
Water will not rinse up to purity.	Exhausted cartridges.	Replace all cartridges as explained in "Maintenance & Servicing" section.
	Cartridges upside down.	Install right-side up as explained in "Initial Operation" section.
	Cartridges out of order.	Verify cartridge order is correct for your specific application.
	Feedwater bypassing cartridge(s).	Be sure o-ring is not damaged and is properly installed.
	Excessive flow rate.	Reduce flow to a specified maximum or less.
Reduced or no water flow.	Particulate filter clogged.	Replace the filter as explained in the "Maintenance & Servicing" section.
	Air trapped in filter.	Purge air in the system as explained in "Purging Air From the System."
Leaking canisters.	O-ring missing, damaged or not seated properly in the groove of canister.	Replace or position correctly.
Excessive particulate passage.	One or both filter adapters missing or installed improperly.	Check that the adapters are installed on the filters properly and that their o-rings are in place.
Short cartridge life.	Cartridges being used beyond expiration date.	Check the expiration date; cartridges begin to lose capacity after being stored 2 years from date of manufacture. Replace with fresh cartridges.
	Change in feedwater characteristics.	If tap water is the feedwater source, check the quality of the water. In some cases, the quality of the water will change with the seasons; changing the source (city water to well water and vice versa) will result in a water quality change. If feedwater is from a central purification source, verify water quality and proper functioning of the system.

Section 8 Exploded Views

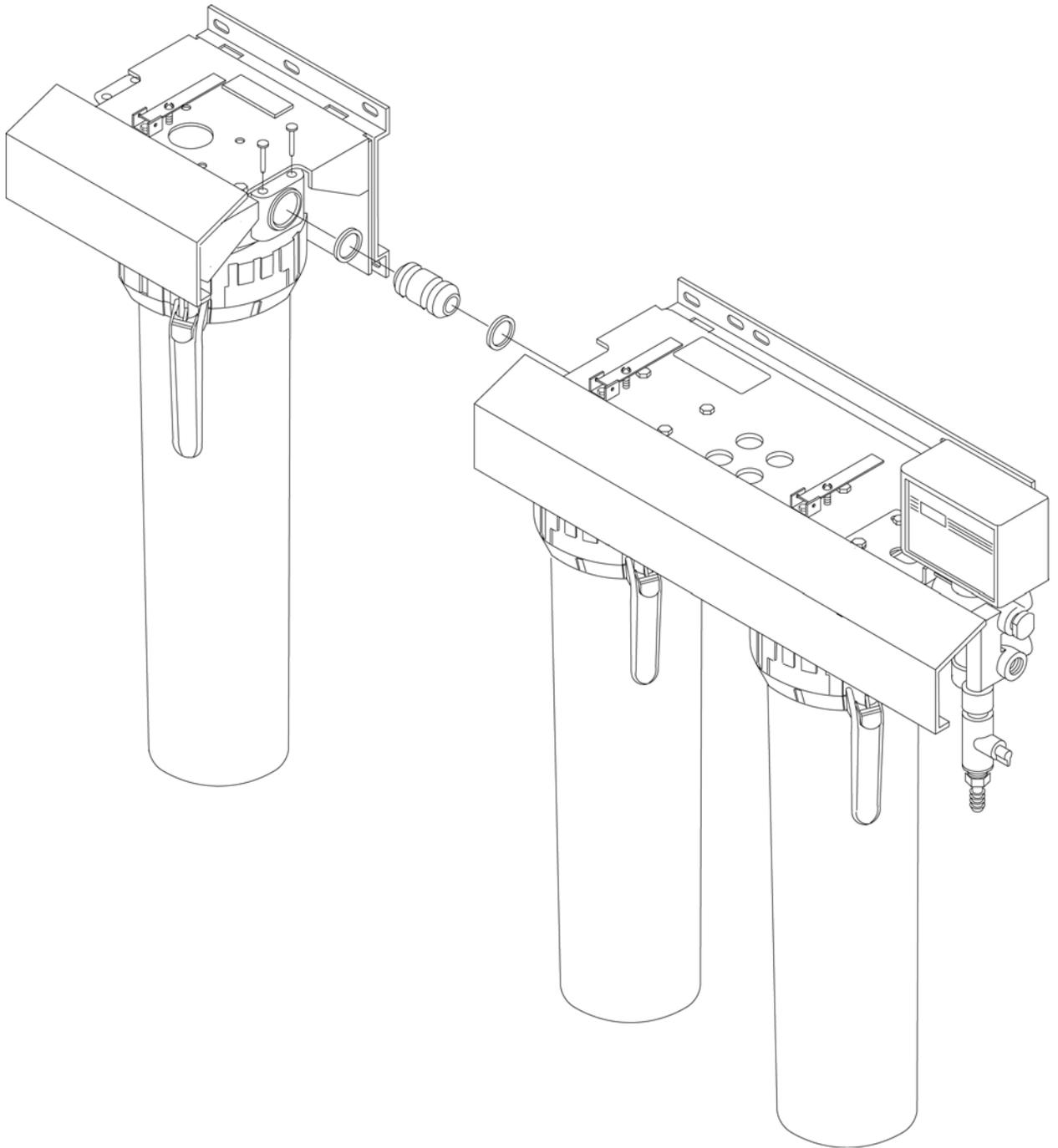


Figure 8-1. Three Holder E-pure (Three Water treatment Cartridges)

Section 8
Exploded Views

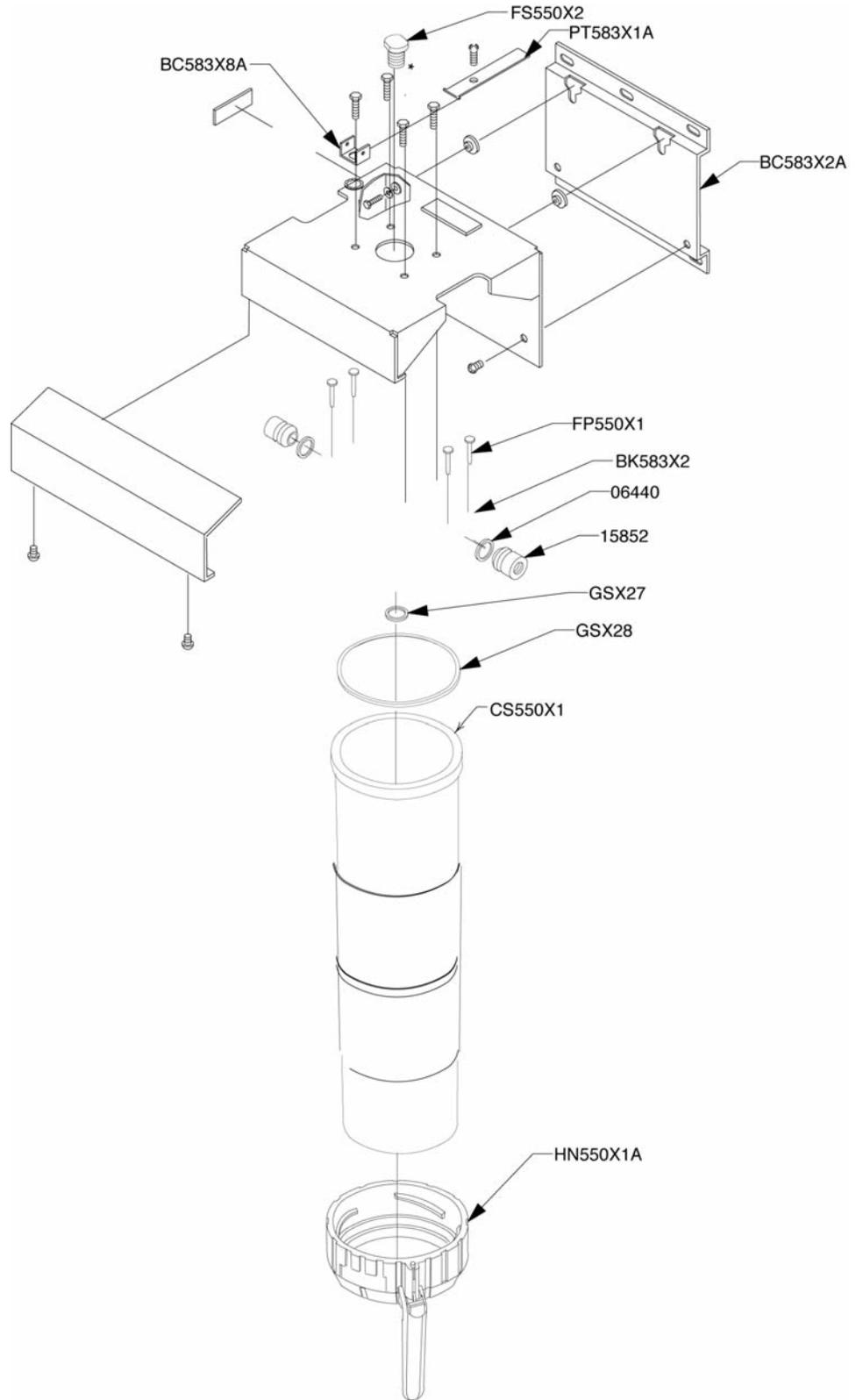


Figure 8-2. B-pure (D4511)

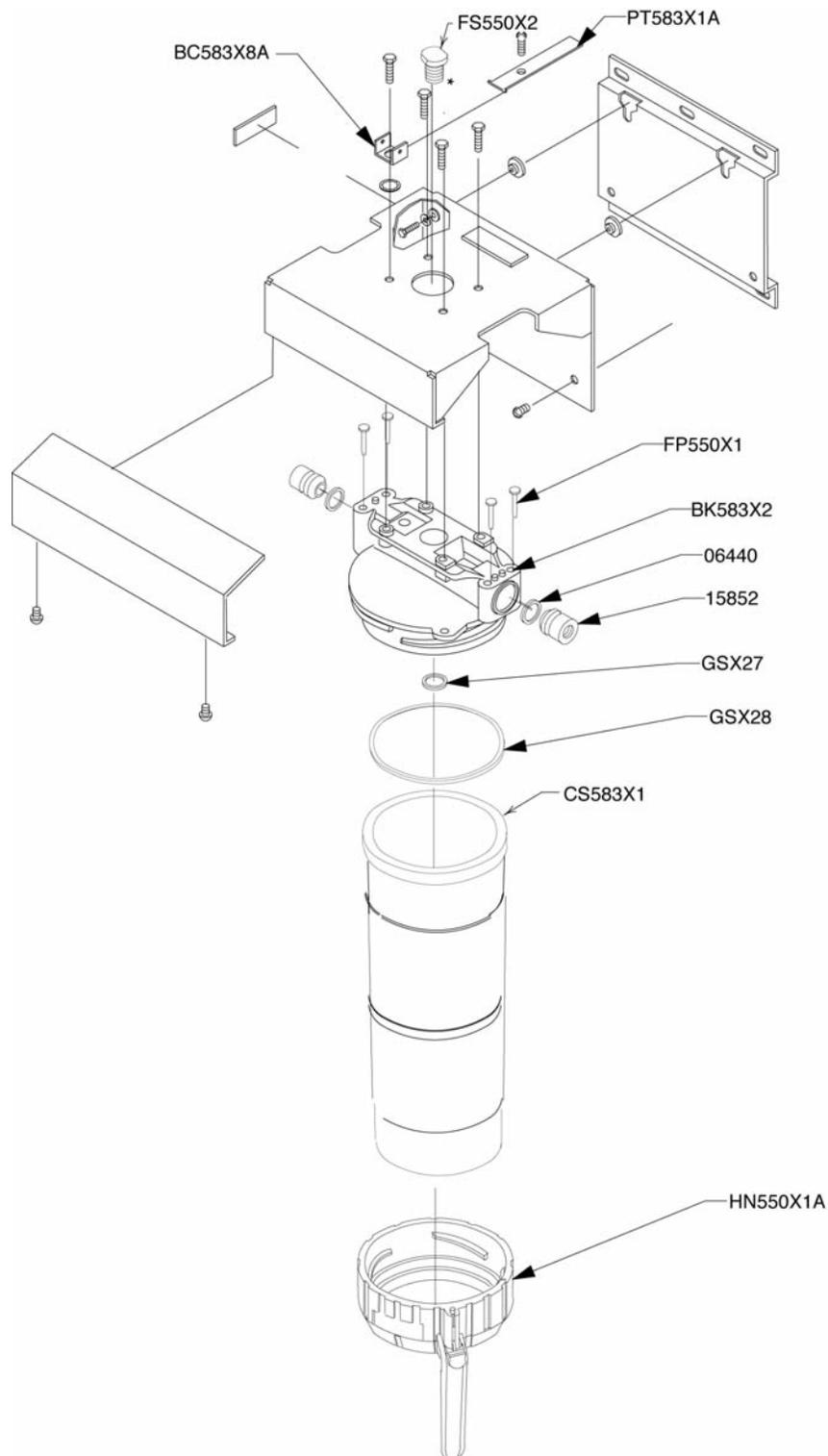


Figure 8-3. B-pure (D4505)

Section 8
Exploded Views

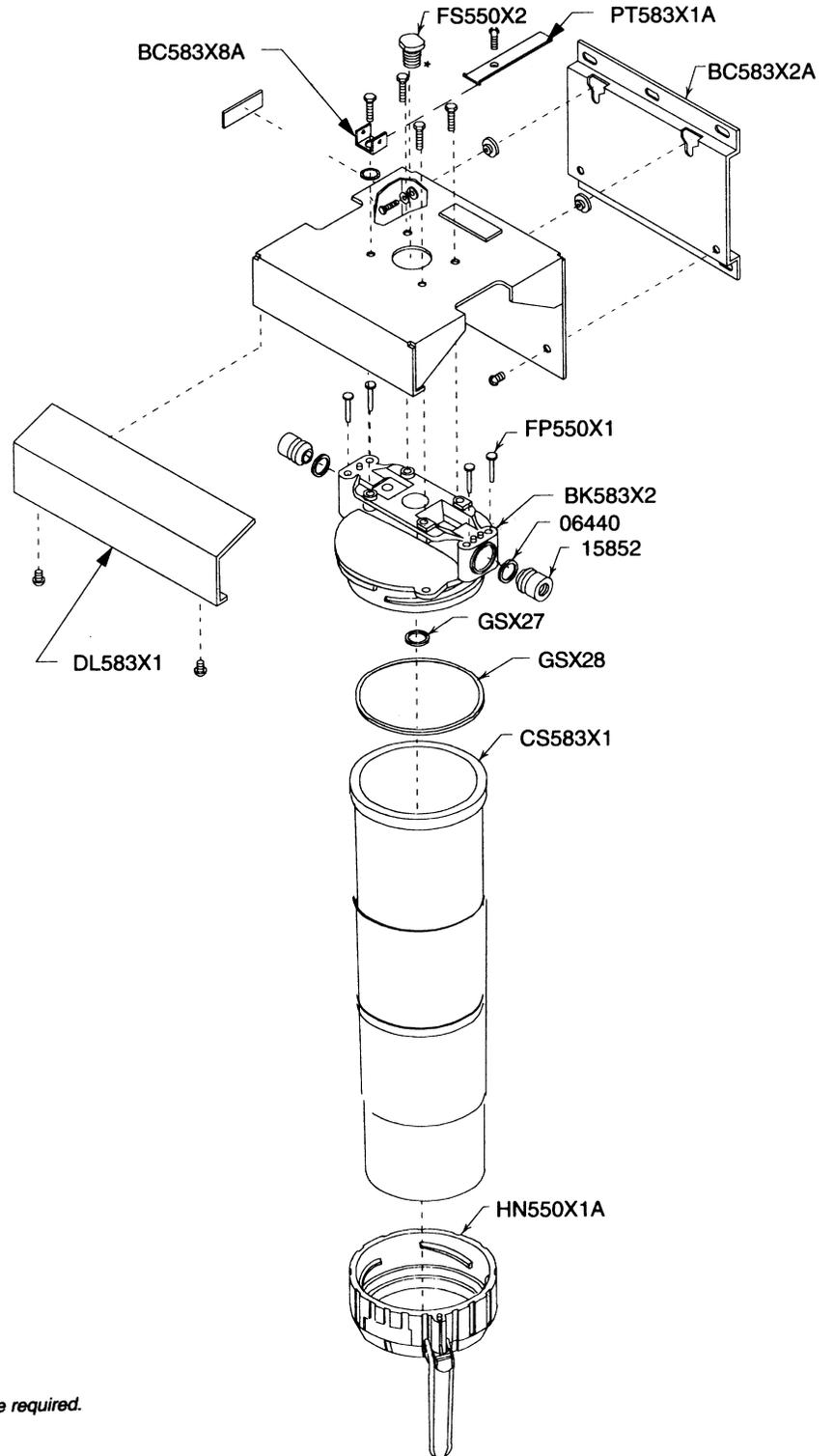


Figure 8-4. B-pure (D5839)

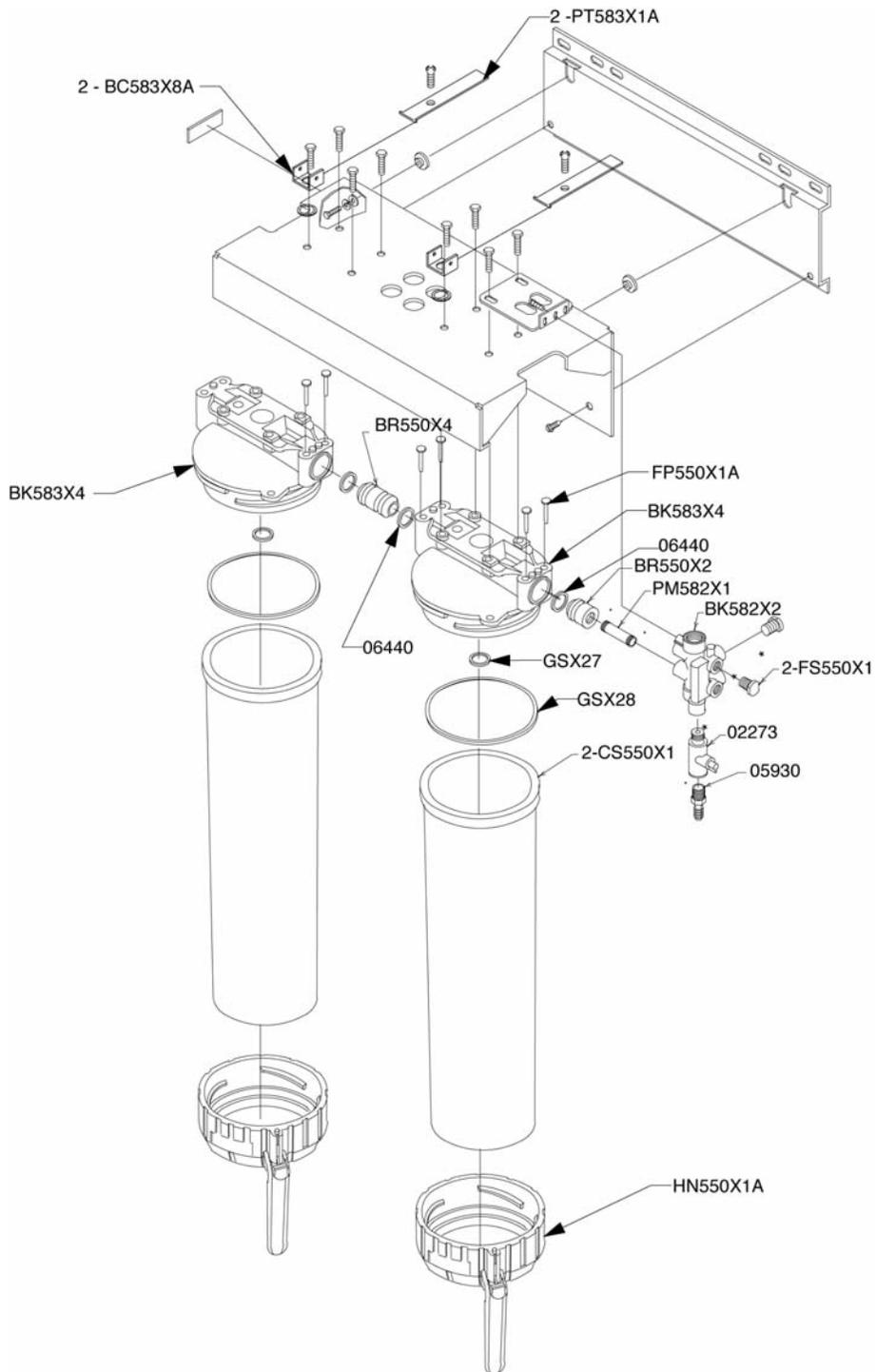


Figure 8-5. Dual Holder B-pure

Section 9 Replacement Parts

Warning To avoid electrical shock, always disconnect from power supply before maintenance and servicing. Refer servicing to qualified personnel.

Recommended Spares

Consumable parts are those required to support the day-to-day operation of this equipment. We've established two types of consumables:

- Those items that must periodically be replaced to maintain performance (filters, resin cartridges, etc.)
- Other items of limited life (indicator lights, fuses, etc.) that the user can expect to replace on a more or less random basis.

The replacement of consumable parts is discussed in the Maintenance and Servicing section of this manual to assist the user in accomplishing his own service.

Consumable List

The only consumables used in the B-pure products are user selected. The following chart is provided for the user as a means of recording the cartridges, part numbers (catalog numbers), and their location in the system.

Location	Part# (Qty)	Description
1		
2		
3		
4		
5		
6		

General Maintenance Parts

General maintenance parts are defined as laboratory level repair parts which do not require great expertise or special tools for installation. We recommend that the user stock the general maintenance parts as an aid to ensuring the continued operation of this equipment.

		Recommended Quantity		
Part #	Description	1/2 size B-pure	Single B-pure	Dual B-pure
GSX27	O-ring, cartridge head seal	1	1	2
GSX28	O-ring, large head seal	1	1	2
06440	O-ring (between heads)	1	1	4
FP550X1	Fastener pin	4	4	8
BR550X4	Head interconnector	N.R.	N.R.	1
15852	Connector (inlet/outlet)	1	1	1

Safety Stock

For critical applications where performance with minimum downtime is required, we recommend that the user maintain a local stock of those parts listed under “General Maintenance” and “Safety Stock.” In the event of component failure, the safety stock can be drawn upon by the user or qualified technicians, thereby, avoiding unnecessary delays in delivery of replacement parts.

		Recommended Quantity		
Part #	Description	1/2 size B-pure	Single B-pure	Dual B-pure
BK583X4	Cartridge canister head	N.R.	1	2
BK583X2	Filter canister head	1	N.R.	N.R.
CS550X1	Full-size cartridge canister	N.R.	1	1
CS583X1	1/2-size filter canister	1	N.R.	N.R.
D2770	Resistivity meter, 115 VAC	N.R.	N.R.	1
D2769	Resistivity meter, 230 VAC	N.R.	N.R.	1
HN550X1A	Cartridge canister handle	1	1	1

Ordering Procedures

Please refer to the Specification Plate for the complete model number, serial number, and series number when requesting service, replacement parts or in any correspondence concerning this unit.

All parts listed herein may be ordered from the Thermo Scientific dealer from whom you purchased this unit or can be obtained promptly from the factory. When service or replacement parts are needed, check first with your dealer. If the dealer cannot process your request, then contact our Technical Services Department.

Prior to returning any materials to the manufacturer, please contact our Technical Services Department for a “Return Goods Authorization” number (RGA). Material returned without a RGA number will be refused.

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