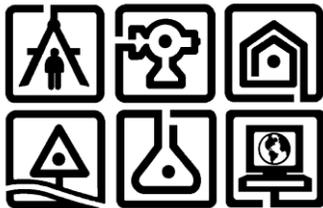


February 24, 2017



OPERATION & MAINTENANCE
MANUAL
Point of Entry Systems (POET)
Private Water Supply Systems
North Bennington
Bennington County, Vermont

Prepared for:

Mr. Edward J. Canning
Director of Health, Safety & Environment
SAINT-GOBAIN PERFORMANCE PLASTICS CORP.
14 McCaffrey Street
Hoosick Falls, New York 12090

Prepared by:

C.T. MALE ASSOCIATES
50 Century Hill Drive
Latham, New York 12110
(518) 786-7400
FAX (518) 786-7299

C.T. Male Associates Project No: 16.6131

POET O&M MANUAL
Village of N. Bennington & Town of Bennington, VT

TABLE OF CONTENTS

	<u>Page</u>
1.0 Introduction	1
1.1 Project Background.....	1
2.0 Purpose & Organization of Manual	3
2.1 Organizational Structure.....	3
2.2 O&M Contractor	3
2.3 Treatment System Overview	3
3.0 Operation	5
3.1 Operational Overview	5
3.2 POET System Startup	5
3.3 Laboratory Analyses.....	6
3.4 System Shutdown	7
4.0 Inspection and Maintenance Requirements.....	8
4.1 Scheduled Inspection and Maintenance	8
4.2 GAC Change Out.....	8
4.3 UV Change Out	9
4.4 Filter Change Out.....	10
5.0 Long Term Monitoring and Reporting.....	11
5.1 Sample Collection and Analysis	11
5.2 System Sampling.....	11
5.3 System Data Records	12
5.5 Periodic Reporting.....	12

APPENDICES

Appendix A: Project Organization

Appendix B: POET System Installation Schematic and Picture

Appendix C: POET Installation and Operation Manual (Culligan)

1.0 INTRODUCTION

The intent of this document is to provide the Operation and Maintenance procedures and requirements for the installation, operation, maintenance and monitoring of Point of Entry Treatment (POET) systems installed at residential and other non-public water supply well locations within the Village of North Bennington (Village) and Town of Bennington (Town), Vermont. This manual does not pertain to Public Water Systems or Non Transient Water Systems which are being addressed on a site-by-site basis.

The POETs are installed to treat all water entering the building from the current water supply source. In this manner, the POET provides treated water to all water fixtures (sinks, baths/showers, toilets, ice makers, outside hose connections, etc.) of the structure.

The treatment of perfluorinated chemicals (PFCs) with use of Granular Activated Carbon is well understood and demonstrated at multiple municipal water supply systems. However, applications in residential locations are highly dependent on water quality parameters besides perfluorinated chemicals that vary from location to location. As a result, predicting specific performance of residential systems is difficult with the limited data available to date, and the monitoring frequency of the POETs is and will continue to be evaluated over time as presented herein.

1.1 Project Background

PFOA is a member of the class of substances called perfluorinated chemicals (PFCs). The chemical formula of PFOA is $\text{CF}_3(\text{CF}_2)_6\text{COOH}$. PFOA and other PFCs have been produced and used in commercial products and industrial processes for over 60 years. Known commercial uses of PFOA include: water-, soil-, and stain-resistant coatings for clothing, leather, upholstery, and carpets; oil-resistant coatings for food contact paper; aviation hydraulic fluids; fire-fighting foams; paints, adhesives, waxes, polishes, and other products. Known industrial uses of PFOA include: surfactants, emulsifiers, wetting agents, additives, non-stick coatings on cookware, membranes for waterproof/breathable clothing, electrical wire casing, fire and chemical resistant tubing, and plumbing thread seal tape.

Investigations conducted by the Vermont Department of Environmental Conservation (VTDEC) in early 2016 within the Village of North Bennington, Vermont identified Perfluorinated Compounds (PFCs) in several residential water supply wells in the immediate vicinity of the former Chemfab facility located at 1030 Water Street. The concentration of one particular PFC, Perfluorooctanoic Acid (PFOA), was detected at concentrations greater than the Perfluorooctanoic acid and Perfluoro-octanesulfate (PFOS) Vermont Drinking Water Health Advisory dated June 22, 2016. The VT Health Department has recently derived (June 22, 2016) a drinking water health advisory of 20 parts per trillion (ppt) applicable to the sum of PFOS and PFOA.

As a result of the PFOA detections, VTDEC required the installation of POETs at properties within the Village and Town with water supply wells with concentrations of PFOA/PFOS greater than 20 ppt. The majority of POETs within the Village and Town have PFOA/PFOS concentrations less than 200 ppt. Only 5 locations in close proximity to the former Chem Fab site have exhibited PFOA/PFOS at concentrations greater than 1,000 ppt.

2.0 PURPOSE & ORGANIZATION OF MANUAL

2.1 Organizational Structure

Table 1 in Appendix A presents the overall project organization structure, and identifies the various agencies, firms and contractors and their overall responsibilities.

For this project, VTDEC and other State agencies are responsible for overall project oversight and management. The initial sampling and analysis of the individual water supply wells for PFC evaluation is performed by VTDEC. Periodically, VTDEC provides lists of locations where water samples have been collected and analyzed and identification of which locations require the installation of a POET system. Culligan of Vermont (Culligan) is the water treatment contractor for the POET installations. C.T. Male is responsible for the sampling and analysis of each installed POET as further discussed herein. Analytical results related to the ongoing operation of each POET are periodically provided to VTDEC by C.T. Male. In turn, VTDEC issues the results to each owner of a property that has received a POET system.

2.2 O&M Contractor

Culligan, a Vermont licensed water treatment contractor, is responsible for the installation, scheduled inspection and scheduled and non-scheduled maintenance of each POET system.

2.3 Treatment System Overview

The POET systems components include the follow:

- Pre-filter (Dual Gradient 50 -5 micron)
- Lead GAC Canister (2 ft³ Culligan Cullar F600AW)
- Lag GAC Canister (2 ft³ Culligan Cullar F600AW)
- Post-Filter (Dual Gradient 50 -5 micron)
- UV Lamp (VIQUA S8Q-PA)
- Flow Meter (total gallons)
- Influent, Midpoint and Effluent Water Sampling Ports

A schematic and picture of a typical POET system installation is presented in Appendix B. The manufacturer's information and specification sheets for each system component are presented in Appendix C. The plumbing piping and fittings used are composed of PEX Products, and are typically three-quarter inch diameter. All plumbing fittings are NSF approved.

3.0 OPERATION

3.1 Operational Overview

The POET system operates through pressurized flow from the water supply well pump and pressure tank system within the structure. Electrical service for the UV unit is taken from the electrical service (115V) within the building.

Well water from the water supply well/pressure tank first flows through a polypropylene pre-sediment filter. It is then plumbed to the Lead and Lag Granulated Activated Carbon (GAC) canisters. GAC treated water then flows through a post-polypropylene sediment filter and a totalizing mechanical flow meter, to record the total gallons of water before passing through the UV unit. Lastly, the water passes through a flow controller to assure sufficient disinfection by the UV unit.

3.2 POET System Startup

Prior to installing a POET, Culligan completes a site visit to review the existing water system and area required for the equipment installation. In most instances the POET is installed within the basement of the building, but this may not always be possible depending on the set up of the existing water supply systems. During the pre-installation site visit, an un-treated water sample from the source is collected and analyzed by Culligan for Hardness, Iron, Manganese, Hydrogen Sulfide, Alkalinity, Total Dissolved Solids and pH. This data is retained by Culligan for future review and evaluation.

Following the installation of a POET, approximately 200 gallons of water are processed through the system prior to collecting the initial set of water samples for PFC and arsenic analysis. Arsenic is included as it is naturally occurring in the GAC media material, and although the GAC canisters are prewashed, backwashed and flushed prior to installation, arsenic has been detected at system startup in some instances above the Vermont regulatory drinking water standard value of 10 micrograms per liter (ug/L) or parts per billion (ppb).

Water samples at system startup are collected from the water sampling point located prior to the Lead GAC canister, and from the effluent water sampling point after the

Lag GAC canister. The arsenic water sample is also collected after the Lag GAC canister. A visual check of the UV unit is completed to make sure it is operating. The total gallons of water treated are then recoded at the flow meter.

For all POETs installed to date (>200 systems), a subsequent round of samples are collected from the influent and midpoint sampling points for PFC analysis approximately 1 month thereafter, and again 1 month after the second round of sampling. The results for each round of samples collected are reported to VTDEC who in turn provide the results to the respective POET recipient.

Approximately two-thirds of the POET systems have now been subjected to 3 consecutive months of sampling and analysis. None of these POETs, regardless of the PFC influent concentration or the amount of water used in the building as measured by the flow meter, have identified a breakthrough at the mid-point GAC canister sampling port. As a result, all new POETs installed after September 30, 2016 will be sampled 3 months after the initial set of results have been collected.

3.3 Laboratory Analyses

The influent and effluent samples from the POETs are analyzed by EPA Method 537 Rev. 1.1 (Low Level) for the following list of PFCs. At the time of POET installation and startup, a water sample is also collected from the POET effluent for arsenic and discussed in Section 3.2 above.

<u>CAS #</u>	<u>Compound</u>	<u>MRL</u>
375-73-5	Perfluorobutanesulfonic acid (PFBS)	2 ng/L
375-85-9	Perfluoroheptanoic acid (PFHpA)	2 ng/L
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	2 ng/L
375-95-1	Perfluorononanoic acid (PFNA)	2 ng/L
1763-23-1	Perfluorooctane sulfonate (PFOS)	2ng/L
335-67-1	Perfluorooctanoic acid (PFOA)	2 ng/L
307-24-4	Perfluorohexanoic acid (PFHxA)	2 ng/l
335-76-2	Perfluorodecanoic acid (PFDA)	2 ng/L
2058-94-8	Perfluoroundecanoic acid (PFUnA)	2 ng/L
307-55-1	Perfluorododecanoic acid (PFDoA)	2 ng/L
72629-94-8	Perfluorotridecanoic acid (PFTriA)	2 ng/L
376-06-7	Perfluorotetradecanoic acid (PFTA)	2 ng/L

Notes:

MRL denotes Minimum Reporting Limit

ng/L denotes nanogram per liter or parts per trillion (ppt)

3.4 System Shutdown

The POETs are designed to operate continuously and to treat the supply water whenever there is water use within the building. Other than the UV unit which requires electrical power, all POET components rely on water pressure and flow to operate. The only time the POET will not treat water is during a power outage (i.e. as the water well pump will not be in operation).

Ultimately, many of the locations equipped with a POET may be connected to municipal water. In these instances, the POET system will be disconnected and removed from the premises.

The property owner will be given the opportunity to keep the system components after they have been permanently disconnected. If the property would like to reinstall the system, it will be the owners responsibility to have a licensed water treatment specialist complete the work as well as be responsible for the POET system operation and maintenance.

POETs to remain in service will be maintained in general accordance with Section 4 below.

4.0 INSPECTION AND MAINTENANCE REQUIREMENTS

4.1 Scheduled Inspection and Maintenance

Following the installation of each POET system, a quality control inspection of the system is completed by Culligan management to ensure all system components have been installed and are properly functioning. The initial sampling/monitoring of each POET is generally completed several days after installation to allow for at least 200 gallons of the water to be treated by the system.

Scheduled maintenance of each POET system is as follows:

Pre and Post Filter Replacement:	Every 4 months
Ultraviolet Lamp Replacement:	Every 12 months
Ultraviolet Quartz Sleeve Cleaning:	Every 12 to 24 months
GAC Canister Replacement:	As needed depending on periodic analytical monitoring. (See Section 4.2)

4.2 GAC Change Out

Following the collection and analysis of the initial effluent water sample from a POET system (3 months of consecutive monthly sampling (Section 3.2)), subsequent samples will be collected from the midpoint sample port, between the Lead and Lag GAC canisters. Sampling at the midpoint ensures that if the Lead GAC media in the Lead canister has been saturated with PFCs it can be scheduled for change out.

To eliminate the need to collect and analyze effluent water samples for arsenic from the GAC canisters following the replacement of a GAC canister, Culligan will be required to collect a water sample from the replacement GAC canister before it is transported to the POET location. If the arsenic concentration in the water sample is below the Vermont regulatory standard (currently 10 ppb) the replacement canister will be installed. If the arsenic concentration in the water sample is above the regulatory standard further GAC canister flushing will be required, until such time as the arsenic concentration is less than the regulatory standard value. The water samples will be

analyzed by a current Vermont Department of Health Laboratory Certified For Drinking Water Analysis. The results of the Arsenic analysis will be submitted to C.T. Male and VTDEC along with the canister serial number prior to placing the canister in service.

The change out of the GAC canisters will be initiated when the sum of PFOS and PFOA concentrations in the water sample collected from the midpoint sample port is greater than 20 ppt. Immediately after receiving the laboratory report indicating an exceedance of the 20 ppt PFOS/PFOA health advisory at the midpoint sampling port, a water sample will be collected from the effluent sampling port to document the concentration of PFOS/PFOA is not above 20 ppt. The GAC canisters will then be scheduled for immediate change out as follows:

- Remove the Lead GAC canister.
- Remove the Lag GAC canister and place it in the Lead GAC position.
- Install the replacement GAC canister in the Lag position.
- Spent GAC media will be bulked by Culligan for subsequent shipment to Calgon. GAC media will be accumulated and stored undercover at Culligan's facility until approximately 1 ton of media is accumulated. Pick-up of the bulked media will then be scheduled by Culligan with Calgon. The bulked material will be transported to Calgon's facility for processing.
- Upon return of the Lead GAC canister to Culligan, the GAC media will be evaluated and recorded for indications of biofilm accumulation, and mineral encrustation to determine if "channeling" is occurring within the GAC canister beds. Channeling can significantly reduce the GAC life cycle and will be important in determining when a GAC canister should be replaced as discussed in Section 4.4.

4.3 UV Change Out

The UV lamp will be replaced with a new unit or serviced on a 12 month basis.

Depending on the visual condition of the UV quartz sleeve at the time the UV lamp is replaced, it will either be replaced or cleaned. The frequency for cleaning the UV quartz sleeve is dependent upon the hardness of the well water. Culligan will maintain a written record of the water hardness for each POET system from the time of

installation, and during each UV system inspection until the POET system is permanently removed. The following establishes the general timeframe for the cleaning of the UV quartz sleeve.

- 0 - 8 gpg (grams per gallon): Every 12 months
- 9 - 14 gpg: Every 6 months
- 15+ gpg: Every 4 months

4.4 Filter Change Out

The pre and post polypropylene sediment cartridge filters will be replaced by Culligan every four months. The frequency of filter changes may be modified over time as location specific historical data is developed for each POET system.

water will be run to waste at a faucet location for approximately 10 minutes prior to the collection of the system samples.

5.3 System Data Records

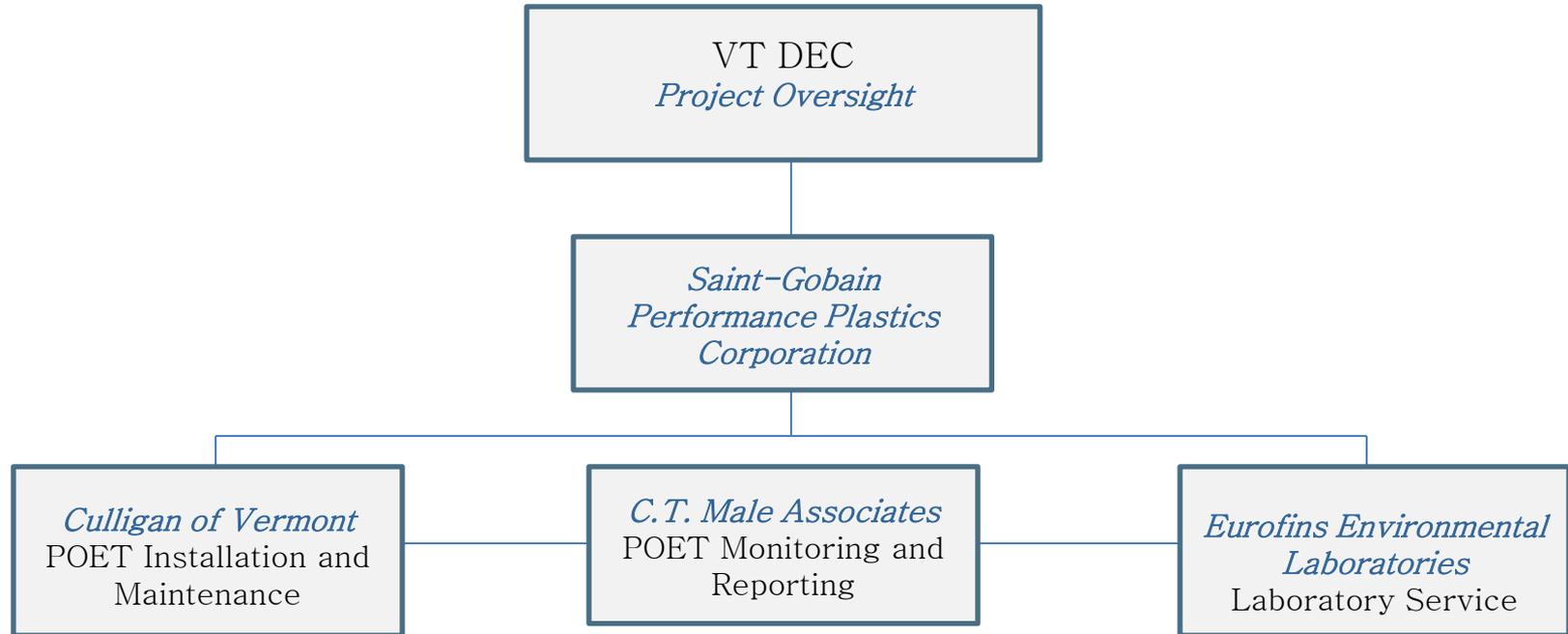
C.T. Male/Culligan will retain system data and maintenance records in electronic format for each POET system installation. This will include all of the data and information specified herein.

5.5 Periodic Reporting

The results of each monitoring event for each POET system will be provided to VTDEC typically within one month following the collection of the samples and data. The normal turnaround time of the collected samples by the laboratory is typically 3 weeks. The results for all POET sampling events, dating back to the initial set of VTDEC results from the water supply wells, will be provided in a master Excel spreadsheet to VTDEC on an annual basis.

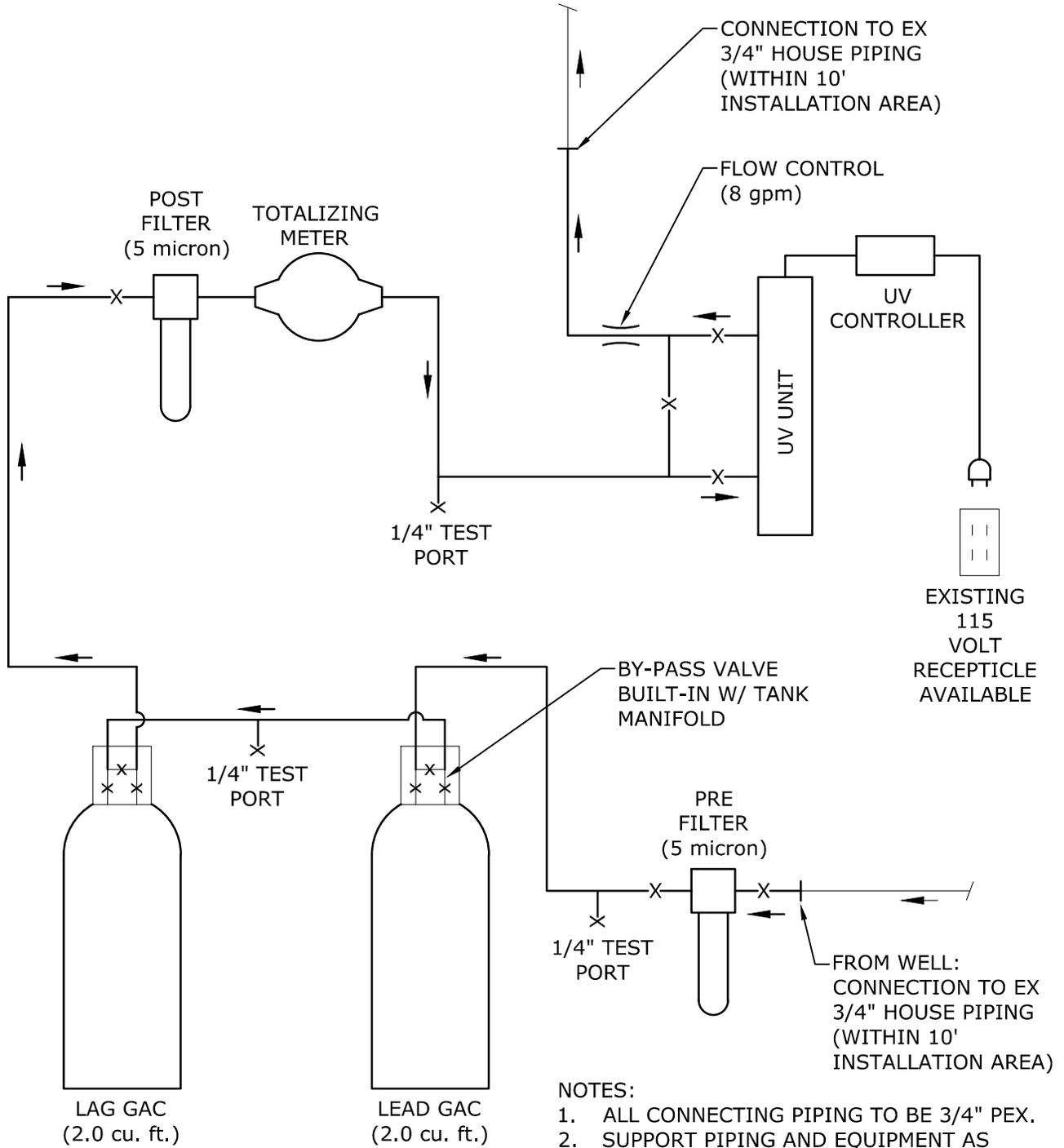
APPENDIX A
PROJECT ORGANIZATION

TABLE 1 – PROJECT ORGANIZATION



APPENDIX B
POET SYSTEM INSTALLATION SCHEMATIC

UNAUTHORIZED ALTERATION OR ADDITION TO THIS DOCUMENT IS A VIOLATION OF SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW.



Date	RECORD OF WORK	Appr.
Drafter: DLP	Checker: DPR	
Appr. by: DPR	Proj. No. 16.6131	

SCHMATIC
TYPICAL GAC POET SYSTEM
VARIOUS RESIDENTIAL / COMMERCIAL LOCATIONS

BENNINGTON AREA VERMONT

C.T. MALE ASSOCIATES
Engineering, Surveying, Architecture & Landscape Architecture, D.P.C.

50 CENTURY HILL DRIVE, LATHAM, NY 12110
518.786.7400 * FAX 518.786.7299

SCALE: NONE

DATE: MAR 15, 2016



3.7

Culligan
better water. pure and simple.
1-800-555-5555
www.culligan.com

Culligan
better water. pure and simple.

WATER
WORKER

APPENDIX C
POET INSTALLATION AND OPERATIONS MANUAL
(CULLIGAN)



Installation and Operation Manual

Exchange Carbon Filter System



Contents

Overview	2
System Design – Typical Operation	2
I. FILLING PROCEEDURES:	4
II. RECOMMENDED START UP PROCEDURE:	4
Carbon Filter Component Parts:	6
Filter Cartridge Replacement Procedures	7
UV Sterilizer # S8Q-PA-C (#D1022214)	8



Overview

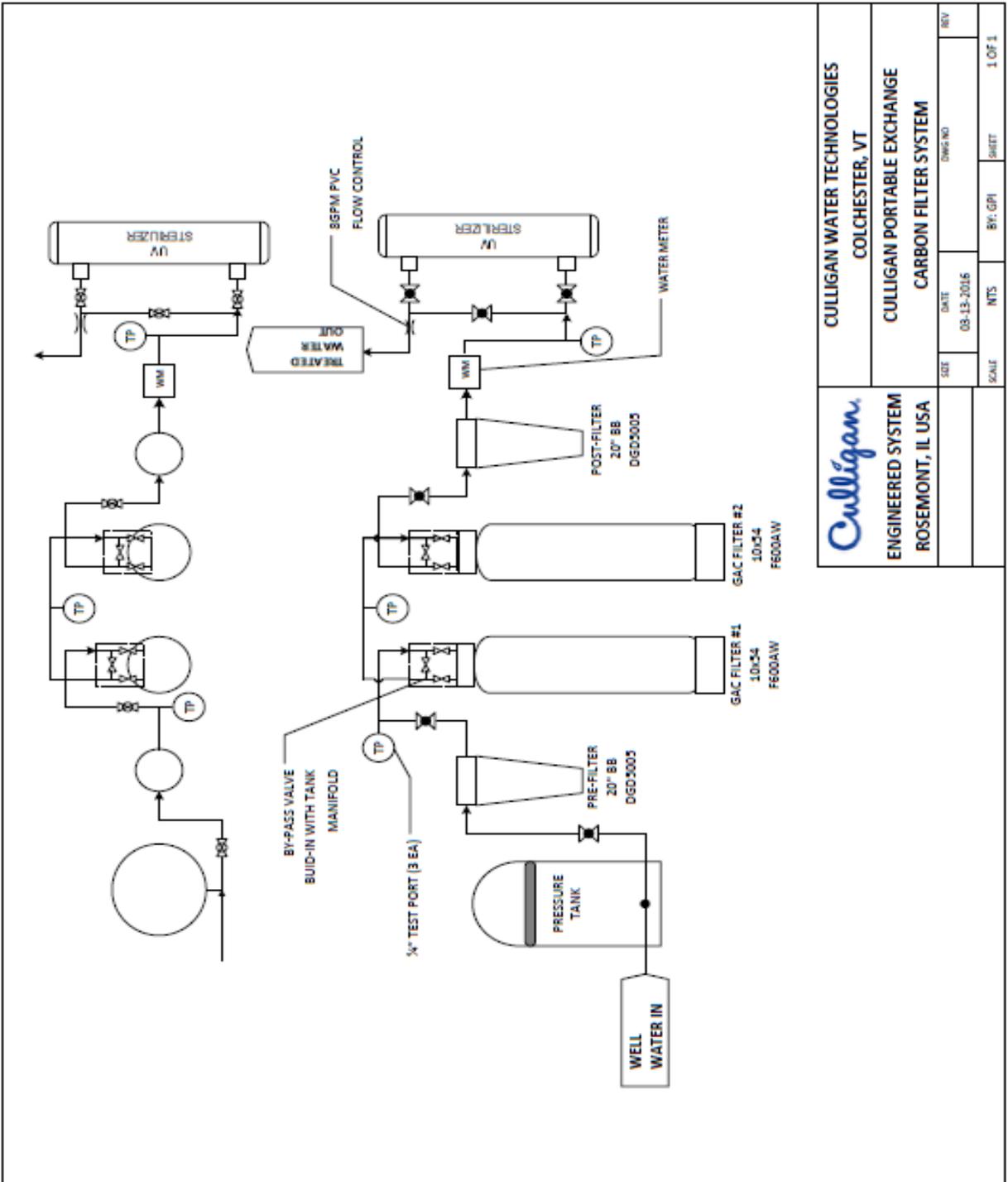
This Portable Exchange Carbon Filtration System is designed to be installed in residential applications for the reduction of traces of organic chemical contamination from well water supplies. The system provides maximum flow rate of up to 8 GPM and includes a cartridge type sediment pre-filter (Dual Gradient 50-5 micron), a dual Carbon Filter system containing a total of 4 Ft³ of a Filtrasorb F600AW Bituminous Coal Acid Washed Granular Activated Carbon (Culligan Cullar F600AW), cartridge type sediment post-filter (Dual Gradient 50-5 micron) and a final UV Light Water Sterilizer rated at 8 GPM flow rate. The system incorporates test ports in the inlet, in between the two carbon vessels and at the outlet of the system for monitoring the system efficiency. Also, a water totalizing meter is included in the outlet of the system to record water usage and facilitate service monitoring.

System Design – Typical Operation

System is installed on the main water line of the residence after the well pressure tank as indicated in the system flow diagram (Fig. 1) below. The first sediment filter is used for the removal of sediments and suspended matter. Then water flows through two (2) 10"x54" vessels in series each containing 2.0 Ft³ of the Cullar F600AW (#SPC10776) Granular Activated Carbon media for the adsorption of traces of organic contaminants. The dual filter approach provides for a continuous back contingency. Following the carbon filter vessels a secondary cartridge type sediment filter is utilized to provide clean water to the residence. Finally, a UV light water sterilization unit is providing microbiological control prior to distribution of the water to the household.

The system operation is designed to be simple and maintenance free. Periodic exchange of the carbon filters is performed by your local Culligan dealer. Sampling ports are included during the installation to facilitate testing the system efficacy and determine when the carbon filter(s) need to be replaced. The spent carbon should be disposed according to applicable local and federal requirements as it may contain the contaminants being removed in the process and has to be treated accordingly.

Refer to this manual for further details and instructions for the system components.



CULLIGAN WATER TECHNOLOGIES COLCHESTER, VT		DATE 08-13-2016	DWG NO.	REV
ENGINEERED SYSTEM ROSEMONT, IL USA		SCALE NTS	BY: GPI	SHEET 1 OF 1
CULLIGAN ENGINEERED SYSTEM ROSEMONT, IL USA		CULLIGAN PORTABLE EXCHANGE CARBON FILTER SYSTEM		

Figure 1: System Flow Diagram



PORTABLE EXCHANGE CARBON FILTERS

FILLING AND START UP PROCEEDURES

The following procedures should be followed every time a new Portable Exchange carbon filter is installed or exchange for an application. Every filter needs to be prepared according to the following instructions before it is placed in service.

I. FILLING PROCEEDURES:

1. Insert the Outlet distributor manifold in the tank and make sure it is properly centered
2. Cover the opening of the manifold with a clean rag.
3. Place a wide-mouth funnel in the tank opening.
4. Open one (1) 55 lbs. bag of Filtrasorb F600AW carbon. Slowly pour the carbon into the tank via the funnel. Fill the carbon within 2" – 3" from the top. Each tank depending on the size used should take 2 Ft³ of carbon.
5. Fill the tank with water and allow the media to soak for 24-48 hours. The water level in the tank will decrease as the media soaks up water. Add water to the tank to keep the media submerged so all the media gets saturated.
6. Thread the tank closure with the inlet strainer into the tank; be careful not to miss thread.

II. RECOMMENDED START UP PROCEDURE:

1. It is advisable that every new filter is backwashed for 10 - 15 minutes at a flow rate of 5 – 8 GPM.
2. Easiest way to backwash the PE Carbon Tanks is utilizing a backwash funnel assembly, usually installed in a Culligan dealership. Backwash the media in the funnel for 10-15 minutes to make sure water is clean and all carbon fines are washed out.
3. Drop media back in the tank, drain excess water. Unit is ready to set in service.
4. If a backwash funnel is not available reverse the flow of the water on the tank manifold. Flow backwards to drain for 10-15 minutes at a flow rate no more than 5 GPM. If flow starts diminishing is because media is lifted around the top manifold. After 10-15 minutes make sure that the water to drain comes out clear. Reverse the flow and run to drain for another 5 min at 5 GPM to settle the bed.
5. You are ready to place the unit to service.
6. When installing the unit make sure that the Inlet & Outlet are hooked up correctly.

For servicing of the system contact the Culligan Dealer in your area.



Portable Exchange Carbon Filtration Specifications and Operating Data

Cullar Portable Exchange Carbon Unit – 10x54 FRP Tank, 2.0 Ft³

The 10"x54"-CARB FRP 1" will Provide:

Superior Quality Flow, gpm	: 3.1 @ 2 psi loss
High Quality Flow, gpm	: 4.7 @ 4 psi loss
Utility Quality Flow, gpm	: 6.3 @ 6 psi loss
Carbon Volume, ft ³	: 2.0

Miscellaneous Design Data:

Tank Size, in.	: 10x54
Tank Area, ft ²	: 0.54
Operating Pressure, psi	: 0-150
Oper. Temperature, °F	: 33-120

The 10"-CARB FRP 1" System Requirements:

Voltage	: None*
Pipe Conn, in NPT...	
Inlet	: 1.0
Outlet	: 1.0
Weight per tank, lbs...	
Shipping	: 132.0
Operating	: 195.0
Overall Dimensions, in....	
Width	: 11.0
Depth	: 12.0
Height	: 56.0

* Note: Voltage may be required for water quality instruments.

Cullar – Filtrasorb F600AW Activated Carbon Media:

The Filtrasorb F600AW media is a granular activated carbon for the removal of dissolved organic compounds from water. Such contaminants include taste and odor compounds, organic color, Total organic Carbon (TOC), and industrial organic compounds such as TCE, PCE and others. The F600AW is made of selected grades of bituminous coal and it is acid wash to provide cleanliness. See attached factory data sheet for more details.

FILTRASORB® 600

Granular Activated Carbon

Applications



Groundwater



Surface Water



Bottle & Brewing



Water Processing



Environmental Water



Food & Beverage



Ultra Pure Water



Remediation Water Treatment

With its enhanced high energy pore structure, FILTRASORB 600 is ideally suited for trace removal applications and offers a significant performance advantage over traditional activated carbon products used in these types of applications.

Specific applications include:

- Removal of MTBE
- Removal of DBCP
- Removal of THMs
- Removal of pesticides and herbicides
- Removal of other organics at concentrations < 1 ppm
- Potable water treatment
- Groundwater treatment
- Ultrapure water treatment

Description

FILTRASORB 600 is a granular activated carbon for the removal of dissolved organic compounds from water and wastewater as well as industrial and food processing streams. These contaminants include taste and odor compounds, organic color, total organic carbon (TOC), and industrial organic compounds such as TCE and PCE.

This activated carbon is made from select grades of bituminous coal through a process known as reagglomeration to produce a high activity, durable, granular product capable of withstanding the abrasion associated with repeated backwashing, hydraulic transport, and reactivation for reuse. Activation is carefully controlled to produce a significant volume of both low and high energy pores for effective adsorption of a broad range of high and low molecular weight organic contaminants.

FILTRASORB 600 is formulated to comply with all the applicable provisions of the AWWA Standard for Granular Activated Carbon (B604) and Food Chemicals Codex. This product may also be certified to the requirements of ANSI/NSF Standard 61 for use in municipal water treatment facilities. Only products bearing the NSF Mark are certified to the NSF/ANSI 61 - Drinking Water System

Components - Health Effects standard. Certified Products will bear the NSF Mark on packaging or documentation shipped with the product.

Features / Benefits

- Produced from a pulverized blend of high quality bituminous coals resulting in a consistent, high quality product.
- Carbon granules are uniformly activated through the whole granule, not just the outside, resulting in excellent adsorption properties and constant adsorption kinetics.
- The reagglomerated structure ensures proper wetting while also eliminating floating material.
- High mechanical strength relative to other raw materials, thereby reducing the generation of fines during backwashing and hydraulic transport.
- Carbon bed segregation is retained after repeated backwashing, ensuring the adsorption profile remains unchanged and therefore maximizing the bed life.
- Reagglomerated with a high abrasion resistance, which provides excellent reactivation performance.
- High density carbon resulting in a greater adsorption capacity per unit volume.

Specifications¹

FILTRASORB 600

Iodine Number, mg/g	850 (min)
Moisture by Weight	2% (max)
Abrasion Number	80 (min)
Trace Capacity Number, mg/g	16 (min)
Screen Size by Weight, US Sieve Series	
On 12 mesh	5% (max)
Through 40 mesh	4% (max)

¹Calgon Carbon test method

Typical Properties*

FILTRASORB 600

Apparent Density (tamped)	0.62 g/cc
Water Extractables	<1%
Non-Wettable	<1%

*For general information only, not to be used as purchase specifications.

Safety Message

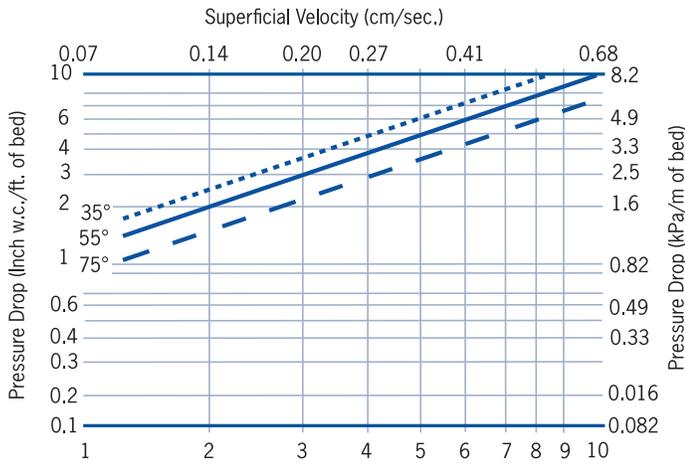
Wet activated carbon can deplete oxygen from air in enclosed spaces. If use in an enclosed space is required, procedures for work in an oxygen deficient environment should be followed.

1.800.4CARBON calgoncarbon.com

© Copyright 2015 Calgon Carbon Corporation, All Rights Reserved
DS-FILTRA60015-EIN-E1

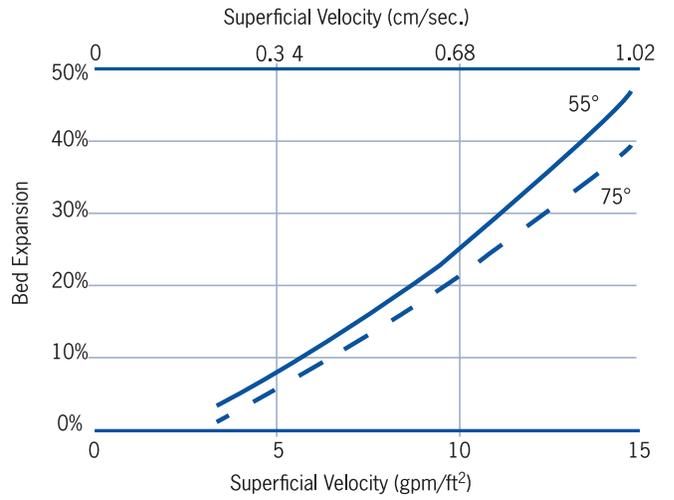
Typical Pressure Drop

Based on a backwashed and segregated bed



Typical Bed Expansion During Backwash

Based on a backwashed and segregated bed



Safety Message

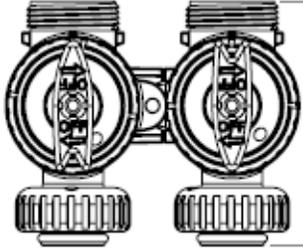
Wet activated carbon can deplete oxygen from air in enclosed spaces. If use in an enclosed space is required, procedures for work in an oxygen deficient environment should be followed.

1.800.4CARBON calgoncarbon.com

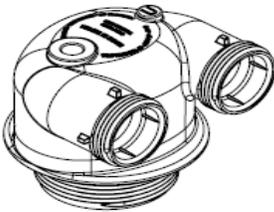
© Copyright 2015 Calgon Carbon Corporation, All Rights Reserved
DS-FILTRA60015-EIN-E1



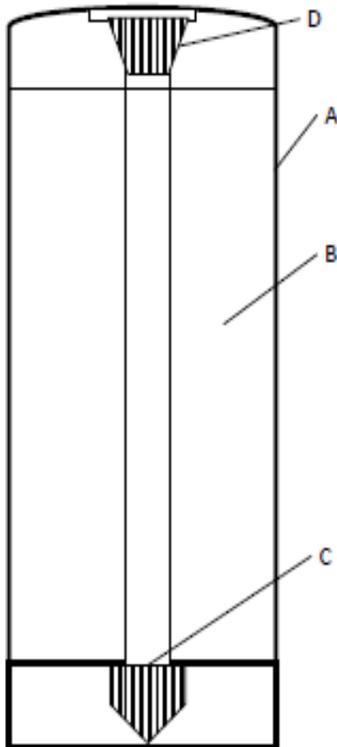
Carbon Filter Component Parts:



By-Pass Valve WS1 (#SPC10762)



In & Out Tank Head (#SPC10761)



A. Filter Tank, FRP, 10"x54" (#SPC10770)

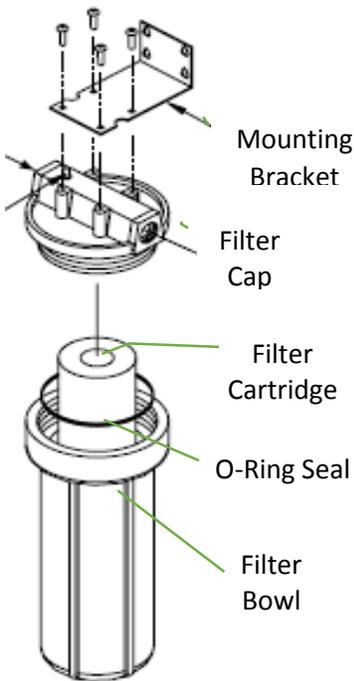
B. Carbon Media, 2 Ft³, Cullar F600AW (#SPC10776)

C. Distributor Manifold (#SPC10773)

D. Top Distributor Basket (#SPC10765)



Filter Cartridge Replacement Procedures



The pre and post filter cartridges need to be replaced when a significant pressure drop across the filter increases, or in a regular intervals as determine by local water conditions.

1. Turn off water supply to filter. Depress red pressure-relief button to relief the pressure from the filter.
2. Using the filter wrench provided (#MS010522), unscrew the filter bowl.
3. Remove and discard old filter cartridge.
4. Clean the filter bowl with a damp cloth and rinse thoroughly.
5. Remove the wrapper from the new cartridge (#MS004512). Install the cartridge in the bowl, making sure it seals in the bottom of the bowl.
6. Check the O-ring seal (#MS404498) for dryness and cuts. Replace the seal if necessary and use silicone lube as needed.

CAUTION! Do not use petroleum-based lubricants, which destroy the synthetic rubber seal.

7. Screw the filter bowl onto the filter cap and hand tighten. **DO NOT OVER-TIGHTEN.**
8. Slowly turn on the water supply to allow filter to fill with water and then press the red pressure-relief button on top of the filter cap to release trapped air.



UV Sterilizer # S8Q-PA-C (#D1022214)



Models:

S2Q-PA, S5Q-PA, S8Q-PA, S2Q-P/12VDC,
S5Q-P/12VDC

NSF Standard 55 Class B

Validated Models:

SV5Q-PA, SV8Q-PA

Powered by
Sterilight

125 Clair Rd. W, Guelph, Ontario, Canada N1L 1R1
t. (+1) 519.763.1032 • tf. (+1) 800.265.7246 (US and Canada only)
f. (+31) 73 747 0144 (Europe only) • f. (+1) 519.763.5069
e-mail: info@viqua.com
www.viqua.com



Section 1 Safety Information

These are the original instructions. Please read this entire manual before operating this equipment. Pay attention to all danger, warning, and caution statements in this manual. Failure to do so could result in serious personal injury or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. DO NOT use or install this equipment in any manner other than that specified in the installation manual.

1.1 Potential Hazards:

Read all labels and tags attached to the system. Personal injury or damage to the system could occur if not observed.

	Waste electrical and electronic equipment (WEEE). This symbol indicates that you should not discard wasted electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling/reuse or hazardous waste center.		This symbol indicates not to store any combustible or flammable material close to the system.
	This symbol indicates there is Mercury present.		This symbol indicates that the contents of the transport package are fragile and the package should be handled with care.
	This is the safety alert symbol. Obey all safety messages that follow this symbol to avoid potential injury. When on the equipment, refer to the Operational and Maintenance manual for additional safety information.		This symbol indicates safety glasses with side protection is required for protection against UV exposure.
	This symbol indicates a risk of electrical shock and/or electrocution exists.		This symbol indicates gloves must be worn.
	This symbol indicates the marked equipment may contain a component that can eject forcibly. Obey all procedures to safely depressurize.		This symbol indicates safety boots must be worn.
	This symbol indicates the system is under pressure.		This symbol indicates the operator must read all available documentation to perform required procedures.
	This symbol indicates there is a potential UV hazard. Proper protection must be worn.		This symbol indicates the plumber must use copper piping.
	This symbol indicates the marked item could be hot and should not be touched without care.		This symbol indicates that the system should only be connected to a properly grounded, grounding-type controller receptacle that is protected by a Ground Fault Circuit Interrupter (GFCI).
	This symbol indicates there is a potential for VERY hot water when flow is started.		

Warning: This product may contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

1.2 Safety Precautions:

⚠ DANGER

 	<p>Failure to follow these instructions will result in serious injury or death.</p> <ul style="list-style-type: none"> Electric Shock: To avoid possible electric shock, special care should be taken since water is present near the electrical equipment. Unless a situation is encountered that is explicitly addressed by the provided maintenance and troubleshooting sections, DO NOT attempt repairs yourself, refer to an authorized service facility. GROUNDING: This product must be grounded. If it should malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electrical shock. This system is equipped with a cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances. Improper connection of the equipment-grounding conductor can result in a risk of electrocution. Check with a qualified electrician or service personnel if you are in doubt as to whether the outlet is properly grounded. DO NOT modify the plug provided with this system – if it does not fit in the outlet, have a proper outlet installed by a qualified electrician. DO NOT use any type of adapter with this system. GROUND FAULT CIRCUIT INTERRUPTER PROTECTION: To comply with the National Electrical Code (NFPA 70) and to provide additional protection from the risk of electric shock, this system should only be connected to a properly grounded, grounding-type controller receptacle that is protected by a Ground Fault Circuit Interrupter (GFCI) or to a residual current device (RCD) having a rated residual operating current not exceeding 30 mA. Inspect operation of GFCI as per manufacturer’s suggested maintenance schedule. DO NOT operate the disinfection system if it has a damaged cord or plug, if it is malfunctioning or if it has been dropped or damaged in any manner. DO NOT use this disinfection system for other than intended use (potable water applications). The use of attachments not recommended or sold by the manufacturer / distributor may cause an unsafe condition. DO NOT install this disinfection system where it will be exposed to the weather or to temperatures below freezing. DO NOT store this disinfection system where it will be exposed to the weather. DO NOT store this disinfection system where it will be exposed to temperatures below freezing unless all water has been drained from it and the water supply has been disconnected.
--	--

Safety Information

⚠ WARNING



- During extended periods of no water flow, the water in your chamber can become very hot (Approx. 60 °C) and potentially lead to scalding. It is recommended to run your water until this hot water has been purged from your chamber. Do not allow water to contact your skin during this time. To eliminate this condition, a temperature management valve can be installed at the outlet of your UV system.
- This system contains a UV Lamp. Do not operate the UV Lamp when it is removed from the chamber. Unintended use or damage of the system may result in the exposure of dangerous UV radiation. UV radiation may, even in little doses, cause harm to the eyes and skin.
- Changes or modifications made to this system without the consent of the manufacturer could render the system unsafe for operation and may void the manufacturer's warranty.

⚠ CAUTION



Failure to follow these instructions could result in minor or moderate injury.

- Carefully examine the disinfection system after installation. It should not be plugged in if there is water on parts not intended to be wet such as, the controller or lamp connector.
- Due to thermal expansion concerns and potential material degradation due to UV exposure, it is recommended to use metal fittings and at least 10" of copper pipe on the outlet of your UV chamber.
- **Hg EXPOSURE:** The UV lamp contains mercury. If the lamp breaks, then avoid inhalation or ingestion of the debris and avoid exposure to eyes and skin. Never use a vacuum cleaner to clean up a broken lamp as this may scatter the spilled mercury. Obey local regulations and guidelines for the removal and disposal of mercury waste.

NOTICE



- The UV lamp inside the disinfection system is rated at an effective life of approximately 9000 hours. To ensure continuous protection, replace the UV lamp annually.
- The UV system is not to be used or played with by children. Persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, are also not to handle the UV system unless they have been given supervision or instruction.
- This system is intended to be permanently connected to the water lines.
- This system is not intended to be used in or above water or outdoors or used in swimming pools when persons are in the pool.
- **EXTENSION CORDS:** If an extension cord is necessary, use only 3-wire extension cords that have 3-prong grounding-type plugs and 3-pole cord connectors that accept the plug from this system. Use only extension cords that are intended for outdoor use. Use only extension cords having an electrical rating not less than the rating of the system. A cord rated for less amperes or watts than this system rating may overheat. Exercise caution when arranging the cord so that it will not be tripped over or pulled. DO NOT use damaged extension cords. Examine extension cord before using and replace if damaged. DO NOT abuse extension cord. Keep extension cord away from heat and sharp edges. Always disconnect the extension cord from the receptacle before disconnecting this system from the extension cord. Never yank cord to pull plug from outlet. Always grasp the plug and pull to disconnect.
- If the supply cord is damaged, it must be replaced by a special cord or assembly available from the manufacturer or its service agent.
- **SYSTEM PROTECTION:** To protect your Controller, a UL1449 certified (or equivalent) transient voltage surge suppressor is strongly recommended.
- The UV lamp in this system conforms to the applicable provisions of the Code of Federal Regulations (CFR) requirements including, Title 21, Chapter 1, Subchapter J, Radiological Health.
- Read and understand the Owner's Manual before operating and performing any maintenance on this equipment.

1.3 Water Chemistry

Water quality is extremely important for the optimum performance of your UV system. The following levels are recommended for installation:

Water Quality and Minerals	Level
Iron	< 0.3 ppm (0.3 mg/L)
Hardness*	< 7 gpg (120 mg/L)
Turbidity	< 1 NTU
Manganese	< 0.05 ppm (0.05 mg/L)
Tannins	< 0.1 ppm (0.1 mg/L)
UV Transmittance	> 75% (call factory for recommendations on applications where UVT < 75%)

* Where total hardness is less than 7 gpg, the UV unit should operate efficiently provided the quartz sleeve is cleaned periodically. If total hardness exceeds 7 gpg, the water should be softened. If your water chemistry contains levels in excess of those mentioned above, proper pre-treatment is recommended to correct these water problems prior to the installation of your UV disinfection system. These water quality parameters can be tested by your local dealer, or by most private analytical laboratories. *Proper pre-treatment is essential for the UV disinfection system to operate as intended.*

Section 2 General Information

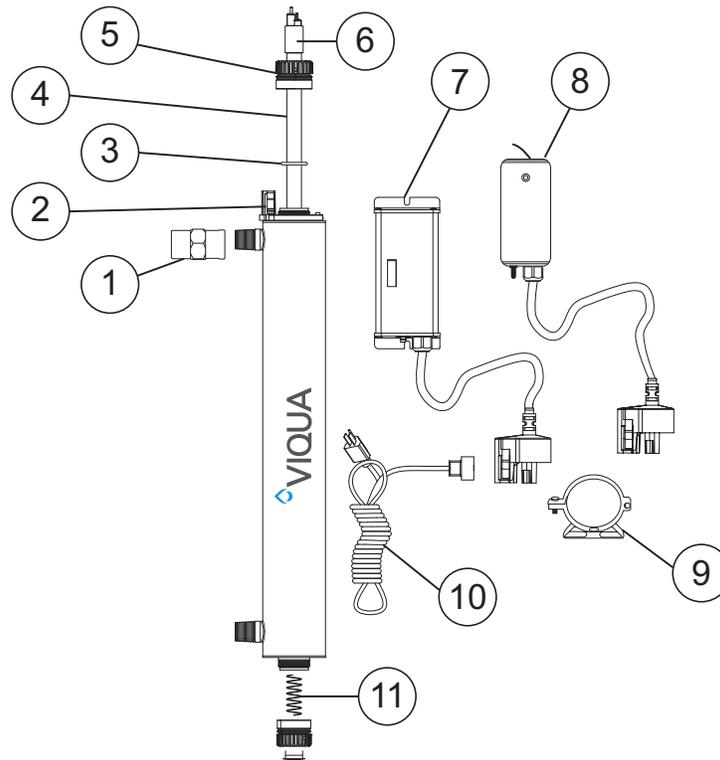


Figure 1 System Components

Item	Description	Part Number	UV Systems
1	Flow restrictor (Only for certified models)	440263-R	SV5Q-PA
		440264-R	SV8Q-PA
2	Lamp connector base	270276-R	Used on all systems
3	O-ring	410867	Used on all systems
4	Open-ended, 214 fused quartz sleeves with fire polished ends	QS-001	S1Q-PA
		QS-330	S2Q-PA
		QS-463	S5Q-PA, SV5Q-PA
		QS-810	S8Q-PA, SV8Q-PA
5	Retaining nut	RN-001	Used on all systems
6	Hard glass, coated Sterilumze®-EX UV lamps for long, consistent life (9000 hours)	S330RL	S2Q-PA
		S463RL	S5Q-PA, SV5Q-PA
		S810RL	S8Q-PA, SV8Q-PA
7	Controller (for 100-240V models only)	BA-ICE-S	S5Q-PA, S8Q-PA, SV5Q-PA, SV8Q-PA
8	Controller (for 12VDC models only)	BA-RO/P/12	S2Q-P/12VDC, S5Q-P/12VDC
9	2.5" Mounting brackets	410958-R	Used on all systems
10	IEC replacement power cords for VIQUA ICE Controller (sold separately)	260010	NORTH AMERICAN (NEMA 5-15P), 3-PRONG GROUNDED
		602637	CONTINENTAL EUROPEAN (CEE 7/7) 2-PIN WITH GROUND, "SCHUKO"
		260012	UK VERSION (BS 1363) 3-PRONG GROUNDED (5 AMP FUSE)
		260013	AUSTRALIAN VERSION (AS 3112) 3-PRONG GROUNDED
		260019	NO CONNECTOR, 3-WIRE, BARE LEADS
11	Spring	SP008	Used on all systems

Section 3 Installation

3.1 UV Disinfection System

⚠ CAUTION



Electronic controller must be connected to a Ground Fault Protected Circuit (GFCI) receptacle. Ensure green ground wire ring terminal is securely fastened to ground stud on UV chamber.

The disinfection system is designed to be mounted either horizontally or vertically at the point-of-use or point-of-entry depending on the specific flow rate of the unit.

Note: The ideal installation is vertical with the lamp connector on top. This is to prevent water damage from occurring on the lamp pins and lamp connector.

- The controller should be mounted either above or beside the UV chamber. Always mount controller horizontally to prevent moisture from running down cordage and causing a potential fire hazard. Drip loops in all cordage connected to controller is highly recommended. Refer to [Figure 5](#).
- The complete water system, including any pressure or hot water tanks, must be sterilized before start up by flushing with chlorine (household bleach) to destroy any residual contamination. Refer to [Section 3.2](#).
- The disinfection system is intended for indoor use only. DO NOT install disinfection system where it may be exposed to the weather.
- Install the disinfection system on cold water line only, before any branched lines.
- A 5 micron sediment filter must precede the disinfection system. Ideally, the disinfection system should be the last treatment the water receives before it reaches the faucet.

Procedure:

1. [Figure 2](#) shows the installation of a typical disinfection system and the related components that may be used for the installation. The use of a by-pass assembly is recommended in case the system requires “off-line” maintenance. In this case, note the system requires supplementary disinfection for the distribution system if any water is used during by-pass condition. In addition, during by-pass, the water will NOT be disinfected and a “DO NOT CONSUME THE WATER” tag should be physically installed on the by-pass assembly until such time as the system is sanitized and returned to service. For more information, refer to [Section 3.2](#). If the water is to be consumed while the system is off-line, the water must be boiled for two minutes prior to consumption.

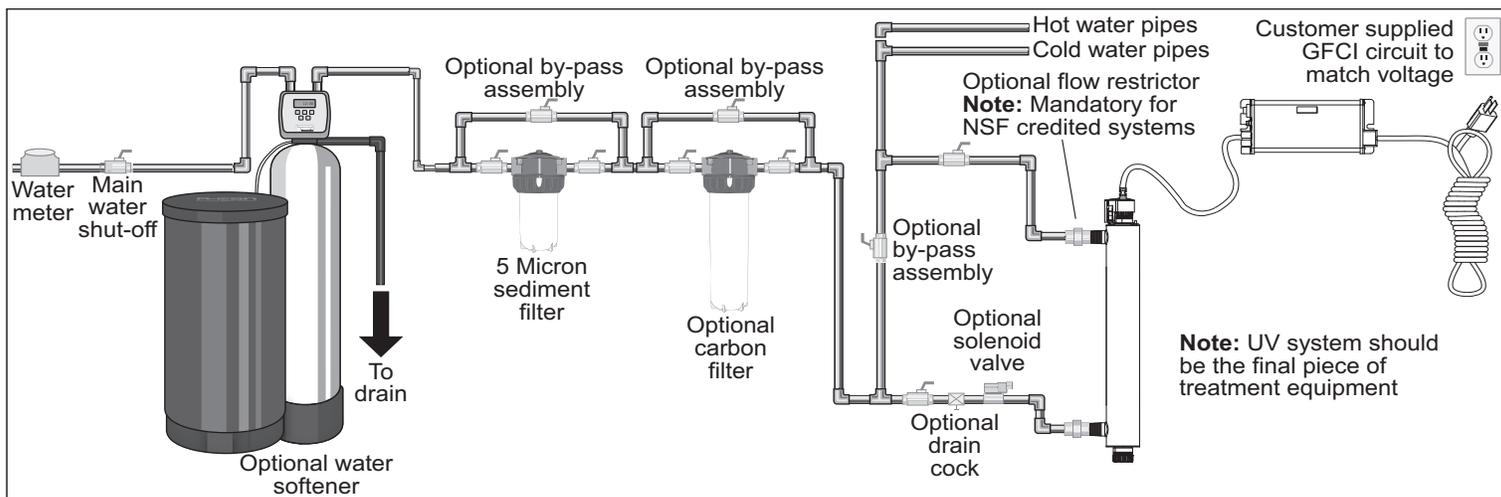


Figure 2 Disinfection System

2. Select a suitable location for the disinfection system and its related components. As it is recommended to install a GFCI, make sure that this is taken into consideration prior to any installation. The system can either be installed vertically (inlet port at the bottom) as shown in [Figure 3 A](#), or horizontally as shown in [Figure 3 B](#). However, the vertical installation is the most preferred method. When selecting a mounting location, leave enough space to allow the removal of the UV lamp and/or quartz sleeve (typically leave a space equal to the size of the UV chamber itself).

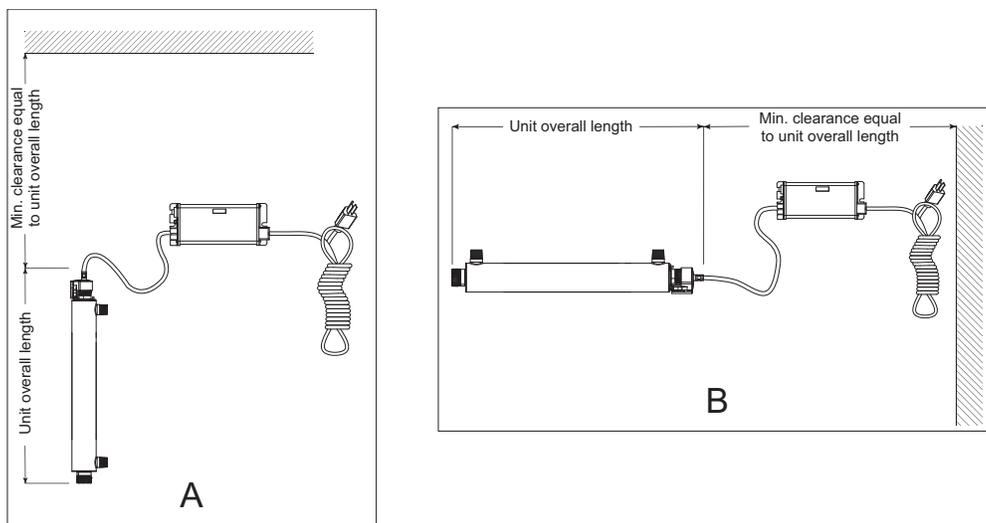


Figure 3 Disinfection Installation - Vertical and Horizontal

3. Mount the system to the wall using the supplied clamps. Various connection methods can be used to connect the water source to the system, however union type connectors are recommended. The use of a flow restrictor device will help to maintain the manufacturer's rated flow. The flow restrictor should be installed on the outlet port and is designed to be installed in one direction only. Ensure that the flow of the water matches the flow direction as indicated on the flow restrictor. Refer to [Figure 4](#).

Note: DO NOT solder connections while attached to the system as this could damage the O-ring seals.

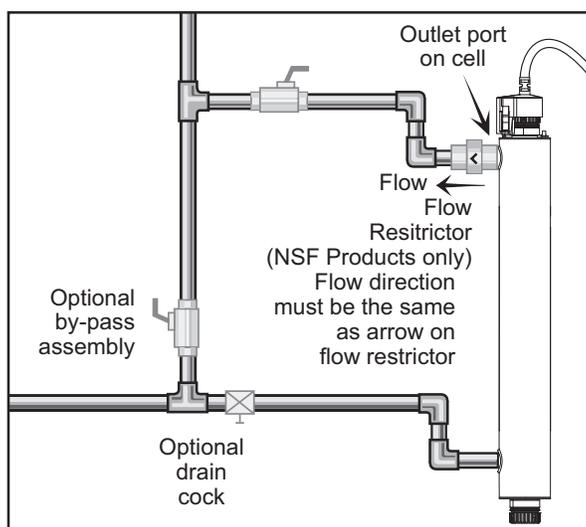


Figure 4 Flow Restrictor

4. Mount the VIQUA ICE controller horizontally to the wall, near the UV chamber. Ideally place the controller above the chamber and away from any water connection point, to prevent any water from potentially leaking onto the controller by means of a leak at a connection point or a “sweating” system. Make sure you allow for a “drip-loop” as shown in [Figure 5](#) on the UV lamp, UV sensor, and power cord, again, to prevent any water from potentially entering the controller.

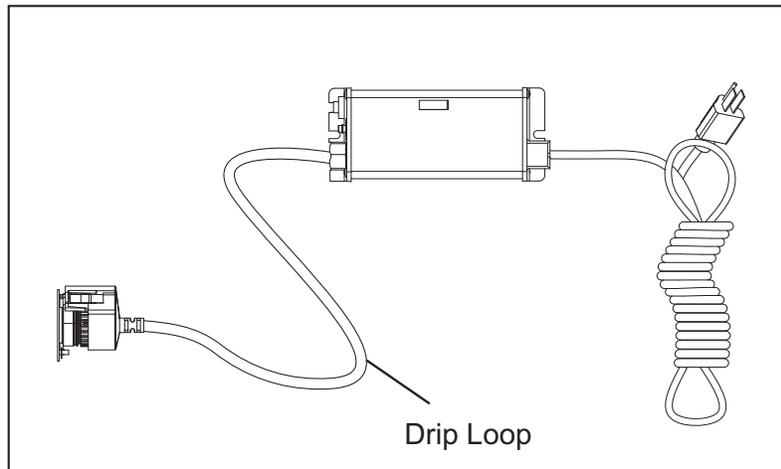
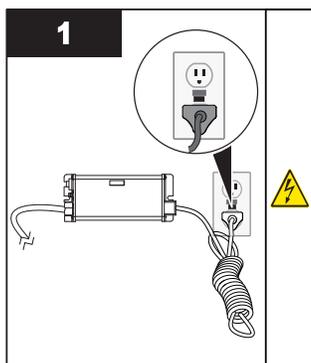


Figure 5 Drip Loop

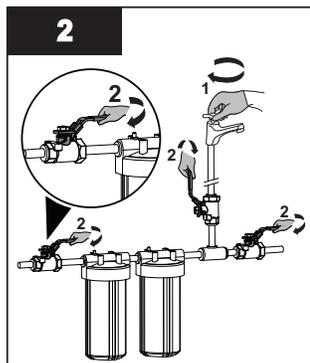
5. Install the UV lamp. Refer to [Section 4.1](#).
6. When all plumbing connections are complete, slowly turn on the water supply and check for leaks. The most likely cause of leaks is from the O-ring seal. In case of a leak, shut water off, drain cell, remove the retaining nut, wipe the O-ring and threads. Clean and re-install.
7. Once it is determined that there are no leaks, plug the system into the ground fault interrupter and check controller to ensure the system is operating properly. The controller should illuminate without any alarms.
Note: *DO NOT look directly at the glowing UV lamp.*
8. Allow the water to run for a few minutes to clear any air or dust that may be in the UV chamber.
Note: *When there is no flow, the water in the cell will become warm, as the UV lamp is always on. To remedy this, run a cold water tap anywhere in the house for a minute to flush out the warm water.*

3.2 Disinfection Procedure

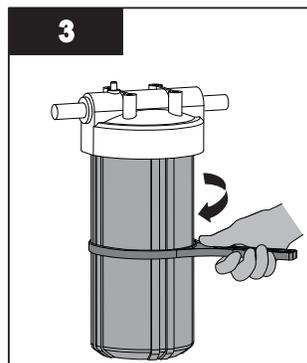
UV disinfection is a physical disinfection process and does not add any potentially harmful chemicals to the water. As UV does not provide a disinfection residual, it is imperative that the entire distribution system located after the UV be chemically disinfected to ensure that the plumbing system is free from any bacteriological contaminants. The disinfection process must be performed immediately after the UV unit is installed and repeated thereafter whenever the UV is shut down for service, without power, or inoperative for any reason. The procedure for sanitizing the plumbing system is readily accomplished as follows:



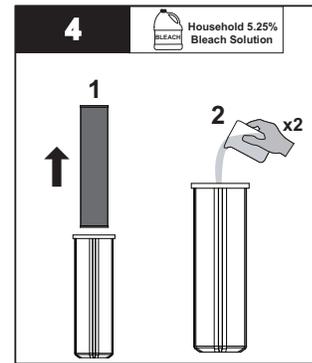
- Ensure the controller is plugged in for entire disinfection process.



- Shut off the water supply.
- Close each faucet.

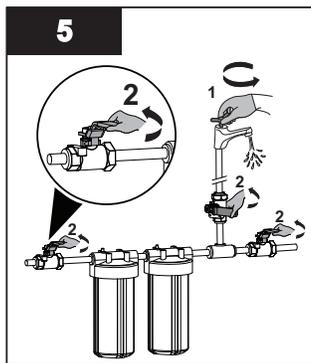


- Remove filter cartridge(s).

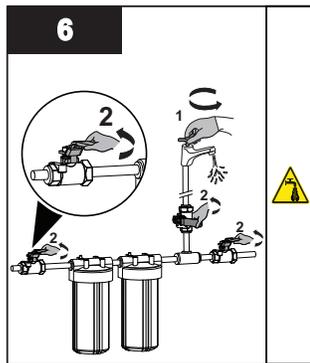


- Pour 2 cups of household bleach solution into the filter housing(s).

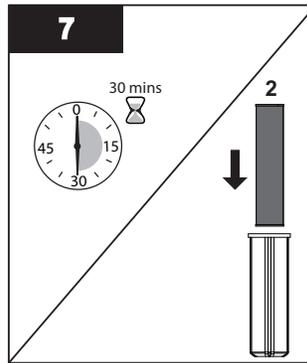
Note: DO NOT use Hydrogen Peroxide.



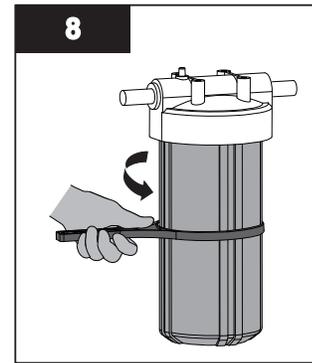
- Re-install the housings.
- Turn on the cold water supply.
- Open each faucet and all water openings until you smell the bleach and then close the faucets.



- Turn on the hot water supply.
- Open each faucet and all water openings until you smell the bleach and then close the faucets.



- DO NOT use water for 30 minutes.
- Flush the system until no chlorine smell is detectable and reinstall the filters.



- Reinstall filter housing(s).

Notes: 1) The addition of chlorine (bleach) to a hot water tank that has in the past been fed with untreated raw water with high levels of other contaminants (iron, manganese, hydrogen sulphide, organics, etc.) will result in oxidation of these contaminants and may require repeated flushing of the hot water tank. This contingency must be dealt with independently under the start-up procedure for any other conditioners that may form a part of the pre-treatment for the UV unit.

2) The above disinfection procedure will result in a massive chlorine residual far in excess of the 0.5 to 1.0 mg/L typically present in municipally chlorinated water and of a magnitude consistent with the minimum 50 mg/L chlorine solution recommended for the disinfection of distribution systems known to be contaminated. DO NOT consume water until complete system has been flushed.

Section 4 Maintenance

⚠ WARNING



- Always disconnect power before performing any work on the disinfection system.
- Always shut-off water flow and release water pressure before servicing.
- Regularly inspect your disinfection system to ensure that the power indicators are on and no alarms are present.
- Replace the UV lamp annually (or biennially if seasonal home use) to ensure maximum disinfection.
- Always drain the chamber when closing a seasonal home or leaving the unit in an area subject to freezing temperatures.

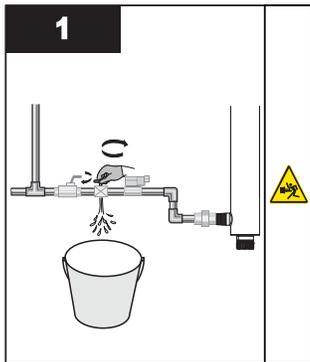
4.1 Replacing UV Lamp

NOTICE

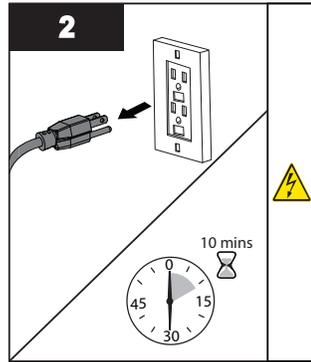
- Reset UV lamp life timer after UV lamp replacement. Refer to [Section 5.1.3](#). Refer to www.lamprecycle.org for UV lamp disposal.
- DO NOT use water during replacement of UV lamp.

UV lamp replacement is a quick and simple procedure requiring no special tools. The UV lamp must be replaced after 9000 hours of continuous operation (approximately one year) in order to ensure adequate disinfection.

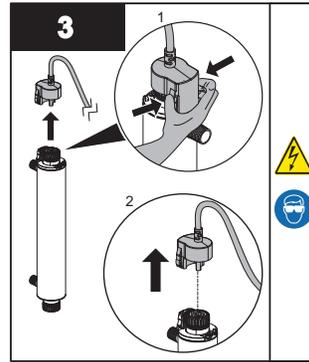
Procedure:



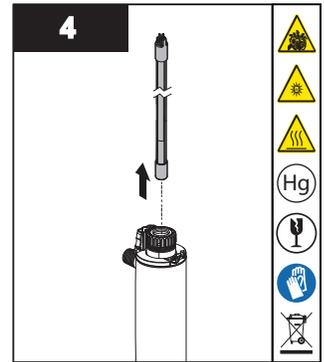
- Shut off the water line to chamber and release system pressure before servicing.



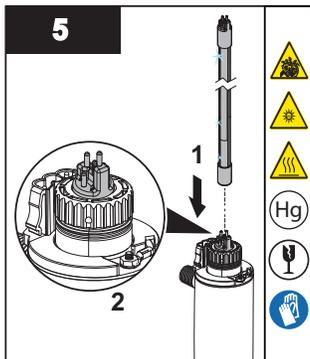
- Disconnect main power source and allow the unit to cool for 10 minutes.



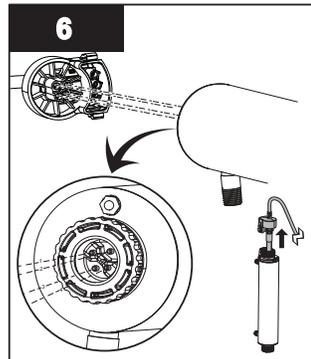
- Remove the lamp connector by squeezing the plastic locking tabs on the side of the connector.



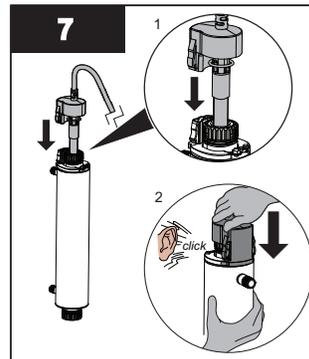
- Remove the lamp in upward direction from the chamber and lamp connector base.
- Always hold the lamp at the ceramic ends.



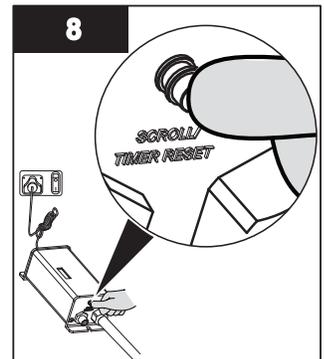
- Insert the new lamp fully into the chamber leaving about two inches of the lamp protruding from the chamber.



- Attach the connector to the lamp and note that the connector will only allow correct installation in one position.



- Push the lamp connector against lamp connector base together until an audible click is heard.
- Re-pressurize the system to check for leaks.



- Hold down the timer reset button and reapply power to the controller until you see [5:55], then release timer reset button.
- A 5 second delay will occur until you hear an audible tone and LED display will read once again [3:55].

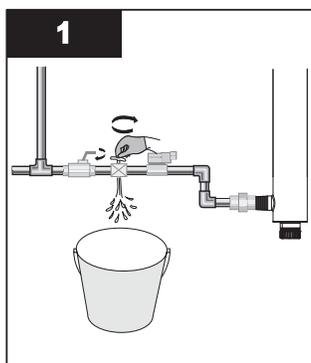
4.2 Cleaning and Replacing Quartz Sleeve

Note: Minerals in the water slowly form a coating on the quartz sleeve. This coating must be removed because it reduces the amount of UV light reaching the water, thereby reducing disinfection performance. If the sleeve can not be cleaned, it must be replaced.

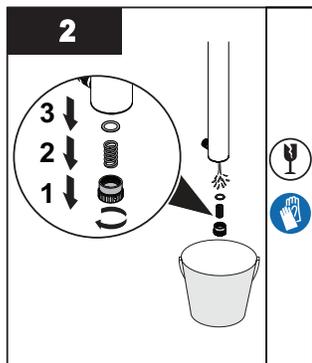
Prerequisites:

- Shut off water supply and drain all lines.
- Remove the UV lamp. Refer to [Section 4.1](#).

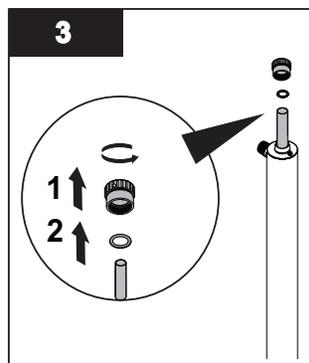
Procedure:



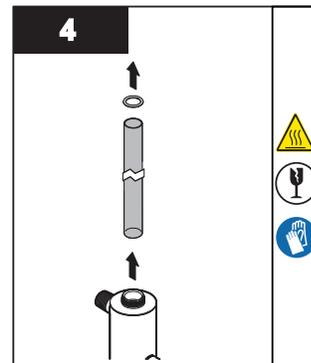
- Drain the chamber by using the drain port.



- Remove the bottom retaining nut, floating spring, and O-ring.



- Remove the top retaining nut and O-ring.

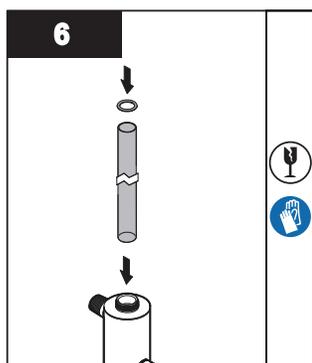


- Carefully, remove O-ring adhering to the quartz sleeve.
- Remove the quartz sleeve.

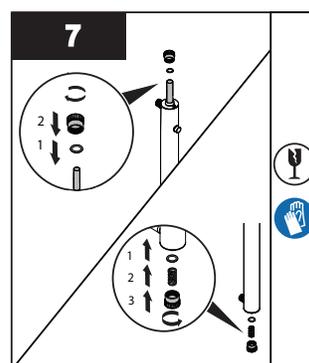


- Clean the quartz sleeve with a cloth soaked in CLR, vinegar or some other mild acid and then rinse with water.

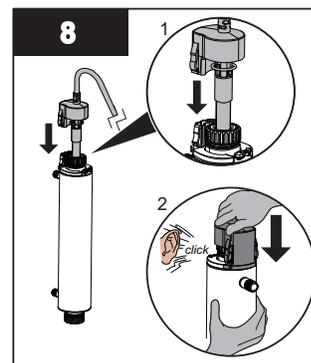
Note: If sleeve cannot be cleaned completely or it is scratched or cracked, then replace the sleeve.



- Reinstall the quartz sleeve in the chamber allowing the sleeve to protrude an equal distance at both ends of the chamber.
- Slide supplied O-rings onto each end of the quartz sleeve.



- Reinstall the top and bottom retaining nuts, floating spring, and O-rings respectively.
- When service is complete, assemble the prerequisites in the reverse order of disassembly.



- Push the lamp connector against lamp connector base together until an audible click is heard.
- Plug in controller and verify the POWER-ON LED display.
- Re-pressurize the system to check for leaks.

Note: After replacing the UV lamp or quartz sleeve perform the disinfection procedure, refer to [Section 3.2](#).

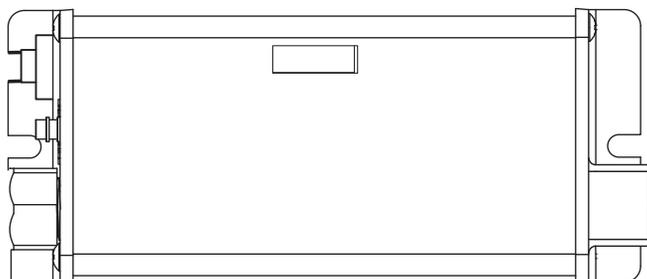
Section 5 Operation

▲ WARNING



The advanced warning system has been installed to provide the optimum protection against microbiological contamination in water. DO NOT disregard the warning signals. The best way to ensure optimum UV performance is to have the water microbiologically tested by a recognized testing agency on a regular basis.

5.1 Basic Systems Incorporating BA-ICE-S Controller



5.1.1 UV lamp Life Remaining (days)

365 The controller tracks the number of days of operation of the UV lamp and the controller. The default screen will display the total UV lamp life remaining (in days). The controller will count down the number of days remaining until the UV lamp requires changing (365 days to 1 day). At “0” days, the controller will display **A3** and sound an intermittent audible chirp (1 second on, 5 seconds off), indicating the need to change the UV lamp.

5.1.2 Understanding your “A3” Code

A3 DEFERRAL - Once the “A3” or end of UV lamp life message is shown on the LED display, the audible alarm can be deferred up to 4 separate times. The delay is designed to allow you time to address the alarm while you obtain a new UV lamp. This can be done by simply depressing the timer reset button for 5 seconds, which is located on the left side of the controller. Each time the timer reset button is pressed the controller alarm is deferred seven days. Once the final 7 day deferral has been reached the alarm can only be silenced by changing the UV lamp and manually resetting the controller timer, refer to [Section 4.1](#).

5.1.3 Resetting UV lamp Life

Refer to [Section 4.1](#).

Note: Even though the alarm on the system can be deferred for a period of time, it is important to address each and every alarm condition as they are indicating that there is a potential problem with the system and should be remedied.

5.1.4 Total Days of Operation

1680 The controller also displays the total running time of the controller. To obtain this reading, press the push-button once. The total running time of the controller will be numerically displayed in days. This information will remain displayed for ten seconds and will then revert back to the UV lamp life remaining default screen. It should be noted that this value cannot be reset.

5.1.5 UV lamp Failure (Blank Screen)

[Blank] When the system recognizes UV LAMP FAILURE (no current running through the UV lamp), the display will be blank **[Blank]** (no default UV LAMP LIFE REMAINING screen) and the system will sound an intermittent audible tones (1 second on, 1 second off). The system will remain in this state, until this condition is remedied.

5.2 12VDC Systems Incorporating BA-RO/P/12 Controller



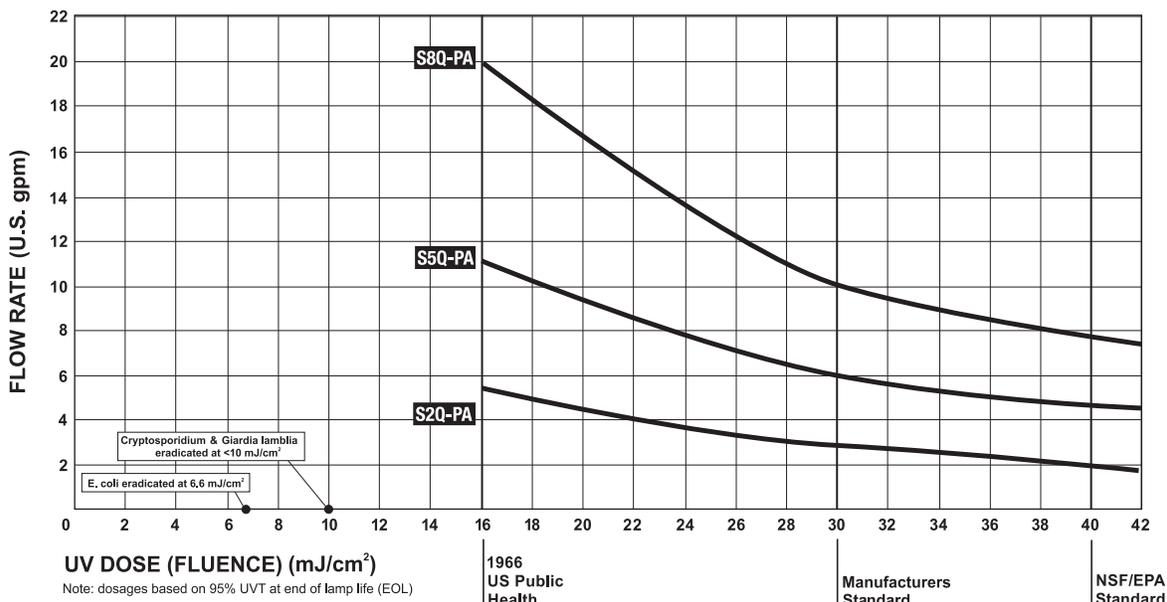
Green LED indicates UV lamp “ON”.

Section 6 Troubleshooting

Symptom	Possible Causes	Solutions
Pressure Drop	Sediment pre-filter clogged	Replace filter cartridge with appropriate 5 micron cartridge. Note: Check source water supply as fluctuations may occur in source pressure.
	Flow regulator	Flow regulator will result in pressure drop when approaching full flow.
High Bacteria Counts	Quartz sleeve is stained or dirty	Clean sleeve with scale cleaner and eliminate source of staining problem (ie. softened hard water, refer to Section 4.2).
	Change in feed water quality	Have source water tested to ensure that water quality is still within allowable limits for this system.
	Contamination in water lines after UV system (eg. power failures, plumbing)	Disinfection system must have a bacterial free distribution system to work effectively. Refer to Section 3.2
	Possible break-through of sediment through pre-filter	Have source water tested for turbidity - may need stepped filtration in order to catch all sediment entering water system (20 micron filter followed by a 5 micron filter followed by UV)
Heated Product Water	Common problem caused by infrequent use of water	Run water until it returns to ambient temperature.
Water Appears Milky	Caused by air in the water lines	Run water until air is purged.
Unit Leaking Water	Problem with O-ring seal (on retaining nut and/or UV sensor)	Ensure O-ring is in place, check for cuts or abrasions, clean O-ring, moisten with water/lubricant and re-install, replace if necessary (410867).
	Condensation on UV chamber caused by excessive humidity & cold water	Check location of disinfection system and control humidity.
	Inadequate inlet/outlet port connections	Check thread connections, reseal with Teflon [®] tape and re-tighten.
System Shutting Down Intermittently	Interrupted controller	<ul style="list-style-type: none"> Ensure system has been installed on its own circuit, as other equipment may be drawing power away from UV (ie. pump or fridge). UV system should not be installed on a circuit which is incorporated into a light switch.
UV lamp Failure Alarm on - New lamp	Loose connection between UV lamp and connector	Disconnect UV lamp from connector and reconnect, ensuring that a tight fit is accomplished
	Moisture build up in connector may keep UV lamp and connector from making a solid connection	Eliminate chance of any moisture getting to the connector and/or lamp pins

DISPLAY FAULT MODES	
LED display reads “A3”	<ul style="list-style-type: none"> UV lamp life expired - countdown is at “0” days. Refer to Section 5.1.2, Understanding your A3 Code. Press reset button for a deferred alarm, replace UV lamp
LED display is blank	<ul style="list-style-type: none"> Controller is in UV lamp failure mode. Refer to Section 5.1.5, UV Lamp Failure. Replace UV Lamp, refer to Section 4.1. Power system down, allowing it to reset itself; apply power in order to confirm that the controller is able to power UV lamp Check to see if there is sufficient power to the UV system
Green LED off (12 VDC only)	<ul style="list-style-type: none"> UV lamp failure. Replace UV Lamp, refer to Section 4.1. No input voltage to controller

Section 7 Manufacturer's Dose Flow Chart



Section 8 Specifications: Standard and Validated

Model		S2Q-P/12VDC/ S2Q-PA		S5Q-P/12VDC/ S5Q-PA/SV5Q-PA*		S8Q-PA/ SV8Q-PA*	
Flow Rate	*NSF Class B Certified 16mJ/cm ² @ 70% UVT	-		3.6 gpm (13.6 lpm) (0.8 m ³ /hr)		7 gpm (26.5 lpm) (1.6 m ³ /hr)	
	US Public Health 16mJ/cm ² @ 95% UVT	5 gpm (19 lpm) (1.1 m ³ /hr)		11 gpm (42 lpm) (2.5 m ³ /hr)		20 gpm (75 lpm) (4.5 m ³ /hr)	
	VIQUA Standard 30 mJ/cm ² @ 95% UVT	3 gpm (11 lpm) (0.7 m ³ /hr)		6 gpm (23 lpm) (1.4 m ³ /hr)		10 gpm (38 lpm) (2.3 m ³ /hr)	
	NSF/EPA 40mJ/cm ² @ 95% UVT	2 gpm (7 lpm) (0.4 m ³ /hr)		4.5 gpm (17 lpm) (1.0 m ³ /hr)		8 gpm (29 lpm) (1.8 m ³ /hr)	
Dimensions	Chamber	43.2 cm x 6.4 cm (17" x 2.5")		56 cm x 6.4 cm (22" x 2.5")		90 cm x 6.4 cm (35" x 2.5")	
	Controller 100-250 VAC	18.6 cm x 8.1 cm x 6.4 cm (7.3" x 3.2" x 2.5")		18.6 cm x 8.1 cm x 6.4 cm (7.3" x 3.2" x 2.5")		18.6 cm x 8.1 cm x 6.4 cm (7.3" x 3.2" x 2.5")	
	Controller 12 VDC	13.5 cm x 4.3 cm x 5.8 cm (5.3" x 1.7" x 2.3")		13.5 cm x 4.3 cm x 5.8 cm (5.3" x 1.7" x 2.3")		-	
Inlet/Outlet Port Size ¹		1/2" MNPT		3/4" MNPT"		3/4" MNPT	
Shipping Weight		2.7 kg (6 lbs)		2.7 kg (6 lbs)		4.5 kg (10 lbs)	
Electrical	Voltage ²	100-240 V / 50/60 Hz	12 VDC	100-240 V / 50/60 Hz	12 VDC	100-240 V / 50/60 Hz	
	Max. Current	0.6 Amp	1.8 Amp	0.6 Amp	1.8 Amp	0.6 Amp	
	Power Consumption	22 W	20 W	30 W	27 W	46 W	
	UV lamp Watts	17 W	15 W	25 W	20 W	37 W	
Maximum Operating Pressure		125 psi (861 kPa)		125psi (861 kPa)		125 psi (861 kPa)	
Minimum Operating Pressure		15 psi (103 kPa)		15psi (103 kPa)		15 psi (103 kPa)	
Ambient Water Temperature		2-40 °C (36-104 °F)		2-40 °C (36-104 °F)		2-40 °C (36-104 °F)	
UV Lamp Type		Sterilume™-EX (standard-output)		Sterilume™-EX (standard-output)		Sterilume™-EX (standard-output)	
UV Chamber Material		304 SS		304 SS		304 SS	

¹ Units ending in "/2B" have BSPT connections.

² Units ending in "/2" are for 230V applications.

Section 9 Manufacturer's Warranty

Our Commitment

VIQUA is committed to ensuring your experience with our products and organization exceeds your expectations. We have manufactured your UV disinfection system to the highest quality standards and value you as our customer. Should you need any support, or have questions about your system, please contact our Technical Support team at 1.800.265.7246 or technicalsupport@viqua.com and we will be happy to assist you. We sincerely hope you enjoy the benefits of clean, safe drinking water after the installation of your VIQUA disinfection system.

How to Make a Warranty Claim

Note: *To maximise the disinfection performance and reliability of your VIQUA product, the system must be properly sized, installed and maintained. Guidance on the necessary water quality parameters and maintenance requirements can be found in your Owner's Manual.*

In the event that repair or replacement of parts covered by this warranty are required, the process will be handled by your dealer. If you are unsure whether an equipment problem or failure is covered by warranty, contact our Technical Support team at 1.800.265.7246 or e-mail technicalsupport@viqua.com. Our fully trained technicians will help you troubleshoot the problem and identify a solution. Please have available the model number (system type), the date of purchase, the name of the dealer from whom you purchased your VIQUA product ("the source dealer"), as well as a description of the problem you are experiencing. To establish proof of purchase when making a warranty claim, you will either need your original invoice, or have previously completed and returned your product registration card via mail or online.

Specific Warranty Coverage

Warranty coverage is specific to the VIQUA range of products. Warranty coverage is subject to the conditions and limitations outlined under "[General Conditions and Limitations](#)".

Ten-Year Limited Warranty for VIQUA UV Chamber

VIQUA warrants the UV chamber on the VIQUA product to be free from defects in material and workmanship for a period of ten (10) years from the date of purchase. During this time, VIQUA will repair or replace, at its option, any defective VIQUA UV chamber. Please return the defective part to your dealer who will process your claim.

Three-Year Limited Warranty for Electrical and Hardware Components

VIQUA warrants the electrical (controller) and hardware components to be free from defects in material and workmanship for a period of three (3) years from the date of purchase. During this time, VIQUA will repair or replace, at its option, any defective parts covered by the warranty. Please return the defective part to your dealer who will process your claim.

One-Year Limited Warranty for UV lamps, Sleeves, and UV Sensors

VIQUA warrants UV lamps, sleeves, and UV sensors to be free from defects in material and workmanship for a period of one (1) year from the date of purchase. During this time, VIQUA will repair or replace, at its option, any defective parts covered by the warranty. Your dealer will process your claim and advise whether the defective item needs to be returned for failure analysis.

Note: *Use only genuine VIQUA replacement lamps and sleeves in your system. Failure to do so may seriously compromise disinfection performance and affect warranty coverage.*

General Conditions and Limitations

None of the above warranties cover damage caused by improper use or maintenance, accidents, acts of God or minor scratches or imperfections that do not materially impair the operation of the product. The warranties also do not cover products that are not installed as outlined in the applicable Owner's Manual.

Parts repaired or replaced under these warranties will be covered under warranty up to the end of the warranty period applicable to the original part.

The above warranties do not include the cost of shipping and handling of returned items. The limited warranties described above are the only warranties applicable to the VIQUA range of products. These limited warranties outline the exclusive remedy for all claims based on a failure of or defect in any of these products, whether the claim is based on contract, tort (including negligence), strict liability or otherwise. These warranties are in lieu of all other warranties whether written, oral, implied or statutory. Without limitation, no warranty of merchantability or of fitness for a particular purpose shall apply to any of these products.

VIQUA does not assume any liability for personal injury or property damage caused by the use or misuse of any of the above products. VIQUA shall not in any event be liable for special, incidental, indirect or consequential damages. VIQUA's liability shall, in all instances, be limited to repair or replacement of the defective product or part and this liability will terminate upon expiration of the applicable warranty period.