OptiVenn™ Series

Operation and Maintenance

User Manual

Original Instructions

Edition 8

DC640101-08-01

If you require technical assistance, please contact Aquafine Corporation Technical Support using the contact information below:

Telephone: 1-661-257-4770
E-mail: techservice@trojantechnologies.com

At the time of publishing, the information within this document is current. Due to continuous improvements, we may have future changes and recommendations which will be sent via product bulletins.

Table of Contents

Section 1 Specifications

Specifications are subject to change without notice.

General			
Fluid Standard Temperature Range	40°F to 104°F (5°C to 40°C)		
Fluid High Temperature Range (Liquid Sugar Applications only)	40°F to 131°F (5°C to 55°C)		
Ambient Air Temperature	34°F to 104°F (1°C to 40°C)		
Ambient Storage Temperature	-4°F to 104°F (-20°C to 40°C)		
Ambient Relative Humidity	10% to 90%, non-condensing		
Control Power Panel			
Supply Voltage	Refer to Component Label		
Environmental Rating			
Material			
Weight			
UV Chamber			
Operating Pressure (maximum)	150 psi (10 bar)		
Material	316L Stainless Steel		
Weight	**Model**	**Diameter (in.)**	**Weight (lbs / kg)**
	01CDS, 02CDS, 03CDS	6	75 / 34
	02CDM, 03CDM, 04CDM, 04CTM, 06CTM	6	190 / 86
	04CDL	6	200 / 91
	02DDM, 04DDM, 08DTM, 12DTM	8	220 / 100
	04DDL, 06DDL, 08DDL, 08DTL, 10DTL, 12DTL	8	235 / 107
	08EDL	10	305 / 138
	08FDL	12	430 / 195
	10GDL	14	285 / 129
	12HDL	16	575 / 261
** Maximum allowable flow velocity at inlet is 8 ft/sec (2.5 m/s).*			
UV Lamp			
Type	Low pressure, High output (254 nm or 185 nm, with non-validated or validated options)		
Lamp Sleeve Material	Natural Quartz		
UV Lamp Driver			
Input	110-240 VAC, 50-60Hz		
UVI Sensor			
Output range	4 to 20 mA current loop (2 wire)		
Supply Voltage	24 VDC from the Control Power Panel		
Maximum Operational Temperature	131°F (55°C)		
Maximum Non Operational Temperature	194°F (90°C)		

System Regulatory Compliance
cULus, CE, UKCA, NOM and KC optional

User Guide: *This device is a device that has been evaluated for use in a work environment and may be subject to radio interference if used in a home environment.*

Section 2 Safety Information

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.

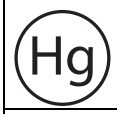
Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in installation manual.

2.1 Use of Hazard Information

⚠ DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION
Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE
Indicates a situation that is not related to personal injury.

2.2 Precautionary Labels

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

	Electrical equipment marked with this symbol may not be disposed of in European public disposal systems. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of life equipment to the Producer for disposal at no charge to the user. ***Note:*** *For recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment, producer-supplied electrical accessories, and all auxiliary items for proper disposal. No equipment is to be returned without authorization. Local recycling programs may be used. For the manufacturer recycling UV Lamp program or producer-supplied electrical accessories and auxiliary items, contact the equipment supplier for proper disposal instructions.*
	This symbol indicates there is Mercury present.
	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 a risk of electrical shock and/or electrocution exists.
	This symbol indicates the marked item has stored energy. Obey procedures to wait 5 (five) minutes after disconnecting main power, to allow stored energy to dissipate.
	This symbol indicates the marked equipment may contain a component that can eject forcibly. Obey all procedures to safely depressurize.
	This symbol indicates corrosive material. Avoid inhalation, ingestion, or exposure to eyes and skin. Wear appropriate clothing and personal protective equipment.

	This symbol indicates the components of the system have been exposed to biohazardous waste.
	This symbol indicates a trained and competent lift operator should be used to move the equipment.
	This symbol indicates a body crush hazard. People should stay clear from under overhead loads.
	This symbol indicates surfaces may be slippery and there is a potential fall hazard.
	This symbol indicates there is a potential UV hazard. Proper protection must be worn.
	This symbol indicates the marked item could be hot and should not be touched without care.
	This symbol indicates that there is a potential ozone exposure hazard. Adequate ventilation is required.
	This symbol indicates that there is potential for VERY hot fluid to drain from UV Chamber openings. Allow fluid inside UV Chamber to cool before performing maintenance or service procedures.
	This symbol indicates that there is potential for VERY hot fluid spray from UV Chamber openings. Obey all procedures to safely depressurize. Allow fluid inside UV Chamber to cool before performing maintenance or service procedures.
	This symbol indicates the marked item should not be touched.
	This symbol indicates a risk of electrical shock and/or electrocution exists. All appropriate lockout tag out procedures must be obeyed.
	This symbol indicates to secure the device with a safety device / hook.
	This symbol indicates a safety glasses with side protection is required for protection against UV exposure.
	This symbol indicates a UV rated full face shield is required. Face shields are to be worn with safety glasses or safety goggles.
	This symbol indicates gloves must be worn.

	This symbol indicates safety boots must be worn.
	This symbol indicates a hard hat must be worn.
	This symbol indicates the operator must read all available documentation to perform required procedures.

2.3 Safety Precautions

Read the safety precautions in this section before doing maintenance, service or repair. Obey the instructions in the safety precautions. Failure to follow the instructions in the safety precautions can result in serious injury or death.

⚠ DANGER



Arc Flash and Shock Hazard - Live Electrical Circuit Present. Hazardous Voltage.

- Failure to follow these instructions will result in electrical shock, injury or death from electrocution.
- Devices inside this equipment contain stored energy.
- NEVER work inside this equipment until at least 5 (five) minutes after disconnecting main power to allow stored energy to dissipate.
- Lockout tag out all sources of power before performing any inspection, repair, or maintenance. ***There may be more than one source of power!***

⚠ DANGER

Shock Hazard.

- Failure to use manufacturer approved parts, including UV Lamps, may result in significant thermal damage to insulation systems which may result in the exposure of live parts.

⚠ DANGER


Pressurized Device - Impalement Hazard.

- Failure to follow these instructions will result in serious injury or death due to forcible ejection of materials from UV Chamber.
- ALWAYS follow lockout tag out procedures.
- NEVER perform any physical inspection, repair, maintenance or service on UV Chamber unless UV Chamber has been isolated, depressurized and open to atmosphere.
- NEVER pressurize UV Chamber without service end cap properly installed.
- NEVER stand in front of UV Lamp section while UV Chamber is undergoing a hydrostatic pressure test. Stand to the side of the UV Chamber while looking for leaks.
- ***If a leak is observed, depressurize immediately, drain, repair and retest.***

⚠ DANGER

Inhalation Hazard.

- Failure to follow these instructions will result in exposure to ozone.
- ALWAYS ensure adequate ventilation.

⚠ WARNING

Personal Injury Hazard.

- Use of parts not approved by the manufacturer may cause personal injury, damage to the UV system or malfunction of the UV System and may void the manufacturer's warranty.
- Use of UV Lamps and Lamp Drivers, not approved by the manufacturer, will void UL and CE product safety certifications.
- The parts listed in Section 11 are approved by the manufacturer.

⚠ WARNING

Body Crush Hazard.

- Failure to follow these instructions could result in serious injury or death due to improper lifting procedures, underrated lifting equipment, and moving parts.
- ALWAYS secure with safety device.
- ALWAYS stay clear of elevated loads.
- ALWAYS comply with local safety regulations.

⚠ WARNING

Scald or Burn Hazard.

- Failure to follow these instructions could result in serious scalds or burns due to exposure to VERY hot fluid.
- Fluid inside UV Chamber may be very hot. Avoid severe burns.
- NEVER touch hot fluid.
- Allow fluid inside UV Chamber to cool before performing maintenance or service procedures.

⚠ CAUTION

UV Light Hazard.

- Failure to follow these instructions may result in serious burns to unprotected eyes and skin.
- ALWAYS use UV protective gear, including gloves and clothing and face shield, when UV light is present.
- NEVER look directly at illuminated UV Lamp, even with protective gear.
- NEVER illuminate UV Lamp if personnel may be directly exposed to UV light.

⚠ CAUTION

Burn Hazard.

- Failure to follow these instructions may result in minor or moderate injury due to burns.
- NEVER touch hot surface.
- Allow UV Lamps to cool for a minimum of 10 (ten) minutes before handling.
- If accidental exposure occurs, immediately cool affected area. Consult physician.

⚠ CAUTION

Slip and Fall Hazard.

- Failure to follow these instructions may result in injuries from a slip and fall.
- ALWAYS ensure safe footing.
- ALWAYS clean up spills promptly.
- ALWAYS comply with site specific safety protocols and procedures.

NOTICE

Mercury Chemical.

- UV Lamps contain a small amount of mercury in either elemental or bound amalgam state, depending on lamp type. These lamps are similar to fluorescent and compact fluorescent lamps (CFL). Always comply with local regulations governing the disposal of lamps containing mercury and the waste associated with breakage.
- NEVER use a vacuum cleaner to clean up broken lamps containing mercury. Vacuuming could spread mercury-containing powder or vapour.
- Thoroughly collect broken glass and trace amounts of mercury and place into a sealable bag or container. For further reference see the U.S. EPA guidelines http://www.epa.gov/cfl/cleaning-broken-cfl.
- If you have further questions about the safe clean-up of mercury containing lamps, contact the Aquafine service support group at techservice@trojantechnologies.com

NOTICE

Personal Protective Equipment Required.

- ALWAYS use appropriate eye, hand, and foot protection.
- ALWAYS wear UV-C safety glasses when around equipment or a UV-C faceshield with safety glasses or safety goggles when inspecting open running equipment.
- ALWAYS follow plant safety procedures and protocols.
- ALWAYS take all necessary precautions when working around, operating, or working on this equipment, if contamination of components is expected within this application due to effluent biological or chemical contaminants.

NOTICE

Only competent personnel should undertake operation, repairs, maintenance or servicing of equipment described in the product manual. Maintain the continuity of the lockout tag out between shifts. If you do not understand the information or procedure explanations in the product manual, STOP and contact your Service Provider for assistance.

NOTICE
The **OptiVenn** system model **01CDS, 02CDS, 03CDS, 02CDM, 03CDM, 04CDM, 04CDL, 02DDM, 04DDM, 04DDL, 06DDL, 08DDL, 08EDL, 08FDL, 10GDL and 12HDL** inactivates Escherichia coli (E. coli) and Fecal Coliform.
The **OptiVenn** system model **04CTM, 06CTM, 08DTM, 12DTM, 08DTL, 10DTL and 12DTL** breaks down trace levels of ozone, chlorine and total organic carbon.
The **OptiVenn LS** system model **02CDS, 03CDS, 02CDM, 03CDM, 04CDM, 04CDL, 02DDM, 04DDM, 04DDL, 06DDL, 08DDL, 08EDL, 08FDL, 10GDL and 12HDL** inactivates Alicyclobacillus, Salmonella and Escherichia coli (E. coli).

NOTICE
The product has only the approvals listed and the registrations, certificates and declarations officially provided with the product. The usage of this product in an application for which it is not permitted is not approved by the manufacturer.

WARNING: This product can expose you to chemicals including phthalates, which is known to the State of California to cause cancer, and mercury, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Notes: *1) Dispose of contaminated parts/components as per country requirements.*

2) Refer to the Safety Data Sheets for accidental exposure to materials.

2.4 Safety Features

The UV System has safety features that prevent personal injury:

- Service End Cap - The electrical power supplied to all lamp holders is turned off when the service end cap is removed.
- Door disconnect switch - A disconnect switch removes power to the UV System.

Section 3 General Information

The information in this manual has been carefully checked and is believed to be accurate. However, the manufacturer assumes no responsibility for any inaccuracies that may be contained in this manual. In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. In the interest of continued product development, the manufacturer reserves the right to make improvements in this manual and the products it describes at any time, without notice or obligation.

3.1 Acceptable Noise Levels

The airborne noise emissions, A-weighted emission sound pressure level, is not more than 70dB(A).

3.2 Patents and Permissions

The products described in this document may be protected by one or more patents in The United States of America, Canada and/or other countries. For a list of patents owned by Trojan Technologies, go to: www.trojantechnologies.com/patents.

3.3 Abbreviations and Acronyms

Table 1 describes the abbreviations and acronyms included in this manual.

Table 1 Abbreviations and Acronyms

Abbreviation/Acronym	Description
AC	Alternating Current
AO	Analog Output
CE	Conformité Européenne (European Conformity)
CPP	Control Power Panel
cULus	Underwriters Laboratories Listed to Canadian and USA standards
EOL	End of Life
EPDM	Ethylene Propylene Diene Monomer
FKM	Fluorocarbon based fluoroelastomer material
HMI	Human Machine Interface
KC	Korea Certification
lbf.ft	Pounds force foot
lbf.in	Pounds force inch
LS	Liquid Sugar
N.m	Newton metre
NOM	Norma Oficial Mexicana
psi	pounds per square inch
TOC	Total Organic Compound
UKCA	UK Conformity Assessed
UV	Ultraviolet
UVI	Ultraviolet Intensity

3.4 System Overview

The system is a pressurized UV Chamber that uses high-output low pressure UV Lamps.

Figure 1 and Figure 2 show the UV Chamber components.

One Control Power Panel (CPP) provides the power distribution for one UV Chamber and controls the UV Chamber through a microprocessor user interface. Refer to Section 8.

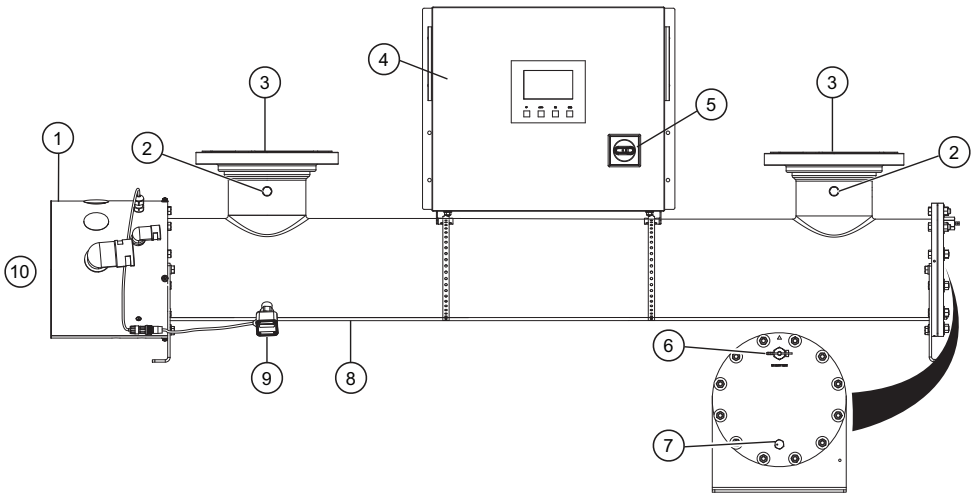


Figure 1 UV System with ANSI Flange Option

1	Service End Cap	**2**	Sample Port
3	Inlet/Outlet Connections - ANSI Flange	**4**	Control Power Panel
5	Disconnection Switch	**6**	Pressure Relief Kit
7	Drain Port	**8**	UV Chamber
9	UVI Sensor	**10**	Service End (Clearance required - Section 7.2)

Illustration showing UV System with ANSI Flange Option with local mounted CPP.

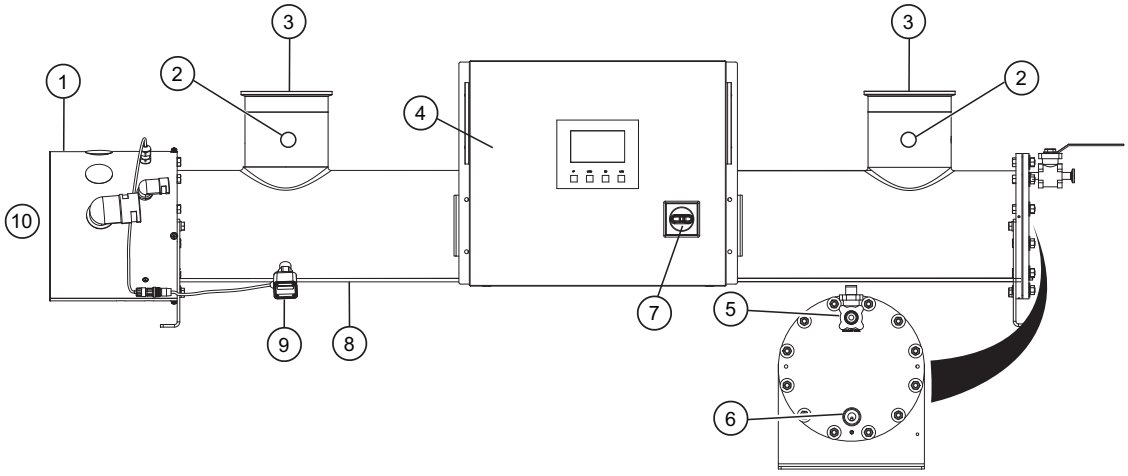


Figure 2 UV System with Sanitary Ferrule Option

1	Service End Cap	**2**	Sample Port
3	Inlet/Outlet Connections - Sanitary Ferrule	**4**	Control Power Panel
5	Pressure Relief Kit	**6**	Drain Port
7	Disconnection Switch	**8**	UV Chamber
9	UVI Sensor	**10**	Service End (Clearance required - Section 7.2)

Illustration showing UV System with Sanitary Ferrule Option with local mounted CPP.

3.4.1 UV Chamber

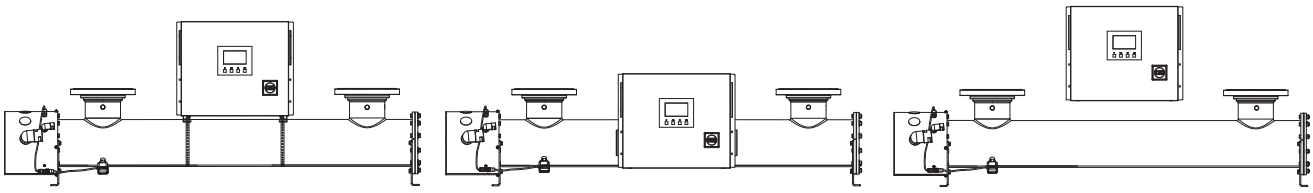
The UV Chamber contains the UV Lamps and Lamp Sleeves.

3.4.2 Control Power Panel

The CPP contains Lamp Drivers that power and control the UV Lamps.

For UV Systems without a Skid:

Depending on the UV System size, the CPP may be mounted locally on the UV Chamber or Remote to the UV Chamber. Refer to the provided General Outline drawing to determine CPP mounting options for the provided system.



Top of Chamber **Front of Chamber** **Remote**

Figure 3 HMI Panel Locations

For UV Systems with a Skid:

The CPP will be mounted on the skid frame.

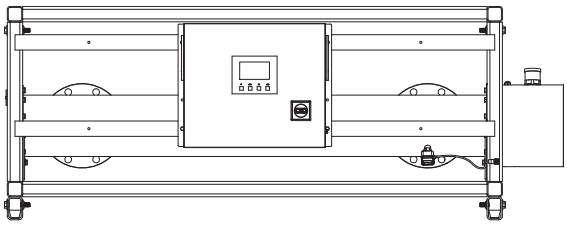


Figure 4 Control Power Panel (Skid Mounted)

Illustration showing Low Profile Skid Base.

3.4.3 Sample Ports

Two optional ports are available for obtaining fluid samples pre-and post UV Chamber.

3.4.4 UVI Sensor (Optional)

When a NIST traceable UVI Sensor is purchased the Certificate of Calibration is included with each unit. This certificate indicates the serial number of the UVI Sensor and provides date of calibration. Keep the certificate in a safe place.

The UVI Sensor is provided with O-Rings. The O-Rings are necessary to create the proper seal. Be sure that the O-Rings are present when installing the UVI Sensor into the Treatment Chamber.

⚠ DANGER

Obey all warning and caution statements. Refer to Section 2.

Read and understand the Operation and Maintenance Manual before operating this equipment. Read all user documentation before performing operations, inspections, repair, or maintenance on this equipment.

Only competent personnel should undertake operation, repairs, maintenance, or servicing of equipment described in this section of the manual. If you do not understand the information or procedure explanations in this manual, STOP and contact your Service Provider for assistance.

The procedure in Section 4.1 is the minimum lockout requirement. Use additional precautions, as needed. Obey all site-specific protocols.

4.1 Lockout Tag Out Procedure

4.1.1 Equipment Shutdown

Contact the plant manager or shift supervisor for help regarding equipment location and identification.

1. Ensure that no hazards will be created by equipment shutdown.
2. Shut down all equipment that will need lockout tag out.
3. Ensure that all moving parts come to a complete stop.

4.1.2 Deactivate Energy Sources

A hazardous energy source is any energy source that can cause serious personal injury or death. The potential hazardous energy sources in this manual are:

1. Identify and deactivate the main isolating device of each energy source:
   -  Electrical Energy (Incoming Power)
   -  Fluid Pressure (Potential Energy)
   -  Thermal (Thermal Energy)
   -  UV Light (Radiation Energy)
   -  Mechanical (Kinetic Energy)
2.  Disconnect all electrical equipment from power:
   - Disconnect all electrical equipment
   - Power off and disconnect electrical power to hard-wired equipment
3.  Dissipate stored electrical energy in capacitors.
4. Close all shut-off valves.

4.1.3 Lockout Tag Out Energy Sources

1. Use a multi-lock scissor adaptor to lockout each energy source.
2. Attach a completed lockout tag. Include the required information:
   - Person and company applying the lockout
   - Reason for the lockout
   - Date of the lockout
3. Apply a personal lock.

4.1.4 Verify the Lockout

1. Ensure that the meter is working correctly with a test before and after measuring the de-energized source:
   a. Test the voltmeter to a known, energized 24 VAC/120 VAC source.
   b. Use the same voltmeter to test the locked-out energy sources to verify that there is no voltage.
   c. Test the voltmeter again to a known, energized 24 VAC/120 VAC source.
2. Ensure that the stored energy sources have dissipated.
3. Try to start the de-energized equipment and verify that it does not start.

4.2 Remove the Lockout Tag Out

When the work is finished and the system has been restored to full operational condition, including closing all enclosure doors, the lockout tag out can be removed.

1. Ensure that no hazards will be created by removal of the lockout.
2. Obey manufacturer's instructions and safe work procedures to energize and start the equipment.

Section 5 System Startup and Shutdown

DANGER

Obey all warning and caution statements. Refer to Section 2.

Read and understand this manual before operating this equipment. Read all user documentation before performing operations, inspections, repair, or maintenance on this equipment.

Only competent personnel should undertake operation, repairs, maintenance, or servicing of equipment described in this section of the manual. If you do not understand the information or procedure explanations in this manual, STOP and contact your Service Provider for assistance.

NOTICE

Do not operate the UV System until the UV Chamber is completely filled with process fluid.

To prevent alarm conditions, overheating or equipment damage, process fluid level and flow in the UV Chamber must be established and maintained at all times when UV Lamps are in operation. Follow all provided site-specific instructions about automatic or manual power to operate the system.

5.1 Start-Up Procedure

5.1.1 Pre-Start Checklist:

1. UV Chamber should be filled with process fluid to be treated. The flow of fluid for the initial filing should not exceed 50 GPM (3.15 L/s). Failure to comply may result in Lamp Sleeve breakage. Ensure there are no system leaks and no piping connection leaks.
2. Check for complete assembly:
   - UV Chamber is fully assembled.
   - Make sure that drainage and by-pass provisions are ready.
   - UV Lamps and Lamp Sleeves are fully assembled and installed.
   - There is fluid in the UV Chamber.
   - There are no leaks in the UV Chamber.
   - The Service End Cap is fastened and secure at the end of the UV Chamber
   - If supplied, installation of UVI Sensor is complete, otherwise port is plugged.
   - Verify all incoming power connections conductors, including the ground conductor, are properly terminated.
   - Verify that the primary over-current protection device and circuit breaker are in the closed position.
   - Turn the main power disconnect switch to the “ON” position. The enclosure fans, Control Power Panel display screens and the Lamp Drivers will be energized.
3. For local ON/OFF control:
   - At the CPP → Turn the local disconnect switch to the ON position.
   - At the CPP HMI → Press ENTER, to power on the UV Lamps. Refer to Section 8.
4. For remote ON/OFF control:
   - At the CPP HMI → Enable. These terminals require only a contact closure to operate the remote relay. When the microprocessor is set to “REMOTE” operation, the closure at these terminals will “START/STOP” the system from a remote location.

5.2 Shutdown Procedure

5.2.1 UV Unit

1. The Plant:

   Stop the process flow through the UV Chamber as per site specific protocols.

2. For local ON/OFF control:

   - At the CPP HMI → Press ENTER, to power on the UV Lamps. Refer to Section 8.

3. For remote ON/OFF control:

   - These terminals require only a contact closure to operate the remote relay. When the microprocessor is set to “REMOTE” operation, the closure at these terminals will “START/STOP” the system from a remote location.

4. At the CPP → Turn the local disconnect switch to the OFF position.

Section 6 Shipment and Storage

6.1 Shipping Contents

The system consists of two major components, the UV Chamber and the Control Power Panel. Some components may be disconnected at the UV Chamber for shipment.

6.2 How the equipment is shipped

The system is delivered to the site by truck. System components are packed in crates labeled with the component name. Other labels identify components which are fragile or breakable and components which must be kept dry.

To prepare for installation, remove only the shipping straps and bolts that secure the panel to the pallet.

6.3 Storage requirements before the install

The manufacturer recommends indoor storage of the system equipment. The equipment should be stored in a dry warehouse. Heating is not necessary during storage. However, before system start up, the equipment must be warmed to greater than 60ºF (15ºC) for a period of 24 hours.

Storage area conditions:

- Ambient air temperature between -4ºF to 104ºF (-20ºC to 40ºC)
- Relative humidity from 10% to 90%, non-condensing
- Free from dust and dirt ingress
- Must not contain corrosive or explosive gases
- Free from salt air
- Vermin free

If indoor storage is not possible, the panel may be stored outdoors, with additional conditions:

- Equipment is stored on high ground that is not susceptible to flooding.
- Equipment is elevated a minimum of 12 inches (300 mm) above the ground or as appropriate to prevent flooding.
- Equipment is completely covered with waterproof tarps to prevent exposure to the elements (e.g., rain, snow, sand, dust etc.). Tarps must be tight fitting, attached securely and examined regularly. Water and snow accumulation should be removed regularly.
- Equipment stored in crates should not be exposed to direct sunlight.
- Equipment can be stored in sea containers.

6.4 Overview of Equipment Connections

Refer to the general layout drawings provided by the manufacturer. If the supplied layout drawings do not match the site conditions, contact the manufacturer for assistance.

Section 7 Installation

DANGER

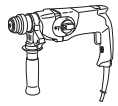
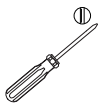
Obey all warning and caution statements. Refer to Section 2.

Read and understand this manual before operating this equipment. Read all user documentation before performing operations, inspections, repair, or maintenance on this equipment.

Only competent personnel should undertake operation, repairs, maintenance, or servicing of equipment described in this section of the manual. If you do not understand the information or procedure explanations in this manual, STOP and contact your Service Provider for assistance.

7.1 Tools and Materials

Tools and materials are to be provided by the Installation Contractor unless otherwise specified.

Symbols	Description	Symbols	Description
	Lifting straps (properly sized and rated for equipment load)		Spreader Bar (properly sized and rated for equipment load)
	Drill - Concrete Hammer		Drill with bits
	Level		Tape measure
	Flat Screw Driver		Philips Screwdriver
	Wrench		Wrench - Adjustable
	Wrench - Torque		Wrench - Socket
	Punch Tool (for a 3/8" dowel pin)		Punch, Small Hammer
	Anti Seize		

All Aquafine products are carefully inspected and tested before shipment from our plant. Upon delivery, check the packaging and equipment for damage that occurred during shipment.

7.2 Pre-Installation

1. When preparing the site for installation, allow for valves, drain and bypass as part of your plumbing circuit.
2. It is recommended to have a provision to bypass and isolate the UV Chamber from flow, to allow for UV Chamber shutdown for maintenance and/or service purposes.
3. Connecting pipes to the UV System should be supported, to avoid any undue strain on the UV Chamber.

   Note: *The UV System should not bear any load of the attached piping.*
4. For CPP side and front clearance refer to local codes for local minimum requirements.
5. Allow for sufficient service access around the UV Chamber. Depending on the UV Lamp length, the service clearance area required will vary:

UV Lamp Length	Service Area Clearance (Figure 1 and Figure 2)
15 inch	26 inches (660 mm)
30 inch	48 inches (1220 mm)
60 inch	72 inches (1830 mm)

6. If your piping system is subject to impulse pressure resulting in “water hammer” condition, a surge tank or other means must be provided to remove this condition; otherwise the extreme momentary pressure may rupture and fracture the Lamp Sleeves.
7. Avoid locations that experience vibration within proximity of heavy equipment or from erratic pumps. Excessive vibration from other equipment can cause damage to UV Lamps within the UV Chamber.

7.3 UV Chamber

The UV Chamber may be installed with or without a skid.

Installations without a skid

The UV Chamber is required to be supported by piping supports provided by others (Section 7.3.1). The Control Power Panel can be wall mounted or it can be mounted onto the UV Chamber, either on top or in front (Section 7.4).

Installations with a Skid

The UV Chamber and the Control Power Panel are supported by the supplied skid. Skids are capable of stacking one (1), two (2) or three (3) UV Chambers and Control Power Panels high (Section 7.3.4). The base skid provided may be either Low Profile (Section 7.3.2) or High Profile (Section 7.3.3).

Note: *The UV Chamber and Control Power Panel will be assembled onto the skid prior to shipment.*

NOTICE

FOR LIQUID SUGAR, FOOD & BEVERAGE APPLICATIONS

Good Manufacturing Practice (GMP) requires a thorough cleaning of food contact surfaces. Ensure all wetted surfaces in the UV Chamber are cleaned and sanitized in accordance with the facility standard operating procedures and / or local regulatory requirements.

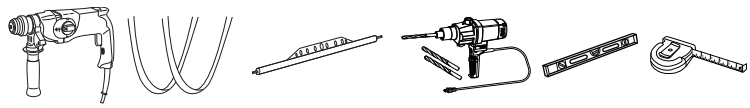
7.3.1 Install the UV Chamber without a Skid

7.3.1.1 Orientate the UV Chamber

Prerequisites:

- Clear area where the UV Chamber will be installed.
- Remove UVI Sensor if lifting straps interfere with the UVI Sensor Assembly. Refer to Section 9.8.

Tools:



Materials:

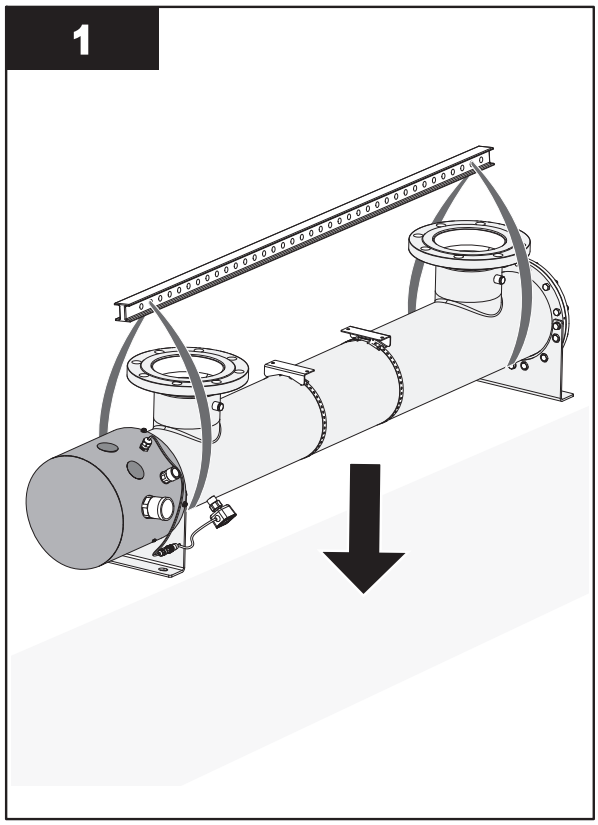
- Mounting hardware (by others)
- Shim (by others)

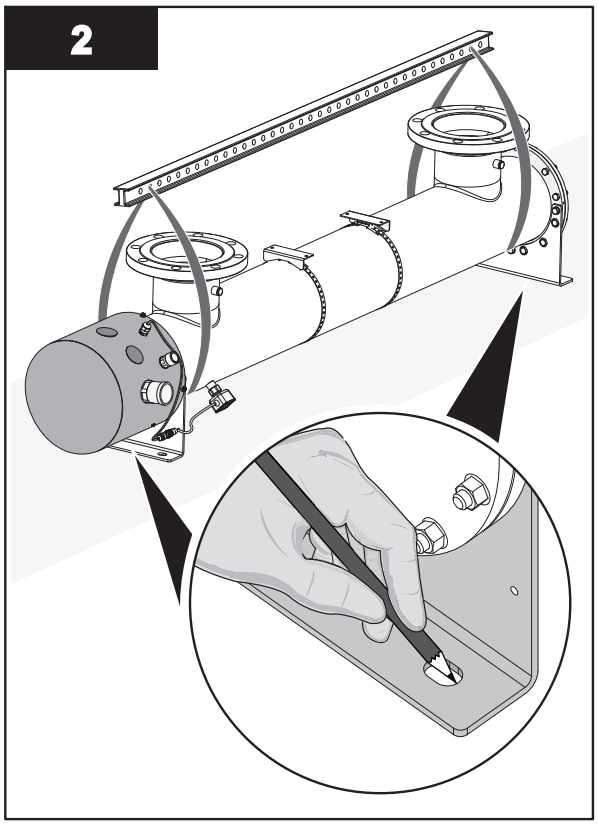
Procedure:

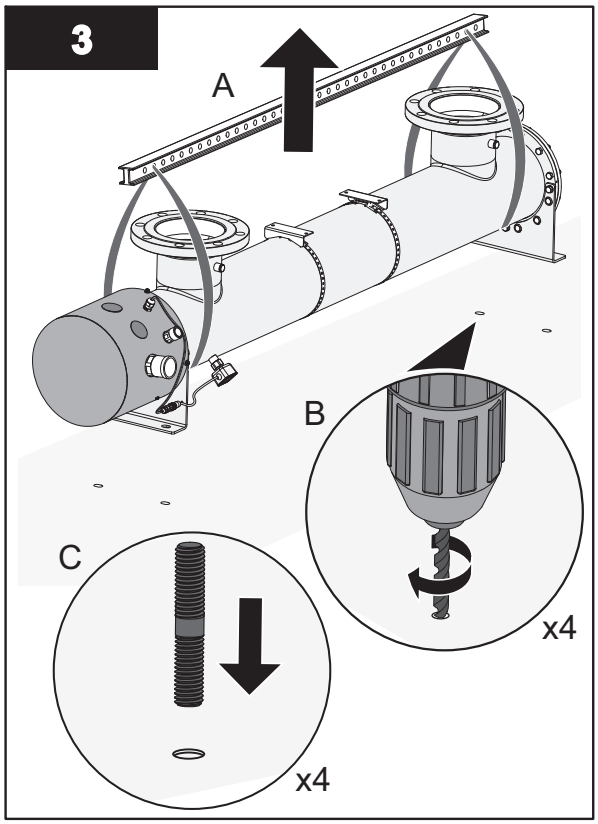
NOTICE

Orientate the service end (i.e. Service End Cap) in the required service direction. Allow sufficient service access clearance for the UV Lamps and Lamp Sleeves, refer to table in Section 7.2, step 5.

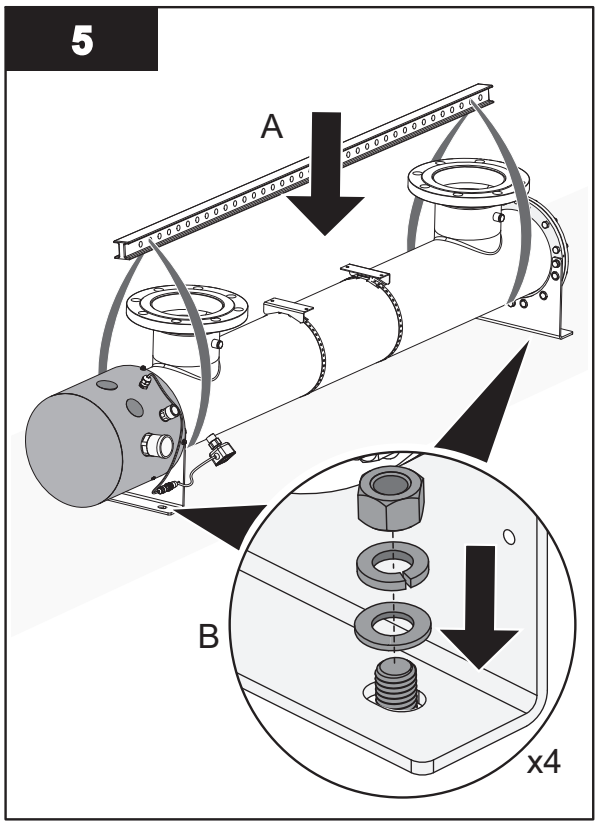
UV Chambers are delivered with the inlet and outlet connections in a 12 o'clock orientation. Follow the steps in Section 7.3.1.2 to change the orientation.







4. If the UV Chamber is:
   a. required to be rotated to a 3, 6 or 9 o'clock orientation, proceed to Section 7.3.1.2.
   b. not required to be rotated, proceed to step 5.



Note: *Loosely install the mounting hardware.*

6. Level the UV Chamber from side to side and front to back (horizontal).
7. Tighten the mounting hardware.
8. Remove the lifting straps.
9. Install UVI Sensor, if previously removed. Refer to Section 9.8.
10. Connect UV Chamber Inlet and Outlet to Plant process piping:
    - For UV Chamber with ANSI Flanges, refer to Section 7.3.5.
    - For UV Chamber with Sanitary Flanges, refer to Section 7.3.6.

7.3.1.2 Rotate the UV Chamber Inlet and Outlet Connections

The UV Chamber is delivered with the inlet and outlet connections in a 12 o'clock orientation. Depending on site-specific requirements, the UV Chamber can be rotated to a 3'o, 6'o or 9 o'clock orientation. Refer to Figure 5.

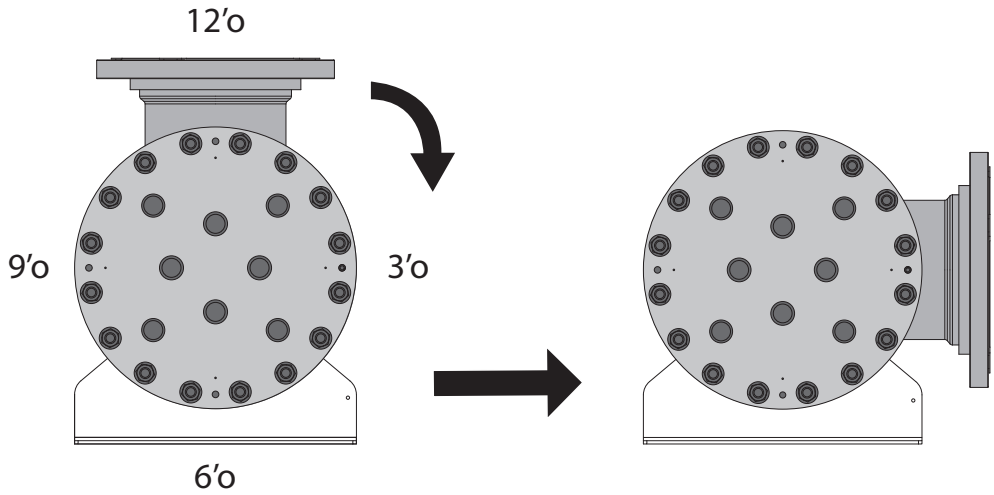


Figure 5 UV Chamber Inlet and Outlet Orientations

Prerequisites:

- Orientate the UV Chamber. Refer to Section 7.3.1.1

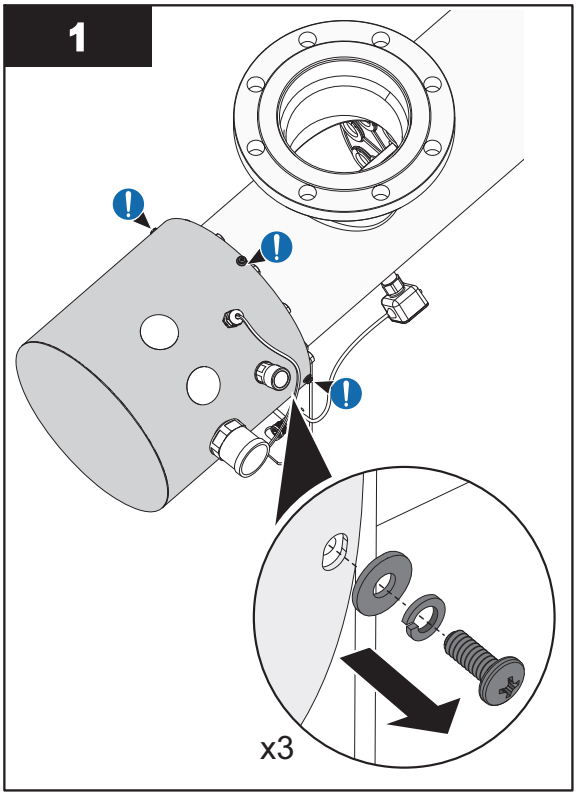
Tools:

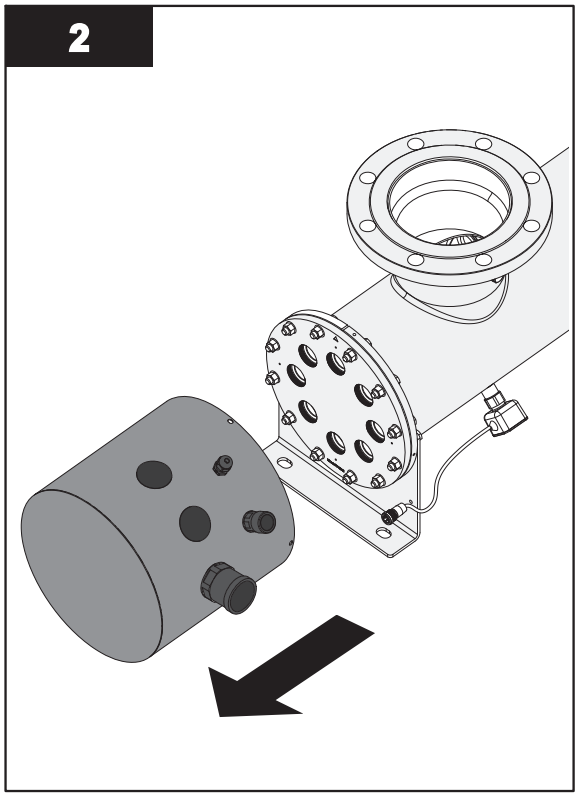
Materials:

- Mounting hardware (by others)
- Shim (by others)

Procedure:

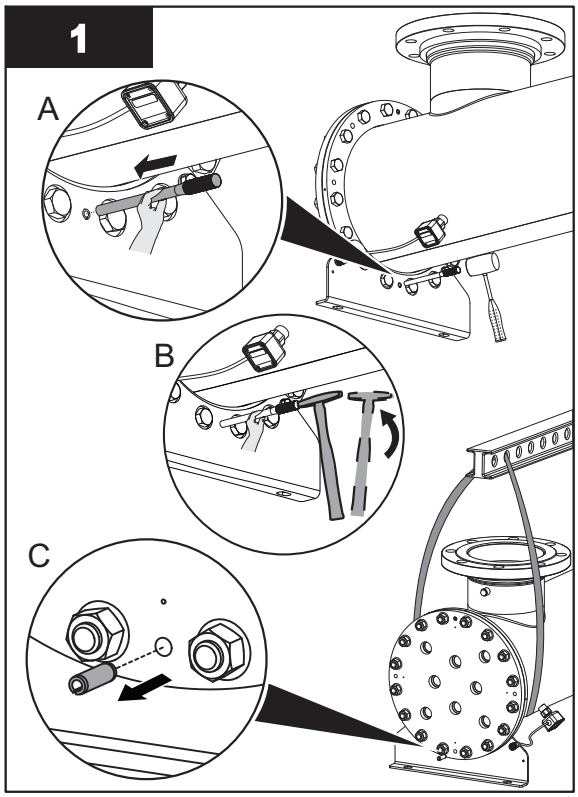
Note: *The procedure below demonstrates rotating the UV Chamber from 12'o to 3 o'clock orientation. The procedure will vary depending on site-specific orientation required.*

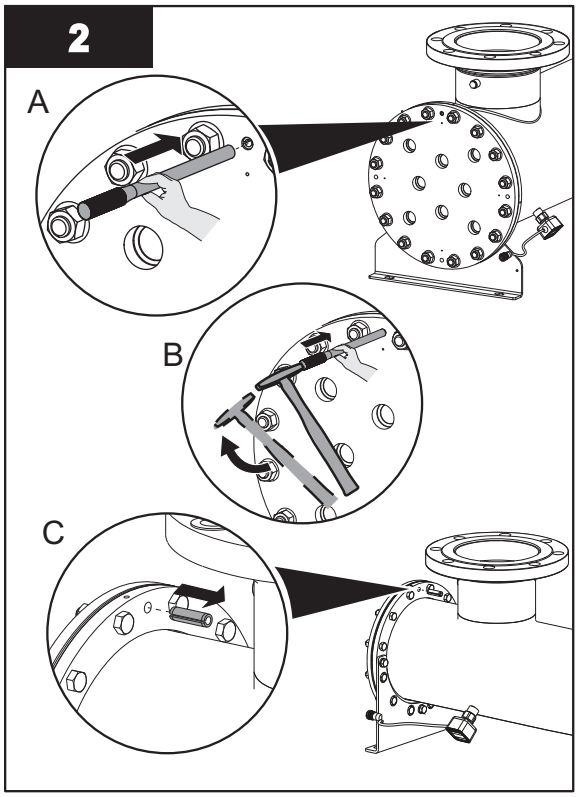




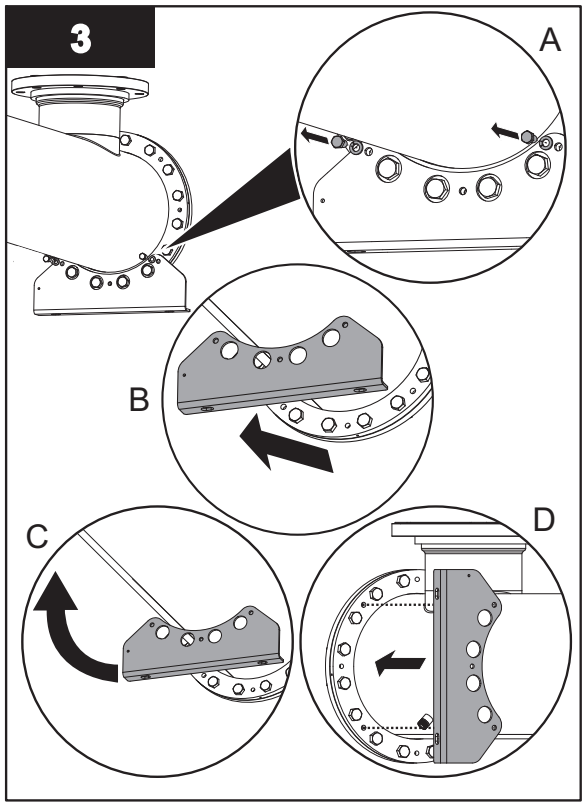
3. For UV Chamber Diameter:
   a. 12 Inches or greater, go to Section 7.3.1.2.1.
   b. 10 Inches or less, go to Section 7.3.1.2.2.

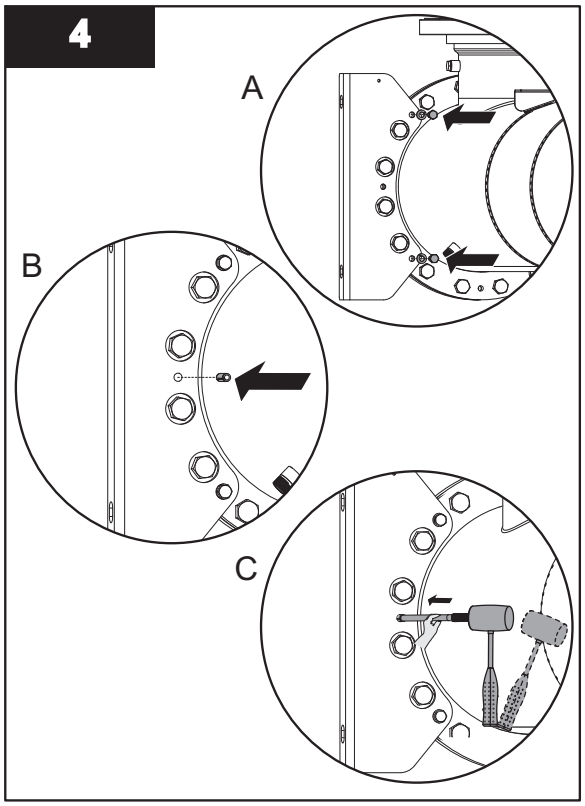
7.3.1.2.1 UV Chamber Diameter: 12 inches or greater



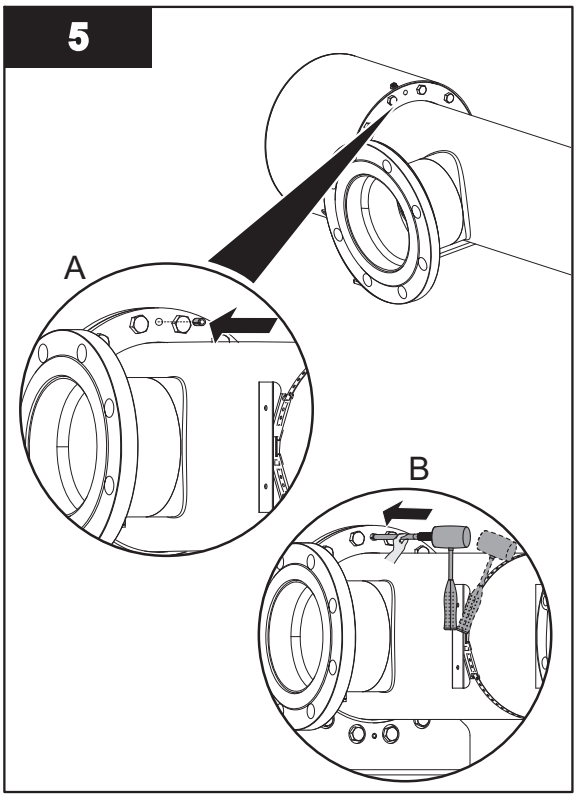


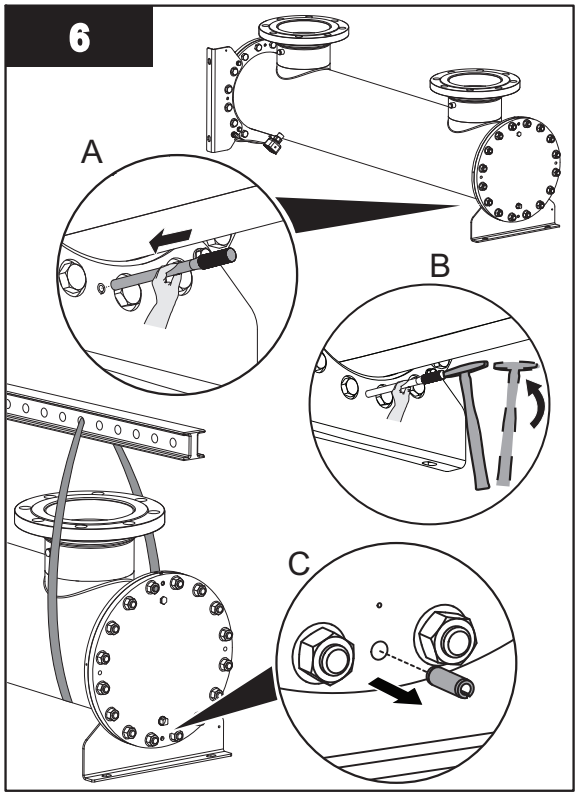
Note: *Lift the UV Chamber as required before removing the spring pin.*



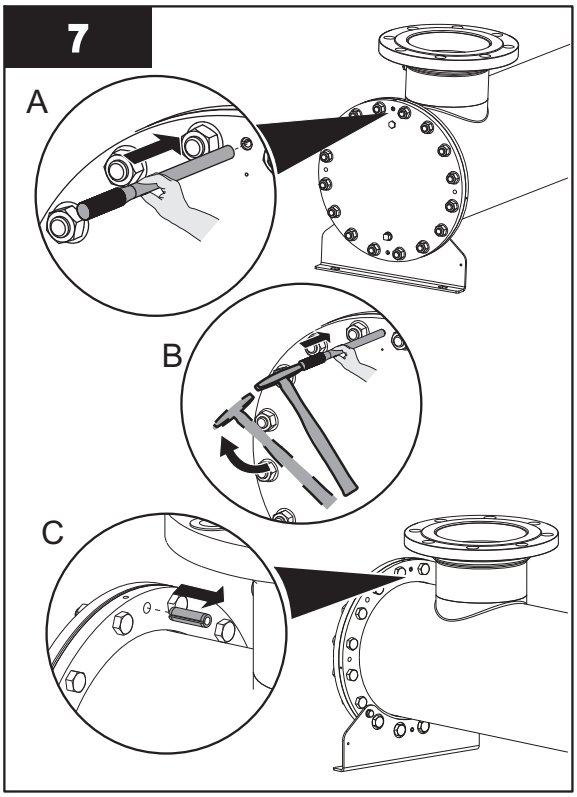


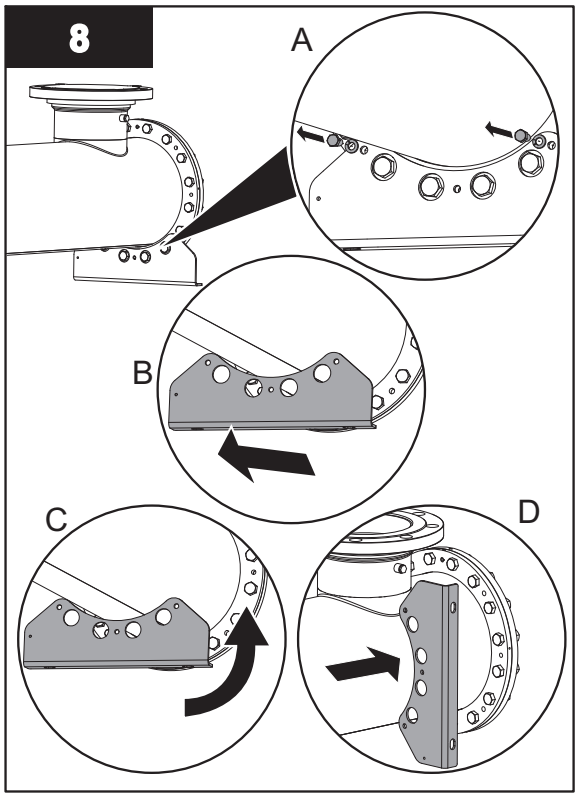
Note: *Do not tighten down bolts and washers until the dowel pin is secured in place.*

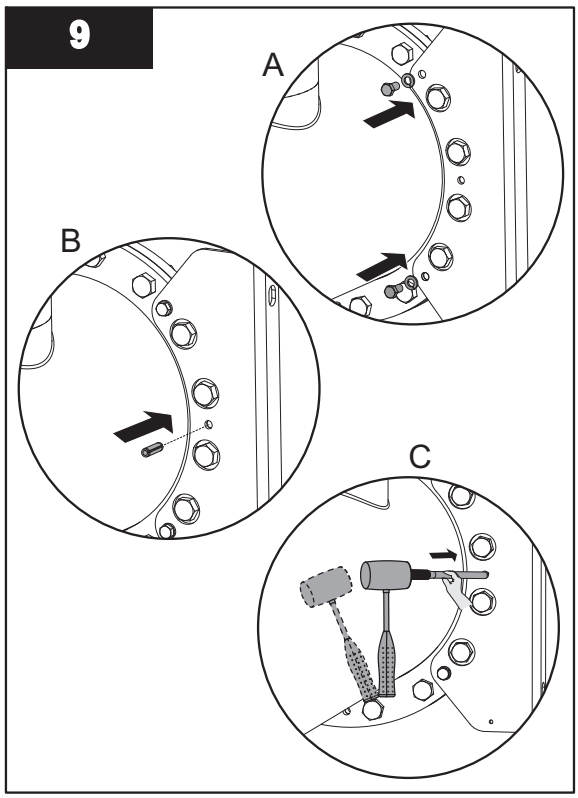




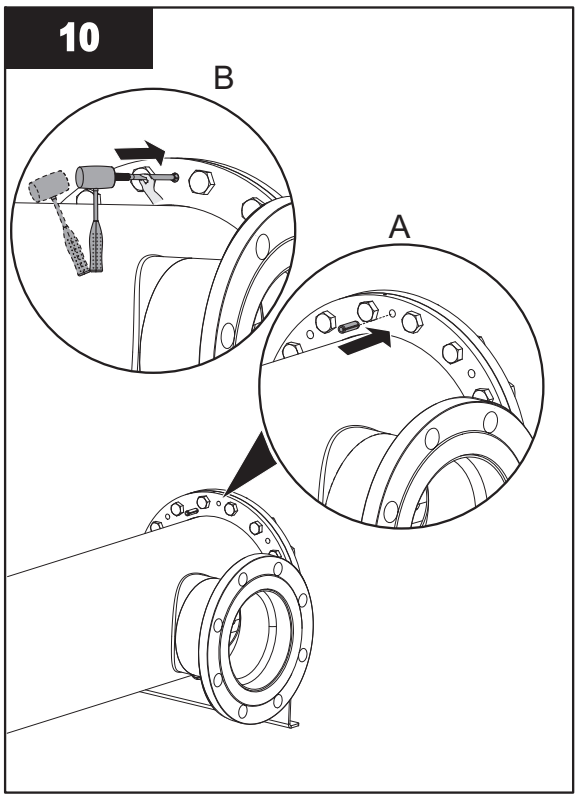
Note: *Install the spring pin removed in Step 2 into the hole at the top of UV Chamber.*



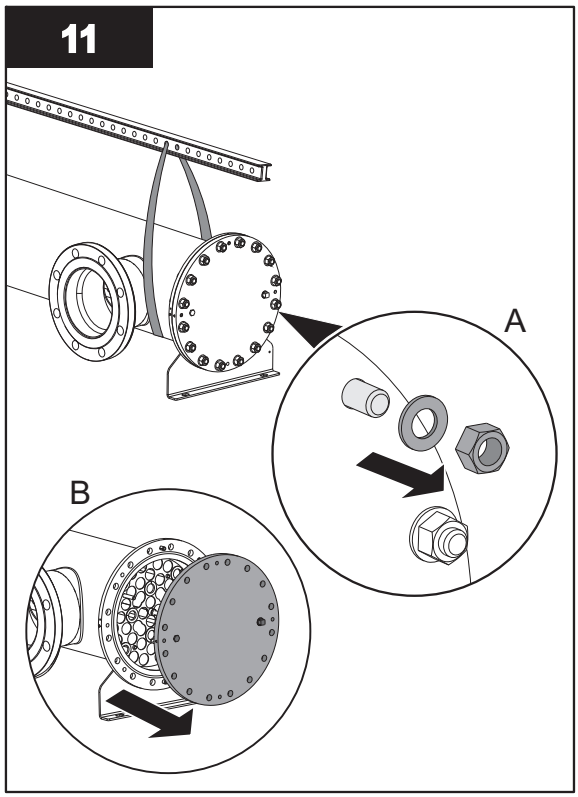




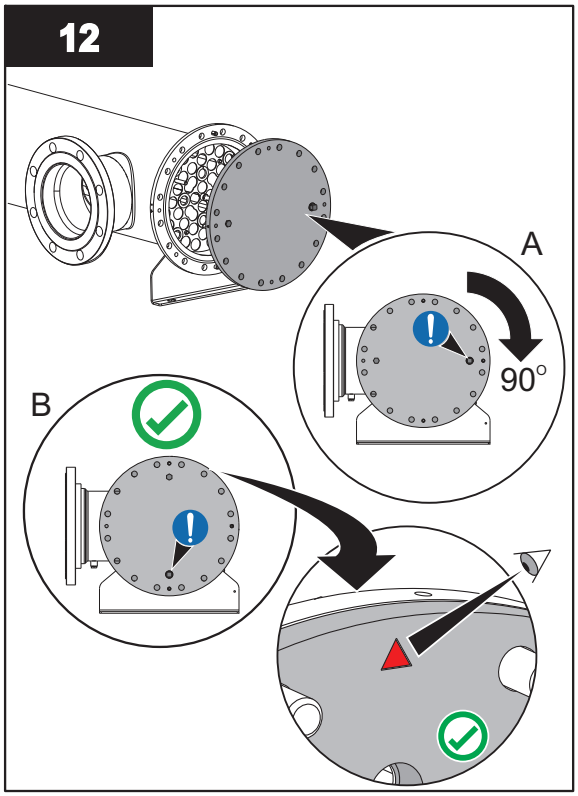
Note: *Do not tighten down bolts and washers until the dowel pin is secured in place.*



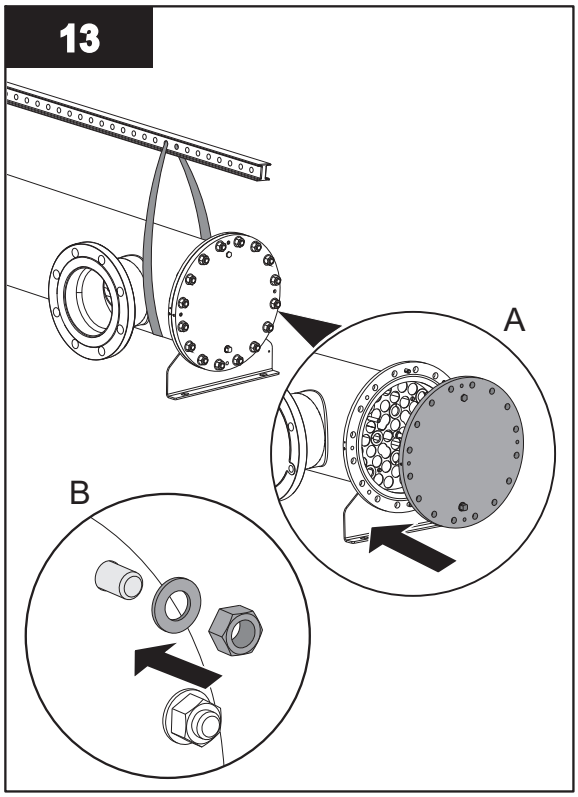
Note: *Install the spring pin removed in Step 7 into the hole at the top of UV Chamber.*

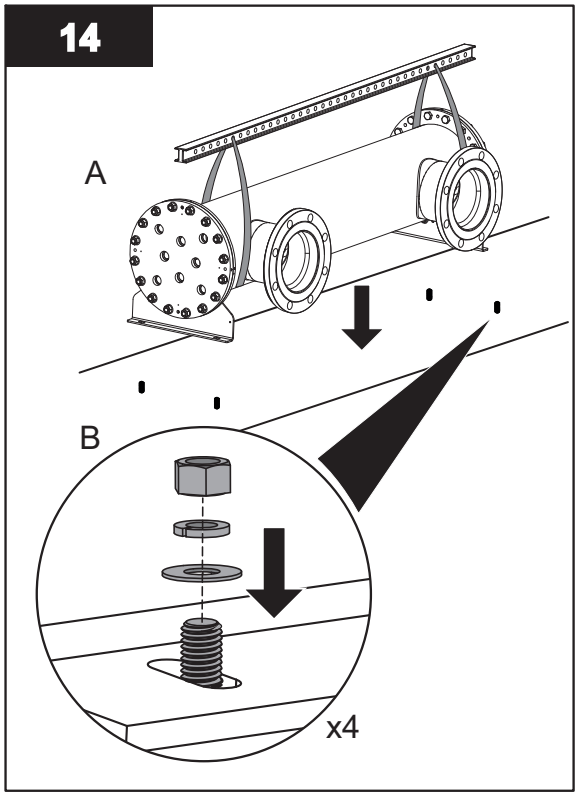


Note: *Remove all end plate mounting hardware.*



Notes: *1) Position the drain at the bottom of the end plate.*
2) Make sure the orientation mark on the end plate is pointing up as shown.

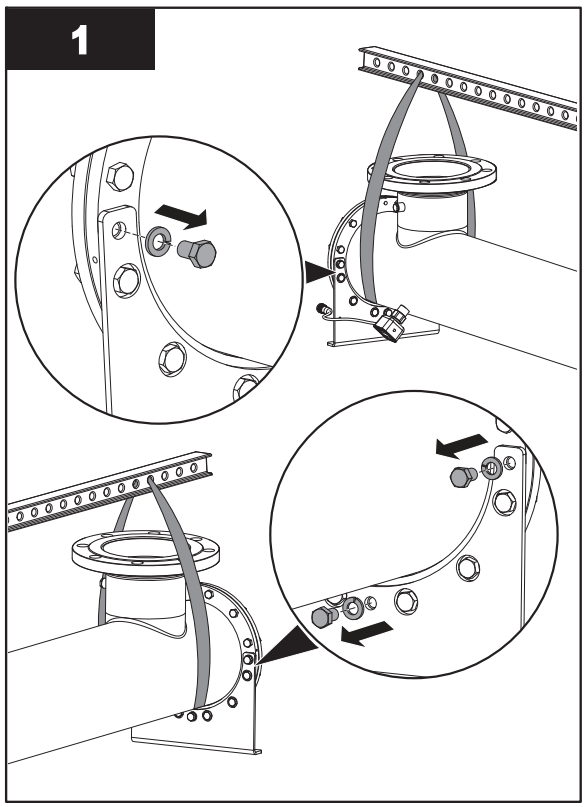


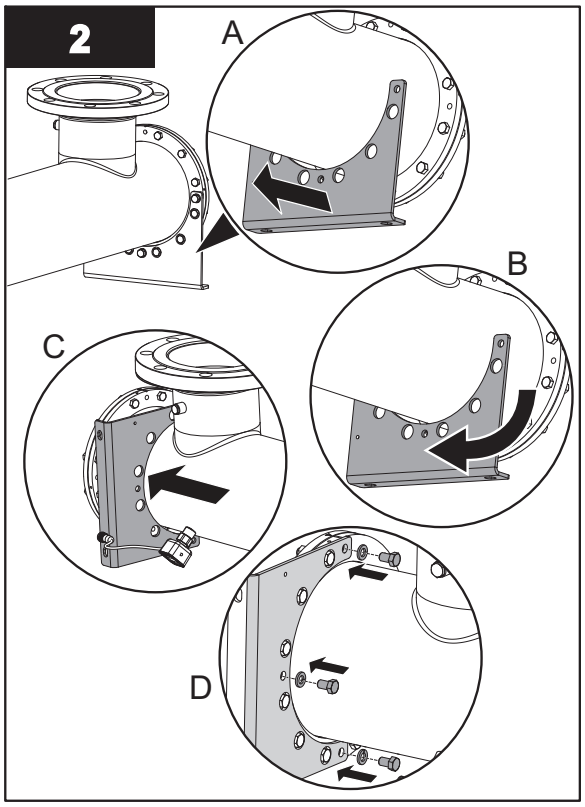


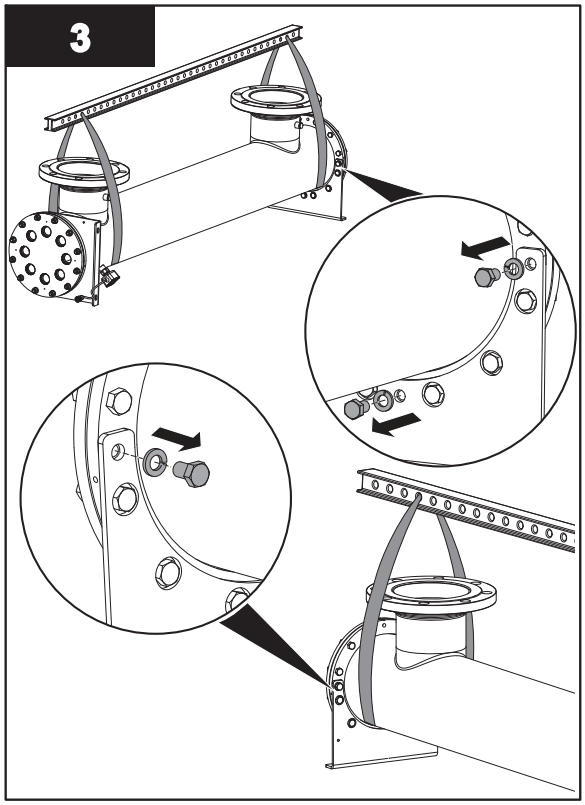
Note: *Install all end plate mounting hardware.*

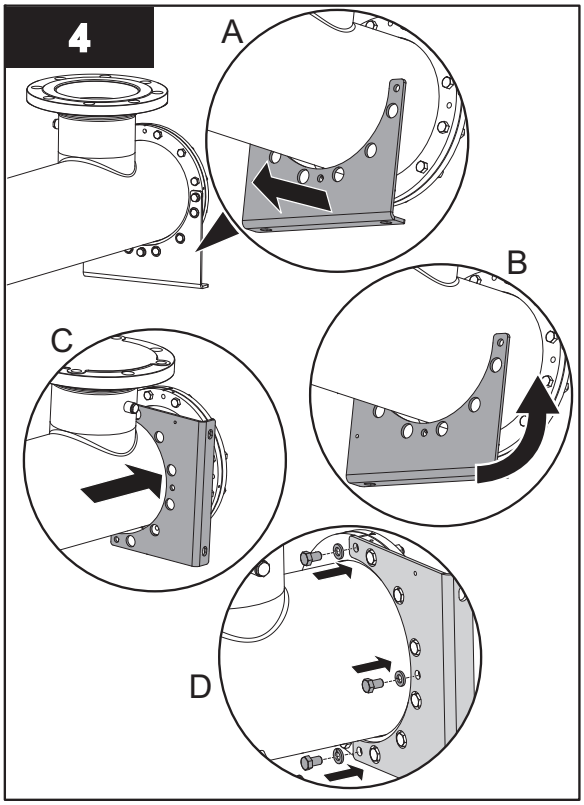
15. Go to Section 7.3.1.2.3.

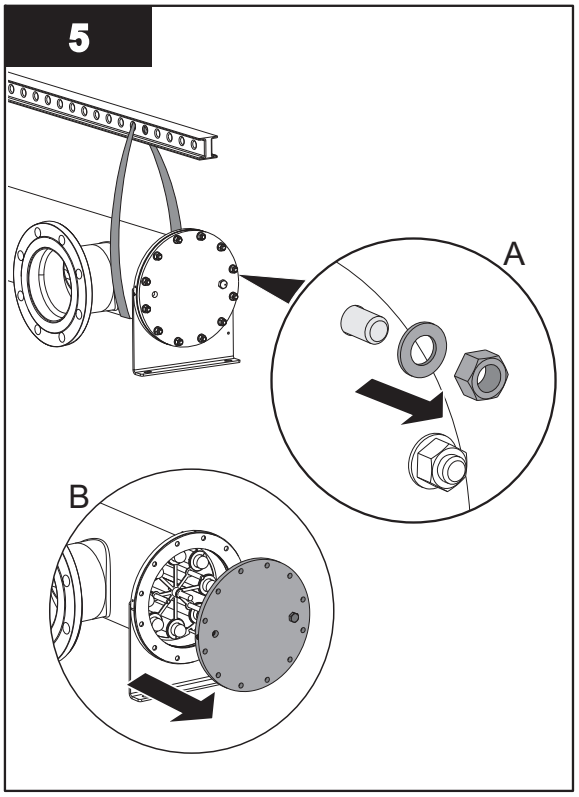
7.3.1.2.2 UV Chamber Diameter: 10 inches or less

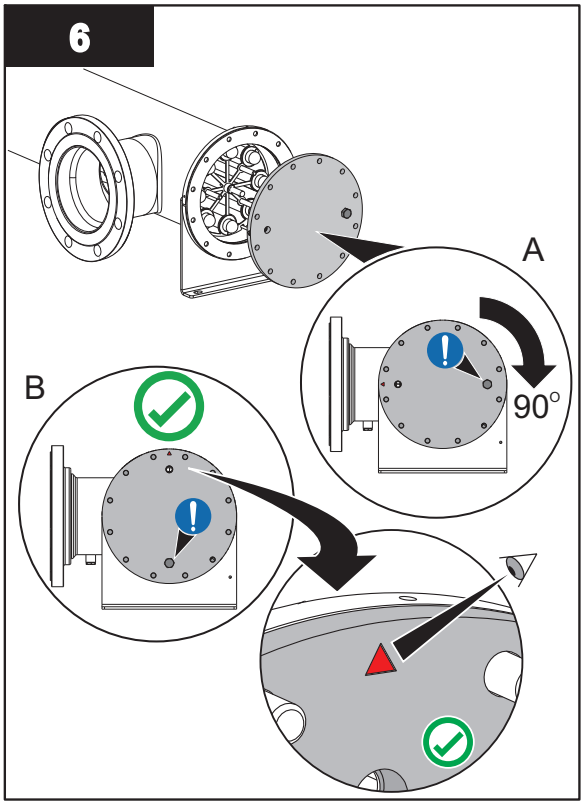






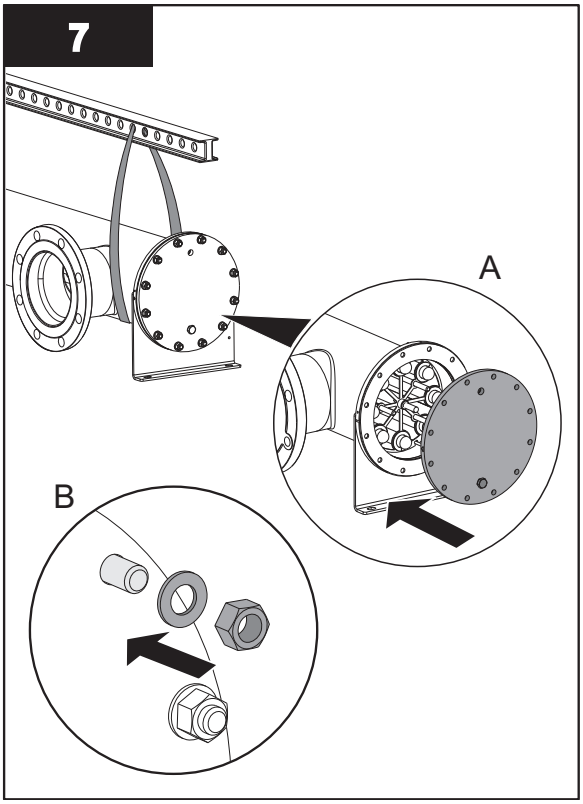


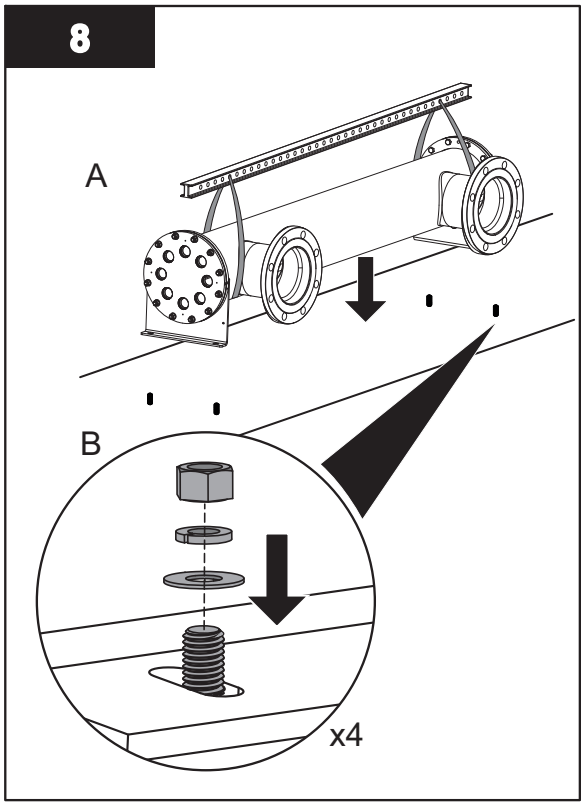




Note: *Remove all end plate mounting hardware.*

Notes: *1) Position the drain at the bottom of the end plate.*
2) Make sure the orientation mark on the end plate is pointing up as shown.

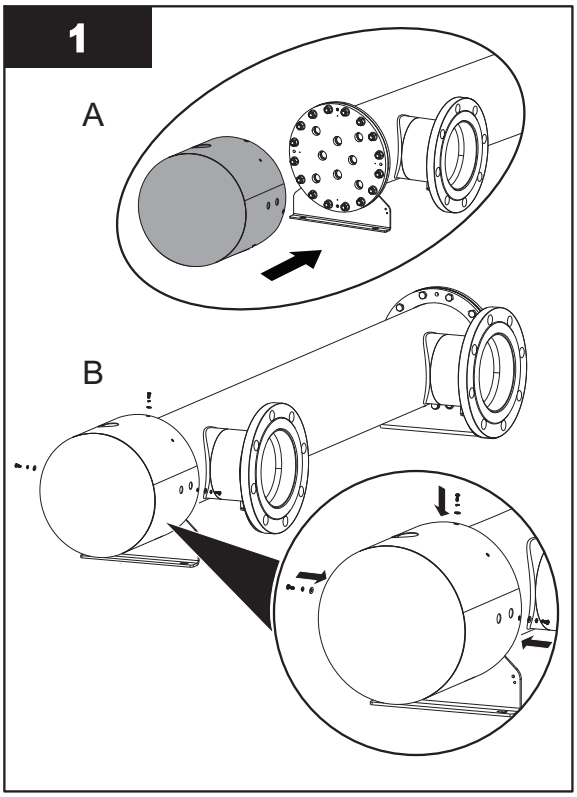




Note: *Install all end plate mounting hardware.*

9. Go to Section 7.3.1.2.3.

7.3.1.2.3 Service End Cap Installation



Note: *It is recommended to orientate the lamp cable connection side of the service end cap, opposite to the UV Chamber inlet and outlet connections.*

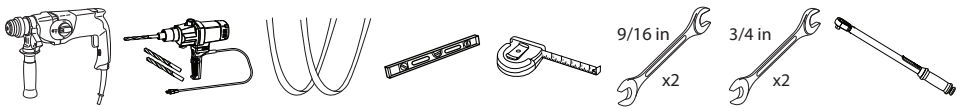
2. Remove the lifting straps.
3. Install UVI Sensor, if previously removed. Refer to Section 9.8.
4. Connect UV Chamber Inlet and Outlet to Plant process piping:
   - For UV Chamber with ANSI Flanges, refer to Section 7.3.5.
   - For UV Chamber with Sanitary Flanges, refer to Section 7.3.6.

7.3.2 Install a UV Chamber with Low Profile Skid Base

Prerequisites:

- Clear the area where the UV Chamber will be installed.

Tools:

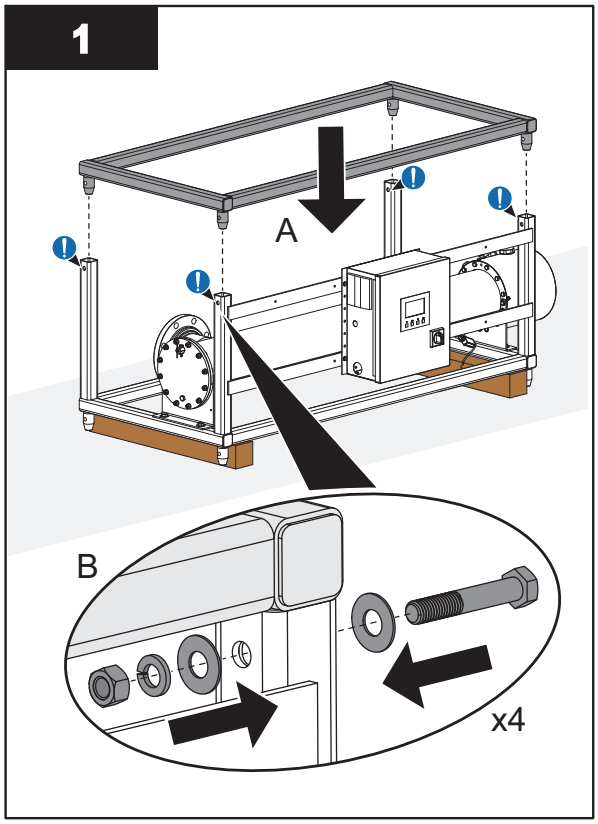


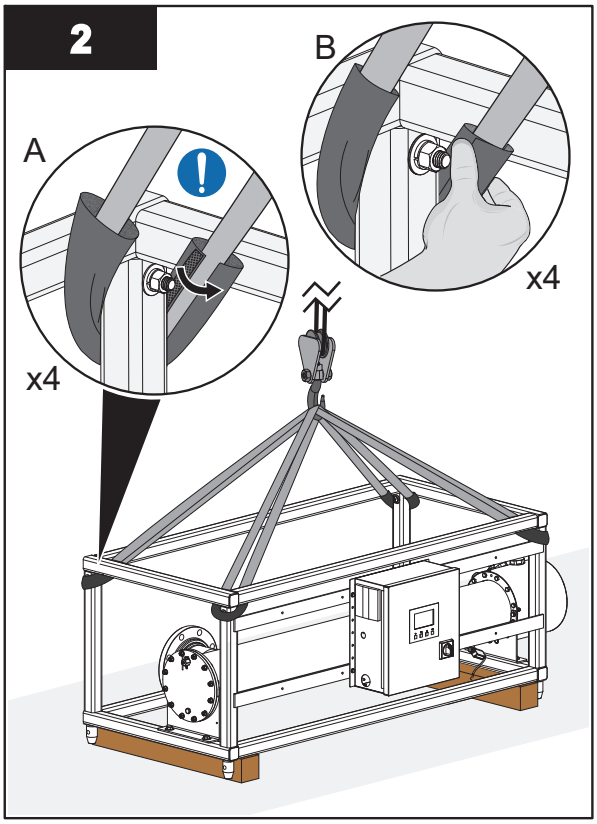
- Lifting Strap protective pads (x4) (by others)

Materials:

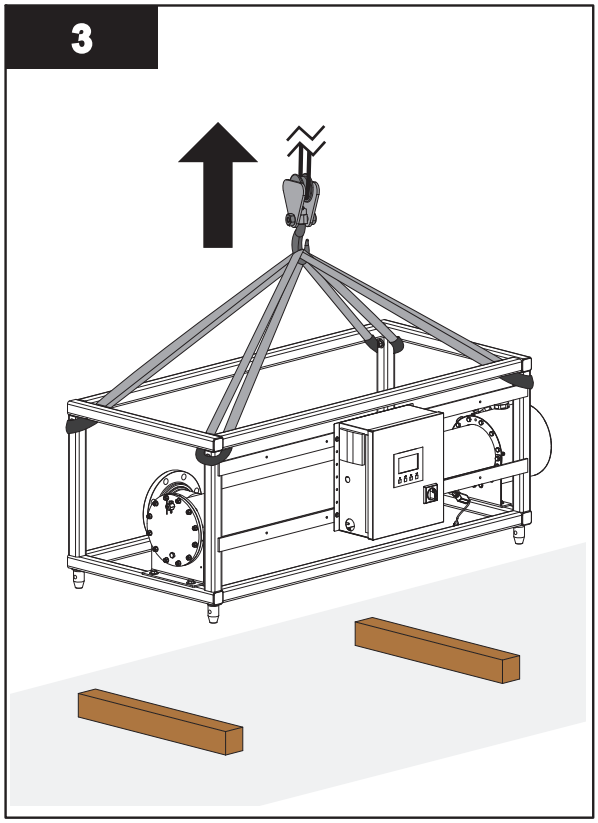
- Anchoring hardware (by others)
- Skid Mounting and Assembly Hardware (provided)
- Shims, if required (by others)

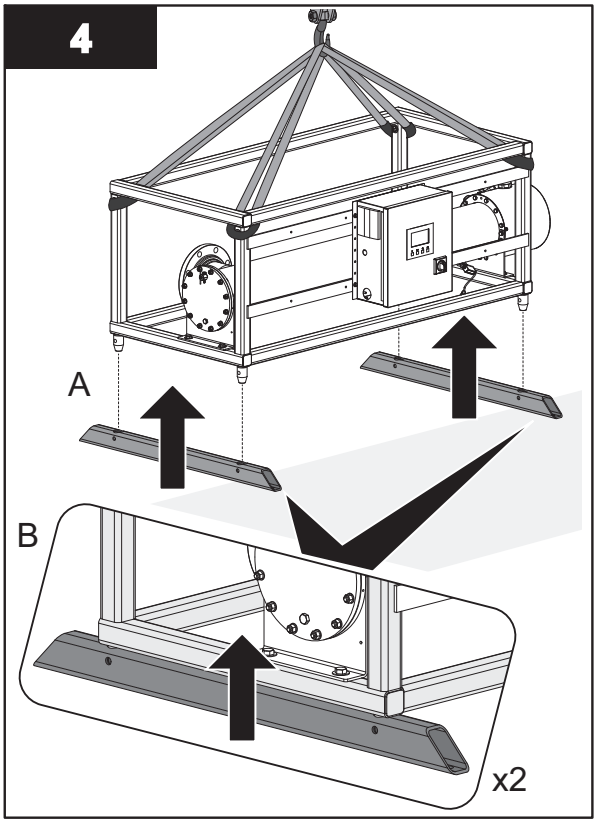
Procedure:

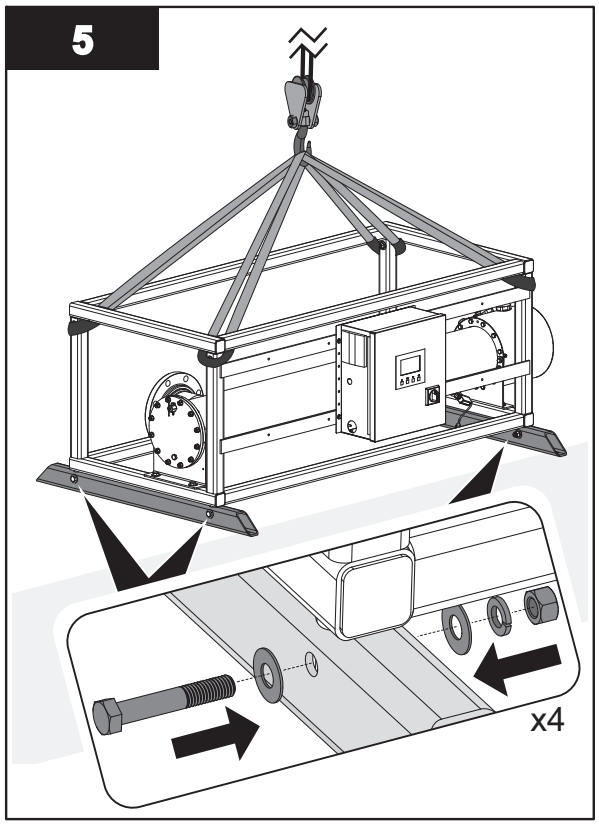


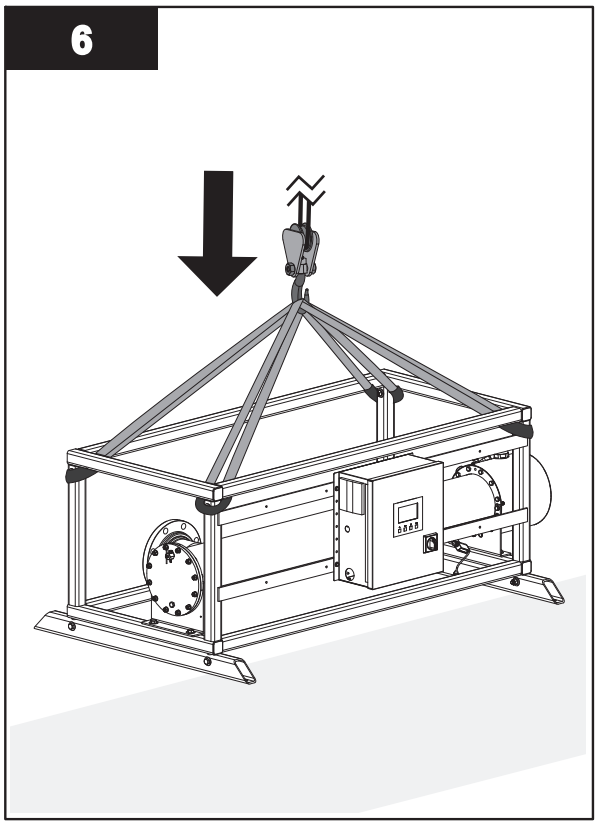


Notes: *1) Install lifting straps.*
2) Install and position strap protectors between the skid frame and the lifting straps to prevent the straps from tearing.

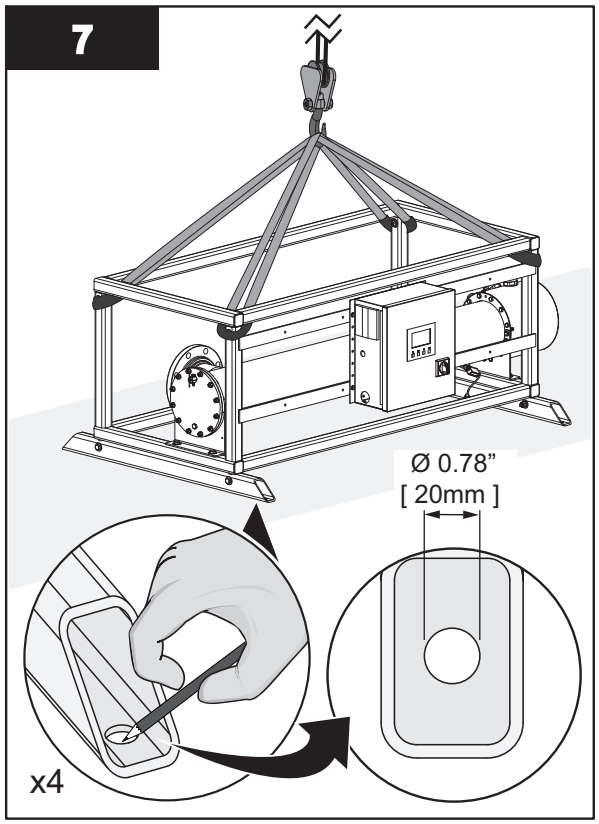


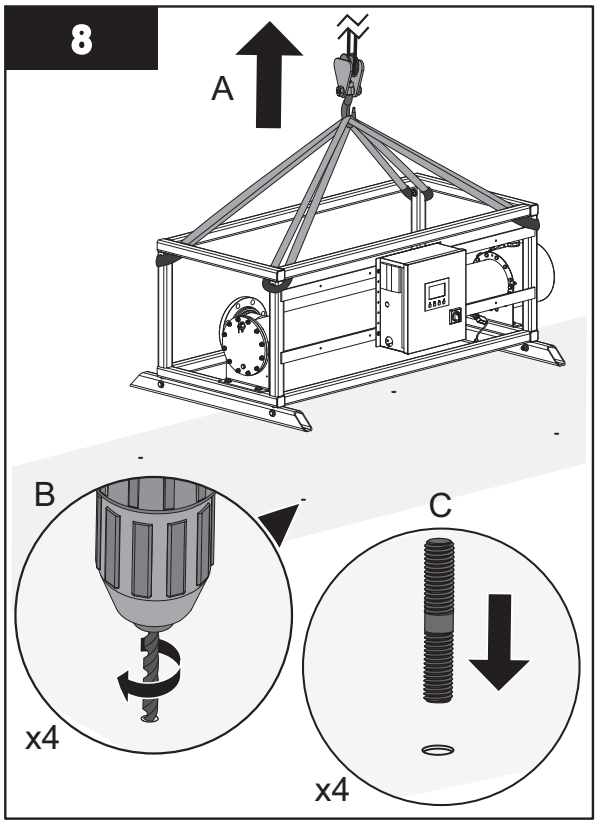




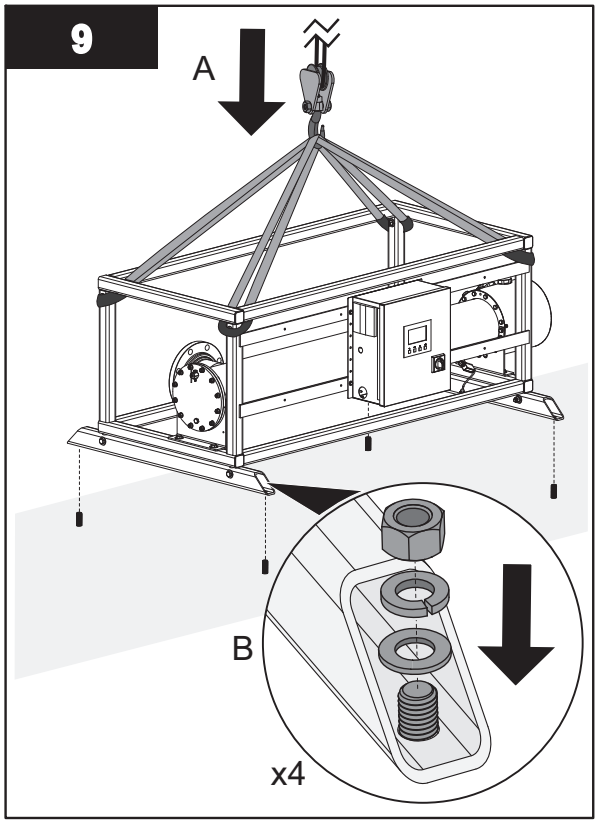


Note: *Move UV Chamber Skid to the final installation location.*



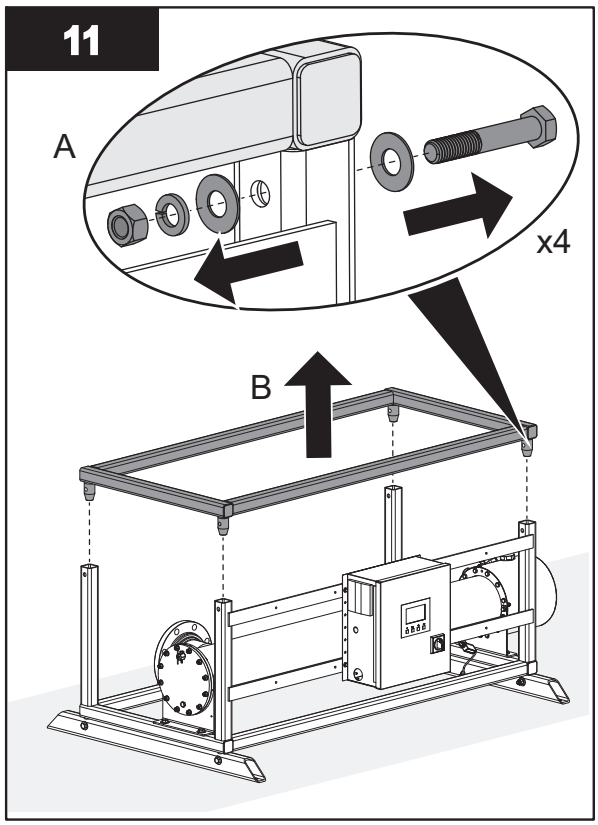


Note: *Temporarily move the UV Chamber Skid away from the work area.*



10. If a UV Chamber is:

- required to be stacked onto the base assembly, proceed to Step 11.
- not required to be stacked onto the base assembly, proceed to:
  - Section 7.3.5 for UV Chamber with ANSI Flanges.
  - Section 7.3.6 for UV Chamber with Sanitary Flanges.



Note: *Remove the Top Frame.*

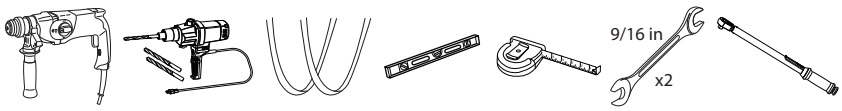
12. Go to Section 7.3.4.

7.3.3 Install a UV Chamber with High Profile Skid Base

Prerequisites:

- Clear area where the UV Chamber will be installed.

Tools:

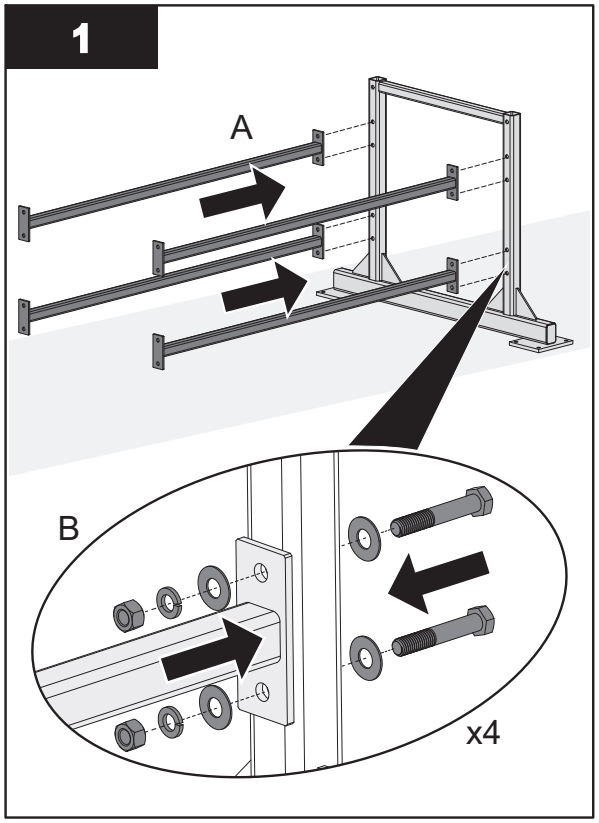


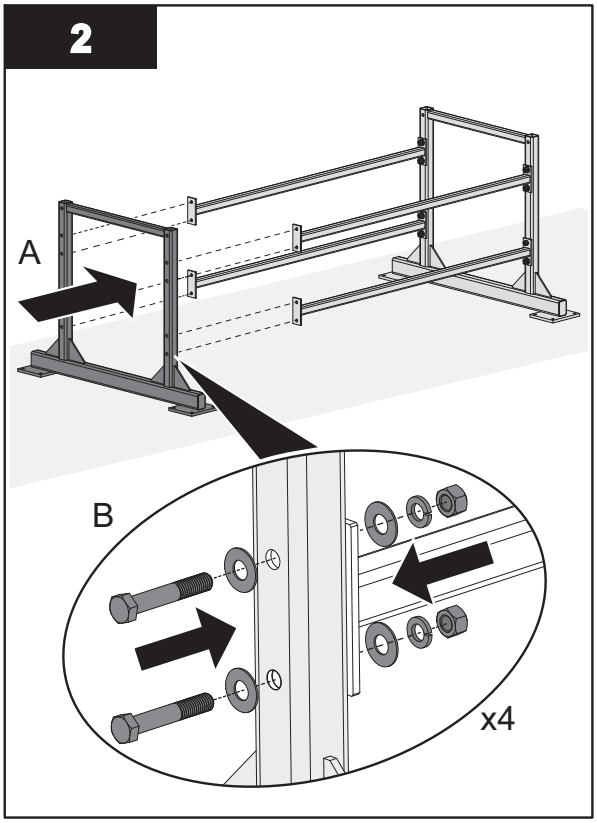
- Lifting Strap protective pads (x4) (by others)

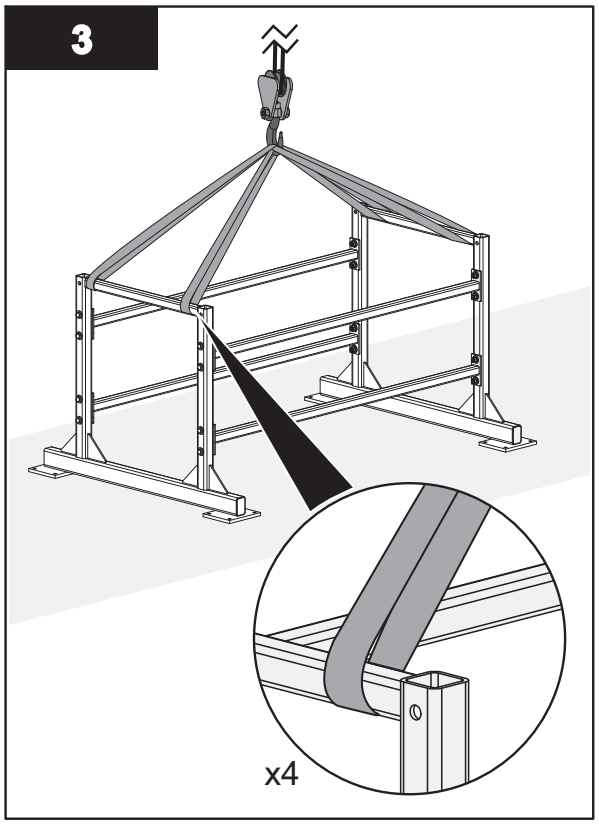
Materials:

- Anchoring hardware (by others)
- Skid Mounting and Assembly Hardware (provided)
- Shims, if required (by others)

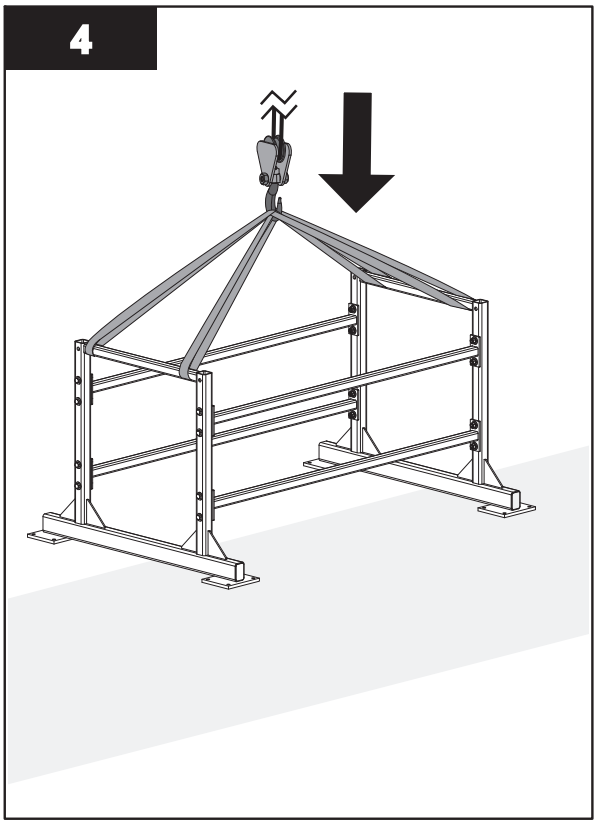
Procedure:



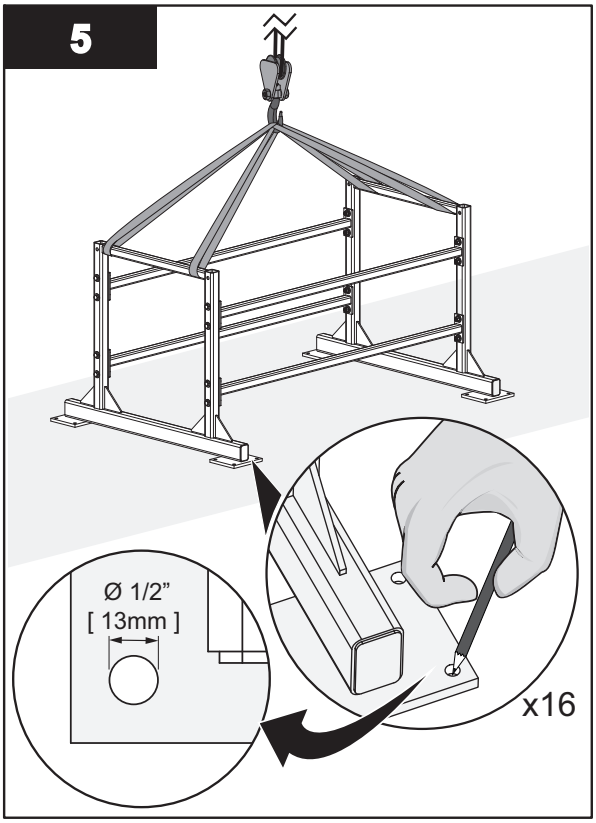


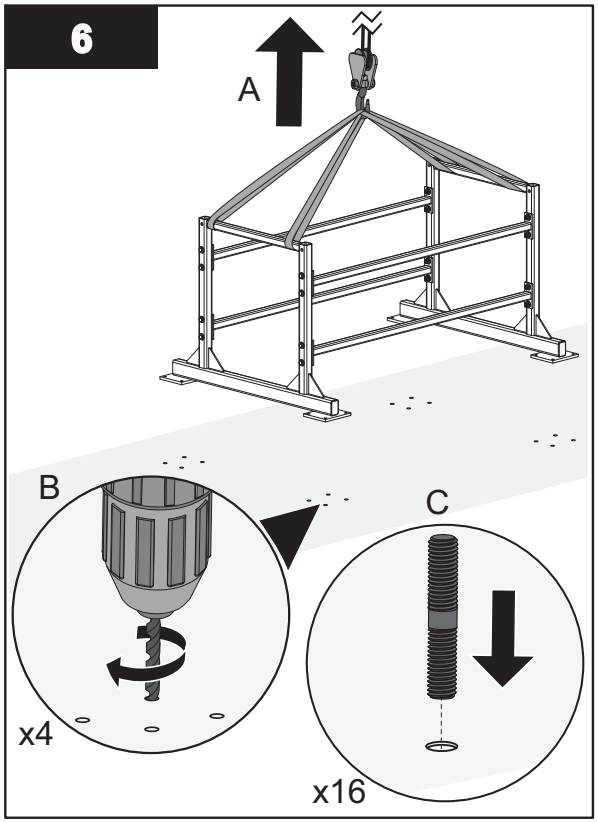


Note: *Install lifting straps.*

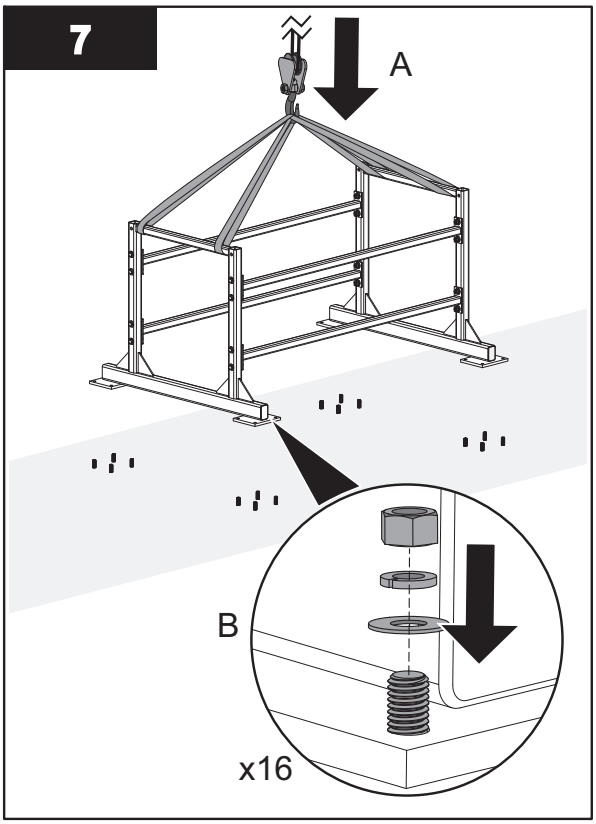


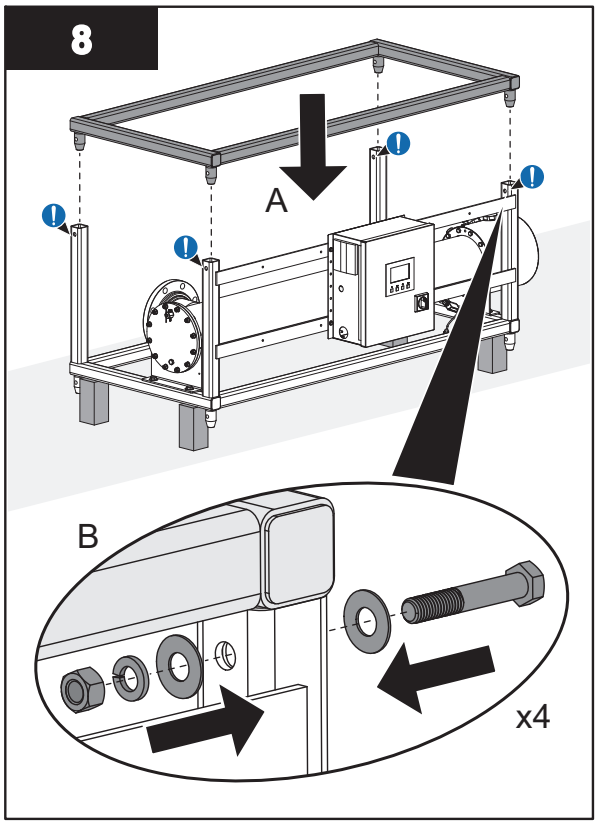
Note: *Move the skid to the final installation location.*

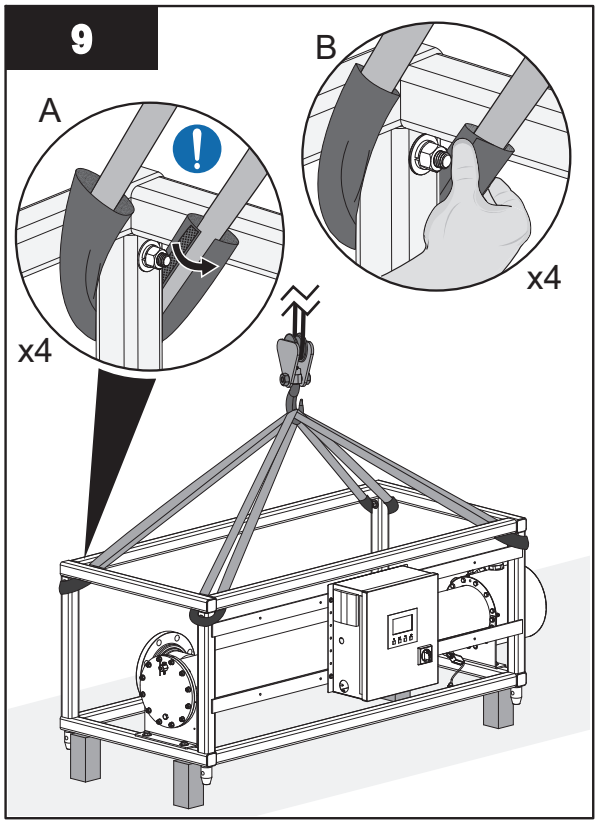


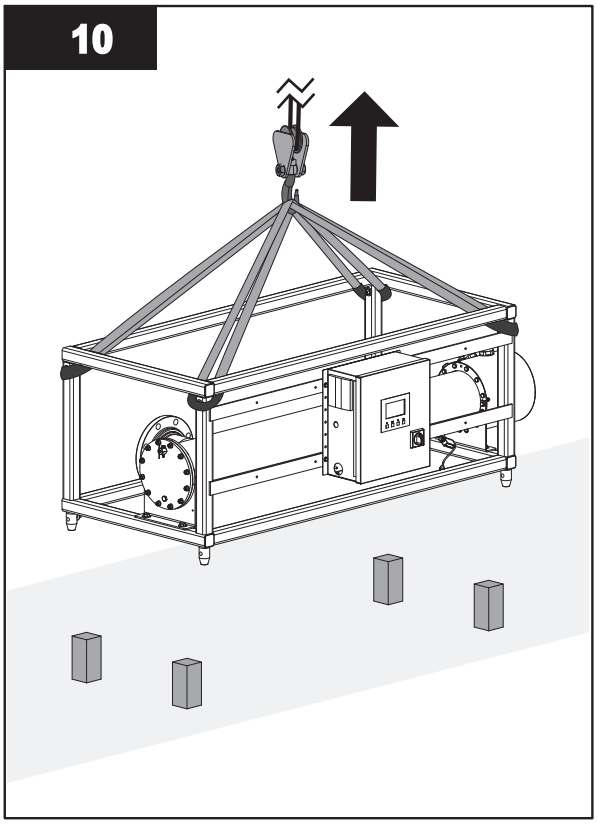


Note: *Temporarily move the skid away from the work area.*



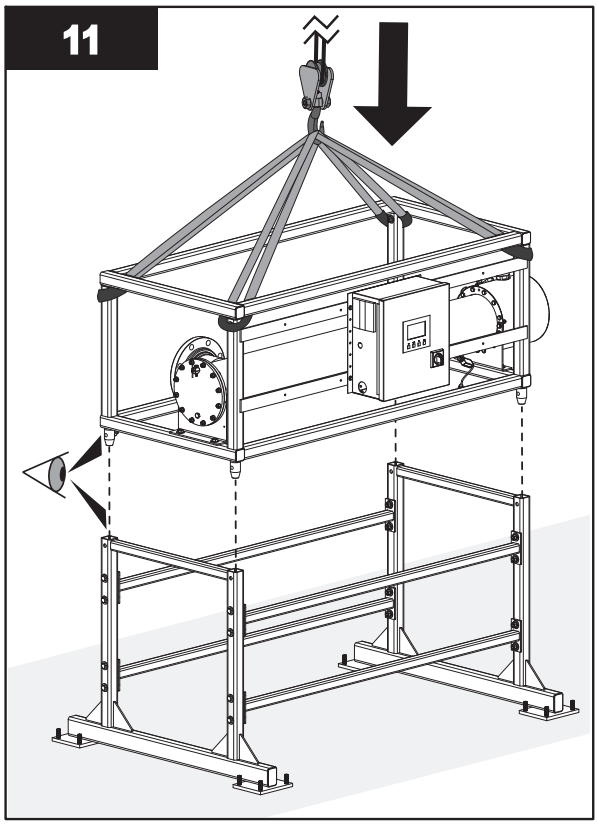


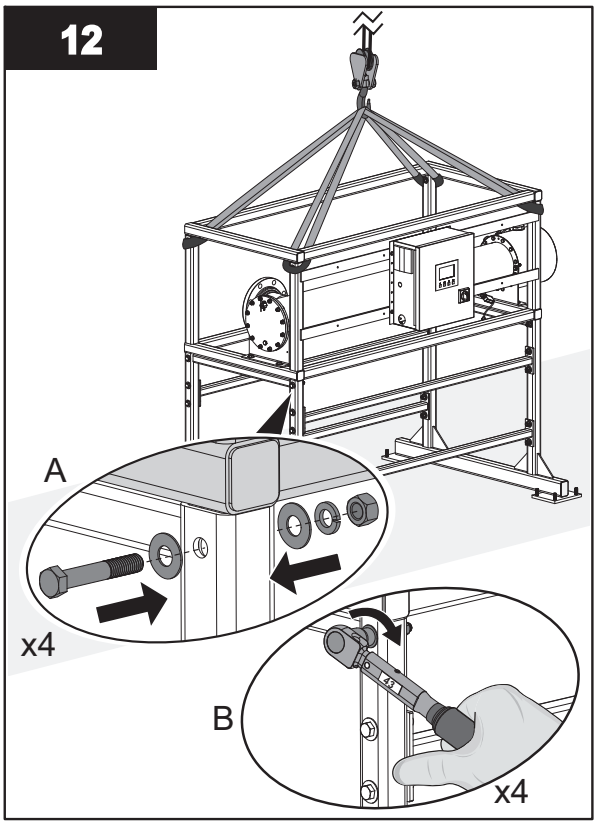




Notes: *1) Install lifting straps.*
2) Install and position strap protectors between the skid frame and the lifting straps to prevent the straps from tearing.

Note: *Move UV Chamber Skid to the final installation location.*

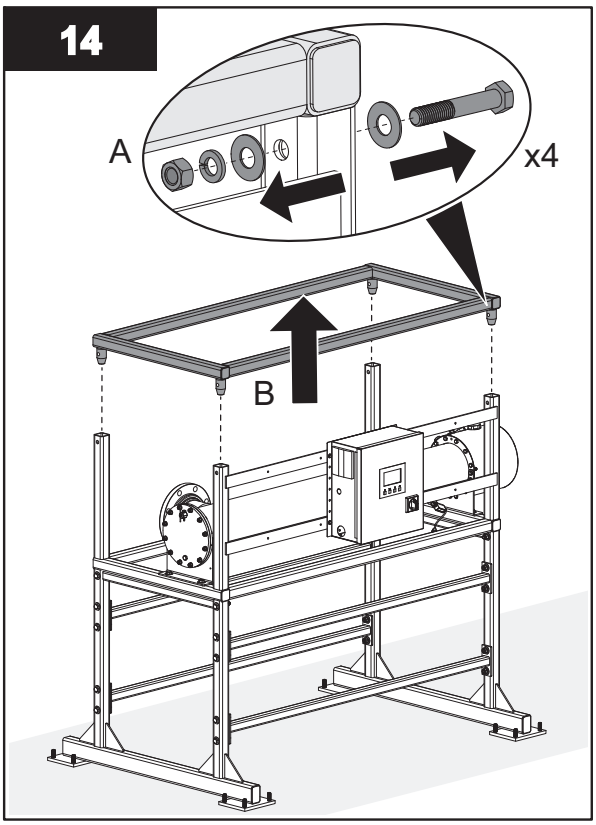




Note: *Torque the bolts to 58.3 N.m (43 lbf.ft).*

13. If a UV Chamber is:

- required to be stacked onto the base assembly, proceed to Step 14.
- not required to be stacked onto the base assembly, proceed to:
  - Section 7.3.5 for UV Chamber with ANSI Flanges.
  - Section 7.3.6 for UV Chamber with Sanitary Flanges.



Note: *Remove the Top Frame.*

15. Go to Section 7.3.4.

7.3.4 Install a Stacked UV Chamber

Refer to Figure 6 to Figure 9 to determine the UV Chamber stacking arrangement for the provided system. UV Systems that have a UV Chamber diameter of ≤ 8 inches and use a large CPP must be assembled as shown in Figure 7.

Note: *The type of Skid Base does not affect the arrangement of the UV Chamber Skids.*

UV Chamber Diameter : 8 Inches or less

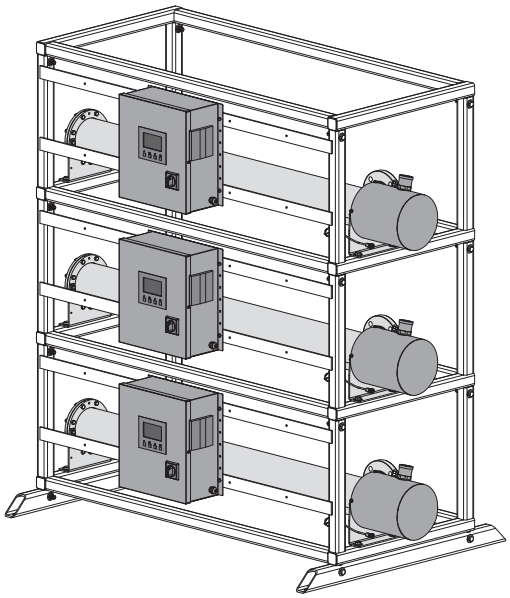


Figure 6 Skid Assembly With Small/Medium CPP

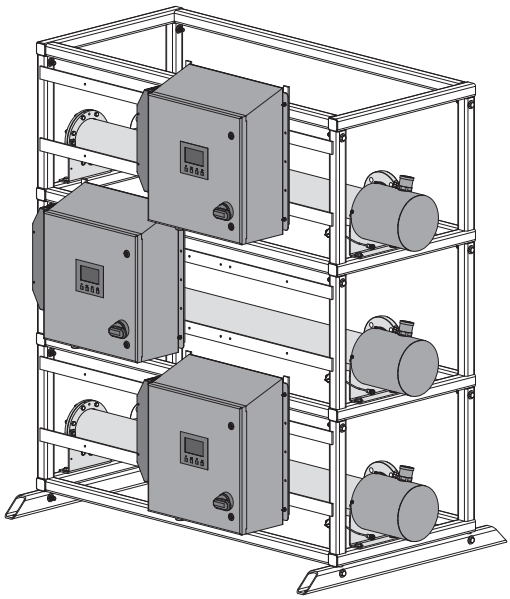


Figure 7 Skid Assembly With Large CPP

UV Chamber Diameter : 10 Inches or greater

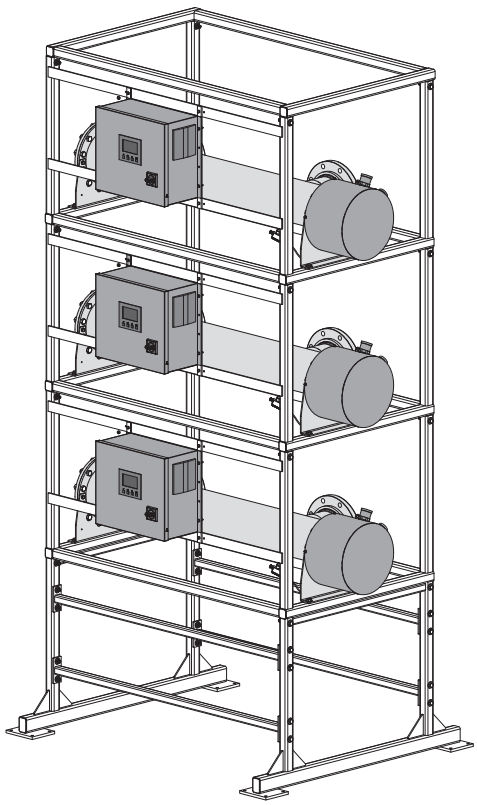


Figure 8 Skid Assembly with Medium CPP

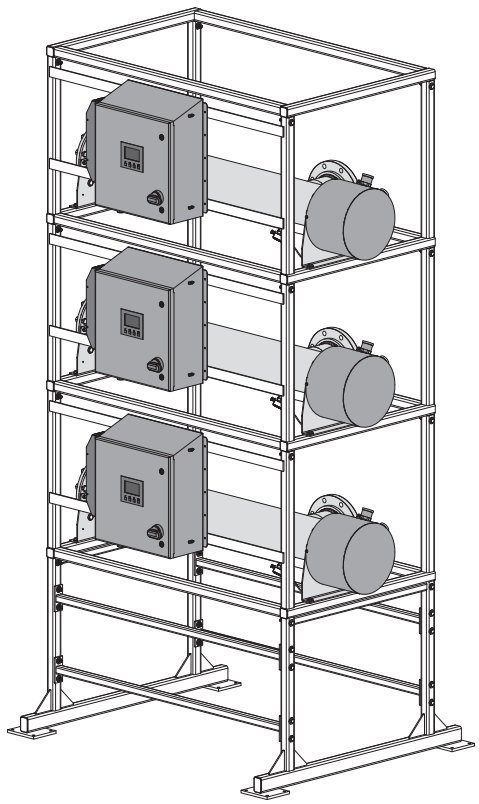


Figure 9 Skid Assembly With Large CPP

Prerequisites:

- Install a UV Chamber with a Low Profile Skid Base. Refer to Section 7.3.2.

  OR

- Install a UV Chamber with a High Profile Skid Base. Refer to Section 7.3.3.

Note: *The procedure below shows the Stacked UV Chamber installed on a Low Profile Skid Base for illustration purposes, the procedure will be the same for a High Profile Skid Base.*

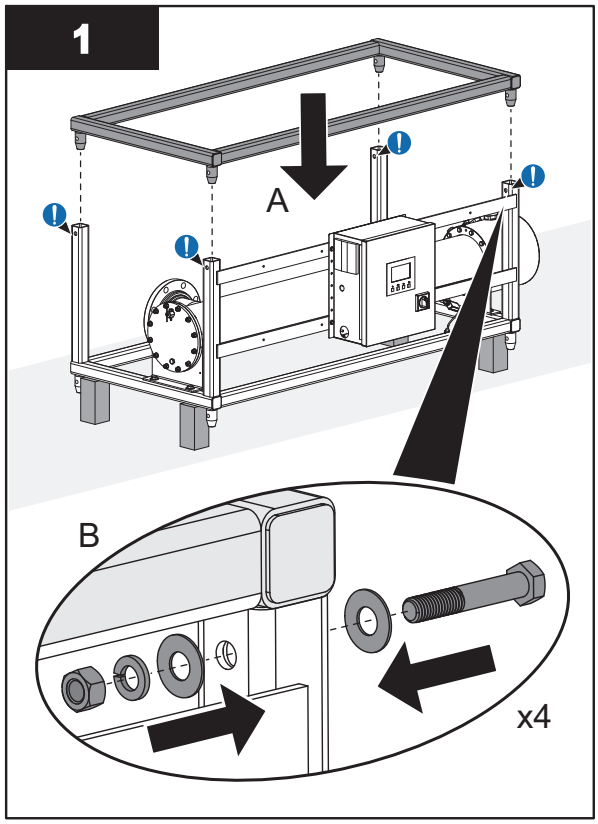
Tools:

- Lifting Strap protective pads (x4) (by others)

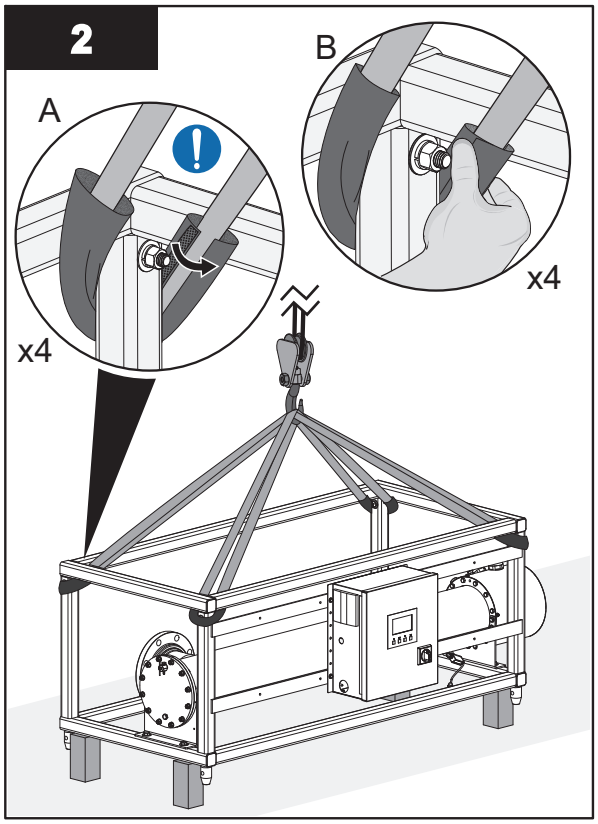
Materials:

- Skid Mounting and Assembly Hardware (provided)
- Shims, if required (by others)

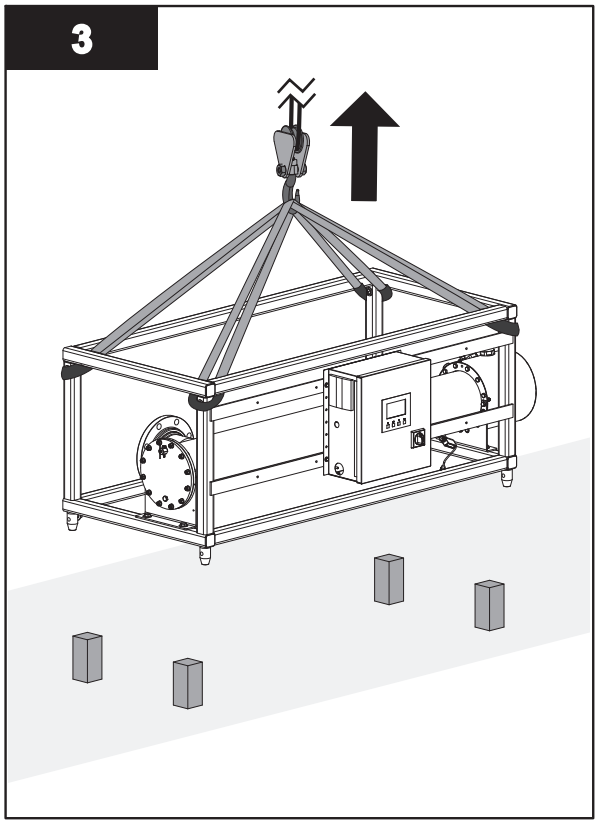
Procedure:

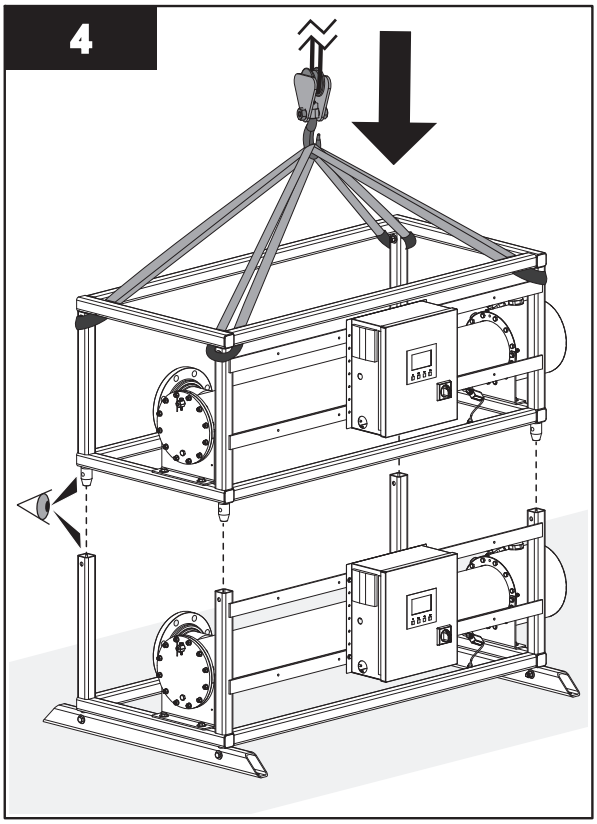


Note: *Install the removed Top Frame onto the UV Chamber Skid to be stacked.*

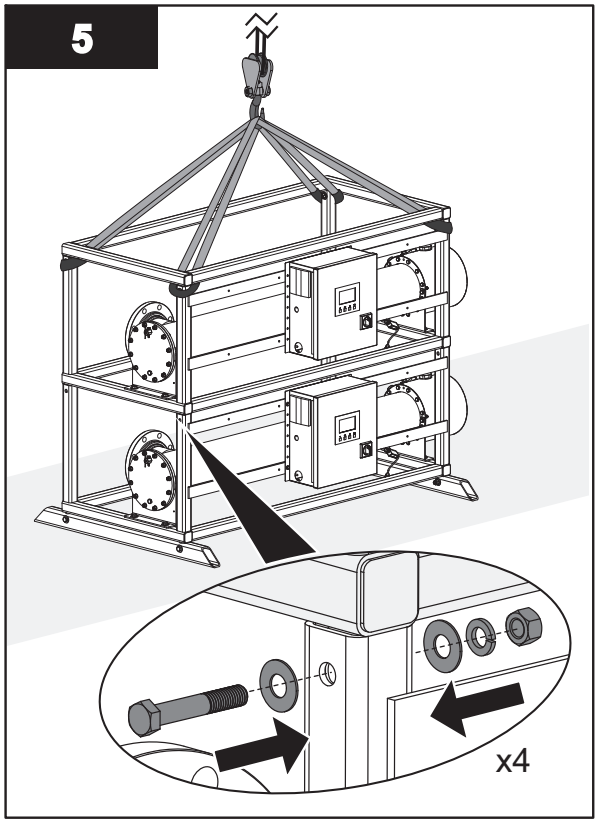


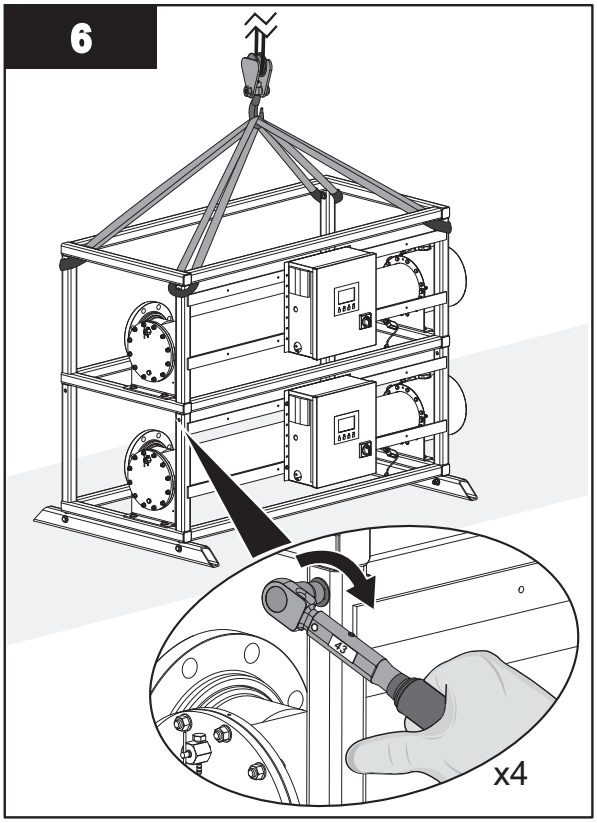
Notes: *1) Install lifting straps.*
2) Install and position strap protectors between the skid frame and the lifting straps to prevent the straps from tearing.





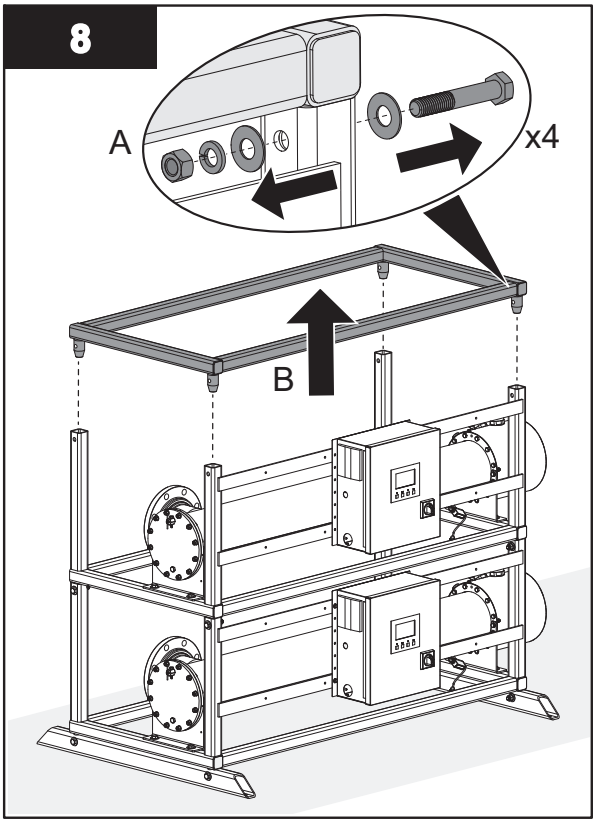
Note: *Move UV Chamber Skid to the final installation location.*





Note: *Torque the bolts to 58.3 N.m (43 lbf.ft).*

7. If there are:
   - additional UV Chambers to be stacked, proceed to Step 8.
   - no additional UV Chambers to be stacked, proceed to:
     - Section 7.3.5 for UV Chamber with ANSI Flanges.
     - Section 7.3.6 for UV Chamber with Sanitary Flanges.



Note: *Remove the Top Frame.*

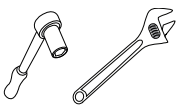
9. Repeat steps 1 to 6 in this procedure.

7.3.5 Connect Inlet and Outlet Process Piping to the UV Chamber (ANSI Flanges)

Prerequisites:

- Install the UV Chamber(s).
- Clean and inspect inlet and outlet connections for any damage (i.e. scratches, nicks, gouges and burrs).

Tools:



Materials:

- Bolts and hardware (by others)
- Gaskets x 2 (by others)

Procedure:

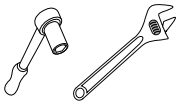
1. Install gasket on UV Chamber inlet connection.
2. Apply anti-seize lubricant and install bolts.
3. Tighten bolts to bolt manufacturers torque recommendation.
4. Repeats steps 1-3 for the UV Chamber outlet connection.

7.3.6 Connect Inlet and Outlet Process Piping to the UV Chamber (Sanitary Fitting)

Prerequisites:

- Install the UV Chamber(s).
- Clean and inspect inlet and outlet connections for any damage (i.e. scratches, nicks, gouges and burrs).

Tools:



Materials:

- Sanitary Flange Clamps (by others)

Procedure:

1. Loosely install the sanitary clamp on the UV Chamber inlet flange to the plant inlet supply piping.

   Note: *The UV Chamber will not bear the load of process piping or other equipment. Make sure all piping is properly supported independent of the UV Chamber.*

2. Repeat step 1 for the outlet piping.
3. Level the UV Chamber from front to back.

   Note: *The UV Chamber must be installed such that it remains full of process fluid at all times during operation and must be mounted level to ensure it drains properly when service is required.*

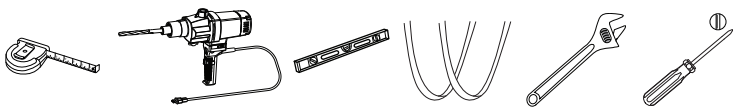
4. Secure the sanitary clamp and torque to the manufacturer's specifications.

7.4 Control Power Panel

Prerequisites:

- Clear area where CPP will be installed.

Tools:



Materials:

- If Wall Mounted: Mounting hardware (by others)
- If UV Chamber Mounted: Mounting Hardware (provided)

Procedure:

The CPP may be installed either:

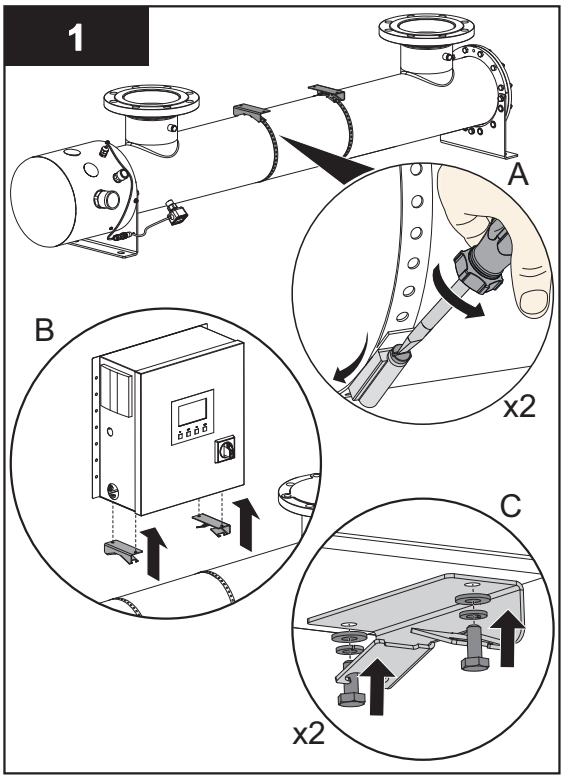
- On top of the UV Chamber (maximum 8 UV Lamp Systems only)
- In front of the UV Chamber (maximum 4 UV Lamp Systems only)
- Remote from the UV Chamber (all systems)
- Mounted on a Skid Frame

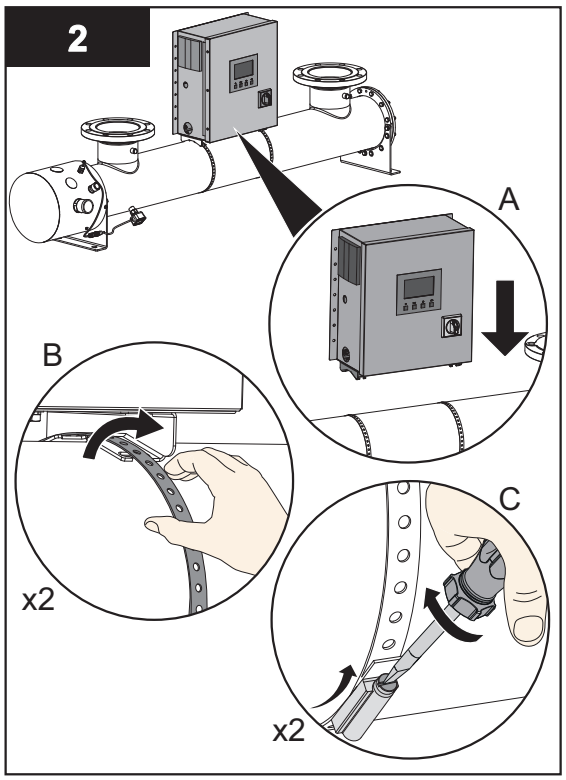
Note: *Skid mounted CPP's will be shipped mounted to the skid. Skip this procedure and proceed to Section 7.4.1.*

Refer to Section 3.4.2 for example on mounting locations.

Follow the appropriate installation instruction below.

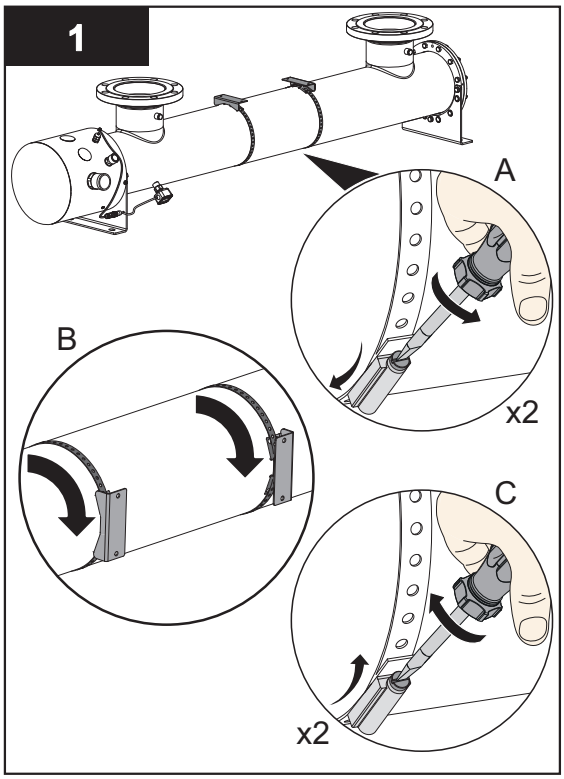
Mounting CPP: Top

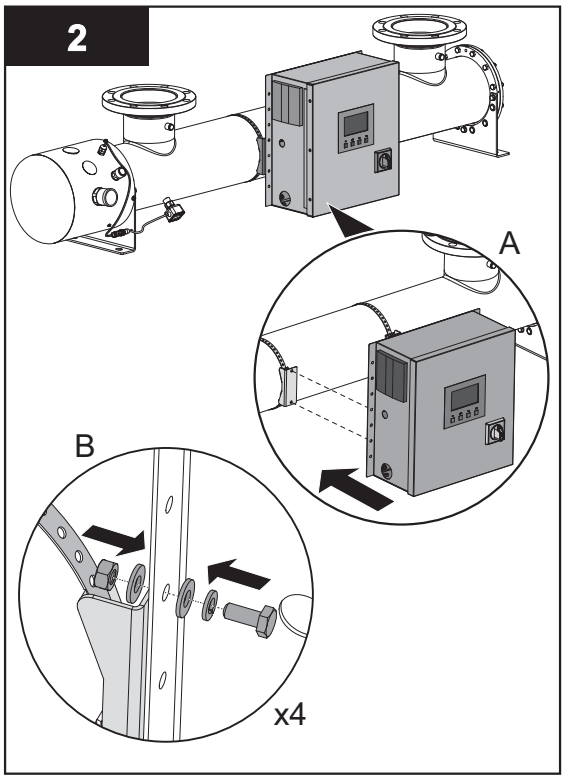




Note: *Level the CPP front to back.*

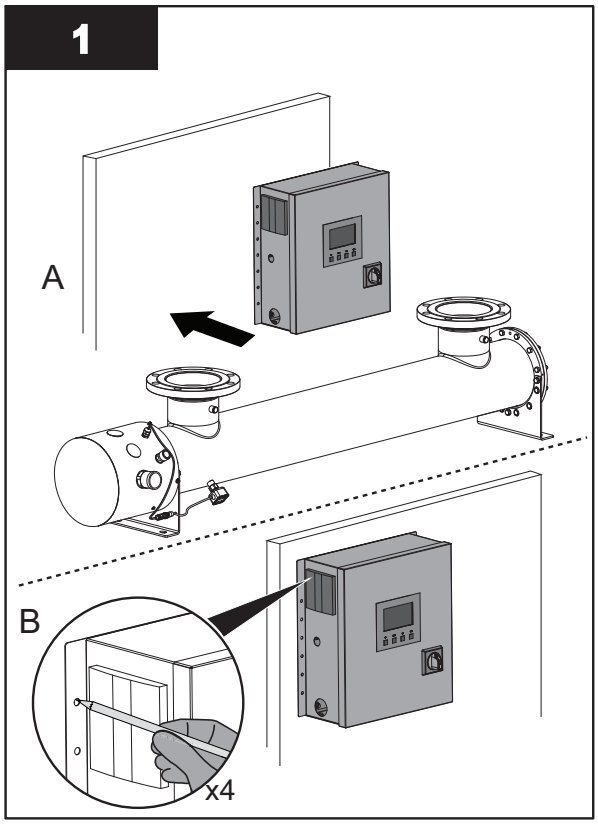
Mounting CPP: Front

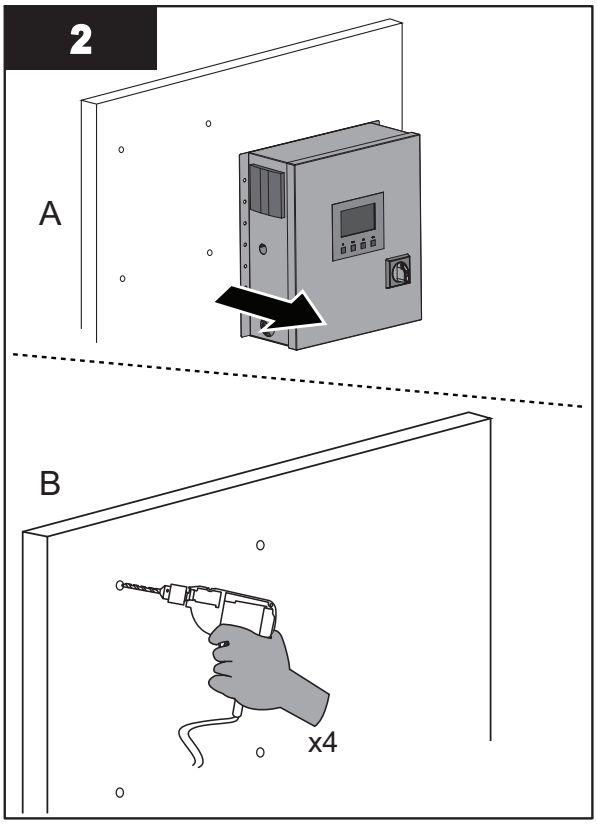


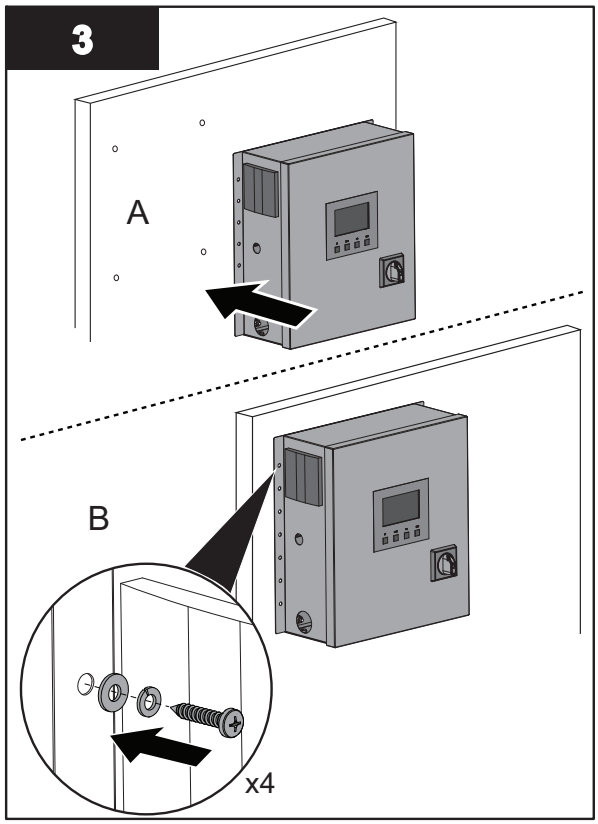


Note: *Level the CPP top to bottom.*

Mounting CPP: Remote







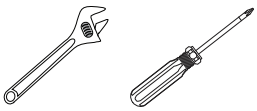
Note: *Level the CPP top to bottom and front to back.*

7.4.1 Electrical Connections

Prerequisites:

- Apply lockout tag out devices as necessary. Refer to Section 4.
- Install the UV Chamber(s) - with or without skid. Refer to Section 7.3.
- Install the CPP (for standalone CPP only). Refer to Section 7.4.
- Remove the Service End Cap. Refer to Section 9.5.

Tools:



Materials:

- Cable conduit (by others)
- Electrical Drawings (supplied with the system)
- Strain Relief – for incoming power (by others)

Procedure:

1. Connect the Lamp Cables to the CPP. The individual lamp connectors are numbered with wire tags for convenient connection; match these numbers to their corresponding number on the UV Chamber end plate. Refer to Electrical Wiring Diagrams for termination points.
2. There are four (4) mounting points (as shown in Figure 10) for the temperature switch and conduit grounding. The top most mounting point should be used for the temperature switch. Refer to Electrical Wiring Diagrams for termination points.

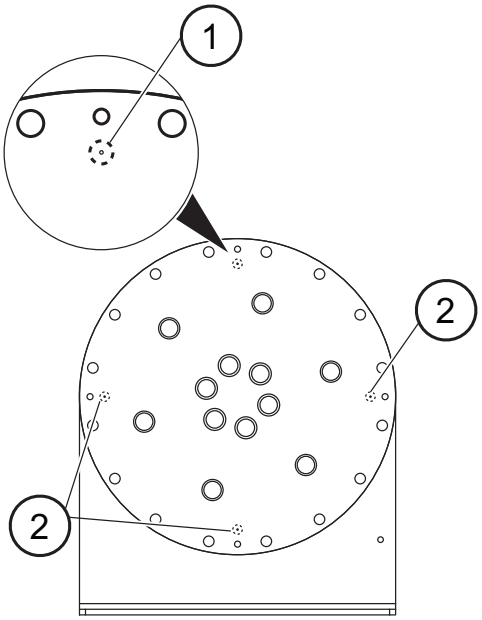


Figure 10 Temperature and Ground Wire Connections

1	Mounting Point reserved for Temperature Switch	**2**	Mounting Point reserved for Ground Wire

3. Route and terminate AC power to the CPP (Figure 11), matching voltage and power specifications on the serial label of the system. Refer to the wiring diagram to match wire tag numbers.

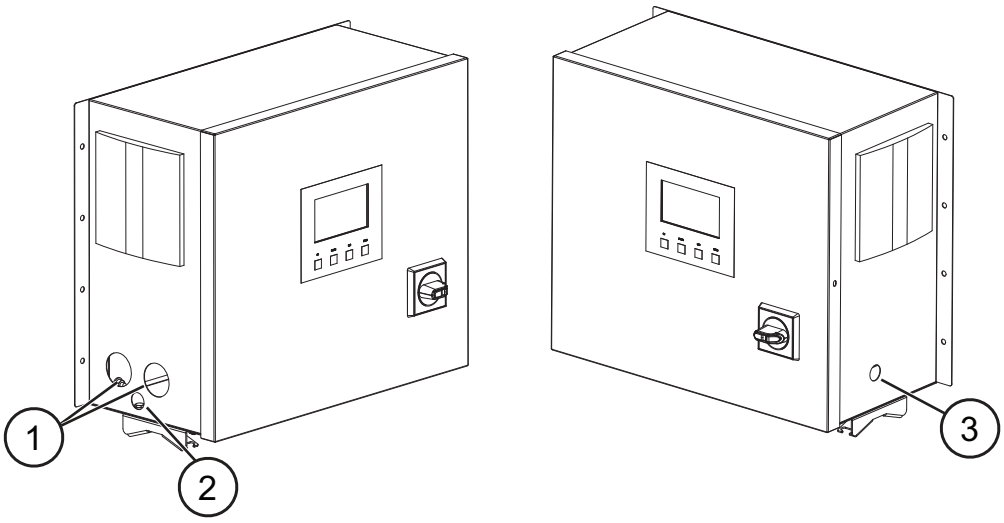


Figure 11 CPP Wiring

1	Cutout for Lamp Cable Conduit (i.e. Lamp, Instrumentation) [Ø 1.75" (44.5mm)]	**3**	Cutout for Incoming Power Wires [Ø 0.85" (21.6mm)]
2	Cutout for Instrument Wiring (i.e. Temperature, UVI) [Ø 0.88" (22.4mm)]		

Notes: *1) All openings created on the cabinets MUST be filled with equipment marked with the same type rating as the enclosure.*

2) CPP shown for representative purposes only, CPP appearance may vary depending on system size and enclosure type rating requirements.

4. Complete Hydrostatic Test. Refer to Section 7.5.

7.4.2 For all Voltages

1. Control wiring should reference appropriate wiring diagram. Control wiring is based upon customer requirements and installed options. Should your requirements differ, contact your local Aquafine representative or Aquafine Customer Service.

   Note: *UV performance is line voltage sensitive. Line voltage should be ±10% of the rating on the electrical nameplate. Voltage outside of these limits will affect the performance of the UV equipment.*

7.5 Hydrostatic Test

Prerequisites:

- Complete Electrical Connections. Refer to Section 7.4.1.
- Remove UV Lamps (if installed). Refer to Section 9.6.2.
- Inspect condition of sleeves for visible cracks or damage. Replace if necessary.
- Make sure the drain valve is closed.

Materials:

Procedure:

1. Fill the UV Chamber with process fluid.
   a. Stand off to the side and make sure the area is clear of all plant personnel.
   b. Pressurize the UV Chamber. Refer to Section 9.4.
   c. Check for leaks.
   d. Wait twenty minutes.
2. If leaks are found:
   a. Depressurize and drain the UV Chamber. Refer to Section 9.3.
   b. Fix the leaks.
   c. Fill the UV Chamber and do a pressure test. Check for leaks.
3. If there are no leaks, depressurize the UV Chamber. Refer to Section 9.3.
4. Install the UV Lamps. Refer to Section 9.6.2.
5. Install the Service End Cap. Refer to Section 9.5.

DANGER

Obey all warning and caution statements. Refer to Section 2.

Read and understand this manual before operating this equipment. Read all user documentation before performing operations, inspections, repair, or maintenance on this equipment.

Only competent personnel should undertake operation, repairs, maintenance, or servicing of equipment described in this section of the manual. If you do not understand the information or procedure explanations in this manual, STOP and contact your Service Provider for assistance.

NOTICE

The Microprocessor user interface screens on the CPP vary with the system configuration. The screens described in this section of the manual may not be the same as the screens shown on the CPP.

8.1 User Interface

The microprocessor user interface (Figure 12) on the CPP is a HMI display that is programmed with custom screens.

The Microprocessor user interface has two levels of user access: operator-level and technician-level. A user with operator-level access cannot view all the screens that a user with technician-level access can. Operator level requires no log in or password and is the default level.

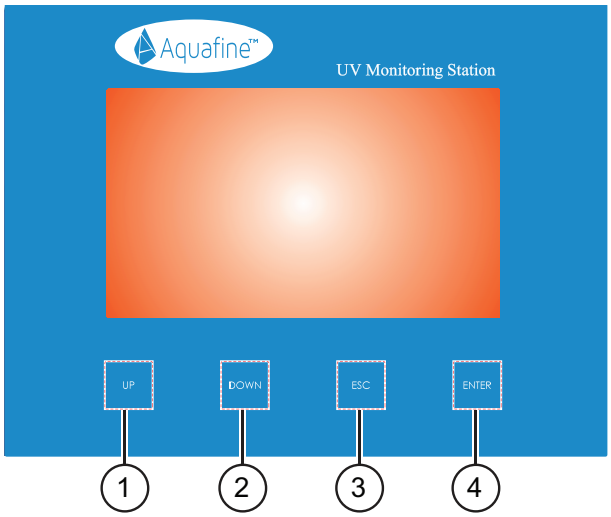


Figure 12 Microprocessor Interface

1	UP Button	**2**	DOWN Button
3	ESC - Escape Button	**4**	ENTER Button

8.1.1 Navigate between screens:

1. Use the UP/DOWN (Figure 12) keys to scroll to the required navigation button → ENTER.
2. The Login Screen will display → Input User password (Section 8.3).
3. Press ESC to exit.

8.1.2 To return to the Main Screen from any screen:

1. Press ESC.

8.2 Main Screen

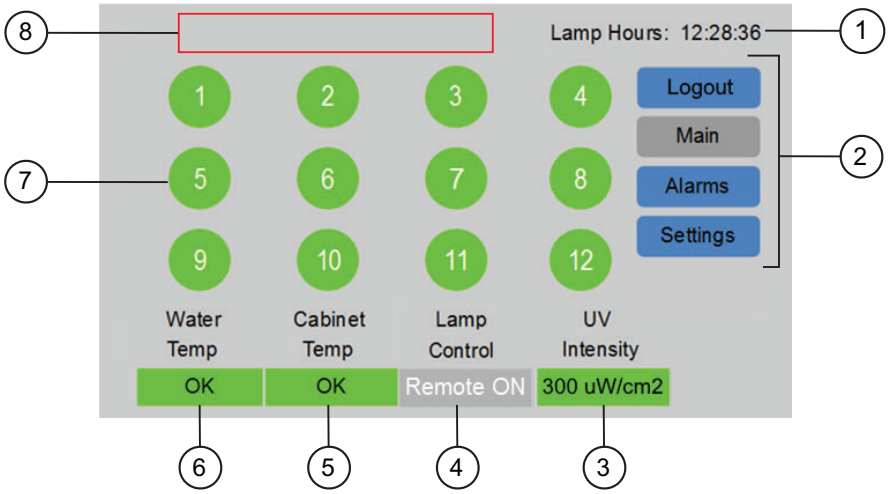


Figure 13 Main Screen

Item		Description	Display Options
1	Lamp Hours	Displays UV Lamp runtime	Hours: minutes: seconds
2	Navigation Bar	The Navigation Screen allows the user to navigate between the different sections of the HMI application.	Refer to Section 8.2.1.
3	UV Intensity	Displays the UV Intensity measured by the sensor in uW/cm^2 or %. ***Note:*** *Only displayed when the system is configured for UV Monitoring Mode.*	• **uW/cm^2** - Displays the UVI Sensor reading. • **%** - Displays the relative UVI Sensor reading as a percentage of the UV Intensity 100% value.
4	Control Mode	Displays the Control Mode	**Control Mode**: • **Local ON** - Lamp(s) is controlled locally and is in ON mode. • **Local OFF** - Lamp(s) is controlled locally and is in OFF mode. • **Remote ON** - Lamp(s) is controlled remotely and is in ON mode. • **Remote OFF** - Lamp(s) is controlled remotely and is in OFF mode.
5	Cabinet Temperature	Displays the status of the Cabinet Temperature.	**OK** - The cabinet temperature is within design range.
			OverTemp - The cabinet temperature has exceeded design range.
6	Water Temperature	Displays the status of the UV Chamber Temperature	**OK** - The UV Chamber temperature is within design range.
			OverTemp - The UV Chamber temperature has exceeded design range.
7	Individual Lamp Status	The lamp circle changes color based on the status of the UV Lamp.	Refer to Section 8.2.2.

Item		Description	Display Options
8	Alarm Display	Displays current active alarms. ***Notes:*** *1) If multiple alarms occur at the same time, each alarm will display for one second before displaying the next. If an alarm is not present, information will not be displayed.* *2) Alarm text will be visible on every screen.*	**Water Temp High** - Water temperature reading is greater than the maximum temperature alarm setpoint.
			Cabinet Temp High - Cabinet temperature reading is greater than the maximum temperature alarm setpoint.
			UVI Low - UV Intensity is lower than the UVI Low alarm setpoint
			Lamp Out Alert - A UV Lamp needs to be replaced
			Lamp Expire Soon - A UV Lamp runtime hours is approaching the maximum hours.
			Lamp Expired - UV Lamp runtime hours has exceed the maximum hours.

8.2.1 Navigation Bar

Unselected Button	Selected Button	Screen	Description	Refer to:
Login	Login	Login	Users must login to access the Settings Screen. The Login button toggles to Logout when a user is currently logged in.	Section 8.3
Logout	Logout	--	The Login button toggles to Logout when a user is currently logged in. ***Note:*** *Make sure to log out before leaving the HMI.*	--
Main	Main	Main	The Main Screen is designed to provide key system operation information.	Section 8.2
Alarms	Alarms	Alarms	The Alarm Screen shows the fifteen (15) most recent alarms in the order they occurred, older alarms will be overwritten when the buffer is full. The Alarm Screen displays the time and alarm information.	Section 8.5
Settings	Settings	Settings	The user must be logged in at User level to access the Settings Screens. Select the white text boxes to enter new setting values. The Settings Screen has two (2) available modes, Basic Unit and UV Monitoring. The information displayed on the Settings Screen varies based on mode type used. The mode type used is site dependent.	Section 8.4

8.2.2 Individual Lamp Status

The circles represent the UV Lamps and are named according to the label designation on the physical lamp. The lamp circle changes color based on the status of the UV Lamp.

Icon	Icon Color	Description
	Green	UV Lamp is ON and is healthy.
	Red	UV Lamp has failed.
	Yellow	UV Lamp has exceeded maximum runtime hours or it will soon reach the maximum runtime hours.
	Black	UV Lamp is OFF.

Note: *During startup, UV Lamps require a one (1) minute warm up period to allow the UV intensity and UV Lamp to reach optimal conditions. Alarms indications may occur.*

8.3 Login Screen

Selecting the LOGIN button on the Main Screen will bring up the Login Screen which allows the user to change the user access level.

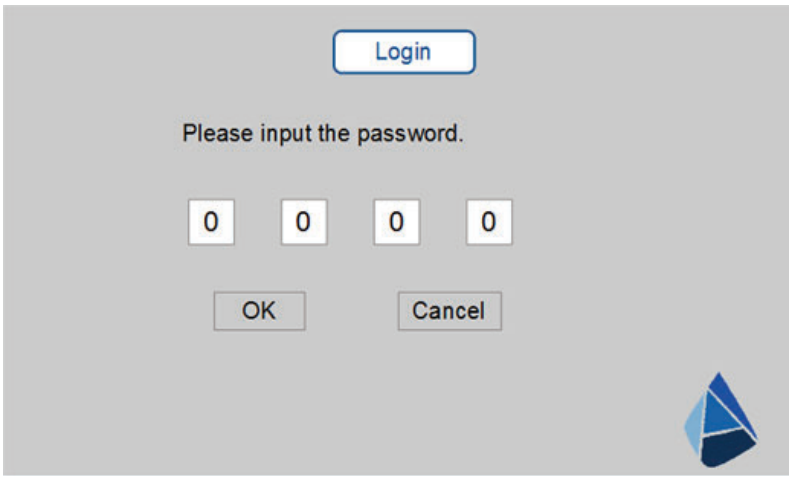


Figure 14 Login Screen

Table 2 Display Screen Visibility and Access

		Screen		
Access Level	**Password**	**Main**	**Alarms**	**Settings**
No Login	n/a	Read Only		No Access
User	1234	Read Only	Full Access	

8.3.1 Login:

1. Main Screen → Use the ‘UP’ button on the keypad to navigate to the Login Screen. Press ENTER.
2. Login Screen:
   a. Press the ‘UP’ button on the keypad to navigate to the '0', starting from left to right.
   b. Press ‘ENTER’ to activate the '0'.

      Note: *A green outline around the entry box indicates that the box is active.*

   c. Press the ‘UP’ button on the keypad to enter the first number of the login password (i.e. 1).
   d. Press the ‘ESC’ button on the keypad to activate the change.
   e. Press the ‘DOWN’ button on the keypad to move to the right.
   f. Repeat steps b – e for the remaining digits.
   g. Press the UP/DOWN buttons to navigate to the ‘OK’ button.
   h. After all password digits have been entered, press the ‘ENTER’ button on the keypad. Full access to the Alarms and Settings Screens will be available.

8.3.2 Logout:

1. Main Screen → Use the ‘UP’ button on the keypad to navigate to the Logout button.

8.4 Settings Screen

The user must be logged in at User level to access the Settings Screens. Select the white text boxes to enter new setting values.

The Settings Screen has two (2) available modes, Basic Unit and UV Monitoring. The information displayed on the Settings Screen varies based on mode type used. The mode type used is site dependent.

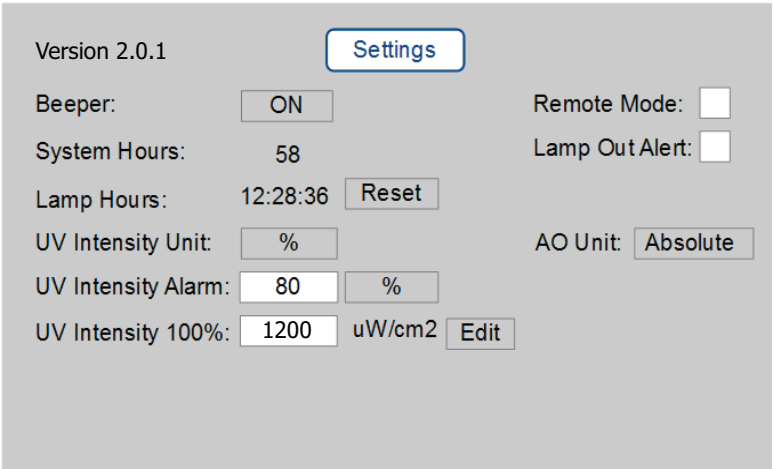


Figure 15 Settings Screen

Text Box	Modes Visible	Display Options	Refer to:
Beeper	Basic Unit & UV Monitoring	**ON** = Beeper will sound during active alarms. **OFF** = Beeper will not sound during active alarms.	Section 8.4.2
System Hours		Displays the total UV System runtime hours.	--
Lamp Hours		Displays the UV Lamp Runtime hours. Range 00:00:00 to 9999:59:59. Press the Reset button when new UV Lamps are installed.	Section 8.4.3

Text Box	Modes Visible	Display Options	Refer to:
Remote Mode	Basic Unit & UV Monitoring	**Checked** = Remote Mode is active **Unchecked** = Remote Mode is not active	Section 8.4.4
Lamp Out Alert		**Selected** = Lamp Out Alert Alarm is enabled **Not Selected** = Lamp Out Alert Alarm is disabled	Section 8.4.5
UV Intensity Unit*	UV Monitoring	**uW/cm^2** = Displays the UV Intensity value in absolute mode on the Main Screen. **%** = Displays the UV Intensity value in relative mode on the Main Screen ***Note:*** *Recommended default is % (i.e. relative mode).* **OFF** = The UV Intensity will not be displayed on the Main Screen.	Section 8.4.6
AO Unit*		**Absolute** = Analog output 4-20mA will display the UV Intensity reading as a range between 0-1200 uW/cm^2. **Relative** = Analog output 4-20mA will display UV Intensity reading as a range between 0 to +100%.	Section 8.4.7
UVI Intensity Alarm*		Maximum setpoint value. When the UV Intensity reading meets or exceeds this value, a UV Intensity Alarm will be triggered. **UV Intensity Alarm %** * **UV Intensity 100%** = **Alarm Threshold** (e.g. 0.8 * 1200 = 960 uW/cm^2).	Section 8.4.8
UV Intensity 100%*		Displays the UV intensity in uW/cm^2 for a new lamp. The UV Intensity 100% value is to be refreshed during a new UV Lamp installation. ***Note:*** *System should be operating under normal operating conditions (flow, temperature) with new lamps and clean quartz sleeves.* **Edit** = UV Intensity 100% value can be manually edited by the user. **Direct** = UV Intensity 100% value cannot be edited by the user; UVI Sensor measures the current UV Intensity 100% value for the system at the time of measurement. This value is recorded by the controller.	Section 8.4.9 Section 8.4.10

** Setting available on systems configured with the optional UVI Sensor only.*

8.4.1 Access the Settings Screen

1. Login with the User level Password (Section 8.3).
2. Press the 'UP' or the ‘DOWN' button on the keypad to move the cursor to the Settings Screen button.
3. Press the 'ENTER' button on the keypad to open the Settings Screen (Figure 15).

8.4.2 Turn the Alarm Beeper ON or OFF

Note: *The Alarm Beeper is an optional feature.*

1. Access the Settings Screen (Section 8.4.1).
2. Press the 'UP' or the 'DOWN' button on the keypad until the selection is on the Beeper 'ON' or 'OFF' tab.
3. Press the 'ENTER' button on the keypad to toggle between 'ON' or 'OFF' selections.
4. Press the 'UP' or the 'DOWN' button to navigate to another setting or press 'ESC' to return to the Main Screen.

8.4.3 Reset Lamp Hours

Note: *Reset Lamp Hours when all UV Lamps are replaced in a UV Chamber with new UV Lamps.*

1. Access the Settings Screen (Section 8.4.1).
2. Press the 'UP' or the 'DOWN' button on the keypad until the selection is on the Lamp Hours 'Reset' tab.
3. Press the 'ENTER' button on the keypad to reset the Lamp Runtime Hours to 00:00:00.
4. Press the 'UP' or the 'DOWN' button to navigate to another setting or press 'ESC' to return to the Main Screen.

8.4.4 Activate or Deactivate Remote Mode

1. Access the Settings Screen (Section 8.4.1).
2. Press the 'UP' or the 'DOWN' button on the keypad until the selection is on the 'Remote Mode' Entry Box.
3. Press the 'ENTER' button on the keypad to activate (i.e. checked) or deactivate (i.e. unchecked) Remote Mode.
4. Press the 'UP' or the 'DOWN' button to navigate to another setting or press 'ESC' to return to the Main Screen.

8.4.5 Activate or Deactivate the Lamp Out Alert

1. Access the Settings Screen (Section 8.4.1).
2. Press the 'UP' or the 'DOWN' button on the keypad until the selection is on the 'Lamp Out Alert' Entry Box.
3. Press the 'ENTER' button on the keypad to activate (i.e. checked) or deactivate (i.e. unchecked) Lamp Out Alerts.
4. Press the 'UP' or the 'DOWN' button to navigate to another setting or press 'ESC' to return to the Main Screen.

8.4.6 Change UV Intensity Display Units

1. Access the Settings Screen (Section 8.4.1).
2. Press the 'UP' or the 'DOWN' button on the keypad until the selection is on the 'UV Intensity Unit' value (i.e. %, uW/cm^2 or OFF).
3. Press the 'ENTER' button to toggle UV Intensity Unit values (i.e. %, uW/cm^2 or OFF).
4. Press the 'UP' or the 'DOWN' button to navigate to another setting or press 'ESC' to return to the Main Screen.

8.4.7 Change Analog Output (AO) Units

1. Access the Settings Screen (Section 8.4.1).
2. Press the 'UP' or the 'DOWN' button on the keypad until the selection is on the AO Unit 'Absolute' or 'Relative' tab.
3. Press the 'ENTER' button on the keypad to toggle between 'Absolute' or 'Relative' selections.
4. Press the 'UP' or the 'DOWN' button to navigate to another setting or press 'ESC' to return to the Main Screen.

8.4.8 Set the UV Intensity Alarm Setpoint

1. Access the Settings Screen (Section 8.4.1).
2. Press the 'UP' or the 'DOWN' button on the keypad until the selection is on the 'UV Intensity Alarm' entry box.
3. Press the 'ENTER' button to activate the entry box.

   Note: *A green outline around the entry box indicates that the box is active.*
4. Press the 'UP' or the 'DOWN' button to adjust the value up or down to the required %.

   Note: *Pressing up or down will result in the value increasing or decreasing in 1% increments.*
5. Press the 'ESC' button to deactivate the entry box.

   Note: *A red outline around the entry box indicates that box is deactivated.*
6. Press the 'UP' or the 'DOWN' button to navigate to another setting or press 'ESC' to return to the Main Screen.

8.4.9 Set the UV Intensity 100% Value (Edit Mode)

1. Access the Settings Screen (Section 8.4.1).
2. Press the 'UP' or the 'DOWN' button on the keypad until the selection is on the 'UV Intensity 100%' 'Direct' tab.
3. Press the 'ENTER' button on the keypad to toggle to the 'Edit' tab.
4. Press the 'UP' button on the keypad to move the selection to the UV Intensity 100% entry box.
5. Press the 'ENTER' button to activate the entry box.

   Note: *A green outline around the entry box indicates that the box is active.*
6. Press the 'UP' or the 'DOWN' button on the keypad to edit the UV Intensity 100% value.
7. Press the 'ESC' button on the keypad to deactivate the entry box.

   Note: *A red outline around the entry box indicates that box is deactivated.*
8. Press the 'UP' or the 'DOWN' button to navigate to another setting or press 'ESC' to return to the Main Screen.

8.4.10 Set the UV Intensity 100% Value (Direct Mode)

1. Access the Settings Screen (Section 8.4.1).
2. Press the 'UP' or the 'DOWN' button on the keypad until the selection is on the 'UV Intensity 100%' 'Edit' tab.
3. Press the 'ENTER' button on the keypad to toggle to the 'Direct' tab.
4. Press the 'UP' or the 'DOWN' button to navigate to another setting or press 'ESC' to return to the Main Screen.

8.5 Alarm Screen

The Alarm Screen shows the fifteen (15) most recent alarms in the order they occurred, older alarms will be overwritten when the buffer is full.

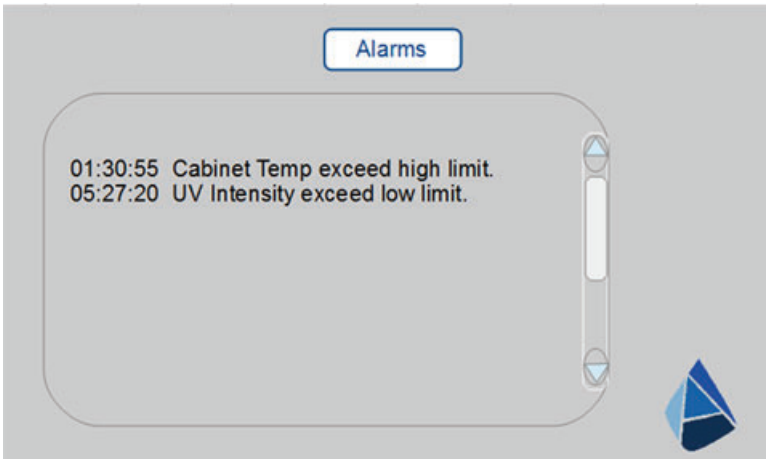


Figure 16 Alarms Screen

The Alarm Screen displays the time and alarm information.

8.5.1 View Alarm List:

1. Use the UP/DOWN (Figure 12) keys to scroll to the alarm.
2. Press ESC to return to the Main Screen.

8.5.2 Alarm Messages

Alarm notification and information are shown in Table 3.

Table 3 Monitoring Station Alarm

Alarm	Alarm Message
UVILow	UV Intensity exceed low limit.
WaterTempHigh	Water temperature exceeds high limit of 120˚F (49˚C). Automatic system shutdown.
CabinetTempHigh	Cabinet temperature exceeds high limit
LampOutAlert	Lamp output fail.
LampExpireSoon	Lamp expiration within 200 hours
LampExpired	Lamps hours expired.

Section 9 Maintenance

DANGER

Obey all warning and caution statements. Refer to Section 2.

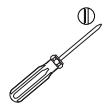
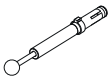
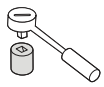
Read and understand this manual before operating this equipment. Read all user documentation before performing operations, inspections, repair, or maintenance on this equipment.

Only competent personnel should undertake operation, repairs, maintenance, or servicing of equipment described in this section of the manual. If you do not understand the information or procedure explanations in this manual, STOP and contact your Service Provider for assistance.

The tasks and safety information described in this section of the manual are external to the UV Chamber.

Refer to Section 11 for replacement part numbers.

9.1 Tools and Materials

Symbols	Description	Symbols	Description
	Screwdriver		Philips Screwdriver
	Wrench - Adjustable		Wrench - Torque
	Clean Water		Mild Acidic Solution (for example, ActiClean® Gel) or approved by Aquafine Service, food grade cleaner
	Isopropyl Alcohol		Lint Free Cloth
	Cotton Swab		Sleeve Bolt Removal Tool
	Sleeve Removal Tool		Socket Wrench and Socket
	Hex Key		Wrench
	Spray Bottle		

9.2 Maintenance Schedule

Scheduled maintenance and inspections can extend the life of the system and prevent problems. Routine maintenance may include partial disassembly to access components for cleaning and visual evaluation. Table 4 shows the maintenance schedule. During any maintenance activity, the manufacturer recommends inspection of all components that can be seen. Some of the preventative maintenance tasks may also need to be done to remove a condition that caused a system alarm. Refer to Figure 1 for components that are accessible for maintenance.

Remember, always using genuine Aquafine parts keeps your warranty and regulatory certifications valid (cULus, CE, UKCA, NOM and KC).

Table 4 Preventive Maintenance Schedule

System component	Maintenance requirement	Weekly	Monthly	Semi-Annually	Annually	Every 2 years	9000 hours	On removal	As needed
CPP	Visually inspect the air filter for signs of debris or film. Replace filters as needed (Section 9.12.2).	X							
	Check cooling fan air inlet and outlet for signs of build-up and replace air filters if necessary (Section 9.12.3).		X						X
UV Lamps	Replace UV Lamp. Refer to Section 9.6.2.						X		
Lamp Sleeves	Remove a representative sample (i.e. 10%) of Lamp Sleeves • Check the Lamp Sleeve O-Rings and Sleeve Bolt Washers for UV decay and brittle parts. Replace O-Rings and washers as needed. • Remove any condensation inside the Lamp Sleeve • Inspect Lamp Sleeves for physical damage • Inspect for build-up on the Lamp Sleeves			X					X[1]
	Clean the Lamp Sleeves. Refer to Section 9.7.2.				X			X	X
	Replace Lamp Sleeve (Section 9.7.1)				X				X
	Replace Lamp Sleeve O-Ring (Section 9.7.1, Step 5)				X			X	
	Inspect Sleeve Bolts for signs of fluid leakage.		X						
UVI Sensor	Clean the UVI Sensor. Refer to Section 9.8.			X					X
	Replace UVI Sensor. Refer to Section 9.8.								X
	Inspect UVI Sensor O-Rings for UV decay and brittle parts. Replace O-Rings as needed.				X			X	
UVI Sensor Plug	Inspect UVI Sensor Plug O-Rings for UV decay and brittle parts. Replace O-Rings as needed.				X				
UV Chamber	Inspect End Plate O-Rings or Gaskets for UV decay and brittle parts. Replace as needed (Section 9.9.2) ***Note:*** *For 01CDS, 02CDS or 03CDS system models, refer to Section 9.11.2.*					X		X	X

[1] Frequency may need to be increased or decreased depending on process fluid quality. Refer to your facility's Clean in Place (CIP) process.

9.3 Depressurize and Drain a UV Chamber

The manufacturer recommends that the UV Chamber be depressurized and drained before any maintenance, service or repair task is done. Failure to depressurize and drain the UV Chamber can result in serious injury or death. Always follow all site-specific safety protocols and procedures. Refer to Section 2.

Prerequisites:

- Shut down the UV System. Refer to Section 5 as needed.
- Apply lockout tag out devices as necessary. Refer to Section 4.
- The drainage or process fluid bypass provisions are followed until UV system starts.

Materials:

Procedure:

1. Stand off to the side of the end plate, open the vent valve and then the drain valve, as the process fluid level drops, the UV System will depressurize.
2. To depressurize only, open the vent valve.
3. Keep drain valve open until the UV Chamber is empty.
4. When service is complete, assemble the prerequisites in the reverse order of disassembly.

9.4 Pressurize the UV Chamber

Prerequisites:

- Remove UV Lamps (if installed). Refer to Section 9.6.2.
- Inspect condition of sleeves for visible cracks or damage. Replace if necessary.
- Make sure the drain valve is closed.

Materials:

Procedure:

1. Fill the UV Chamber with process fluid.
   a. Stand off to the side and make sure the area is clear of all plant personnel.
   b. Pressurize the UV Chamber.
   c. Check for leaks.
   d. Wait twenty minutes.
2. If leaks are found:
   a. Depressurize and drain the UV Chamber. Refer to Section 9.3.
   b. Fix the leaks.
   c. Fill the UV Chamber and do a pressure test. Check for leaks.
3. If there are no leaks, depressurize the UV Chamber. Refer to Section 9.3.
4. Install the UV Lamps. Refer to Section 9.6.2.
5. Install the Service End Cap. Refer to Section 9.5.

9.5 Remove and Install the Service End Cap

Prerequisites:

- Shut down the UV System. Refer to Section 5 as needed.
- Apply lockout tag out devices as necessary. Refer to Section 4.
- Depressurize the UV Chamber. Refer to Section 9.3.

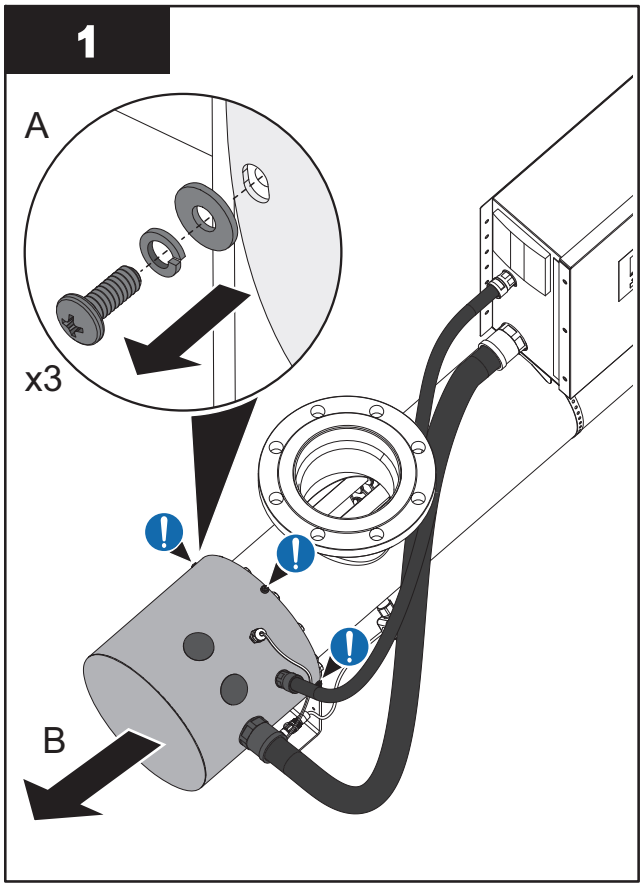
Tools:

Materials:

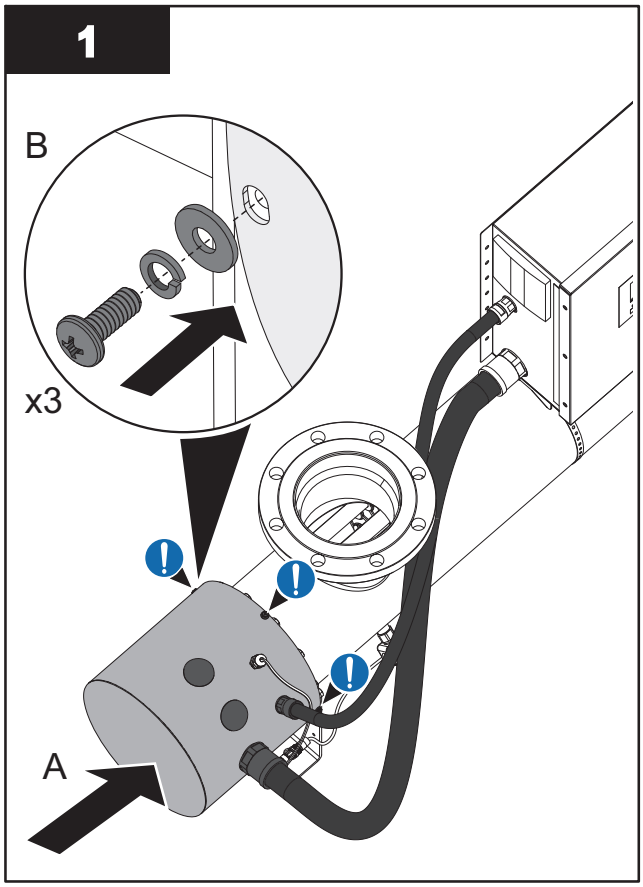
Procedure:

Note: *An ozone inhalation hazard may be present on TOC Systems, adequate ventilation is required.*

Remove:



Install:



Note: *CPP is shown mounted to the UV Chamber for illustration purposes*

When service is complete, assemble the prerequisites in the reverse order of disassembly.

9.6 UV Lamp

UV lamps contain mercury (Section 2).

UV Lamps are made of quartz tubing and are breakable. Do not strike, bend or apply pressure or it will break. Discard UV Lamps appropriately. Follow all local regulations.

9.6.1 Storage Requirements for Used UV Lamps

Put used UV Lamps into the replacement UV Lamp shipping container, or a similar container. It is preferable that the original packing materials be used where possible, or materials adequate to prevent breakage during storage and transportation.

Boxes of used UV Lamps should be labeled as such and stored in a location where the potential for accidental breakage is minimized.

A UV Lamp recycler may have specific procedures and UV Lamp storage requirements. Consult with a UV Lamp recycler to determine all applicable policies.

This component contains Mercury. Dispose according to Local, State, or Federal Laws.

9.6.2 Remove and Replace a UV Lamp

Inspect a UV Lamp as part of scheduled maintenance and when a UV Lamp status alarm occurs.

Replace a UV Lamp for every 9,000 hours (a Lamps Expired alarm occurs) or when the UV Lamp fails inspection.

NOTICE

Failure to replace UV Lamps for every 9000 hours of runtime may cause the equipment to fail. With intermittent use, in no case should the UV Lamps be used for more than 24 months, regardless of number of hours of operation, due to normal operational degradation.

Prerequisites:

- Shut down the UV System. Refer to Section 5 as needed.
- Apply lockout tag out devices as necessary. Refer to Section 4.
- Depressurize the UV Chamber, and stand off to the side. Refer to Section 9.3.
- Wait minimum ten (10) minutes to allow UV Lamps to cool.
- Remove the Service End Cap. Refer to Section 9.5.

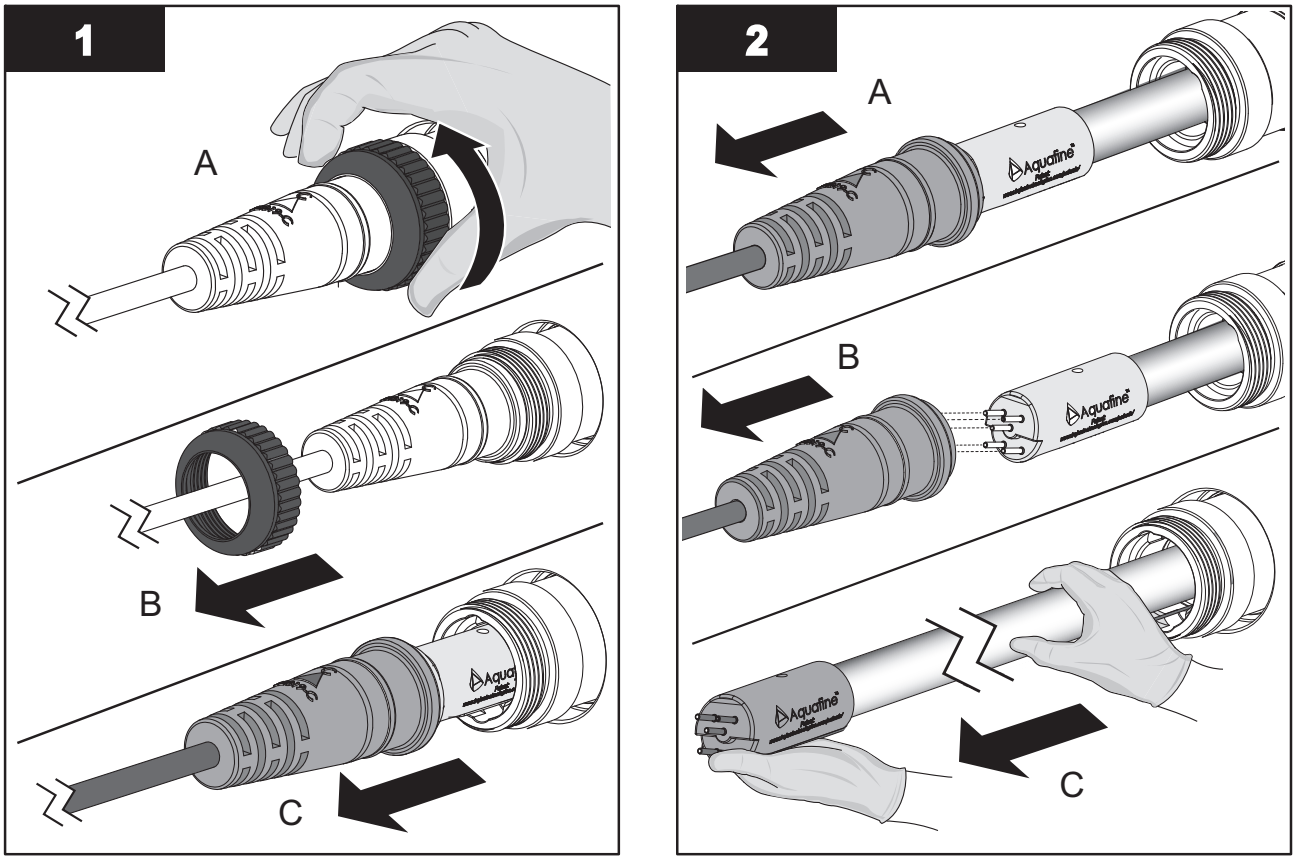
Materials:

- UV Lamp

Note: *Use clean lint free cotton gloves to handle UV Lamps.*

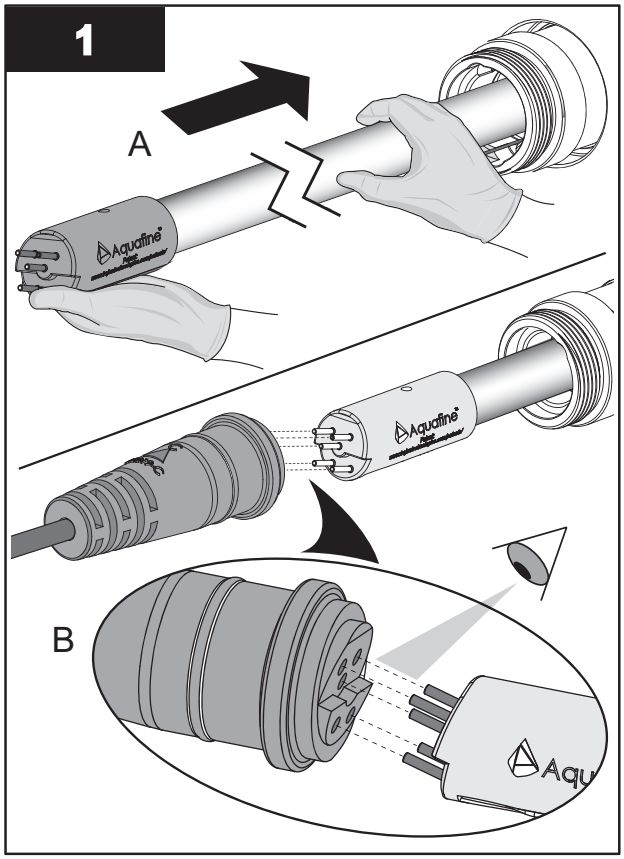
Procedure:

Remove:

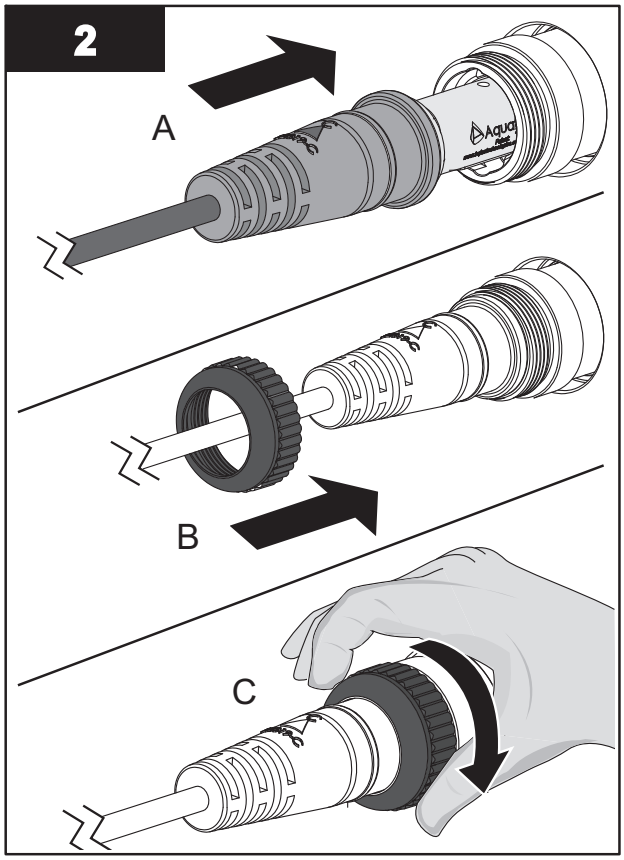


3. Inspect the UV Lamp pins for:
   - Evidence of overheating
   - Moisture
   - Displaced or bent pins (pins are angled at 10 degrees)
4. Inspect the UV Lamp for:
   - Cracks or breaks, loose ceramic ends.
5. If the conditions listed are:
   - Present, replace the UV Lamp.
   - Not present, reinstall the UV Lamp.

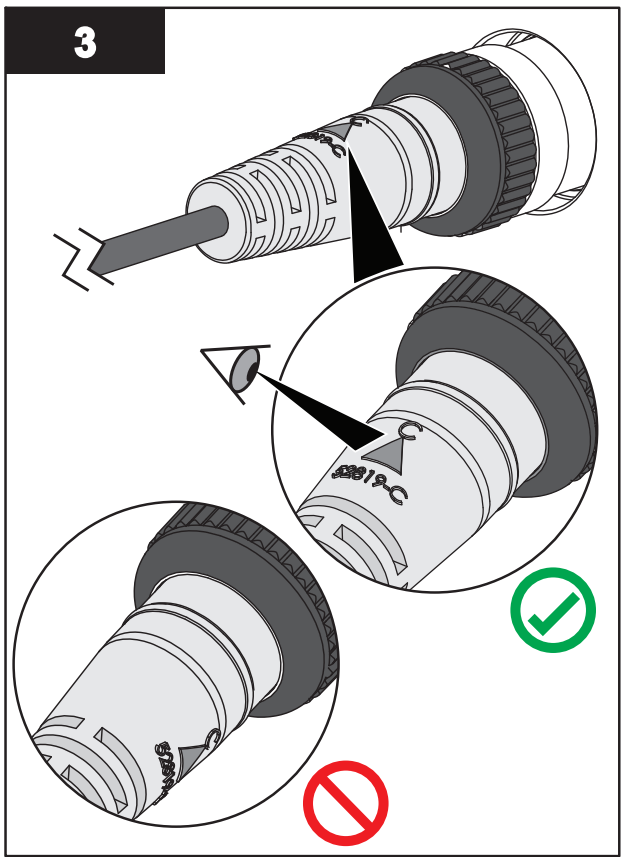
Install:



Note: *Always support the UV Lamp with lint free cotton gloved hands.*



Note: *Hand tighten the cap compression nut.*



Note: *The arrow must be positioned at the top of the Lamp Port.*

Post-requisites:

- Reset Lamp Hours when replacing all UV Lamps in the UV Chamber (Section 8.4.3).

9.7 Lamp Sleeves

Lamp Sleeves are made of quartz tubing and are breakable. Do not strike, bend or apply pressure or it will break. Discard Lamp Sleeves appropriately. Follow all local regulations.

9.7.1 Remove and Replace a Sleeve

Inspect the Sleeves and Sleeve O-rings as a part of scheduled maintenance or when a UVI Low alarm occurs.

Replace a Sleeve if buildup cannot be removed, or when the Sleeve shows signs of damage, such as cracks and chips.

Prerequisites:

- Shut down the UV System. Refer to Section 5 as needed.
- Apply lockout tag out devices as necessary. Refer to Section 4.
- Depressurize and drain the UV Chamber, and stand off to the side. Refer to Section 9.3.
- Wait ten (10) minutes to allow UV Lamps to cool.
- Allow residual fluid inside of UV Chamber to cool ***- applies to Liquid Sugar applications only.***
- Remove the Service End Cap. Refer to Section 9.5.
- Remove the UV Lamp. Refer to Section 9.6.2.

Tools:

Materials:

- Lamp Sleeve (if required)
- Sleeve Bolt Washer
- Lamp Sleeve O-Rings

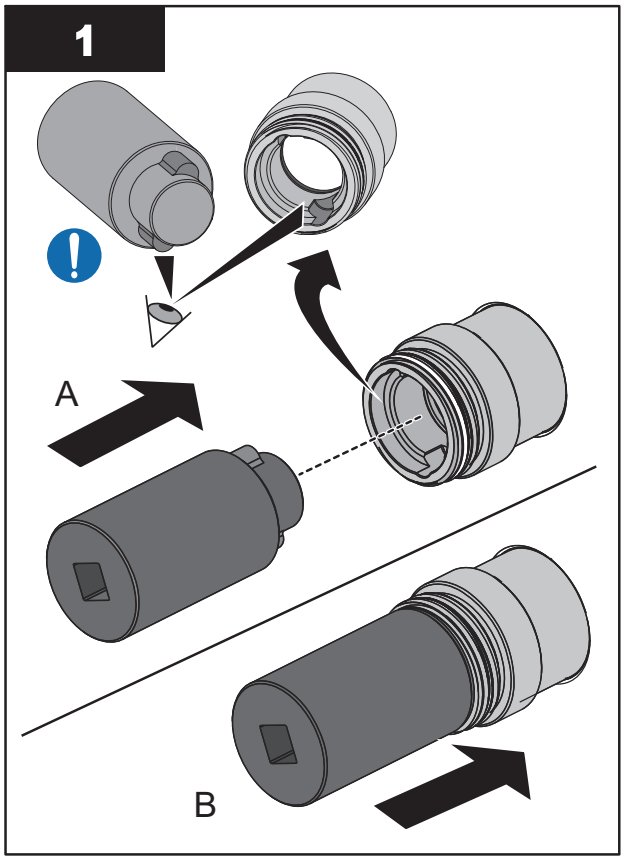
Procedure:

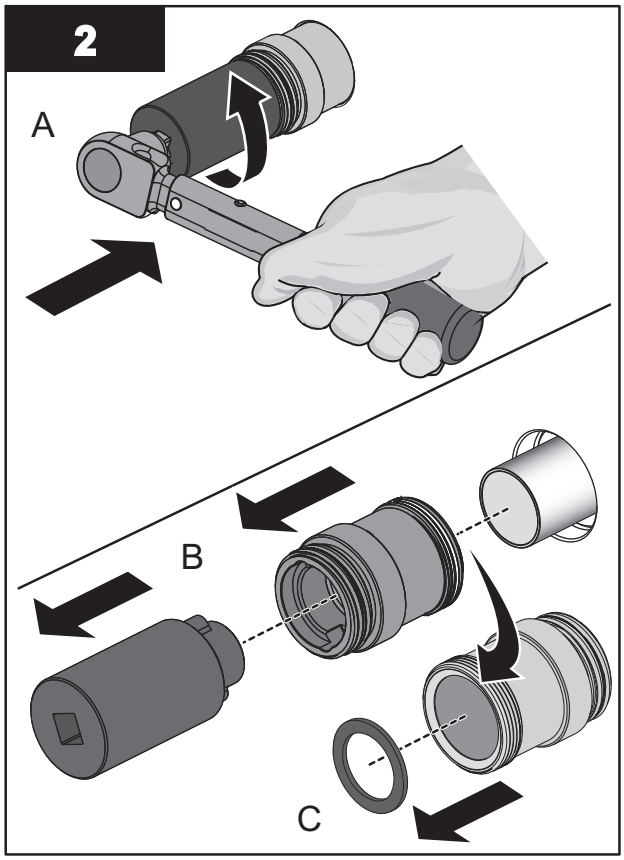
NOTICE

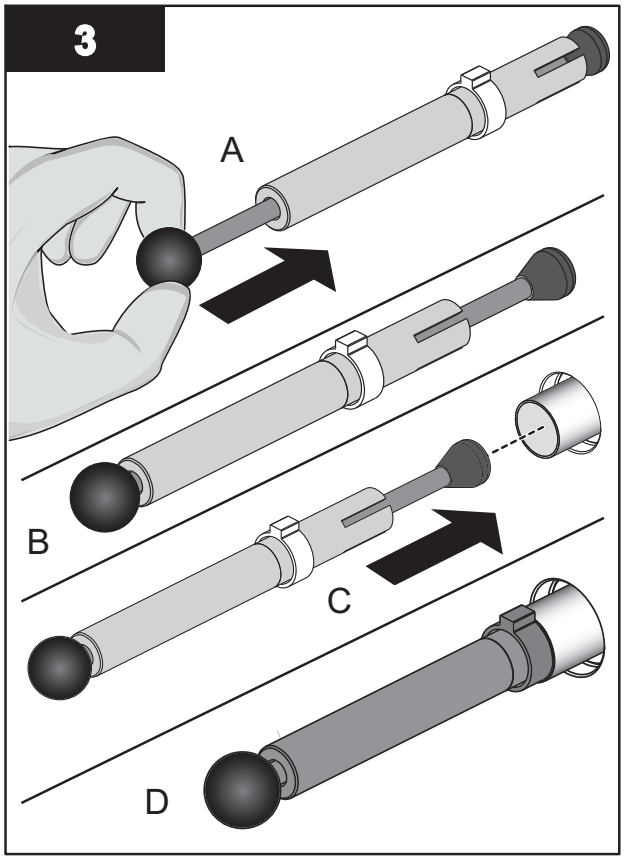
To prevent Sleeve damage during removal, be sure to keep the Sleeve level and perpendicular to the end plate. Physical damage to Sleeves indicates a possible serious condition in the UV Chamber. Full service of the UV Chamber may be needed.

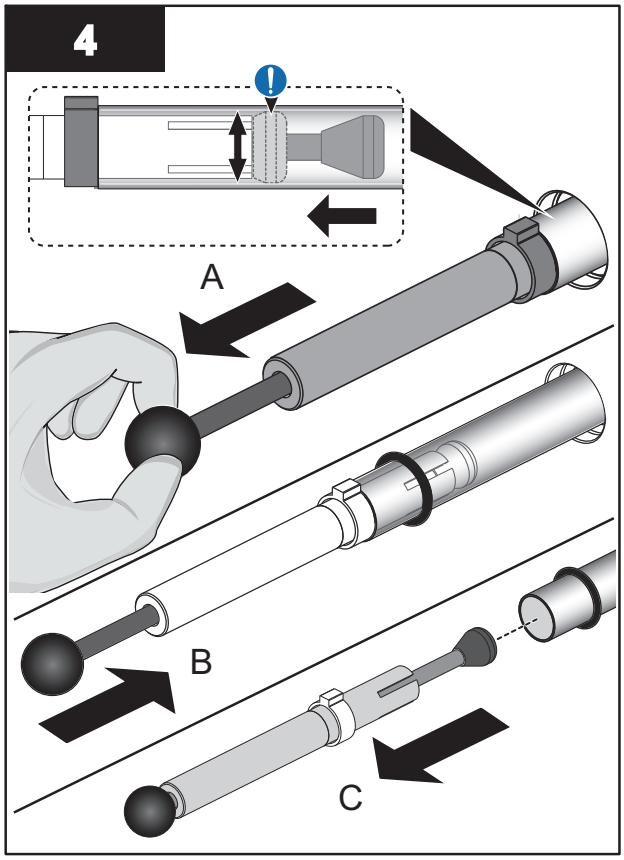
Use caution and apply only 100 lbf.in (11.3 N-m) of torque to the Sleeve bolt. Excessive torque will crack the Sleeve. Low torque may result in fluid leakage into the service end cap. Use only the provided Sleeve Bolt Removal Tool.

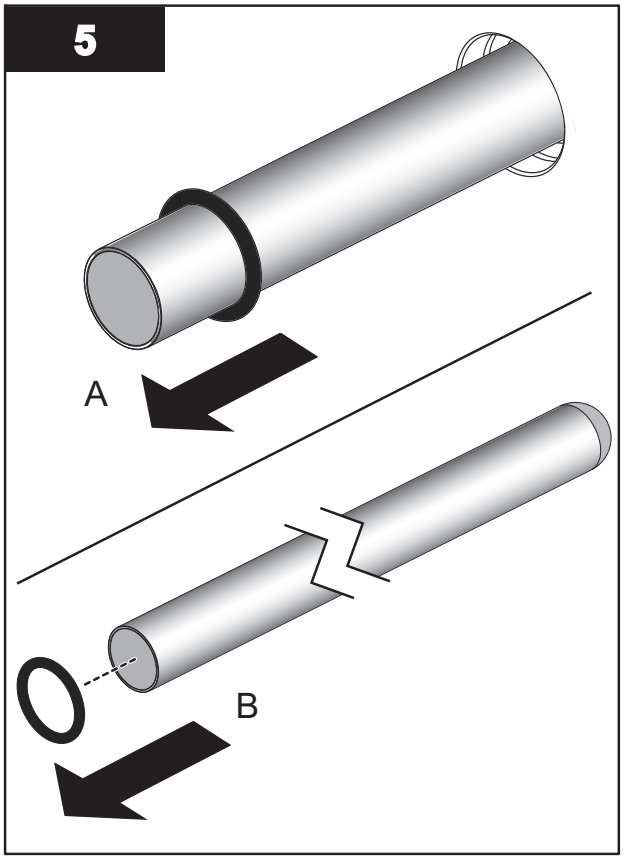
Remove:



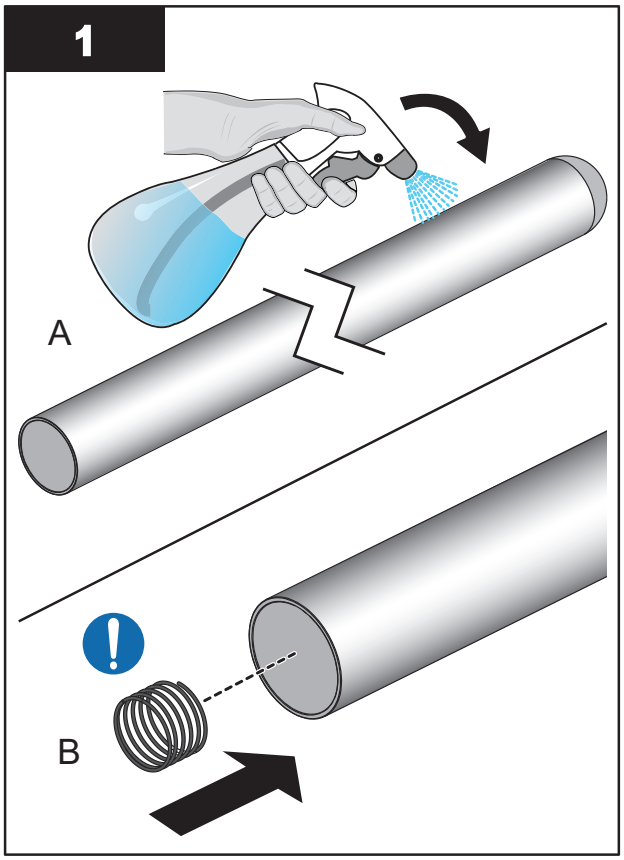




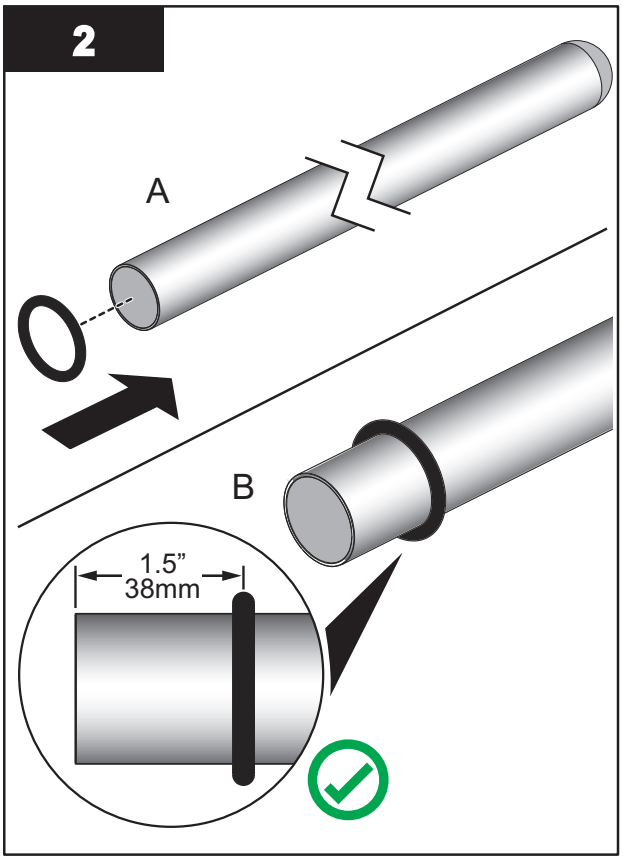




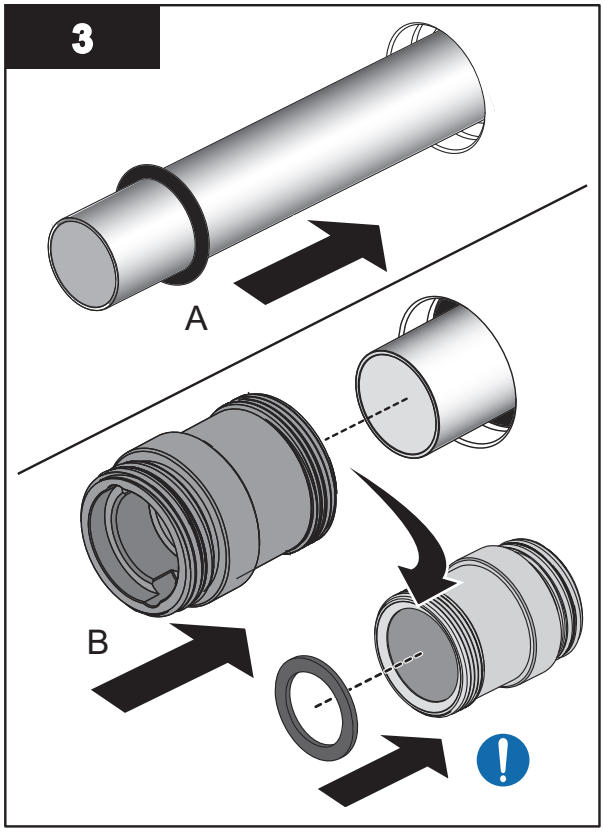
Install:

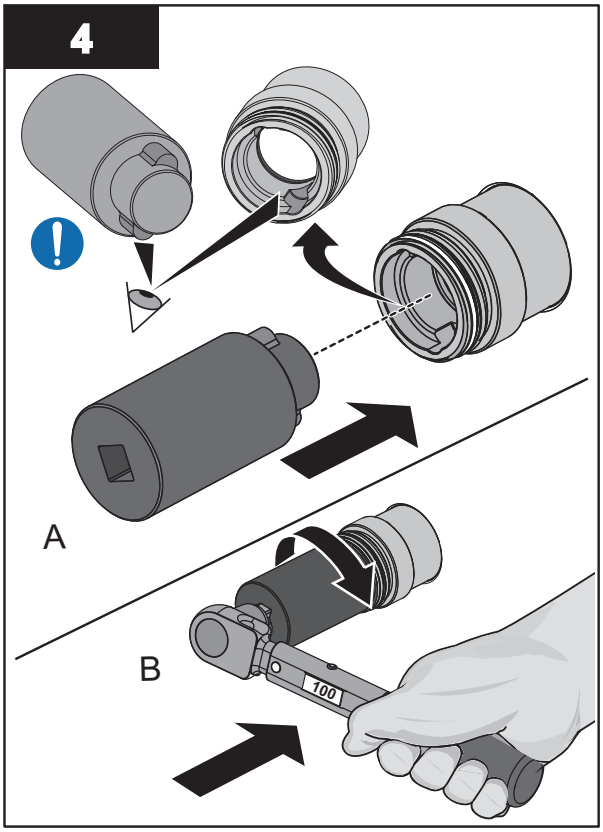


Note: *Verify that compression spring is in the Lamp Sleeve.*



Note: *Ensure the O-ring is installed at 1.5” (38 mm) from the open end of the Lamp Sleeve.*





Note: *Torque the Sleeve Bolt to 11.3 N.m (100 lbf.in).*

9.7.2 Clean a Sleeve

Clean all Sleeves manually if there is buildup on any of the inspected Sleeves.

NOTICE

Do not use abrasive materials to clean a Sleeve. Abrasive materials will scratch and cause damage to the Sleeve.

Keep water and debris out of the Sleeves. Moisture can cause build-up in the Sleeves and corrosion of the lamp shunt and pins, which results in shorter UV Lamp life. Use a lint-free cloth to remove water or debris.

Build-up on the Sleeves decreases the amount of UV light, and can result in higher UV Lamp temperatures and decreased UV Lamp efficiency.

Only use Aquafine Corporation approved cleaning solutions on the Sleeves. Use of unapproved chemicals may result in damage to the equipment. For a list of approved cleaning solutions refer to Table 5.

Table 5 Approved Cleaning Solutions and Dilution Ratio

Solution	Dilution
ActiClean® Gel	Not Required
20% Phosphoric Acid	2 parts water to 1 part acid
40% Phosphoric Acid	5 parts water to 1 part acid
75% Phosphoric Acid	10 parts water to 1 part acid
80% Phosphoric Acid	12 parts water to 1 part acid

Prerequisites:

- Remove a Lamp Sleeve. Refer to Section 9.7.1.

Materials:

Procedure:

1. Refer to Table 5 for approved cleaning solutions and dilution ratios. Mix the solution thoroughly. Use pH indicator strips to make sure that pH is between 1.0-1.5. The solution is effective in cleaning sleeves when the pH is less than 3.0. Above pH 3.0, the cleaning solution should be replaced.
2. Clean the sleeve with an approved cleaning solution and a lint-free cloth. Wipe up and down the length of the sleeve. Do not wipe across or around the sleeve. Wipe until all the build-up on the sleeve is removed.
3. Rinse the sleeve fully with clean distilled water.
4. Allow the sleeve to air-dry. Make sure the sleeve is completely dry on the inside and outside before installation.

   Notes: *1) Sleeves may look clean when wet.*

   2) A completely clean sleeve will have the clarity of a new, unused sleeve.
5. When service is complete, assemble the prerequisites in the reverse order of the disassembly.

9.8 UVI Sensor

9.8.1 Remove and Replace the UVI Sensor

Prerequisites:

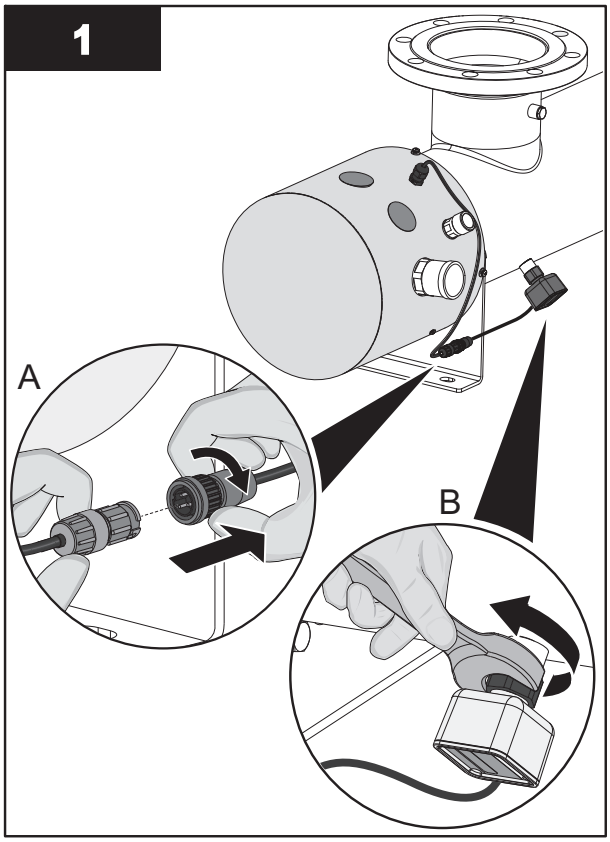
- Shut down the UV System. Refer to Section 5 as needed.
- Apply lockout tag out devices as necessary. Refer to Section 4.
- Depressurize and drain the UV Chamber. Refer to Section 9.3.
- Allow residual fluid inside of UV Chamber to cool ***- applies to Liquid Sugar applications only.***

Tools:

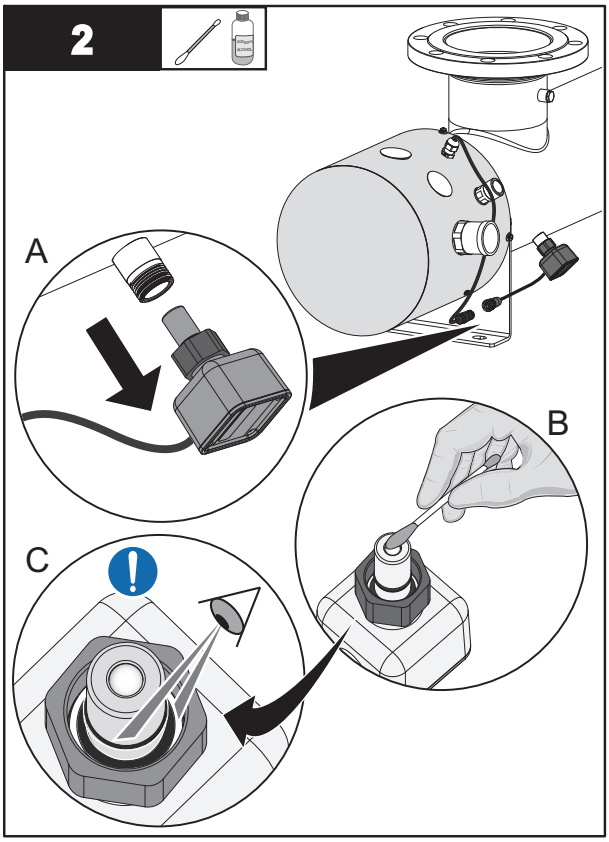
Materials:

Procedure:

Remove:

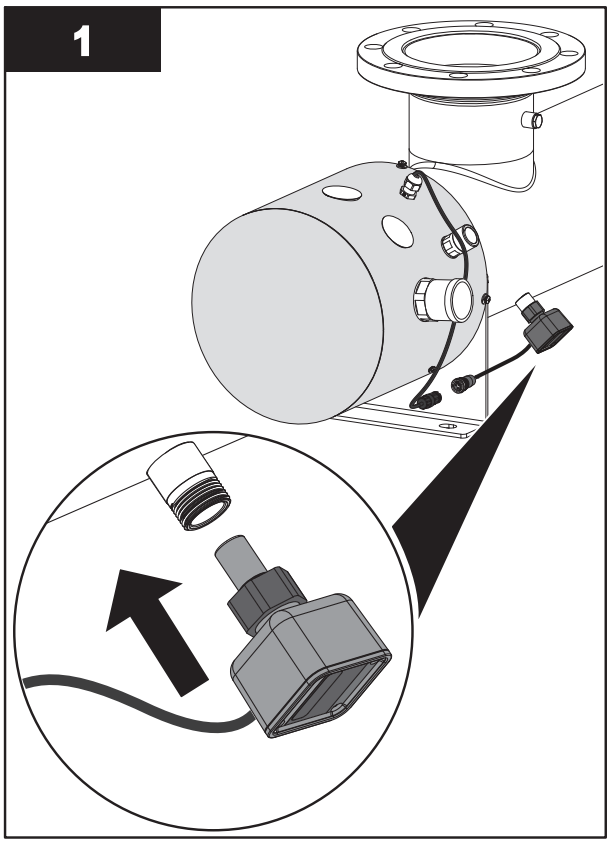


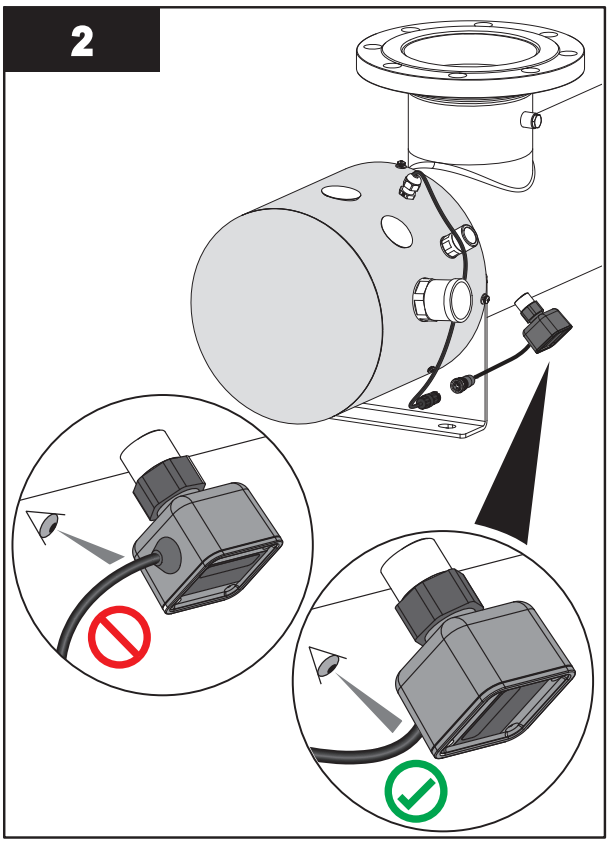
Note: *Loosen the nut securing the UVI Sensor.*



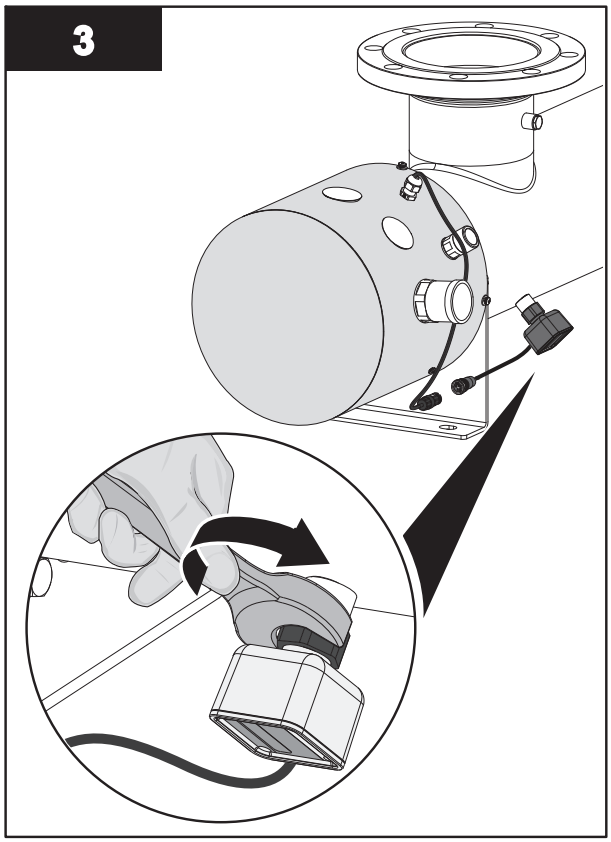
Note: *Inspect O-rings for signs of UV decay or brittle parts. Replace if necessary.*

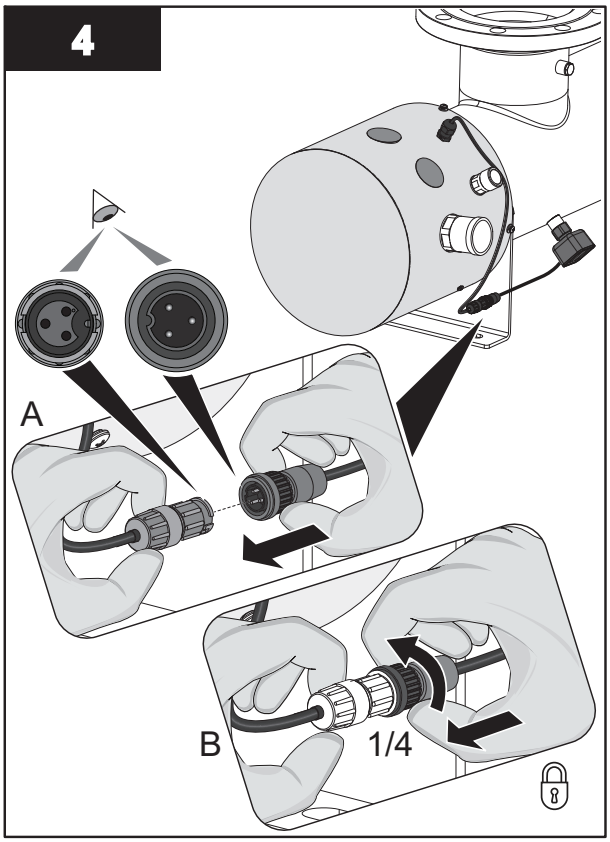
Install:





Note: *Orientate the UVI Sensor to position the cable at the bottom as shown.*





Note: *Tighten the nut to 40 N.m (29.5 lbf.ft) to secure the UVI Sensor.*

9.9 UV Chamber End Plate

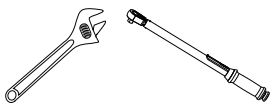
Note: *Applies to UV Chambers with 30 inch or 60 inch UV Lamps only. For UV Chambers with 15 inch UV Lamps, proceed to Section 9.11.*

9.9.1 Remove and Install the UV Chamber End Plate

Prerequisites:

- Shut down the UV System. Refer to Section 5.
- Apply lockout tag out devices as necessary. Refer to Section 4.
- Depressurize and drain the UV Chamber. Refer to Section 9.3.
- Allow residual fluid inside of UV Chamber to cool ***- applies to Liquid Sugar applications only.***
- Remove Service End Cap. Refer to Section 9.5.
- Remove the UV Lamps. Refer to Section 9.6.2.
- Remove the Lamp Sleeves. Refer to Section 9.7.1.
- Disconnect the Temperature Switch. Refer to Section 7.4.1.
- Disconnect the Ground Wires. Refer to Section 7.4.1.

Tools:

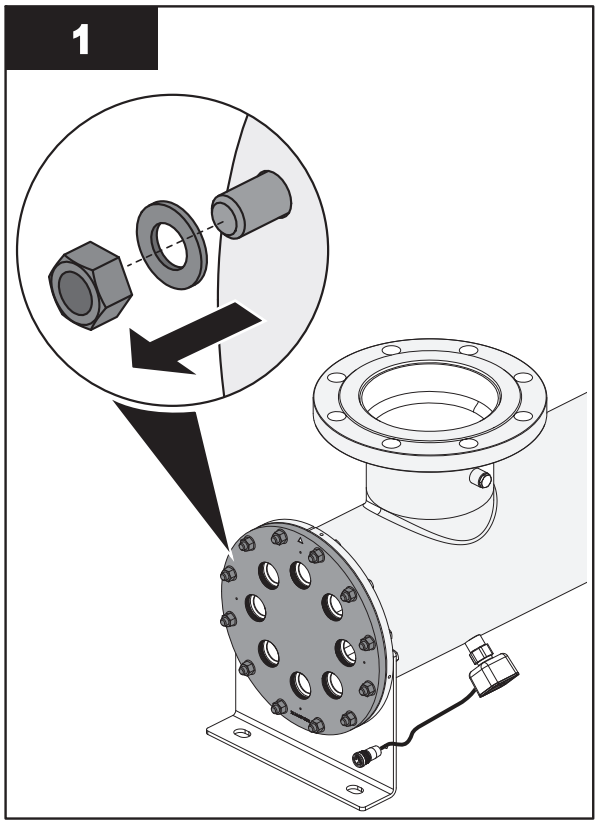


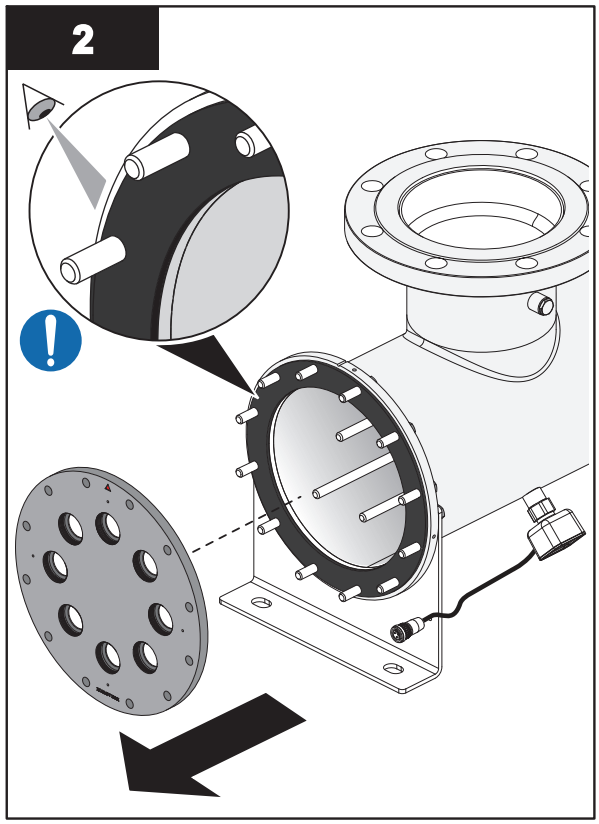
Materials:

Procedure:

Note: *The UV Chamber may be supplied with End Plate Gaskets or End Plate O-Rings. Follow the appropriate removal and installation procedure in this section.*

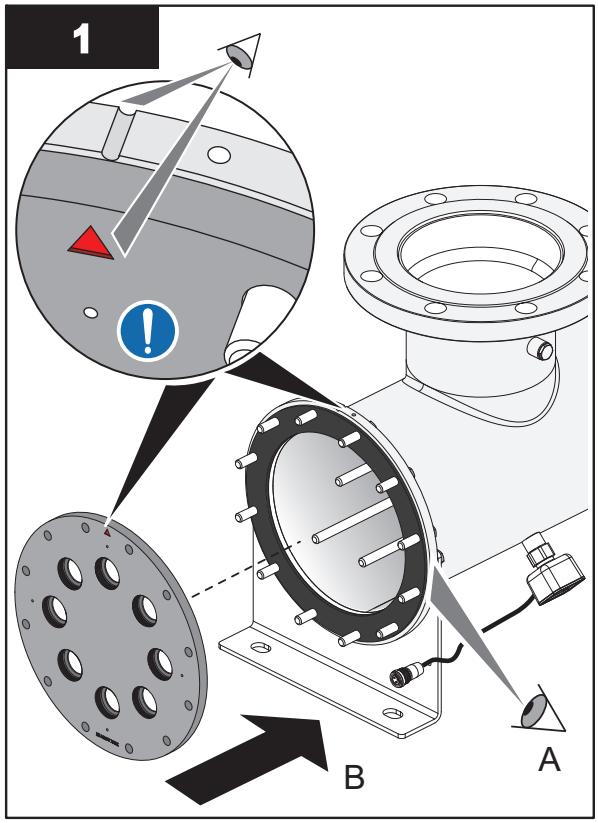
Remove (For UV Chambers with End Plate Gaskets):

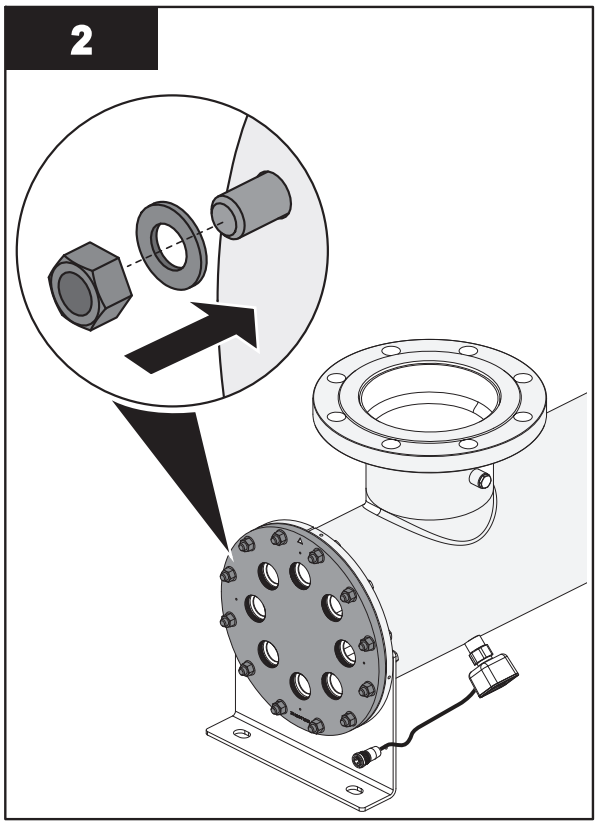




Note: *Inspect the Gasket for signs of damage, cracks or wear. Replace if required. Refer to Section 9.9.2.*

Install (For UV Chambers with End Plate Gaskets):



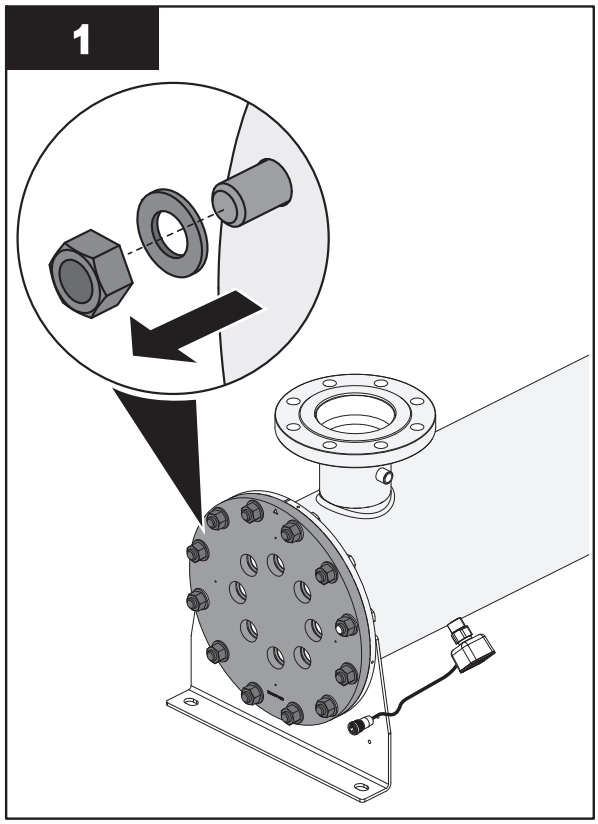


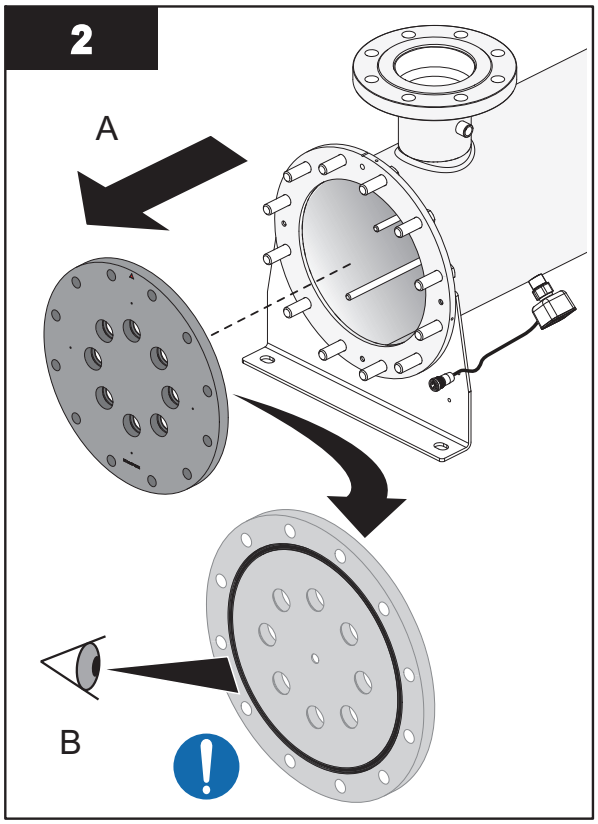
Notes: *1) Make sure the Gasket is properly installed before installing the UV Chamber End Plate.*

2) Align the orientation mark on the end plate with the orientation mark on the end flange of the UV chamber.

Note: *Torque the bolts in a star pattern to 25.8 N.m (19 lbf.ft).*

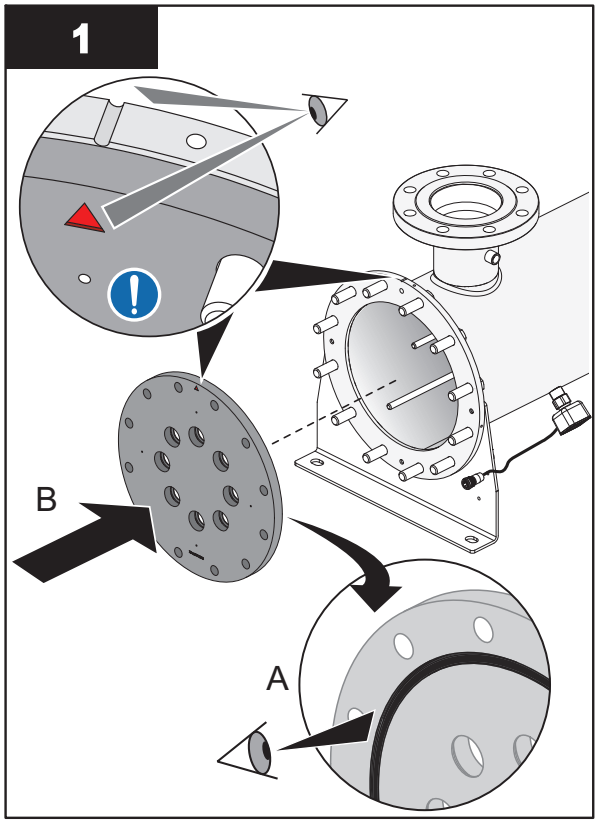
Remove (For UV Chambers with End Plate O-Rings):

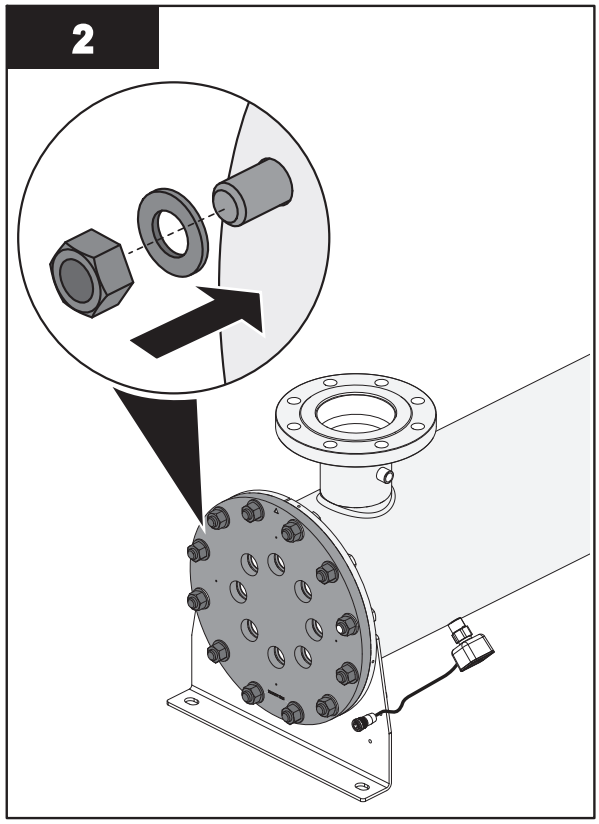




Note: *Inspect the End Plate O-Ring for signs of damage, cracks or wear. Replace if required. Refer to Section 9.9.2.*

Install (For UV Chambers with End Plate O-Rings):





Notes: *1) Make sure the End Plate O-Ring is properly seated in the groove before installing the UV Chamber End Plate.*

2) Make sure that the O-Ring does not pinch when installing the UV Chamber End Plate.

3) Align the orientation mark on the end plate with the orientation mark on the end flange of the UV chamber.

Note: *Torque the bolts in a star pattern to 107.1 N.m (79 lbf.ft).*

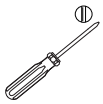
3. When service is complete, assemble the prerequisites in the reverse order of the disassembly.

9.9.2 Remove and Replace End Plate O-Ring / Gasket

Prerequisites:

- Remove the UV Chamber End Plate. Refer to Section 9.9.1.

Tools:



Note: *A small slotted screwdriver may be required for systems with End Plate O-Rings.*

Materials:

- New End Plate O-Ring (if applicable)
- New End Plate Gasket (if applicable)

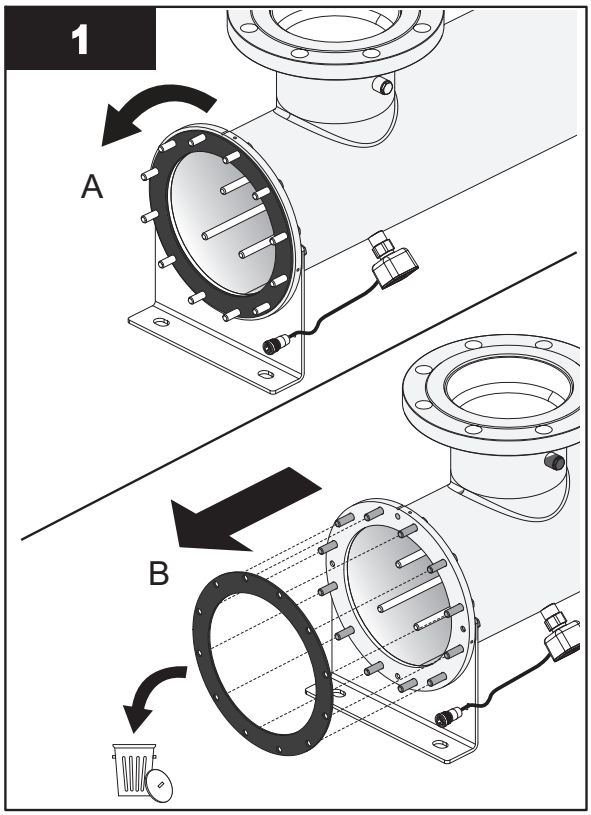
Procedure:

To replace an:

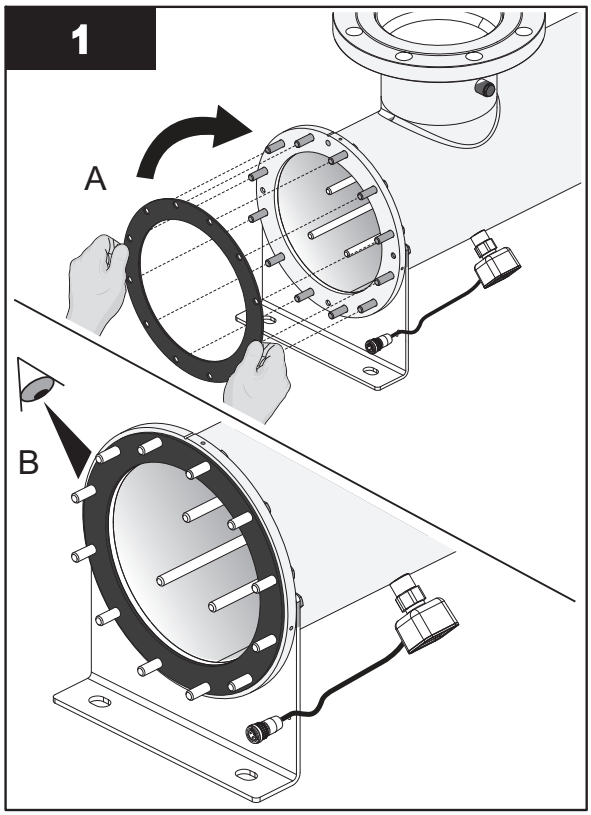
- End Plate Gasket, proceed to End Plate Gasket Replacement
- End Plate O-Ring, proceed to End Plate O-Ring Replacement

End Plate Gasket Replacement

Remove:



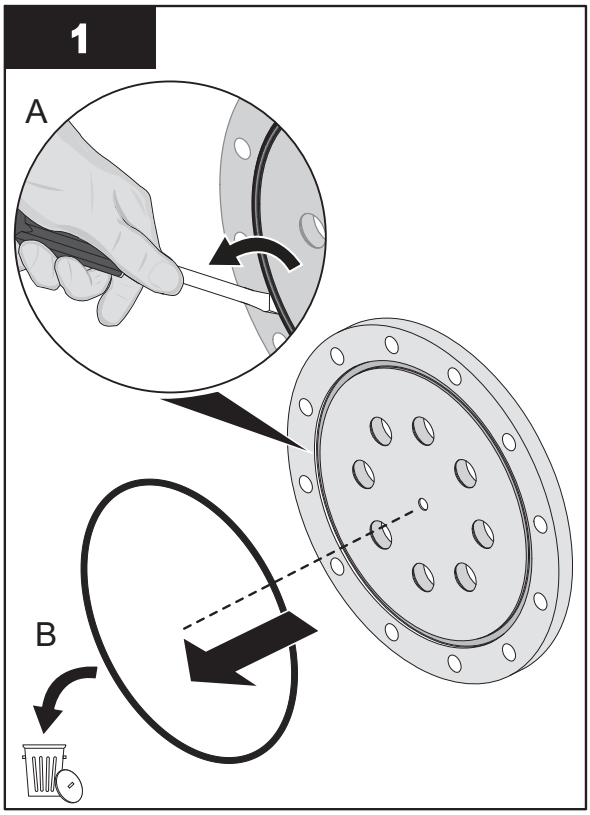
Install:



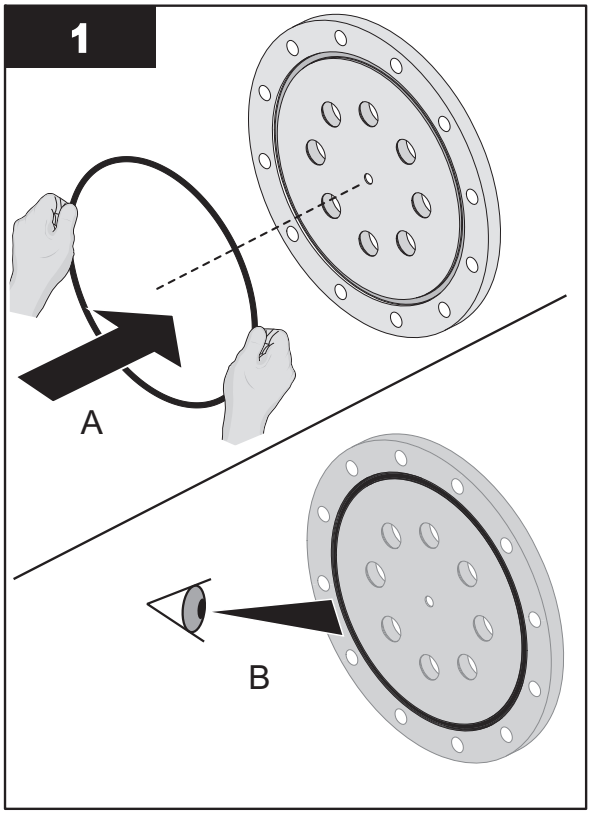
Note: *Make sure the Gasket is properly installed on the UV Chamber End Flange.*

End Plate O-Ring Replacement

Remove:



Install:



Note: *Make sure the End Plate O-Ring is properly seated in the groove.*

9.10 Baffle Assembly

Note: *Applies to UV Chambers with 30 inch or 60 inch UV Lamps only. For UV Chambers with 15 inch UV Lamps, proceed to Section 9.11.*

9.10.1 Remove and Replace the Baffle Assembly

Prerequisites:

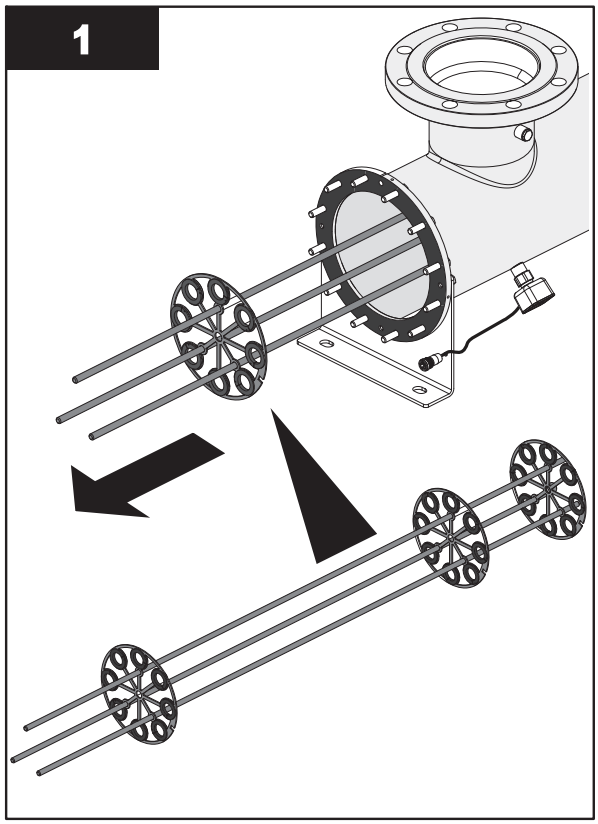
- Remove the UV Chamber End Plate. Refer to Section 9.9.1

Materials:

Procedure:

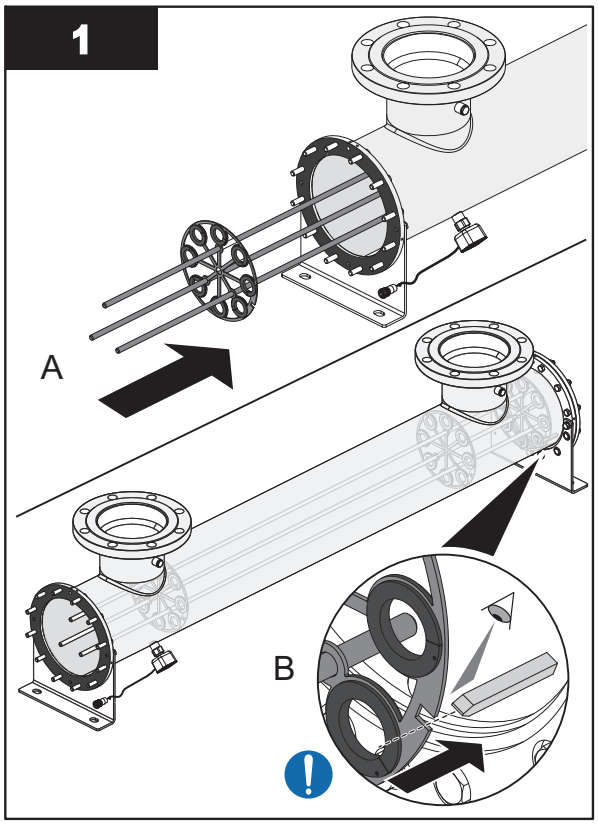
Note: *Baffle Assembly shown for illustrative purposes only. Depending on system size and system application, the Baffle Assembly design may vary.*

Remove:



Note: *Remove the Baffle Assembly slowly and evenly.*

Install:



Note: *Align the notch on the baffle with the key in the UV Chamber.*

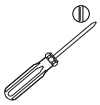
2. When service is complete, assemble the prerequisites in the reverse order of the disassembly.

9.10.2 Remove and Replace a Sleeve Bushing

Prerequisites:

- Remove Baffle Assembly. Refer to Section 9.10.1.

Tools:

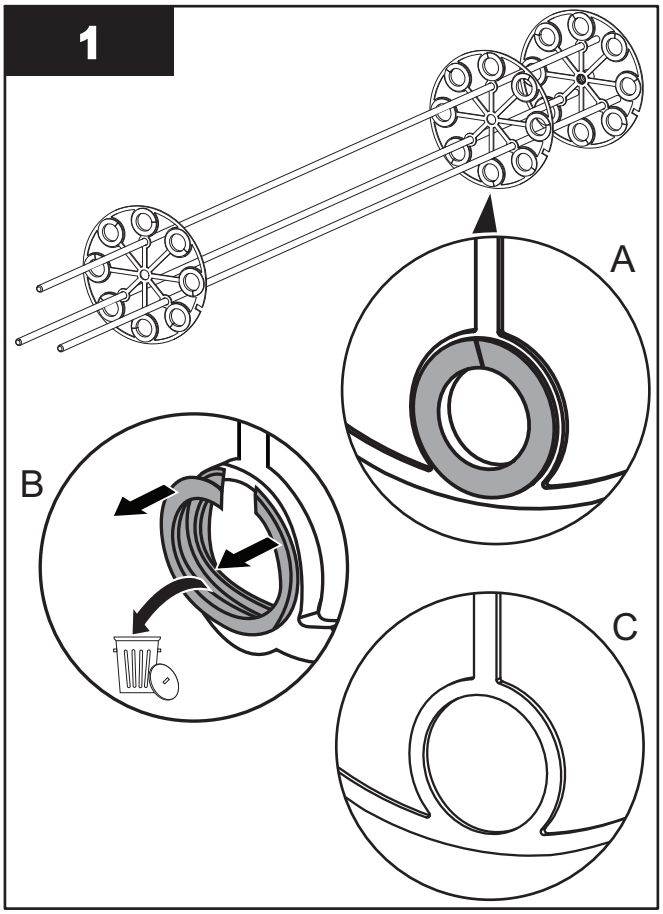


Materials:

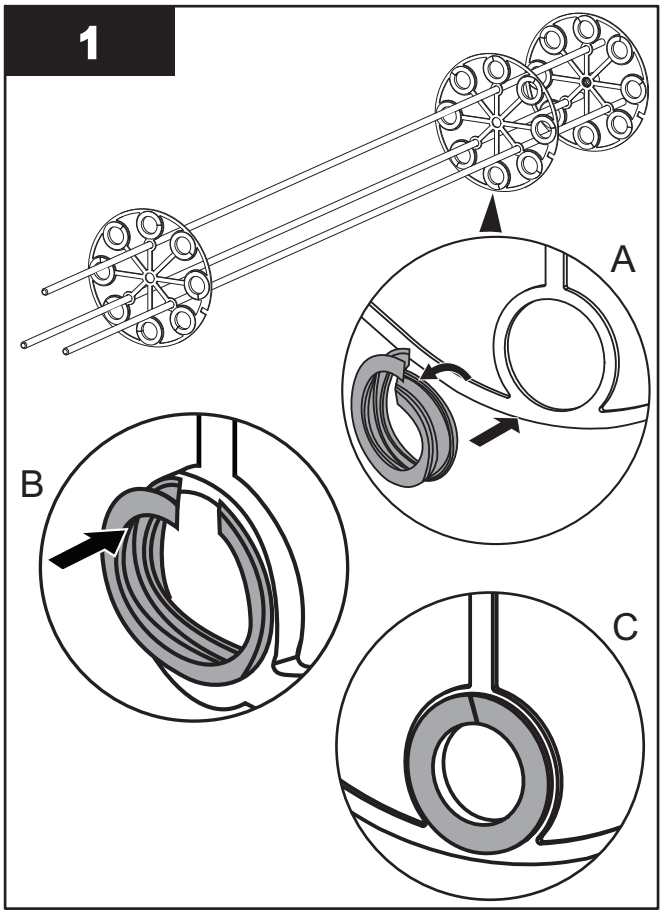
- New Sleeve Bushing

Procedure:

Remove:



Install:

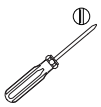


9.10.3 Remove and Replace a Baffle Plate Guide O-Ring

Prerequisites:

- Remove Baffle Assembly. Refer to Section 9.10.1.

Tools:

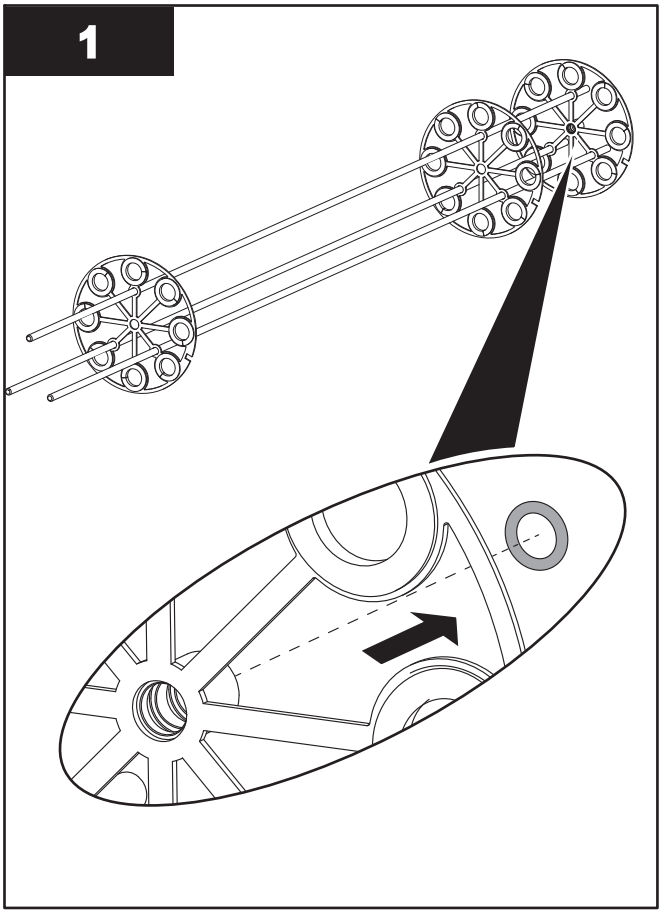


Materials:

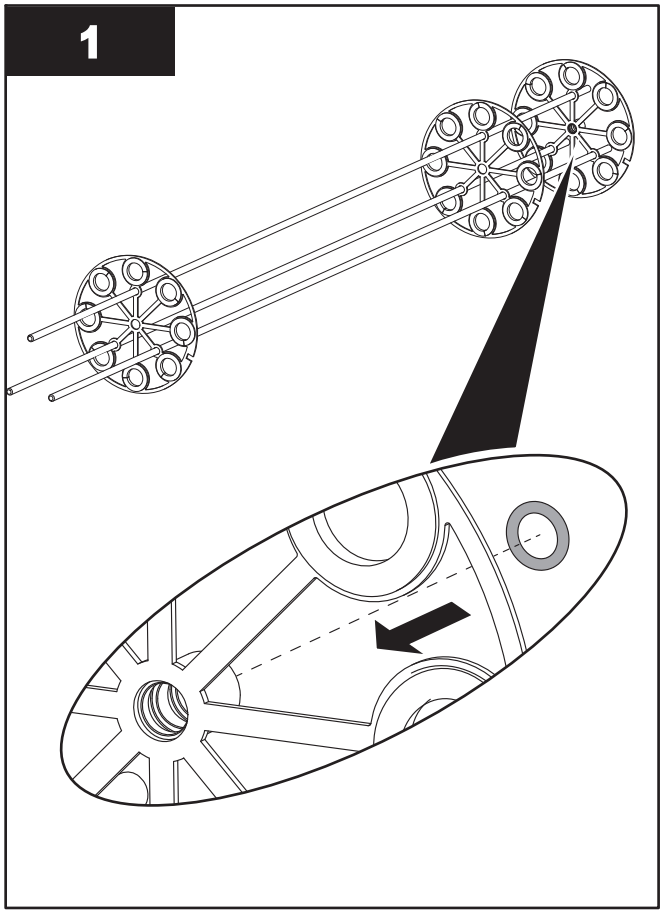
- New Baffle Plate Guide O-Ring

Procedure:

Remove:



Install:



9.11 UV Chamber End Plate / Baffle Assembly

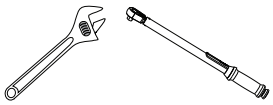
Note: *Applies to 01CDS, 02CDS and 03CDS system models only.*

9.11.1 Remove and Install the UV Chamber End Plate / Baffle Assembly

Prerequisites:

- Shut down the UV System. Refer to Section 5.
- Apply lockout tag out devices as necessary. Refer to Section 4.
- Depressurize and drain the UV Chamber. Refer to Section 9.3.
- Allow residual fluid inside of UV Chamber to cool ***- applies to Liquid Sugar applications only.***
- Remove Service End Cap. Refer to Section 9.5.
- Remove the UV Lamps. Refer to Section 9.6.2.
- Remove the Lamp Sleeves. Refer to Section 9.7.1.
- Disconnect the Temperature Switch. Refer to Section 7.4.1.
- Disconnect the Ground Wires. Refer to Section 7.4.1.

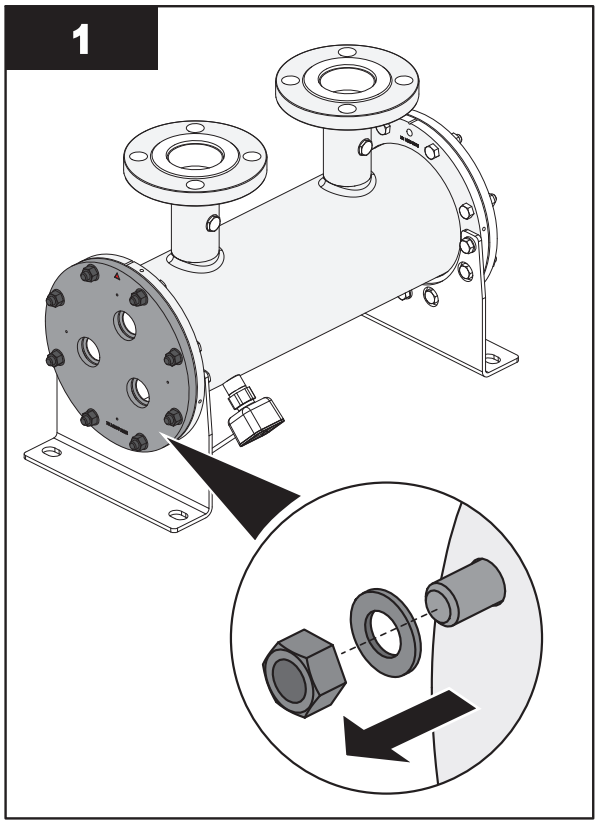
Tools:

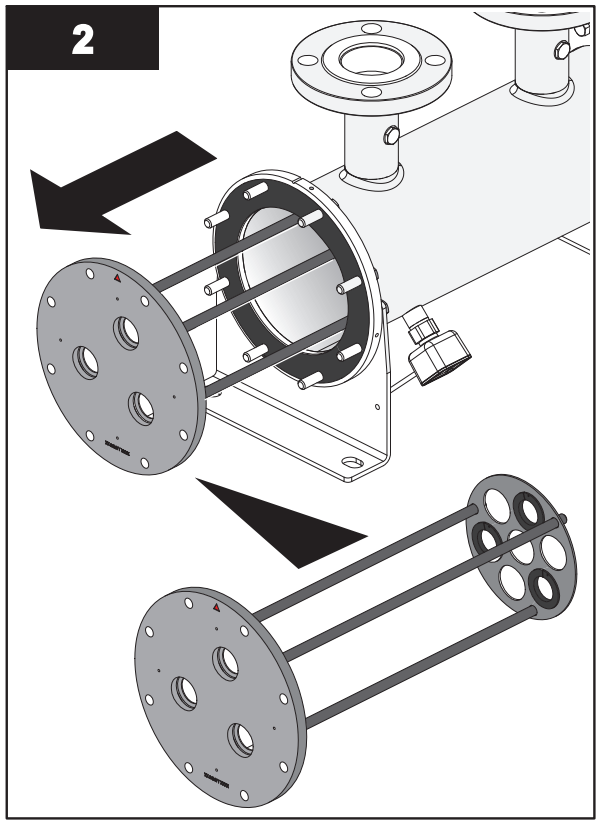


Materials:

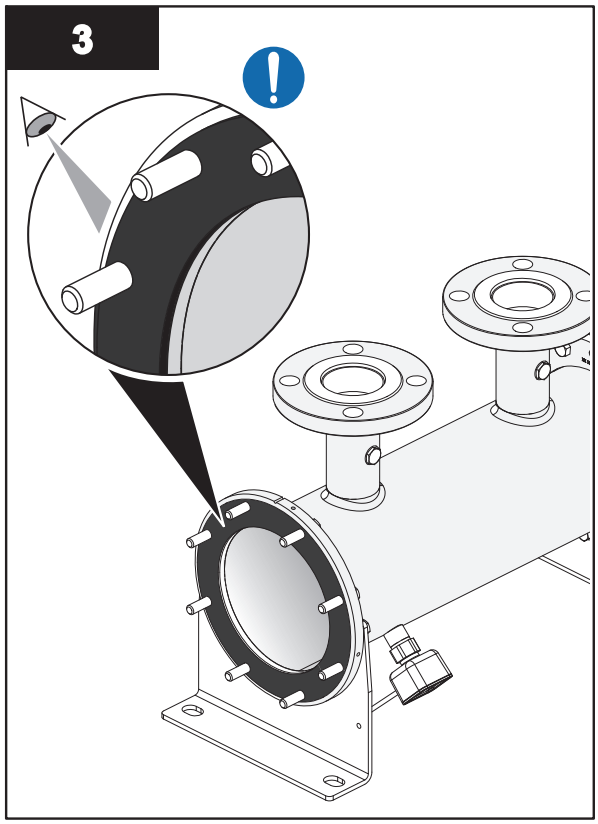
Procedure:

Remove:



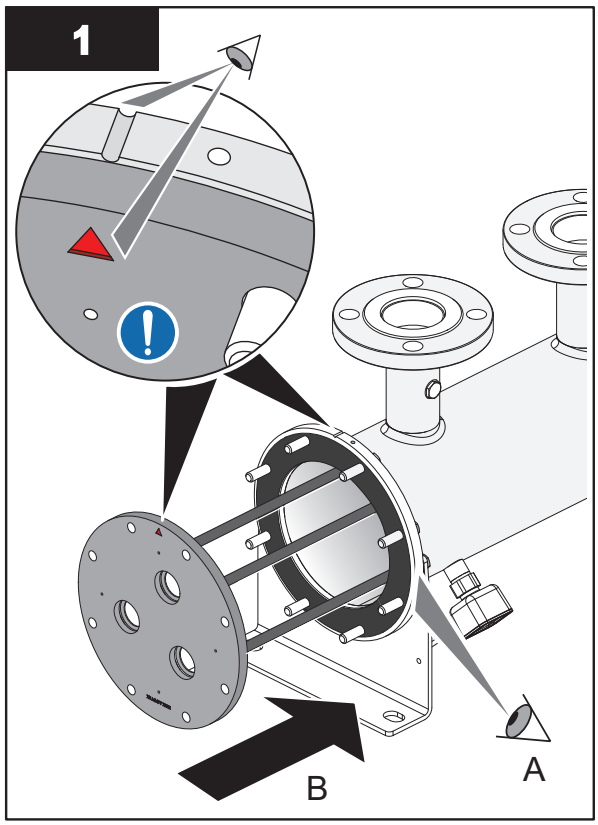


Note: *Remove the End Plate / Baffle Assembly slowly and evenly.*



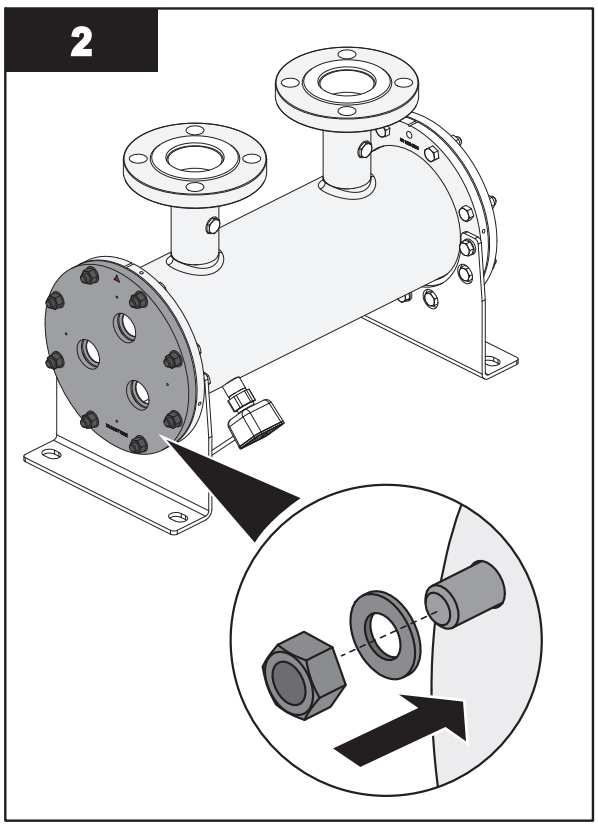
Note: *Inspect the Gasket for signs of damage, cracks or wear. Replace if required. Refer to Section 9.11.2.*

Install:



Notes: *1) Make sure the Gasket is properly installed before installing the UV Chamber End Plate / Baffle Assembly.*

2) Align the orientation mark on the end plate with the orientation mark on the end flange of the UV chamber.



Note: *Torque the bolts in a star pattern to 25.8 N.m (19 lbf.ft).*

3. When service is complete, assemble the prerequisites in the reverse order of the disassembly.

9.11.2 Remove and Replace End Plate Gasket

Prerequisites:

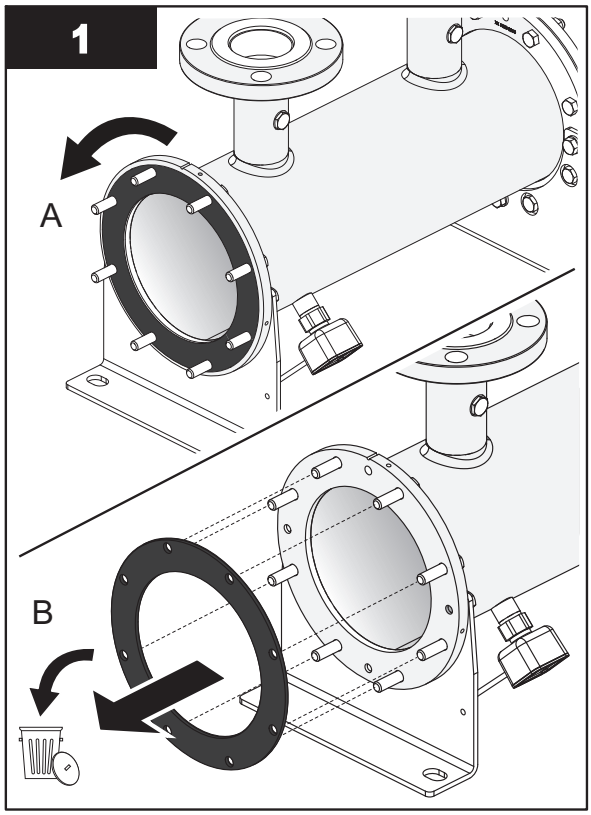
- Remove the UV Chamber End Plate / Baffle Assembly. Refer to Section 9.11.1.

Materials:

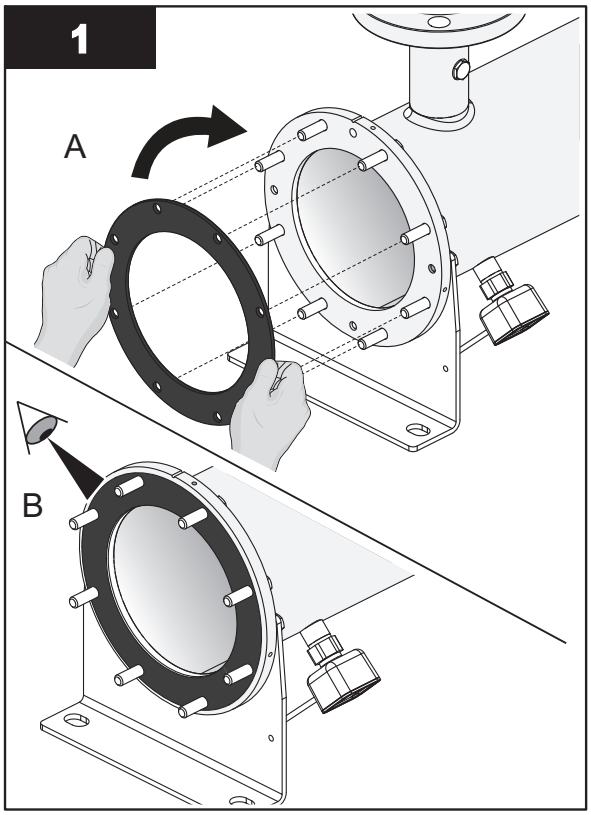
- New End Plate Gasket

Procedure:

Remove:



Install:



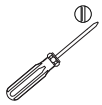
Note: *Make sure the Gasket is properly installed on the UV Chamber End Flange.*

9.11.3 Remove and Replace a Sleeve Bushing

Prerequisites:

- Remove the UV Chamber End Plate / Baffle Assembly. Refer to Section 9.11.1.

Tools:

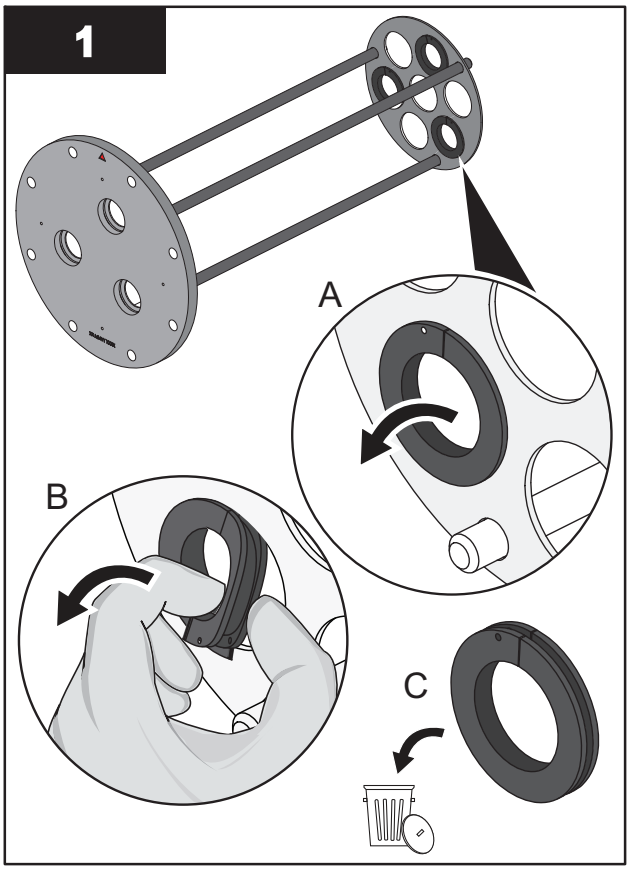


Materials:

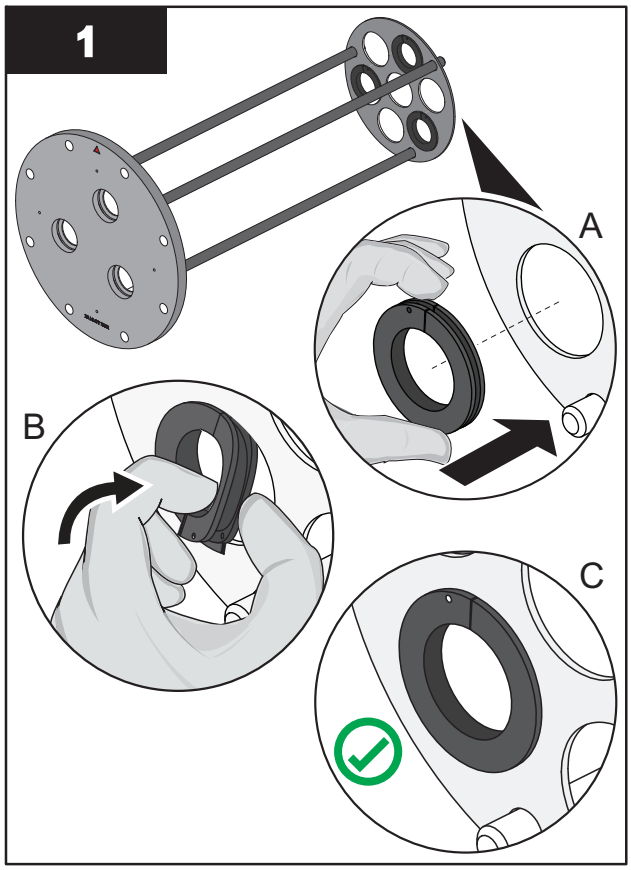
- New Sleeve Bushing

Procedure:

Remove:



Install:



9.12 Control Power Panel

9.12.1 Remove and Replace a Lamp Driver

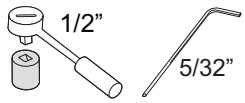
Replace a Lamp Driver when a Lamp Driver failure alarm occurs.

Prerequisites:

- Shut down the UV System. Refer to Section 5.
- Turn the UV Power Unit Switch to “Off”. Refer to Section 5.
- Apply lockout tag out devices as necessary. Refer to Section 4.
- Wait 5 (five) minutes to allow stored energy to dissipate.

  Note: *Using the Lamp Driver ON/OFF switch does not disconnect the main power source.*

Tools:



Materials:

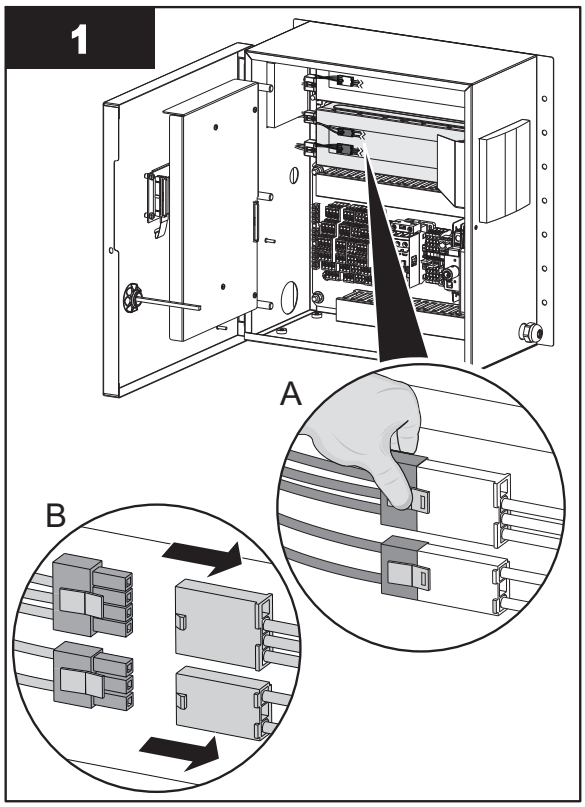
- New Lamp Driver
- Wiring Diagram

Procedure:

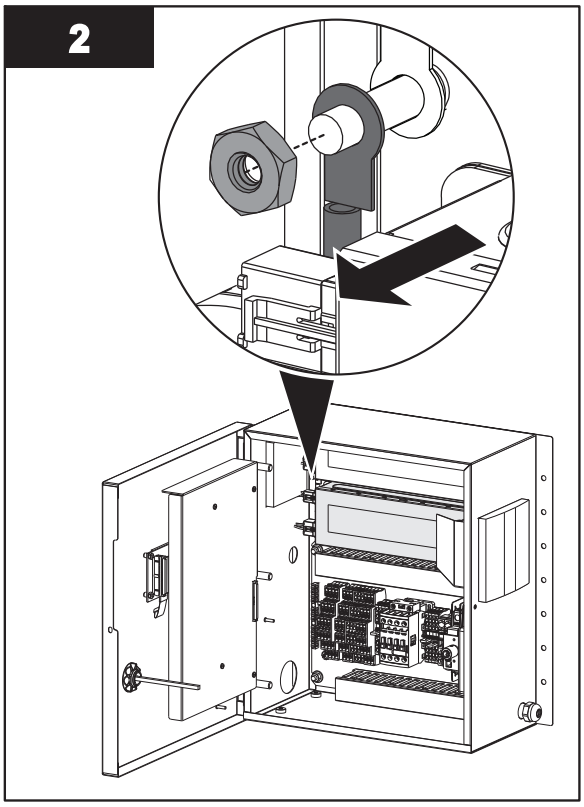
To replace Lamp Driver(s) for:

- Small CPP, proceed to Small CPP Lamp Driver Replacement
- Medium or Large CPP, proceed to Medium or Large CPP Lamp Driver Replacement

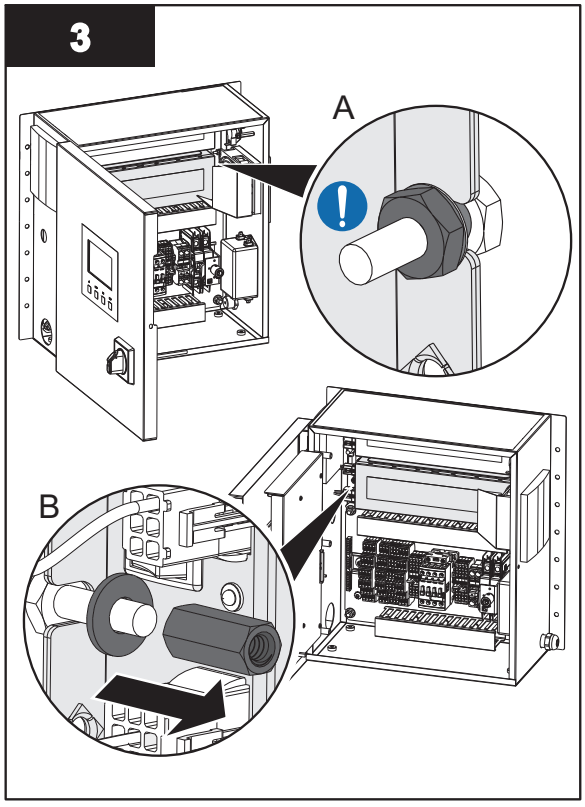
Small CPP Lamp Driver Replacement



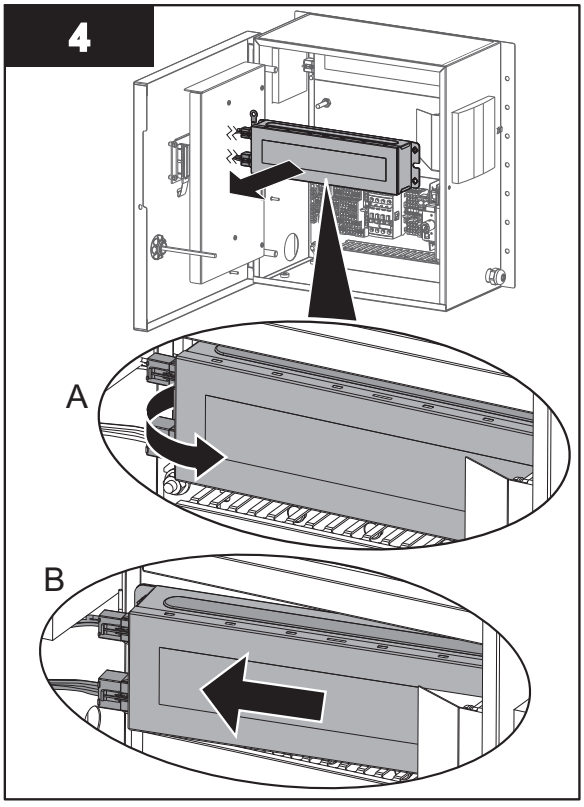
Note: *Disconnect the Lamp Driver connectors.*



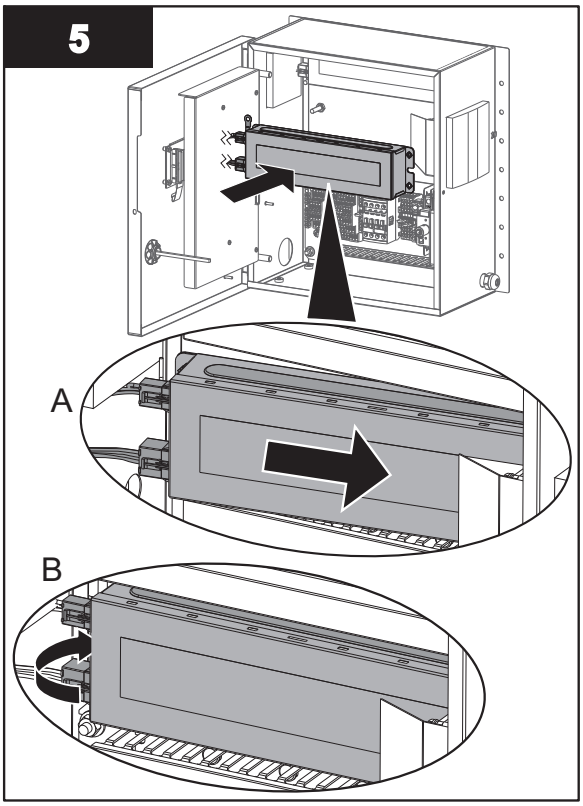
Note: *Remove the Lamp Driver ground wire.*



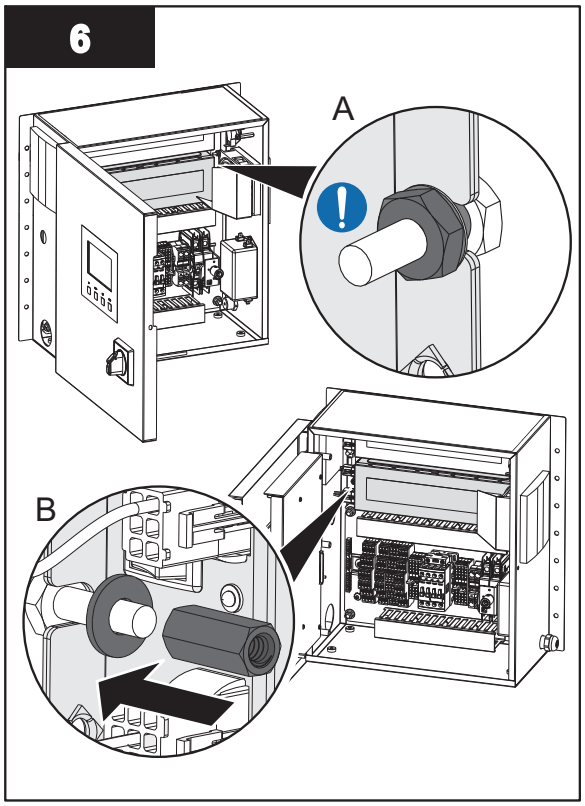
Note: *DO NOT adjust nut shown in detail A.*



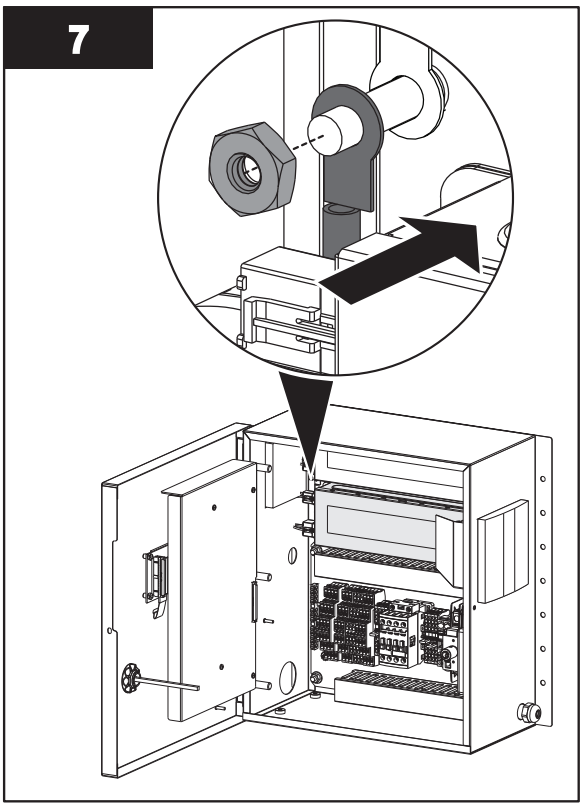
Note: *Remove the faulty Lamp Driver as shown.*



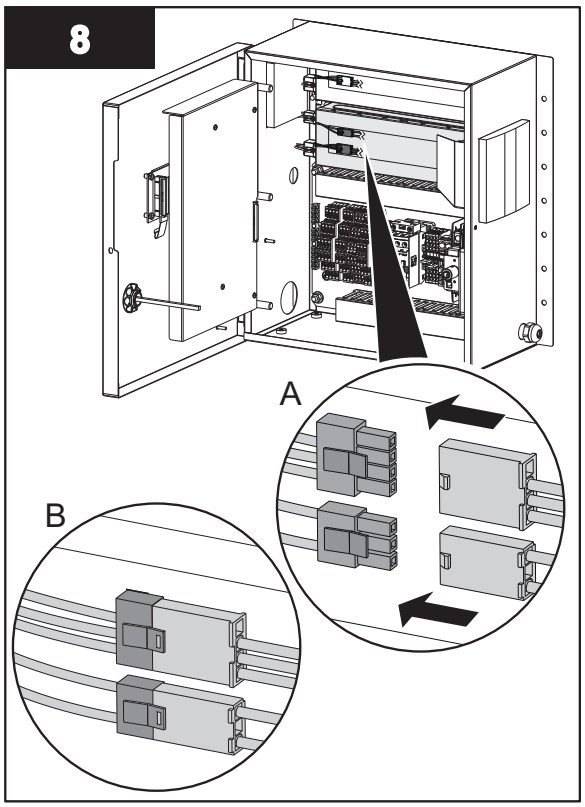
Note: *Install the new Lamp Driver as shown.*



Note: *DO NOT adjust nut shown in detail A.*



Note: *Install the Lamp Driver ground wire.*

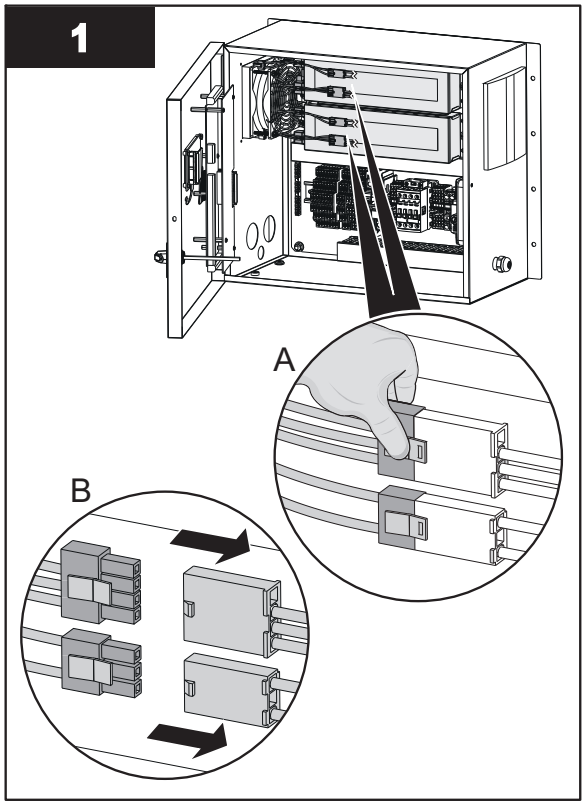


Note: *Connect the new Lamp Driver connectors.*

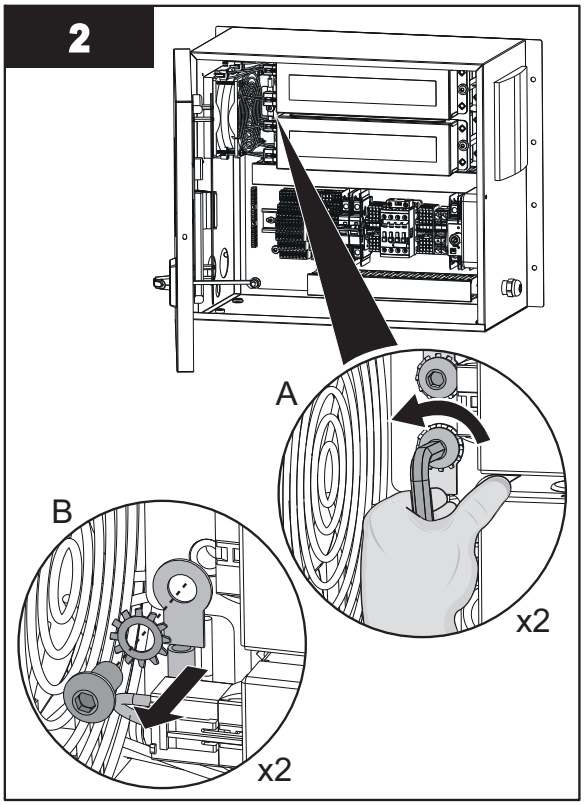
9. Repeat steps 1 to 8 for other Lamp Driver if required.

Medium or Large CPP Lamp Driver Replacement

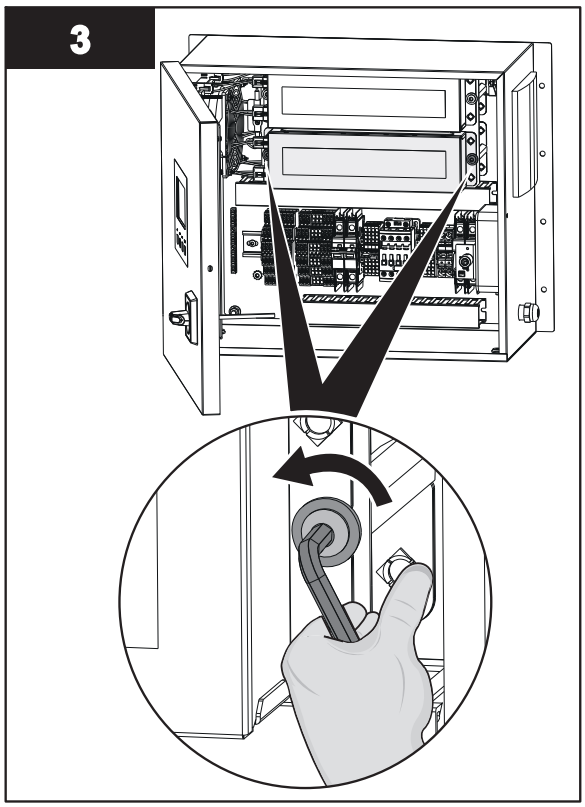
Note: *The illustrations below show Medium CPP. Large CPP has one additional Lamp Driver on each layer.*



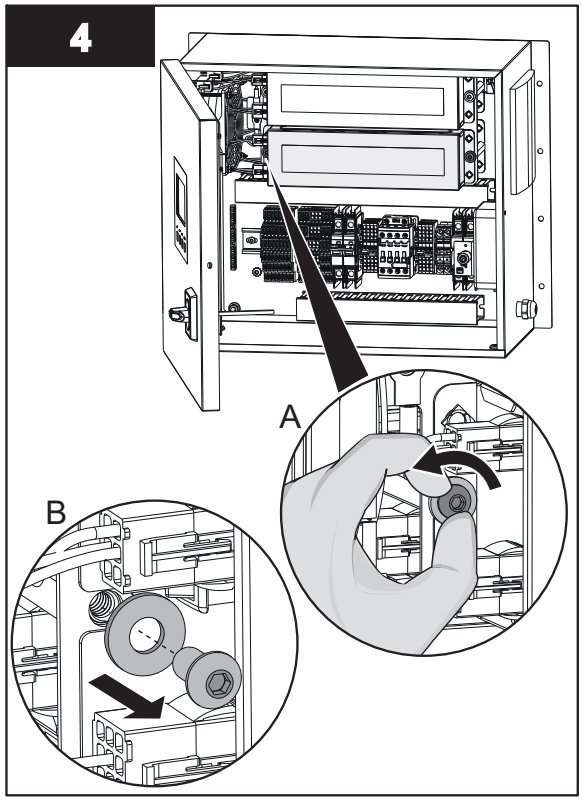
Note: *Disconnect the Lamp Driver connectors.*



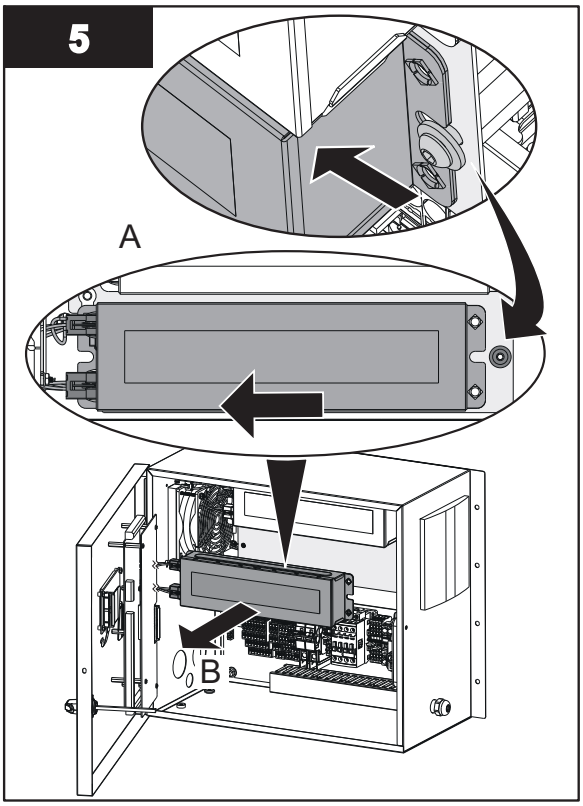
Note: *Remove the Lamp Driver ground screw.*



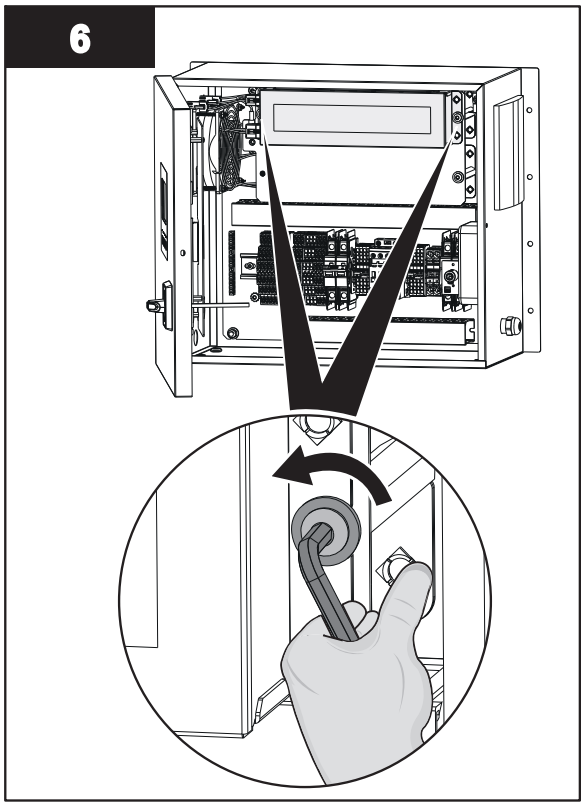
Note: *Loosen the two Lamp Driver mounting screws.*



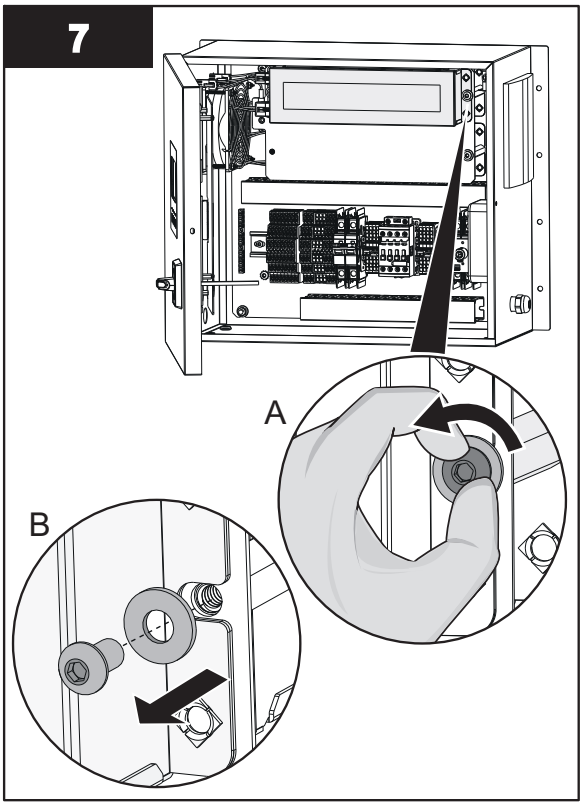
Note: *Remove the Lamp Driver mounting screw shown while supporting Lamp Driver.*



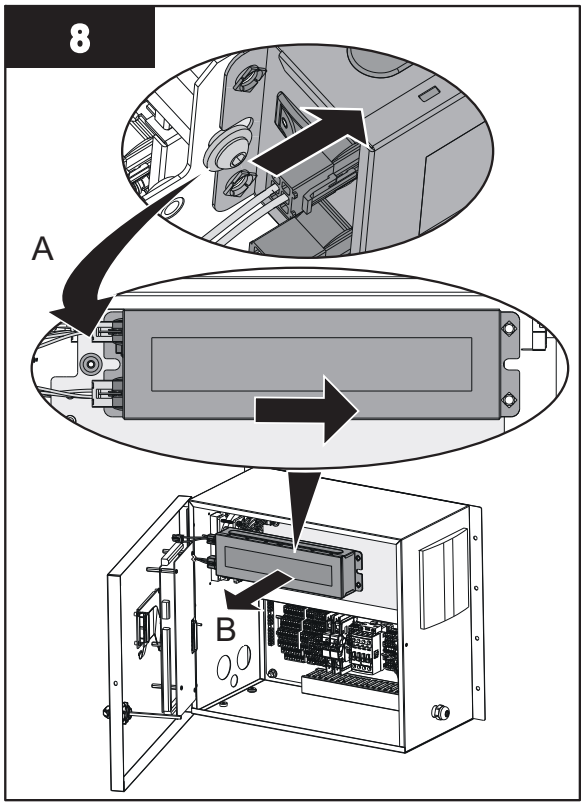
Note: *Remove the bottom Lamp Driver by sliding the Lamp Driver to the side and then remove from panel.*



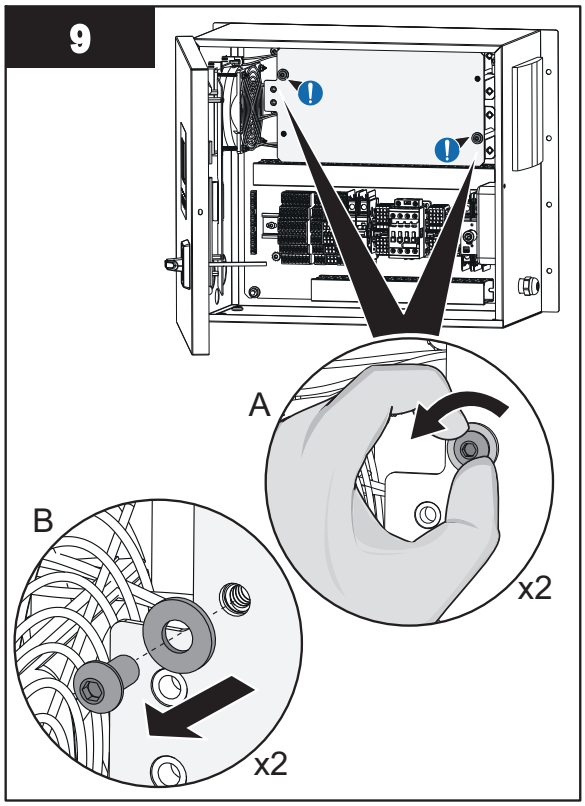
Note: *Loosen the two Lamp Driver mounting screws.*



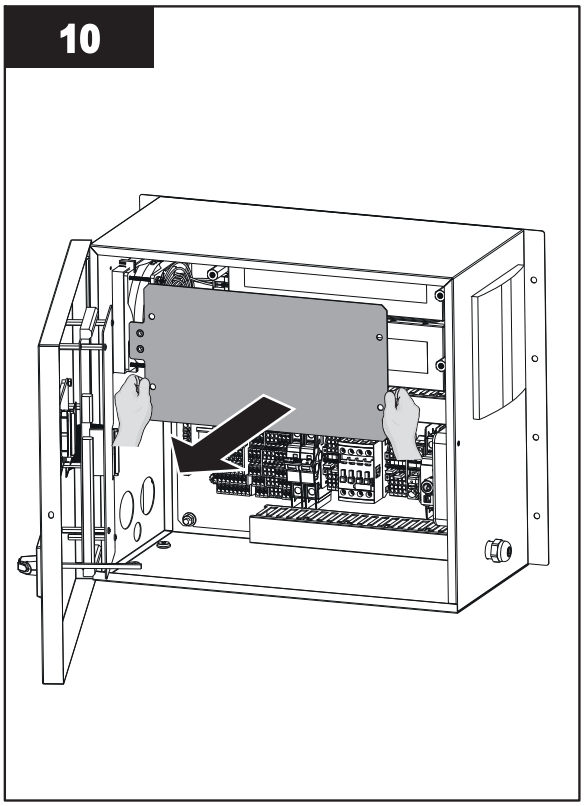
Note: *Remove the Lamp Driver mounting screw shown while supporting Lamp Driver.*



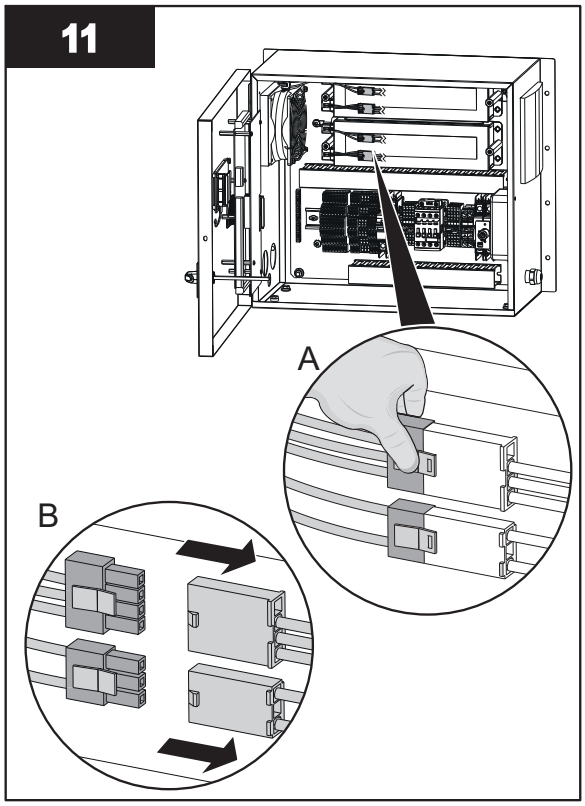
Note: *Remove the top Lamp Driver by sliding the Lamp Driver to the side and then remove from panel.*



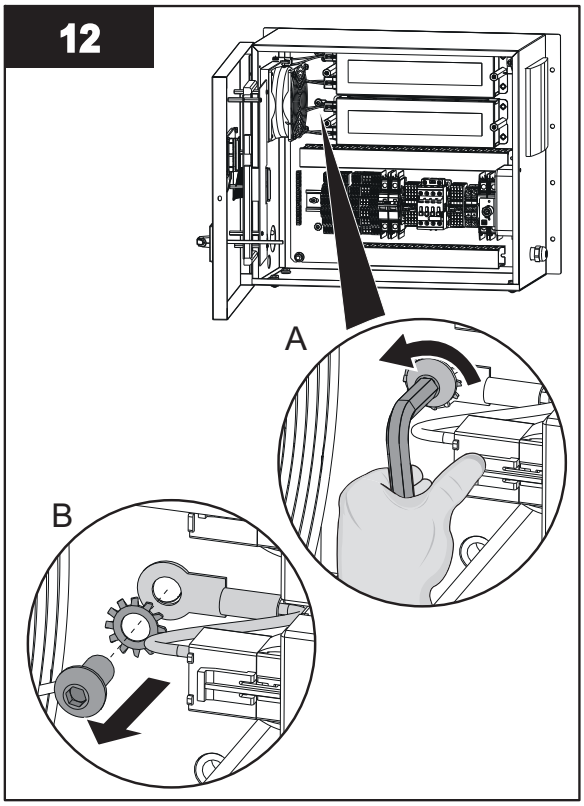
Note: *Remove the two mounting screws holding the front plate to the standoffs if access to rear Lamp Drivers is required.*



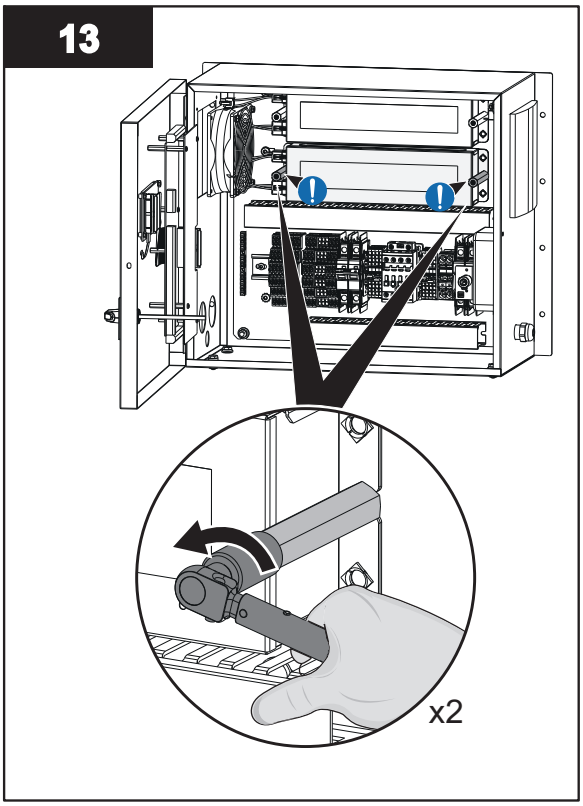
Note: *Remove the front Lamp Driver plate.*



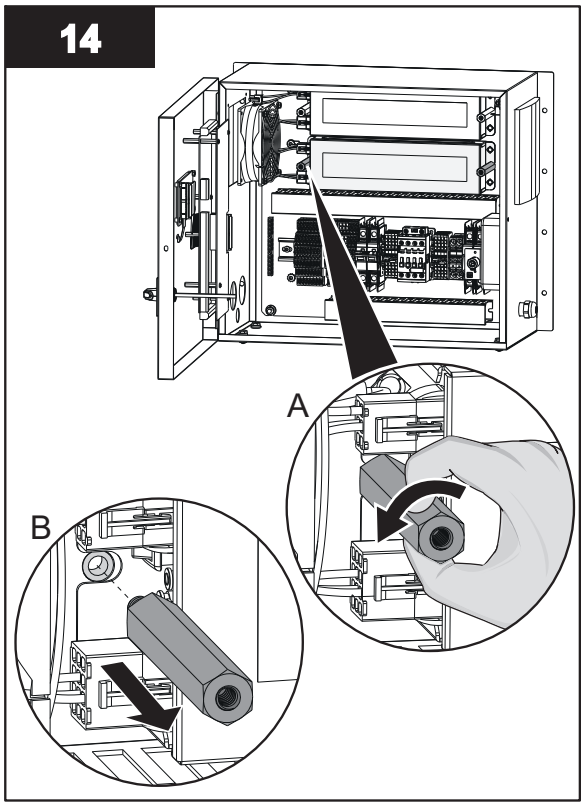
Note: *Disconnect the Lamp Driver connectors.*



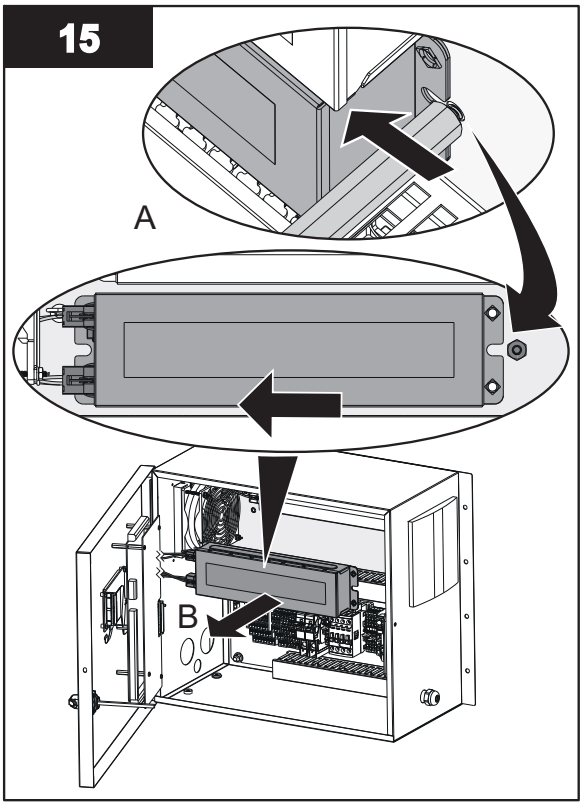
Note: *Remove the Lamp Driver ground screw.*



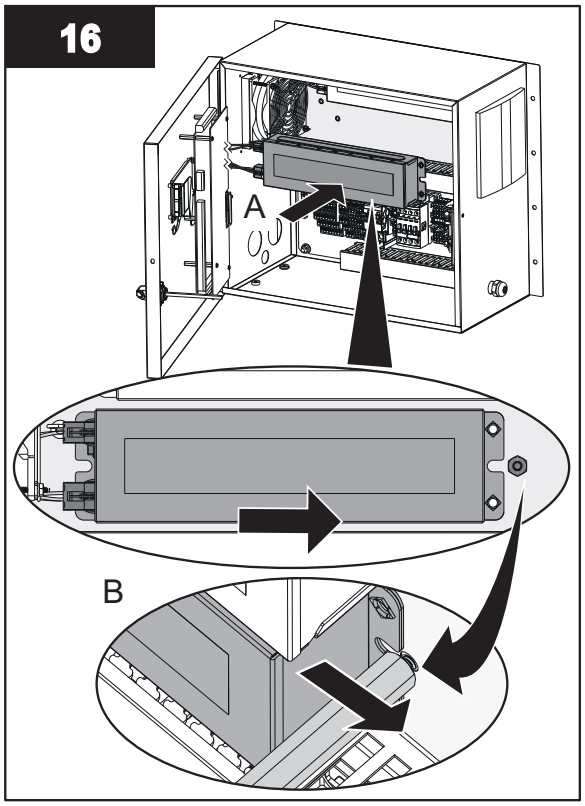
Note: *Loosen the standoffs.*



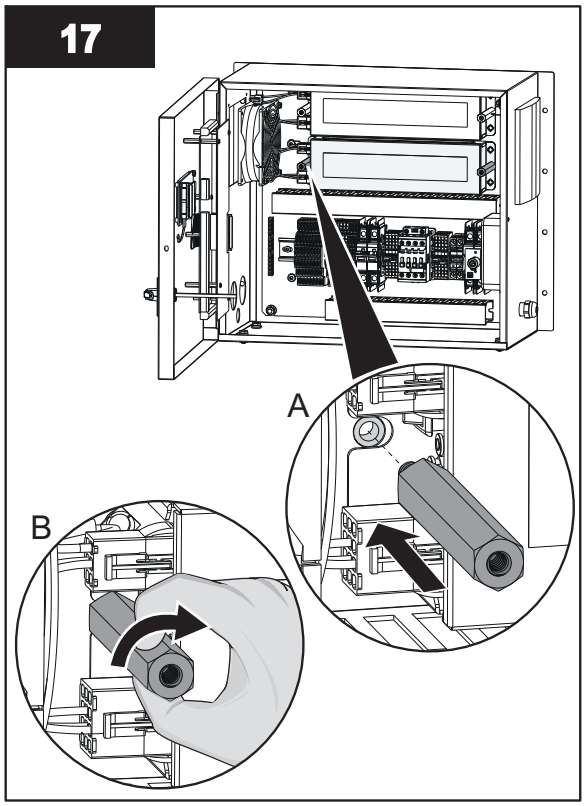
Note: *Remove the standoff shown while supporting Lamp Driver.*



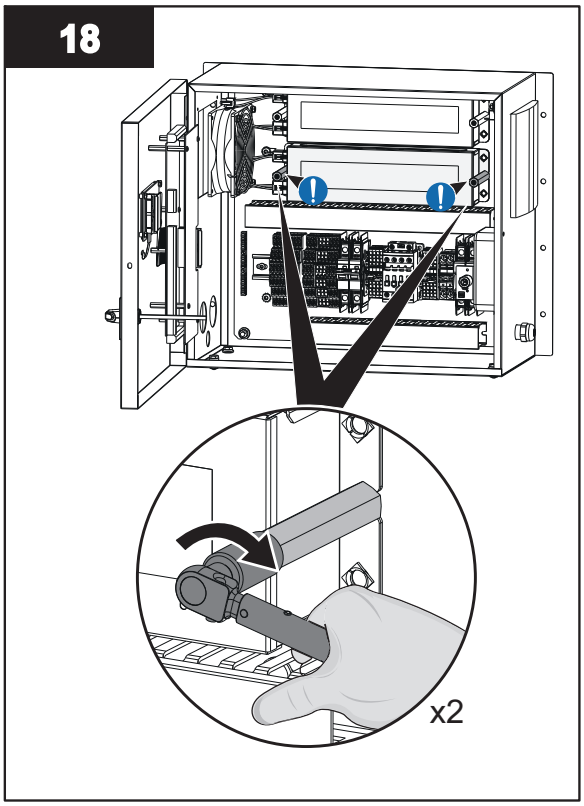
Note: *Remove the faulty Lamp Driver by sliding the Lamp Driver to the side and then remove from panel.*



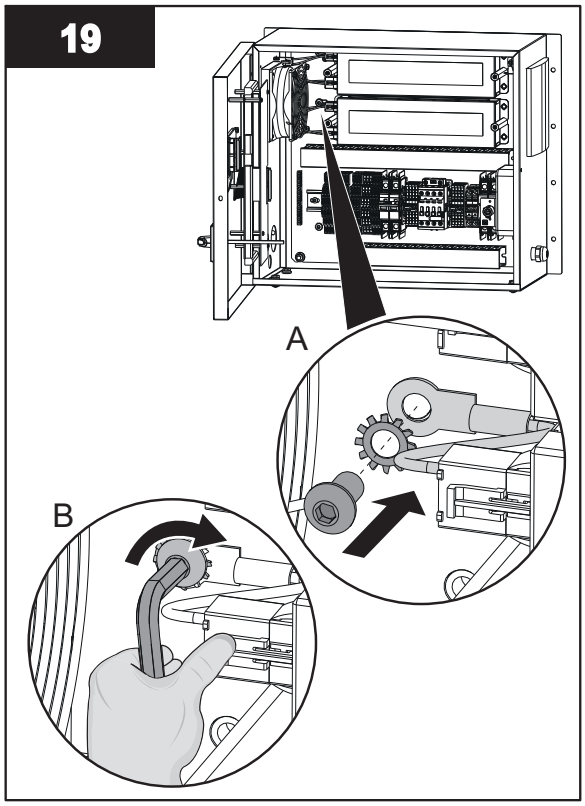
Note: *Install the new Lamp Driver by sliding the Lamp Driver between the standoff and the panel as shown.*



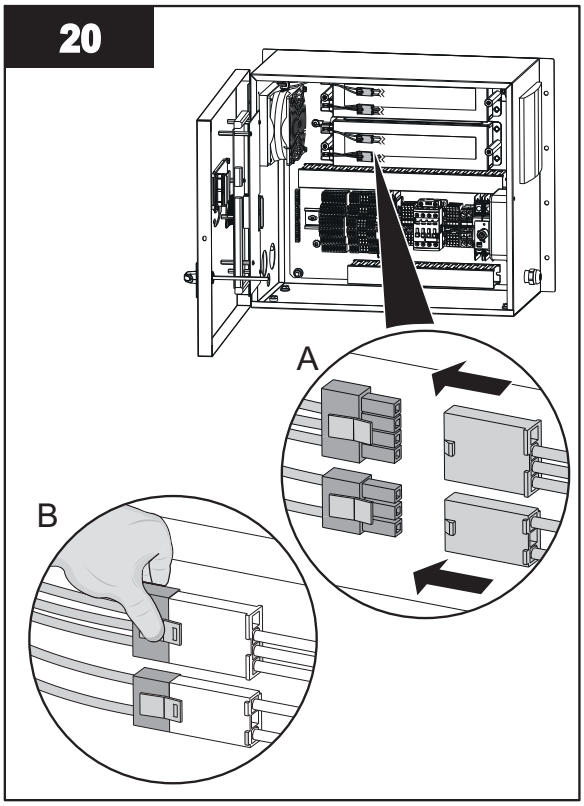
Note: *Install the second standoff.*



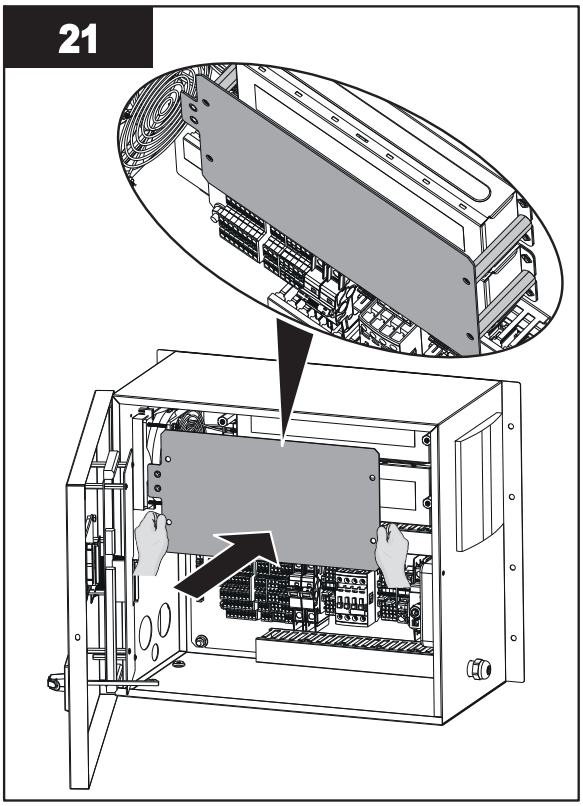
Note: *Tighten the standoffs.*



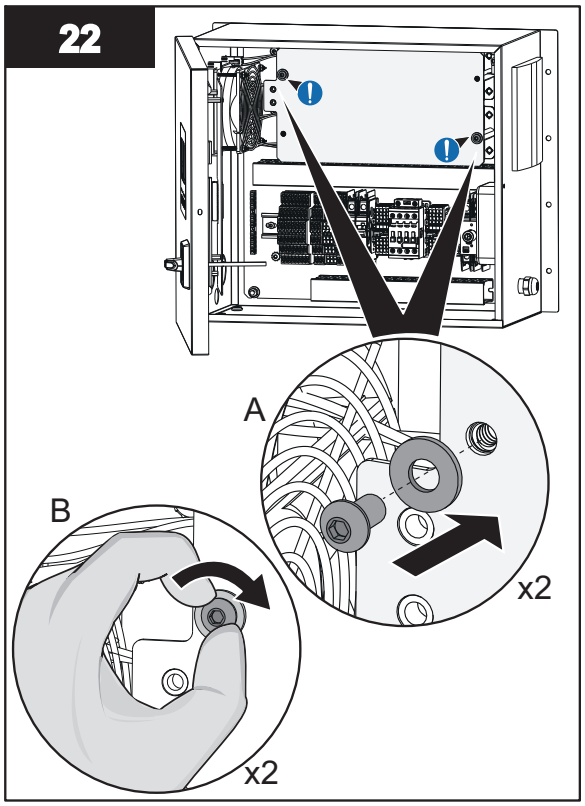
Note: *Install the Lamp Driver ground wire.*



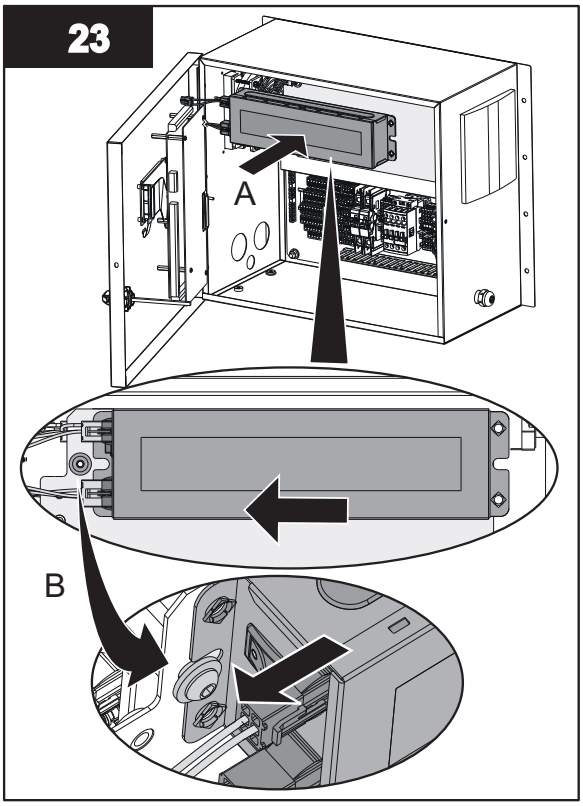
Note: *Connect the new Lamp Driver connectors.*



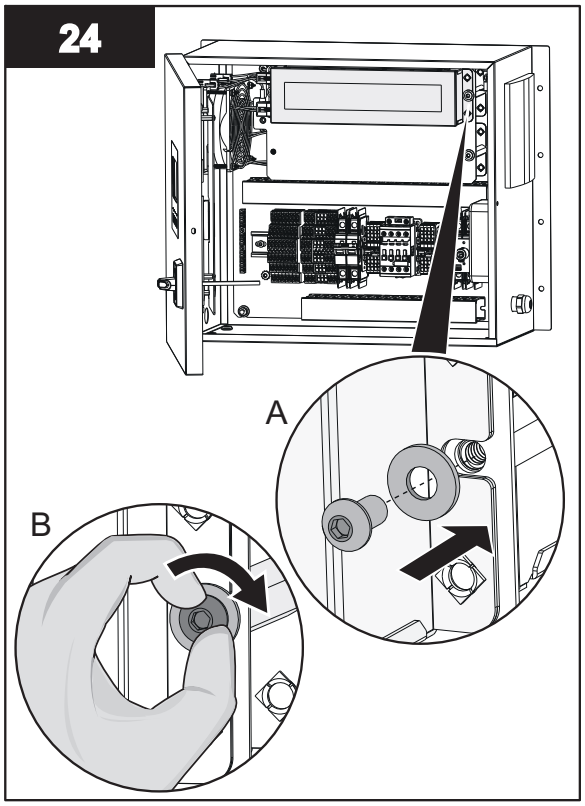
Note: *Position the front plate on the standoffs.*



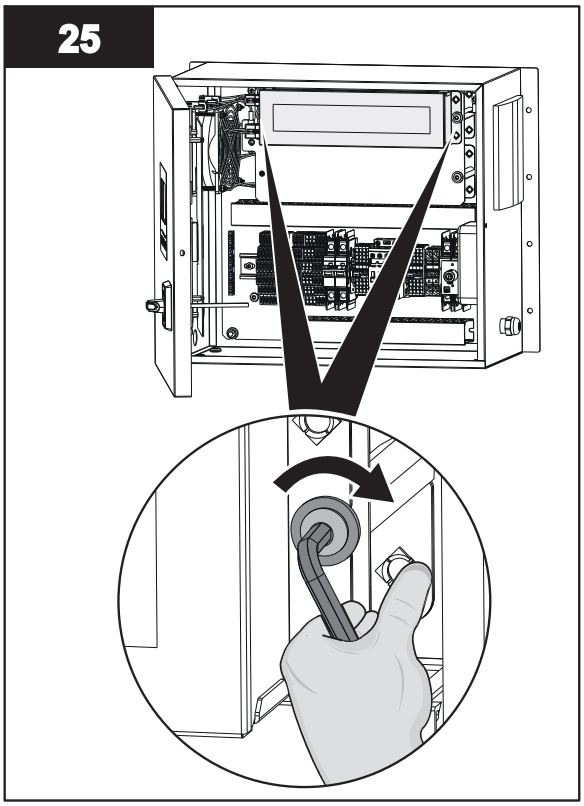
Note: *Loosely install mounting screws in the positions shown.*



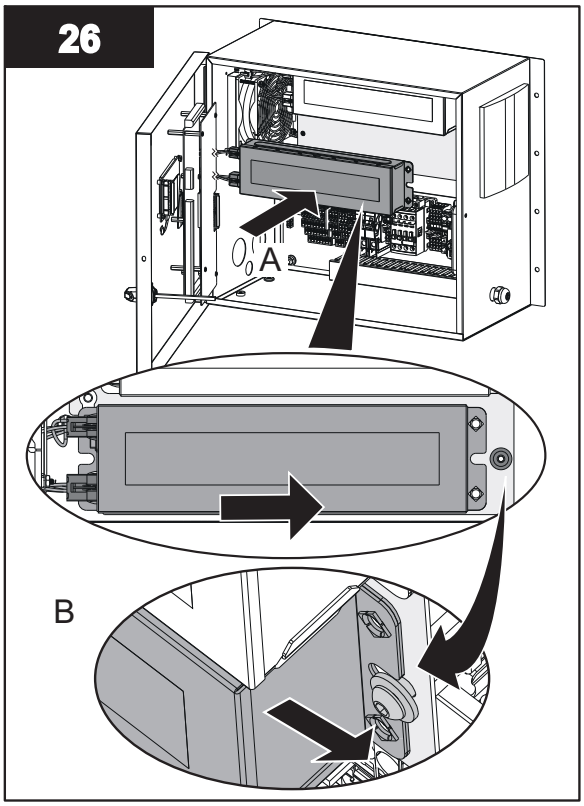
Note: *Install the top Lamp Driver by sliding the Lamp Driver between the screw and the front plate as shown.*



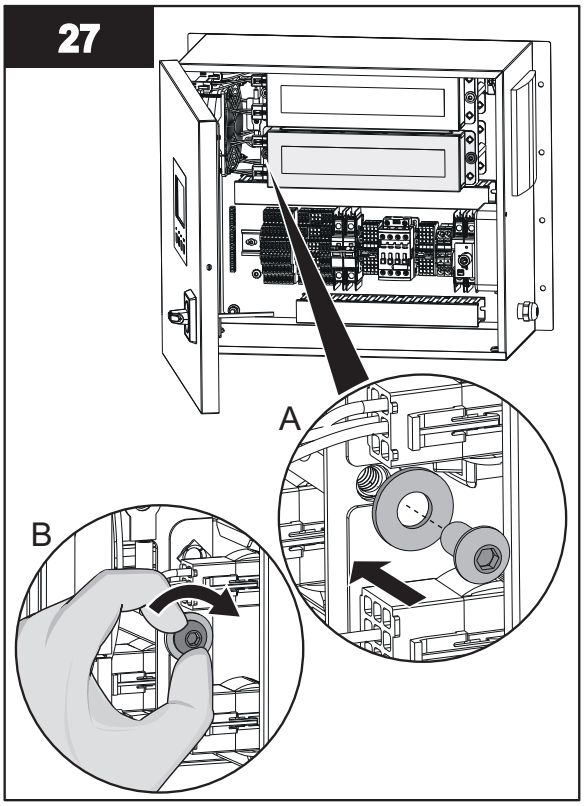
Note: *Install the second mounting screw for the Lamp Driver.*



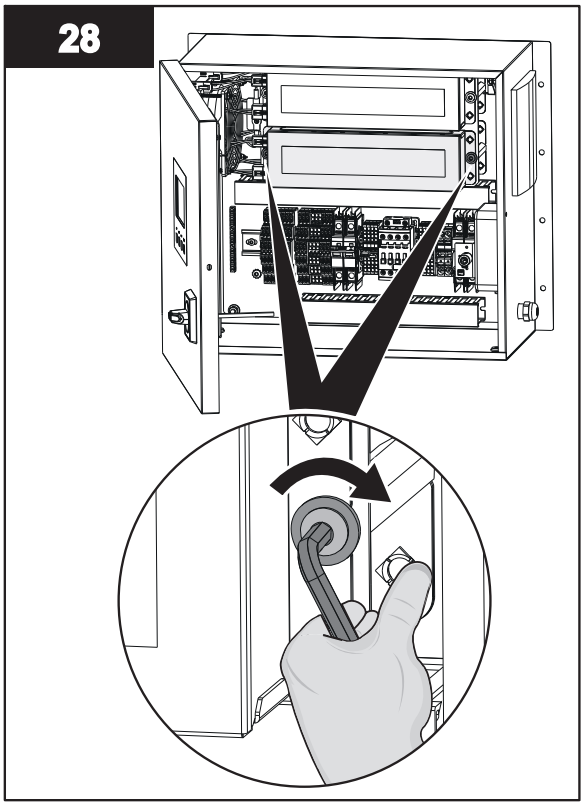
Note: *Tighten the Lamp Driver mounting screws.*



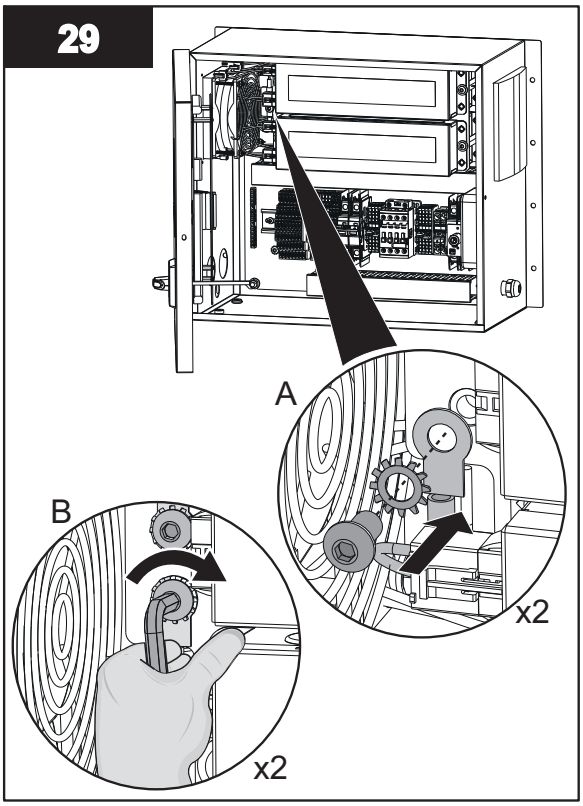
Note: *Install the bottom Lamp Driver by sliding the Lamp Driver between the screw and the front plate as shown.*



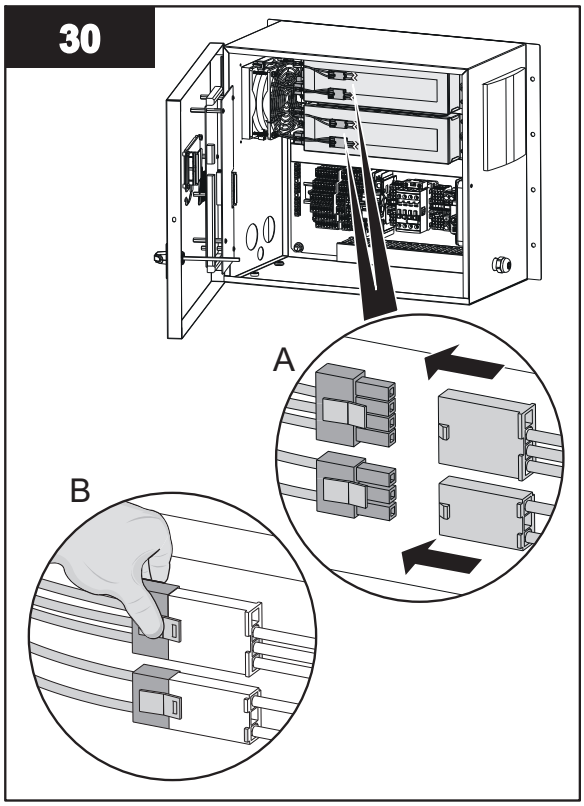
Note: *Install the second mounting screw for the Lamp Driver.*



Note: *Tighten the Lamp Driver mounting screws.*



Note: *Install the Lamp Driver ground wires.*



Note: *Connect the Lamp Driver connectors.*

9.12.2 Air Filters

On some configurations, an air filter is provided for intake fans. The fans are located on the back or side of the Control Power Panel. Visually inspect the air filter once a week to see if any debris or film has settled by snapping off the cover and replacing the filter as necessary.

9.12.3 Cooling Fan

If equipped, check the CPP while in normal operating mode for airflow at the exhaust ports and that no obstructions are present. If there is diminished or no airflow, replace fan (s) immediately.

9.13 Clean the UV Chamber

Use a soft cloth with soap and water or any commercial stainless steel cleaner on the outside of the UV Chamber.

9.14 Clean in Place (CIP)

Refer to Document Number **DC0A0601-011** for the Clean in Place procedure.

Section 10 Troubleshooting

⚠ DANGER

Obey all warning and caution statements. Refer to Section 2.

Read and understand this manual before operating this equipment. Read all user documentation before performing operations, inspections, repair, or maintenance on this equipment.

Only competent personnel should undertake operation, repairs, maintenance, or servicing of equipment described in this section of the manual. If you do not understand the information or procedure explanations in this manual, STOP and contact your Service Provider for assistance.

NOTICE

Injury or damage to the equipment due to improper testing, handling or maintenance will not be covered under the manufacturer's warranty and is the responsibility of the individual performing the troubleshooting. If there is any question about a procedure, contact Aquafine Corporation® before service.

10.1 Alarm Conditions

10.1.1 Low UV Intensity Exceeds Low Limit

Alarm	Active when	Control Action
Low UV Intensity Exceeds Low Limit	The Irradiance measured below the Set Point	Check the UV Alarm Set Point setting and current UV display. If the display reading is less than the Alarm Set Point, the screen will flash Low UV Intensity. Readjust Set Point.
		Check the UV Lamp.
		Check for Lamp Sleeve fouling.
	Loose or disconnected connection on cable	Check all connections and connect them with corresponding color coded wires if needed.

10.1.2 Water Temperature High Alarm

Alarm	Active when	Control Action
Water Temp High Alert Message	Chamber temperature is above set point 122º F (50º C).	System automatic shutdown. When water temperature cools down to below less than 100°F (38° C), unit will turn back ON.
	Loose or disconnected connection on cable	Check all connections and connect them with corresponding color code wires if needed.

10.2 Non-Alarm Conditions

10.2.1 UV Chamber

Symptom	Probable Cause	Remedy
Leaking	Sleeve Bolt	Verify that the sleeve bolt and O-ring are installed properly. Replace if required. (Section 9.7.1)
	UV Chamber pressure exceeds design limit.	Depressurize the UV Chamber.
	Faulty Chamber End Plate O-Rings / Gaskets	Inspect End Plate O-Rings (if applicable) or End Plate gaskets (if applicable) for signs of damage, wear or deterioration. Replace if required. (Section 9.9.2)
	Faulty gasket	Inspect gaskets for signs of damage, wear or deterioration. Replace if required. (Section 7.3.5)
	Faulty O-rings	Inspect O-rings for signs of damage, wear or deterioration. Replace if required. (Section 9.7.1)
	Water Hammer	Water hammer pressure can be 5 to 10 times higher than the static pressure of a water system and can cause leaking and/or breakage to Lamp Sleeves. Open shut off valves gradually to fully open state.
	Broken Lamp Sleeves	Inspect the ends of the sleeves for cracks and chips. Replace broken Lamp Sleeves (Section 9.7.1)
	Damaged Parts - due to heat	Excessive heat can distort the plastic material, resulting in a loss in compression of the O-ring seal.

10.2.2 UV Lamp

Symptom	Probable Cause	Remedy
Premature Lamp Failure	Leaking/Water in Lamp Sleeve	The leak should be repaired immediately. Water can cause the Lamp Socket to arc, corrosion on the lamp pins, burning of the Lamp Sockets and damage to the electrical components.
	Lamp Cycling	Systems in which the UV is turned ON/OFF frequently (more than 3 times) will cause the UV Lamp filament damage.
	Low Electrical Power	The electrical power should be within 5% of the name plate voltage. Small transformers may be required to boost low voltages.
	Improper Electrical Connection	Vibration can cause the electrical connects to become loose. The connection should be inspected and repaired.
	Heat	Excessive heat from no flow conditions can damage the lamps. Do not turn on the system with no process fluid.
	Mechanical Vibration	Vibration from water hammer, pumps, and unsupported piping can cause excess stress to the lamp filament and equipment. Take measure to reduce vibration by controlling flow. Ensure proper connection of all pipings.
Lamp Out on Display	Faulty UV Lamp	Inspect the UV Lamp. Replace if required (Section 9.6.2)
	Improper Lamp socket connection	The socket should be inspected to ensure that the lamp connection is tight and no damage is present. Replace if defective.
	Faulty Lamp Driver	Where 2 (two) consecutive UV Lamps are out, the Lamp Driver may be defective. Replace Lamp Driver. (Section 9.12)

10.2.3 Lamp Socket

Symptom	Probable Cause	Remedy
Lamp Socket Burning	Defective Lamp Socket	A defective Lamp Socket can cause a Lamp Socket to fail and burn. Within the Lamp Socket assembly are metallic receptacles. If the receptacles do not make proper contact with the lamp pins, a high resistance short will occur, eventually resulting in heat buildup in the interior of the socket. Replace Lamp Socket and verify proper connection.
	Corroded Lamp Pins	Corrosion of the lamp pins and socket pins can cause a high resistance short. Replace UV Lamp (Section 9.6.2) and Lamp Socket and verify proper connection.
	Lamp connection	The UV Lamps operate under high voltage. If the lamp pins and socket are not properly engaged, the connection can create an electrical arc, eventually generating enough heat to melt the components. Replace UV Lamp (Section 9.6.2) and Lamp Socket and verify proper connection.
	Lamp Driver	The Lamp Driver controls the electrical power to the UV Lamps. If there is a problem with the Lamp Driver, which results in UV Lamp flickering or over-powering, damage can be done to the lamp connector assembly. Replace Lamp Driver (Section 9.12)

10.2.4 UVI Sensor

Symptom	Probable Cause	Remedy
UVI Sensor Reading Declining	Failed UV Lamp(s)	Inspect the UV Lamp. Replace the UV Lamp, if required. (Section 9.6.2)
	UV Lamps have reached End of Life	Replace the UV Lamp (Section 9.6.2). ***Note:*** *Continued use of the UV Lamps that have exceeded EOL means the system will no longer be able to perform as expected.*
	Lamp sleeves are fouled	Remove the Lamp Sleeves. (Section 9.7.1) Manually Clean the Lamp Sleeves. (Section 9.7.2)
	Process fluid quality has dropped below design limits.	Any changes in fluid transmittance or quality will cause the UVI sensor reading to change. In some applications where fluid is blended, transmittance properties can change.
	Change in Process Fluid Temperature	UV Output of the lamps is sensitive to the process fluid temperature. The setting of the relative UV Intensity 100% set point should be completed at the typical process fluid temperature for the application. For fluid temperatures < 60°F (< 15°C) a period of up to 48 hours of operation may be required to ensure the UVI Sensor output signal has stabilized prior to setting UV Intensity 100% set point.
	Improper Connections	Inspect cable and cable connection for signs of damage or corrosion.
	Damaged Parts due to heat	The UVI Sensor will be damaged by heat when temperatures exceed 194°F (90°C).
	Sensor Window is Fouled	Clean UVI Sensor Window (Section 9.8).

10.2.5 UVI System

Symptom	Probable Cause	Remedy
UV System Non-Performance	Faulty or old UV Lamps	Inspect the UV Lamp. Replace if required (Section 9.6.2)
	Lamp Sleeves are fouled	Manually Clean the Lamp Sleeves. (Section 9.7.2)
	Sampling Procedures	Review sampling procedures as they can contribute to measuring errors.
	Concentration Spikes	Contamination or concentration spikes can result in temporary negative performance.
	Piping Contamination	System sanitation is critical. If the pipe system is contaminated, then performance may be flawed.
	Leaking	Eliminate leakage immediately.
	Flow has exceeded design limits	Reduce flow.
	Process fluid quality has dropped below design limits due to debris, chemicals or materials in the upstream process.	Resolve upstream process.

10.2.6 Control Power Panel

Symptom	Possible Cause	Solution
No Display	Power Loss	Check incoming power to CPP.
	Faulty Wiring	Check for faulty or loose connections.
UV Lamps Will Not Turn ON	Power Loss	Check incoming power to CPP.
	Blown fuse/circuit breaker	Replace fuse or reset circuit breaker after checking for electrical shorts.

Section 11 Replacement Parts and Accessories

Contact Aquafine Corporation® with the listed information to order replacement parts.

Provide the:

- Product name and model number (refer to the front of this manual)
- Part number and description of the replacement part or accessory

If a replacement part is not listed, contact Aquafine Corporation®.

There are multiple elastomer types available for use in the UV system. Refer to Table 6 for wetted elastomers types and their intended use. Always refer to site-specific requirements to determine wetted elastomer type required for the provided system.

Table 6 Wetted Elastomers, Intended Use

Wetted Elastomer Type	System Application(s)				
	Liquid Sugar	Food and Beverage	TOC	Disinfection	Ozone
EPDM - EU1935, FDA	X	X			
EPDM - FDA		X		X	X
FKM - USP Class VI, FDA		X	X	X	X
FKM - FDA		X	X	X	X

11.1 UV Lamp and Lamp Sleeve

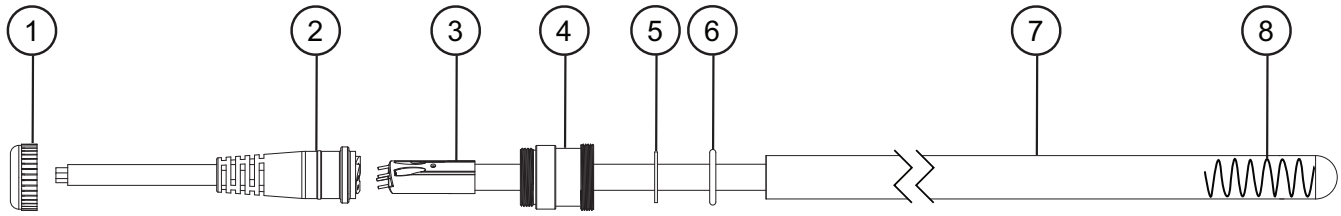


Figure 17 UV Lamp and Lamp Sleeve components

Item	Description	Part Number	System Model																				
			01CDS	02CDS	03CDS	02CDM	03CDM	04CDM	04CTM	06CTM	04CDL	02DDM	04DDM	08DTM	12DTM	04DDL	06DDL	08DDL	08DTL	10DTL	12DTL	08EDL	08FDL	10GDL	12HDL
1	Sleeve Cup Nut	17489-8	✓																						
2	Socket Lamp																								
	Length, 9 feet, 9 inches	52819-3-600-99-105									✓														
	Length, 11 feet	52819-3-600-11-105																					✓		
	Length, 22 feet	52819-3-600-22-105									✓														

Item	Description	Part Number	System Model																					
			01CDS	02CDS	03CDS	02CDM	03CDM	04CDM	04CTM	06CTM	04CDL	02DDM	04DDM	08DTM	12DTM	04DDL	06DDL	08DDL	08DTL	10DTL	12DTL	08EDL	08FDL	10GDL	12HDL
3	**System Application: Food and Beverage, Ozone, Liquid Sugar and Disinfection**																							
	UV Lamp, HX 5P - Standard																							
	15", 254nm	52885-DS15Z[1]		✓																				
	30", 254nm	52885-DS30Z[1]																						
	30", 254nm, 4 Pack	52885-DS30Z-04[1]				✓						✓												
	30", 254nm, 32 Pack	52885-DS30Z-32[1]																						
	60", 254nm	52885-DS60Z[1]																						
	60", 254nm, 4 Pack	52885-DS60Z-04[1]									✓						✓						✓	
	60", 254nm, 32 Pack	52885-DS60Z-32[1]																						
	System Application: TOC																							
	UV Lamp, HX 5P - Standard																							
	30", 185nm	52885-TS30N[1]																						
	30", 185nm, 4 Pack	52885-TS30N-04[1]							✓					✓										
	30", 185nm, 32 Pack	52885-TS30N-32[1]																						
	60", 185nm	52885-TS60N[1]																						
	60", 185nm, 4 Pack	52885-TS60N-04[1]																		✓				
	60", 185nm, 32 Pack	52885-TS60N-32[1]																						
	System Application: Food and Beverage, Ozone, Liquid Sugar and Disinfection																							
	UV Lamp, HX 5P - Validated																							
	15", 254nm	52885-DV15Z[1]		✓																				
	30", 254nm	52885-DV30Z[1]				✓						✓												
	60", 254nm	52885-DV60Z[1]									✓						✓						✓	
	System Application: TOC																							
	UV Lamp, HX 5P - Validated																							
	30", 185nm	52885-TV30N[1]							✓					✓										
	60", 185nm	52885-TV60N[1]																		✓				
4	Sleeve Bolt	52838												✓										
5	Sleeve Bolt Washer, FKM	53439												✓										
6	O-ring, 1 x 1/8[2]																							
	FKM, FDA	002190-214F												✓										
	FKM, USP Class VI, FDA	002287-214										✓												
	EPDM, FDA	002211-214F		✓							✓					✓							✓	
	EPDM, EU1935, FDA	002304-214		✓							✓					✓							✓	
7	Lamp Sleeve, Quartz																							
	25mm x 17" SE	908116-017		✓																				
	25mm x 30" SE	908116-030					✓						✓											
	25mm x 60" SE	908116-060									✓										✓			

Item	Description	Part Number	System Model																						
			01CDS	02CDS	03CDS	02CDM	03CDM	04CDM	04CTM	06CTM	04CDL	02DDM	04DDM	08DTM	12DTM	04DDL	06DDL	08DDL	08DTL	10DTL	12DTL	08EDL	08FDL	10GDL	12HDL
8	Spring	52861	✓																						

[1] This component contains Mercury. Dispose according to Local, State or Federal laws.

[2] Refer to Table 6 for wetted elastomer types and their intended use. Always refer to site-specific requirements to determine wetted elastomer type required for the provided system.

Note: *Validated UV Lamps have been burned in for a period of 100 hours and measured.*

11.2 Systems with UVI Sensor

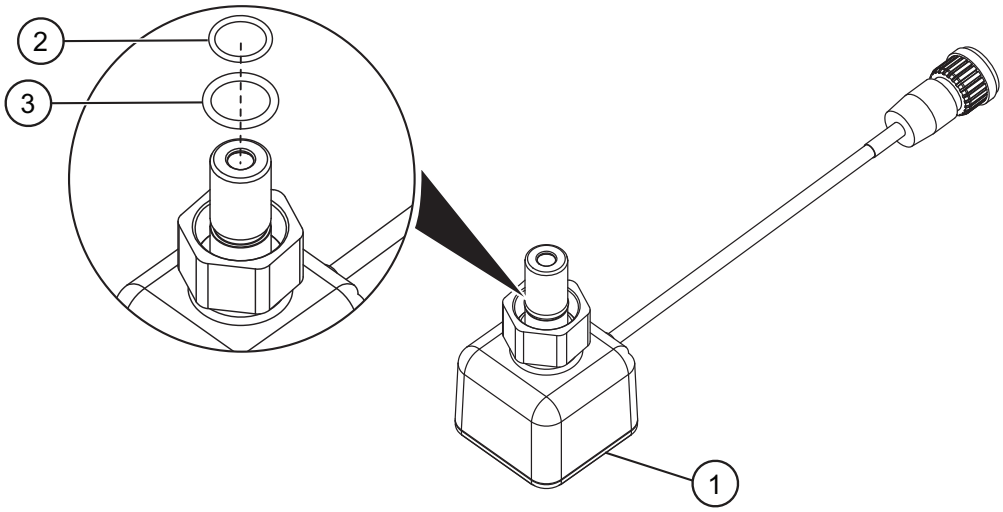


Figure 18 UVI Sensor

Item	Description	Part Number	System Model																						
			01CDS	02CDS	03CDS	02CDM	03CDM	04CDM	04CTM	06CTM	04CDL	02DDM	04DDM	08DTM	12DTM	04DDL	06DDL	08DDL	08DTL	10DTL	12DTL	08EDL	08FDL	10GDL	12HDL
Application: Food and Beverage, TOC, Ozone and Disinfection **Wetted Elastomers Used: FKM, FDA**																									
1	UVI Sensor Assembly	270309R-001	✓																						
2	O-ring, .426 ID x 0.05	002222	✓																						
3	O-ring, 0.489 ID x 0.07	002026	✓																						
Application: Food and Beverage, TOC, Ozone and Disinfection **Wetted Elastomers Used: FKM, USP Class VI, FDA**																									
1	UVI Sensor Assembly	270309R-002	✓																						
2	O-ring, .426 ID x 0.05	002288	✓																						
3	O-ring, 0.489 ID x 0.07	002287-014	✓																						

Item	Description	Part Number	System Model																					
			01CDS	02CDS	03CDS	02CDM	03CDM	04CDM	04CTM	06CTM	04CDL	02DDM	04DDM	08DTM	12DTM	04DDL	06DDL	08DDL	08DTL	10DTL	12DTL	08EDL	08FDL	10GDL	12HDL
Application: Liquid Sugar **Wetted Elastomers Used: EPDM, EU1935, FDA**																								
1	UVI Sensor Assembly	270309R-004																✓					✓	
	UVI Sensor Assembly	270309R-005										✓				✓						✓		✓
	UVI Sensor Assembly	270309R-007		✓							✓													
Application: Food and Beverage **Wetted Elastomers Used: EPDM, EU1935, FDA**																								
1	UVI Sensor Assembly	270309R-006		✓							✓					✓							✓	
Application: Liquid Sugar, Food and Beverage **Wetted Elastomers Used: EPDM, EU1935, FDA**																								
2	O-ring, 10 x 13 x 1.5	002303		✓							✓					✓							✓	
3	O-ring, 1/2 x 1/16	002304-014		✓							✓					✓							✓	

11.3 System without UVI Sensor

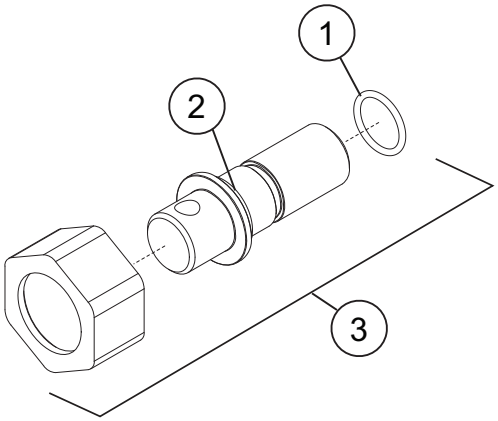


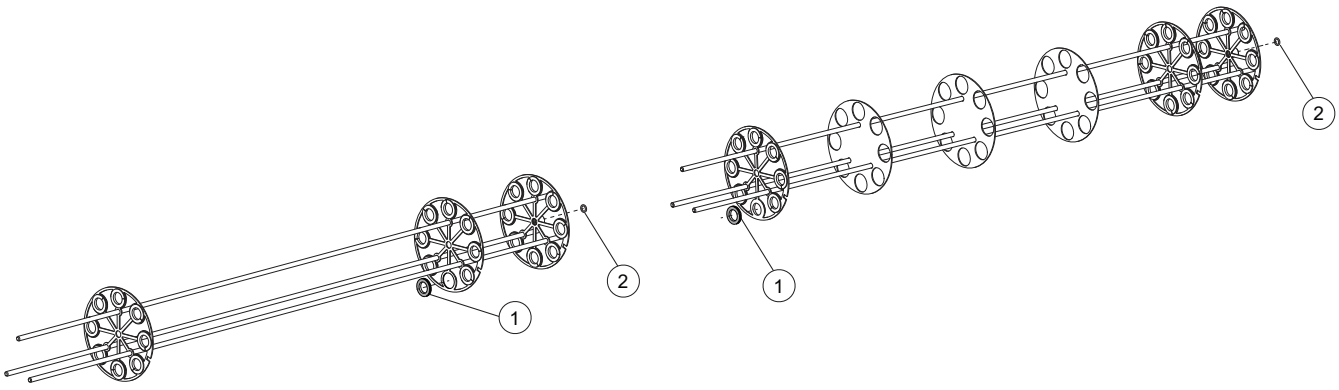
Figure 19 UVI Sensor - Plug Kit

Item	Description	Part Number	System Model																					
			01CDS	02CDS	03CDS	02CDM	03CDM	04CDM	04CTM	06CTM	04CDL	02DDM	04DDM	08DTM	12DTM	04DDL	06DDL	08DDL	08DTL	10DTL	12DTL	08EDL	08FDL	10GDL	12HDL
1	O-ring, .426ID x 0.05[1]																							
	FKM, FDA	002222												✓										
	FKM, USP Class VI, FDA	002288										✓												
	O-ring, 10 x 13 x 1.5																							
	EPDM, EU1935, FDA	002303		✓							✓					✓							✓	

Item	Description	Part Number	System Model																				
			01CDS	02CDS	03CDS	02CDM	03CDM	04CDM	04CTM	06CTM	04CDL	02DDM	04DDM	08DTM	12DTM	04DDL	06DDL	08DDL	08DTL	10DTL	12DTL	08EDL	08FDL	10GDL	12HDL
2	O-ring, 1/2 x 1/16[1]																								
	FKM, FDA	002190-014F												✓											
	FKM, USP Class VI, FDA	002287-014										✓													
	EPDM, FDA	002211-014F	✓								✓			✓		✓						✓			
	EPDM, EU1935, FDA	002304-014	✓								✓			✓		✓						✓			
3	Sensor Port Plug Kit[1]																								
	FKM, FDA	52863-V												✓											
	FKM, USP Class VI, FDA	52863-C										✓													
	EPDM, FDA	52863-E	✓								✓			✓		✓						✓			
	EPDM, EU1935, FDA	52863-F	✓								✓			✓		✓						✓			

[1] Refer to Table 6 for wetted elastomer types and their intended use. Always refer to site-specific requirements to determine wetted elastomer type required for the provided system.

11.4 Baffle Assembly



Disinfection, Ozone and Liquid Sugar TOC

Figure 20 Baffle Assembly

Item	Description	Part Number	System Model																				
			01CDS	02CDS	03CDS	02CDM	03CDM	04CDM	04CTM	06CTM	04CDL	02DDM	04DDM	08DTM	12DTM	04DDL	06DDL	08DDL	08DTL	10DTL	12DTL	08EDL	08FDL	10GDL	12HDL
1	Sleeve Bushing	53446												✓											
2	O-ring, 7/16 x 3/32[1]																								
	FKM, FDA	002190-111F													✓										
	FKM, USP Class VI, FDA	002287-111												✓											
	EPDM, FDA	002211-111F				✓					✓					✓						✓			
	EPDM, EU1935, FDA	002304-111				✓					✓					✓						✓			

[1] Refer to Table 6 for wetted elastomer types and their intended use. Always refer to site-specific requirements to determine wetted elastomer type required for the provided system.

11.5 UV Chamber

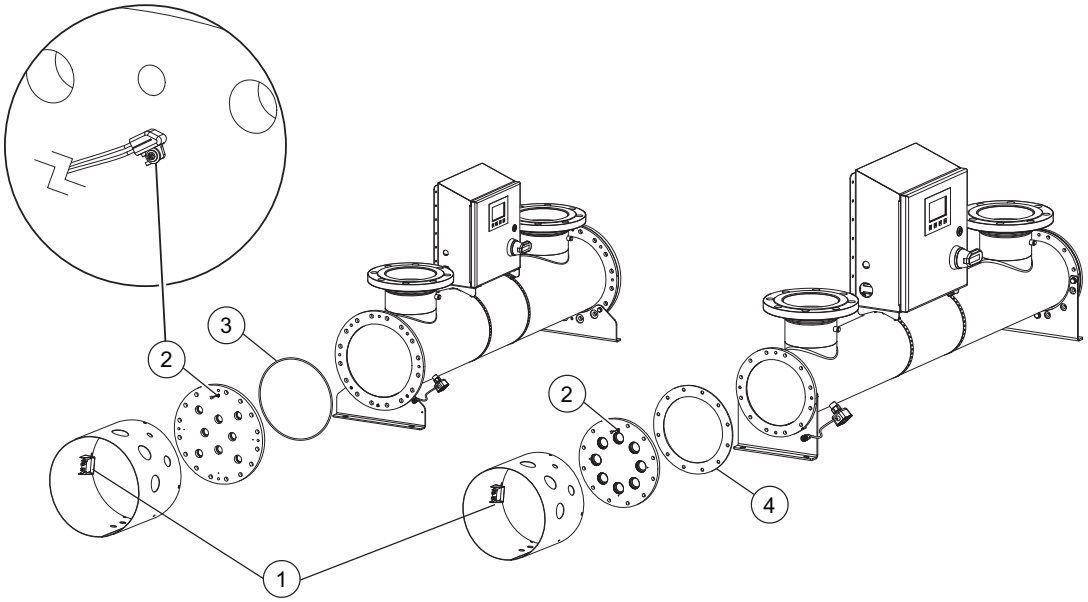


Figure 21 UV Chamber Components

Item	Description	Part Number	System Model																						
			01CDS	02CDS	03CDS	02CDM	03CDM	04CDM	04CTM	06CTM	04CDL	02DDM	04DDM	08DTM	12DTM	04DDL	06DDL	08DDL	08DTL	10DTL	12DTL	08EDL	08FDL	10GDL	12HDL
1	Limit Switch	793851												✓											
2	Temperature Switch, 40C	52855												✓											
	Temperature Switch, 55C (Liquid Sugar Applications only)	52855-065			✓						✓					✓							✓		
3	O-ring, End Flange[1]																								
	FKM, FDA	52796-378																				✓			
		52796-382																					✓		
		52796-384																							
		52796-386																						✓	
	EPDM, FDA	002211-378																				✓			
		002211-382																					✓		
		002211-384																							
		002211-386																						✓	
	EPDM, EU1935, FDA	002304-378																				✓			
		002304-382																					✓		
		002304-384																							
		002304-386																						✓	

Item	Description	Part Number	System Model																							
			01CDS	02CDS	03CDS	02CDM	03CDM	04CDM	04CTM	06CTM	04CDL	02DDM	04DDM	08DTM	12DTM	04DDL	06DDL	08DDL	08DTL	10DTL	12DTL	08EDL	08FDL	10GDL	12HDL
4	Gasket, End Flange[1]																									
	FKM, FDA	52769-06V					✓																			
		52769-08V														✓										
	FKM, USP Class VI, FDA	52769-06C					✓																			
		52769-08C														✓										
	EPDM, FDA	52769-06E				✓					✓															
		52769-08E										✓				✓										
	EPDM, EU1935, FDA	52769-06F				✓					✓															
		52769-08F										✓				✓										

[1] Refer to Table 6 for wetted elastomer types and their intended use. Always refer to site-specific requirements to determine wetted elastomer type required for the provided system.

11.5.1 Port Plugs - UV Chamber Flanged Option

Item	Description	System Model																							
		01CDS	02CDS	03CDS	02CDM	03CDM	04CDM	04CTM	06CTM	04CDL	02DDM	04DDM	08DTM	12DTM	04DDL	06DDL	08DDL	08DTL	10DTL	12DTL	08EDL	08FDL	10GDL	12HDL
		Part Number																							
1	Sample Port Plug	907782-0422316																							
2	Drain Port Plug	907782-0622316																				907782-0822316			

11.5.2 Port Plugs - UV Chamber Sanitary Ferrule Option

Item	Description	Part Number	System Model																							
			01CDS	02CDS	03CDS	02CDM	03CDM	04CDM	04CTM	06CTM	04CDL	02DDM	04DDM	08DTM	12DTM	04DDL	06DDL	08DDL	08DTL	10DTL	12DTL	08EDL	08FDL	10GDL	12HDL
1	End cap, Ferrule 1/2" & 3/4"	793643-001													✓											
2	[1]Gasket, 1/2” & 3/4”																									
	FKM, FDA	795888-005													✓											
	FKM, USP Class VI, FDA	53463-001											✓													
	EPDM, FDA	793644-001			✓							✓				✓									✓	
	EPDM, EU1935, FDA	798291-005			✓							✓				✓									✓	
3	Clamp, Sanitary 1/2” & 3/4”	791195													✓											
	Application: Liquid Sugar																									
	Clamp, Sanitary 1/2” & 3/4” Single Pin Nut	798314			✓							✓				✓									✓	
4	End Cap, Ferrule, 1" & 1.5"	793643-002													✓											

Item	Description	Part Number	System Model																					
			01CDS	02CDS	03CDS	02CDM	03CDM	04CDM	04CTM	06CTM	04CDL	02DDM	04DDM	08DTM	12DTM	04DDL	06DDL	08DDL	08DTL	10DTL	12DTL	08EDL	08FDL	10GDL	12HDL
5	[1]Gasket, 1" & 1 1/2"																							
	FKM, FDA	795888-015												✓										
	FKM, USP Class VI, FDA	53463-002										✓												
	EPDM, FDA	793644-002		✓							✓					✓						✓		
	EPDM, EU1935, FDA	798291-010		✓							✓					✓						✓		
6	Clamp, Sanitary 1" & 1 -1/2"	40234												✓										
	Application: Liquid Sugar																							
	Clamp, Sanitary 1" & 1 -1/2" Single Pin Nut	798318		✓							✓					✓						✓		

[1] Refer to Table 6 for wetted elastomer types and their intended use. Always refer to site-specific requirements to determine wetted elastomer type required for the provided system.

11.6 Control Power Panel

Refer to Electrical Drawings, Bill of Materials for additional CPP replacement parts.

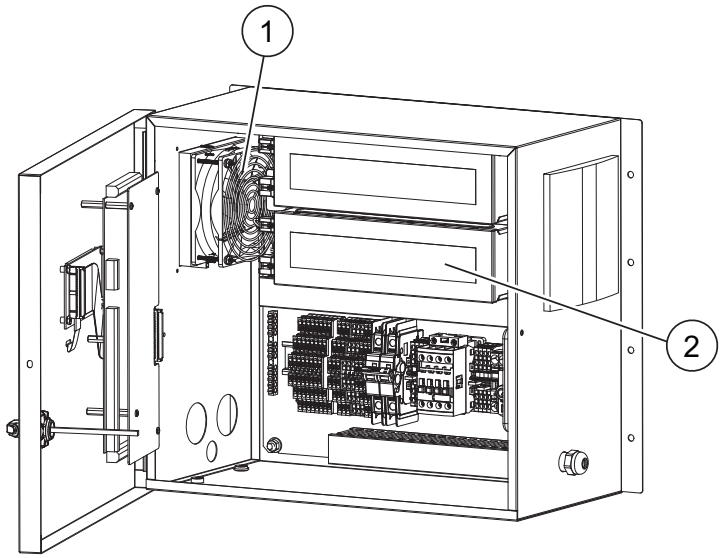


Figure 22 CPP Components

Item	Description	Part Number
1	Fan	52912-BTHR
2	Lamp Driver, Electronic - for use with 15” UV Lamps Lamp Driver, Electronic - for use with 30” and 60” UV Lamps	43474-4 43474-3
-	Fan Filter Mat 5"x5” EMC (Quantity 5)	916850-3237066
-	Fan Filter Mat 5"x5” Standard (Quantity 5)	916850-3321700
-	Fan Filter Mat 6"x6” EMC (Quantity 5)	916850-3238066
-	Fan Filter Mat 6"x6” Standard (Quantity 5)	916850-3322700

11.7 Miscellaneous

Note: *These components are provided with the system.*

Description	Part Number
Face Shield	906002
Operator Kit (includes 1 Sleeve Removal Tool and 1 Sleeve Bolt Removal Tool)	52929
Sleeve Removal Tool	52923
Sleeve Bolt Removal Tool	52917