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.

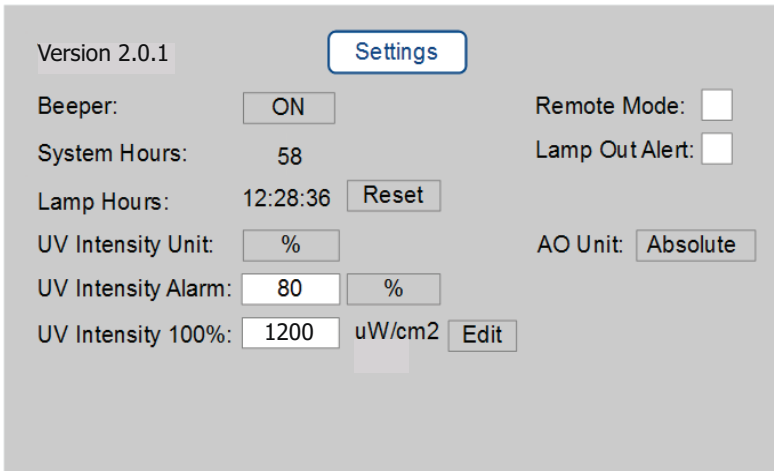


Figure 15 Settings Screen

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.

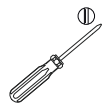
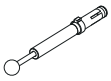
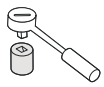
Read and understand this manual before operating this equipment. Read all user documentation before performing operations, inspections, repair, or maintenance on this equipment.

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.

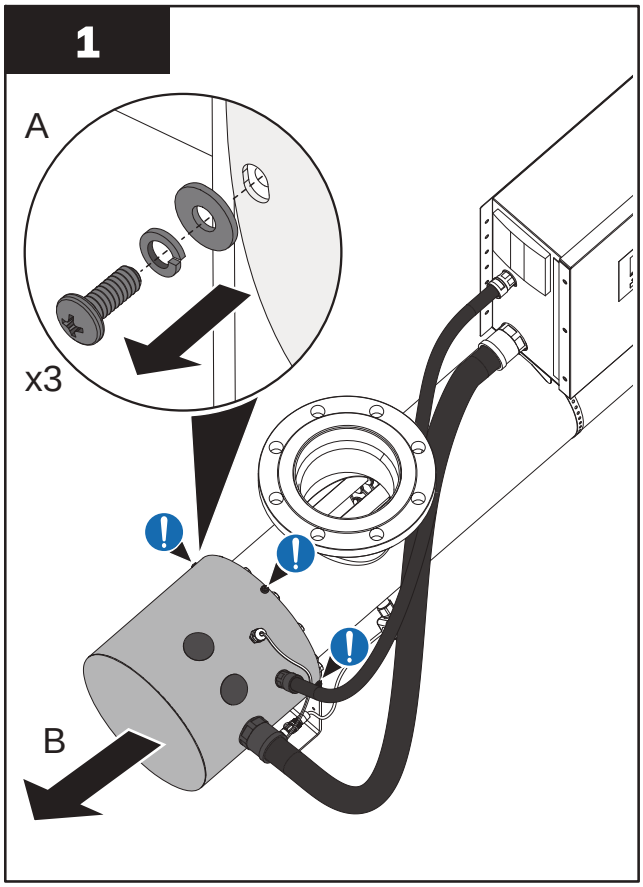
Tools:

Materials:

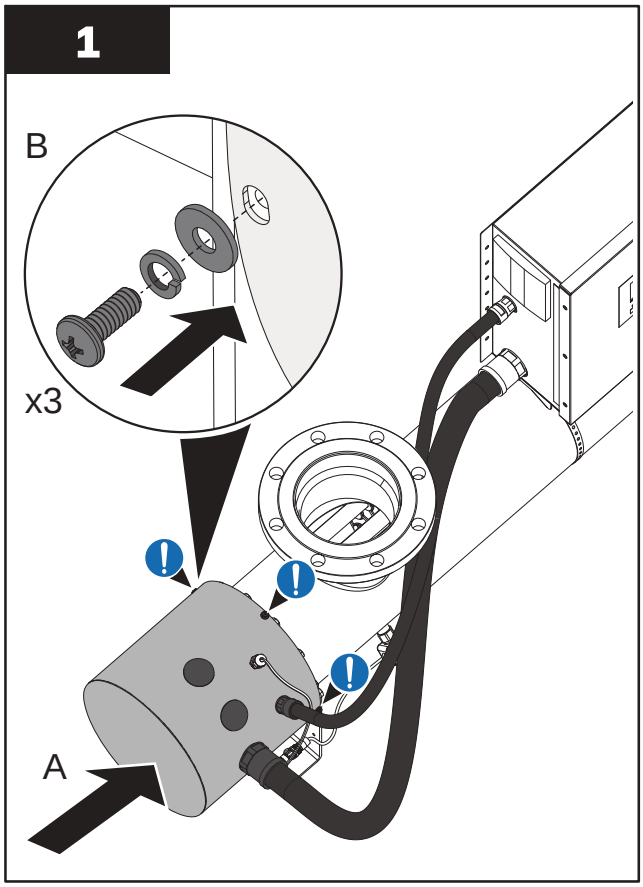
Procedure:

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.

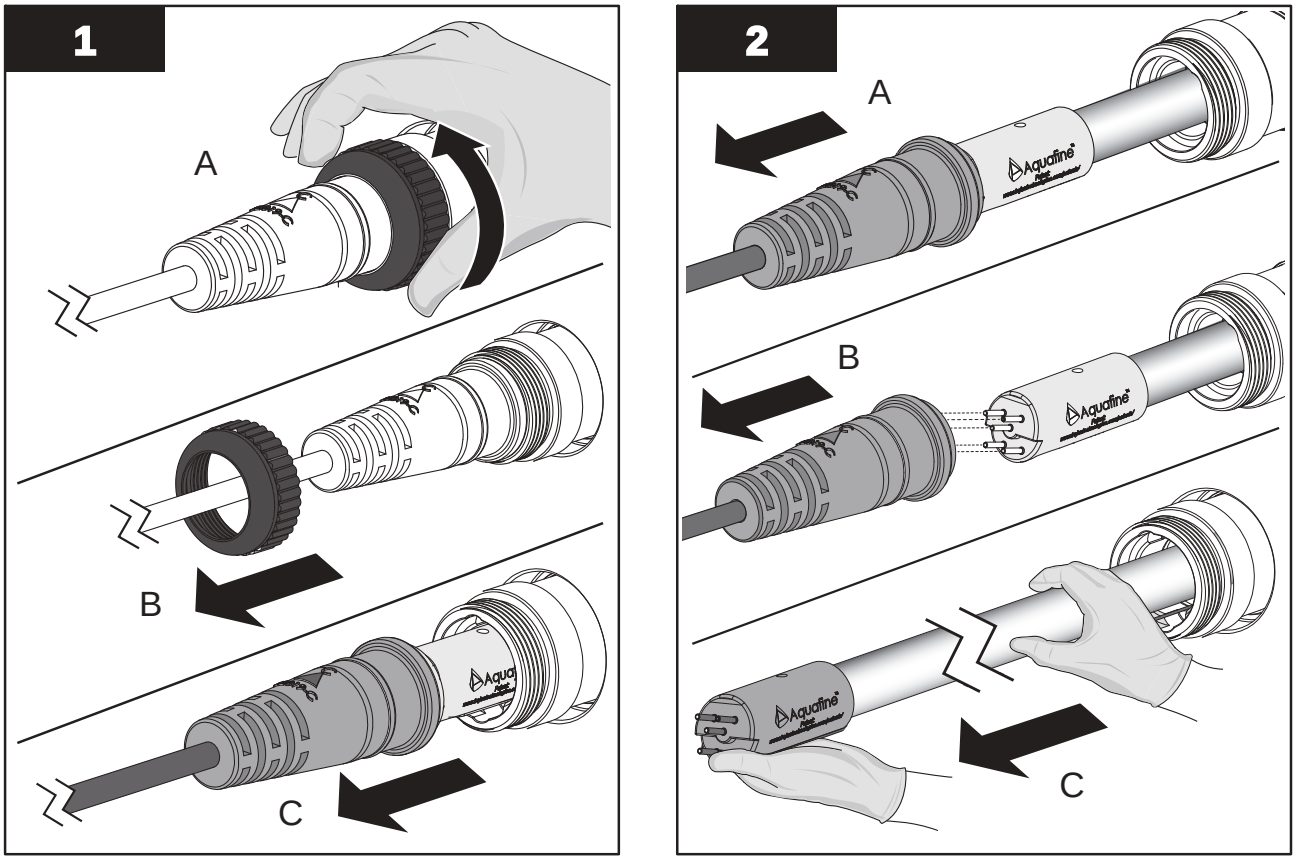
Materials:

- UV Lamp

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

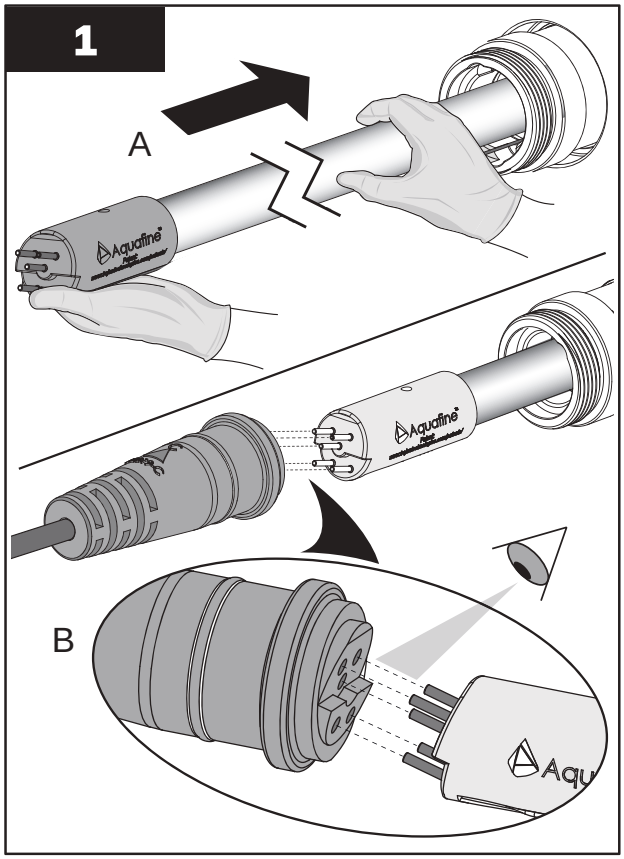
Procedure:

Remove:

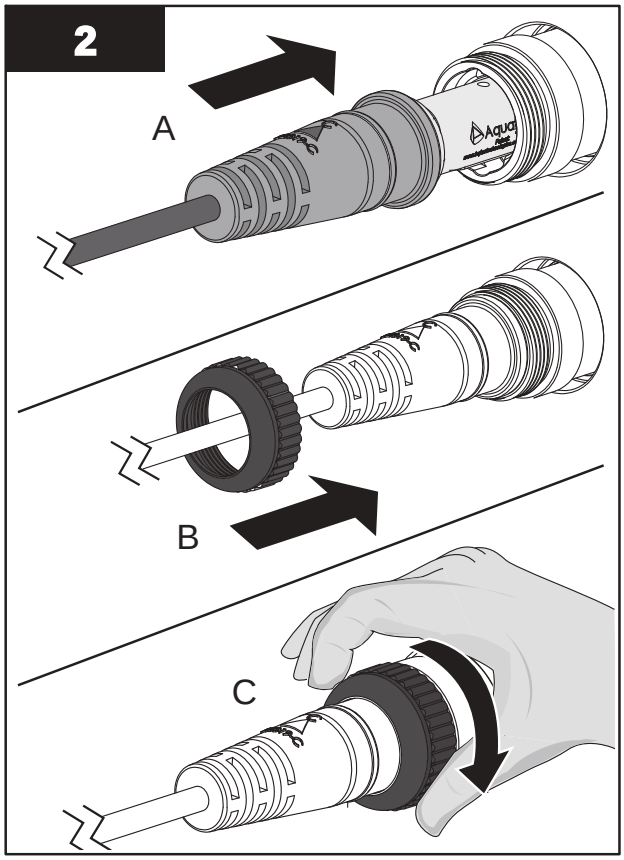


3. Inspect the UV Lamp pins for:
   - Evidence of overheating
   - Moisture
   - Displaced or bent pins (pins are angled at 10 degrees)
4. Inspect the UV Lamp for:
   - Cracks or breaks, loose ceramic ends.
5. If the conditions listed are:
   - Present, replace the UV Lamp.
   - Not present, reinstall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

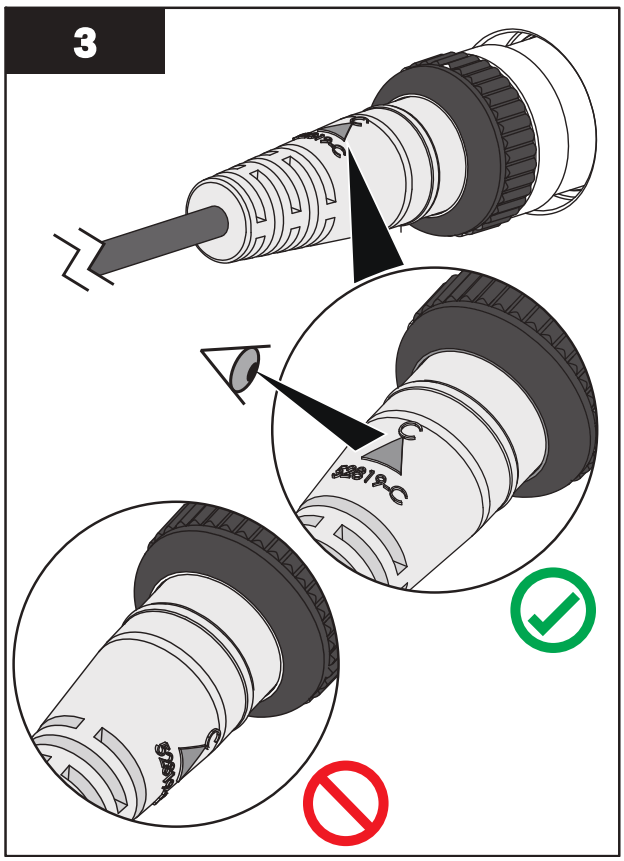
Install:



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

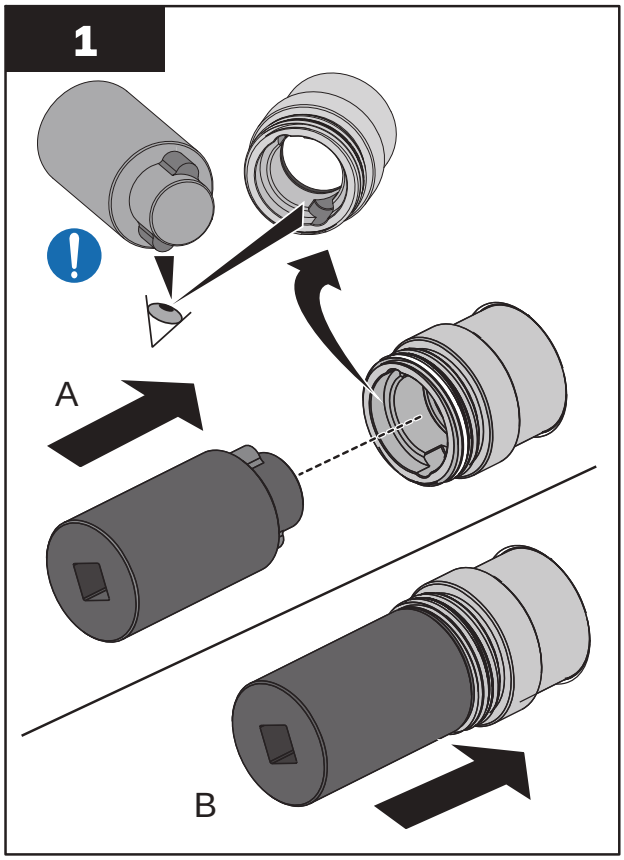
Procedure:

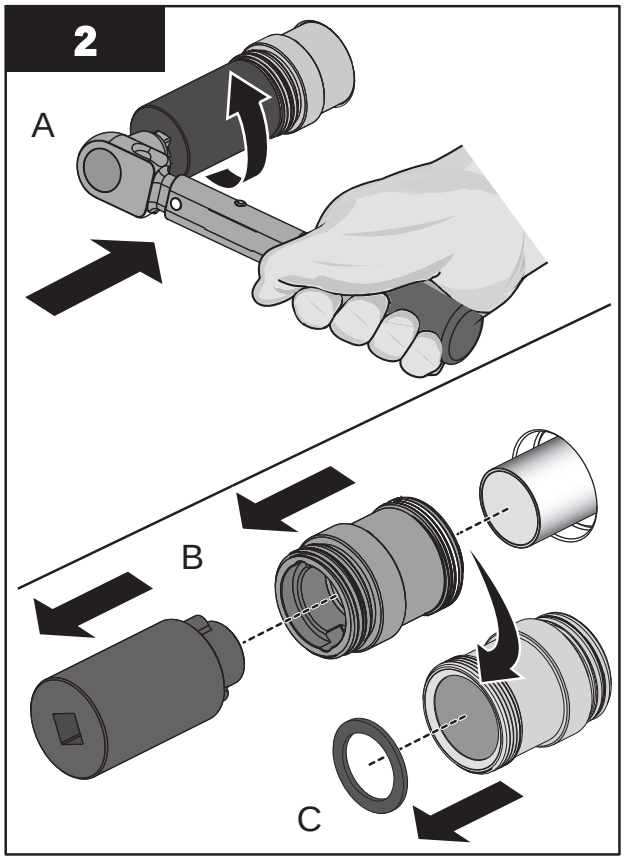
NOTICE

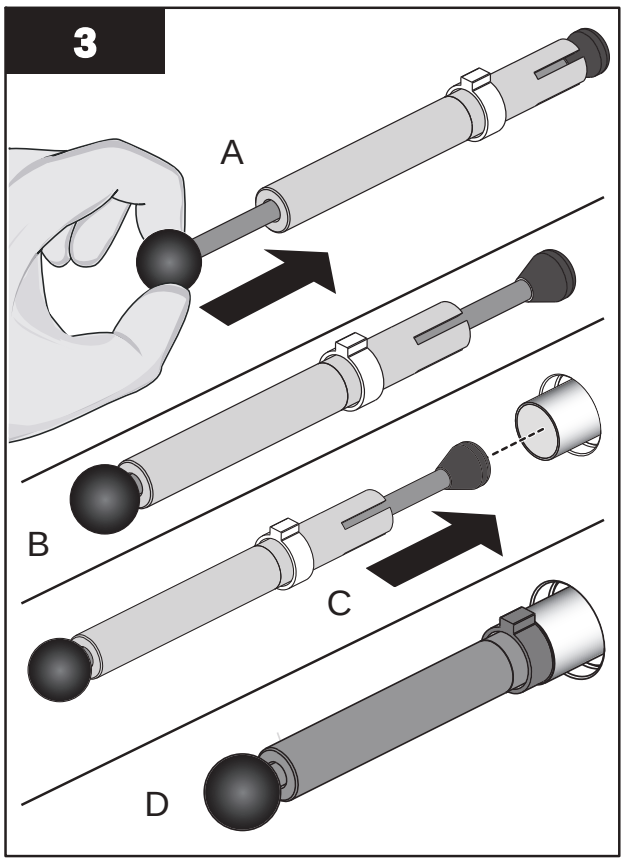
To prevent Sleeve damage during removal, be sure to keep the Sleeve level and perpendicular to the end plate. Physical damage to Sleeves indicates a possible serious condition in the UV Chamber. Full service of the UV Chamber may be needed.

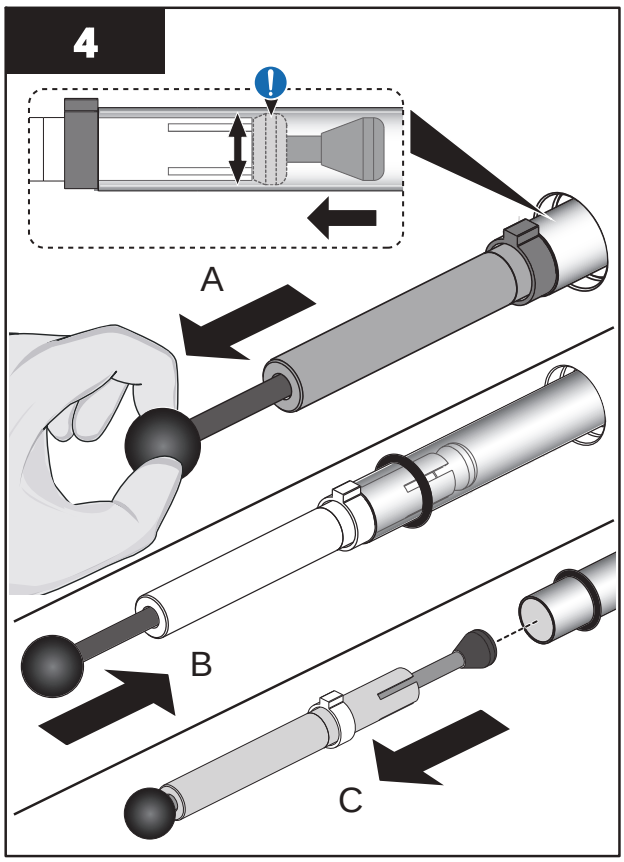
Use caution and apply only 100 lbf.in (11.3 N-m) of torque to the Sleeve bolt. Excessive torque will crack the Sleeve. Low torque may result in fluid leakage into the service end cap. Use only the provided Sleeve Bolt Removal Tool.

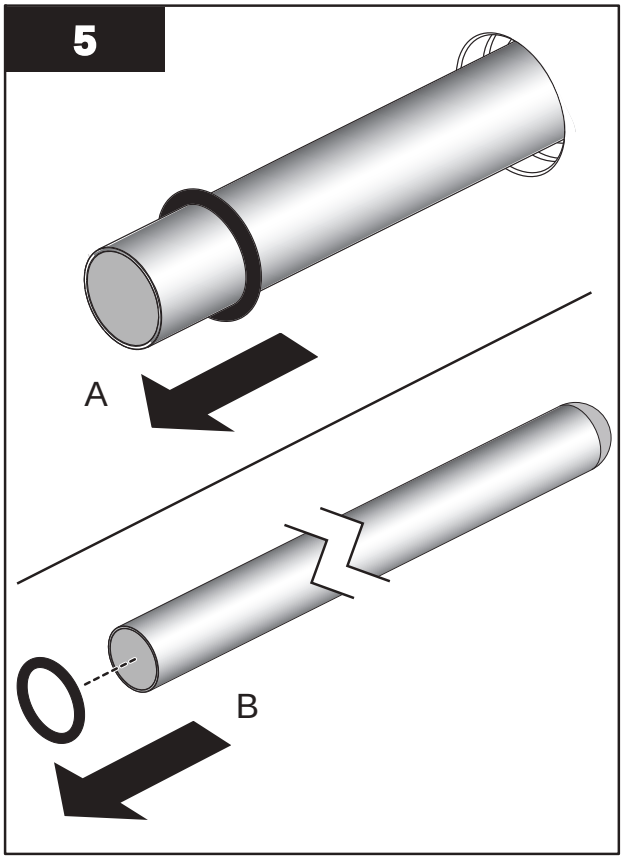
Remove:



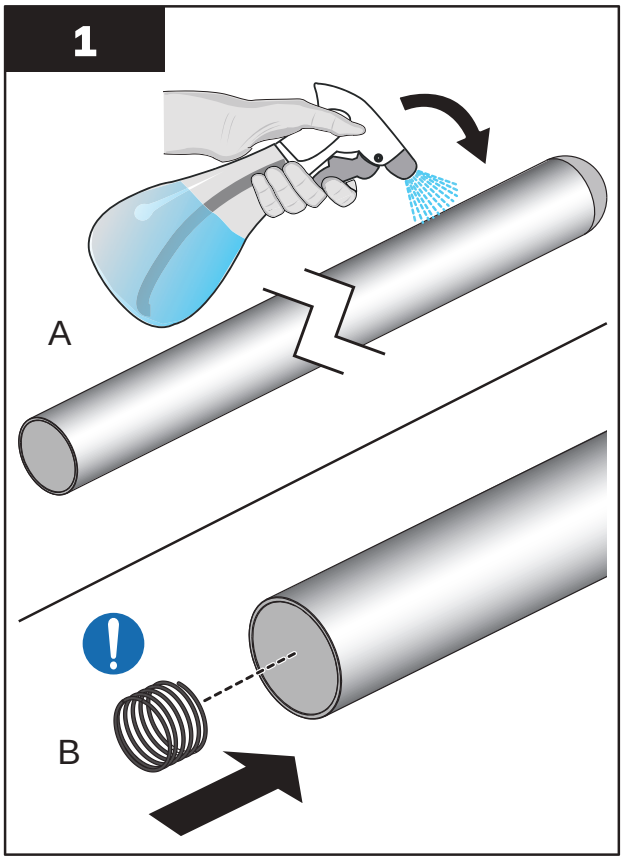




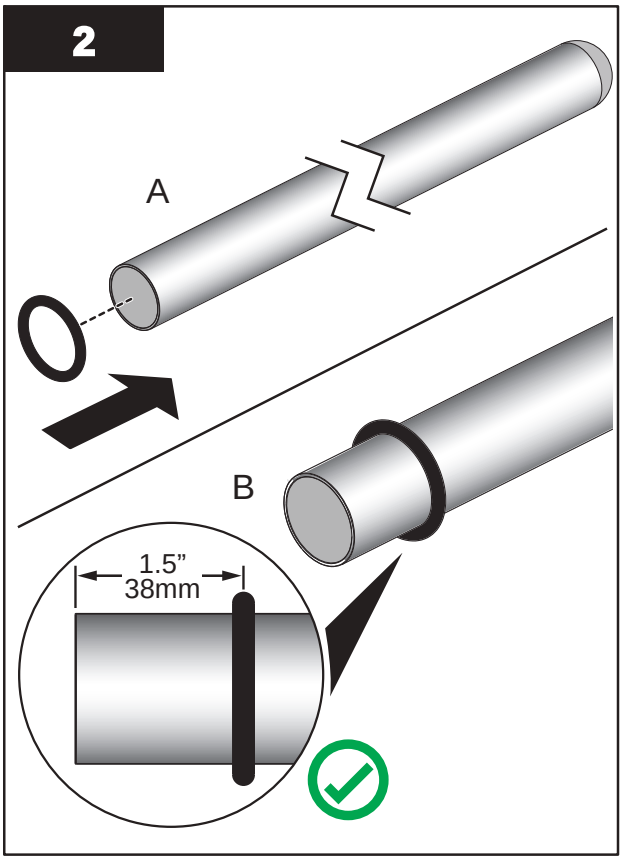




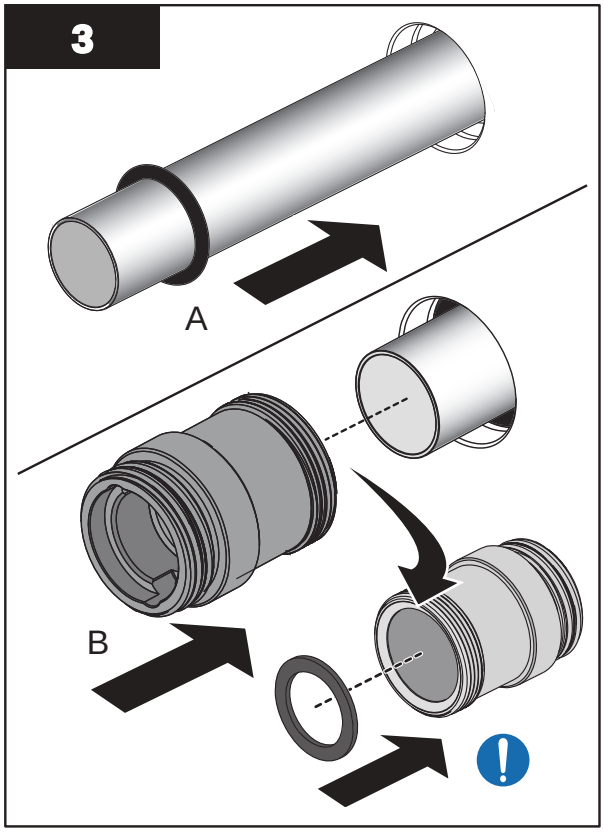
Install:

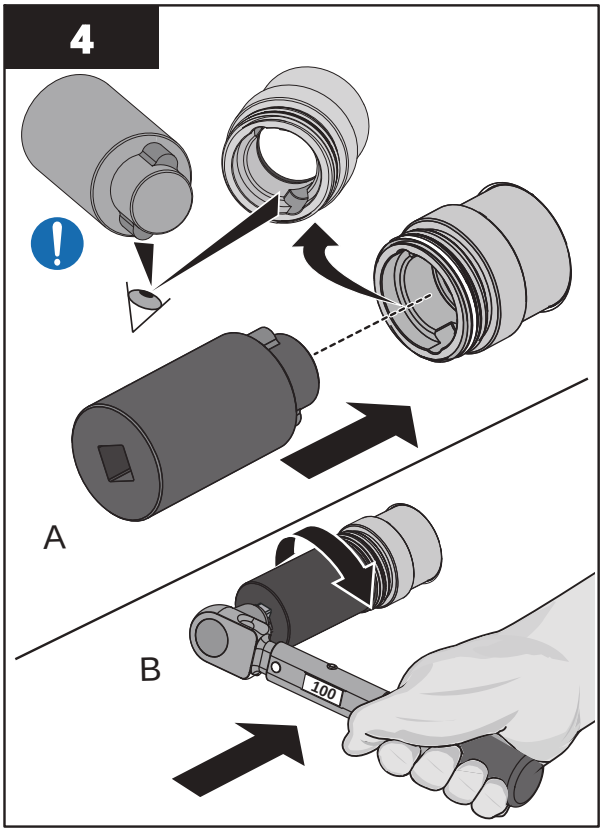


Note: *Verify that compression spring is in the Lamp Sleeve.*



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:

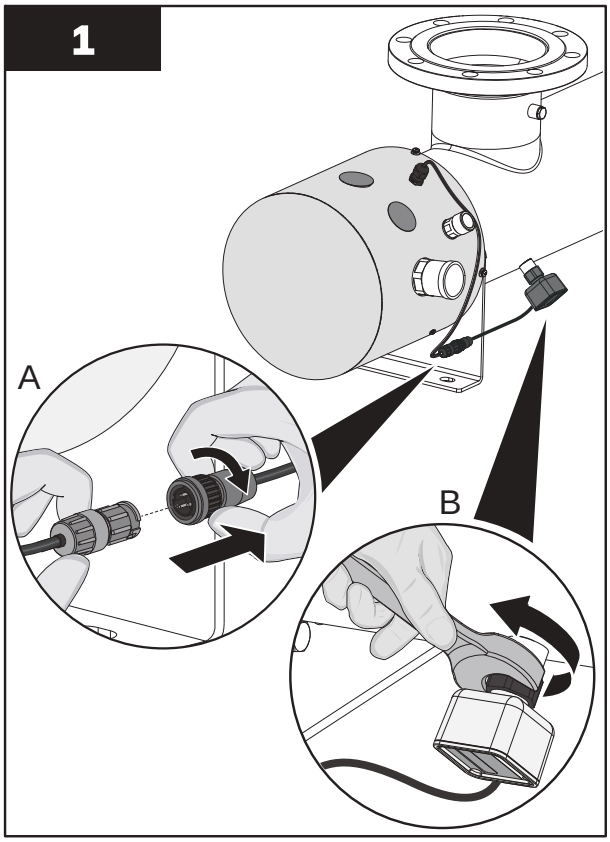
- Shut down the UV System. Refer to Section 5 as needed.
- Apply lockout tag out devices as necessary. Refer to Section 4.
- Depressurize and drain the UV Chamber. Refer to Section 9.3.
- Allow residual fluid inside of UV Chamber to cool ***- applies to Liquid Sugar applications only.***

Tools:

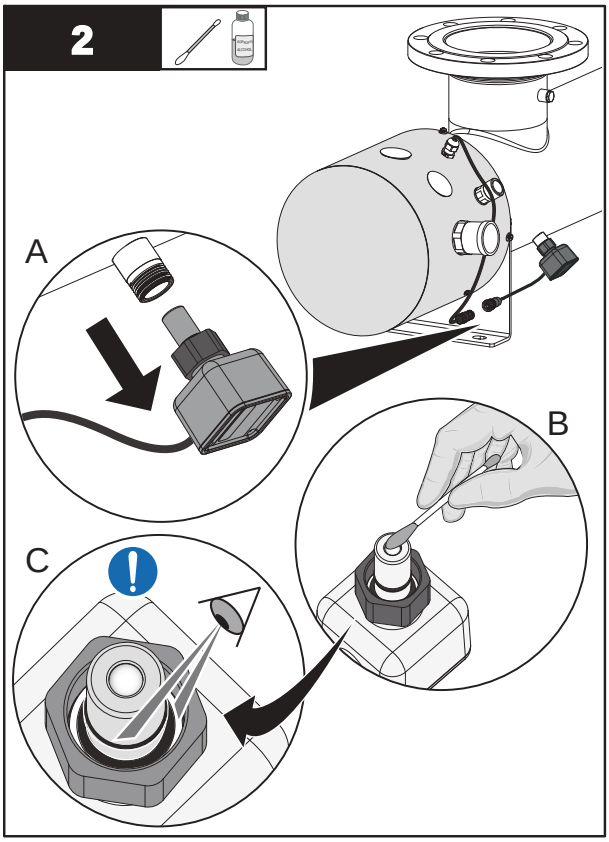
Materials:

Procedure:

Remove:

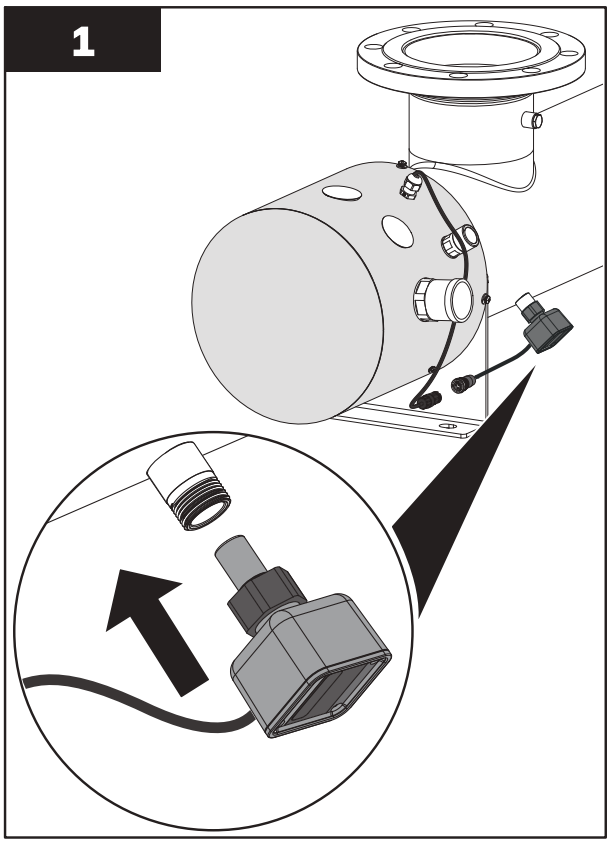


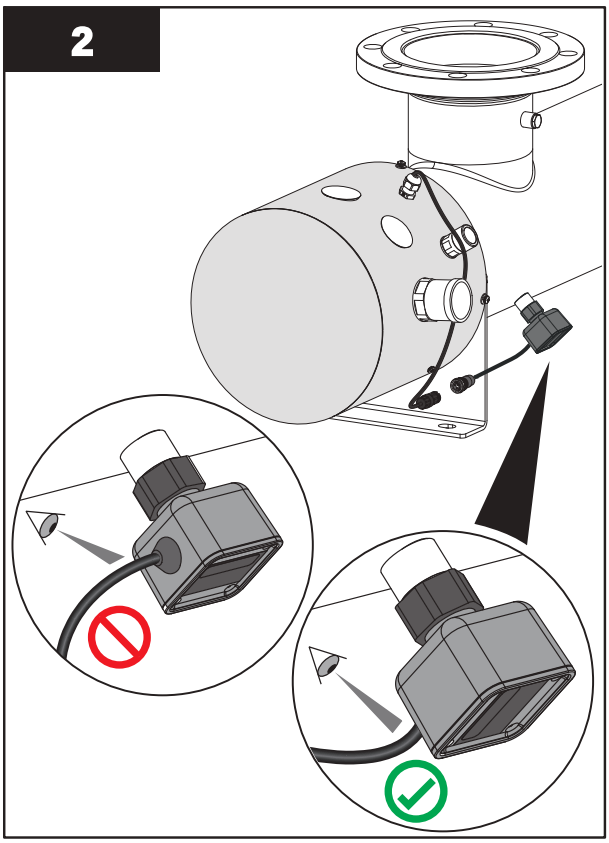
Note: *Loosen the nut securing the UVI Sensor.*



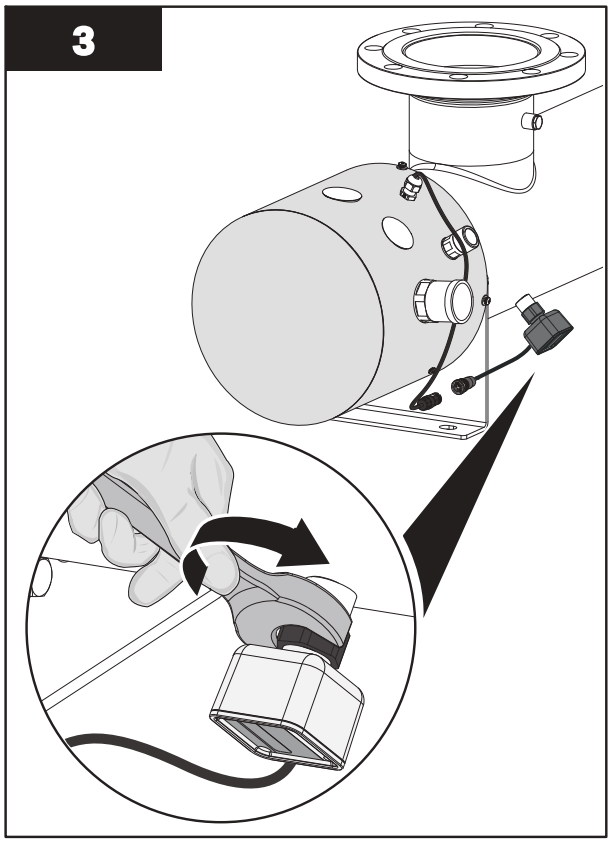
Note: *Inspect O-rings for signs of UV decay or brittle parts. Replace if necessary.*

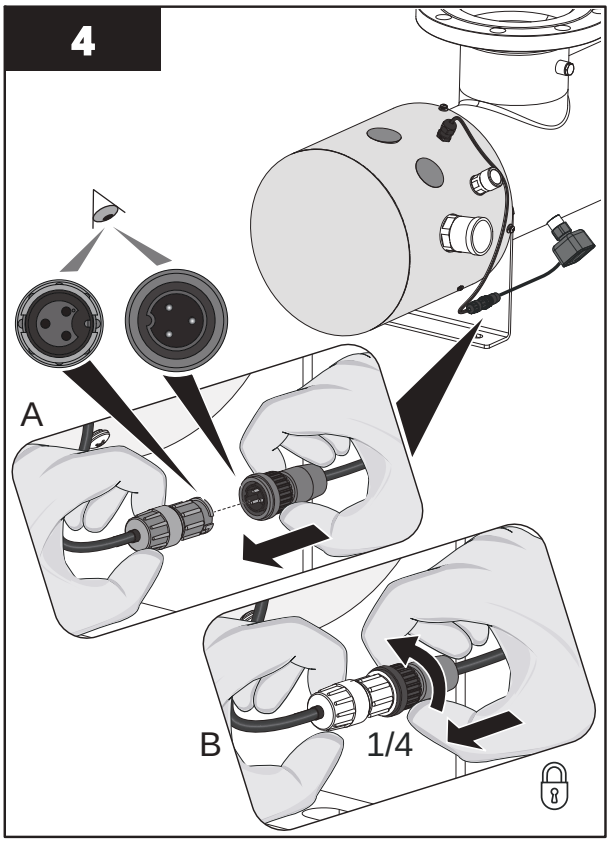
Install:





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

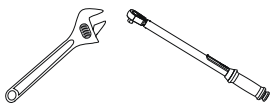
Note: *Applies to UV Chambers with 30 inch or 60 inch UV Lamps only. For UV Chambers with 15 inch UV Lamps, proceed to Section 9.11.*

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:

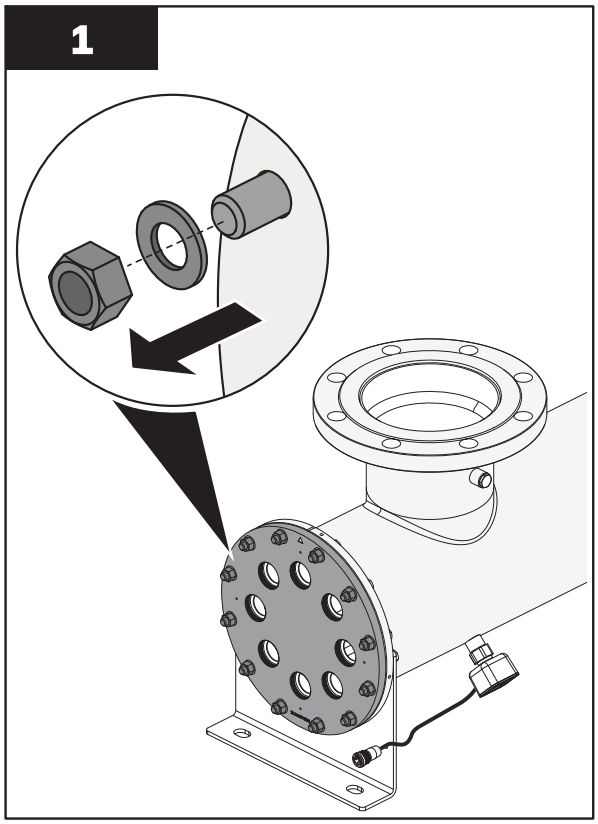


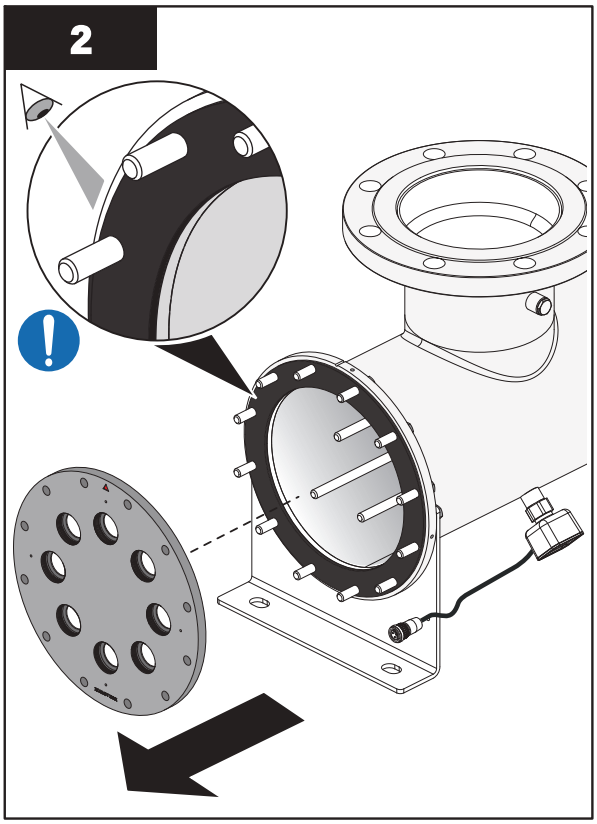
Materials:

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.*

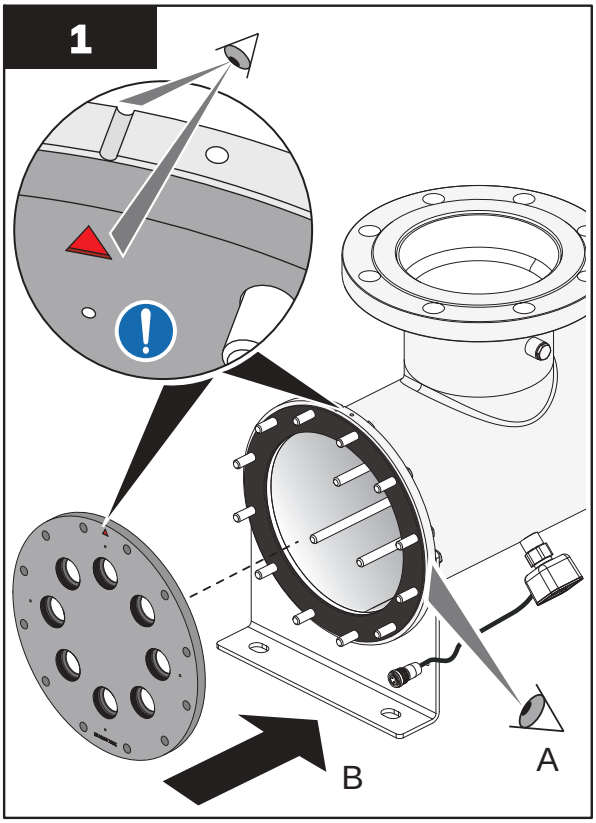
Remove (For UV Chambers with End Plate Gaskets):

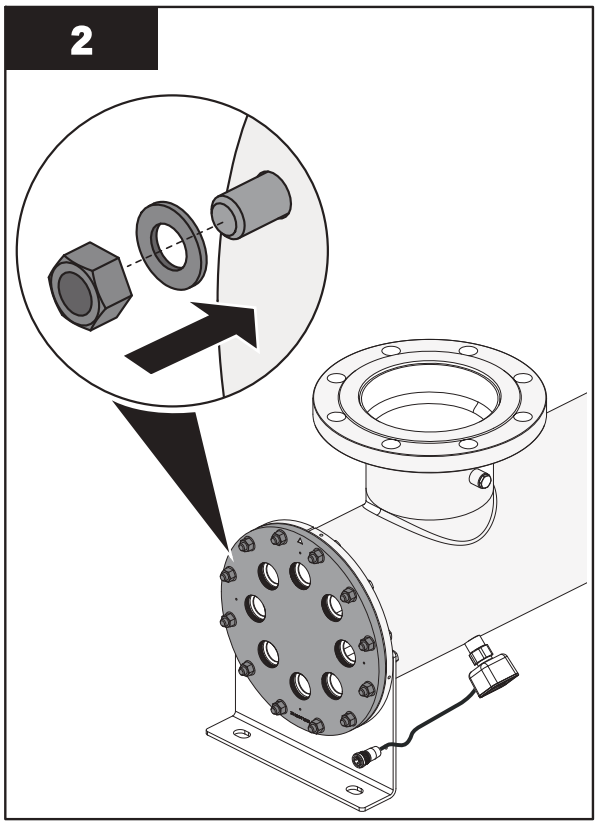




Note: *Inspect the Gasket for signs of damage, cracks or wear. Replace if required. Refer to Section 9.9.2.*

Install (For UV Chambers with End Plate Gaskets):



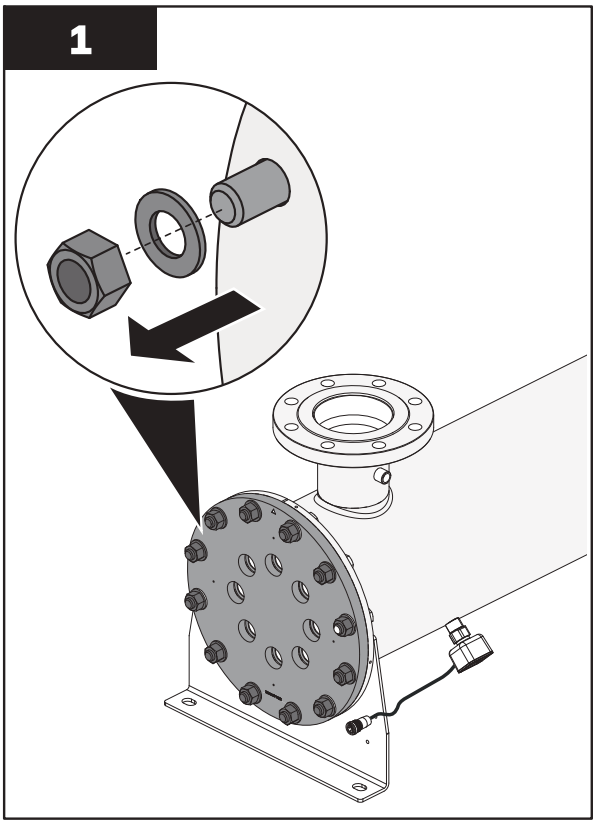


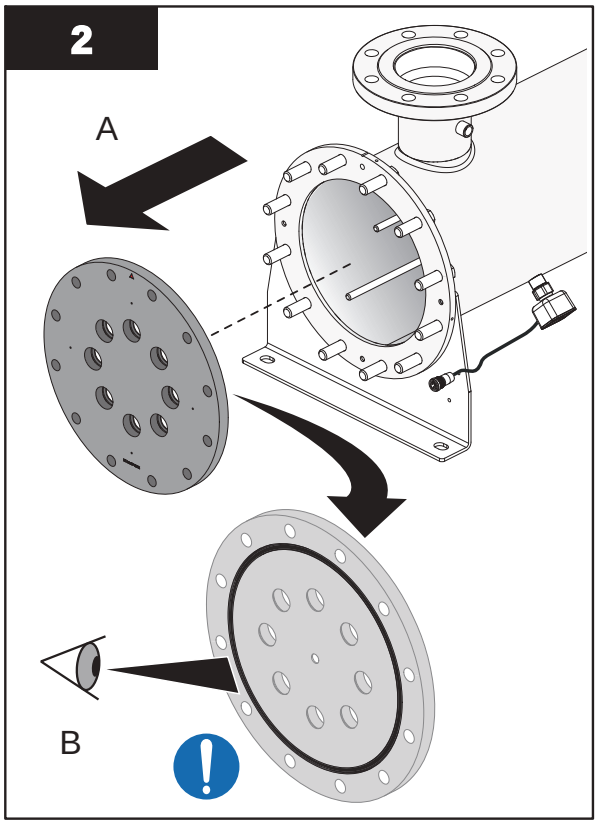
Notes: *1) Make sure the Gasket is properly installed before installing the UV Chamber End Plate.*

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).*

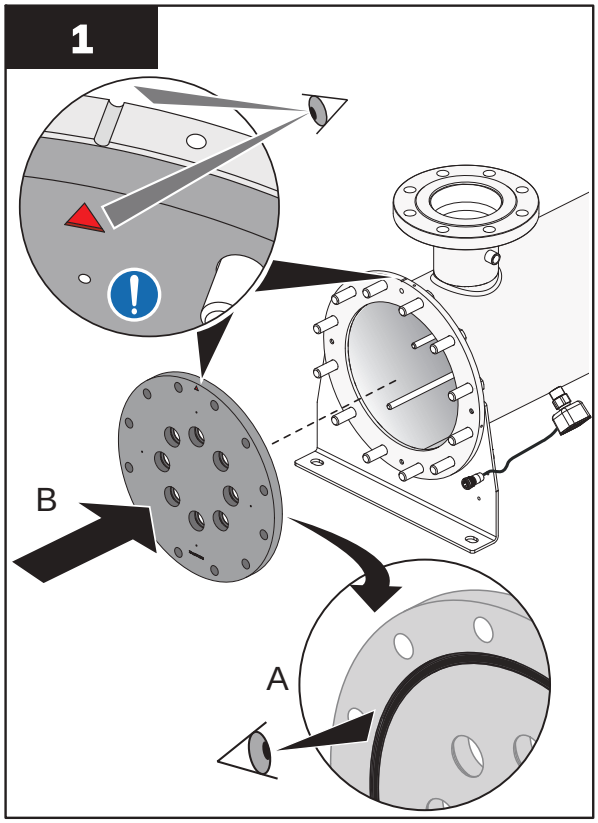
Remove (For UV Chambers with End Plate O-Rings):

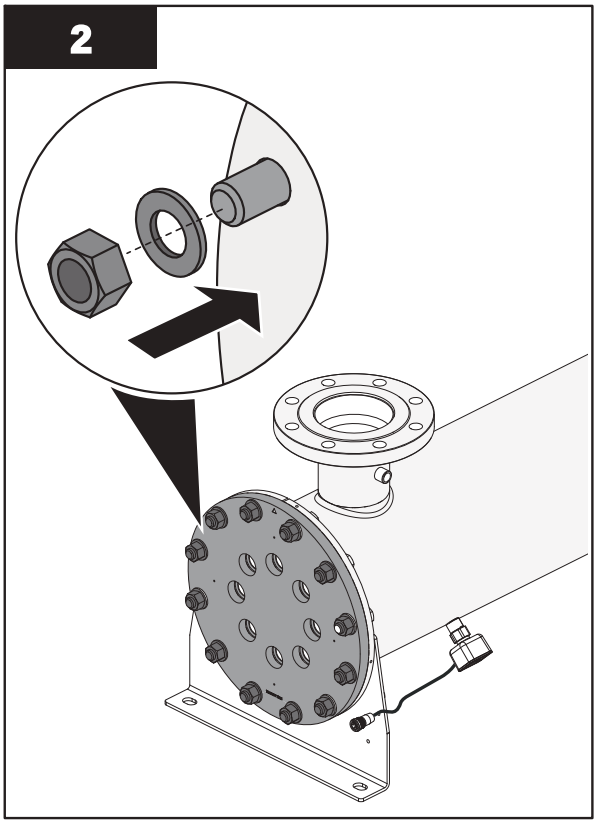




Note: *Inspect the End Plate O-Ring for signs of damage, cracks or wear. Replace if required. Refer to Section 9.9.2.*

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).*

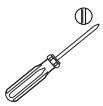
3. When service is complete, assemble the prerequisites in the reverse order of the disassembly.

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)

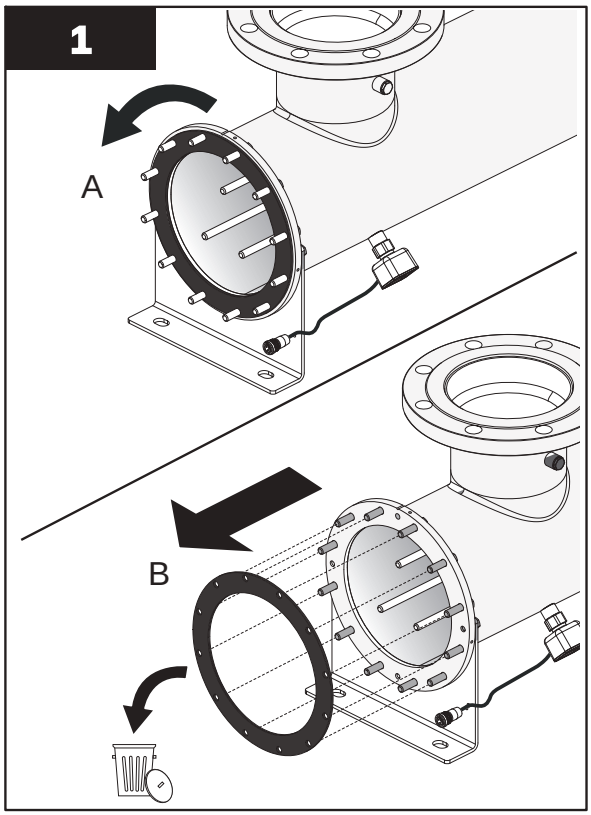
Procedure:

To replace an:

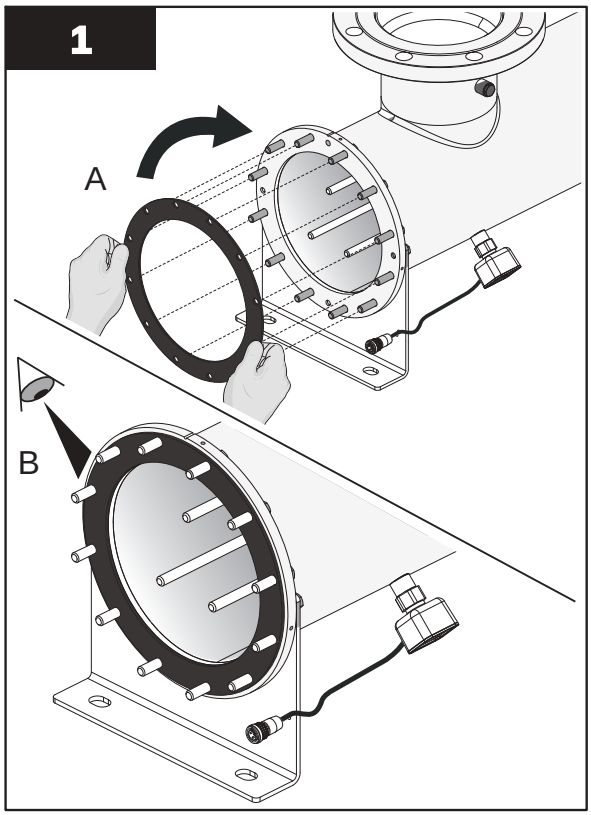
- End Plate Gasket, proceed to End Plate Gasket Replacement
- End Plate O-Ring, proceed to End Plate O-Ring Replacement

End Plate Gasket Replacement

Remove:



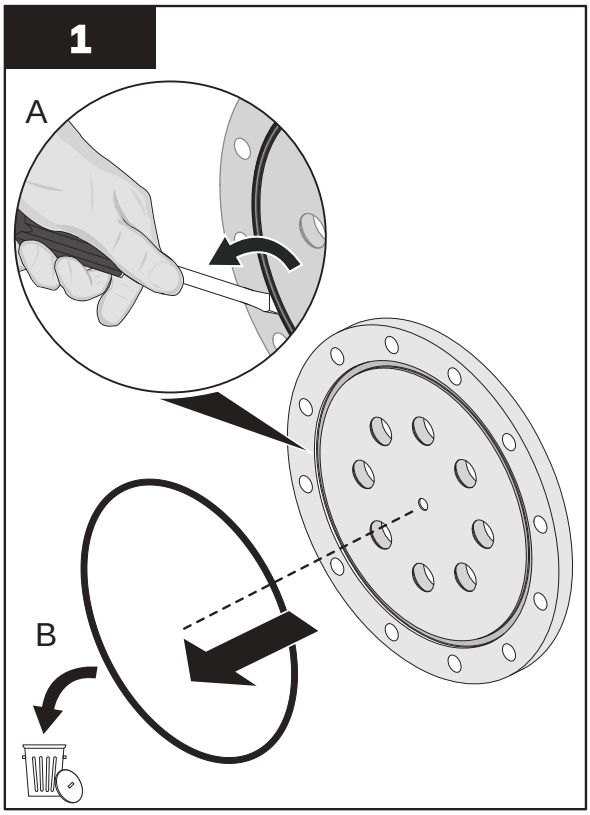
Install:



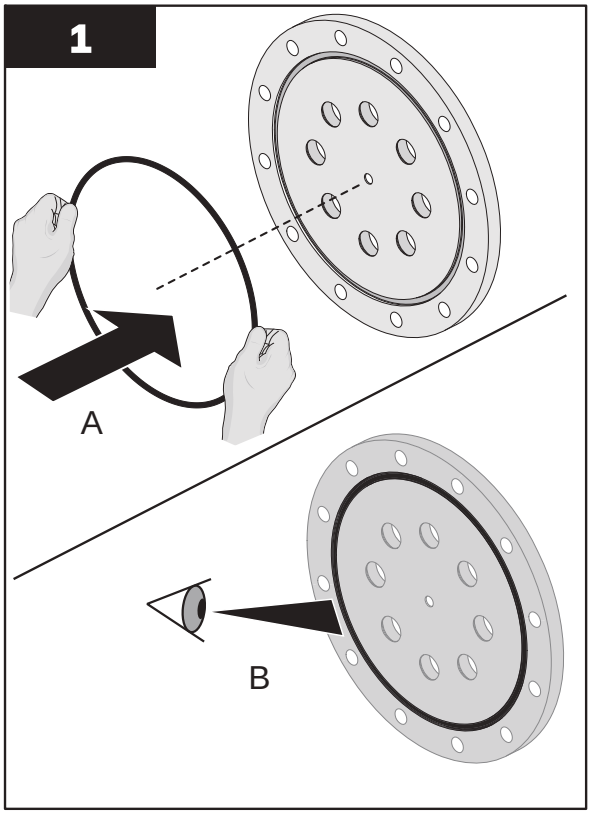
Note: *Make sure the Gasket is properly installed on the UV Chamber End Flange.*

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:

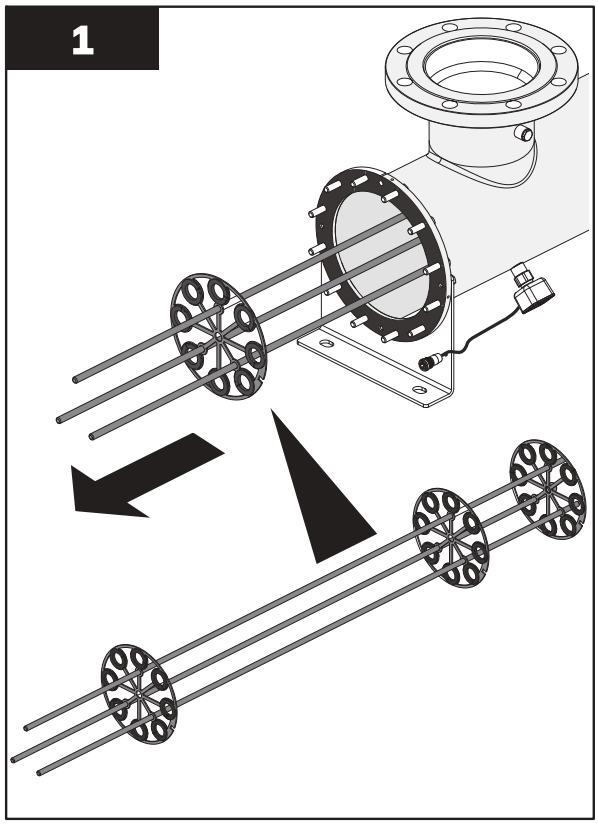
- Remove the UV Chamber End Plate. Refer to Section 9.9.1

Materials:

Procedure:

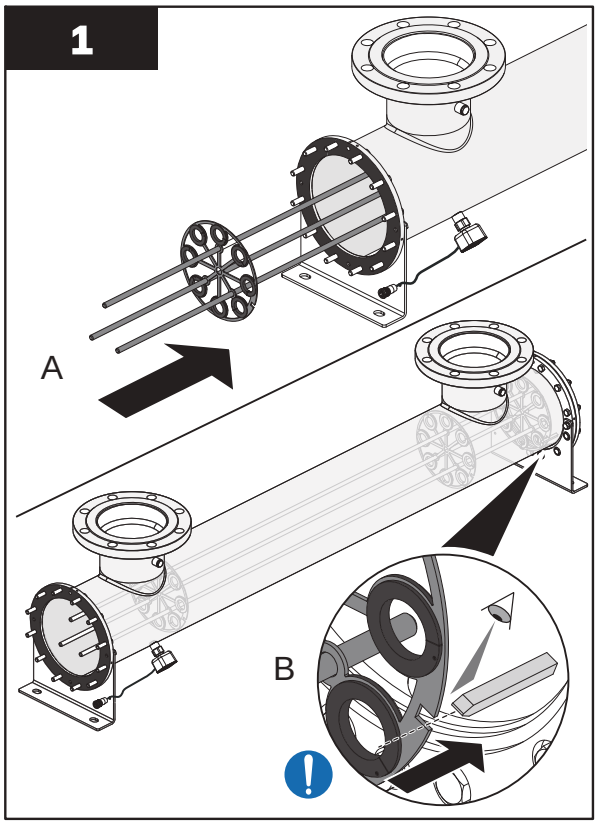
Note: *Baffle Assembly shown for illustrative purposes only. Depending on system size and system application, the Baffle Assembly design may vary.*

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.

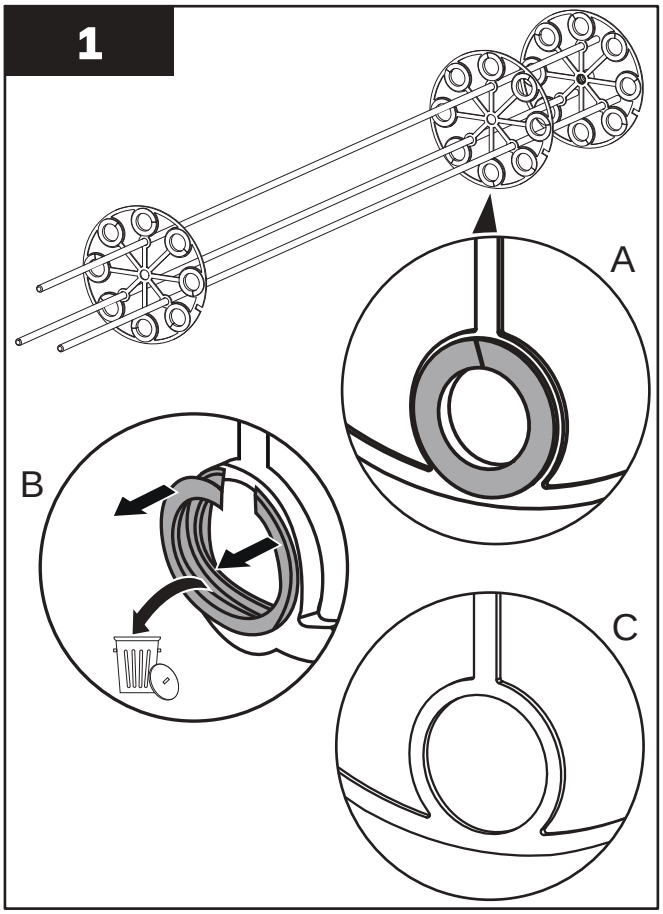
Tools:

Materials:

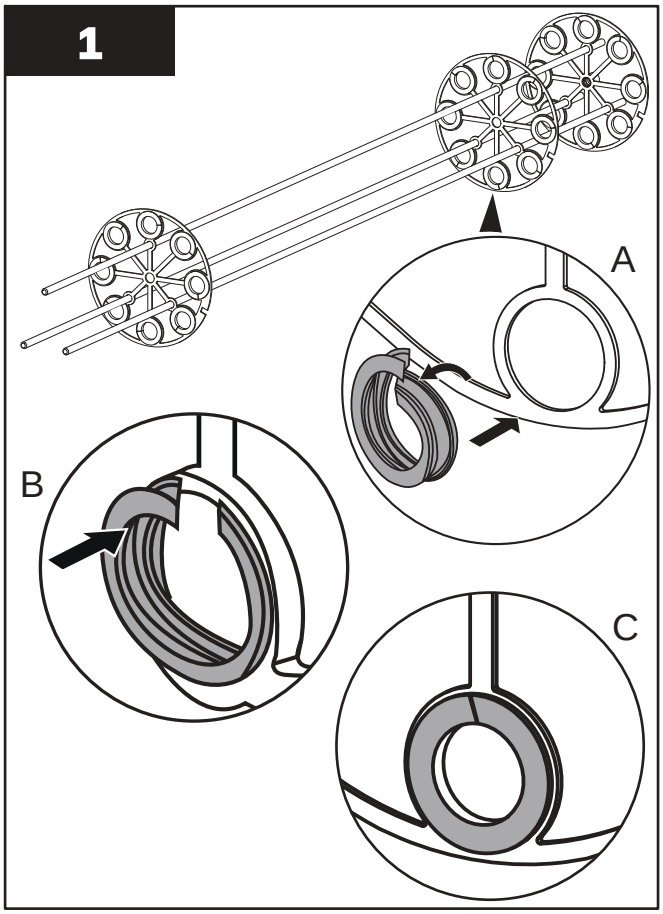
- New Sleeve Bushing

Procedure:

Remove:



Install:

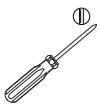


9.10.3 Remove and Replace a Baffle Plate Guide O-Ring

Prerequisites:

- Remove Baffle Assembly. Refer to Section 9.10.1.

Tools:

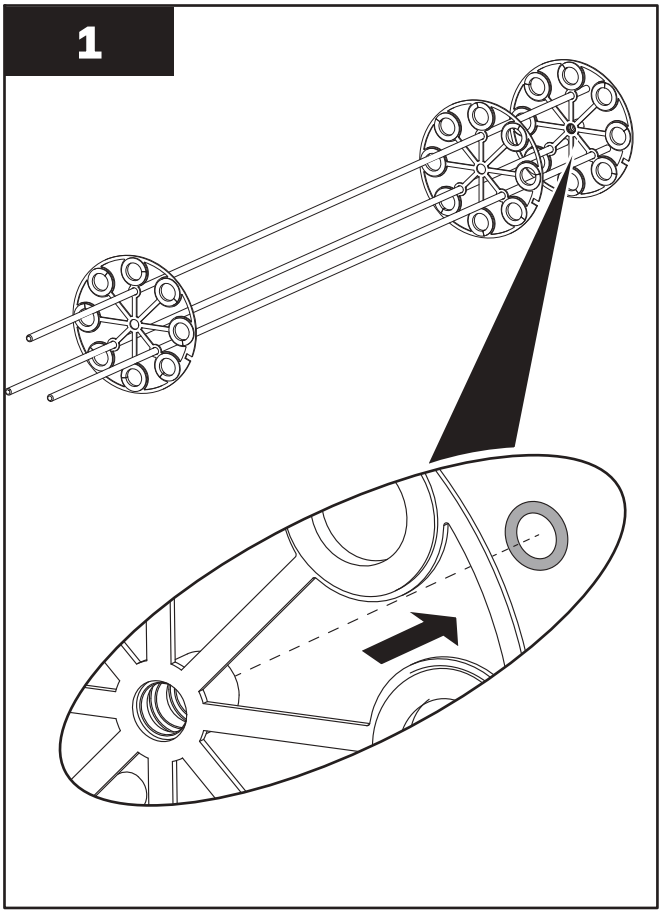


Materials:

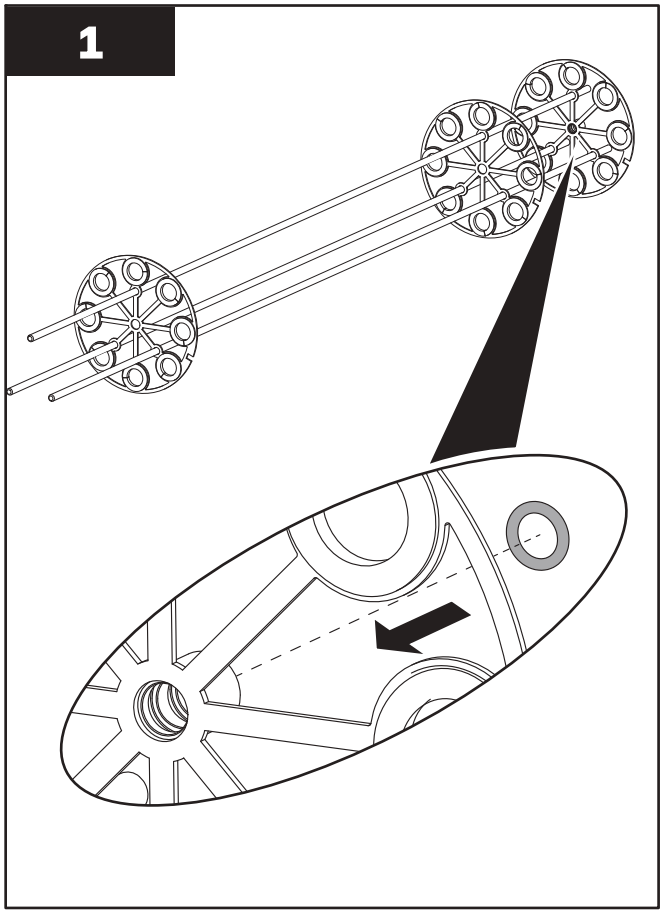
- New Baffle Plate Guide O-Ring

Procedure:

Remove:



Install:



9.11 UV Chamber End Plate / Baffle Assembly

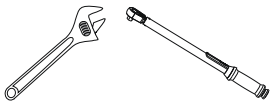
Note: *Applies to 01CDS, 02CDS and 03CDS system models only.*

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.

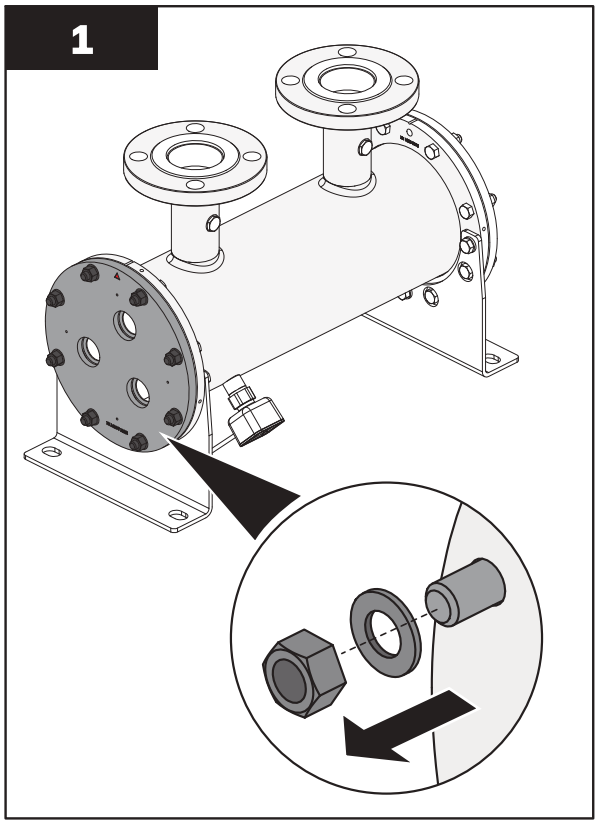
Tools:

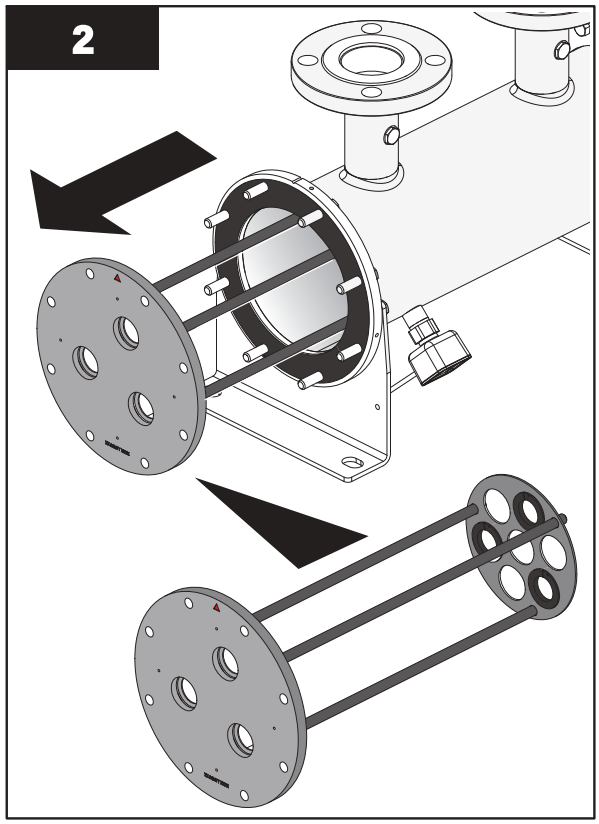


Materials:

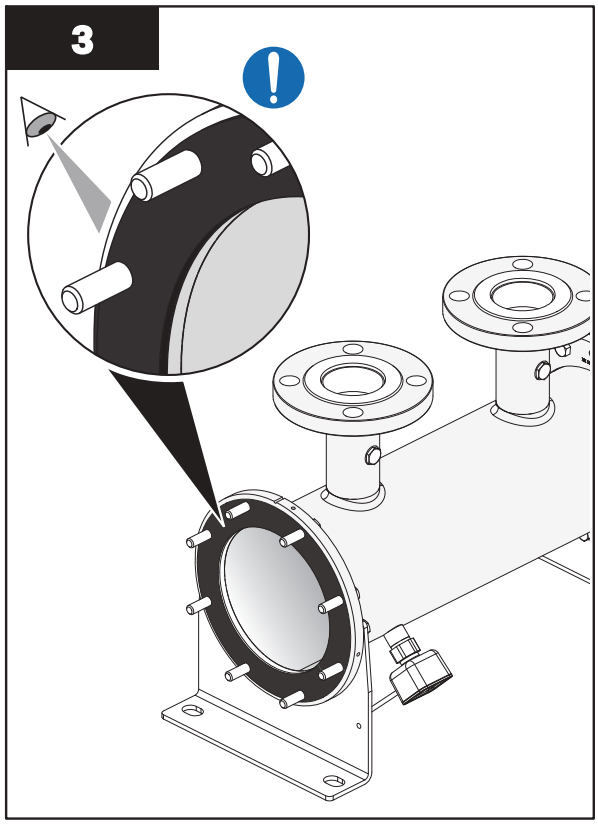
Procedure:

Remove:



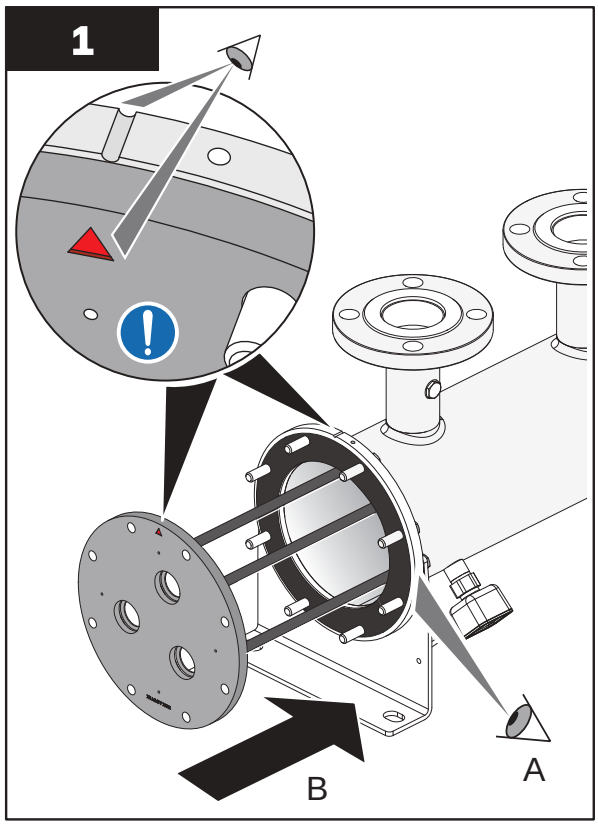


Note: *Remove the End Plate / Baffle Assembly slowly and evenly.*



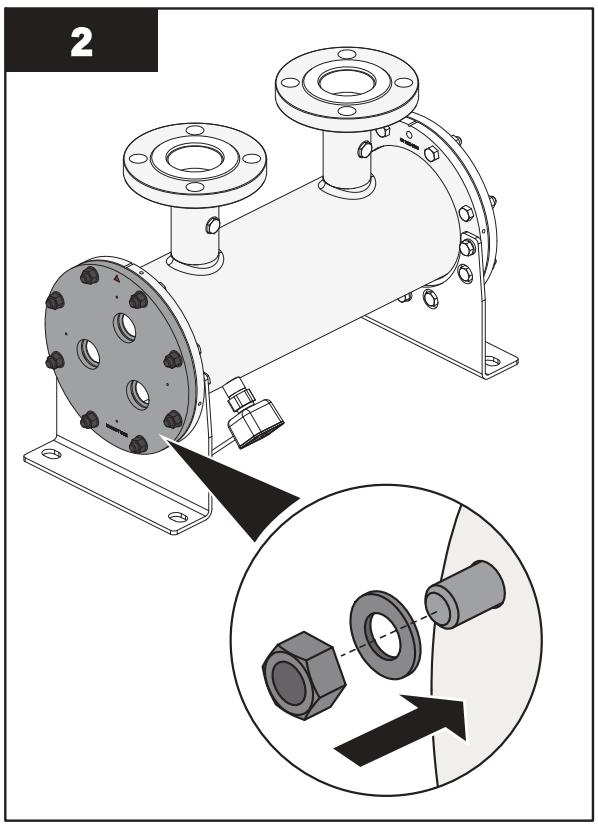
Note: *Inspect the Gasket for signs of damage, cracks or wear. Replace if required. Refer to Section 9.11.2.*

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:

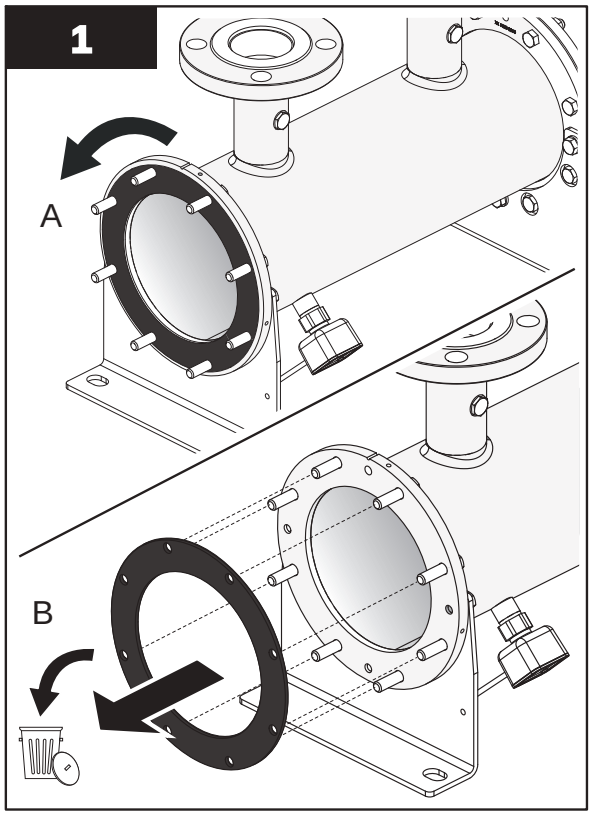
- Remove the UV Chamber End Plate / Baffle Assembly. Refer to Section 9.11.1.

Materials:

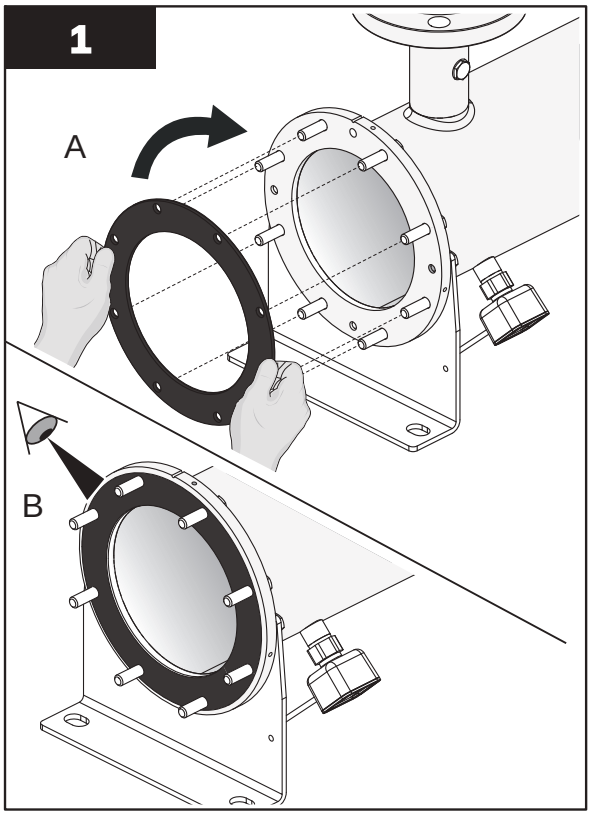
- New End Plate Gasket

Procedure:

Remove:



Install:



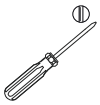
Note: *Make sure the Gasket is properly installed on the UV Chamber End Flange.*

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:

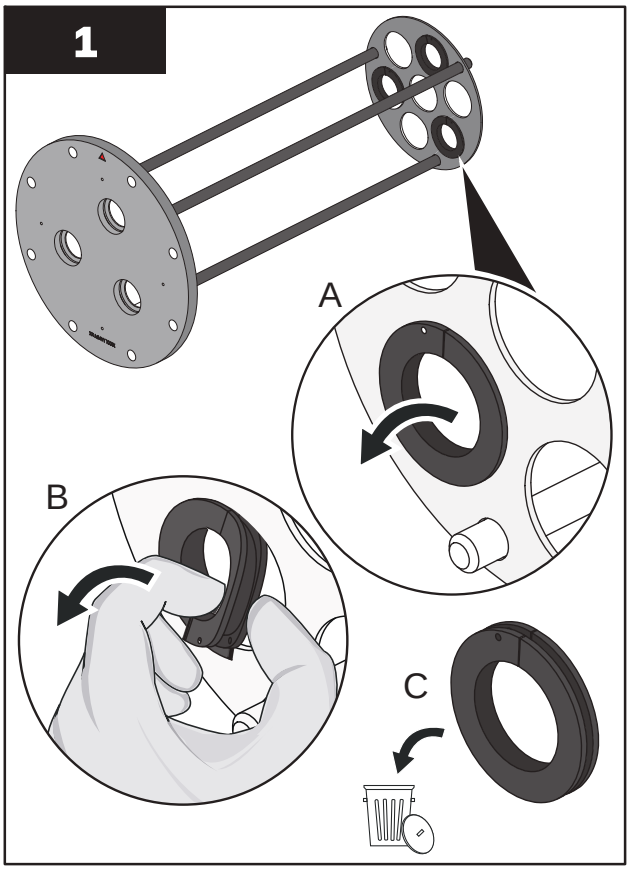


Materials:

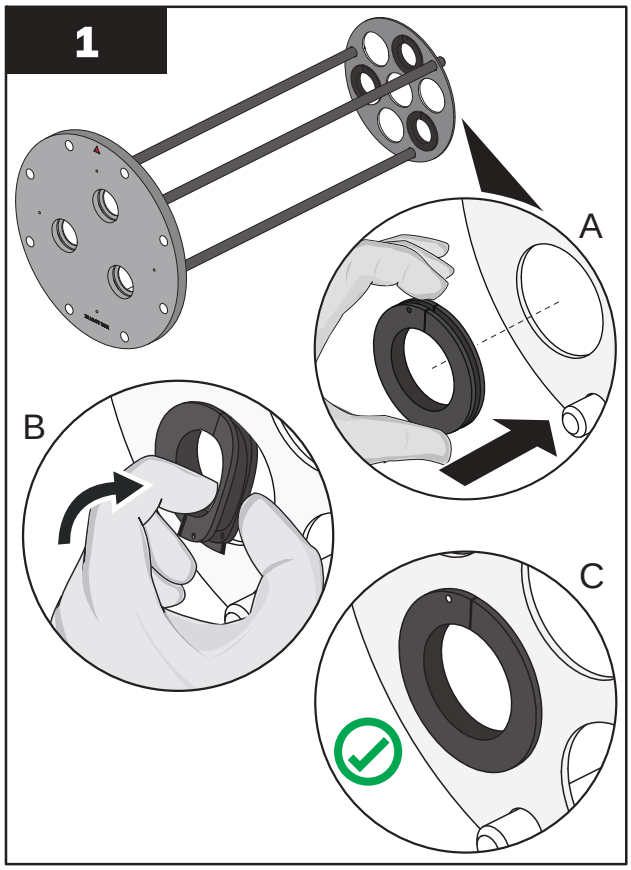
- New Sleeve Bushing

Procedure:

Remove:



Install:



9.12 Control Power Panel

9.12.1 Remove and Replace a Lamp Driver

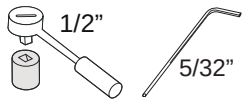
Replace a Lamp Driver when a Lamp Driver failure alarm occurs.

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:

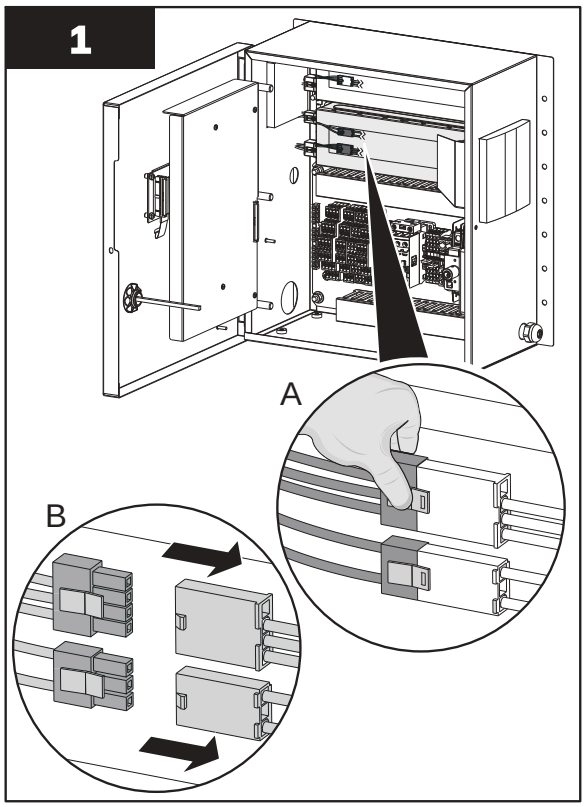
- New Lamp Driver
- Wiring Diagram

Procedure:

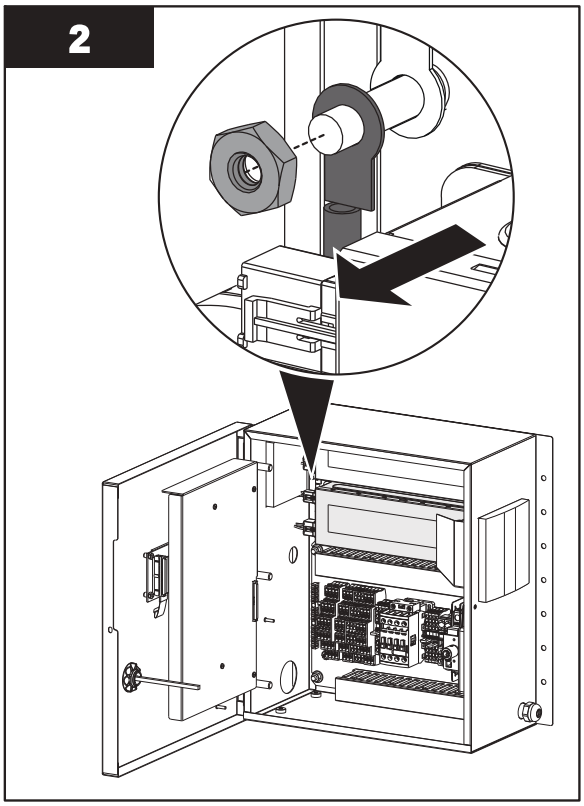
To replace Lamp Driver(s) for:

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

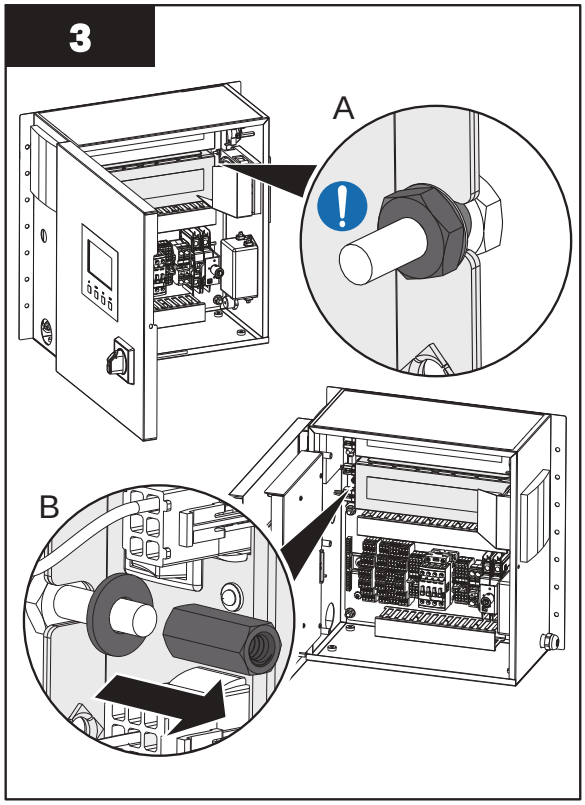
Small CPP Lamp Driver Replacement



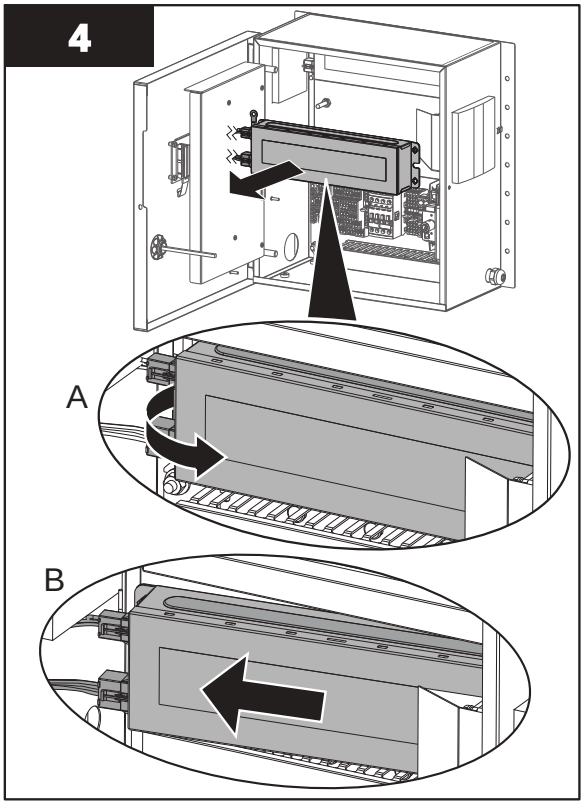
Note: *Disconnect the Lamp Driver connectors.*



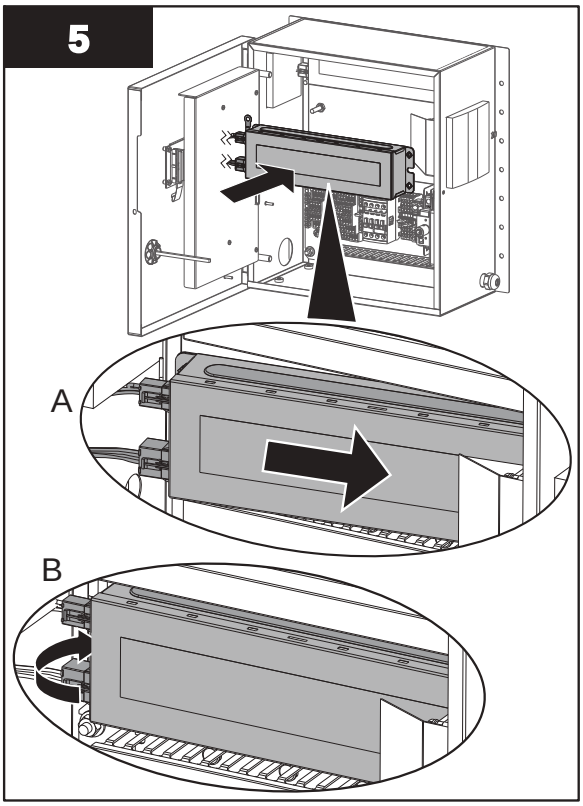
Note: *Remove the Lamp Driver ground wire.*



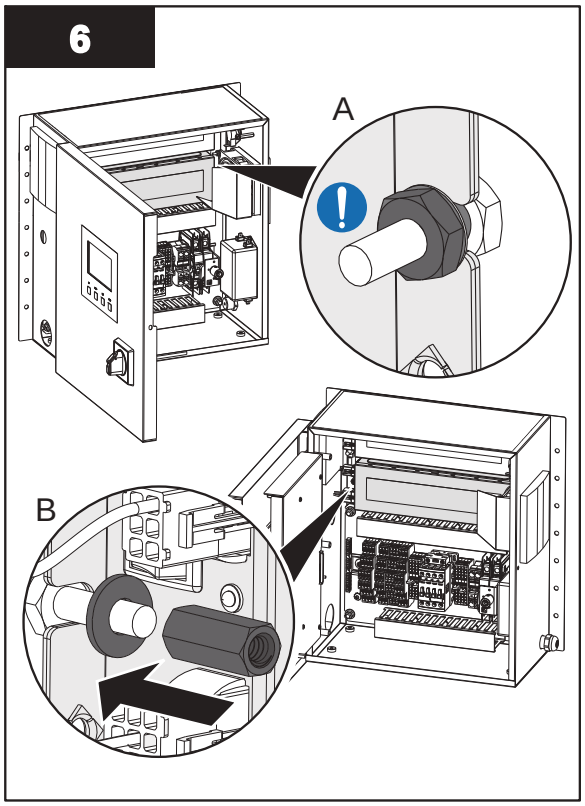
Note: *DO NOT adjust nut shown in detail A.*



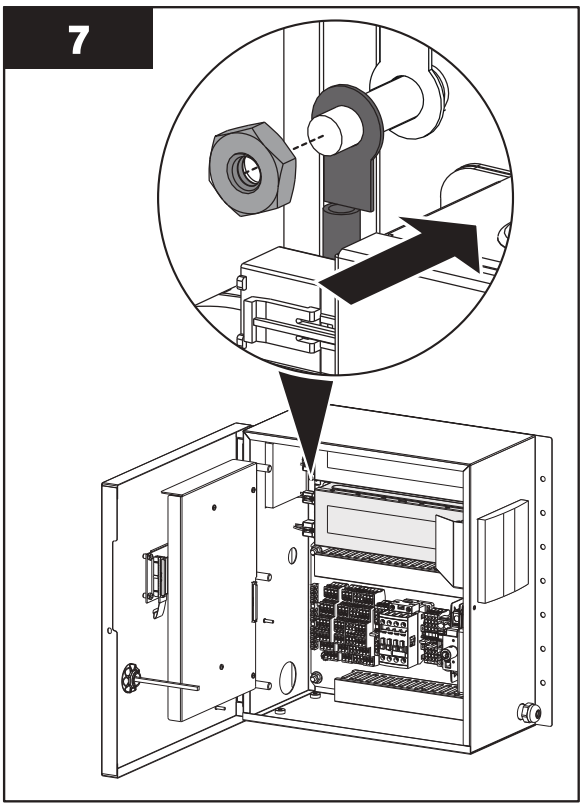
Note: *Remove the faulty Lamp Driver as shown.*



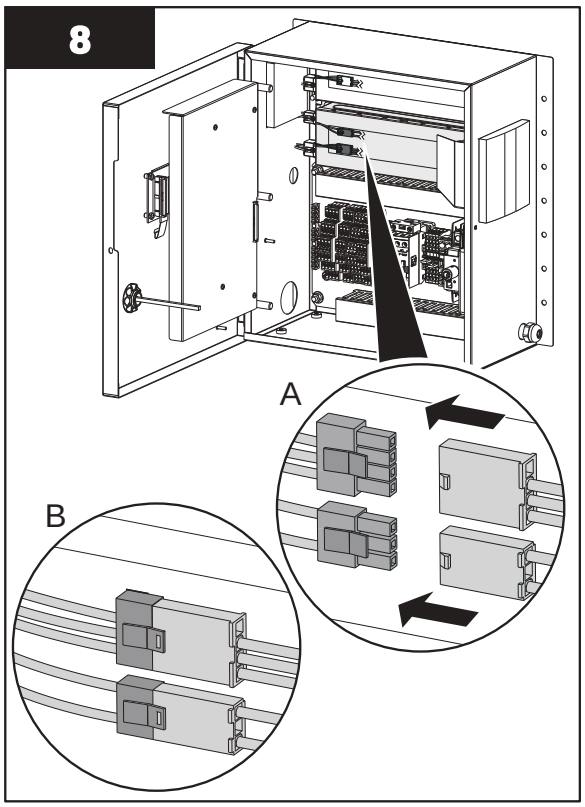
Note: *Install the new Lamp Driver as shown.*



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



Note: *Install the Lamp Driver ground wire.*

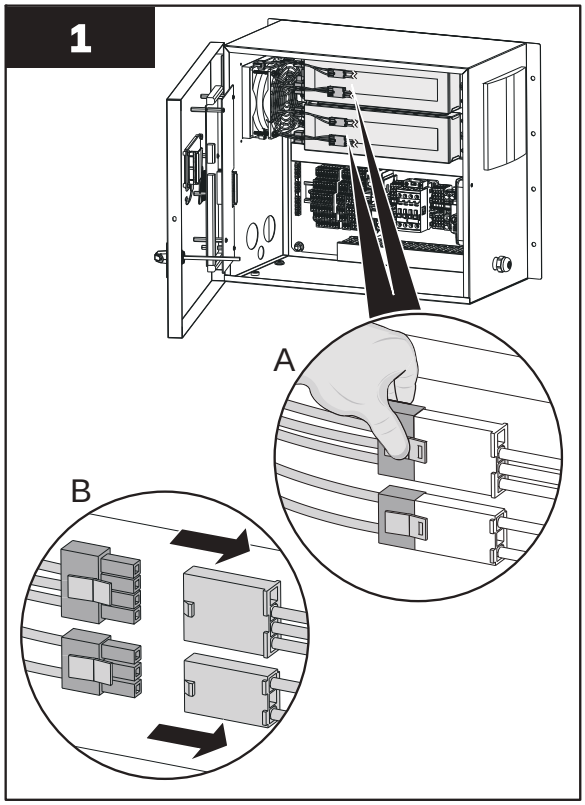


Note: *Connect the new Lamp Driver connectors.*

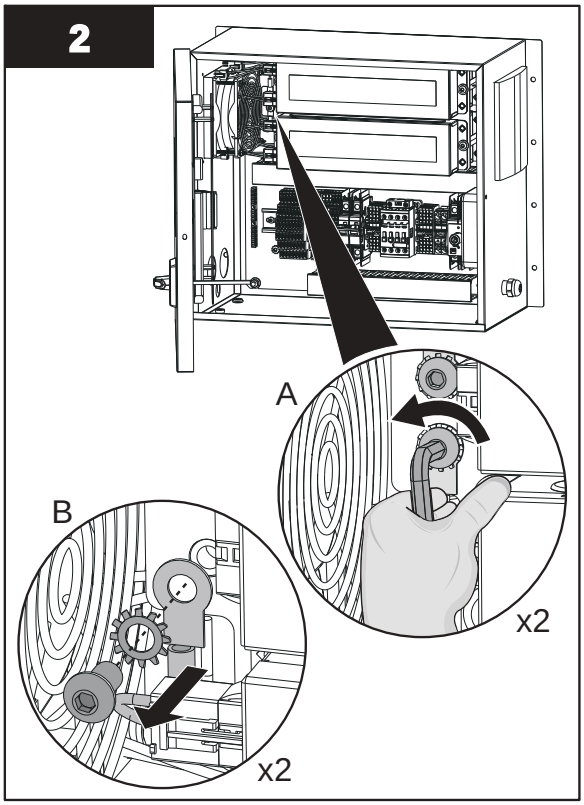
9. Repeat steps 1 to 8 for other Lamp Driver if required.

Medium or Large CPP Lamp Driver Replacement

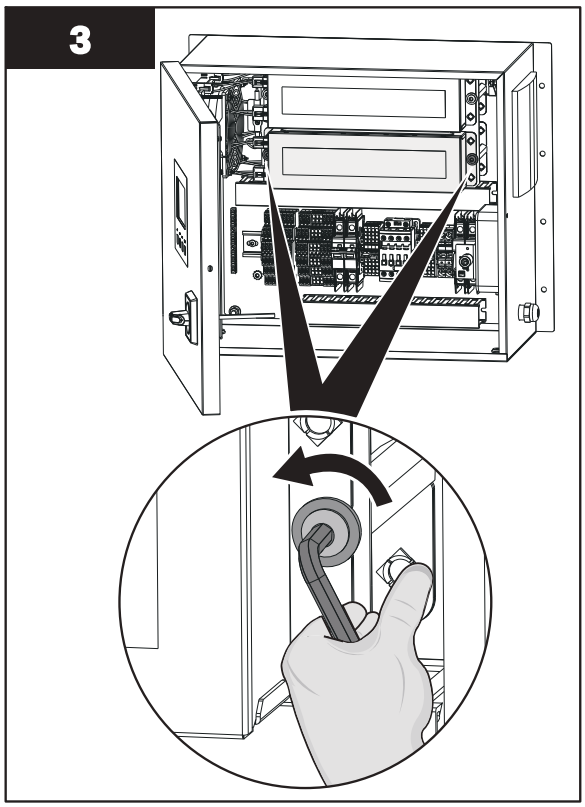
Note: *The illustrations below show Medium CPP. Large CPP has one additional Lamp Driver on each layer.*



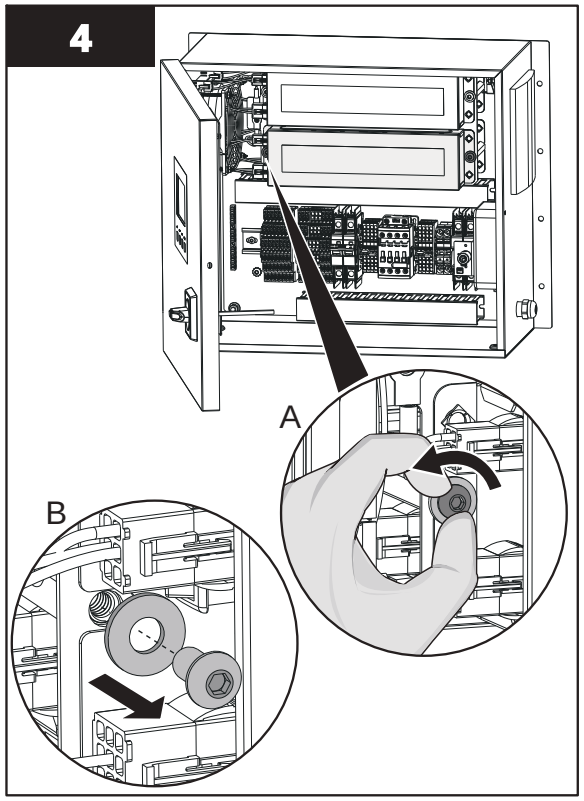
Note: *Disconnect the Lamp Driver connectors.*



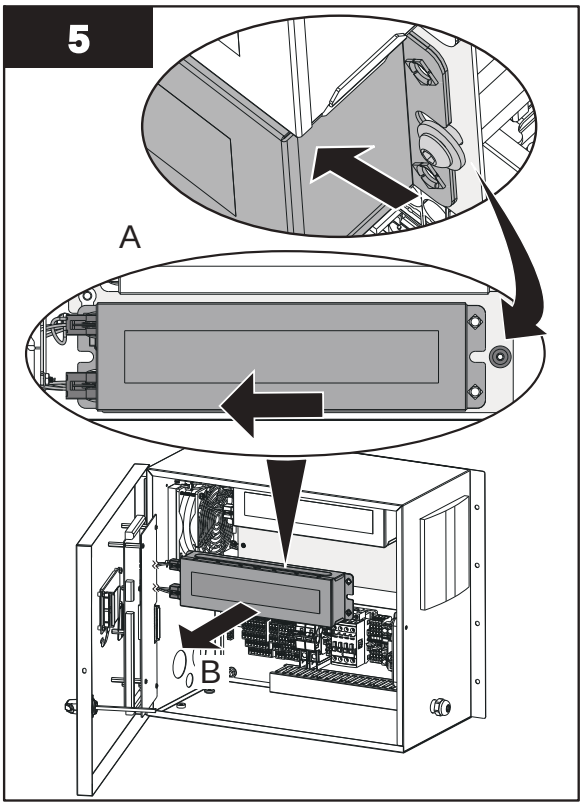
Note: *Remove the Lamp Driver ground screw.*



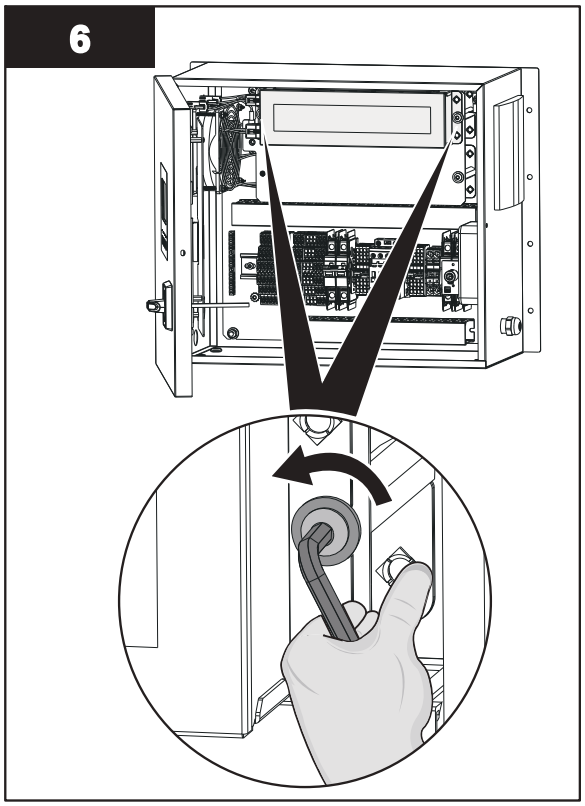
Note: *Loosen the two Lamp Driver mounting screws.*



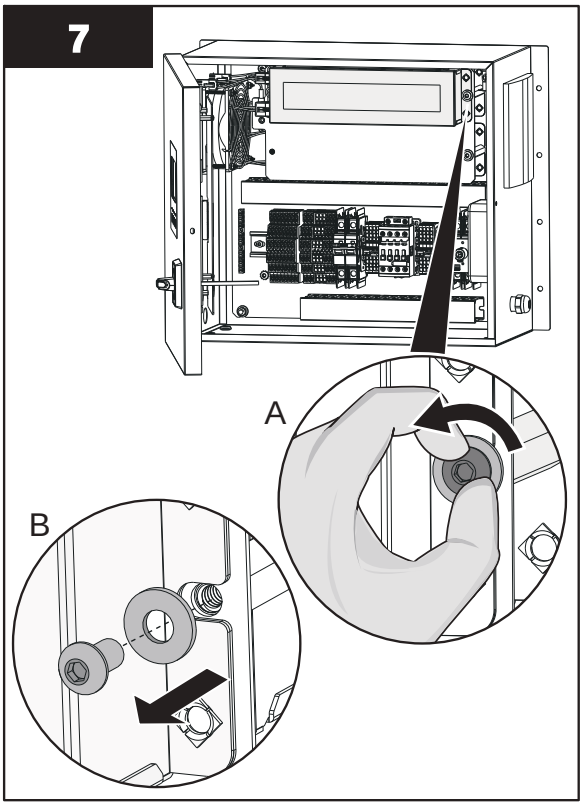
Note: *Remove the Lamp Driver mounting screw shown while supporting Lamp Driver.*



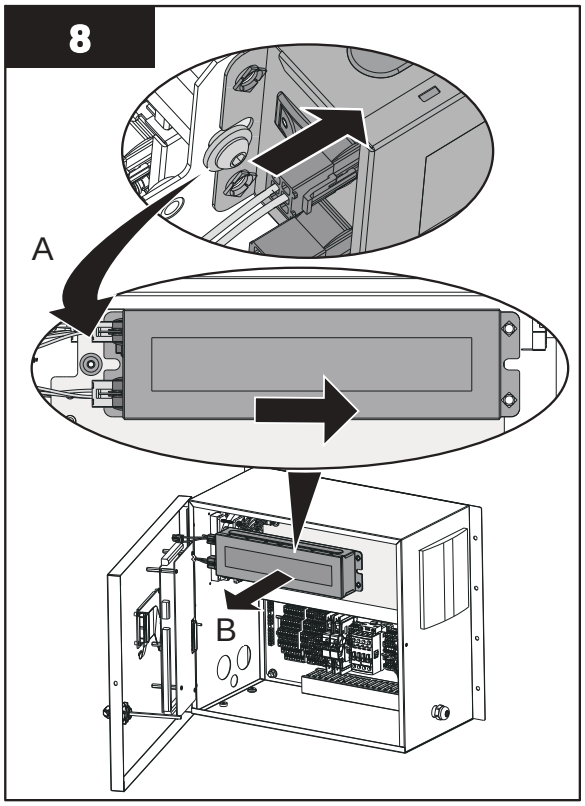
Note: *Remove the bottom Lamp Driver by sliding the Lamp Driver to the side and then remove from panel.*



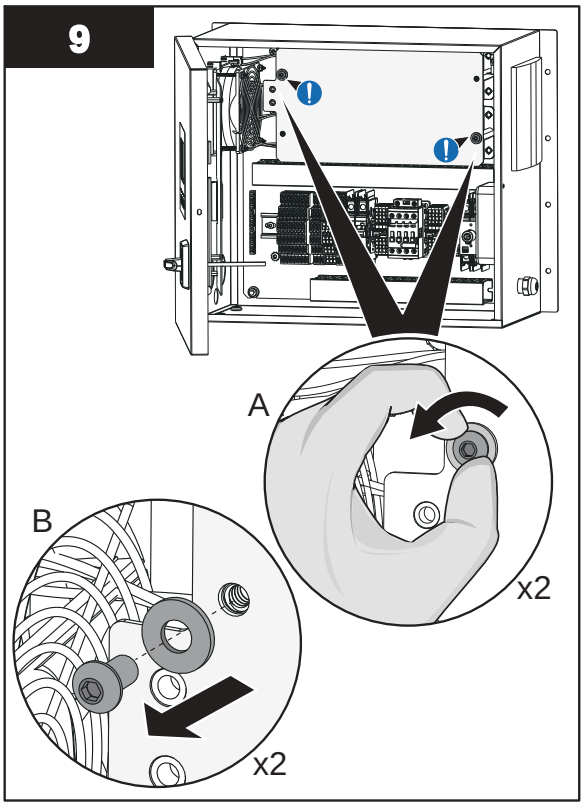
Note: *Loosen the two Lamp Driver mounting screws.*



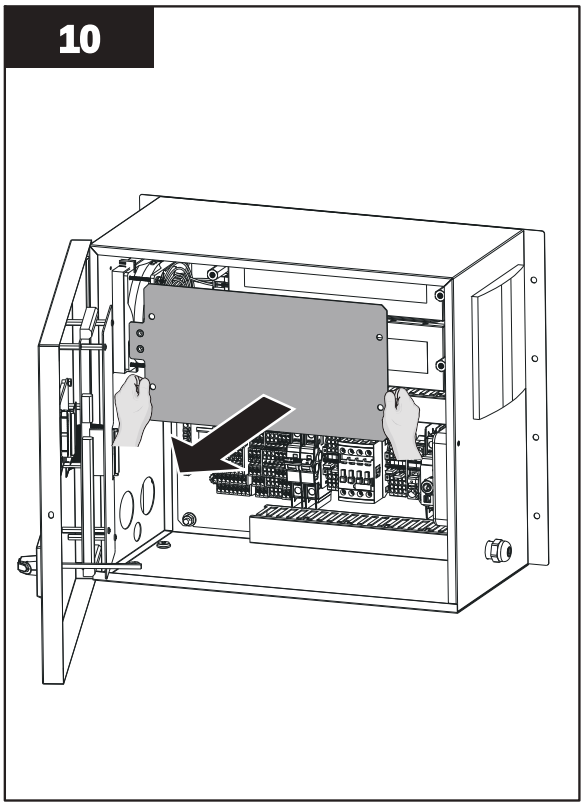
Note: *Remove the Lamp Driver mounting screw shown while supporting Lamp Driver.*



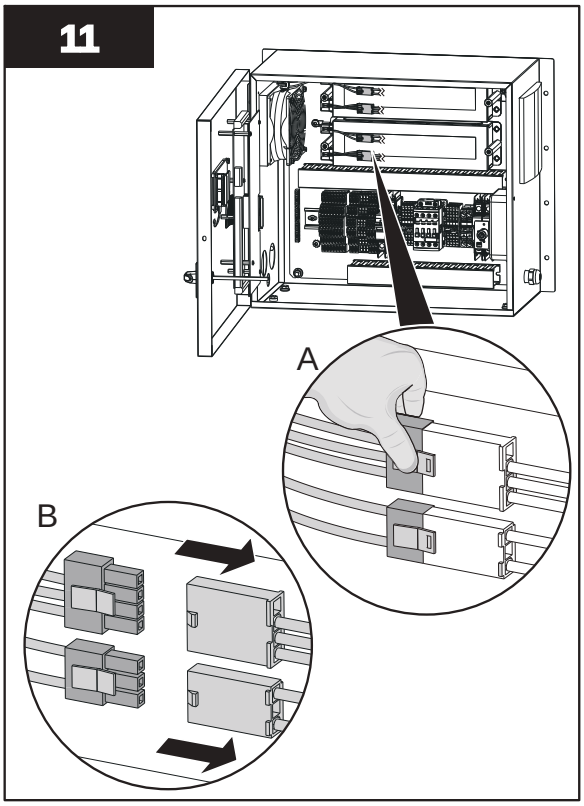
Note: *Remove the top Lamp Driver by sliding the Lamp Driver to the side and then remove from panel.*



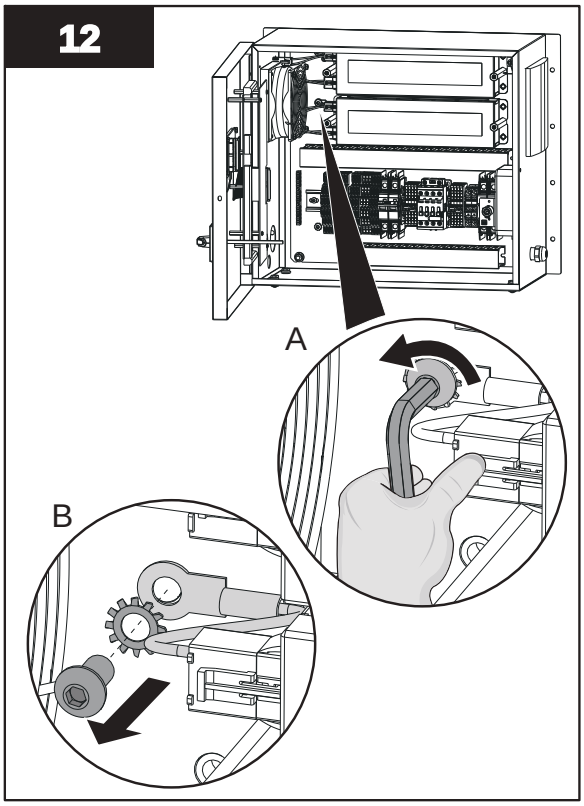
Note: *Remove the two mounting screws holding the front plate to the standoffs if access to rear Lamp Drivers is required.*



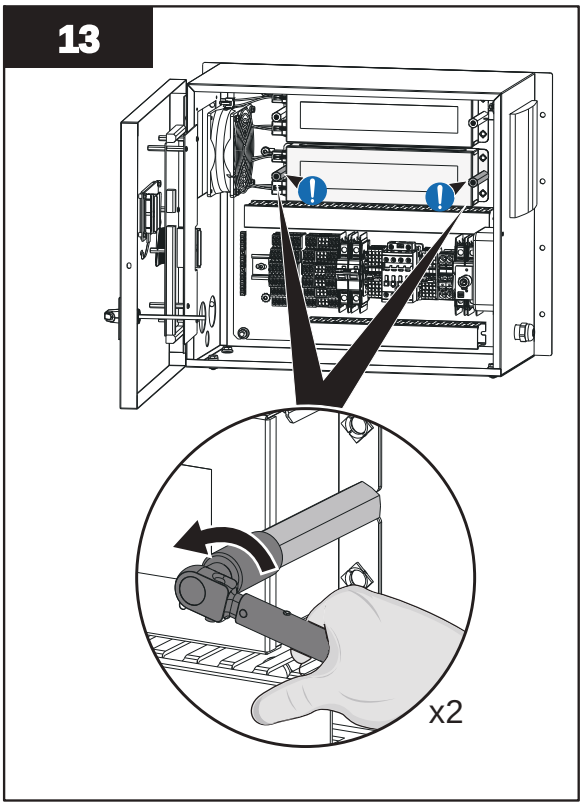
Note: *Remove the front Lamp Driver plate.*



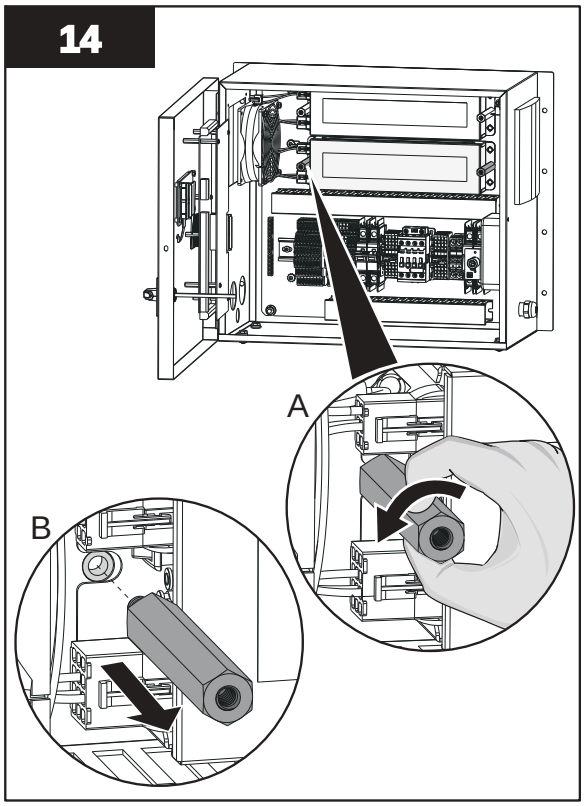
Note: *Disconnect the Lamp Driver connectors.*



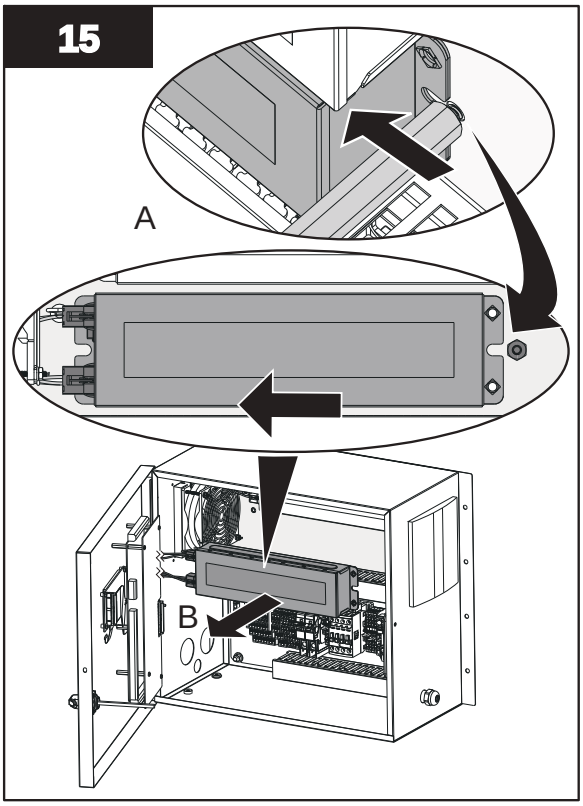
Note: *Remove the Lamp Driver ground screw.*



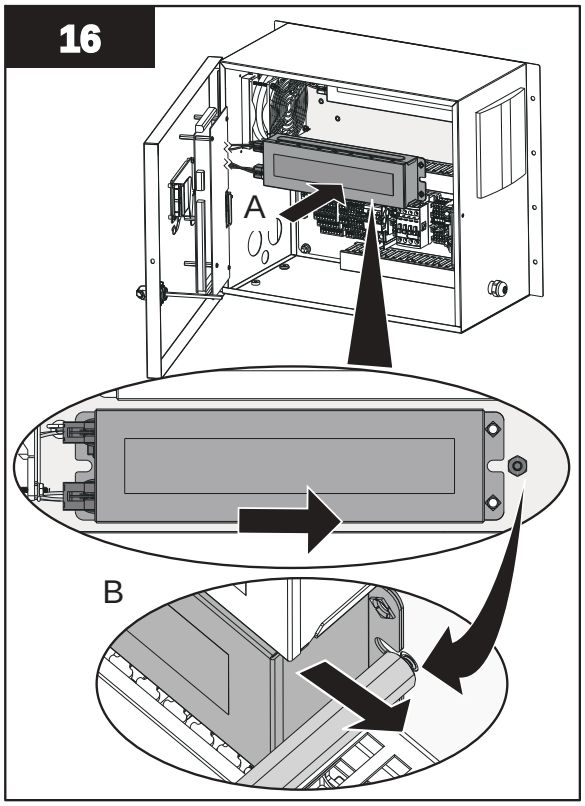
Note: *Loosen the standoffs.*



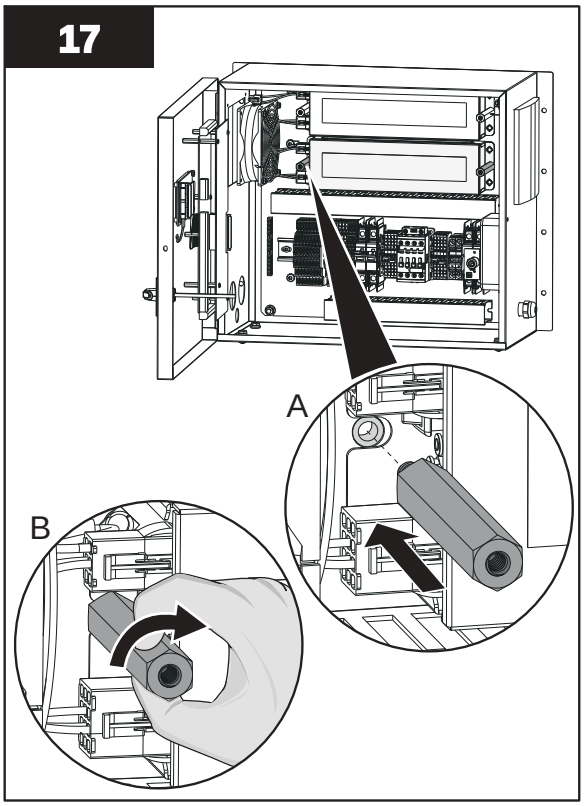
Note: *Remove the standoff shown while supporting Lamp Driver.*



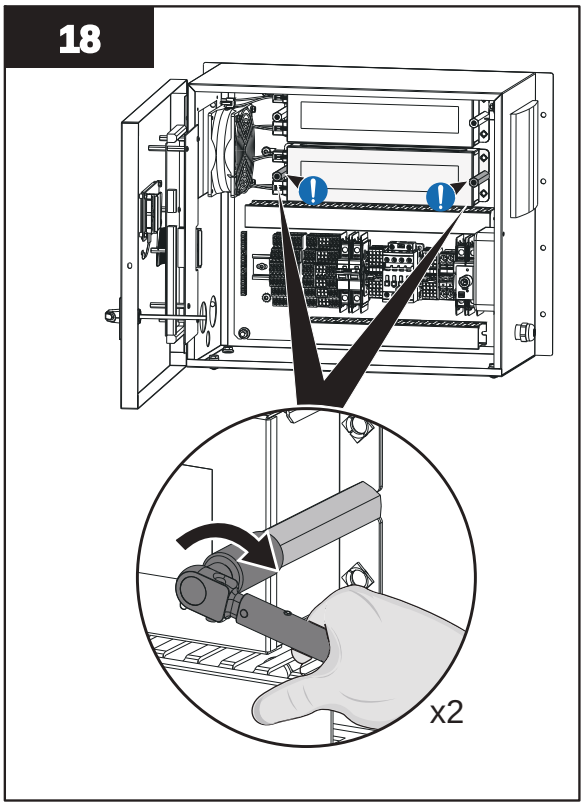
Note: *Remove the faulty Lamp Driver by sliding the Lamp Driver to the side and then remove from panel.*



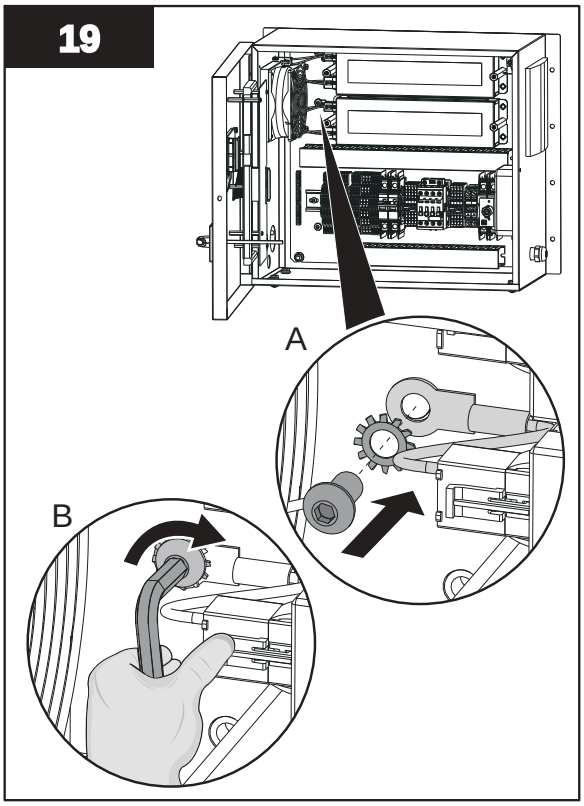
Note: *Install the new Lamp Driver by sliding the Lamp Driver between the standoff and the panel as shown.*



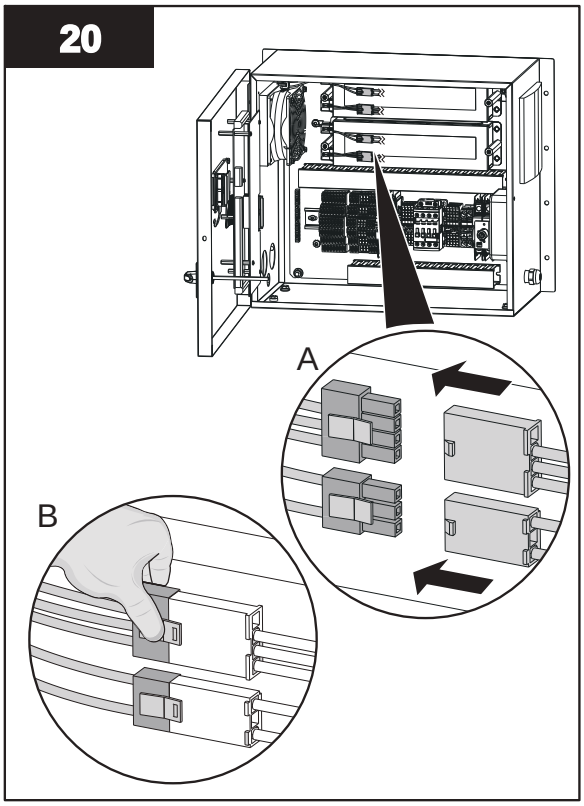
Note: *Install the second standoff.*



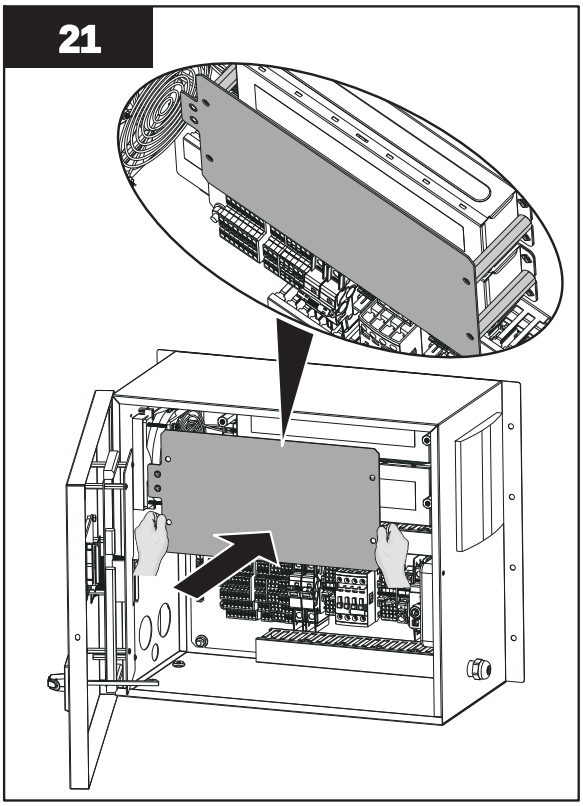
Note: *Tighten the standoffs.*



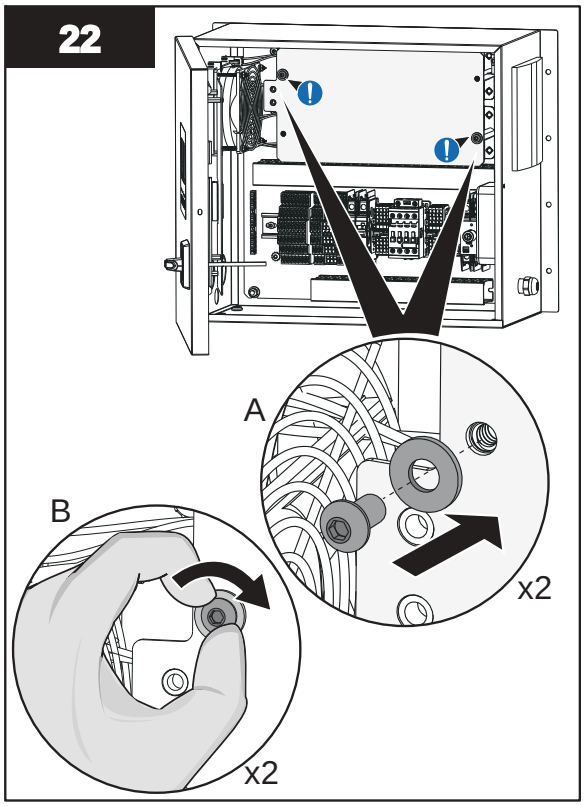
Note: *Install the Lamp Driver ground wire.*



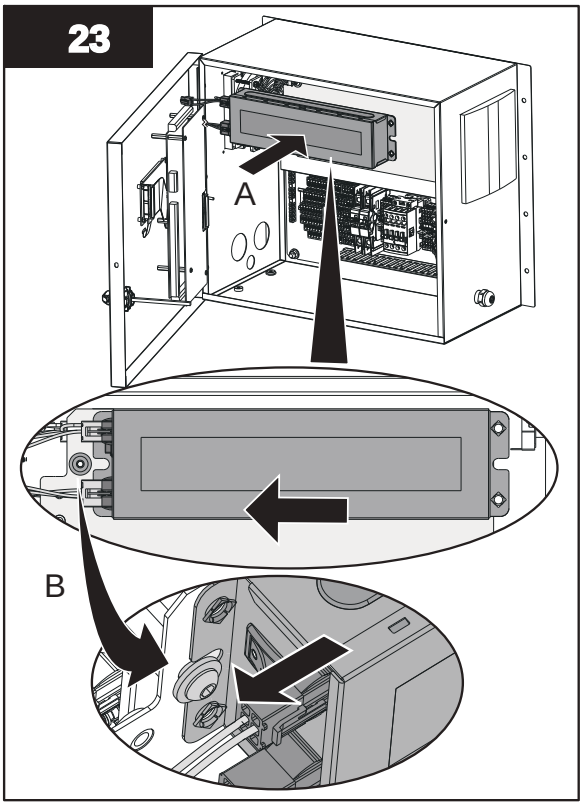
Note: *Connect the new Lamp Driver connectors.*



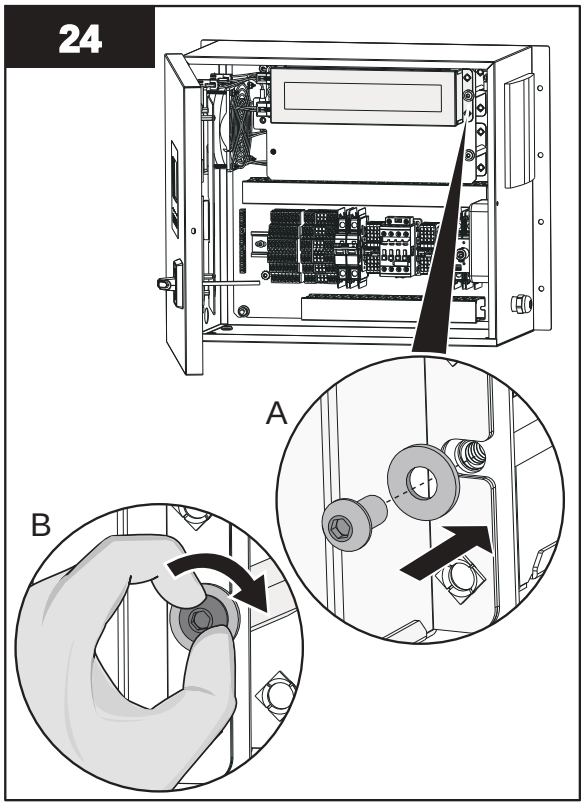
Note: *Position the front plate on the standoffs.*



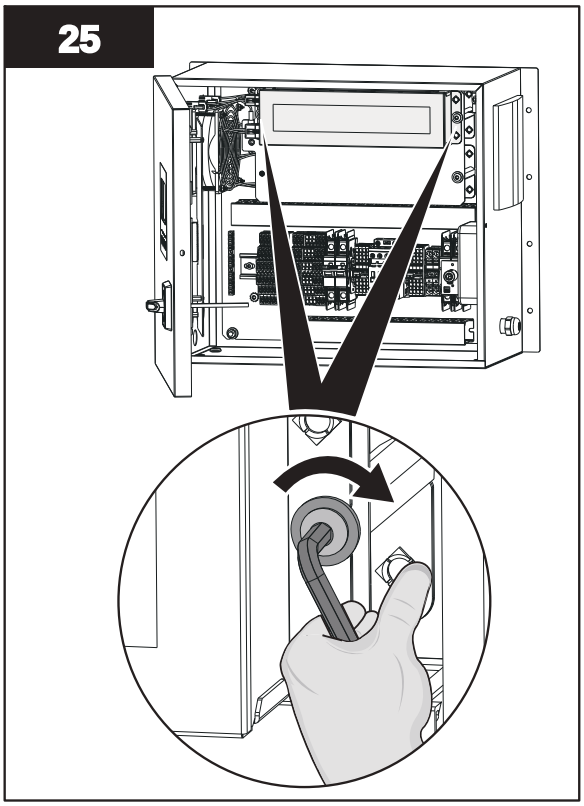
Note: *Loosely install mounting screws in the positions shown.*



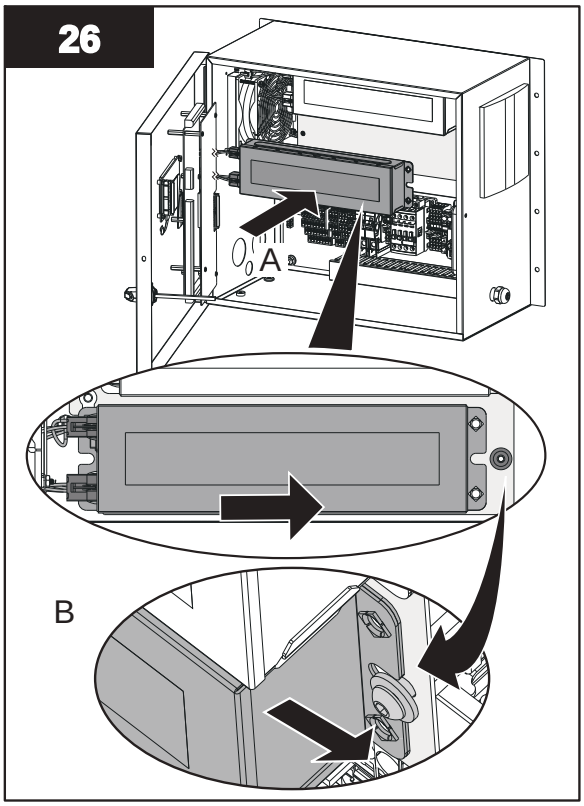
Note: *Install the top Lamp Driver by sliding the Lamp Driver between the screw and the front plate as shown.*



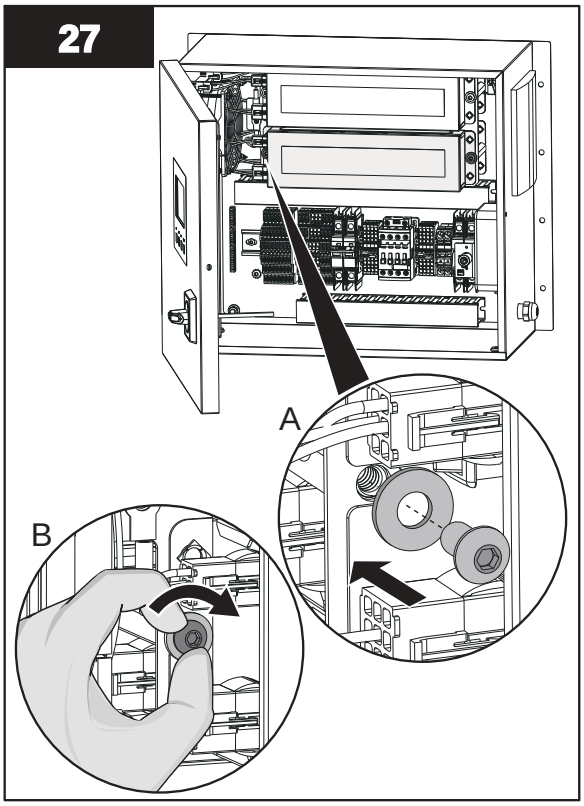
Note: *Install the second mounting screw for the Lamp Driver.*



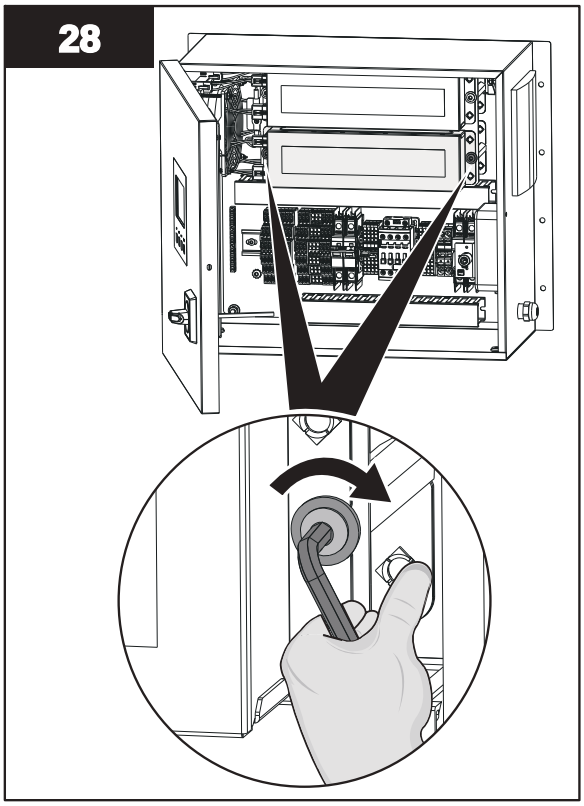
Note: *Tighten the Lamp Driver mounting screws.*



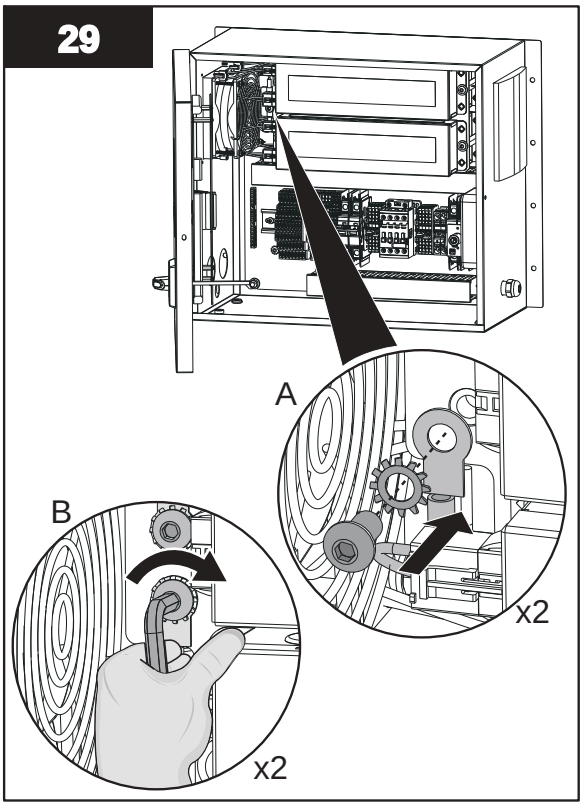
Note: *Install the bottom Lamp Driver by sliding the Lamp Driver between the screw and the front plate as shown.*



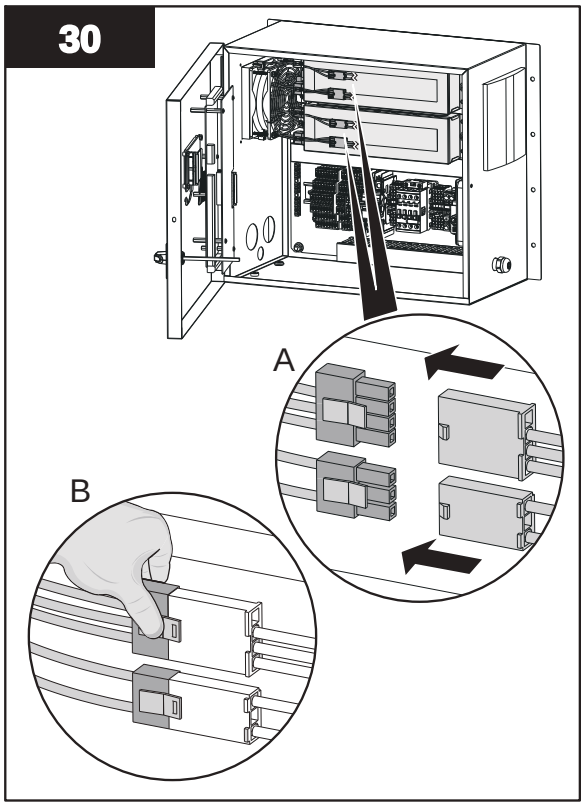
Note: *Install the second mounting screw for the Lamp Driver.*



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

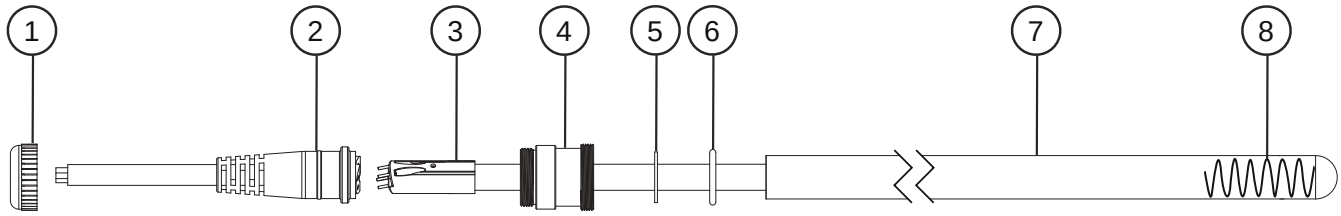


Figure 17 UV Lamp and Lamp Sleeve components

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

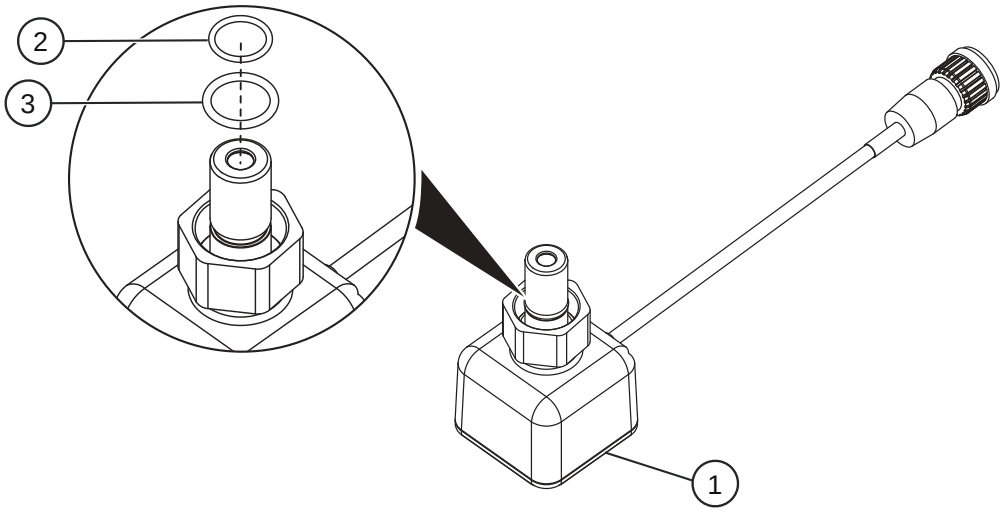


Figure 18 UVI Sensor

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

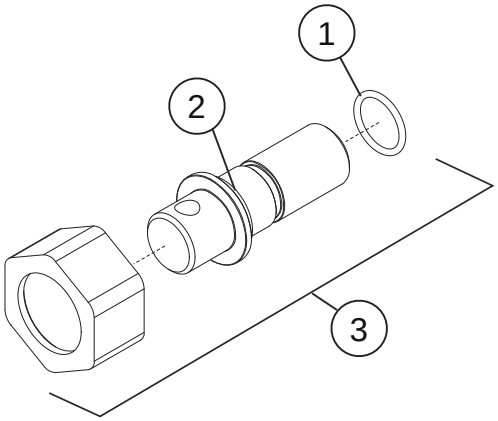


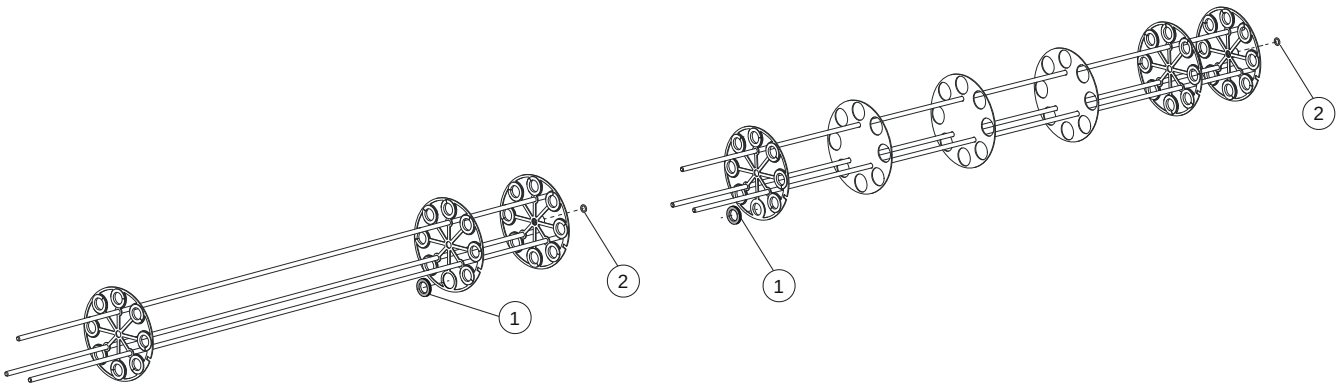
Figure 19 UVI Sensor - Plug Kit

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

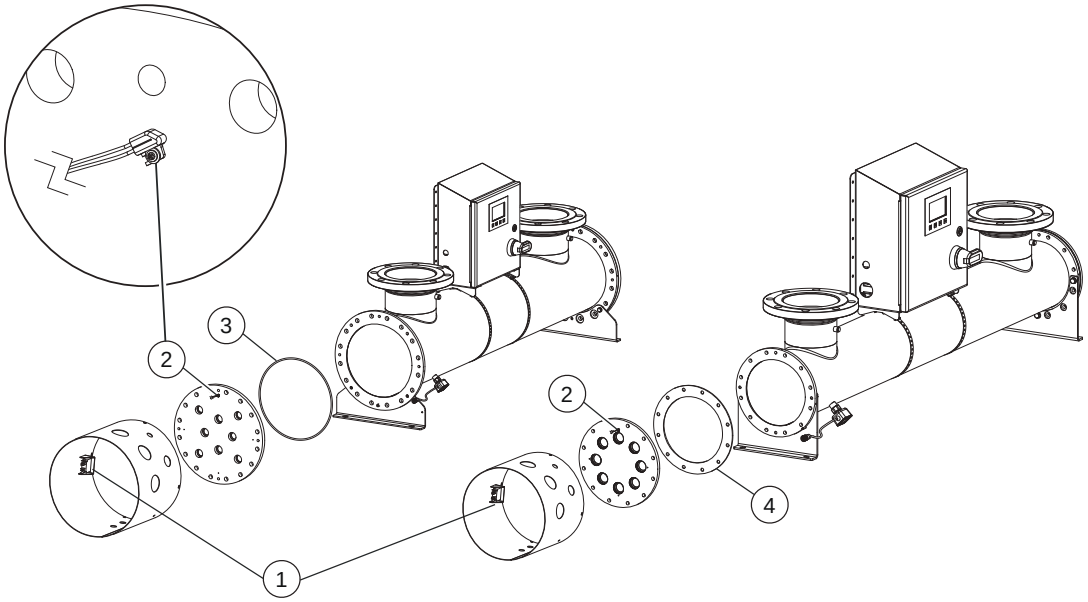


Figure 21 UV Chamber Components

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.

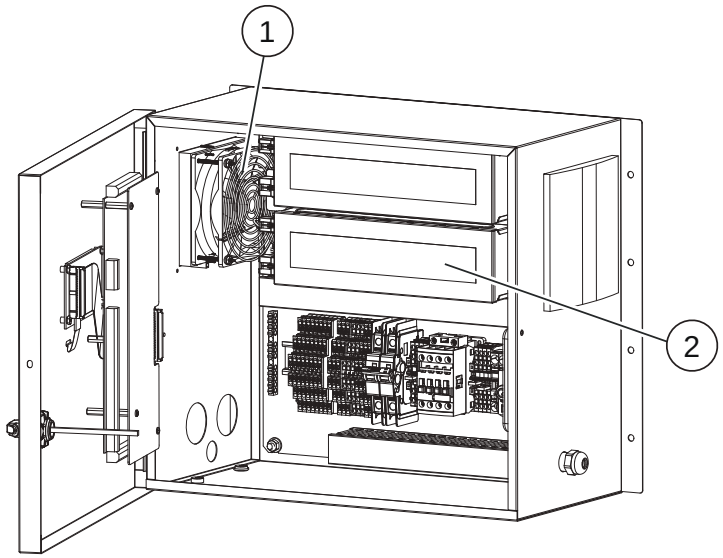


Figure 22 CPP Components

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