

600-000

by Instrumentation Pumps

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1. Safety Requirements

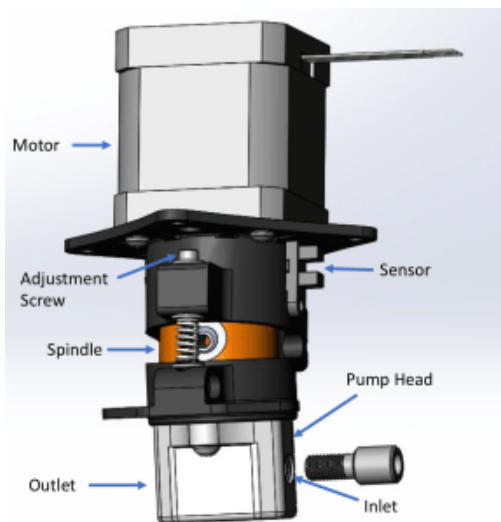
Before using an Instrument Pump Inc. product, read the following safety instructions as well as specific product specifications and operating instructions.

Warning! Fire, electrical shock, injury and damage may occur if metering pump products are not used in accordance with Instrument Pump, Inc. specifications and operation instructions.

- Disconnect electrical power before checking pump for any problems.
- Connect motor, speed controllers, or any other electrical devices based on Instrument Pump, Inc. specifications. Unauthorized work performed on the product by the purchaser or by third parties can impair product functionality and thereby relieves Instrument Pump, Inc. of all warranty claims or liability for any misuse that will cause damage to product and/or injury to the individual.
- Power cables and leads should not be bent, pulled or inserted by excessive force. Otherwise there is a threat of electrical shock or fire.
- Replace any inline fuses only with fuse rating as specified by Instrument Pump, Inc.
- When pump/drive is under operation, never point discharge tubing into face or touch any rotating components of pump.
- In a power down thermal overload cut-in condition, unplug or turn off power to pump. Always allow a cool down period before restarting: otherwise, injury or damage may occur.
- For 30 seconds after power is removed from pump/drive: do not touch any output terminals. Electrical shock may occur because of residual voltage.
- Do not put wet fingers into power outlet of unit.
- Do not operate with wet hands.
- Do not operate drive assemblies that require a hard mount (to be bolted down) unless they are mounted per Instrument Pump, Inc. specifications, if not injury may occur and/or damage to unit.
- Do not touch any rotating pump or motor components: injury may occur.
- Do not run pump dry, unless designed for that service.
- Running dry is harmful to the pump, and will cause excessive heating due to internal friction.
- Check pump rotation and inlet/outlet pump port orientation before connecting power to pump. If not injury may occur.
- When pulling out cords from outlets do not pull cord, grasp plug to prevent plug damage or electrical shock.
- Instrument Pump Inc. Drive Motors become HOT and can cause a burn. **DO NOT TOUCH!**

2. Pump Mounting

To gain optimal performance out of your Instrument Pump metering pump, ensure that your pump is mounted vertically with the motor or drive pointing towards the ceiling, and the pump head or wet end pointing towards the floor. This orientation will promote air bubbles to exit the pumping chamber for optimal precision and performance. Please note that air bubbles can act as springs in your medium, which will impact the performance of your metering or dosing pump.



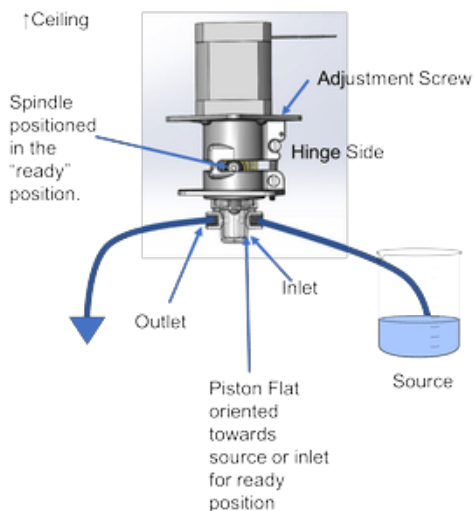
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3. General Set Up

3.1. Quick Start

1. Mount pump upside down with motor facing the ceiling.
2. Connect Source fitting (1/4-28) to hinge side of pump.
3. Connect Dispense fitting (1/4-28) to opposite side of hinge.
 - If you have a stainless steel pump head, then your fitting needs to be long enough to seal on the ceramic flat inside the pump head. The fitting also acts as a press fit to ensure that the ceramics do not spin inside the pump head. Please check the ceramic sleeve is oriented correctly in the stainless steel pump head before replacing fittings. If you have a PVDF pump head, then your fitting will seal against a mating surface inside the female 1/4-28 thread. The ceramics are press fit into the PVDF pump head so it should not move.
4. Attach desired pump nozzle. Begin



dispensing.

(<https://i0.wp.com/instrumentpump.com/wp->

content/uploads/2018/02/Idle-Position.png?ssl=1)

5. If you are having high variations in shot size then there may be air bubbles in the fluid circuit or your setup is incorrect.
6. Adjust shot size if necessary by turning the adjustment screw on the hinge. This will void your factory calibration.
7. If your shot is not a consistent flow and you have removed air from the fluid circuit then you may need to start the spindle in Ready position, so the flat on the ceramics starts out in the "ready" position.

3.2. Speed

For media of 500 centipoise (cP) or less a stroke rate of 120 to 350 rpm is ideal. For media with greater than 500 centipoise (cP) a slower RPM is recommended. Please keep in mind this is highly contingent upon your application.

3.3. Fluidics

Inlet (Suction) tubing: To avoid cavitation use the most resilient tubing possible with the largest inside diameter (I.D.).

Outlet (Dispense) tubing: For the best dispense performance use rigid Teflon tubing, which will reduce peristaltic action) with an equal or smaller I.D. than the inlet tubing.

To clarify, ideally you would like to have a larger ID tubing for inlet side of your metering pump in comparison to the outlet to prevent cavitation.

4. Maintenance

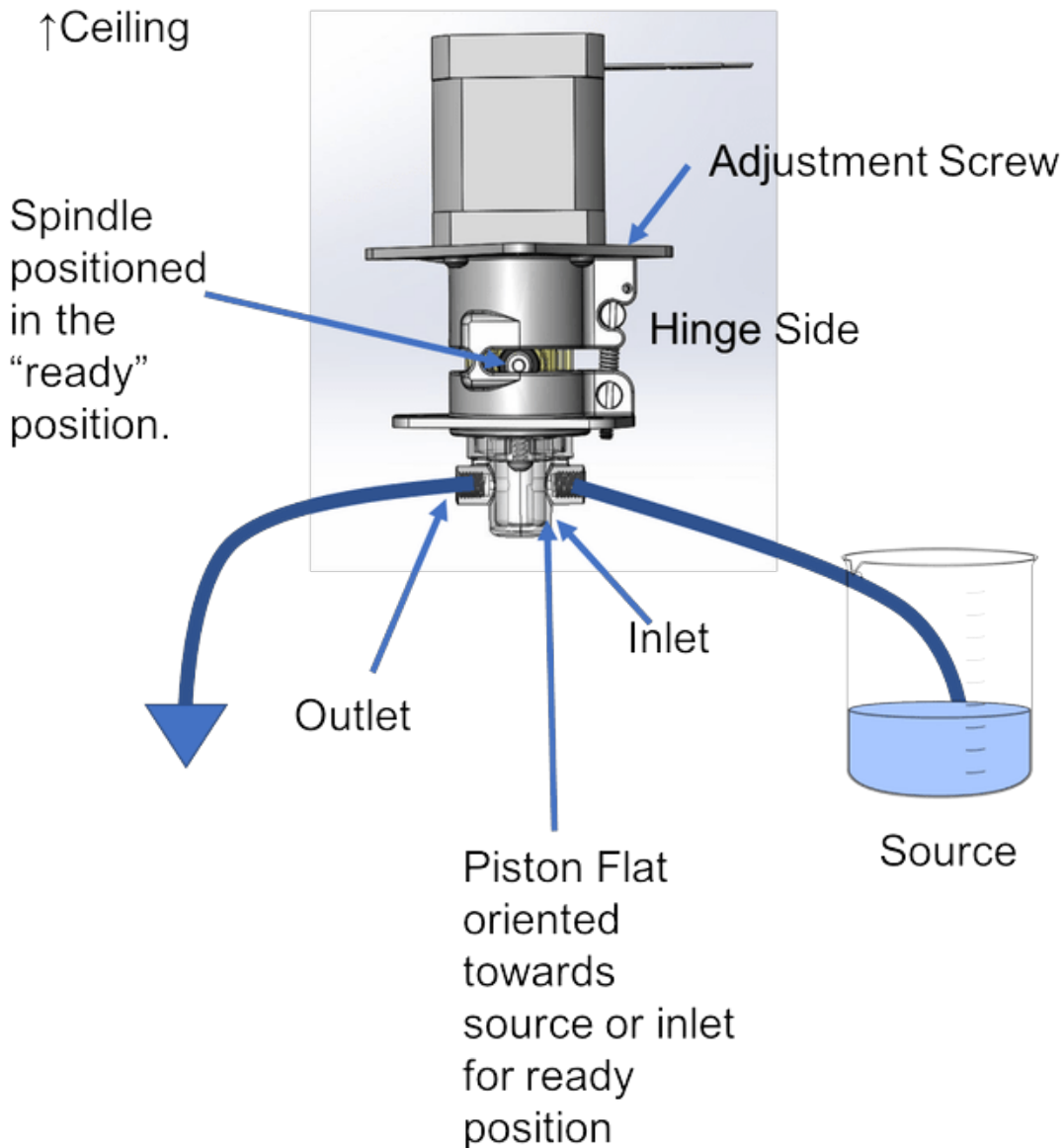
A running pump is a happy pump.

4.1. Idle Position

Due to the harsh nature of certain applications such as battery manufacturing or waste water treatment dosing, it is important to keep the pump running. If your metering pump application has a long cycle time or your metering pump is run infrequently, it is in your best interest to keep the wetted path wet.

If your metering pump is in the non-operating mode for an extended period of time:

1. Completely flush out the pump with water
2. During the non-operating period leave the pumps fluid circuit or wetted path wet with flush water.
3. Extend piston all the way to towards the bottom of the liner and position flat on piston in the "idle or closed" position
 - Stop metering or dosing pump
 - While monitoring the sensor signal, instruct motor to turn clockwise while looking for the leading edge of the flag. The leading edge of the flag is the edge of the flag you see first when rotating clockwise.
 - Once the sensor "sees" the leading edge of the flag rotate the spindle counter clockwise 90 degrees.
 - Step 3 ensures that the flat on the piston is not communicating with the inlet or outlet port.



(<https://i0.wp.com/instrumentpump.com/wp-content/uploads/2018/02/Idle-Position.png?ssl=1>)

4.2. Pump Head Seized

DO NOT FORCE THE ASSEMBLY FREE OR YOU COULD DAMAGE THE PRODUCT!

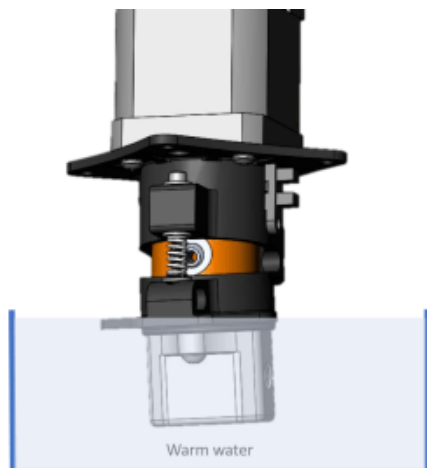
If a metering pump remains idle for long periods of time and the media dries out then there is a chance the pump head can be seized or "frozen". Here are some things you can try before sending the pump back to the factory for maintenance.

If your metering pump is still in an instrument we recommend:

1. Cycling the pump clockwise and counter clockwise at a slow speed in a high torque mode
2. Start and stop the pump to free the system
3. With the power to the stepper motor off, if you can access the pump head with your fingers, rotate the spindle back and forth. This can be accomplished with your index finger pushing against the side of the spindle

If this does not work, remove your pump from the instrument.

1. Soak the top portion of the pump head (pump head only) in a warm water bath for a minimum of 20 minutes. Using your fingers, gently attempt to rotate the spindle back and forth. **THIS SHOULD NOT AFFECT CALIBRATION.**



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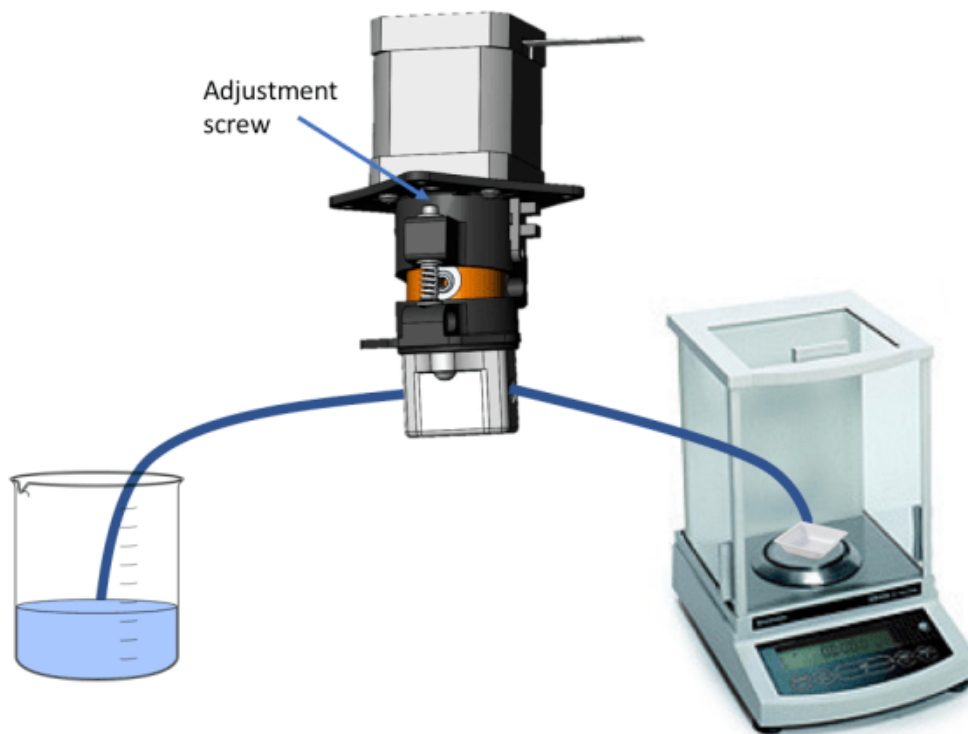
If the piston is still seized:

1. GENTLY remove the pump head by removing the two screws holding the pump head to the pump body. While removing the pump head, twist, tilt & pull the pump head/cylinder/piston assembly such that the piston does not travel too far out of the cylinder. The goal is to remove the pin on the piston out of the bearing on the spindle without removing the piston from the cylinder. There are two lip seals inside the pump head assembly that can be damaged if the flat on the piston comes into contact with the seals hence why you need to delicately remove the pump head.
2. Soak the piston/cylinder assembly in warm water for a minimum of 20 minutes. An ultrasonic bath may be helpful.
3. Try to loosen the assembly by hand by gently rolling the piston back and forth.
4. Reassemble the pump head assembly back onto the pump body, by reversing the direction you just followed.
5. Rotate the assembly via the spindle to ensure that the pump head is correctly assembled.
6. Check the pump for calibration.
7. If you cannot fix the problem, please contact Instrument Pump Inc.

5. Calibration

Calibration is set at the Factory and should not be changed.

1. Flush the system with clean alcohol or suitable cleaning/wetting agent before using the metering pump for first time. Prime the pump with desired media and ensure that **NO AIR BUBBLES** are in the fluid circuit.
2. Put the pump head in the “ready” position with the piston-flat perpendicular to the inlet port.
3. Determine what the pump’s dispense volume is by cycling the pump for a complete 360° revolution. Dispense onto an analytical pan balance and observe the volume. Readjust the pump’s dispense volume by turning the socket head screw from the motor side of the pump. There is a small access hole near where the motor mounts to the pump body. Using a tool, decrease the pump volume by turning the adjustment screw clockwise or increase the pump dispense volume by turning the adjustment screw counter clockwise.



(<https://i1.wp.com/instrumentpump.com/wp-content/uploads/2018/02/Screenshot-2018-02-13-at-11.31.49-AM.png?ssl=1>)

Note: 1 ml of water = 1 gram. A correction factor is required for other media.

6. Troubleshooting

6.1. Loud Noise

At high rpm rates you may hear a loud hammering sound. This can be caused from bubbles being present in the pumping chamber. Causes and solutions for bubbles in the pumping chamber might include:

1. Poor seal at the suction fitting
 - Solution: Use teflon tape to seal the inlet fitting
2. Fluid vaporization or cavitation and degassing
 - Solutions: Increase the diameter of the suction tubing.
 - Reduce suction lift height
 - Pressurize suction supply container
 - Position pump below supply source for gravimetric flow
 - Reduce viscosity of fluid by heating or diluting
 - Reduce flow rate
 - Add pulse suppressors in suction and discharge lines
 - This can also be accomplished by adding resilience in your fluid circuit. Resilient tubing can act as a pulse suppressant, which might include flexible tubing such as viton, hypalon, gum rubber, or soft vinyl. Shield this tubing in case of rupture.
 - Bubble traps can also be used as pulse suppressants.