Pulse-Tone™ Inline Surge Supressors

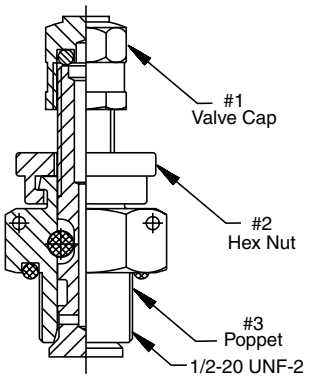
Maintenance Instructions

Installation Tips

1. Either end of the Inline Pulse-Tone can serve as inlet or outlet.
2. For pump pulsation suppression and pump noise reduction, mount the Inline Pulse-Tone directly at the outlet of the pump. The noise reduction will occur when the pump pressure exceeds the precharge pressure of the suppressor. The Inline Pulse-Tone is usually precharged to 50% of the system pressure.
3. For vibration dampening, mount the Inline Pulse-Tone as close as possible to the pump outlet since the pump is usually the source of the vibrations.
4. For shock dampening, mount the Inline Pulse-Tone as close as possible to the source of the shock.
5. The precharge pressure should be checked once every three months.
6. Do not leave the charging and gauging assembly permanently mounted to the top of the Inline Pulse-Tone in an attempt to monitor the precharge pressure.
7. Always close the hex nut #2 on the charging valve in order to seal the precharge in the Inline Pulse-Tone.
8. The T handle on the charging and gauging assembly serves no purpose when either charging or checking precharge. It is only used when working with accumulators.

Important Notice

The charging valve used on the Inline Pulse-Tone is a high-flow valve. It is opened and closed by the hex nut (#2). Turn this nut counterclockwise to open the passage to the nitrogen chamber and clockwise to close the passage to the nitrogen. If the nut is not turned, nitrogen cannot enter or leave the suppressor. During suppressor operation, this nut must always be in the closed position.



Checking the Precharge

1. Remove the valve cap (#1) from the Inline Pulse-Tone valve.
2. Install the charging and gauging assembly onto the Inline Pulse-Tone valve. Make sure all connections are tight.
3. Turn the swivel hex (#2) counterclockwise approximately 4-1/2 turns to open the poppet (#3). You can now read the nitrogen charge on the pressure gauge.
4. After reading the nitrogen charge, turn the swivel hex nut (#2) clockwise 4-1/2 turns.
5. Torque to approximately 50 to 70 inch/lbs.
6. Remove the charging and gauging assembly from the Inline Pulse-Tone.
7. Install the valve cap (#1).

Charging the Inline Pulse-Tone

Use only inert gas such as nitrogen for pre-charging the Inline Pulse-Tone. If possible, use water pumped nitrogen (gas bottle will have a right-hand thread). Oil pumped nitrogen may be used; however, gas bottle will have a left-hand thread. All components must be rated for a pressure at least as high as the nitrogen source. **It is strongly recommended that the nitrogen bottle used have a high pressure regulator.**

Make sure nitrogen supply is shut off. Attach hose to nitrogen bottle.

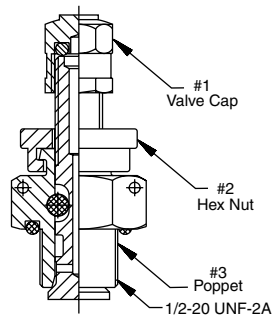
1. Remove the valve cap (#1) from the Inline Pulse-Tone valve. Turn the swivel hex nut (#2) counterclockwise approximately 4-1/2 turns open the poppet (#3).
2. Connect the charging and gauging assembly to the Inline Pulse-Tone valve. Since the Inline Pulse-Tone valve does not have a core, there is no need to utilize the 'T' handle on the gas chuck.
3. Open the valve on the nitrogen bottle slowly and allow the pressure to build to the desired level.
4. When you reach the required pressure level, close the valve on the nitrogen bottle.
5. Turn the swivel hex nut (#2) on the Inline Pulse-Tone valve clockwise approximately 4-1/2 turns to close the valve poppet.
6. When the poppet has seated, apply approximately 50 to 70 inch/lbs of torque.
7. Open the bleeder valve on charging and gauging assembly to vent the gas in the charging hose.
8. Remove the charging and gauging assembly from the Inline Pulse-Tone valve.
9. Install the valve cap (#1).

Disassembly

To vent precharge

1. Remove valve cap (#1).
2. Turn swivel hex nut (#2) counterclockwise approximately 4½ turns to open poppet (#3).
3. Precharge will vent to atmosphere.

Charging Valve

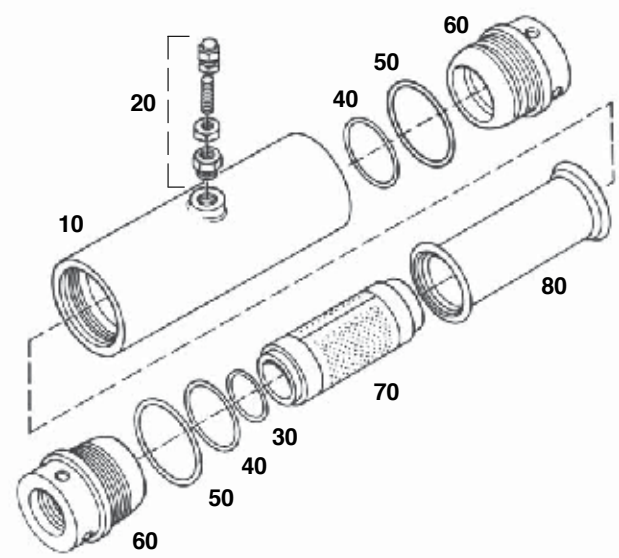


To Disassemble the Inline Pulse-Tone

1. Make certain to vent the gas charge before attempting to disassemble the Inline Pulse-Tone. Refer to above venting procedure. Leave the charging valve in open position.
2. Place the Inline Pulse-Tone in a vise or fixture. With a spanner wrench or dowel pins, remove one of the end ports.
3. Turn the Inline Pulse-Tone 180° in the vise or fixture and remove the other end port.
4. Push the diffuser tube out one end of the body.
5. With a screwdriver or other flat device, remove the flanges of the bladder from their grooves and push the bladder out one end of the steel body.
6. There is usually no need to remove the charging valve.

Assembly

1. Visually inspect and clean all parts prior to assembly.
2. Place end port o-rings (#50) in the grooves of the end ports (#60). Lubricate the o-rings and the face of the end port that comes in contact with the bladder with Superlube grease provided or a PTFE base grease.
3. Place the tube o-rings (#40) over the ends of the diffuser tube (#70). Lubricate the o-rings to hold them in position.
4. Place the tube face o-ring (#30) on the proper end of the diffuser tube (#70) as shown in the sketch below. Lubricate the o-ring to hold it in position.
5. Insert the bladder (#80) into the steel body (#10). the flanges at the ends of the bladder must be properly seated in the grooves in the steel body. ***Do not lubricate the bladder at this time.***
6. After installing the bladder and it is properly seated in the steel body, lubricate the inside diameter of the ends of the bladder with Superlube grease provided.
7. Place one end port (#60) in a vise or fixture to hold it during assembly. Make certain that the face of the end port is properly lubricated. Place the steel body (#10) over the end port and thread it onto the end port until you have metal to metal contact.
8. Lubricate the outside diameter of the diffuser tube (#70) with hydraulic oil and insert it into the inside diameter of the bladder which is installed in the steel body.
9. Thread the second end port into the open end of the steel body until you have metal to metal contact.
10. With a Spanner wrench or dowel pins, tighten each end port approximately another 5°.
11. Thread the charging valve part (#20) into the port on the steel body (#10). The charging valve has an o-ring at the base of the valve to seal between the valve port and the steel body. Lightly oil the o-ring to hold it in position while installing the valve.



10	Body
20	Charging Valve
30	Tube Face O-Ring
40	Tube O.D. O-Ring
50	End Port O-Ring
60	End Port
70	Diffuser
80	Bladder

Gas Chuck Disassembly

> ***The use of safety glasses during the disassembly of the gas chuck is recommended.***

1) Insert the head of a flat screwdriver at one edge of the retaining ring opening and slowly begin to remove the retaining ring.

   Caution:
   The retaining ring will spring out of the groove once half of it has been moved out of the groove. Hold the ring with one finger to avoid loosing it.

2) Remove the external hexagon shaped sleeve and the two internal round sleeves to reach the copper washer.

3) Replace the damaged washer with a new one, part number 5824390000.

   Note:
   The washer should drop out of the groove by it self. Otherwise, use a small screwdriver to remove it if necessary.

4) Reassemble the sleeves.

5) Reassemble the retaining ring back into the groove using a small screwdriver.

6) Due to the low cost of replacing an entire gas chuck, we encourage you to replace this entire assembly instead of replacing the washer, 5824390000.

   Caution:
   Make sure that the retaining ring is completely seated into the groove prior to reusing the gas chuck. If the retaining ring is damaged, replace the entire gas chuck.

Temperature Variation

Temperature variation can seriously affect the precharge pressure of an accumulator. As the temperature increases, the precharge pressure increases; conversely, decreasing temperature will decrease the precharge pressure. In order to assure the accuracy of your accumulator precharge pressure, you need to factor in the temperature variation. The temperature variation factor is determined by the temperature encountered during precharge versus the operating temperature expected in the system.

Temperature During Precharge

	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.	180.	190.	200.	210.	220.
30.	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.24	1.27	1.29	1.31	1.33	1.35	1.37	1.39
40.	.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.24	1.26	1.28	1.30	1.32	1.34	1.36
50.	.94	.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.24	1.25	1.27	1.29	1.31	1.33
60.	.92	.94	.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.13	1.15	1.17	1.19	1.21	1.23	1.25	1.27	1.29	1.31
70.	.92	.94	.96	.98	1.00	1.02	1.04	1.06	1.08	1.09	1.11	1.13	1.15	1.17	1.19	1.21	1.23	1.25	1.26	1.28
80.	.91	.93	.94	.96	.98	1.00	1.02	1.04	1.06	1.07	1.09	1.11	1.13	1.15	1.17	1.19	1.20	1.22	1.24	1.25
90.	.89	.91	.93	.95	.96	.98	1.00	1.02	1.04	1.05	1.07	1.09	1.11	1.13	1.15	1.16	1.18	1.20	1.22	1.24
100.	.88	.89	.91	.93	.95	.96	.98	1.00	1.02	1.04	1.05	1.07	1.09	1.11	1.13	1.14	1.16	1.18	1.20	1.21
110.	.86	.88	.89	.91	.93	.95	.96	.98	1.00	1.02	1.04	1.05	1.07	1.09	1.11	1.12	1.14	1.16	1.18	1.19
120.	.84	.86	.88	.90	.91	.93	.95	.97	.98	1.00	1.02	1.03	1.05	1.07	1.09	1.10	1.12	1.14	1.16	1.17
130.	.83	.85	.86	.88	.90	.92	.93	.95	.97	.98	1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.12	1.14	1.15
140.	.82	.83	.85	.87	.88	.90	.92	.93	.95	.97	.98	1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.12	1.13
150.	.80	.82	.84	.85	.87	.89	.90	.92	.93	.95	.97	.98	1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.11
160.	.79	.81	.82	.84	.85	.87	.89	.90	.92	.94	.95	.97	.98	1.00	1.02	1.03	1.05	1.06	1.08	1.10
170.	.78	.79	.81	.83	.84	.86	.87	.89	.90	.92	.94	.95	.97	.98	1.00	1.02	1.03	1.05	1.06	1.08
180.	.77	.78	.80	.81	.83	.84	.86	.88	.89	.91	.92	.94	.95	.97	.98	1.00	1.02	1.03	1.05	1.06
190.	.75	.77	.78	.80	.82	.83	.85	.86	.88	.89	.91	.92	.94	.95	.97	.98	1.00	1.02	1.03	1.05
200.	.74	.76	.77	.79	.80	.82	.83	.85	.86	.88	.89	.91	.92	.94	.95	.97	.98	1.00	1.02	1.03
210.	.73	.75	.76	.78	.79	.81	.82	.84	.85	.87	.88	.90	.91	.93	.94	.96	.97	.99	1.00	1.01
220.	.72	.74	.75	.76	.78	.79	.81	.82	.84	.85	.87	.88	.90	.91	.93	.94	.96	.97	.99	1.00

Let's assume the temperature during precharge is 70°F, the expected operating temperature is 130°F, and your desired precharge is 1000 PSI. Find the charging temperature of 70°F in the top horizontal row. Next, find the operating temperature of 130°F in the left hand, vertical column. Extend lines from each value until they intersect to find the temperature variation factor; in this case, 0.90. Multiply the desired precharge of 1000 PSI by the temperature variation factor of 0.90 to obtain the actual precharge pressure required – 900 PSI.

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