



# Model VR2K

## High Volume Vacuum Regulator

### Installation, Operation & Maintenance

**General:** The Archer Instruments Model VR2K vacuum regulator is designed for use in vacuum gas feed systems. The VR2K can be provided with or without an integral pressure gage.

**Safety:** When working with chlorine, always use caution and follow applicable safety procedures. General safety considerations:

- \* Store chlorine separately from ammonia.
- \* When using chlorine, avoid locations that expose the chlorine containers and feed equipment to direct sunlight.
- \* Do not apply heater or heat source directly to chlorine containers.
- \* Ton Containers: Use appropriate handling equipment when moving ton containers. When readying ton container for use, ensure valves are aligned vertically. The top valve accesses gaseous chlorine and the bottom valve accesses liquid chlorine. The bottom valve should never be touched unless your system employs a chlorine heat exchanger (evaporator) designed expressly for use with liquid chlorine.

## Installing the Model VR2K:

### **\*IMPORTANT SAFETY NOTES:**

- The VR2K inlet assembly is connected to the back of the vacuum regulator by means of a lead gasket seal (lead gasket part# LGA-3) and four (4) socket head cap screws. Prior to use and during any periods of significant change in ambient temperature, these screws should be checked to make sure they are tight. 20 lbs of torque is recommended. The LGA-3 lead gasket should be replaced once each year, but only after the pressure manifold has been properly evacuated.
- The VR2K is equipped with a drip leg and heater, which is designed to trap any solids entering the unit and also to trap any chlorine that might have re-liquefied inside the pressure manifold. **The drip leg heater should be hot prior to operating the system.**
- Pressure manifolds must include an adequate number of heated drip legs to trap the liquid chlorine discharged from each ton container during initial use. It is also recommended that the pressure manifold be constructed so that the line entering the VR2K is higher than the rest of the pressure manifold, so as to prevent the possibility of excessive liquid chlorine entering the VR2K vacuum regulator body.

- 1) Wall-mounting: After selecting the best location, mount the VR2K to the wall using the wall-mounting hardware provided, connecting onto the VR2K as shown in Figure 1. The VR2K must be installed vertically (as shown) with the drip leg down.
- 2) Gas inlet: The gas inlet connection on the VR2K is a 2-bolt 3/4" NPT union, which is sealed with one lead gasket. Using proper PTFE thread treatment, connect the gas manifold to the Archer union and using one LGA-3 lead gasket (included), bolt the union together. 20 ft/lbs of torque is recommended. Do not overtighten.
- 3) Vacuum: The VR2K vacuum connection is a 1" sch. 80 PVC union. Archer recommends all vacuum lines be sch. 80 PVC 1" pipe.
- 4) Vent: All Archer vacuum regulators are equipped with a vent tubing connection for directing and venting chlorine gas to a safe location. Tubing (1/2" O.D.) is also provided.
- 5) Heater: Prior to startup of the system or prior to placing any new ton container on suction, the drip leg heater(s) must be powered for at least 15 minutes. This will ensure any trapped chlorine liquid is evaporated before reaching the VR2K inlet valve. The heater must always be powered during operation.
- 6) Refer to Figure 2 for proper gas feed system configurations.

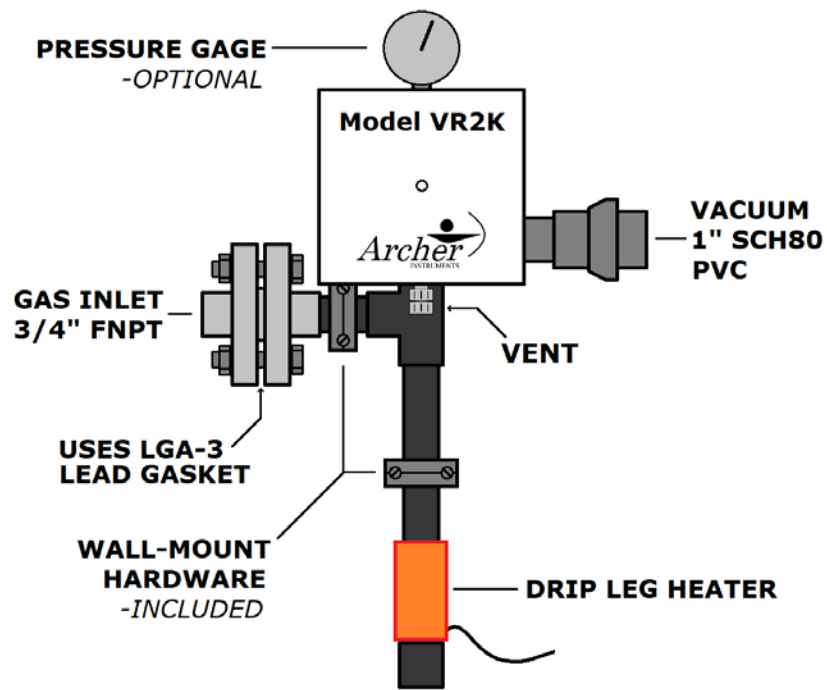


Figure 1

**NOTE:** Vent tubing should always be connected and run to a safe location (outside of any building). A vent screen (provided with every Archer Instruments vacuum regulator) should be fitted over the end of vent tubing to prevent insects from entering.

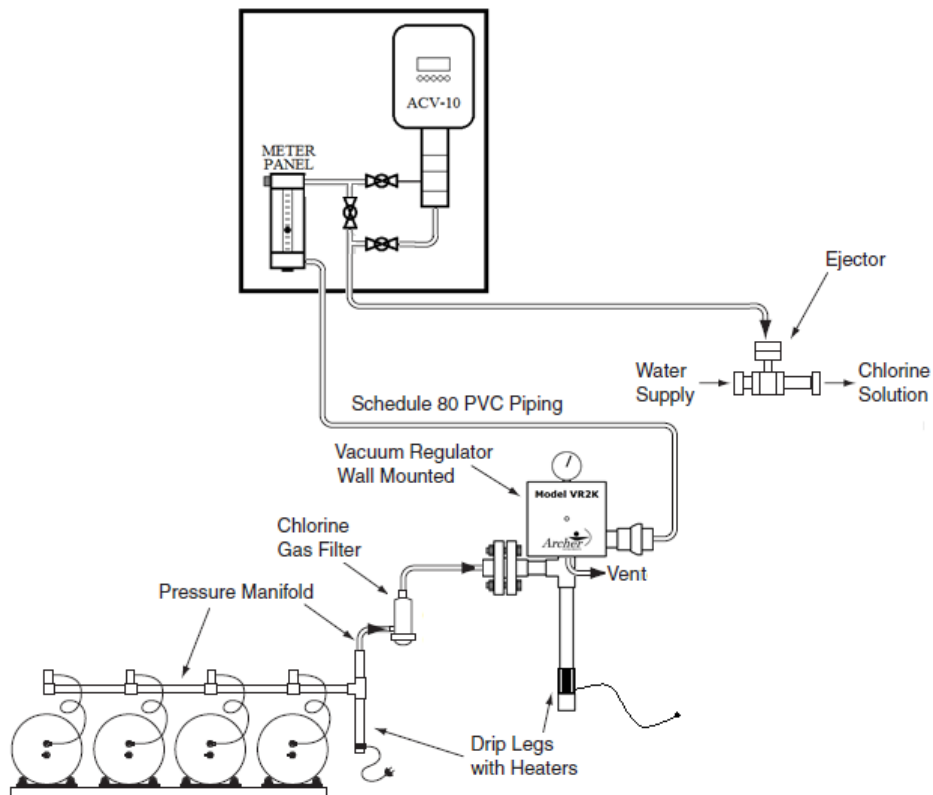


Figure 2

## **Operating the Model VR2K:**

- 1) Before placing the VR2K vacuum regulator into operation, it is important to carefully test each lead gasket seal. A small squeeze bottle (provided with every Archer Instruments vacuum regulator) should be partially filled with ammonia. Squeezing the bottle allows the ammonia fumes to be used to test for chlorine leaks. A leak is detected by a visible light gray / white gas cloud when the two fumes interact. To test for leaks, open each container valve ¼ turn and then close immediately. This pressurizes the lead gasket seal but ensures the container of chlorine is isolated during leak testing. Use ammonia fumes around the cylinder valve and each lead gasket to check for any signs of leaking gas. If a leak is found, this must be addressed before placing the unit into operation.
- 2) After confirming no leaks exist, open the chlorine cylinder valve 1 turn. This is fully open and there is no need to open the valve further. Archer Instruments recommends leaving the wrench on the valve stem whenever a container valve is open.
- 3) The VR2K operates using vacuum supplied by the ejector. Once the gas supply has been prepared for operation and pressurized gas is supplied to the VR2K, gas feed will begin when the ejector is put into operation.

**NOTE:** If the gas supply to the VR2K is exhausted, the guide pin will retract into the front body. This indicates that gas is no longer flowing and that increased internal vacuum has caused the diaphragm to fully open the inlet valve. When a high internal vacuum level exists the diaphragm assembly will seal against the inside of the back body until either the vacuum is relieved or the gas supply is restored.

## **Maintaining the VR2K:**

Recommended Maintenance Frequency: Archer Instruments recommends yearly routine maintenance of the VR2K vacuum regulator.

-Refer to the following parts diagram when performing maintenance on the VR2K.

NOTE: Prior to removal, the gas manifold must be properly evacuated to be sure all chlorine has been removed and no pressure remains in the system.

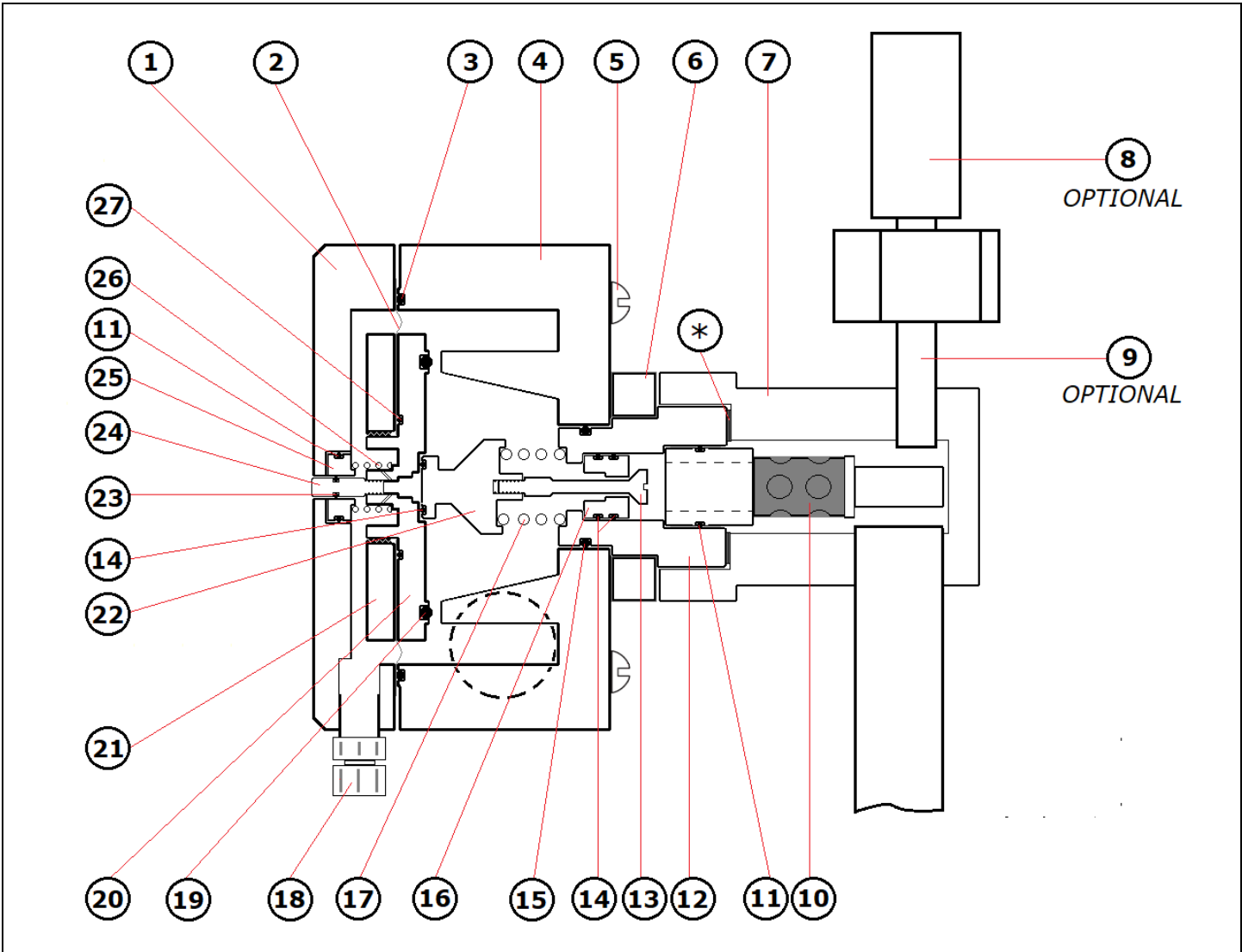
### **DISASSEMBLY:**

- 1) Remove the four BTA-139 cap screws and pull the drip leg & inlet assembly straight out of the back of the vacuum regulator. Take care to pull it straight away, so as to avoid damaging the VRA-644 Filter Holder.
- 2) Remove the four BTA-125 body screws and two BTA-131 back plate screws, then carefully separate the VR2K front and back bodies.
- 3) The diaphragm assembly can then be removed by pulling it straight out of the front body. Take care to not lose the vent spring, which is located between the diaphragm assembly and the front body.

- 4) It is generally not necessary to remove the VRA-600 guide pin for routine maintenance. Simply replace the OA-VIT-006 o-ring. However, the guide pin *can be* unscrewed by hand or (if necessary) by using a pair of pliers.
- 5) The diaphragm back plate VRA-56A and diaphragm front plate VRA-269 are threaded together and can often be unscrewed by hand. If they will not unscrew by hand, it may be necessary to use a vice and / or channel locks.
- 6) To complete disassembly of the back body and inlet valve assembly:
  - a. Remove the VRA-644 filter holder from the inlet capsule by pulling it straight out. It is held only by an o-ring fit. It may be necessary to use pliers to twist and pull the VRA-644.
  - b. Remove the old LGA-3 lead gasket by carefully prying it away from the VRA-645 inlet capsule.
  - c. Using a flat head screwdriver, carefully unscrew the inlet valve stem VRA-647 from the spring retainer VRA-649. Remove the stem, spring retainer and SPA-639 inlet spring.
  - d. The inlet capsule VRA-645 and back plate VRA-646 can be separated from the back body VRA-641 using a mallet or similar implement to tap on the inlet capsule from the inside of the back body.
  - e. The inlet capsule is press-fit into the back plate. Once they are separated from the back body, the inlet capsule can be pressed or knocked out of the back plate.
  - f. The inlet valve seat VRA-648 is o-ring fit into the inlet capsule and can be pressed or tapped out of the capsule. **The inlet valve seat should always be replaced during maintenance.**
- 7) The filter holder VRA-644 incorporates a wrapped silver screen through which all gas entering the unit must pass before reaching the inlet valve. This screen can be cleaned in place using compressed air, hot water, etc. If necessary, the screen can be carefully removed and cleaned using a solvent such as acetone. If the screen is damaged or torn the VRA-644 should be replaced.
- 8) Whenever routine maintenance is being performed, all parts should be thoroughly cleaned. It is recommended that the inlet valve seat and all o-rings (with the exception of the OA-VIT-332) be replaced.
- 9) When reassembling, new o-rings should be given a thin film of the Fluorolube grease.

**SAFETY NOTE:** The inlet valve assembly is a critical component of the VR2K. Improper handling or reassembly can result in dangerous leakage of chlorine gas. **Archer Instruments recommends that only trained personnel or those familiar with vacuum regulator maintenance service the VR2K.**

*-Should you have any questions during maintenance of your VR2K vacuum regulator, please contact your local service provider or Archer Instruments for support.*



Item#	Qty.	Part #	Description	Item#	Qty.	Part #	Description
1	1	VRA-642	Front Body	18	1	TCA-84	Tube Connector (Vent)
2	1	DIA-640	Double Diaphragm	19	1	OA-VIT-332	O-Ring
3	1	OA-VIT-047	O-Ring	20	1	VRA-56A	Diaphragm Back Plate
4	1	VRA-641	Back Body w/ 1" Union	21	1	VRA-269	Diaphragm Front Plate
5	4	BTA-125	¼-20 x 2-3/4" Body Screw	22	1	VRA-649	Spring Retainer
6	1	VRA-646	Back Plate	23	1	OA-VIT-006	O-Ring
7	1	VRA-643	Inlet Manifold	24	1	VRA-600	Guide Pin
8	1	PGL-200	Pressure Gage Assembly	25	1	VRA-104	Pin Guide
9	1	VRA-650	¼" Monel Nipple	26	1	SPA-100	Vent Spring
10	1	VRA-644	Filter Holder & Silver Screen	27	1	OA-VIT-029	O-Ring
11	2	OA-VIT-014	O-Ring	*	1	LGA-3	Lead Gasket
12	1	VRA-645	Inlet Capsule	<b>NOT SHOWN:</b>			
13	1	VRA-647	Inlet Valve Stem	2		BTA-131	¼-20 X 3" Back Plate Screw
14	3	OA-VIT-013	O-Ring	4		BTA-139	3/8-16 x 1" Cap Screw
15	1	OA-VIT-214	O-Ring	1		OA-VIT-215	O-Ring - inside 1" PVC Union
16	1	VRA-648	Inlet Valve Seat	1		HTA-111	Drip Leg Heater
17	1	SPA-639	Inlet Spring	1		LGA-3	Lead Gasket -inside pressure union

**Notes:**

- 1. Vacuum Connection is 1" PVC Sch. 80 Socket Union
- 2. Vent Tubing is ½" O.D.



Date: Nov 2019  
Drawing #: VR2K