Model VR3 Vacuum Regulator

Installation, Operation & Maintenance

General: The Archer Instruments Model VR3 vacuum regulator is designed for use in vacuum gas feed systems. The VR3 incorporates an integral graduated meter tube, which provides a local indication of gas flow rate. The VR3 can be provided with or without an integral rate control valve. *Note: For systems using an automatic switchover module, the VR3 vacuum regulator should be plugged (rate valve removed) as the integral rate valve can cause improper switchover operation.

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 cylinder and equipment to direct sunlight.

* Do not apply heater or heat source directly to chlorine cylinders.

* 150lb (upright) cylinders: Always keep cylinders upright and ensure the steel valve cap is in place when moving cylinders. Once cylinder is in place, a safety chain should be used to secure the cylinder.

* 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. When drawing gas from ton containers an appropriate ton container adapter & drip leg must be used (also available from Archer Instruments).

Installing the Model VR3:

1) Carefully inspect the cylinder valve outlet surfaces and vacuum regulator inlet capsule surfaces for damage or debris prior to installation.

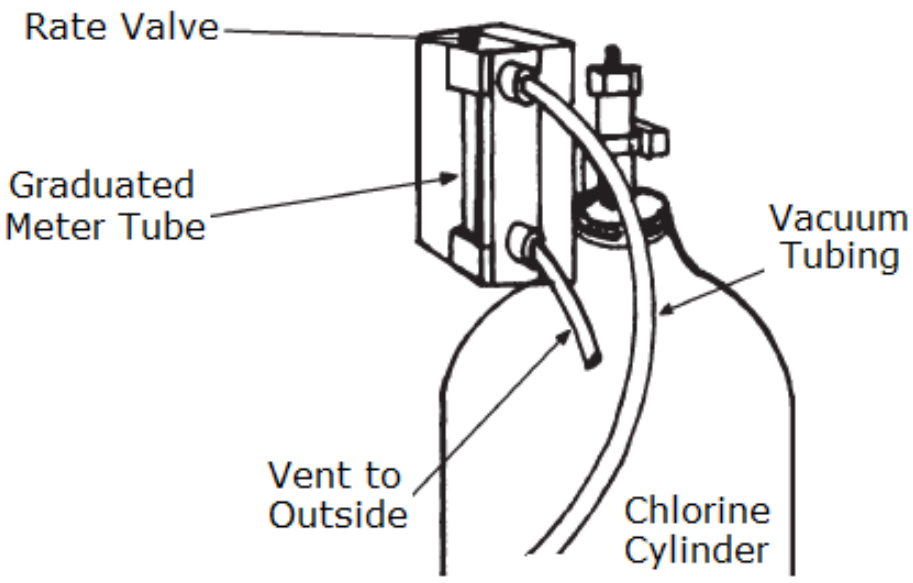
2) Note that the inlet port on the VR3 regulator ships with a filter cartridge installed. Do not remove this filter, as doing so will bring on maintenance requirements.

3) Always use a new lead gasket when connecting the vacuum regulator to a chlorine cylinder valve.

4) Holding the VR3 vacuum regulator upright, settle it over the cylinder valve and fit the inlet capsule into the cylinder valve outlet port.

5) Using a 3/8" wrench, tighten the yoke assembly "half-dog" set screw so that the lead gasket is crushed between the valve and the inlet capsule.

6) Connect the vent and vacuum tubing to the VR3 regulator (these are labeled). See figure below:



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

Operating the Model VR3:

1) Prior to placing the VR3 vacuum regulator into operation, it is important to carefully test the 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 the cylinder valve ¼ turn and then close immediately. This pressurizes the lead gasket seal but ensures the full cylinder of chlorine is isolated during leak testing. Use ammonia fumes around the cylinder valve and 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 1/3 of a turn. This is fully open and there is no need to open the valve further.

3) If the Model VR3 is not equipped with a rate valve (if this is plugged), no further action is needed.

4) If the VR3 is equipped with a rate valve, adjust the rate valve knob until the desired feed rate is indicated on the graduated meter tube.

Maintaining the VR3:

Recommended Maintenance Frequency: Archer Instruments recommends yearly routine maintenance of the VR3 vacuum regulator.

-Refer to the following parts diagram when performing maintenance on the VR3.

1) To disassemble the VR3, remove the two BTA-125 yoke screws and pull the yoke & inlet assembly out of the back of the vacuum regulator.
2) Remove the BTA-124 body screws and separate the VR3 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) 250 PPD Units & Lower:
    a. Unscrew the RVA-518-XXX rate valve & knob (or the dummy plug if the unit is plugged) from the VBA-100C valve bonnet until it can be gently pulled straight up and out.
    b. Remove the VBA-100C rate valve bonnet (if unit is not plugged) by unscrewing it from the top meter block using a pair of pliers. Beneath the bonnet (or dummy plug) is an OA-VIT-106 o-ring, which should be removed and replaced.
    c. Next remove the glass meter tube by slowly unscrewing the MIA-140 inlet plug. This clamps the glass tube into place. Be careful to not let the glass meter tube fall out.

d. The MIA-140 inlet plug can then be removed fully by unscrewing it several turns and then pulling it out.
e. The RVA-830-100 / 250 rate valve seat may or may not need to be replaced. If the rate valve stem fits loosely into the seat, replace the seat. If it feels snug the seat can be left in place. If the rate valve seat does need to be replaced, it can be pushed down and out of the top meter block from above using a small screwdriver or other small tool. Using a flathead screwdriver, remove the top and bottom meter blocks from the front body.

5) 500 PPD Units:
   a. Remove the VRA-122 Meter Body by unscrewing the (4) #10-24 screws.
   b. Unscrew the RVA-652 / 651 Rate Valve and remove.
   c. Using a pair of pliers, unscrew and remove the RVA-224 bonnet & RVA-116 sleeve from the meter body
   d. Next remove the glass meter tube by slowly unscrewing the MIA-232 inlet plug. This clamps the glass tube into place. Be careful to not let the glass meter tube fall out.
   e. Using a flathead screwdriver, remove the top and bottom meter blocks from the front body.
6) The guide pin VRA-100 can be unscrewed from the diaphragm assembly by hand or (if necessary) by using a pair of pliers. But it is generally not necessary to remove this pin for routine maintenance. Simply replace the OA-VIT-006 o-ring.
7) The diaphragm back plate VRA-363 and diaphragm front plate 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.
8) Whenever routine maintenance is being performed, all parts should be thoroughly cleaned. It is recommended that 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.

NEXT: The inlet assembly is a critical component of the VR3. Improper handling or reassembly can result in dangerous leakage of chlorine gas.

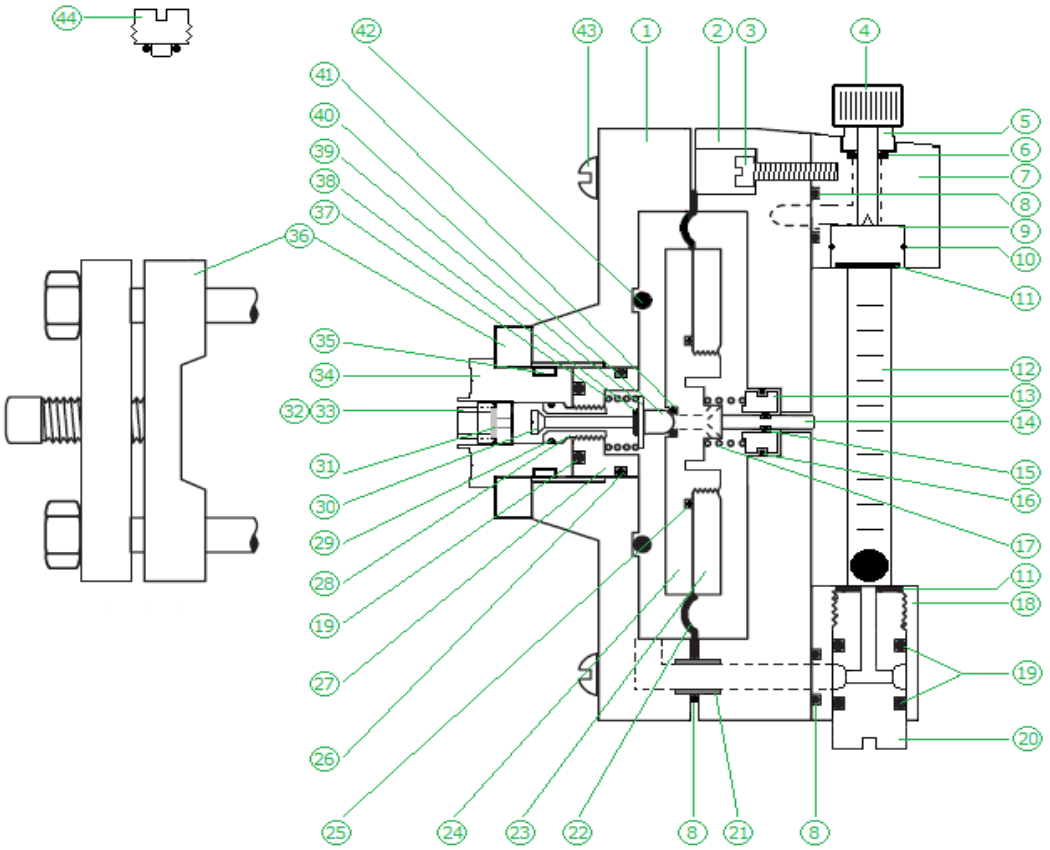
Archer Instruments recommends that only trained personnel or those familiar with vacuum regulator maintenance service the inlet assembly.

To service the inlet assembly:

a. Remove the inlet assembly from the yoke plate by sliding the VRA-142 retainer clip off of the inlet capsule.
b. Remove the inlet filter from the inlet capsule. The inlet filter cartridge (FCA-1 & FCA-2) can be removed using any ¼-20 threaded bolt or screw. The VR3 body screws and yoke screws are ¼-20 thread. Unscrew the FCA-2 from the FCA-1 and replace the filter.

c. The inlet assembly can now be disassembled by using a small flathead screwdriver to unscrew the inlet valve (VRA-112) from the vent plug (VRA-111). Be careful when disassembling as the inlet assembly is under spring tension and small parts could be lost.
d. Once the inlet valve, vent plug, spring, spring holder and spring retainer are removed, the seal plug (VRA-182) and inlet capsule (VRA-141) can be unscrewed.
e. The inlet valve seat (VRA-110) can be removed by pressing it up and through the inlet capsule. The inlet valve seat is a maintenance part and once removed should never be reused.
f. Carefully clean the inlet capsule, seal plug, inlet valve stem, vent plug, spring holder, spring retainer and spring. NOTE: The VRA-112 inlet valve stem must be cleaned using a non-abrasive cloth (or Scotch-Brite pad).
g. Using a new inlet valve seat and new o-rings (with a thin film of the grease provided on each o-ring), reassemble the inlet assembly in reverse order.

-Should you have any questions during maintenance of your VR3 vacuum regulator, please contact your local service provider or Archer Instruments for support.

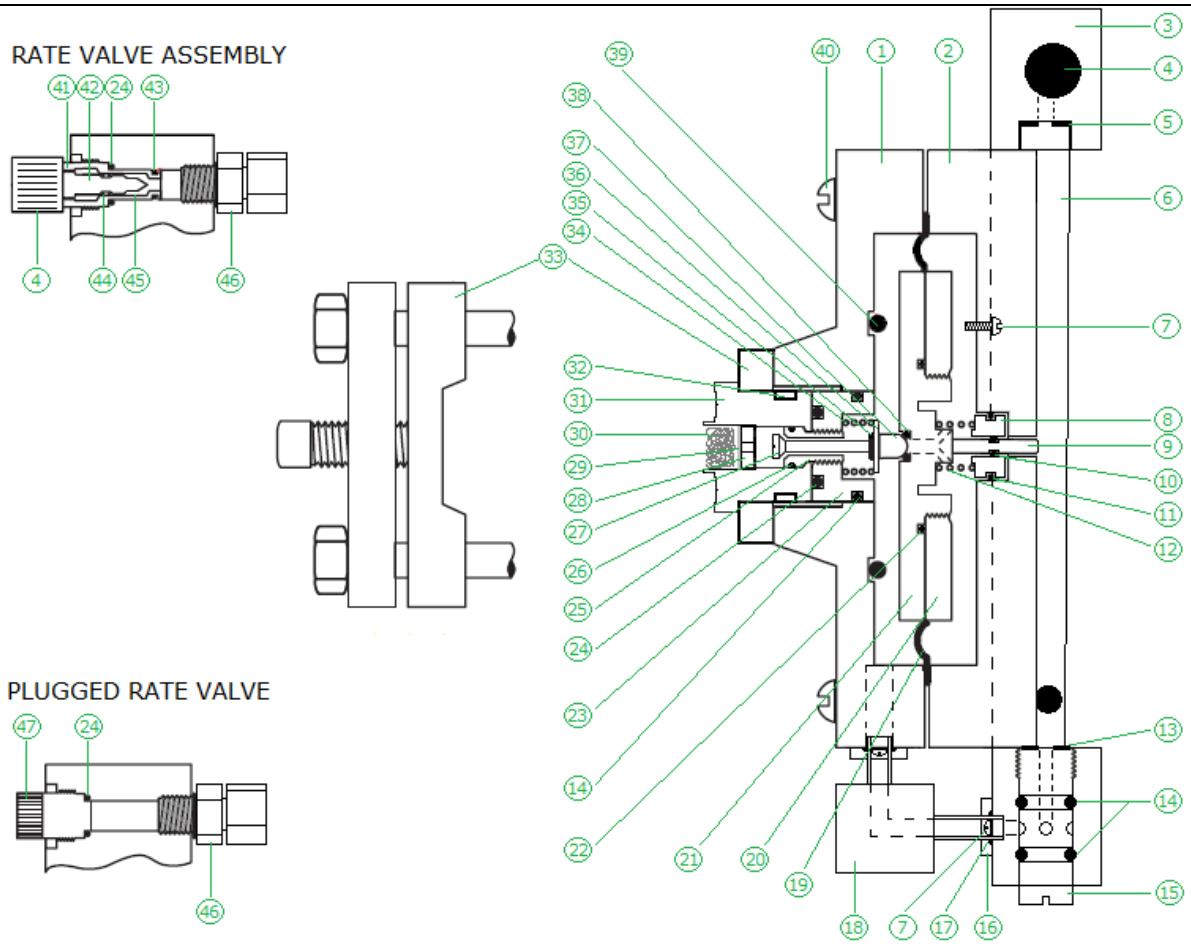


Item#	Qty.	Part #	Description	Item#	Qty.	Part #	Description
1	1	VRA-160	Back Body	24	1	VRA-363	Diaphragm Back Plate
2	1	VRA-107	Front Body	25	1	OA-VIT-126	O-Ring
3	4	BTA-126	#10-24 x 1" Screw	26	1	OA-VIT-212	O-Ring
4	1	RVA-518-XXX 010 / 100 / 250	Rate Valve & Knob 10, 100 or 250 PPD	27	1	VRA-182	Seal Plug
5	1	VBA-100C	Valve Bonnet	28	1	VRA-110	Inlet Valve Seat
6	1	OA-VIT-106	O-Ring	29	2	OA-VIT-011	O-Ring
7	1	MBA-110	Top Meter Block	30	1	VRA-112	Inlet Valve Stem
8	3	OA-VIT-012	O-Ring	31	1	VRA-5010	Filter Membrane * Used for 100 PPD units. 250 PPD units provided with screen & floss
9	1	RVA-830-XXX 100 / 250	Rate Valve Seat 100PPD / 250 PPD	32	1	FCA-1	Filter Cartridge Base *with one OA-VIT-011
10	1	OA-VIT-016	O-Ring	33	1	FCA-2	Filter Cartridge Body
11	2	MGA-X 1 / 2 / 3 / 4	Meter Gasket 10 , 25, 100, 250 PPD	34	1	VRA-141	Inlet Capsule
12	1	MTA-108-XXX 004 / 010 / 025 / 050 / 100 / 250 = PPD	Meter Tube (with ball & stops)	35	1	VRA-142	Retainer Clip
13	1	VRA-104	Pin Guide	36	1	VRA-346	Yoke Assembly
14	1	VRA-100	Guide Pin	37	1	SPA-104	Inlet Spring
15	1	OA-VIT-006	O-Ring	38	1	VRA-113	Inlet Spring Holder
16	1	OA-VIT-014	O-Ring	39	1	VRA-183	Spring Retainer
17	1	SPA-100	Vent Spring	40	1	VRA-111	Vent Plug
18	1	MBA-109	Bottom Meter Block	41	1	OA-VIT-009	O-Ring
19	3	OA-VIT-112	O-Ring	42	1	OA-VIT-332	O-Ring
20	1	MIA-140	Inlet Plug	43	6	BTA-124	¼-20 x 1-3/4" Screw
21	1	VRA-162	Flow Tube	44	*	FMA-104	Plug (replaces rate valve & knob)
22	2	DIA-106	VR3 Diaphragm	Not Shown-2		BTA-125	¼-20 x 2-3/4" Yoke Screw
23	1	VRA-269	Diaphragm Front Plate	Not Shown-1		TCA-64	Vent Tube Conn. ¼" NPT x 3/8

Notes: Vacuum Tube Connector (not shown) supplied as follows: 3/8" tubing (TCA-64) for 100 PPD & below and ½" tubing (TCA-84) for 250 PPD. Vent tubing is always 3/8" (TCA-64).

Archer INSTRUMENTS

Date: Aug 2014
Drawing Number: VR3-250



Item#	Qty.	Part #	Description	Item#	Qty.	Part #	Description
1	1	VRA-234	Back Body	25	1	VRA-110	Inlet Valve Seat
2	1	VRA-256	Front Body	26	1	OA-VIT-011	O-Ring
3	1	VRA-122	Meter Body 500 PPD	27	1	VRA-112	Inlet Valve Stem
4	1	RVA-652	Rate Valve Knob	28	1	VRA-184	Filter Stop
5	1	MGA-116	Top Meter Gasket	29	1	VRA-101	Inlet Screen
6	1	MTA-129-500	Meter Tube 500 PPD	30	1	VRA-455	Filter Floss
7	8	BTA-138	#10-24 Machine Screw	31	1	VRA-141	Inlet Capsule
8	1	VRA-104	Pin Guide	32	1	VRA-142	Retainer Clip
9	1	VRA-100	Guide Pin	33	1	VRA-346	Yoke Assembly
10	1	OA-VIT-006	O-Ring	34	1	SPA-104	Inlet Spring
11	2	OA-VIT-014	O-Ring	35	1	VRA-113	Inlet Spring Holder
12	1	SPA-100	Vent Spring	36	1	VRA-183	Spring Retainer
13	1	MGA-115	Bottom Meter Gasket	37	1	VRA-111	Vent Plug
14	3	OA-VIT-212	O-Ring	38	1	OA-VIT-009	O-Ring
15	1	MIA-232	Meter Inlet Plug 500 PPD	39	1	OA-VIT-332	O-Ring
16	2	VRA-235	Clamp	40	6	BTA-124	¼-20 x 1-3/4” Screw
17	2	OA-VIT-114	O-Ring	41	1	RVA-224	Rate Valve Bonnet 500 PPD
18	1	VRA-321	Flow Tube	42	1	RVA-651	Rate Valve Stem 500 PPD
19	2	DIA-106	VR3 Diaphragm	43	1	OA-VIT-012	O-Ring
20	1	VRA-269	Diaphragm Front Plate	44	2	OA-VIT-010	O-Ring
21	1	VRA-363	Diaphragm Back Plate	45	1	RVA-116	Rate Valve Sleeve
22	1	OA-VIT-126	O-Ring	46	1	TCA-108	Tube Conn. ½” NPT x 5/8” tube
23	1	VRA-182	Seal Plug	47	*	PLA-438	Plug *Replaces 41, 42, 43, 44 & 45
24	2	OA-VIT-112	O-Ring	Not Shown-2		BTA-125	¼-20 x 2-3/4” Yoke Screw

Notes: Vent tubing is always 3/8” (TCA-64 tube connector – not shown).

Archer INSTRUMENTS

Date: Sept 2014
Drawing Number: VR3-500