



Commander Vacuum Regulators

1.5K 7750-0013-850 and 5K 7750-0013-855
Installation and Operation Instructions

NOTE: Dairy Owners/Operators should read all operation and maintenance information and keep it on file for future reference.

Features

Highly Sensitive

- With a properly designed system, this “servo” type regulator is capable of holding your vacuum level set point within +/- 0.1 in. Hg (.4 kPa) from zero milking units to having all units attached.

Fast Response

- Large system disturbances are responded to within 50 msec.

Low Maintenance

- Few parts to fail or cause problems.
- Simple to disassemble, clean and reassemble.

General Description

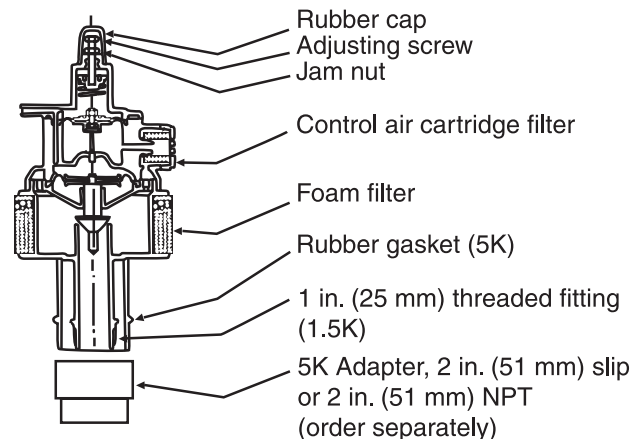


FIGURE 1 Regulator Components

Application Information

Westfalia•Surge Technologies recommends the following:

Model Commander 1.5K

For 15 in. Hg (51 kPa) approximate vacuum set point

- Install on 53 cfm ASME (1500 L/min.) maximum vacuum pump capacity.

For 12.5 in. Hg (42 kPa) approximate vacuum set point

- Install on 45 cfm ASME (1260 L/min.) maximum vacuum pump capacity.

Model Commander 5K

For 15 in. Hg (51 kPa) approximate vacuum set point

- Install on 208 cfm ASME (5000 L/min.) maximum vacuum pump capacity.

For 12.5 in. Hg (42 kPa) approximate vacuum set point

- Install on 178 cfm ASME (5000 L/min.) maximum vacuum pump capacity.

Installation Procedure

Location

The regulator is flexible in that it can be mounted in many different configurations and still provide reasonable vacuum control. However, for the greatest confidence in regulator operation, please follow the recommendations presented.

NOTE: Using two regulators on a single vacuum system is not recommended.

NOTE: A vacuum relief valve is required.

1. Mount the regulator vertically in a clean, dry place where the air is free from dust, oil, chemicals, water, etc.
2. Recommended - The regulator should be mounted in a horizontal sweep tee in the main vacuum supply line between the trap and the header tank. **A sweep tee should always be used to minimize air flow turbulence.** Mount the tee with the sweep towards the vacuum pump. The sensor tube should be mounted on the main vacuum supply line 24 in. (600 mm) from the regulator base on the milk receiver side of the sweep tee.
3. Optional Mounting - The regulator may be remote mounted from the main vacuum supply line when using a vertical mounted sweep tee. A maximum combined total length of 32 in. (800 mm) out and up is recommended. The sensor hose should be tapped into the main vacuum supply line 8 in. (200 mm) below the sweep tee on the milk receiver side if the branch line is more than 16 in. (400 mm).

Mounting -- 1.5K

The Commander 1.5K comes with a 1" Male Pipe Thread regulator base. This can be threaded into a 1" NPT female

fitting. Thread seaant should be used to ensure there are no vacuum leaks. Thread in the regulator base and place the regulator head in position. Refer to **Figure 2** and **3**.

Mounting -- 5K

Either the 2" (51 mm) PVC male slip adapter or 2" (51 mm) NPT male adapter (ordered separately) should be used to properly mount the regulator to the vacuum line. The slip adapter may be glued into a standard 2" (51 mm) fitting. See sensor hose connection instructions.

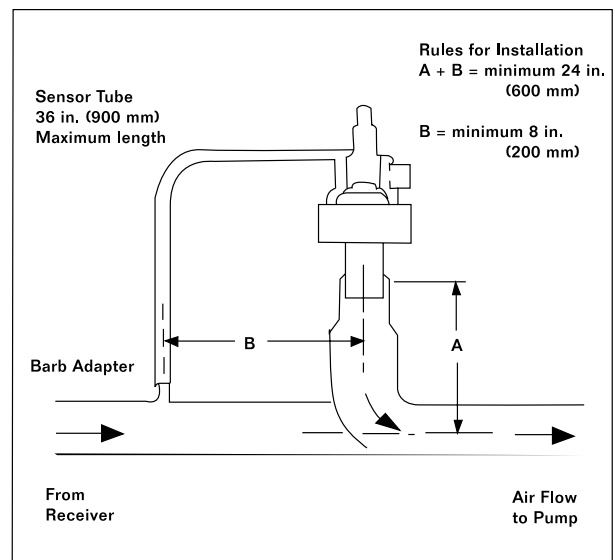
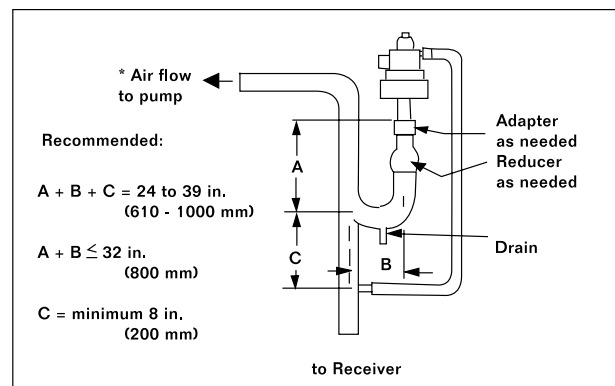


FIGURE 2 Typical Horizontal Installation



≤ Less than or equal to

FIGURE 3 Typical Vertical Installation

Sensor Hose Connection

1. The sensor hose should be connected to the main vacuum supply line between the regulator connection and the sanitary trap. Never mount the sensor hose fitting downstream from the regulator.
2. The distance from the regulator mounting connection and the sensor hose barbed fitting should be a minimum of 24 in. (600 mm).
3. If the regulator is mounted on a branch pipe longer than 16 in. (400 mm), locate the fitting in the main vacuum line 8 in. (200 mm) to the receiver side of the regulator tee.

Install the .25 in. (6 mm) x 8 mm hose barb adapter provided. Use a .25 in. (6 mm) NPT tap. You may need to tap full depth to allow for ease of threading in the adapter.

If the sensor hose needs replacing, use .25 in. (6 mm) I.D. by .5 in. (13 mm) O.D. transparent hose. The maximum length should be 36 in. (900 mm). A longer hose than 36 in. (900 mm) will slow regulator response and reduce regulator performance.

Adjusting Regulator

To adjust the vacuum level, first remove the rubber cap on top of the regulator. Loosen the jam nut and turn the adjusting screw “In” to increase vacuum and “Out” to decrease vacuum. Tighten jam nut and replace rubber cap once the vacuum level is set properly.

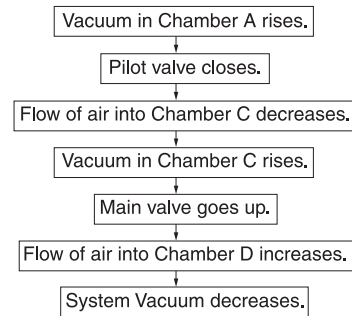
Installation Verification

Use a Tri-Scan™ or Pulsotest to verify the regulator’s performance. Install a vacuum port a few inches on the receiver side of the regulator sensor port.

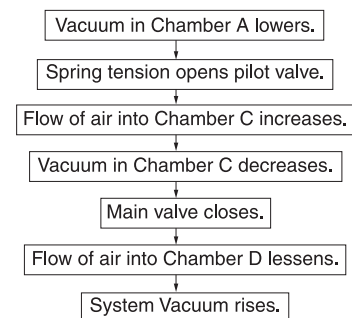
Set the vacuum to the desired level and verify the change in vacuum as units are connected in the barn or parlor. There should be less than 0.2" Hg (0.7 kPa) change in stable vacuum from no units attached to having all units milking. While no cows are being milked, introduce a large disturbance to the system and observe the regulator response. The vacuum should return properly to the set level and the regulator should not oscillate for more than approximately one second.

IMPORTANT! Vacuum level is very important and should be checked daily. Install an accurate gauge on the vacuum line to aid in monitoring the system’s vacuum. Periodic calibration of the gauge and total check of the system are also very important. We do not recommend adjusting vacuum level without a calibrated vacuum gauge. Do not change vacuum level by more than 1/4 in. Hg (.8 kPa) without contacting service center.

1. When vacuum increases



2. When vacuum drops



IMPORTANT! Vacuum Relief Valve Required! A vacuum relief valve must be used in conjunction with this regulator to ensure safe operation of the system. With almost any regulator, there is a potential for it to stick or fail to open and cause the vacuum level to rise above set levels. Be sure a vacuum relief valve is properly installed before using this or any regulator to help guard against increased vacuum levels.

Operation

Principle of Operation

Chamber A: Chamber A controls the pilot valve through Diaphragm A by means of vacuum from the system and the spring tension.

Chamber B: This chamber is connected to atmospheric air through the paper cartridge filter.

Chamber C: A certain vacuum level is created here by means of vacuum from the system through the orifice and atmospheric air from Chamber B through the pilot valve. Chamber C controls the main control valve by countering the vacuum pull of Chamber D on the valve, resulting in a regulated vacuum level in D.

Chamber D: This chamber is connected directly to the system. Air admitted by the regulator goes through here to the system to maintain proper system vacuum.

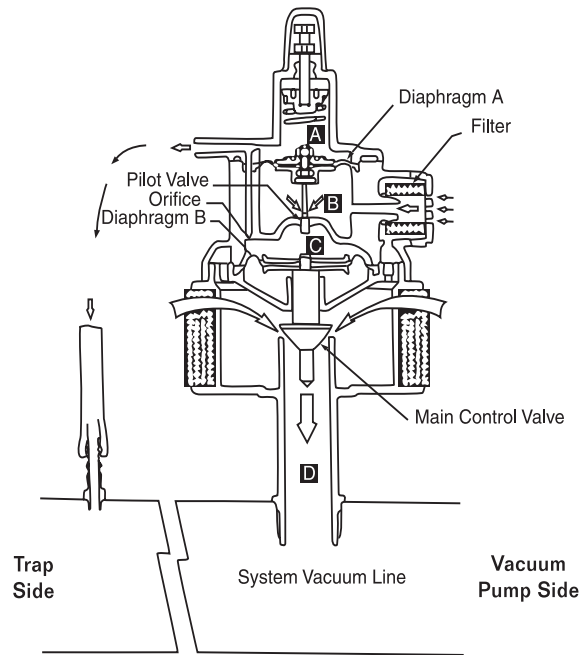


FIGURE 4 Regulator Operation

Clean/Inspect Procedure

Procedure for cleaning and inspecting inner components:

1. Remove lower piston/housing/diaphragm assembly by removing the 8 screws on the under side of the regulator head. Pull out pilot valve and wipe clean. Wipe valve seat.
2. Remove upper diaphragm/housing/spring assembly by removing the 4 screws on the regulator top. Hold together when removing screws to prevent spring and cup from flying out. Clean pilot orifice.
3. Inspect diaphragms for cracks or wear. Remove the c-clip to replace lower diaphragm. Remove the hex nut to replace the upper diaphragm.
4. Reassemble all components in reverse order.

MAINTENANCE

Use the table below to determine the interval and task required to maintain your Westfalia•Surge™ product. Those procedures that may only be performed by the Westfalia•Surge dealer or service person have been marked with the following dealer icon.



Maintenance Chart

Interval	Task	Action
Daily**	Check system vacuum level.	Check and adjust as required.
6 months	Check and clean pilot valve, valve seat and orifice.	Remove dirt w/brush, needle and damp cloth.
Weekly**	Inspect and clean main control valve.	Wipe with damp cloth.
Monthly**	Inspect control air cartridge filter.	Replace if dirty (little light seen through paper).
Weekly**	Inspect outer foam filter.	Replace.
2,500 hours of operation or 1 yr. Installed.	Replace diaphragms.	Replace.
Monthly**	Inspect sensor tube.	Replace if damaged.

*Conditions could affect interval requirements

**Function should be performed by Dairyman

TROUBLESHOOTING

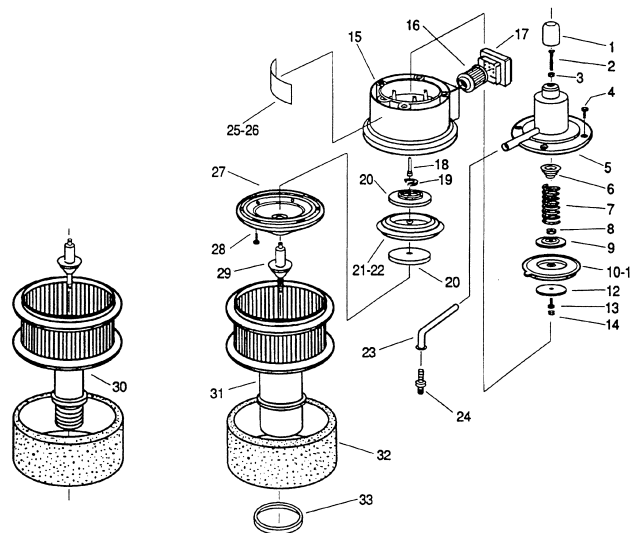
Use the decision table below to troubleshoot products that are not operating properly. Those procedures that may only be performed by the Westfalia•Surge™ dealer or service person have been marked with the following dealer icon.



Troubleshooting Chart

Symptom	Possible Cause	Solution/Action
Vacuum increasing.	Air sensor tube cracked or leaking.	Replace with new tube.
	Diaphragm A and/or B cracked.	Call for service.
	Outer foam or paper cartridge filter dirty.	Replace filter/filters.
	Orifice clogging.	Call for service.
Vacuum decreasing.	Pilot needle valve dirty.	Call for service.
	Spring fatigue.	Adjust vacuum set point.
Vacuum very high.	Air sensor tube disconnected.	Connect tube.
	Diaphragm A and/or B cracked.	Call for service.
Vacuum falls or not stable.	Controller filter clogged (paper cartridge).	Replace filter.

PARTS BREAKOUT



1.5K 7750-0013-850 and 5K 7750-0013-855

Part	SKU	Description	Part	SKU	Description
1		Cap, Rubber	27		Diaphragm Retainer
2		Hexagon Head Bolt M6 x 45	28		Pan Head Small Screw
3		Pan Head Small Screw	29		Weight
4		Hexagon Nut	30		Base Regulator (1.5K)
5		Spring Case, Plastic	31		Base Regulator (5K)
6		Spring Holder	32	7750-0213-854	Filter Foam
7		Spring	33		Rubber Gasket (5K only)
8		Hexagon Nut	34	7750-0013-857	Adapter, 2" PVC Male Slip (5K) (not shown)
9		Center Disk A			
10	7750-0013-852	Diaphragm A, upper (1.5K)	35	7750-0013-860	Adapter, 2" PVC Male Threaded (5K) (not shown)
11	7750-0013-858	Diaphragm A, upper (5K)			
12		Center Disk B	36*	7750-0013-888	Minor Rebuild Kit 1.5K Inc. Part 10, 16, 19, 21, 32
13		Hexagon Head Bolt			
14		Permanent Magnet	37*	7750-0013-890	Minor Rebuild Kit 5K Inc. Part 11, 16, 19, 22, 32
15		Regulating Chamber, Plastic			
16	7750-0213-851	Filter, Control Air Cartridge	38*	7750-0013-887	Major Rebuild Kit 1.5K Inc. Part 1, 6, 7, 9, 10, 12, 14, 16, 18, 19, 21, two of 20, 32
17		Cover, Filter			
18	7750-0102-853	Valve, Pilot; Magnetic Stainless			
19		C Clip	39*	7750-0013-889	Major Rebuild Kit 5K Inc. Part 1, 6, 7, 9, 11, 12, 12,14, 16, 18, 19, 22, two of 20, 32
20		Check Valve Assembly			
21	7750-0013-853	Diaphragm B, lower (1.5K)			
22	7750-0013-859	Diaphragm B, lower (5K)	40*	7750-0013-891	Hardware Kit Inc.: Part 2, 3, four of 4, 8, 13, six of 28
23		Hose 1/4" ID x 36" (900 mm)			
24		Hose Barb 1/4" NPT x 1/4" OD			
25		Decal, Specification (1.5K)			
26		Decal, Specification (5K)			

* Recommended for Dealer Inventory

Revised 7/00

Westfalia•Surge Technologies