



An Ingersoll Rand Business

Considerations in Gas Sample Systems

Best Practices for Installation of Gaseous
Sample Pumps

Goal of the Gas Sample Pump

Transport a clean, reliable, sample of the process/stack gas to the analyzer, in the safest and easiest way possible, to ensure accuracy and reliability.



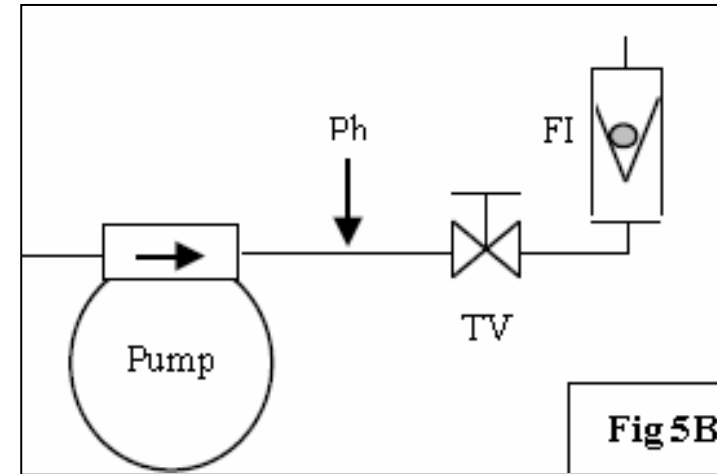
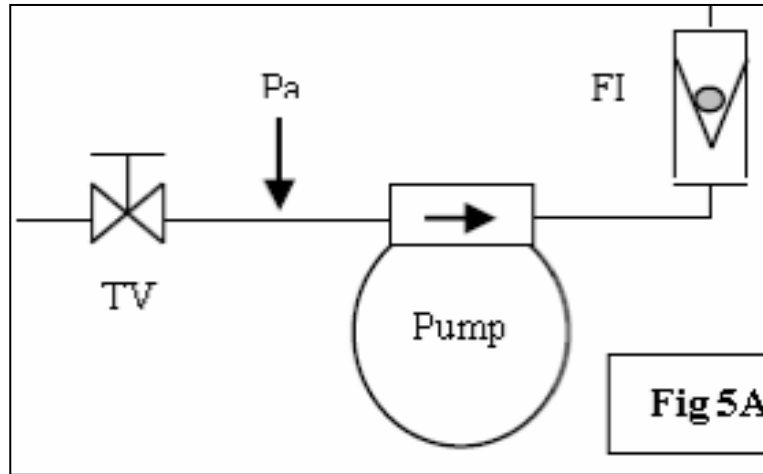
Required information to ensure proper pump selection

For most gas sampling applications, the following information is required to determine the pressure drop and proper pump selection:

- Sample point conditions atmospheric, vacuum, or positive pressure
- Analyzer pressure requirements
- Endpoint considerations (Vent to Atmosphere or return back to process)
- Required Flow Rate or Response Time
- Temperature and Type of Gas being pumped
- Ambient temperature where pump will operate
- Distance and diameter of tubing
- Voltage, frequency, and electrical classification
(Safe area, Division I, Zone II)



Flow and Pressure Control



Configuration A

Flow rate reduced by increased restriction by Throttle Valve TV, resulting in pressure reduction at **pump inlet**. With TV closed, Pa will decrease to ultimate vacuum.

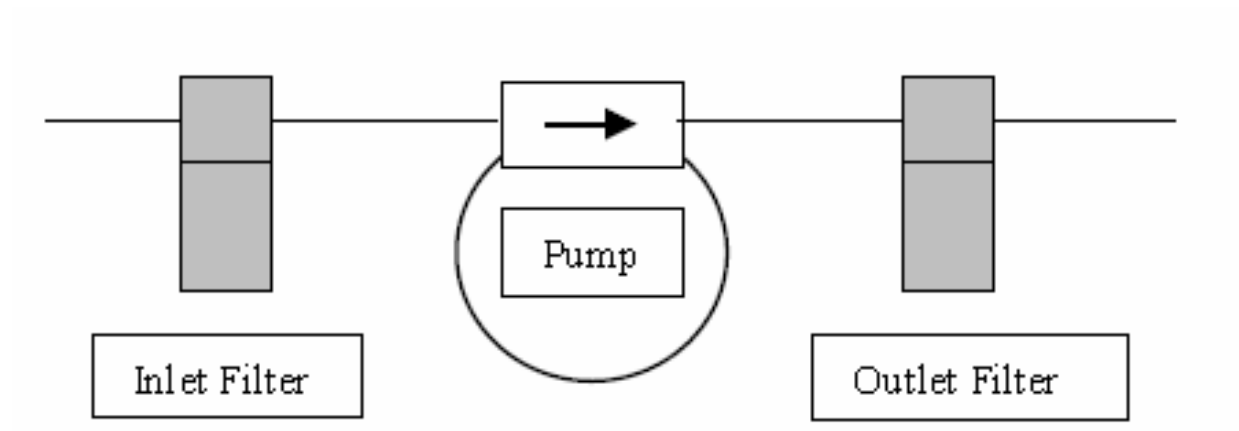
Configuration B

Flow rate reduced by increased restriction by TV, increasing pressure at **pump outlet** – up to maximum of pump capacity. Depending on pump characteristics, pressure increase at Ph may range from 30 PSIG to 100 PSIG or more.

Summary

Excessive pressure on pump diaphragm (Configuration B) will result in increased diaphragm and bearing stress, reducing pump life and increasing service requirement.

Flow Pulsations



- Addition of a filter at the outlet will reduce the **pump outlet** pressure pulse amplitude.
- This is important when flowmeters or other pressure-sensitive instrumentation is used, as pulsation will give false readings.



Liquid Considerations

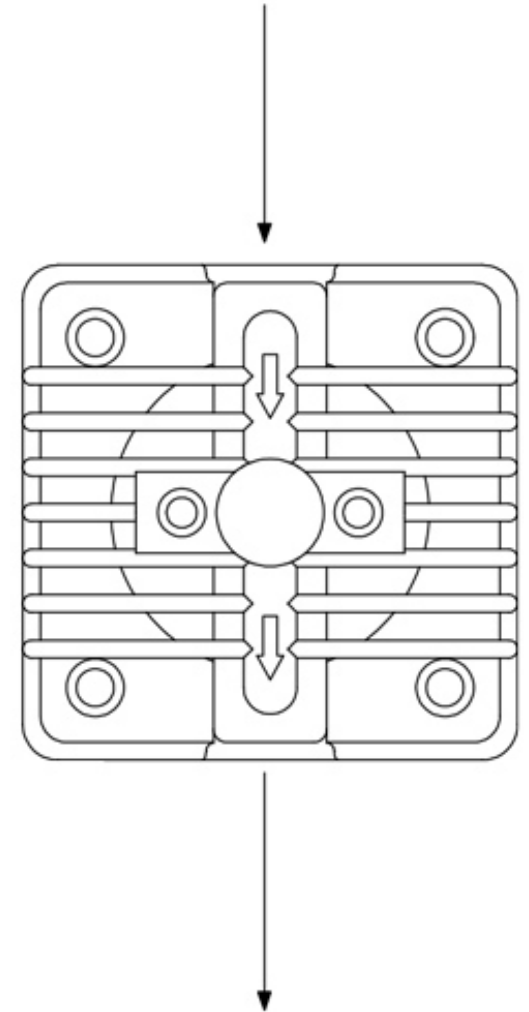
Keep liquid out of the pump head

- Heat sample line and pump head
 - Self contained Heated Head with cartridge heaters
 - Elevated Head for hazardous areas (Explosive/Flammable)
- Gas Cooler
- Liquid Separators (*e.g. Sheffield Separators*)
- Membrane Filters (*e.g. A+ Genie*)

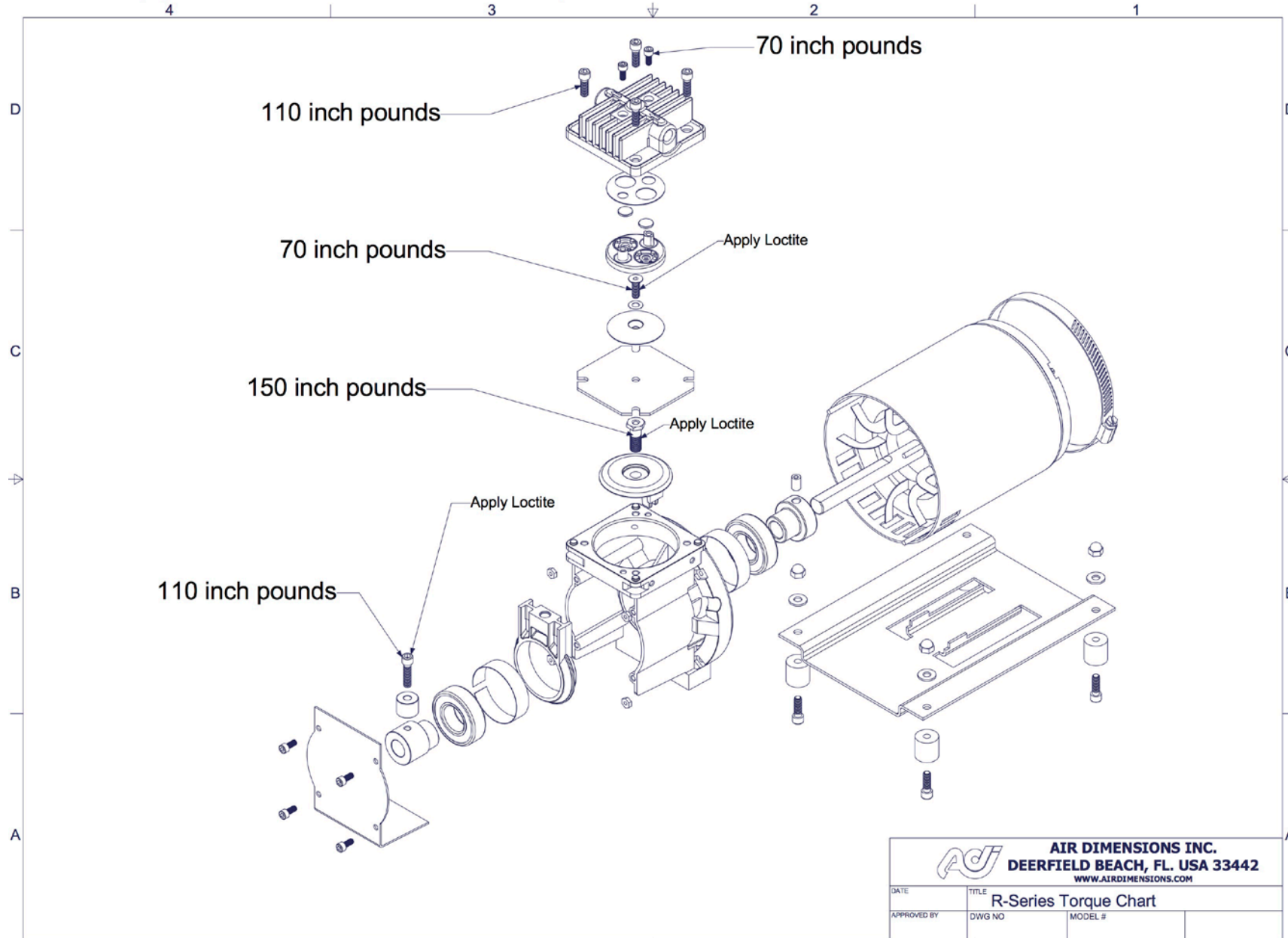


Head Orientation Best Practices

- Install pump with head facing downward.
- Install pump at highest point in system.
- Heat sample line and pump head above dew point.



Maintenance



Eccentric Performance

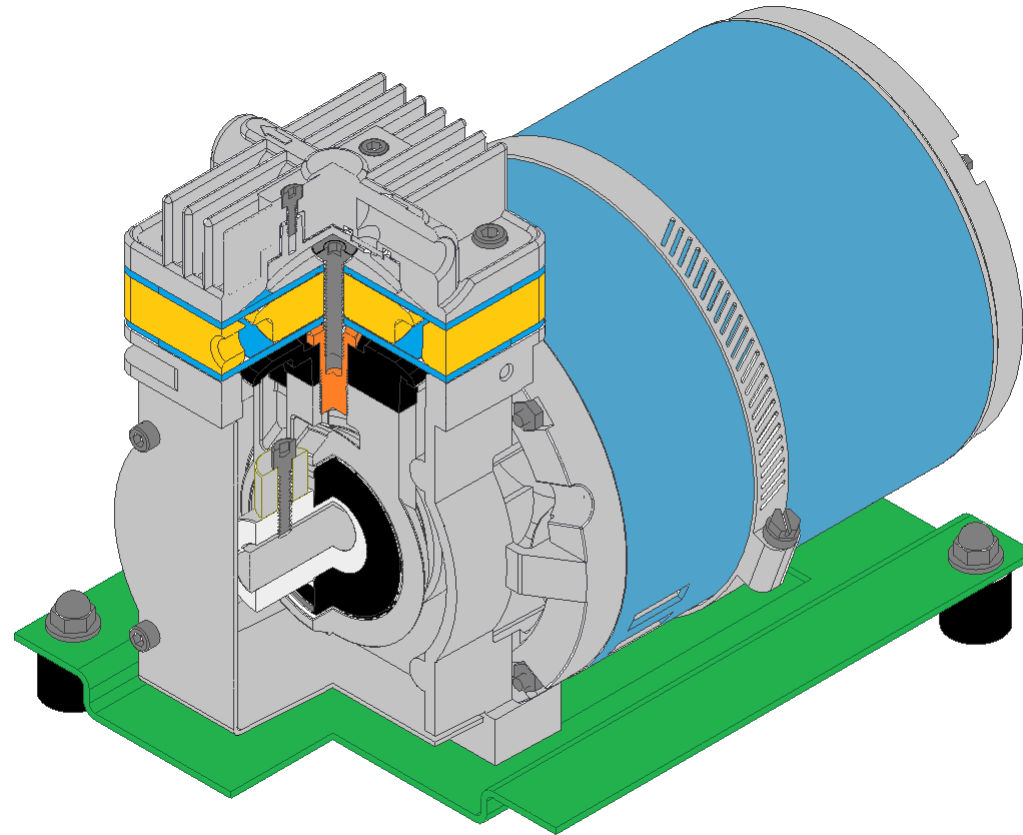
Standard Product 60Hz (50 Hz)

Eccentric	Max Press PSIG Minimum	Open Flow LPM Minimum	Ult Vac In Hg Minimum
R27x	60	27 (22)	24
R25x	52	25 (21)	23.5
R22x	46	26 (22)	23
R20x	36	22 (18)	21.5
R18x	27	19 (16)	20
R15x	17	17 (14)	17
R12x	13	14 (12)	15
R10x	8	12 (10)	13
R08x	7	11 (9)	11
R06x	4	8 (7)	7



Double Diaphragm for dangerous or expensive gases

- Double diaphragm utilizes (2) diaphragms per head.
- Primary diaphragm is in constant contact with the process gas.
- The secondary (or safety) diaphragm is separated from the primary by a spacer.
- The (2) diaphragms together with the spacer form a leak detection chamber.
- This chamber can be monitored for ingress of process gas or variations in pressure that would indicate a primary diaphragm failure.



ADI Pump Options

- IP ratings – 44, 54, 65, & **Marine Duty**.
- 115v/230v 1 phase, 3 phase 230/460v, Air Driven
- Heated head for safe areas
- Elevated & Steam traced heads for hazardous areas
- Corrosion resistant 316ss, Hastelloy C, Teflon-coating, Silconert® 2000 treated.
- Fast shipments.

Dia-Vac[®] Pump Selector

In our effort to provide the excellent support that ADI has become known for, we have developed a new online tool.

[The Pump Selector](#)

This tool is meant as a reference only. Please consult with ADI technical support on all selections.

Thank you for your time.

Chris Williamson

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