# Installation Recommendations

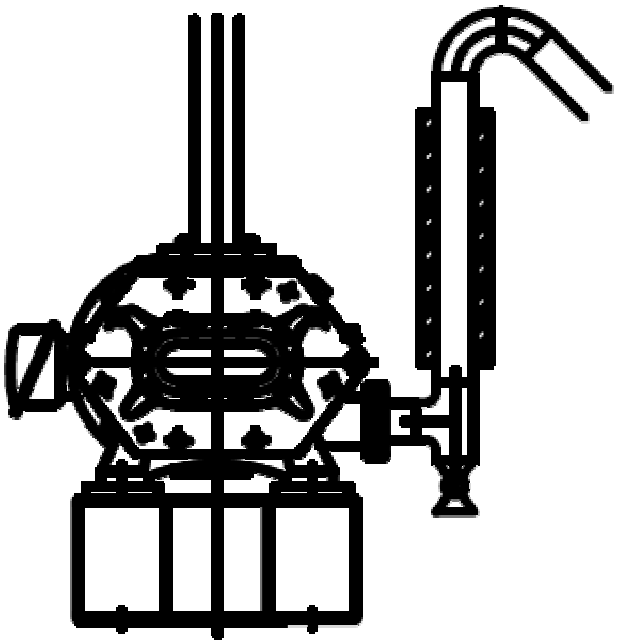
## CHEMICAL DRY VACUUM PUMPS

## Introduction

ESP-H series Dry Screw Vacuum pumps are designed and manufactured to operate under the harsh environment of a chemical plant. The correct installation of the pumps will extend the service life of pumps and provide high reliability.

Though the dry screw vacuum pump has been designed to operate under dry condition, it handles the liquid carry over and reduces by-product accumulation due to the short flow passage than that of dry claw pump. However, large quantity of carry-over, frequent flooding, and pumping of a large amount of liquid can lead to increase downtime. Thus proper provision for installation is very important when handling particulates, flammable, explosive mixtures.

The vacuum system designed to take account of these factors will result in an extended service life, and a high reliability of the dry screw pump.



- Don’t use long vertical pipe drops into the pump inlet or outlet. These will allow liquids/ condensation to drain into the pump
- Where vertical drop are unavoidable, install knock out pots with drain points or traps
- Pipe-work slopes away from the pump to protect liquids/ condensation to drain into the pump
- Insulate vertical exhaust pipe-work to prevent condensation
- Avoid to allow outlet to become blocked

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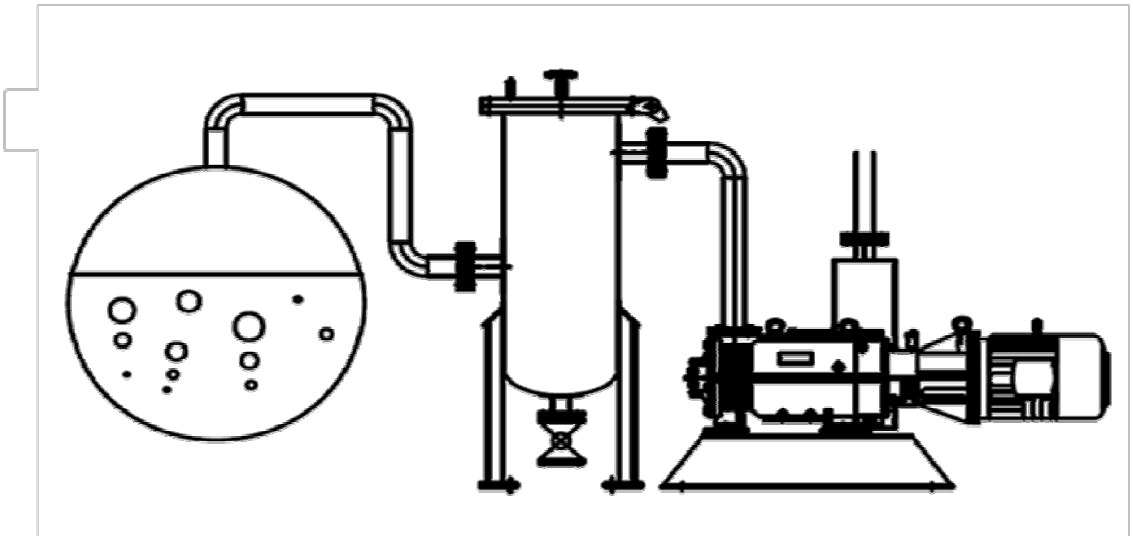
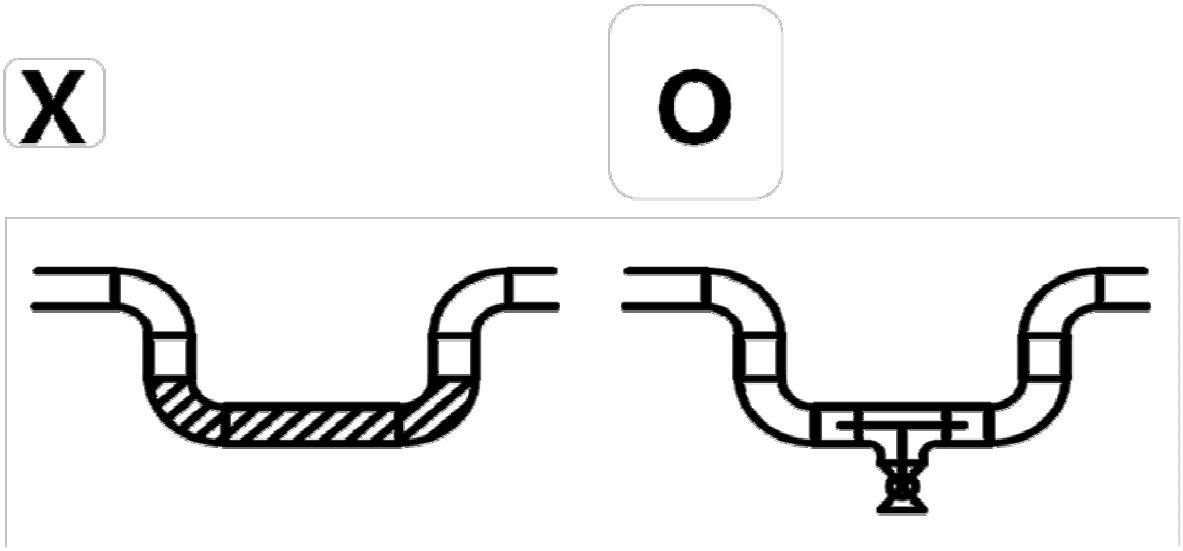
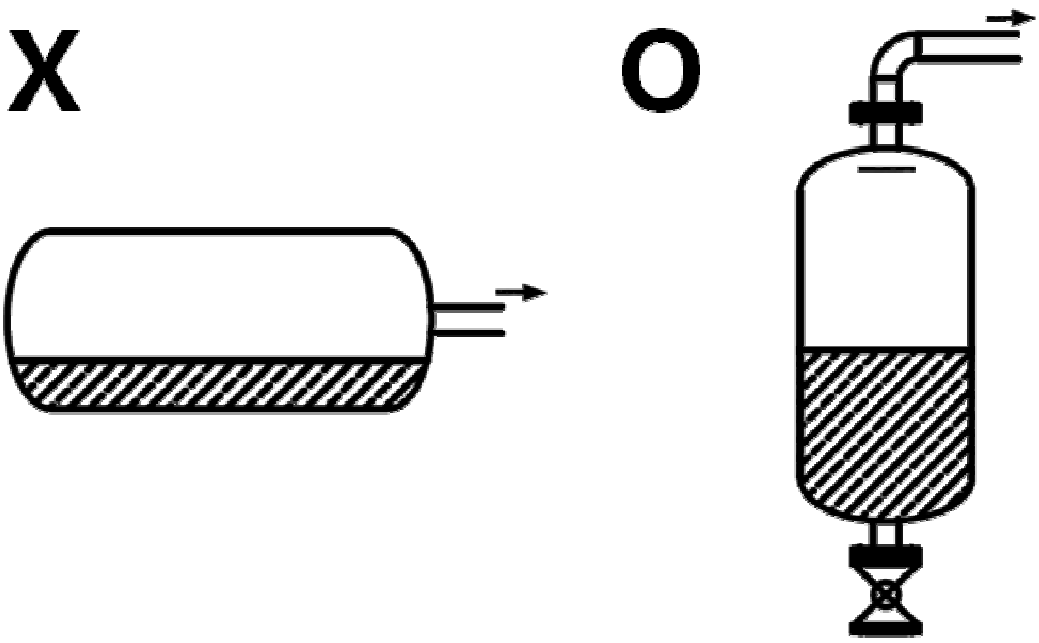


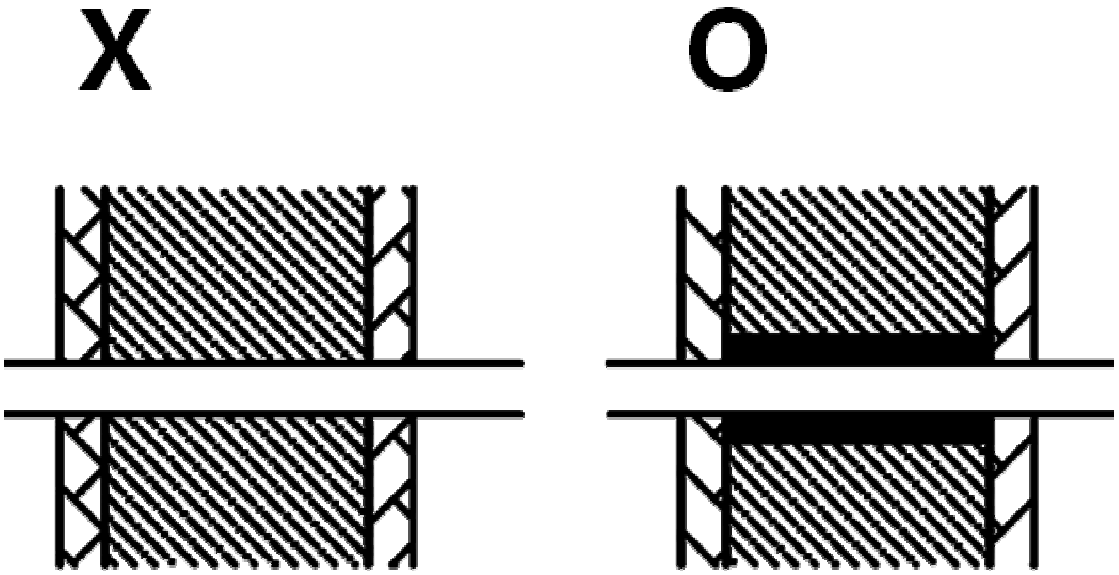
- Install a properly designed knock out pot to maximize pump uptime where frequent process upsets are predicted
- Adopt a high level alarm to close the inlet valve and trip or trigger a fault signal if the knock out pot fills up




- Avoids liquids traps in pipe-work
- Install drain valve where liquid traps are unavoidable
- Drain the Pipe-work before start up




- Locate vacuum connections to the top of vessels
- Adopt internal baffles to minimize liquid carry-over




- Don’t allow temperature changes along the pipeline as condensation might take place in the lower temperature sections
- Insulate or trace heat pipeline where necessary

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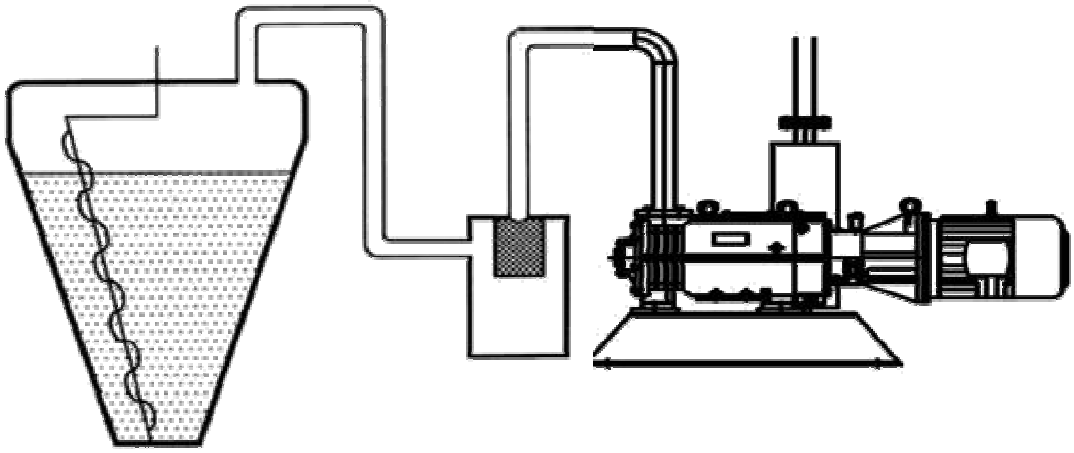

- Fit a suitable filter in front of the pump where high particulate carry over is expected (e.g. 20$\mu$m)

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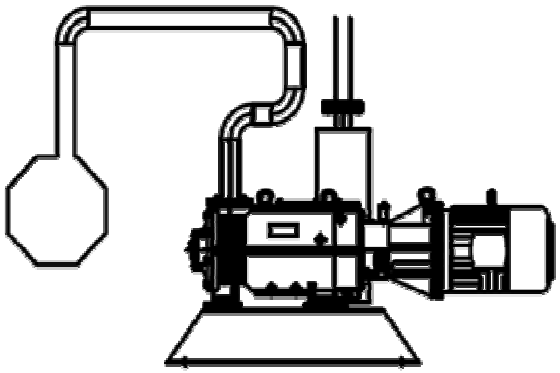

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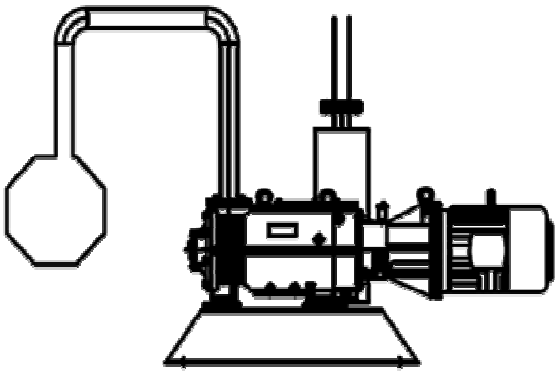

- Select inlet pipeline no less than the inlet connection to the pump to minimize pressure drop loss
- Make sure inlet pipe line runs as short as possible

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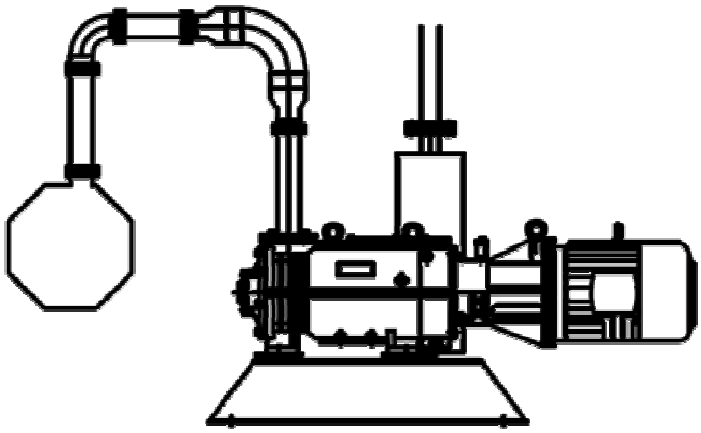

- Don’t use paralleled thread screw fittings which increase air leakage
- Don’t use small radius bends in pipeline will increase the pressure drop along the pipeline
- Don’t change in cross section of the pipeline, this will increase the pressure drop along the pipeline
- Use metal trapped ‘O’ ring vacuum connections
- Use tapered thread screwed fittings
- Use smooth bore pipeline

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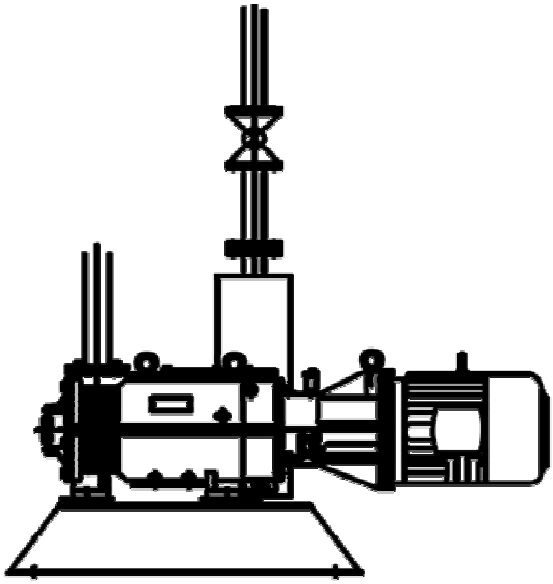

- Provide unrestricted pipeline that will block exhaust and result in high power consumption, and higher exhaust gas temperature
- If exhaust isolation valves are necessary, then these should have auto actuation and be linked to the motor starter, and be fail safe open to avoid motor trip due to back pressure or pressure generation

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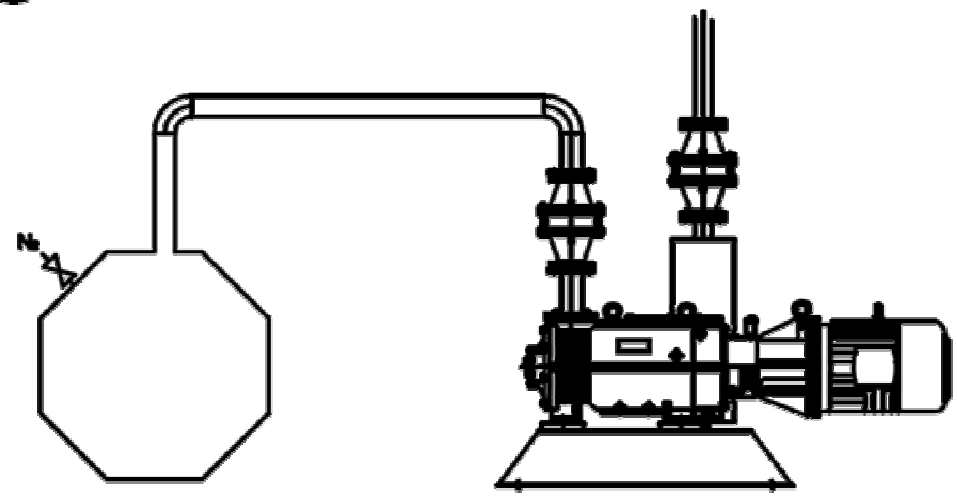
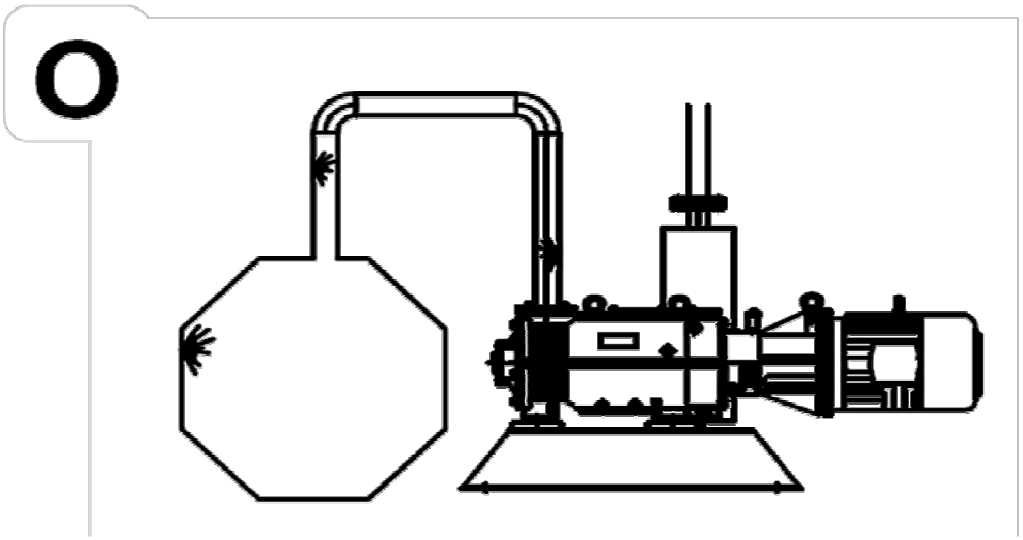
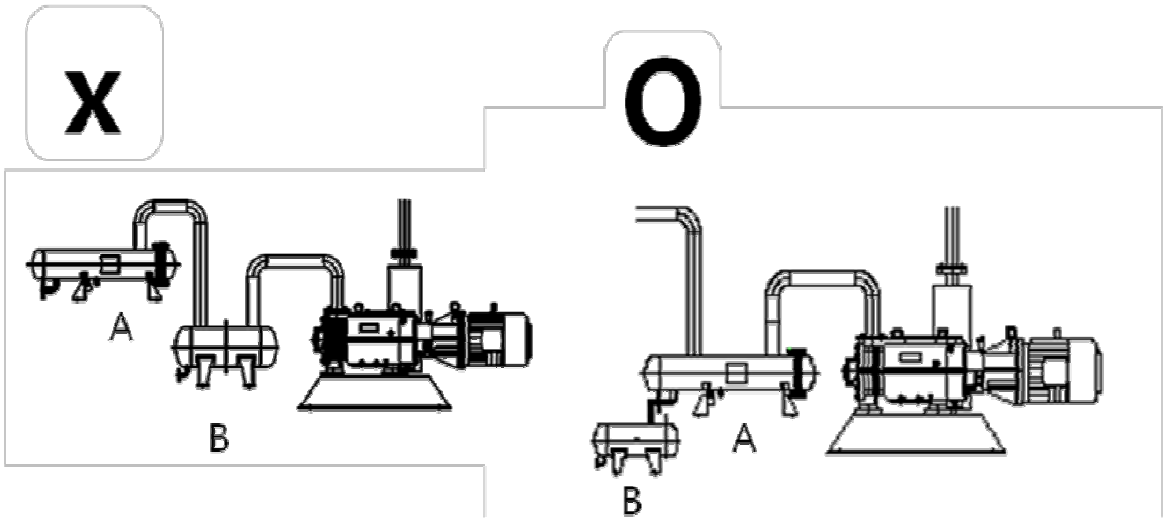



- Where flammable mixtures are pumped, either Inert the system prior to evacuating or adopt flame arresters to the pump inlet and exhaust. If air is used for the seal purge, a flame arrester should be fitted to the seal purge line.



- Secure that the vacuum system is leak-tight such that:
  - The size of the vacuum pump is minimized.
  - condensers operate at maximum sufficiency
  - Vapour emissions from the vacuum system are minimized




- Apply vacuum connections to condensers (A), not receiver vessels (B)
  - This provides the receiver to be drained while the rest of the system is under vacuum..
  - This reduces re-evaporation of condensate in the receiver.
  - This keeps vacuum and liquid lines separate, and reduce liquid entrainment

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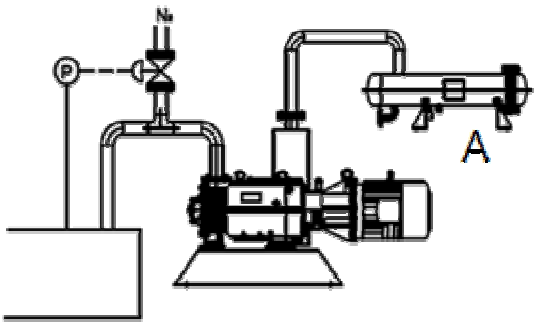


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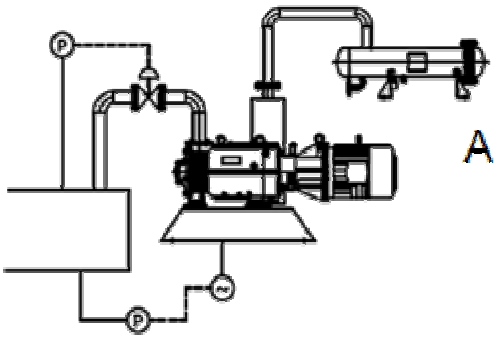


- If it is necessary to use exhaust condensers (A), control the system pressure by throttling the pump inlet, or by the use of variable speed drivers.
- Gas bleeds should not be used because they will rescue the efficiency of exhaust condensation, and increase emission levels.

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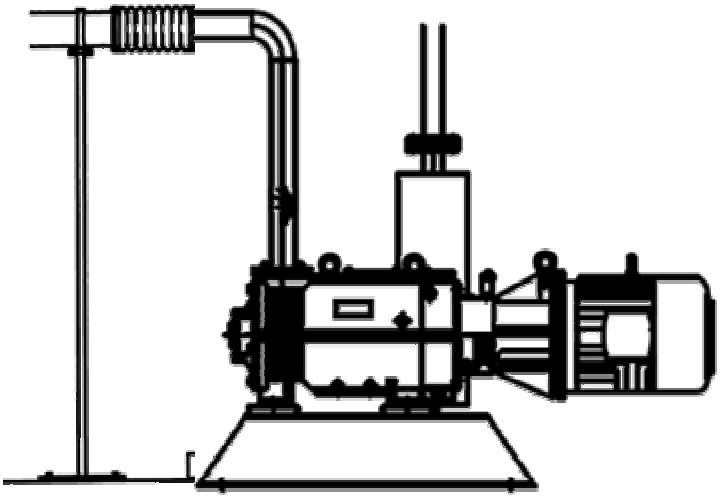

- In case large force transfer to the pipe connections, ensure to install inlet and exhaust pipeline to minimize force on the pump connections and to isolate the pipeline from vibration.
- Use flexible connector on inlet and exhaust connections. The connector should be a 10 bar pressure rated braided flexible connector.