

## Ammonia Anhydrator / Regenerator / Purifier Type WDO

The removal of water from a system is best accomplished by use of a batch method in which external heat is utilized. The heat source may be hot gas, warm or hot water, electrical heater.

The unit used for removal of water is called by different names like Ammonia Anhydrator / Regenerator / Purifier. We will use word Purifier for ease of operation.

The Ammonia Purifier operates as a self-regulating still to remove water, oil, and other impurities from ammonia. Because the unit uses heat from high pressure liquid, thereby sub-cooling it, the unit is essentially energy-neutral. Because of its unique self-regulating capability, the unit can be allowed to run indefinitely without draining the accumulated impurities until a time that is convenient for the operator.

Inside the unit, cold impure liquid ammonia (typically taken from the pump discharge) is exposed to heat from the high pressure receiver liquid. (Refer to Figure) The warm and cold streams do not mix. The cold impure liquid ammonia boils, and the resulting pure ammonia vapor is returned to the pump accumulator. The liquid from the high pressure receiver also goes to the pump accumulator.

Because this liquid is now subcooled, the reduction in flash gas at the accumulator roughly balances with the pure ammonia vapor mentioned earlier. Depending on the system, the liquid remaining in the units ultimately becomes a mixture of up to about 70% water, 30% ammonia, and other impurities. (It is not practical to remove all the ammonia from the water.) These impurities are drained from the bottom of the unit and disposed of according to local regulations.

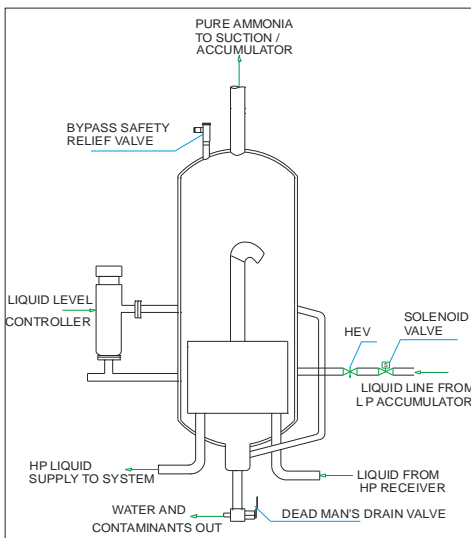


Figure is an example of how the Purifier may be integrated into a basic liquid recirculation system. Here, a small amount of contaminated liquid is taken intermittently from just downstream of the pumps. The ammonia vaporized in the Purifier returns to the accumulator, while the impurities are left behind. Although the Purifier's self-regulation prevents liquid from returning through the vapor connection due to boil-over, attaching the vapor outlet to the accumulator or a wet suction line provides an extra measure of safety against a component malfunction.

The liquid inlet and level controller on the unit must be at a lower elevation than the source of the liquid. The Unit should be located in an area with adequate ventilation for safe draining.

A self-closing drain ("dead-man") valve should be installed after the ball or globe valve, similar to those recommended for oil pot drains. Note that in the event that liquid ammonia is trapped in the pipe above the dead man valve, a self-relieving feature will prevent hydrostatic rupture. But in this case, the discharge of the dead man valve should not be capped.



### *Initial Start-Up*

1. With warm liquid flowing through the 1" lines at the bottom of the unit,
  - Close the 2" valve at the top of the unit,

- Close the 1/2" valve upstream of the float valve, and
  - Close the 1" valve on the bottom of the unit.
2. Draw a vacuum inside the unit through the service connection near the top of the unit.
  3. Open the 2" valve to suction.
  4. Open the 1/2" valve, allowing liquid to flow through the float valve.

Frost should begin to form on the level indicator tube as the liquid level inside the unit rises. Pure ammonia is now boiling to a vapor and returning to the pump separator. Water, oil, and other impurities are trapped in the Purifier.

**Allow the unit to run until the frost is melting above the 1" drain valve and on the oil pot portion of the unit.**

This indicates that a significant amount of water, oil and other impurities have been collected. (The time required before this happens depends on the quantity of impurities present in the system.) Guidelines for draining the unit are given below.

There is no danger in allowing the impurities to collect indefinitely. They will be trapped inside the Purifier where they cannot affect system operation. However, it is recommended that initially the Purifier be drained on a monthly basis to assess the level of system contamination. Thereafter, the unit should be drained every three months.

*Draining (Continued)*

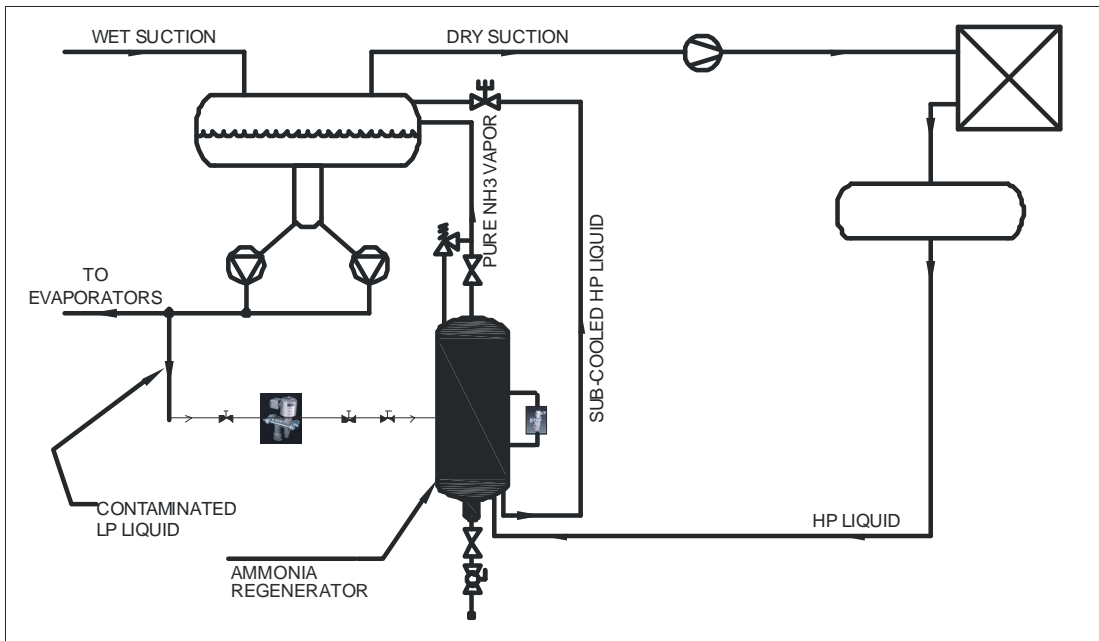
**SAFETY NOTES:**

***Remain in position at the Purifier and keep a vigilant watch for the duration of the draining process.***

***Never disable the self-closing feature of the "dead-man" valve. Never apply direct heat to the Purifier to speed up the pump-down or draining process.***

1. Close the 1/2" valve upstream of the float valve.
2. Allow the unit to run until the bottom (uninsulated) portion of the unit begins to clear of frost.
3. **Allow the unit to run at least an additional 60 minutes.** Heat from the warm liquid ensures that ammonia mixed with the impurities (which will be drained) minimal.
4. **BE SURE THE PURIFIER HAS BEEN INSTALLED WITH A PRESSURE RELIEF VALVE BEFORE PROCEEDING.**
5. Close the 2" valve at the top of the unit.
6. Place bucket under drain valve.

7. If the system operates at a vacuum, wait for pressure to rise to a positive value.
  8. Open the 1" valve at the bottom of the unit.
  9. Open the "dead-man" drain valve at the bottom of the unit and allow liquid (oil, water, some ammonia) to begin to drain into a bucket.
- A strong odor of ammonia will be apparent and is normal. **However, if the odor is overwhelming, immediately stop draining, close drain valves, and open 2" suction valve. Allow the unit to pump down for an additional 60 minutes.** (Return to steps 3 & 4, above.)
10. Drain 4 gallons of liquid into a bucket.
  11. Close the "dead man" valve
  12. Close the 1" valve.
  13. Dispose of the drained liquid per established procedures and in accordance with local regulations.



**: Basic Installation**



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