VORTEX PILOT GAS HEATER (VPGH)

The **Vortex Pilot Gas Heater (VPGH)** is a Class 1, Division 1 explosive proof device that meets and/or exceeds all requirements for natural gas transmission and distribution regulator station design and application.

The core of the Vortex Pilot Gas Heater is a proprietary vortex heater, which operates under the station's available gas pressure differential and converts internal energy of the decompressing gas flow into highly intensive heat flux. The released thermal energy is then applied to the pilot gas as it travels through a heat exchanger set up on the vortex heater's walls. A portion of the generated heat flux is also internally applied to warm up the unit's pressure reducing inlet nozzles (spot heating). This self-heating provision enables the VPGH to operate non freeze with non preheated pipeline gas.

Vortex Pilot Gas Heater Features:

- Adds up to 90°F to the pilot supply gas
- Heats pilot gas as an outcome of routine gas pressure reduction in the vortex tube
- Not sensitive to wet feed gas
- No lost gas.
- No moving parts.
- No chance of overheating.
- No maintenance, EVER.
- Easy to install or retrofit in new or existing facilities.
- Working pressure is 1500 psig or 100 bar.
- Available in 2 designs that can work with any currently available pilot gas pressure regulators (PR).
  - Single Path (VPGH-SP) has a single heating chamber to serve one pilot at a time.
  - Dual Path (VPGH-DP) can simultaneously serve two pilots.

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Universal Vortex, Inc.
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The Vortex Pilot Gas Heater has performed efficiently in a broad range of operational parameters such as:

- Handling a single pressure cut of over 1,000 psi pressure differential of non preheated gas while operating outdoors under ambient temperatures that can reach as low as -44°F.
- Operating while submerged in water (pit installations).
- Working with sulfur-containing flow and maintaining the sulfur content as vapor, which prevents the sulfur from depositing in the pilot orifice.

The Vortex Pilot Gas Heater (over 5,000 installations worldwide) has been operating at Pressure Regulation Stations with non pre-heated upstream gas as well as at Pressure Regulation Stations equipped with a Water Bath Heater. For the latter, the Vortex Pilot Gas Heater has also demonstrated the possibility to save fuel gas by reducing the Water Bath Heater discharge gas temperature.

Vortex Pilot Gas Heater Case Study #1 (Midwest USA)

Pressure Regulation Station with Water Bath Line Heater

Situation: A Pressure Regulation Station with a 250,000 BTU rated Water Bath Heater (Line Heater) set at 120°F to preheat the gas flow that is upstream of the 900 to 135 psi pressure regulator. UVI's client installed the Vortex Pilot Gas Heater at the Station to separately heat the pilot flow to a measured pilot gas temperature of 135°F at the VPGH discharge.

Results: The Water Bath Heater set up temperature was reduced to 85°F (35° less) yet still maintained 32°F at the Station outlet.

Vortex Pilot Gas Heater Case Study #2 (Turkey)

Pressure Regulation Station with Line Heater

Situation: 2 Pressure Regulating Stations with the inlet pressure of 55 barg (808.5 psig), delivery pressure of 23,5 barg (345.5 psig) and the inlet gas temperature of 7ºC (45ºF). To overcome the Joule-Thomson temperature drop in the depressurized gas of 16ºC (61ºF) and keep the pilot gas at positive temperatures, a Line Heater was used all year at both Stations. Before implementing the VPGH solution, the total fuel cost of the gas pre-heat was $247,000 in 2011.

Results: After installing a Dual Path Vortex Pilot Gas Heater at both Stations, UVI's client was able to shut down its Line heaters during the summer months and reduce the gas discharge temperature to 0°C (32°F) in the winter time. The estimated savings for the client in fuel gas is $150,000 year.

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