



CRYOGENIC
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FROSTBYTE

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Uniflo Fog Reduction Module

Cryoquip has developed a modular vaporizer fan addition option for its range of Uniflo natural draft ambient vaporizers for use with atmospheric gases and LNG. The Fog Reduction Module (FRM), is an upgrade accessory which can be applied to existing installed Uniflo units to enhance multiple aspects of performance. The main advantages of this module are:

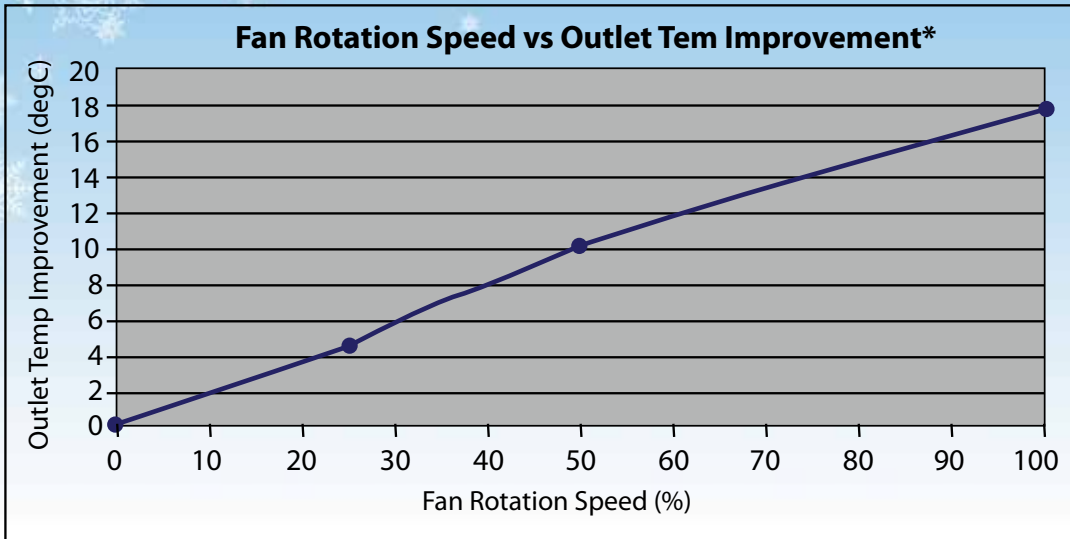
- Reduction in fogging and improvement in thermal performance
- Special fan blade design for low audible noise for quiet operation
- 10-20 horsepower (7-15 kW) electric motor
- VFD housed in NEMA 4 electrical cabinet

The FRM has enough space clearance so that the original natural draft performance will not be impacted. The fan blades are of special design that reduces the audible noise. The electric drive motor is a TEFC controlled by a VFD, connected to a customer DCS control system or a manual system to vary rotational speed based on desired parameters.

One of the challenges associated with the use of ambient air as the heating medium for vaporization of cryogenic fluids and LNG is the formation of fog. This is especially true in an LNG send out station application when multiple AAVs are being used simultaneous to provide Natural gas to a pipeline. Air is a two-component mixture of dry air and water vapor and when it is cooled by heat exchange with the cold LNG the water vapor turns into fog and with multiple units operating a great deal of fog can be generated.

The FRM's main enhancement is reduction of fogging. By forcing a higher convective air flow rate through the vaporizer, the enthalpy change of the air becomes lower so the air does not drop in temperature nearly as much as in the natural draft conditions. A side benefit on the FRM is the improved thermal performance which provides higher outlet temperatures for the process discharge. A further benefit of the FRM is the shorter defrost time promoted by the fan when used in vaporizer switching applications.



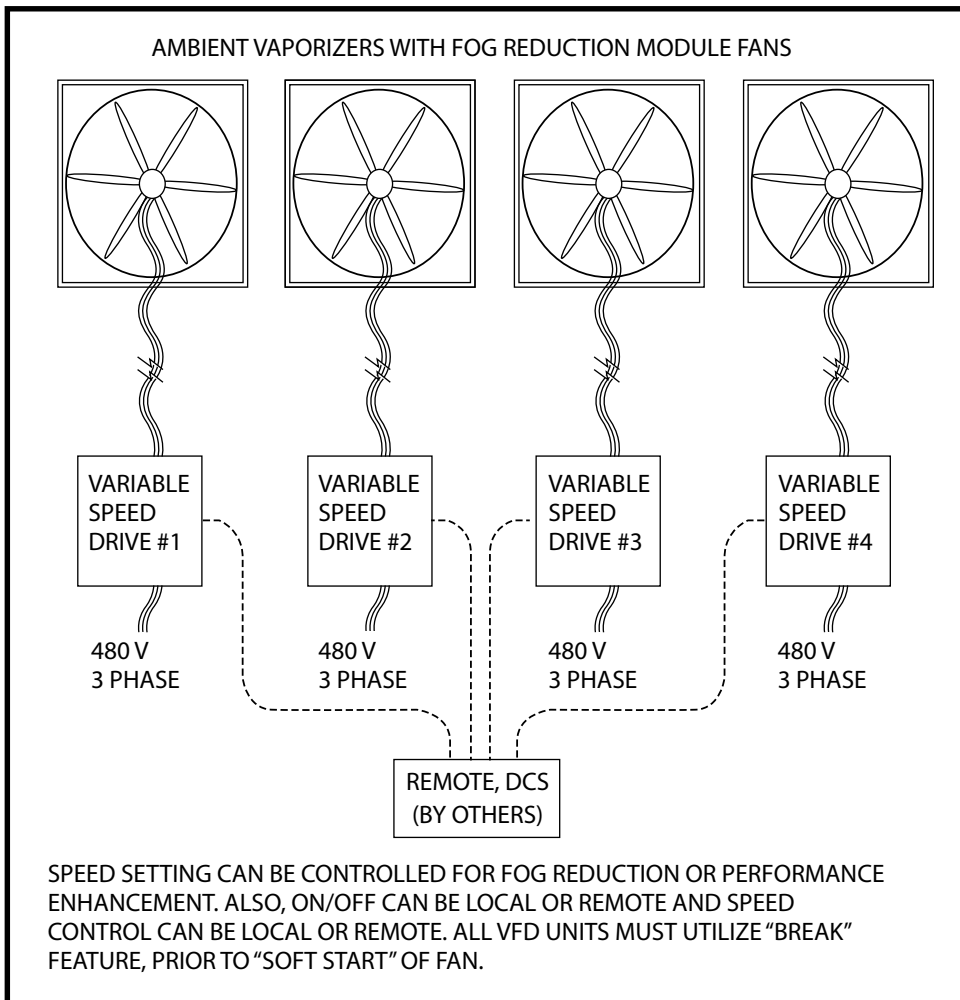


Thermal Enhancement

*Above performances are general only. Actual performances are subject to many site-specific factors and may vary.

The fan motor can be connected to a variable frequency drive (VFD) which modulates the fan speed. With precise control of the fan rotation speed, a control system can be implemented to help dissipate fog at the bottom of the vaporizer as well as improve outlet temperatures for the process discharge.

Example bank of vaporizers with FRMs



Testing photos before and after controlled by an external DCS using the FRM



BEFORE



AFTER

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