MESSAGE FROM

Frick®

SERVICE INFORMATION

DATE: September 30, 2004

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TO: Factor Principals, Service Manual Holders,
National, International and Canada
Field Sales and Waynesboro Personnel

SUBJECT: **Quantum™ Panel – Separator Velocity Safety**

In the release of Quantum™ software version 3.00, in February 2, 1998, a Separator Velocity safety feature was added to the panel. This letter is written to provide additional information on the function of this safety.

When a screw compressor package is ordered, Frick conducts calculations to determine the required diameter of the separator, and number of coalescing filters required to prevent oil carryover at the sales order conditions, and with condensing temperature 20°F lower than the sold conditions. If the separator needs to be “oversized” to run at these conditions in order to prevent oil carryover, the bigger separator would be required on the order. In some cases this may result in additional cost and delivery time and may not be necessary if the upset condition is rare.

Many systems will run at suction pressures above design, or discharge pressures below design, temporarily during their life. This may occur during initial pull down of the plant or during startup on days of the year with very low condensing temperatures. Operation at such conditions puts the separator at risk to carry over oil to the plant since the separator velocity can exceed its operational limits.

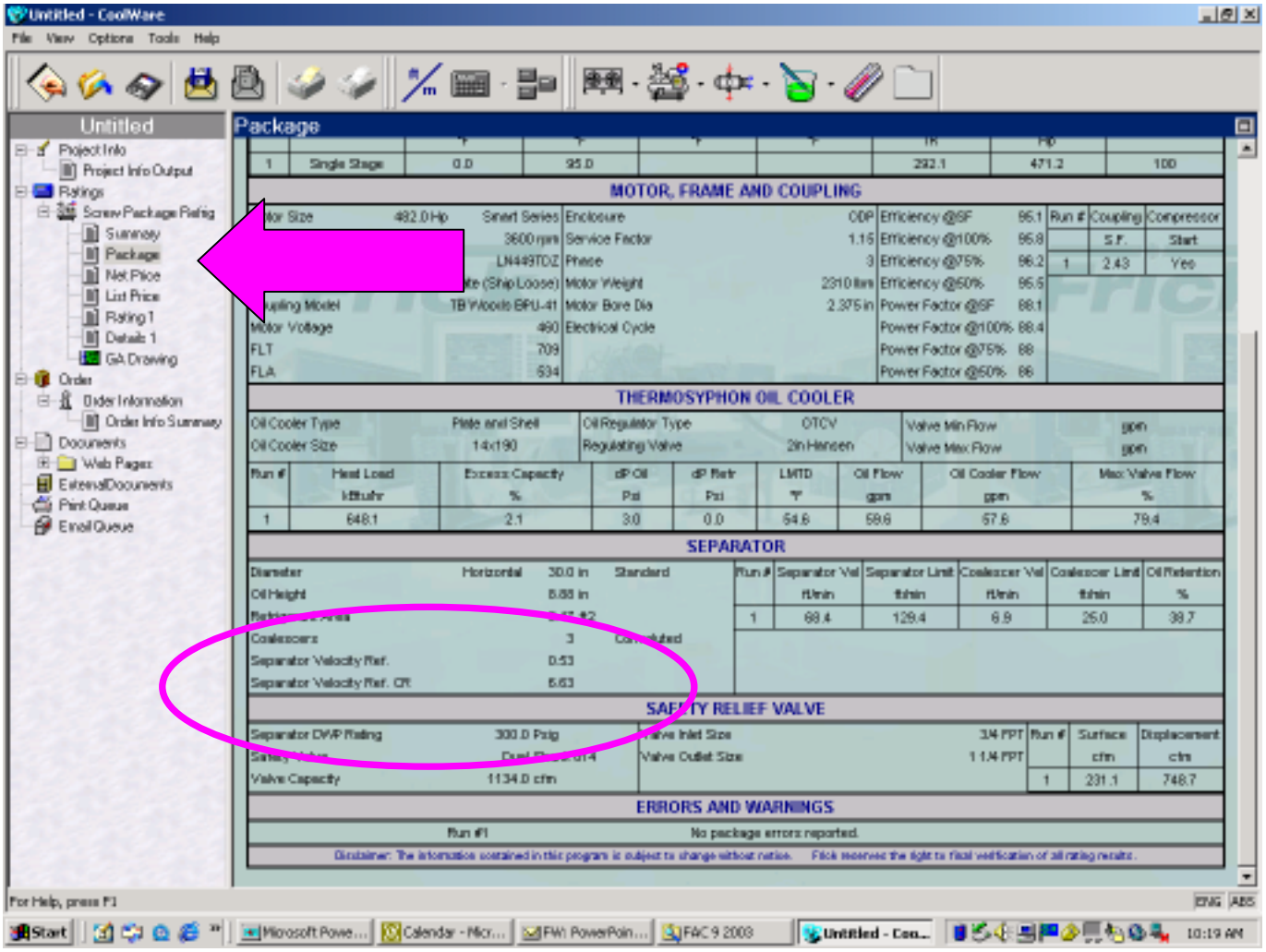
A Separator Velocity Safety was developed that calculates the instantaneous separator velocity and forces the slide valve to be limited to a lower percentage load until the condition passes that would cause oil carryover. Once conditions return to normal and separator velocity is within design limits, the slide valve position is no longer limited.

Proper configuration of this setpoint requires two values that must be calculated in Coolware™.

- Separator Velocity Reference is the percent of maximum allowable velocity the separator is running at any set of conditions. This should be calculated at the design conditions.
- Separator Velocity Compression Ratio is the compression ratio from the above Coolware run.

Input of these two variables into the Quantum™ allows it a reference velocity that can be used to determine when the package is outside of design conditions far enough to risk oil carryover. When the safety determines that the package is at risk to carry over oil, the slide valve position is inhibited from fully loading until the condition passes.

The location of the Coolware™ page showing the two required setpoints is shown below.



In the above example the compressor performance was calculated for an RWF-222 running at 0°F/95°F, its design condition. The first stage separator velocity is shown as 68.4 ft/min with a maximum allowable velocity at this condition of 129.4 ft/min. The coalescers velocity is shown as 6.9 ft/min with a maximum allowable velocity of 25 ft/min.

The Separator Velocity Reference is 0.53 or 68.4/129.4 ft/min. This can be interpreted as 53% of maximum allowable velocity at a Separator Velocity Reference Compression Ratio of 6.63:1. In this example the coalescer velocity is a lower percentage of max allowable, so the first stage limit is controlling.

Coolware™ calculates the maximum allowable velocity of the first stage of the oil separator and the coalescing filters, and displays the SepVel Ref values for the portion of the separator that is nearer to its maximum velocity at these conditions.

If this package is rerun in Coolware™ at a lower condensing temperature of 0°F / 75°F, the new setpoints are 0.642 @ 4.79 CR. This is interpreted as the separator running at 64.2% of its maximum allowable velocity at a compression ratio of 4.79:1. If either set of numbers are programmed into the Quantum™ it will limit loading in nearly identical manner, as the mathematics in the Quantum™ will be able to correct the slide valve loading limitation in the same manner given either set of numbers.

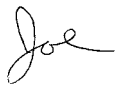
If you want to allow the compressor to run at higher separator velocities before limiting the load, the percent of maximum allowable setpoint can be adjusted to allow this. In the above example the separator was at 53% at 6.63 CR. If you want the compressor to run 10% higher in velocity before limiting the load, divide the SepVel Ref value of .53 by 1.10. The new setpoints would be 0.48 SepVel Ref at 6.63 CR. This will allow the separator to run 10% higher velocity before limiting the slide valve position.

Entering zero as the SepVel Ref setpoint at any compression ratio will disable the alarm, with no function to limit loading at any condition.

The Separator Velocity Safety is a powerful tool that allows much greater control of your screw compressor operation reducing the likelihood of oil carryover in systems with temporary upset conditions.

Please feel free to contact Frick with any questions.

Best regards,



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