

MESSAGE FROM



## SERVICE INFORMATION

**DATE:** September 30, 2004

**REF. NO.:** NS-18-04

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

**SUBJECT:** Quantum™ Panel – Liquid Slugging Safety

In the release of Quantum software version 4.50, on November 2, 2001, a Liquid Slugging safety feature was added to the panel. This letter is written to provide additional information on the function of this safety.

It has always been desirable to find a means to detect a large liquid slug and shut down the compressor before hydraulic locking of the rotors, as this can cause total compressor failure. It is nearly impossible to detect a liquid slug merely by the suction temperature of the compressor, as the liquid is normally at the same temperature as the suction vapor.

In field testing of plants with liquid refrigerant carryover to the compressor, it was determined that the discharge temperature dropped rapidly in the seconds leading up to total failure. While a drop in discharge temperature could have a variety of more normal causes, we noticed that when the rate of discharge temperature drop exceeded 20°F in 5 seconds, liquid carryover was most likely occurring with total compressor failure likely to follow.

A safety was developed with the alarm and shutdown triggered when the rate of change of the discharge temperature drops faster than the setpoint degrees per 5 seconds. The safety must function very rapidly in order to save the compressor from failure when a liquid slug is hitting the compressor, so this safety has no time delay. While the rate is expressed as degrees per 5 seconds, the calculation of the rate is instantaneous, so the safety can stop the compressor very quickly when a rapid drop is detected.

The default setpoints are 10°F/ 5 sec for the alarm and 20°F /5 sec for the shutdown. Note that the 5 sec is understood and the setpoints are entered in the Quantum as 10°F and 20°F. Both setpoints have a range of 0-90°F.

If nuisance alarm and shutdowns occur, it is first recommended that the technician be certain that they are indeed "nuisance" and not real indicators of system problems, since situations that trigger this alarm can lead to rapid compressor failure. The alarm and shutdown can be defeated by setting them to their maximum value of 90°F.

Please feel free to contact Frick with any questions.

Best regards,

A handwritten signature in black ink that reads "Joe".

Joe Pillis  
Director Engineering, Frick

***You can't beat the system when it's all FRICK***

100 CV Avenue • P.O. Box 997 • Waynesboro, Pennsylvania USA 17268-0997  
Phone: 717-762-2121 • FAX: 717-762-8624 • [www.frickcold.com](http://www.frickcold.com)