ENGINEERING
TOMORROW

Programming Guide

Strategy for heat recovery on CO_2 transcritical rack (Pack Control)

1. In Pack Controller

A. Heat reclaim request can be based on a number of user selected options including:
- heat exchanger outlet temp
- heat exchanger inlet/outlet TD
- fluid temperature

B. Once there is a call for heat reclaim based on the above, 3-way modulating valve is energized as long as safety conditions are met:
- Flow switch, if used, confirms proper flow
- temp sensors on heat exchanger inlet/outlet, fluid temp, and CO_2 discharge line after 3-way valve all measure below boiling (212 °F).

C. 'HP offset'. with heat reclaim valve energized, control of condensation pressure can be altered based on a 0 – 10 V signal into the pack controller.
- during heat reclaim and a signal of 0 V, pressure target is increased to setting for 'gas cooler-heat recovery minimum pressure'
- during heat reclaim and a signal of 10 V, pressure target is increased to setting for 'gas cooler heat recovery offset pressure'
- during heat reclaim and a signal between 0 – 10 V, pressure target is increased linearly to a value that corresponds to range between min pressure and offset pressure.
- in the event multiple 0 – 10 V sources are being used (up to 5), maximum voltage signal will be used for control signal.

D. 'Max heat reclaim'. the following control occurs within the pack controller
- during heat reclaim and a signal of 0 – 2.5 V, pressure target is increased to setting for 'gas cooler heat recovery minimum pressure'
- during heat reclaim and a signal of 7 V, pressure target is increased to setting for 'gas cooler heat recovery offset pressure'
- during heat reclaim and a signal between 2.5 – 7 V, pressure target is increased linearly to a value that corresponds to range between min pressure and offset pressure.
- during heat reclaim and a signal between 6.5 – 8 V, gas cooler fan capacity is decreased proportionally (voltage increase results in larger capacity decrease). At 8 V or greater, gas cooler fans are disabled.
- if piping exists, valve to fully bypass gas cooler for maximum recovery can be utilized. Bypass would occur at a voltage signal of 9.5 V. Bypass valve would be disabled once voltage signal drops below 8 V.

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2. In EMS controller

A. 0 – 10 V signal(s) generated based on desired amount of heat reclaim, signal(s) sent to pack controller.

Danfoss A/S
Climate Solutions • danfoss.com • +45 7488 2222