Unistat® 425w

Cooling a 5-litre HWS reactor

Requirement

This case study looks at the performance of a Unistat 425w cooling a 5-litre glass reactor from 20 °C to -20 °C and then to T_{min} under "process" control.

Method

The Unistat 425w is connected to the 5-litre HWS glass reactor using two insulated metal 1.5-metre hoses. The reactor is filled with 3.75 litre of "M90.055.03", a silicon based HTF.

Results

The jacket cools quickly to -33 °C to pull the process to its new set-point from 20 °C to -20 °C (40 K) within 15 minutes (ramp rate > 2.6 K/min.).

Once temperatures are stable a set-point of -40 °C is entered. After approximately 22 minutes the jacket temperature asymptotes at -40 °C with a corresponding end-process temperature of -39 °C.

Setup details

Unistat® 425w & 5-litre HWS reactor

Temperature range:	-40...250 °C
Cooling power:	2.8 kW @ 250...100 °C
	2.5 kW @ 0 °C
	1.9 kW @ -20 °C
	0.2 kW @ -40 °C
Heating power:	2.0 kW
Hoses:	2x1.5 m; M38x1.5 (#6656)
HTF:	DW-Therm (#6479)
Reactor:	5-litre jacketed glass reactor
Reactor contents:	3.75 litre M90.055.03 (#6259)
Reactor stirrer speed:	200 rpm
Control:	process

Process ramps at > 2.6 K/min.

Jacket temperature asymptotes at -40 °C

- Jacket temperature
- Process temperature
- Setpoint