

Unistat P915w

Unistat P915w controls process temperature during the simulated exothermic reaction in a 100l Büchi reactor



Requirement

This case study demonstrates the performance of the Unistat P915w to control the process temperature during simulated exothermic reactions at +70°C and -20°C in “real” ambient conditions. Case study also demonstrates the heat up & cool down from +20°C to +80°C and back to +20°C again.

The tables and the graphics show the responsive, tight and stable control with the jacket temperature being continually adjusted to reach and maintain each new set point.

Method

To simulate the exothermic reactions, a 1000 Watt immersion heater was placed inside the reaction mass. The heat output was controlled by a regulator with the results recorded using Huber’s Service software.

Setup details

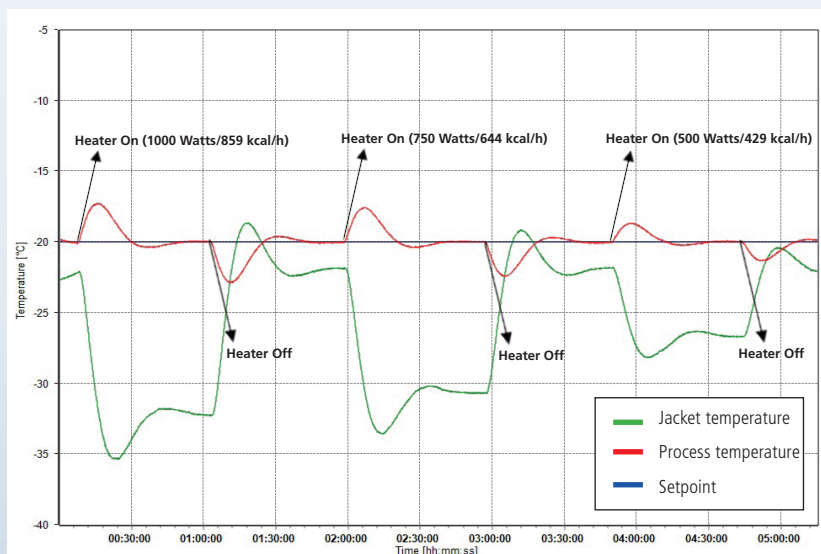
- Temperature range: -90°C...+250°C
- Heating power: 6.0 kW
- Hoses: 2 x M30 Metal Insulated
- HTF: M90.170.02
- Reactor: Büchi 100l
- Reactor content: 70 l DW-Therm
- Stirrer speed: 250 rpm
- Control: process
- Amb. temperature: +20°C

Results

1. Performance:

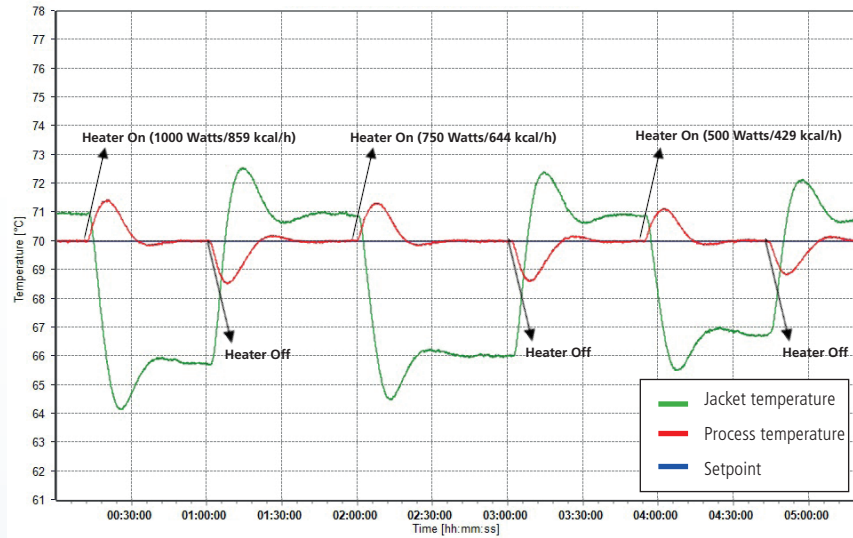
Controlling and regulating temperature at -20°C with simulated exothermic reactions of 1000 Watts (859.85 kcal/hr), 750 Watts (644.88 kcal/hr) and 500 Watts (429.92 kcal/hr).

Set Point	Exotherm	ΔT (b/w Process & Jacket)
-20°C	1000W	15K
-20°C	750W	12,5K
-20°C	500W	9K



Controlling and regulating temperature at +70°C with simulated exothermic reactions of 1000 Watts (859.85 kcal/hr), 750 Watts (644.88 kcal/hr) and 500 Watts (429.92 kcal/hr).

Set Point	Exotherm	ΔT (b/w Process & Jacket)
+70°C	1000W	5,3K
+70°C	750W	5K
+70°C	500W	4K



Temperature control between +20°C and +80°C, the compressor mode was selected to automatic.

Start T	End T	Approximate Time (in jacket)	Approximate Time (in process)	Average Ramp Rate
+20°C	+80°C	26 min	56 min	1.07 K/Min
+80°C	+20°C	11 min	46 min	1.3 K/Min

