Unistat P915w

Unistat P915w controls a 80 liter De Dietrich reactor

Requirement

This case study demonstrates the performance of the Unistat P915w to control the process temperature during simulated exothermic reactions at +20°C and -40°C in "real" ambient conditions. Case study also demonstrates the lowest achievable temperature in the process along with cool down & heat up from +20°C to -60 °C to +20°C.
The tables and the graphics show the responsive, tight and stable control with the jacket temperature being continually adjusted to return and hold the process temperature at the set-points as the thermal load generated by the immersion heater is suddenly changed.

Method

To simulate the exothermic reactions, a 600 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".

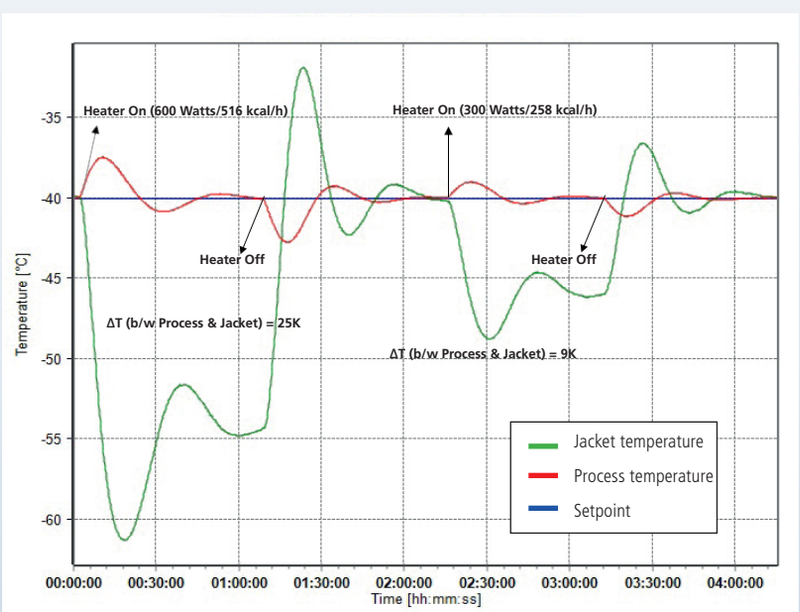
Setup details

Temperature range:	-90°C...+250°C
Heating power:	6.0 kW
Hoses:	2 x M30 Metal Insulated
HTF:	M90.170.02
Reactor:	De Dietrich 80 liter
Reactor content:	60 l DW-Therm
Stirrer speed:	85 rpm
Control:	process
Amb. temperature:	+20°C

Results

1. Performance:
Controlling and regulating temperature at -40°C with simulated exothermic reactions of 600 Watts (516 kcal/h) and 300 Watts (258 kcal/h).

Set Point	Exotherm	ΔT (b/w Process & Jacket)
-40°C	600W	25K
-40°C	300W	10K



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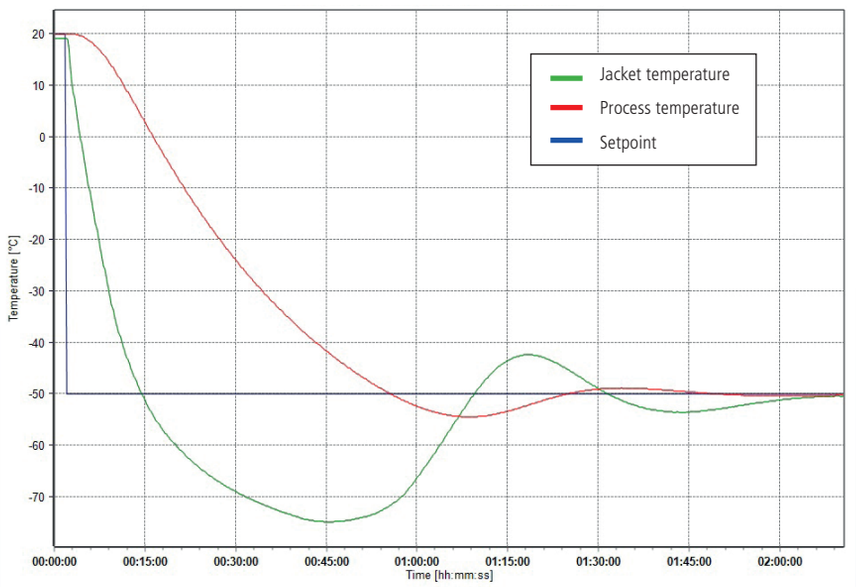
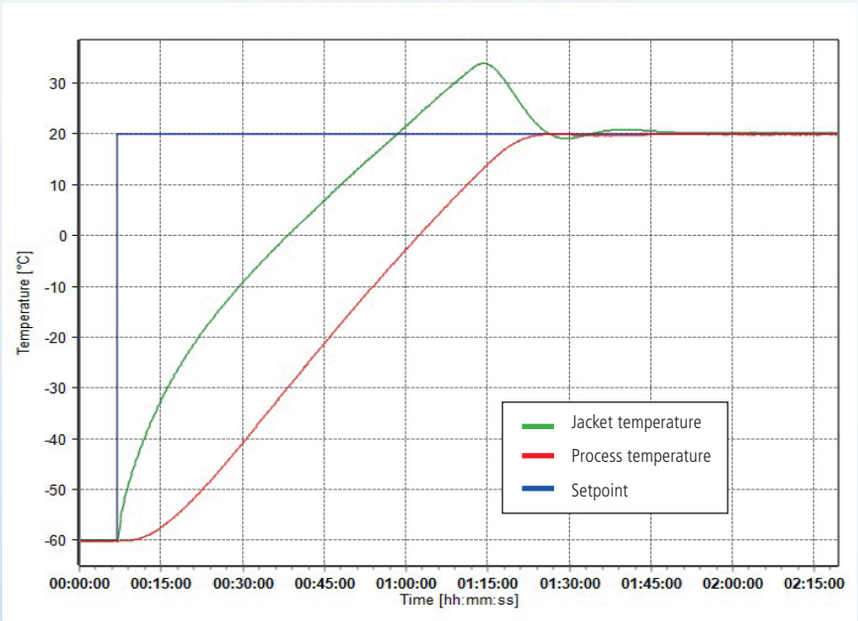
Cooling from +20°C to -60°C.

Start (°C)	Set Point(°C)	Time (in jacket)	Time (in process)
+20°C	-60°C	18 min	1 h 10 min



Heating from -60°C to +20°C.

Start (°C)	Set Point(°C)	Time (in jacket)	Time (in process)
-60°C	+20°C	50 min	1 h 20 min



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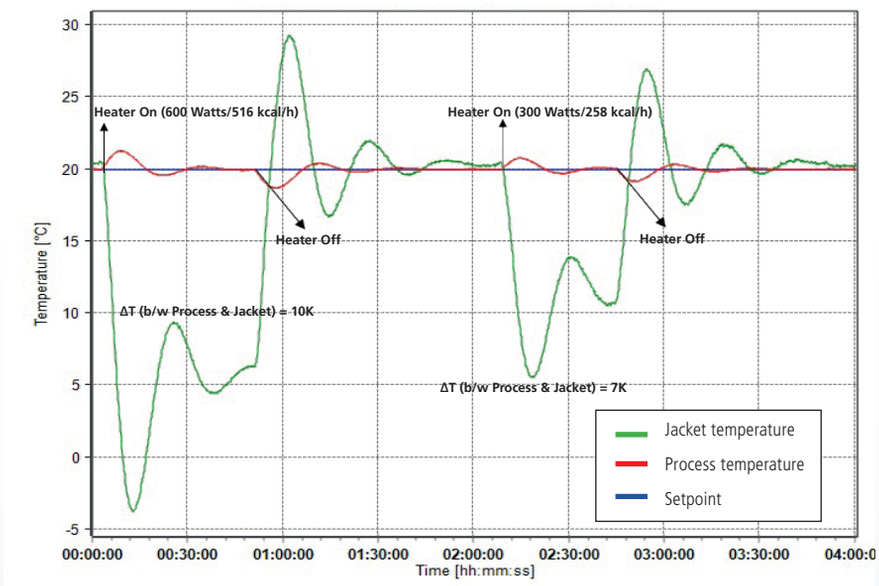
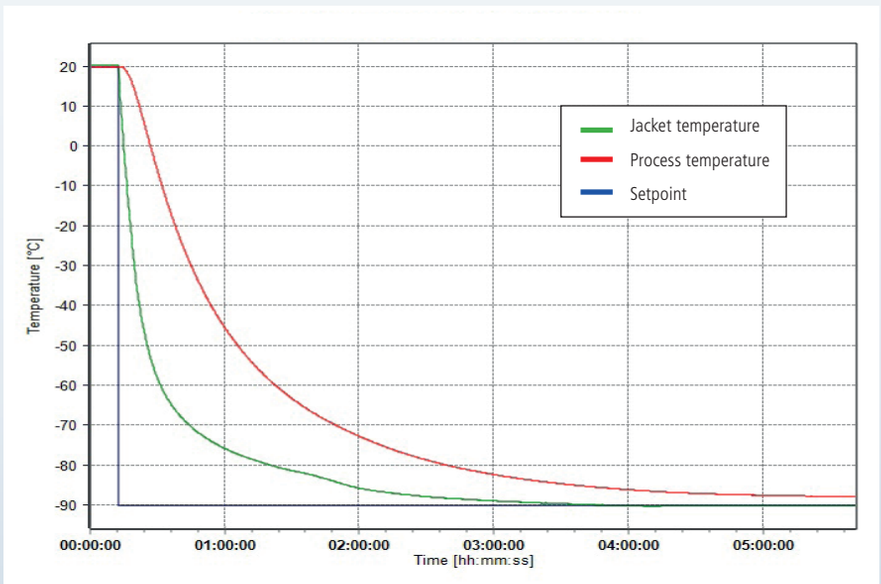
Controlling and regulating temperature at +20°C with simulated exothermic reactions of 600 Watts (516 kcal/h) and 300 Watts (258 kcal/h).

Set Point	Exotherm	ΔT (b/w Process & Jacket)
+20°C	600W	24K
+20°C	300W	21K



2. Lowest achievable temperature in the process:

Start (°C)	T-min (in Process °C)	Time (in process)	T-Min (in Jacket °C)	Time (in process)
+20°C	-88°C	6 h	-90 °C	3 h 30 min



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