## Case Study CS 101



# Unistat<sup>®</sup> 425

#### Controlling a simulated 100 W (86 kcal / hr) exothermic reaction

#### Requirement

This case study looks at the performance of a Unistat 425 as it controls a simulated 100 W (86 kcal / hr) exothermic reaction in a 2-litre DDPS reactor.

#### Method

The Unistat 425 is connected to the 2-litre DDPS glass reactor using two insulated metal 1-metre hoses. The reactor is filled with 1.5 litre of "M90.055.03", a silicon based HTF. An electric heater is immersed in the "process" and controlled to give a pre-determined power value.

#### Results

As soon as the "reaction" starts and raises the temperature of the process the Unistat cools the jacket to generate a wide  $\Delta T$  rapidly to remove the heat and bring the process temperature back to its set-point. The reaction is caught and controlled within 7 minutes. The heater is then turned off and the Unistat responds again by ramping the jacket to return and hold the process at its set-point

### Setup details

Unistat <sup>®</sup> 425 & DDPS 2-litre reacted
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Temperature range:	-40250 °C
Cooling power:	2.5 kW @ 0 °C
	1.8 kW @ -20 °C
Heating power:	2.0 kW
Hoses:	2x1 m; M24x1.5
	(#9325)
HTF:	DW-Therm (#6479)
Reactor:	2-litre jacketed glass
	reactor
Reactor content:	1.5 litre M90.055.03
	(#6259)
Stirrer speed:	150 rpm
Control:	process



32 30 28 26	The heater is tu value of 100 W	rned "On" at a (86 kcal/hr)	The heater is turned "Off"		Jacket temper Process tempe Setpoint	ature rature
22						
16 14 12 10 8 6 4 2		The jacket-temperature i rapidly cooled to "suck" heat out of the process	is	eaction" is brought under rature is exactly on its set-	control and the process point	
0 -2 -4 -6 -8				jacket ramps through 26 K minutes	(21 °C-to-5 °C)	
	3:50:00	03:55:00	04:00:00 Time in [hh:mi	<b>04:05:00</b> m:ss]	04:10:00	04:15:00