Unistat® tango NR

Temperature control of the 2l vacuum insulated Radleys Reactor-Ready

Requirement

The case study demonstrates the capabilities of the Unistat Tango when controlling the temperature of the process mass in a Radleys 2l vacuum insulated reactor.

Method

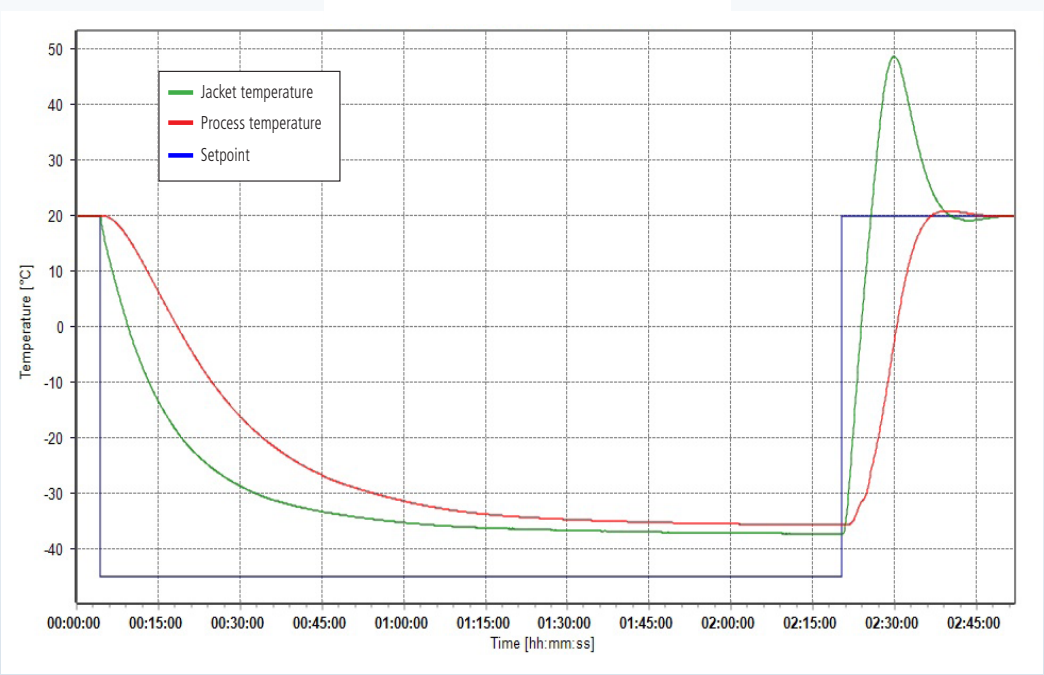
The Unistat and reactor were connected using metal hoses M24. The reactor was filled with M20.195/235.20. Stirrer speed was set to 130 rpm.

Setup details

Temperature range:	-45 … +250°C
Cooling power:	0,7 kW @ 0°C
	0,4 kW @ -20°C
	0,6 kW @ -40°C
Heating power:	3,0 kW
Hoses:	1 x 1,5m x metal Insulated
	1 x 1,0m x metal Insulated
HTF:	M60.115/200.05
Reactor:	2l vacuum insulated
Reactor content:	M20.195/235.20
Reactor stirrer speed:	130 rpm
Control:	Process
Amb. temperature:	+22°C

Results: Glass Jacketed Reactor (1l)

1. Lowest achievable temperature in the reaction mass:
The graphic below shows that the minimum achievable process temperature in the process mass was -35,7°C

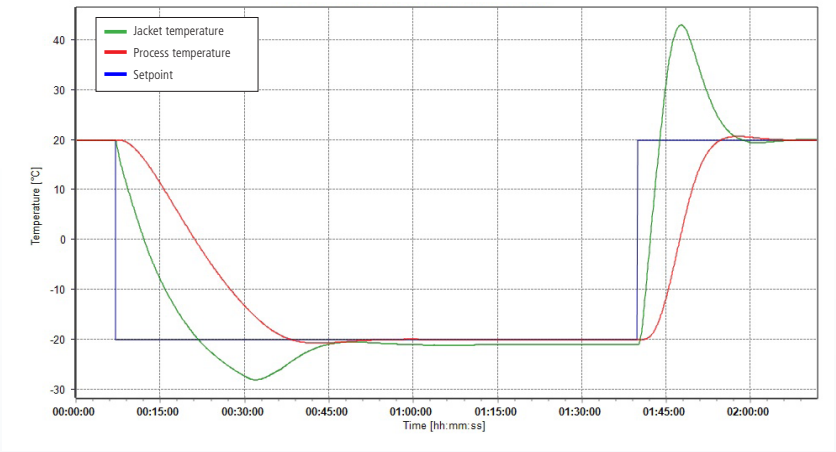


2. Performance:

Temperature Control from +20°C to -20°C and back to +20°C

The graphic below demonstrates the performance of the Unistat tango in the lower temperatures as it cycles the temperature of the process mass to -20°C then quickly back +20°C.

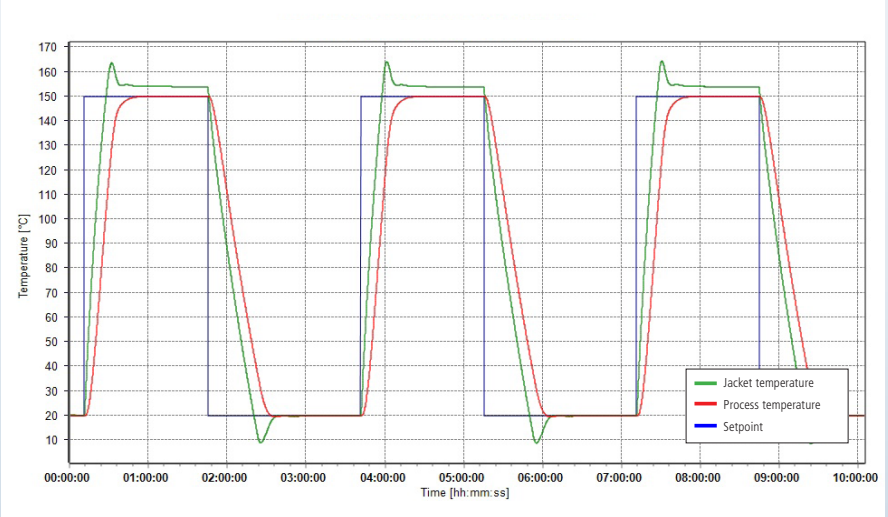
Start T	End T	Time taken	Av. Ramp Rate
+20°C	-20°C	31 minutes	1,3 K/Min
-20°C	+20°C	16 minutes	2,5 K/min



Temperature Control: from +20°C to +150°C and back to +20°C

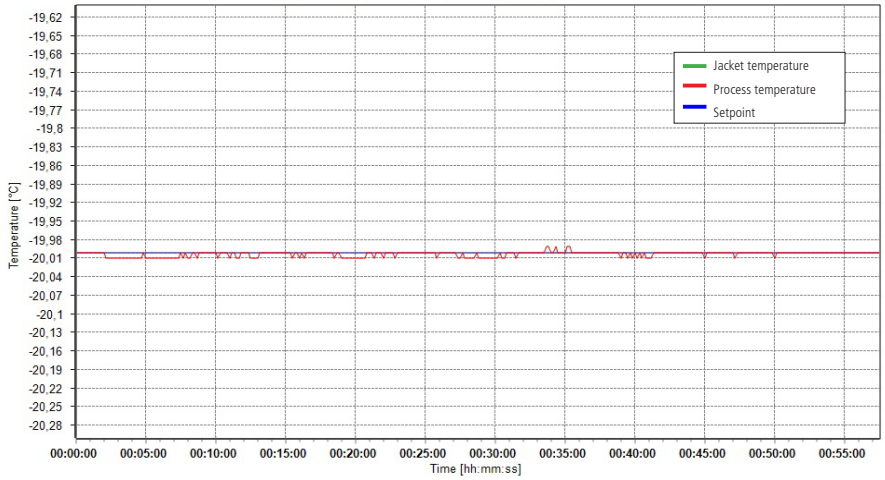
The graphic below demonstrates the speed at which the Unistat tango heats the jacket of the reactor to drag the process mass to it's target temperature and very quickly stabilising at the new set-point.

Start T	End T	Time taken	Av. Ramp Rate
+20°C	+150°C	40 minutes	3,3 K/Min
+150°C	+20°C	48 minutes	2,7 K/min



3. Stability

The graphic below shows that stability of the process mass at -20°C as being better than +/- 0.01K



The graphic below shows the stability of the process mass at 150°C is better than +/- 0.02 K