

Unistat 530w

Unistat 530w controls an uninsulated Chemglass 100l glass jacketed reactor

Requirement

This case study demonstrates the ability of the Unistat 530w to control the process temperature in an uninsulated Chemglass 100l glass jacketed reactor. The tables and the graphics below show the speed, accuracy and stability as the process temperature is changed to each new set-point.

Method

The Unistat 530w was connected to a Chemglass 100l uninsulated glass jacketed reactor via 2 x 1.5-meter metal insulated tubes. The HTF used was Huber’s M60.115/200.05 and the process mass simulated with 75l of Huber’s M40.165/220.10 silicon oil. Under “Process Control” from a Pt100 located in the process mass, different set-points were entered and the performance of the Unistat 530w was recorded using Huber’s service software and recorded onto a USB thumb drive inserted in the USB interface on the Pilot ONE controller.

Setup details

- Temperature range: -55...+250°C
- Heating power: 12 kW
- Hoses: 2 x M30 Metal Insulated
- HTF: M60.115/200.05
- Reactor: glass jacketed reactor 100l
- Reactor content: 75l M40.165/220.10
- Control: process
- Stirrer speed: 100 rpm
- Amb. temperature: +23°C

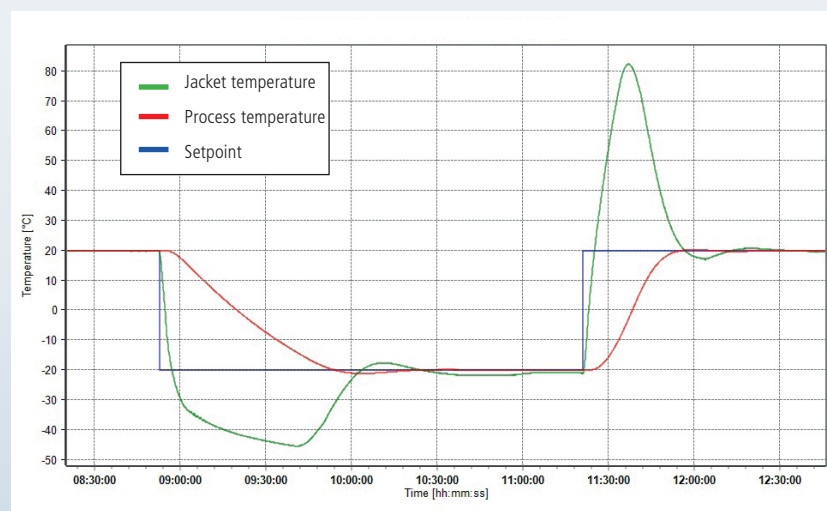


Results

1. Temperature Control: from +20°C to -20°C and back to +20°C

This test demonstrates the speed and accuracy that the Unistat 530w cycles the process temperature between +20°C and -20°C.

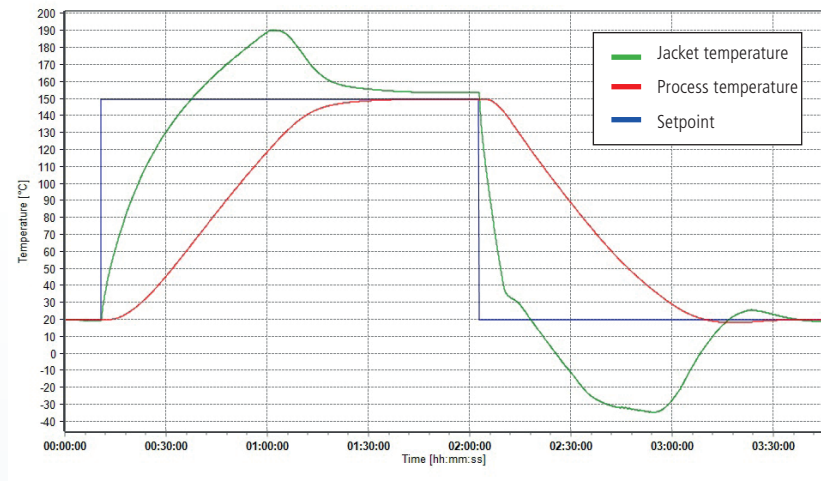
Start T	End T	Approximate Time	Average Ramp Rate
+20°C	-20°C	62 min	0.7 K/min
-20°C	+20°C	34 min	1.2 K/min



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

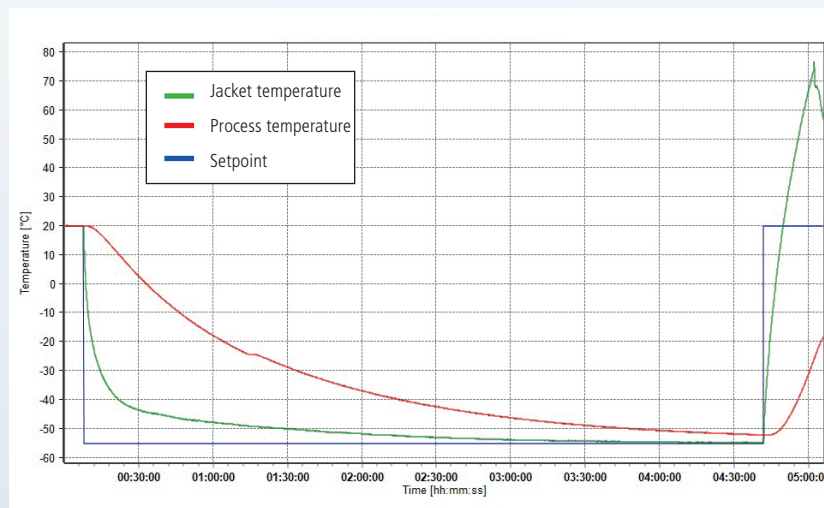
This test demonstrates the speed and accuracy that the Unistat 530w cycles the process temperature between +20°C and +150°C.

Start T	End T	Approximate Time	Average Ramp Rate
+20°C	+150°C	84 min	1.6 K/min
+150°C	+20°C	68 min	1.9 K/min



3. Minimum Process Temperature

It can be seen in the graphic below that the minimum achievable process temperature was -52°C with a corresponding jacket temperature of -55°C.



4. Stability

The following graphics demonstrate the stability of temperature control over the process at +150°C, +20°C and -20°C. It can be seen that the process temperature stability is better than 0.02K at all set-points.

