

## Unistat 510w

**Unistat 510w controls a 50l DDPS glass jacketed reactor**

### Requirement

This case study demonstrates the ability of the Unistat 510w to control the process temperature in an uninsulated DDPS 50l glass jacketed reactor.

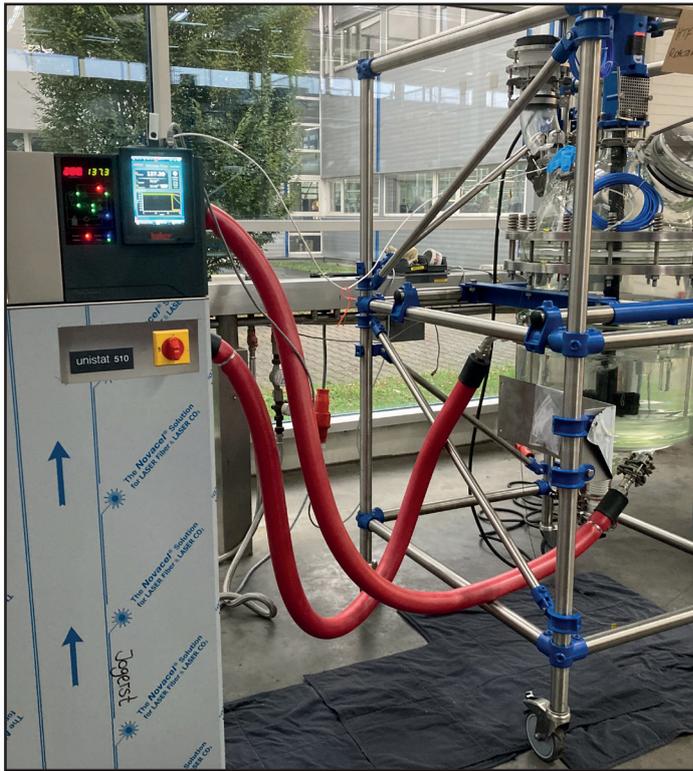
The table and the graphic below shows the speed, accuracy and stability as the process is changed to each new set-point.

### Method

The Unistat 510w was connected to the 50l uninsulated DDPS QVF glass jacketed reactor with 2 x M30 metal hoses. The process mass was simulated with 50l of Huber's "M40.165/220.10" inside the reactor. Under "Process control" from a Pt100 located inside the process mass, the temperature of the process was cycled through various set-points and the results recorded using Huber's "Spy Service" software via a USB thumb drive inserted in the USB interface on the Pilot ONE controller.

### Setup details

Temperature range: -50°C...+250°C  
 Heating power: 6.0 kW  
 Hoses: 2 x M30 Metal Insulated  
 HTF: M60.115/200.05  
 Reactor: glass jacketed reactor 50l  
 Reactor content: 50l M40.165/220.10  
 Control: process  
 Stirrer speed: 250 rpm  
 Amb. temperature: +23°C

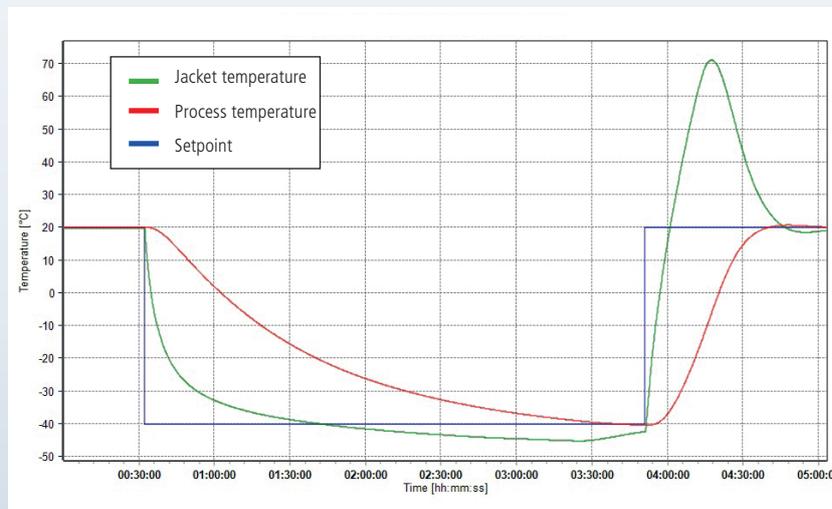


## Results

### 1. Performance. Temperature control from +20°C to -40°C and back to +20°C

The graphic below shows the speed and accuracy of temperature control as the process is cooled & heated from +20°C to -40°C and back to +20°C.

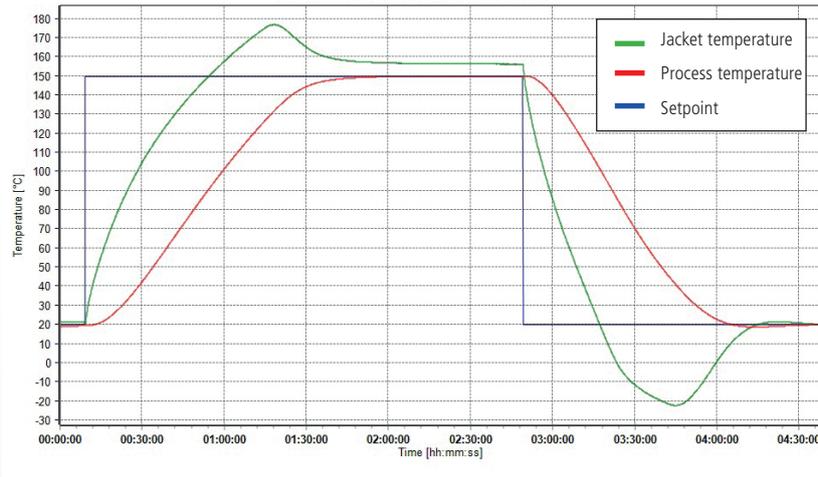
| Start (°C) | End (°C) | Approximate Time      | Average Ramp Rate |
|------------|----------|-----------------------|-------------------|
| +20°C      | -40°C    | 187 Minutes (3:07 hr) | 0.32 K/Min        |
| -40°C      | +20°C    | 48 Minutes (0:48 hr)  | 1.25 K/Min        |



## 2. Performance. Temperature control from +20°C to +150°C and back to +20°C

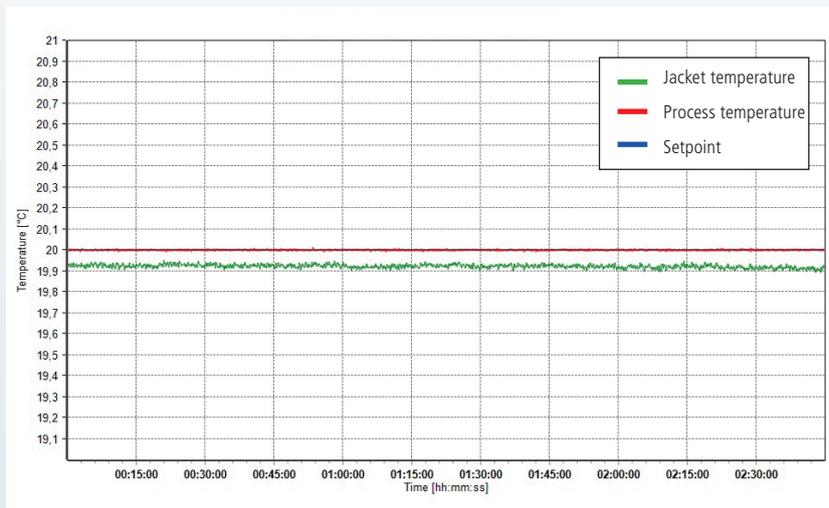
The graphic below shows the speed and accuracy of temperature control as the process is cooled & heated from +20°C to +150°C and back to +20°C.

| Start (°C) | End (°C) | Approximate Time      | Average Ramp Rate |
|------------|----------|-----------------------|-------------------|
| +20°C      | +150°C   | 124 Minutes (2:04 hr) | 1 K/Min           |
| +150°C     | +20°C    | 76 Minutes (1:16 hr)  | 1.7 K/Min         |



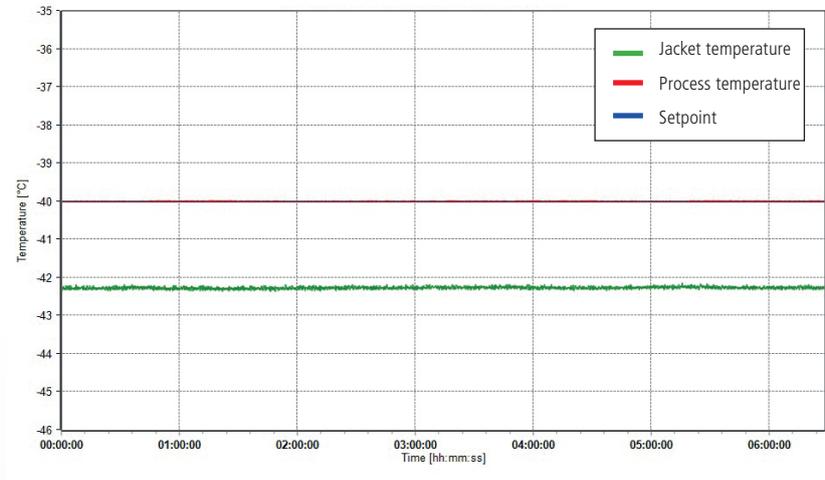
## 3. Stability at +20°C

The graphic below demonstrates a continual stability of the process temperature of better than 0.01K at a set-point of +20°C.



## 4. Stability at -40°C

The graphic below demonstrates a continual stability of the process temperature of better than 0.01K at a set-point of -40°C.



## 5. T-Min

The graphic below demonstrates that the minimum achievable process temperature is -47°C with a corresponding jacket temperature of -50°C.

