



# Ministat® 240

**Ministat® 240 cycling a 10-litres glass vacuum insulated reactor**

**Requirement**

This Case Study demonstrates the minimum achievable process temperature and the temperature control capabilities when Ministat 240 is connected with a 10-liter Asahi vacuum insulated reactor.

**Method**

The 10-litres Asahi glass vacuum insulated reactor was connected to Ministat® 240 using 1-meter metal insulated hoses. The thermofluid used in the system was "DW-Therm". "Process" control was carried out via a Pt100 sensor located in the "process" mass. Stirrer speed was set to 100 rpm.

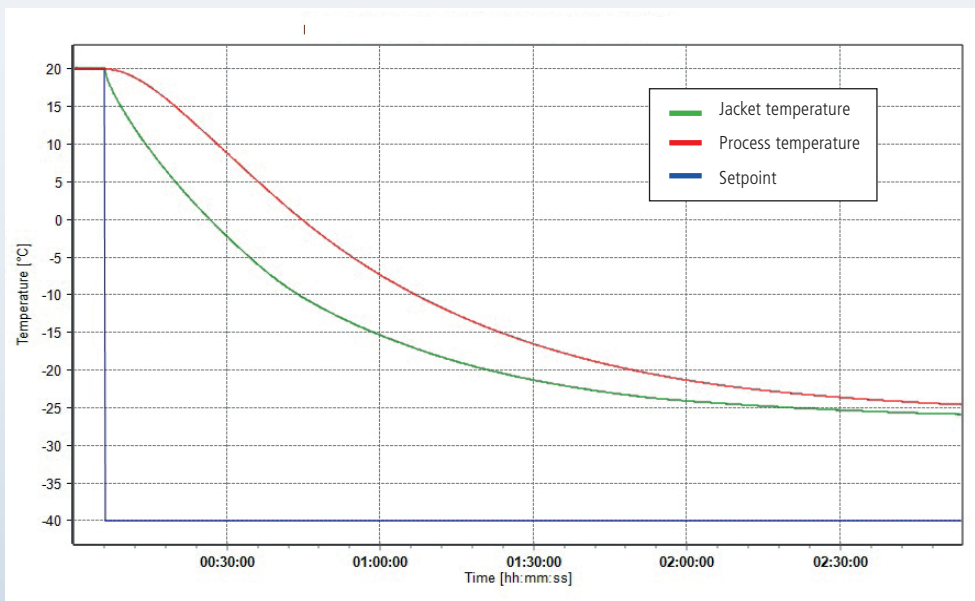
**Setup details**

- Temperature range: -45°C...+200°C
- Cooling power: 0.60 kW @ +20°C
- 0.55 kW @ 0°C
- 0.35 kW @ -20°C
- Heating power: 2.0 kW
- Hoses: 2\*1 m metal insulated
- HTF: DW-Therm
- Reactor: Asahi 10-litres glass vacuum insulated
- Reactor content: 7 l DW-Therm
- Stirrer speed: 100 rpm
- Control: process
- Amb. temperature: +25°C

## Results

**1. Lowest achievable temperature (Tmin):**

As the graphic shows, the minimum achievable process temperature was -24.5°C.



## 2. Performance:

The table and graphic data show the tight and rapid control as the Ministat 240 ramps to each new set-point.

Start T	End T	Approximate time	Av. Ramp Rate	Fastest Ramp Rate
+20°C	-20°C	113 minutes	0.4 K/min	(+10°C to 0°C) 0.6 K/min
-20°C	+100°C	69 minutes	1.7 K/min	(+30°C to +60°C) 2.5 K/min
+100°C	+20°C	96 minutes	0.8 K/min	(+60°C to +30°C) 0.9 K/min

