

Unistat 530w

Unistat 530w controls a simulated exothermic reaction in an insulated 100l GLSS reactor from Büchi Glass Uster

Requirement

This case study demonstrates the ability of the Unistat 530w to control the process temperature of the reaction mass when a simulated exothermic reaction is taking place in an insulated 100l GLSS reactor from Büchi Glass Uster.

Method

To simulate the reactions, a 1kW immersion heater was placed into the reaction mass (80-liters of M40.165/220.10) and connected to a controller. The agitator speed was set to 250rpm.

At set points of -20°C and 70°C, the heater was turned "On" at values of 1kW, 750w, 500w and 250w.

Once the temperature had stabilised with the additional heat load of the simulated reaction, the heater was turned "Off".

Again, once the temperature had stabilised, the heater was turned "On" again at the new wattage level and the procedure repeated.

The results were recorded using a USB thumb drive via the Pilot ONE controller and can be seen below.

Setup details

- Temperature range: -55...+250°C
- Heating power: 12 kW
- Hoses: 2 x M30 Metal Insulated
- HTF: M80.100/250.03
- Reactor: Büchi Glass Ulster reactor 100l
- Reactor content: 80l M40.165/220.10
- Control: process
- Stirrer speed: 250 rpm
- Amb. temperature: +23°C



Results

1. Simulated reaction at -20°C

kW	kcal/hr	Process rise	Recovery	Process fall	Recovery	Max Delta T
1.0	860	2.5°C	23 min	2.5°C	24 min	23K
0.75	645	2.1°C	20 min	2.1°C	18 min	20.1K
0.5	430	1.4 °C	19 min	1.4°C	11 min	14.6K
0.25	215	0.4°C	20 min	0.3°C	15 min	6.2K



2. Simulated reaction at +70°C

kW	kcal/hr	Process rise	Recovery	Process fall	Recovery	Max Delta T
1.0	860	1.1°C	16 min	1.1°C	14 min	8.6K
0.75	645	1.0°C	16 min	1.1°C	16 min	8.0K
0.5	430	0.9°C	15 min	0.9°C	15 min	6.9K
0.25	215	0.5°C	14 min	0.4°C	15 min	4.0K

