

TRIPLE WALLED REACTION UNIT IN MINIPLANT TECHNOLOGY



EXAMPLE FOR DISCONTINUOUS OPERATION OVER A WIDE TEMPERATURE RANGE

M119E.0

GENERAL

This 25l discontinuously operated reaction set-up has been developed to carry out experiments at very low temperatures as well as at high temperatures. The apparatus with the unique heating and cooling thermostat is especially suited to carry out reactions at low or elevated temperatures to distil the light boiling components off and then to crystallise the product at a low temperature.

The unit is an example of the modular concept of our Mini-plant technology in combination with modern high performance thermostat technology.

- The whole system as the temperature in the reactor and the stirrer speed is controlled by the thermostat.
- The unit can be operated in a wide temperature range from -80 to +180°C and pressures from 1 to 1100 mbar abs.
- The process can be observed because of the transparent material borosilicate glass 3.3.
- The reaction can be observed even at low temperatures due to transparent vacuum jacket avoiding the formation of ice.
- The vacuum jacket around the reaction vessel minimises the required cooling power of the thermostat.
- All components in contact with products are made of borosilicate glass 3.3, PTFE, SiC, KALREZ or PFA and are therefore highly corrosion resistant.
- The bottom off take valve is free of dead volume and conform to GMP.

CONSTRUCTION

The major component is the graduated triple walled reactor made of borosilicate glass 3.3. The inner jacket serves as heating or cooling jacket whereas the outer vacuum jacket realises the transparent insulation. The single powerful thermostat pumping the heating and cooling medium via a tangential inlet into the inner jacket allows to operate the reactor over the wide temperature range.

The reactor temperature is measured by the Pt-100 almost reaching the inner bottom of the reactor. The PTFE plunger of the bottom outlet valve seals perfectly over the complete temperature range. The big outlet valve eliminating dead volume assures easy and complete draining of the vessel even of high viscous or solids containing liquids. The lid of the reactor is connected by a KF-flange with a grease free PTFE gasket. The PTFE inclined blade stirrer is connected to a PTFE-coated stirrer shaft made of stainless steel which

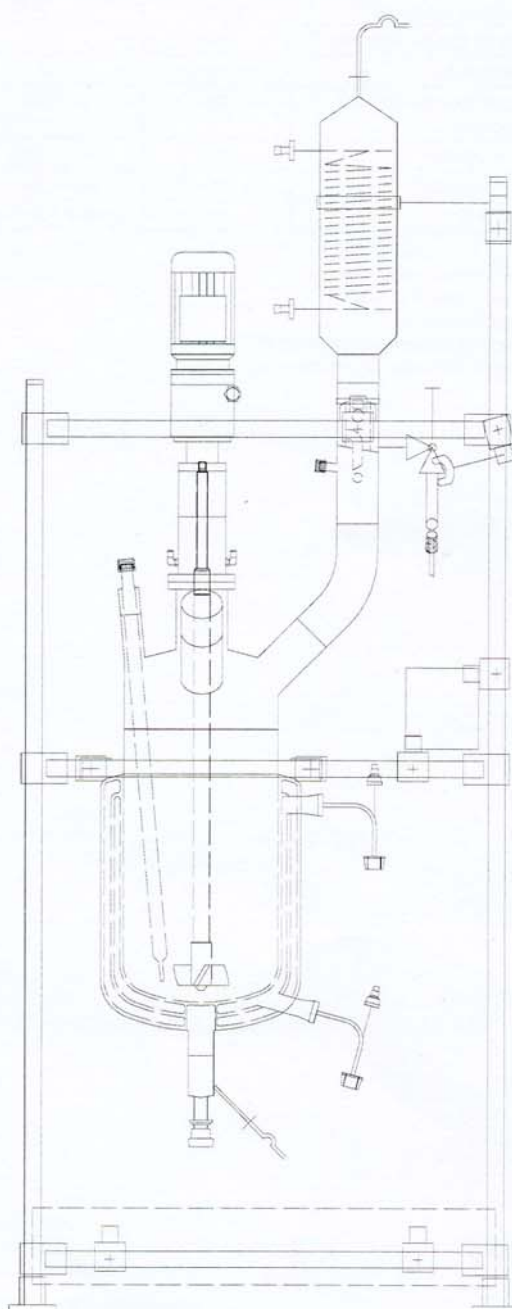


Fig. 2: Pneumatic throughway valve

is mounted into a corrosion resistant stirrer guiding with a single mechanical seal. The stirrer speed is continuously adjustable by a 4-20mA signal through a frequency converter. The control signal is generated by the thermostat. In order to enable reaction or dissolution under reflux as well as distillation the unit is equipped with a condenser and a manual distillate take off section. The boiling temperature of the distillate is measured by a Pt-100 sensor mounted under the distillate take off section. The distillate withdrawal is regulated manually by an angle valve. The angle valve is

followed by a vapour barrier with purging valve and connection possibility for distillate drainage line. The whole unit is mounted in a structure made of stainless steel with our unique clamps made of lacquered aluminium. A safety tub made of stainless steel is installed underneath the reaction system.

TECHNICAL DATA¹⁾

| | | |
|---------------------------------------|----------------|-------------------|
| Volume | l | 25 |
| Operating temperature | °C | -80 -180 |
| Operating pressure ³⁾ | mbar | 1 - 1100 |
| Nominal flange diameter ²⁾ | DN | 300 |
| Necks on lid | number | 5 |
| Heat exchange area of condenser | m ² | 0,6 |
| Stirrer speed | rpm | 0 - 550 |
| Power supply ⁴⁾ | V / Hz / kW | 400 / 50 / 4 |
| H x W x D | m | 2,55 x 1,0 x 0,85 |

¹⁾ Other versions upon request

²⁾ Flange diameter of reactor

³⁾ Absolute pressure

⁴⁾ Power supply almost depending on the power consumption of the thermostat

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