

# REACTION UNIT IN MINIPLANT TECHNOLOGY TYPE RAD



## STANDARD APPARATUS FOR DISCONTINUOUS OPERATION

M104E.2

### GENERAL

This standard batch reaction unit, type RAD, is used for liquid phase reactions. It is a versatile basic module and typical for our Miniplant-construction set. The vessel with a volume of 0,5 to 10l can be used for classical synthesis and purification steps as well as for bio-reactions.

The advantages of the Miniplant-reaction unit are:

- It operates under pressures between 1 and 1000mbar abs. and at temperatures up to 200°C. A vacuum generation system can easily be connected.
- The component parts in contact with the product are made of borosilicate glass type 3.3 and PTFE. Due to the high chemical resistance of these materials the variety of substances being processed in the unit is almost unlimited.
- The transparency of glass allows the observation of the reaction itself.
- The reactions carried out are well controlled due to the reproducible flow rate of the feed and the reproducible tempering of the reaction mixture.
- The unit is free of dead-volume and can be completely discharged.
- The measuring and control technology is a modular system. Hence, the reaction unit may be gradually upgraded.

### CONSTRUCTION

The scope of delivery for the reaction unit RAD is shown in figure 1.

The thermostat to heat the reaction vessel is part of the additional equipment as it is generally supplied by the customer.

The reactor with double jacket and robust flat-end laboratory plane flange, with incorporated groove for the grease-free o-ring seal, is a graduated glass vessel. The heat transfer medium is introduced into the double jacket via an annular heating medium inlet to ensure an equally distributed heat input. The integrated bottom off-take valve with PTFE plunger eliminates dead volume in the reactor and enables at the same time the total discharge of the reactor since it has no hold-up. The experienced construction of this valve easy handling is guarantees easyhandling even after long term operation.

Besides the three existing necks for condenser, feed funnel and stirrer, the hood is provided with further three necks for measuring sensors and additional product feed.

The triple holding device allows an alternate independent removal of the hood resp. reactor and their quick connection to each other.

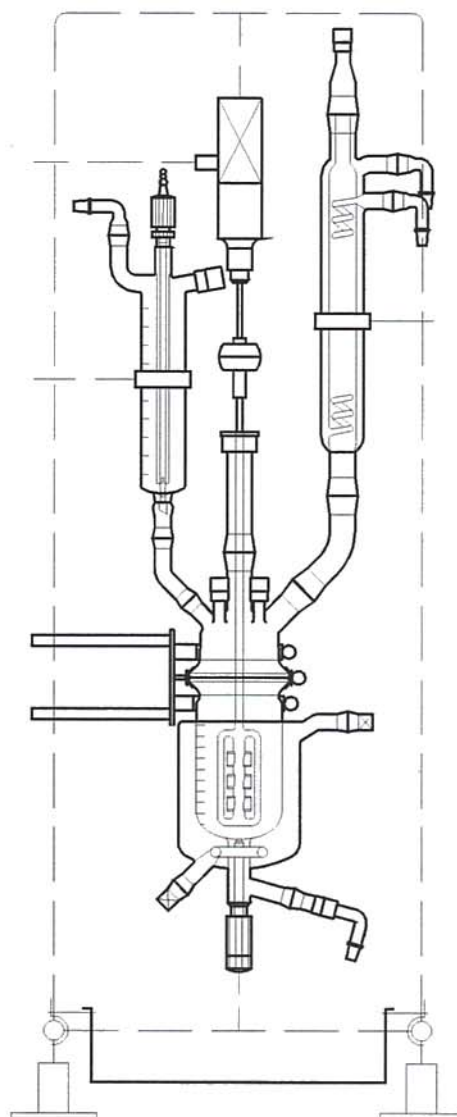


Figure 1: Reaction Unit RAD

The stirrer motor which can also be externally controlled is equipped with a digital speed display, enabling a reproducible heat transfer. A universally applicable grid type stirrer made of borosilicate glass type 3.3 producing tangential and radial primary streams is installed.

The product is constantly and precisely dosed even under vacuum or inert gas admission via a feed dosing funnel with Mariotte tube.

For reactions under total reflux the reactor is equipped with an adequate condenser.

The structure made of galvanised ¾"-tubes is provided with an incorporated safety pan made of stainless steel.

## ADDITIONAL EQUIPMENT

Apart from the thermostat for the evaporator this unit can be easily extended due to its modular construction. It can be upgraded with additional sensors and a temperature/time-program could be realised by means of a process control system.

An additional gas inlet provides the possibility to carry out reactions with gaseous products.

Selection of additional equipment:

- Thermostat
- Circulation cooler
- Vacuum generation system
- Temperature measurement
- Pressure measurement
- Level measurement
- Concentration measurement
- Additional dosing funnel
- Dosing funnel for solids
- Inert gas admission
- Gas inlet
- Process control system
- PC visualisation

## TECHNICAL DATA<sup>1)</sup>

Capacity	l	0,5	1	2	3	5	10
Nominal width	DN	100		150		200	
No. of necks on lid	no.	6					
Feed dosing funnel	l	0,25	0,5	1		2	5
Condenser surface	m <sup>2</sup>	0,1		0,28		0,41	
Operating temperature	°C	20-200					
Operating pressure <sup>2)</sup>	mbar	1-1000					
Voltage supply <sup>3)</sup>	V / Hz / W	230 / 50 / 130					
H x W x D	m	1,5 x 0,5 x 0,5		1,5 x 0,75 x 0,75		1,75 x 0,75 x 0,75	
Order No.		M-SY/RAD 05	M-SY/RAD 1	M-SY/RAD 2	M-SY/RAD 3	M-SY/RAD 5	M-SY/RAD 10

<sup>1)</sup> Other versions are available upon request

<sup>2)</sup> Absolute pressure

<sup>3)</sup> Voltage supply for standard unit without additional or optional equipment

## OPTIONAL EQUIPMENT

Contrary to additional equipment the optional equipment replaces parts of the standard unit.

Alternatives such as the exchange of a feed dosing funnel by a balance based dosing system are further contributions to better reproducibility.

The extension with optional equipment is almost unlimited and permits solutions totally different to the standard which we would be pleased to elaborate with you. Thus, due to the modular system, the reaction unit could for example be enlarged into a rectification unit.

Selection of optional equipment:

- Reaction vessels and lids made of metallic materials
- Reaction vessels exceeding 5l made of enamel coated steel
- Stirrer of other types
- Dosing pump
- Dosing funnel with tempering jacket
- ¾"-Tubular structure made of stainless steel

## CODE FOR ORDER NUMBERS

(see technical data)