



# UNIVERSAL REACTOR

The Universal-Reactor is the solution for synthesizing quantities that are too large for a lab scale 3-neck flask.





The complete solution if the 3 neck flask becomes too small.

## HIGHLIGHTS

- Reaction unit including instrumentation
- Easy cleaning due to self-draining construction
- Certificates for material in contact with product
- Robust stirrer drive
- For operation in EX-rated areas

## CONCEPT

The QVF® Universal-Reactor is the solution for synthesizing quantities that are too large for a lab scale 3-neck flask. With this unit it is possible to safely run reactions with larger quantities in the liquid phase under inert gas between -20°C and +150°C. Light boiling components can be distilled off. The QVF Universal-Reactor is equipped with the required instrumentation, ready for operation and only needs to be connected to heating and cooling media. The construction of the reaction unit permits simple and reliable cleaning via CIP-nozzles. The instrumentation of the unit is ex-rated according to German and European regulations so that the complete unit can be operated in EX-rated areas.

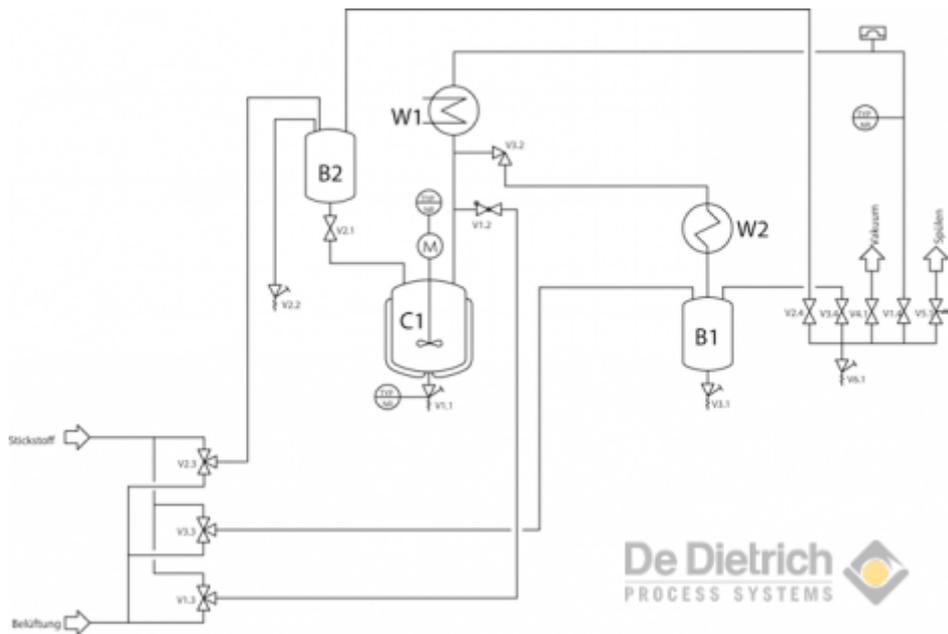


## FUNCTION

The addition of the reactants into the reactor is done through the hand whole equipped with a quick release closure. By applying vacuum to the feed vessel another reactant can be sucked into the feed vessel and afterward dosed through a dip pipe directly into the liquid reaction phase. The valve assemblies permit to operate the complete unit as well as single receivers under vacuum or slight inert gas overpressure up to +0.5 barg.

Tempering of the jacketed reaction vessel is done by thermo liquids in a temperature range between -50°C and 200°C. This way the temperature in the reactor, which is captured precisely by a Pt-100 temperature sensor in the bottom outlet valve, can be adjusted below or at the boiling point of the reaction mixture. This permits operation under total reflux or distillation. The mixing process and the heat transfer can be adjusted reproducibly at the continuously adjustable stirrer drive. The OptiMix® baffle system provides maximum mixing performance without splashing the reaction solution against the inner wall of the reactor. After the reaction solvents or other light boiling components can be withdrawn out of the reactor into the distillate receiver by distillation. Temperature sensitive products can be distilled at

lower temperatures under vacuum.



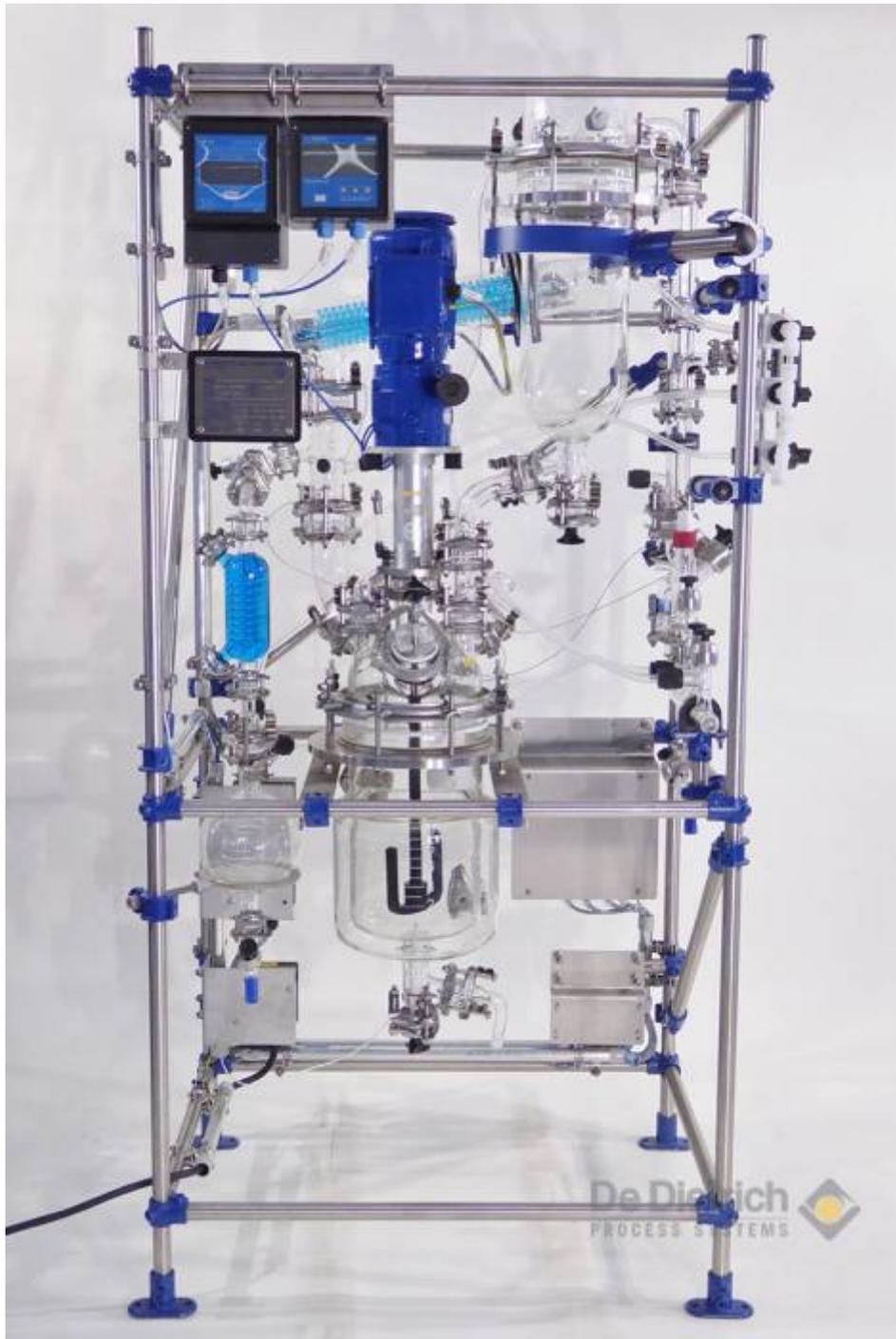
Valve arrangement of the vacuum connection

## TECHNICAL DESCRIPTION

The jacketed reactor, the feed vessel, the distillate receiver, condenser section and the main piping are made of borosilicate glass 3.3. The gaskets and bellows are made of PTFE having FDA-material certificates. The flange couplings up to DN 300 are made of stainless steel, the larger ones are made of coated steel. The tightness of the glass flange connections is certified by TA-Luft. In order to optimize self-draining the glass piping for liquids is inclined and equipped with fire polished QVF SUPRA-glass flanges. This is complementary to the CIP-nozzles providing easy and reliable cleaning of the inside of the reaction system. The hoses are made

of PFA. The PTFE coating of the steel shaft of the stirrer as well as the stirring turbine are made of dissipative PTFE. The stirrer shaft is reliably sealed by a single mechanical seal. The stirrer is operated by an electric motor with a continuously adjustable gear box. The speed of the stirrer is adjusted manually and is captured digitally as well as the temperature and the pressure in the reactor. Three OptiMix baffles are connected to the inner wall of the reactor improve mixing without blocking nozzles of the reactor cover. The gap between the baffles and the reactor wall guarantee good liquid flow and avoids dead volumes.

To prevent an over pressure of more than +0.5barg the unit is equipped with a bursting disc and a pressure relieve valve open slightly before that pressure. The intrinsically safe electrical wires are installed separately from the other power supply lines. For operation in zone 1 IIB and according to CLC/TR50404 and TRBS 2153 all metal flange couplings equal and larger than DN50 are connected with a stainless steel cable to the metal structure which needs to be earthed. All electrical and mechanical instruments are ex-rated and permits also the operation of the unit in zone 1 IIB. Optionally the unit can equipped in a way that the operation is possible in zone 1IIC outside and zone 0 IIC inside the unit.



## Technical data

Nominal reactor volume	l	6	10	16	25	50
Nominal reactor diameter	DN	200	300	300	300	450
Feed vessel	l	2	5	5	10	20
Distillate receiver	l	5	10	10	20	30
Condenser	m <sup>2</sup>	0,3	0,3	0,3	0,7	1
Cooler	m <sup>2</sup>	0,03	0,06	0,06	0,1	0,3
Stirrer shaft	mm	18	18	18	44	44
Motor power	kw	0,25	0,25	0,25	0,37	0,37
Amount of CIP-Nozzles		1	2	2	2	2
Height	mm	1900	2000	2100	2600	2700
Width	mm	900	1100	1100	1500	1700
Depth	mm	700	850	850	850	1000
T in the reactor	°C	-20 to +150				
P in the reactor	barg	-1 to +0,5				
EX-area inside	l IIB					
EX-area outside	1 IIB					

## Options

- OptiMix Baffles
- Triple walled reactor
- Triple wall-baffled OptiMix reactor
- Inert gas connection
- Vacuum connection including pressure release valve and bursting disc
- CIP-Nozzle made of PTFE
- CIP-Nozzle made of stainless steel
- RPM-Measurement
- pH-Measurement
- Magnetic coupling
- Safety tub

## Which kind of industry can use this product?

**Pharmaceuticals and Fine chemicals**  
**Agricultural chemicals**  
**Specialty Chemicals**

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### Questions? We are here to help.

If you'd like to talk with a sales representative about purchasing De Dietrich Process Systems's products and services, you can reach us here.

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