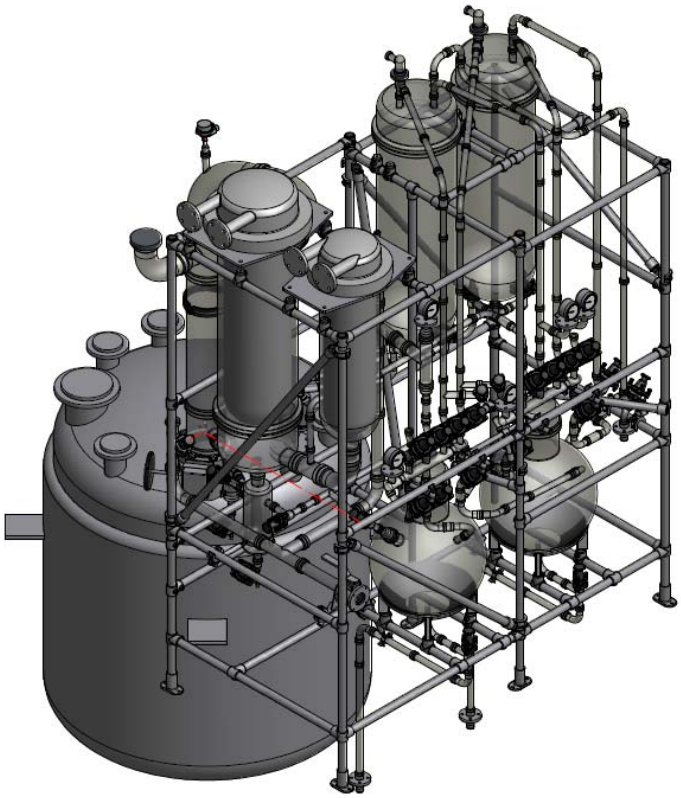
LABOR- und PROZESSTECHNIK

Reaction units and distillation tops - lab and process scale

- **Reaction Units and distillation tops for the chemical and pharmaceutical industry**
- **Units for experimental halls and production**
- **Customer and process specific design**
- **Reactors made of borosilicate glass 3.3, enamel or stainless steel**
- **Permissible operation conditions**
  - temperatures from -80°C to 200°C and
  - pressures from -1 barg to 0.5 barg or higher
- **Optional**
  - Phase separation liquid-liquid
  - solid dosage
  - glass coating
  - lifting device
  - N_2- and vacuum distributor
  - multistage distillation top
  - Temperisation
  - Automation with PLC-system
  - GMP-design conformity for Pharma
  - EX-protected design
  - scale-up of units
  - skid-mounted units

Reaction units and distillation tops from **NORMAG** are used for various processes, e.g. production and separation of fine chemicals or pharmaceutical products.
The typical requirements of each customer will be clarified right at the beginning of each project, e.g. liquid/gaseous feed, viscosity, phase separation, temperature/pressure range, as well as the material requirements, to engineer a specific customized unit. These specific units are based on our reliable solutions for each specific requirement - even for very specific requirements such as photo reaction or deep temperature - due to our long-term experience and cooperation with leading european chemical and pharmaceutical companies since many years.
The illustrated pharmaceutical unit shows a 2.500 l enamelled reaction vessel. The vapour is condensed in two vertical enamelled and fully draining condensers. The distillate will be led into a phase separator and then back into the vessel or two graduated distillate glass receivers. For Dosage are two separate glass vessels integrated. The design is easy to operate from the front, very compact as well as fully draining and cleanable.



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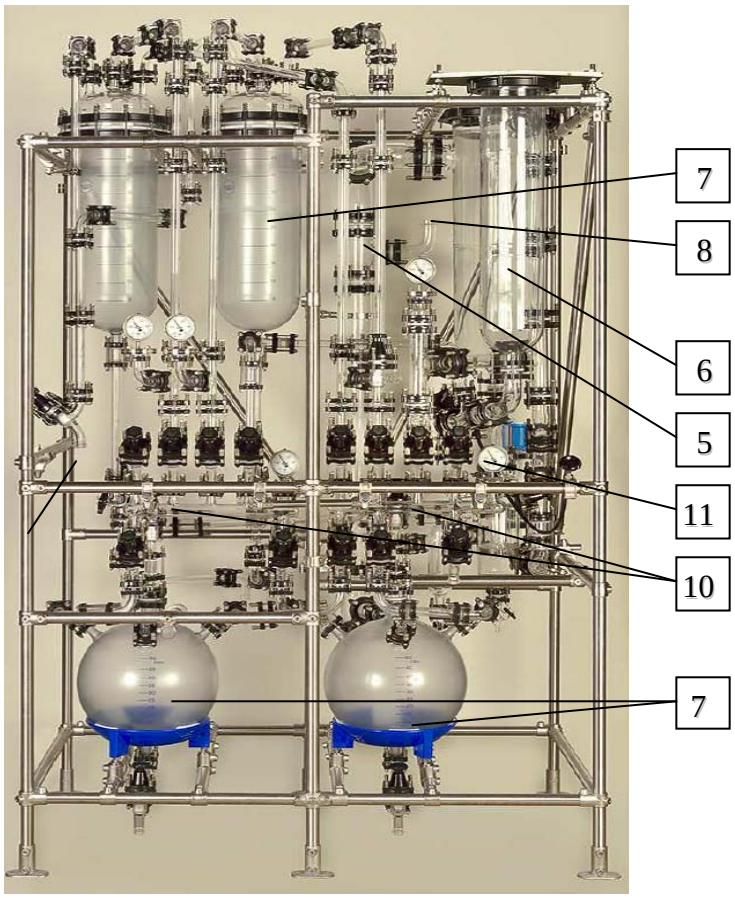
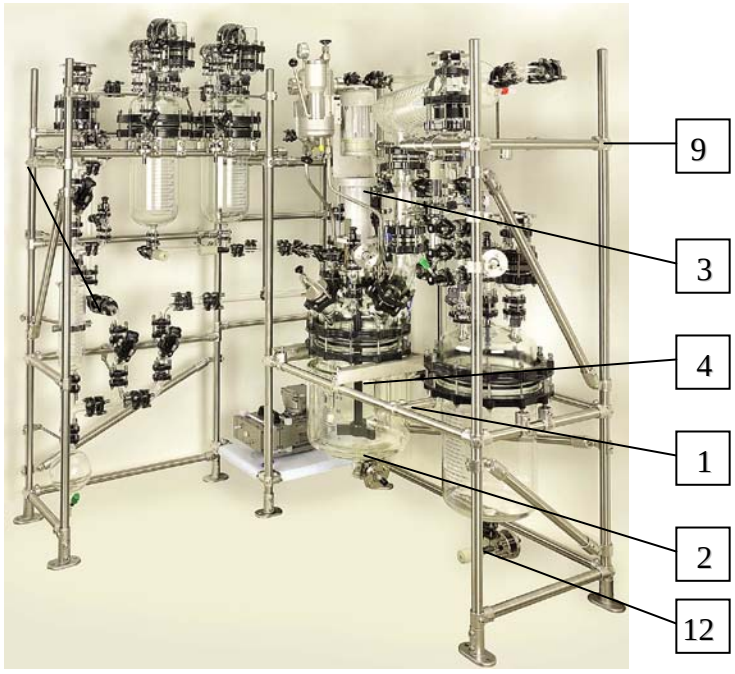
Reaction units and distillation tops – Characteristics

PROCESS UNIT



LAB / EXPERIMENTAL HALL UNIT



1 reaction units, jacketed
- borosilicate glass 3.3
- glass-lined steel
- stainless steel

optional special reactors such as 3-wall or photo reactors

2 bottom outlet valve,
- dead-space free and GMP-conform,
- redundand sealing
- manual or pneumatic

3 agitator drive
very compact and light design for a wide temperature range,
mechanical seal single or double,
rpm-adjustment manual or FU,
optional Ex-protected

4 agitator & vessel internals
Process related agitator selection,
combined with baffles / dip tube,
small non-agitated volume,
exchangeable agitator / agitator head

5 distillation top
process specific design,
optional with
- multistage distillation/rectification
- phase separation
- azeotropic / heteroazeotr. distillation

6 condenser as
- spiral condenser, Boro 3.3
- STE, Boro 3.3 // Boro 3.3/SiC
- U-tube, Enamel/Boro 3.3

7 feed vessels / distillate receivers
- optional graduated,
- optional redundant,
- optional coated

8 bursting disc

9 structure
- SS or galvanized steel
- optional with lifting device
- optional mobile

10 N_2- and vacuum distributor

11 measure (pH, temperature, pressure)

12 adaptor
- hose connectors
- KAMLOK
- TriClamp

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Reaction units and distillation tops - PID and Internals

Hand hole /
Quick release

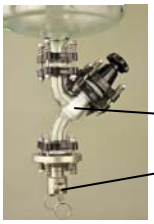
Options for cover:
- solid dosage
- CIP-spry nozzle
- dip tube
- measures (pH, P, T,...)

- SiC-condenser
- STE made of Boro 3.3
- spiral condenser

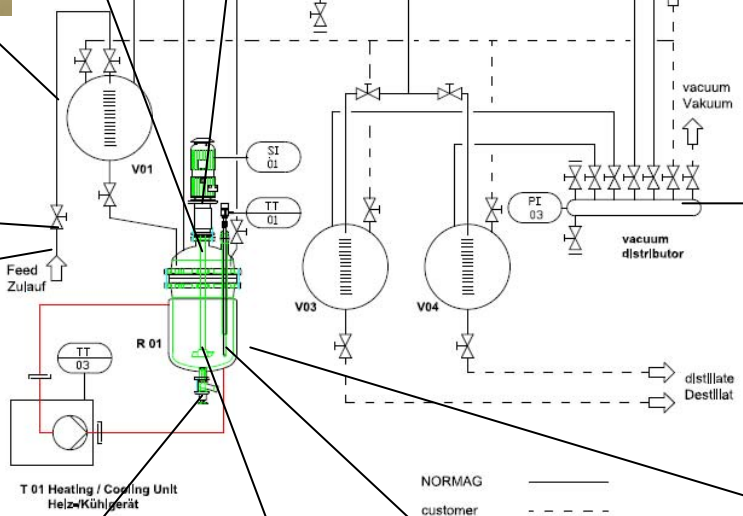
Flange system

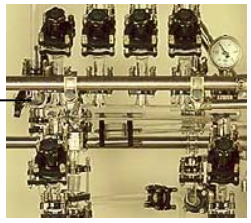
Phasen separator
(optional)

Valves



Adaptor:
- hose
- TriClamp
- KAMLOK
- milk tube
- bellow

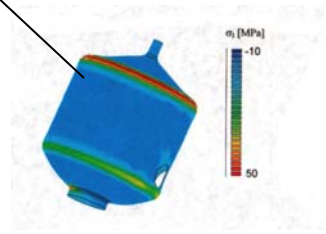




Vacuum distributor
(optional N_2)

Bottom outlet valve,
dead-space minimized

Reaction vessels,
- jacketed vessels
- 3-wall vessel
- photo reaction



Design
- PED 97/23EG
- ATEX 94/9EG
- TA-Luft

Lifting device
(optional)

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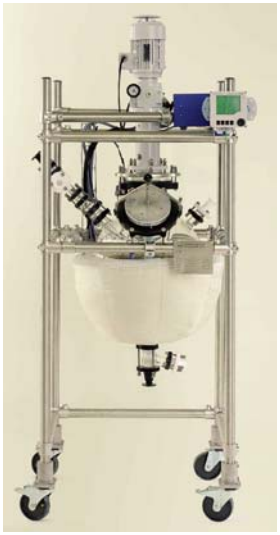
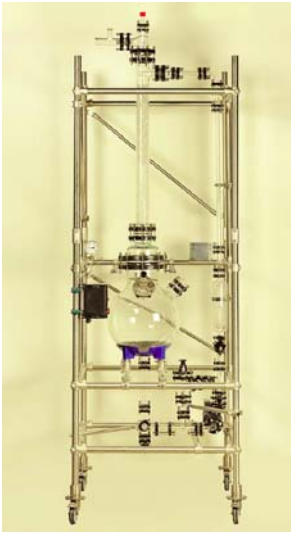
Reaction units and distillation tops - Options



Vessel, mobile



scrubber, mobile

Nutch filter, mobile

In addition to the reaction units are in many cases the following mobile units connected:

Mobile vessels:
Alternatively to fixed installed vessels may mobile vessels used, depending on the application – for example for phase separation of product – temperised and with agitator.

Mobile scrubber:
For vent purification are mobile scrubbers designed, positioned in line after the condensers.

Mobile Nutch filtration:
For processes with solid separation the reaction vessel outlet can be connected to a mobile Nutch filter unit.

Technical specification:

R 01– Reactor	[l]:	30	50	100	160	250	400	630	1.000	1.600	2.500	4.000
– Material*	[l]:	G	G/EG	G/EG	EG	EG	E	E	E	E	E	E
area	[m²]:	x	x	0,85	1,25	1,65	2,45	3,1	4,6	7,35	9,6	13,5
E 01– Spiral	[m²]:	1	0,7	1	1,5	2,5	4,0	-	-	-	-	-
– RBW-glass	[m²]:	-	-	-	-	2,5	4,0	8,0	12,5	16,0	20,0	25,0
– RBW-SiC	[m²]:	-	-	-	-	1,0	1,5	2,5	4,0	5,0	6,3	10
E 02– Spiral	[m²]:	-	0,5	0,7	1	1,5	1,5	-	-	-	-	-
V 01-Vessel	[l]:	20	20	50	50	100	150	200	200	400	400	400
V 03/04-distillate	[l]:	20	20	50	50	100	150	200	200	400	400	400
PS 01-Phase sep.	[l]:	1	1	1	1	3	3	5	5	5	5	10
Vapour line	[DN]:	50	50	50	80	80	100	100	150	150	150	200
	*	G = glass vessel & cover				EG = Enamel/glass cover			E = Enamel vessel and cover			

Energies:

power:	230/400 VAC, 50/60 Hz (others on request)
Cooling media:	max. 3 barg
Instrument air:	6 barg, trocken

Regulations / guide lines:

PED 97/23 EG*	-1/+0,5 barg (product/glass mantle) -1/+3 barg (cooling media) -1/+6 barg (Enamel)
ATEX 94/9EG:	optional
TRBS 2153	optional
TA-Luftzertifizierung	for connections and valves made of borosilicate glass 3.3
FDA-Materialzert.	optional
*	Other perm. operation conditions on requests

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