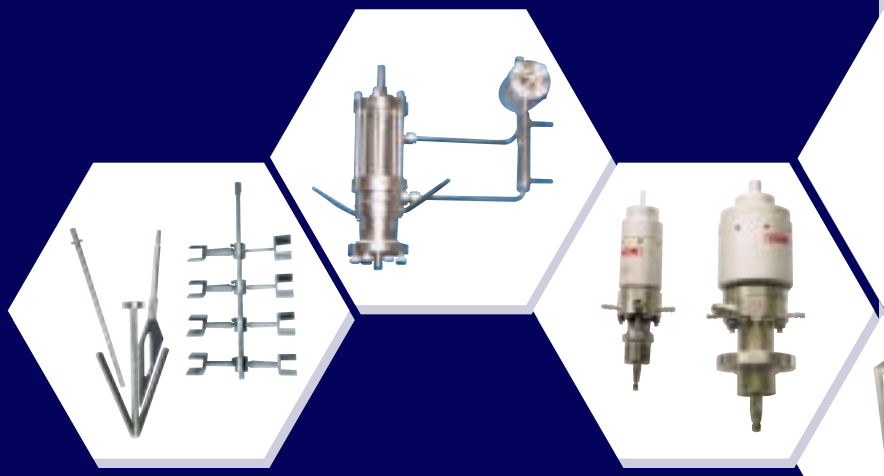


PRODUCT CATALOGUE

Reaction vessels for pressure and vacuum

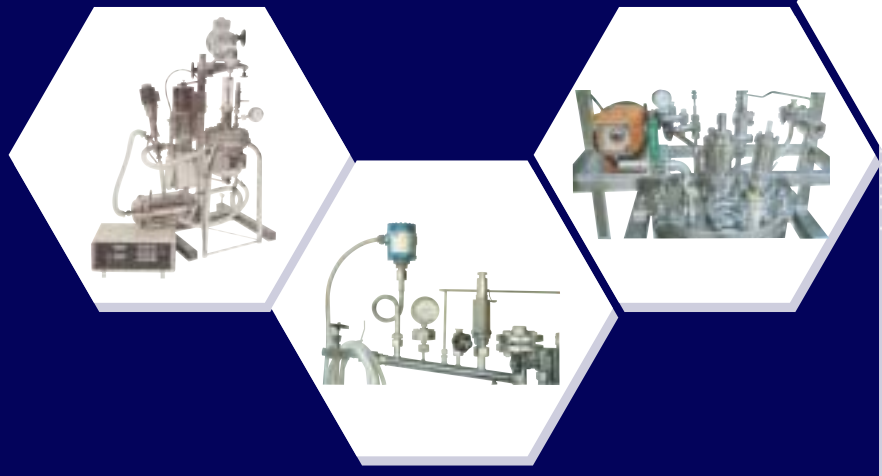
Lifting jacks for vessels

Stirrerheads

Stirrer drives

Thermostats and controllers

Fire suppression troughs



KARL KURT
JUCHHEIM
Laborgeräte GmbH
seit 1927

Handwerkstraße
54470 Bernkastel-Kues
Tel. 0 65 31 / 96 44-0
Fax 0 65 31 / 96 44-15

TÜV Rheinland/
Berlin-Brandenburg

TÜV

CERTIFICATE

Karl Kurt Juchheim
Laborgeräte GmbH
D-54462 Bernkastel-Kues

has fulfilled the quality requirements for welding activities
according to

DIN EN 729-3

The company provides qualified personnel
for the supervision of welding and non destructive testing.

The range of approvals - based on the valid welding procedure qualifications -
is given in the list of the welding procedure tests.

This certificate with No. 01 729-3 711-01 0059 is valid till

November 2004

Department for
Material and Manufacture

Senior engineer

Dipl.-Ing. F.J. Steinborn

Cologne, November 19, 2001

Skill and Longstanding Experience

Custom Design and Manufacture

Assured Quality and Professional Advice

Made in Germany

Research, development, production and the laboratory always need reaction vessels from 0.1 to 100 litres capacity, capable of working under vacuum or pressures up to 150 Bar, at temperatures ranging from –80 °C to 400 °C.

The single name JUCHHEIM brings together design and manufacture know-how, reasonable prices, and long-term reliability.

Its skills and years of experience in making reaction vessels and their accessories can bring your ideas to reality.

We specialise in the production of vessels of 0.5 to 128 L capacity working at

- Vacuum - $10E^{-3}$ mBar
- Pressure - 100 Bar
- Temperatures - –80 °C to 400 °C

The major components of a system comprise:

- **Reaction vessels and accessories**
  Stirrerheads, stirrers, connections and drains
- **Auxiliary equipment**
  Stirrer drive motors, lifting jacks, feeders, and condensers
- **Heating and cooling**
  Recirculating thermostats, heat exchangers, valves and controllers.

All these and a standard range of reaction vessels from 1 to 50 litres are described in this catalogue.

The company is licensed by TÜV Rheinland to manufacture pressure vessels in various materials.

We are experienced in the manufacture of vessels complying with GMP (Good Manufacturing Practice) for use in the food and pharmaceutical industries.

KARL KURT
JUCHHEIM
Laborgeräte GmbH
seit 1927

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PRODUCT RANGE

Reaction vessels for vacuum

Stainless steel reaction vessels provide safety when handling dangerous or poisonous materials. Danger from breaking glass is avoided.

Their mechanical stability ensures a long service life.

With appropriate gasket materials, the vessels can be used up to 350 °C.

The surfaces of the vessels are polished. Our standard roughness is 8 µm. These high quality surfaces mean that they are easy to clean.

In the centre of the lid is the stirrerhead, on to which the desired type of stirrer can be screwed.

Various ports are sited in a circle around the stirrerhead. All lids have a sightglass, an illumination glass and a thermometer pocket.

The other ports fitted adaptors with sockets which accept standard conical joints.

All fittings are screwed into the lid, which allows the easy substitution of adaptors.

10 litre insulated vacuum vessel with lifting stage and thermostat.

Dimensions

Nominal capacity [ltr]	D1	LK	Central boring	L	Gasket	H	H1	H2	d	D2	D3	No. clamps
1	160	78	M33 x 1.5	145	∅143 x ∅135	629	475	163	318	114	140	6
2	180	86	M33 x 1.5	175	∅157 x ∅149	674	520	193	364	134	160	6
4	236	120	M48 x 1.5	180	∅205 x ∅197	725	555	203	422	180	206	6
10	300	160	M48 x 1.5	250	∅279 x ∅271	825	655	283	514	244	273	9
15	300	160	M48 x 1.5	350	∅279 x ∅271	925	755	378	514	244	273	9
20	330	180	∅48.5	355	∅309 x ∅301	975	805	418	595	267	306	9
30	370	210	∅48.5	380	∅349 x ∅341	1025	855	443	606	314	350	9
40	420	240	∅48.5	395	∅399 x ∅391	1025	855	468	646	354	390	9
50	420	240	∅48.5	455	∅399 x ∅391	1125	955	578	676	354	390	9

Consumables: sightglasses and gaskets

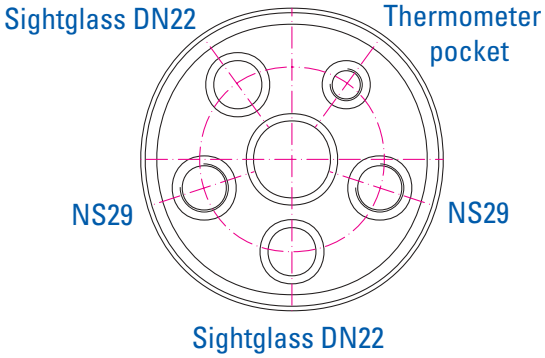
	Lid fittings gaskets				Drain	Sightglass					
	Thermometer					DN 22			DN 30		
	NS 19	NS 29	NS 45	20312.00	M24 x 1,5	Gasket	Gasket	Glass	Gasket	Gasket	Glass
Size	∅30x∅24	∅40x∅34	∅56x∅49	∅56x∅49	∅34x∅24	∅40x∅34	∅30x∅24	∅30x∅10	∅56x∅49	∅40x∅34	∅40x∅7
Cat. no.	20337.2*	20337.3*	20337.4*	20337.4*	20337.1*	20337.3*	20337.2*	20466.3*	20337.4*	20337.3*	20466.2*

* Final digit of the catalogue number defines the material: 1 = PTFE 3 = Aluminium 4 = Klingersil 5 = Gylon 7 = Borosilicate glass (to 300 °C) 9 = Vycor (to 350 °C)

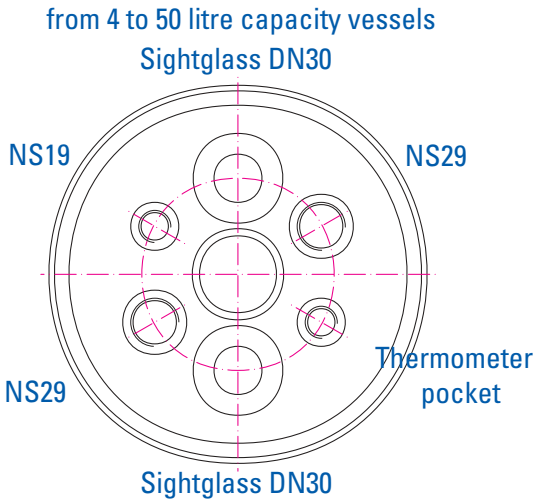
[All standard reaction vessels are supplied with a set of tools and material certificates for all pressurised parts according to EN 10204 3.1B and the Pressure Vessel Regulations]

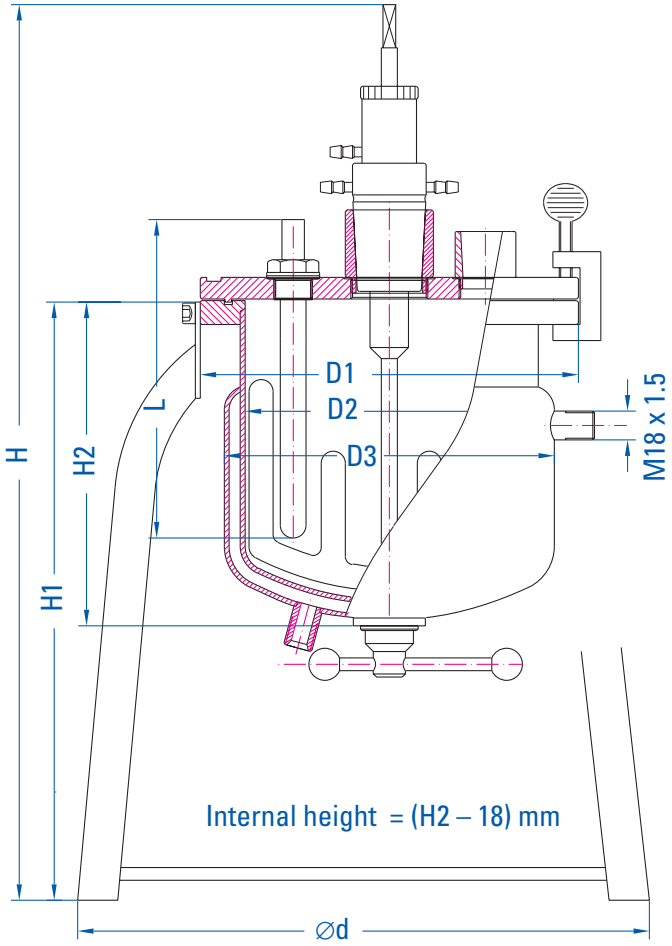
Vacuum Vessels

1 and 2 litre capacity vessels



from 4 to 50 litre capacity vessels





Nominal capacity [ltr]	With heating jacket Cat. no.	Without heating jacket Cat. no.	Volume [ltr]	Weight with heating jacket [kg]	Heating jacket Volume [ltr]	Heating jacket max pressure [Bar]	Lid gasket Cat. no. PTFE	Lid gasket Cat. no. Klingersil
1	10103.0*	10102.0*	1.4	8	0.35	6	20338.31	20338.34
2	10106.0*	10104.0*	2.4	10	0.45	6	20339.01	20339.04
4	10109.0*	10107.0*	4.5	16	0.6	6	20340.11	20340.14
10	10112.0*	10110.0*	12	25	1.2	6	20342.11	20342.14
15	10115.0*	10113.0*	16.3	29	2.2	6	20342.11	20342.14
20	10118.0*	10116.0*	24	34	3.8	6	20343.11	20343.14
30	10121.0*	10119.0*	32	45	4.6	3	20344.11	20344.14
40	10124.0*	10122.0*	43	56	5.5	3	20346.11	20346.14
50	10127.0*	10125.0*	54.5	61	8.0	3	20346.11	20346.14

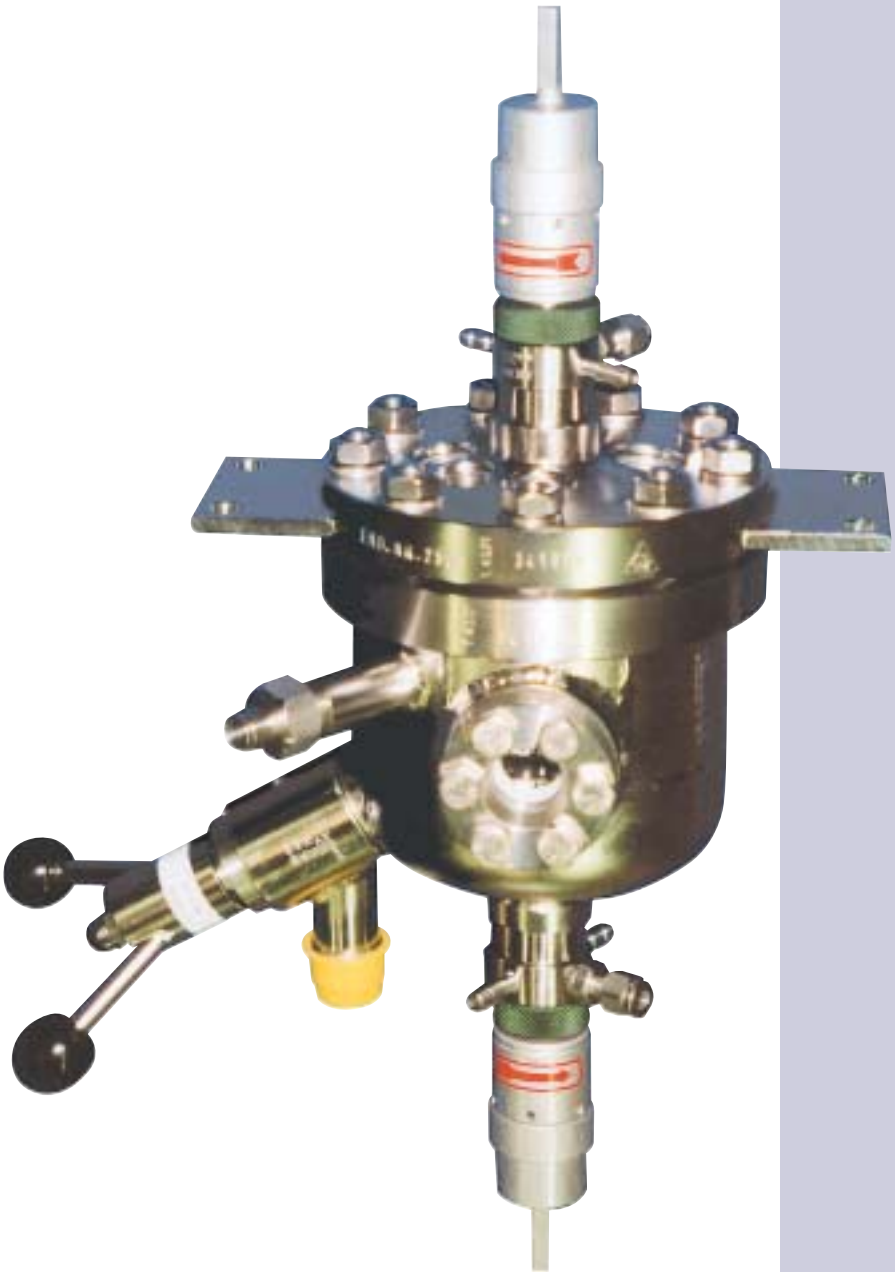
* Final digit of the catalogue number defines the material: 1 = PTFE 4 = Klingersil 5 = Gylon

Cylindrical-conical pressure vessel

- With heated ports, DIN flanges, mechanically sealed stirrerhead and reservoir vessel
- Mounted on an electrically driven lifting stage
- With stirrer drive motor fitted with integral torque measurement

0.5 litre reaction vessel

- With lateral sightglass and outlet
- With stirrer drive motor fitted with integral torque measurement
- Vessels and stirrerheads without sightglass are available up to 150 bar



Reaction vessels for vacuum and pressure

Safety

Our stainless steel reaction vessels provide safety when handling poisonous or dangerous substances. This guarantee extends over the entire pressure range up to the maximum rated pressure of the vessel being used.

Resistance

Stainless steel 316 (1.4571) is suitable for temperatures up to 350 °C and is resistant to many reagents. For further details, consult the corrosion tables at the end of this catalogue.

Applicability

Almost all fittings and adaptors are screwed in and can thus be easily changed. This means that the vessel can be used for all applications. The welded-on heating jacket allows the contents to be evenly heated up to the maximum temperature.

The large selection of accessories enables the reaction vessels to be used in all branches of process technology.

Stirrers

Stirrers in various shapes and sizes are available. Used with the various stirrer drives, they provide the correct stirring for all applications.

Stirrerheads of various sizes and types are available. They range from the simplest type through mechanically sealed models to totally statically sealed magnetically coupled models.

Thermostats

For heating and cooling the vessel we offer:

- Recirculating thermostats from 2 to 9 kW rating
- Heat exchangers from 0.16 m² to 1 m² surface area
- Programmable and non-programmable controllers. Programmable controllers allow the heating and cooling to exactly controlled. This is especially important for exothermic reactions.

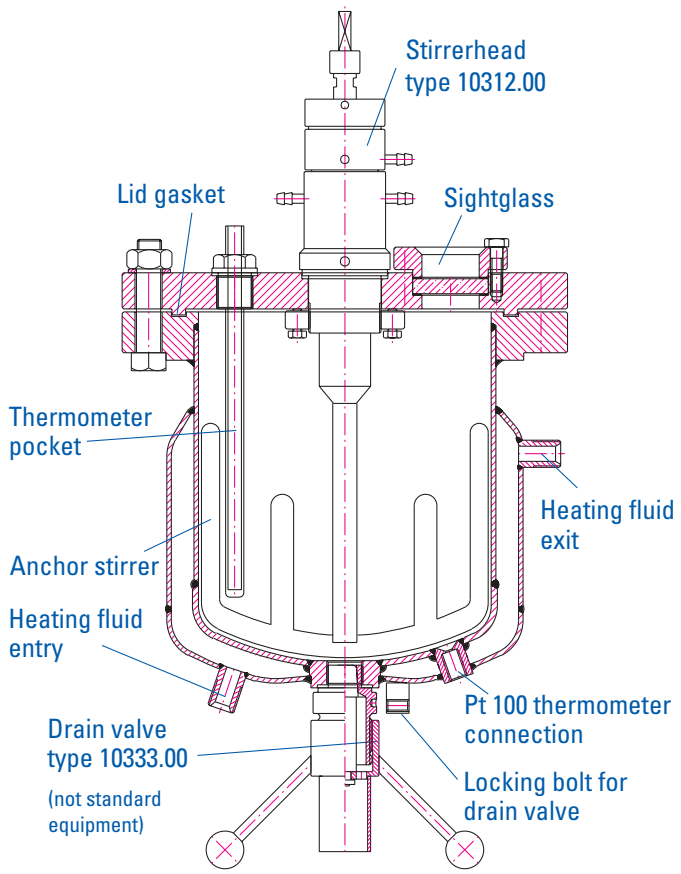
Custom vessels

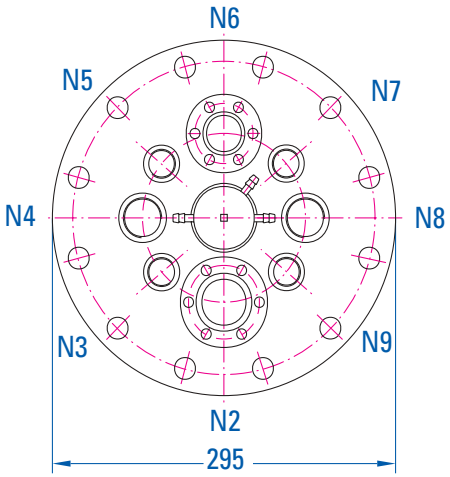
Custom vessels are our speciality. We manufacture vessels with capacities between 0.25 and 128 litres. If needed, they can be manufactured to the GMP (Good Manufacturing Practice) standard. After discussion and release of the working drawings, we manufacture the required vessel or a complete pilot plant.

5 litre pressure vessel with condenser and stirrer drive

2 litre pressure vessel with segmented clamps, stirrer drive and fixed body lifting jack

Reaction vessels for vacuum and pressure





N1 Port, central, ∅48.5 with stirrerhead
N2 Sightglass DN48
N3 Port, M24 x 1.5, with pressure gauge
N4 Port, M33 x 1.5, with plug
N5 Port, M24 x 1.5, with excess pressure valve
N6 Illumination glass, DN30
N7 Port, M24 x 1.5, with plug
N8 Port, M33 x 1.5, with plug
N9 Port, M24 x 1.5, with thermometer pocket

Standard equipment

Pressure vessels are normally supplied with a tripod which can be fastened either to the vessel body or lid.

The bottom drain is fitted with a plug. The lid is sealed with a gasket and a spare is supplied.

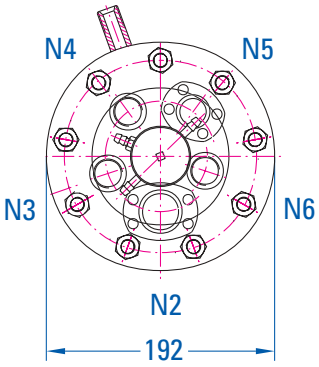
A stirrerhead and stirrer are mounted in the centre of the lid. (In order to avoid damage to the stirrerhead during transport, the stirrer is detached before dispatch). The other ports are arranged in a circle around the central port. All lids have sight and illumination glasses, and a pressure gauge and excess pressure valve. The connections can be seen in the drawing of the vessel above. All lid fittings are fully installed in their respective ports.

Unassigned ports are fitted with plugs. The instructions for use must be carefully studied before the vessel is put into service.

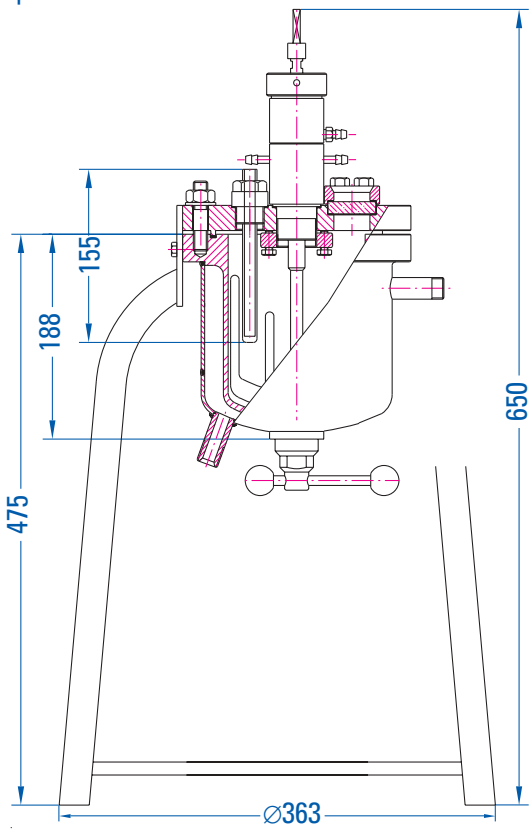
A set of tools is supplied as well as material certificates for the parts subject to pressure according to EN 10204 3.1B and a works test certificate complying with the Pressure Vessel Regulations.

Nominal capacity [ltr]	Description Total Page	Volume [ltr]	Pressure [Bar]	Weight with heating jacket [kg]	Heating jacket Volume [ltr]	Heating jacket max pressure [Bar]	No. of Lid bolts
1	10-11	1.4	25	13.6	0.35	6	9 x M12
2	12-13	2.3	25	16.5	0.45	6	9 x M12
5	14-15	6.4	15	36	0.6	6	12 x M16
10	16-17	11	10	50	1.2	6	15 x M16
20	18-19	21	9	62	3.6	6	15 x M16
30	20-21	30.5	6	82	4.5	3	15 x M16
50	22-23	51	3.7	108	6.5	3	18 x M16

Reaction vessels for vacuum and pressure, 1 litre nominal capacity



N1 Port, central, ∅33.5 with stirrerhead
N2 Sightglass, DN30
N3 Port, M24 x 1.5, with 3/8" BSP cap nut
N4 Port, M24 x 1.5, with pressure gauge and excess pressure valve
N5 Illumination glass, DN22
N6 Port, M24 x 1.5, with thermometer pocket



Internal height	160 mm
Internal diameter	114 mm

Fitted with stirrerhead type 10310.00

	PTFE	Klingersil	Weight	Volume	Pressure	Heating jacket	
Cat. no. without heating jacket	10140.01	10140.04	14.3 kg	1.4 ltr	25 Bar	Volume	Pressure
Cat. no. with heating jacket	10142.01	10142.04	15.1 kg	1.4 ltr	25 Bar	0.7 ltr	6 Bar

All information is for the standard vessel, gaskets and glasses are consumables

Components of standard vessel – PTFE gaskets

Description	Size	No.	Cat. no.
Vessel with heating jacket	1.4 ltr	1	10142.01
Lid gasket	∅143 x ∅135 x 2	1	20338.31
Bolts	M12 x 30 A2-70	9	
Nuts	M12 A2-70	9	
Washers	∅13 A2	9	
Drain plug	M24 x 1,5	1	10334.00
Drain plug gasket	∅34 x ∅24 x 1	1	20337.21
Stirrerhead gasket	∅40 x ∅34 x 1	1	20337.31
Stirrerhead		1	10310.00
'O' ring	∅10 x 5	2	20310.04
Double universal joint	6 x 6	1	20440.00
Shield		1	20446.00
Anchor stirrer		1	10315.10
Thermometer pocket, closed		1	20465.21
Gasket for M24 ports	∅30 x ∅24 x 1	3	20337.11
Adaptor M24 to M18		1	20462.01
T-piece	3/8" BSP	1	20468.00
Gasket, 3/8" BSP	∅14 x ∅6 x 1.5	1	20336.03
Pressure gauge	–1 to 25 Bar	1	20460.30
Gasket, 1/4" BSP	∅11 x ∅6 x 1.5	1	20336.13
Excess pressure valve	25 Bar, 1/2" BSP	1	21453.25
Gasket, 1/2" BSP	∅18 x ∅12 x 1	1	20336.51
Illumination glass, DN22	∅30 x 10	1	20466.37
Flange, DN22		1	20467.01
Gasket for DN22 flange	∅30 x ∅24 x 1	2	20337.11
Sightglass, DN30	∅40 x 10	1	20466.47
Flange, DN30		1	20467.02
Gasket for DN30 flange	∅40 x ∅30 x 1	2	20336.71

Klingersil gaskets

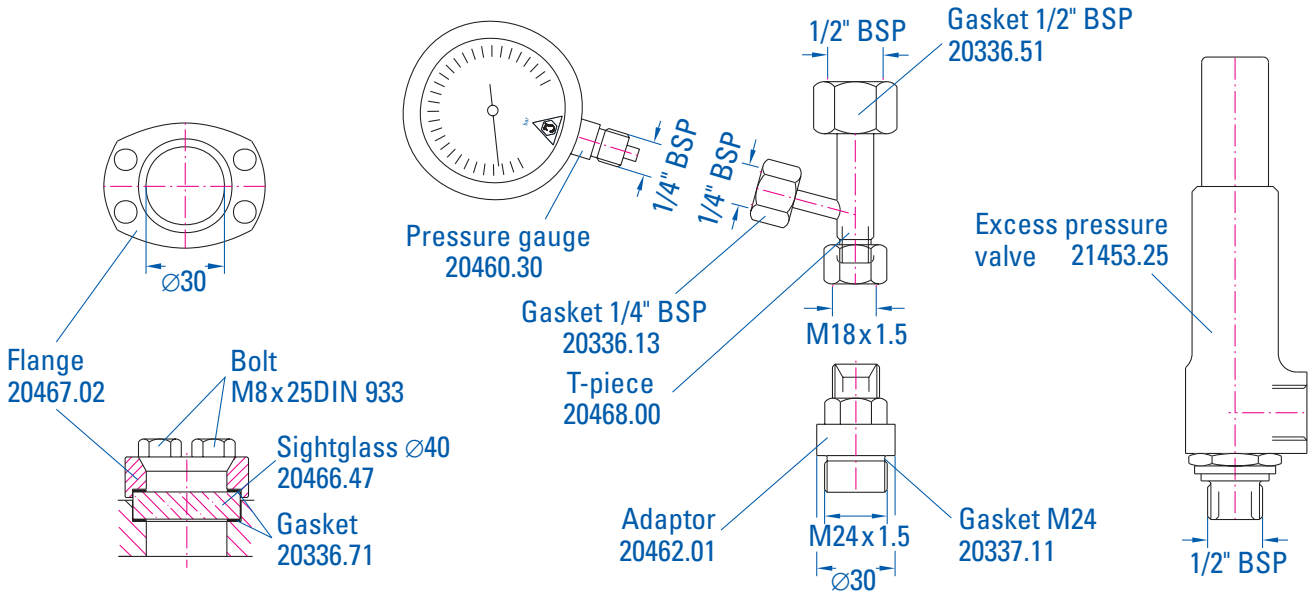
Description	Size	Cat. no.
Lid gasket	∅143 x ∅135 x 2	20338.34
Drain plug gasket	∅34 x ∅24 x 2	20337.24
Gasket for M24 ports	∅30 x ∅24 x 2	20337.14
Gasket, 1/2" BSP	∅18 x ∅12 x 2	20336.54
Gasket for DN22 flange	∅30 x ∅24 x 2	20337.14
Gasket for DN30 flange	∅40 x ∅30 x 2	20336.74
Stirrerhead gasket	∅40 x ∅34 x 2	20337.34

Gasket sets, options and accessories

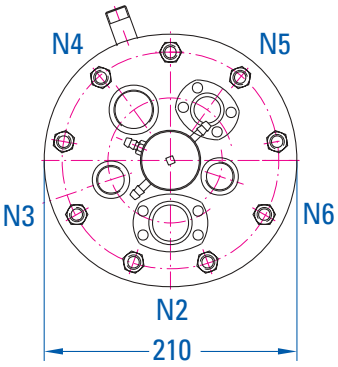
Description	Size	Cat. no.
Set of 11 gaskets	PTFE	20365.01
Set of 11 gaskets	Klingersil	20360.01
Mechanically sealed stirrerhead	M33 x 1.5	10309.00
Magnetic stirrerhead	M33 x 1.5	10311.00
Double universal joint, stainless steel 6 x 6		20440.11
Vessel insulation		10142.90
Drain with ball valve*	15 to 25	
Drain valve, straight outlet	M24 x 1.5	10333.1*
Drain valve, lateral outlet	M24 x 1.5	10335.0*
Pt100 thermometer for closed pocket EL145		52009.04
Thermometer holders:		
- open with dip tube		20465.40
- open without dip tube		20465.50
Pt100 direct immersion thermometer EL120		52009.02
Bottom Pt100 thermometer mounted in vessel bottom*	EL50	15009.00
Vycor glass, DN22	∅30 x 10	20466.39
Vycor glass, DN30	∅40 x 10	20466.49

* available only as original equipment

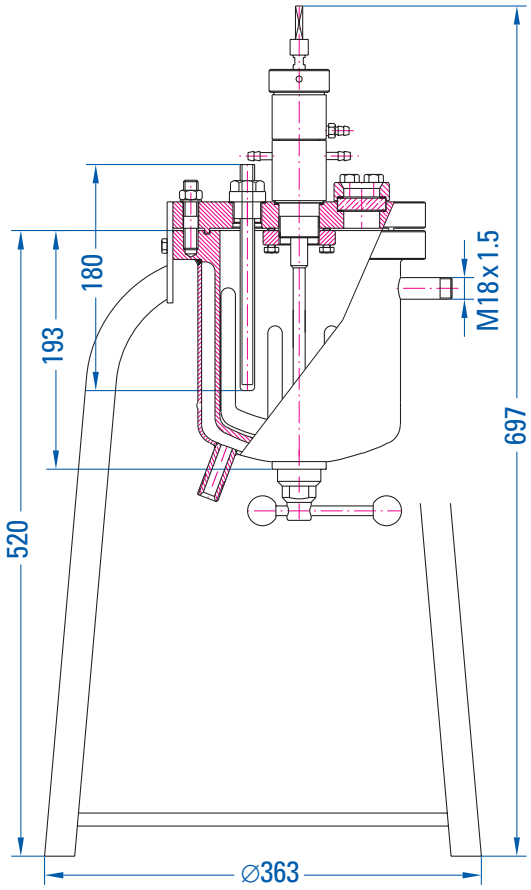
Accessories in detail



Reaction vessels for vacuum and pressure, 2 litre nominal capacity



N1 Port, central, ∅33.5 with stirrerhead
N2 Sightglass, DN30
N3 Port, M24 x 1.5, with 3/8" BSP cap nut
N4 Port, M24 x 1.5, with pressure gauge and excess pressure valve
N5 Illumination glass, DN22
N6 Port, M24 x 1.5, with thermometer pocket



Internal height 175 mm
Internal diameter 133.7 mm

Fitted with stirrerhead type 10310.00

	PTFE	Klingersil	Weight	Volume	Pessure	Heating jacket	
Cat. no. without heating jacket	10143.01	10143.04	17.8 kg	2.3 ltr	25 Bar	Volume	Pressure
Cat. no. with heating jacket	10145.01	10145.04	18.6 kg	2.3 ltr	25 Bar	0.7 ltr	6 Bar

All information is for the standard vessel, gaskets and glasses are consumables

Components of standard vessel – PTFE gaskets

Description	Size	No.	Cat. no.
Vessel with heating jacket	2.3 ltr	1	10145.01
Lid gasket	∅157 x ∅149 x 2	1	20339.01
Bolts	M12 x 30 A2-70	9	
Nuts	M12 A2-70	9	
Washers	∅13 A2	9	
Drain plug	M24 x 1.5	1	10334.00
Drain plug gasket	∅34 x ∅24 x 1	1	20337.21
Stirrerhead gasket	∅40 x ∅34 x 1	1	20337.31
Stirrerhead		1	10310.00
'O' ring	∅10 x 5	2	20310.04
Double universal joint	6 x 6	1	20440.00
Shield		1	20446.00
Anchor stirrer		1	10315.20
Thermometer pocket, closed		1	20465.22
Gasket for M24 ports	∅30 x ∅24 x 1	3	20337.11
Gasket for M33 port	∅40 x ∅34 x 1	1	20337.31
Adaptor M24 to 3/8" BSP		1	20460.21
T-piece	3/8" BSP	1	20468.00
Gasket, 3/8" BSP	∅14 x ∅6 x 1.5	1	20336.03
Pressure gauge	–1 to 25 Bar	1	20460.30
Gasket, 1/4" BSP	∅11 x ∅6 x 1.5	1	20336.13
Excess pressure valve	25 Bar, 1/2" BSP	1	21453.25
Gasket, 1/2" BSP	∅18 x ∅12 x 1	1	20336.51
Illumination glass, DN22	∅30 x 10	1	20466.37
Flange, DN22		1	20467.01
Gasket for DN22 flange	∅30 x ∅24 x 1	2	20337.11
Sightglass, DN30	∅40 x 10	1	20466.47
Flange, DN30		1	20467.02
Gasket for DN30 flange	∅40 x ∅30 x 1	2	20336.71

Klingersil gaskets

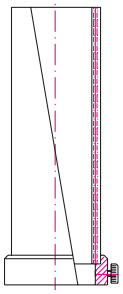
Description	Size	Cat. no.
Lid gasket	∅157 x ∅149 x 2	20339.04
Drain plug gasket	∅34 x ∅24 x 2	20337.24
Gasket for M24 ports	∅30 x ∅24 x 2	20337.14
Gasket for M33 port	∅40 x ∅34 x 1	20337.31
Gasket, 1/2" BSP	∅18 x ∅12 x 2	20336.54
Gasket for DN22 flange	∅30 x ∅24 x 2	20337.14
Gasket for DN30 flange	∅40 x ∅30 x 2	20336.74
Stirrerhead gasket	∅40 x ∅34 x 2	20337.34

Gasket sets, options and accessories

Description	Size	Cat. no.
Set of 11 gaskets	PTFE	20365.02
Set of 11 gaskets	Klingersil	20360.02
Mechanically sealed stirrerhead	M33 x 1.5	10309.00
Magnetic stirrerhead	M33 x 1.5	10311.00
Double universal joint, stainless steel 6 x 6		20440.11
Vessel isolation		10145.90
Drain with ball valve*	15 to 25	
Drain valve, straight outlet	M24 x 1.5	10333.1*
Drain valve, lateral outlet	M24 x 1.5	10335.0*
Pt100 thermometer for closed pocket EL145		52009.04
Thermometer holders		
- open with dip tube		20465.40
- open without dip tube		20465.50
Pt100 direct immersion thermometer EL120		52009.02
Bottom Pt100 thermometer mounted in vessel bottom*	EL50	15009.00
Vycor glass, DN22	∅30 x 10	20466.39
Vycor glass, DN30	∅40 x 10	20466.49

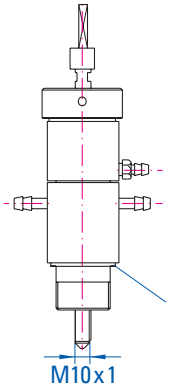
* available only as original equipment

Accessories in detail



Shield
20446.00

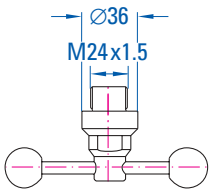
Double universal joint 6x6
20440.00



'O' ring sealed stirrerhead
10310.00

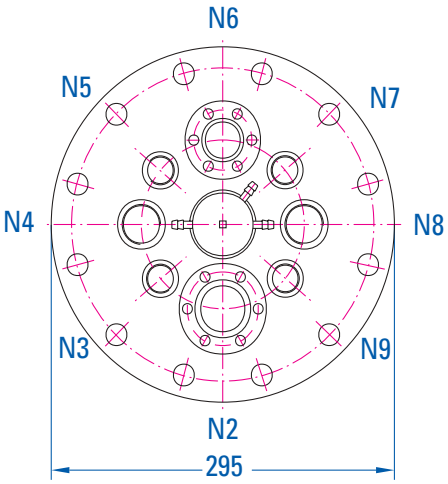
PTFE gasket
∅40x∅34x1
20337.31

Locking ring for stirrerhead M33x1.5
20310.18

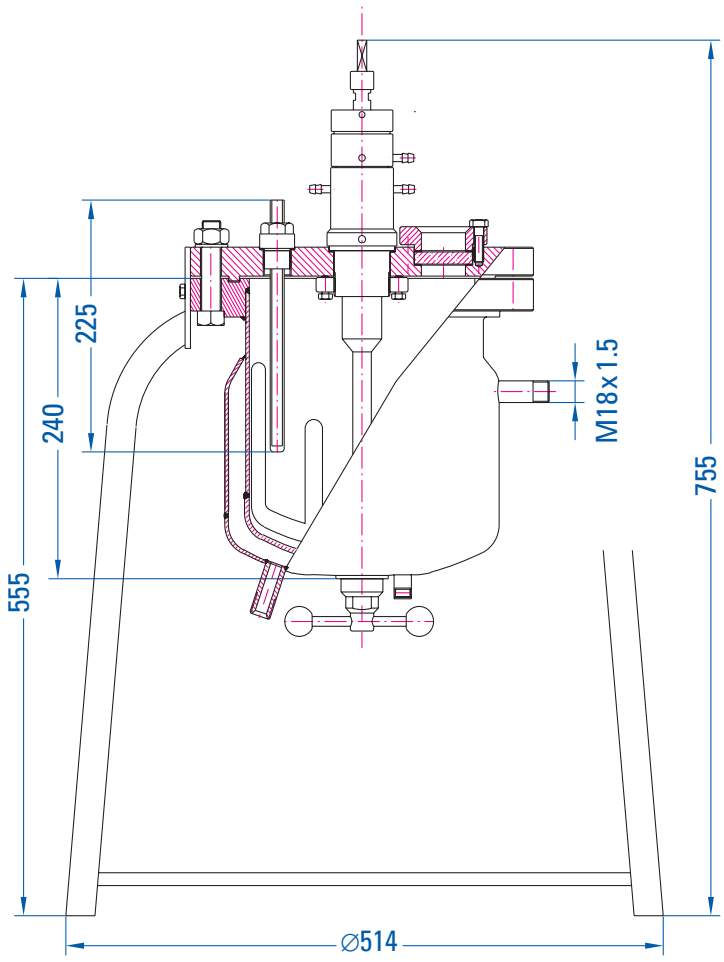


drain plug
M24x1.5
10334.00

Reaction vessels for vacuum and pressure, 5 litre nominal capacity



N1 Port, central, ∅48.5, with stirrerhead
N2 Sightglass, DN38
N3 Port, M24x1.5, with pressure gauge
N4 Port, M33x1.5, with plug
N5 Port, M24x1.5, with excess pressure valve
N6 Illumination glass, DN30
N7 Port, M24x1.5, with plug
N8 Port, M33x1.5, with plug
N9 Port, M24x1.5, with thermometer pocket



Internal height 222 mm
Internal diameter 194 mm

Fitted with stirrerhead
type 10312.00

	PTFE	Klingersil	Weight	Volume	Pressure	Heating jacket	
Cat. no. without heating jacket	10152.01	10152.04	32.7 kg	6.4 ltr	15 Bar	Volume	Pressure
Cat. no. with heating jacket	10154.01	10154.04	36.3 kg	6.4 ltr	15 Bar	1.4 ltr	6 Bar

All information is for the standard vessel, gaskets and glasses are consumables

Components of standard vessel – PTFE gaskets

Description	Size	No.	Cat. no.
Vessel with heating jacket	6.4 ltr	1	10154.01
Lid gasket	∅229 x ∅211 x 2	1	20341.31
Bolts	M16 x 70 A2-70	12	
Nuts	M16 A2-70	12	
Washers	∅17 A2	12	
Drain plug	M24 x 1.5	1	10334.00
Drain plug gasket	∅34 x ∅24 x 1	1	20337.21
Stirrerhead gasket	∅56 x ∅49 x 1	1	20337.41
Stirrerhead		1	10312.00
'O' ring	∅15 x 4	2	20312.04
Double universal joint	8 x 8	1	20441.00
Shield		1	20447.00
Anchor stirrer		1	10315.30
Thermometer pocket, closed		1	20465.24
Gasket for M24 ports	∅30 x ∅24 x 1	4	20337.11
Adaptor	M24 - 1/2" BSP	1	20461.11
Gasket, 1/2" BSP	∅18 x ∅12 x 1	1	20336.51
Excess pressure valve	15 Bar, 1/2" BSP	1	21453.15
Adaptor	M24 - 1/4" BSP	1	20461.21
Gasket, 1/4" BSP	∅11 x ∅6 x 1.5	1	20336.13
Pressure gauge	–1 to 15 Bar	1	20460.20
Plug, M24 ports		1	20463.21
Plug, M33 ports		2	20463.31
Gasket for M33 ports	∅40 x ∅34 x 2	2	20337.31
Illumination glass, DN30	∅40 x 10	1	20466.47
Flange, DN30		1	20467.03
Gasket for DN30 flange	∅40 x ∅30 x 1	2	20336.71
Sightglass, DN38	∅50 x 10	1	20466.57
Flange, DN38		1	20467.04
Gasket for DN38 flange	∅50 x ∅40 x 1	2	20337.51

Klingersil gaskets

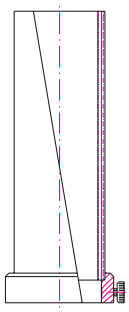
Description	Size	Cat. no.
Lid gasket	∅229 x ∅211 x 2	20341.34
Drain plug gasket	∅34 x ∅24 x 2	20337.24
Gasket for M24 ports	∅30 x ∅24 x 2	20337.14
Gasket for M33 ports	∅40 x ∅34 x 2	20337.34
Gasket, 1/2" BSP	∅18 x ∅12 x 2	20336.54
Gasket for DN30 flange	∅30 x ∅24 x 2	20336.74
Gasket for DN38 flange	∅50 x ∅40 x 2	20337.54
Stirrerhead gasket	∅56 x ∅49 x 1	20337.44

Gasket sets, options and accessories

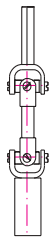
Description	Size	Cat. no.
Set of 14 gaskets	PTFE	20365.05
Set of 14 gaskets	Klingersil	20360.05
Mechanically sealed stirrerhead	M48 x 1.5	10309.50
Magnetic stirrerhead	M48 x 1.5	10313.00
Double universal joint, stainless steel 8 x 8		20441.11
Vessel insulation		10154.90
Drain with ball valve*	15 to 32	
Drain valve, straight outlet	M24 x 1.5	10333.1*
Drain valve, lateral outlet	M24 x 1.5	10335.0*
Pt100 thermometer for closed pocket EL215		52009.10
Thermometer holders		
- open with dip tube		20465.40
- open without dip tube		20465.50
Pt100 direct immersion thermometer EL190		52009.05
Bottom Pt100 thermometer mounted in vessel bottom*	EL50	15009.00
Vycor glass, DN30	∅40 x 10	20466.49
Vycor glass, DN38	∅50 x 10	20466.59

* available only as original equipment

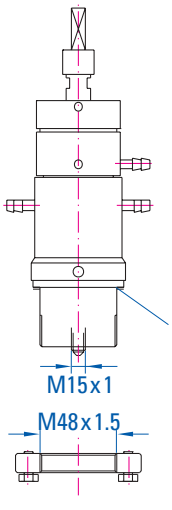
Accessories in detail



Shield
20447.00



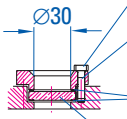
Double universal joint 8x8
20441.00



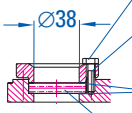
'O' ring sealed stirrerhead
10312.00

PTFE gasket
∅56x ∅49x1
20337.41

Locking ring for stirrerhead
M48x1.5
20312.18

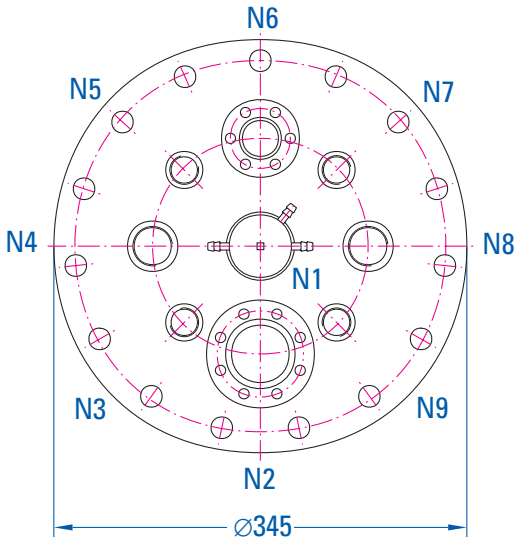


Bolt
M8x25 DIN 933
Flange DN30
20467.03
Gasket ∅30
20336.71
Borosilicate glass ∅40
20466.47

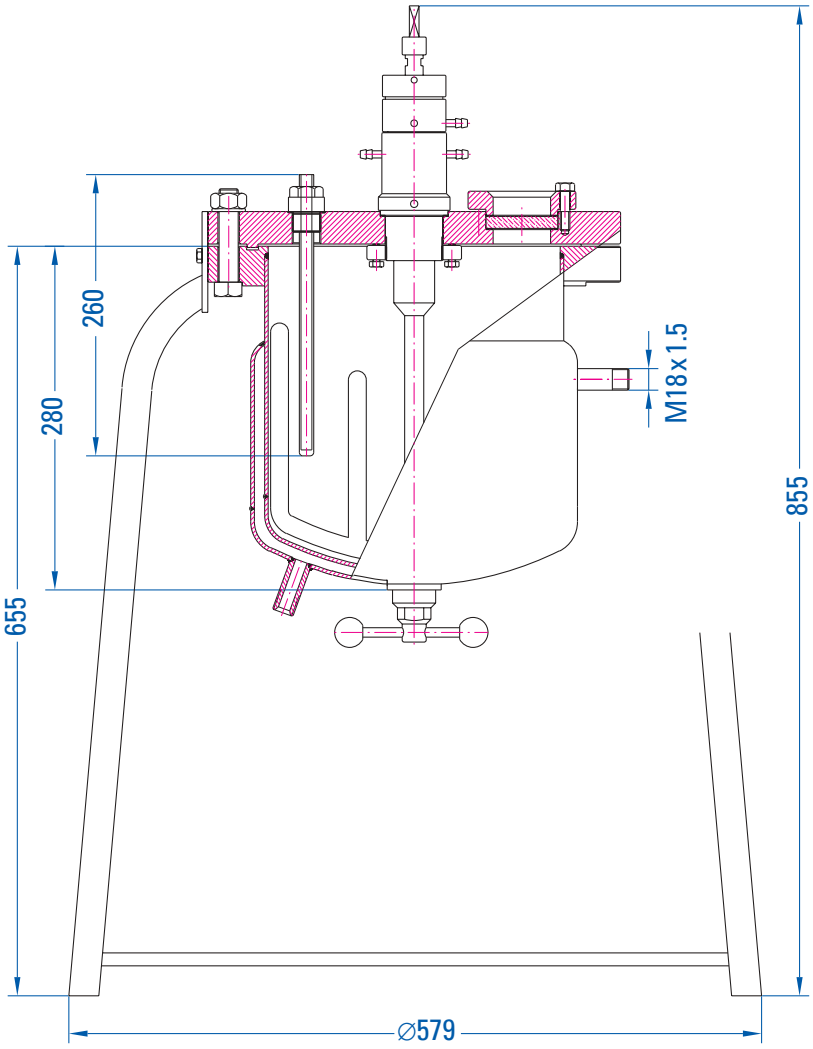


Bolt
M8x25 DIN 933
Flange DN40
20467.04
Gasket ∅50
20337.51
Borosilicate glass ∅50
20466.57

Reaction vessels for vacuum and pressure, 10 litre nominal capacity



N1 Port, central, ⌀48.5, with stirrerhead
N2 Sightglass, DN48
N3 Port, M24x1.5, with pressure gauge
N4 Port, M33x1.5, with plug
N5 Port, M24x1.5, with excess pressure valve
N6 Illumination glass, DN30
N7 Port, M24x1.5, with plug
N8 Port, M33x1.5, with plug
N9 Port, M24x1.5, with thermometer pocket



Internal height	262 mm
Internal diameter	244 mm

Fitted with stirrerhead
type 10312.00

	PTFE	Klingersil	Weight	Volume	Pressure	Heating jacket	
Cat. no. without heating jacket	10155.01	10155.04	51.3 kg	11 ltr	10 Bar	Volume	Pressure
Cat. no. with heating jacket	10157.01	10157.04	54.0 kg	11 ltr	10 Bar	2 ltr	6 Bar

All information is for the standard vessel, gaskets and glasses are consumables

Components of standard vessel – PTFE gaskets

Description	Size	No.	Cat. no.
Vessel with heating jacket	11 ltr	1	10157.01
Lid gasket	∅279 x ∅261 x 2	1	20342.31
Bolts	M16 x 80 A2-75	15	
Nuts	M16 A2-70	15	
Washers	∅17 A2	15	
Drain plug	M24 x 1.5	1	10334.00
Drain plug gasket	∅34 x ∅24 x 1	1	20337.21
Stirrerhead gasket	∅56 x ∅49 x 1	1	20337.41
Stirrerhead		1	10312.00
'O' ring	∅15 x 4	2	20312.04
Double universal joint	8 x 8	1	20441.00
Shield		1	20447.00
Anchor stirrer		1	10315.40
Thermometr pocket, closed		1	20465.25
Gasket for M24 ports	∅30 x ∅24 x 1	4	20337.11
Adaptor	M24 - 1/2" BSP	1	20461.11
Gasket, 1/2" BSP	∅18 x ∅12 x 1	1	20336.51
Excess pressure valve	10 Bar, 1/2" BSP	1	21453.10
Adaptor	M24 - 1/4" BSP	1	20461.21
Gasket, 1/4" BSP	∅11 x ∅6 x 1.5	1	20336.13
Pressure gauge	–1 to 9 Bar	1	20460.10
Plug, M24 ports		1	20463.21
Plug, M33 ports		2	20463.31
Gasket for M33 ports	∅40 x ∅34 x 2	2	20337.31
Illumination glass, DN30	∅40 x 10	1	20466.47
Flange, DN30		1	20467.03
Gasket for DN30 flange	∅40 x ∅30 x 1	2	20336.71
Sightglass, DN48	∅60 x 10	1	20466.67
Flange, DN48		1	20467.05
Gasket for DN48 flange	∅60 x ∅50 x 1	2	20337.61

Klingersil gaskets

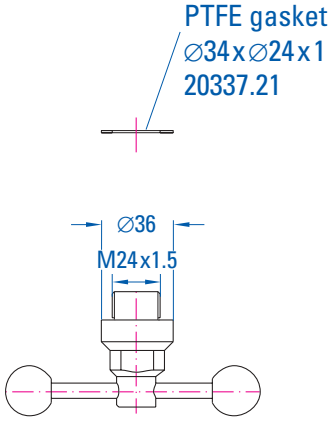
Description	Size	Cat. no.
Lig gasket	∅279 x ∅261 x 2	20342.34
Drain plug gasket	∅34 x ∅24 x 2	20337.24
Gasket for M24 ports	∅30 x ∅24 x 2	20337.14
Gasket for M33 ports	∅40 x ∅34 x 2	20337.34
Gasket, 1/2" BSP	∅18 x ∅12 x 2	20336.54
Gasket for DN30 flange	∅40 x ∅30 x 2	20336.74
Gasket for DN48 flange	∅60 x ∅50 x 2	20336.64
Stirrerhead gasket	∅56 x ∅49 x 1	20337.44

Gasket sets, options and accessories

Description	Size	Cat. no.
Set of 14 gaskets	PTFE	20365.10
Set of 14 gaskets	Klingersil	20360.10
Mechanically sealed stirrerhead	M48 x 1.5	10309.50
Magnetic stirrerhead	M48 x 1.5	10313.00
Double universal joint, stainless steel 8 x 8		20441.11
Vesselisolation		10157.90
Drain with ball valve*	15 to 50	
Drain valve, straight outlet	M24 x 1.5	10333.1*
Drain valve, lateral outlet	M24 x 1.5	10335.0*
Pt100 thermometer for closed pocket		52009.15
Thermometer holders		
- open with dip tube		20465.41
- open without dip tube		20465.51
Pt100 direct immersion thermometer EL215		52009.10
Bottom Pt100 thermometer mounted in vessel bottom*	EL50	15009.00
Vycor glass, DN30	∅40 x 10	20466.49
Vycor glass, DN38	∅60 x 10	20466.69

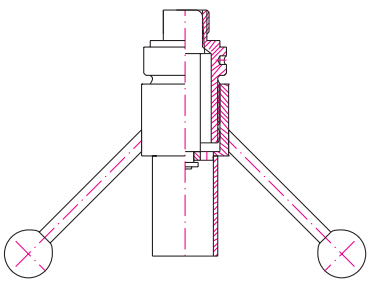
* available only as original equipment

Accessories in detail



Drain plug
M24 x 1.5
10334.00

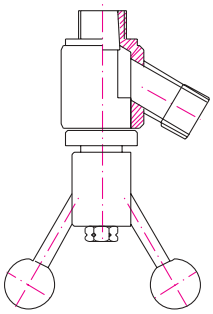
Option:
Drain plug DN15
with straight outlet



10333.10

with PTFE ring in plug
10333.11

Option:
Drain plug DN15
with lateral outlet

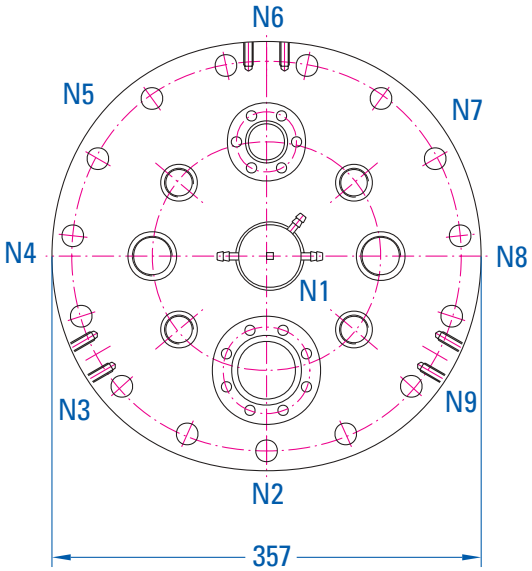


10335.00

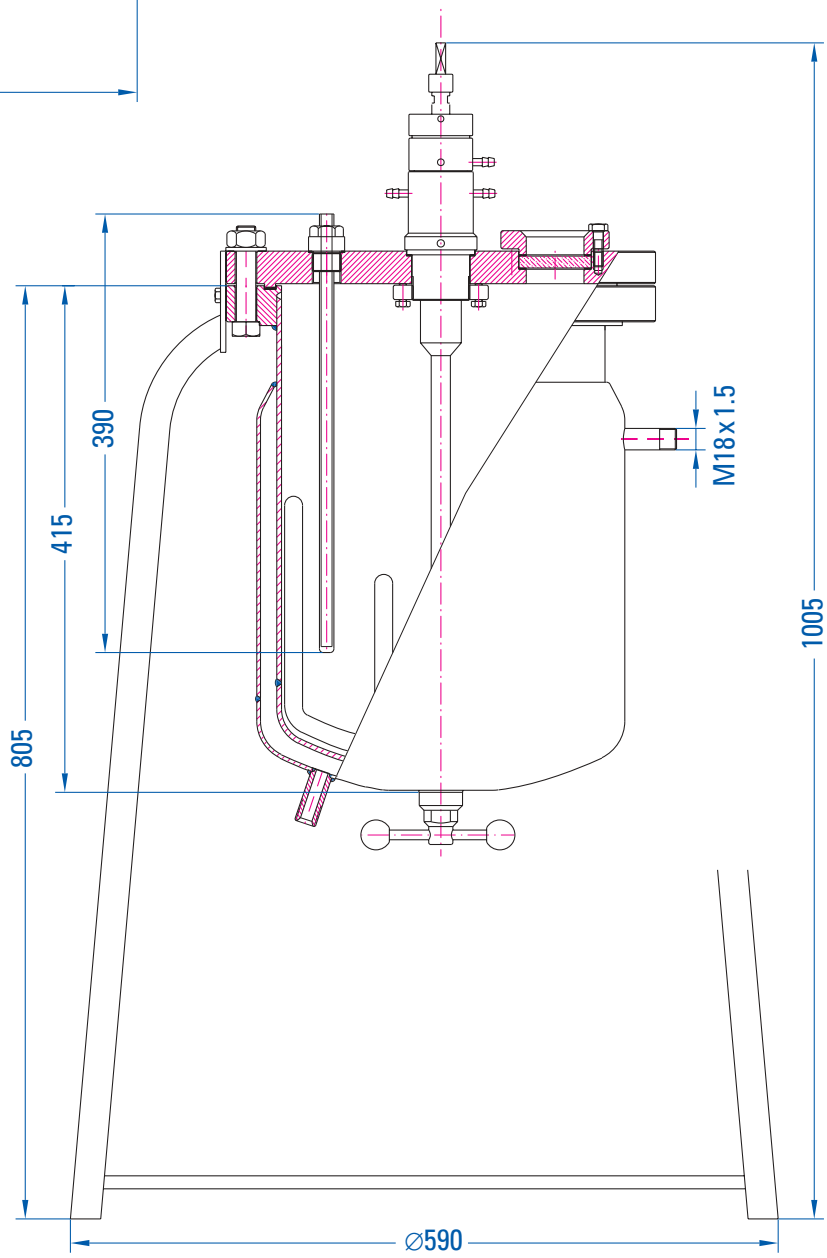
with heating jacket
10335.10

with PTFE ring in plug
10335.01

Reaction vessels for vacuum and pressure, 20 litre nominal capacity



N1 Port, central, ∅48.5, with stirrerhead
N2 Sightglass, DN48
N3 Port, M24x1.5, with pressure gauge
N4 Port, M33x1.5, with plug
N5 Port, M24x1.5, with excess pressure valve
N6 Illumination glass, DN30
N7 Port, M24x1.5, with plug
N8 Port, M33x1.5, with plug
N9 Port, M24x1.5, with thermometer pocket



Internal height 397 mm
Internal diameter 267 mm

Fitted with stirrerhead
type 10312.00

	PTFE	Klingersil	Weight	Volume	Pressure	Heating jacket	
Cat. no. without heating jacket	10158.01	10158.04	62 kg	21 ltr	9 Bar	Volume	Pressure
Cat. no. with heating jacket	10160.01	10160.04	64.7 kg	21 ltr	9 Bar	3.5 ltr	3 Bar

Components of standard vessel – PTFE gaskets

Description	Size	No.	Cat. no.
Vessel with Heating jacket	21 ltr	1	10160.01
Lid gasket	∅293 x ∅275 x 2	1	20344.31
Bolts	M16 x 80 A2-75	15	
Nuts	M16 A2-70	15	
Washers	∅17 A2	15	
Drain plug	M24 x 1.5	1	10334.00
Drain plug gasket	∅34 x ∅24 x 1	1	20337.21
Stirrerhead gasket	∅56 x ∅49 x 1	1	20337.41
Stirrerhead		1	10312.00
'O' ring	∅15 x 4	2	20312.04
Double universal joint	8 x 8	1	20441.00
Shield		1	20447.00
Anchor stirrer		1	10315.60
Thermometer pocket, closed		1	20465.26
Gasket for M24 ports	∅30 x ∅24 x 1	4	20337.11
Adaptor	M24 - 1/2" BSP	1	20461.11
Gasket, 1/2" BSP	∅18 x ∅12 x 1	1	20336.51
Excess pressure valve	9 Bar, 1/2" BSP	1	21453.09
Adaptor	M24 - 1/4" BSP	1	20461.21
Gasket, 1/4" BSP	∅11 x ∅6 x 1,5	1	20336.13
Pressure gauge	–1 to 9 Bar	1	20460.10
Plug, M24 ports		1	20463.21
Plug, M33 ports	M33 x 1,5	2	20463.31
Gasket for M33 ports	∅40 x ∅34 x 2	2	20337.31
Illumination glass, DN30	∅40 x 10	1	20466.47
Flange, DN30		1	20467.03
Gasket for DN30 flange	∅40 x ∅30 x 1	2	20336.71
Sightglass, DN48	∅60 x 10	1	20466.67
Flange, DN48		1	20467.05
Gasket for DN48 flange	∅60 x ∅50 x 1	2	20337.61

Klingersil gaskets

Description	Size	Cat. no.
Lid gasket	∅293 x ∅275 x 2	20344.34
Drain plug gasket	∅34 x ∅24 x 2	20337.24
Gasket for M24 ports	∅30 x ∅24 x 2	20337.14
Gasket for M33 ports	∅40 x ∅34 x 2	20337.34
Gasket for 1/2" BSP	∅18 x ∅12 x 2	20336.54
Gasket for DN30 flange	∅40 x ∅30 x 2	20336.74
Gasket for DN48 flange	∅60 x ∅50 x 2	20336.64
Stirrerhead gasket	∅56 x ∅49 x 1	20337.44

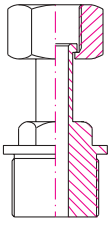
Gasket sets, options and accessories

Description	Size	Cat no.
Set of 14 gaskets	PTFE	20365.20
Set of 14 gaskets	Klingersil	20360.20
Mechanically sealed stirrerhead	M48 x 1.5	10309.50
Magnetic stirrerhead	M48 x 1.5	10313.00
Double universal joint, stainless steel 8 x 8		20441.11
Vessel insulation		10160.90
Drain with ball valve*	15 to 50	
Drain valve, straight outlet	M24 x1.5	10333.1*
Drain valve, lateral outlet	M24 x 1.5	10335.0*
Pt100 thermometer for closed pocket EL375		52009.30
Thermometer holders		
- open with dip tube		20465.41
- open without dip tube		20465.51
Pt100 direct immersion thermometer EL315		52009.20
Bottom Pt100 thermometer mounted in vessel bottom*	EL50	15009.00
Vycor glass, DN30	∅40 x 10	20466.49
Vycor glass, DN38	∅60 x 10	20466.69

* available only as original equipment

All information is for the standard vessel, gaskets and glasses are consumables

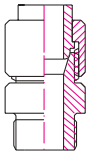
Accessories in detail



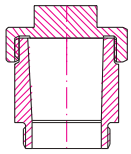
20460.22

Adaptor, cap nut 3/8" BSP to M24 x 1.5

Welding adaptor for tubes



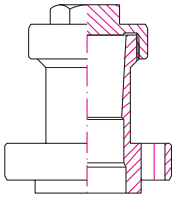
20462.12



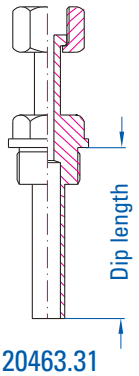
20457.29

B29 to M33 x 1.5 adaptor with pressure-tight cap

B45 to DN48 flange adaptor, with pressure-tight cap



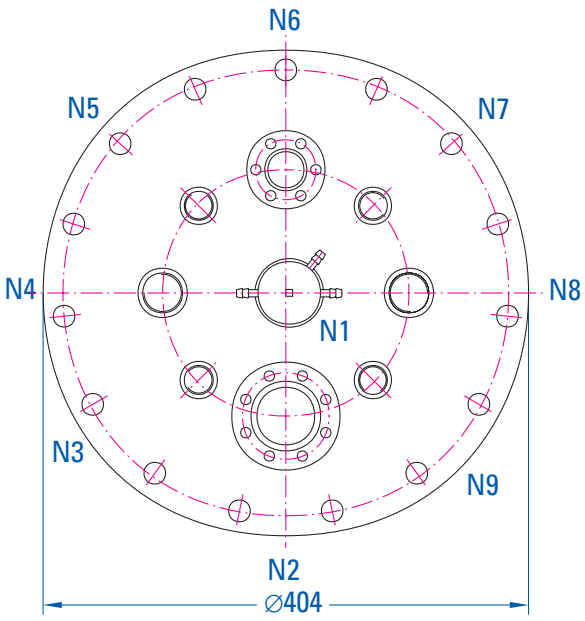
20458.46



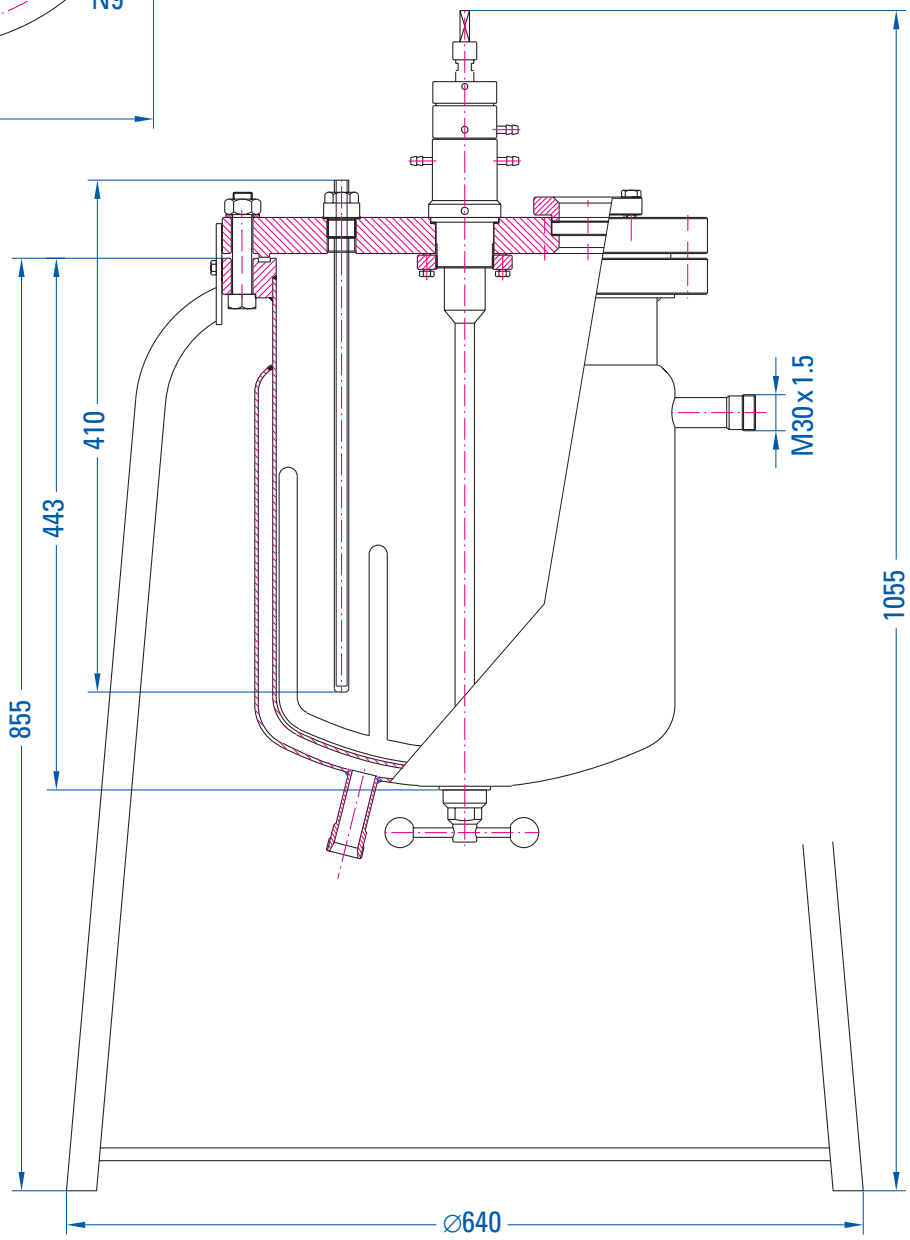
20463.31

Gas inlet tube, M24 x 1.5

Reaction vessels for vacuum and pressure, 30 litre nominal capacity



N1 Port, central, ⌀48.5, with stirrerhead
N2 Sightglass, DN48
N3 Port, M24x1.5, with pressure gauge
N4 Port, M33x1.5, with plug
N5 Port, M24x1.5, with excess pressure valve
N6 Illumination glass, DN30
N7 Port, M24x1.5, with plug
N8 Port, M33x1.5, with plug
N9 Port, M24x1.5, with thermometer pocket



Internal height 425 mm
Internal diameter 314 mm

Fitted with stirrehead type 10312.00

	PTFE	Klingersil	Weight	Volume	Pressure	Heating jacket	
Cat. no. without heating jacket	10161.01	10161.04	81 kg	30.5 ltr	6 Bar	Volume	Pressure
Cat. no. with heating jacket	10163.01	10163.04	87 kg	30.5 ltr	6 Bar	4.3 ltr	3 Bar

Components of standard vessel – PTFE gaskets

Description	Size	No.	Cat. no.
Vessel with Heating jacket	30.5 ltr	1	10163.01
Lid gasket	∅343 x ∅325 x 2	1	20345.31
Bolts	M16 x 80 A2-70	15	
Nuts	M16 A2-70	15	
Washers	∅17 A2	15	
Drain plug	M24 x 1,5	1	10334.00
Drain plug gasket	∅34 x ∅24 x 1	1	20337.21
Stirrerhead gasket	∅56 x ∅49 x 1	1	20337.41
Stirrerhead		1	10312.00
'O' ring	∅15 x 4	2	20312.04
Double universal joint	8 x 8	1	20441.00
Shield		1	20447.00
Anchor stirrer		1	10315.70
Thermometer pocket, closed		1	20465.27
Gasket for M24 ports	∅30 x ∅24 x 1	4	20337.11
Adaptor	M24 - 1/2" BSP	1	20461.11
Gasket, 1/2" BSP	∅18 x ∅12 x 1	1	20336.51
Excess pressure valve	6 Bar, 1/2" BSP	1	21453.06
Adaptor	M24 - 1/4" BSP	1	20461.21
Gasket, 1/4" BSP	∅11 x ∅6 x 1,5	1	20336.13
Pressure gauge	–1 to 5 Bar	1	20460.00
Plug, M24 ports	M24 x 1,5	1	20463.21
Plug, M33 ports	M33 x 1,5	2	20463.31
Gasket for M33 ports	∅40 x ∅34 x 2	2	20337.31
Illumination glass, DN30	∅40 x 10	1	20466.47
Flange, DN30		1	20467.03
Gasket for DN30 flange	∅40 x ∅30 x 1	2	20336.71
Sightglass, DN48	∅60 x 10	1	20466.67
Flange, DN48		1	20467.05
Gasket for DN48 flange	∅60 x ∅50 x 1	2	20337.61

All information is for the standard vessel, gaskets and glasses are consumables

Klingersil gaskets

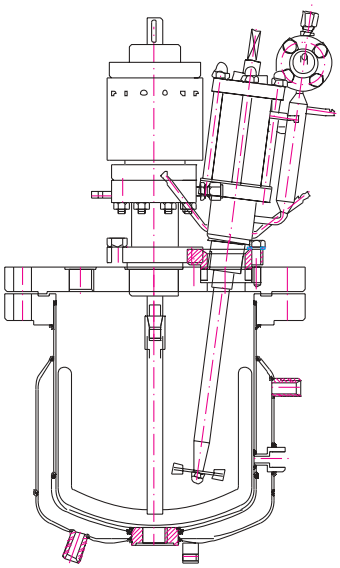
Description	Size	Cat. no.
Lid gasket	∅343 x ∅325 x 2	20345.34
Drain plug gasket	∅34 x ∅24 x 2	20337.24
Gasket for M24 ports	∅30 x ∅24 x 2	20337.14
Gasket for M33 ports	∅40 x ∅34 x 2	20337.34
Gasket, 1/2" BSP	∅18 x ∅12 x 2	20336.54
Gasket for DN30 flange	∅40 x ∅30 x 2	20336.74
Gasket for DN48 flange	∅60 x ∅50 x 2	20336.64
Stirrerhead gasket	∅56 x ∅49 x 1	20337.44

Gasket sets, options and accessories

Description	Size	Cat. no.
Set of 14 gaskets	PTFE	20365.30
Set of 14 gaskets	Klingersil	20360.30
Mechanically sealed stirrerhead	M48 x 1,5	10309.50
Magnetic stirrerhead	M48 x 1,5	10313.00
Double universal joint, stainless steel	8 x 8	20441.11
Vessel insulation		10163.90
Drain with ball valve*	15 ... 50	
Drain valve, straight outlet	M24 x 1,5	10333.1*
Drain valve, lateral outlet	M24 x 1,5	10335.0*
Pt100 thermometer for closed pocket	EL420	52009.50
Thermometer holders		
- open with dip tube		20465.41
- open without dip tube		20465.51
Pt100 direct immersion thermometer	EL375	52009.30
Bottom Pt100 thermometer mounted in vessel bottom*	EL50	15009.00
Vycor glass, DN30	∅40 x 10	20466.49
Vycor glass, DN38	∅60 x 10	20466.69

* available only as original equipment

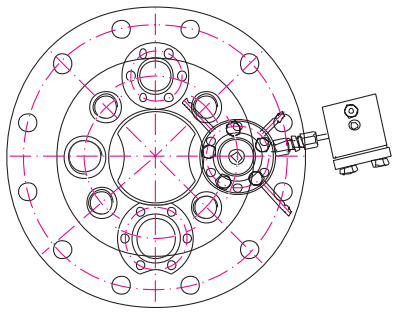
Custom design with a second stirrerhead in the lid



The drawing shows a 5 litre vessel with a centrally mounted 16 Nm magnetic stirrerhead and a sloping mechanically sealed stirrerhead to one side.

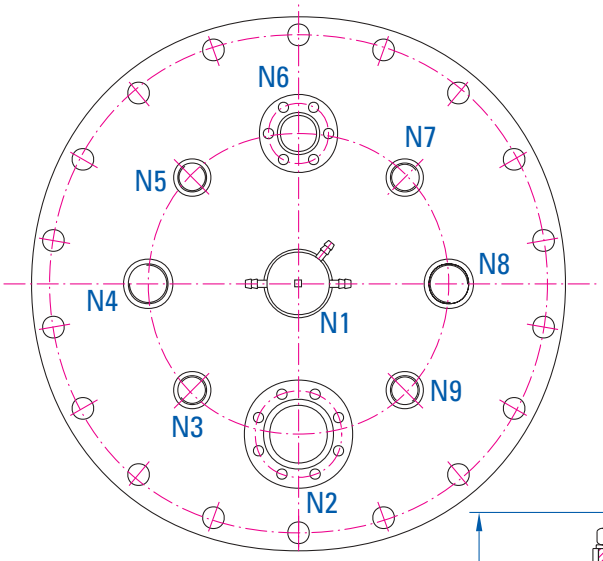
The magnetic stirrerhead is fitted with an anchor stirrer and the lateral stirrerhead is fitted with a dispersion disk.

Both stirrers can be used simultaneously.

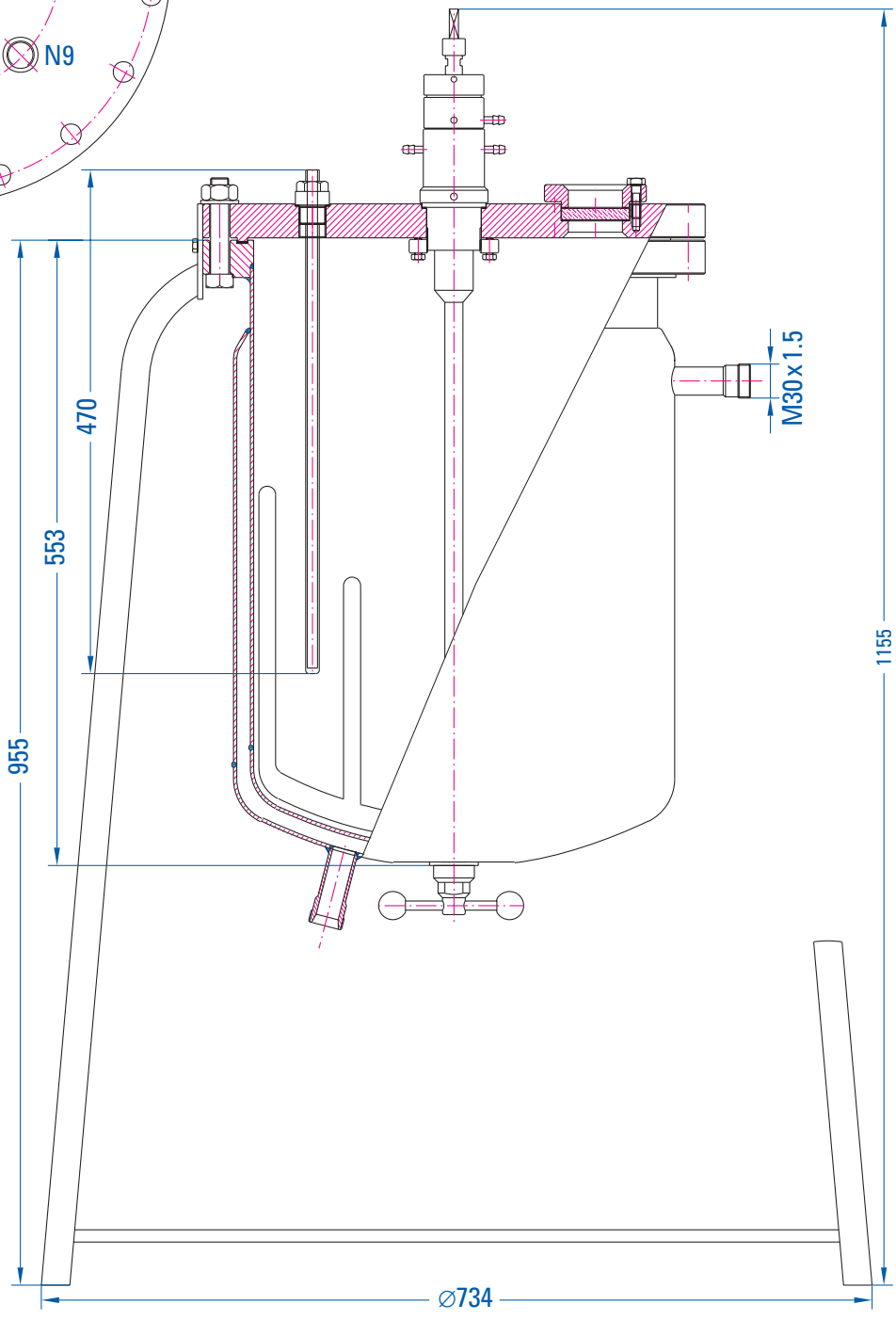


The view from above the vessel shows the constrained layout.

Reaction vessels for vacuum and pressure, 50 litre nominal capacity



N1 Port, central, ∅48.5, with stirrerhead
N2 Sightglass, DN48
N3 Port, M24x1.5, with pressure gauge
N4 Port, M33x1.5, with plug
N5 Port, M24x1.5, with excess pressure valve
N6 Illumination glass, DN30
N7 Port, M24x1.5, with plug
N8 Port, M33x1.5, with plug
N9 Port, M24x1.5, with thermometer pocket



Internal height 535 mm

Internal diameter 354 mm

Fitted with stirrerhead type 10312.00

	PTFE	Klingersil	Weight	Volume	Pressure	Heating jacket	
Cat. no. without heating jacket	10164.01	10164.04	92 kg	51 ltr	3.8 Bar	Volume	Pressure
Cat. no. with heating jacket	10166.01	10166.04	95 kg	51 ltr	3.8 Bar	8 ltr	3 Bar

Components of standard vessel – PTFE gaskets

Description	Size	No.	Cat. no.
Vessel with Heating jacket	51 ltr	1	10166.01
Lid gasket	∅383 x ∅365 x 2	1	20347.31
Bolts	M16 x 90 A2-70	15	
Nuts	M16 A2-70	15	
Washers	∅17 A2	15	
Drain plug	M24 x 1.5	1	10334.00
Drain plug gasket	∅34 x ∅24 x 1	1	20337.21
Stirrerhead gasket	∅56 x ∅49 x 1	1	20337.41
Stirrerhead		1	10312.00
'O' ring	∅15 x 4	2	20312.04
Double universal joint	8 x 8	1	20441.00
Shield		1	20447.00
Anchor stirrer		1	10315.90
Thermometer pocket, closed	EL414	1	20465.29
Gasket for M24 ports	∅30 x ∅24 x 1	4	20337.11
Adaptor	M24 - 1/2" BSP	1	20461.11
Gasket, 1/2" BSP	∅18 x ∅12 x 1	1	20336.51
Excess pressure valve	3.8 Bar, 1/2" BSP	1	21453.04
Adaptor	M24 - 1/4" BSP	1	20461.21
Gasket, 1/4" BSP	∅11 x ∅6 x 1.5	1	20336.13
Pressure gauge	–1 to 5 Bar	1	20460.00
Plug, M24 ports	M24 x 1.5	1	20463.21
Plug, M33 ports	M33 x 1.5	2	20463.31
Gasket for M33 ports	∅40 x ∅34 x 2	2	20337.31
Illumination glass, DN30	∅40 x 10	1	20466.47
Flange, DN30		1	20467.03
Gasket for DN30 flange	∅40 x ∅30 x 1	2	20336.71
Sight glass, DN48	∅60 x 10	1	20466.67
Flange, DN48		1	20467.05
Gasket for DN48 flange	∅60 x ∅50 x 1	2	20337.61

All information is for the standard vessel, gaskets and glasses are consumables

Klingersil gaskets

Description	Size	Cat. no.
Lid gasket	∅383 x ∅365 x 2	20347.34
Drain plug gasket	∅34 x ∅24 x 2	20337.24
Gasket for M24 ports	∅30 x ∅24 x 2	20337.14
Gasket for M33 ports	∅40 x ∅34 x 2	20337.34
Gasket, 1/2" BSP	∅18 x ∅12 x 2	20336.54
Gasket for DN30 flange	∅40 x ∅30 x 2	20336.74
Gasket for DN48 flange	∅60 x ∅50 x 2	20336.64
Stirrerhead gasket	∅56 x ∅49 x 1	20337.44

Gasket sets, options and accessories

Description	Size	Cat. no.
Set of 14 gaskets	PTFE	20365.50
Set of 14 gaskets	Klingersil	20360.50
Mechanically sealed stirrerhead	M48 x 1.5	10309.50
Magnetic stirrerhead	M48 x 1.5	10313.00
Double universal joint, stainless steel	8 x 8	20441.11
Vessel insulation		10166.90
Drain with ball valve*	15 to 50	
Drain valve, straight outlet	M24 x 1.5	10333.1*
Drain valve, lateral outlet	M24 x 1.5	10335.0*
Pt100 thermometer for closed pocket	EL420	52009.50
Thermometer holders		
- open with dip tube		20465.41
- open without dip tube		20465.51
Pt100 direct immersion thermometer	EL420	52009.50
Bottom Pt100 thermometer mounted in vessel bottom*	EL50	15009.00
Vycor glass, DN30	∅40 x 10	20466.49
Vycor glass, DN38	∅60 x 10	20466.69

* available only as original equipment

15 litre conical vessel with mechanically sealed stirrerhead, shaft ∅ 25 mm (optional)

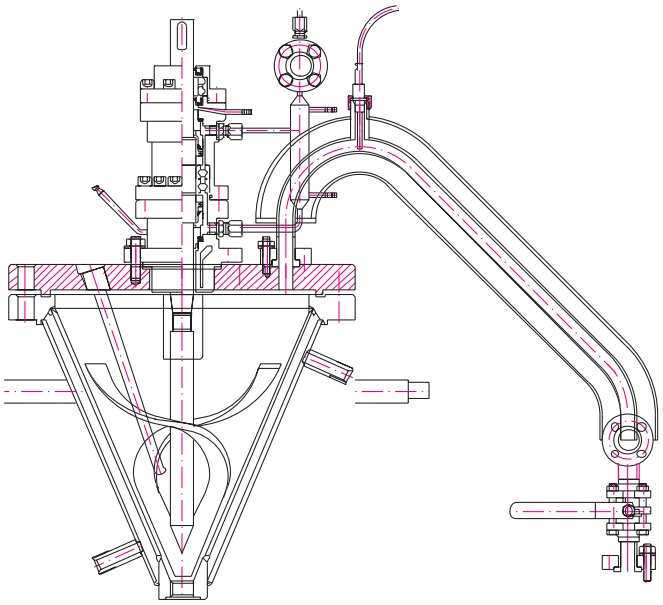
The lid is roughly the same size as the lid of a 50 litre cylindrical stirrerhead.

A mechanically sealed stirrerhead with a 25 mm shaft is installed.

The stirrer is a 45° twisted anchor stirrer, acting downwards.

On the sides of the vessel are attachments for a hydraulic lifting jack.

On the right the lid carries a curved and heated vapour line with a flange connection and a sightglass.



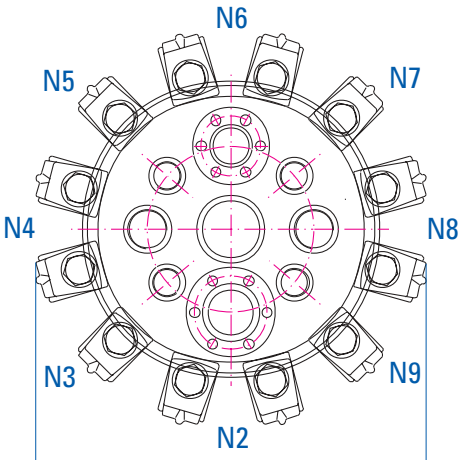
10 litre pressure vessel, rated at 10 Bar

- With clamp bolts for the lid (see page 26)
- With stirrer drive, stand
- With hydraulically operated lifting stage

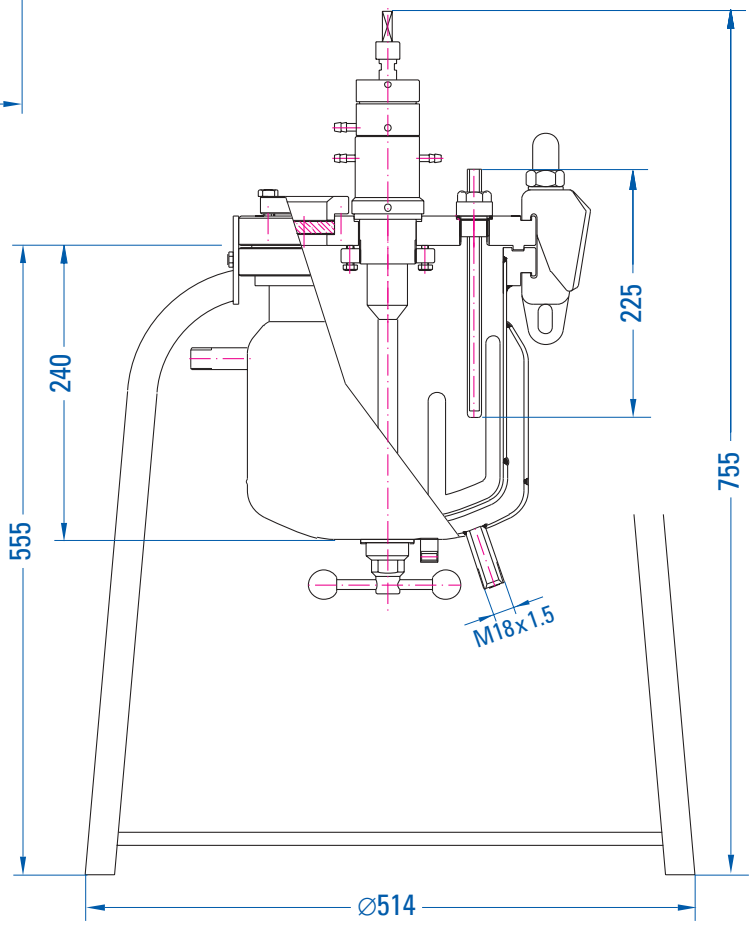
5 litre conical pressure vessel, rated at 25 Bar

- With a mechanically sealed stirrerhead and drive motor
- With reflux condenser to one side and a recipient vessel with valves

Reaction vessel with segmented clamps



N1 Port, central, ∅48.5, with stirrerhead
N2 Sightglass, DN38
N3 Port, M24x1.5, with pressure gauge
N4 Port, M33x1.5, with plug
N5 Port, M24x1.5, with excess pressure valve
N6 Illumination glass, DN30
N7 Port, M24x1.5, with plug
N8 Port, M33x1.5, with plug
N9 Port, M24x1.5, with thermometer pocket

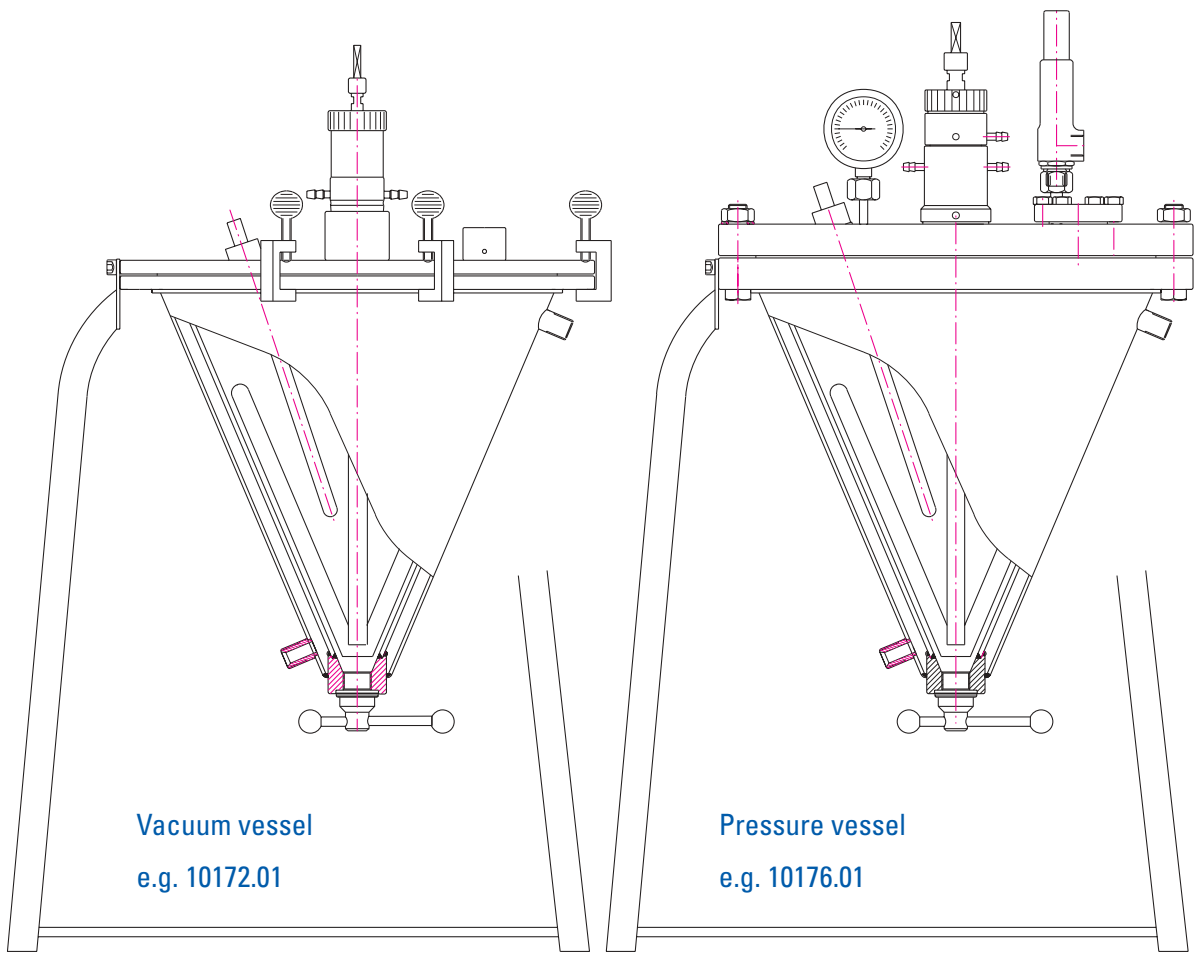


5 litre vessel with
stirrerhead 10312.00 shown

For pressure and capacity data, together with accessories and spares consult the data for the vessels of corresponding size listed on pages 8 to 23.

Nominal capacity [ltr]	Catalogue no. with heating jacket PTFE	with heating jacket Klingersil	without heating jacket PTFE	without heating jacket Klingersil	No. of clamp bolts
1	10142.51	10142.54	10140.51	10140.54	9 x M10
2	10145.51	10145.54	10143.51	10143.54	9 x M12
5	10154.51	10154.54	10152.51	10152.54	12 x M16
10	10157.51	10157.54	10155.51	10155.54	12 x M16
20	10160.51	10160.54	10158.51	10158.54	12 x M16
30	10163.51	10163.54	10161.51	10161.54	15 x M16
50	10166.51	10166.54	10164.51	10164.54	15 x M16

Reaction vessels for pressure and vacuum – conical pattern



Nominal capacity [ltr]	Pressure and vacuum vessel Cat. no.		Volume and Pressure			
			Vessel		Heating jacket	
	PTFE	Klingersil	Volume [ltr]	Pressure [Bar]	Volume [ltr]	Pressure [Bar]
1	10175.01	10175.04	1.3	25	0.6	6
2	10176.01	10176.04	2.3	15	0.9	6
5	10177.01	10177.04	6	15	1.6	6
10	10178.01	10178.04	11	10	1.8	6
15	10179.01	10179.04	16.5	10	2.2	3

Nominal capacity [ltr]	Vacuum vessel Cat. no.		Volume and Pressure			
			Vessel		Heating jacket	
	PTFE	Klingersil	Volume [ltr]	Pressure [mBar]	Volume [ltr]	Pressure [Bar]
1	10170.01	10170.04	1.3	10^{-1}	0.6	6
2	10171.01	10171.04	2.3	10^{-1}	0.9	6
4	10172.01	10172.04	5	10^{-1}	1.4	6
10	10173.01	10173.04	11	10^{-1}	1.8	6
15	10174.01	10174.04	16.5	10^{-1}	2.2	3

Reservoirs

Reservoirs have a conical bottom, which ensures that the contents are completely drained. They can be supplied with or without a heating jacket.

The lid is welded on permanently forming a pressure seal, and is fitted with a pressure gauge, an excess pressure valve, a plug valve and a B29 conical adaptor with cap.

The outlet has a plug valve and a short connection tube.

See page 29

Pressure filter vessel with paper holder

The vessel has a cylindrical pressure-tight body. An internal, flat, horizontal partition carries a filter paper.

The conical lower section collects the filtrate.

The vessels are available with or without heating jackets.

See page 32

Glass vessel with metal lid

For special purposes a glass vessel with a metal lid is available. The associated safety cage, in which accessories such as the stirrer drive and thermostat are mounted, adds to the operator's safety.

If required, a fire suppression trough (page 97) can be placed under the glass vessel.

The lid will accept the same fittings that are used for all-metal vessels.

See page 33

Stainless steel transport vessels

Transport vessels have two lateral handles and have a loose-fitting lid. A stand is available to prevent the vessel from being tipped over accidentally.

The vessels can be supplied with an outlet tap.

See page 34

Tube-and-shell and Liebig condensers

Tube-and-shell condensers with surface areas from 0.16 m^2 to 1 m^2 are available. Both ends can be fitted with various types of connector.

Liebig condensers are straight tube with cooling jackets. We also manufacture coiled condensers and columns with various packings to customers' requirements.

See page 35

Custom manufacture of vessels

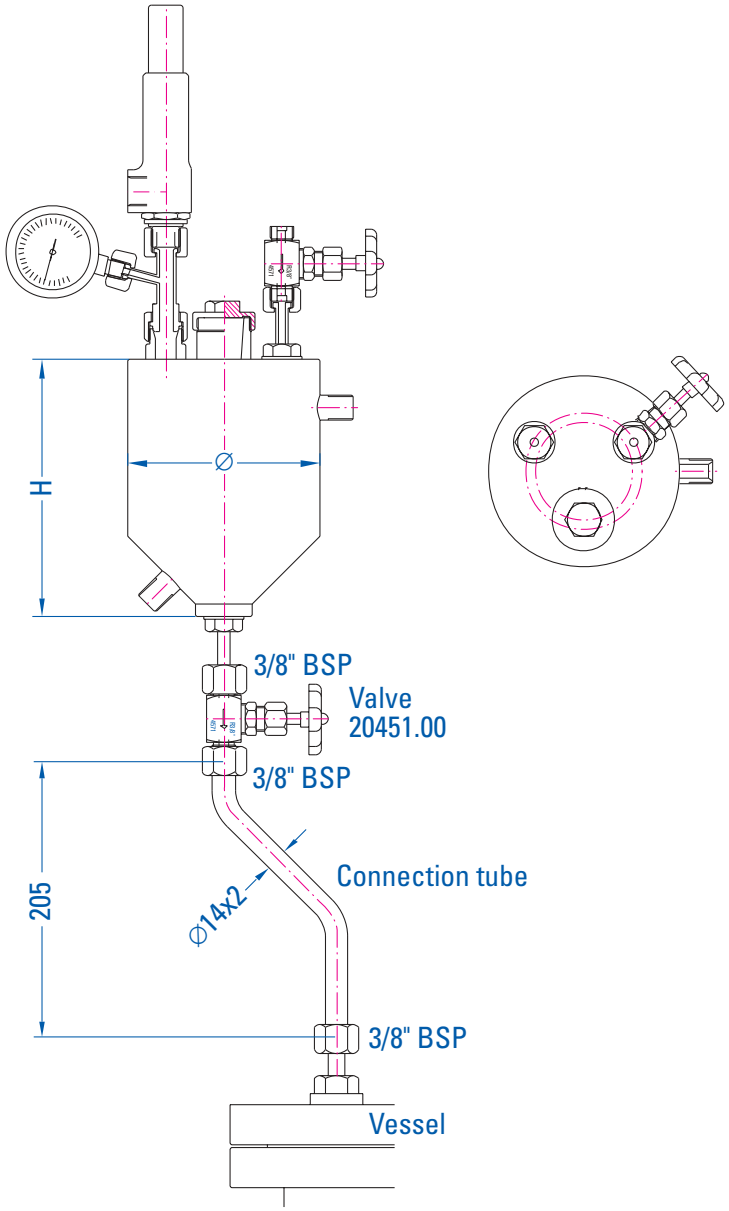
During manufacture vessels can be equipped with special features such as:

- Drain valves of various types and sizes
- Rectangular or round lateral sightglasses
- Temperature measurement points in the bottom or side of the vessel
- Injection or sampling points in the bottom or side of the vessel

See pages 21, 23, 37, 39

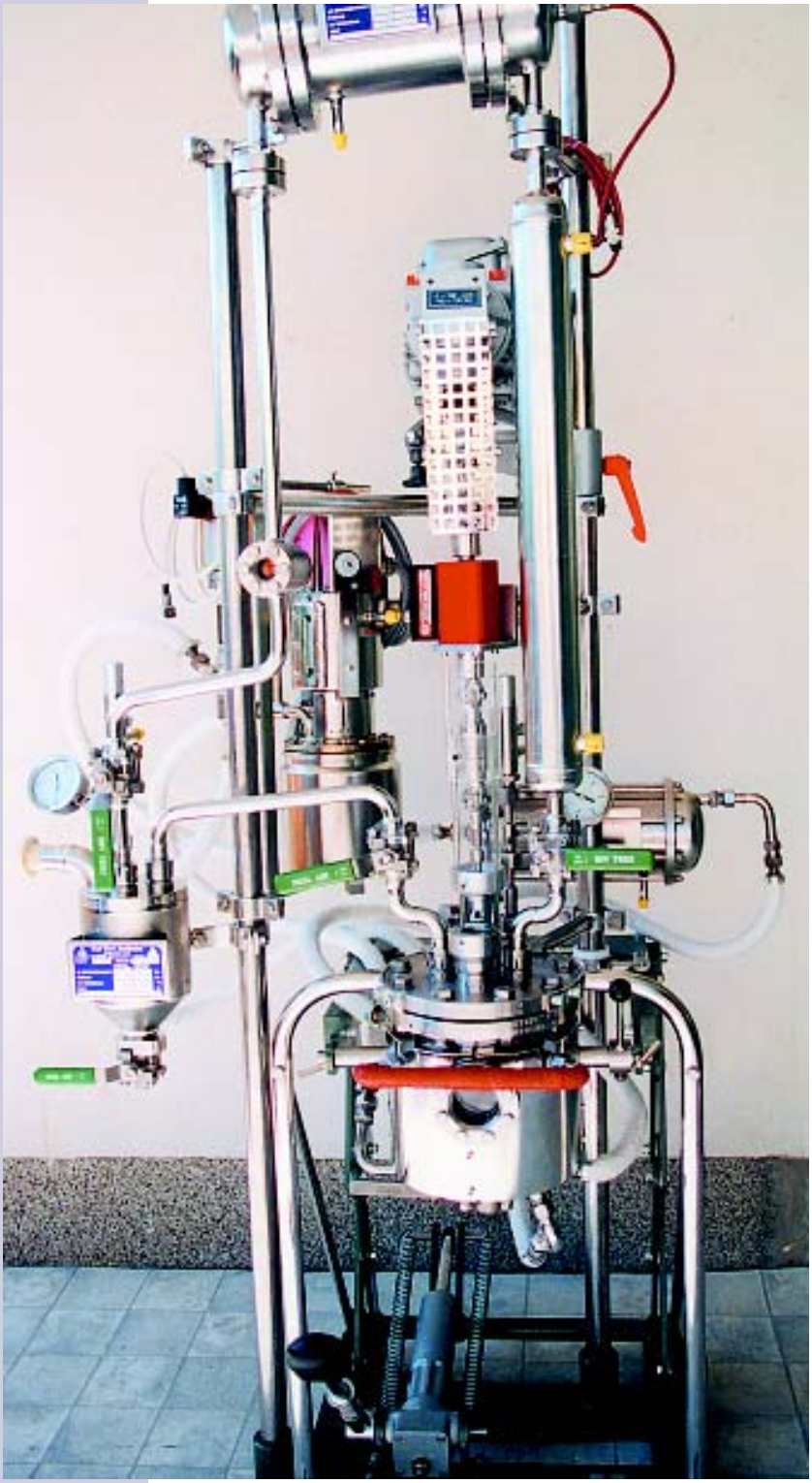
Reservoir, cylindrical-conical pattern

Reservoir with heating jacket



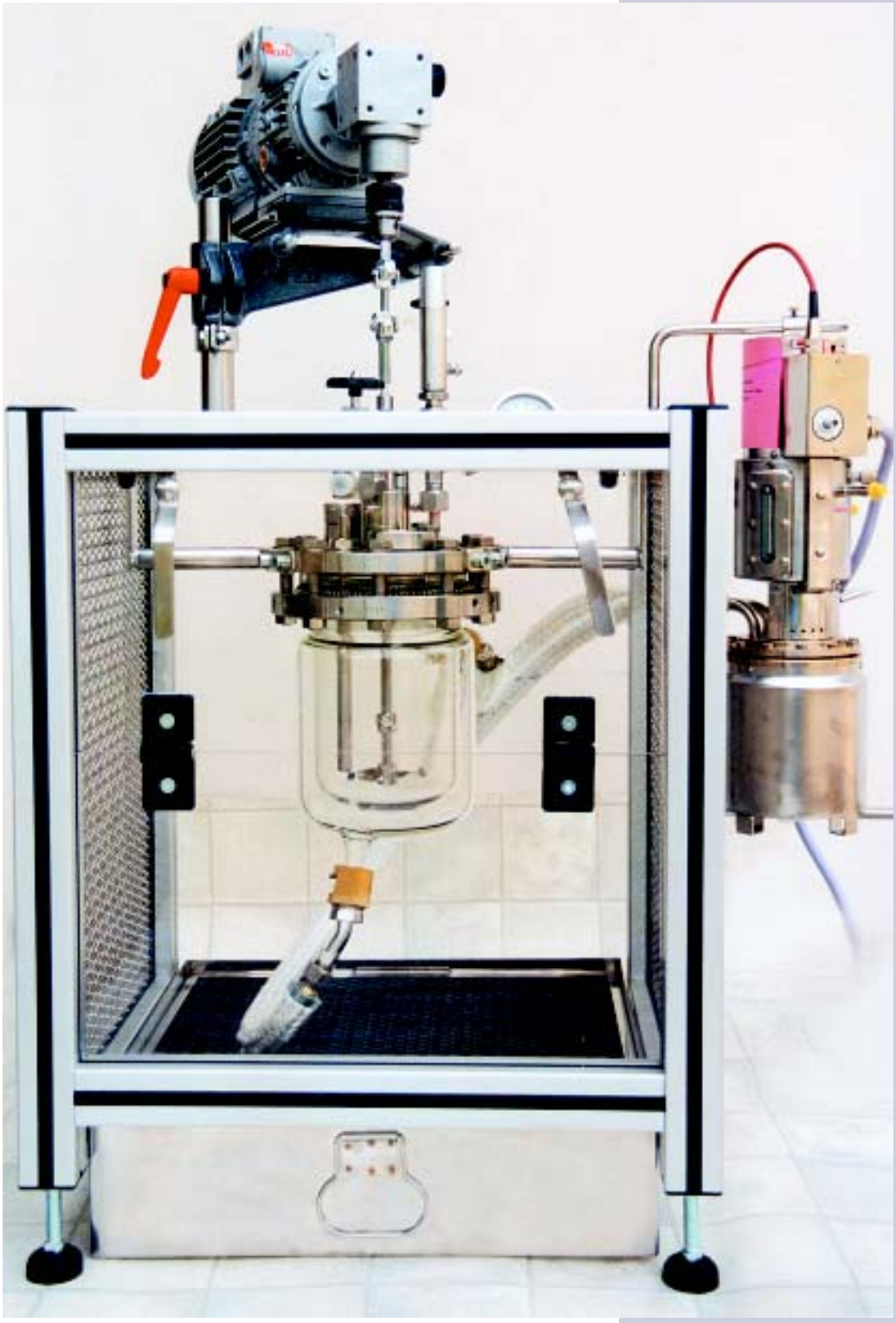
Nominal capacity [ltr]	Cat. no. PTFE gasket* with jacket	without jacket	Volume [ltr]	Pressure [Bar]	Dimensions Ø [mm]	H [mm]	Heating jacket Volume [ltr]	Pressure [Bar]
1	10190.01	10195.01	1,3	25	140	172	0,6	6
2	10191.01	10196.01	2,3	25	160	210	0,9	6
5	10192.01	10197.01	5,3	15	220	285	1,3	6
10	10193.01	10198.01	11	10	273	348	1,9	6
1–10		10199.01	Connection tube, 3/8" BSP upper inlet, 3/8" BSP underneath outlet					

* for Klingersil gaskets change the last digit of the catalogue no. to 4.



Reactor system with lifting stage

- With thermostat, stirrer drive motor with torque mesurement
- Reactor, 5 litres, 15 Bar with lateral sightglass
- With reflux condenser, tube condenser and feeder reservoir

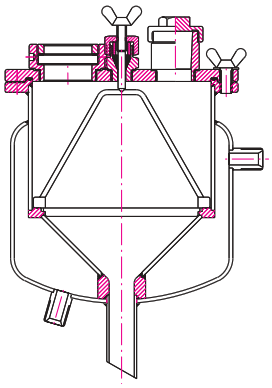


Glass vessel with metal lid within its safety cage

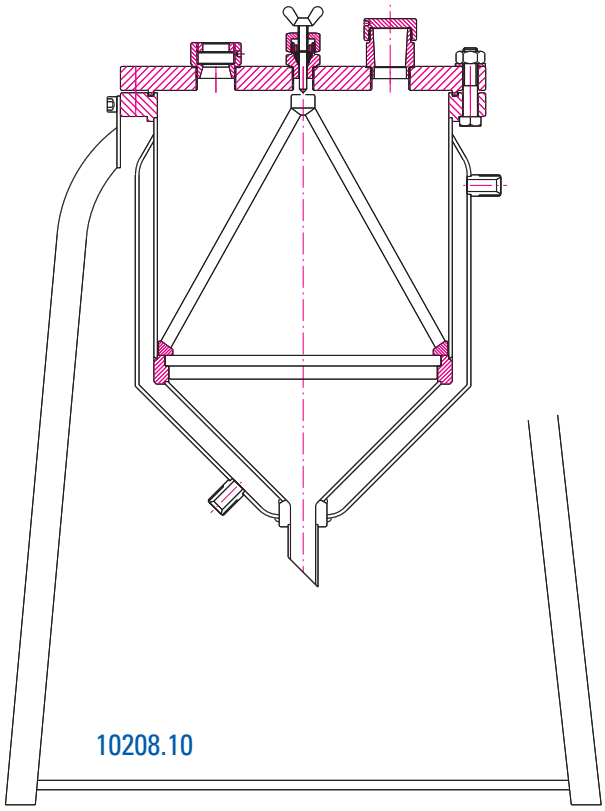
See page 33

- With stirrer drive motor above and a thermostat to one side
- A fire suppression trough is fitted underneath to extinguish any fire caused by a failure of the glass vessel, see page 103

Pressure filter vessel with paper holder



10208.02



10208.10

Fittings

N1 Central support for the paper carrier

N2 Sightglass

N3 Connection with T-piece with pressure gauge and excess pressure valve

N4 Illumination glass

N5 Filler port with B29 socket with cap for pressure tight seal.
Lid fitted with connector and shut-off valve for pressurisation.

Nominal capacity [ltr]	Cat. no. with jacket	Cat. no. without jacket	Volume over filter paper carrier	Pressure [Bar]	Filter ∅ [mm]	Filter Clearance	Heating jacket Volume [ltr]	Heating jacket Pressure [Bar]
2	10208.02	10208.03	2	3	125	ca. 32 %	1,6	6
5	10208.05	10208.06	5	3	180	ca. 32 %	2,4	6
10	10208.10	10208.11	11	5	210	ca. 32 %	2,1	3

Glass vessel - 2 litre nominal capacity, 220 °C, 6 Bar

Glass vessel with a 316 stainless steel metal lid

- Glass vessel with heating jacket.
- Jacket connections DN10 plane flanges.
- The lid is attached to the vessel body with a compression ring, a circular spring and and pressure equalising springs. An 'O' ring provides the pressure seal.
- The lid is fitted with a stirrerhead.
- Five ports threaded M33 x 1.5 are provided. Their assignments are:

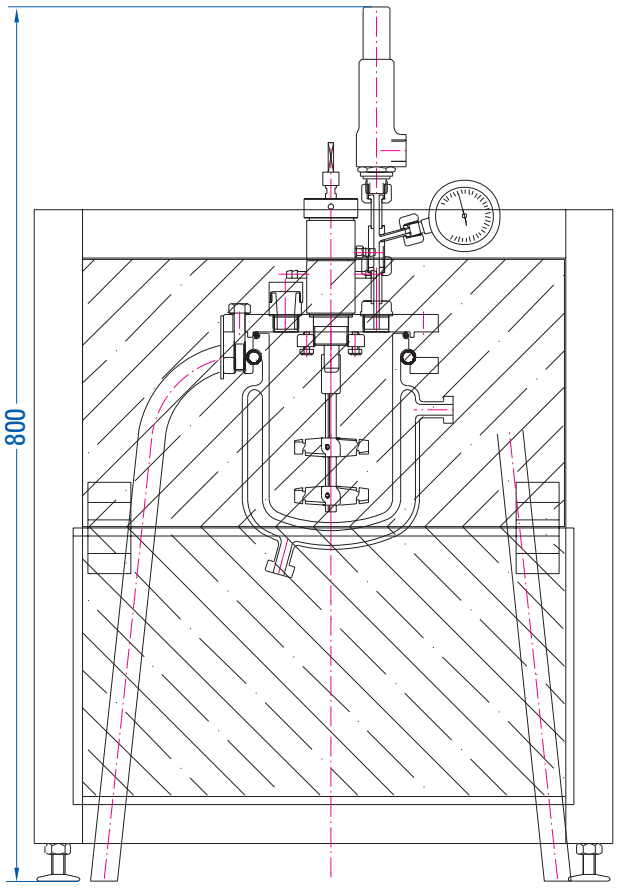
  Pressure gauge and excess pressure valve

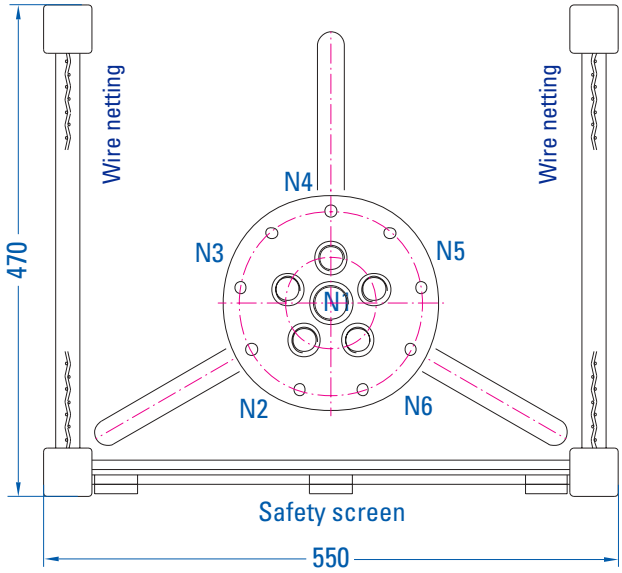
  Thermometer pocket

  B29 adaptor, with pressure tight cap

  Inlet, with plug valve

  Spare, with plug
- The vessel is provided with a tripod and a safety cage. The front panel is made from transparent high impact polycarbonate, the sides from stainless steel netting.





Item	Cat. no.
Complete	10101.12
Additional rear wall wire netting	10101.02
Glass vessel body 2 litres with jacket	10101.00
Safety cage, three sided	10101.01
Lid, stainless steel without fittings	10101.20
Spares	
Pressure equalising spring	10101.03
'O' ring	10101.04
Compression ring	10101.05
Bolt springs, each	10101.06

Gaskets and glasses are consumables

Transport vessel

Transport vessels are manufactured from stainless steel. They have two lateral handles and one supplied with a loose-fitting lid. For additional protection against accidental tipping, they can be supplied with a stand.

If required, they can be supplied with an outlet tap.

Cat. no.	Capacity [ltr]	Diameter [mm]	Height [mm]	Material
10200.20	20	270	375	18/8
10200.25	25	300	375	18/8
10200.30	30	300	440	18/8
10200.50	50	350	550	18/8
10200.75	75	400	600	18/8
10200.99	100	450	670	18/8

Accessory:

Outlet tap with hose connector for transport vessel, 316 stainless steel with PTFE seals.

Cat. no. 10200.99

Tube-and-shell and Liebig condensers

Tube-and-shell condenser

Tube-and-shell condensers are manufactured entirely from 316 stainless steel and are suitable for use under vacuum as well as at pressures up to 25 Bar.

Input and output connections: DN15 welding connectors. They are inclined 5° towards the outlet.

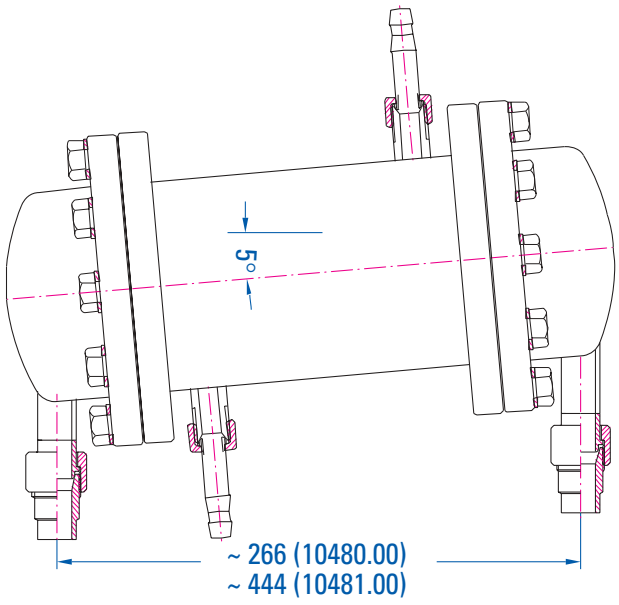
Coolant connections: Male M18 x 1.5. Fitted with Ø12 mm hose connections for pressures up to 10 Bar.

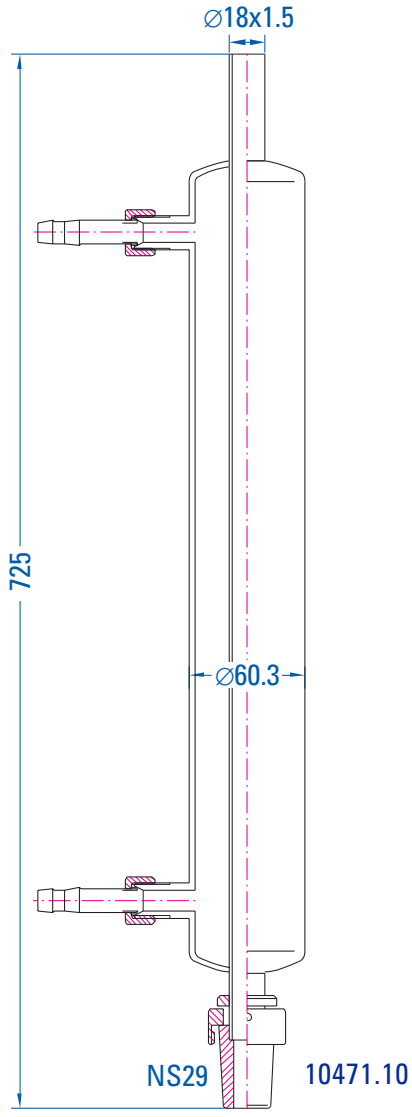
The condensers are available in two sizes:

- 1.2 litres, 0.16 m² cooling surface, coolant volume approx. 0.9 litres
- 1.6 litres, 0.32 m² cooling surface, coolant volume approx. 1.7 litres

Item	Cat. no.
Tube-and-shell condenser, surface area 0.16 m²	
PTFE gaskets	10480.01
Klingersil gaskets	10480.04
Tube-and-shell condenser, surface area 0.32 m²	
PTFE gaskets	10481.01
Klingersil gaskets	10481.04
Gaskets for tube-and-shell condenser (1993 on)	
PTFE	20481.11
Klingersil	20481.14
Gaskets for tube-and-shell condenser (up to 1992)	
PTFE (old design with threaded rods)	10480.11

Gaskets and glasses are consumables





Liebig condenser

Liebig condensers are manufactured from 316 stainless steel. If the upper outlet is closed off, they are suitable for use at pressures up to 25 Bar as well as vacuum.

Vapour inlet is a B29 cone with a cap nut. This ensures a pressure tight connection to the reaction vessel.

Inner tube ∅ 18 x 1.5 mm, outer diameter 60.3 mm. Coolant connections: Male M18 x 1.5. Fitted with ∅ 12 mm hose connections for pressures up to 10 Bar.

Item	Cat. no.
Liebig condenser B29 inlet, open outlet	10471.10
Liebig condenser DN15 tube connectors	10471.20

Fittings and spare parts

This section is divided into three parts

- **Fittings to pressure vessels that are supplied as original equipment.**

  Retrofitting such items requires considerable extra outlay.

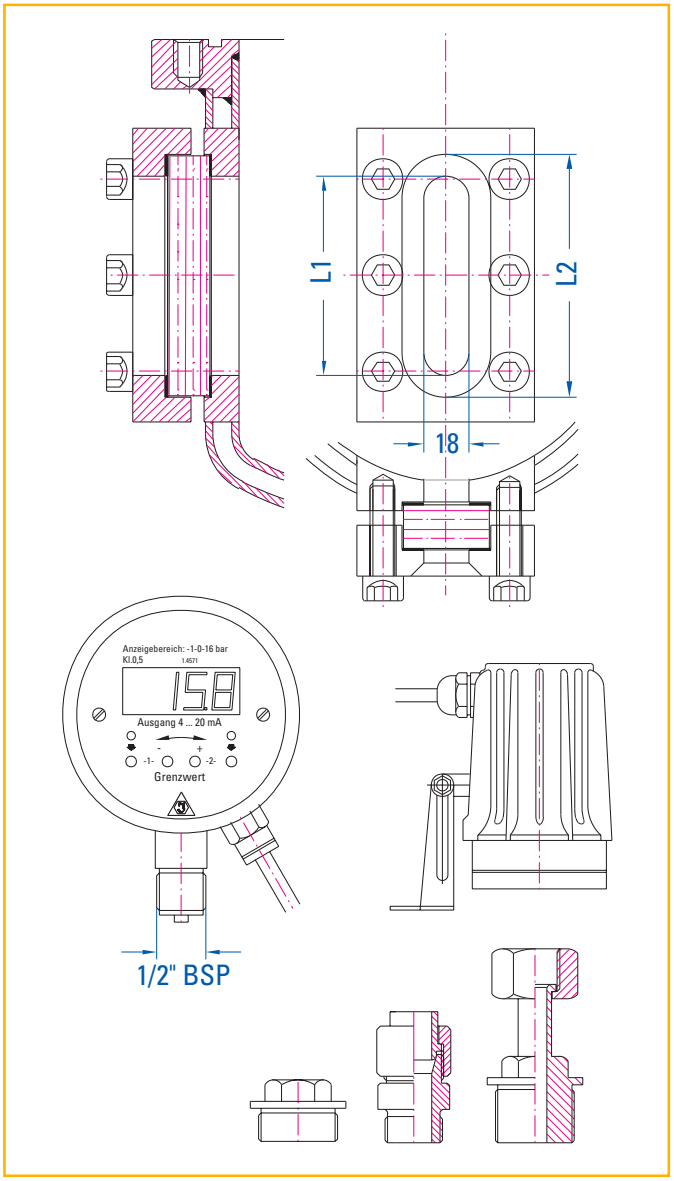
- **Removable fittings to existing connections or ports, which might be required through changes in application.**

  Such items are adaptors, valves, drains and safety equipment. In cases of doubt, please contact us, quoting the serial number of the vessel concerned.

- **Consumables**

  This heading includes fittings, gaskets, bolts, glasses and special tools.

  Only those parts that are suitable and approved for use with the particular vessel should be used. In cases of doubt, please contact us, quoting the serial number of the vessel concerned.



Materials

Unless otherwise noted, all spare parts listed in this catalogue are made from 316 (1.4571) stainless steel.

Sightglasses are made from either borosilicate glass or Vycor.

Gaskets are available in PTFE, Klingersil, Gylon and other materials.

Material	
Germany:	**1.4571** **DIN x 10 CrNiMoTi 18 10**
USA:	**AISI 316 Ti**
Great Britain:	**BS 320 S 17**
France:	**AFNOR Z 8 CND Ti 18-12**
Sweden:	**SIS 2350**

Certification

Certification to EN 10204 3.1B is available for practically all components made from 316 stainless steel and borosilicate glass. A charge will be made for such certification.

If special documentation is required, please contact us before ordering.

Sightglasses for vessel bodies (original equipment only)

Rectangular sightglasses

These can be installed in vacuum vessels, pressure vessels or reservoirs. The PTFE gaskets are stable up to 250 °C. Suitable for vacuum and pressures up to 25 Bar.

L1* [mm]	Vessel size [ltr]	L2 [mm]	Cat. no.
68	1 upwards	79	11068.00
79	2 upwards	95	11079.00
124	5 upwards	140	11124.00

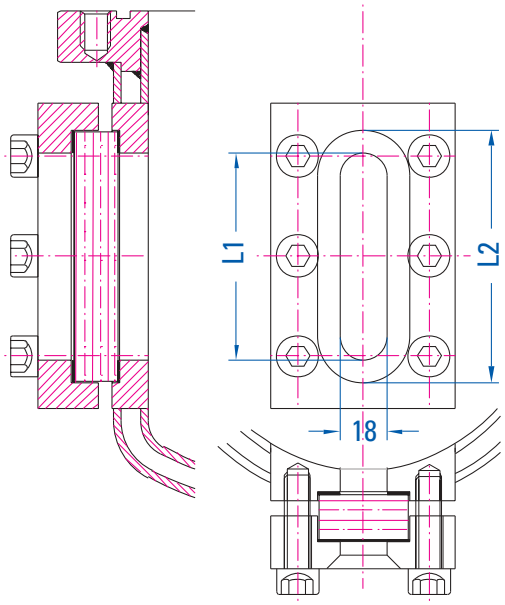
* Other sizes on request

Gaskets

L1 [mm]	Dimensions	L2 [mm]	Cat. no.
68	79 x 68 x 34 x 2	79	21068.02
79	95 x 79 x 34 x 2	95	21079.02
124	140 x 124 x 34 x 2	140	21124.02

Replacement glasses

68	79 x 34	79	11068.01
79	95 x 34	95	11079.01
124	140 x 34	140	11124.01



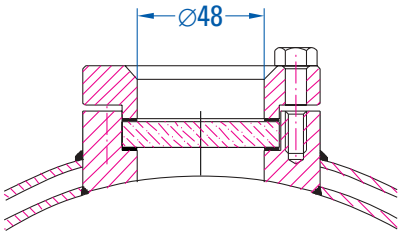
11079.00

Circular sightglasses

These can be welded into vacuum vessels, pressure vessels or reservoirs. The PTFE gaskets are stable up to 250 °C. Suitable for vacuum and pressures up to 25 Bar.

Width* ⌀ [mm]	Vessel size [ltr]	Nominal width	Cat. no.
38	1 upwards	DN40	11038.00
48	2 upwards	DN50	11048.00

* Other sizes on request

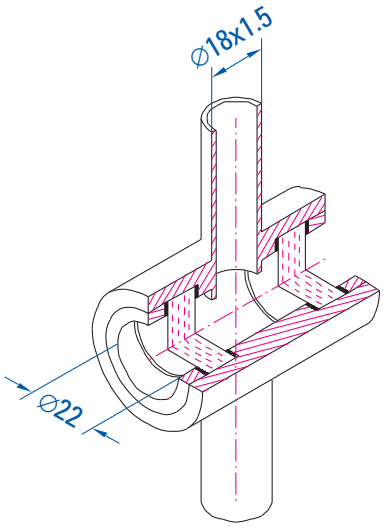


11048.00

In-line sightglasses

Suitable for rising and falling lines. For spares refer to vessel sightglasses of the same nominal width.

Pipe size ⌀ [mm]	Sightglass	Pressure [Bar]	Cat. no.
18 x 1.5	DN22	32	20454.22
18 x 1.5	DN30	50	20454.20
25 x 2.0	DN30	50	20454.30
30 x 2.0	DN40	32	20454.40
42 x 2.0	DN50	32	20454.50
Locking ring for 20454.22			20455.34



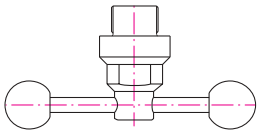
20454.22

For sightglass spares refer to pages 43 and 47.

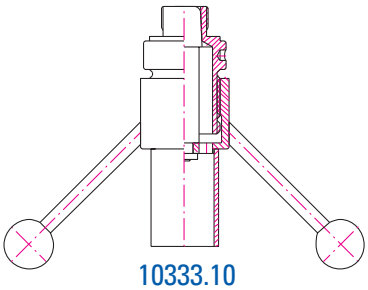
Drain valves and accessories, stainless steel

Item	Cat. no.
Drain plug, with knobs	
Standard vessel fitting	10334.00
Drain valve, straight outlet	
Fitted with a metal to metal seal. The outlet at the lower end is not suitable for connection to pipework.	
M24 x 1.5	10333.10
M33 x 1.5, sealing cone B29	10333.20
Drain valve, straight outlet, with PTFE seal	
Fitted with a PTFE ring to provide a gas tight seal. For use up to 250 °C.	10333.11
Drain valve, lateral outlet	
Fitted with a metal to metal seal. Pressure tight to 50 Bar. Outlet is threaded M24 x 1.5 male. Suitable for connection to pipework.	10335.00
As 10335.00, but heated	10335.10
Drain valve, lateral outlet, with PTFE seal	
Fitted with a PTFE ring to provide a gas tight seal. For use up to 250 °C.	10335.01
Straight connector for valve 10335.00	
With cap nut and olive, 18 mm external diameter	
PTFE seal	10335.51
Klingersil seal	10335.53
Elbow connector for valve 10335.00	
With cap nut and olive, 18 mm external diameter	
PTFE seal	10335.61
Klingersil seal	10335.63
Drain valve, ball type	
With welded on flange. Very low dead space when an anchor stirrer is used. Seals made from PTFE. For use up to 250 °C.	
Available only as original equipment.	

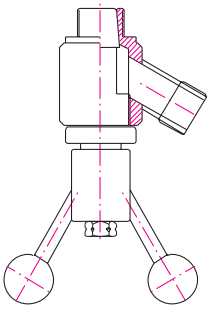
DN 15	10336.15	DN 32	10336.32
DN 20	10336.20	DN 40	10336.40
DN 25	10336.25	DN 50	10336.50



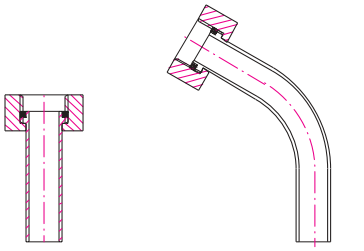
10334.00



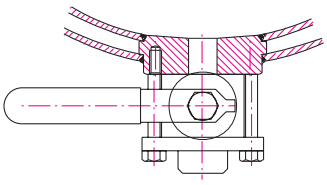
10333.10



10335.00



10335.5* 10335.6*

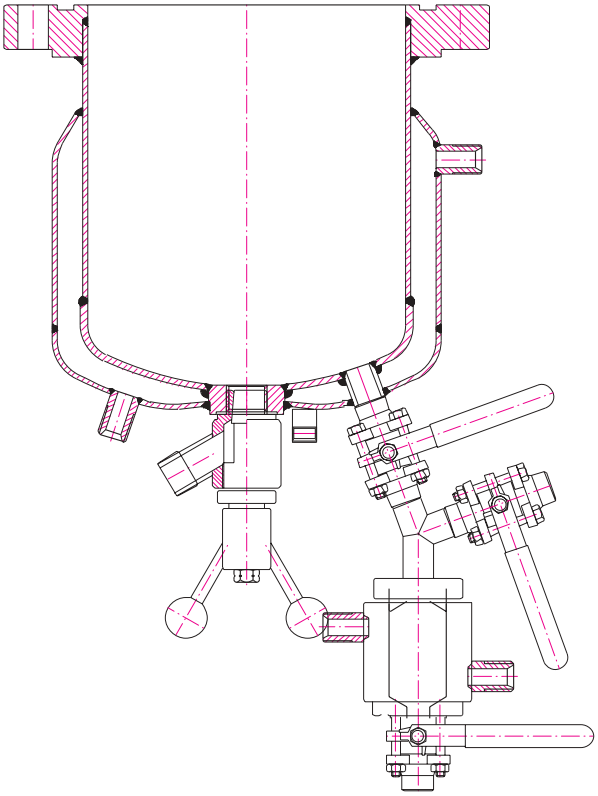


10336.15 to 10336.50

Available only as original equipment

Lateral connections and inbuilt Pt100 thermometers (Only available as original equipment)

Example of a custom vessel with a sampling facility.



The drawing shows a vessel body fitted with screwed-in outlet valve 10335.00 and sampling outlet to one side. The sample collector is heated and has a volume of about 50 ml. The sample is fed into the collector through DN15 ball valves.

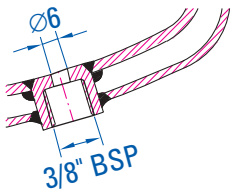
A sample collector for viscous products can be attached to the M24 thread on the outlet of the drain valve. Further details on request.

Lateral connections to vessels.

They can be fitted to vacuum vessels, pressure vessels, or reservoirs. Fitted with PTFE gaskets for use up to 250 °C.

Thread (BSP) [mm]	Vessel size* [ltr]	Cat. no.
1/4" – ⌀ 4	1 upwards	15014.00
3/8" – ⌀ 6	1 upwards	15038.00
1/2" – ⌀ 10	2 upwards	15012.00
3/4" – ⌀ 15	5 upwards	15034.00

*Other sizes on request

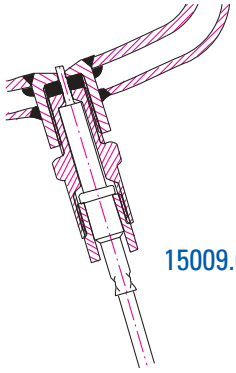


15038.00

Pt100 thermometers in vessel bottom

A measurement point that takes a Pt100 thermometer can be fitted to the bottom of the vessel. The Pt100 thermometer has a pressure tight housing and 1.6 m long connection cable. The gaskets are so arranged to allow the amount of protrusion of the thermometer into the vessel to be adjusted.

	Cat. no.
Assembly including thermometer	15009.00
Replacement thermometer with 1.6 m cable	52009.01
Gasket set, PTFE, three pieces	15009.11
Gasket set, Klingersil, for use to 400 °C	15009.14



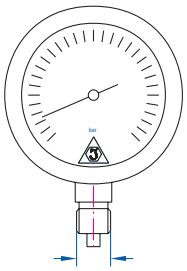
15009.00

Pressure gauges

Item		Cat. no.

Analogue pressure gauge
Connection 1/4" BSP male, working parts made from 316 stainless steel, stainless steel housing, exchangeable dial cover.

Range [Bar]	–1...5	20460.00
	–1...9	20460.10
	–1...15	20460.20
	–1...25	20460.30
	–1...60	20460.60



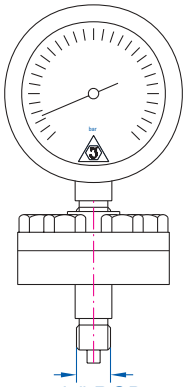
1/4" BSP

20460.00-60

Analogue pressure gauge with membrane pressure transfer
For those purposes where the vessel atmosphere must be kept apart from the gauge mechanism. Membrane made from Hastelloy® C4.

Stainless steel 316 housing	20460.*1
Hastelloy® C4 housing	20460.*3

* The penultimate digit indicates the pressure range (see above)

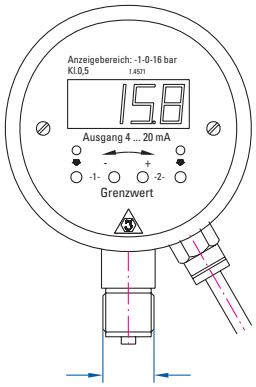


1/4" BSP

20460.*1
20460.*3

Electronic pressure gauge
With piezoresistive sensor, digital LED display and limit indicators. Accuracy class 0.5, 1/2" BSP male connection, diameter of housing 100 mm. Stainless steel housing, parts in contact with pressure medium 316 stainless steel.
Supply voltage 18 - 27 V DC
Output: 0/4 - 20 mA (indicate which when ordering)
Load: max 300 Ohm at 12 volts
max 600 Ohm at 24 volts
Display: 3 1/2 significant figures ± 1999.
Negative values are displayed.
Limit switch: Optocoupler

Sensor range [Bar]	–1...6	24604.06
	–1...25	24604.25
	–1...50	24604.50



1/2" BSP

20604.25

Mains power supply unit
Input 230 V, AC, output 24 V, 600 mA DC. Clip-on or screw fastening.
Protection class IP 00.

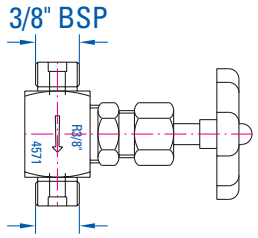
24605.00

Limit switch relay
Allows the limit switches to control 230 V, 4 A.
Unit contains two relays. Supply 230V, protection class IP 00. Clip-on fastening.

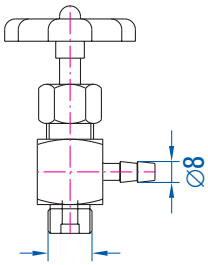
24606.00

Valves and connectors for vessels

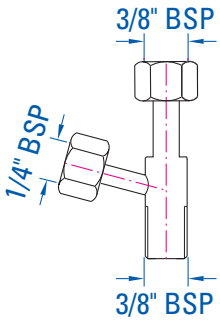
Item		Cat. no.
Straight valve, plug type, DN4		
Connections	2 x 3/8" BSP male	20451.00
	2 x 1/2" BSP male	20451.20
Corner valve, plug type, DN4		
Connection 3/8" BSP male		20452.00
T-piece, stainless steel		
Inlet 3/8" BSP, upper outlet 3/8" BSP		
Side outlet 1/4" BSP for pressure gauge		20468.00
Side outlet 3/8" BSP		20468.02
T-piece, stainless steel		
Inlet M18 x 1.5, Upper outlet 1/2" BSP female for excess pressure valve		
Side outlet 1/4" BSP female for pressure gauge		20468.10
Side outlet 3/8" BSP female		20468.12
Side and upper outlets 3/8" BSP female		20468.14
Adaptor for connection to vessel lids		
Stainless steel, M24 x 1.5, with hexagon		
Thread length 14 mm for vessels up to 2 litres		20462.01
Thread length 24 mm for vessels from 5 litres		20462.02



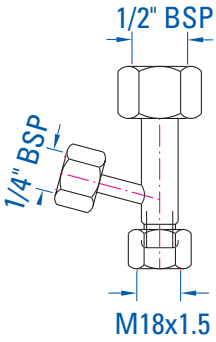
20451.00-20



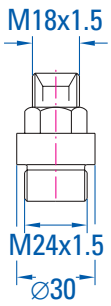
20452.00



20468.00-02



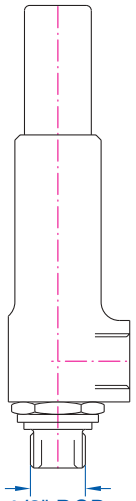
20468.10-14



20462.01-02

Safety devices for vessels

Item		Cat. no.
Spring loaded excess pressure valve Stainless steel, DN10. Inlet and outlet 3/8" BSP. TÜV approved. Supplied calibrated and sealed. The valve opens proportionally to the excess pressure. After cleaning it can be reused. Other blow-off pressures can be supplied on request.		
Blow-off pressure [Bar]	3,8	21453.04
	6	21453.06
	9	21453.09
	10	21453.10
	15	21453.15
	25	21453.25
	50	21453.50
TÜV certification of excess pressure valves		21453.98
Other ratings on request		

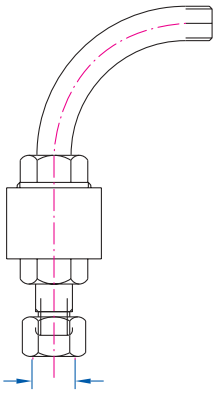


1/2" BSP
21453.00-50

Bursting disks
Bursting disks protect pressure vessels from unacceptable overpressures. They open instantly to their full diameter. The disk must be replaced before reuse.

Bursting disk, DN15, with holder		
DN10 with M18 x 1.5 female cap nut (state bursting pressure when ordering)		24821.10
DN15 with M26 x 1.5 female cap nut (state bursting pressure when ordering)		24821.15

Bursting disks, DN15, stainless steel, vacuum resistant		
Bursting pressure at 100 °C [Bar]	3,8	24820.04
	6	24820.06
	9	24820.09
	11	24820.11
	15	24820.15
	25	24820.25
	50	24820.50
TÜV certification of bursting disks		21453.98
Other ratings on request		



M18x1.5

24820.00

Gaskets for bursting disks	
Gylon	24821.05
Klingersil	24821.04

Sightglasses with accessories and spares for vessels

Sightglasses, screw-in, 316 stainless steel with PTFE gaskets and borosilicate glass

Nominal width	Vessel size[ltr]	Thread	Cat. no.
DN22	1+2	M33 x 1.5, 14 mm	20455.31
DN22		M33 x 1.5, 24 mm	20455.45
DN30	4–50 Vacuum	M48 x 1.5, 14 mm	20455.42
Locking ring for 20455.31			20455.34
Locking ring for 20455.42			20455.44

Spare glasses for vacuum vessels

Nominal width	Vessel size [ltr]	Size ⌀ [mm]	Cat. no.
DN22V	1+2	30 x 10	20466.37
DN30V	4–50	40 x 7	20466.27

Replacement sightglasses for pressure vessels

Nominal width	Max. pressure [Bar]	Size ⌀ [mm]	Cat. no.*
DN22	50	30 x 10	20466.3*
DN30	50	40 x 10	20466.4*
DN40	25	50 x 10	20466.5*
DN50	16	60 x 10	20466.6*
	25	60 x 12	20466.7*
	40	60 x 15	20466.8*

*Last digit '7' for borosilicate glass (to 280°C), '9' for Vycor (to 400°C)

Sightglass gaskets

Nominal width	Size ⌀ [mm]	Cat. no.*
DN22	30 x 24	20337.1*
DN30	40 x 30	20336.7*
DN40	50 x 40	20337.5*
DN50	60 x 50	20337.6*

*Last digit '1' for PTFE (to 250°C), 1 mm thick;
'9' for Klingersil (to 400°C), 2 mm thick.

Spare flanges for sightglasses

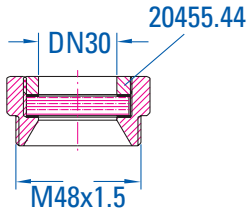
For 1 and 2 litre cylindrical and 1 litre conical

Nominal width	Max. pressure [Bar]	Cat. no.
DN22K	32	20467.01
DN30K	32	20467.02
For all other vessels		
DN30	50	20467.03
DN40	50	20467.04
DN50	32	20467.05

Flanges for other pressure ranges available on request.

Lamp with reflector

20 W halogen lamp, power supply	20467.70
Explosion proof version	20467.77



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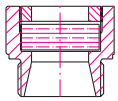
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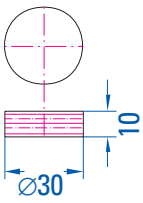
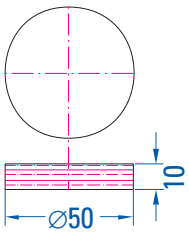
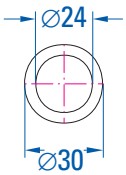


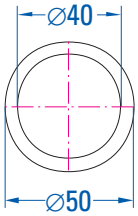
20466.37



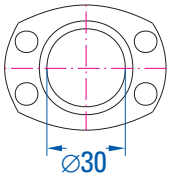
20466.57



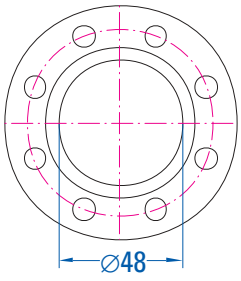
20337.11



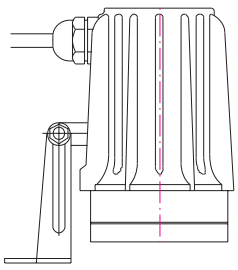
20337.51



20467.02



20467.05

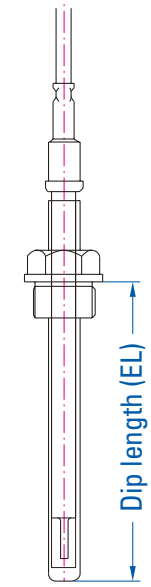

20467.77

Thermometers, thermometer pockets and holders

Closed thermometer pockets

Threaded M24 x 1.5; thread length 14 mm for vessels up to 5 litres, 24 mm for vessels over 5 litres.

Pressure vessel			Vacuum vessel		
Size [ltr]	EL [mm]	Cat. no.	Size [ltr]	EL [mm]	Cat. no.
1	113	20465.21	1	120	20465.01
2	135	20465.22	2+4	155	20465.02
5	169	20465.24	10	234	20465.05
10	204	20465.25	15	330	20465.15
20	334	20465.26	20	362	20465.06
30	354	20465.27	30+40	385	20465.07
50	414	20465.29	50	530	20465.09



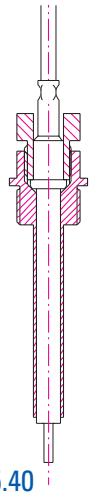
20465.01-29

Thermometer holders with dip tube

Threaded M24 x 1.5; thread length 14 mm for vessels up to 5 litres, 24 mm for vessels over 5 litres.

The dip tube serves to increase the responsiveness of the thermometer in viscous media. When ordering replacements please state the vessel size and serial number. Pt100 thermometers are listed below.

Thread length 14 mm for vessels up to 5 litres	20465.40
Thread length 24 mm for vessels over 5 litres	20465.41

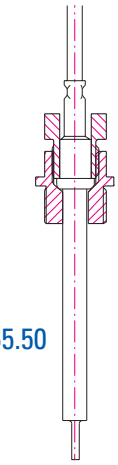


20465.40

Thermometer holders without dip tube

Threaded M24 x 1.5; thread length 14 mm for vessels up to 5 litres, 24 mm for vessels over 5 litres. Pt100 thermometers are listed below.

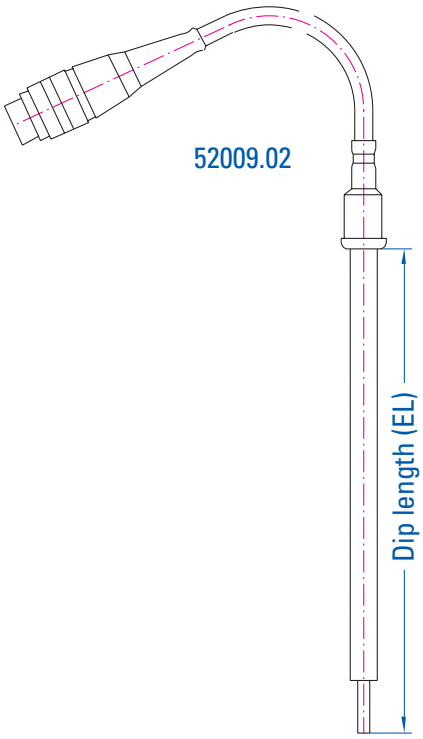
Thread length 14 mm for vessels up to 5 litres	20465.50
Thread length 24 mm for vessels over 5 litres	20465.51



20465.50

Pt100 resistance thermometers, the Pt100 resistance thermometer sits in a metal casing with band and has a double-coned cable approxmately 1.6 m long with a 3-pole connector.

Vessel size	To fit thermometer pockets		To fit thermometer holders	
Pressure vessel [ltr]	EL [mm]	Cat. no.	EL [mm]	Cat. no.
1+2	145	52009.04	115	52009.02
5	215	52009.10	190	52009.05
10	335	52009.20	215	52009.10
20	375	52009.30	335	52009.20
30	420	52009.50	375	52009.30
50	420	52009.50	420	52009.50
Vacuum vessel [ltr]	**EL [mm]**	**Cat. no.**	**EL [mm]**	**Cat. no.**
1+2	145	52009.04	115	52009.02
4	190	52009.05	145	52009.04
10	315	52009.15	215	52009.10
15+20	335	52009.20	315	52009.15
30+40	375	52009.30	335	52009.20
50	420	52009.50	420	52009.50

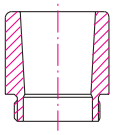


52009.02

Adaptors for ports in vessel lids

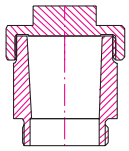
Conical joint adaptors
316 stainless steel, thread length 14 mm

Socket size	Thread	Cat. no.
NS 14/23	M24 x 1.5	20456.14
NS 19/26	M24 x 1.5	20456.19
NS 29/32	M33 x 1.5	20456.29
NS 45/40	M48 x 1.5	20456.45


20456.29

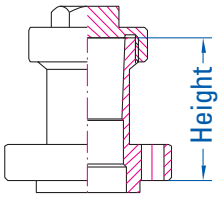
Conical joint adaptors with pressure tight cap
316 stainless steel, thread length 14 mm

Socket size	Thread	Cat. no.
NS 14/23	M24 x 1.5	20457.14
NS 19/26	M24 x 1.5	20457.19
NS 29/32	M33 x 1.5	20457.29
NS 45/40	M48 x 1.5	20457.45


20457.29

Conical joint adaptors
316 stainless steel, thread length 14 mm, with pressure tight cap and flange connection

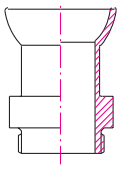
Height [mm]	Socket size	Flange size	Cat. no.
35	NS 29/32	DN30	20458.29
60	NS 45/40	DN38	20458.45
50	NS 45/40	DN48	20458.46



20458.45

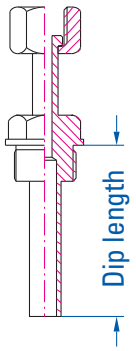
Spherical joint adaptors
316 stainless steel, thread length 14 mm

Socket size	Outer ⌀ [mm]	Internal ⌀ [mm]	Thread	Cat. no.
S29	19 x 2	15	M24 x 1.5	20457.30
S35	30 x 2.4	25.2	M33 x 1.5	20457.35
S51	36 x 2.4	31.2	M48 x 1.5	20457.51


20457.35

Gas inlet adaptors
316 stainless steel, with 3/8" BSP cap nut

Vessel size [ltr]	Thread	Dip length [mm]	Cat. no.
1+2	M24 x 1.5, 14 mm lang	113	20461.51
5+10	M24 x 1.5, 14 mm lang	169	20461.52
20+30	M24 x 1.5, 24 mm lang	334	20461.53
50	M24 x 1.5, 24 mm lang	414	20461.54



Adaptors for ports in vessel lids

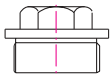
Thread lengths of adaptors

Vacuum vessels - all sizes	14 mm
Pressure vessels up to 10 litres	14 mm
Pressure vessels over 20 litres	24 mm

Plugs, 316 stainless steel, 24 mm A/F

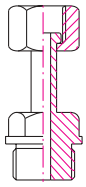
Thread	Cat. no.
M24 x 1.5, 14 mm	20463.21
M24 x 1.5, 24 mm	20463.22
M33 x 1.5, 14 mm	20463.31
M33 x 1.5, 24 mm	20463.32

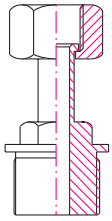

20463.21


20463.31

Adaptors with cap nuts, 316 stainless steel

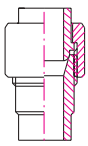
Application	Thread	Nut size	Cat. no.
Pressure gauge	M24 x 1.5 x 14 mm	1/4" BSP Female	20461.21
Valve	M24 x 1.5 x 14 mm	3/8" BSP Female	20460.21
Excess pressure valve	M24 x 1.5 x 14 mm	1/2" BSP Female	20461.11
Pressure gauge	M24 x 1.5 x 24 mm	1/4" BSP Female	20461.33
Valve	M24 x 1.5 x 24 mm	3/8" BSP Female	20460.22
Excess pressure valve	M24 x 1.5 x 24 mm	1/2" BSP Female	20461.12
Valve	M33 x 1.5 x 14 mm	3/8" BSP Female	20460.31
Pressure gauge	M33 x 1.5 x 24 mm	1/4" BSP Female	20461.32
Valve	M33 x 1.5 x 24 mm	3/8" BSP Female	20460.32
Excess pressure valve	M33 x 1.5 x 24 mm	1/2" BSP Female	20461.13

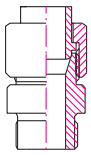

20460.21


20461.13

Welding adaptors
24 mm A/F

	Connection	Cat. no.
DN10, 316 stainless steel	Tubes ⌀ 12 x 1	20462.00
	M24 x 1.5, 14 mm lang	20462.01
	M24 x 1.5, 24 mm lang	20462.02
DN15, 316 stainless steel	Tubes ⌀ 18 x 1.5	20462.10
	M24 x 1.5, 14 mm lang	20462.11
	M24 x 1.5, 24 mm lang	20462.12
DN20, 316 stainless steel	Tubes ⌀ 25 x 1.5	20462.20
	M33 x 1.5, 14 mm lang	20462.21
	M33 x 1.5, 24 mm lang	20462.22
DN25, 316 stainless steel	Tubes ⌀ 30 x 1.5	20462.30
	M33 x 1.5, 14 mm lang	20462.31
	M33 x 1.5, 24 mm lang	20462.32


20462.10


20462.11

Gaskets

Gaskets for pressure and vacuum use at temperatures up to 250 °C are made from **PTFE** and are 1 mm thick except lid gaskets which are 2 mm thick.

The final digit of the catalogue numbers for PTFE gaskets is '**1**'.

Gylon beige is a modified PTFE gasket. The material has similar properties to PTFE, but is more resilient and does not creep as readily as PTFE. The upper temperature limit is slightly higher at 260 °C.

The final digit of the catalogue numbers for Gylon gaskets is '**5**'.

For maximum temperature resistance **Klingersil** gaskets are used for both pressure and vacuum applications. Klingersil gaskets are 2 mm thick.

The final digit of the catalogue numbers for Klingersil gaskets is '**4**'.

Klingerite gaskets contain asbestos and are no longer available.

Certain gaskets are made from **aluminium**. They are 1.5 mm thick.

The final digit of the catalogue numbers for aluminium gaskets is '**3**'.

Other gasket materials are available on request.
In the list below certain catalogue numbers appear more than once.

	Dimensions [mm]	Cat. no. Aluminium	Cat. no. PTFE	Cat. no. Klingersil	Cat. no. Gylon
General purpose gaskets					
1/4", pressure gauge	∅ 11 x ∅ 6	20336.13	20336.11		20336.15
3/8", general purpose	∅ 14 x ∅ 6	20336.03	20336.01	20336.04	20336.05
1/2", pressure gauge	∅ 18 x ∅ 12	20336.53	20336.51	20336.54	20336.55
3/4", excess pressure valve	∅ 24 x ∅ 16		20336.61	20336.64	20336.65
Lids, M24 x 1.5	∅ 30 x ∅ 24		20337.11	20337.14	20337.15
Drain, M24 x 1.5	∅ 34 x ∅ 24		20337.21	20337.24	20337.25
Lids, M33 x 1.5	∅ 40 x ∅ 34		20337.31	20337.34	20337.35
Lids, M48 x 1.5	∅ 56 x ∅ 49		20337.41	20337.44	20337.45
Lids, M56 x 1.5	∅ 66 x ∅ 57		22309.31	22309.34	22309.35
Flange gaskets					
DN15 flange	∅ 28 x ∅ 16		20337.01	20337.04	20337.05
DN20 flange	∅ 30 x ∅ 24		20337.11	20337.14	20337.15
DN25 flange	∅ 36 x ∅ 24		20337.71	20337.74	20337.75
DN38 flange	∅ 50 x ∅ 40		20337.51	20337.54	20337.55
DN48 flange	∅ 60 x ∅ 50		20337.61	20337.64	20337.65
Sightglass gaskets					
Width ∅ 22, glass ∅ 30 mm	∅ 30 x ∅ 24		20337.11	20337.14	20337.15
Width ∅ 30, glass ∅ 40 mm	∅ 40 x ∅ 30		20336.71	20336.74	20336.75
Width ∅ 38, glass ∅ 50 mm	∅ 50 x ∅ 40		20337.51	20337.54	20337.55
Width ∅ 48, glass ∅ 60 mm	∅ 60 x ∅ 50		20337.61	20337.64	20337.65
Width ∅ 65, glass ∅ 80 mm	∅ 80 x ∅ 66		20337.81	20337.84	20337.85
68 mm rectangular	80 x 30 x 2		21068.02		
79 mm rectangular	95 x 34 x 2		21079.02		
124 mm rectangular	140 x 34 x 2		21124.02		

Lid gaskets for vessels

Vessel size	Dimension [mm]	Cat. no. PTFE	Cat. no. Klingersil	Cat. no. Gylon
1 ltr Vacuum	∅ 143 x ∅ 135 x 2	20338.31	20338.34	20338.35
2 ltr Vacuum	∅ 157 x ∅ 149 x 2	20339.01	20339.04	20339.05
4 ltr Vacuum	∅ 205 x ∅ 197 x 2	20340.11	20340.14	20340.15
10 ltr Vacuum	∅ 279 x ∅ 271 x 2	20342.11	20342.14	20342.15
15 ltr Vacuum	∅ 279 x ∅ 271 x 2	20342.11	20342.14	20342.15
20 ltr Vacuum	∅ 309 x ∅ 301 x 2	20343.11	20343.14	20343.15
30 ltr Vacuum	∅ 349 x ∅ 341 x 2	20344.11	20344.14	20344.15
40 ltr Vacuum	∅ 399 x ∅ 391 x 2	20346.11	20346.14	20346.15
50 ltr Vacuum	∅ 399 x ∅ 391 x 2	20346.11	20346.14	20346.15
1 ltr Conical vacuum	∅ 205 x ∅ 197 x 2	20340.11	20340.14	20340.15
2 ltr Conical vacuum	∅ 219 x ∅ 211 x 2	20349.11	20349.14	20349.15
4 ltr Conical vacuum	∅ 309 x ∅ 301 x 2	20343.11	20343.14	20343.15
10 ltr Conical vacuum	∅ 349 x ∅ 341 x 2	20344.11	20344.14	20344.15
15 ltr Conical vacuum	∅ 399 x ∅ 391 x 2	20346.11	20346.14	20346.15
1 ltr Pressure	∅ 143 x ∅ 135 x 2	20338.31	20338.34	20338.35
2 ltr Pressure	∅ 157 x ∅ 149 x 2	20339.01	20339.04	20339.05
5 ltr Pressure	∅ 229 x ∅ 211 x 2	20341.31	20341.34	20341.35
10 ltr Pressure	∅ 279 x ∅ 261 x 2	20342.31	20342.34	20342.35
20 ltr Pressure	∅ 293 x ∅ 275 x 2	20344.31	20344.34	20344.35
30 ltr Pressure	∅ 343 x ∅ 325 x 2	20345.31	20345.34	20345.35
40 ltr Pressure	∅ 383 x ∅ 365 x 2	20347.31	20347.34	20347.35
50 ltr Pressure	∅ 383 x ∅ 365 x 2	20347.31	20347.34	20347.35
1 ltr Conical pressure	∅ 193 x ∅ 184 x 2	20348.31	20348.34	20348.35
2 ltr Conical pressure	∅ 229 x ∅ 211 x 2	20341.31	20341.34	20341.35
5 ltr Conical pressure	∅ 293 x ∅ 275 x 2	20344.31	20344.34	20344.35
10 ltr Conical pressure	∅ 343 x ∅ 325 x 2	20345.31	20345.34	20345.35
15 ltr Conical pressure	∅ 383 x ∅ 365 x 2	20347.31	20347.34	20347.35
Gaskets for conical joint adaptors with caps				
B14.5 + B19	∅ 28 x ∅ 20	20336.21	20336.24	20336.25
B29	∅ 36 x ∅ 30	20336.31	20336.34	20336.35
B45	∅ 52 x ∅ 45	20336.41	20336.24	20336.25
Gaskets for tube-and-shell condensers				
From 1993 on	∅ 115 x ∅ 107 x 2	20481.11	20481.14	20481.15
Before 1993	∅ 108 x ∅ 103 x 2	10480.11		

Replacement bolts for lids

Use only bolts listed below or in the instructions for use. If bolts of other sizes or quality are used, a dangerous situation can arise. In any case, the guarantee is rendered void. In case of doubt contact us stating the vessel size, year of manufacture and serial number.

Vessel type	Size	DIN und quality stamp	Cat. no.
Stud, 1 and 2 litre pressure	M12 x 40	939 A2-70	20490.40
Hexagonal bolt, 1 and 2 litre pressure	M12 x 50	939 A2-70	20490.50
Hexagonal bolt, 5 litre pressure	M16 x 75	931 A2-70	20491.75
Hexagonal bolt, 10 and 20 litre pressure	M16 x 80	931 A2-70	20491.80
Hexagonal bolt, 30 and 50 litre pressure	M16 x 85	931 A2-70	20491.85

Clamps for vacuumvessels

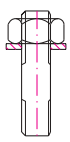
	Cat. no.
Clamp, 32 mm	20464.32
Clamp, 38 mm	20464.38

Special tools

		Cat. no.
Ring key 10/60	For sightglass rings on vacuum vessels etc	20510.60
C-spanner 32/36	For round adaptors 32 - 36 mm ∅	20532.36
C-spanner 40/42	For round adaptors 40 - 42 mm ∅	20540.42
C-spanner 45/50	For round adaptors 45 - 50 mm ∅	20545.50
C-spanner 52/55	For round adaptors 52 - 56 mm ∅	20552.55
C-spanner 58/62	For round adaptors 58 - 65 mm ∅	20558.62

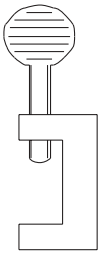
Luviskol-glycercine stirrerhead lubricant

	Size [ml]	Cat. no.
A special lubricant for stirrerheads is described on pages 51-55, 77 und 78	100	20313.00



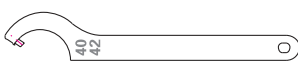
Stud

Bolt



Clamp

Ring key



C-spanner

Fixed lid lifting jack

A hydraulic ram lowers and raises the vessel body. The vessel body can be tipped to one side for cleaning and draining purposes.

The drive motor and the lid remain fixed in position. This eliminates long turnround times caused by disassembly and re-assembly of any attached apparatus.

The stage is supplied with bearing fork for the vessel and a mounting for the lid.

Dimensions	[mm]
Lifting jack 1–5 litre vessel	500 x 480
Clearance under lid	673–700
Lifting jack 10–30 litre vessel	735 x 680
Clearance under lid	873–1200

Vessel size [ltr]	Cat. no.
1 + 2	42295.02
5 + 10	42295.10
15 + 20	42295.20
30 + 40	42295.30
50	42295.50

Vessel in normal position for use

Vessel body is raised and lowered

Vessel can be easily filled, drained and cleaned

Fixed body lifting jack

A hydraulic ram lowers and raises the vessel lid, including the stirrer drive motor. The vessel body can be accessed for filling, draining and cleaning. This eliminates long turnround times caused by disassembly and re-assembly of any attached apparatus.

The vessel body is attached to the static part of the jack assembly. The jack is supplied already fitted to the vessel.

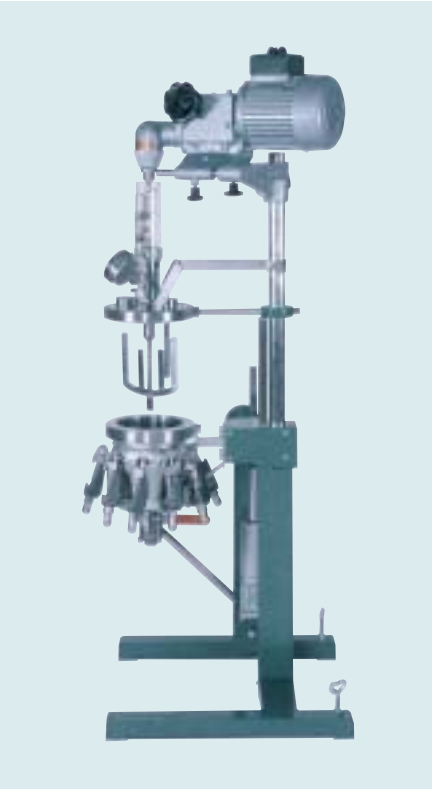
Dimensions	[mm]
Lifting jack 1–2 litre vessel	500 x 480
Overall height	850
Lifting jack 5 litre vessel	680 x 480
Overall height	950

Existing vessels can be modified for use with this pattern of jack.

Vessel size [ltr]	Cat. no.
1	42299.01
2	42299.02
5	42299.05

Vessel in normal position for use

Lid with stirrer assembly and fittings is raised



Vessel body can be detached for cleaning

Stirrer drive with stand and motor

Speed range 9:1

- All steel assembly, continuously variable over a 9 to 1 range. With angle gearbox and three jawed chuck for the output shaft. For output shafts 1 to 8 mm diameter.
- Motor output 250 W, 400 V / 50 Hz 3 phase, protected to IP54. With ON/OFF rocker switch.
- Supplied with stand and adjustable bearer fork. Height of motor (H2) approx. 235

Speed range [rpm]	Output torque [Nm]	Cat. no.
17–155	30.0–11.7	30017.00
22–204	30.0–8.25	30022.00
38–346	30.0–5.25	30038.00
47–425	28.2–4.34	30047.00
61–553	21.6–3.3	30061.00
103– 933	12.9–1.95	30103.00
155–1400	8.3–1.33	30155.00

Maximum allowable gearbox torque: 30 Nm.

Version with explosion proof motor to Eex e II T1 - T4
Explosion proof, without rocker switch *.99

Stirrer drive with stand and motor

Speed range 0 to max rpm

- All steel assembly, continuously variable from 0 to max rpm. Motor output 750 W, 400 V / 50 Hz 3 phase, protected to IP54. Supplied with stand and adjustable bearer fork. Motor mounted vertically, no gearbox. Height of motor (H4) approx. 427 mm.

Speed range [rpm]	Output torque [Nm]	Cat. no.
0–1400	4.5–3.5	31200.00

As above, but with angle gearbox, motor height (H2) approx. 292 mm.

Speed range [rpm]	Output torque [Nm]	Cat. no.
0–657	9.0–7.0	30700.00
0–1437	4.5–3.5	31400.00
0–2875	1.8–1.4	33500.00

Version with explosion proof motor to Eex e II T1 - T4
Explosion proof *.98

Stirrer drives with stand, motor and frequenzy changer

With seperate frequency changer
Speed range 10:1

- Motor without gearbox with stepless speed range using a frequency changer.
  Motor output 1.1 kW, protected to IP54.
  Frequency changer, supply 200 - 240 V / 50 Hz AC. With mains filter, protected to IP100.
- Motor mounted vertically, no gearbox.
  Motor height (H4) approx. 325 mm. Operated from frequency changer.

Speed range [rpm]	Output torque [Nm]	Cat. no.
ca. 282–1410–2820	4.4–7.4–3.6	34011.00

- as above, but with gearbox, ratio approx. 5:1, H4 approx. 515 mm

Speed range [rpm]	Output torque [Nm]	Cat. no.
ca. 56–282–564	ca. 20–35–16	34011.05

Frequency changer in a steel cabinet. With mains switch, filter and cable.

Cabinet dimensions: 380 x 300 x 155 mm

Other speed ranges and outputs available
Explosion proof motors available

With frequenzy changer built into motor
Speed range 10:1

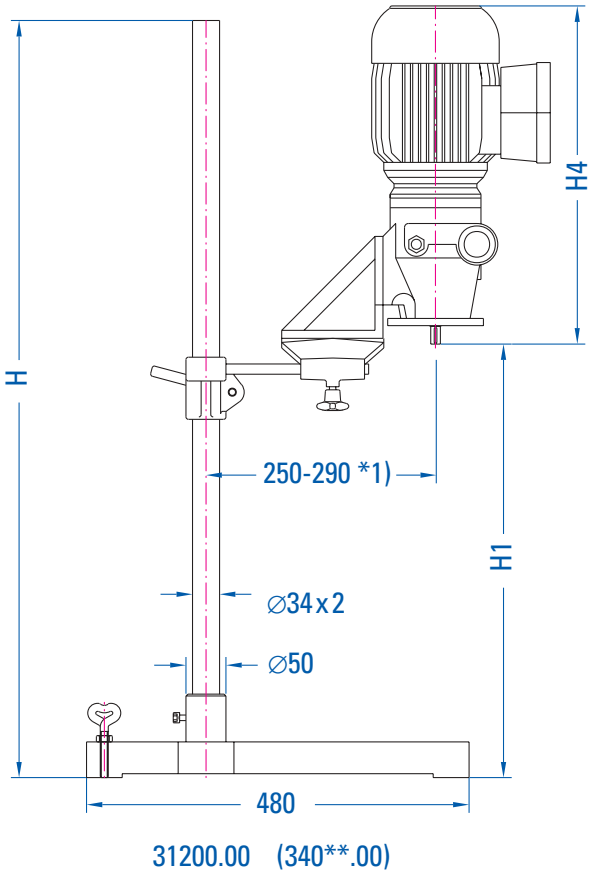
- Motor with stepless speed adjustment using a frequency changer.
  Motor output 2.2 kW
- Supply 400 V / 50 Hz 3 phase. With remote control with approx. 3 m cable.
- Motor mounted vertically, no gearbox. Motor height (H4) approx. 560 mm.

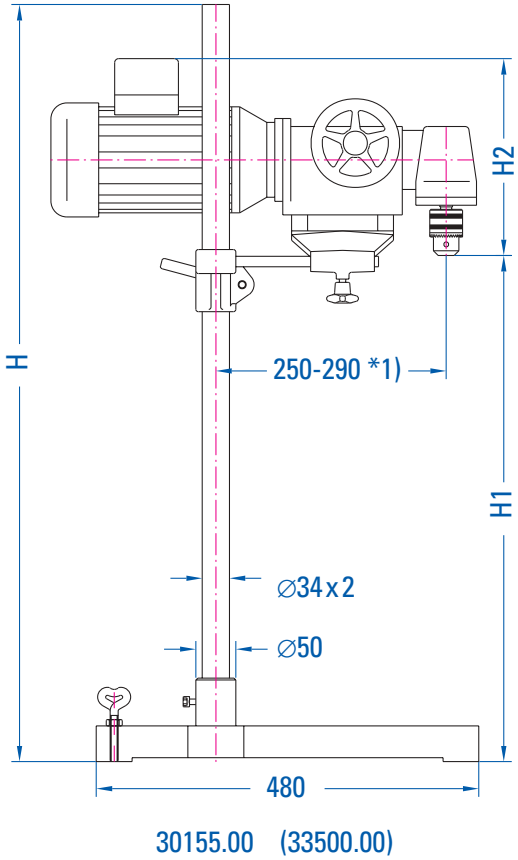
Speed range [rpm]	Output torque [Nm]	Cat. no.
ca. 412–3000–4126	ca. 6.11–10.1–4.08	34022.00

Other speed ranges and outputs available.
No explosion proof version available.

Contact us if you have any questions about the choice the right stirrer drive for your application.

Stirrer drives with stands for vacuum and pressure vessels





*1) Radial adjustment range

Stands for stirrer drives

Volume [ltr]	Foot width [mm]	Height H [mm]	Usable height H1 [mm]	Weight*2) [kg]	Cat. no.
1+2	500	895	837	15	32001.02
4	630	945	837	22	32004.05
5	630	995	895	22	32004.05
10	630	1100	995	22	32010.20
15	630	1150	1045	22	32010.20
20	630	1200	1095	22	32010.20
30	630	1250	1165	16	32030.50
40	500	1300	1195	16	32030.50
50	500	1400	1295	16	32030.50

	Cat. no.
Bearer fork without stand (drawing on the right)	32100.00
Bearer fork (drawing on the left)	32100.10

*2) Weight without motor

Torque measurement

- Stirrer shaft torque is measured using a non-contact torque sensor, whose output is independent of the shaft rotation speed.
- Torque measurement range 2 - 50 Nm, with 1.5 overload margin. Can be statically calibrated. Tachometer range 800 to 6 000 rpm.
- Compact housing containing a photoelectric tachometer sensor. With maintenance-free bearings and connection cable.

Display unit in a bench cabinet or a 19" 3HE rack mounting to DIN 41 494.

- Contains power supply for sensors and signal handling system.
- Power supply 230 V / 50 Hz
- Signal processing system has controls for setting gain and zero. LED power on indicator, digital displays of torque and rotation speed. Two switchable torque ranges: x1 and x10.
- Outputs: ± 0 - 10 V DC or 4 - 20 mA (0 - 20 mA) current loop for both torque and rotation speed.

Nominal torque [Nm]	Max speed [rpm]	Cat. no.
2	8000	35500.02
5	8000	35500.05
10	8000	35500.10
20	6000	35500.20
50	6000	35500.50

Rack mounted version can is installed in a cabinet 800 x 800 x 350 mm

- With connection cable. All 0 - 10 V DC or 4 - 20 mA (0 - 20 mA) outlets brought to the outside.
- Cabinet fully wired.

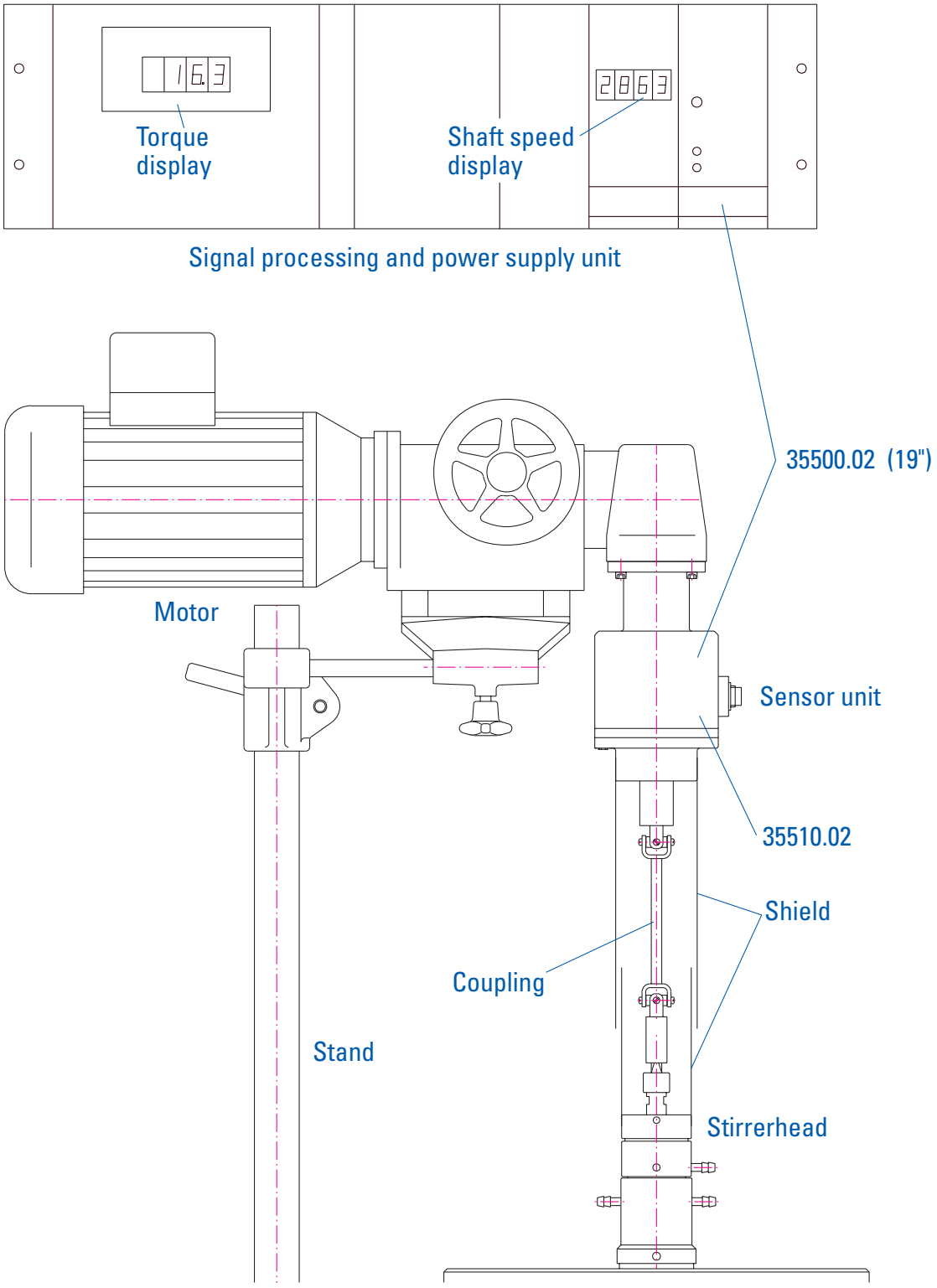
	Cat. no.
	35501.00

Sensor unit
Supply voltage 24 V DC

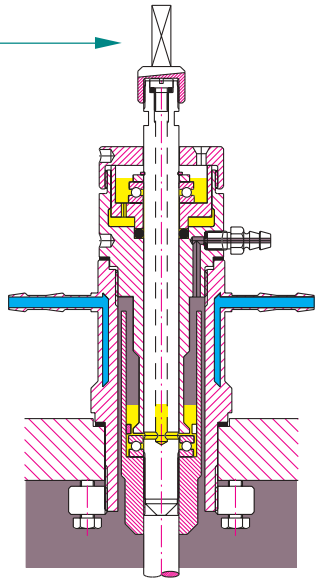
- Torque output: ± 10 V, Tachometer output: 360 impulses / revolution
- Includes connection cable, but not the display unit.

Nominal torque [Nm]	Max speed [rpm]	Cat. no.
2	8000	35510.02
5	8000	35510.05
10	8000	35510.10
20	6000	35510.20
50	6000	35510.50

Torque measurement JU



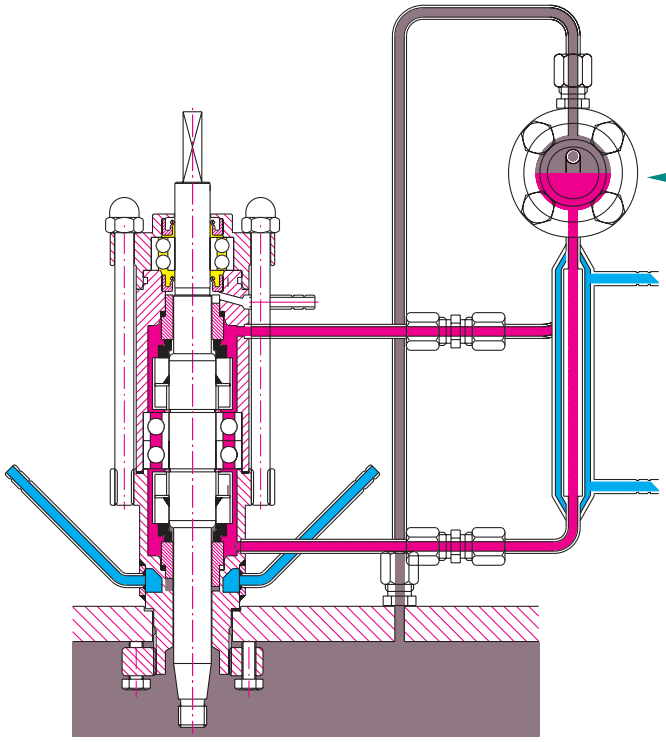
'O' and oil film sealed stirrerhead



- For use up to 350 °C
- For vacuum and pressures up to 25 Bar
- See pages 57–61 for description

Lowest cost option for undemanding applications. It requires constant attention and, at higher pressures, frequent maintenance. The 'O' ring imposes a high and variable counter-torque on the shaft.

Hence it is unsuitable for use with the torque measurement unit.

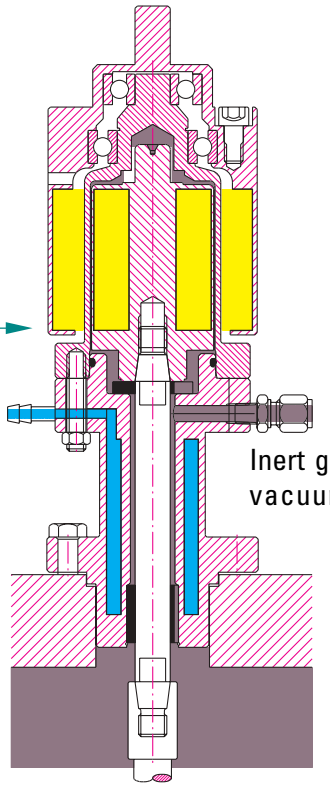


Mechanically sealed stirrerhead

- For use up to 350 °C
- For vacuum and pressures up to 50 Bar at 4 000 rpm.
- See pages 62–67 for description

This triple ball bearing stirrerhead is practically maintenance free. Years of use without maintenance are normal. Pressure has no effect on the shaft counter-torque. The counter-torque varies from 0.2 Nm at 100 rpm to 0.9 Nm at 4 000 rpm.

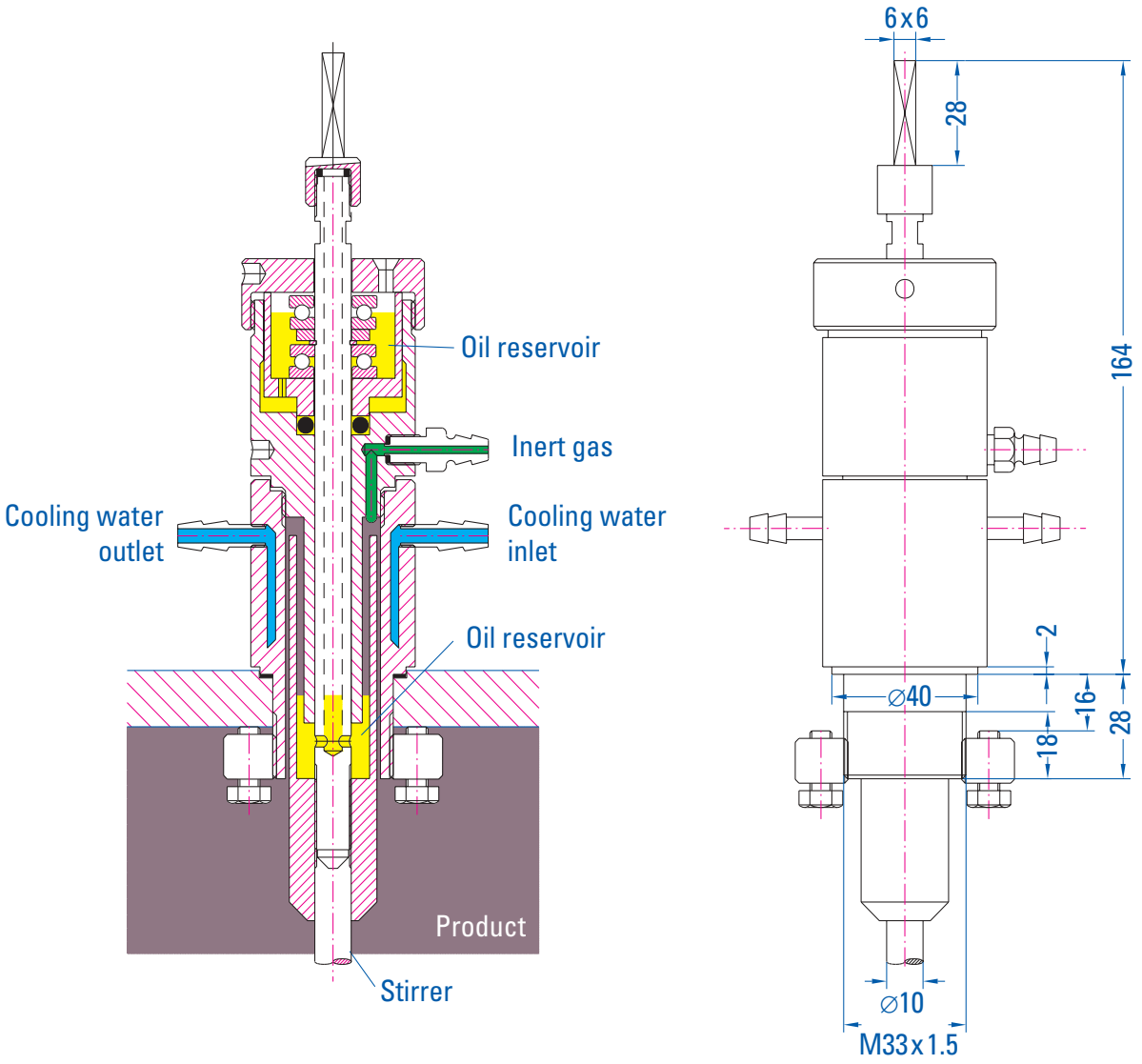
Magnetically coupled stirrerhead



- For use up to 350 °C
- For vacuum and pressures up to 50 Bar (special versions available for up to 150 Bar 1 600 rpm)
- See pages 68–75 for description

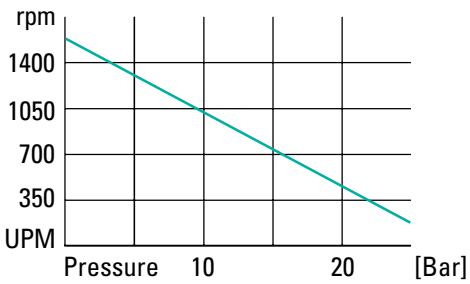
This stirrerhead has a static seal. No gasket comes into contact with moving parts. Pressure has no effect on the shaft counter-torque. The counter-torque varies from 0.2 Nm at 100 rpm to 1.5 Nm at 1 500 rpm.

'O' ring sealed stirrerhead, shaft diameter 10 mm



- Uses an oil film controlled by an 'O' ring for sealing the shaft
- Suitable for pressures up to 25 Bar
- All parts in contact with product protected against corrosion
- Suitable for use up to 350 °C with cooling
- Suitable for light duty application in vessels from 1–2 litres capacity
- Standard equipment for 1–2 litre JUVO vessels

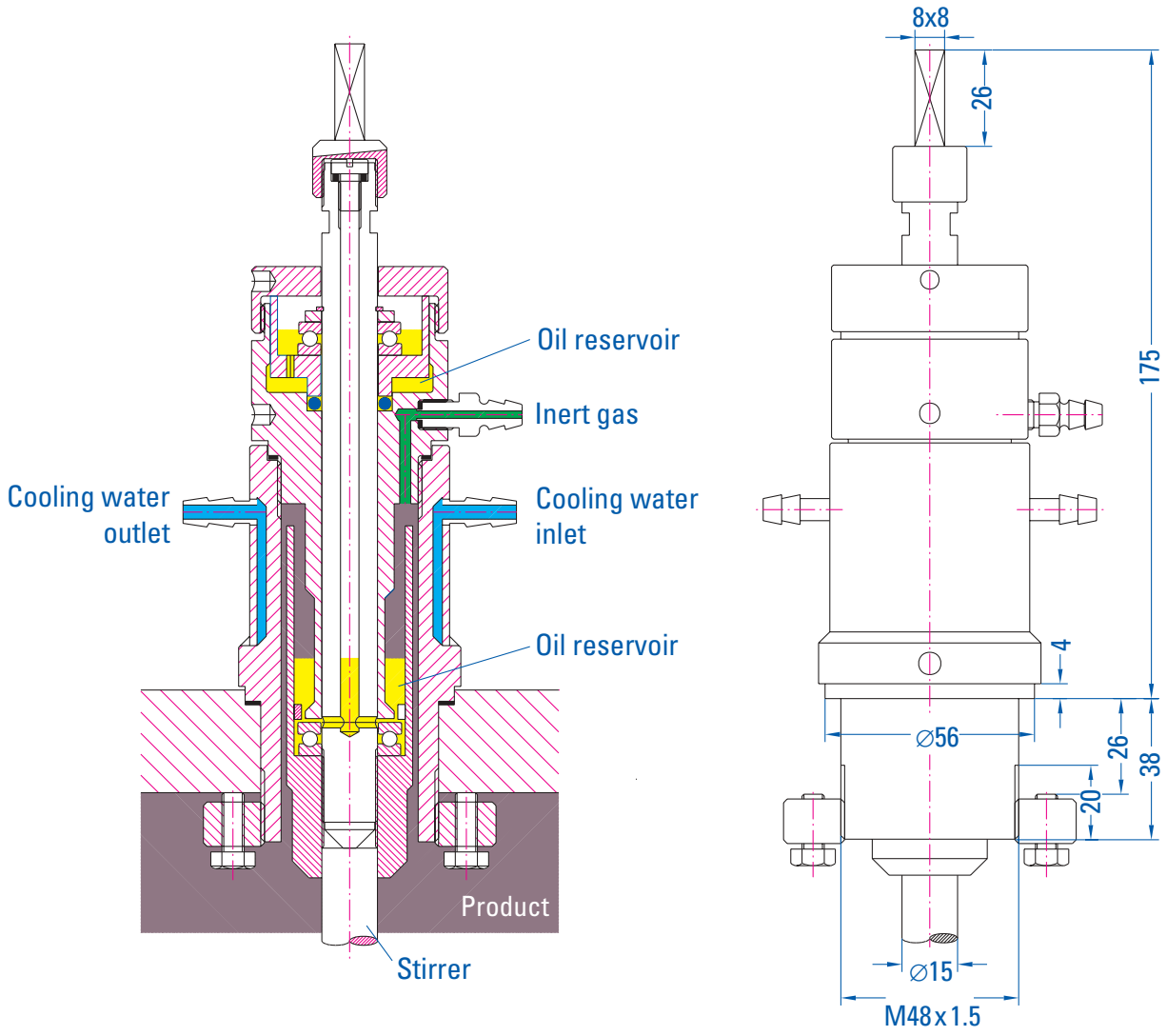
Recommended zone of application
(Pressure v Rotation speed)



Item	Cat. no.
Stirrerhead with 'O' ring seal Shaft diameter 10 mm, threaded M33 x 1.5	10310.00

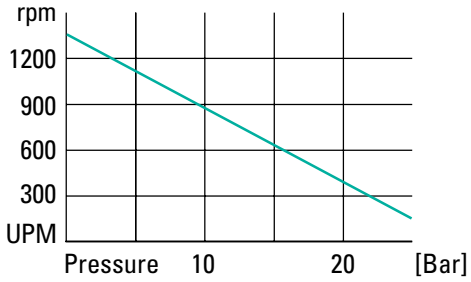
Item	Cat. no.
Stirrerhead with 'O' ring seal Stainless steel with a PTFE bearing Threaded M33 x 1.5	10310.11

'O' ring sealed stirrerhead, shaft diameter 15 mm



- Uses an oil film controlled by an 'O' ring for sealing the shaft
- Suitable for pressures up to 25 Bar
- All parts in contact with product protected against corrosion
- Suitable for use up to 350 °C with cooling
- Suitable for light duty applications in vessels from 5–50 litres capacity
- Standard equipment for 5–50 litre JUVO pressure vessels and 30 and 50 litre vacuum vessels.

Recommended zone of application
(Pressure v Rotation speed)



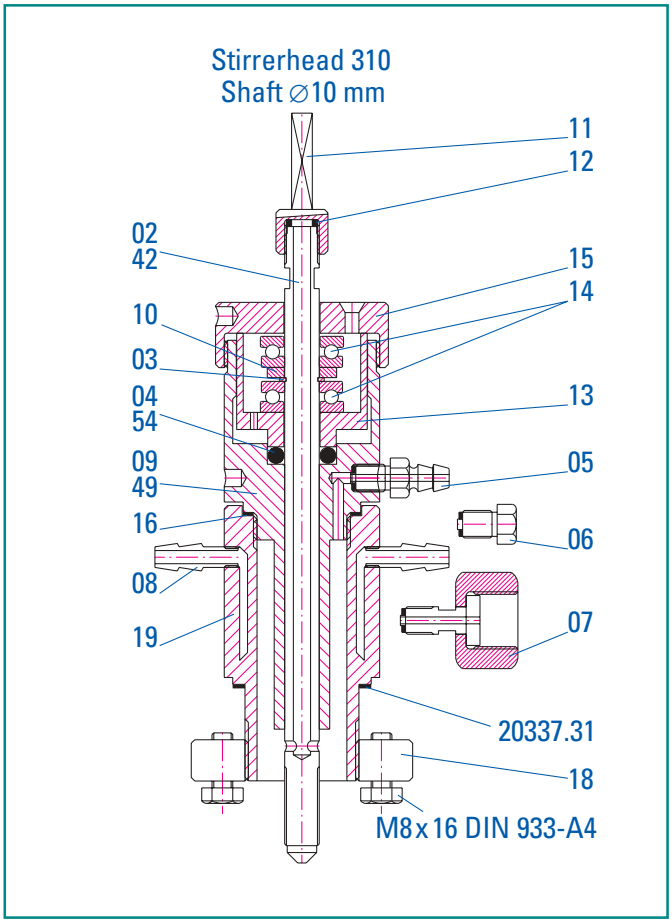
Item	Cat. no.
Stirrerhead with 'O' ring seal	
Nickel plated brass upper body	
M48 x 1.5 thread fixing	10312.00
Flange fixing 48.5 mm with 8 x M10 bolts on a 74 mm circle	10312.20

Item	Cat. no.
Stirrerhead with 'O' ring seal	
Stainless steel upper body	
M48 x 1.5 thread fixing	10312.11
Flange fixing 48.5 mm with 8 x M10 bolts on a 74 mm circle	10312.21

Spare parts for 'O' ring sealed stirrerheads 310 and 312

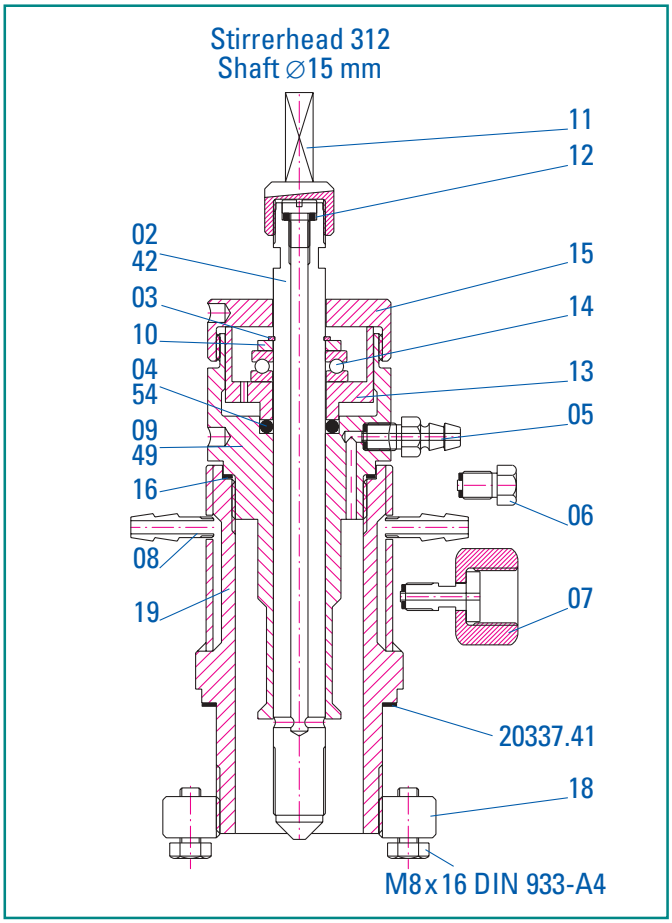
Stirrerhead 310, shaft diameter 10 mm

Item	Description	Cat. no.
Main drive shaft	Chromium plated	20310.02
Main drive shaft	Stainless steel	20310.42
Circlip	A 10	20310.03
Viton 'O' ring	10 x 5	20310.04
FEP sheathed 'O' ring	10 x 5	20310.54
Hose connector DN 2	M8 x 1	20310.05
Blanking plug	M8 x 1	20310.06
Gas connector DN 2	M8 x 1, 3/8" BSP	20310.07
Coolant connector	DN4 / 8 mm	20310.08
Upper body	Ni plated brass	20310.09
Upper body	Stainless steel	20310.49
Spacer		20310.10
Upper drive shaft	6 x 6	20310.11
Drive shaft gasket		20310.12
Stuffing box		20310.13
Ball bearings	51100	20310.14
Stirrerhead cap		20310.15
PTFE gasket	34 x 28 x 1	20310.16
PTFE gasket	40 x 34 x 1	20310.31
Locknut, M33 x 1.5	Stainless steel	20310.18
Lower body	Stainless steel	20310.19

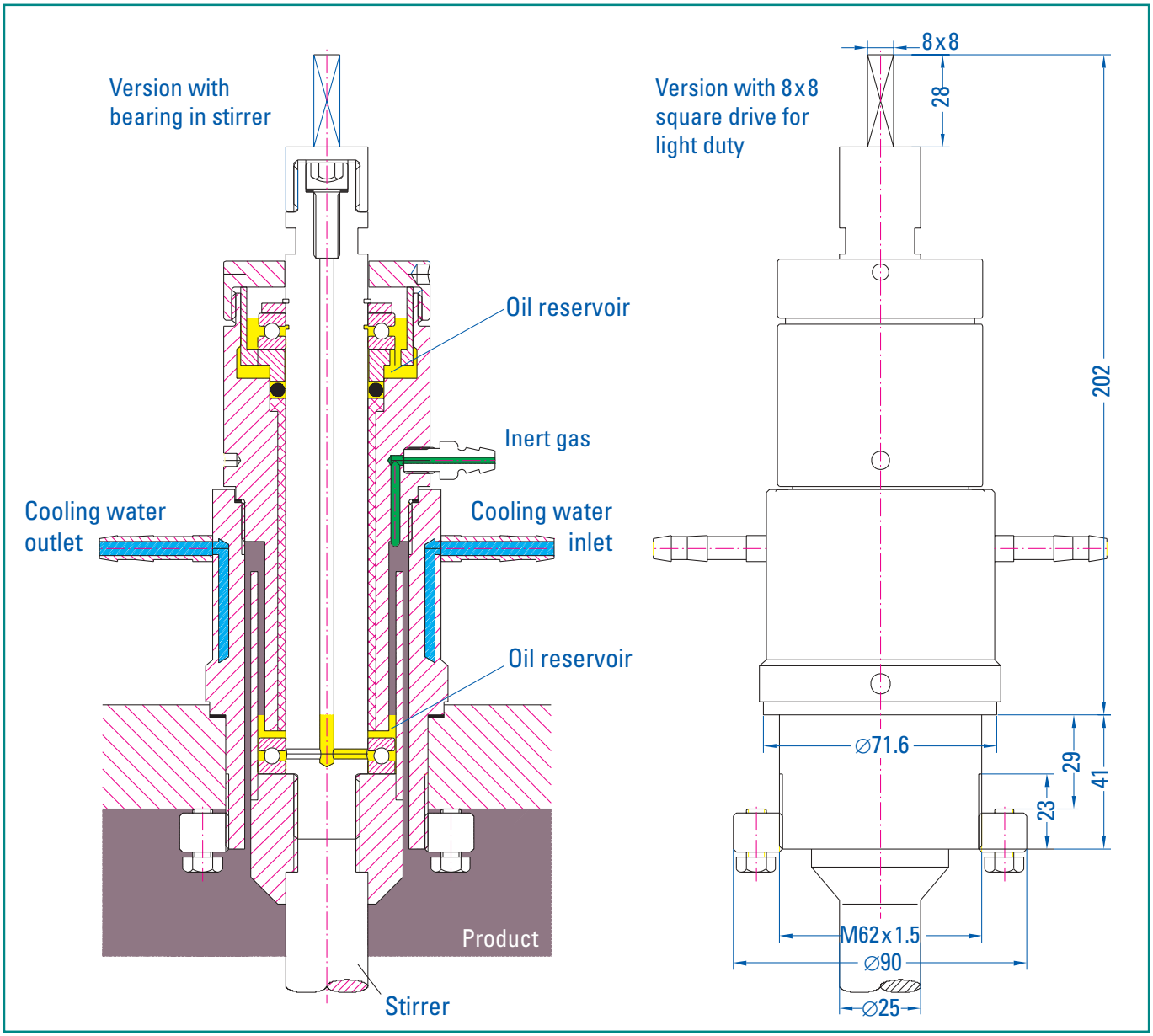


Stirrerhead 312, shaft diameter 15 mm

Item	Description	Cat. no.
Main drive shaft	Chromium plated	20312.02
Main drive shaft	Stainless steel	20312.42
Circlip	A 15	20312.03
Viton 'O' ring	15 x 4	20312.04
FEP sheathed 'O' ring	15 x 4	20312.54
Parafluor 'O' ring	15 x 4	20312.69
Hose connector DN 2	M8 x 1	20312.05
Blanking plug	M8 x 1	20312.06
Gas connector DN 2	M8 x 1, 3/8" BSP	20312.07
Coolant connector	DN4 / 8 mm	20312.08
Upper body	Ni plated brass	20312.09
Upper body	Stainless steel	20312.49
Spacer		20312.10
Upper drive shaft	8 x 8	20312.11
Drive shaft plug		20312.12
Stuffing box		20312.13
Ball bearings	51102	20312.14
Stirrerhead cap		20312.15
PTFE gasket	44 x 39 x 1	20312.16
PTFE gasket	56 x 49 x 1	20312.31
Locknut, M33 x 1.5	Stainless steel	20312.18
Lower body	Stainless steel	20312.19

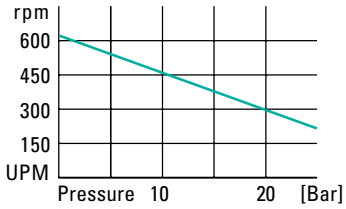


'O' ring sealed stirrerhead, shaft diameter 25 mm



- Uses an oil film controlled by an 'O' ring for sealing the shaft
- Suitable for pressures up to 25 Bar (but see below)
- All parts in contact with product protected against corrosion
- Suitable for use up to 350 °C with cooling
- Suitable for heavy duty applications in vessels up to 128 litres capacity
- Standard equipment for vessels from 99 litres capacity

Recommended zone of application
(Pressure v Rotation speed)

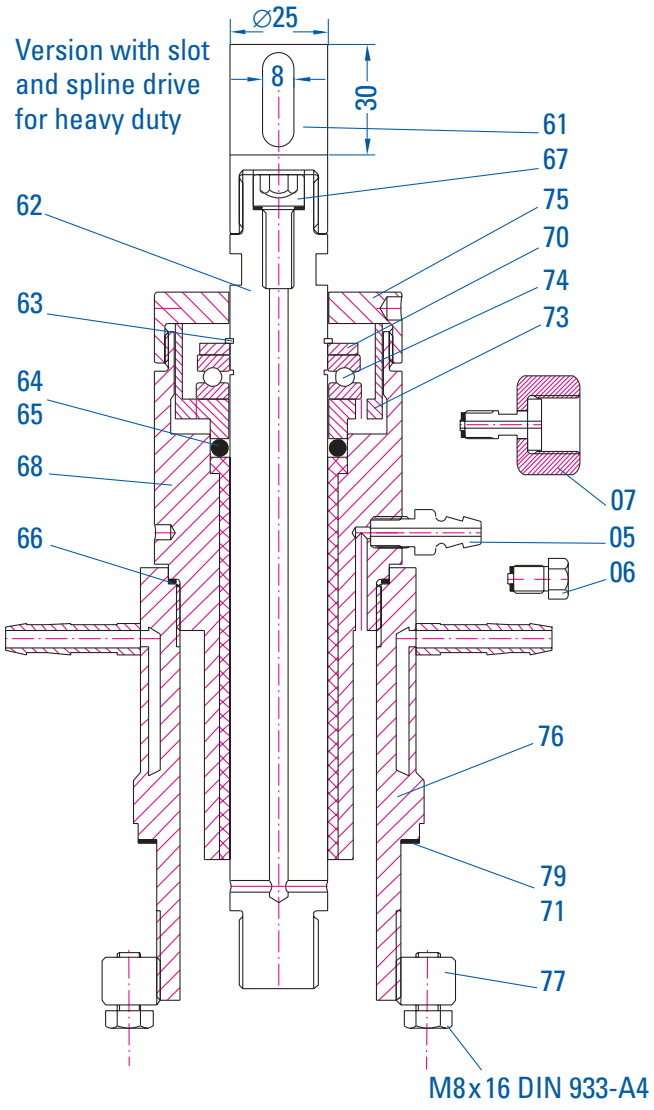


Item	Cat. no.
Stirrerhead with 'O' ring seal, stainless steel	
With one bearing in stirrer, second in stirrerhead	
M62 x 1.5 thread fixing	10312.40
Flange fixing 62.5 mm with 8 x M10 bolts on a 90 mm circle	10312.50

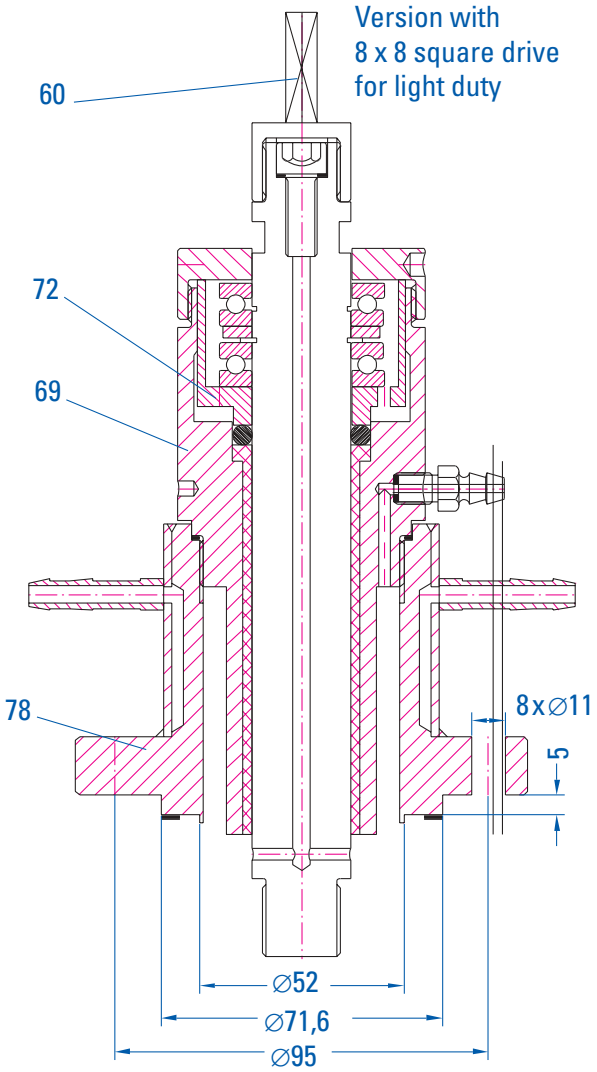
Item	Cat. no.
Stirrerhead with 'O' ring seal, stainless steel,	
max pressure 6 Bar	
With both bearings in stirrerhead	
M62 x 1.5 thread fixing	10312.42
Flange fixing 62.5 mm with 8 x M10 bolts on a 90 mm circle	10312.52

Spare parts for 'O' ring sealed stirrerhead 312-25

10312.40
Version with one bearing in stirrer and one in stirrerhead



10312.52
Version with two bearings in stirrerhead

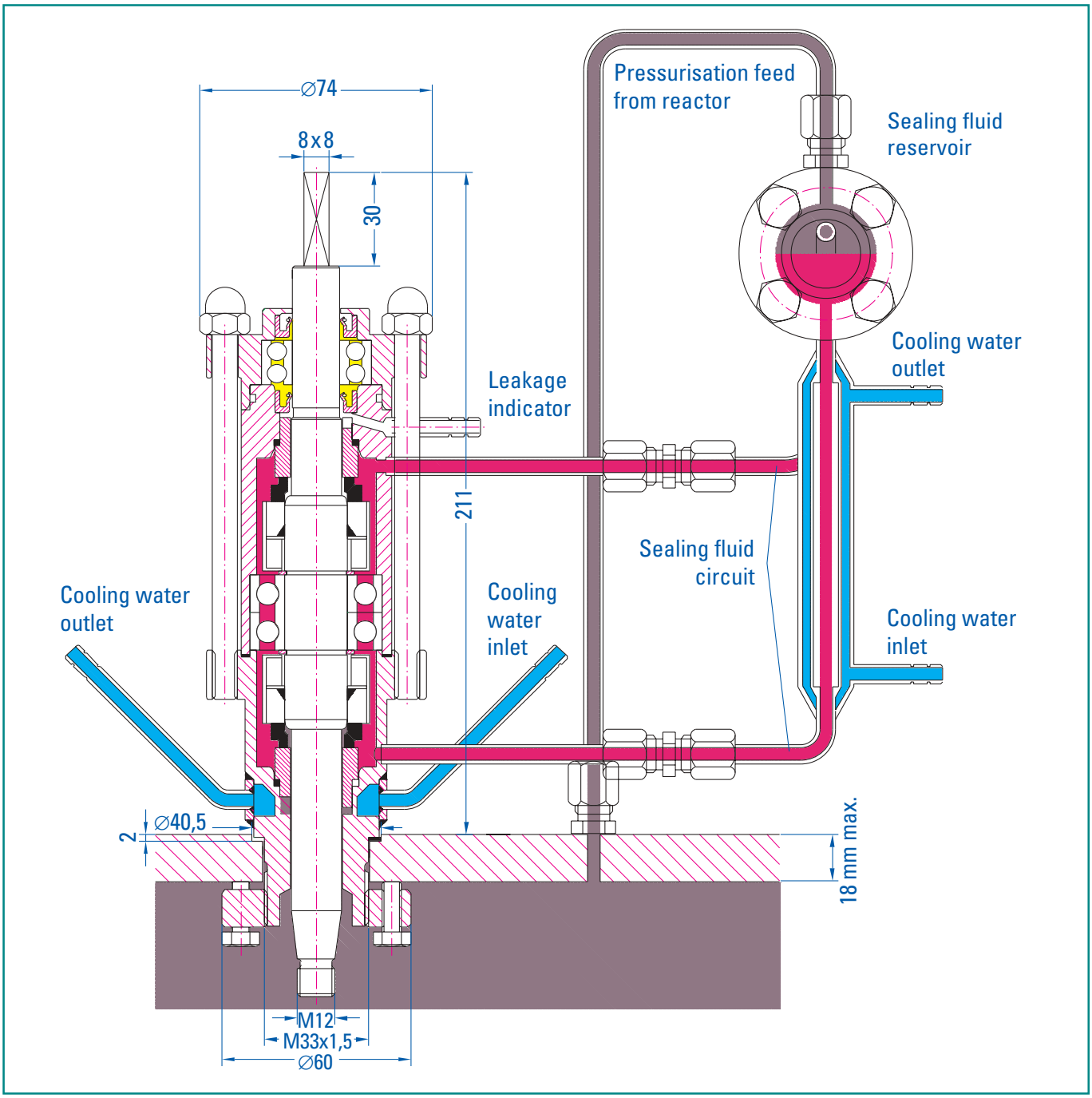


Item	Description	Cat. no.
Square drive	8 x 8	21312.60
Slot and spline drive	25 mm diam	21312.61
Drive shaft	Stainless steel	21312.62
Circlip	A 25	21312.63
Viton 'O' ring	25 x 4	21312.64
FEP sheathed 'O' ring	25 x 4	21312.65
Gasket, PTFE	56 x 52 x 1	21312.66
Drive shaft plug	M8	21312.67
Upper body, one bearing	Stainless steel	21312.68
Upper body, two bearings	Stainless steel	21312.69
Spacer		21312.70
Gasket, PTFE	71 x 62 x 1	21312.71

Item	Description	Cat. no.
Stuffing box, two bearings	Stainless steel	21312.72
Stuffing box, one bearing	Stainless steel	21312.73
Ball bearing	51105	21312.74
Stirrerhead cap	Chromium plated	21312.75
Lower body, thread fixing	Stainless steel	21312.76
Locknut M62 x 1.5	Stainless steel	21312.77
Lower body, flange fixing	Stainless steel	21312.78
Gasket, Klingersil	71 x 62 x 2	21312.79
Hose connector DN 2	M8 x 1	20312.05
Blanking plug	M8 x 1	20312.06
Gas connector DN 2	M8 x 1, 3/8" BSP	20312.07

Gaskets, 'O' rings and bearings are consumables

Mechanically sealed stirrerhead, M33 x 1.5 screw fixing, shaft diameter 15 mm

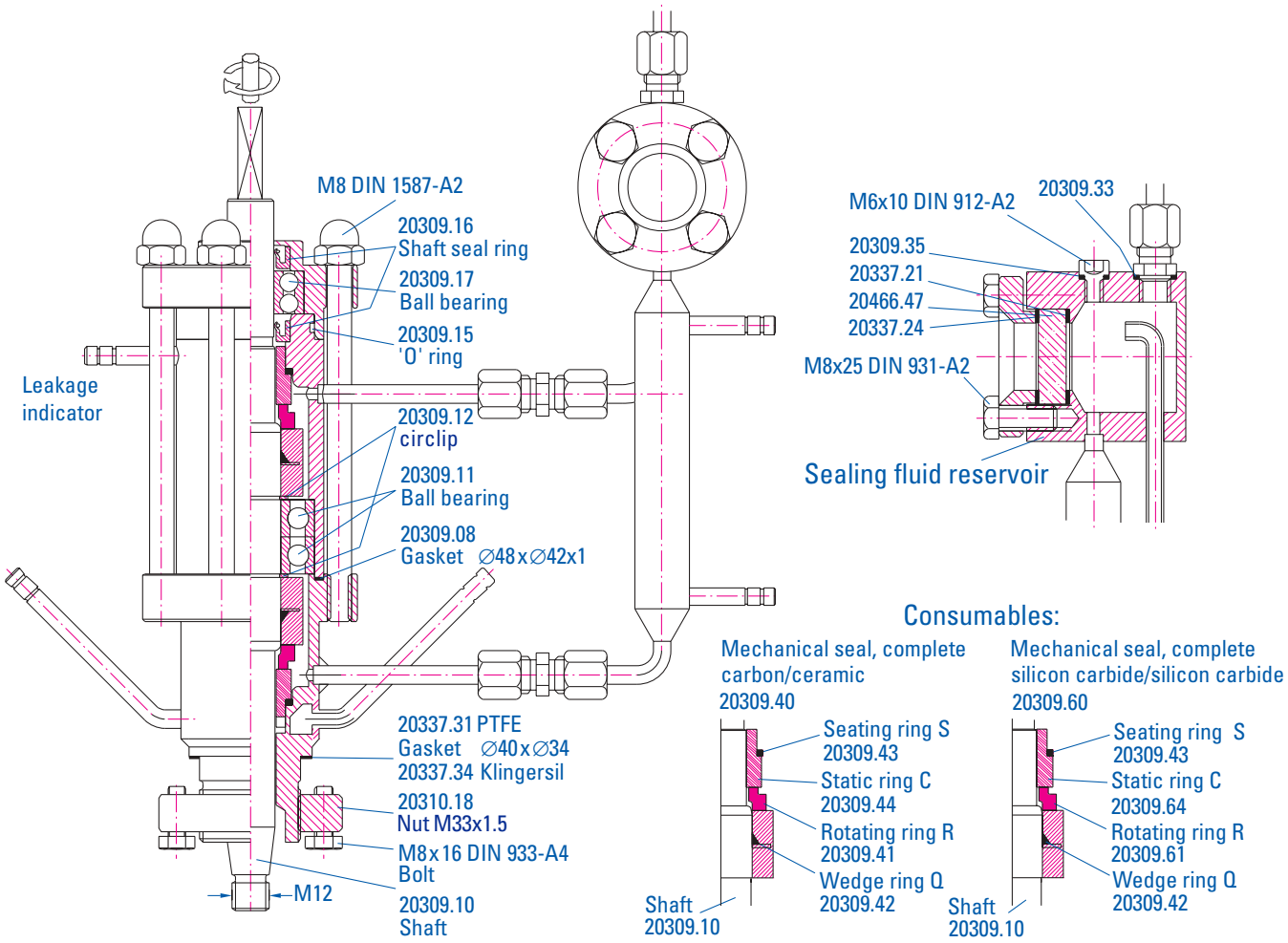


- Shaft seal suitable for heavy duty applications
- M33 x 1.5 threaded fixing for vessels of 1–2 litres capacity
- Made from 316 stainless steel
- Shaft held by three ball bearings, two situated between the two back-to-back mechanical seals
- Mechanical seals are free from loads. Auxiliary seals PTFE
- Suitable for all applications
- Supplied with sealing fluid reservoir

Technical data	
Max. operating pressure	50 Bar
Max. operating temperature	350 °C
Max. rotation speed	4 000 rpm

Item	Cat. no.
With carbon/ceramic seals	10309.00
With silicon carbide seals	10309.11

Spare parts for mechanically sealed stirrerhead, M33 x 1.5 fixing

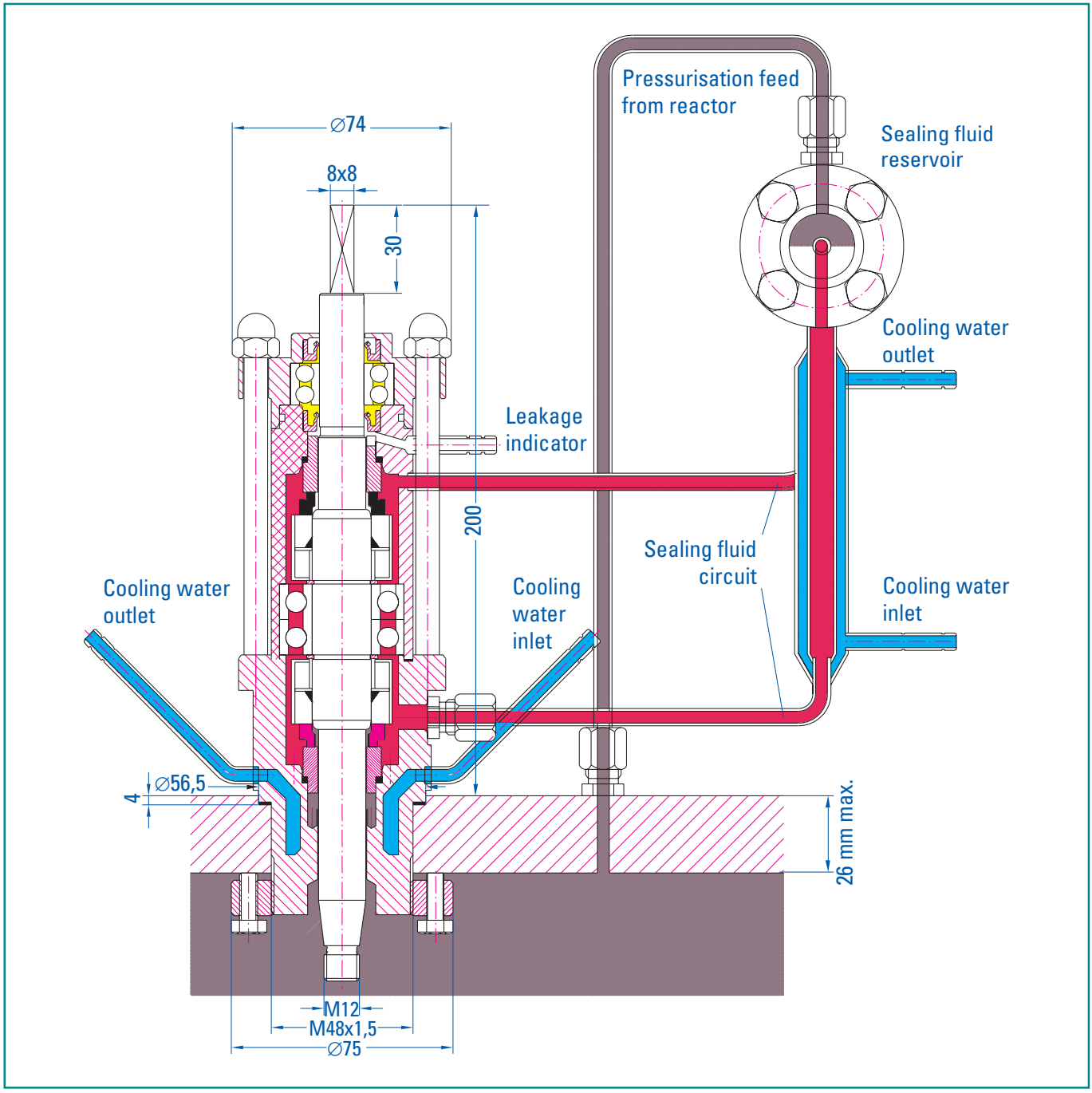


For further information spare parts please refer to the operating instructions.

Carbon/ceramic seals resist the following media:

Acetaldehyde	Ethylene oxide	Potassium nitrate
Acetic acid 50%	Fatty acids	Potassium permanganate solution
Adiponitrile	Film developer solution	Sodium acetate solution
Ammonium acetate solution	Gallic acid	Sodium bisulfite solution
Ammonium carbonate solution	Glucose solution	Sodium carbonate solution
Ammonium phosphate solution	Hydrazine solution	Sodium cyanide solution
Ammonium sulfate	Iron II sulfate solution	Sodium dihydrogen phosphate solution
Aqueous ammonia	Iron III sulfate solution	Sodium nitrate solution
Benzoic acid	Maleic acid solution	Sodium nitrite solution
Butylamine	Malic acid	Sodium sulfate solution
Calcium bisulfate	Methyl bromide	Sodium sulfide solution
Calcium carbonate	Nickel sulfate solution	Sodium thiocyanate solution
Calcium phosphate slurry	Oleic acid	Sodium thiosulfate solution
Copper I cyanide solution	Potassium chlorate solution	Sulfated oils
Copper sulfate solution	Potassium cyanide solution	Urea solution
Ethyl acetate	Potassium dichromate solution	

Mechanically sealed stirrerhead, M48 x 1.5 screw or DN 48 flange fixing, shaft

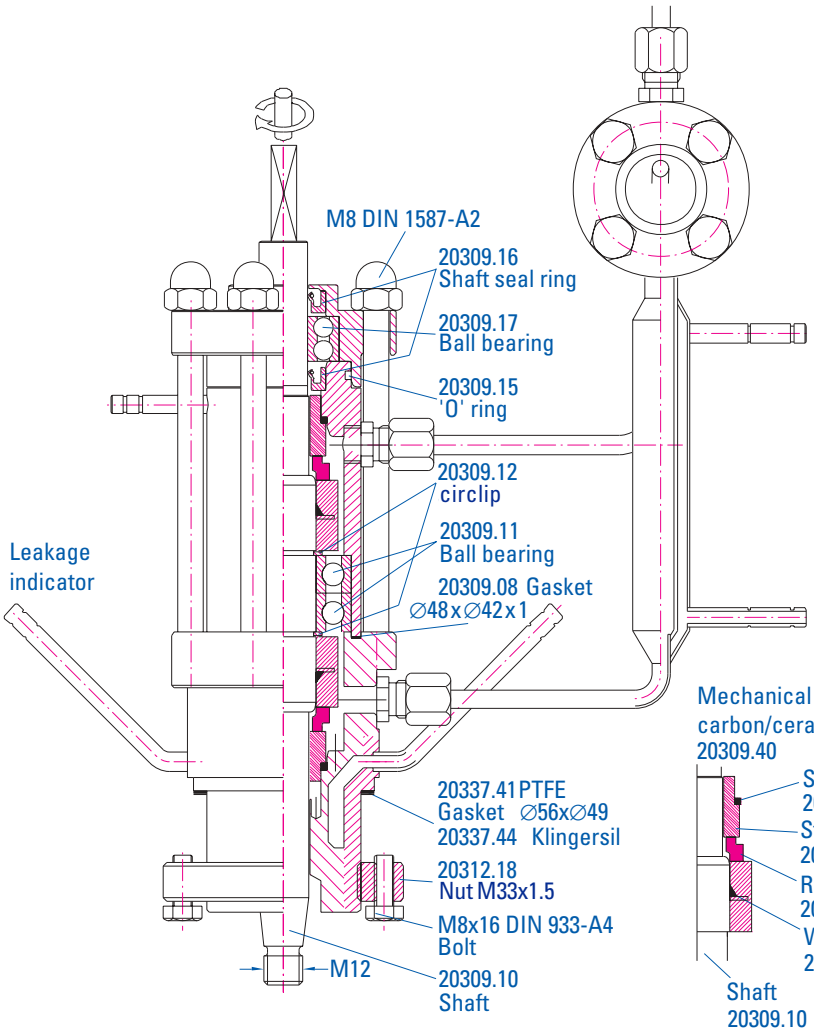


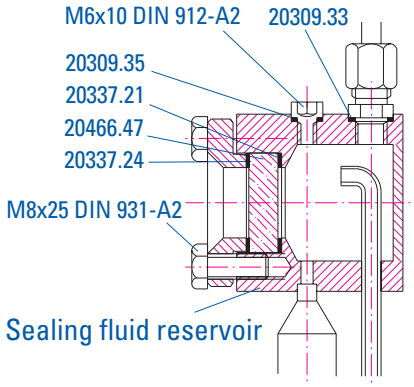
- Shaft seal suitable for heavy duty applications
- M48 x 1.5 threaded or flange fixing for vessels of 5–50 litres capacity
- Made from 316 stainless steel
- Shaft held by three ball bearings, two situated between the two back-to-back mechanical seals
- Mechanical seals are free from loads. Auxiliary seals PTFE
- Suitable for all applications
- Supplied with sealing fluid reservoir

Technical data	
Max. operating pressure	50 Bar
Max. operating temperature	350 °C
Max. rotation speed	4 000 rpm

Item	Cat. no.
With carbon/ceramic seals	
M48 x 1.5 threaded fixing	10309.50
DN48 flange fixing	10309.60
With silicon carbide seals	
M48 x 1.5 threaded fixing	10309.55
DN48 flange fixing	10309.65

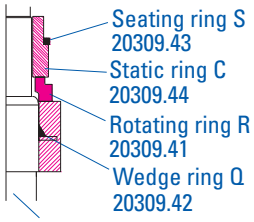
Spare parts for mechanically sealed stirrerhead, M48 x 1.5 or flange fixing



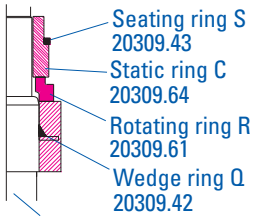


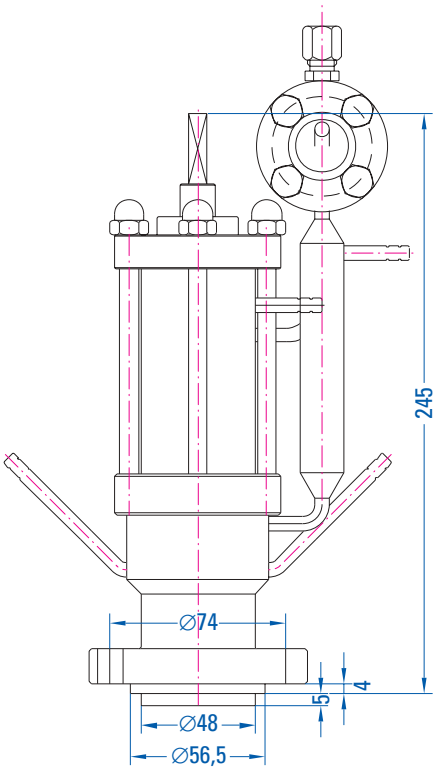
Consumables:

Mechanical seal, complete carbon/ceramic
20309.40

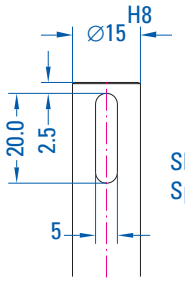


Mechanical seal, complete silicon carbide/silicon carbide
20309.60

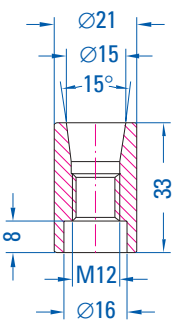




Stirrerhead with flange fixing.
DN48
Cat. no.
10309.60 (carbon/ceramic)
10309.65 (silicon carbide/silicon carbide)



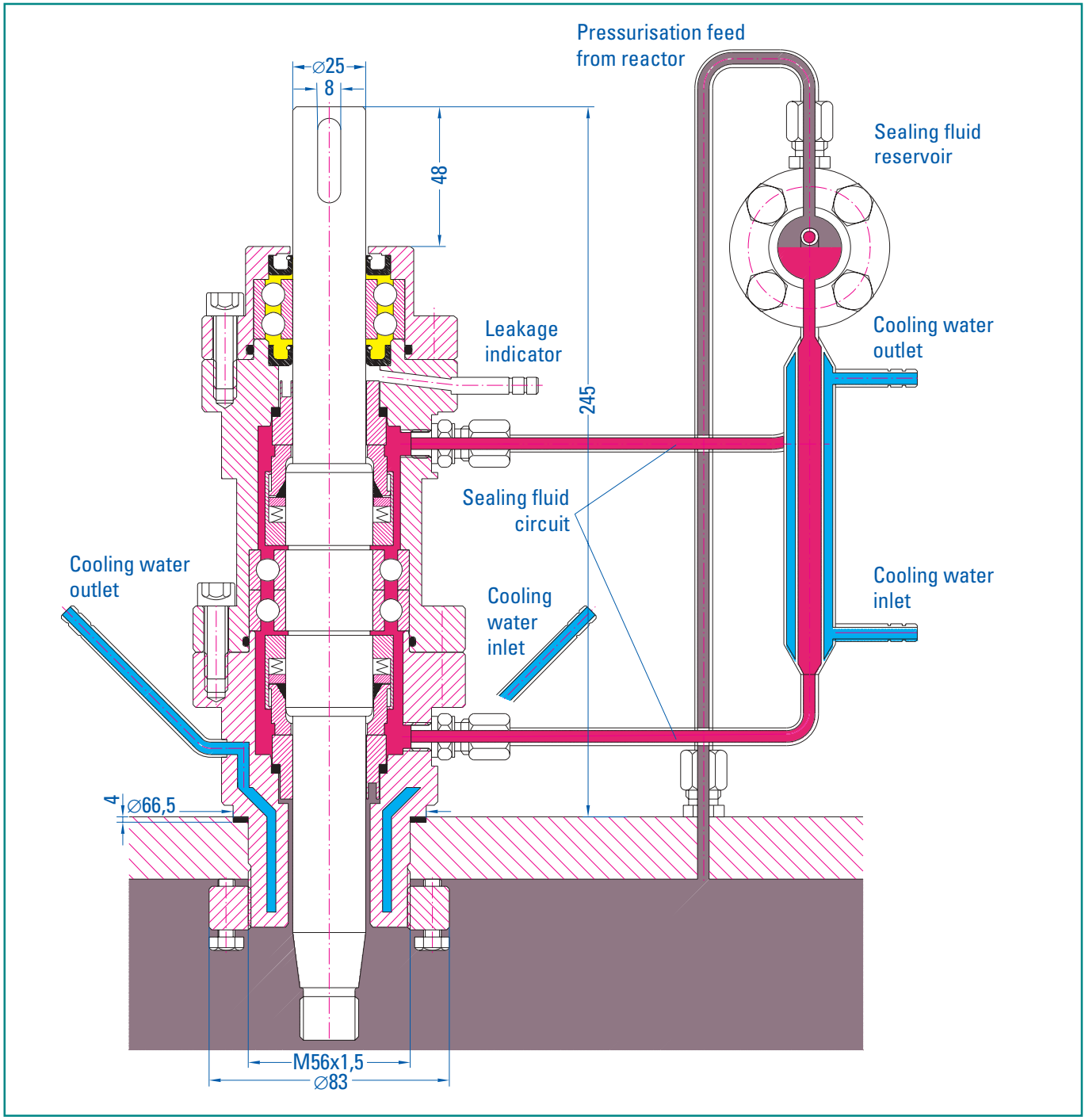
Slot and spline drive.
Specify when ordering.



Stirrer adaptor
Cat. no.
20313.28

For further information spare parts please refer to the operating instructions.

Mechanically sealed stirrerhead, M56 x 1.5 screw or DN 60 flange fixing, shaft diameter 25 mm

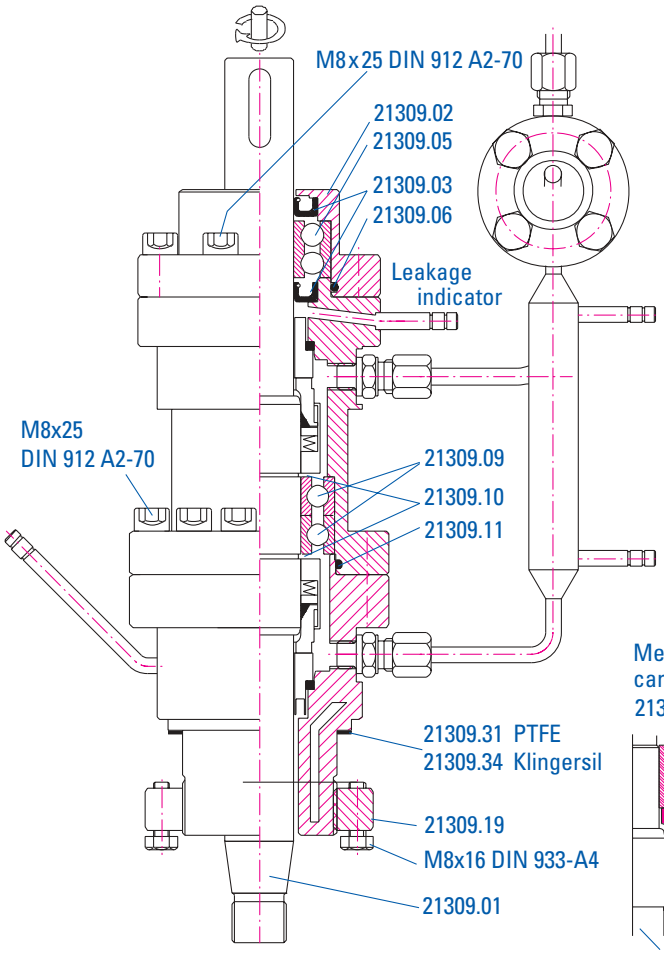


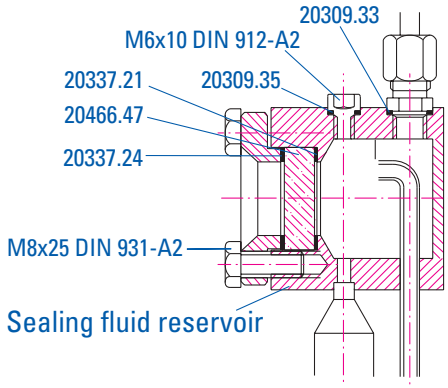
- Shaft seal suitable for heavy duty applications
- M56 x 1.5 threaded or flange fixing for vessels of 5–50 litres capacity
- Made from 316 stainless steel
- Shaft held by three ball bearings, two situated between the two back-to-back mechanical seals
- Mechanical seals free from loads. Auxiliary seals PTF
- Suitable for all applications
- Supplied with sealing fluid reservoir

Technical data	
Max. operating pressure	50 Bar
Max. operating temperature	350 °C
Max. rotation speed	3 500 rpm

Item	Cat. no.
With carbon/ceramic seals	
M56 x 1.5 screw fixing	10309.70
DN60 flange fixing	10309.80
With silicon carbide seals	
M56 x 1.5 screw fixing	10309.75
DN60 flange fixing	10309.85

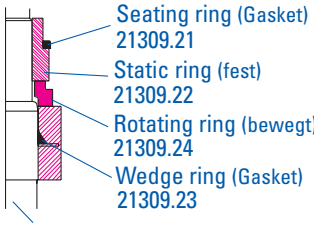
Spare parts for mechanically sealed stirrerhead



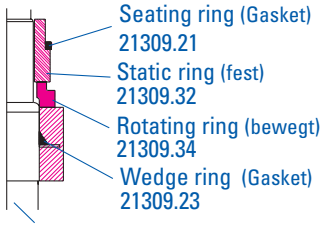


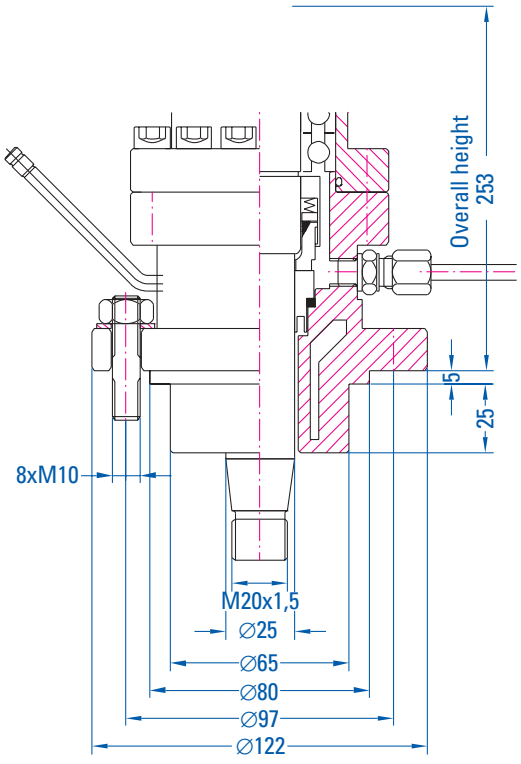
Consumables:

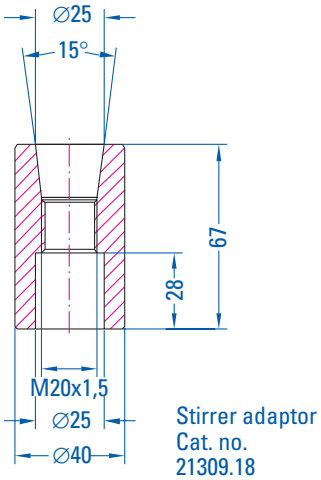
Mechanical seal, complete
carbon/ceramic
21309.20



Mechanical seal, complete
silicon carbide/silicon carbide
21309.30

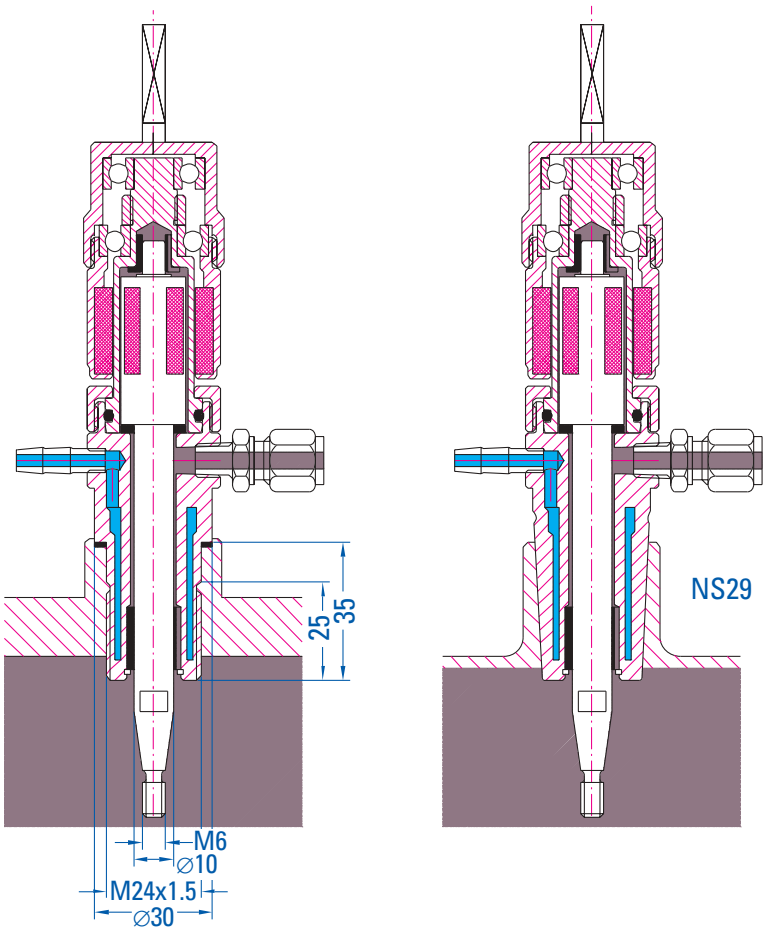






For further information spare parts please refer to the operating instructions.

Magnetically coupled stirrerhead Type 221 (Torque: 40 Ncm) B29 or threaded fixing. Shaft Ø 10 mm

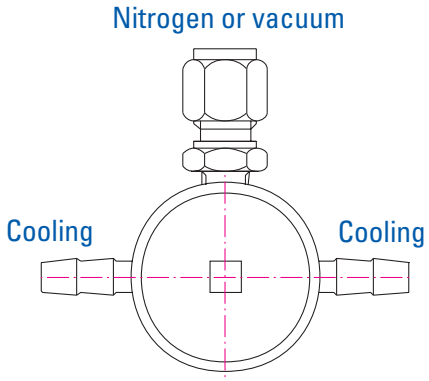


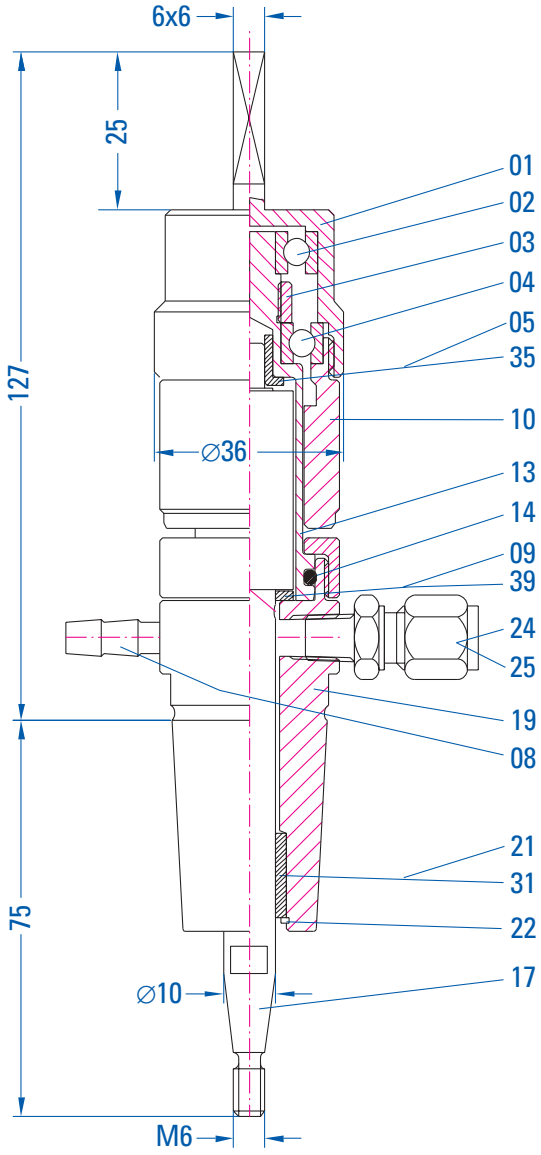
- Magnetic coupling is the most secure means of sealing a shaft to laboratory equipment
- The internal space is separated from the exterior by a static seal
- The stirrerhead is especially suitable for use with poisonous or dangerous materials

Stirrerhead	Cat. no.		
Fixing	B29	M24 x 1.5	3/4" BSP
PTFE bearings (up to 220 °C)	10221.00	10221.20	10221.40
PEEK bearings (up to 310 °C)	10221.05	10221.25	10221.45
Stirrerhead with tachometer sensor (no display)			
PTFE bearings (up to 220 °C)	10221.10	10221.30	10221.50
PEEK bearings (up to 310 °C)	10221.15	10221.35	10221.55

Double torque, other fixings, and materials available.

Spare parts for magnetically coupled stirrerhead 221





Technical data	
Torque capacity	40 Ncm *1
Speed range	0 - 2800 rpm
Pressure range	$10E^{-4}$ mBar to 100 Bar *2
Material	316 stainless steel *3
Shaft diameter	Ø 10 mm
Maximum magnet temperature	170 °C
Bearings for use to 220 °C	Carbon loaded PTFE
Bearings for use up to 310 °C	Carbon loaded PEEK

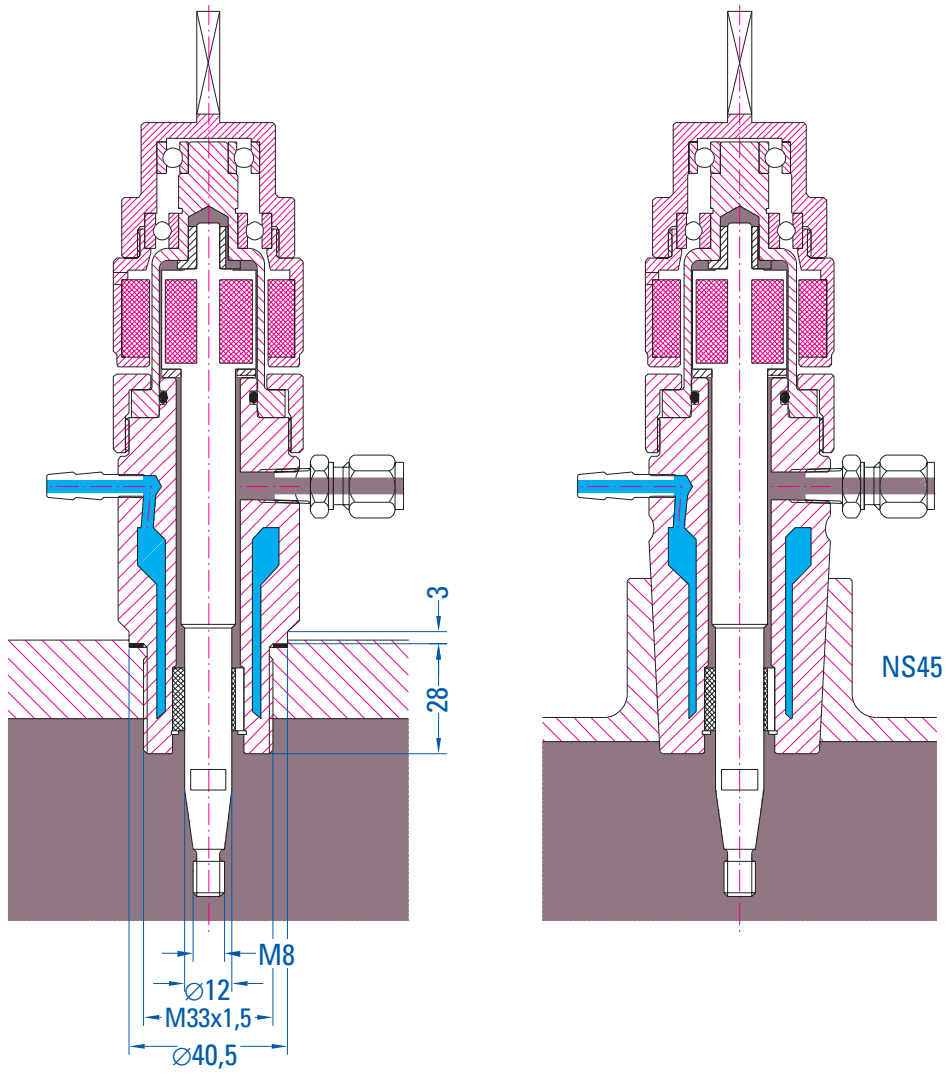
*1 Double torque capacity on request
*2 Other pressure ranges on request
*3 Hastelloy C4® on request

Item	Material	Cat. no.
Cap		20221.01
Ball bearing		20221.02
Threaded ring		20221.03
Ball bearing		20221.04
Upper bearing	PTFE + C	20221.05
Upper bearing	PEEK + C	20221.35
Outer magnet		20221.10
Upper body		20221.13
'O' ring	Kalrez	20221.14
Central bearing	PTFE + C	20221.09
Central bearing	PEEK + C	20221.39
Swagelok® connector		20221.24
Plug, 1/8" NPT		20221.25
Lower body, B29 cone		20221.19
Cooling water connectors		20310.08
Lower bearing	PTFE + C	20221.21
Lower bearing	PEEK + C	20221.31
Shaft with inner magnet		20211.17
Retaining ring		20221.22
Set of bearings	PTFE + C	20221.26
Set of bearings	PEEK + C	20221.36
Connector		20221.23

Gaskets, 'O' rings and bearings are consumables

When ordering spares, please state year and month when supplied.

Magnetically coupled stirrerhead Type 231 (Torque: 90 Ncm)

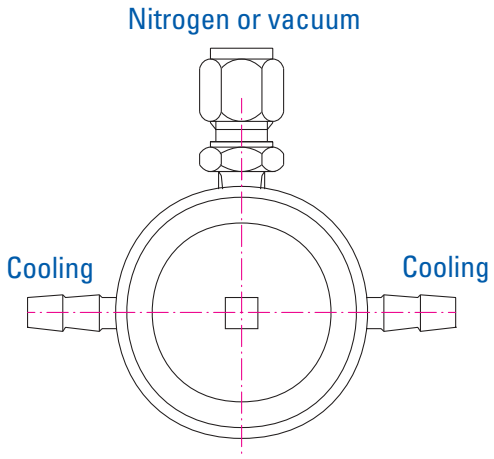


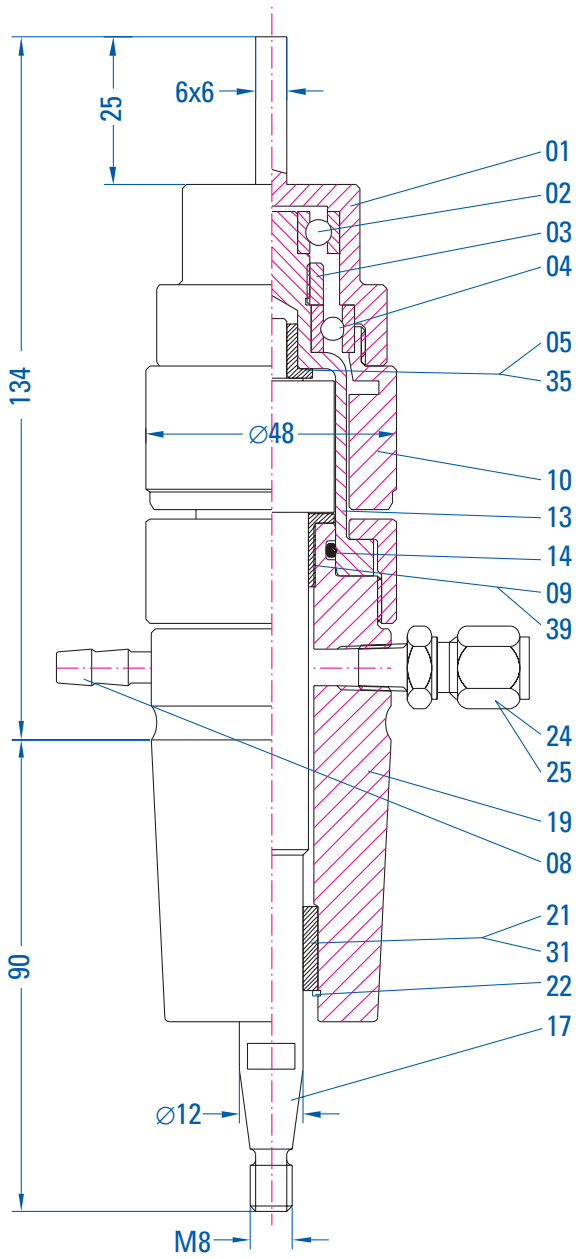
- Magnetic coupling is the most secure means of sealing a shaft to laboratory equipment
- The internal space is separated from the exterior by a static seal
- The stirrerhead is especially suitable for use with poisonous or dangerous materials

Stirrerhead	Cat. no.		
Fixing	B45	M33 x 1.5	3/4" BSP
PTFE bearings (up to 220 °C)	10231.00	10231.20	10231.40
PEEK bearings (up to 310 °C)	10231.05	10231.25	10231.45
Stirrerhead with tachometer sensor (no display)			
PTFE bearings (up to 220 °C)	10231.10	10231.30	10231.50
PEEK bearings (up to 310 °C)	10231.15	10231.35	10231.55

Double torque, other fixings, and materials available.

Spare parts for magnetically coupled stirrerhead 231





Technical data	
Torque capacity	90 Ncm *1
Speed range	0 - 2800 rpm
Pressure range	10E-4 mBar to 100 Bar *2
Material	316 stainless steel *3
Shaft diameter	∅ 12 mm
Maximum magnet temperature	170 °C
Bearings for use to 220 °C	Carbon loaded PTFE
Bearings for use up to 310 °C	Carbon loaded PEEK

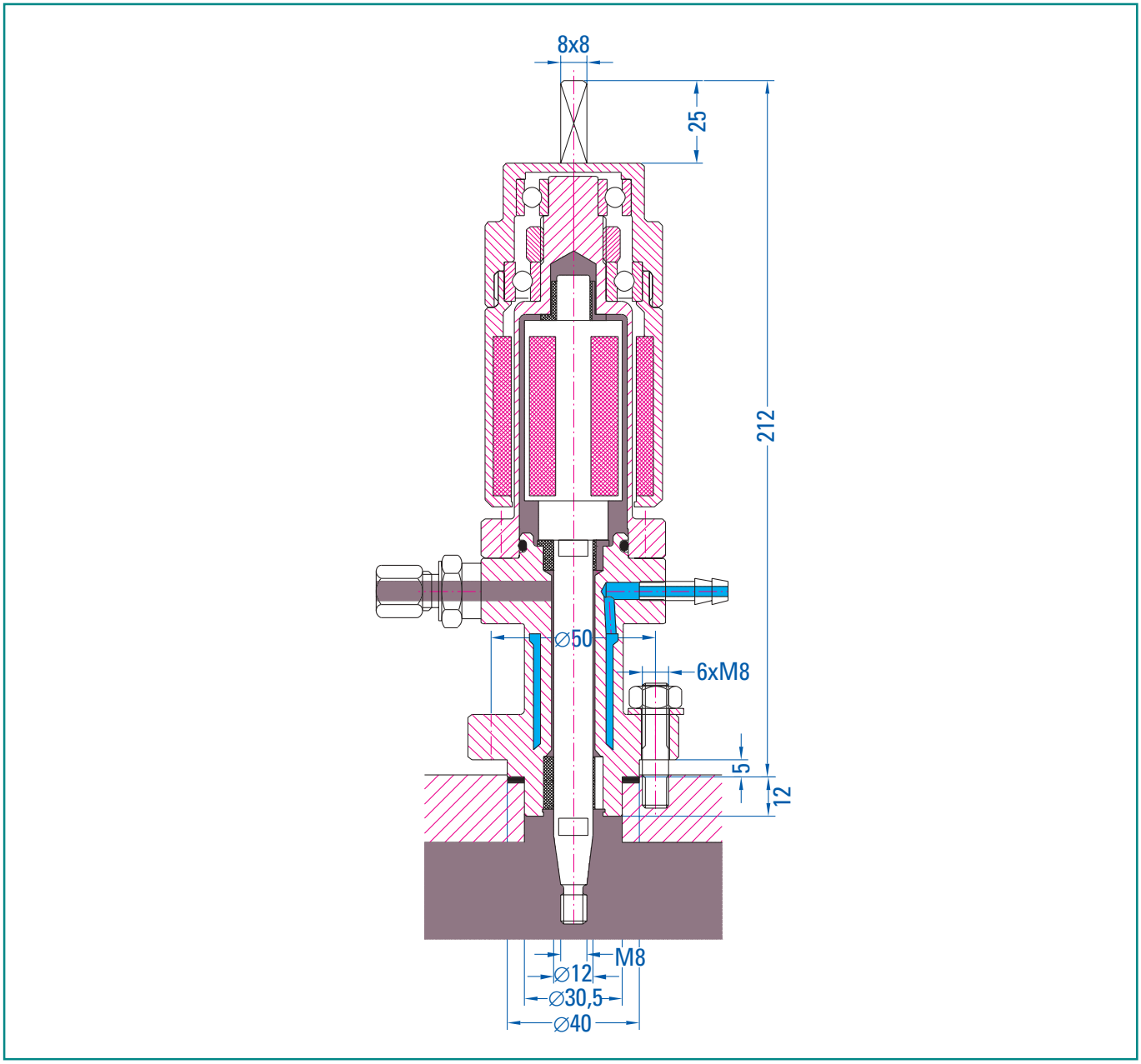
*1 Double torque capacity on request
*2 Other pressure ranges on request
*3 Hastelloy C4® on request

Item	Material	Cat. no.
Cap		20231.01
Ball bearing		20231.02
Threaded ring		20231.03
Ball bearing		20231.04
Upper bearing	PTFE + C	20231.05
Upper bearing	PEEK + C	20231.35
Outer magnet		20231.10
Upper body		20231.13
'O' ring	Kalrez	20231.14
Central bearing	PTFE + C	20231.09
Central bearing	PEEK + C	20231.39
Swagelok® connector		20231.24
Plug, 1/8" NPT		20231.25
Lower body, B29 cone		20231.19
Cooling water connectors		20310.08
Lower bearing	PTFE + C	20231.21
Lower bearing	PEEK + C	20231.31
Shaft with inner magnet		20231.17
Retaining ring		20231.22
Set of bearings	PTFE + C	20231.26
Set of bearings	PEEK + C	20231.36
Connector		20231.23

Gaskets, 'O' rings and bearings are consumables

When ordering spares, please state year and month when supplied.

Magnetically coupled stirrerhead Type 311 (Torque: 4.2 Nm)
DN30 Flange or M33 x 1.5 threaded fixing. Shaft diameter 12 mm



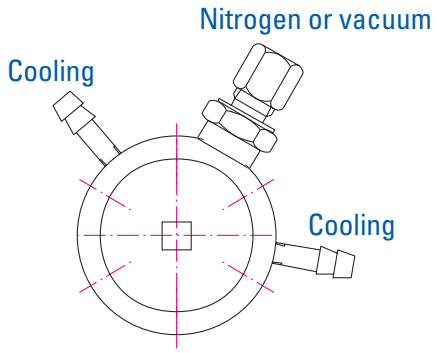
- Magnetic coupling is the most secure means of sealing a shaft to laboratory equipment
- The internal space is separated from the exterior by a static seal
- The stirrerhead is especially suitable for use with poisonous or dangerous materials

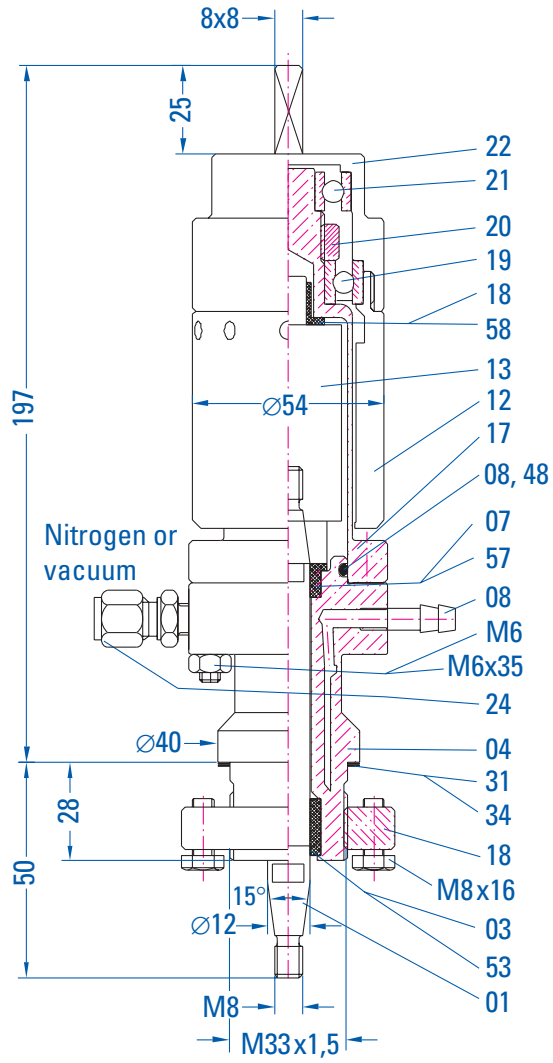
Stirrerhead	Cat. no.	
Fixing	M33 x 1.5	DN30 flange
PTFE bearings (up to 220 °C)	10311.00	10311.30
PEEK bearings (up to 310 °C)	10311.10	10311.35
Set replacement PTFE bearings	20311.05	
Set replacement PEEK bearings	20311.15	
Optional tachometer sensor (only as original equipment)	10231.90	Option

Double torque, other fixings, and materials available.

Spare parts for magnetically coupled stirrerhead 311

Suitable for 1–2 litre cylindrical and 1 litre conical vessels





Gaskets, 'O' rings and bearings are consumables

Technical data

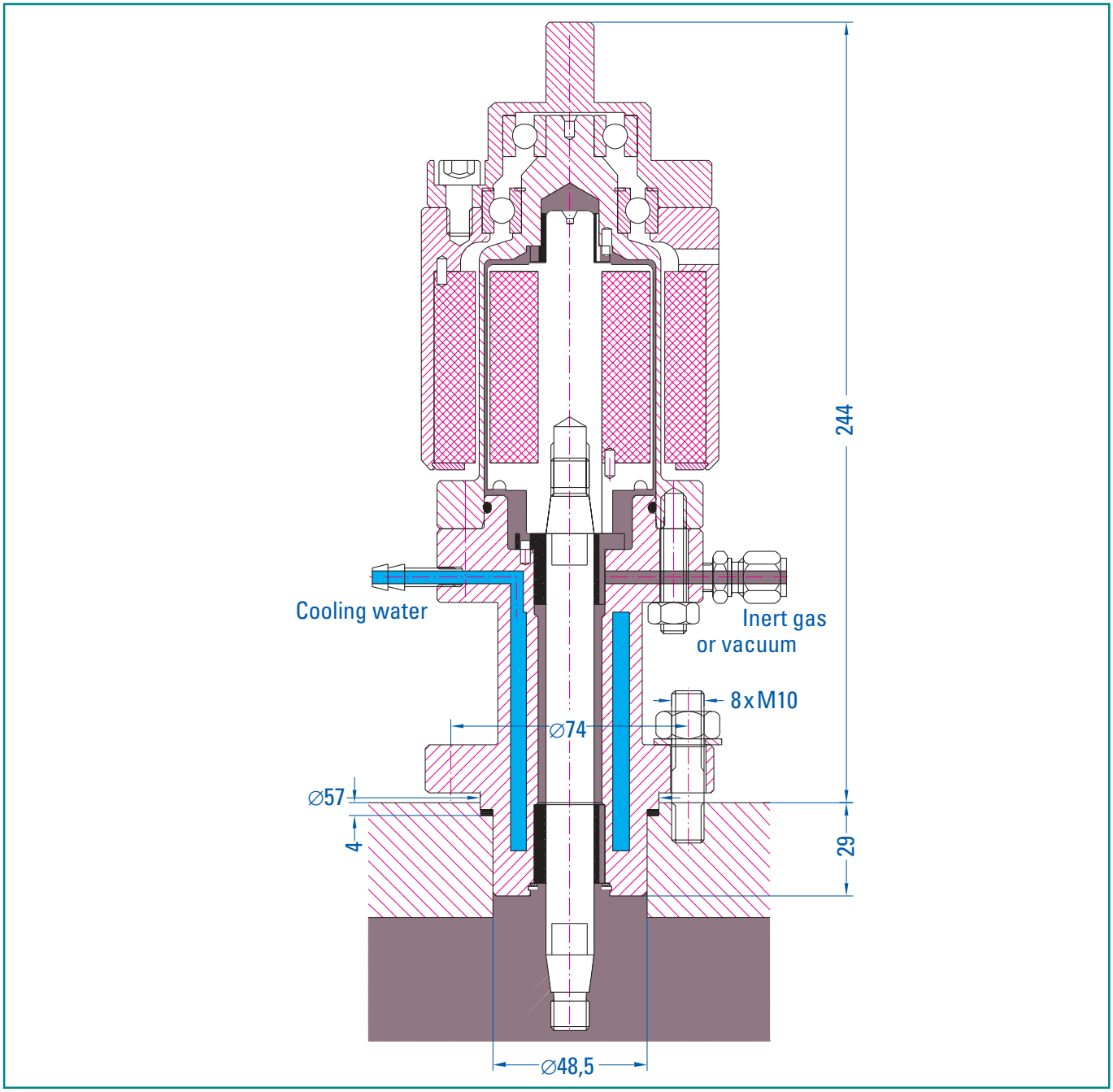
Torque capacity	4.2 Ncm *1
Speed range	0 - 2000 rpm
Pressure range	10E -4 mBar bis 50 Bar *2
Material	316 stainless steel *3
Shaft diameter	∅ 12 mm
Maximum magnet temperature	170 °C
Bearings for use to 220 °C	Carbon loaded PTFE
Bearings for use up to 310 °C	Carbon loaded PEEK

*1 Double torque capacity on request
*2 Other pressure ranges on request
*3 Hastelloy C4® on request

Item	Material	Cat. no.
Set of 3 bearings	PTFE + C	20311.05
Set of 3 bearings	PEEK + C	20311.15
Cap		20311.22
Ball bearing 6202		20311.21
Threaded ring		20311.20
Ball bearing 6004Z		20311.19
Upper bearing	PTFE + C	20311.18
Upper bearing	PEEK + C	20311.58
Inner magnet		20311.13
Outer magnet		20311.12
Upper body		20311.17
'O' ring	FEP sheathed	20311.08
'O' ring	Parofluor	20311.48
Central bearing	PTFE + C	20311.07
Central bearing	PEEK + C	20311.57
Cooling water connectors		20310.08
Nut, M6 DIN 934-A2-70		
Bolt, M6 x 35 DIN 938-A2		
Swagelok® connector		20311.24
Lower body		20311.04
Gasket	PTFE	20337.31
Gasket	Klingersil	20337.34
Nut, M33 x 1.5		20310.18
Locking bolts, M8 x 16 DIN 933-A4		
Lower bearing	PTFE + C	20311.03
Lower bearing	PEEK + C	20311.53
Shaft		20311.01

When ordering spares, please state year and month when supplied.

Magnetically coupled stirrerhead Type 313 (Torque: 16 Nm)
DN50 Flange or M48 x 1.5 threaded fixing. Shaft diameter 15 mm



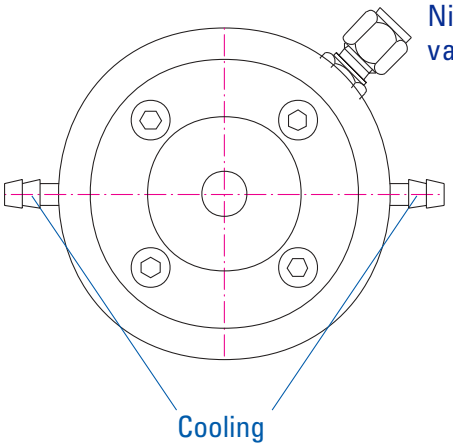
- Magnetic coupling is the most secure means of sealing a shaft to laboratory equipment
- The internal space is separated from the exterior by a static seal.
- The stirrerhead is especially suitable for use with poisonous or dangerous materials

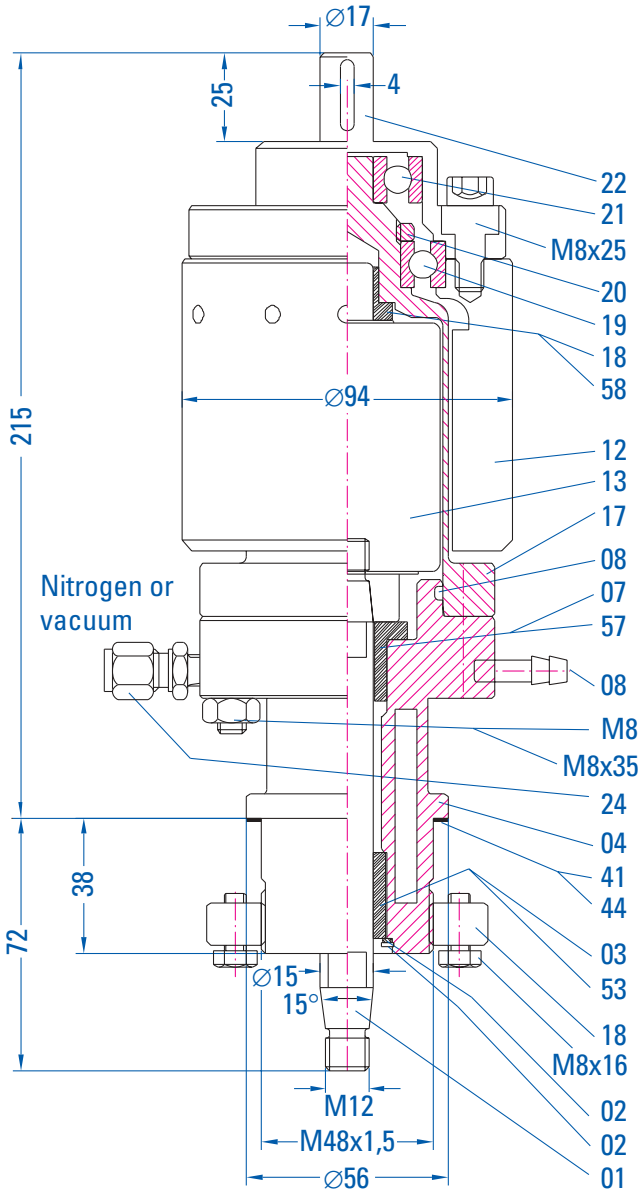
Stirrerhead	Cat. no.	
Fixing	M48 x 1.5	DN50 Flange
PTFE bearings (up to 220 °C)	10313.00	10313.30
PEEK bearings (up to 310 °C)	10313.10	10313.35
Set replacement PTFE bearings	20313.05	
Set replacement PEEK bearings	20313.15	
Optional tachometer sensor (only as original equipment)	10231.90	Option

Double torque, other fixings, and materials available.

Spare parts for magnetically coupled stirrerhead 313

Suitable for 5–50 litre cylindrical and
2–15 litre conical vessels





Gaskets, 'O' rings and bearings are consumables

Technical data	
Torque capacity	16 Ncm *1
Speed range	0 - 2000 rpm
Pressure range	$10E^{-4}$ mBar to 100 Bar *2
Material	316 stainless steel *3
Shaft diameter	⌀ 15 mm
Maximum magnet temperature	170 °C
Bearings for use to 220 °C	Carbon loaded PTFE
Bearings for use up to 310 °C	Carbon loaded PEEK

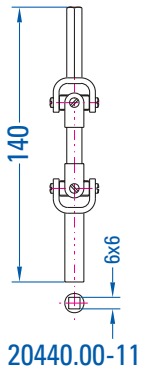
*1 Double torque capacity on request
*2 Other pressure ranges on request
*3 Hastelloy C4® on request

Item	Material	Cat. no.
Set of 3 bearings	PTFE + C	20313.05
Set of 3 bearings	PEEK + C	20313.55
Cap		20313.22
Ball bearing 6302		20313.21
Bolts M8 x 25 DIN 912 A270		
Gewindering		20313.20
Ball bearing 6006Z		20313.19
Upper bearing	PTFE + C	20313.18
Upper bearing	PEEK + C	20313.58
Outer magnet		20313.12
Inner magnet		20313.13
Upper body		20313.17
'O' ring	FEP sheathed	20313.08
Central bearing	PTFE + C	20313.07
Central bearing	PEEK + C	20313.57
Cooling water connectors		20310.08
Nut, M8 DIN 934-A2-70		
Bolt, M8 x 35 DIN 938-A2		
Swagelok® connector		20311.24
Lower body		20313.04
Gasket	PTFE	20337.41
Gasket	Klingersil	20337.44
Lower bearing	PTFE + C	20313.03
Lower bearing	PEEK + C	20313.53
Nut, M48 x 1.5		20312.18
Locking bolts, M8 x 16 DIN 933-A4		
Retainer rings		20313.02
Shaft		20313.01

When ordering spares, please state year and month when supplied.

Accessories for Stirrerheads and Reaction vessels

Item		Cat. no.
Double Universal Joints		
For stirrerheads 10210-10262.00, 10310.00 Female 6 x 6 mm square drive		
Chromium plated brass maximum torque 10 Nm		20440.00
Stainless steel Maximum torque 35 Nm		20440.11
Double Universal Joint		
For stirrerheads 10310-10312.00 Female 8 x 8 mm square drive		
Chromium plated brass Maximum torque 10 Nm		20441.00
Stainless steel Maximum torque 35 Nm		20441.11
Double Universal Joint		
Chromium plated brass Round 8 mm female, with locking screw Maximum torque 10 Nm		20442.00
Stainless steel Round ∅ 17 mm female, with slot Maximum torque 35 Nm		20442.11
Round ∅ 17 mm female, with slot for use with stirrerhead 10313.00		20442.17
As above, but with shear pin to limit torque		20442.16
Double Universal Joint		
Chromium plated brass Internal diameter 13 mm		20443.00
Stainless steel Internal diameter 16 mm		20443.11
Universal Joint Shields		
With thick Plexiglas walls and an aluminium fixing ring.		
for stirrerheads	B29	20444.00
	B45	20445.00
	10310.00	20446.00
	10312.00	20447.00
	10309.00	20447.10
	10311.00	20448.00
	10313.00	20449.00



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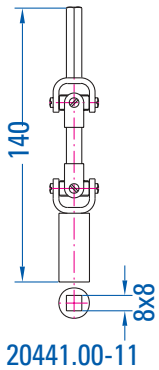

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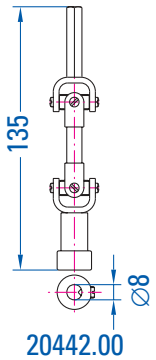
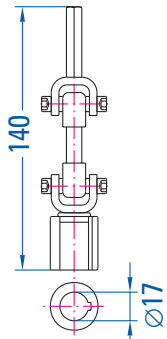


20442.00



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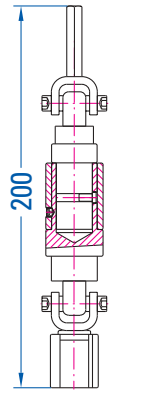
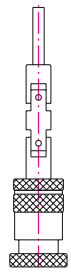


20442.16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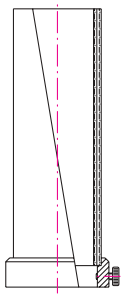
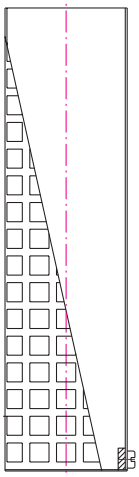

20444.00 – 20447.10

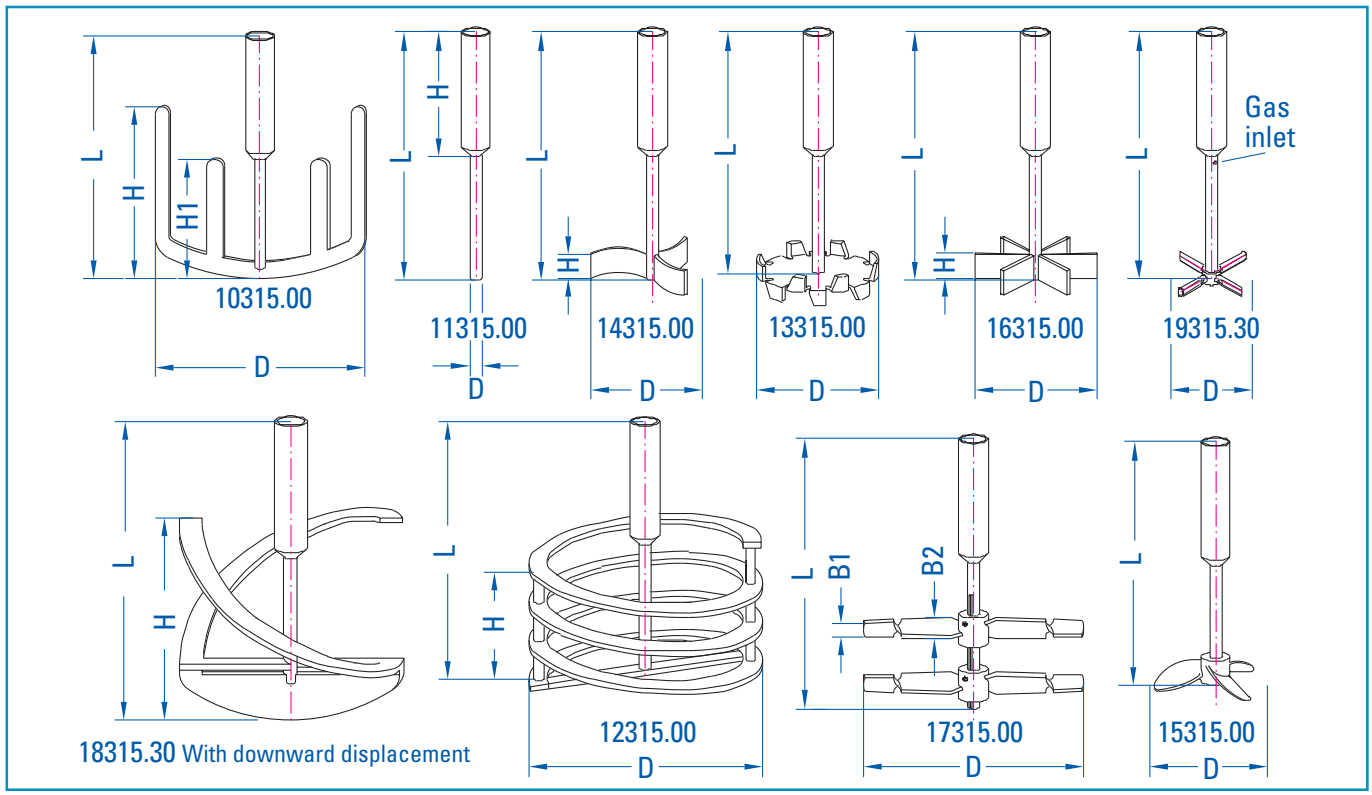

20448.00, 20449.00

Dimensions of stirrers for cylindrical pressure vessels

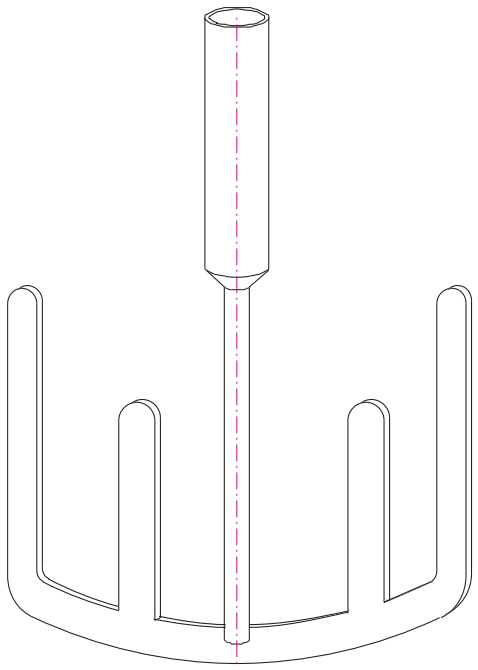
Capacity	[ltr]	1	2	5	10	20	30	50
Internal diameter	**[mm]**	**114**	**134**	**194**	**244**	**267**	**314**	**354**
Vessel depth	**[mm]**	**150**	**175**	**225**	**265**	**400**	**425**	**540**
Anchor stirrer 10315.**	D [mm]	108	128	188	238	260	305	345
Sloped anchor	H/H1 [mm]	112/80	130/97	160/112	205/140	225/160	260/175	310/230
stirrer 18315.**	L* [mm]	197	222	287	327	467	482	607
Helical stirrer	D [mm]	108	124	188	235	258	300	338
12315.**	H [mm]	100	120	120	210	210	280	280
	L* [mm]	180	207	250	320	440	460	515
Countercurrent stirrer	D [mm]	60	65	120	160	170	180	220
17315.**	H [mm]	12/17	12/17	20/24	20/24	24/30	24/30	24/30
	L* [mm]	185	212	265	287	422	442	547
Impeller stirrer	D [mm]	60	70	110	150	160	180	210
14315.00	H [mm]	10	10	15	22	24	27	30
	L* [mm]	187	212	274	312	452	477	582
Dispersion disk	D [mm]	50	50	60	90	90	100	100
13315.**	L* [mm]	180	200	245	270	400	400	515
Turbine stirrer	D [mm]	35	40	60	70	80	95	105
16315.**	H [mm]	18	22	30	35	40	50	60
	L* [mm]	154	169	237	257	377	387	487
Propeller stirrer 15315.**	D [mm]	40	40	50	70	100	100	100
Aeration stirrer 19315.00	L* [mm]	172	197	252	272	382	397	592
Stirrer shafts 11315.00	D [mm]	10	10	16	16	16	16	16
	H [mm]	103	95	95	95	95	95	95
	L* [mm]	202	227	292	332	472	487	612

When ordering please mention the type and size of the stirrerhead to which it will be fitted.

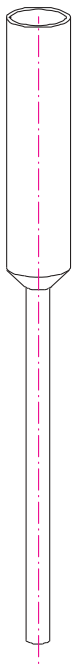
* Overall lengths: add 23 mm for a mechanically sealed stirrerhead, 37 mm for a magnetically coupled stirrerhead.



Anchor stirrers and stirrer shafts



10315.30



11315.00

11315.32

When ordering please mention the type and size of the stirrerhead to which it will be fitted.

Anchor stirrers, stainless steel, with catchpot

	Cat. no.		
Vessel size [ltr]	Vacuum vessel	Pressure vessel	Magnet or mechanical seal stirrerhead
1	10316.10	10315.10	
2	10316.20	10315.20	10315.22
4	10316.30		
5		10315.30	10315.32
10	10316.40	10315.40	10315.42
15	10316.50		
20	10316.60	10315.60	10315.62
30	10316.70	10315.70	10315.72
40	10316.80		
50	10316.90	10315.90	10315.92

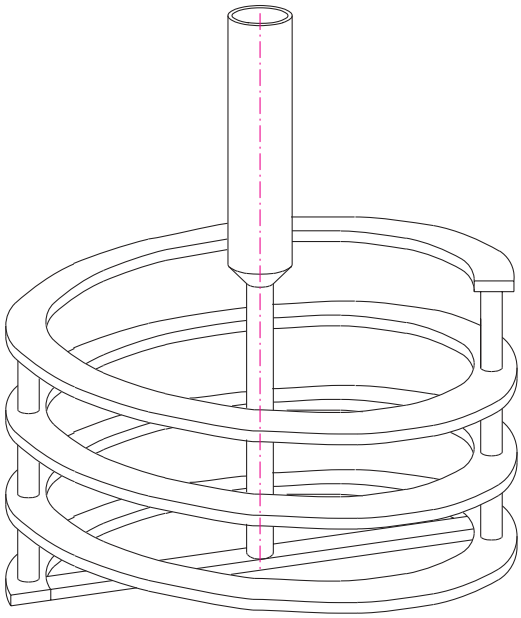
Stirrer shafts for in-house construction of stirrers

	Cat. no.		
Vessel size [ltr]	Vacuum vessel	Pressure vessel	Magnet or mechanical seal stirrerhead
1	11316.10	11315.10	
2	11316.20	11315.20	11315.22
4	11316.30		
5		11315.30	11315.32
10	11316.40	11315.40	11315.42
15	11316.50		
20	11316.60	11315.60	11315.62
30	11316.70	11315.70	11315.72
40	11316.80		
50	11316.90	11315.90	11315.92

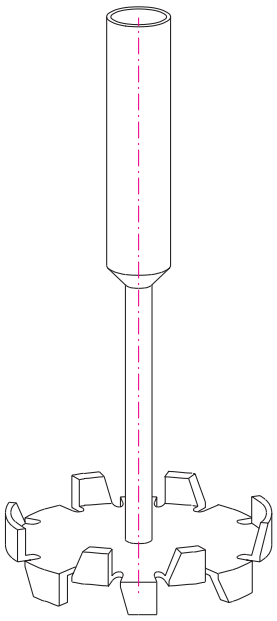
Other patterns available on request.

For replacements, please mention the vessel serial number.

Helical stirrers and Dispersion disks



12315.00



13315.00

When ordering please mention the type and size of the stirrerhead to which it will be fitted.

Helical stirrers, stainless steel, with catchpot

	Cat. no.		
Vessel size [ltr]	Vacuum vessel	Pressure vessel	Magnet or mechanical seal stirrerhead
1	12316.10	12315.10	
2	12316.20	12315.20	12315.12
4	12316.30		
5		12315.30	12315.32
10	12316.40	12315.40	12315.42
20	12316.60	12315.60	12315.62
30	12316.70	12315.70	12315.72
40	12316.80		
50	12316.90	12315.90	12315.92

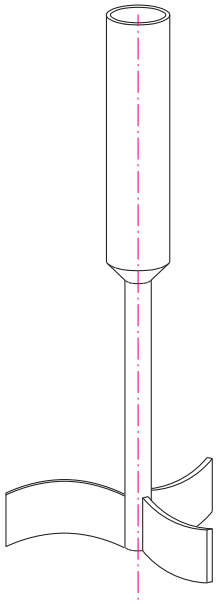
Dispersion disks, stainless steel, with catchpot

		Cat. no.		
Vessel size [ltr]	Ø x 1.5 mm 12 teeth [mm]	Vacuum vessel	Pressure vessel	Magnet or mechanical seal stirrerhead
1	50	13316.10	13315.10	
2	50	13316.20	13315.20	13315.12
4	60	13316.30		
5	60		13315.30	13315.32
10	90	13316.40	13315.40	13315.42
20	90	13316.60	13315.60	13315.62
30	100	13316.70	13315.70	13315.72
40	100	13316.80		
50	100	13316.90	13315.90	13315.92

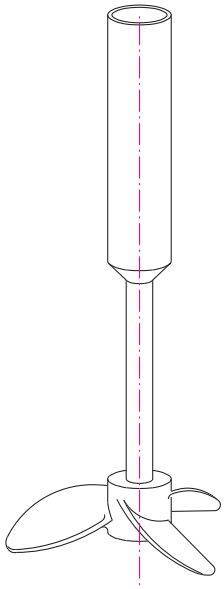
Other patterns available on request.

For replacements, please mention the vessel serial number.

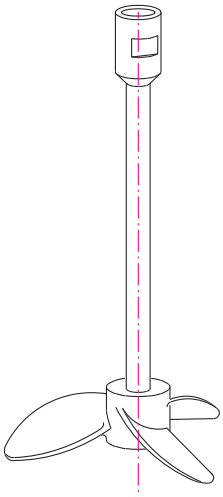
Impeller stirrers and Propeller stirrers



14315.00



15315.00



15315.32

When ordering please mention the type and size of the stirrerhead to which it will be fitted.

Impeller stirrers, stainless steel, with catchpot

	Cat. no.		
Vessel size [ltr]	Vacuum vessel	Pressure vessel	Magnet or mechanical seal stirrerhead
1	14316.10	14315.10	14315.12
2	14316.20	14315.20	14315.22
4	14316.30		
5		14315.30	14315.32
10	14316.40	14315.40	14315.42
15	14316.50		
20	14316.60	14315.60	14315.62
30	14316.70	14315.70	14315.72
40	14316.80		
50	14316.90	14315.90	14315.92

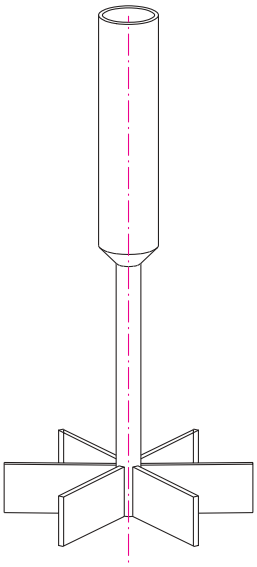
Propeller stirrers, stainless steel, with catchpot

	Cat. no.		
Vessel size [ltr]	Vacuum vessel	Pressure vessel	Magnet or mechanical seal stirrerhead
1	15316.10	15315.10	15315.12
2	15316.20	15315.20	15315.22
4	15316.30		
5		15315.30	15315.32
10	15316.40	15315.40	15315.42
15	15316.50		
20	15316.60	15315.60	15315.62
30	15316.70	15315.70	15315.72
40	15316.80		
50	15316.90	15315.90	15315.92

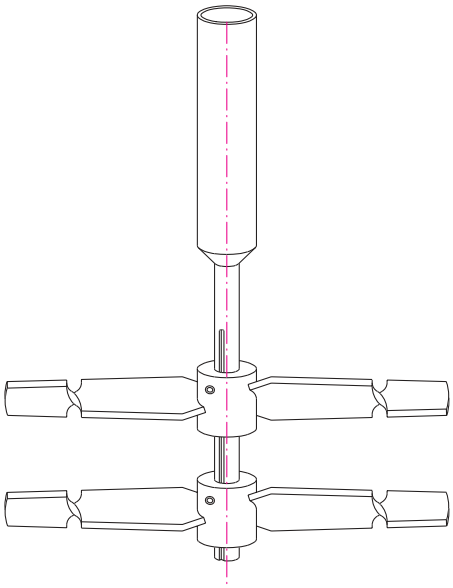
Other patterns available on request.

For replacements, please mention the vessel serial number.

Turbine stirrers and Countercurrent stirrers



16315.00



17315.00

When ordering please mention the type and size of the stirrerhead to which it will be fitted.

Turbine stirrers, stainless steel, with catchpot

	Cat. no.		
Vessel size [ltr]	Vacuum vessel	Pressure vessel	Magnet or mechanical seal stirrerhead
1	16316.10	16315.10	16315.12
2	16316.20	16315.20	16315.22
4	16316.30		
5		16315.30	16315.32
10	16316.40	16315.40	16315.42
15	16316.50		
20	16316.60	16315.60	16315.62
30	16316.70	16315.70	16315.72
40	16316.80		
50	16316.90	16315.90	16315.92

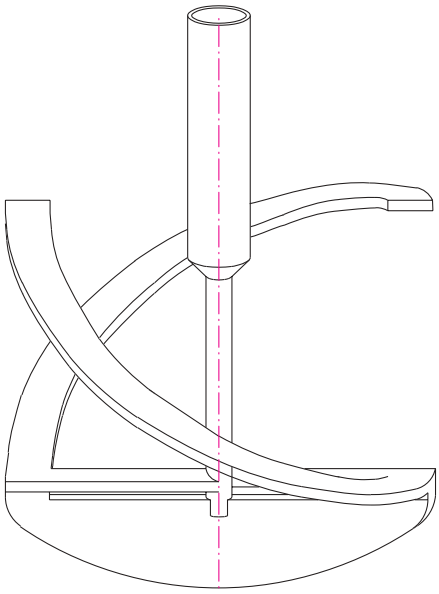
Countercurrent stirrers, stainless steel, with catchpot

	Cat. no.		
Vessel size [ltr]	Vacuum vessel	Pressure vessel	Magnet or mechanical seal stirrerhead
1	17316.10	17315.10	17315.12
2	17316.20	17315.20	17315.22
4	17316.30		
5		17315.30	17315.32
10	17316.40	17315.40	17315.42
15	17316.50		
20	17316.60	17315.60	17315.62
30	17316.70	17315.70	17315.72
40	17316.80		
50	17316.90	17315.90	17315.92

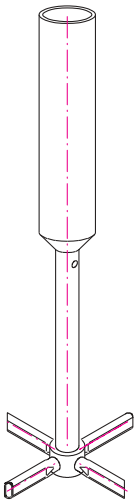
Other patterns available on request.

For replacements, please mention the vessel serial number.

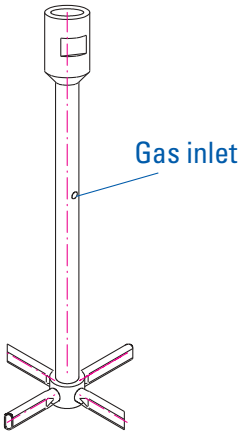
Sloped anchor stirrers and Aeration stirrers



18315.30 For ensuring vertical displacement of the material being stirred. When ordering, please state direction (upward or downward) required.



19315.30



19315.32

When ordering please mention the type and size of the stirrerhead to which it will be fitted.

Sloped anchor stirrers, stainless steel, with catchpot

	Cat. no.		
Vessel size [ltr]	Vacuum vessel	Pressure vessel	Magnet or mechanical seal stirrerhead
1	18316.10	18315.10	18315.12
2	18316.20	18315.20	18315.22
4	18316.30		
5		18315.30	18315.32
10	18316.40	18315.40	18315.42
15	18316.50		
20	18316.60	18315.60	18315.62
30	18316.70	18315.70	18315.72
40	18316.80		
50	18316.90	18315.90	18315.92

Aeration stirrers, stainless steel, with catchpot

	Cat. no.		
Vessel size [ltr]	Vacuum vessel	Pressure vessel	Magnet or mechanical seal stirrerhead
1	19316.10	19315.10	19315.12
2	19316.20	19315.20	19315.22
4	19316.30		
5		19315.30	19315.32
10	19316.40	19315.40	19315.42
15	19316.50		
20	19316.60	19315.60	19315.62
30	19316.70	19315.70	19315.72
40	19316.80		
50	19316.90	19315.90	19315.92

Other patterns available on request.

For replacements, please mention the vessel serial number.

Stirrerheads for conical joint glass vessels

Conical joint stirrerheads have been used in laboratories for many years and gained an excellent reputation. They allow intensive mixing, even of highly viscous materials in standard conical joint flasks.

- The drive shaft is held in exactly the same place and thus operations are always reproducible.
- The stirrerheads are absolutely vacuum-tight, even for long runs.
- Any material coming from the stirrerhead, such as lubricants, is collected in the catchpot, and not in the reaction flask.
- The stirrerhead can be cooled, which reduces loss of lubricant and prevents seizure of the stirrerhead in the conical joint.
- The stirrerheads have a long life. They are easy to connect to a drive motor; either a rubber tube or a double universal joint can be used.

The standard pattern has a lower body made from 316 stainless steel. The shaft is made from chromium plated special steel and should not be left in contact with laboratory fumes without a coating of grease. The upper body is made from chromium plated brass. The gasket between the two is made from polyurethane. A PTFE gasket is recommended for operating temperatures above 100 °C. Stirrerheads for use at slight positive pressures have a shaft sealed with an 'O' ring, which is compressed by the stirrerhead cap.

The inbuilt cooling facility holds the metal cone and glass socket at the same temperature, so that the different coefficients of expansion are of no significance. However, the usual safety precautions for glass apparatus must be taken.

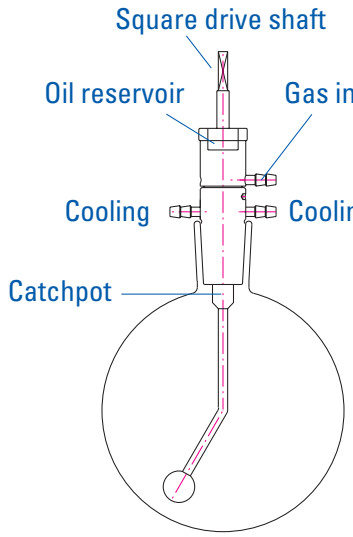
After use the stirrer can be cleaned with solvents without removing it from the stirrerhead.

However, the stirrerhead should not be laid horizontally. For thorough cleaning, the stirrerhead can be dismantled.

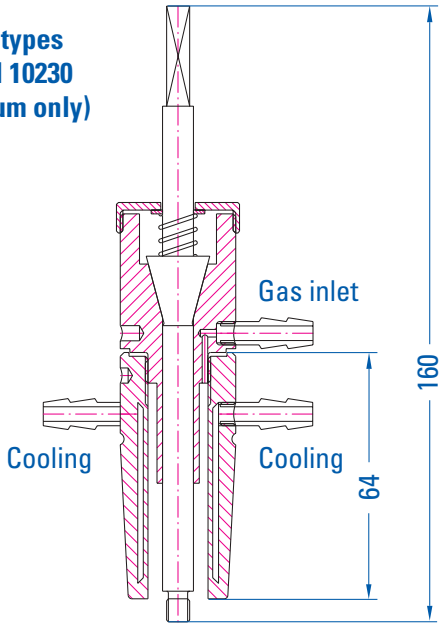
The upper body has an inlet with a hose connector for the introduction of inert gas.

Lubricants: liquid paraffin, machine oil or Luviskol-glycerine are recommended.

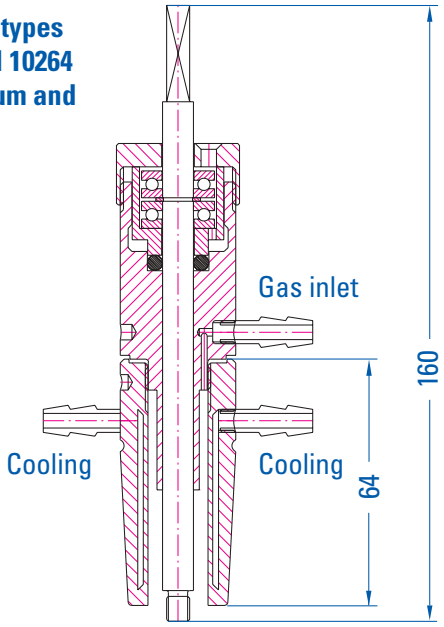
For high vacuum distillations a higher viscosity oil should be used such as SAE 30 motor oil, or vacuum pump oil.



Layout of types 10220 and 10230 (for vacuum only)



Layout of types 10262 and 10264 (for vacuum and slight)



Conical joint stirrerheads, for vacuum only

Lower body stainless steel, upper body chromium plated brass, shaft special steel

Cone	Cat. no.
B29	10220.00
B45	10230.00
B60	10240.00

Thread fixing,
M42 x 1.5 with locknut
Upper body as B45 above

	Cat. no.
	10260.00

Gaskets, polyurethane

	Cat. no
∅ 25 x ∅ 17 x 1 for B29	20314.39
∅ 34 x ∅ 28 x 1 for B45 and B60	20314.45

Conical joint stirrerheads, for vacuum and slight positive pressure

Lower body stainless steel, upper body chromium plated brass, shaft special steel

Cone	Cat. no
B29	10262.00
B45	10264.00

'O' rings

	Cat. no
∅ 8 x ∅ 4, viton for 10262.00	20262.00
∅ 10 x ∅ 5, viton for 10264.00	20310.04

Luviskol Glycerine lubricant

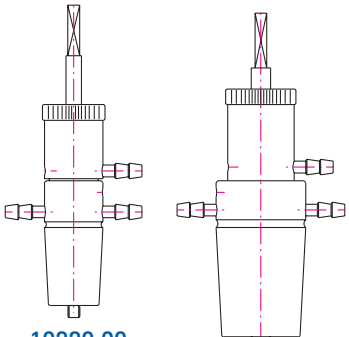
Special lubricant for JUVO stirrerheads 20313.00

Magnetically coupled conical joint stirrerheads

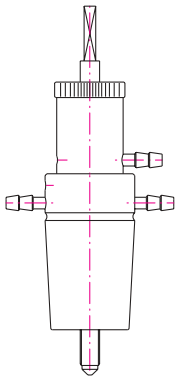
For description and spare parts see pages 68–75.
This is the most secure type of shaft seal for laboratory work.

Cone		Cat. no
B29	PTFE bearings	10221.00
	PEEK bearings	10221.05
B45	PTFE bearings	10231.00
	PEEK bearings	10231.05

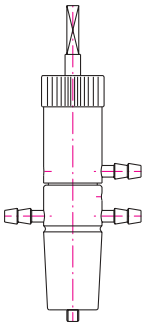
For models with tachometer sensors or with screw fitting, see pages 68-75.



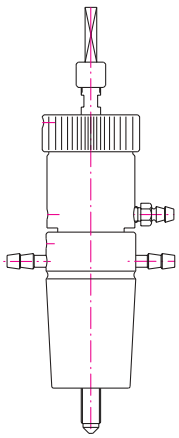
10220.00



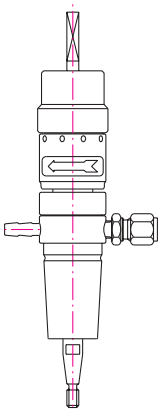
10230.00



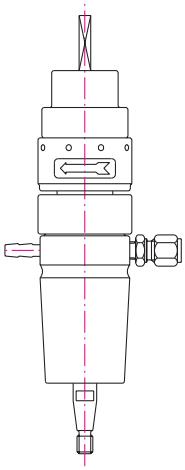
10262.00



10264.00



10221.00



10231.00

Gaskets, 'O' rings and bearings are consumables

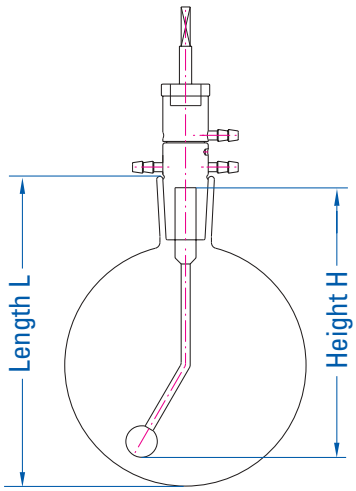
Stirrers for conical joint stirrerheads

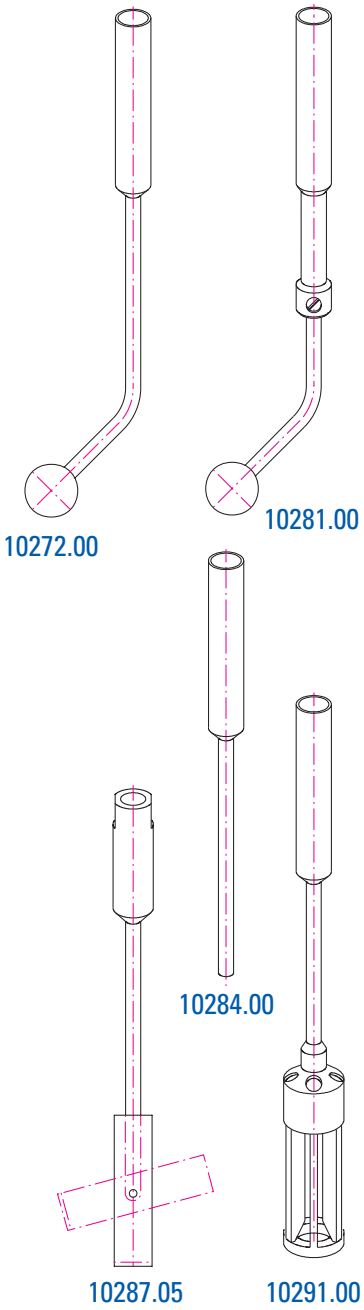
B29 stirrerheads

Flask size [ltr]	Length [mm]	Height [mm]	Cat. no. for 10220.00, 10262.00	Cat. no. for 10221.00, 10221.05
Leaf stirrers				
0.25	170	170	10270.00	10270.05
0,5	195	195	10271.00	10271.05
1	220	220	10272.00	10272.05
2	260	255	10273.00	10273.05
4	280	275	10274.00	10274.05
6	305	305	10275.00	10275.05
Adjustable leaf stirrers				
0.25–0.5	170	200	10280.00	10280.05
0.5–1	190	220	10281.00	10281.05
1–2	230	260	10281.11	10281.15
2–4	260	290	10282.00	10282.05
Stirrer shafts (please state length when ordering)				
	270	—	10284.00	10284.05
Wing stirrers				
0,25	162	170	10285.00	10285.05
0,5	180	195	10286.00	10286.05
1	210	220	10287.00	10287.05
2	240	255	10288.00	10288.05
4	260	275	10289.00	10289.05
6	270	305	10290.00	10290.05
Hoesch stirrers				
1	225	220	10291.00	10291.05
2	265	255	10292.00	10292.05
4	280	275	10293.00	10293.05
6	310	305	10294.00	10294.05

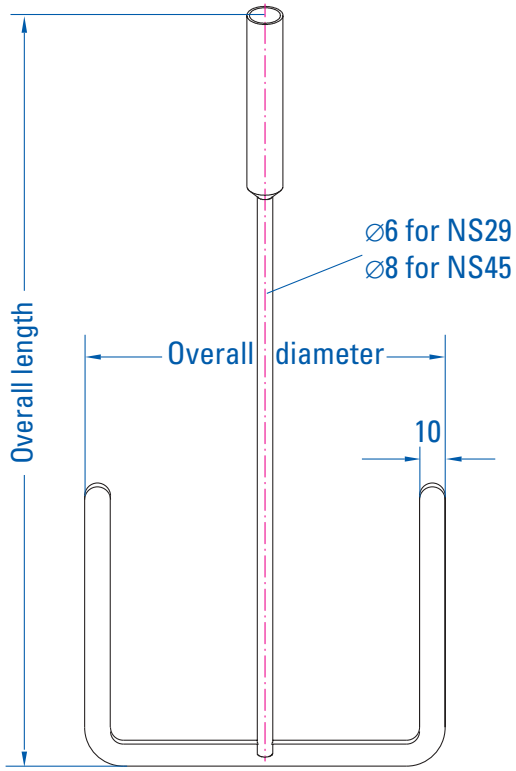
B45 stirrerheads

Flask size [ltr]	Length [mm]	Height [mm]	Cat. no. for 10230.00, 10264.00, 10260.00	Cat. no. for 10231.00, 10231.05
Leaf stirrers				
4	280	290	10295.00	10295.05
6	310	320	10296.00	10296.05
Wing stirrers				
4	270	290	10297.00	10297.05
6	310	320	10298.00	10298.05
Hoesch stirrers				
4	280	290	10299.00	10299.05
6	310	320	10300.00	10300.05
Stirrer shafts (please state length when ordering)				
	300	—	10301.00	10301.05

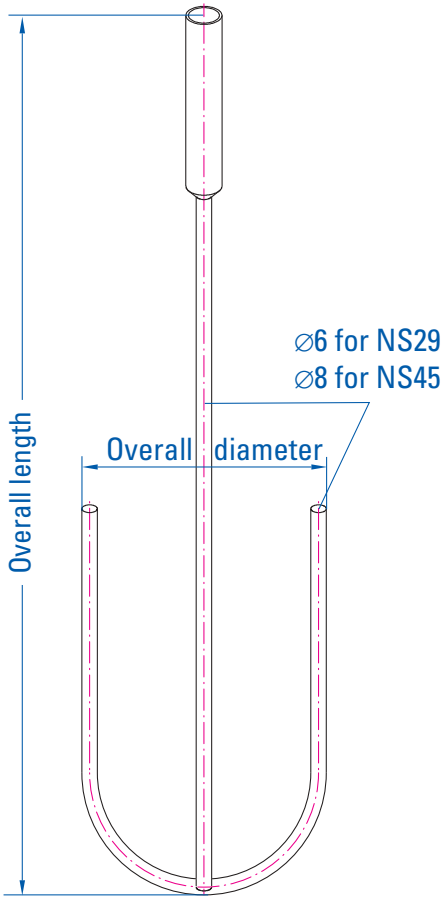




Stirrers for conical joint stirrerheads

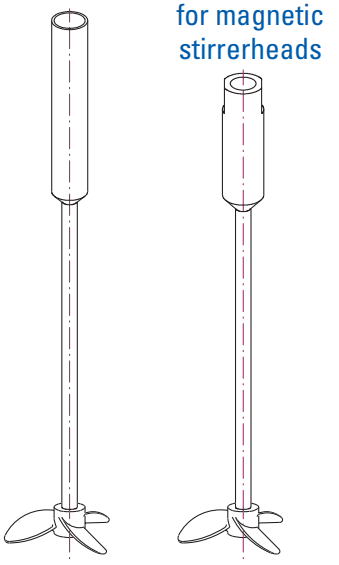


Anchor stirrers for flat flasks

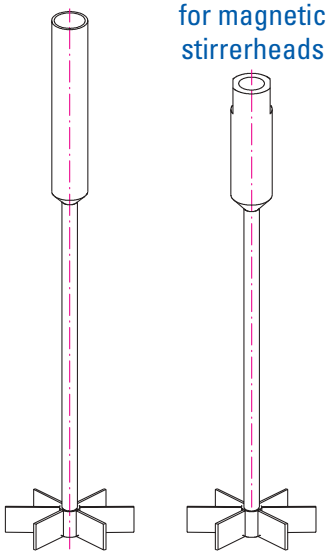


Anchor stirrers for Quickfit flasks

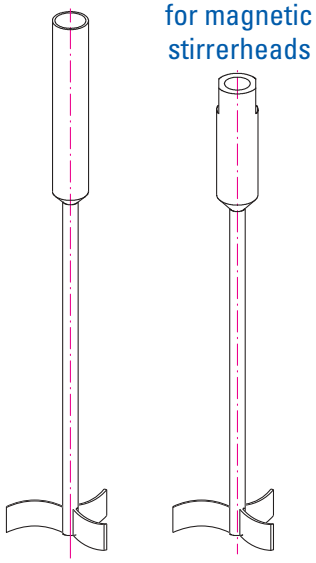
Propeller stirrer



Turbine stirrer



Impeller stirrer



JUVO Thermostats for Industry and the Laboratory

JUVO thermostats are used in all branches of science and industry.

JUVO thermostats have a special design, proven over many years, that ensures trouble-free continuous operation at temperatures up to 350 °C.

JUVO thermostats have a heat output up 9 kW and high pumping capacity circulation pump.

They are built in stainless steel, with a glandless pump, a visual level gauge and a temperature limiter.

If required, an expansion chamber containing a float switch can be fitted. This arrangement complies with safety level 2 of DIN 12 879. The 9 kW thermostat has this as standard.

No Decomposition Products

At temperatures over about 200 °C, oxidative decomposition of heat transfer fluids are liable to produce fogs or vapours. This effect is suppressed in the JUVO thermostat by using a double layer of heat transfer fluid.

The hot fluid is covered by a static layer of cold fluid, which is not circulated. Only the circulating pump shaft connects the two.

The cold layer shields the hot fluid from the air. Decomposition products are neither produced nor liberated to the atmosphere.

Applications of JUVO thermostats

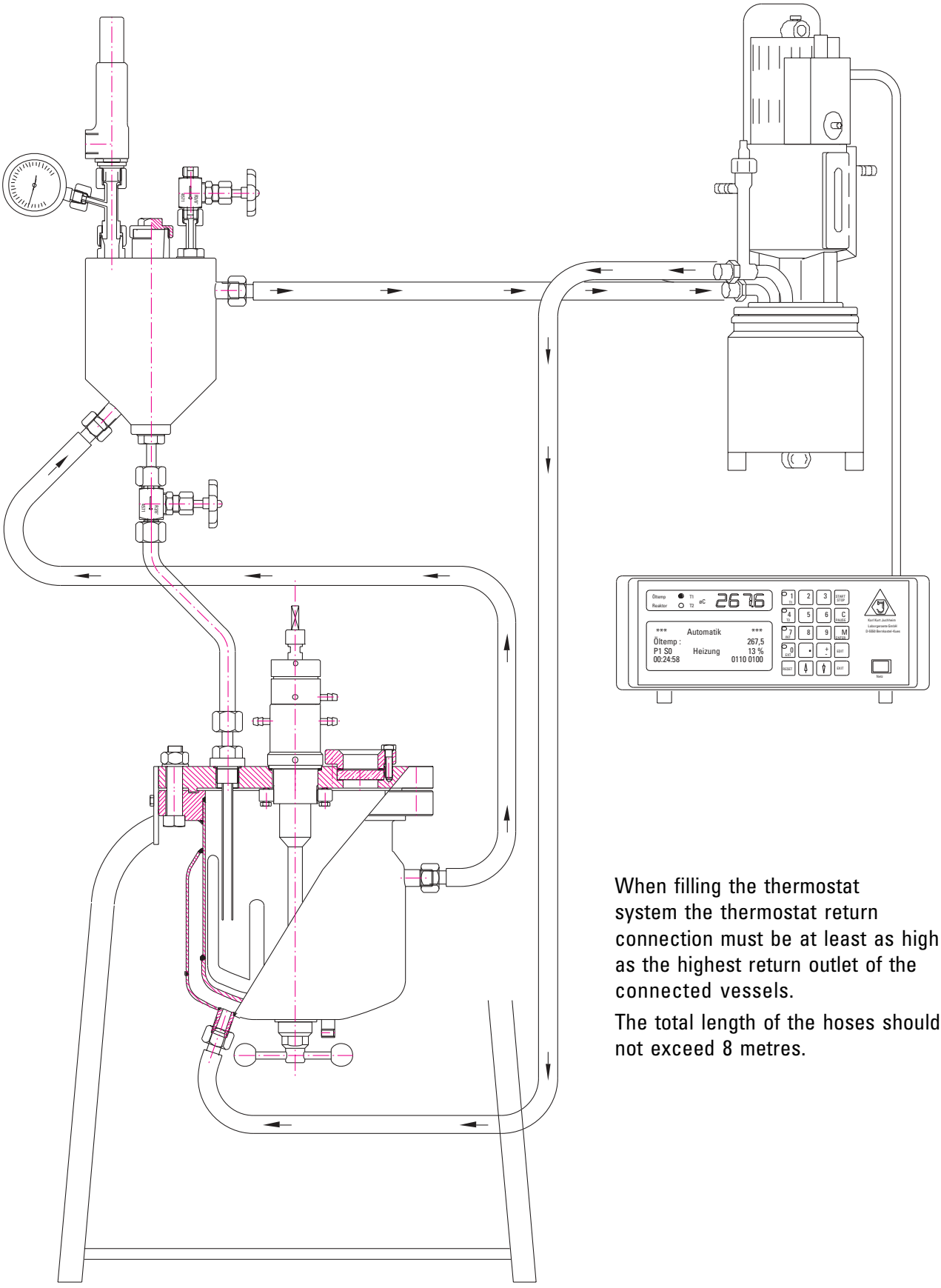
Used for continuous operation at temperatures up to 350 °C in:

- Laboratory and industry for heating measuring equipment, double walled glass reaction vessels, autoclaves and JUVO metal pressure and vacuum reaction vessels.
- For accurate and overheating free heating of plastics forming machinery such as extruders, presses, injection moulders, or the injector heads of large injection moulders.
- High vacuum thin film evaporators.
- Isothermal execution of chemical reactions. Because the mass of the heat transfer fluid is low, it is possible to switch rapidly from heating to cooling.
- Execution of exothermic chemical reactions. A programmable controller in conjunction with an automatic cooling system, (see p 95) senses the onset of the exotherm, and diverts the heat transfer fluid through the heat exchanger, thus suppressing the exotherm.

Heat Transfer Fluids

Suitable fluids are Marlotherm SH® Dowtherm® or low viscosity silicone oil.

Connection scheme for two heated vessels



When filling the thermostat system the thermostat return connection must be at least as high as the highest return outlet of the connected vessels.

The total length of the hoses should not exceed 8 metres.

Output	
Maximum continuous fluid temperature	350 °C
Heat output	2, 3, 4 kW
Pump output	up to 16 l/min
Pump head	8 m water gauge

Technical data	
Supply voltage	230 V / 50 Hz (2 kW) 3 x 230 V / 50 Hz (4 kW)
Current	10 A (2 kW) 19 A (4 kW)
Fluid capacity	1,2 l
Overtemperature protection /cutout	50 - 350 °C +/- 10° and OFF
Low fluid level protection	Only for thermostats with expansion chamber *1
High fluid level protection	By overflow
Safety group (DIN 12879)	2 (with low fluid level detection)

Dimensions	
Height	440 mm
Diameter	140 mm
Weight	11.2 kg

*1

An expansion chamber is required for:

- Operation to DIN 12 879 safety class 2
- Use with moderate volumes of heat transfer fluid and large temperature variations
- Use with large volumes of heat transfer fluid

Programmable controller for JUVO thermostats

- Large LED temperature indicator
- LCD menu control with diplay of all relevant parameters
- All monitor and control functions for operation of thermostat and ancillary equipment
- Three 20 mA loop outputs, two RS-232 ports
- Program capacity: 10 programs, each with 10 steps
- Operation: manual, automatic, 20 mA loop or V24 inputs
- Control points: Fluid temperature (T1) or vessel interior (T2)
- Eight switches available for use in programs
- Dimensions [W x D x H) 340 x 355 x 130 mm

550*0.00

550*0.11

Base units

2 kW Thermostat
Fitted with a single 2 kW heating element and a cooling coil.

	Cat. no.
	55020.00
As 55020.00, but with expansion chamber and float switch.	55020.11

4 kW Thermostat
Fitted with two 2 kW heating elements.

	Cat. no.
	55040.00
As 55040.00, but with expansion chamber and float switch.	55040.11

Non-programmable controller for 2 kW thermostat. (Figure see p 87)
With digital display and ON/OFF switch. Output selectable 0 or 2 kW.

	Cat. no.
	55102.00
As 55102.00, but for 4 kW thermostat. With digital display and ON/OFF switch. Output selectable 0, 2 or 4 kW.	55104.00

Programmable controller
for 2 to 4 kW thermostats (Description see p 89)

	Cat. no.
	55105.00
As 55105.00, but 19" rack mounted.	55105.11

Obligatory Accessories
Pt100/DIN, Platinum resistance thermometer for measurement of fluid temperature.
With three pin plug for thermostats with serial numbers 500-14 and later.

	Cat. no.
	51009.00
As above, but with 2 pin plug for thermostats with serial numbers 500-13 and earlier.	51009.10

Accessories for 2 - 4 kW thermostats

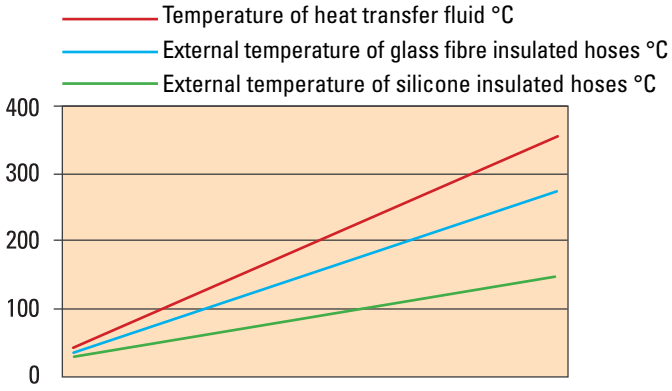
Heat transfer fluid Marlotherm SH

5 litres, in plastic container with spout.

Cat. no.
51016.00

51016.00

Surface temperatures of hoses

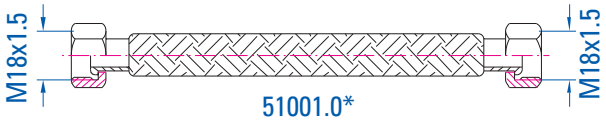


Hoses are made from stainless steel, are flexible, and suitable for use up to 400 °C. End connections are plasma welded. Supplied with either glass fibre or silicone insulation.

Glass fibre insulated hoses, DN10

with two female cap nuts M18 x 1.5

Length [m]	Cat. no.
0,5	51001.05
1,0	51001.10
1,5	51001.15
2,0	51001.20

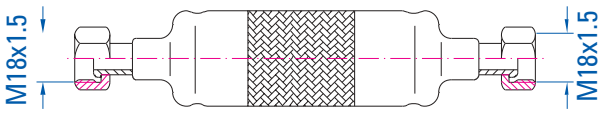


51001.0*

Silicone insulated hoses

with two female cap nuts M18 x 1.5

Length [m]	Cat. no.
0,5	51003.05
1,0	51003.10
1,5	51003.15
2,0	51003.20



51003.0*

Accessories for 2 - 4 kW thermostats - stainless steel

Connectors DN10

	Cat. no.
Straight - Female/Female M18 x 1.5	51005.00
Straight - Male/Male M18 x 1.5	51005.11
Male/Female M18 x 1.5, elbow	51005.22

Adaptors DN10

	Cat. no.
Male M18 x 1.5 Female M16 x 1*[1]	51006.00
Male M16 x 1 *[1] Female M18 x 1.5	51006.01
Male M14 x 1.5 Female M18 x 1.5	51006.11

Welding adaptors, DN10

	Cat. no.
Female M18 x 1.5	51010.00
Male M18 x 1.5	51011.00
Female M16 x 1*[1]	51010.11
Male M16 x 1*[1]	51011.11

Thermometer holder DN10

	Cat. no.
For glass thermometers cat no. 51008.** or Pt100 resistance thermometers Threaded M18 x 1.5 Female/Male	51007.00

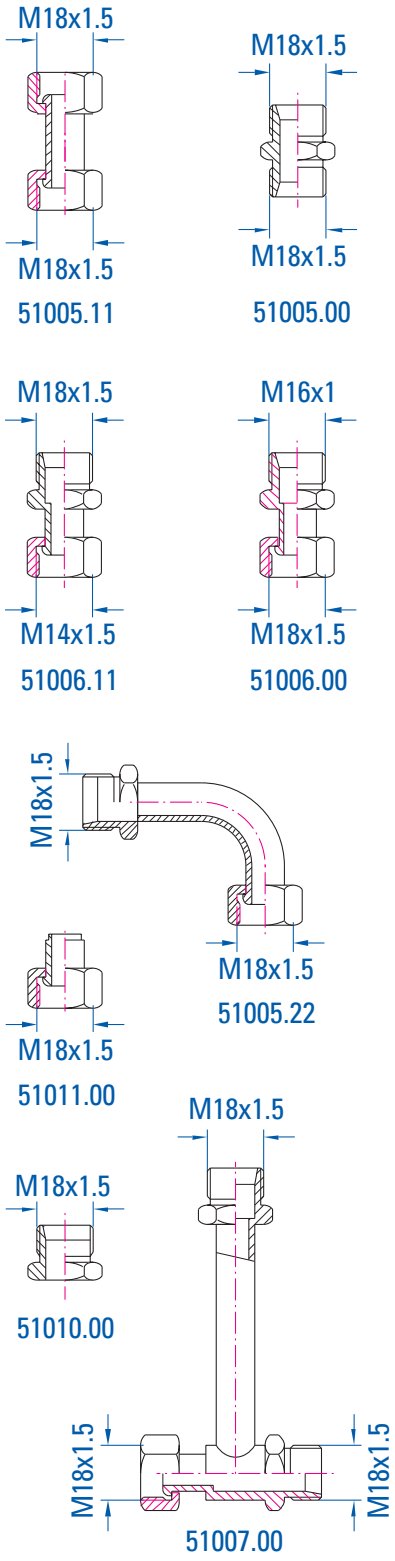
Glass thermometers

Specially designed to fit in thermometer holder 51007.00

	Cat. no.
Range 0–100 °C	51008.10
Range 0–200 °C	51008.20
Range 0–300 °C	51008.30

*[1] M16 x 1 thread is specified by DIN 71668

** 10, 20, 30 according to measurement range



Accessories for 2 - 4 kW thermostats - stainless steel

Welding adaptors, DN10, straight

	Cat. no.
Male M18 x 1,5	51024.00
Female M18 x 1,5	51025.00

Schott flange adaptors

	Cat. no.
Female M18 x 1.5	51026.00

Welding adaptors, DN10, elbow

	Cat. no.
Male M18 x 1.5	51022.00
Female M18 x 1.5	51023.00

Three way ball valve, with PTFE seals.
For manual control of cooling. For connections see page 98, lower diagram.

Threaded M18 x 1.5, two male, 1 female.

Cat. no.
50114.00

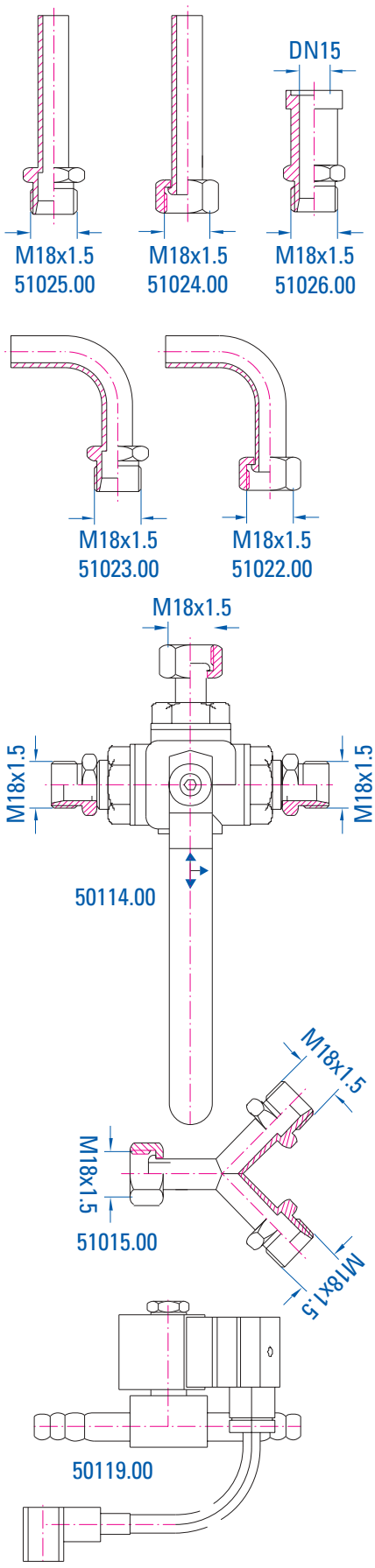
Y - Piece
Allows outlet from reactor heating jacket to be connected to two hoses. For connections see page 98, lower diagram, page 99 upper diagram.

Threaded M18 x 1.5, two male, 1 female.

	Cat. no.
	51015.00
As 51015.00, but with one male inlet, and one female and one male outlet	51015.11

Cooling water valve
For automatic control of cooling water through heat exchangers. Requires the programmable controller. See page 99, upper diagram.
Power supply 230V / 50 Hz
Fitted with two 9–12 mm hose connectors.

Cat. no.
50119.00



Accessories for 2 – 4 kW thermostats

Platinum resistance thermometers
Pt100/1 DIN resistance thermometer, type EL115. With 0.45 m long cable and plug. Response time 1 second.

	Cat. no.
For thermostats models 500-13 and earlier	51009.11
For thermostats models 500-14 and later	51009.00

Pt100/0.3 DIN resistance thermometer, type EL115. With 0.25 m long cable and plug.
Response time 0.3 second

	Cat. no.
For thermostats models 500-13 and earlier	51009.33
For thermostats models 500-14 and later	51009.22

Pt100/1 DIN resistance thermometer
with various dip length, cable and plug, For measurement of internal temperatures of vessels. (see Pages 39 and 44)

Glass to Metal connector
For connection of Schott flanges to metal hoses. Nominal diameter 10 mm. Supplied with pressure equalising spring and PTFE gasket.

	Cat. no.
For DN 10 Schott flange	51012.00
For DN 15 Schott flange	51013.00

Connectors for plastic hoses
Threaded male M18 x 1.5. For hoses diam 9 - 13 mm

			Cat. no.
			51020.00
Threaded female M18 x 1.5			
Hose diameter	∅ 8 mm	∅ 10 mm	∅ 13 mm
Cat. no.**	51021.08	51021.10	51021.13

Thermostat holder for mounting a thermostat onto a 34 mm rod or tube, such as supplied with a stirrer drive motor mounting stand.

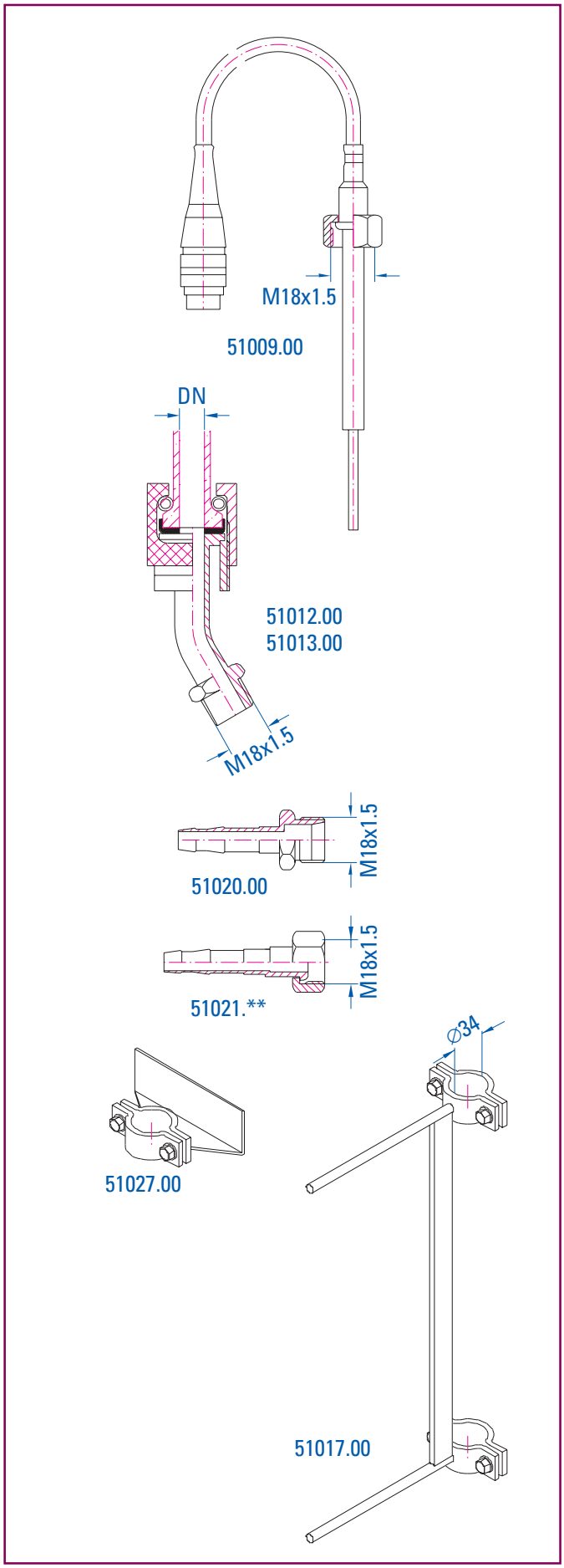
51017.00

Heat exchanger holder, for attachment to a 34 mm diam. rod or tube.

51027.00

Mounting plate for a thermostat, heat exchanger and high temperature valve. (not illustrated)

55041.00



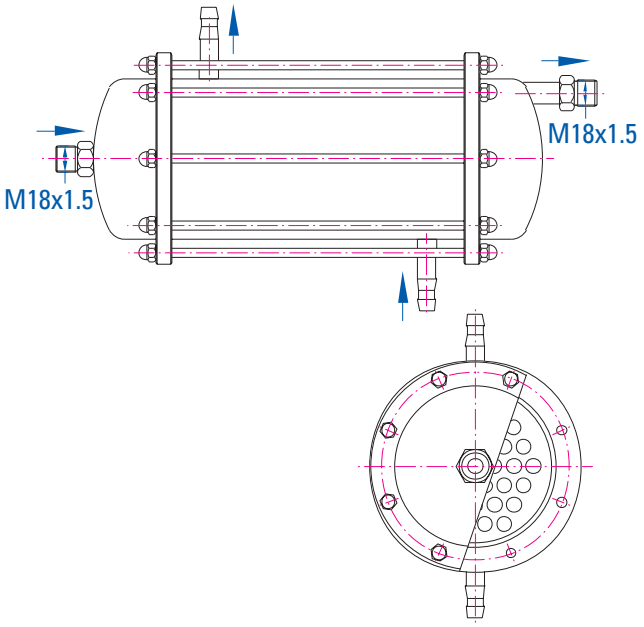
Accessories for 2 - 4 kW thermostats

Heat exchangers

The tube and shell heat exchangers provide for the rapid cooling of heat transfer fluid.

- All stainless steel construction
- PTFE gaskets
- Useable up to 350 °C with continuous water throughput, or with flow controlled by the valve 50119.00 in conjunction with the programmable controller (see layout on page 99 upper).
- Heat transfer fluid connections: male, M18 x 1.5
- Water connections: 12 mm plastic hose connectors.

	Cat. no.
Tube surface area 0.16 m²	50111.00
Tube surface area 0.32 m²	50112.00

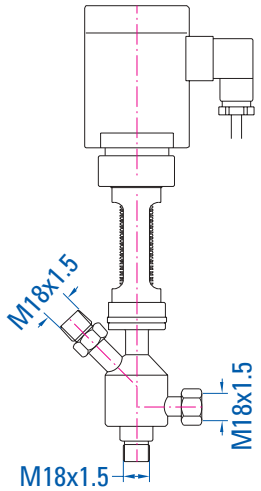


High Temperature Valve DN10

The high temperature valve is designed for switching the flow of heat transfer fluid at temperatures up to 350 °C. For use with the programable controller to provide automatic cooling. All-or-nothing operation.

- Actuator rod sealed within metal bellows
- All parts in contact with heat transfer fluid made from stainless steel
- Fitted with a high temperature electromagnet (normal operating temperature 85 °C). Powered from programmable controller 55105. With connection cable.
- Input: Female M18 x 1.5
- Outputs: Male M18 x 1.5

Cat. no.
50117.00



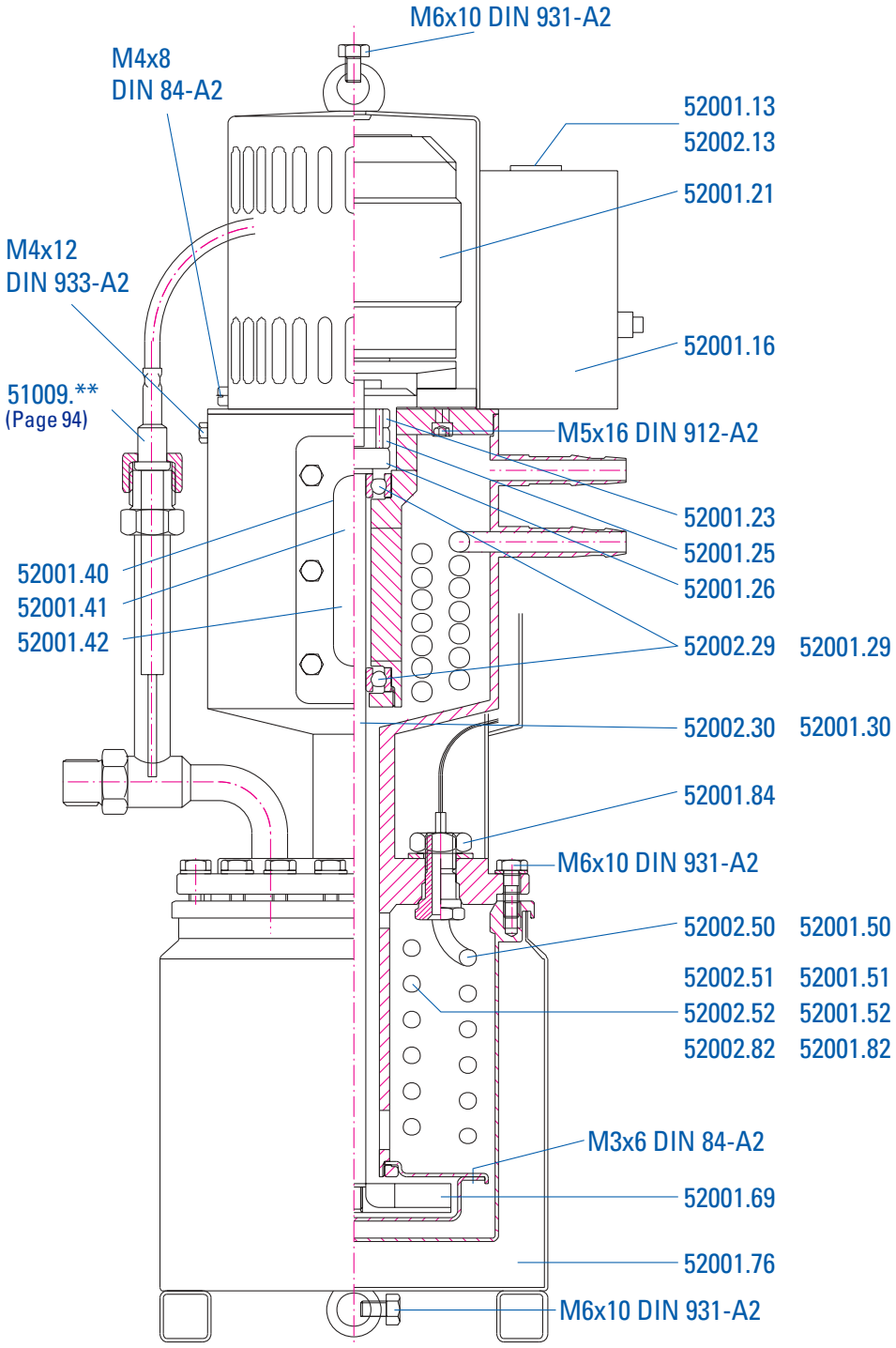
High Temperature Proportioning Valve DN10

As above, but motor driven, allowing continuously variable opening.

Driven by programmable controller 55105. Position of valve is fed back to the controller. Opening proportional to the difference between the actual temperature and the set temperature.

Cat. no.
50117.11

Spare Parts for Thermostat



Consumables for Thermostat

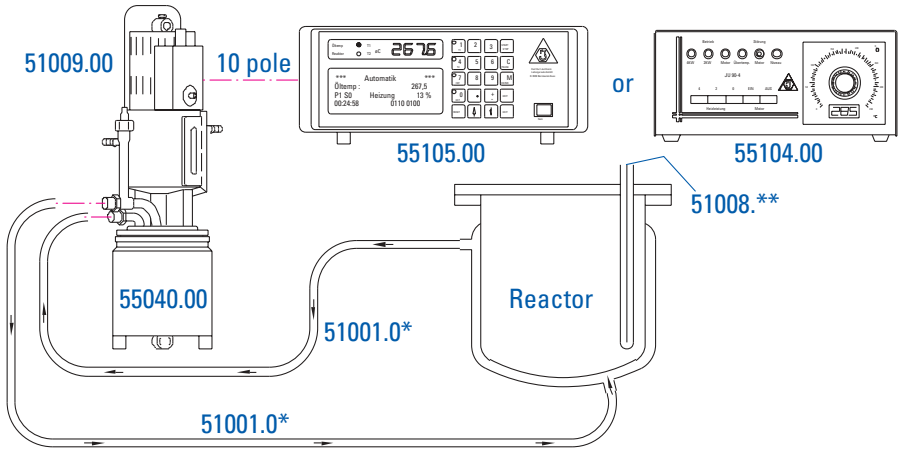
	Cat. no.
Thermometer socket 2 pole with nuts and bolts for models 50013 and earlier	52001.13
Thermometer socket 3 pole with locknuts, for models 500-14 and later	52002.13
8 pole connector	52001.16
Motor 230 V / 50 Hz AC	52001.21
Motor drive plate with adjustment screws	52001.23
Clutch plate plastic	52001.25
Shaft drive plate with adjustment screws	52001.26
Ball bearing 1200.C3S1 heat treated	52001.29
Ball bearing 608Z15 stainless steel	52002.29
Silver steel pump shaft chromium plated, with circlip	52001.30
Stainless steel pump shaft with circlip	52002.30
Silicone seat for sightglass	52001.40
Sightglass	52001.41
'O' ring for sealing sightglass	52001.42
Large heater element 2 kW 230 V / 50 Hz for all thermostats for models up to 500-06**	52001.50
As above, for models 500-07** and later	52002.50

	Cat. no.
Small heater element 2 kW 230 V / 50 Hz for 4 kW thermostats for models up to 500-06**	52001.51
As above, for models 500-07** and later	52002.51
Small heater element 1 kW 230 V / 50 Hz for 3 kW thermostats for models up to 500-06**	52001.52
As above, for models 500-07** and later	52002.52
Cooling coils For 2 kW thermostats only, for models up to 500-06**	52001.82
As above, for models 500-07** and later	52002.82
Gaskets for heater elements and cooling coils, aluminium, for models up to 500-06**	52001.53
Pump impeller	52001.69
Gasket for heat transfer fluid reservoir	52001.71
Insulation for lower heat transfer fluid reservoir	52001.76
Nuts M12 x 1.5 for heater elements and cooling coil	52001.84
Drain tube with connector and M18 x 1.5 female cap nut	52001.87
Resistance thermometer gasket for models up to 500-06**. With cap '0' ring 10 x 3, viton	52001.92

** state serial number when ordering

Thermostat System Layouts

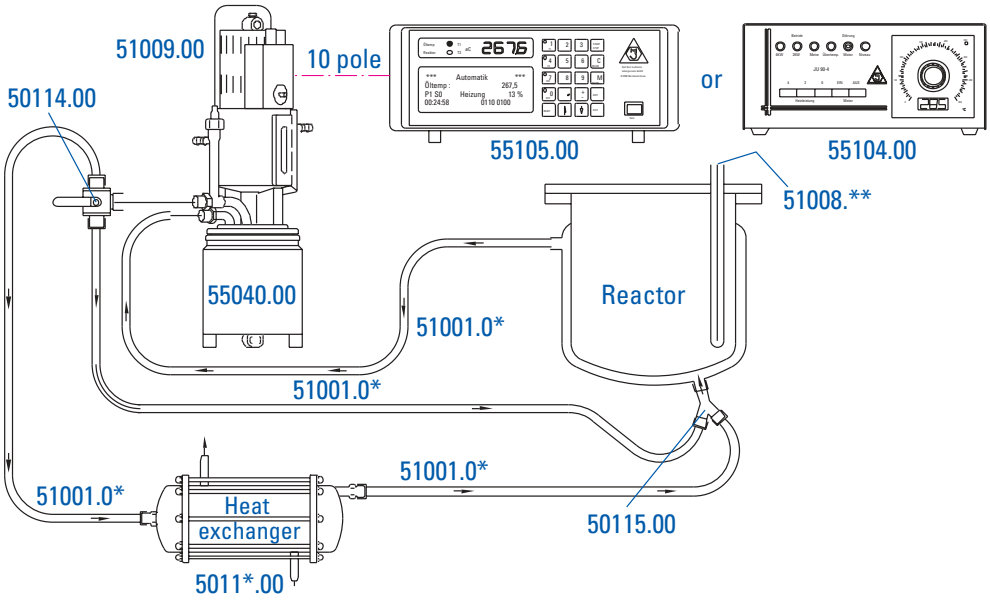
Simplest system



Components required:

	Cat. no.
Thermostat	550*0.**
Pt100 thermometer (T1)	51009.00
Programmable controller	55105.**
or non-programmable controller	5510*.00
2 hoses	5100*.**
Marlotherm heat transfer fluid, 5 Litre	51016.00

System with manual cooling, for temperatures up to 250 °C

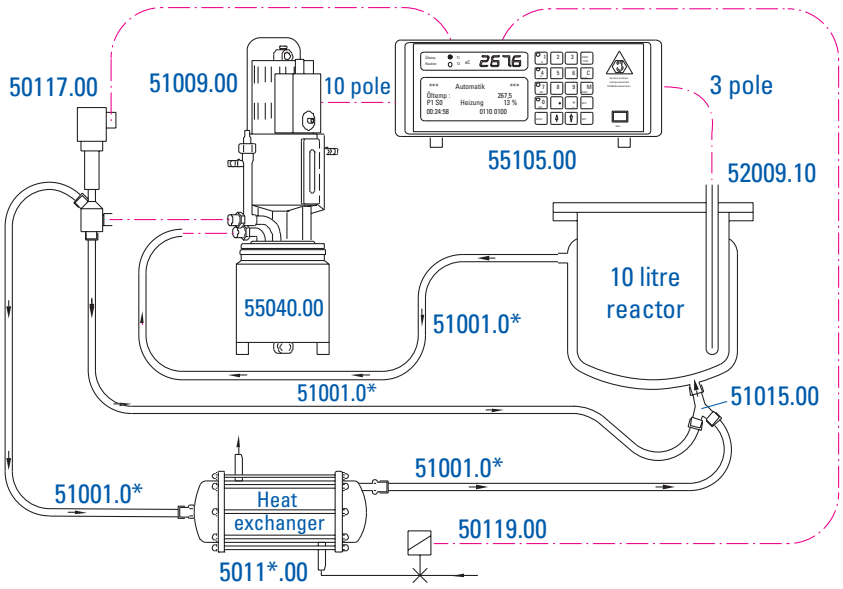


Components required:

	Cat. no.
Thermostat	55040.**
Pt100 thermometer (T1)	51009.00
Programmable controller	55105.**
or non-programmable controller	55104.00
Marlotherm heat transfer fluid, 5 Litre	51016.00
4 hoses	5100*.**
Three-way ball valve	50114.00
Heat exchanger	5011*.00
'Y' piece	51015.00

Thermostat System Layouts

System with automatic cooling, control point reactor temperature

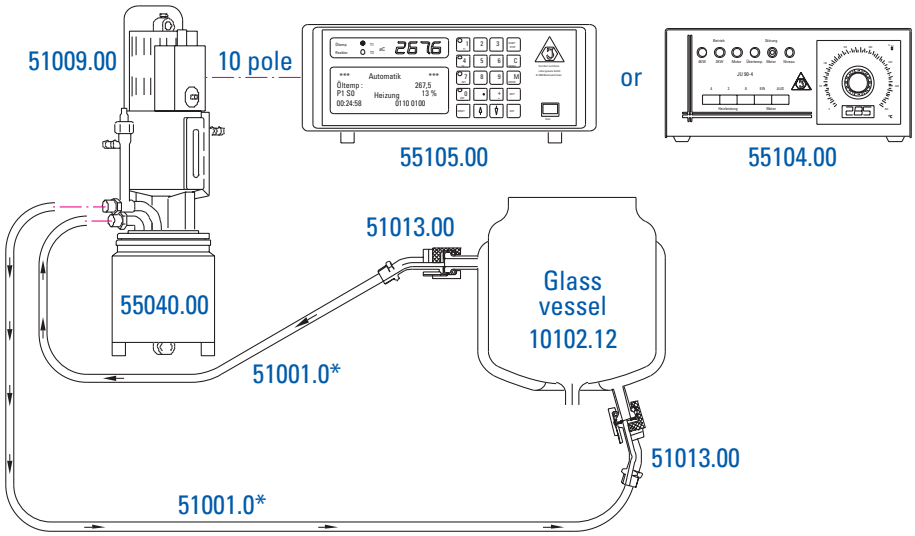


Components required:

	Cat. no.
Thermostat	55040.**
Pt100 thermometer (T1)	51009.00
Programmable controller	55105.00
Pt100 thermometer (T2)	52009.**
4 hoses	5100*.**

	Cat. no.
High temperature valve	50117.00
Heat exchanger	5011*.00
'Y' piece	51015.00
Cooling water valve	50119.00
Marlotherm heat transfer fluid, 5 Litre	51016.00

Simple system for use with glass reactor

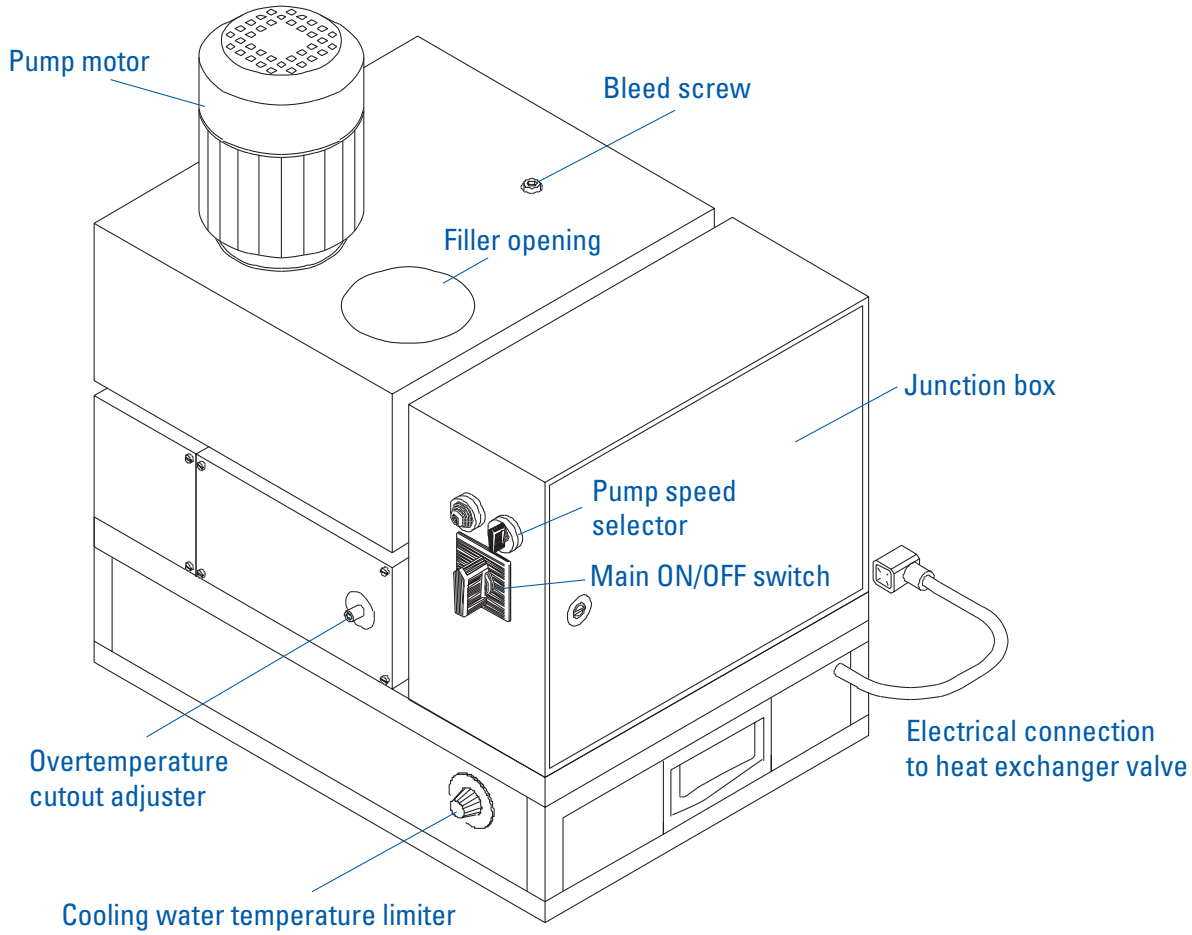


Components required:

	Cat. no.
Thermostat	550*0.**
Pt100 thermometer (T1)	51009.00
Programmable controller	55105.00
or non-programmable controller	5510*.00

	Cat. no.
2 hoses	5100*.**
2 DN10 glass - metal connectors	51013.00
Marlotherm heat transfer fluid, 5 Litre	51016.00

9 kW Thermostat

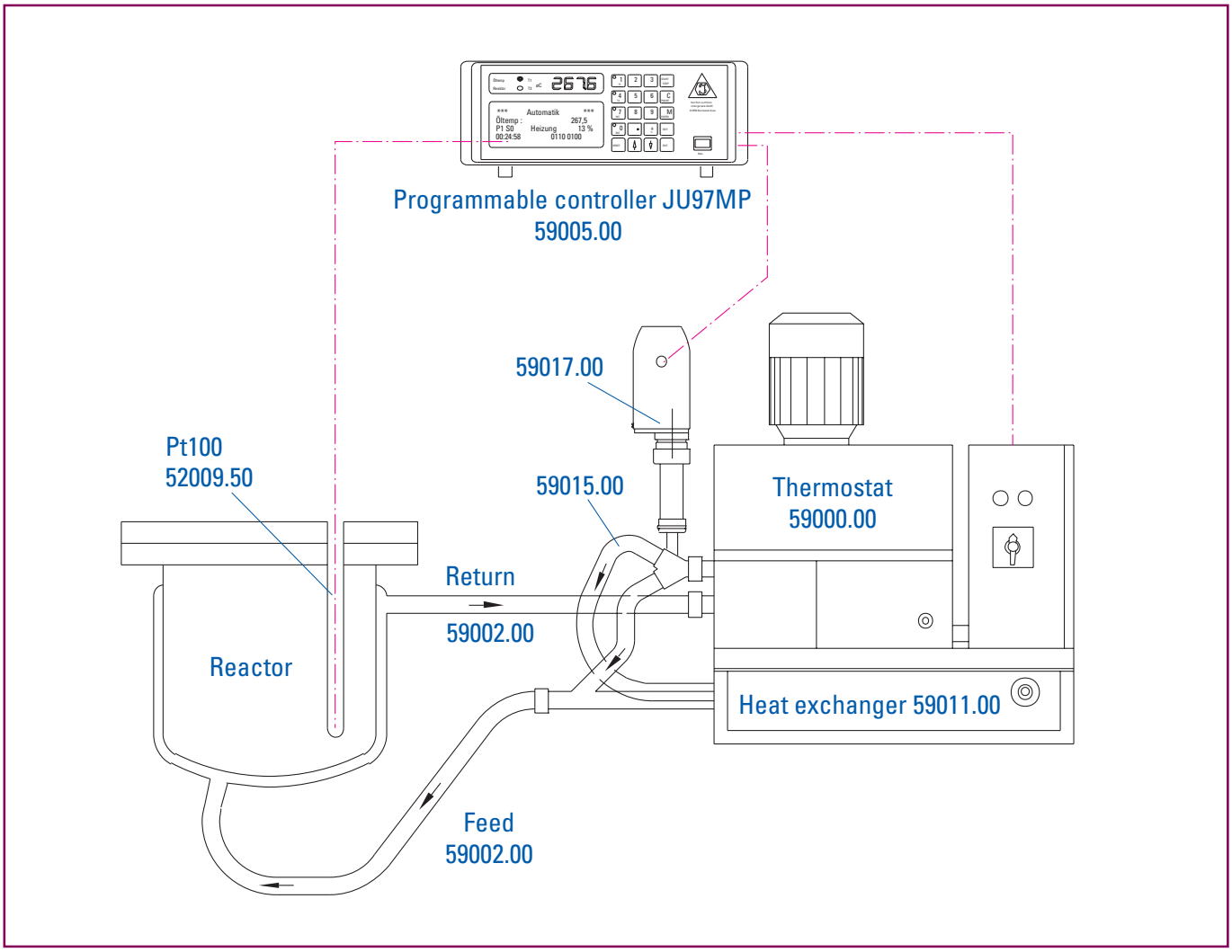


Technical data	
Supply voltage	3 x 400 V, with neutral and earth, 5 pole CEE plug Load per phase 3–4 kW, current 16 A
Motor	0.37 kW, speed 1400/2600 rpm 925 rpm under maximum pump load
Temperature range	30–320 °C with heat exchanger 130 °C to 320 °C without heat exchanger

Technical data	
Cooling water consumption	60 litres/h for temperatures up to 150 °C 300 litres/h for temperatures up to 320 °C
Connections	Heat transfer fluid DN20/M30 x 1.5 Cooling water 10 mm plastic hose connectors

All parts in contact with heat transfer fluid made from stainless steel.

9 kW thermostat accessories



Thermostat DN20
Output 9kW, Dimensions (W x D x H)
530 x 380 x 450 mm

	Cat. no.
	59000.00

Programmable controller
for 9 kW thermostat. For description see page 89

	Cat. no.
	59005.00
As above, but for 19" rack mounting	59005.19

High Temperature Proportioning Valve DN20
with servo control through controller

	Cat. no.
	59017.00

Heat exchanger
1 m² surface area with temperature limiter and magnetic on/off valve for cooling water. Installed in lower part of thermostat.
Dimensions (W x D x H) 530 x 380 x 110 mm

	Cat. no.
	59011.00

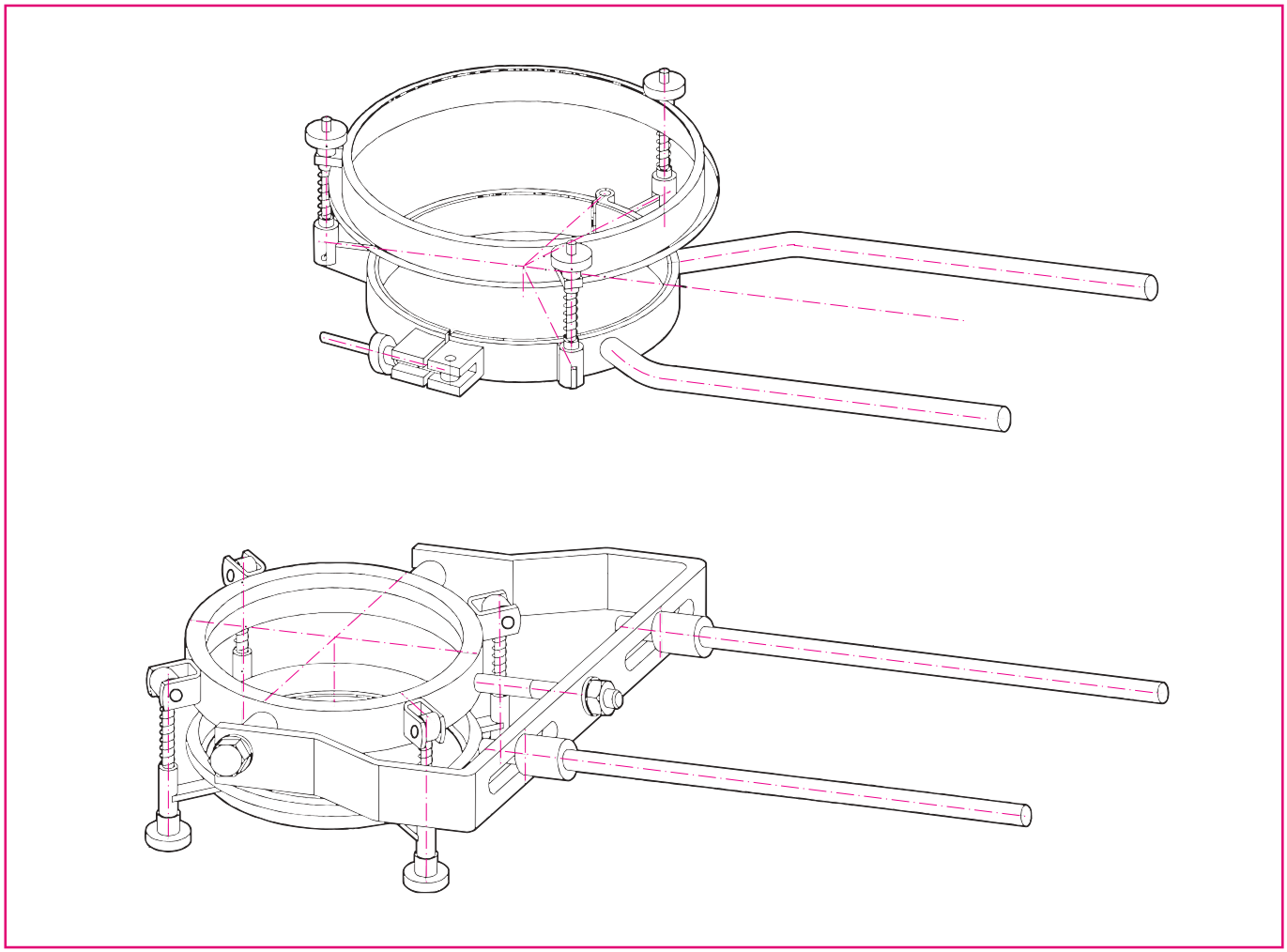
Fittings for connection of thermostat, high temperature valve and heat exchanger.

	Cat. no.
	59015.00

Stainless steel hoses, DN20,
connections M30 x 1.5 female

Length [m]	Cat. no.
1	59001.00
2	59002.00
3	59003.00

Universal holders



Universal holders for flat flange flasks
Retained flask body, removable lid. Made from stainless steel, comprising compression ring with fixed support rods, retention ring and and springs.

	Cat. no.
DN100	7010.00
DN150	7015.00

Retained flask lid, removable body
Made from stainless steel, comprising compression ring, two circular springs, support fork and two adjustable support rods.

	Cat. no.
DN60 (one support rod)	7106.00
DN100	7110.00
DN120	7112.00
DN150	7115.00
DN200	7119.00

Individual parts:
Compression ring, stainless steel

	Cat. no.
DN100	7120.00
DN120	7122.00
DN150	7125.00
DN200	7127.00
Support fork, stainless steel	7128.00
Support rods, stainless steel	7129.00

Mounting block for flask holders.
Drilled 34.5 mm in centre. With locking screws.

Cat. no.
7130.00

Fire suppression troughs, made from chromium-nickel steel

The chromium-nickel steel fire suppression trough effectively prevents liquid fires and offers the following advantages:

- Escaping inflammable liquids (burning or not) are pass through the gauze and are caught in the trough. They are thus removed from the source of ignition. Burning fluids caught in the trough are extinguished from lack of oxygen.
- The chromium-nickel steel construction makes the trough resistant to heat and corrosion from reagents such as acids and alkalis.
- In contrast to aluminium troughs, the use of chromium-nickel steel ensures that no spontaneously inflammable organometallic compounds are produced.
- Once caught in the trough, the liquid can be poured off almost completely into containers. The costly and troublesome mopping up with glass or mineral wool and their subsequent storage are eliminated.
- The mesh can be easily removed, allowing the trough to be quickly and easily cleaned.

Notice

The trough should be of such a size that the amount of liquid to be caught does not exceed 2/3 of the trough volume.

Dimensions [W x D x H]	
Fire suppression trough	450 mm x 450 mm x 120 mm

Other sizes can be manufactured

	Cat. no.
Fire suppression trough	310 BV

Experimental fire with n-heptane, trough size 45 x 45 x 12 cm, ambient 16°C

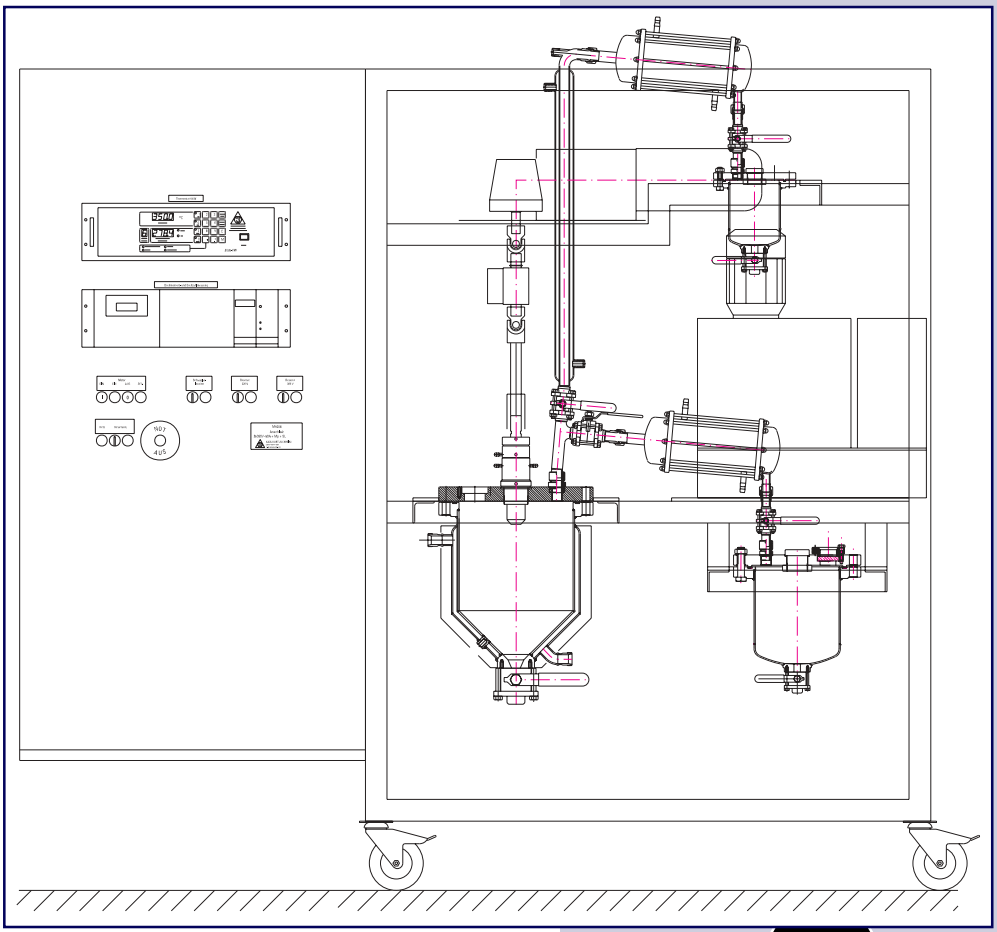
Trough without mesh. Volume 600 ml, height of flame 2.2 m. n-heptane completely burnt.

Trough with mesh. Filled with 3 x 2 l volumes of burning n-heptane. Flame extinguished in 2 - 5 sec for each 2 l volume.

After the trial 5.6 litres of unburnt n-heptane were recovered.

Raction vessel built to GMP requirements

- With lifting jack made from 316 stainless steel
- Fitted with dairy connectors
- Pressure gauge with a dead-space free membrane



Transportable turn-key plant with:

- Control cabinet with 19" rack mounted torque and temperature controllers
- A 9 kW thermostat
- Stirrer motor with torque sensor and speed regulator
- 20 litre cylindrical-conical reactor rated at 20 Bar
- Two-way cooling path
- Reflux condenser, condenser, and receiving vessel.

Materials:

Rust and acid resistant stainless steel - 316
German designation: 1.4571

➡ *See chemical resistance tables page 36*

Unsuitable for applications involving the presence of halide ions. Standard material for vessels and accessories. Suitable for most applications. Lowest cost material.

The company is licensed and supervised by TÜV Rheinland to fabricate pressure vessels in this material.

Nickel based alloy - Hastelloy C4®
German designation: 24610

Highly resistant material for vessels and accessories. Highly suited for applications involving acids, and other applications for which stainless steel is unsuited.

Stocks are held of materials and spare parts made from this material.

The company is licensed and supervised by TÜV Rheinland to fabricate pressure vessels in this material.

Nickel based alloy - Alloy 59
A nickel-chromium-molybdenum based alloy

The company is licensed and supervised by TÜV Rheinland to fabricate pressure vessels in this material.

Additional information about chemical resistance and composition of the alloys mentioned above and others is available on the World Wide Web.

A good source of information is:
http://www.corrosionsource.com

Other materials are possible. Contact us for details.

GMP (Good Manufacturing Practice) Standard for pharmaceutical applications.

Vessels and accessories can be manufactured to comply with the GMP code.

The standard requires that the vessel and its accessories can be cleaned according to a written procedure, and the results must accord with a written procedure.

To achieve this certain modifications are made to the design and to the fabrication process.

Design modifications:

Elimination, as far as possible, of all dead spaces in gaskets, seals, connections, valves and and monitoring equipment.

Specification of sightglasses, valves without dead space, and membrane pressure gauges.

Elimination, as far as possible, of exterior crevices, e.g. any thermal insulation is sheathed and permanently welded onto the vessel.

Manufacturing modifications:

Surface roughness lower than 0.8 µm. Reaction vessels can be made to a roughness down to 0.3 µm. Exterior roughness 3 µm maximum. Surfaces to be inspected at various points.

Vessel marking to be done chemically instead of by nameplates. All bearings and channels in lifting gear and stands to be sealed.

Approved materials to be used. In food or pharmaceutical applications gasket and sealing materials must be FDA (Food and Drug Administration) approved.

A list of all components with all relevant documentation.

Index

Conditions of sale and payment

1 Only our sale and payment conditions apply. Purchase conditions applied by customers are explicitly excluded. We are not bound by such conditions even if they are not excluded at the finalisation of any particular contract of sale.

2 All prices are ex-works, excluding packing. Quotations are valid for 6 months only. We reserve the right to raise prices if manufacturing costs increase between the date of ordering and the date of delivery.

3 Minimum order value € 25.00 net excluding VAT. For deliveries under the minimum order value an administration charge of € 5.00 will be added in addition to packing and dispatch costs.

4 Packing is charged at cost and is not returnable. Railway delivery within the Federal Republic of Germany is generally effected through rented Bahncollicos, which must be emptied and returned immediately after receipt. Return freight for Bahncollicos is free.

5 Quotations must not be disclosed to third parties and competing firms.

6 If items are specially manufactured, we reserve a right to a delivery margin of + or - 10%.

7 As far as our facilities allow us to do so, we will manufacture special products in a proper and timely manner on the basis of samples, drawings or information provided by the customer. No returns or exchanges of specially manufactured goods will be allowed, but any shortages will be made up.

8 Delivery dates are not binding. Operational difficulties outside our control or forces majeures allow us to postpone previously agreed delivery dates, or to cancel the contract. Penalty clauses for late delivery are not accepted.

9 Our order acknowledgements serve as the confirmation of an order. Small orders and orders met ex-stock will not be acknowledged.

10 Delivery and transport are at the buyer's cost and risk. In the absence of specific instructions, packaging and means of delivery are chosen on basis of greatest suitability, rather than minimum cost.

11 Shortages must be notified in writing 8 days after delivery at the latest. Hidden faults must be disclosed immediately on discovery, but within 1 month from the date of invoice at the latest. When a claim is acknowledged the purchaser is entitled to reworking or a make-up delivery. Further claims, especially those engendered by reworking or make-up deliveries will not be entertained.

12 Commercial rights: we are unable to check in detail if the production or delivery of goods according to a drawing or sample infringes the rights of third parties. The risk is borne by the purchaser. If required by us, the purchaser must indemnify us against claims for infringement of these rights. All costs involved are to be borne by the customer.

13 Except in the case of delivery errors, returns or exchanges of specially manufactured goods is not allowed.

14 No responsibility for damage consequent on the use of our products will be accepted.

15 We reserve the right to make technical modifications to our products.

16 Payment: within 8 days with 2% discount, within 30 days net. For foreign payments under € 250.00, all costs of payment must be incurred by the purchaser, otherwise they will be subsequently invoiced. Transfers through the Post system are free of charge. Cheques and transfers are only accepted subject to clearance. Payment is not considered to be effected until such instruments have been cleared. We recognise discounts only when payments are received within the time allowed. The time of payment is taken to be the date of transfer from the settling institution, or the postmark in the case of settlement by cheque.

17 Delays in payment entitles us to block any further deliveries. Additionally, we are entitled to demand immediate settlement of outstanding and any further sums due. Interest will be charged at 2% over local bank rate. Non-compliance with payment conditions entitles the seller to demand payment in advance for outstanding deliveries or for guarantors, and after suitable notice to withdraw from the contract or to demand indemnity against claims for non-fulfilment of the contract.

18 Ownership: all goods supplied remain our property until payment of all invoices, including those stemming from other deliveries and actions. Working and processing of goods are done according to §950 of the Federal German Legal code, with the exception of ownership claims. The goods produced are our collateral. If required by us, the buyer must inform the end user of the goods of this condition. In the case of of loss of ownership through alienation or further working, the buyer relinquishes in advance all the demands stemming from such alienation or other legal grounds

19 In the case of arrears of payment or significant degradation of the financial position of the purchaser, with the opening of agreement with creditors or bankruptcy, the seller is entitled to demand the return of all goods subject to our ownership and to rescind any outstanding contracts to supply. The buyer must inform us immediately of any pledge to or interest of third parties.

The competent court for all questions, including payments, is Bernkastel-Kues. German law applies in all cases.

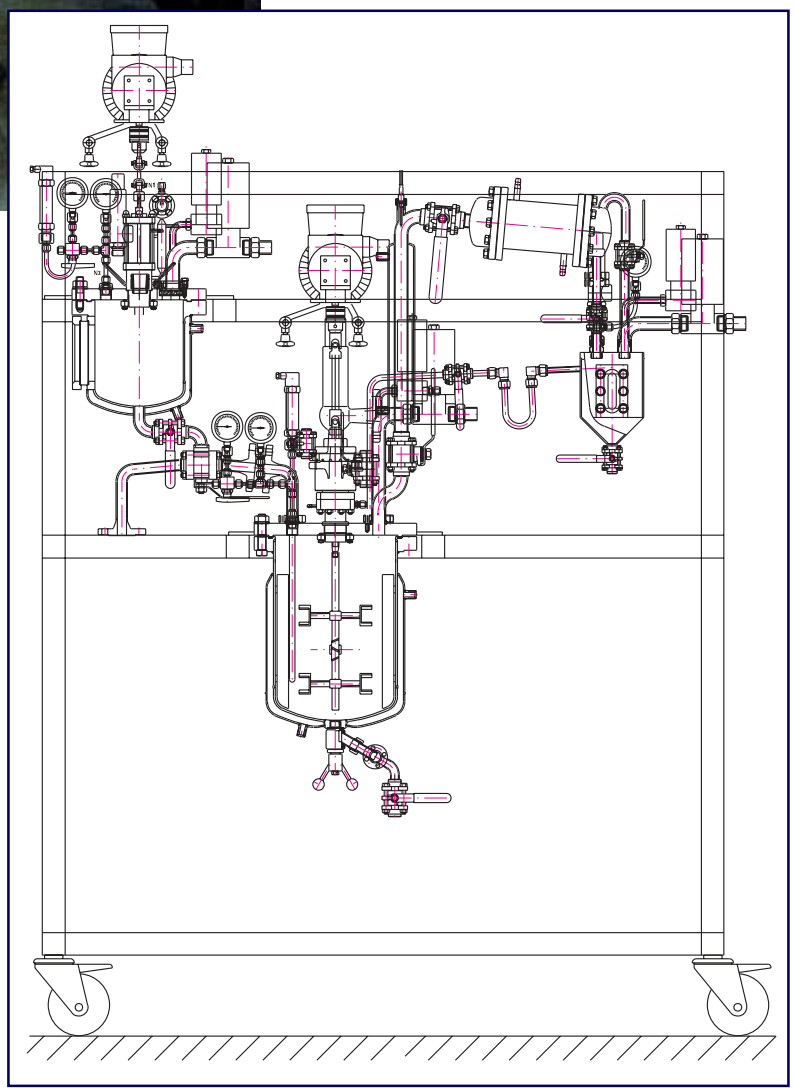
Karl Kurt Juchheim Laborgeräte GmbH

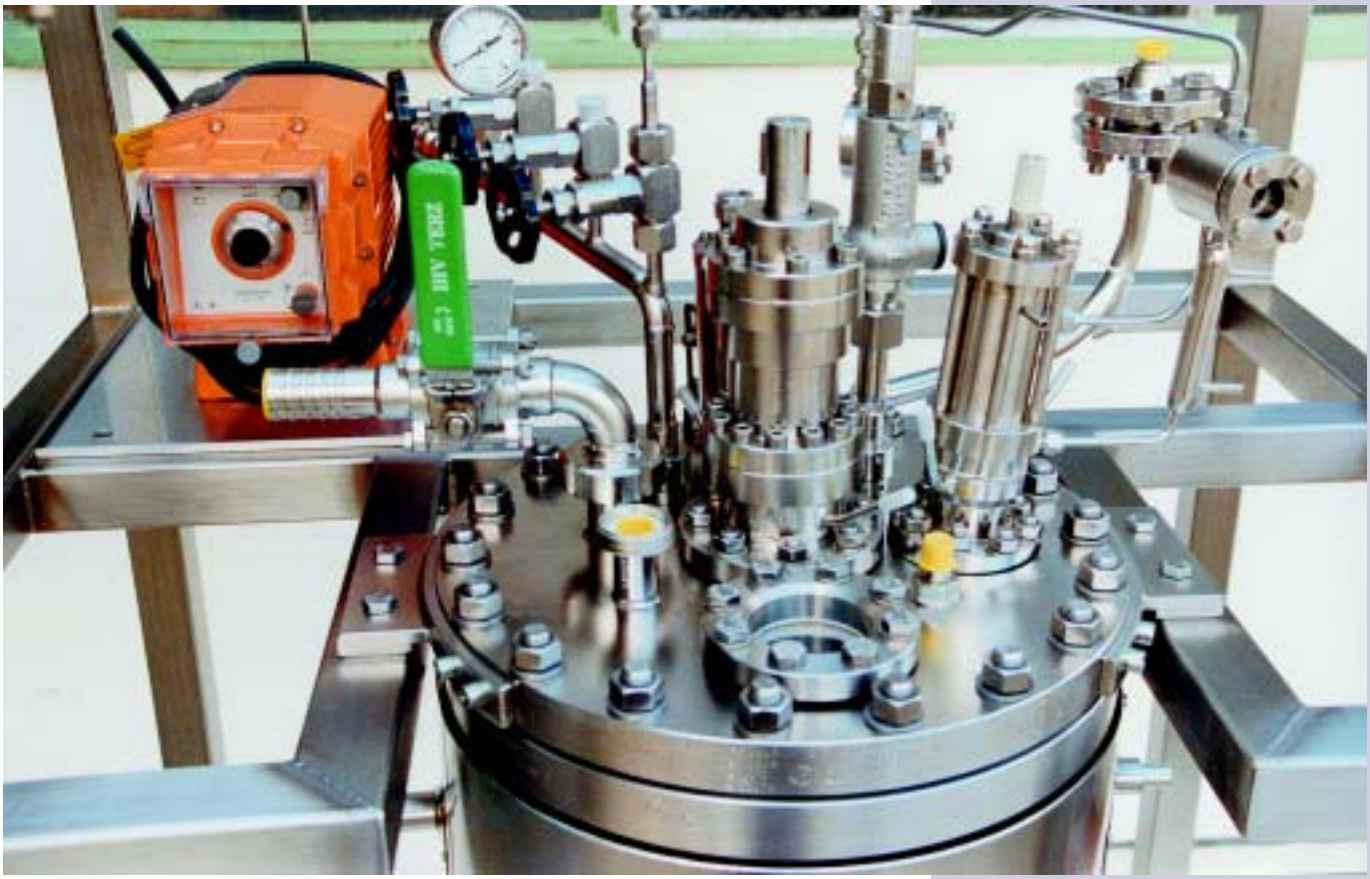
Note: We reserve the right to make modifications on grounds of technical improvements.

Although all reasonable care has been taken to ensure accuracy, we can take no responsibility for any errors.

Transportable turnkey plant, explosion-proof, in stainless steel framework with:

- Main reactor with 16 Nm magnetic stirrerhead and continuously variable stirrer drive
- Stirred reservoir, mechanically sealed stirrerhead and a rectangular lateral sightglass
- Heated reflux condenser and and tube-and-shell condenser with receiving vessel
  Lifting jack and vacuum pump





Reaction vessel, 50 litres, in stainless steel framework

- With various manifolds and connections
- Mechanically sealed stirrerhead with 25 mm shaft and a sloping stirrerhead to one side

KARL KURT JUCHHEIM

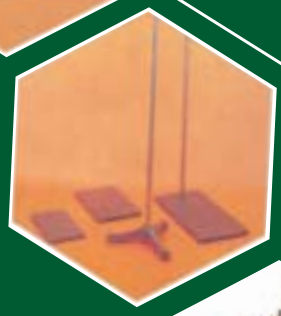
Laborgerätebau GmbH

70 Jahre

Apparatebau
Spezialanfertigungen
für
Laborgeräte

Laborbrenner
nach
Bunsen, Teclu, Heinze
Mikro- u. Sicherheits-
brenner
Gebläsebrenner

Stativklemmen
aus
Edelstahl (18/8)
Stahl
Temperguß



Verstellbare Druckgas-
Flaschenhalterung
Brandschutzwannen
Spinnmilben-
Bürstenmaschinen
Reagenzglasgestelle

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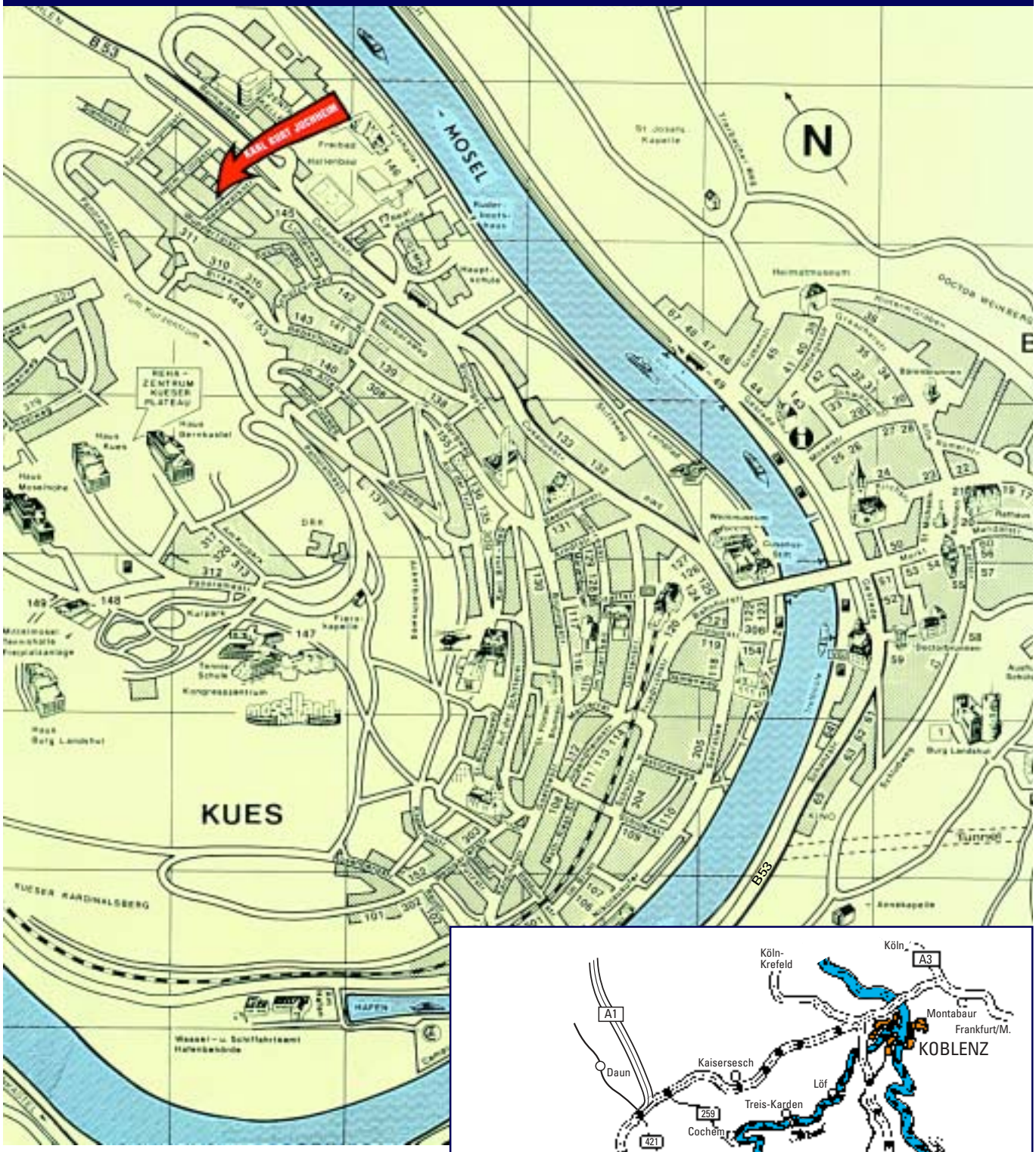
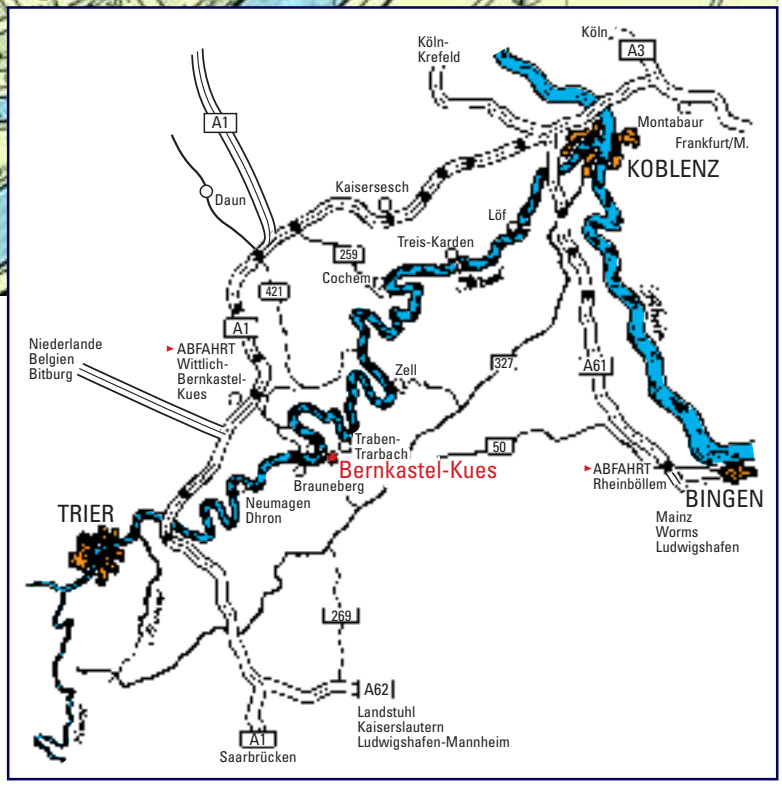
Fax: (0 65 31) 30 17





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