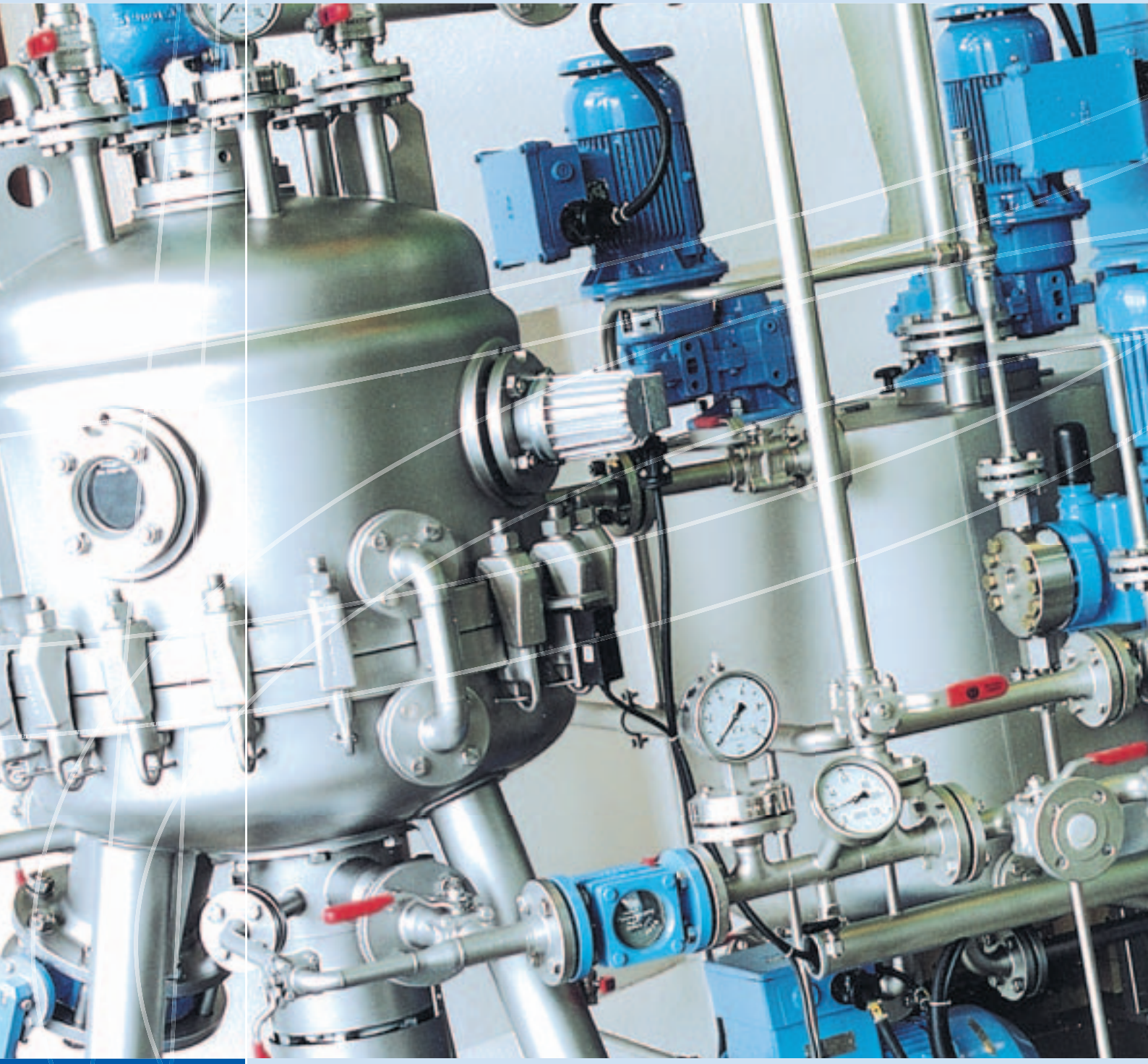
PALL

Fuels and Chemicals



ZHF Centrifugal Discharge Filter

ZHF Centrifugal Discharge Filter

GENERAL

Due to increased quality demands on the manufacture of many products process filtration gains importance. Additionally, workers' safety, minimizing and eliminating substance exposure while maintaining a simple and familiar filtration operation necessitate the use of totally enclosed filters with a broad range of features. Hence, the choice and proper selection of a filtration system is essential for meeting increased stringent requirements. Pall SeitzSchenk Filter Systems is dedicated to the design and construction of solid-liquid separation equipment in many branches of the Chemical industry. Our specialists will be pleased to provide you with the know-how and assist you in finding the optimum solution for your filtration needs.

Centrifugal Discharge Filter ZHF Description of Filter

- The Pall SeitzSchenk Centrifugal Discharge Filter Type ZHF consists mainly of a pressure vessel with a hollow center shaft around which series of round filter elements are vertically stacked at specific, but variable spacing.

- The filter stack, consisting of both the hollow shaft and the elements, is installed in the vessel, so that it can freely rotate. To clean the filter, the whole stack is spun by means of a drive system.

- The hollow shaft that serves as a filtrate discharge manifold is connected to an external drive motor permitting the removal of cake by centrifugal action.

- The filter elements are covered, depending on requirement, with woven wire, textile material, sintered metal or perforated plates. For cake stability, the elements are covered only on the upper side.

- The pressure vessel can be designed and built to meet most international and local codes (i.e. ASME, AD, etc.). Available materials of construction are Carbon Steel, rubberized or glass lined steel, Stainless Steel, Hastelloy, Titanium, etc. A broad range of pressure and temperature design conditions are available.

FILTER OPERATION

During filtration the filter vessel is fed under pressure; the filtrate passes through the plates and out through the shaft. The filter cake forms on the upper side of the filter elements. After filtration, the remaining feed in the vessel is either drained or filtered via the scavenge system. The cake may then be washed or dried by an appropriate heated gas. Spinning the entire stack at moderate speeds generates a centrifugal force that discharges the cake. The cake can be discharged in slurry or dry form.

The operating advantages of the SeitzSchenk Centrifugal Discharge Filter is the use of horizontal filter elements and the ability of automatic cake discharge without having to open the filter.

MAIN FEATURES AND ADVANTAGES

- Bottom-drive
  - Simple installation, low headroom, and low center of gravity.
  - Each dynamic seal can be checked and replaced, if necessary, without disturbing the filter stack.
  - Removal of filter element stack is achieved without disturbing the rotational drive mechanism.

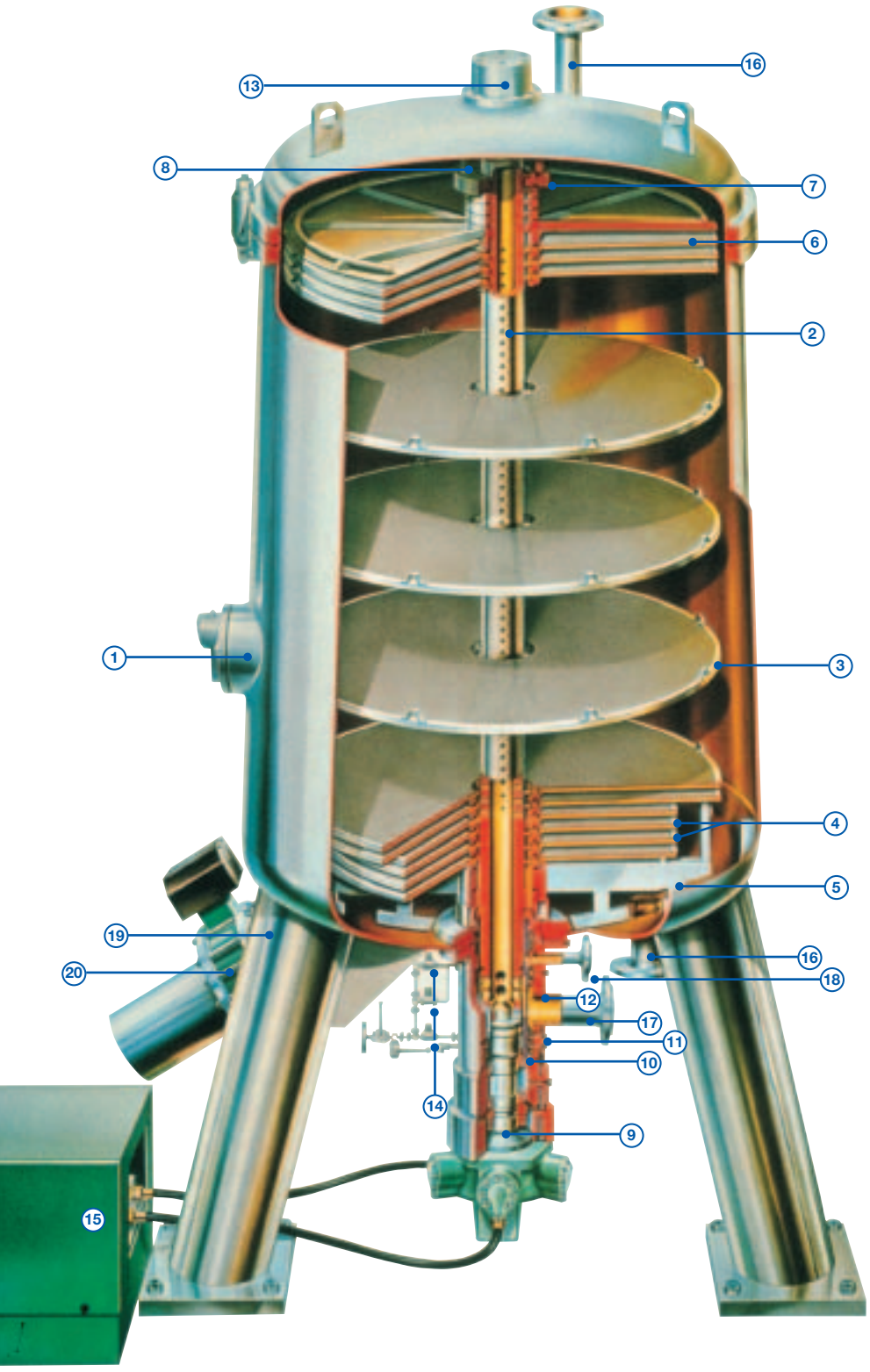
- Scavenge filtration
  An independent scavenge filtration system is provided with a separate and independent filtrate outlet. This system minimizes the remaining feed material in the filter after completion of the batch.

- Totally enclosed system:
  - Provides safe operation with biohazardous substances. (i.e. production and harvest of therapeutical proteins by CHO cells)
  - safe operation with toxic, explosive or other hazardous substances

- Automatic discharge of filter cake
  - No manual cleaning operation
  - Brief «downtime»
  - Easy automation
  - Cake discharge by centrifugation
  - Dust-free discharge under clean room conditions

- Horizontal filter elements
  - Optimal filter cake distribution, unaffected by pressure fluctuation or power (pump) failure.
  - Effective cake washing and drying are possible.
  - Spacers support the filter elements at the periphery.
  - This guarantees equal spacing.
  - Also cake-bridging impact is minimized.
  - The filter element has a central welded hub. Only ONE seal is necessary per element.
  - The filter element stack is preloaded until metal to metal contact is achieved at the periphery and center hub, thus attaining an exceptionally strong stack with no floating members.

ZHF Centrifugal Discharge Filter



1. Filter vessel with sight glass
2. Hollow filter shaft
3. Filter plate
4. Scavenge plate
5. Support ring with discharge aids
6. Spider ring with deflector plate
7. Thrust collar
8. Compression flange
9. Drive shaft with bearing housing and hydraulic motor
10. Protector sleeve
11. Seal arrangement (bearing housing)
12. Seal arrangement (distribution housing)
13. Upper bearing housing
14. Seal flush system
15. Pump unit for hydrostatic drive or other drives
16. Feed inlet
17. Filtrate outlet
18. Scavenge filtrate outlet
19. Heel drainage
20. Cake discharge

ZHF-S

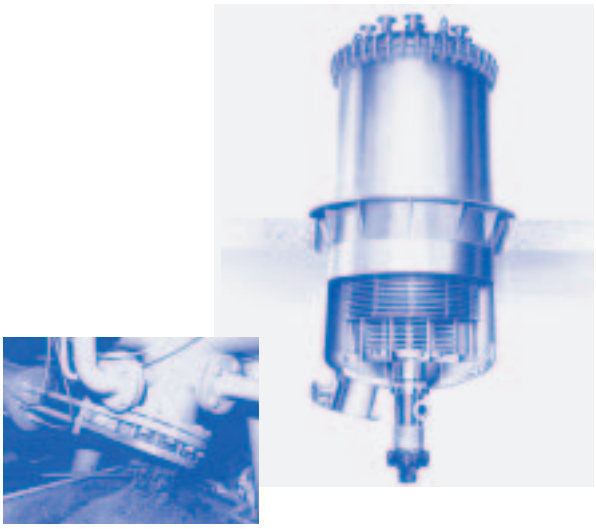
S – vertical vessel wet cake discharge (slurry)

PRECOAT FILTER

ZHF-S model is primarily a precoat filter with a main function to recover the liquid phase (filtrate). The filter elements are normally pre-coated with a layer of filter aid. Depending on the nature of the feed material, further filter aid may be added to the feed using Pall SeitzSchenk mixing and dosing equipment. If the formed cake (from solids in feed suspension) is permeable enough to act as a filter aid, then precoating and dosing of body feed may be avoided. Discharging the formed cake is achieved by rotation, with simultaneous backwash, of the filter stack whereby the cake is removed as a slurry via the filter vessel through the bottom discharge outlet. The ZHF-S filter is available with up to 200 m^2 of filtration area. A heel (scavenge) recovery filtration system is also available.

ZHF-SR-KL AND SR-KLK

SR	= vertical vessel	dry cake discharge
KL	= cylindrical vessel	dished end design
KLK	= tapered vessel	dished end design

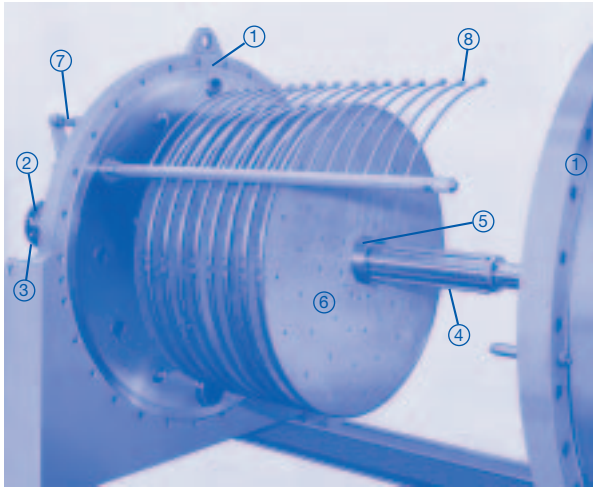


SOLIDS/CAKE RECOVERY FILTER

The ZHF-SR KL and KLK filters can be used simultaneously for a precoat and/or solids recovery applications. They come equipped with an integral discharger, a mechanical system that aids in the discharge and removal of the cake. When used for solids recovery, the same procedure is used as with the ZHF-S precoat filter. Upon the completion of filtration, the cake can be washed, extracted and/or dried in-situ. The mechanical discharge device and a large solids discharge outlet enable the filter cake to be removed in a dry state (the degree being dependent on its characteristics). A special design, offering a tapered vessel (KLK-design) is available for certain applications where minimal residual heel of stick or heavy cake is desired, and to ensure trouble free cake discharge. The ZHF-SR KL and KLK filters are available with up to 200 m^2 of filtration area. A scavenge recovery filtration system is also available.

PALL SEITZSCHENK ZHF-L

L – horizontal vessel



① Vessel
② Bearing
③ Drive
④ Filtrate shaft
⑤ Spacer ring
⑥ Filter element
⑦ Drive for high pressure cleaning
⑧ Cleaning jets

PALL SEITZSCHENK ZHF-SR-KL RESIDUE (DRY DISCHARGE) FILTER

SeitzSchenk ZHF-SR-KL and KLK residue filters are used for filtrate and/or cake recovery. The filter residue can be treated (washed, extracted, dried) in-place within the filter. It is then discharged, using an integral mechanical discharge aid in a dry or paste like form.

APPLICATIONS

Catalyst Separation:	Raney nickel, palladium, platinum, copper.
Salt Separation:	Polyole, Polyetherole.
Resins/Waxes:	alkyd resins, phenolic resin, epoxy resin, paraffines.
Mineral Oils:	light petrol, additives.
Polymere:	PE, PP, optical brighteners, plasticiser, viscose.
Chlor-Alkali Industry:	brine solution, mercury separation from caustic soda.

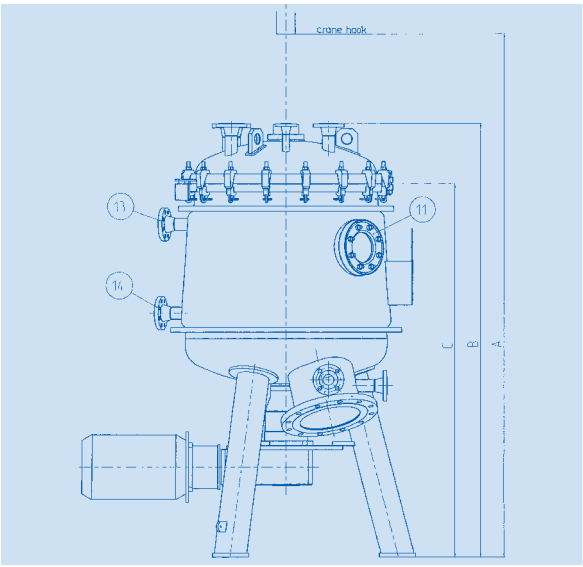
TEST UNITS

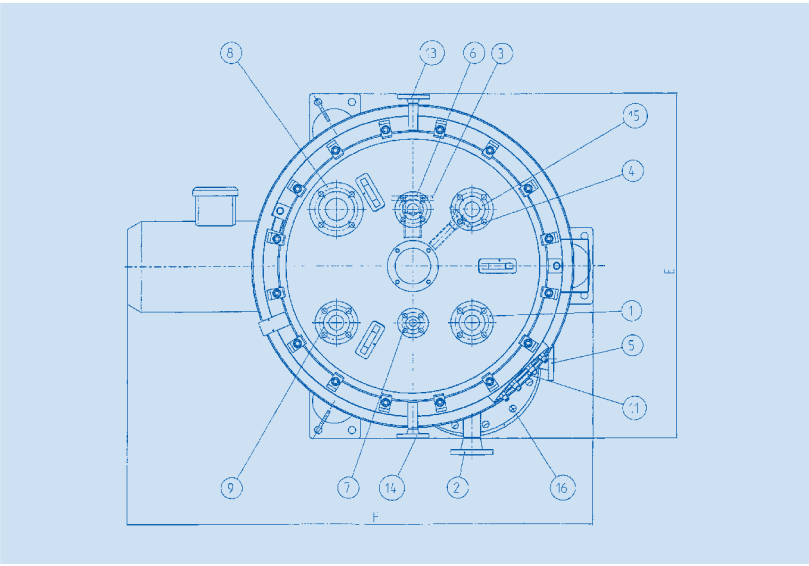
Pall SeitzSchenk has different Centrifugal Discharge Filters type ZHF available for tests at the works of the customer. The units are rent to reasonable conditions. SCHENK also offers technical support during the tests and control of the tests.

AVAILABLE TEST UNITS

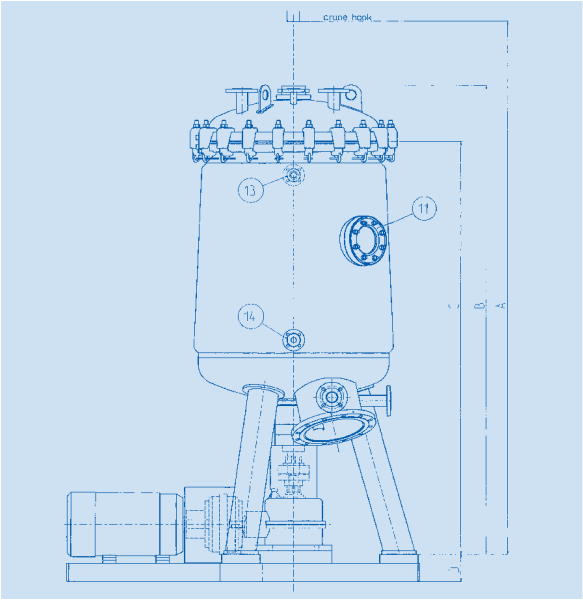
- Filter unit ZHF-SR 2,5/1KL
  filtration area 1 m^2
  with pump
  with precoat tank
  material of construction 1.4571/1.4401
  design 6 bar
  complete with pipings and electric
  electric Eex d II T3
- ZHF-SR 5 KL
  filtration area approx. 5 m^2
  scavenge filtration area approx. 1 m^2
  with drive
  motor Eex e II T3

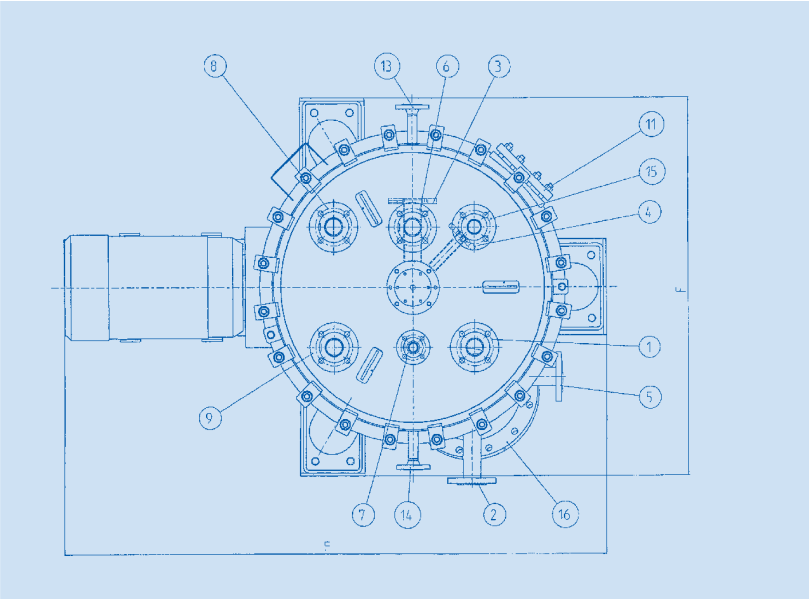
ZHF - SUSPENDED DRIVE





ZHF - FRAME-MOUNTED DRIVE

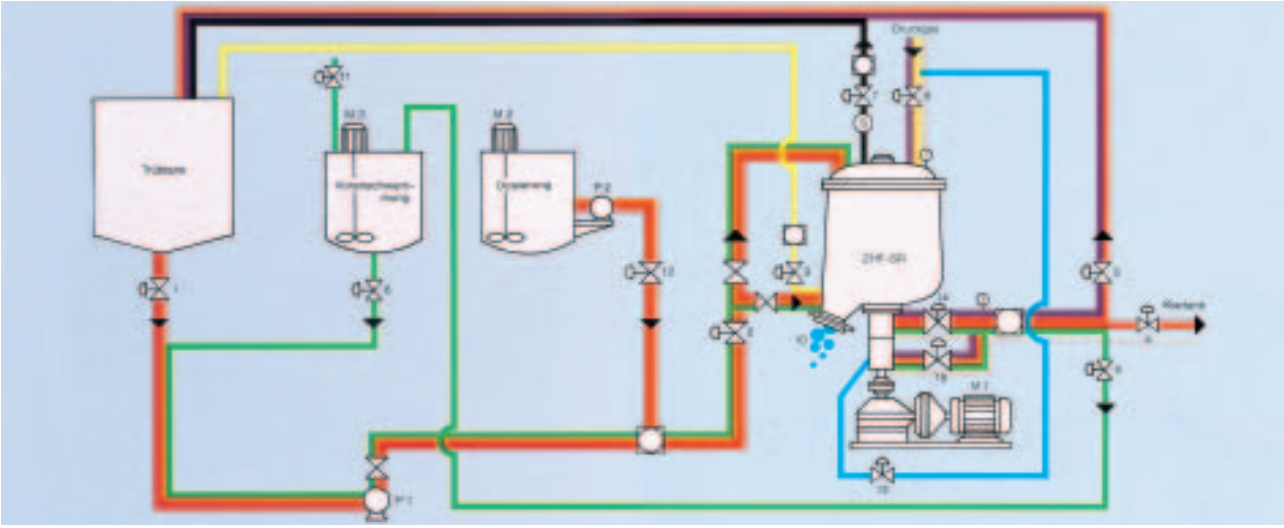




PROCESS DIAGRAM OF A SCHENK CENTRIFUGAL SELFCLEANING FILTER WITH SEMI OR FULLY AUTOMATIC CONTROL

○	valve open or motor on
a	automatic
x	automation locked, valve closed
⋈	manual valve
⋈	remote controlled valve
▢	sightglass
Ⓢ	float switch

1	fill filter - precoat
2	re-cycle
3	filtration
4	scavenge I
5	scavenge II
6	drain
7	drying
8	pressure relief
9	discharge



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	M1	M2	M3	P1	P2
1	fill filter - precoat		o			o	o	a				o			o	o			o	o	
2	re-cycle	o	o	o				a					o		o	o		o		o	o
3	filtration	o	o		o			a					o		o			o		o	o
4	scavenge I				o			x	o						o						
5	scavenge II				o			x	o							o					
6	drain							x	o	o											
7	drying			o				x	o						o	o					
8	pressure relief							a													
9	discharge							a			o			o			o				
10	neutral							a													

ZHF Centrifugal Discharge Filter

** frame underdrive unit only*

filter-type	filterelements									filtervessel				total weight	filter-motor	type of drive	dimensions					
ZHF	main filterelement with		30 mm spacing		scavenge element with		30 mm spacing				diameter vessel			fully equipped empty 6 bar/20°C	kW	mechanical hydraulic	height				floor space	
	element diameter	filter area element	number	filter area	element diameter	filter area element	number	filter area	total cake volume	vessel-volume	vessel Ø	main flange Ø	shipping weight				A	B	C	D*	E width	F length
	mm	m^2		m^2	mm	m^2		m^2	m^3	m^3	mm	mm	kg	kg			mm	mm	mm	mm	mm	mm
Design A – Size 0 (Type SR 3 – element 505 mm – shaft 60/72 mm)																						
S 2,5 /A0 SR 2,5 KL/A0 SR 2,5 KLK/A0	Ø 505	0.172	13	2.2	Ø 505	0.172	2	0.35	0.07	0.22	600 600 600/700	655	400	650	5.5	mech. hydro	2800	1720	1410	100	1500	1200
Design B – Size 1 (Type SR 10 – element 805 mm – shaft 76/90 mm)																						
S 5 B1 SR 5 KL/B1	Ø 805	0.47	10	4.7	Ø 805	0.47	2	0.94	0.17	0.35	900	960	650	1200	7.5	mech. hydraulic	2875	1735	1585	160	1600	1800
S 10 /B1 SR 10 KL/B1 SR 10 KLK/B1	Ø 805	0.47	21	9.87	Ø 805	0.47	2	0.94	0.30	0.7	900 900 900/1000	960	1050	1600	11	mech. hydraulic	3650	2100	1830	160	1600	1800
S 15 /B1 SR 15 KL/B1 SR 15 KLK/B1	Ø 805	0.47	32	15.04	Ø 805	0.47	2	0.94	0.45	1.0	900 900 900/1000	960	1200	2000	15	mech. hydraulic	4450	2510	2240	160	1600	1800
Design B – Size 2 (Type SR 20 – element 985 mm – shaft 76/90 mm																						
S 20 /B2 SR 20 KL/B2 SR 20 KLK/B2	Ø 985	0.71	28	19.88	Ø 985	0.71	2	1.42	0.60	1.3	1100 1100 1100/1200	1160	1500	2200	18.5	mech. hydraulic	4300	2450	2140	160	1800	2000
S 25 /B2 SR 25 KL/B2 SR 25 KLK/B2	Ø 985	0.71	35	24.85	Ø 985	0.71	2	1.42	0.76	1.6	1100 1100 1100/1200	1160	1600	2500	22	mech. hydraulic	5150	2730	2420	160	1800	2000
S 30 /B2 SR 30 KL/B2 SR 30 KLK/B2	Ø 985	0.71	45	31.95	Ø 985	0.71	2	1.42	0.97	1.8	1100 1100 1100/1200	1160	1900	3100	30	mech. hydraulic	5650	3260	2900	160	1800	2300
Design C – Size 3 (Type SR 40 – element 1200 mm – shaft 115/125 mm)																						
S 30/32 /C3 SR 30/32 KL/C3 SR 30/32 KLK/C3	Ø 1200	1.075	28	30.1	Ø 985	0.7	3	2.1	0.9	1.8	1350 1350 1350/1450	1420	1400	4700	37	mech. hydraulic	5220 4960	2850 2640	2395 2185	310 260	2300	3000
S 40/43 /C3 SR 40/43 KL/C3 SR 40/43 KLK/C3	Ø 1200	1.075	37	39.77	Ø 985	0.7	4	2.8	1.2	2.2	1350 1350 1350/1450	1420	1560	5050	37	mech. hydraulic	5980 5720	3230 3020	2775 2565	310 260	2300	3000
S 50/53 KLK/C3 SR 50/53 KLK/C3	Ø 1200	1.075	47	50.52	Ø 985	0.7	4	2.8	1.5	2.9	1350/1450	1420	1850	5350	45 37	mech. hydraulic	6680 6420	3580 3370	3125 2915	310 260	2300	3000
S 60/63 KL/C3 SR 60/63 KLK/C3	Ø 1200	1.075	55	59.12	Ø 985	0.7	5	3.5	1.8	3.6	1350/1450	1420	1950	5700	45 37	mech. hydraulic	7380 7120	3930 3720	3475 3265	310 260	2300	3000

** frame underdrive unit only*

filter-type	filterelements									filtervessel				total weight	filter-motor	type of drive	dimensions					
ZHF	main filterelement with		30 mm spacing		scavenge element with		30 mm spacing			diameter vessel				fully equipped empty 6 bar/20°C	kW	mechanical hydraulic	height				floor space	
	element diameter	filter area element	number	filter area	element diameter	filter area element	number	filter area	total cake volume	vessel-volume	vessel Ø	main flange Ø	shipping weight				A	B	C	D*	E width	F length
	mm	m^2		m^2	mm	m^2		m^2	m^3	m^3	mm	mm	kg	kg			mm	mm	mm	mm	mm	mm
Design D – Size 3 (Type SR 80 – element 1200 mm – shaft 150/170 mm)																						
S 80/69 KLK/D3	Ø 1200	1.06	61	64.66	Ø 985	0.685	6	4.2	1.9	4.0	1350/1450	1420	2400	6900	55	mech.	8240	4540	4080	310	2800	3200
SR 80/69 KLK/D3															45	hydraulic	7960	4310	3850	260		
S 90/81 KLK/D3	Ø 1200	1.06	72	76.32	Ø 985	0.685	6	4.2	2.3	4.4	1350/1450	1420	2600	7400	55	mech.	9040	4940	4480	310	2800	3200
SR 90/81 KLK/D3															45	hydraulic	8760	4710	4250	260		
S 100/91 KLK/D3	Ø 1200	1.06	81	85.86	Ø 985	0.685	7	4.9	2.6	5.1	1350/1450	1420	2800	7950	55	mech.	9840	5340	4880	310	2800	3200
SR 100/91 KLK/D3															45	hydraulic	9560	5110	4650	260		
Design D – Size 4 (Type SR 130 – element 1500 mm – shaft 150/170 mm)																						
S 90/86 KLK/D4	Ø 1500	1.65	48	79.2	Ø 1200	1.06	6	6.36	2.4	5.75	1750/1900	1820	3250	9000	55	hydraulic	7260	4010	3550	260	2800	3200
SR 90/86 KLK/D4																						
S 110/104 KLK/D4	Ø 1500	1.65	59	97.35	Ø 1200	1.06	6	6.36	2.9	6.7	1750/1900	1820	3500	9600	55	hydraulic	8060	4410	3950	260	2800	3200
SR 110/104 KLK/D4																						
S 130/120 KLK/D4	Ø 1500	1.65	69	113.85	Ø 1200	1.06	6	6.36	3.4	7.6	1750/1900	1820	3750	10 200	55	hydraulic	8860	4810	4350	260	2800	3200
SR 130/120 KLK/D4																						
Design E – Size 4 (Type SR 100 – element 1500 mm – shaft 205/230 mm)																						
S 150/130 KLK/E4	Ø 1500	1.60	77	123.2	Ø 1200	1.03	7	7.21	3.7	8.75	1750/1900	1820	4200	11 700	75	hydraulic	9910	5500	4850	260	3000	3800
SR 150/130 KLK/E4																						
S 170/151 KLK/E4	Ø 1500	1.60	90	144.0	Ø 1200	1.03	7	7.21	4.3	9.80	1750/1900	1820	4400	12 400	75	hydraulic	10 910	6000	5350	260	3000	3800
SR 170/151 KLK/E4																						

Nozzle connections

part	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			16	
type	feed		filtrate	scavenge filtrate	heel volume return	vent	comp. air	press. gauge	spare	gland irrigation	sight glass		steam inlet	condensate outlet	savety valve			cake discharge	
	top	bottom													inlet*	outlet*	connections	S	SR-KL SR-KLK
25/A0	50	50	50	20	50	25	25	50	50	10	150		25	25	40	50	to DIN 2633/PN16 Trubaustrag cake discharge to DIN 2633/PN10	100/PN10	150/PN10
5/B1 – 10/B1	50	50	50	25	50	50	25	50	50	10	150		25	25	40	50		125/PN10	300/PN10
15/B1	50	50	50	25	50	50	25	50	50	10	150		25	25	50	80		125/PN10	300/PN10
20/B2 – 25/B2	65	65	65	25	50	50	25	50	50	10	150		25	25	50	80		150/PN10	350/PN10
30/C3 – 60/C3	80	80	80	25	50	50	50	50	50	15	150		25	25	50	80		150/PN10	400/PN10
80/D3 – 100/D3	100	100	125	50	80	80	80	50	80	15	150		25	25	80	100		200/PN10	400/PN10
90/D4 – 130/D4	125	125	150	50	100	80	80	50	100	15	150		50	50	80	100		350/PN10	500/PN10
150/E4 – 170/E4	150	150	175	50	125	100	100	50	125	15	150		50	50	100	150		350/PN10	500/PN10

** size depending on product*

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