

# T-Rack<sup>®</sup> 3.0 S

Modern ultrafiltration in a compact design



## T-Rack® 3.0 S – state-of-the-art ultrafiltration solutions

- **Proven T-Rack® 3.0 concept – safe and reliable operation**
- **Suitable for containerized solutions – extremely compact footprint**
- **Plug-and-play installation – easy to assemble on-site**
- **Optimized for sea water – highest corrosion resistance class (C5)**
- **Modular design – great flexibility and extension ready**

The T-Rack® 3.0 S is optimized for the specific requirements of **space-saving, lightweight UF solutions** with a low installation height. In particular, this includes commercial deployment in mobile applications, for example in containers and trailers.

**Robust:** The new generation of racks features high **corrosion and pressure resistance**. This has been achieved by welding the T-pieces directly to the module body, connecting the individual modules and headers with 6" flexible pipe couplings, and avoiding the use of any adhesive connections. As a result, the design pressure\* of our new T-Rack® 3.0 S is 5 bar at 40°C with a service life of 10 years.

**Compact:** Integrating the header pipes in the module end caps enables us to position the modules closer together in the rack. This **space-saving design** gives the T-Rack® 3.0 S a footprint that is up to 60 percent smaller than conventional rack designs. By using standardized components, we have made our new rack into a fully scalable solution.

**High capacity:** The dizzer® module for the new T-Rack® 3.0 S is available in two different variants. Modules equipped with the Multibore® 0.9 membrane have an active membrane area of 60 m<sup>2</sup> (645 ft<sup>2</sup>) per module. The maximum rack size of 80 modules provides **up to 4800 m<sup>2</sup> (51,686 ft<sup>2</sup>) of membrane area**. Assuming a flux rate of 80 LMH (47 gfd), that corresponds to a water treatment capacity of approx. 380 m<sup>3</sup>/h (2.4 MGD). For the version with the Multibore® 1.5, the membrane area is 40 m<sup>2</sup> (430 ft<sup>2</sup>) per module with a corresponding treatment capacity of approx. 260 m<sup>3</sup>/h (1.6 MGD) for the maximum rack size.

**Expandable:** The standardized components and the modular design of the rack make it quick and easy to expand capacity to reflect changing needs. **Additional individual modules** can simply be added to the end of the rack.

**Flexible:** The more flexibility you have to configure a system, the more you can tailor it to your exact requirements. Depending on the required system size and treatment capacity, we can supply **configurations with either two or four rows of modules**. However, the design includes separate filtrate headers, so each row can still be operated as a separate filtration line.

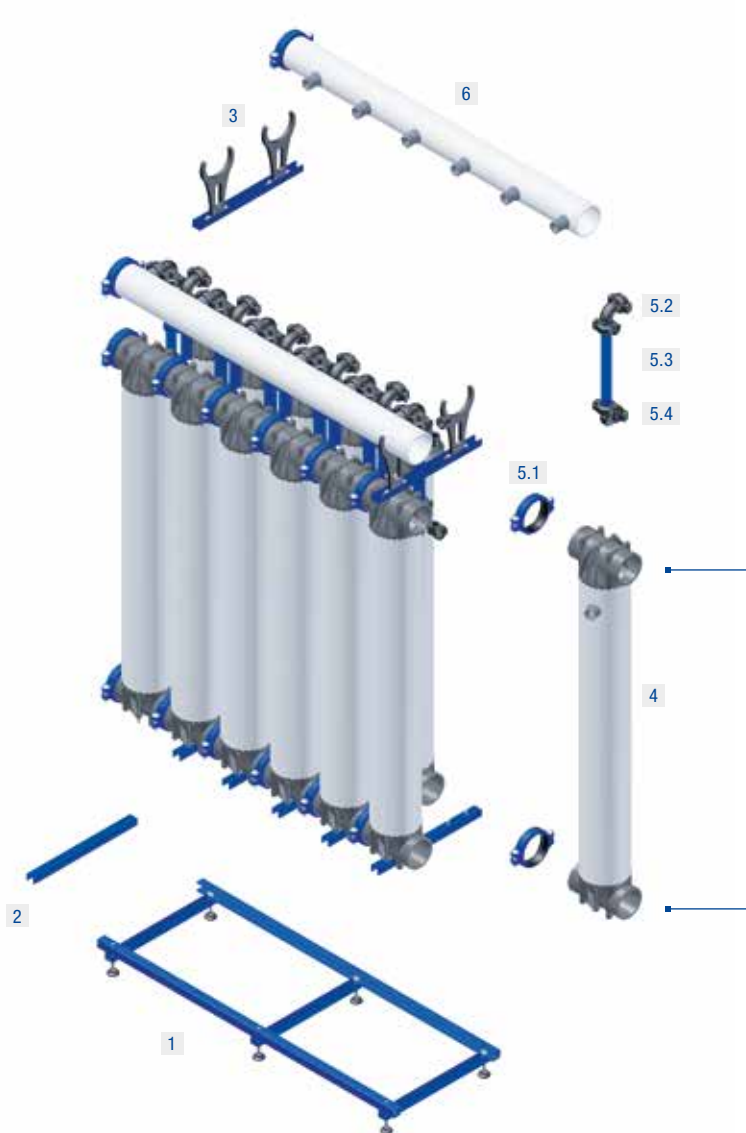
**Optional features:** In the standard version, the racks feature C4-coated frame profiles. A stainless steel version is also available on request.

\* The design pressure corresponds to the maximum permitted operating pressure in continuous operation at the specified design temperature. Higher operating pressures than 5 bar may be possible in certain cases. However, this must first be verified and approved by inge®.

® = Registered trademark of BASF

# T-Rack® 3.0 S – modular and standardized design




## T-Rack® 3.0 S parts list



Pos.	Article description	Material
1	Bottom frame	
1.1	Channel section U 50 x 50 x 4 x div.*	1.0037 C5 coated
1.2	Channel section (DIN 1026) U 50 x 710 mm*	1.0037 C5 coated
1.3	Hexagon nut (DIN 934) M16	1.4401
1.4	Hexagon bolt (DIN 933) M16 x 150	1.4401
1.5	Washer (DIN 125) A17	1.4401
1.6	Adjustable feet M16	PA6 GF 30
2	Bottom connecting brace	
2.1	Channel section (DIN 1026) U 50 x 688 mm*	1.0037 C5 coated
2.2	Threaded pins (DIN 913) M10 x 50	1.4401
2.3	Washer (DIN 125) A10.5	1.4401
2.4	Hexagon nut (DIN 934) M10	1.4401
3	Top cross brace	
3.1	Channel section (DIN 1026) U 50 x 688 mm*	1.0037 C5 coated
3.2	Threaded pins (DIN 913) M10 x 50	1.4401
3.3	Washer (DIN 125) A10.5	1.4401
3.4	Hexagon nut (DIN 934) M10	1.4401
3.5	Mounting clamp PE	PE
4	dizzer® XL-ST module body	PVC-U
5	Module connecting parts	
5.1	Flexible coupling 6" / d168 incl. galvanized bolts and EPDM seal	cast iron, C5 coated
5.2	90° elbow piece PP 2"	PP
5.3	Transparent filtrate pipe 2" / 362 mm	PVC-U
5.4	Flexible coupling 2" incl. galvanized bolts and EPDM seal	PA6 GF30
6	Filtrate header 168.3 mm / 6"	PVC-U

\* Frame parts optionally available in stainless steel.

## T-Rack® 3.0 S End-Cap options

Option	Part number	Article description	Description
	KT-0162	Flange Adapter Cap DN 150 x 6"	Connection of 6" grooved coupling system to flange with connecting dimensions according to ISO 7005 PN 10, ANSI Class 150
	KT-0163	Blind Cap 6"	Closing of feed and filtrate headers
	KT-0164	Blind Cap 6" with G2" thread	Connection of equipment for venting, measuring, etc., G 2" female thread according to DIN ISO 228 BSPP

End-Caps need to be mounted with genuine inge® 6" flexible couplings.

# T-Rack® 3.0 S – system configuration with 2 rows

## Configuration with 2 rows and Multibore® 0.9 membrane

Number of modules	T-Rack® 3.0 S unit	Part number <sup>1)</sup>	Length (A) <sup>2)</sup>		Membrane area <sup>3)</sup>		Shipping weight <sup>4)</sup>		Weight, filled <sup>4)</sup>		Hold-up volume, feed side		Hold-up volume, filtrate side	
			mm	ft.	m <sup>2</sup>	sq.ft.	kg	lbs.	kg	lbs.	m <sup>3</sup>	US. gal	m <sup>3</sup>	US. gal
4	TR-4-2-3.0-S	TR-0420	661	2.17	240	2583	312	688	572	1261	0.11	30.4	0.18	48.8
6	TR-6-2-3.0-S	TR-0620	991	3.25	360	3875	445	982	835	1841	0.17	45.5	0.28	73.3
8	TR-8-2-3.0-S	TR-0820	1322	4.34	480	5167	578	1275	1098	2420	0.23	60.7	0.37	97.7
10	TR-10-2-3.0-S	TR-1020	1652	5.42	600	6459	712	1570	1362	3002	0.29	75.9	0.46	122.1
12	TR-12-2-3.0-S	TR-1220	1983	6.51	720	7750	847	1866	1626	3585	0.34	91.1	0.55	146.5
14	TR-14-2-3.0-S	TR-1420	2313	7.59	840	9042	1023	2256	1933	4261	0.40	106.2	0.65	171.0
16	TR-16-2-3.0-S	TR-1620	2644	8.67	960	10334	1156	2549	2195	4840	0.46	121.4	0.74	195.4
18	TR-18-2-3.0-S	TR-1820	2974	9.76	1080	11625	1290	2845	2460	5423	0.52	136.6	0.83	219.8
20	TR-20-2-3.0-S	TR-2020	3305	10.84	1200	12917	1425	3141	2724	6005	0.57	151.8	0.92	244.2
22	TR-22-2-3.0-S	TR-2220	3635	11.93	1320	14209	1559	3437	2988	6587	0.63	166.9	1.02	268.7
24	TR-24-2-3.0-S	TR-2420	3966	13.01	1440	15501	1693	3733	3252	7169	0.69	182.1	1.11	293.1
26	TR-26-2-3.0-S	TR-2620	4296	14.10	1560	16792	1869	4120	3557	7843	0.75	197.3	1.20	317.5
28	TR-28-2-3.0-S	TR-2820	4627	15.18	1680	18084	2003	4415	3821	8425	0.80	212.5	1.29	341.9
30	TR-30-2-3.0-S	TR-3020	4957	16.26	1800	19376	2137	4711	4086	9007	0.86	227.6	1.39	366.4
32	TR-32-2-3.0-S	TR-3220	5288	17.35	1920	20667	2271	5007	4350	9589	0.92	242.8	1.48	390.8
34	TR-34-2-3.0-S	TR-3420	5618	18.43	2040	21959	2405	5303	4614	10172	0.98	258.0	1.57	415.2
36	TR-36-2-3.0-S	TR-3620	5949	19.52	2160	23251	2540	5599	4878	10754	1.03	273.2	1.66	439.6
38	TR-38-2-3.0-S	TR-3820	6279	20.60	2280	24543	2715	5986	5183	11427	1.09	288.4	1.76	464.1
40	TR-40-2-3.0-S	TR-4020	6610	21.69	2400	25834	2849	6282	5447	12010	1.15	303.5	1.85	488.5

<sup>1)</sup> Rack parts without modules   <sup>2)</sup> Tolerance to ISO 2768-1c   <sup>3)</sup> Rack equipped with 60m<sup>2</sup> (645 sq.ft.) dizzer® XL 0.9 MB 60 ST modules   <sup>4)</sup> incl. modules and frame

## Configuration with 2 rows and Multibore® 1.5 membrane

Number of modules	T-Rack® 3.0 S unit	Part number <sup>1)</sup>	Length (A) <sup>2)</sup>		Membrane area <sup>3)</sup>		Shipping weight <sup>4)</sup>		Weight, filled <sup>4)</sup>		Hold-up volume, feed side		Hold-up volume, filtrate side	
			mm	ft.	m <sup>2</sup>	sq.ft.	kg	lbs.	kg	lbs.	m <sup>3</sup>	US. gal	m <sup>3</sup>	US. gal
4	TR-4-2-3.0-S	TR-0420	661	2.17	160	1722	315	693	578	1275	0.12	32.4	0.25	65.4
6	TR-6-2-3.0-S	TR-0620	991	3.25	240	2583	449	990	845	1862	0.18	48.6	0.37	98.2
8	TR-8-2-3.0-S	TR-0820	1322	4.34	320	3445	583	1286	1111	2449	0.27	70.0	0.56	149.0
10	TR-10-2-3.0-S	TR-1020	1652	5.42	400	4306	719	1584	1378	3038	0.33	87.5	0.71	186.3
12	TR-12-2-3.0-S	TR-1220	1983	6.51	480	5167	854	1883	1645	3627	0.40	105.0	0.85	223.6
14	TR-14-2-3.0-S	TR-1420	2313	7.59	560	6028	1032	2276	1955	4311	0.45	118.6	0.94	247.2
16	TR-16-2-3.0-S	TR-1620	2644	8.67	640	6889	1166	2571	2221	4897	0.53	140.0	1.13	298.1
18	TR-18-2-3.0-S	TR-1820	2974	9.76	720	7750	1302	2870	2489	5487	0.60	157.5	1.27	335.4
20	TR-20-2-3.0-S	TR-2020	3305	10.84	800	8611	1437	3169	2756	6076	0.66	175.0	1.41	372.6
22	TR-22-2-3.0-S	TR-2220	3635	11.93	880	9473	1573	3467	3023	6665	0.73	192.5	1.55	409.9
24	TR-24-2-3.0-S	TR-2420	3966	13.01	960	10334	1708	3766	3291	7255	0.80	210.1	1.69	447.1
26	TR-26-2-3.0-S	TR-2620	4296	14.10	1040	11195	1885	4156	3599	7935	0.86	227.6	1.83	484.4
28	TR-28-2-3.0-S	TR-2820	4627	15.18	1120	12056	2020	4454	3867	8524	0.93	245.1	1.97	521.7
30	TR-30-2-3.0-S	TR-3020	4957	16.26	1200	12917	2156	4753	4134	9114	0.99	262.6	2.12	558.9
32	TR-32-2-3.0-S	TR-3220	5288	17.35	1280	13778	2291	5052	4401	9703	1.06	280.1	2.26	596.2
34	TR-34-2-3.0-S	TR-3420	5618	18.43	1360	14639	2427	5350	4669	10293	1.13	297.6	2.40	633.4
36	TR-36-2-3.0-S	TR-3620	5949	19.52	1440	15501	2562	5649	4936	10882	1.19	315.1	2.54	670.7
38	TR-38-2-3.0-S	TR-3820	6279	20.60	1520	16362	2739	6039	5245	11562	1.26	332.6	2.68	708.0
40	TR-40-2-3.0-S	TR-4020	6610	21.69	1600	17223	2875	6337	5512	12152	1.33	350.1	2.82	745.2

<sup>5)</sup> Rack equipped with 40m<sup>2</sup> (430 sq.ft.) dizzer® XL 1.5 MB 40 ST modules

# T-Rack® 3.0 S – system configuration with 4 rows

## Configuration with 4 rows and Multibore® 0.9 membrane

Number of modules	T-Rack® 3.0 S unit	Part number <sup>1)</sup>	Length (A) <sup>2)</sup>		Membrane area <sup>3)</sup>		Shipping weight <sup>4)</sup>		Weight, filled <sup>4)</sup>		Hold-up volume, feed side		Hold-up volume, filtrate side	
			mm	ft.	m <sup>2</sup>	sq.ft.	kg	lbs.	kg	lbs.	m <sup>3</sup>	US. gal	m <sup>3</sup>	US. gal
16	TR-16-4-3.0-S	TR-1640	1322	4.34	960	10334	1156	2549	2195	4840	0.46	121.4	0.74	195.4
20	TR-20-4-3.0-S	TR-2040	1652	5.42	1200	12917	1425	3141	2724	6005	0.57	151.8	0.92	244.2
24	TR-24-4-3.0-S	TR-2440	1983	6.51	1440	15501	1693	3733	3252	7169	0.69	182.1	1.11	293.1
28	TR-28-4-3.0-S	TR-2840	2313	7.59	1680	18084	2047	4513	3866	8522	0.80	212.5	1.29	341.9
32	TR-32-4-3.0-S	TR-3240	2644	8.67	1920	20667	2313	5098	4391	9680	0.92	242.8	1.48	390.8
36	TR-36-4-3.0-S	TR-3640	2974	9.76	2160	23251	2581	5690	4919	10845	1.03	273.2	1.66	439.6
40	TR-40-4-3.0-S	TR-4040	3305	10.84	2400	25834	2849	6282	5447	12010	1.15	303.5	1.85	488.5
44	TR-44-4-3.0-S	TR-4440	3635	11.93	2640	28418	3118	6874	5976	13174	1.26	333.9	2.03	537.3
48	TR-48-4-3.0-S	TR-4840	3966	13.01	2880	31001	3386	7465	6504	14339	1.38	364.2	2.22	586.2
52	TR-52-4-3.0-S	TR-5240	4296	14.10	3120	33584	3737	8239	7115	15685	1.49	394.6	2.40	635.0
56	TR-56-4-3.0-S	TR-5640	4627	15.18	3360	36168	4006	8831	7643	16850	1.61	424.9	2.59	683.9
60	TR-60-4-3.0-S	TR-6040	4957	16.26	3600	38751	4274	9423	8171	18014	1.72	455.3	2.77	732.7
64	TR-64-4-3.0-S	TR-6440	5288	17.35	3840	41335	4542	10014	8699	19179	1.84	485.6	2.96	781.6
68	TR-68-4-3.0-S	TR-6840	5618	18.43	4080	43918	4811	10606	9228	20344	1.95	516.0	3.14	830.4
72	TR-72-4-3.0-S	TR-7240	5949	19.52	4320	46502	5079	11198	9756	21508	2.07	546.4	3.33	879.3
76	TR-76-4-3.0-S	TR-7640	6279	20.60	4560	49085	5430	11972	10367	22855	2.18	576.7	3.51	928.1
80	TR-80-4-3.0-S	TR-8040	6610	21.69	4800	51668	5699	12564	10895	24019	2.30	607.1	3.70	977.0

<sup>1)</sup> Rack parts without modules    <sup>2)</sup> Tolerance to ISO 2768-1c    <sup>3)</sup> Rack equipped with 60m<sup>2</sup> (645 sq.ft.) dizzer® XL 0.9 MB 60 ST modules    <sup>4)</sup> incl. modules and frame

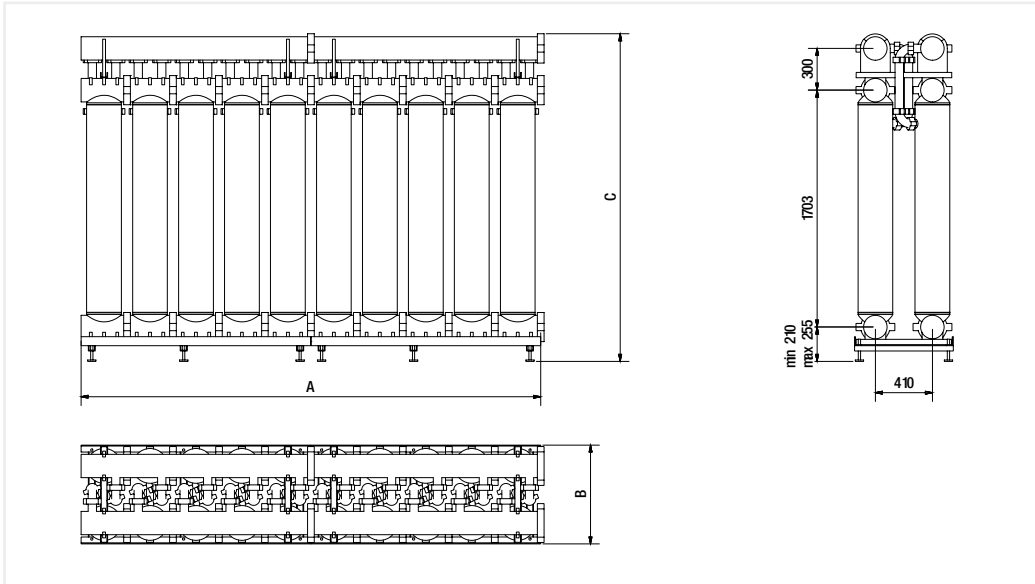
## Configuration with 4 rows and Multibore® 1.5 membrane

Number of modules	T-Rack® 3.0 S unit	Part number <sup>1)</sup>	Length (A) <sup>2)</sup>		Membrane area <sup>3)</sup>		Shipping weight <sup>4)</sup>		Weight, filled <sup>4)</sup>		Hold-up volume, feed side		Hold-up volume, filtrate side	
			mm	ft.	m <sup>2</sup>	sq.ft.	kg	lbs.	kg	lbs.	m <sup>3</sup>	US. gal	m <sup>3</sup>	US. gal
16	TR-16-4-3.0-S	TR-1640	1322	4.34	640	6889	1166	2571	2221	4897	0.53	140.0	1.13	298.1
20	TR-20-4-3.0-S	TR-2040	1652	5.42	800	8611	1437	3169	2756	6076	0.66	175.0	1.41	372.6
24	TR-24-4-3.0-S	TR-2440	1983	6.51	960	10334	1708	3766	3291	7255	0.80	210.1	1.69	447.1
28	TR-28-4-3.0-S	TR-2840	2313	7.59	1120	12056	2065	4551	3911	8622	0.90	237.2	1.87	494.4
32	TR-32-4-3.0-S	TR-3240	2644	8.67	1280	13778	2333	5143	4443	9794	1.06	280.1	2.26	596.2
36	TR-36-4-3.0-S	TR-3640	2974	9.76	1440	15501	2604	5740	4977	10973	1.19	315.1	2.54	670.7
40	TR-40-4-3.0-S	TR-4040	3305	10.84	1600	17223	2875	6337	5512	12152	1.33	350.1	2.82	745.2
44	TR-44-4-3.0-S	TR-4440	3635	11.93	1760	18945	3146	6935	6047	13331	1.46	385.1	3.10	819.8
48	TR-48-4-3.0-S	TR-4840	3966	13.01	1920	20667	3416	7532	6581	14509	1.59	420.1	3.39	894.3
52	TR-52-4-3.0-S	TR-5240	4296	14.10	2080	22390	3770	8311	7199	15870	1.72	455.1	3.67	968.8
56	TR-56-4-3.0-S	TR-5640	4627	15.18	2240	24112	4041	8909	7733	17049	1.86	490.1	3.95	1043.3
60	TR-60-4-3.0-S	TR-6040	4957	16.26	2400	25834	4312	9506	8268	18228	1.99	525.1	4.23	1117.8
64	TR-64-4-3.0-S	TR-6440	5288	17.35	2560	27557	4583	10103	8803	19406	2.12	560.1	4.51	1192.4
68	TR-68-4-3.0-S	TR-6840	5618	18.43	2720	29279	4854	10701	9337	20585	2.25	595.2	4.80	1266.9
72	TR-72-4-3.0-S	TR-7240	5949	19.52	2880	31001	5125	11298	9872	21764	2.39	630.2	5.08	1341.4
76	TR-76-4-3.0-S	TR-7640	6279	20.60	3040	32723	5478	12077	10489	23125	2.52	665.2	5.36	1415.9
80	TR-80-4-3.0-S	TR-8040	6610	21.69	3200	34446	5749	12675	11024	24304	2.65	700.2	5.64	1490.5

<sup>3)</sup> Rack equipped with 40m<sup>2</sup> (430 sq.ft.) dizzer® XL 1.5 MB 40 ST modules

# T-Rack® 3.0 S – sample configuration

## TR-20-2-1-3.0 S



Header feed / drain  
 $d_i = 142 \text{ mm (5.59 inch)}$   
 $d_o = 168 \text{ mm (6.61 inch)}$

Header filtrate  
 $d_i = 152 \text{ mm (5.98 inch)}$   
 $d_o = 168 \text{ mm (6.61 inch)}$

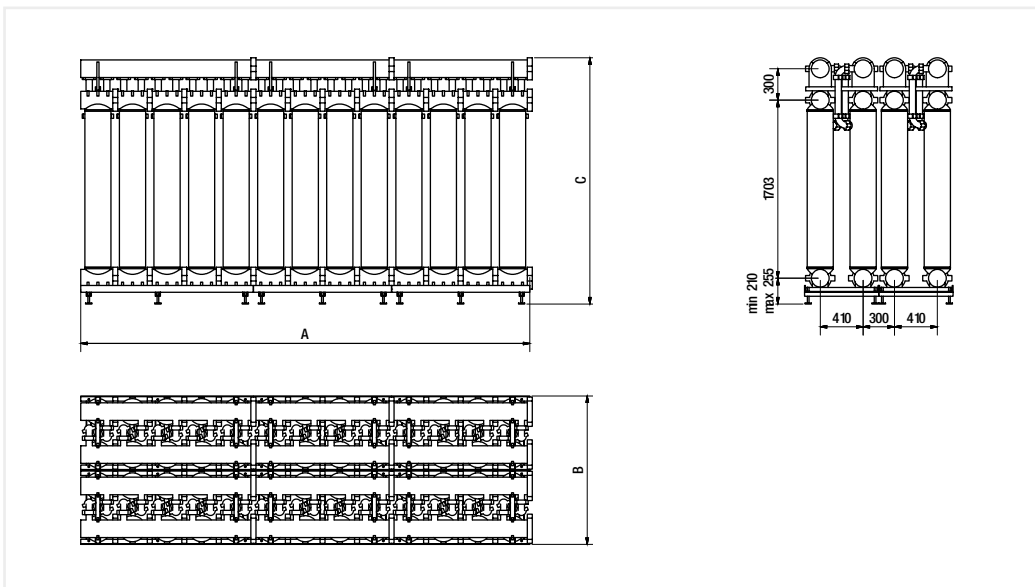
Height (C)\*  
 min = 2318 mm (7.60 ft.)  
 max = 2363 mm (7.75 ft.)

Width (B)\*  
 $B = 710 \text{ mm (2.33 ft.)}$

\* Tolerance to ISO 2768-1c

Connection for 6" grooved pipe coupling  
 Manifold ends equipped with 6" couplings  
 on one side as standard

## TR-52-4-1-3.0 S



Header feed / drain  
 $d_i = 142 \text{ mm (5.59 inch)}$   
 $d_o = 168 \text{ mm (6.61 inch)}$

Header filtrate  
 $d_i = 152 \text{ mm (5.98 inch)}$   
 $d_o = 168 \text{ mm (6.61 inch)}$

Height (C)\*  
 min = 2318 mm (7.60 ft.)  
 max = 2363 mm (7.75 ft.)

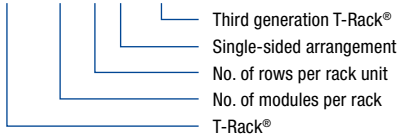
Width (B)\*  
 $B = 1420 \text{ mm (4.66 ft.)}$

\* Tolerance to ISO 2768-1c

Connection for 6" grooved pipe coupling  
 Manifold ends equipped with 6" couplings  
 on one side as standard

### T-Rack® designation:

#### TR-52-4-1-3.0 S





# dizzer® XL ultrafiltration module and Multibore® membrane

## Multibore® membrane

Membrane specifications		Multibore® 0.9	Multibore® 1.5
Capillaries per fiber		7	7
Inside diameter	mm	0.9	1.5
Pore size	µm	approx. 0.02	approx. 0.02
Material		PESM	PESM
Mode of operation		In-to-Out-filtration	In-to-Out-filtration

## dizzer® XL in T-Rack® 3.0 S

Module specifications			dizzer® XL 0.9 MB 60 ST		dizzer® XL 1.5 MB 40 ST	
Part number			VK-1102		VK-1103	
Active membrane area	m <sup>2</sup>	sq.ft.	60	645	40	430
Length (incl. T-piece)	mm	inch	1878 ± 1.5	74	1878 ± 1.5	74
Module diameter	mm	inch	250	9 7/8	250	9 7/8
Shipping weight	kg	lbs.	55	121	55	121
Casing material			PVC-U, white		PVC-U, white	
Operating parameters						
Permissible temperature range	°C	°F	1 – 40	34 – 104	1 – 40	34 – 104
Max. operating pressure T-Rack®	bar	psi	5	72	5	72
Flux rate						
Filtration*	l/(m <sup>2</sup> h)	gfd	60 – 180	35 – 105	60 – 180	35 – 180
Standard backwash	l/(m <sup>2</sup> h)	gfd	230	135	230	135
Backwash range	l/(m <sup>2</sup> h)	gfd	230 – 300	135 – 175	230 – 300	135 – 175
Transmembrane pressure (TMP)						
Filtration	bar	psi	0.1 – 3.0	1.5 – 43.5	0.1 – 3.0	1.5 – 43.5
Standard backwash	bar	psi	0.3 – 3.0	5 – 43.5	0.3 – 3.0	5 – 43.5
Burst pressure (membrane)	bar	psi	> 12	> 174	> 10	> 150
Cleaning/disinfection chemicals						
NaClO (sodium hypochlorite)	ppm	ppm x h	max. 500 max. 250,000 (at pH ≥ 9.5)		max. 500 max. 250,000 (at pH ≥ 9.5)	
H <sub>2</sub> O <sub>2</sub> (hydrogen peroxide)	ppm		max. 500		max. 500	
Caustic pH			max. 13		max. 13	
Acid pH			min. 1		min. 1	

\* Typical operating conditions.



**Note**

The descriptions, designs, data and information („Product Information“) contained herein are presented in good faith and are based on inge GmbH's current knowledge and experience. inge GmbH cannot accept any liability for the accuracy of this Product Information, which is provided at no charge and for guidance only.

inge® products are designed to specifically be operated in accordance with the corresponding inge® „Operator's Manual“. The Product Information and products are protected by copyright and/or other intellectual property laws worldwide. However, inge GmbH cannot guarantee that the Product Information and products can be used without infringing third party intellectual property rights. The products and Product Information may only be used, distributed and marketed with the express prior permission of inge GmbH.

No warranties of any kind regarding the products, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose or no third party rights are made, other than as expressly set out in the contractual agreement with the customer. Mechanical stability and full functionality of inge® products can only be provided by genuine inge® parts.

inge GmbH reserves the right to modify products and Product Information at any time without prior information. Current Product Information can be obtained from the website [www.inge.basf.com](http://www.inge.basf.com)

Technical Specifications T-Rack 3.0 S 3.1(2017-02) E inge

inge GmbH  
Flurstrasse 27  
86926 Greifenberg, Germany  
Phone +49 8192 997-700  
Fax +49 8192 997-999  
[info@inge.ag](mailto:info@inge.ag)

[www.inge.basf.com](http://www.inge.basf.com)

