

# T-Rack<sup>®</sup> 3.0 S

Modern ultrafiltration in a compact design



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

- Suitable for containers – small footprint
- Plug-and-play installation – easy to assemble
- Suitable for direct feed – high pressure operability
- Optimized for seawater – high corrosion resistance
- Easy to add more modules – great flexibility

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.

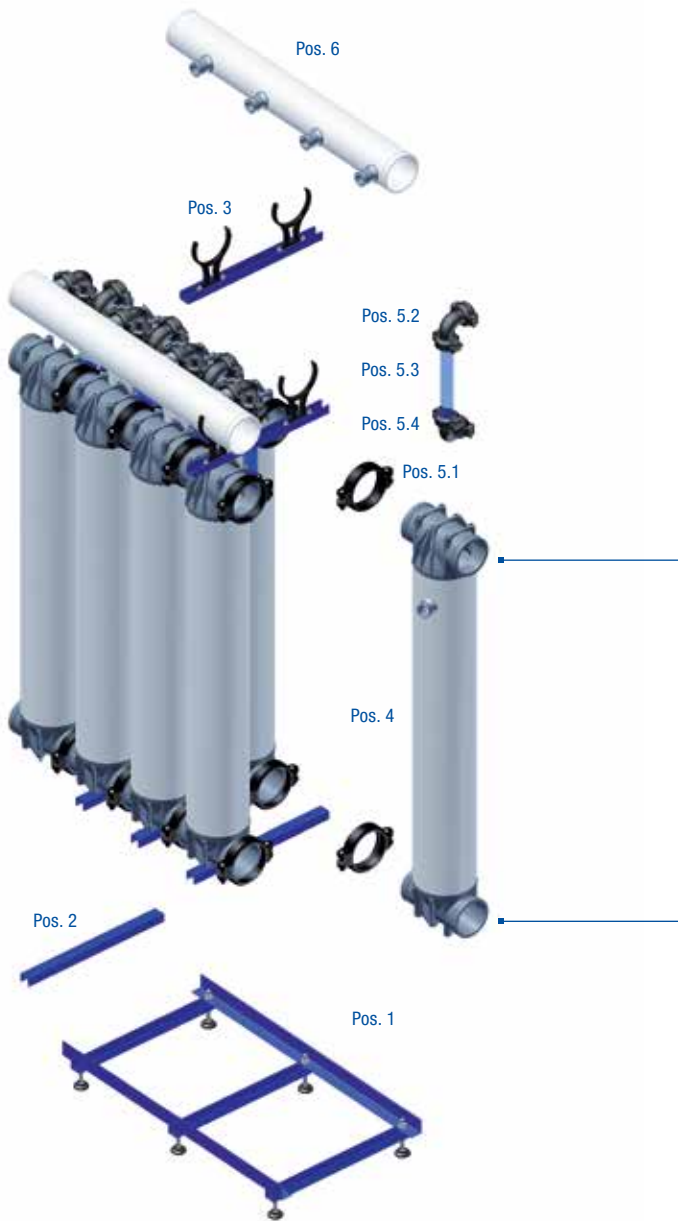
**Optional features:** In the standard version, the racks feature C4-coated frame profiles. A stainless steel version is also available on request.

\* The design pressure corresponds to the maximum permitted operating pressure in continuous operation at the specified design temperature. Higher operating pressures than 5 bar at 40°C may be possible in certain cases. However, this must first be verified and approved by inge.

\*\* Use DIN ISO 9080 and/or ASTM D 2837 to calculate the design pressure for different temperatures and service lives. For example, the design pressure of 5 bar at 40°C with a service life of 10 years corresponds to a design pressure of 8.2 bar at 20°C. Once again, however, this must first be verified and approved by inge.

® = Registered trademark of BASF

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



## End flange options



## T-Rack® 3.0 S parts list

Pos.	Article description	Material
1	Bottom frame	
1.1	Angle profile L 65 x 50 x 5 x div.*	1.0037 C4 coated
1.2	Channel section U 50 x 710 mm*	1.0037 C4 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 U 50 x 688 mm*	1.0037 C4 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 U 50 x 688 mm*	1.0037 C4 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, C4 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 flange options\*

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

\* Securing of end flange with 6" coupling (S0-0093) not included in standard package.

# 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*	Length (A)**		Membrane area***		Shipping weight****		Weight, filled****		Hold-up volume, feed side		Hold-up volume, filtrate side	
			mm	ft.	m²	sq.ft.	kg	lbs.	kg	lbs.	m³	US. gal	m³	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

\* Rack parts without modules    \*\* Tolerance to ISO 2768-1c    \*\*\* Rack equipped with 60m² (645 sq.ft.) dizzer® XL 0.9 MB 60 ST modules    \*\*\*\* incl. modules and frame

## Configuration with 2 rows and Multibore® 1.5 membrane

Number of modules	T-Rack® 3.0 S unit	Part number*	Length (A)**		Membrane area***		Shipping weight****		Weight, filled****		Hold-up volume, feed side		Hold-up volume, filtrate side	
			mm	ft.	m²	sq.ft.	kg	lbs.	kg	lbs.	m³	US. gal	m³	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	2800	30140	2875	6337	5512	12152	1.33	350.1	2.82	745.2

\* Rack parts without modules    \*\* Tolerance to ISO 2768-1c    \*\*\* Rack equipped with 40m² (430 sq.ft.) dizzer® XL 1.5 MB 40 ST modules    \*\*\*\* incl. modules and frame

# 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*	Length (A)**		Membrane area***		Shipping weight****		Weight, filled****		Hold-up volume, feed side		Hold-up volume, filtrate side	
			mm	ft.	m²	sq.ft.	kg	lbs.	kg	lbs.	m³	US. gal	m³	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

\* Rack parts without modules    \*\* Tolerance to ISO 2768-1c    \*\*\* Rack equipped with 60m² (645 sq.ft.) dizzer® XL 0.9 MB 60 ST modules    \*\*\*\* incl. modules and frame

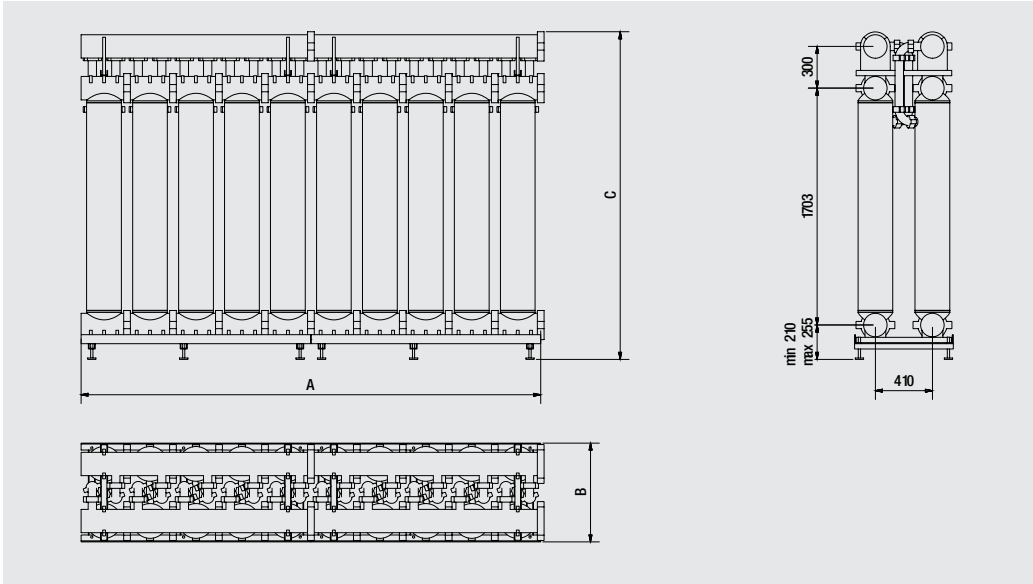
## Configuration with 4 rows and Multibore® 1.5 membrane

Number of modules	T-Rack® 3.0 S unit	Part number*	Length (A)**		Membrane area***		Shipping weight****		Weight, filled****		Hold-up volume, feed side		Hold-up volume, filtrate side	
			mm	ft.	m²	sq.ft.	kg	lbs.	kg	lbs.	m³	US. gal	m³	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

\* Rack parts without modules    \*\* Tolerance to ISO 2768-1c    \*\*\* Rack equipped with 40m² (430 sq.ft.) dizzer® XL 1.5 MB 40 ST modules    \*\*\*\* incl. modules and frame

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

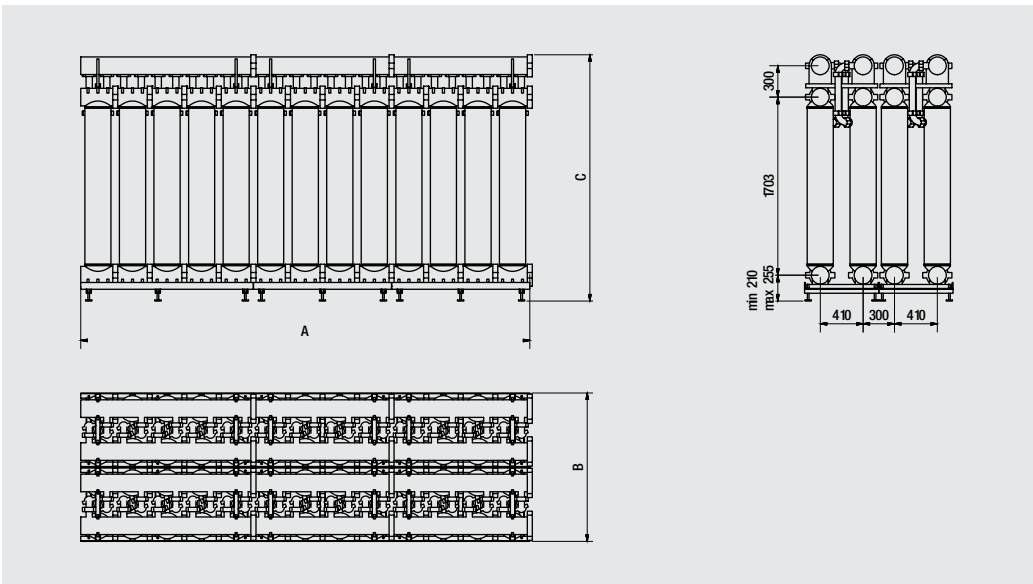
Height (C)\*  
 min = 2318 mm (7.60 ft.)  
 max = 2363 mm (7.75 ft.)

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.)

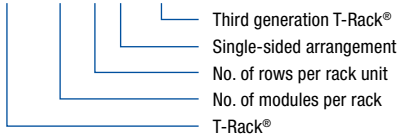
Width (B)\*  
 $B = 1420 \text{ mm (4.66 ft.)}$

\* 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
Outside diameter	mm	4.0	6.0
Pore size	µm	approx. 0.02	approx. 0.02
Material		PESM	PESM

### 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®						
20°C	bar	psi	8.2	119	8.2	119
40°C	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 – 1.5	1.5 – 20	0.1 – 1.5	1.5 – 20
Standard backwash*	bar	psi	0.3 – 3.0	5 – 40	0.3 – 3.0	5 – 40
Burst pressure (membrane)	bar	psi	> 10	> 150	> 10	> 150
Cleaning/disinfection chemicals						
Free chlorine	ppm	ppm x h	max. 200 max. 200,000 (at pH ≥ 9.5)		max. 200 max. 200,000 (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	

\* Specifications apply to normal operating conditions.



**Note**

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