

# T-Rack<sup>®</sup> 3.0

Integrated rack solutions for ultrafiltration



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

- **Proven T-Rack® 3.0 concept – safe and reliable operation**
- **dizzer® UF modules with 80 m<sup>2</sup> – more performance per module**
- **Less UF modules – reduced shipping costs and assembly time**
- **Extremely compact footprint – high treatment capacity**
- **Optimized for sea water – highest corrosion resistance class (C5)**
- **Modular design – great flexibility and extension ready**
- **Plug-and-play installation – easy to assemble on-site**

We carefully tailor our product development to the needs of the market and our customers' requirements. That's why we've decided to further address the specific requirements of larger-scale filtration systems (e.g. those used for pretreatment in sea water desalination or waste water reuse) by introducing a UF module with 80 m<sup>2</sup> filtration area for our time proven, ultra-compact and T-Rack® 3.0.

### More performance with dizzer® XL 0.9 MB 80 WT

When combined with T-Rack® 3.0, the new 80 m<sup>2</sup> UF module enables a significant footprint reduction, while providing outstanding treatment capacities. A T-Rack® with the maximum size of 120 modules, operated at 80 LMH (47 gfd) can provide a water treatment capacity of approx. up to 760 m<sup>3</sup>/h (4.8 MGD). This approach also results in fewer UF modules which translates into lower shipping costs and faster assembly times on-site.

### Extremely compact footprint

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 a footprint that is up to 60 percent smaller than conventional rack designs. By using standardized components, inge® is offering a fully scalable solution, while providing practical serviceability on-site.

### Modular design, extension ready

The standardized components and modular design of the rack allow for a quick and easy expansion of capacity to reflect changing treatment parameters. Additional UF modules can be added at any time.

### Easy on-site assembly

With a plug-and-play solution in mind, the T-Rack® 3.0 and the corresponding dizzer® UF modules with 80 m<sup>2</sup> do not require specialized equipment or training to assemble, thereby supporting easy installation and system integration.

### Full flexibility

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. For systems containing 72 modules or more, the racks are arranged on both sides of a manifold unit. inge® offers the option of providing the manifold unit as a T-Rack® Manifold.

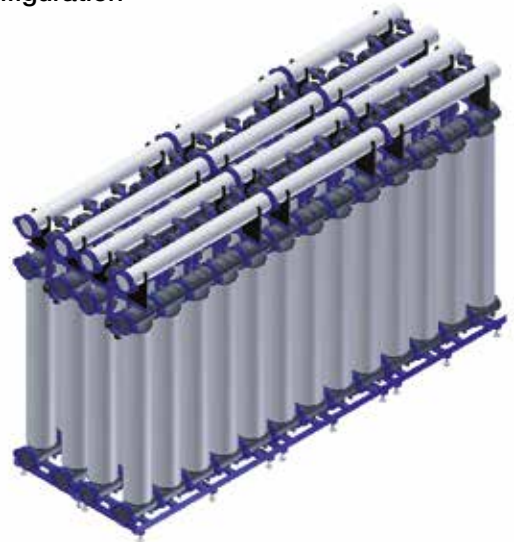
## T-Rack® 3.0 – flexible design for maximum performance

### Rack configurations (examples)

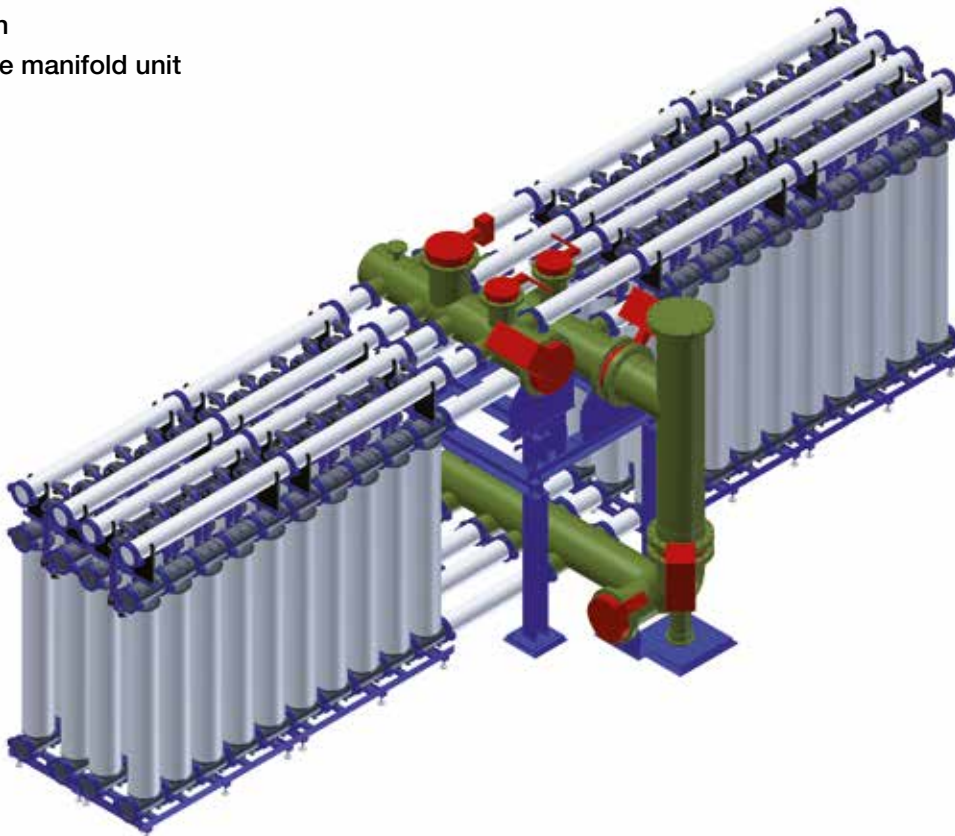
2-row configuration



4-row configuration



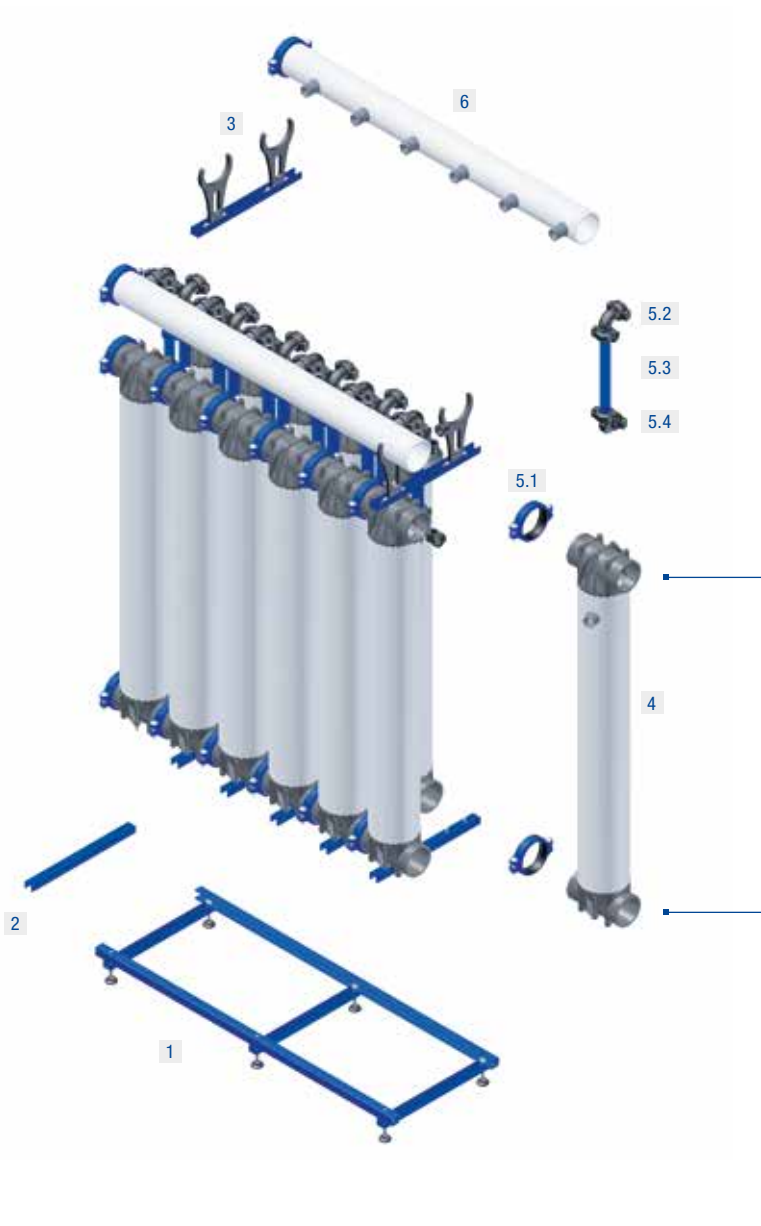
4-row configuration  
on both sides of the manifold unit



### Optional features

The standard version of the racks features C5-coated frame profiles. A stainless steel version is also available on request.

# T-Rack® 3.0 – modular and standardized design






## T-Rack® 3.0 parts list

Pos.	Article description	Material
1	Bottom frame	
1.1	Angle profile 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-WT 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" / 464 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

\* Building parts optionally available with stainless materials.

## T-Rack® 3.0 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 to be mounted with genuine inge® 6" flexible couplings.

## dizzer® XL ultrafiltration module and Multibore® membrane

### Multibore® membrane

Membrane specifications		Multibore® 0.9	Multibore® 1.5
Capillaries per fiber		7	7
Capillary inner 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

Module specifications			dizzer® XL 0.9 MB 80 WT		dizzer® XL 1.5 MB 50 WT	
Part number			VK-1109		VK-1101	
Active membrane area	m²	sq.ft.	80	861	50	538
Length (incl. T-piece)	mm	inch	2100 ± 1.5	82 2/3	2100 ± 1.5	82 2/3
Module diameter	mm	inch	250	9 7/8	250	9 7/8
Shipping weight	kg	lbs.	58	128	58	128
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/(m²h)	gfd	60 – 180	35 – 105	60 – 180	35 – 180
Standard backwash	l/(m²h)	gfd	230	135	230	135
Backwash range	l/(m²h)	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.





# T-Rack® 3.0 – system configurations

Number of modules	T-Rack® 3.0 unit	Part number <sup>1)</sup>	Length (A) <sup>2)</sup>		Membrane area <sup>3)</sup>		Shipping weight <sup>5)</sup>		Weight, filled <sup>5)</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

### dizzer® XL 0.9 MB 80 WT organized in 2 rows

4	TR-4-2-1-3.0	TR-0004	661	2.17	320	3445	325	717	594	1309	0.13	35.6	0.20	53.4
6	TR-6-2-1-3.0	TR-0006	991	3.25	480	5167	473	1043	876	1932	0.20	53.4	0.30	80.2
8	TR-8-2-1-3.0	TR-0008	1322	4.34	640	6889	621	1369	1158	2554	0.27	71.2	0.40	106.9
10	TR-10-2-1-3.0	TR-0010	1652	5.42	800	8611	769	1695	1441	3176	0.34	89.0	0.51	133.6
12	TR-12-2-1-3.0	TR-0012	1983	6.51	960	10334	917	2021	1723	3798	0.40	106.8	0.61	160.3
14	TR-14-2-1-3.0	TR-0014	2313	7.59	1120	12056	1094	2412	2035	4486	0.47	124.7	0.71	187.1
16	TR-16-2-1-3.0	TR-0016	2644	8.67	1280	13778	1242	2738	2317	5108	0.54	142.5	0.81	213.8
18	TR-18-2-1-3.0	TR-0018	2974	9.76	1440	15501	1390	3064	2599	5730	0.61	160.3	0.91	240.5
20	TR-20-2-1-3.0	TR-0020	3305	10.84	1600	17223	1538	3390	2881	6352	0.67	178.1	1.01	267.2
22	TR-22-2-1-3.0	TR-0022	3635	11.93	1760	18945	1686	3716	3164	6975	0.74	195.9	1.11	294.0
24	TR-24-2-1-3.0	TR-0024	3966	13.01	1920	20667	1834	4042	3446	7597	0.81	213.7	1.21	320.7
26	TR-26-2-1-3.0	TR-0026	4296	14.10	2080	22390	2011	4433	3758	8284	0.88	231.5	1.32	347.4
28	TR-28-2-1-3.0	TR-0028	4627	15.18	2240	24112	2159	4759	4040	8906	0.94	249.3	1.42	374.1
30	TR-30-2-1-3.0	TR-0030	4957	16.26	2400	25834	2307	5085	4322	9529	1.01	267.1	1.52	400.9

Single-sided connection to Manifold

### dizzer® XL 0.9 MB 80 WT organized in 4 rows

32	TR-32-4-1-3.0	TR-0033	2644	8.67	2560	27557	2484	5476	4634	10216	1.08	284.9	1.62	427.6
36	TR-36-4-1-3.0	TR-0036	2974	9.76	2880	31001	2780	6128	5198	11460	1.21	320.5	1.82	481.0
40	TR-40-4-1-3.0	TR-0040	3305	10.84	3200	34446	3076	6781	5763	12705	1.35	356.2	2.02	534.5
44	TR-44-4-1-3.0	TR-0044	3635	11.93	3520	37890	3371	7433	6327	13949	1.48	391.8	2.23	587.9
48	TR-48-4-1-3.0	TR-0048	3966	13.01	3840	41335	3667	8085	6892	15194	1.62	427.4	2.43	641.4
52	TR-52-4-1-3.0	TR-0052	4296	14.10	4160	44779	4022	8867	7515	16568	1.75	463.0	2.63	694.8
56	TR-56-4-1-3.0	TR-0056	4627	15.18	4480	48224	4318	9519	8080	17813	1.89	498.6	2.83	748.3
60	TR-60-4-1-3.0	TR-0060	4957	16.26	4800	51668	4613	10171	8644	19057	2.02	534.2	3.03	801.7

### dizzer® XL 0.9 MB 80 WT organized in 4 rows

72	TR-72-4-2-3.0	TR-0072	5949	19.52	5760	62002	5448	12010	10272	22647	2.48	654.4	3.58	945.5
76	TR-76-4-2-3.0 <sup>4)</sup>	TR-0076	6279	20.60	6080	65447	5737	12648	10830	23876	2.61	690.8	3.78	998.1
80	TR-80-4-2-3.0	TR-0080	6610	21.69	6400	68891	6027	13287	11388	25106	2.75	727.2	3.98	1050.6
84	TR-84-4-2-3.0 <sup>4)</sup>	TR-0084	6940	22.77	6720	72336	6316	13925	11945	26335	2.89	763.5	4.18	1103.1
88	TR-88-4-2-3.0	TR-0088	7271	23.85	7040	75780	6606	14563	12503	27564	3.03	799.9	4.37	1155.7
92	TR-92-4-2-3.0 <sup>4)</sup>	TR-0092	7601	24.94	7360	79225	6895	15202	13061	28794	3.17	836.2	4.57	1208.2
96	TR-96-4-2-3.0	TR-0096	7932	26.02	7680	82670	7185	15840	13618	30023	3.30	872.6	4.77	1260.7
100	TR-100-4-2-3.0 <sup>4)</sup>	TR-0100	8262	27.11	8000	86114	7533	16608	14235	31382	3.44	908.9	4.97	1313.3
104	TR-104-4-2-3.0	TR-0104	8593	28.19	8320	89559	7882	17376	14851	32741	3.58	945.3	5.17	1365.8
108	TR-108-4-2-3.0 <sup>4)</sup>	TR-0108	8923	29.27	8640	93003	8171	18015	15409	33970	3.72	981.7	5.37	1418.3
112	TR-112-4-2-3.0	TR-0112	9254	30.36	8960	96448	8461	18653	15966	35200	3.85	1018.0	5.57	1470.8
116	TR-116-4-2-3.0 <sup>4)</sup>	TR-0116	9584	31.44	9280	99892	8750	19291	16524	36429	3.99	1054.4	5.77	1523.4
120	TR-120-4-2-3.0	TR-0120	9915	32.53	9600	103337	9040	19930	17082	37659	4.13	1090.7	5.97	1575.9

Double-sided connection to Manifold

<sup>1)</sup> Rack parts without modules    <sup>2)</sup> Length = length rack 1 + rack 2, excl. central header pipe, Tolerance to ISO 2768-1c    <sup>3)</sup> Rack equipped with 80m<sup>2</sup> (861 sq.ft.) dizzer® XL 0.9 MB 80 WT modules

Number of modules	T-Rack® 3.0 unit	Part number <sup>1)</sup>	Length (A) <sup>2)</sup>		Membrane area <sup>6)</sup>		Shipping weight <sup>5)</sup>		Weight, filled <sup>5)</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

**dizzer® XL 1.5 MB 50 WT organized in 2 rows**

4	TR-4-2-1-3.0	TR-0004	661	2.17	200	3014	320	705	617	1361	0.14	36.4	0.28	74.3
6	TR-6-2-1-3.0	TR-0006	991	3.25	300	4521	466	1027	912	2010	0.21	54.5	0.42	111.4
8	TR-8-2-1-3.0	TR-0008	1322	4.34	400	4306	612	1349	1206	2659	0.28	72.7	0.56	148.6
10	TR-10-2-1-3.0	TR-0010	1652	5.42	500	5382	758	1670	1501	3308	0.34	90.9	0.70	185.7
12	TR-12-2-1-3.0	TR-0012	1983	6.51	600	6459	903	1992	1795	3958	0.41	109.1	0.84	222.9
14	TR-14-2-1-3.0	TR-0014	2313	7.59	700	7535	1077	2375	2118	4669	0.48	127.3	0.98	260.0
16	TR-16-2-1-3.0	TR-0016	2644	8.67	800	8611	1223	2697	2412	5318	0.55	145.4	1.12	297.2
18	TR-18-2-1-3.0	TR-0018	2974	9.76	900	9688	1369	3019	2707	5968	0.62	163.6	1.27	334.3
20	TR-20-2-1-3.0	TR-0020	3305	10.84	1000	10764	1515	3340	3001	6617	0.69	181.8	1.41	371.5
22	TR-22-2-1-3.0	TR-0022	3635	11.93	1100	11841	1661	3662	3296	7266	0.76	200.0	1.55	408.6
24	TR-24-2-1-3.0	TR-0024	3966	13.01	1200	12917	1807	3984	3590	7916	0.83	218.1	1.69	445.8
26	TR-26-2-1-3.0	TR-0026	4296	14.10	1300	13994	1981	4367	3913	8627	0.89	236.3	1.83	482.9
28	TR-28-2-1-3.0	TR-0028	4627	15.18	1400	15070	2127	4689	4208	9276	0.96	254.5	1.97	520.1
30	TR-30-2-1-3.0	TR-0030	4957	16.26	1500	16146	2273	5010	4502	9925	1.03	272.7	2.11	557.2
32	TR-32-2-1-3.0	TR-0032	5288	17.35	1600	17223	2419	5332	4797	10575	1.10	290.9	2.25	594.4
34	TR-34-2-1-3.0	TR-0034	5618	18.43	1700	18299	2565	5654	5091	11224	1.17	309.0	2.39	631.5

**dizzer® XL 1.5 MB 50 WT organized in 4 rows**

36	TR-36-4-1-3.0	TR-0036	2974	9.76	1800	19376	2738	6037	5414	11935	1.10	290.9	2.25	594.4
40	TR-40-4-1-3.0	TR-0040	3305	10.84	2000	21529	3030	6681	6003	13234	1.38	363.6	2.81	743.0
44	TR-44-4-1-3.0	TR-0044	3635	11.93	2200	23681	3322	7324	6592	14533	1.51	399.9	3.09	817.3
48	TR-48-4-1-3.0	TR-0048	3966	13.01	2400	25834	3614	7967	7181	15831	1.65	436.3	3.37	891.6
52	TR-52-4-1-3.0	TR-0052	4296	14.10	2600	27987	3962	8734	7826	17254	1.79	472.7	3.66	965.9
56	TR-56-4-1-3.0	TR-0056	4627	15.18	2800	30140	4254	9378	8415	18552	1.93	509.0	3.94	1040.2
60	TR-60-4-1-3.0	TR-0060	4957	16.26	3000	32293	4545	10021	9004	19851	2.06	545.4	4.22	1114.5
64	TR-64-4-1-3.0	TR-0064	5288	17.35	3200	34446	4837	10664	9593	21150	2.20	581.7	4.50	1188.7
68	TR-68-4-1-3.0	TR-0068	5618	18.43	3400	36598	5129	11308	10182	22448	2.34	618.1	4.78	1263.0

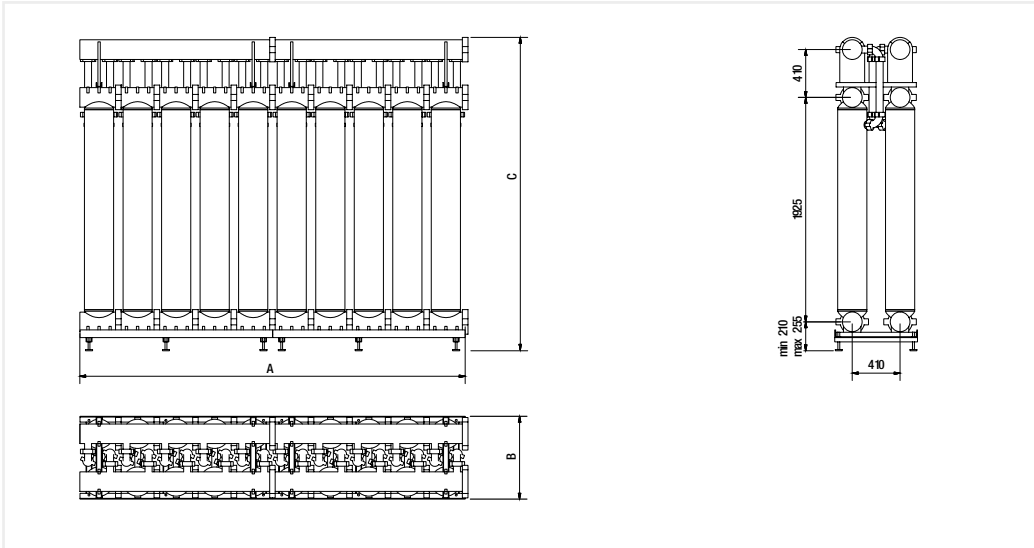
**dizzer® XL 1.5 MB 50 WT organized in 4 rows**

72	TR-72-4-2-3.0	TR-0072	5949	19.52	3600	38751	5477	12075	10828	23871	2.20	581.7	4.50	1188.7
76	TR-76-4-2-3.0 <sup>4)</sup>	TR-0076	6279	20.60	3800	40904	5769	12718	11417	25169	2.48	654.4	5.06	1337.3
80	TR-80-4-2-3.0	TR-0080	6610	21.69	4000	43057	6061	13361	12006	26468	2.75	727.2	5.62	1485.9
84	TR-84-4-2-3.0 <sup>4)</sup>	TR-0084	6940	22.77	4200	45210	6352	14005	12595	27767	2.89	763.5	5.91	1560.2
88	TR-88-4-2-3.0	TR-0088	7271	23.85	4400	47363	6644	14648	13184	29065	3.03	799.9	6.19	1634.5
92	TR-92-4-2-3.0 <sup>4)</sup>	TR-0092	7601	24.94	4600	49516	6936	15291	13773	30364	3.17	836.2	6.47	1708.8
96	TR-96-4-2-3.0	TR-0096	7932	26.02	4800	51669	7228	15934	14362	31662	3.30	872.6	6.75	1783.1
100	TR-100-4-2-3.0 <sup>4)</sup>	TR-0100	8262	27.11	5000	53821	7576	16702	15007	33085	3.44	908.9	7.03	1857.4
104	TR-104-4-2-3.0	TR-0104	8593	28.19	5200	55974	7924	17469	15652	34507	3.58	945.3	7.31	1931.7
108	TR-108-4-2-3.0 <sup>4)</sup>	TR-0108	8923	29.27	5400	58127	8215	18112	16241	35806	3.72	981.7	7.59	2006.0
112	TR-112-4-2-3.0	TR-0112	9254	30.36	5600	60280	8507	18755	16830	37105	3.85	1018.0	7.87	2080.3
116	TR-116-4-2-3.0 <sup>4)</sup>	TR-0116	9584	31.44	5800	62433	8799	19399	17419	38403	3.99	1054.4	8.16	2154.6
120	TR-120-4-2-3.0	TR-0120	9915	32.53	6000	64586	9091	20042	18008	39702	4.13	1090.7	8.44	2228.9
124	TR-124-4-2-3.0 <sup>4)</sup>	TR-0124	10245	33.61	6200	66738	9383	20685	18597	41000	4.27	1127.1	8.72	2303.2
128	TR-128-4-2-3.0	TR-0128	10576	34.70	6400	68891	9674	21328	19187	42299	4.40	1163.5	9.00	2377.5
132	TR-132-4-2-3.0 <sup>4)</sup>	TR-0132	10906	35.78	6600	71044	9966	21972	19776	43598	4.54	1199.8	9.28	2451.8
136	TR-136-4-2-3.0	TR-0136	11237	36.87	6800	73196	10258	22615	20365	44896	4.68	1236.2	9.56	2526.1

<sup>1)</sup> Asymmetric module arrangement <sup>5)</sup> incl. modules and frame <sup>6)</sup> Rack equipped with 50m<sup>2</sup> (538 sq.ft.) dizzer® XL 1.5 MB 50 WT modules

# T-Rack® 3.0 – sample configuration and dimensions

## TR-20-2-1-3.0



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

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

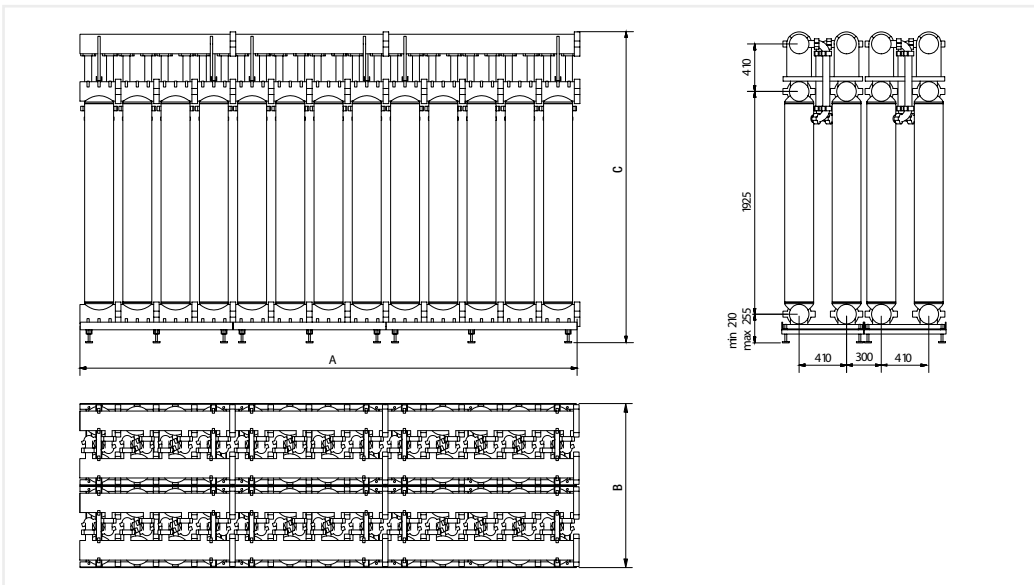
Height (C)\*  
 min = 2650 mm (8.70 ft.)  
 max = 2695 mm (8.85 ft.)

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



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 = 2650 mm (8.70 ft.)  
 max = 2695 mm (8.85 ft.)

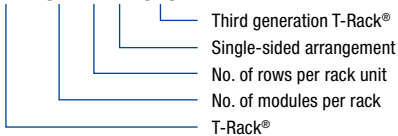
Width (B)\*  
 $B = 1420 \text{ mm (4.66 ft.)}$

\* 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







**Note**

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Technical Specifications TR-3.0 5.1(2017-02) E inge

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