

SUMMARY OF TECHNICAL INFORMATION
FOR DESIGNING THE
CAST-IRON HEATING BODIES

KALOR, KALOR 3, TERMO and BOHEMIA

VIADRUS

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CAST-IRON HEATING BODIES

KALOR

KALOR

DESCRIPTION

Heating body consisting of sections connected into heating systems using steel nipples with external right-hand or left-hand thread G 5/4" is manufactured in eight models:

350/160 mm, 500/70 mm, 500/110 mm, 500/160 mm, 500/220 mm, 600/160 mm, 900/70 mm and 900/160 mm.

Heating bodies comply with CSN EN 442 – 1:1995 and CSN EN 442 – 2:1997. The material used is a grey cast-iron corresponding to CSN 422415:1989. The design of castings ensures a long life cycle of products.

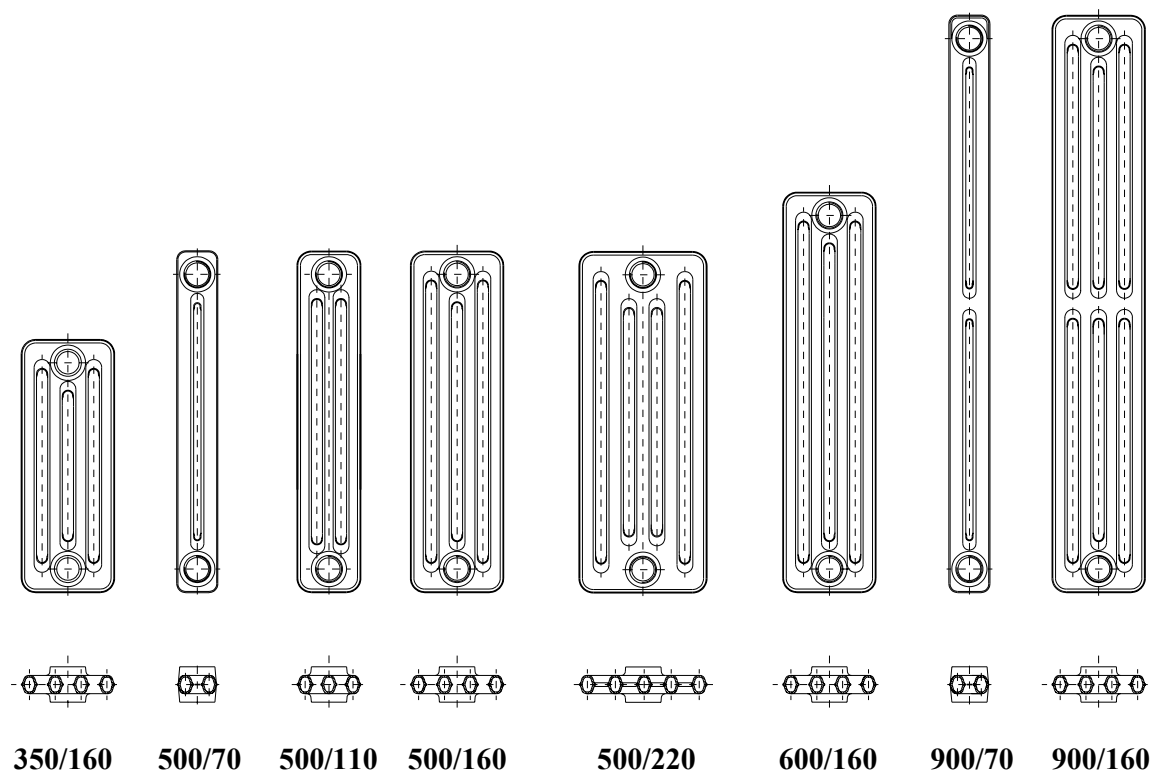


Fig. 1: Kalor line heating bodies

USAGE

All heating bodies of Kalor line are designed for warm-water central heating systems with gravity and forced circulation of heating water with the highest operating temperature not exceeding 120 °C and **highest operating overpressure of up to 0.6 MPa**. In addition to this all models manufactured are approved for steam central heating systems with the maximum operating overpressure of up to 0.07 MPa.

THERMAL AND TECHNICAL PARAMETERS

Table 1: Significant thermal and technical parameters of Kalor heating sections

Property	Symbol	Unit	350/160	500/70	500/110	500/160	500/220	600/160	900/70	900/160
total height	H	(mm)	430	580	580	580	580	680	980	980
spacing	h	(mm)	350	500	500	500	500	600	900	900
depth	B	(mm)	160	70	110	160	220	160	70	160
width	L	(mm)	60	60	60	60	60	60	60	60
connection thread	G	"	5/4	5/4	5/4	5/4	5/4	5/4	5/4	5/4
weight	M	(kg/section)	4.30	3.20	4.00	5.60	6.95	6.60	5.20	10.60
equivalent heating area	S _L	(m ² /section)	0.185	0.120	0.180	0.255	0.345	0.306	0.205	0.440
water volume	V	(dm ³ /section)	0.8	0.5	0.8	1.1	1.3	1.2	0.8	1.5
thermal power	Φ _s	(W/section)	70	53	73	94	120	110	89	152
thermal	Φ _L	(W/m)	1162	889	1162	1516	1979	1815	1370	2475
temperature exponent	m	(-)	1.250	1.240	1.250	1.250	1.285	1.270	1.280	1.310

All Kalor models are certified by SZÚ Brno. Thermal and technical parameters are verified experimentally in compliance with CSN EN 442-2: 1997.

Tables 2 through to 29 provide values of thermal power for individual models of cast-iron heating bodies for number of sections ranging from 2 up to 30, variable required air temperature and temperature gradient of the heat-transfer fluid (water) equal to 90/70°C, 75/65°C, 55/45°C and steam.

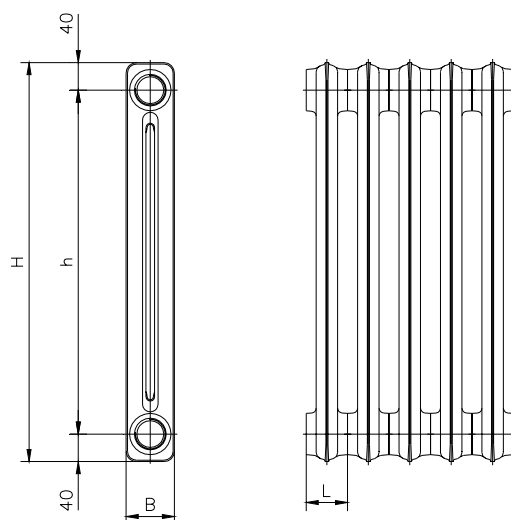


Fig. 2: Standard dimensions of Kalor sections

Basic thermal and technical parameters for the heat-transfer fluid – water – with the temperature gradient of 75/65 °C and one-sided lateral connection (supply) of the heat-transfer fluid (water) at the top are provided in Table 1. Individual models of heating bodies are measured without cover.

TESTING OVERPRESSURE

Units manufactured are subject to the pressure test performed in manufacturer's facility using overpressure of cold water equal to 1 MPa.

ASSEMBLY

In order to achieve required thermal power of heating bodies it is necessary to maintain the installation position indicated on Fig. 3. In addition to this a **minimum overlap of the window sill** shall be adhered to.

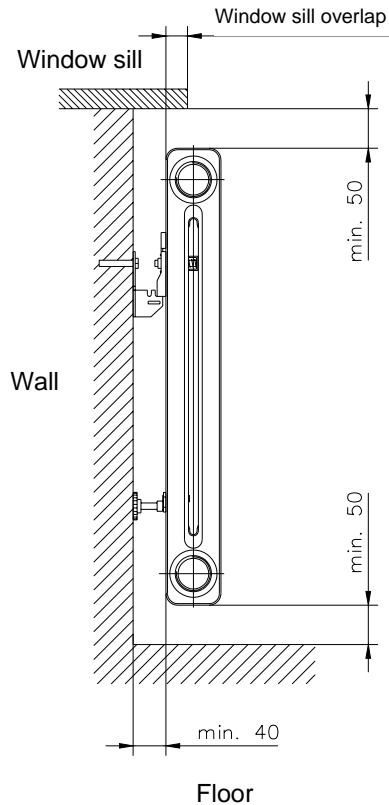


Fig. 3: Installation of Kalor heating bodies

Kalor heating bodies are connected to the distribution piping using roses provided with external right-hand or left hand thread G 5/4" with G 1/8", G 1/4", G 3/8", G 1/2", G 3/4" and G 1" bores. Openings of the heating body on the opposite side to the inlet and outlet connections of the heat-transfer fluid (water) are usually terminated by plugs provided with external right-hand or left-hand thread G 5/4". The upper plug can be provided with a bore with eccentrically positioned thread G 3/8" or G 1/4" for the air relief valve. Automatic air relief valves are suitable for this purpose. Prior to combining the individual units supplied into the heating body of required size it is necessary to perform a thorough cleaning of contact surfaces of sections and individual connections shall be sealed by Clingerite, which is normally used during production and it is suitable both for warm-water and steam systems. The sections shall be coupled with the torque of min. 180 Nm and max. 250 Nm.

Other installation data are provided in the section of instruction manual common for all models of heating bodies manufactured.

THERMAL POWER TABLES
FOR INDIVIDUAL MODELS OF HEATING BODIES

WARM-WATER HEATING

Temperature gradient to CSN EN 442 – 2:1997

Temperature gradients 75/65 °C
 90/70 °C
 55/45 °C

Table 2: Thermal power for all models of Kalor heating bodies depending on the number of sections

Warm-water heating

$t_{w1} = 90\text{ }^{\circ}\text{C}$

$t_{w2} = 70\text{ }^{\circ}\text{C}$

$t_i = 20\text{ }^{\circ}\text{C}$

Thermal power Q_N (W)

No. of sections (n)	350/160	500/70	500/110	500/160	900/70	900/160
2	198	166	198	259	261	473
3	289	233	289	376	364	662
4	379	300	379	494	468	850
5	469	367	469	612	572	1038
6	559	434	559	729	675	1227
7	649	501	649	847	779	1415
8	740	568	740	965	883	1603
9	830	635	830	1082	986	1792
10	920	702	920	1200	1090	1980
11	1010	769	1010	1318	1194	2168
12	1100	836	1100	1435	1297	2357
13	1191	903	1191	1553	1401	2545
14	1281	970	1281	1671	1505	2733
15	1371	1037	1371	1788	1608	2922
16	1461	1104	1461	1906	1712	3110
17	1552	1171	1552	2024	1816	3298
18	1642	1238	1642	2141	1919	3487
19	1732	1305	1732	2259	2023	3675
20	1822	1372	1822	2377	2127	3863
21	1912	1439	1912	2494	2230	4052
22	2003	1506	2003	2612	2334	4240
23	2093	1573	2093	2730	2438	4428
24	2183	1640	2183	2847	2542	4617
25	2273	1707	2273	2965	2645	4805
26	2363	1774	2363	3083	2749	4994
27	2454	1841	2454	3200	2853	5182
28	2544	1908	2544	3318	2956	5370
29	2634	1975	2634	3435	3060	5559
30	2724	2042	2724	3553	3164	5747

Table 3: Thermal power of Kalor type heating bodies depending on the number of sections

Warm-water heating

$t_{w1} = 55\text{ }^{\circ}\text{C}$

$t_{w2} = 45\text{ }^{\circ}\text{C}$

$t_i = 20\text{ }^{\circ}\text{C}$

Thermal power Q_N (W)

No. of sections (n)	350/160	500/70	500/110	500/160	900/70	900/160
2	83	70	83	109	107	191
3	121	98	121	158	150	267
4	159	127	159	208	193	343
5	197	155	197	257	235	419
6	235	184	235	307	278	495
7	273	212	273	356	321	571
8	311	240	311	406	363	647
9	349	269	349	455	406	723
10	387	297	387	505	449	799
11	425	325	425	554	492	875
12	463	354	463	603	534	951
13	501	382	501	653	577	1026
14	539	411	539	702	620	1102
15	576	439	576	752	662	1178
16	614	467	614	801	705	1254
17	652	496	652	851	748	1330
18	690	524	690	900	790	1406
19	728	552	728	950	833	1482
20	766	581	766	999	876	1558
21	804	609	804	1049	918	1634
22	842	638	842	1098	961	1710
23	880	666	880	1148	1004	1786
24	918	694	918	1197	1047	1862
25	956	723	956	1247	1089	1938
26	994	751	994	1297	1132	2014
27	1032	779	1032	1346	1175	2090
28	1070	808	1070	1395	1217	2166
29	1107	836	1107	1444	1260	2242
30	1145	865	1145	1494	1303	2318

Table 4: Thermal power of heating bodies Kalor 350/160 and 500/110 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 90\text{ }^{\circ}\text{C}$

$t_{w2} = 70\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	241	219	207	198	190	182
3	350	319	301	289	277	265
4	459	419	395	379	363	348
5	569	518	489	469	450	430
6	678	618	583	559	536	513
7	787	718	677	649	623	596
8	897	818	771	740	709	679
9	1006	917	865	830	795	761
10	1116	1017	959	920	882	844
11	1225	1117	1053	1010	968	927
12	1334	1216	1147	1100	1055	1010
13	1444	1316	1241	1191	1141	1092
14	1553	1416	1334	1281	1228	1175
15	1662	1515	1428	1371	1314	1258
16	1772	1615	1522	1461	1401	1341
17	1881	1715	1616	1552	1487	1423
18	1991	1841	1710	1642	1574	1506
19	2100	1914	1804	1732	1660	1589
20	2209	2014	1898	1822	1747	1672
21	2319	2114	1992	1912	1833	1754
22	2428	2213	2086	2033	1919	1837
23	2537	2313	2180	2093	2006	1920
24	2647	2413	2274	2183	2092	2003
25	2756	2512	2368	2273	2179	2085
26	2866	2612	2462	2363	2265	2168
27	2975	2712	2556	2454	2352	2251
28	3084	2811	2650	2544	2438	2334
29	3194	2911	2744	2634	2525	2416
30	3303	3011	2838	2724	2611	2499

Table 5: Thermal power of heating bodies Kalor 350/160 and 500/110 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 55\text{ }^{\circ}\text{C}$

$t_{w2} = 45\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	120	101	90	83	77	70
3	174	147	132	121	111	101
4	228	193	173	159	146	133
5	283	239	214	197	181	165
6	337	285	255	235	216	197
7	391	331	296	273	251	228
8	446	377	337	311	285	260
9	500	423	378	349	320	292
10	554	469	419	387	355	323
11	609	515	460	425	390	355
12	663	561	502	463	424	387
13	717	607	543	501	469	419
14	772	653	584	539	494	450
15	826	699	625	576	529	482
16	880	745	666	614	564	514
17	935	791	707	652	598	545
18	989	837	748	690	633	577
19	1043	883	789	728	668	609
20	1098	929	830	766	703	641
21	1152	975	872	804	738	672
22	1206	1021	913	842	772	704
23	1261	1067	954	880	807	736
24	1315	1113	995	918	842	767
25	1369	1159	1036	956	877	799
26	1424	1205	1077	994	912	831
27	1478	1251	1118	1032	946	863
28	1532	1297	1159	1070	981	894
29	1587	1343	1200	1107	1016	926
30	1641	1389	1242	1145	1051	958

Table 6: Thermal power of heating bodies Kalor 500/70 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 90\text{ }^{\circ}\text{C}$

$t_{w2} = 70\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	15	18	20	22	24
2	183	172	166	159	152
3	257	242	233	223	214
4	331	312	300	287	275
5	405	382	367	352	337
6	479	452	434	416	398
7	553	521	501	480	460
8	627	591	568	544	521
9	701	661	635	609	583
10	775	731	702	673	644
11	849	801	769	737	706
12	923	870	836	801	767
13	997	940	903	866	829
14	1071	1010	970	930	890
15	1145	1080	1037	994	952
16	1219	1150	1104	1058	1013
17	1293	1219	1171	1123	1075
18	1367	1289	1238	1187	1136
19	1441	1359	1305	1251	1198
20	1515	1429	1372	1315	1259
21	1589	1499	1439	1380	1321
22	1663	1568	1506	1444	1382
23	1737	1638	1573	1508	1444
24	1811	1708	1640	1572	1505
25	1885	1778	1707	1637	1567
26	1959	1848	1774	1701	1628
27	2033	1917	1841	1765	1690
28	2107	1987	1908	1829	1751
29	2181	2057	1975	1894	1813
30	2255	2127	2042	1958	1875

Table 7: Thermal power of heating bodies Kalor 500/70 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 55\text{ }^{\circ}\text{C}$
 $t_{w2} = 45\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	15	18	20	22	24
2	85	76	70	64	59
3	119	107	98	90	82
4	154	137	127	116	106
5	188	168	155	142	130
6	222	199	184	169	154
7	257	230	212	195	178
8	291	260	240	221	201
9	325	291	269	247	225
10	360	322	297	273	249
11	394	353	325	299	273
12	428	383	354	325	296
13	463	414	382	351	320
14	497	445	411	377	344
15	531	476	439	403	368
16	566	506	467	429	391
17	600	537	496	455	415
18	634	568	524	481	439
19	669	598	552	507	463
20	703	629	581	533	486
21	737	660	609	559	510
22	772	691	638	585	534
23	806	721	666	611	558
24	841	752	694	637	581
25	875	783	723	663	605
26	909	814	751	689	629
27	944	844	779	715	653
28	1012	906	836	768	700
29	1047	937	865	794	724
30	1047	937	865	794	724

Table 8: Thermal power of heating bodies Kalor 500/160 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 90\text{ }^{\circ}\text{C}$

$t_{w2} = 70\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	314	286	270	259	248	237
3	456	416	392	376	361	345
4	599	546	515	494	474	453
5	742	676	637	612	586	561
6	884	806	760	729	699	669
7	1027	936	883	847	812	777
8	1170	1066	1005	965	925	885
9	1312	1196	1128	1082	1037	993
10	1455	1326	1250	1200	1150	1101
11	1598	1456	1373	1318	1263	1209
12	1740	1586	1495	1435	1376	1317
13	1883	1716	1618	1553	1489	1425
14	2026	1846	1741	1671	1601	1533
15	2168	1977	1863	1788	1714	1641
16	2311	2107	1986	1906	1827	1748
17	2454	2237	2108	2024	1940	1856
18	2596	2367	2231	2141	2052	1964
19	2739	2497	2353	2259	2165	2072
20	2882	2627	2476	2377	2278	2180
21	3024	2757	2599	2494	2391	2288
22	3167	2887	2721	2612	2504	2396
23	3310	3017	2844	2730	2616	2504
24	3452	3147	2966	2847	2729	2612
25	3595	3277	3089	2965	2842	2720
26	3738	3407	3211	3083	2955	2828
27	3880	3537	3334	3200	3067	2936
28	4023	3667	3457	3318	3180	3044
29	4166	3797	3579	3435	3293	3152
30	4308	3927	3702	3553	3406	3260

Table 9: Thermal power of heating bodies Kalor 500/160 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 55\text{ }^{\circ}\text{C}$

$t_{w2} = 45\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	156	132	118	109	100	91
3	227	192	172	158	145	132
4	298	252	225	208	191	174
5	369	312	279	257	236	215
6	439	372	332	307	281	256
7	510	432	386	356	327	298
8	581	492	440	406	372	339
9	652	552	493	455	417	381
10	723	612	547	505	463	422
11	794	672	601	554	508	463
12	865	732	654	603	554	505
13	936	792	708	653	599	546
14	1006	852	761	702	644	587
15	1077	912	815	752	690	629
16	1148	972	869	801	735	670
17	1219	1032	922	851	781	711
18	1290	1092	976	900	826	753
19	1361	1152	1030	950	871	794
20	1432	1212	1083	999	917	836
21	1503	1272	1137	1049	962	877
22	1573	1332	1190	1098	1007	918
23	1644	1392	1244	1148	1053	960
24	1715	1451	1298	1197	1098	1001
25	1786	1511	1351	1247	1144	1042
26	1857	1571	1405	1296	1189	1084
27	1928	1631	1459	1346	1234	1125
28	1999	1691	1512	1395	1280	1166
29	2070	1751	1566	1444	1325	1208
30	2140	1811	1619	1494	1370	1249

Table 10: Thermal power of heating bodies Kalor 900/70 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 90\text{ }^{\circ}\text{C}$

$t_{w2} = 70\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	317	289	272	261	249	239
3	444	404	380	364	349	333
4	570	518	488	468	448	428
5	696	633	596	572	547	523
6	823	748	704	675	647	618
7	949	863	812	779	746	713
8	1075	978	920	883	845	808
9	1201	1098	1029	986	944	903
10	1328	1208	1137	1090	1044	998
11	1454	1322	1245	1194	1143	1093
12	1580	1437	1353	1297	1242	1188
13	1707	1552	1461	1401	1342	1283
14	1833	1667	1569	1505	1441	1378
15	1959	1782	1677	1608	1540	1472
16	2086	1897	1785	1712	1639	1567
17	2212	2012	1894	1816	1739	1662
18	2338	2127	2002	1919	1838	1757
19	2464	2241	2110	2023	1937	1852
20	2591	2356	2218	2127	2036	1947
21	2717	2471	2326	2230	2136	2042
22	2843	2586	2434	2334	2235	2137
23	2970	2701	2542	2438	2334	2232
24	3096	2810	2650	2542	2434	2327
25	3222	2931	2759	2645	2433	2422
26	3348	3045	2867	2749	2632	2517
27	3475	3160	2975	2853	2731	2611
28	3601	3275	3083	2956	2831	2706
29	3727	3390	3191	3060	2930	2801
30	3854	3505	3299	3164	3029	2896

Table 11: Thermal power of heating bodies Kalor 900/70 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 55\text{ }^{\circ}\text{C}$

$t_{w2} = 45\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	155	131	117	107	98	89
3	217	183	163	150	137	125
4	278	235	209	193	176	160
5	340	287	256	235	215	196
6	402	339	302	278	255	232
7	464	391	348	321	294	267
8	525	443	395	363	333	303
9	587	495	441	406	372	338
10	649	547	488	449	411	374
11	710	599	534	492	450	409
12	772	651	580	534	489	445
13	834	703	627	577	528	480
14	895	755	673	620	567	516
15	957	807	719	662	606	551
16	1019	859	766	705	645	587
17	1081	911	812	748	685	623
18	1142	963	858	790	724	658
19	1204	1015	905	833	763	694
20	1266	1067	951	876	802	729
21	1327	1119	998	918	841	765
22	1389	1171	1044	961	880	800
23	1451	1223	1090	1004	919	836
24	1513	1275	1137	1047	958	871
25	1574	1327	1183	1089	997	907
26	1636	1379	1229	1132	1036	943
27	1698	1431	1276	1175	1075	978
28	1759	1483	1322	1217	1114	1014
29	1821	1535	1369	1260	1154	1049
30	1883	1587	1415	1303	1193	1085

Table 12: Thermal power of heating bodies Kalor 900/160 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 90\text{ }^{\circ}\text{C}$

$t_{w2} = 70\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	579	526	494	473	453	432
3	810	735	691	662	633	604
4	1040	944	887	850	813	777
5	1271	1153	1084	1038	993	949
6	1501	1362	1280	1227	1173	1121
7	1732	1571	1477	1415	1354	1293
8	1962	1781	1674	1603	1534	1465
9	2193	1990	1870	1792	1714	1637
10	2423	2199	2067	1980	1894	1809
11	2654	2408	2264	2168	2074	1981
12	2884	2617	2460	2357	2254	2153
13	3115	2826	2657	2545	2435	2325
14	3345	3036	2853	2733	2615	2497
15	3576	3245	3050	2922	2795	2669
16	3806	3454	3247	3110	2975	2841
17	4037	3663	3443	3298	3155	3013
18	4267	3872	3640	3487	3335	3185
19	4497	4081	3836	3675	3515	3358
20	4728	4291	4033	3863	3696	3530
21	4958	4500	4230	4052	3876	3702
22	5189	4709	4426	4240	4056	3874
23	5419	4918	4623	4428	4236	4046
24	5650	5127	4819	4617	4416	4218
25	5880	5336	5016	4805	4596	4390
26	6111	5546	5213	4994	4777	4562
27	6341	5755	5409	5182	4957	4734
28	6572	5964	5606	5370	5137	4906
29	6802	6173	5802	5559	5317	5078
30	7033	6382	5999	5747	5497	5250

Table 13: Thermal power of heating bodies Kalor 900/160 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 55\text{ }^{\circ}\text{C}$

$t_{w2} = 45\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	278	234	208	191	174	158
3	389	327	290	267	244	221
4	500	420	373	343	313	284
5	610	512	456	419	383	347
6	721	605	538	495	452	410
7	832	698	621	571	521	473
8	943	727	704	647	591	536
9	1053	884	786	723	660	599
10	1164	977	869	799	730	662
11	1275	1070	952	875	799	725
12	1386	1163	1034	951	868	788
13	1496	1256	1117	1026	938	851
14	1607	1349	1200	1102	1007	914
15	1718	1442	1282	1178	1077	977
16	1828	1535	1365	1254	1146	1040
17	1936	1628	1448	1330	1215	1103
18	2050	1721	1530	1406	1285	1166
19	2161	1814	1613	1482	1354	1229
20	2271	1907	1696	1558	1424	1292
21	2382	2000	1778	1634	1493	1255
22	2493	2093	1861	1710	1562	1418
23	2604	2186	1944	1786	1632	1481
24	2714	2279	2026	1862	1701	1544
25	2825	2372	2109	1938	1771	1607
26	2936	2465	2192	2014	1840	1670
27	3047	2558	2274	2090	1909	1733
28	3157	2651	2357	2166	1979	1796
29	3268	2744	2440	2242	2048	1859
30	3379	2836	2522	2318	2118	1922

STEAM HEATING

Steam condensation temperature

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Table 14: Thermal power for all models of Kalor heating bodies depending on the number of sections

Steam heating

$$t_{pk} = 101.5\text{ }^{\circ}\text{C}$$

$$t_i = 20\text{ }^{\circ}\text{C}$$

Thermal power Q_N (W)

No. of sections (n)	350/160	500/110	500/160	900/70	900/160
2	328	335	426	454	737
3	478	488	620	634	1030
4	627	640	814	815	1323
5	776	793	1008	995	1616
6	925	945	1202	1175	1909
7	1075	1098	1396	1356	2202
8	1224	1250	1590	1536	2495
9	1373	1403	1783	1717	2788
10	1522	1555	1977	1897	3081
11	1672	1707	2171	2078	3374
12	1821	1860	2365	2258	3667
13	1970	2012	2559	2439	3960
14	2119	2165	2753	2619	4253
15	2269	2317	2946	2799	4546
16	2418	2470	3140	2980	4839
17	2567	2622	3334	3160	5132
18	2716	2775	3528	3341	5425
19	2866	2927	3722	3521	5718
20	3015	3080	3916	3702	6011
21	3164	3232	4110	3882	6304
22	3313	3385	4303	4063	6597
23	3463	3537	4497	4243	6890
24	3612	3689	4691	4423	7183
25	3761	3842	4885	4604	7476
26	3910	3994	5079	4784	7769
27	4060	4147	5273	4965	8062
28	4209	4299	5466	5145	8355
29	4358	4452	5660	5326	8648
30	4507	4604	5854	5506	8941

Table 15: Thermal power of heating bodies Kalor 350/160 depending on required air temperature and number of sections

Steam heating

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	382	355	339	328	318	307
3	556	517	493	478	462	447
4	730	678	647	627	607	587
5	904	839	801	776	751	726
6	1078	1001	955	925	895	866
7	1252	1162	1109	1075	1040	1005
8	1426	1324	1263	1224	1184	1145
9	1600	1485	1418	1373	1329	1285
10	1774	1647	1572	1522	1473	1424
11	1947	1808	1726	1672	1618	1564
12	2121	1969	1880	1821	1726	1704
13	2295	2131	2034	1970	1907	1843
14	2469	2292	2188	2119	2051	1983
15	2643	2454	2342	2269	2195	2123
16	2817	2615	2496	2418	2340	2262
17	2991	2777	2650	2567	2484	2402
18	3165	2938	2804	2716	2629	2542
19	3338	3100	2958	2766	2773	2681
20	3512	3261	3112	3015	2918	2821
21	3686	3422	3266	3164	3062	2961
22	3860	3584	3421	3313	3206	3100
23	4034	3745	3575	3463	3351	3240
24	4208	3907	3729	3612	3495	3380
25	4382	4068	3883	3761	3640	3519
26	4556	4230	4037	3910	3784	3659
27	4729	4391	4191	4060	3929	3799
28	4903	4552	4345	4209	4073	3938
29	5077	4717	4499	4358	4217	4078
30	5251	4875	4653	4507	4362	4218

Table 16: Thermal power of heating bodies Kalor 500/110 depending on required air temperature and number of sections

Steam heating

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	392	363	347	335	324	313
3	570	529	504	488	472	456
4	749	649	662	640	619	598
5	927	859	819	793	767	741
6	1105	1024	977	945	914	883
7	1283	1190	1134	1098	1061	1026
8	1462	1355	1292	1250	1209	1168
9	1640	1520	1449	1403	1356	1310
10	1818	1685	1607	1555	1504	1453
11	1996	1851	1764	1707	1651	1595
12	2175	2016	1922	1860	1799	1738
13	2353	2181	2079	2012	1946	1880
14	2531	2346	2237	2165	2093	2023
15	2710	2511	2394	2317	2241	2165
16	2888	2677	2552	2470	2388	2307
17	3066	2842	2710	2622	2536	2450
18	3244	3007	2867	2775	2683	2592
19	3423	3172	3025	2927	2831	2735
20	3601	3338	3182	3080	2978	2877
21	3779	3503	3340	3232	3125	3020
22	3957	3668	3497	3385	3273	3162
23	4136	3833	3655	3537	3420	3304
24	4314	3998	3812	3689	3568	3447
25	4492	4164	3970	3842	3715	3589
26	4670	4329	4127	3994	3862	3732
27	4849	4494	4285	4147	4010	3874
28	5027	4659	4442	4299	4157	4017
29	5205	4825	4600	4452	4305	4159
30	5383	4990	4757	4604	4452	4302

Table 17: Thermal power of heating bodies Kalor 500/160 depending on required air temperature and number of sections

Steam heating

$$t_{PK} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	497	461	440	426	413	399
3	723	671	640	620	600	580
4	949	881	841	814	788	762
5	1175	1091	1041	1008	975	943
6	1401	1300	1241	1202	1163	1124
7	1627	1510	1441	1396	1351	1306
8	1853	1720	1641	1590	1538	1487
9	2078	1930	1841	1783	1726	1668
10	2304	2139	2042	1977	1913	1850
11	2530	2349	2242	2171	2101	2031
12	2756	2559	2442	2365	2288	2213
13	2982	2768	2642	2559	2476	2394
14	3208	2978	2842	2753	2664	2575
15	3434	3188	3042	2946	2851	2757
16	3660	3398	3243	3140	3039	2938
17	3886	3607	3443	3334	3226	3119
18	4112	3817	3643	3528	3414	3301
19	4338	4027	3843	3722	3601	3482
20	4564	4237	4043	3916	3789	3663
21	4789	4446	4243	4110	3977	3845
22	5015	4656	4444	4303	4164	4026
23	5241	4866	4644	4497	4352	4208
24	5467	5076	4844	4691	4539	4389
25	5693	5285	5044	4885	4727	4570
26	5919	5495	5244	5079	4915	4752
27	6145	5705	5444	5273	5102	4933
28	6371	5914	5645	5466	5290	5114
29	6597	6124	5845	5660	5477	5296
30	6823	6334	6045	5854	5665	5477

Table 18: Thermal power of heating bodies Kalor 900/70 depending on required air temperature and number of sections

Steam heating

$$t_{PK} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	529	490	468	454	439	425
3	736	685	654	634	614	594
4	946	880	840	815	789	763
5	1155	1074	1026	995	963	932
6	1365	1269	1213	1175	1138	1101
7	1575	1464	1399	1356	1313	1270
8	1784	1659	1585	1536	1488	1439
9	1994	1854	1771	1717	1662	1608
10	2203	2049	1957	1897	1837	1778
11	2413	2240	2144	2078	2012	1947
12	2622	2439	2330	2258	2187	2116
13	2832	2633	2516	2436	2361	2116
14	3042	2828	2702	2619	2536	2454
15	3251	3023	2888	2799	2711	2623
16	3461	3218	3075	2980	2885	2792
17	3670	3413	3261	3160	3060	2961
18	3880	3608	3447	3341	3235	3130
19	4089	3803	3633	3521	3410	3299
20	4299	3998	3819	3702	3584	3468
21	4509	4193	4006	3882	3759	3637
22	4718	4387	4192	4063	3937	3806
23	4928	4582	4378	4243	4109	3976
24	5137	4777	4564	4423	4283	4145
25	5347	4972	4750	4604	4458	4314
26	5556	5167	4936	4784	4633	4483
27	5766	5362	5123	4965	4808	4652
28	5976	5557	5309	5145	4982	4821
29	6185	5752	5495	5326	5157	4990
30	6395	5947	5681	5506	5332	5159

Table 19: Thermal power of heating bodies Kalor 900/160 depending on required air temperature and number of sections

Steam heating

$$t_{PK} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	858	797	760	737	713	689
3	1200	1114	1063	1030	996	963
4	1542	1431	1366	1323	1280	1237
5	1883	1748	1668	1616	1563	1511
6	2225	2065	1971	1909	1847	1785
7	2566	2382	2273	2202	2130	2060
8	2908	2699	2576	2495	2414	2334
9	3249	3016	2878	2788	2697	2608
10	3591	3333	3181	3081	2981	2882
11	3933	3650	3484	3374	3264	3156
12	4274	3968	3786	3667	3548	3530
13	4616	4285	4089	3960	3831	3704
14	4957	4602	4391	4253	4114	3978
15	5299	4919	4694	4546	4399	4253
16	5641	5236	4997	4839	4682	4527
17	5982	5553	5299	5132	4966	4801
18	6324	5870	5602	5425	5249	5075
19	6665	6187	5904	5718	5533	5349
20	7007	6504	6207	6011	5816	5623
21	7348	6821	6510	6304	6100	5897
22	7690	7138	6812	6597	6383	6171
23	8032	7455	7115	6890	6667	6446
24	8373	7772	7417	7183	6950	6720
25	8715	8089	7720	7476	7234	6994
26	9056	8407	8022	7769	7518	7268
27	9398	8724	8325	8062	7801	7542
28	9740	9041	8628	8355	8085	7816
29	10081	9358	8930	8648	8368	8090
30	10423	9675	9233	8941	8652	8365

CAST-IRON HEATING BODIES

KALOR 3

KALOR 3

DESCRIPTION

Cast-iron heating body consisting of sections with extended transfer surface forming the front panel area of the heating body connected into heating systems using steel nipples with external right-hand or left-hand thread G 5/4" is manufactured in five sizes:

350/160 mm, 500/70 mm, 500/110 mm, 500/160 mm and 900/70 mm.

Heating bodies comply with CSN EN 442 – 1:1995 and CSN EN 442 – 2:1997. The material used is a grey cast-iron corresponding to CSN EN 1561. The design of castings ensures a long life cycle of products.

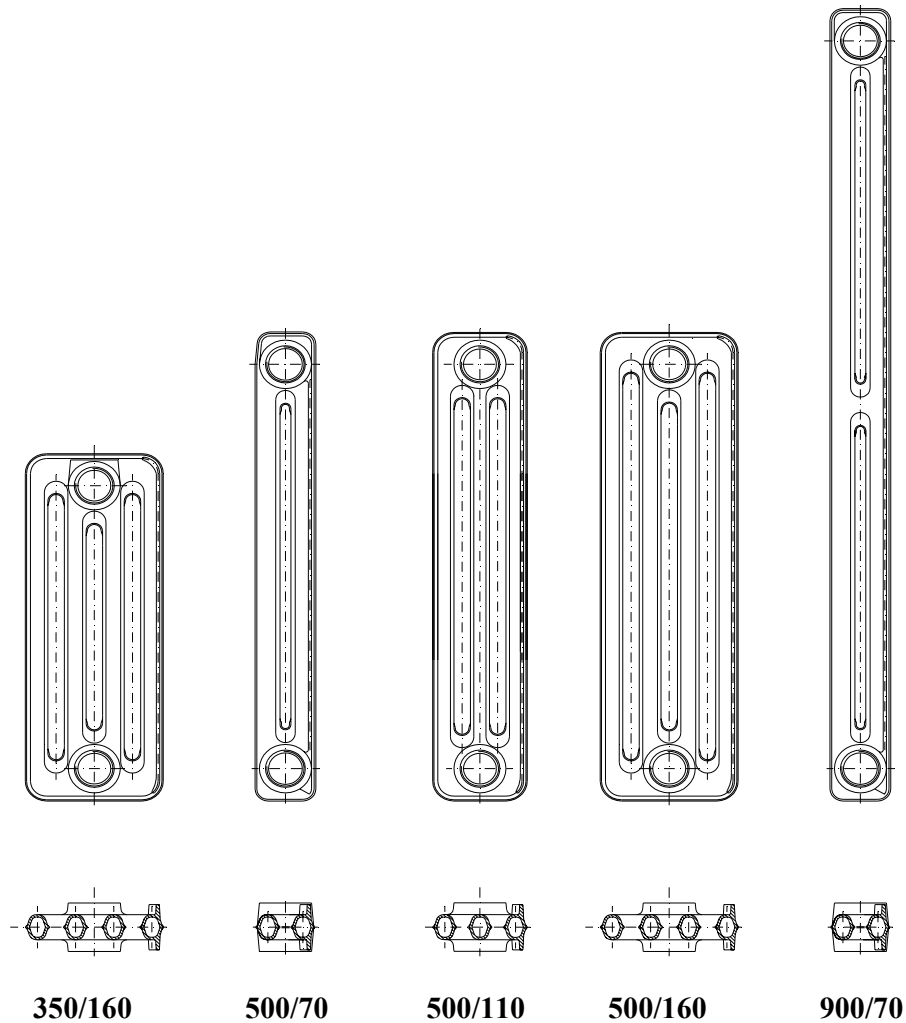


Fig. 1: Heating sections of Kalor 3 type

USAGE

All heating bodies of Kalor 3 line are designed for warm-water central heating systems with gravity and forced circulation of heating water with the highest operating temperature not exceeding 115 °C and highest operating

overpressure of up to 0.6 MPa. In addition to this all sizes except 500/70 mm are also designed for steam central heating systems with the maximum operating overpressure of up to 0.07 MPa.

THERMAL AND TECHNICAL PARAMETERS

Both types of Kalor 3 are certified by SZÚ Brno (certificate No. 0-70-1265-006/40 and 0-95-0107/40). Thermal and technical parameters of the heat-transfer fluid (water) have been verified experimentally in compliance with CSN EN 442-1:1995 and CSN EN 442-2:1997 by the Structural Engineering Research Institute in Prague and for the low-pressure steam by the State Research Institute of Machinery Design in Prague.

The basic technical properties are provided in Table 29. Indicated thermal power applies to the heat-transfer fluid (water) with the temperature gradient of 90/70°C. Connection of bodies is one-sided and the heat-transfer fluid is supplied at the top. The body is measured without covers.

Tables 1 through 18 provide thermal power values for various numbers of sections (2 – 30), various room temperatures, water temperature gradient of 55/45 °C and steam heating.

Table 1: Significant thermal and technical parameters of Kalor 3 heating sections

Property	Symbol	350/160	500/70	500/110	500/160	900/70
total height	H (mm)	430	580	580	580	980
spacing	h (mm)	350	500	500	500	900
depth	B (mm)	160	70	110	160	70
width	L (mm)	60	60	60	60	60
connection thread	G	5/4	5/4	5/4	5/4	5/4
weight	M (kg/pc.)	4.90	3.70	4.70	6.20	6.10
equivalent heating area	S_L (m ² /pc.)	0.208	0.163	0.215	0.290	0.240
water volume	V (dm ³ /pc.)	0.8	0.5	0.8	1.1	0.8
thermal power	Q_{NI} (W/section)	103.8	78	102.6	134.7	126.7
thermal module	Q_M (W/m)	1782	1305	1688	2216	2084
temperature exponent	m (-)	1.251	1.26	1.255	1.294	1.306

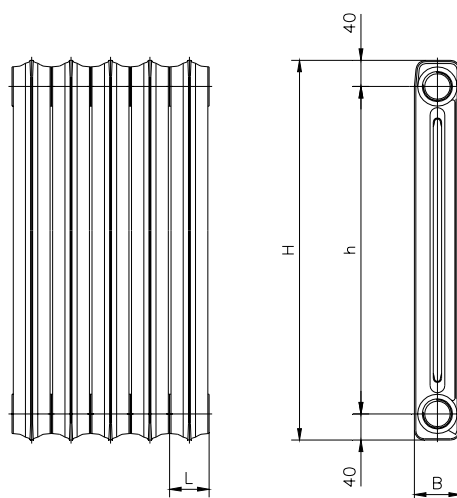


Fig. 2: Standard dimensions of Kalor 3 sections

TESTING OVERPRESSURE

Units manufactured are subject to the pressure test performed in manufacturer's facility using overpressure of cold water equal to 1 MPa.

ASSEMBLY

In order to achieve required thermal power it is necessary to maintain the installation position indicated on Fig. 9. In addition to this it is most beneficial to secure a minimum overlap of window sill from the viewpoint of thermal power.

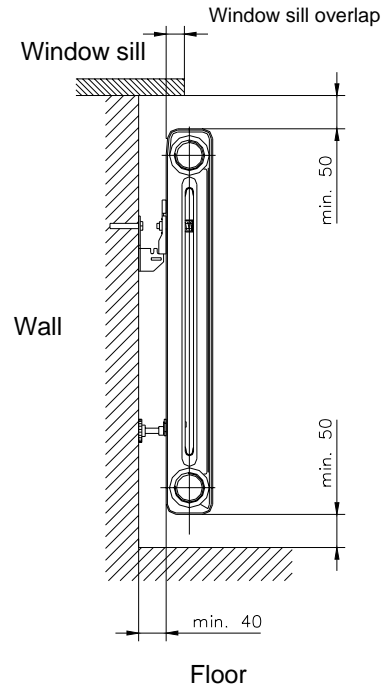


Fig. 3: Installation of Kalor 3 heating bodies

Kalor 3 line heating bodies are connected to the distribution piping using roses provided with external thread G 5/4" with G 3/8", G 1/2", G 3/4" and G 1" bores. When facing the front panel surface, the bodies are provided on the left side with rose with right-hand thread and on the right side with rose with left-hand thread G 5/4". Openings of the heating body on the opposite side to the connection are usually terminated by solid plugs provided with external left-hand thread G 5/4". The upper plug can be provided with a bore with eccentrically positioned thread G 1/4" for the air relief valve. Automatic air relief valves are suitable for this purpose. Prior to combining the individual units supplied it is necessary to perform a thorough cleaning of contact surfaces of sections. We recommend to seal joints by Clingerite, which is normally used during production and it is suitable both for warm-water and steam systems. The sections shall be coupled with the torque of min. 180 Nm and max. 250 Nm.

Other installation data are provided in the section of instruction manual common for all models of heating bodies manufactured.

THERMAL POWER TABLES
FOR INDIVIDUAL MODELS OF HEATING BODIES

WARM-WATER HEATING

Temperature gradient to CSN EN 442 – 2:1997

Temperature gradients 75/65 °C
 90/70 °C
 55/45 °C

Table 2: Thermal power for all models of Kalor 3 heating bodies depending on the number of sections

Warm-water heating

$t_{w1} = 90\text{ °C}$

$t_{w2} = 70\text{ °C}$

$t_i = 20\text{ °C}$

Thermal power Q_N (W)

No. of sections (n)	350/160	500/70	500/110	500/160	900/70
2	252	188	241	318	297
3	356	264	339	445	418
4	460	340	437	572	539
5	564	417	535	699	660
6	668	493	633	826	781
7	772	569	731	935	902
8	876	645	829	1080	1023
9	980	721	927	1207	1144
10	1084	797	1026	1347	1267
11	1188	873	1123	1474	1388
12	1292	949	1221	1601	1509
13	1396	1026	1319	1728	1630
14	1500	1102	1417	1855	1751
15	1604	1178	1515	1982	1872
16	1708	1254	1613	2109	1993
17	1812	1330	1711	2236	2114
18	1916	1406	1809	2363	2235
19	2020	1482	1907	2490	2356
20	2124	1559	2005	2617	2477
21	2228	1635	2103	2744	2598
22	2332	1711	2201	2871	2719
23	2436	1787	2299	2998	2840
24	2540	1863	2397	3125	2961
25	2644	1939	2495	3252	3082
26	2748	2015	2593	3379	3203
27	2852	2091	2691	3506	3324
28	2956	2168	2789	3633	3445
29	3060	2244	2887	3760	3566
30	3164	2320	2985	3887	3687

Table 3: Thermal power for all models of Kalor 3 heating bodies depending on the number of sections

Warm-water heating

$t_{w1} = 55\text{ }^{\circ}\text{C}$

$t_{w2} = 45\text{ }^{\circ}\text{C}$

$t_i = 20\text{ }^{\circ}\text{C}$

Thermal power Q_N (W)

No. of sections (n)	350/160	500/70	500/110	500/160	900/70
2	107	79	101	128	120
3	150	110	142	181	169
4	193	142	183	234	218
5	236	174	224	287	267
6	279	206	265	340	316
7	322	237	306	393	365
8	365	269	347	446	414
9	408	301	388	499	463
10	455	333	430	549	513
11	498	365	471	602	562
12	541	396	512	655	611
13	584	428	553	708	660
14	627	460	594	761	709
15	670	492	635	814	758
16	713	524	676	867	807
17	756	555	717	920	856
18	799	587	758	973	905
19	842	619	799	1026	954
20	885	651	840	1079	1003
21	928	683	881	1132	1052
22	971	714	922	1185	1101
23	1014	746	963	1238	1150
24	1057	778	1004	1291	1199
25	1100	810	1045	1344	1248
26	1143	841	1086	1397	1297
27	1186	873	1127	1450	1346
28	1229	905	1168	1503	1395
29	1272	937	1209	1556	1444
30	1315	969	1250	1609	1494

Table 4: Thermal power of heating bodies Kalor 3 350/160 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 90\text{ }^{\circ}\text{C}$

$t_{w2} = 70\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	306	279	262	252	242	231
3	431	394	371	356	341	327
4	558	509	479	460	441	422
5	684	623	587	564	541	518
6	810	738	696	668	640	613
7	936	853	804	772	740	708
8	1062	968	912	876	839	804
9	1188	1083	1021	980	939	899
10	1314	1198	1129	1084	1039	995
11	1440	1313	1238	1188	1139	1089
12	1566	1428	1346	1292	1238	1185
13	1692	1543	1454	1396	1338	1281
14	1818	1658	1562	1500	1438	1376
15	1944	1773	1671	1604	1538	1471
16	2070	1888	1779	1708	1637	1566
17	2196	2003	1888	1812	1737	1662
18	2322	2118	1996	1916	1837	1758
19	2450	2233	2105	2020	1936	1853
20	2575	2348	2213	2124	2036	1948
21	2702	2463	2321	2228	2135	2044
22	2828	2578	2429	2332	2235	2139
23	2954	2692	2538	2436	2335	2235
24	3080	2808	2646	2540	2435	2330
25	3206	2823	2754	2644	2534	2425
26	3332	3037	2851	2748	2635	2520
27	3458	3152	2971	2852	2734	2616
28	3585	3267	3080	2956	2733	2712
29	3711	3385	3188	3060	2933	2791
30	3837	3497	3297	3164	3033	2782

Table 5: Thermal power of heating bodies Kalor 3 350/160 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 55\text{ }^{\circ}\text{C}$

$t_{w2} = 45\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	153	130	116	107	98	89
3	215	182	163	150	138	126
4	277	234	209	193	177	161
5	238	286	256	236	217	197
6	400	338	303	279	256	233
7	462	390	349	322	295	269
8	523	443	396	365	335	305
9	585	495	442	408	374	341
10	652	552	493	455	417	381
11	714	604	540	498	457	416
12	775	656	587	541	496	452
13	837	708	633	584	536	488
14	899	760	679	627	575	524
15	960	813	723	670	615	560
16	1022	864	773	713	654	596
17	1084	916	820	756	694	632
18	1145	969	866	799	733	668
19	1207	1021	913	842	772	704
20	1268	1073	954	885	812	740
21	1330	1125	1006	928	851	776
22	1392	1178	1053	971	891	812
23	1453	1230	1009	1014	930	848
24	1515	1282	1146	1057	970	884
25	1577	1334	1193	1100	1009	920
26	1638	1386	1293	1143	1049	956
27	1699	1438	1286	1186	1088	992
28	1618	1469	1224	1129	1036	944
29	1823	1543	1379	1272	1167	1064
30	1885	1594	1426	1315	1206	1100

Table 6: Thermal power of heating bodies Kalor 3 500/70 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 90\text{ }^{\circ}\text{C}$
 $t_{w2} = 70\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	15	18	20	22	24
2	208	196	188	180	172
3	292	275	264	253	242
4	377	355	340	326	312
5	461	434	417	399	382
6	545	513	493	472	452
7	629	593	569	545	521
8	713	672	645	618	591
9	798	751	721	691	661
10	882	831	797	764	731
11	966	910	873	837	801
12	1050	990	949	910	870
13	1134	1069	1026	983	940
14	1219	1148	1102	1056	1010
15	1303	1228	1178	1129	1080
16	1387	1307	1254	1202	1150
17	1471	1386	1330	1275	1219
18	1555	1466	1406	1347	1289
19	1640	1545	1482	1420	1359
20	1724	1624	1559	1493	1429
21	1808	1704	1635	1566	1499
22	1892	1783	1711	1639	1568
23	1977	1862	1787	1712	1638
24	2061	1942	1863	1785	1708
25	2145	2021	1939	1858	1778
26	2229	2100	2015	1931	1848
27	2313	2180	2091	2004	1917
28	2398	2259	2168	2077	1987
29	2482	2338	2244	2150	2057
30	2566	2418	2320	2223	2127

Table 7: Thermal power of heating bodies Kalor 3 500/70 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 55\text{ }^{\circ}\text{C}$

$t_{w2} = 45\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	15	18	20	22	24
2	95	85	79	72	66
3	134	120	110	101	92
4	173	154	142	130	119
5	211	189	174	159	145
6	250	223	206	189	172
7	288	258	237	218	198
8	327	292	269	247	225
9	366	327	301	276	251
10	404	361	333	305	278
11	443	396	365	334	304
12	481	430	396	363	331
13	520	465	428	393	358
14	559	499	460	422	384
15	597	533	492	451	411
16	636	568	524	480	437
17	674	602	555	509	464
18	713	637	587	538	490
19	752	671	619	567	517
20	790	706	651	597	543
21	829	740	683	626	570
22	867	775	714	655	596
23	906	809	746	684	623
24	945	844	778	713	650
25	983	878	810	742	676
26	1022	913	841	771	703
27	1060	947	873	801	729
28	1099	982	905	830	756
29	1138	1016	937	859	782
30	1176	1051	969	888	809

Table 8: Thermal power of heating bodies Kalor 3 500/110 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 90\text{ }^{\circ}\text{C}$

$t_{w2} = 70\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	293	266	251	241	231	221
3	411	375	353	339	325	311
4	530	483	455	437	419	401
5	649	592	557	535	513	491
6	768	700	660	633	607	581
7	887	808	762	731	701	670
8	1005	916	864	829	795	760
9	1124	1024	966	927	888	850
10	1245	1134	1069	1026	983	941
11	1363	1241	1170	1123	1076	1029
12	1482	1350	1272	1221	1170	1119
13	1610	1458	1374	1319	1264	1210
14	1720	1566	1476	1417	1358	1300
15	1838	1675	1579	1515	1452	1389
16	1957	1783	1681	1613	1546	1479
17	2076	1892	1783	1711	1640	1569
18	2195	2000	1885	1809	1734	1659
19	2314	2109	1987	1907	1828	1749
20	2433	2217	2089	2005	1922	1839
21	2552	2325	2119	2103	2015	1929
22	2671	2434	2294	2201	2109	2019
23	2790	2542	2396	2299	2203	2108
24	2809	2650	2498	2397	2297	2198
25	3028	2758	2600	2495	2391	2288
26	3147	2867	2702	2593	2485	2378
27	3265	2975	2804	2691	2579	2468
28	3384	3084	2906	2789	2673	2558
29	3503	3192	3008	2887	2767	2648
30	3622	3300	3110	2985	2860	2737

Table 9: Thermal power of heating bodies Kalor 3 500/110 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 55\text{ }^{\circ}\text{C}$

$t_{w2} = 45\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	145	123	110	101	93	84
3	204	172	154	142	130	119
4	263	222	199	183	168	153
5	321	272	243	224	205	187
6	380	322	287	265	243	222
7	439	371	322	306	281	256
8	498	421	376	347	318	290
9	557	471	420	388	356	324
10	617	522	466	430	394	359
11	676	572	510	471	432	394
12	735	621	555	512	470	428
13	794	671	599	553	507	462
14	852	721	644	594	545	496
15	911	771	688	635	582	531
16	970	820	723	676	620	565
17	1029	870	778	717	658	599
18	1088	920	822	758	695	633
19	1147	970	867	799	733	668
20	1205	1019	912	840	770	702
21	1264	1069	955	881	808	736
22	1323	1119	1000	922	846	771
23	1382	1169	1044	963	883	805
24	1441	1218	1089	1004	921	839
25	1499	1268	1133	1045	958	873
26	1558	1318	1178	1086	996	908
27	1617	1368	1222	1127	1034	942
28	1676	1418	1276	1168	1071	976
29	1735	1467	1311	1209	1109	1010
30	1794	1517	1356	1250	1146	1045

Table 10: Thermal power of heating bodies Kalor 3 500/160 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 90\text{ }^{\circ}\text{C}$

$t_{w2} = 70\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	388	353	332	318	304	291
3	543	494	403	445	426	407
4	698	635	594	572	548	523
5	853	775	729	699	669	639
6	1008	916	862	826	791	755
7	1163	1057	944	953	912	872
8	1318	1198	1127	1080	1034	988
9	1474	1339	1259	1207	1155	1104
10	1644	1494	1405	1347	1289	1232
11	1799	1635	1538	1447	1411	1348
12	1954	1776	1670	1601	1532	1464
13	2109	1917	1803	1728	1654	1580
14	2265	2058	1935	1855	1753	1697
15	2420	2198	2068	1982	1897	1813
16	2575	2339	2200	2109	2019	1929
17	2730	2480	2333	2236	2140	2045
18	2885	2621	2466	2363	2262	2161
19	3040	2762	2598	2490	2383	2277
20	3195	2903	2730	2617	2505	2394
21	3350	3044	2863	2744	2626	2510
22	3505	3184	2996	2871	2748	2626
23	3660	3325	3128	2998	2869	2742
24	3815	3466	3260	3125	2991	2858
25	3970	3607	3393	3252	3113	2974
26	4125	3748	3525	3379	3234	3090
27	4208	3889	3658	3506	3356	3207
28	4450	4029	3791	3633	3447	3323
29	4590	4170	3923	3760	3599	3439
30	4745	4311	4056	3887	3720	3555

Table 11: Thermal power of heating bodies Kalor 3 500/160 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 55\text{ }^{\circ}\text{C}$

$t_{w2} = 45\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	186	156	139	128	117	106
3	263	221	197	181	166	150
4	340	286	254	234	214	195
5	417	350	312	287	263	239
6	493	415	370	340	311	283
7	570	480	427	393	359	327
8	647	545	485	446	408	371
9	724	609	543	499	456	415
10	797	670	597	549	502	456
11	874	735	655	602	551	500
12	950	800	712	655	599	544
13	1027	864	770	708	648	588
14	1104	929	827	761	696	632
15	1181	994	885	814	745	676
16	1258	1058	943	867	793	720
17	1335	1123	1000	920	842	765
18	1412	1188	1058	973	890	808
19	1489	1253	1115	1026	938	853
20	1566	1317	1173	1079	987	897
21	1643	1382	1231	1132	1035	941
22	1720	1447	1288	1185	1084	985
23	1796	1511	1346	1238	1132	1029
24	1873	1576	1404	1291	1181	1073
25	1950	1641	1461	1344	1229	1117
26	2027	1705	1519	1397	1278	1161
27	2104	1770	1576	1450	1326	1205
28	2181	1835	1634	1503	1375	1249
29	2258	1899	1692	1556	1423	1293
30	2335	1964	1749	1609	1472	1337

Table 12: Thermal power of heating bodies Kalor 3 900/70 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 90\text{ }^{\circ}\text{C}$

$t_{w2} = 70\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	363	329	310	297	284	271
3	511	464	436	418	400	382
4	659	598	563	539	516	493
5	807	733	689	660	632	603
6	955	867	815	781	747	714
7	1103	1001	942	902	863	824
8	1251	1136	1068	1023	979	935
9	1399	1270	1194	1144	1095	1046
10	1590	1340	1323	1667	1212	1158
11	1698	1541	1449	1388	1328	1268
12	1846	1675	1575	1509	1444	1379
13	1994	1810	1701	1630	1559	1490
14	2142	1944	1828	1751	1675	1600
15	2290	2078	1954	1872	1791	1711
16	2438	2213	2080	1993	1907	1821
17	2586	2347	2207	2114	2023	1932
18	2733	2481	2333	2235	2138	2042
19	2882	2616	2459	2356	2254	2153
20	3029	2750	2585	2477	2370	2264
21	3177	2884	2712	2598	2486	2374
22	3325	3019	2838	2719	2601	2485
23	3473	3153	2964	2840	2717	2595
24	3621	3287	3091	2961	2833	2706
25	3769	3421	3217	3082	2949	2817
26	3917	3556	3343	3203	3064	2744
27	4065	3690	3470	3324	3180	3038
28	4213	3825	3596	3445	3296	3148
29	4361	3959	3722	3566	3412	3259
30	4509	4093	3848	3687	3527	3369

Table 13: Thermal power of heating bodies Kalor 3 900/70 depending on required air temperature and number of sections

Warm-water heating

$t_{w1} = 55\text{ }^{\circ}\text{C}$

$t_{w2} = 45\text{ }^{\circ}\text{C}$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	175	147	131	120	110	100
3	246	207	184	169	154	140
4	317	267	237	218	199	181
5	389	327	291	267	244	222
6	460	387	344	316	289	262
7	532	446	397	365	334	303
8	603	506	450	414	378	344
9	674	566	504	463	423	384
10	747	627	558	513	469	426
11	818	687	612	562	514	466
12	890	747	665	611	558	507
13	961	807	724	660	603	548
14	1032	867	771	709	648	588
15	1104	927	825	758	693	629
16	1175	987	878	807	738	670
17	1246	1047	931	856	782	710
18	1318	1107	986	905	827	751
19	1389	1167	1038	954	872	791
20	1460	1227	1091	1003	917	832
21	1532	1287	1145	1052	961	873
22	1603	1347	1198	1101	1006	913
23	1675	1407	1251	1150	1051	954
24	1746	1466	1305	1199	1096	995
25	1817	1526	1358	1248	1141	1035
26	1889	1586	1411	1297	1185	1074
27	1960	1648	1464	1346	1230	1117
28	2031	1706	1518	1395	1275	1157
29	2103	1766	1571	1444	1320	1095
30	2174	1826	1624	1493	1364	1132

STEAM HEATING

Steam condensation temperature

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Table 14: Thermal power for all models of Kalor 3 heating bodies depending on the number of sections

Steam heating

$$t_{pk} = 101.5\text{ }^{\circ}\text{C}$$

$$t_i = 20\text{ }^{\circ}\text{C}$$

Thermal power Q_N (W)

No. of sections (n)	350/160	500/110	500/160	900/70
2	398	385	486	463
3	561	543	685	653
4	724	701	884	843
5	886	858	1083	1033
6	1049	1016	1281	1222
7	1212	1173	1480	1412
8	1375	1331	1679	1602
9	1537	1489	1877	1791
10	1700	1646	2076	1981
11	1863	1804	2275	2171
12	2026	1961	2474	2361
13	2188	2119	2672	2550
14	2351	2276	2871	2740
15	2514	2434	3070	2930
16	2676	2592	3268	3119
17	2839	2749	3467	3309
18	3002	2907	3666	3499
19	3165	3064	3865	3688
20	3327	3222	4063	3878
21	3490	3379	4262	4068
22	3653	3537	4461	4258
23	3815	3694	4659	4447
24	3978	3852	4858	4637
25	4141	4010	5057	4827
26	4303	4167	5255	5017
27	4466	4325	5454	5206
28	4629	4482	5653	5396
29	4792	4640	5852	5586
30	4954	4798	6050	5775

Table 15: Thermal power of heating bodies Kalor 3 350/160 depending on required air temperature and number of sections

Steam heating

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	472	434	412	398	384	370
3	665	612	581	561	541	521
4	858	790	750	724	698	673
5	1050	967	918	886	854	823
6	1243	1144	1087	1049	1012	974
7	1436	1322	1256	1212	1169	1126
8	1629	1500	1425	1375	1326	1277
9	1821	1677	1592	1537	1482	1427
10	2014	1855	1761	1700	1639	1579
11	2207	2033	1930	1863	1796	1731
12	2490	2210	2099	2026	1954	1882
13	2592	2387	2267	2188	2110	2032
14	2786	2656	2436	2351	2267	2184
15	2979	2743	2605	2514	2424	2335
16	3171	2919	2772	2676	2580	2486
17	3364	3097	2941	2839	2738	2637
18	3557	3275	3110	3002	2895	2789
19	3750	3453	3279	3165	3052	2940
20	3942	3630	3447	3327	3208	3090
21	4135	3808	3616	3490	3365	3241
22	4328	3985	3785	3653	3524	3393
23	4520	4162	3952	3815	3679	3544
24	4713	4340	4121	3978	3836	3695
25	4906	4518	4290	4141	3993	3847
26	5098	4694	4458	4303	4149	3997
27	5291	4872	4626	4466	4307	4149
28	5484	5050	4796	4629	4464	4300
29	5678	5228	4965	4792	4621	4451
30	5870	5405	5132	4954	4777	4602

Table 16: Thermal power of heating bodies Kalor 3 500/110 depending on required air temperature and number of sections

Steam heating

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	452	418	398	385	372	360
3	638	590	564	543	525	506
4	823	762	725	701	677	654
5	1006	932	887	858	829	800
6	1194	1104	1051	1016	982	947
7	1378	1274	1213	1173	1133	1094
8	1564	1446	1377	1331	1286	1241
9	1750	1617	1540	1489	1438	1388
10	1934	1788	1702	1646	1590	1535
11	2120	1960	1866	1804	1743	1682
12	2304	2130	2028	1961	1894	1828
13	2490	2302	2192	2119	2047	1976
14	2674	2472	2354	2276	2199	2122
15	2858	2644	2518	2434	2351	2269
16	3046	2816	2681	2592	2504	2417
17	3230	2986	2843	2749	2656	2563
18	3416	3158	3007	2907	2808	2710
19	3600	3328	3169	3064	2950	2857
20	3786	3500	3333	3222	3113	3004
21	3970	3671	3494	3378	3264	3150
22	4156	3842	3658	3537	3417	3298
23	4340	4013	3821	3694	3569	3444
24	4526	4184	3984	3852	3721	3591
25	4712	4356	4147	4010	3873	3739
26	4896	4527	4310	4167	4025	3885
27	5082	4698	4473	4325	4178	4032
28	5266	4869	4636	4482	4320	4179
29	5452	5040	4799	4640	4482	4326
30	5638	5212	4963	4798	4635	4473

Table 17: Thermal power of heating bodies Kalor 3 500/160 depending on required air temperature and number of sections

Steam heating

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	570	527	502	486	470	454
3	803	743	708	685	662	639
4	1036	959	914	884	854	825
5	1270	1175	1120	1083	1047	1011
6	1502	1390	1324	1281	1238	1196
7	1735	1606	1530	1480	1430	1381
8	1968	1822	1736	1679	1623	1567
9	2200	2037	1940	1877	1814	1752
10	2434	2253	2146	2076	2006	1937
11	2667	2769	2352	2275	2199	2123
12	2900	2685	2558	2474	2391	2309
13	3132	2899	2762	2672	2582	2494
14	3365	3115	2968	2871	2775	2679
15	3599	3331	3174	3070	2967	2865
16	3830	3546	3379	3268	3159	3050
17	4064	3762	3584	3467	3351	3235
18	4297	3978	3790	3666	3543	3421
19	4531	4194	3996	3865	3736	3607
20	4763	4409	4200	4063	3927	3792
21	4996	4625	4406	4262	4129	3977
22	5229	4841	4612	4461	4312	4163
23	5461	5055	4817	4659	4503	4348
24	5695	5272	5022	4858	4695	4534
25	5928	5487	5228	5057	4888	4719
26	6160	5702	5433	5255	5079	4904
27	6393	5918	5638	5454	5271	5090
28	6626	6134	5844	5653	5464	5275
29	6859	6350	6050	5852	5656	5461
30	7092	6564	6255	6050	5847	5646

Table 18: Thermal power of heating bodies Kalor 3 900/70 depending on required air temperature and number of sections

Steam heating

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (n)	10	15	18	20	22	24
2	548	505	470	463	447	430
3	772	712	676	653	630	607
4	997	919	873	843	813	784
5	1222	1126	1070	1033	997	960
6	1445	1332	1266	1222	1179	1136
7	1670	1539	1462	1412	1362	1313
8	1895	1746	1659	1602	1545	1489
9	2118	1952	1855	1791	1728	1665
10	2343	2159	2052	1981	1911	1841
11	2568	2366	2249	2171	2094	2018
12	2792	2574	2445	2361	2278	2195
13	3016	2782	2641	2550	2460	2370
14	3240	2987	2838	2740	2643	2547
15	3465	3194	3035	2930	2827	2724
16	3689	3399	3230	3119	3009	2899
17	3914	3607	3427	3309	3192	3076
18	4138	3814	3624	3409	3289	3253
19	4362	4020	3820	3688	3558	3428
20	4587	4227	4016	3878	3741	3605
21	4811	4434	4213	4068	3924	3782
22	5036	4641	4410	4258	4108	3958
23	5250	4847	4606	4447	4290	4134
24	5484	5054	4837	4637	4473	4311
25	5709	5261	4999	4827	4657	4487
26	5934	5469	5196	5017	4840	4664
27	6157	5675	5392	5206	5022	4840
28	6382	5882	5589	5396	5206	5016
29	6607	6089	5785	5586	5389	5193
30	6828	6293	5981	5775	5571	5367

CAST-IRON HEATING BODIES

TERMO

TERMO

DESCRIPTION

Cast-iron heating sections with reduced water volume and extended face transfer surface forming the front panel area connected into heating bodies using steel nipples with external right-hand or left-hand thread G 1" are manufactured in six models :

500/95 mm, 500/130 mm, 623/95 mm, 623/130 mm, 813/95 mm and 813/130 mm.

Heating bodies comply with CSN EN 442 – 1:1995 and CSN EN 442 – 2:1997. The material used is a grey cast-iron corresponding to CSN EN 1561. The design of castings ensures a long life cycle of products.

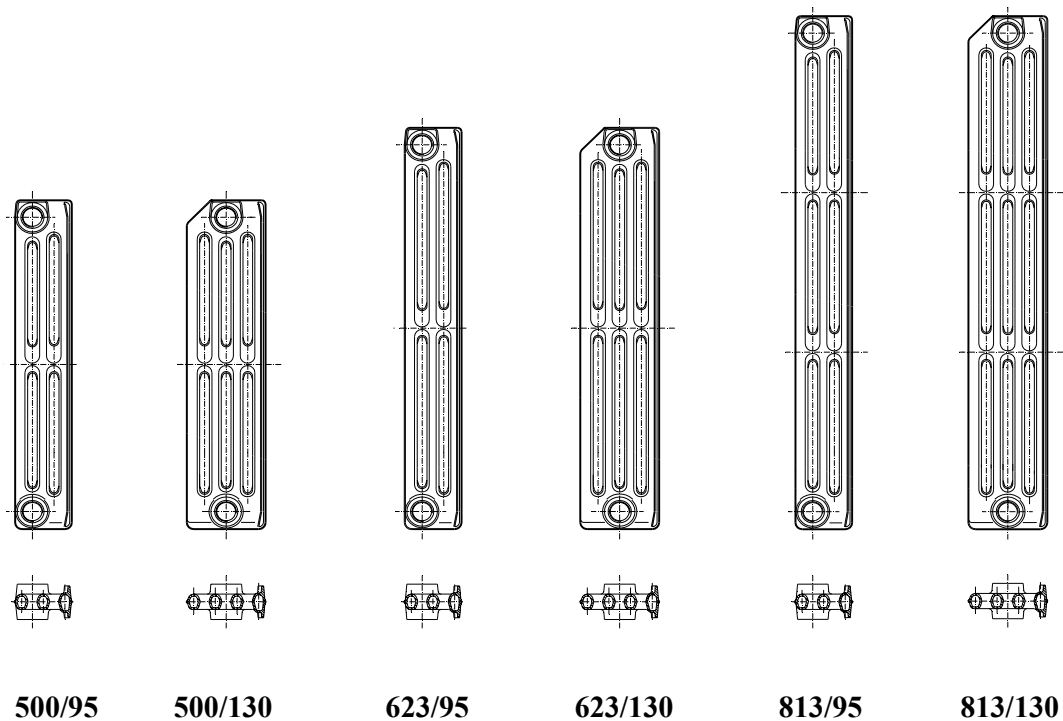


Fig. 10: Heating sections of Termo type

USAGE

All heating bodies of Termo line are designed for warm-water central heating systems with gravity and forced circulation of heating water with the highest operating temperature not exceeding 120 °C and **highest operating overpressure of up to 0.6 MPa. On request** we are able to supply heating bodies with higher operating overpressure **up to 0.8 MPa**. All models manufactured are approved for steam central heating systems with the highest operating overpressure o up to 0.07 MPa.

THERMAL AND TECHNICAL PARAMETERS

Table 1: Significant thermal and technical parameters of Termo heating sections

Property	Symbol	Unit	500/95	500/130	623/95	623/130	813/95	813/130
total height	H	(mm)	560	560	683	683	873	873
spacing	h	(mm)	500	500	623	623	813	813
depth	B	(mm)	95	130	95	130	95	130
width	L	(mm)	60	60	60	60	60	60
connection thread	G	"	1	1	1	1	1	1
weight	M	(kg/section)	4.35	5.36	5.08	6.46	6.70	8.80
equivalent heating area	S _L	(m ² / section)	0.192	0.254	0.230	0.303	0.310	0.380
water volume	V	(dm ³ /)	0.6	0.8	0.8	1.0	1.0	1.3
thermal power	Φ _s	(W/ section)	73.4	91	88.7	108.8	109.3	136.1
thermal module	Φ _L	(W/m)	1213	1504	1466	1499	1807	2250
temperature exponent	m	(-)	1.288	1.296	1.316	1.300	1.340	1.316

All Termo models are certified by SZÚ Brno. Thermal and technical parameters are verified experimentally in compliance with CSN EN 442-2 : 1997.

Tables 2 through to 25 provide values of thermal power for individual models of cast-iron heating bodies for number of sections ranging from 2 up to 30, variable required air temperature and temperature gradient of the heat-transfer fluid (water) equal to 90/70°C, 75/65°C, 55/45°C and steam.

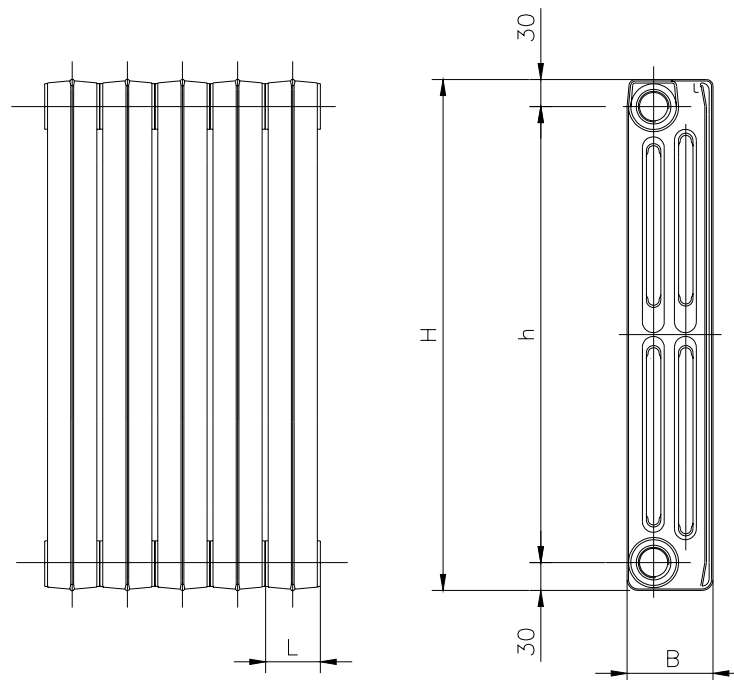


Fig. 11: Standard dimensions of Termo sections

Basic thermal and technical parameters for the heat-transfer fluid – **water** – with the **temperature gradient of 75/65 °C** and one-sided lateral connection (supply) of the heat-transfer fluid (water) at the top are provided in Table 8. Individual models of heating bodies are measured without cover.

TESTING OVERPRESSURE

Units manufactured are subject to the pressure test performed in manufacturer’s facility using overpressure of cold water equal to 1 MPa (1.3 MPa for maximum operating overpressure of 0.8 MPa).

ASSEMBLY

In order to achieve required thermal power of individual heating bodies it is necessary to maintain the installation position indicated on Fig. 12. In addition to this **a minimum overlap of window sill** shall be adhered to.

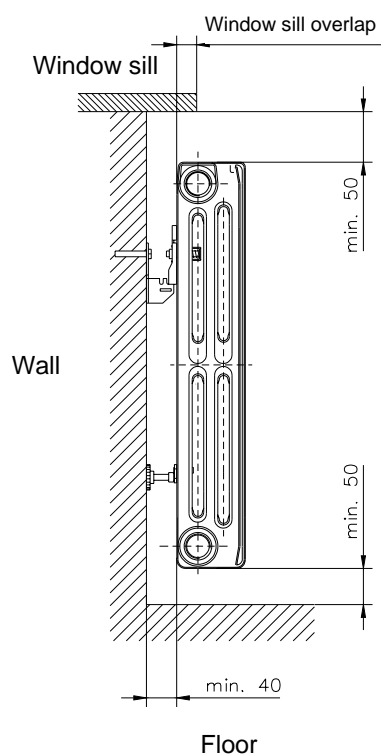


Fig. 12: Installation of Termo heating bodies

Termo heating bodies are connected to the distribution piping using roses provided with external thread G 1“ with G 1/8“, G 1/4“, G 3/8“, G 1/2“ and G 3/4“ bores. When facing the front panel surface the bodies are provided on the left side with rose with right-hand thread for connection of the heat-transfer fluid (water) and on the right side with rose with left-hand thread for outlet of the heat-transfer fluid (water) G 1“. The upper plug on the opposite side to the connection of the heat-transfer fluid (water) can be provided with bore with eccentrically positioned thread G 1/4“ or G 3/8“ for the air relief valve. Automatic air relief valves are suitable for this purpose. Prior to combining the individual units supplied into the heating body of required size it is necessary to perform a thorough cleaning of contact surfaces of sections and individual connections shall be sealed by Clingerite, which is normally used during production and it is suitable both for warm-water and steam systems. The sections shall be coupled with the torque of min. 180 Nm and max. 250 Nm.

Other installation data are provided in the section of instruction manual common for all models of heating bodies manufactured.

THERMAL POWER TABLES
FOR INDIVIDUAL MODELS OF HEATING BODIES

WARM-WATER HEATING

Temperature gradient to CSN EN 442 – 2:1997

Temperature gradients 75/65 °C
 90/70 °C
 55/45 °C

Table 2: Thermal power of heating bodies Termo 500/95 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 75\text{ }^\circ\text{C}$
 $t_2 = 65\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_i ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	220	196	183	173	164	156
3	309	276	256	244	231	219
4	398	355	330	314	298	281
5	487	435	404	384	364	344
6	576	514	478	454	431	407
7	665	594	552	524	497	470
8	754	673	626	594	564	533
9	843	752	699	665	630	596
10	932	832	773	735	697	659
11	1021	911	847	805	763	722
12	1110	991	921	875	830	785
13	1199	1070	995	945	896	848
14	1288	1150	1069	1016	963	911
15	1377	1229	1143	1086	1029	974
16	1466	1309	1216	1156	1096	1037
17	1555	1388	1290	1226	1163	1100
18	1644	1467	1364	1296	1229	1163
19	1732	1547	1438	1366	1296	1226
20	1821	1626	1512	1437	1362	1289
21	1910	1706	1586	1507	1429	1352
22	1999	1785	1660	1577	1495	1415
23	2088	1865	1733	1647	1562	1478
24	2177	1944	1807	1717	1628	1541
25	2266	2024	1881	1787	1695	1604
26	2355	2103	1955	1858	1761	1666
27	2444	2182	2029	1928	1828	1729
28	2533	2262	2103	1998	1895	1792
29	2622	2341	2176	2068	1961	1855
30	2711	2421	2250	2138	2028	1918

Table 3: Thermal power of heating bodies Termo 500/95 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 90\text{ }^\circ\text{C}$
 $t_2 = 70\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	269	244	229	220	210	201
3	378	343	322	309	296	282
4	486	442	415	398	381	364
5	595	540	508	487	466	445
6	704	639	601	576	551	526
7	813	738	694	665	636	608
8	921	837	787	754	721	689
9	1030	935	879	843	806	770
10	1139	1034	972	932	891	852
11	1248	1133	1065	1021	977	933
12	1356	1232	1158	1110	1062	1014
13	1465	1330	1251	1199	1147	1096
14	1574	1429	1344	1288	1232	1177
15	1683	1528	1437	1377	1317	1258
16	1791	1627	1529	1466	1402	1340
17	1900	1725	1622	1555	1487	1421
18	2009	1824	1715	1644	1573	1502
19	2118	1923	1808	1732	1658	1584
20	2226	2022	1901	1821	1743	1665
21	2335	2120	1994	1910	1828	1746
22	2444	2219	2087	1999	1913	1828
23	2553	2318	2180	2088	1998	1909
24	2661	2417	2272	2177	2083	1990
25	2770	2515	2365	2266	2168	2072
26	2879	2614	2458	2355	2254	2153
27	2988	2713	2551	2444	2339	2234
28	3096	2812	2644	2533	2424	2316
29	3205	2910	2737	2622	2509	2397
30	3314	3009	2830	2711	2594	2478

Table 4: Thermal power of heating bodies Termo 500/95 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 55\text{ }^\circ\text{C}$
 $t_2 = 45\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	130	109	97	89	82	74
3	182	153	136	125	114	104
4	235	197	175	161	147	134
5	287	241	215	197	180	164
6	340	285	254	234	213	194
7	392	330	293	270	246	224
8	445	374	332	306	279	254
9	497	418	372	342	312	284
10	550	462	411	378	345	314
11	602	506	450	414	378	344
12	654	550	489	450	411	374
13	707	594	529	486	444	403
14	759	638	568	522	477	433
15	812	682	607	558	510	463
16	864	726	646	594	543	493
17	917	771	686	630	576	523
18	969	815	725	667	609	553
19	1022	859	764	703	642	583
20	1074	903	803	739	675	613
21	1127	947	843	775	708	643
22	1179	991	882	811	741	673
23	1232	1035	921	847	774	703
24	1284	1079	960	883	807	733
25	1337	1123	1000	919	840	763
26	1389	1167	1039	955	873	793
27	1442	1212	1078	991	906	823
28	1494	1256	1117	1027	939	853
29	1547	1300	1157	1063	972	883
30	1599	1344	1196	1100	1005	913

Table 5: Thermal power of heating bodies Termo 500/130 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 75\text{ }^\circ\text{C}$
 $t_2 = 65\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	280	249	230	218	206	194
3	394	349	323	306	290	273
4	507	450	416	395	373	352
5	621	551	510	483	456	430
6	734	651	603	571	540	509
7	848	752	696	659	623	588
8	961	852	789	747	707	666
9	1075	953	882	836	790	745
10	1188	1054	975	924	873	824
11	1301	1154	1068	1012	957	902
12	1415	1255	1162	1100	1040	981
13	1528	1356	1255	1189	1124	1060
14	1642	1456	1348	1277	1207	1138
15	1755	1557	1441	1365	1290	1217
16	1869	1658	1534	1453	1374	1296
17	1982	1758	1627	1542	1457	1374
18	2096	1859	1720	1630	1541	1453
19	2209	1959	1814	1718	1624	1531
20	2323	2060	1907	1806	1707	1610
21	2436	2161	2000	1895	1791	1689
22	2550	2261	2093	1983	1874	1767
23	2663	2362	2186	2071	1958	1846
24	2776	2463	2279	2159	2041	1925
25	2890	2563	2372	2248	2124	2003
26	3003	2664	2466	2336	2208	2082
27	3117	2764	2559	2424	2291	2161
28	3230	2865	2652	2512	2375	2239
29	3344	2966	2745	2600	2458	2318
30	3457	3066	2838	2689	2542	2397

Table 6: Thermal power of heating bodies Termo 500/130 depending on required air temperature and number of sections

Warm-water heating

$$t_1 = 90\text{ }^{\circ}\text{C}$$

$$t_2 = 70\text{ }^{\circ}\text{C}$$

Thermal power Φ (W) at air temperature of t_r ($^{\circ}\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	347	313	293	280	268	255
3	487	440	412	394	376	358
4	627	566	531	507	484	461
5	768	693	649	621	592	564
6	908	820	768	734	701	668
7	1048	947	887	848	809	771
8	1189	1073	1006	961	917	874
9	1329	1200	1124	1075	1026	977
10	1469	1327	1243	1188	1134	1080
11	1610	1453	1362	1301	1242	1183
12	1750	1580	1480	1415	1350	1287
13	1890	1707	1599	1528	1459	1390
14	2031	1833	1718	1642	1567	1493
15	2171	1960	1837	1755	1675	1596
16	2311	2087	1955	1869	1783	1699
17	2452	2214	2074	1982	1892	1802
18	2592	2340	2193	2096	2000	1906
19	2732	2467	2311	2209	2108	2009
20	2873	2594	2430	2323	2217	2112
21	3013	2720	2549	2436	2325	2215
22	3153	2847	2667	2550	2433	2318
23	3294	2974	2786	2663	2541	2421
24	3434	3100	2905	2776	2650	2524
25	3574	3227	3024	2890	2758	2628
26	3715	3354	3142	3003	2866	2731
27	3855	3481	3261	3117	2974	2834
28	3995	3607	3380	3230	3083	2937
29	4136	3734	3498	3344	3191	3040
30	4276	3861	3617	3457	3299	3143

Table 7: Thermal power of heating bodies Termo 500/130 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 55\text{ }^\circ\text{C}$
 $t_2 = 45\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	160	133	118	108	98	89
3	225	187	166	151	138	124
4	290	241	213	195	177	160
5	355	295	261	239	217	196
6	420	349	309	282	257	232
7	485	403	356	326	296	268
8	550	457	404	370	336	303
9	614	511	452	413	376	339
10	679	565	499	457	415	375
11	744	619	547	500	455	411
12	809	673	595	544	495	447
13	874	727	642	588	534	482
14	939	781	690	631	574	518
15	1004	835	738	675	614	554
16	1068	889	785	719	653	590
17	1133	943	833	762	693	626
18	1198	997	881	806	733	662
19	1263	1051	929	849	772	697
20	1328	1105	976	893	812	733
21	1393	1159	1024	937	852	769
22	1458	1213	1072	980	891	805
23	1523	1266	1119	1024	931	841
24	1587	1320	1167	1068	971	876
25	1652	1374	1215	1111	1010	912
26	1717	1428	1262	1155	1050	948
27	1782	1482	1310	1198	1090	984
28	1847	1536	1358	1242	1129	1020
29	1912	1590	1405	1286	1169	1055
30	1977	1644	1453	1329	1209	1091

Table 8: Thermal power of heating bodies Termo 623/95 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 75\text{ }^\circ\text{C}$
 $t_2 = 65\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	280	249	230	218	207	195
3	393	349	324	307	290	274
4	507	450	417	395	374	353
5	620	551	510	484	457	432
6	733	651	603	572	541	511
7	847	752	697	660	625	589
8	960	853	790	749	708	668
9	1073	953	883	837	792	747
10	1187	1054	976	926	875	826
11	1300	1155	1070	1014	959	905
12	1413	1255	1163	1102	1043	984
13	1526	1356	1256	1191	1126	1063
14	1640	1456	1349	1279	1210	1142
15	1753	1557	1443	1367	1293	1221
16	1866	1658	1536	1456	1377	1299
17	1980	1758	1629	1544	1461	1378
18	2093	1859	1722	1633	1544	1457
19	2206	1960	1815	1721	1628	1536
20	2320	2060	1909	1809	1712	1615
21	2433	2161	2002	1898	1795	1694
22	2546	2262	2095	1986	1879	1773
23	2660	2362	2182	2075	1962	1852
24	2773	2463	2282	2163	2064	1931
25	2886	2564	2375	2251	2130	2010
26	2999	2664	2468	2340	2213	2088
27	3113	2765	2561	2428	2297	2167
28	3226	2865	2655	2516	2380	2246
29	3339	2966	2748	2605	2464	2325
30	3453	3067	2841	2693	2548	2404

Table 9: Thermal power of heating bodies Termo 623/95 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 90\text{ }^\circ\text{C}$
 $t_2 = 70\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	345	312	293	280	267	255
3	485	439	411	393	376	358
4	625	565	530	507	484	461
5	765	691	648	620	592	564
6	905	818	767	733	700	667
7	1044	944	885	847	808	771
8	1184	1070	1004	960	917	874
9	1324	1197	1122	1073	1025	977
10	1464	1323	1241	1187	1123	1080
11	1604	1450	1359	1300	1241	1183
12	1743	1576	1478	1413	1349	1286
13	1883	1702	1596	1526	1458	1389
14	2023	1829	1715	1640	1566	1493
15	2163	1955	1833	1753	1674	1596
16	2303	2081	1952	1866	1782	1699
17	2442	2208	2070	1980	1890	1802
18	2582	2334	2189	2093	1999	1905
19	2722	2461	2307	2206	2107	2008
20	2862	2587	2426	2320	2215	2112
21	3002	2713	2544	2433	2323	2215
22	3141	2840	2663	2546	2431	2318
23	3281	2966	2781	2660	2540	2421
24	3421	3092	2900	2773	2648	2524
25	3561	3219	3018	2886	2756	2627
26	3701	3345	3137	2999	2864	2730
27	3840	3471	3255	3113	2972	2834
28	3980	3598	3374	3226	3080	2937
29	4120	3724	3492	3339	3189	3040
30	4260	3851	3610	3453	3297	3143

Table 10: Thermal power of heating bodies Termo 623/95 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 55\text{ }^\circ\text{C}$
 $t_2 = 45\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	161	134	119	109	99	90
3	226	189	167	153	139	126
4	292	243	215	197	179	162
5	357	297	263	241	219	198
6	422	352	311	285	260	235
7	487	406	360	329	300	271
8	552	461	408	373	340	307
9	618	515	456	417	380	343
10	683	569	504	461	420	380
11	748	624	552	506	460	416
12	813	678	600	550	500	452
13	879	732	648	594	540	488
14	944	787	696	638	580	525
15	1009	841	744	682	621	561
16	1074	895	793	726	661	597
17	1139	950	841	770	701	634
18	1205	1004	889	814	741	670
19	1270	1059	937	858	781	706
20	1335	1113	985	902	821	742
21	1400	1167	1033	946	861	779
22	1465	1222	1081	990	901	815
23	1531	1276	1129	1034	942	851
24	1596	1330	1178	1078	982	887
25	1661	1385	1226	1122	1022	924
26	1726	1439	1274	1167	1062	960
27	1792	1494	1322	1211	1102	996
28	1857	1548	1370	1255	1142	1032
29	1922	1602	1418	1299	1182	1069
30	1987	1657	1466	1343	1222	1105

Table 11: Thermal power of heating bodies Termo 623/130 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 75\text{ }^\circ\text{C}$
 $t_2 = 65\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	330	295	274	260	246	233
3	464	414	384	365	346	327
4	598	533	495	470	446	421
5	732	652	606	575	545	515
6	865	772	717	681	645	610
7	999	891	827	786	745	704
8	1133	1010	938	891	844	798
9	1267	1129	1049	996	944	892
10	1400	1249	1160	1101	1044	987
11	1534	1368	1270	1206	1143	1081
12	1668	1487	1381	1312	1243	1175
13	1801	1606	1492	1417	1342	1269
14	1935	1726	1603	1522	1442	1363
15	2069	1845	1713	1627	1542	1458
16	2203	1964	1824	1732	1641	1552
17	2336	2083	1935	1837	1741	1646
18	2470	2202	2046	1942	1841	1740
19	2604	2322	2156	2048	1940	1835
20	2737	2441	2267	2153	2040	1929
21	2871	2560	2378	2258	2140	2023
22	3005	2679	2489	2363	2239	2117
23	3139	2799	2599	2468	2339	2211
24	3272	2918	2710	2573	2439	2306
25	3406	3037	2821	2679	2538	2400
26	3540	3156	2931	2784	2638	2494
27	3674	3276	3042	2889	2738	2588
28	3807	3395	3153	2994	2837	2683
29	3941	3514	3264	3099	2937	2777
30	4075	3633	3374	3204	3037	2871

Table 12: Thermal power of heating bodies Termo 623/130 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 90\text{ }^\circ\text{C}$
 $t_2 = 70\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	405	367	345	330	316	302
3	569	516	485	464	444	424
4	733	664	624	598	572	546
5	896	813	764	732	700	668
6	1060	962	904	865	828	790
7	1224	1110	1043	999	955	912
8	1388	1259	1183	1133	1083	1034
9	1552	1407	1322	1267	1211	1156
10	1716	1556	1462	1400	1339	1279
11	1879	1705	1602	1534	1467	1401
12	2043	1853	1741	1668	1595	1523
13	2207	2002	1881	1801	1723	1645
14	2371	2150	2021	1935	1851	1767
15	2535	2299	2160	2069	1978	1889
16	2699	2448	2300	2203	2106	2011
17	2863	2596	2439	2336	2234	2133
18	3026	2745	2579	2470	2362	2255
19	3190	2893	2719	2604	2490	2370
20	3354	3042	2858	2737	2618	2500
21	3518	3191	2998	2871	2746	2622
22	3682	3339	3138	3005	2874	2744
23	3846	3488	3277	3139	3002	2866
24	4009	3636	3417	3272	3129	2988
25	4173	3785	3557	3406	3257	3110
26	4337	3934	3696	3540	3385	3232
27	4501	4082	3836	3674	3513	3354
28	4665	4231	3975	3807	3641	3476
29	4829	4379	4115	3941	3769	3599
30	4993	4528	4255	4075	3897	3721

Table 13: Thermal power of heating bodies Termo 623/130 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 55\text{ }^\circ\text{C}$
 $t_2 = 45\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	194	162	144	133	121	110
3	272	228	203	186	170	154
4	350	294	261	240	219	199
5	429	360	320	293	268	243
6	507	425	378	347	317	287
7	586	491	436	401	366	332
8	664	557	495	454	415	376
9	742	623	553	508	464	421
10	821	688	612	562	513	465
11	899	754	670	615	562	510
12	977	820	728	669	611	554
13	1056	885	787	723	660	598
14	1134	951	845	776	709	643
15	1213	1017	904	830	758	687
16	1291	1083	962	884	807	732
17	1369	1148	1020	937	856	776
18	1448	1214	1079	991	905	821
19	1526	1280	1137	1044	954	865
20	1604	1345	1196	1098	1003	909
21	1683	1411	1254	1152	1052	954
22	1761	1477	1312	1205	1101	998
23	1839	1543	1371	1259	1150	1043
24	1918	1608	1429	1313	1199	1087
25	1996	1674	1488	1366	1248	1132
26	2075	1740	1546	1420	1297	1176
27	2153	1806	1604	1474	1346	1220
28	2231	1871	1663	1527	1395	1265
29	2310	1937	1721	1581	1444	1309
30	2388	2003	1780	1635	1493	1354

Table 14: Thermal power of heating bodies Termo 813/95 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 75\text{ °C}$
 $t_2 = 65\text{ °C}$

Thermal power Φ (W) at air temperature of t_r (°C)

No of sections (Ns)	10	15	18	20	22	24
2	336	299	278	264	250	236
3	472	421	390	371	351	332
4	608	542	503	477	452	427
5	744	663	615	584	553	523
6	880	784	728	691	654	618
7	1016	905	840	797	755	714
8	1152	1026	953	904	856	809
9	1288	1148	1065	1011	958	905
10	1424	1269	1178	1118	1059	1000
11	1560	1390	1290	1224	1160	1096
12	1696	1511	1402	1331	1261	1191
13	1832	1632	1515	1438	1362	1287
14	1968	1753	1627	1545	1463	1383
15	2104	1875	1740	1651	1564	1478
16	2241	1996	1852	1758	1665	1574
17	2377	2117	1965	1865	1766	1669
18	2513	2238	2077	1972	1867	1765
19	2649	2359	2190	2078	1969	1860
20	2785	2480	2302	2185	2070	1956
21	2921	2602	2415	2292	2171	2051
22	3057	2723	2527	2399	2272	2147
23	3193	2844	2639	2505	2373	2242
24	3329	2965	2752	2612	2474	2338
25	3465	3086	2864	2719	2575	2434
26	3601	3207	2977	2826	2676	2529
27	3737	3329	3089	2932	2777	2625
28	3873	3450	3202	3039	2879	2720
29	4009	3571	3314	3146	2980	2816
30	4145	3692	3427	3253	3081	2911

Table 15: Thermal power of heating bodies Termo 813/95 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 90\text{ }^\circ\text{C}$

$t_2 = 70\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	413	374	351	336	321	307
3	580	525	493	472	451	431
4	747	677	635	608	581	555
5	914	828	777	744	711	679
6	1081	979	919	880	841	803
7	1247	1130	1062	1016	971	927
8	1414	1282	1204	1152	1102	1051
9	1581	1433	1346	1288	1232	1175
10	1748	1584	1488	1424	1362	1300
11	1915	1736	1630	1560	1492	1424
12	2082	1887	1772	1696	1622	1548
13	2249	2038	1914	1832	1752	1672
14	2416	2190	2056	1968	1882	1796
15	2583	2341	2198	2104	2012	1920
16	2750	2492	2340	2241	2142	2044
17	2917	2643	2482	2377	2272	2168
18	3084	2795	2625	2513	2402	2292
19	3251	2946	2767	2649	2532	2416
20	3418	3097	2909	2785	2662	2441
21	3585	3249	3051	2921	2792	2665
22	3752	3400	3193	3057	2922	2789
23	3919	3551	3335	3193	3052	2913
24	4086	3703	3477	3329	3182	3037
25	4253	3854	3619	3465	3312	3161
26	4420	4005	3761	3601	3442	3285
27	4587	4156	3903	3737	3572	3409
28	4754	4308	4045	3873	3702	3533
29	4921	4459	4188	4009	3832	3657
30	5088	4610	4330	4145	3962	3782

Table 16: Thermal power of heating bodies Termo 813/95 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 55\text{ }^{\circ}\text{C}$
 $t_2 = 45\text{ }^{\circ}\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^{\circ}\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	196	164	146	134	122	111
3	275	231	205	188	171	155
4	355	297	264	242	221	200
5	434	363	323	296	270	245
6	513	430	382	350	320	290
7	595	496	441	404	369	334
8	672	563	500	458	418	379
9	751	629	558	513	468	424
10	831	696	617	567	517	468
11	910	762	676	621	566	513
12	989	828	735	675	616	558
13	1069	895	794	729	665	603
14	1148	961	853	783	715	647
15	1227	1028	912	837	764	692
16	1307	1094	971	891	813	737
17	1386	1161	1030	946	863	782
18	1465	1227	1089	1000	912	826
19	1545	1293	1148	1054	961	871
20	1624	1360	1207	1108	1011	916
21	1703	1426	1266	1162	1060	961
22	1783	1493	1325	1216	1110	1005
23	1862	1559	1384	1270	1159	1050
24	1941	1626	1443	1324	1208	1095
25	2021	1692	1502	1378	1258	1140
26	2100	1758	1561	1433	1307	1184
27	2179	1825	1620	1487	1356	1229
28	2259	1891	1679	1541	1406	1274
29	2338	1958	1738	1595	1455	1319
30	2417	2024	1797	1649	1504	1363

Table 17: Thermal power of heating bodies Termo 813/130 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 75\text{ }^\circ\text{C}$
 $t_2 = 65\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	414	368	341	324	306	289
3	582	517	480	455	430	406
4	750	666	618	586	554	523
5	917	816	756	717	678	641
6	1085	965	894	848	802	758
7	1253	1114	1032	979	926	875
8	1420	1263	1171	1110	1050	992
9	1588	1412	1309	1241	1174	1109
10	1756	1561	1447	1372	1298	1226
11	1923	1710	1585	1503	1422	1343
12	2091	1859	1723	1634	1546	1460
13	2259	2008	1861	1765	1670	1577
14	2426	2157	2000	1896	1794	1694
15	2594	2306	2138	2027	1918	1811
16	2762	2455	2276	2158	2042	1928
17	2929	2604	2414	2289	2166	2045
18	3097	2753	2552	2420	2291	2162
19	3265	2902	2690	2552	2415	2279
20	3432	3051	2829	2683	2539	2397
21	3600	3201	2967	2814	2663	2514
22	3768	3350	3105	2945	2787	2631
23	3935	3499	3243	3076	2911	2748
24	4103	3648	3381	3207	3035	2865
25	4271	3797	3520	3338	3159	2982
26	4438	3946	3658	3469	3283	3099
27	4606	4095	3796	3600	3407	3216
28	4774	4244	3934	3731	3531	3333
29	4941	4393	4072	3862	3655	3450
30	5109	4542	4210	3993	3779	3567

Table 18: Thermal power of heating bodies Termo 813/130 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 90\text{ }^\circ\text{C}$
 $t_2 = 70\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	510	462	433	414	396	377
3	717	649	608	582	556	530
4	923	835	784	750	716	683
5	1130	1022	959	917	876	836
6	1336	1209	1134	1085	1036	988
7	1543	1396	1309	1253	1197	1141
8	1750	1583	1485	1420	1357	1294
9	1956	1770	1660	1588	1517	1447
10	2163	1956	1835	1756	1677	1599
11	2369	2143	2011	1923	1837	1752
12	2576	2330	2186	2091	1997	1905
13	2782	2517	2361	2259	2158	2058
14	2989	2704	2536	2426	2318	2210
15	3195	2891	2712	2594	2478	2363
16	3402	3077	2887	2762	2638	2516
17	3608	3264	3062	2929	2798	2669
18	3815	3451	3237	3097	2958	2821
19	4021	3638	3413	3265	3118	2974
20	4228	3825	3588	3432	3279	3127
21	4434	4012	3763	3600	3439	3279
22	4641	4198	3939	3768	3599	3432
23	4847	4385	4114	3935	3759	3585
24	5054	4572	4289	4103	3919	3738
25	5260	4759	4464	4271	4079	3890
26	5467	4946	4640	4438	4240	4043
27	5673	5133	4815	4606	4400	4196
28	5880	5319	4990	4774	4560	4349
29	6087	5506	5165	4941	4720	4501
30	6293	5693	5341	5109	4880	4654

Table 19: Thermal power of heating bodies Termo 813/130 depending on required air temperature and number of sections

Warm-water heating

$t_1 = 55\text{ }^\circ\text{C}$
 $t_2 = 45\text{ }^\circ\text{C}$

Thermal power Φ (W) at air temperature of t_r ($^\circ\text{C}$)

No of sections (Ns)	10	15	18	20	22	24
2	239	200	177	162	148	134
3	336	281	249	228	208	188
4	433	362	320	294	268	242
5	530	443	392	359	327	296
6	627	524	464	425	387	350
7	724	604	535	491	447	404
8	821	685	607	556	507	459
9	918	766	679	622	567	513
10	1015	847	751	688	627	567
11	1112	928	822	753	686	621
12	1209	1009	894	819	746	675
13	1306	1090	966	885	806	729
14	1402	1171	1037	951	866	783
15	1499	1252	1109	1016	926	837
16	1596	1333	1181	1082	986	892
17	1693	1414	1252	1148	1045	946
18	1790	1494	1324	1213	1105	1000
19	1887	1575	1396	1279	1165	1054
20	1984	1656	1467	1345	1225	1108
21	2081	1737	1539	1410	1285	1162
22	2178	1818	1611	1476	1345	1216
23	2275	1899	1682	1542	1404	1271
24	2372	1980	1754	1607	1464	1325
25	2468	2061	1826	1673	1524	1379
26	2565	2142	1897	1739	1584	1433
27	2662	2223	1969	1804	1644	1487
28	2759	2303	2041	1870	1704	1541
29	2856	2384	2112	1936	1763	1595
30	2953	2465	2184	2001	1823	1649

STEAM HEATING

Steam condensation temperature

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Table 20: Thermal power of heating bodies Termo 500/95 depending on required air temperature and number of sections

Steam heating

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Φ (W) at air temperature of t_r ($^{\circ}\text{C}$)

No. of sections (Ns)	10	15	18	20	22	24
2	403	374	358	346	335	324
3	566	526	502	487	471	456
4	729	677	647	627	607	587
5	892	829	792	767	743	718
6	1055	980	936	907	878	850
7	1218	1132	1081	1047	1014	981
8	1381	1283	1226	1188	1150	1112
9	1544	1435	1370	1328	1285	1244
10	1707	1586	1515	1468	1421	1375
11	1870	1738	1660	1608	1557	1506
12	2033	1889	1804	1748	1693	1637
13	2196	2041	1949	1888	1828	1769
14	2359	2192	2094	2029	1964	1900
15	2522	2344	2238	2169	2100	2031
16	2685	2495	2383	2309	2236	2163
17	2848	2647	2528	2449	2371	2294
18	3011	2798	2672	2589	2507	2425
19	3174	2950	2817	2730	2643	2556
20	3337	3101	2962	2870	2778	2688
21	3500	3253	3107	3010	2914	2819
22	3663	3404	3251	3150	3050	2950
23	3826	3556	3396	3290	3186	3082
24	3989	3707	3541	3431	3321	3213
25	4151	3859	3685	3571	3457	3344
26	4314	4010	3830	3711	3593	3476
27	4477	4162	3975	3851	3729	3607
28	4640	4313	4119	3991	3864	3738
29	4803	4465	4264	4131	4000	3869
30	4966	4616	4409	4272	4136	4001

Table 21: Thermal power of heating bodies Termo 500/130 depending on required air temperature and number of sections

Steam heating

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Φ (W) at air temperature of t_r ($^{\circ}\text{C}$)

No. of sections (Ns)	10	15	18	20	22	24
2	531	491	468	452	437	422
3	745	690	657	635	614	593
4	960	888	846	818	791	763
5	1175	1087	1035	1001	968	934
6	1389	1286	1225	1184	1144	1105
7	1604	1484	1414	1367	1321	1276
8	1819	1683	1603	1550	1498	1446
9	2033	1882	1792	1733	1675	1617
10	2248	2080	1981	1916	1852	1788
11	2463	2279	2171	2099	2029	1959
12	2677	2478	2360	2282	2205	2129
13	2892	2676	2549	2465	2382	2300
14	3107	2875	2738	2648	2559	2471
15	3321	3074	2928	2831	2736	2642
16	3536	3272	3117	3014	2913	2812
17	3751	3471	3306	3197	3090	2983
18	3965	3670	3495	3380	3267	3154
19	4180	3868	3685	3563	3443	3325
20	4395	4067	3874	3746	3620	3495
21	4609	4266	4063	3929	3797	3666
22	4824	4464	4252	4112	3974	3837
23	5039	4663	4442	4295	4151	4008
24	5253	4862	4631	4478	4328	4178
25	5468	5060	4820	4662	4505	4349
26	5683	5259	5009	4845	4681	4520
27	5897	5458	5198	5028	4858	4690
28	6112	5656	5388	5211	5035	4861
29	6327	5855	5577	5394	5212	5032
30	6541	6054	5766	5577	5389	5203

Table 22: Thermal power of heating bodies Termo 623/95 depending on required air temperature and number of sections

Steam heating

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Φ (W) at air temperature of t_r ($^{\circ}\text{C}$)

No. of sections (Ns)	10	15	18	20	22	24
2	526	487	465	449	434	420
3	739	685	652	631	610	589
4	952	882	840	813	786	759
5	1165	1079	1028	995	962	929
6	1378	1276	1216	1177	1138	1099
7	1591	1474	1404	1359	1313	1269
8	1804	1671	1592	1541	1489	1438
9	2017	1868	1780	1722	1665	1608
10	2230	2065	1968	1904	1841	1778
11	2442	2262	2156	2086	2017	1948
12	2655	2460	2344	2268	2193	2118
13	2868	2657	2532	2450	2368	2288
14	3081	2854	2720	2632	2544	2457
15	3294	3051	2908	2814	2720	2627
16	3507	3249	3096	2995	2896	2797
17	3720	3446	3284	3177	3072	2967
18	3933	3643	3472	3359	3247	3137
19	4146	3840	3660	3541	3423	3306
20	4359	4037	3848	3723	3599	3476
21	4572	4235	4036	3905	3775	3646
22	4785	4432	4224	4087	3951	3816
23	4998	4629	4412	4268	4126	3986
24	5210	4826	4600	4450	4302	4155
25	5423	5024	4788	4632	4478	4325
26	5636	5221	4976	4814	4654	4495
27	5849	5418	5164	4996	4830	4665
28	6062	5615	5352	5178	5005	4835
29	6275	5813	5540	5360	5181	5004
30	6488	6010	5728	5541	5357	5174

Table 23: Thermal power of heating bodies Termo 623/130 depending on required air temperature and number of sections

Steam heating

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Φ (W) at air temperature of t_r ($^{\circ}\text{C}$)

No. of sections (Ns)	10	15	18	20	22	24
2	609	566	540	523	506	490
3	856	795	759	735	711	688
4	1103	1024	977	947	916	886
5	1349	1253	1196	1158	1121	1084
6	1596	1482	1414	1370	1326	1282
7	1842	1711	1633	1582	1531	1480
8	2089	1940	1852	1793	1736	1678
9	2335	2169	2070	2005	1940	1876
10	2582	2398	2289	2217	2145	2075
11	2829	2627	2507	2428	2350	2273
12	3075	2856	2726	2640	2555	2471
13	3322	3085	2944	2852	2760	2669
14	3568	3314	3163	3064	2965	2867
15	3815	3543	3382	3275	3170	3065
16	4062	3772	3600	3487	3375	3263
17	4308	4001	3819	3699	3580	3461
18	4555	4230	4037	3910	3784	3659
19	4801	4459	4256	4122	3989	3858
20	5048	4688	4474	4334	4194	4056
21	5294	4917	4693	4546	4399	4254
22	5541	5146	4912	4757	4604	4452
23	5788	5374	5130	4969	4809	4650
24	6034	5603	5349	5181	5014	4848
25	6281	5832	5567	5392	5219	5046
26	6527	6061	5786	5604	5424	5244
27	6774	6290	6005	5816	5628	5443
28	7021	6519	6223	6027	5833	5641
29	7267	6748	6442	6239	6038	5839
30	7514	6977	6660	6451	6243	6037

Table 24: Thermal power of heating bodies Termo 813/130 depending on required air temperature and number of sections

Steam heating

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Φ (W) at air temperature of t_r ($^{\circ}\text{C}$)

No. of sections (Ns)	10	15	18	20	22	24
2	775	718	685	663	641	619
3	1089	1009	962	931	900	870
4	1402	1300	1239	1199	1160	1120
5	1716	1591	1516	1468	1419	1371
6	2030	1881	1794	1736	1678	1622
7	2344	2172	2071	2004	1938	1872
8	2657	2463	2348	2272	2197	2123
9	2971	2754	2625	2541	2457	2373
10	3285	3044	2902	2809	2716	2624
11	3598	3335	3180	3077	2975	2875
12	3912	3626	3457	3345	3235	3125
13	4226	3916	3734	3614	3494	3376
14	4539	4207	4011	3882	3754	3626
15	4853	4498	4288	4150	4013	3877
16	5167	4789	4565	4418	4272	4128
17	5480	5079	4843	4686	4532	4378
18	5794	5370	5120	4955	4791	4629
19	6108	5661	5397	5223	5050	4879
20	6421	5951	5674	5491	5310	5130
21	6735	6242	5951	5759	5569	5381
22	7049	6533	6228	6028	5829	5631
23	7362	6824	6506	6296	6088	5882
24	7676	7114	6783	6564	6347	6132
25	7990	7405	7060	6832	6607	6383
26	8303	7696	7337	7101	6866	6634
27	8617	7987	7614	7369	7125	6884
28	8931	8277	7892	7637	7385	7135
29	9244	8568	8169	7905	7644	7385
30	9558	8859	8446	8174	7904	7636

Table 25: Thermal power of heating bodies Termo 813/95 depending on required air temperature and number of sections

Steam heating

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Φ (W) at air temperature of t_r ($^{\circ}\text{C}$)

No. of sections (Ns)	10	15	18	20	22	24
2	623	578	552	534	517	500
3	875	812	775	750	726	702
4	1127	1046	998	966	935	904
5	1379	1280	1221	1183	1144	1106
6	1631	1514	1444	1399	1353	1308
7	1883	1748	1668	1615	1562	1510
8	2136	1982	1891	1831	1771	1712
9	2388	2216	2114	2047	1981	1915
10	2640	2450	2337	2263	2190	2117
11	2892	2684	2561	2479	2399	2319
12	3144	2918	2784	2695	2608	2521
13	3396	3151	3007	2912	2817	2723
14	3648	3385	3230	3128	3026	2925
15	3900	3619	3453	3344	3235	3127
16	4152	3853	3677	3560	3444	3330
17	4404	4087	3900	3776	3653	3532
18	4656	4321	4123	3992	3863	3734
19	4909	4555	4346	4208	4072	3936
20	5161	4789	4569	4425	4281	4138
21	5413	5023	4793	4641	4490	4340
22	5665	5257	5016	4857	4699	4542
23	5917	5491	5239	5073	4908	4745
24	6169	5725	5462	5289	5117	4947
25	6421	5959	5686	5505	5326	5149
26	6673	6193	5909	5721	5535	5351
27	6925	6427	6132	5937	5744	5553
28	7177	6661	6355	6154	5954	5755
29	7429	6895	6578	6370	6163	5957
30	7682	7128	6802	6586	6372	6160

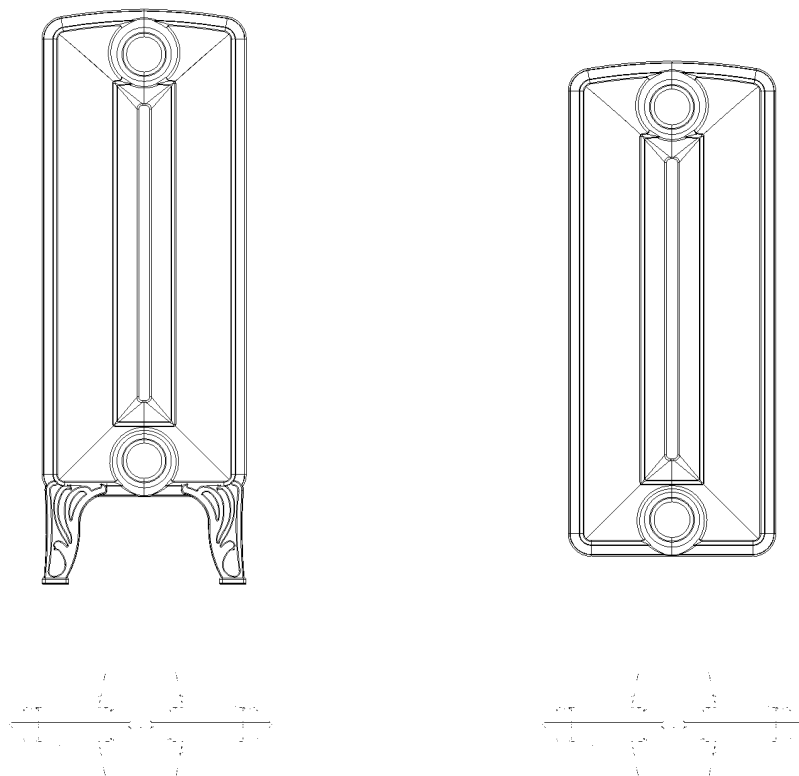
CAST-IRON HEATING BODIES

BOHEMIA

BOHEMIA

DESCRIPTION

Cast-iron heating body consisting of sections connected into heating systems using steel nipples with external right-hand or left-hand thread G 5/4" is manufactured in the following size: **450/220 mm**. Heating bodies material complies with CSN EN 442 – 2:1997 (grey cast-iron to CSN EN 1561, grade 150). The design of castings ensures a long life cycle of products.



BOHEMIA 450/220 with foot

BOHEMIA 450/220

Fig. 1: BOHEMIA type heating body

USAGE

BOHEMIA heating body is designed for warm-water central heating systems with gravity and forced circulation of heating water with the highest operating temperature not exceeding 115 °C and highest operating overpressure of up to 0.6 MPa. With its design the body is suitable for historical buildings and stylish interiors.

THERMAL AND TECHNICAL PARAMETERS

BOHEMIA type is certified by SZÚ Brno (certificate No. B-30-00532-03). Thermal and technical parameters for the heat-transfer fluid (water) have been verified experimentally in compliance with CSN EN 442-2 in the Measuring laboratory of Technical University in DARMSTADT.

Basic thermal and technical parameters are provided in Table 1. Indicated thermal power applies to the heat-transfer fluid (water) with the temperature gradient of 75/65 °C and one-sided lateral connection (supply) of the heat-transfer fluid (water) at the top. The body is measured without cover.

Environment: These heating bodies can be used in the following temperature range: +2 °C up to +35 °C.

Table 1: Significant thermal and technical parameters of BOHEMIA heating sections

Property	Symbol	450/220	450/220 with foot
total height	H (mm)	540	634
spacing	h (mm)	450	450
depth	B (mm)	225	225
width	L (mm)	86	86
connection thread	G	5/4	5/4
weight	M (kg/pc.)	11.4	13.2
water volume	V (dm ³ /pc.)	1.3	1.3
thermal power	Q_{NI} (W/section)	110	110

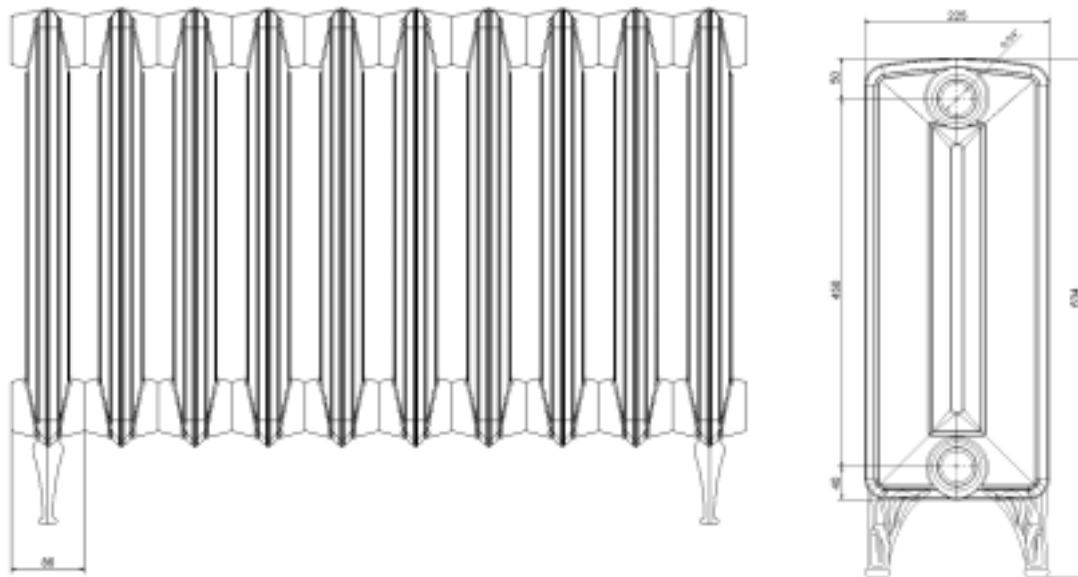


Fig. 2: Standard dimensions of BOHEMIA sections

TESTING OVERPRESSURE

Units manufactured are subject to the pressure test performed in manufacturer's facility using overpressure of cold water equal to 1 MPa.

ASSEMBLY

In order to achieve required thermal power of heating bodies it is necessary to maintain the installation position indicated on Fig. 3.

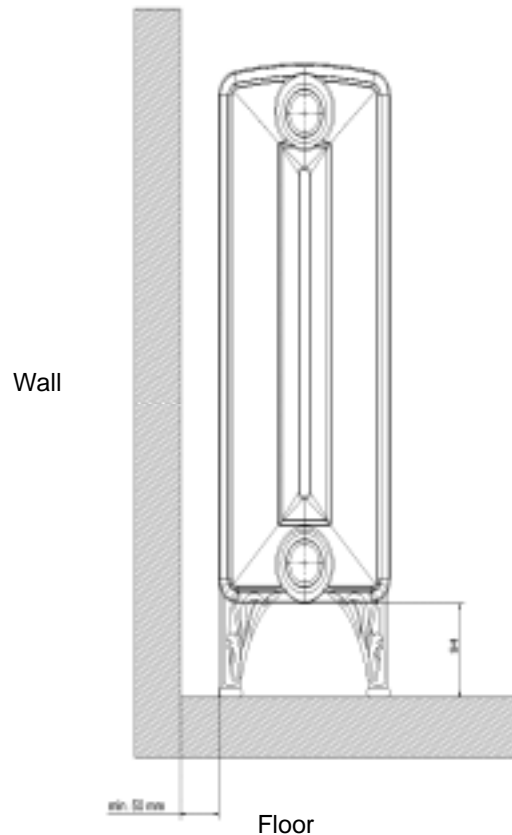


Fig. 3: Installation of BOHEMIA heating bodies

BOHEMIA heating bodies are connected to the distribution piping using roses provided with external thread G 5/4" with G 3/8", G 1/2", G 3/4" and G 1" bores.

Openings of the heating body on the opposite side to connection are terminated by solid plugs provided with external left-hand thread G 5/4". The upper plug can be provided with bore with eccentrically positioned thread G 1/4" for the air relief valve. Automatic air relief valves are suitable for this purpose.

Prior to combining the individual units supplied it is necessary to perform a thorough cleaning of contact surfaces of sections and connections should be sealed by TEMASIL packing, which is normally used during production and it is suitable both for warm-water and steam systems. The sections shall be coupled with the torque of min. 180 Nm and max. 250 Nm.

Other installation data are provided in the section of instruction manual common for all models of heating bodies manufactured.

THERMAL POWER TABLES
FOR INDIVIDUAL MODELS OF HEATING BODIES

WARM-WATER HEATING

Temperature gradient to CSN EN 442 – 2:1997

Temperature gradients 75/65 °C
 90/70 °C
 55/45 °C

Table 2: Thermal power of heating bodies Bohemia 450/220, h = 450 mm depending on required air temperature and number of sections for warm-water heating

$$t_{w1} = 75\text{ }^{\circ}\text{C}$$

$$t_{w2} = 65\text{ }^{\circ}\text{C}$$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (Ns)	10	15	18	20	22	24
2	335	297	275	260	246	232
3	471	417	386	366	345	326
4	607	538	497	471	445	419
5	743	658	609	576	544	513
6	878	778	720	682	644	607
7	1014	898	831	787	744	701
8	1150	1019	942	892	843	795
9	1286	1139	1054	998	943	888
10	1421	1259	1165	1103	1042	982
11	1557	1380	1276	1208	1142	1076
12	1693	1500	1387	1314	1241	1170
13	1828	1620	1498	1419	1341	1264
14	1964	1740	1610	1524	1440	1357
15	2100	1861	1721	1630	1540	1451
16	2236	1981	1832	1735	1639	1545
17	2371	2101	1943	1840	1739	1639
18	2507	2221	2055	1946	1838	1733
19	2643	2342	2166	2051	1938	1826
20	2779	2462	2277	2156	2037	1920
21	2914	2582	2388	2262	2137	2014
22	3050	2702	2500	2367	2236	2108
23	3186	2823	2611	2472	2336	2202
24	3322	2943	2722	2578	2435	2295
25	3457	3063	2833	2683	2535	2389
26	3593	3183	2945	2788	2634	2483
27	3729	3304	3056	2894	2734	2577
28	3864	3424	3167	2999	2833	2670
29	4000	3544	3278	3104	2933	2764
30	4136	3665	3389	3210	3032	2858

Table 3: Thermal power of heating bodies Bohemia 450/220, h = 450 mm depending on required air temperature and number of sections for warm-water heating

$$t_{w1} = 90 \text{ }^{\circ}\text{C}$$

$$t_{w2} = 70 \text{ }^{\circ}\text{C}$$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (Ns)	10	15	18	20	22	24
2	416	375	351	335	320	305
3	584	527	493	471	449	428
4	752	678	635	607	579	551
5	920	830	777	743	708	675
6	1088	982	919	878	838	798
7	1257	1134	1061	1014	967	921
8	1425	1285	1203	1150	1097	1045
9	1593	1437	1346	1286	1226	1168
10	1761	1589	1488	1421	1356	1291
11	1929	1740	1630	1557	1485	1415
12	2098	1892	1772	1693	1615	1538
13	2266	2044	1914	1828	1744	1661
14	2434	2196	2056	1964	1874	1784
15	2602	2347	2198	2100	2003	1908
16	2770	2499	2340	2236	2133	2031
17	2938	2651	2482	2371	2262	2154
18	3107	2802	2624	2507	2392	2278
19	3275	2954	2766	2643	2521	2401
20	3443	3106	2908	2779	2651	2524
21	3611	3258	3050	2914	2780	2648
22	3779	3409	3192	3050	2910	2771
23	3948	3561	3334	3186	3039	2894
24	4116	3713	3477	3322	3169	3018
25	4284	3864	3619	3457	3298	3141
26	4452	4016	3761	3593	3428	3264
27	4620	4168	3903	3729	3557	3388
28	4789	4320	4045	3864	3686	3511
29	4957	4471	4187	4000	3816	3634
30	5125	4623	4329	4136	3945	3758

Table 4: Thermal power of heating bodies Bohemia 450/220, h = 450 mm depending on required air temperature and number of sections for warm-water heating

$$t_{w1} = 55\text{ }^{\circ}\text{C}$$

$$t_{w2} = 45\text{ }^{\circ}\text{C}$$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (Ns)	10	15	18	20	22	24
2	191	158	140	128	116	105
3	268	223	197	180	163	147
4	345	287	253	231	210	190
5	423	351	310	283	257	232
6	500	415	366	335	304	274
7	577	479	423	387	351	317
8	654	543	480	438	398	359
9	731	607	536	490	445	402
10	809	672	593	542	492	444
11	886	736	649	594	539	487
12	963	800	706	645	586	529
13	1040	864	763	697	633	571
14	1118	928	819	749	680	614
15	1195	992	876	801	727	656
16	1272	1056	933	853	775	699
17	1349	1121	989	904	822	741
18	1426	1185	1046	956	869	783
19	1504	1249	1102	1008	916	826
20	1581	1313	1159	1060	963	868
21	1658	1377	1216	1111	1010	911
22	1735	1441	1272	1163	1057	953
23	1813	1505	1329	1215	1104	996
24	1890	1569	1386	1267	1151	1038
25	1967	1634	1442	1318	1198	1080
26	2044	1698	1499	1370	1245	1123
27	2121	1762	1555	1422	1292	1165
28	2199	1826	1612	1474	1339	1208
29	2276	1890	1669	1525	1386	1250
30	2353	1954	1725	1577	1433	1293

STEAM HEATING

Steam condensation temperature

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Table 5: Thermal power of heating bodies Bohemia 450/220, h = 450 mm depending on required air temperature and number of sections

Steam heating

$$t_{pk} = 101.5 \text{ }^{\circ}\text{C}$$

Thermal power Q (W) at air temperature of t_i ($^{\circ}\text{C}$)

No. of sections (Ns)	10	15	18	20	22	24
2	638	590	562	543	525	506
3	896	829	789	763	737	711
4	1154	1067	1016	983	949	916
5	1412	1306	1244	1202	1161	1121
6	1670	1545	1471	1422	1374	1326
7	1929	1784	1698	1642	1586	1531
8	2187	2022	1925	1862	1798	1736
9	2445	2261	2153	2081	2011	1941
10	2703	2500	2380	2301	2223	2145
11	2961	2738	2607	2521	2435	2350
12	3219	2977	2835	2741	2647	2555
13	3477	3216	3062	2960	2860	2760
14	3735	3455	3289	3180	3072	2965
15	3994	3693	3516	3400	3284	3170
16	4252	3932	3744	3620	3497	3375
17	4510	4171	3971	3839	3709	3580
18	4768	4409	4198	4059	3921	3785
19	5026	4648	4425	4279	4133	3989
20	5284	4887	4653	4498	4346	4194
21	5542	5126	4880	4718	4558	4399
22	5800	5364	5107	4938	4770	4604
23	6059	5603	5335	5158	4983	4809
24	6317	5842	5562	5377	5195	5014
25	6575	6081	5789	5597	5407	5219
26	6833	6319	6016	5817	5619	5424
27	7091	6558	6244	6037	5832	5629
28	7349	6797	6471	6256	6044	5834
29	7607	7035	6698	6476	6256	6038
30	7865	7274	6926	6696	6469	6243

SUPPLEMENTARY DATA

SUPPLEMENTARY DATA

The external surface of heating bodies shall be provided with a final paint prior to their putting into operation.

Thermal power changes if other heat-transfer fluid than the bodies were verified for (e.g. anti-free mixture) is used. Thus, utilization of such mixtures shall be consulted with the manufacturer of radiators.

We recommend to add inhibitors to the heat carrying medium (e.g. INHICOR I, II).

All models of heating bodies may be provided with thermostatic valves.

SURFACE FINISHING

The bodies are provided with the anticorrosive protective primer at the manufacturer's facility. The final paint is performed by organization ensuring assembly based on requirements of the implementation project and/or customers. On request we are able to secure supply of heating bodies already provided with a final paint directly from TT Viadrus. The front contact surfaces of outlets and openings for nipples are protected by plastic closures (caps).

BOHEMIA heating bodies are provided with a final paint in the mill, particularly WECO-FAN paint, hue 9007.

INSTALLATION INSTRUCTIONS

If the cast-iron heating bodies are used for central heating systems with forced circulation of heating water it is advisable to perform flushing of the system (preferably three times) prior to turning the pump on. This will ensure removal of all impurities, avoid clogging of ceramic plates of the pump and ensure long-term trouble-free operation.

PACKAGING, TRANSPORT, STORAGE

KALOR, KALOR 3, TERMO

These heating bodies are usually delivered in sets of 10 sections, however, different size of the set can be provided based on agreement. Products may be shipped by all suitable means of transport, e.g. railway cars, trucks, containers, etc. The sets are placed horizontally during transport – bodies with depth of 160 and 130 mm in max. 7 layers, while bodies with depth of 110 mm and smaller in max. 10 layers. The sets shall be secured against shifting during transport properly. The lowermost layer shall be laid on horizontal surface to avoid slipping. Customer shall store the products in such a way to protect them against climatic effects. The same principles apply to storage as applicable to transport.

When handling the sets it is necessary to exercise a proper care to avoid damage of sections. Sets can be carried only in vertical position in order to prevent their deflection (applies especially to longer sets) and damage or packing in joints.

BOHEMIA

These heating bodies are supplied in sets per customer's requirement, from 3 up to 19 sections. Bodies consisting of 3 up to 12 sections include 2 sections BOHEMIA 450/220 with foot. Maximum number of sections is 19 and such a set includes 3 sections BOHEMIA 450/220 with foot (third section with foot is located in the middle). The same applies also to systems consisting of 13, 15 and 17 sections (from 12 sections up only odd numbers of sections are supplied). Heating bodies are wrapped into protective foil. Cardboard sheets are inserted between individual sections placed on the transport pallet. These packages can be disposed of as a normal municipal waste. Products may be shipped by all suitable means of transport, e.g. railway cars, trucks, containers, etc. The sets shall be secured against shifting during transport properly. Customer shall store the

products in such a way to protect them against climatic effects. The same principles apply to storage as applicable to transport.

When handling the sets it is necessary to exercise a proper care to avoid damage of sections. Sets can be carried only in vertical position in order to prevent their deflection (applies especially to longer sets) and damage or packing in joints.

ORDERING

Purchase order shall include the following data:

- type of heating body (Kalor, Kalor 3, Termo or Bohemia)
- connection spacing and depth
- number of sections or sets expressed in pieces, or external equivalent heating surface in m²

As accessories customers may order brackets, holders, bolts, gudgeons, stand profile with the set and all necessary roses and plugs according to information provided in the Installation instructions chapter.

WARRANTY

Manufacturer provides 10 years warranty covering production defects on heating systems delivered. The warranty period starts as of the ex-works shipment date from Viadrus mill.

DESIGNING DATA

DESIGNING DATA

The main thermal and technical parameters for all types of heating bodies are indicated in tables. The following formulae apply to conversion of thermal power of a heating body from basic operating mode for other warm-water difference than stated in previous text.

$$\phi = \phi_S \cdot \varphi_{\Delta t} \quad t = \frac{t_1 + t_2}{2} - t_r \quad \text{for warm-water heating}$$

$$\varphi_{\Delta t} = \left(\frac{t}{t_D} \right)^m \quad t = t_{PK} - t_r \quad \text{for steam heating}$$

m	(-)	.....	temperature exponent
Φ	(W)	.....	thermal power
Φ_s	(W)	.....	nominal thermal power (in basic operating mode)
t_r	(°C)	.....	air temperature
t_{PK}	(°C)	.....	steam condensation temperature
t₁	(°C)	.....	inlet water temperature
t₂	(°C)	.....	outlet water temperature
Δt	(°C)	.....	temperature difference
Δt_D	(°C)	.....	definition temperature difference in basic operating mode
φ_{Δt}	(°C)	.....	corrective factor for temperature difference

Detailed information on conversion of the heating body's thermal power for other operating conditions are provided in the Czech standard CSN 06 1101 or other appropriate standards applicable in individual countries.

PRESSURE LOSSES

Pressure losses of all type of heating bodies manufactured were verified experimentally. Data provided in Table 76 apply to particular calculations of pressure losses at the water flow. These data can be used independently on the number of cells in the system for two-point connection to the distribution piping.

Table 1: Factors for calculation of pressure losses

Pipe connection size	ξ _T (-)	A _T (m ²)
DN 6 (1/8")	1.0	0.00008
DN 8 (1/4")	1.0	0.00010
DN 10 (3/8")	1.0	0.00013
DN 15 (1/2")	2.5	0.00018
DN 20 (3/4")	2.5	0.00030
DN 25 (1")	2.5	0.00046
DN 32 (5/4")	2.5	0.00091

Formula for calculation of pressure losses Δp (Pa) is as follows:

$$\Delta p = \xi T \cdot \frac{w^2}{2} \cdot \rho_w = \frac{(V)^2}{(A_T)^2} \cdot \rho_w$$

ξ_T	(-)	.....	drag coefficient
A_T	(m ²)	.....	flow coefficient
w	(m.sec ⁻¹)	.....	water velocity in pipeline
V	(m ³ .sec ⁻¹)	.....	volume flow of water
ρ_w	(kg.m ⁻³)	.....	water density

INTEGRATED THERMOSTATIC VALVE

INTEGRATED THERMOSTATIC VALVE “VIADRUS ITV“ with adjustable valve insert “V” and thermostatic head

Thanks to application of thermostatic valves in heating equipment it is possible to control individually the required room temperature and save the energy. This ensures reduction of heating costs.

Various application conditions required different sizes – dimensions of thermostatic valves (DN 10 – DN 20, sizes 3/8“, 1/2“, 3/4“).

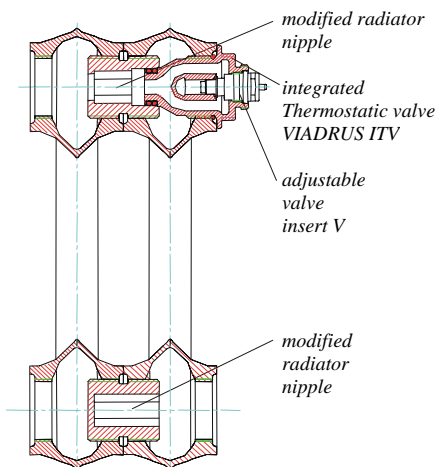
Integrated thermostatic valve “VIADRUS ITV” with adjustable valve insert “V” and thermostatic head was developed based on cooperation of company ŽDB a.s., VIADRUS heating equipment mill with Honeywell company. This valve can be used for the above specified dimension – size range.

Integrated thermostatic valve “VIADRUS ITV“ with adjustable valve insert “V” and thermostatic head is supplied with a pair of heating sections coupled together using modified radiator nipples.

At the present time a version with 5/4” thread is being produced. This version can be used for heating bodies of the following types:

- **KALOR manufactured in eight models:** 350/160 mm, 500/70 mm, 500/110 mm, 500/160 mm, 500/220 mm, 600/160 mm, 900/70 mm and 900/160 mm.
- **KALOR 3 manufactured in five models:** 350/160 mm, 500/70 mm, 500/110 mm, 500/160 mm and 900/70 mm.

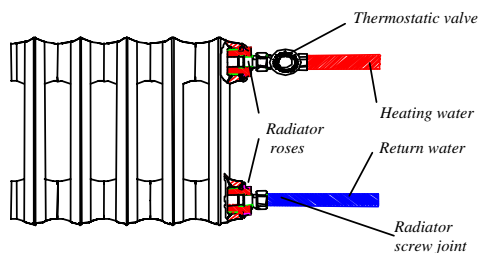
Schematic representation of two connected sections with integrated thermostatic valve and adjustable valve insert is illustrated on the following figure:



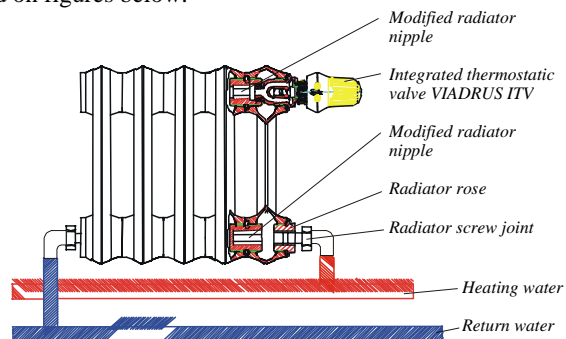
ADVANTAGES OF INTEGRATED THERMOSTATIC VALVE VIADRUS ITV:

- More advanced heating water connection
- Installation of integrated valve directly into heating body
- Simpler assembly of heating bodies

Integrated thermostatic valve “VIADRUS ITV“ with adjustable valve insert “V“ allows a different method of heating and return water connection, which is illustrated on figures below.



EXAMPLE OF CLASSIC INSTALLATION

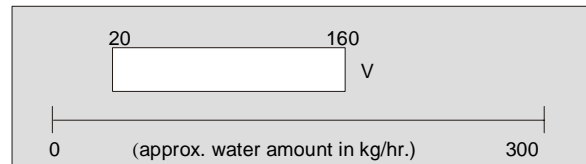


EXAMPLE OF A NEW INSTALLATION WITH INTEGRATED THERMOSTATIC VALVE

INTEGRATED THERMOSTATIC VALVE “VIADRUS ITV“ With adjustable insert “V“

A. TECHNICAL DESCRIPTION

- For warm-water central heating systems with gravity and forced circulation of heating water
- For two-pipe heating systems with medium volume of heating water
- With stepless pre-control (infinitely adjustable) for medium volume of heating water



- Setting up using special wrench

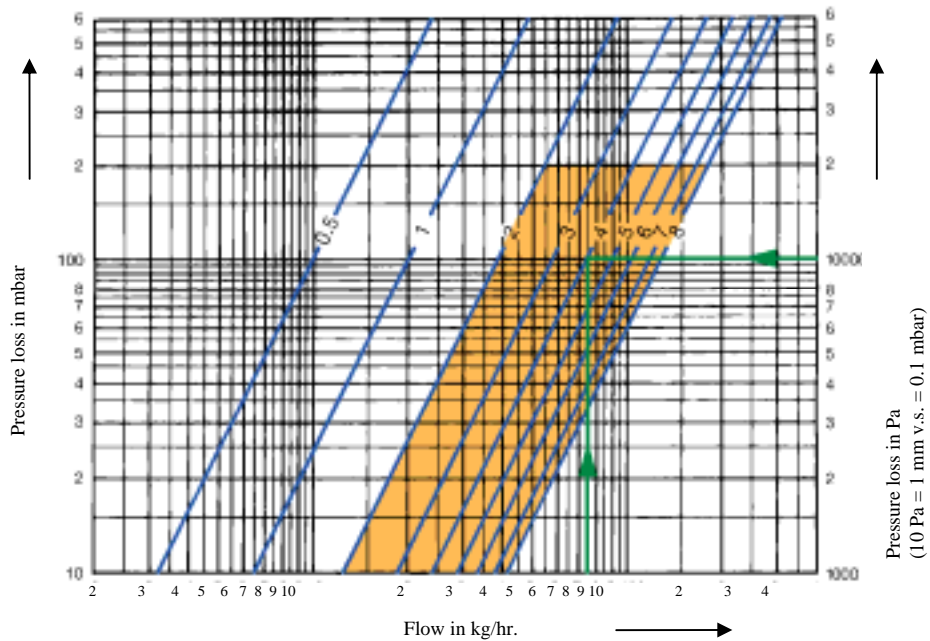



- Set-up visible also from outside
- Noiseless
- k_v equal to 0.51
- Highest operating temperature of heating water below 120 °C
- Maximum operating pressure 8 bar
- Maximum differential pressure 2 bar
- Connection of heating body with ITV to all pipe sizes DN 10 – DN 20 (3/8“, 1/2“, 3/4“)
- pH value of heating water from 4 up to 9.5
- Adjustable valve insert “V“



B. TECHNICAL DATA

Flow diagram for body of thermostatic valve V



 x = recommended application area

Pre-control	0.5	1	2	3	4	5	6	7	8*
Pp = 2 K	0.03	0.06	0.12	0.18	0.23	0.28	0.33	0.38	0.41
k _v (m ³ /h)	0.03	0.06	0.12	0.18	0.25	0.32	0.38	0.44	0.51

* At full stroke

Example of sizing:

Specified: flow rate 75 kg/hr.

To be found out: set-up at required pressure loss Dp = 10 000 Pa = 100 mbar

The pressure loss looked for is obtained as a point of intersection of the flow line with selected valve parameter, e.g. at Pp = 2 K.

Result: position 4

k_v – flow rate – amount of heating fluid (heating water), which flows through the valve at given pre-control

Pp – 2nd zone of proportionality – change of required value in order to ensure shifting of actuator (valve) from one limit position to the other one.

2 K – 2 Kelvin temperature difference for operation of the valve (for apartments – 2, for industrial halls - 3)

ACCESSORIES

ACCESSORIES

As accessories customers may order brackets, holders, spacers, bolts, and stand profiles according to article numbers specified in Installation instructions chapter. Roses, plugs and packing can be ordered using specific names indicated on Fig. 1 Accessories.

In addition to the above it is necessary to specify, whether the rose should be provided with left-hand or right-hand thread. Internal thread in the rose can be 3/8", 1/2", 3/4" or 1". Plug is a full rose.

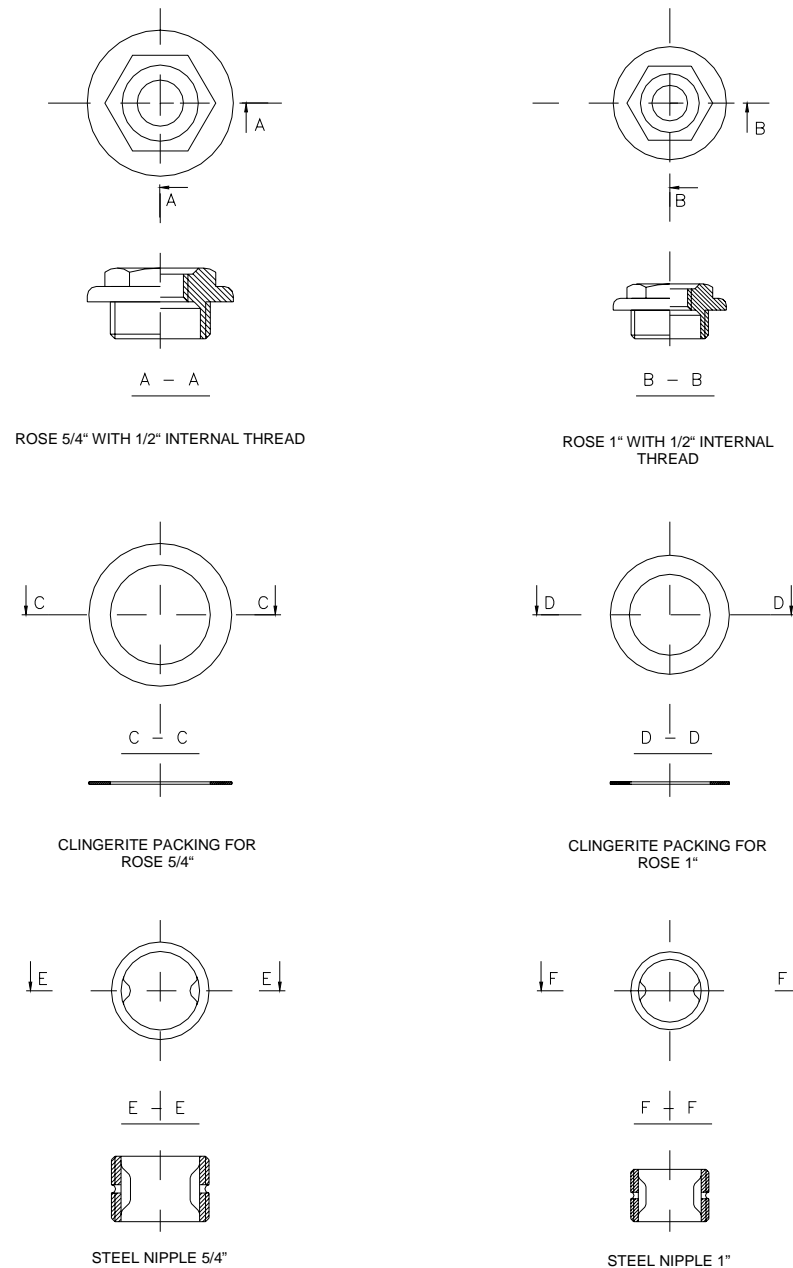


Fig. 1: Accessories

We recommend to fix the heating bodies using one of the following methods

Installation of Bohemia heating bodies should be performed by their positioning on the feet of the body.

1. Utilization of special brackets with holders and spacers acc. to Fig. 2

They are used similarly to pipe brackets for fixation of heating bodies to solid walls. Their advantage consists especially in significantly simpler and quicker installation (when drilling holes for brackets it is not necessary to maintain accurate spacing and width of sections in sets). This allows a very simple installation of all types and sizes of heating bodies manufactured.

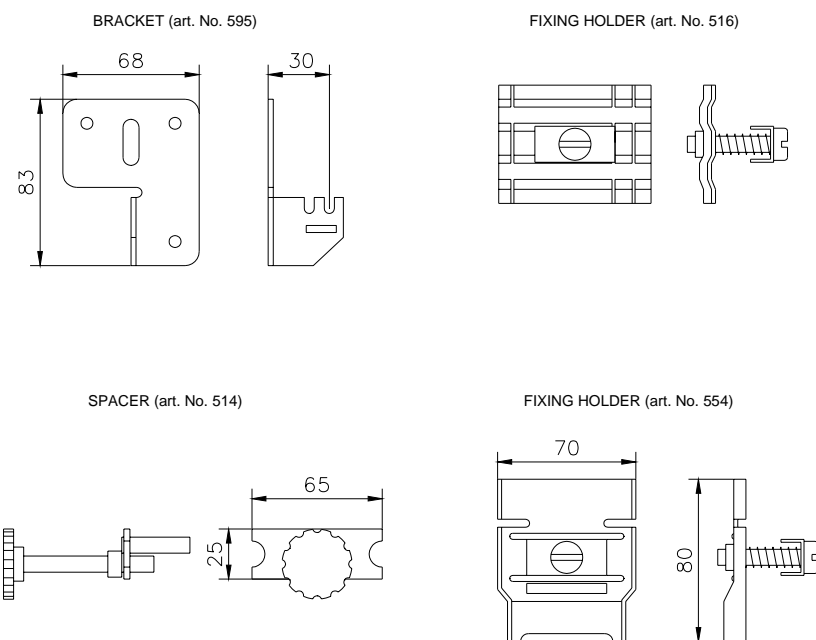


Fig. 2: Bracket with fixing holder and spacer

Complete kit for given fixation method includes:

- **bracket (art. No. 595)**
- **fixing holder (art. No. 516 or art. No. 554, both are identical)**
- **spacer (art. No. 514)**
- **bolt 8 x 60 (art. No. 1051)**
- **gudgeon ϕ 10 (art. No. 1071-1).**

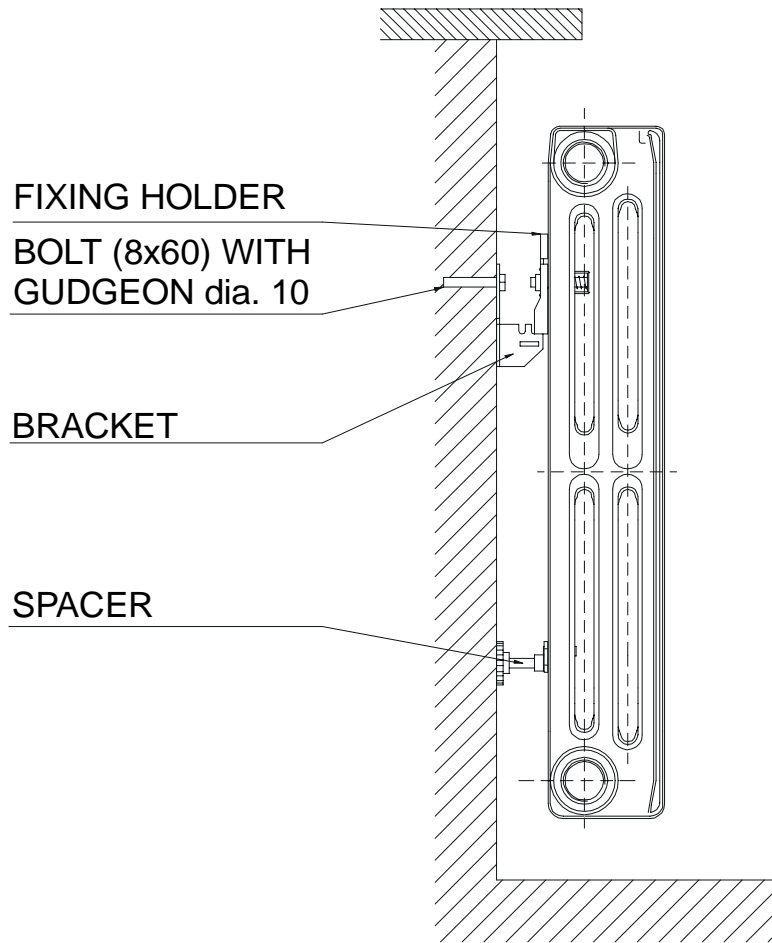


Fig. 3: Fixation of heating bodies using brackets with fixing holders

Table 1: Number of brackets with fixing holders depending on dimension of sections

Dimensions of sections (mm)	Number of sections														
	3	4	6	8	10	12	14	16	18	20	22	24	26	28	30
K 500/70			2				2		2		2		2	3	3
K 500/110, K3 500/70, T 500/95			2				2		2		2		3	3	3
K 350/160, K 900/70, K3 350/160, K3 500/110, T 623/95			2				2		2		3		3	3	3
K 500/160, K 600/160, K3 900/70, T 500/130			2				2		3		3		3	3	3
K3 500/160, K 500/220, T 623/130, T 813/95			2				2		3		3		3	3	3
T 813/130			2				3		3		3		3	4	4
K 900/160			2				3		3		4		4	4	5

2. Screw brackets with fixing holders and spacers are designed for fixation of heating bodies into hollow walls

Proceed in compliance with Fig. 4 (indicates all items necessary to assembly including article numbers; fixing holders can be used in the same way as in previous example). This method may be used for all types of heating bodies manufactured.

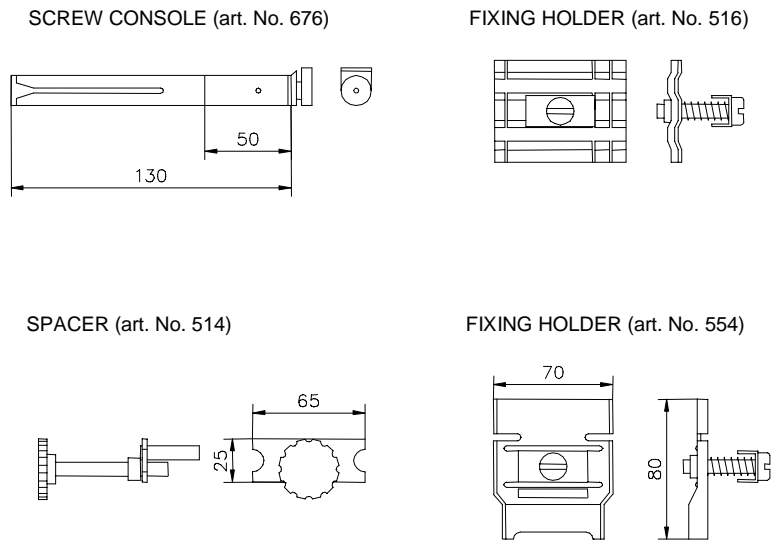


Fig. 4: Screw bracket with fixing holder and spacer

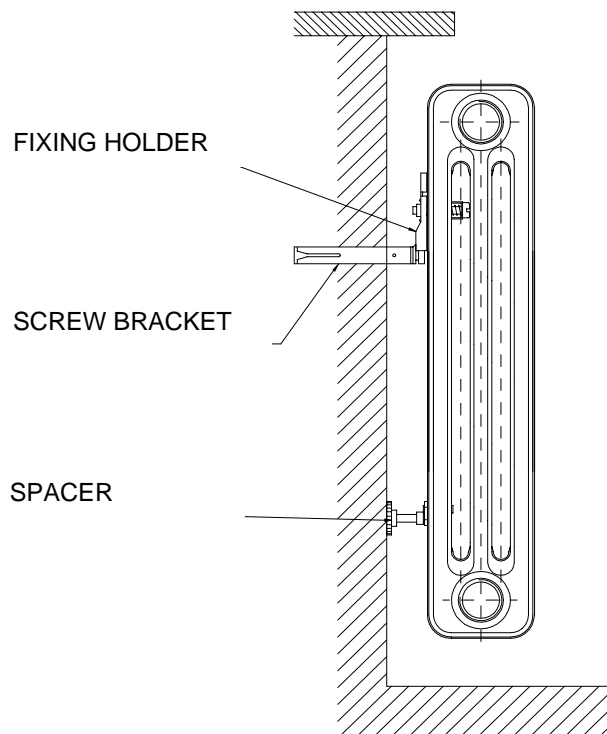


Fig. 5: Fixation of heating bodies into hollow walls using screw brackets

Table 2: Number of screw brackets with fixing holders depending on dimension of sections

Dimensions of sections (mm)	Number of sections														
	3	4	6	8	10	12	14	16	18	20	22	24	26	28	30
K 500/70,	2			2			3			3			3		
K 500/110, K3 500/70, T 500/95	2			3			3			3			4		
K 350/160, K 900/70, K3 350/160, K3 500/110, T 623/95	2			3			3			3			4		
K 500/160, K 600/160, K3 900/70, T 500/130	2	3		3		3	3	4	4		4	4	4	5	
K3 500/160, K 500/220, T 623/130, T 813/95	2	3		3		4	4	4		4	4	5	5		
T 813/130	2	3		3		4	4	4		4	5	5	5		
K 900/160	2	3		4		4	5	6		6	6	6	6		

3. Fixation of heating bodies to a stand

Proceed in compliance with Fig. 6 and 7. Indicated method is suitable for all models manufactured. We recommend to use it in rooms with plasterboard partition walls or facing and in all places where it is impossible to apply fixation according to Fig. 1 – 3. Foot of the stand can be fixed into the floor by screwing down or embedding in concrete, e.g. for sizes 900/160, 900/70 and so on.

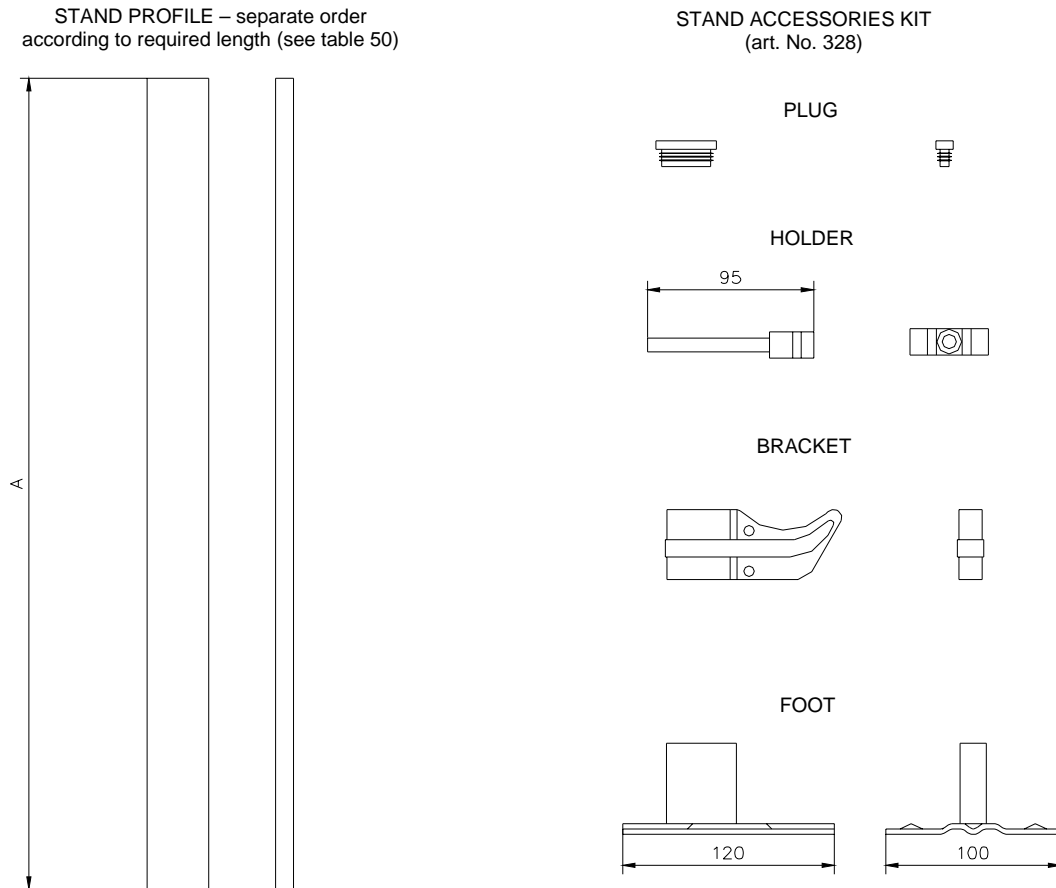


Fig. 6: Stand with accessories kit

Table 3: Ordering number of the stand profile

Length A(mm)	360	460	510	560	610	660	710	760	860	960	1060	1160
Ordering No.	360-1	460-1	510-1	560-1	610-1	660-1	710-1	760-1	860-1	960-1	1060-1	1160-1

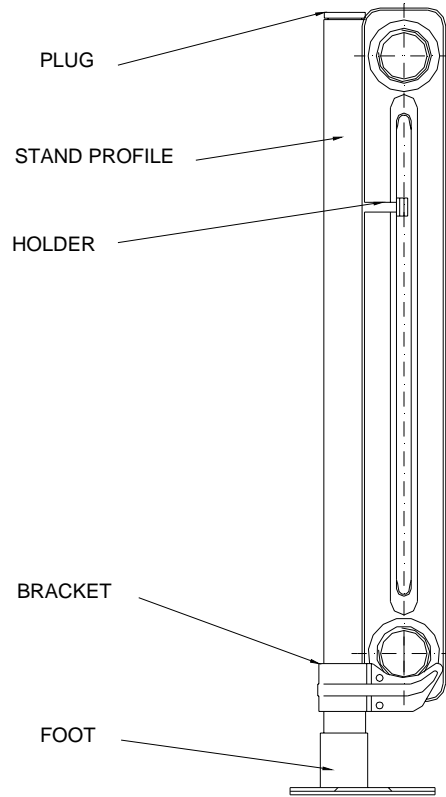


Fig. 7: Fixation of heating bodies using stand

Table 4: Number of stands depending on dimensions of sections

Dimensions of sections (mm)	Number of sections														
	3	4	6	8	10	12	14	16	18	20	22	24	26	28	30
K 500/70	2					2		3				3	3	3	3
K 500/110, K3 500/70, T 500/95	2					3		3				3	3	4	4
K 350/160, K 900/70, K3 350/160, K3 500/110, T 623/95	2					3		3				3	4	4	4
K 500/160, K 600/160, K3 900/70, T 500/130	2			3		3		3		4		4	4	4	5
K3 500/160, K 500/220 T 623/130, T 813/95	2			3		3		4		4		4	4	5	5
T 813/130	2			3		3		4		4		4	5	5	5
K 900/160	2			3		4		4		5		6	6	6	6

4. Using classic radiator pipe brackets and holders

These can be used for fixation of bodies on solid walls. This method is suitable for types Kalor. In case of Kalor 3 and Termo types it is necessary to use brackets instead of holders.

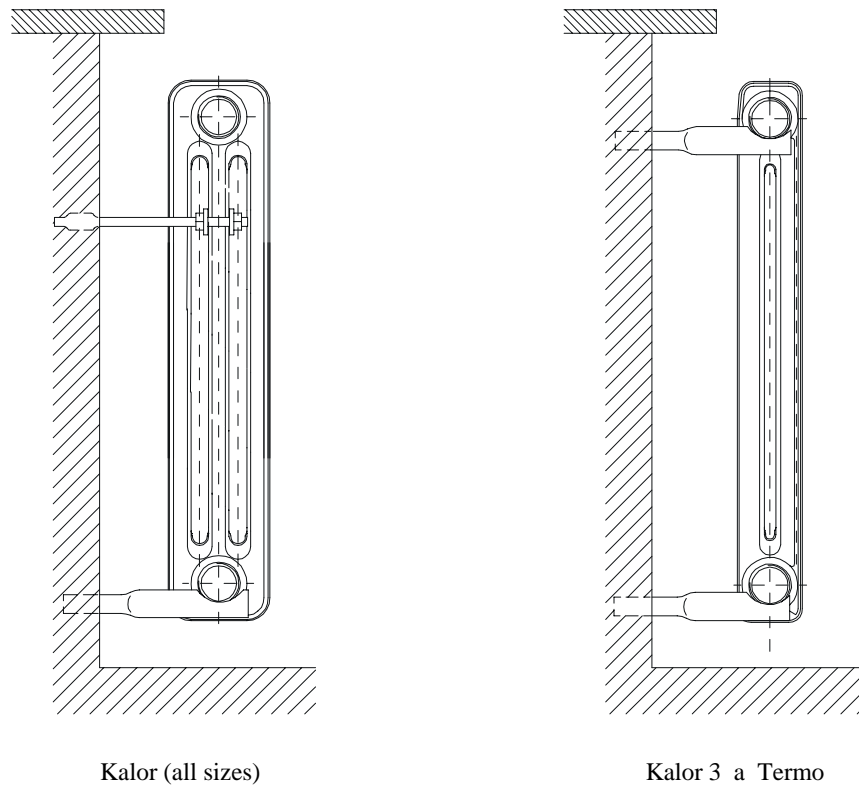


Fig. 8: Fixation of heating sections using pipe brackets and holders

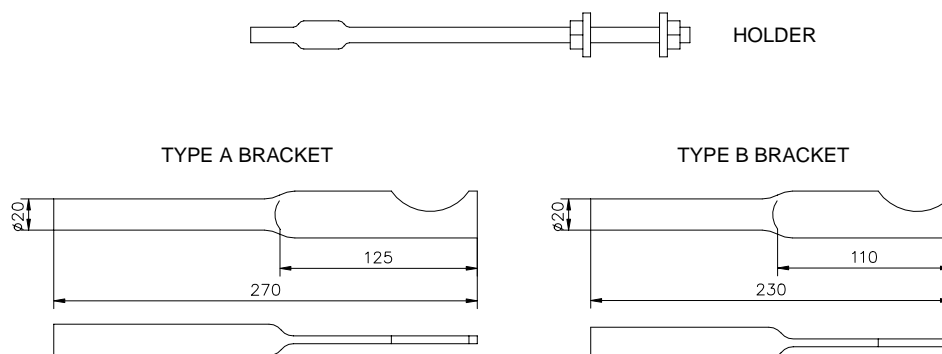


Fig. 9: Radiator pipe brackets and holder

Selection of a bracket is made based on depth of heating bodies, see Table 5. Number of brackets depending on dimensions and number of sections is indicated in Table 6. For sets of up to 4 sections it suffices to use 1 holder. Two holders are usually used for systems with more sections.

Table 5: Recommended types of pipe brackets according to type of heating bodies

Bracket type	Heating body size (spacing / depth)
A	350/160, 500/110, 500/160, 900/160, 500/130, 623/130, 813/130
B	500/70, 500/95, 623/95, 813/95, 900/70

Table 6: Number of brackets depending on dimensions of sections

Dimensions of sections (mm)	Number of sections														
	3	4	6	8	10	12	14	16	18	20	22	24	26	28	30
K 500/70		2					2		3			3	3	4	4
K 500/110, K3 500/70, T 500/95		2					2		3			3	3	4	4
K 350/160, K 900/70, K3 350/160, K3 500/110, T 623/95		2					2		3			3	3	4	4
K 500/160, K3 900/70, T 500/130		2					2		3			3	4	4	4
K3 500/160, T 623/130, T 813/95		2					2		3			3	4	4	4
T 813/130		2					2		3			3	4	4	4
K 900/160		2					3		4			5	5	5	6



Fig. 10: Threaded screws, for top fixation of heating sections into the wall

5. Support under KALOR heating body

This fixation method is used for KALOR and KALOR 3 heating bodies in combination with holders.

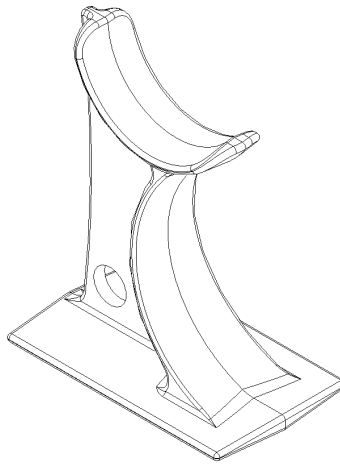


Fig. 11: Support under heating bodies KALOR and KALOR 3

Table 7: Number of brackets depending on dimensions of sections

Dimensions of sections (mm)	Number of sections														
	3	4	6	8	10	12	14	16	18	20	22	24	26	28	30
KALOR 500/70				2				3		4		4	4	5	5
KALOR 500/110				2				3		4		4	4	5	5
KALOR 350/160				2				3		4		4	4	5	5
KALOR 900/70				2				3		4		4	4	5	5
KALOR 500/160,				2				3		4		4	4	5	5
KALOR 900/160,				2				3		4		4	4	5	5

6. Using classic radiator pipe brackets

These can be used for fixation of bodies into solid walls. This type of fixation is suitable for heating body BOHEMIA.

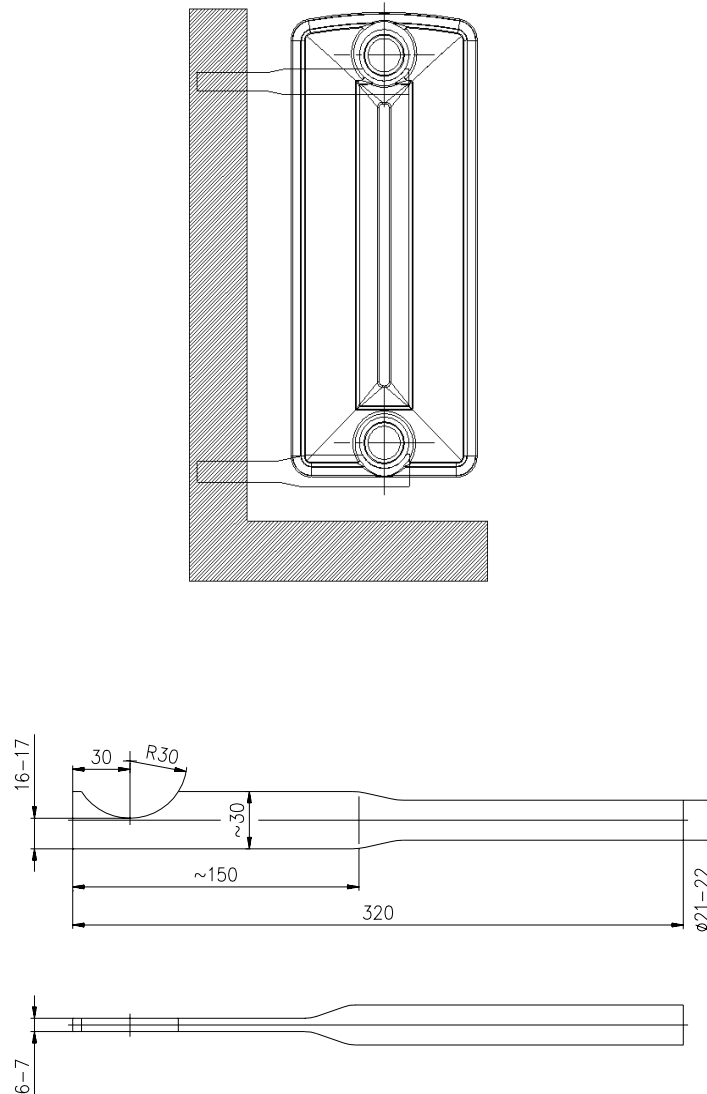


Fig. 12: Bracket for fixation of BOHEMIA heating bodies

Table 8: Number of brackets depending on dimensions of sections

Dimensions of sections (mm)	Number of sections														
	3	4	6	8	10	12	14	16	18	20	22	24	26	28	30
Bohemia 450/220		2				3			4		5	5	5		6