

### Application

Single- or double-acting piston actuator for butterfly valves and other final control elements with rotary closure members

**Maximum opening angle**  $\varphi = 94^\circ$

The Types BR 31a Pneumatic Rotary Actuators are piston actuators for throttling or on/off service.

### Special features

- Externally adjustable travel stops ( $\pm 4^\circ$ )
- Square-end position either diagonal (European standard) or parallel
- Position indicator can be customized (in steps of  $45^\circ$ )
- No special tools needed for mounting and conversion
- Various spring cartridges
- Power transmission without clearance thanks to involute serrations
- Direction of rotation can be reversed without additional components
- Special surface treatment method
- Designed for signal pressures up to 8 bar and for continuous operation at temperatures from  $-20$  to  $80^\circ\text{C}$

Attachment of positioner, limit switch, solenoid valve, and other devices conforming to VDI/VDE 3845.

### Versions

**Type SRP** (Figs. 1 and 2) · Single-acting pneumatic rotary actuator with spring-return mechanism in sizes 15 to 5000

**Type DAP** · Double-acting pneumatic rotary actuator without spring-return mechanism in sizes 15 to 5000

### Further versions

- With manual override
- For continuous operation at temperatures from  $-20$  to  $150^\circ\text{C}$  using FPM (FKM) O-rings or
- For continuous operation at temperatures from  $-40$  to  $80^\circ\text{C}$  using silicone gaskets
- With opening angles of  $120^\circ$  and  $180^\circ$
- Three-position actuator
- With hydraulic rotating speed adjuster
- Stainless steel rotary actuator



Fig. 1 · Pfeiffer Type BR 31a Rotary Actuator, Type SRP 220

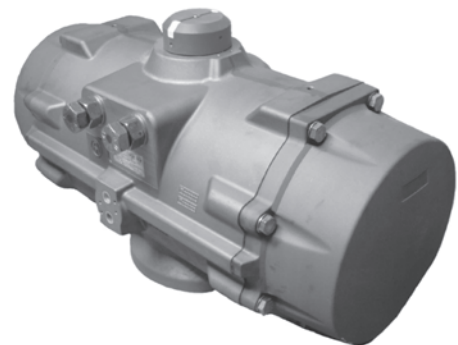


Fig. 2 · Pfeiffer Type BR 31a Rotary Actuator, Type SRP 5000

### Principle of operation

The signal pressure  $p_{st}$  generates a force at the piston surface which is balanced either by the compression springs in the actuator (single-acting version) or by a corresponding counterpressure (double-acting version).

The force generated at the pistons is converted into a rotary motion using the pinion shaft. The adjustable travel stops for OPEN and CLOSED position allow the end positions to be finetuned to  $\pm 4^\circ$ .

In the single-acting version, the spring return torque and the required signal pressure are determined by the number of springs.

Fig. 4 shows the usable air torques

- $M_{dLE}$  for the single-acting version
- $M_{dLD}$  for the double-acting version

and the usable spring torques  $M_{dF}$  depending on the opening angle  $\varphi$ .

### Fail-safe position

The Type SRP Rotary Actuator offers two possible fail-safe actions (rotary motions) in case the supply air fails or the pistons are relieved of pressure. The rotation directions apply when looking from the actuator towards the valve.

"Springs turn clockwise"

Springs rotate clockwise when the pressure drops.

"Springs turn counterclockwise"

Springs rotate counterclockwise when the pressure drops.

The Type DAP Actuator is designed without springs. The actuator does not move to a defined end position when the supply air fails.

### Ordering text

Actuator type	BR 31a, Type DAP or SRP
Size	15, 30, 60, 100, 150, 220, 300, 450, 600, 900, 1200, 2000, 3000 or 5000
No. of springs	Only for single-acting Type SRP
Fail-safe action	Springs turn clockwise or counterclockwise (only for single-acting Type SRP)
Supply pressure	.... bar
Operating range	No. of springs or bench range
VDI/VDE bracket	For attachment of positioner or signaling devices

Specifications subject to change without notice.

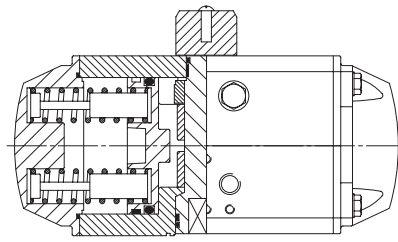


Fig. 3 · Pfeiffer Type BR 31a Rotary Actuator

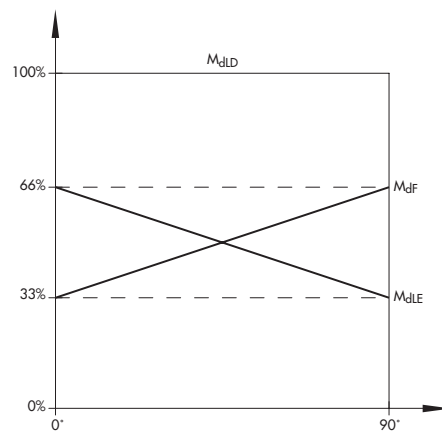


Fig. 4 · Torques at recommended supply pressure

**Table 1 · Technical data for Type BR 31a Rotary Actuators**

Principle of operation	Single-acting or double-acting	
Max. permissible signal pressure	8 bar	
Sizes	Type 15 to Type 5000 (8.3 to 6300 Nm)	
Connection to valve	EN 12116/DIN 3337	
Connection to positioner or signaling devices	Types 15 to 150	VDI/VDE 3845, size 1
	Types 220 to 600	VDI/VDE 3845, size 2
	Types 900 to 5000	VDI/VDE 3845, size 4
Connection to pilot valve	VDI/VDE 3845	
Permissible temperature range	-20 to 80 °C in continuous operation	

**Table 2 · Materials**

Housing	AlMgSi0.5 F25
Cover	GD-AlSi8.5 Cu3.5 Fe
Shaft	ASTM A 105
Compression spring cartridge	ASTM A 401
Piston	GD-AlSi8.5 Cu3.5 Fe

**Table 3 · Torques in Nm for double-acting Type DAP Actuators**

Type DAP	Torques in Nm at supply pressure												
	2.5	3	3.5	4	4.2	4.5	5	5.5	6	6.5	7	7.5	8
15	8.3	10	11.6	13.3	14	15	16.6	18.3	19.9	21.6	23.3	24.9	26.6
30	14.7	17.6	20.5	23.5	24.6	26.4	29.3	32	35.2	38.1	41	44	46.9
60	29.1	34.9	40.7	46.5	48.9	52.4	58.2	64	69.8	75.6	81.4	87.3	93.1
100	45.8	54.9	64.1	73.2	76.9	82.4	91.5	101	110	120	128	138	146
150	66.5	79.8	93.1	106	112	120	133	146	160	173	186	199	213
220	107	129	150	172	181	193	215	236	258	279	301	322	344
300	138	166	194	222	233	249	277	305	332	360	388	415	443
450	217	261	304	348	365	391	435	478	522	565	609	652	696
600	284	340	397	454	477	511	567	624	681	737	794	851	908
900	383	459	536	613	643	689	766	842	919	996	1072	1149	1225
1200	532	638	745	851	893	957	1064	1170	1276	1383	1489	1595	1702
2000	893	1072	1251	1430	1501	1608	1787	1966	2144	2318	2502	2684	2859
3000	1297	1556	1815	2075	2179	2334	2594	2853	3112	3372	3631	3890	4150
5000	2252	2703	3153	3604	3784	4054	4504	4955	5405	5855	6306	-	

**Table 4a · Torques in Nm for single-acting Type SRP Actuators at 2.5 to 4.2 bar supply pressure**

Recommended actuator setups highlighted in gray

Type SRP	No. of springs	Air torques in Nm at 2.5 to 4.2 bar										Spring torques	
		2.5 bar		3 bar		3.5 bar		4 bar		4.2 bar		Start	Stop
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	90°	0°
15	2/3	4.9	3.4	6.6	5.1	8.3	6.8	9.9	8.4	10.6	9.1	4.9	3.4
	3	4.3	2.5	5.9	4.1	7.6	5.8	9.3	7.4	9.9	8.1	5.8	4.0
	3/4			5.3	3.1	6.9	4.8	8.6	6.5	9.2	7.1	6.8	4.7
	4					6.2	3.8	7.9	5.5	8.6	6.2	7.8	5.4
	4/5							7.2	4.5	7.9	5.2	8.8	6.1
30	2/3	9.1	6.2	12	9.2	15	12.1	17.9	15	19.1	16.2	8.4	5.5
	3	8	4.5	10.9	7.5	13.9	10.4	16.8	13.3	18	14.5	10.1	7
	3/4			9.8	5.8	12.8	8.7	15.7	11.6	16.9	12.8	11.8	7.8
	4					11.6	7	14.6	10	15.7	11.1	13.5	8.9
	4/5							13.5	8.3	14.6	9.4	15.2	10
60	2/3	18	11.8	23.8	17.6	29.7	23.4	35.5	29.2	37.8	31.6	17.3	11.1
	3	15.8	8.3	21.6	14.1	27.5	19.9	33.3	25.8	35.6	28.1	20.8	13
	3/4			19.4	10.7	25.2	16.5	31.1	22.3	33.4	24.6	24.2	15.5
	4					23	13	28.8	18.8	31.2	21.2	27.7	17.7
	4/5							26.6	15.4	29	17.7	31.2	19.9
100	2/3	27.4	16.9	36.6	26	45.7	35.2	59.4	44.3	58.5	48	28.9	18.3
	3	23.8	11.1	32.9	20.3	42.1	29.4	51.2	38.6	54.9	42.2	34.7	22
	3/4			29.2	14.5	38.4	23.6	47.5	32.8	51.2	36.4	40.4	25.7
	4					34.7	17.9	43.9	27	47.5	30.7	46.2	29.3
	4/5							40.2	21.2	43.9	24.9	52	33
150	2/3	41.1	27.1	54.4	40.4	67.7	53.7	81	67	86.3	72.3	39.4	25.3
	3	36.1	19.2	49.4	32.5	62.7	45.8	76	59.1	81.3	64.4	47.3	30
	3/4			44.3	24.6	57.6	37.9	70.9	51.2	76.2	56.5	55.1	35.5
	4					52.5	30	65.8	43.3	71.1	48.7	63	40.5
	4/5							60.8	35.5	66.1	40.8	70.9	45.6
220	2/3	66.5	41.9	87.9	63.4	109.4	84.9	131	106.4	140	115	65.5	41
	3	58.3	28.8	79.7	50.3	101.2	71.8	123	93.3	131	101.9	78.6	49.2
	3/4			71.5	37.2	93	58.7	115	80.2	123	88.8	91.7	57.4
	4					84.8	45.6	106	67.1	115	75.7	105	65.6
	4/5							98	54	107	63.6	118	73.8
300	2/3	86	56	114	84	141	111	169	139	180	150	82	53
	3	75	40	103	67	131	95	159	123	170	134	99	63
	3/4			93	51	120	79	148	106	159	117	115	74
	4					110	62	138	90	149	101	132	84
	4/5							127	73	138	84	148	95

Type SRP	No. of springs	Air torques in Nm at 2.5 to 4.2 bar										Spring torques	
		2.5 bar		3 bar		3.5 bar		4 bar		4.2 bar		Start	Stop
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	90°	0°
450	2/3	135	89	179	132	222	176	265	219	283	236	129	82
	3	119	63	162	106	206	150	249	193	266	211	155	99
	3/4			146	80	189	124	233	167	250	185	180	115
	4					173	98	216	142	233	159	206	132
	4/5							200	116	217	133	232	145
600	2/3	171	118	228	174	285	231	342	288	364	310	166	112
	3	149	84	206	141	262	198	319	255	342	277	199	135
	3/4			183	108	240	165	297	221	319	244	233	157
	4					218	131	274	188	297	211	266	180
	4/5							252	155	275	178	299	202
900	2/3	225	146	301	223	378	299	455	376	485	406	237	158
	3	193	99	270	175	346	252	423	329	454	359	284	190
	3/4			238	128	315	205	391	281	422	312	332	221
	4					283	157	360	234	390	264	379	253
	4/5							328	186	359	217	426	285
1200	2/3	319	217	426	323	532	430	638	536	681	578	315	213
	3	277	154	383	260	489	347	596	473	638	515	378	255
	3/4			341	197	447	304	553	410	596	453	441	298
	4					404	241	511	347	553	390	504	340
	4/5							468	284	511	327	567	383
2000	2/3	533	372	712	551	890	730	1069	908	1141	980	521	360
	3	461	268	640	447	818	625	997	804	1068	876	625	433
	3/4			568	343	746	521	925	700	996	771	730	505
	4					674	417	853	596	924	667	834	577
	4/5							781	491	852	563	938	649
3000	2/3	751	496	1011	755	1270	1015	1529	1274	1633	1378	801	546
	3	642	336	902	595	1161	854	1420	1114	1524	1217	961	655
	3/4			792	435	1052	694	1311	954	1415	1057	1121	764
	4					943	534	1202	793	1306	897	1281	873
	4/5							1093	633	1197	737	1442	982
5000	2/3	1332	1014	1783	1465	2233	1915	2684	2365	2864	2546	1238	920
	3	1149	767	1599	1217	2049	1667	2500	2118	2680	2298	1486	1104
	3/4			1415	969	1865	1420	2316	1870	2496	2050	1733	1288
	4					1682	1172	2132	1623	2312	1803	1981	1472
	4/5							1948	1375	2128	1555	2229	1656

**Table 4b · Torques in Nm for single-acting Type SRP Actuators at 4.2 to 8 bar supply pressure**

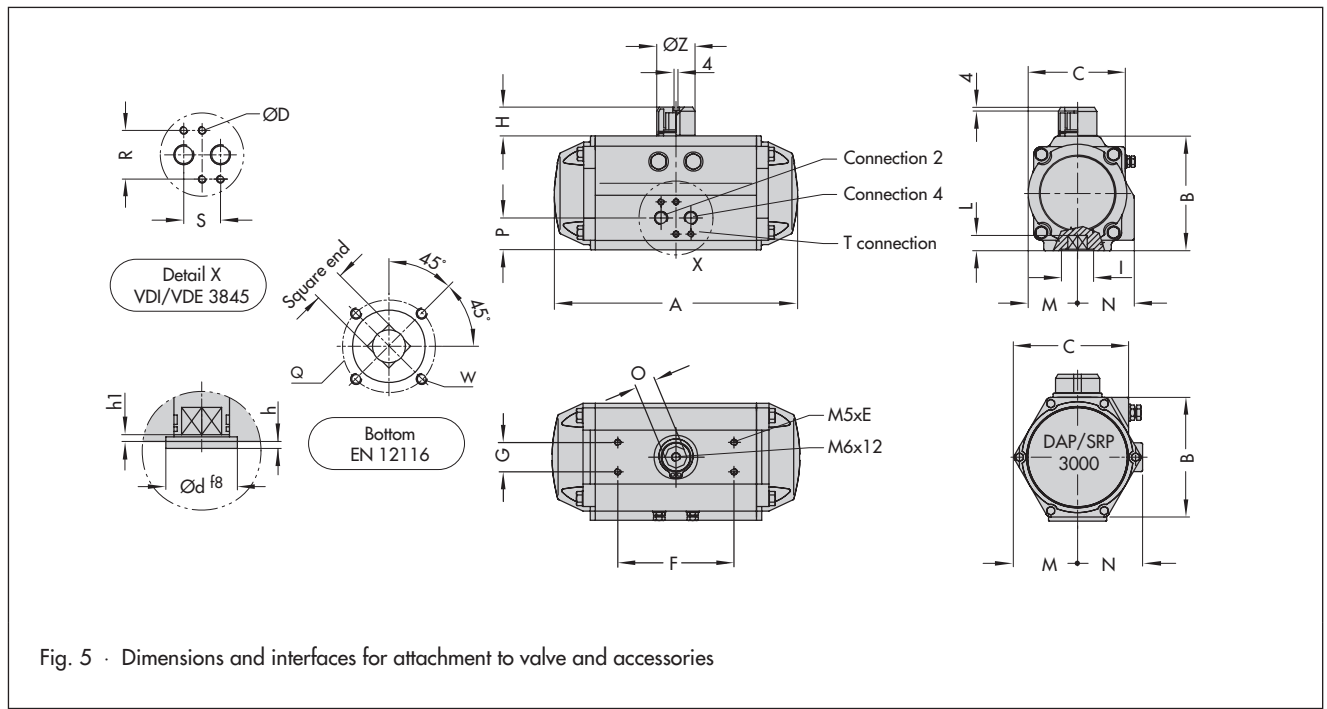
Recommended actuator setups highlighted in gray

Type SRP	No. of springs	Air torques in Nm at 4.2 to 9 bar												Spring torques	
		4.2 bar		4.5 bar		5 bar		5.5 bar		6 bar		8 bar		Start 90°	Stop 0°
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°		
15	4	8.6	6.2	9.6	7.2	11.2	8.8	12.9	10.5	14.6	12.1	–		7.8	5.4
	4/5	7.9	5.2	8.9	6.2	10.6	7.8	12.2	9.5	13.9	11.2	20.5	17.8	8.8	6.1
	5			8.2	5.2	9.9	6.9	11.5	8.5	13.2	10.2	19.8	16.8	9.7	6.7
	5/6					9.2	5.9	10.9	7.6	12.5	9.2	19.2	15.9	10.7	7.4
	6							10.2	6.6	11.9	8.2	18.5	14.9	11.7	8.1
30	4	15.7	11.1	17.5	12.9	20.4	15.8	23.4	18.7	26.3	21.7	–		13.5	8.9
	4/5	14.6	9.4	16.4	11.2	19.3	14.1	22.3	17.1	25.2	20	36.9	31.7	15.2	10
	5			15.3	9.5	18.2	12.4	21.1	15.4	24.1	18.3	35.8	30	16.9	11.1
	5/6					17.1	10.8	20	13.7	23	16.6	34.7	28.3	18.6	12.2
	6							18.9	12	21.9	14.9	33.6	26.7	20.2	13.3
60	4	31.2	21.2	34.7	24.7	40.5	30.5	46.3	36.3	52.1	42.1	–		27.7	17.7
	4/5	29	17.7	32.5	21.2	38.3	27	44.1	32.8	49.9	38.6	73.2	61.9	31.2	19.9
	5			30.2	17.7	36.1	23.6	41.9	29.4	47.7	35.2	71	58.5	34.6	22.1
	5/6					33.8	20.1	39.7	25.9	45.5	31.7	68.7	55	38.1	24.3
	6							37.5	22.4	43.3	28.3	66.5	51.5	41.5	26.5
100	4	47.5	30.7	53	36.2	62.2	45.3	71.3	54.5	80.5	63.6	–		46.2	29.3
	4/5	43.9	24.9	49.4	30.4	58.5	39.5	67.7	48.7	76.8	57.8	113.4	94.5	52	33
	5			45.7	24.6	54.8	33.5	64	42.9	73.1	52.1	109.8	88.7	57.8	36.7
	5/6					51.2	28	60.3	37.1	69.5	46.3	106.1	82.9	63.5	40.3
	6							56.7	31.4	65.8	40.5	102.4	77.1	69.3	44
150	4	71.7	48.7	79.1	56.6	92.4	69.9	105.7	83.2	119	96.5	–		63	40.5
	4/5	66.1	40.8	74	48.8	87.3	62.1	100.6	75.3	113.9	88.6	167.1	141.8	70.9	45.6
	5			69	40.9	82.3	54.2	95.6	67.5	108.9	80.8	162	133.9	78.8	50.7
	5/6					77.2	46.3	90.5	59.6	103.8	72.9	157	126.1	86.7	55.7
	6							85.4	51.7	98.7	65	151.9	118.2	94.5	60.8
220	4	115	75.7	128	88.6	149	110.1	171	131.6	192	153.1	–		105	65.6
	4/5	107	62.6	120	75.5	141	97	163	118.5	184	140	270.1	225.9	118	73.8
	5			111	62.4	133	83.9	154	105.4	176	126.9	261.9	212.8	131	82
	5/6					125	70.8	146	92.3	168	113.8	253.7	199.7	144	90.2
	6							138	79.2	159	100.7	245.5	186.6	157	98.4
300	4	149	101	165	117	193	145	221	173	248	201	–		132	84
	4/5	138	84	155	101	182	129	210	156	238	184	349	295	148	95
	5			144	84	172	112	200	140	227	168	338	278	165	105
	5/6					161	96	189	123	217	151	328	262	181	116
	6							179	107	206	135	317	245	198	126

Type SRP	No. of springs	Air torques in Nm at 4.2 to 9 bar												Spring torques	
		4.2 bar		4.5 bar		5 bar		5.5 bar		6 bar		8 bar		Start 90°	Stop 0°
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°		
450	4	233	159	260	185	303	229	347	272	390	316	–		206	132
	4/5	217	133	243	159	287	203	330	246	374	290	547	464	232	148
	5	–		227	134	270	177	314	221	357	264	531	438	258	165
	5/6	–		–		254	151	297	195	341	238	515	412	283	181
	6	–		–		–		281	169	324	213	498	386	309	198
600	4	297	211	331	245	288	302	444	358	501	415	–		266	180
	4/5	275	178	309	212	365	268	422	325	479	382	706	609	299	202
	5	–		286	178	343	235	400	292	456	349	683	575	332	224
	5/6	–		–		320	202	377	259	434	315	661	542	365	247
	6	–		–		–		355	225	411	282	638	509	399	269
900	4	390	264	436	310	513	387	589	464	666	540	–		379	253
	4/5	359	217	405	263	481	340	558	416	634	493	941	799	426	285
	5	–		373	216	450	292	526	369	603	445	909	752	474	316
	5/6	–		–		418	245	495	321	571	398	877	704	521	348
	6	–		–		–		463	274	540	351	846	657	568	379
1200	4	553	390	617	453	723	560	830	666	936	772	–		504	340
	4/5	511	327	575	390	681	497	787	603	894	709	1319	1135	567	383
	5	–		532	327	638	434	745	540	851	646	1277	1072	630	425
	5/6	–		–		596	371	702	477	809	583	1234	1009	693	468
	6	–		–		–		660	414	766	520	1192	946	756	510
2000	4	924	667	1032	774	1210	953	1389	1132	1568	1310	–		834	577
	4/5	852	563	959	670	1138	849	1317	1028	1495	1206	2210	1921	938	649
	5	–		887	566	1066	745	1245	923	1423	1102	2138	1817	1042	721
	5/6	–		–		994	640	1173	819	1351	998	2066	1713	1146	793
	6	–		–		–		1101	715	1279	894	1994	1608	1251	865
3000	4	1306	897	1461	1053	1721	1312	1980	1571	2239	1831	–		1281	873
	4/5	1197	737	1352	893	1612	1152	1871	1411	2130	1671	3168	2708	1442	982
	5	–		1243	732	1503	992	1762	1251	2021	1510	3059	2548	1602	1091
	5/6	–		–		1393	832	1653	1091	1912	1350	2950	2388	1762	1200
	6	–		–		–		1544	931	1803	1190	2840	2228	1922	1309
5000	4	2312	1803	2582	2073	3033	2524	3483	2974	3934	3424	–		1981	1472
	4/5	2128	1555	2398	1825	2849	2276	3299	2726	3750	3177	–		2229	1656
	5	–		2215	1578	2665	2028	3115	2479	3566	2929	–		2476	1839
	5/6	–		–		2481	1781	2931	2231	3382	2682	–		2724	2023
	6	–		–		–		2748	1983	3198	2734	–		2971	2207

**Table 5 · Dimensions in mm and weights for Pfeiffer Type BR 31a Rotary Actuators**

Type	15	30	60	100	150	220	300	450	600	900	1200	2000	3000	5000
ISO flange	F04	F05	F05	F07	F07	F10	F10	F12	F12	F14	F14	F16	F16	F25
Square end	11	14	14	17	17	22	22	27	27	36	36	46	46	55
T-ISO 228	1/8"	1/8"	1/8"	1/8"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	3/8"	1/2"	1/2"
A	140.5	158.5	210.5	247.5	268.5	315	345	408.5	437.5	487	543	621	684	876
B	69	85	102	115	127	145	157	177	196	220.5	245	298.5	330	410
C	59	72	84.5	97.5	111	127	136	156.5	169	190.7	213	251	298.5	383
D	M 5x8	M 5x8	M 5x8	M 5x8	M 5x8	M 5x8	M 5x8	M 5x8	M 5x8	M 5x8	M 5x8	M 6x10	M 6x10	M 6x10
E	4	8	8	8	8	8	8	8	8	8	8	8	8	8
F	80	80	80	80	80	80	80	80	80	130	130	130	130	130
G	30	30	30	30	30	30	30	30	30	30	30	30	30	30
H	20	20	20	20	20	30	30	30	30	50	50	50	50	50
I	30	35	35	55	55	70	70	85	85	100	100	130	130	200
L <sub>min</sub>	12	16	16	19	19	24	24	29	29	38	38	48	48	58
M	29	36	42.5	49.5	56	64	69.5	80	88	99	110	131	163.5	204
N	41.5	47	52	56.8	67	77	82	91.5	99	105	112	131	166	214
O	11	11	19	19	19	27	27	27	27	42	42	42	42	42
P	26.5	30	30.5	32.5	37.5	42.5	45	47	52	58	62	78.5	165	185
Q	42	50	50	70	70	102	102	125	125	140	140	165	165	254
R	32	32	32	32	32	32	32	32	32	32	32	45	45	45
S	24	24	24	24	24	24	24	24	24	24	24	40	40	40
W	M 5	M 6	M 6	M 8	M 8	M 10	M 10	M 12	M 12	M 16	M 16	M 20	M 20	8xM 16
∅ d f8	30	35	35	55	55	70	70	85	85	100	100	130	130	200
h <sub>max</sub>	2	3	3	3	3	3	3	3	3	4	4	5	5	5
h1	0.5	0.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2	2	2.5	2.5	2.5
∅ Z	40	40	40	40	40	56/65	56/65	65	65	80/115	80/115	115	115	115
Weight, kg	1.5	2	3.5	4.5	6.5	10	13	18.5	24	32	46	65	103	169



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