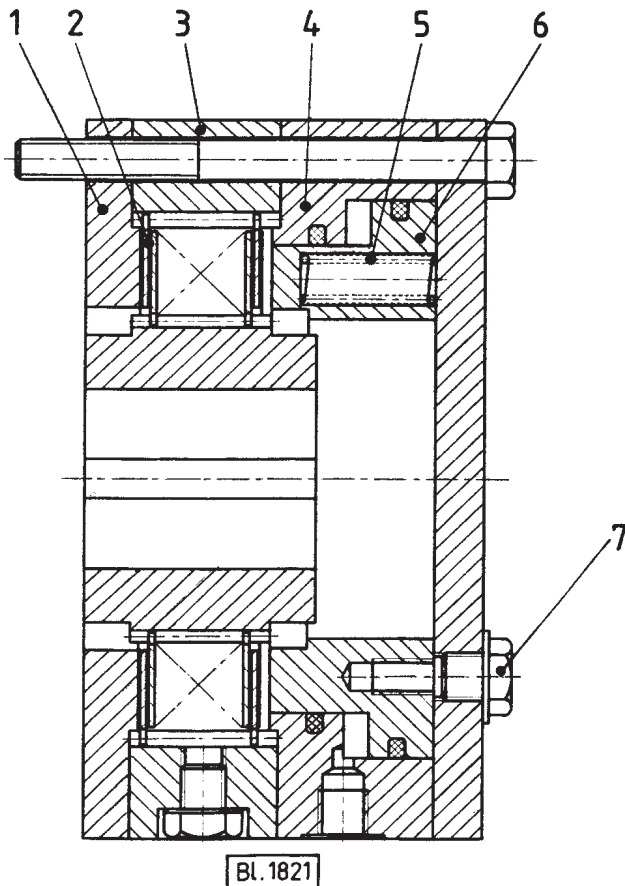


Brakes

Operation



Braking

The brake is applied when it is in its de-energized state. The axial force of the springs (5) pushes the piston (6) which in turn compresses the plate stack (2) against the stop plate (1) so that a frictional connection is produced.

Releasing of the brake

The pressure oil is fed into the brake through the non-rotating cylinder (4). The piston (6) moves against the pressure of the springs; the brake is released.

Properties

Hydraulically released, spring-applied multi-plate brakes are characterised by the low amount of space they require, the low moment of inertia of the rotating parts and by the high application frequencies that can be permitted.

To a large extent they require no maintenance. Cylinder and piston are protected against rust as

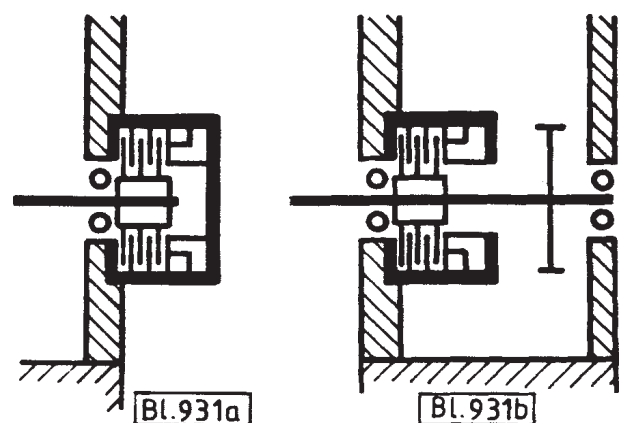
standard; further components can be protected against rust on request. The pressure to release the brakes lies between 10 and 50 bar; in addition they can be pressurised to a maximum of 320 bar for short periods of time. As a result of the spring-applied braking process which occurs automatically when either the oil is depressurised or the pressure oil supply fails, they can be used as safety brakes, in particular in lifting gear. In cases where the pressure oil supply fails, the brake can be released manually with the aid of the jacking screws (7).

Installation

The oil feed pipes and the return lines must be of adequate dimensions if a delay-free application/releasing of the brake is to be ensured. The return lines should offer the least possible resistance to flow. If manual release of the brake is required using the jacking screws (7), the brake must be installed in such a way that there is sufficient space to access them. In order to prevent **faults** in the hydraulic system, it is important that absolute **cleanliness** is maintained during installation.

Different versions are available to suit different installation situations. These are shown in the following examples.

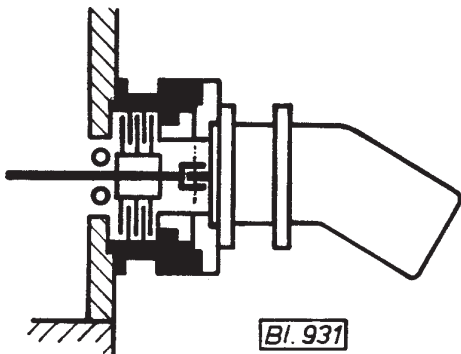
Non-centering version, series 0022-..0/..9



This closed version can be fitted on an extended shaft journal outside the gearbox.

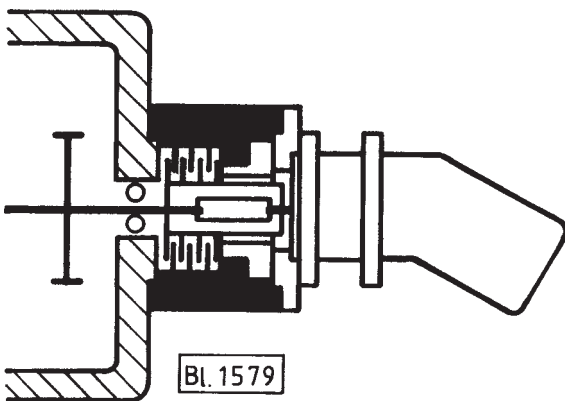
With the open flange as above, the brake can be fitted on a continuous shaft, e.g. inside a gearbox.

Centering version, series 0022-..1



In this solid version with identical outer and inner centering, the forces generated by spring tension and piston pressure are supported within the brake. Bolts serve for fastening only, e.g. between hydraulic motor and gearbox. Perfect centering is guaranteed. All types of hydraulic motor can be fitted with the aid of an intermediate flange.

Version with two different inner centerings, series 0022-320/620



This split version with two different inner centerings is used mainly when the input and output flanges are supplied by the customer.

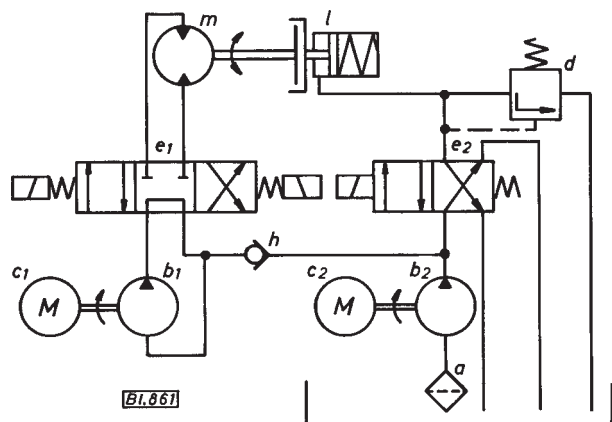
In our **technical product information** on hydraulically released, spring-applied brakes, you will find detailed information on the installation and maintenance of brake systems".

Pressure oil supply

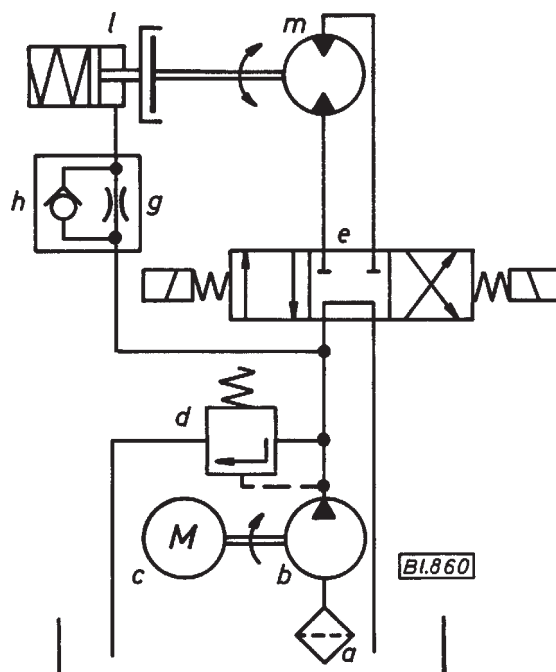
The brakes, piston and cylinder are sealed relative to one another in such a way that there is no leakage. As a result, the pressure oil supply only has to provide the volume of oil required for the disengagement operation. The quantity of oil necessary is determined by the size of the brake and the frequency with which the brake is to be released.

Circuit proposals for hydraulically released, spring-applied multi-plate brakes on hydraulic motors

- a = Suction filter
- b, b₁, b₂ = Pump
- c, c₁, c₂ = Electric motor
- d = Pressure relief valve
- e, e₁, e₂ = Directional control valve
- g = Restrictor (for damping pressure shocks)
- h = Non-return valve
- l = Brake
- m = Hydraulic motor

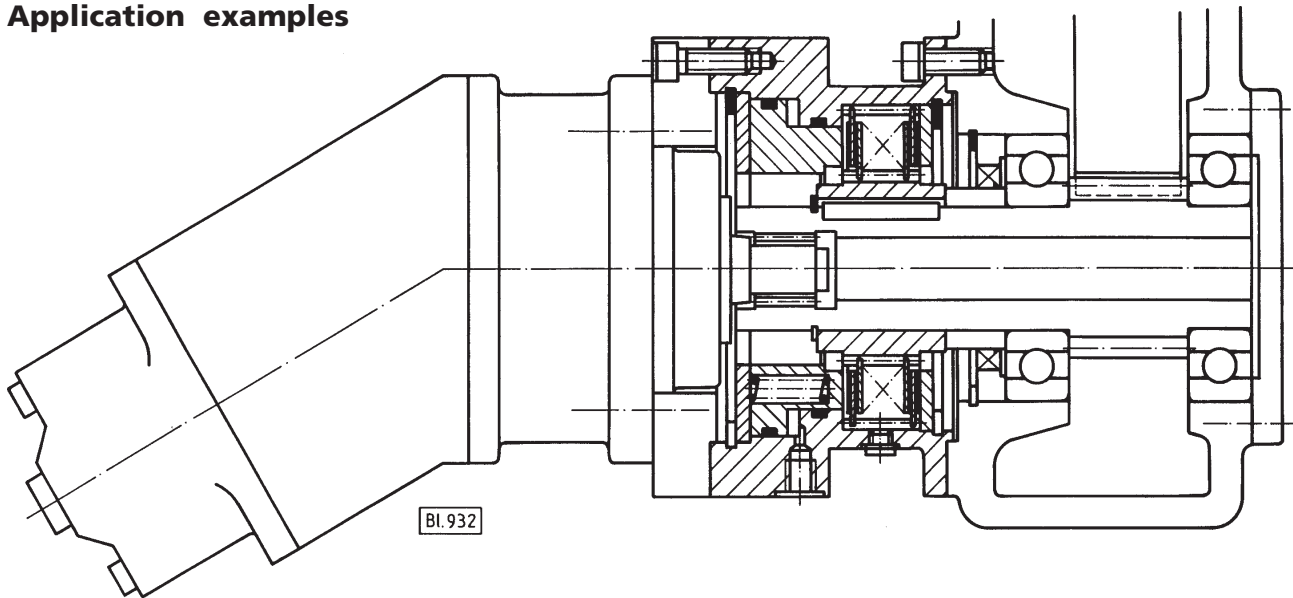


Closed circuit of hydraulic pump and motor. When the hydraulic motor is started with the aid of valve (e₁), the auxiliary valve (e₂) for releasing the brake, is also energised.

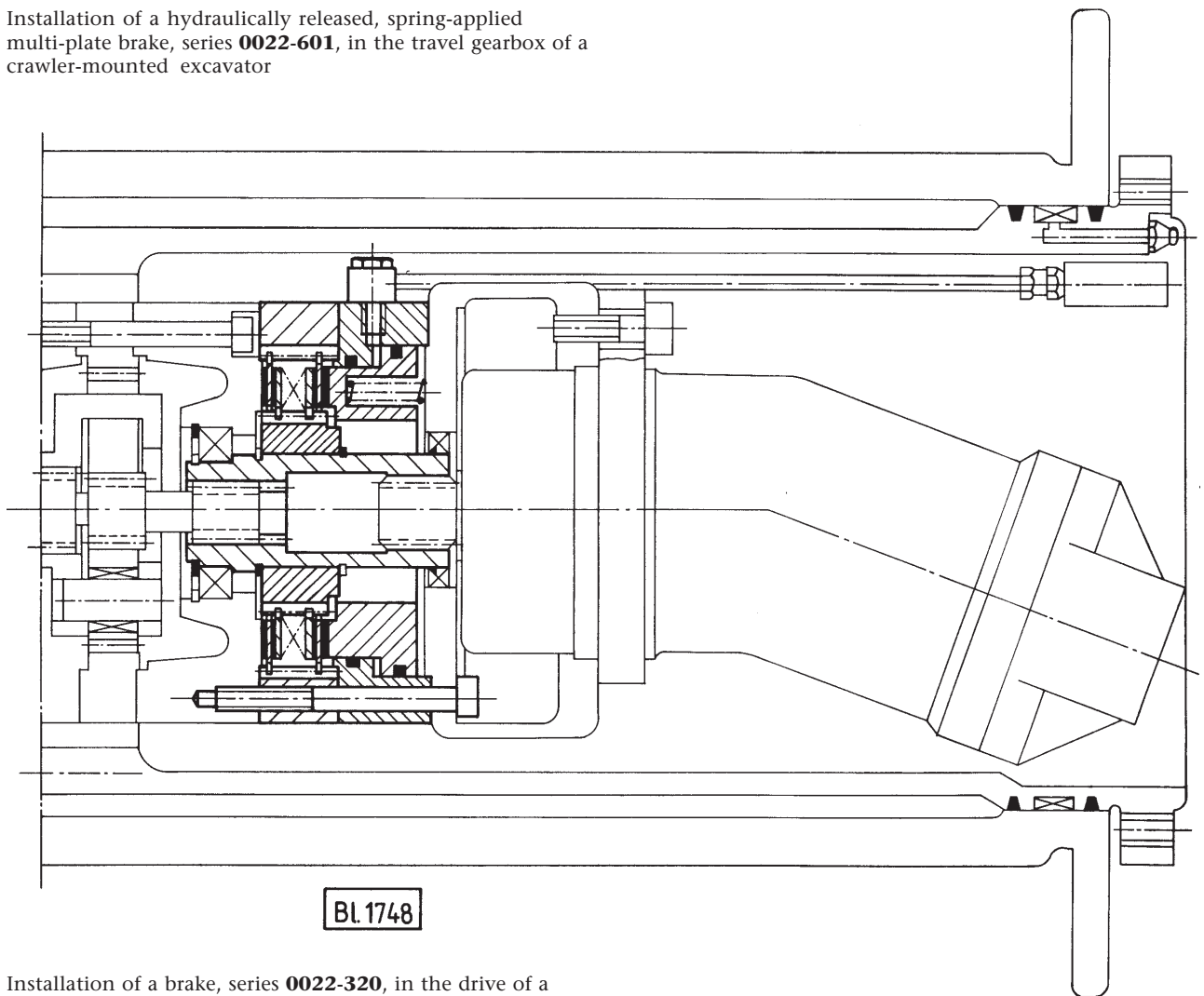


Open circuit for the hydraulic motor. The brake is kept released while the pump is being operated; the brake is applied when the system pressure falls.

Application examples




Installation of a hydraulically released, spring-applied multi-plate brake, series **0022-601**, in the travel gearbox of a crawler-mounted excavator



Installation of a brake, series **0022-320**, in the drive of a hoisting winch.

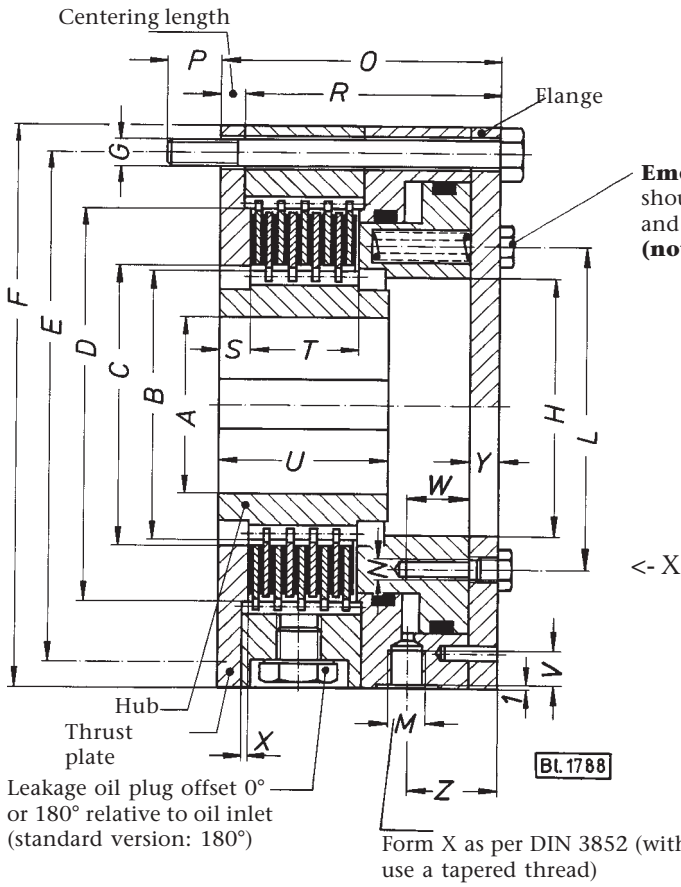
Numbering table for design variation

**0 - 022 - . . . - Size - 00. .00 dry-running
.08 wet-running**

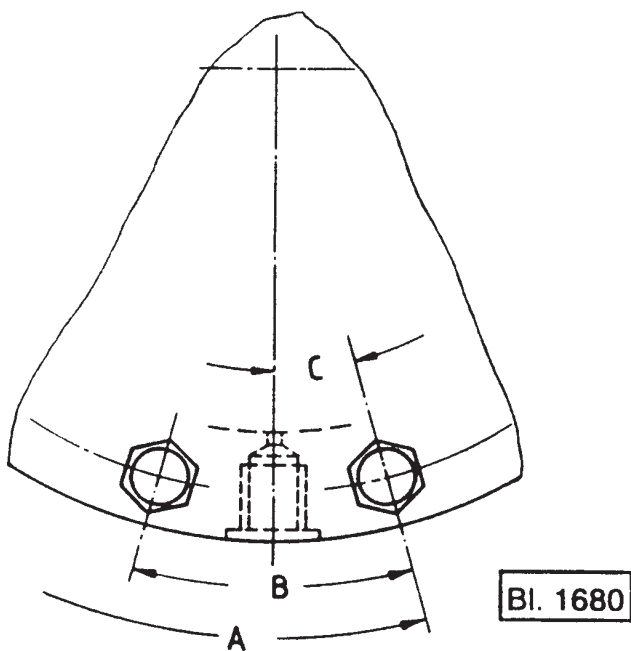


0			Closed version	with thrust plate	Torque standard
1			Open version		
2			Closed version	without thrust plate	
3			Open version		
5			Closed version	with thrust plate	Torque strengthened and maximum
6			Open version		
7			Closed version	without thrust plate	
8			Open version		
	0		Pipe connection with metric thread		with hub
	1		Pipe connection with inch thread		
	2		Pipe connection with metric thread		without hub
	3		Pipe connection with inch thread		
		0	without flange		
		9	with flange		

**Hydraulically released
spring-applied multi-plate brakes
Non-centering version**



View X



Size	A	B	C
07	6x60°	60°	30°
11-15	6x60°	60°	15°
23-90	12x30°	30°	15°

Hydraulically released spring-applied multi-plate brakes Non-centering version



Series Size		0022-...-Size-00200 ¹⁾														
		07	11	15	23	25	31	39	47	55	63	69	75	78	84	90
standard	M _{dyn} dry Nm	50	60	120	170	250	400	650	1100	1800	3000	-	-	-	-	-
	M _{stat} dry Nm	70	80	165	240	350	550	900	1500	2500	4100	-	-	-	-	-
	M _{dyn} wet Nm	33	40	70	115	155	270	430	760	1165	1980	-	-	-	-	-
stengthened	M _{stat} wet Nm	50	60	120	175	230	400	645	1135	1750	2970	-	-	-	-	-
	Pressure ²⁾ min bar	15	19	19	12	12	12	12	12	12	12	-	-	-	-	-
	M _{dyn} dry Nm	65	100	180	270	350	600	1000	1600	2600	4500	7150	13000	19300	33000	60000
maximum	M _{stat} dry Nm	90	140	250	370	480	820	1350	2200	3600	6200	9820	17900	26600	46000	81500
	M _{dyn} wet Nm	45	65	110	180	230	395	610	1100	1755	2880	4775	8650	12850	21870	39320
	M _{stat} wet Nm	65	100	160	270	345	590	915	1650	2635	4325	7180	13000	19300	32890	59130
Pressure ²⁾ min bar		20	28	28	18	18	18	18	18	18	18	24	27	23	18	22
Series Size		0022-...-Size-003.00 ¹⁾														
		07	11	15	23	25	31	39	47	55	63	69	75	78	84	90
maximum	M _{dyn} dry Nm	85	160	260	320	550	970	1320	2660	4300	6300	12110	20000	30000	55000	87500
	M _{stat} dry Nm	120	220	360	450	760	1330	1810	3700	5900	8600	16660	27000	40500	75000	120000
	M _{dyn} wet Nm	60	110	170	210	365	640	875	1750	2840	4165	7710	13080	19000	35470	58000
Operating pressure	M _{stat} wet Nm	90	170	255	320	550	965	1315	2630	4270	6265	11590	19670	28570	53342	87250
	Pressure ²⁾ min bar	22	40	50	25	34	30	25	32	34	32	38	38	32	30	32
	max bar	300	320													
Speed max min ⁻¹		6570	4800	4300	4100	3370	2800	2300	1900	1520	1250	1100	860	770	560	450
Stroke volume	new condition cm ³	2,6	2,5	3,3	7,1	8	12	19	32	46	76	112	154	280	415	682
	with max. wear cm ³	5,2	4	6,3	15,7	17	28	41	61	91	137	204	308	559	890	1365
J	internal kgcm ²	0,6	1,5	3,25	7	14,25	25	65	175	550	1150	2600	7246	14079	50500	150000
Weight approx. kg		2,2	3,5	6,5	7,8	11	16	21,5	30	45,5	66,5	130	234	319	550	810
ØA prebored		-	-	-	-	20	-	-	-	60	70	80	90	100	150	200
Bores ³⁾	A max H7 KeywayDIN 6885	18	30	30	40	45	55	65	90	110	140	150	190	220	300	350
	A H7 KeywayDIN 6885	6x	8x	8x	12x	14x	16x	18x	25x	28x	36x	36x	45x	50x	70x	80x
	A H7 KeywayDIN 6885	2,8	3,3	3,3	2,2	3,8	4,3	4,4	5,4	6,4	8,4	8,4	10,4	11,4	14,4	15,4
	A H7 KeywayDIN 6885		25	25	35	40	50	60								
Diameters	A H7 KeywayDIN 6885		8x	8x	10x	12x	14x	18x								
	A H7 KeywayDIN 6885		3,3	3,3	3,3	3,3	3,8	4,4								
	A H7 KeywayDIN 6885				30	35	45	50								
	A H7 KeywayDIN 6885				8x	10x	14x	14x								
Length-dimensions	B d9	33	49,6	51,6	60	70	81,4	100	127	148	184	216	280	310	430	508
	C	35	52	54	62	72	85	102	132	155	188	220	285	315	435	520
	D H8	55	69	80	82,2	112	126	144	182	228	279	328	392	440	590	758
	E	73	90	100	115	135	160	185	220	265	315	370	440	510	665	860
	F f7	83	105	120	135	155	180	205	245	290	345	400	480	555	710	910
	G	M6	M6	M8	M8	M8	M10	M10	M12	M14	M16	M16	M20	M24	M24	M27
	H H7	27	45	45	52	65	80	95	120	140	180	205	240	270	390	520
	L	-	57	60	66	88	103	118	152	180	220	280	265	300	425	570
	N	-	M6	M6	M6	M8	M8	M8	M10	M12	M12	M12	M16	M16	M20	M20
	M ⁴⁾															
		M10x1 G ¹ /s			M12x1,5 G ¹ /4					M16x1,5 G ³ /8				M22x1,5 G ¹ /2		
Length-dimensions	O	59	67	77	81	90	95	100	110	135	145	165	195	220	255	300
	P	11	13	13	14	20	15	20	20	25	25	25	25	40	45	60
	R	54	61	69	73	82	86	91	99	122	130	148	173	198	233	268
	S	7	8	10	10	10	11	11	14	16	18	20	25	25	25	35
	T	21	22	24	25	32	33	38	40	58	59	70	77	97	105	130
	U	35	38	44	45	52	55	60	68	90	95	110	127	147	155	200
	V	8	9	12	13	13	13	13	13	13	13	14	14	14	14	18
	W	-	15	15	15	20	20	20	20	20	20	25	25	25	30	30
	X	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3
	Y	7	8	9	10	11	12	12	14	16	18	20	25	25	30	35
Z	21	24	27	30	32	34	34	38	41	46	53	62	66	88	95	

1) Friction combination for wet-running **-.08**

2) Min. disengaging pressure

3) Bore diameters shown in bold print available from stock

4) Tube thread G.... as per ISO 228/1 and/or BS 2779

Friction combination

steel/sintered lining
for wet- or dry-running

Tolerances

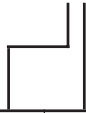
for bore and keyway see
section 1

"Technical information"

**It is essential that you contact us before using
brake fluids that are flame-resistant**

Numbering table for design variation

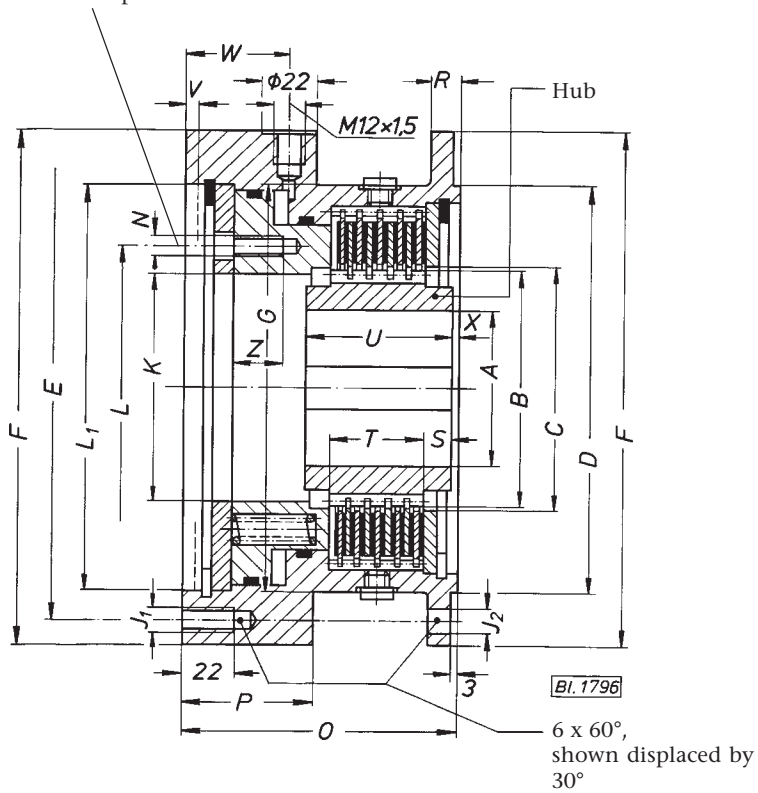
**0 - 022 - .. 1 -Size- 00. .00 dry-running
.08 wet-running**



1		Open version	Torque standard
6		Open version	Torque stengthened and maximum
	0	with hub	
	2	without hub	

Version for identical external and internal centering

Emergency disengagement:
should the hydraulic pump fail,
release the piston with the screws!



Hydraulically released spring-applied multi-plate brakes Centering version



Series Size		0022-..1-Size-00000 ¹⁾						
		15	25	31	39	47	55	
standard	M _{dyn} dry-runningNm	120	250	400	650	1100	1800	
	M _{stat}	165	350	550	900	1500	2500	
	M _{dyn} wet-runningNm	70	155	270	430	760	1165	
stengthened	M _{stat}	120	230	400	645	1135	1750	
	Pressure ²⁾ min. bar	12	12	12	12	12	12	
	M _{dyn} dry-runningNm	180	350	600	1000	1600	2600	
	M _{stat}	250	480	820	1350	2200	3600	
	M _{dyn} wet-runningNm	110	230	395	610	1100	1755	
	M _{stat}	160	345	590	915	1650	2635	
	Pressure ²⁾ min. bar	18	18	18	18	18	18	
	Series Size		0022-..1-Size-001.00 ¹⁾					
			15	25	31	39	47	55
maximum	M _{dyn} dry-runningNm	260	550	970	1320	2660	4300	
	M _{stat}	360	760	1330	1810	3700	5900	
	M _{dyn} wet-runningNm	170	365	640	875	1750	2840	
	M _{stat}	255	550	965	1315	2630	4270	
	Pressure ²⁾ min bar	27	34	30	25	32	34	
Operating pressure max bar		320						
Speed max min ⁻¹		4300	3370	2800	2300	1900	1520	
Stroke volume	new condition cm ³	6,2	8	12	19	32	46	
	with max. wear cm ³	12	17	28	41	61	91	
J	internal kgcm ²	3,25	14,25	25	65	175	550	
Weight	approx. kg	6,5	11	14	18,5	27	51	
ØA	prebored	-	20	-	-	-	60	
Recommended bores ³⁾	A max H7 Keyway DIN 6885	30	45	55	65	90	110	
	A H7 Keyway DIN 6885	8x3,3	14x3,8	16x4,3	18x4,4	25x5,4	28x6,4	
	A H7 Keyway DIN 6885	25	40	50	60			
Diameters	A H7 Keyway DIN 6885	8x3,3	12x3,3	14x3,8	18x4,4			
	B d ₉	51,6	70	81,4	100	127	148	
	C	54	72	85	102	132	155	
	D g ₇	95	130	145	170	205	250	
	E	120	155	170	195	230	290	
	F	135	170	190	215	250	315	
	G	103	136	149	172	210	265	
	K	45	65	80	95	120	140	
	J ₁	M8	M8	M10	M10	M10	M12	
	J ₂	9	9	11	11	11	13	
	L	60	88	103	118	152	180	
	L ₁ H ₇	95	130	145	170	205	250	
	N	M6	M8	M8	M8	M10	M12	
Length dimensions	O	84	100	104	112	122	150	
	P	44	49	52	53	58	63	
	R	10	11	12	13	13	15	
	S	10	10	11	11	14	16	
	T	24	32	33	38	40	58	
	U	44	52	55	60	68	90	
	V _{max}	4	5	5	6	6	6	
	W	32	38	40	42	46	50	
	X	2	4	3	4	4	6	
	Z	15	20	20	20	20	20	

1) Friction combination for wet-running **-.08**

2) Min. disengaging pressure

3) Bore diameters shown in bold print available from stock

Friction combination steel/sintered lining

for wet- or dry-running

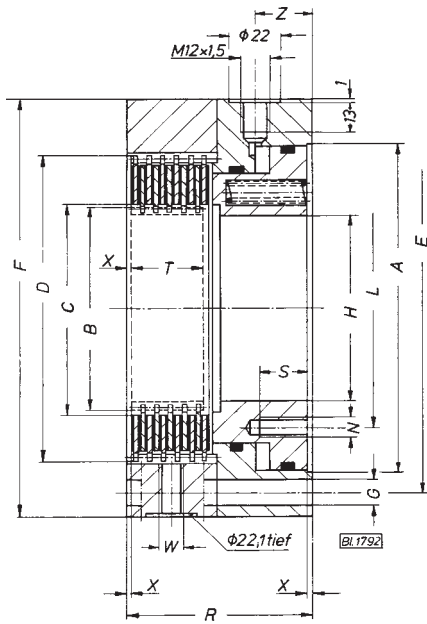
Tolerances

for bore and keyway see section 1
"Technical information"

It is essential that you contact us before using brake fluids that are flame-resistant

Hydraulically released spring-applied multi-plate brakes

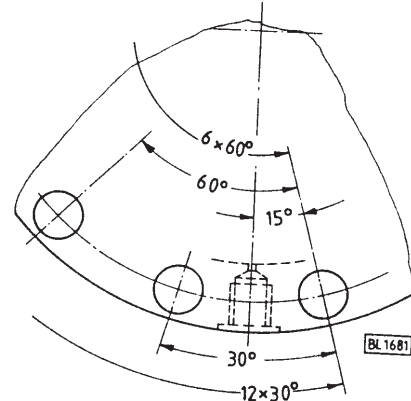
Version with two different internal centerings



<- X

This version is used in applications where special dimensions and centering of the adjacent parts are necessary.

View X
(shown turned through 180°)



tief = depth

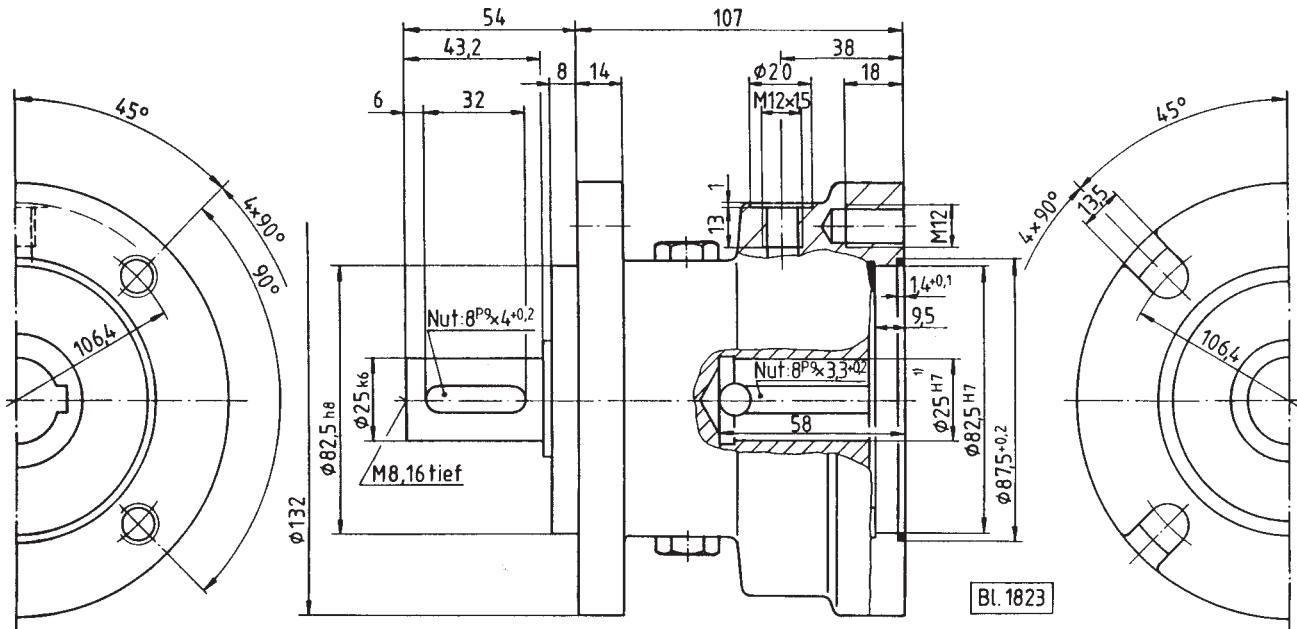
6 x 60° Size 15
12 x 30° Size 23 and larger

Series Size				0022-320-Size-005050							
				15	23	25	31	39	47	55	63
standard	Mdyn	dry-running	Nm	70	170	210	405	650	1140	1650	3090
	Mstat			93	240	280	550	890	1570	2260	4250
	Mdyn	wet-running	Nm	50	115	140	280	440	760	1100	2060
	Mstat			70	170	210	405	650	1140	1650	3090
	Disengaging pressure min.bar			11,5	12,5	15	12,5	13	17	12,5	13,5
Series Size				0022-620-Size-005050							
				15	23	25	31	39	47	55	63
strengthened	Mdyn	dry-running	Nm	135	270	310	690	920	1660	2490	4480
	Mstat			185	370	430	940	1265	2280	3420	6160
	Mdyn	wet-running	Nm	90	180	210	460	610	1100	1660	2990
	Mstat			135	270	310	690	920	1660	2490	4480
	Disengaging pressure min.bar			20	19	22,5	21	18	24,5	18	19
Operating pressure max.			bar	320							
Speed max.			min ⁻¹	4300	4100	3370	2800	2300	1900	1520	1250
Stroke volume	new condition		cm ³	2,95	7,14	6,59	14,6	17,5	20	62,5	68,7
	with max. wear		cm ³	7,38	15,7	14,5	27,8	35	43,8	91	137,4
J	internal	kgcm ²	1	1,9	4,2	13,4	38,9	96,9	296,7	623,9	
Weight approx.			kg	3,9	4,8	6,3	10,2	12,6	17,5	34	51
Diameters	A H7		86	100	115	142	163	192	242	290	
	B -0,1		56	60	76	89	108	119	140	164	
	C		57	62	78	92	110	132	155	189	
	D H7		72,2	82,2	100,2	132	147,2	180,5	231,5	279,5	
	E		100	115	130	160	180	210	265	315	
	F		120	135	150	180	200	230	290	345	
	G		9	9	9	11	11	13	13	17	
	H		45	52	65	80	95	120	140	180	
	L		57	66	82	103	118	152	180	220	
	N		M6	M6	M6	M8	M8	M10	M12	M12	
W			M10 x 1						M12 x 1,5		
Length dimensions	R		63	65	70	78	84	90	111	115	
	T		24	24,5	28	30	36,5	37	54	54	
	X		2	2	2	2	2	3	3	3	
	Z		21	22	21,5	24	26	27	28	31	
	S		15	15	15	20	20	20	20	20	
Tooth system	Reference profile	DIN	5480	5480	5480	867	5480	867	867	867	
	Number of teeth	z	27	29	37	35	35	39	46	54	
	Module	m	2	2	2	2,5	3	3	3	3	
	Addendum modification	x-m	+0,1	+0,1	+0,1	-	+0,15	-	-	-	
	Base tangent length	W-0,1	26,84	27,11	38,75	34,24	49,74	41,18	50,33	59,53	
	Measurement over teeth	k	5	5	7	5	6	5	6	7	
	Root diameter	df	51,4	55,7	71,5	81,1	101,3	109,1	130,1	154,1	

Friction combination steel/sintered lining
for wet- or dry-running

It is essential that you contact us before using brake fluids that are flame-resistant

This hydraulically released, spring-applied multi-plate brake is suitable for fitting to hydraulic motors of various makes.



tief = depth

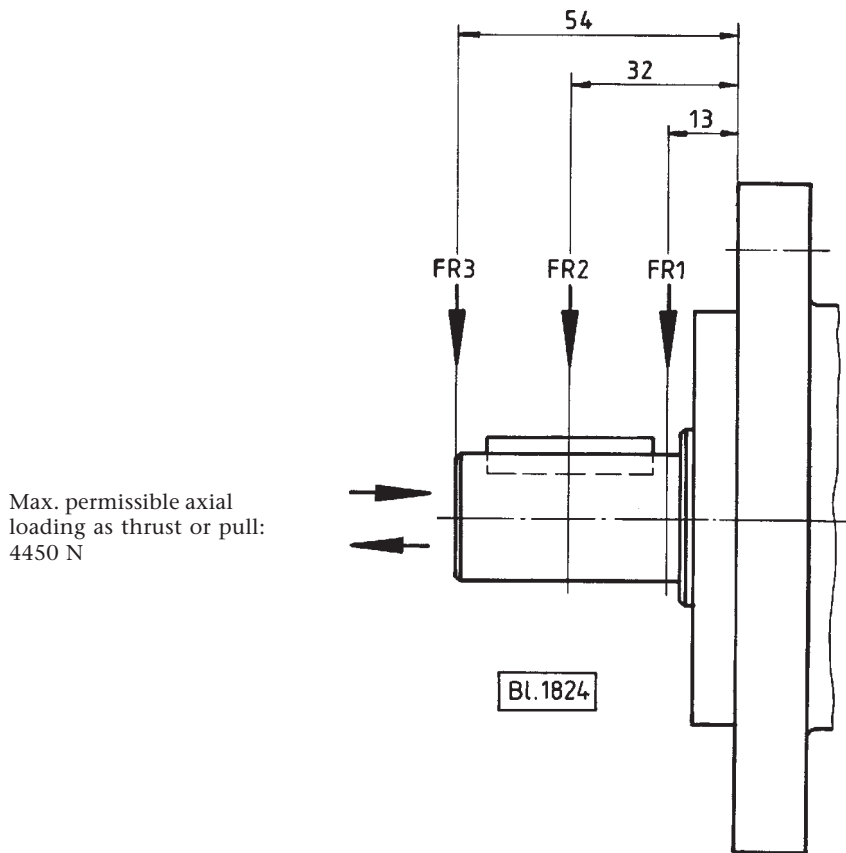
1) Other dimensions on request

Series		0022-601-20...108		
		000	001	002
Mstat	Nm	420	320	220
Mdyn	Nm	260	200	135
Disengaging pressure min		bar 31		
Operating pressure max		bar 220		
Stroke volume	new condition	cm ³ 4,4		
	with max. wear	cm ³ 9		
J	internal	kgcm ² 3,8		
Weight	approx.	kg 6,5		

Friction combination steel/sintered lining for wet-running
Oil approx. 0,04 l
 Highly alloyed oils are to be avoided!
 The oil should behave neutrally to copper.
 Viscosity approx. 32-46 mm²/s at 40° C.

Max. permissible temperature 100° C at the seals

Shaft loading



Max. permissible radial shaft loading

