Operating and Assembly Instructions

for the electromagnetically released

Spring-Applied Brakes FDD / DBR 6…1200 & FDT
— Protection Class IP55 —

Table of contents

1. Preliminary Remarks

1.1 Introduction to the operating and assembly instructions

For validity, purpose and use, as well as terms and labels, see Chapter 1 "Information on the Operating and Assembly Instructions" in the current issue of the *General Introduction (...) PRECIMA Spring-Applied Brakes.* As noted there, please consult PRECIMA in case of doubt. Technical questions, notes and suggestions for improvement can also be sent to the following address:

PRECIMA MAGNETTECHNIK GmbH

Röcker Straße 16
D – 31675 Bückeburg
Phone number.: +49 (0) 57 22 / 89 33 2 -0
Fax number: +49 (0) 57 22 / 89 33 2 -2
E-mail: info@precima.de

1.2 Conditions for assembly and operation

For personnel and product-related conditions, proper application, legal aspects and delivery scope and state, see Chapter 2 "Conditions for Assembly and Operation" in the current issue of the *General Introduction (...) PRECIMA Spring-Applied Brakes*

In addition, the following **general conditions of operation** apply to the FDD brakes:

Humidity: 0… 80% ➔ with humidity >80%, a closed brake (FDW, FDS, FDX) should be used

Duty cycle
(valid for installation on a ***self-ventilated motor*** *with a* ***speed*** *of* ***at least 750 min^{-1} or*** *on a* ***force-ventilated motor****)*:

S1-100% at an ambient temperature of -20…+40°C
S1-100% at -20**…+60°C** and power reduction through a fast-acting rectifier
S3-60% at -20**...+60°C** generally
S3-60% at **-20…+80°C** and power reduction through a fast-acting rectifier

Heating at ambient temperatures < -20°C

Consultation with PRECIMA is required:

- *with the switching noise reduction option (NRB1, see 2.1.3) and an ambient temperature > 60°C*
- *with NRB1 and power reduction through a fast-acting rectifier (underexcitation)*
- *with a PWM (pulse width modulation) control*

1.3 Structure and functionality

For structure and functionality of a spring-applied brake in general, see the corresponding section (Chapter 3) in the current issue of the *General Introduction (…) PRECIMA Spring-Applied Brakes.* **For the distinction between FDD and FDT, see also under 2.2 in this manual.**

1.4 Usage as a working brake

The double brakes FDD are usually used as holding brakes. They can also be used as **working brakes**, but in this case certain restrictive or additional conditions apply: **The maximum nominal braking torque is <u>not</u> allowed** (see 2.2.3.1)**, the maximum permissible friction**

Work per braking is lower (see 2.2.3.4) and switching via a **fast-acting rectifier** (overexcitation) is mandatory from BR125 / FDD 20.

2. Product Description

2.1 Marking

2.1.1 Type label

The type label of the spring-applied brake contains all its important data. These data and the contractual agreements for the brakes define the limits of their use.

2.1.2 Type code for FDD brakes (PRECIMA)

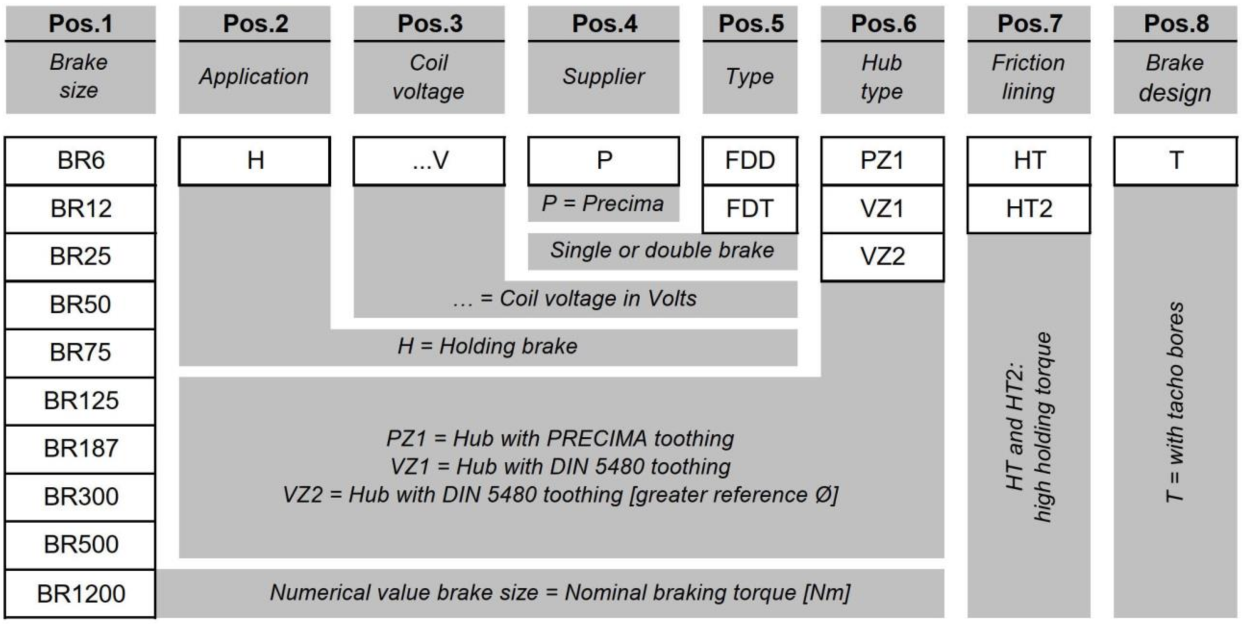
Example:

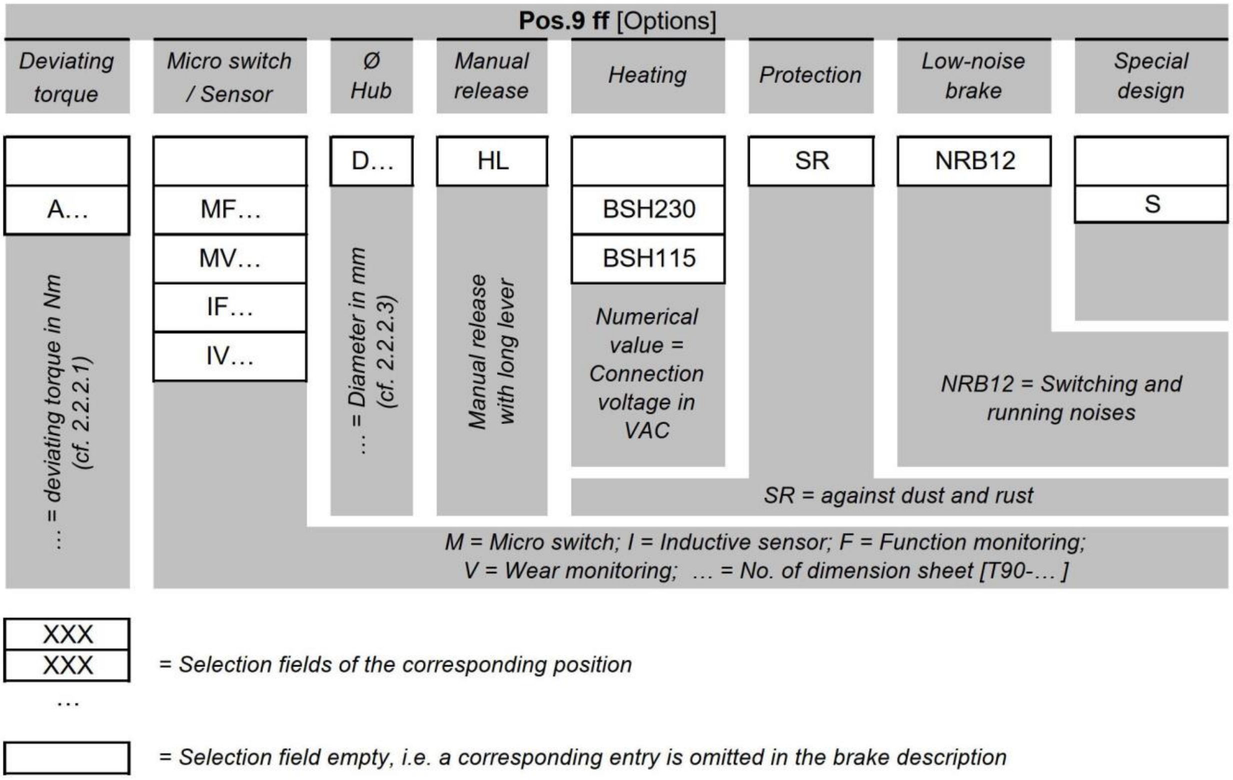
FDD 15 M 20 H7 24 VDC

Operating voltage
Hub bore
Microswitch .... *Options II*
Brake size (sizes: **08, 10, 13, 15, 17, 20, 23, 26, 30, 40**)
Brake designation (series)

2.1.3 FDD brake nomenclature (Getriebebau NORD)

The following two diagrams show how a FDD brake or a FDT brake is designated by Getriebebau Nord. Pos.1 to Pos.8 must be listed in any case, Positions 9 ff only if they are already specified (the hub-Ø must also be specified) or if the respective option is used. Sequence always according to the diagram.





Example: **BR400 H 180V P FDD VZ2 HT T A300 D50 HL SR NRB12**

= Holding brake FDD of size 400 (torque reduced to 300 Nm) in standard design (manual releases, tacho bores, rotors with HT friction lining and toothings according to DIN 5480 (VZ1), dust and corrosion protected, switching and running noise damped), with two 180 VDC coils and two hubs Ø50, supplied by PRECIMA

2.2 Technical information

2.2.1 Special features of the brake

In addition to the general description of the function of the brake (see *General Introduction (...) PRECIMA Spring-Applied Brakes* / Chapter 3 "Structure and Functionality"; cf. 1.3), for the spring-applied brakes FDD the double arrangement must also be considered. Due to the design of the two mechanically connected single brakes (**brake 1**, **brake 2**, Figure 3.1), the braking and release processes are technically separated. This means that the braking function is guaranteed even in case of complete failure of one of the brakes (redundant system). By varying the control of the brakes (DC-side or AC-side switching), a short delay in the braking effects can be obtained.

2.2.2 Options (see also 2.1.2)

With FDD, a distinction must be made between the following options:

a) *Included options:* the FDD brakes are already equipped with some options in the standard version that are absolutely necessary or useful in most applications. These include the options T (= tachometer bores), H (= manual release), S (= dust protection ring), R (= friction plate / only for FDD 08…23 resp. BR5…150) and the low-noise versions of hubs and armature plates. Included options do not have to be ordered separately and are not mentioned in the PRECIMA type code (➔ 2.1.2)

b) *Options II:* options II are *not* taken into account in these operating and assembly instructions. In the case of FDD, this is option M (= microswitch), which must be specified when placing the order and cannot be retrofitted. For Options II, separate descriptions and adjustment instructions are available and must be observed in addition to this document.

➔**Note:** If there is a technical application in which the redundancy of a double brake is not required, but the aforementioned included options (noise damping) are still desired, brake 1 (➔ Figure 3.1) **can also be ordered separately as FDT ➔** “half” FDD brake **or FDB brake in stage version. The technical data** (apart from those specifically related to the double arrangement) **correspond to those of the FDD.** It should be noted that the **IP55 protection class** assigned to the brakes only applies when they are installed under a corresponding **fan cover**, but shall not apply to an attached FDD or FDT brake as such.

2.2.3 Technical data

2.2.3.1 Nominal braking torques and number of springs (**FDT ➔** each only 1x)

➔ Nominal braking torque / **working brake** = **dynamic braking torque** at 1 m/s friction speed
➔ Nominal braking torque / **holding brake** = **static holding torque** (= tearing off torque)
➔ For explanation see: *General introduction (...) PRECIMA spring-applied brakes* / Chapter 5

Size	**BR6** *FDD 08*	**BR12** *FDD 10*	**BR25** *FDD 13*	**BR50** *FDD 15*	**BR75** *FDD 17*	**BR125** *FDD 20*	**BR187** *FDD 23*	**BR300** *FDD 26*	**BR500** *FDD 30*	**BR1200** *FDD 40*
Nominal braking torques M_{bN} [Nm]	**2 x 6**	**2 x 12.5**	**2 x 25**	**2 x 50**	**2 x 75**	**2 x 125**	**2 x 187**	**2 x 300**	**2 x 500**	**2 x 1200**
	2 x 4	2 x 8.5	2 x 17.5	2 x 35	2 x 52	2 x 89	2 x 132	2 x 225	2 x 375	2 x 1000
	2 x 3.5	2 x 7	2 x 14	2 x 28	2 x 42	2 x 70	2 x 107	2 x 150	2 x 250	2 x 800

Maximum nominal braking torque: Used only as a holding brake

— Permissible deviations of the actual braking torque:
Working brake up to BR40 (dynamic torque)**: -20/+30%** (new and run-in*)
Working brake from BR60 (dynamic torque)**: -20/+30%** (new) **or ±20%** (run-in*)
Holding brake (static holding torque)**: -10/+50%** (new) **or -10/+40%** (conditioned*) **—**

***** For explanation see: *General introduction (...) PRECIMA spring-applied brakes* / Chapter 5

Size	**BR6** *FDD 08*	**BR12** *FDD 10*	**BR25** *FDD 13*	**BR50** *FDD 15*	**BR75** *FDD 17*	**BR125** *FDD 20*	**BR187** *FDD 23*	**BR300** *FDD 26*	**BR500** *FDD 30*	**BR1200** *FDD 40*
Number of springs for the above M_{bN}	**7 (2x)**	**7 (2x)**	**7 (2x)**	**7 (2x)**	**7 (2x)**	**7 (2x)**	**7 (2x)**	**8 (2x)**	**8 (2x)**	**12 (2x)**
	5 (2x)	5 (2x)	5 (2x)	5 (2x)	5 (2x)	5 (2x)	5 (2x)	6 (2x)	6 (2x)	10 (2x)
	4 (2x)	4 (2x)	4 (2x)	4 (2x)	4 (2x)	4 (2x)	4 (2x)	4 (2x)	4 (2x)	8 (2x)

2.2.3.2 Dimensions, masses, fastening (Figure 2.1)

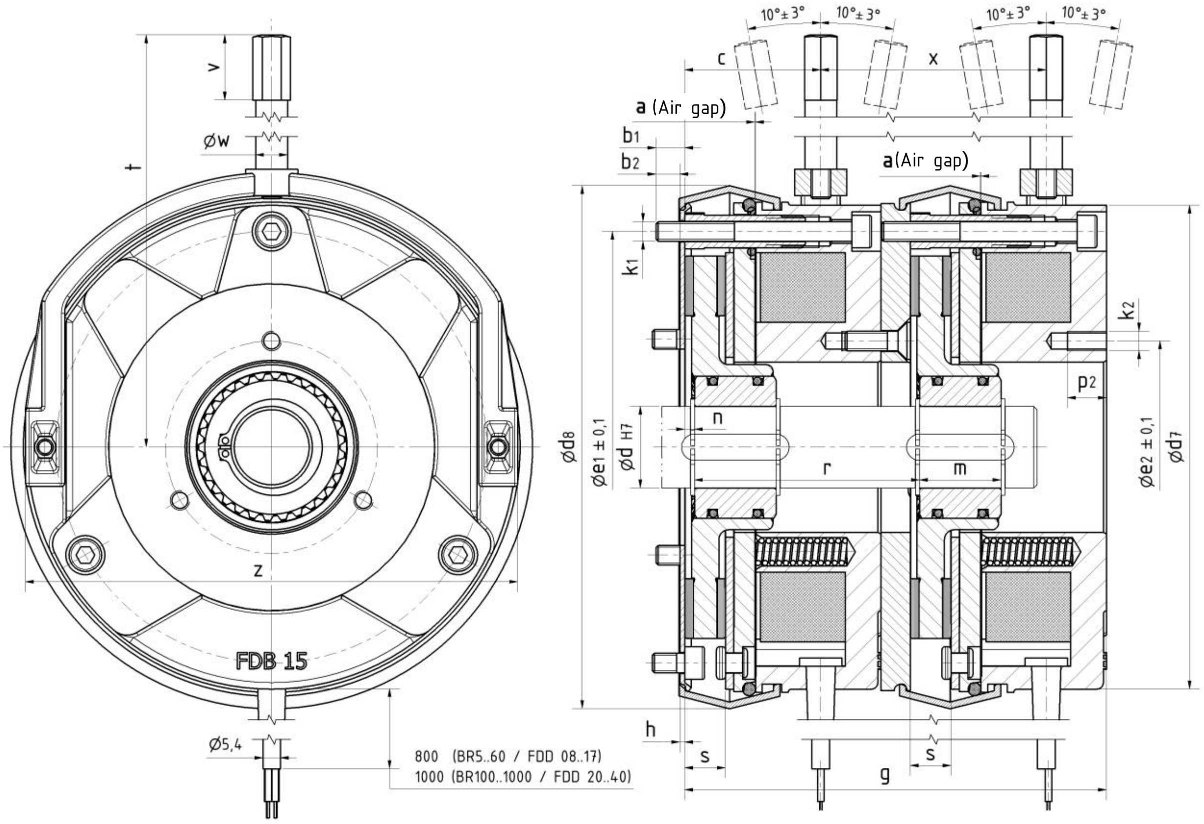


Figure 2.1: Main dimensions of the brake

a (air gap) and **s** (rotor thickness): see 2.2.3.3

Size	Hub dimensions [mm]				General brake dimensions [mm]						Tachometer bore dimensions [mm]		
	Toothed hub Ød ^{H7}	Mounting dimensions			Housing / dust protection ring	Brake in new condition	Manual release				Bolt circle Øe_1 ±0.1	(Number of holes) x thread nominal Ø	Thread depth
	d	*m*	*n*	*r*	d_7 / d_8	*g / h*	*c*	*x*	*v / w*	*t / z*	e_2	k_2	p_2
BR6 *FDD 08*	15*	18	3	44.3	85 / 89	84.1 / 1.5	36	44.3	15 / 8	110 / 89	34	(3 x) M4	8
BR12 *FDD 10*	15	20	4	54	105 / 109	103.9 / 1.5	49	54	15 / 8	120 / 111	40	(3 x) M5	12
BR25 *FDD 13*	15/20	20	5	62	130 / 135	116.7 / 1.5	39	62	20 / 10	160 / 132	54	(3 x) M6	12
BR50 *FDD 15*	20/25	25	4.5	68	150 / 155	131.1 / 1.5	43.5	69	20 / 10	200 / 151	65	(3 x) M6	12
BR75 *FDD 17*	25/30/ 35*	30	5	81	170 / 175	152.6 / 2	48	81	25 / 12	220 / 172	75	(3 x) M8	15
BR125 *FDD 20*	30/35/ 40	30	5	91	195 / 201	173.8 / 2	56	91	25 / 12	220 / 196	85	(3 x) M8	15
BR187 *FDD 23*	35/40/ 45	35	6.5	101	225 / 231	192.6 / 2	60	101	25 / 12	250 / 224	95	(3 x) M8	15
BR300 *FDD 26*	40/45/ 50	40	4**	110	258 / 264	208.8** / -	62 **	110	35 / 19	330 / 258	110	(6 x) M10	25
BR500 *FDD 30*	50/60	50	4**	115.5	306 / 312	220** / -	63.5 **	115.5	35 / 19	357 / 304	138	(6 x) M10	25
BR1200 *FDD 40*	65/70/75 80	70	4**	138.5	400 / 408	259.2** / -	82.6 **	138.5	35 / 19	415 / 403	180	(6 x) M12	43***

Standard keyway of the hub as per DIN 6885/1-JS9
* deviating keyway as per DIN 6885/**3**-JS9 // ** without friction plate
*** separate internal pole: 15 mm without thread (through hole)

Size	Masses [kg]			Mounting dimensions [mm]			Tightening torque [Nm]	Adjustment dimensions [mm]
	Brake without manual release complete	2 x manual release	Friction plate	Bolt circle $Øe_1$±0.1	(Number of holes) x thread nominal Ø	Screw-in depth with friction plate	Fixing screws	Manual release
				e_1	k_1	b_1	M_A	y
BR6 *FDD 08*	2.90	0.11	0.055	72	3 x M4 (2x)	9	**3**	0.8
BR12 *FDD 10*	4.80	0.16	0.080	90	3 x M5 (2x)	10.5	**6**	0.8
BR25 *FDD 13*	7.30	0.19	0.130	112	3 x M6 (2x)	12	**10**	0.8
BR50 *FDD 15*	11.40	0.26	0.160	132	3 x M6 (2x)	12.5	**10**	0.8
BR75 *FDD 17*	17.80	0.34	0.285	145	3 x M8 (2x)	13.5	**25**	0.8
BR125 *FDD 20*	23.50	0.48	0.365	170	3 x M8 (2x)	13	**25**	1
BR187 *FDD 23*	34.50	0.59	0.505	196	3 x M8 (2x)	14	**25**	1
BR300 *FDD 26*	48.60	1.60	**	230	6 x M10 (2x)	20.5 **	**50**	1.2
BR500 *FDD 30*	78.00	1.80	**	278	6 x M10 (2x)	28.5 **	**50**	1.2
BR1200 *FDD 40*	135.00	1.80	**	360	6 x M12 (2x)	32.5 **	**85**	1.5

** without friction plate

Dimension y see 3.3.2 or Figure 3.2

2.2.3.3 Air gaps, rotor values

Size	Min. air gap [mm]		Max. air gap * [mm]	Rotor thickness (NEW) [mm]	Rotor thickness (min.) [mm]	Rotor moment of inertia [kgm²]	Max. rotor speed [min⁻¹] - *permissible speeds higher than indicated are possible by special measures on request* -	
	Brake 1 a_{min}	***Brake 2*** a_{min}	a_{max}	s_{new}	s_{min}	J	n_{max}	n_{max} rotor turning ++
BR6 *FDD 08*	0.2	0.2	0.65	7.5 $^{-0.1}$	4.5	0.015 x 10^{-3}	**6000**	
BR12 *FDD 10*	0.2	0.2	0.65	8.5 $^{-0.1}$	5.5	0.045 x 10^{-3}	**6000**	
BR25 *FDD 13*	0.3	0.3	0.75	10.3 $^{-0.1}$	7.5	0.173 x 10^{-3}	**6000**	
BR50 *FDD 15*	0.3	0.3	0.75	12.5 $^{-0.1}$	9.5	0.45 x 10^{-3}	**6000**	
BR75 *FDD 17*	0.3	0.3	0.75	14.5 $^{-0.1}$	11.5	0.86 x 10^{-3}	**3600**	4500 (6000⁺)
BR125 *FDD 20*	0.6	0.4	0.75	16.0 $^{-0.1}$	12.5	1.22 x 10^{-3}	**3600**	4500 (6000⁺)
BR187 *FDD 23*	0.6	0.4	0.75	18.0 $^{-0.1}$	14.5	2.85 x 10^{-3}	**3600**	4500 (6000⁺)
BR300 *FDD 26*	0.5	0.5	0.90	20.0 $^{-0.1}$	16.5	6.65 x 10^{-3}	**1800**	3000 (4500⁺)
BR500 *FDD 30*	0.5	0.5	0.90	20.0 $^{-0.1}$	16.5	19.5 x 10^{-3}	**1800**	3000 (4500⁺)
BR1200 *FDD 40*	0.6	0.6	1.20	22.0 $^{-0.1}$	18.5	44.5 x 10^{-3}	**1800**	3000 (4500⁺)

* at max. braking torque / ** switched with fast-acting rectifier (overexcitation)
⁺ for max. 5 seconds / ⁺⁺ on request

2.2.3.4 Friction work, friction power

Size	Max. permissible friction power** [J/h]	Max. permissible friction work / braking [J]	Friction work / 0.1 mm wear [J]	Size	Max. permissible friction power** [J/h]	Max. permissible friction work / braking [J]	Friction work / 0.1 mm wear [J]
	P_{Rmax}	W_{Rmax}	*Qr 0.1*		P_{Rmax}	W_{Rmax}	*Qr 0.1*
BR6 *FDD 08*	144×10^3	1.5×10^3 0.9×10^3	16×10^6	**BR125** *FDD 20*	450×10^3	25×10^3 15×10^3	140×10^6
BR12 *FDD 10*	180×10^3	3×10^3 1.8×10^3	30×10^6	**BR187** *FDD 23*	540×10^3	37×10^3 23×10^3	170×10^6
BR25 *FDD 13*	234×10^3	6×10^3 3.5×10^3	42×10^6	**BR300** *FDD 26*	630×10^3	52×10^3 32×10^3	230×10^6
BR50 *FDD 15*	288×10^3	12×10^3 7.5×10^3	70×10^6	**BR500** *FDD 30*	720×10^3	75×10^3 45×10^3	310×10^6
BR75 *FDD 17*	360×10^3	17×10^3 11×10^3	85×10^6	**BR1200** *FDD 40*	810×10^3	100×10^3 60×10^3	400×10^6

** with a uniform timely distribution of the braking   higher max. friction work: used only as a holding brake

2.2.3.5 Electrical parameters

Size	Electrical power (*average value*) [W]	Voltage [VDC]	Rated current (*benchmark*) [A]	Size	Electrical power (*average value*) [W]	Voltage [VDC]	Rated current (*benchmark*) [A]
	$P_{20°C}$	U	I_N		$P_{20°C}$	U	I_N
BR6 *FDD 08*	2 x 22	24	0.92	**BR125** *FDD 20*	2 x 85	24	3.30
		103	0.25			103	0.86
		180	0.12			180	0.46
		205	0.11			205	0.44
BR12 *FDD 10*	2 x 28	24	1.17	**BR187** *FDD 23*	2 x 76	24	3.20
		103	0.31			103	0.86
		180	0.16			180	0.40
		205	0.13			205	0.34
BR25 *FDD 13*	2 x 34	24	1.42	**BR300** *FDD 26*	2 x 105	24	4.17
		103	0.38			103	1.12
		180	0.19			180	0.60
		205	0.15			205	0.54
BR50 *FDD 15*	2 x 45	24	1.69	**BR500** *FDD 30*	2 x 140	24	5.90
		103	0.46			103	1.36
		180	0.25			180	0.78
		205	0.24			205	0.68
BR75 *FDD 17*	2 x 55	24	2.18	**BR1200** *FDD 40*	2 x 144	—	—
		103	0.59			—	—
		180	0.30			180	0.77
		205	0.28			205	0.73

2.2.3.6 Switching times

Size	Nominal braking torque [Nm]	Disconnection time [ms]	Response delay [ms]	Connection time [ms]	Response delay [ms]	Connection time [ms]
			switched on the ***DC side***		*switched on the* ***AC side***	
	M_{bN} =	t_2 =	$t_{11\,DC}$ =	$t_{1\,DC}$ =	$t_{11\,AC}$ =	$t_{1\,AC}$ =
BR6 *FDD 08*	**2 x 6**	85	18	50	70	145
	2 x 4 // 2 x 3.5	75 // 65	22 // 24	60 // 70	100 // 110	175 // 205
BR12 *FDD 10*	**2 x 12.5**	120	16	70	100	210
	2 x 8.5 // 2 x 7	100 // 90	20 // 22	80 // 90	130 // 150	240 // 280
BR25 *FDD 13*	**2 x 25**	150	18	105	150	270
	2 x 17.5 // 2 x 14	135 // 125	20 // 22	112 // 124	230 // 270	350 // 410
BR50 *FDD 15*	**2 x 50**	160	14	115	120	270
	2 x 35 // 2 x 28	140 // 130	18 // 20	127 // 135	180 // 210	330 // 380
BR75 *FDD 17*	**2 x 75**	180	18	120	120	430
	2 x 52 // 2 x 42	170 // 150	19 // 22	130 // 140	180 // 220	490 // 550
BR125 *FDD 20*	**2 x 125**	300** 200	18	150	130	500
	2 x 89 // 2 x 70	200** / 150 // 180** / 140	22 // 30	165 // 175	180 // 210	550 // 600
BR187 *FDD 23*	**2 x 187**	420** / 320	22	190	150	600
	2 x 132 // 2 x 107	340** / 290 // 270** / 230	30 // 40	210 // 225	190 // 220	640 // 690
BR300 *FDD 26*	**2 x 300**	300	40	235	200	750
	2 x 225 // 2 x 150	250 // 200	60 // 75	260 // 295	320 // 530	870 // 1100
BR500 *FDD 30*	**2 x 500**	400	60	250	300	1060
	2 x 375 // 2 x 250	320 // 250	70 // 90	270 // 305	400 // 800	1160 // 1580
BR1200 *FDD 40* ***	**2 x 1200**	800	150	395	2000	2800
	2 x 1000 // 2 x 800	600 // 500	170 // 200	425 // 470	2200 //	3000 // 3220

** values for increased air gap of brake 1 *** switched with fast-acting rectifier (overexcitation)

— The indicated switching times are to be understood as benchmarks with tolerances for the nominal air gap —

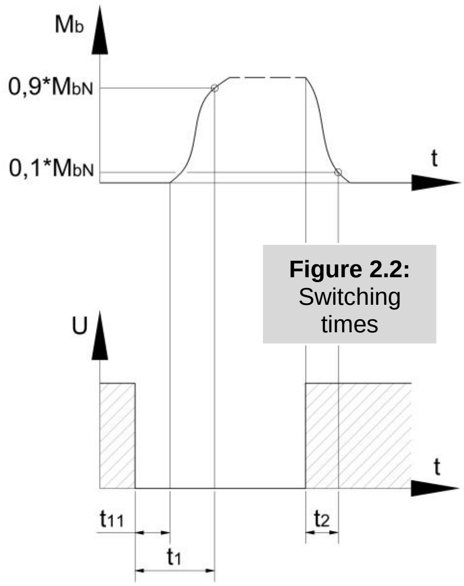


Figure 2.2: Switching times

t_2 = disconnection time = time between the switching on of the current and the ceasing of the braking torque ($M_b \leq 0.1*M_{bN}$)

– Overexcitation by a fast-acting rectifier results in approx. half as long disconnection times –

$t_{1\,DC}$ = connection time = response time during braking with interruption on the DC side by mechanical switches = time between the switching off of the current and the reaching of the full braking torque ($M_b \geq 0.9*M_{bN}$)

$t_{1\,AC}$ = connection time = response time during braking with disconnection on the AC side, i.e. by interruption of a *separately* powered rectifier

$t_{11\,DC}$ / **$t_{11\,AC}$** = response delay = time between the switching off of the current and the increase in the braking torque (included in the respective connection time)

– Depending on the operating temperature and the wear status of the brake discs, the actual switching times (t_2, $t_{11\,DC}$, $t_{11\,AC}$) can deviate from the benchmarks indicated here. When the voltage is reduced by a fast-acting rectifier, connection times are shortened –

3. Assembly

3.1 Mechanical installation

3.1.1 Requirements and preparation

- Check the unpacked spring-applied brake as to being undamaged and complete of all parts (according to the delivery note). Complaints regarding recognizable transport damage must be made immediately to the deliverer, while claims for recognizable defects and incompleteness must be made to PRECIMA (cf. also 2.5 in the *General Introduction (…) PRECIMA Spring-applied Brakes*).
- Compare the nameplate of the brake with the agreed characteristics and the actual conditions

➔Attention!

Should any ambiguities or contradictions be revealed during the inspection, the brake must not be installed and put into operation without consulting PRECIMA.

3.1.2 Counter friction surface

3.1.2.1 Motor end shield etc. as a counter friction surface (= no flange)

- Check whether the provided counter friction surface meets the requirements (material: steel, cast steel, cast iron - *no aluminium / stainless steel with limitations* -; surface quality **Rz 6.3**) and whether it is free of grease and oil.

3.1.2.2 Friction plate, flange

- If the counter friction surface is supplied in the form of a friction plate (item **7**, **Figure 3.1**, standard for BR6...187) or a flange, this component - which lies directly on the motor end shield - is fixed there together with the brake (see also 3.1.3, 3.1.4 and Figure 3.1).

➔Attention!

If the counter friction surface does not meet the requirements, the brake must not be installed and put into operation without consulting PRECIMA. Grease and oil on the counter friction surface must be removed completely before continuing!

3.1.3 Hub and rotor (Figure 3.1)

➔Stop!

Before the assembly, check the thickness of the rotor according to the information in 2.2.3.3. **S_{new} is the value for a new rotor** (tolerance = 0/-0.1 mm)**, s_{min} is the lowest permissible rotor thickness. When installing a new rotor, the values must be $s = s_{new}$; in case of a reassembly (e.g. after a maintenance-related dismantling) the values must be $s > s_{min}$, otherwise the rotor must be replaced.**

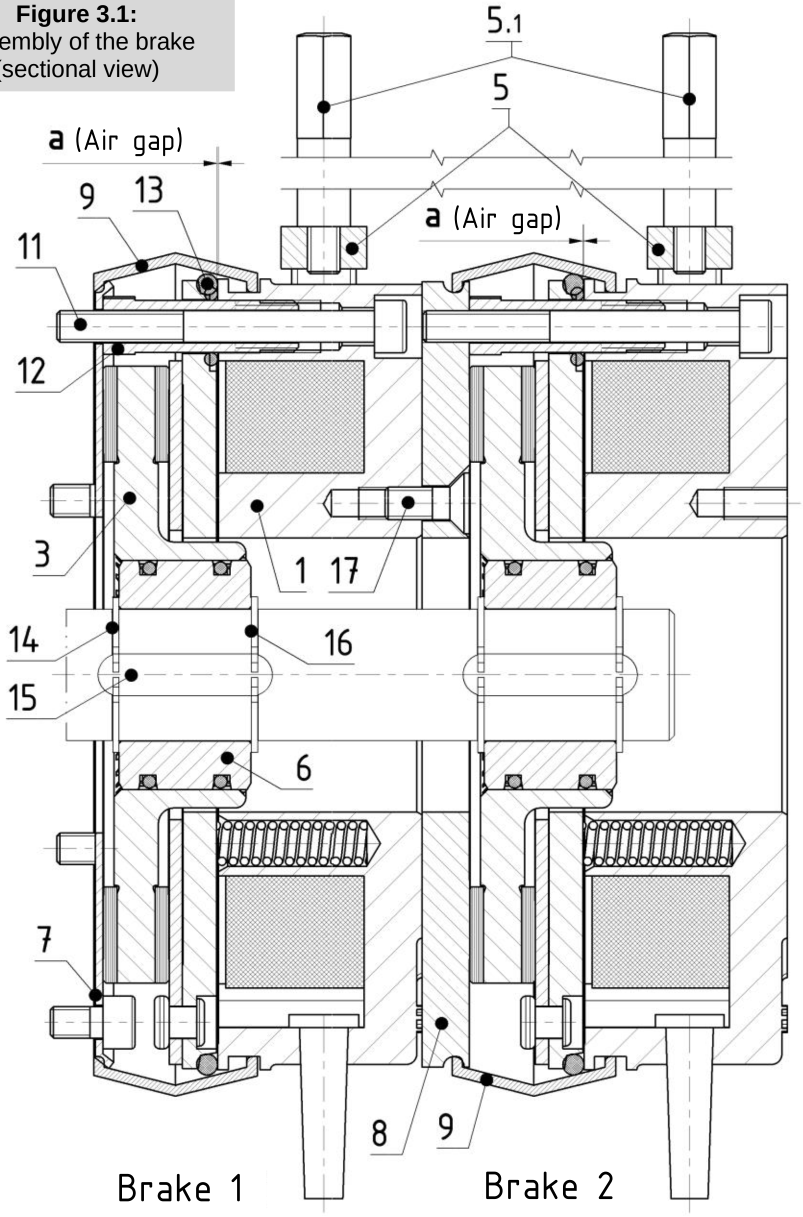
The rotor, as a rotating component of the motor to be braked, is fixed onto the shaft via the hub:

- Insert the first circlip (item **14**) into the rearmost radial groove of the shaft
- Insert the first feather key (item **15**) into the rear axial groove of the shaft
- Push the first toothed hub (item **6**) onto the shaft and over the feather key
- Fix the hub axially by inserting the second circlip (item **16**) into the corresponding radial groove of the shaft

- If necessary, mount the counter friction surface (friction plate (item **7**); flange)
- Push the first rotor (item **3**) onto the hub, the rotor should still be axially displaceable However, because of the O-rings arranged in the hub, the rotor/hub pair can run smoothly only on a short axial path. At the same time, the O-rings reduce noise generation in the gear teeth.

➔Stop! To simplify assembly, you could apply a small quantity of grease on the O-rings in the hub. Please make sure that the friction surfaces are not contaminated during the application of this measure!

Figure 3.1:
Assembly of the brake
(sectional view)



3.1.4 Brake 1 (Figure 3.1)

Brake 1 is attached to the motor flange (possibly with interposition of a friction plate or a flange) and the air gap is checked:

- Place the brake (item **1**) on the rotor, insert and screw in the fixing screws (item **11**) until the hollow screws (item **12**) rest on the counter friction surface
- Check the size of the air gap **a** for compliance with the **nominal value** (+ tolerance) by means of a feeler gauge on three points of the circumference and, if necessary, correct it by adjusting the hollow screws (nominal air gap and tolerance values: see **2.2.3.3**).
  ➔ For the procedure to correct the air gap cf. **4.1.3.1**.

- Insert the O-rings (item **13**) into the groove of the armature plate
- Tighten the fixing screws with the tightening torque according to **2.2.3.2**

3.1.5 Intermediate flange (Figure 4.1; <u>not</u> for FDT)

After brake 1 has been installed, the intermediate flange (item **8**) is attached to it using countersunk screws (item **17**) (tightening torque according to 2.2.3.3).

3.1.6 Brake 2 (Figure 4.1; <u>not</u> for FDT)

Brake 2 is attached to the intermediate flange installed according to 3.1.5 in the same way as brake 1 and the air gap is checked just as for brake 1.

3.1.7 Options included (Figure 4.1)

- Mount the dust protection rings (item **9**)
- Screw the manual release levers (item **5.1**) into the manual release bracket (item 5) with the attached washer and tighten them onto the hexagonal surfaces. ➔ **Screw-in torque:**

Size	Thread lever	Screw-in torque [benchmark in Nm]
BR6/12 // FDD+FDT 08/10	M5	**5**
BR25/50 // FDD+FDT 13/15	M6	**8**
BR75…187 // FDD+FDT 17…23	M8	**18**
BR300…1200 // FDD+FDT 26…40	M10	**25**

3.2 Electrical installation

The electrical connection is only to be carried out in a de-energized state. The operating voltage (DC) of the brake is indicated on the magnet housing (cf. 2.1.1 and Figure 2.2).

3.3 Modifications and additions

3.3.1 Change (reduction) of the braking torque

The braking torque can be reduced by modifying the spring configuration in accordance with **2.2.3.1**. Make sure that at least the springs arranged on the outside are evenly distributed. Such a change may only be implemented after **consulting PRECIMA** (cf. also note in 2.2.1 of the *General Introduction (…) PRECIMA Spring-Applied Brakes*).

3.3.2 Installation of the manual release (Figure 3.2)

For all FDD and FDT brakes, the manual releases of the single brakes are already installed and their setting must not be changed (see below). However, it may also be necessary for the customer to install a manual release (e.g. after modifying the spring configuration ➔ reduction of the braking torque).

- Place the manual release bracket (item **5**) on the magnetic body (item **1**) and insert the two bolts with a cross-threaded hole (item **23**) into the corresponding holes of the manual release bracket
- Insert the screw (item **20**) with the attached washer (item **21**) and the compression spring (item **22**) into the holes of the armature plate. The screws go through the underlying holes of the magnet housing; the washer is placed below the screw head on the armature plate, while the compression spring is inserted between the washer and the magnetic body
- Screw the screws into the bolts (item **23**) and adjust dimension **y** evenly according to **2.2.3.2**. The two screws **must be locked by means of screw sealing wax** in the correct setting position.

➔Attention!

For safety reasons, the setting of the manual release must not be changed! The adjustment of the brake air gap a (cf. 4.1.3.1) **does <u>not</u> require any adaptation of dimension y!**
It is also important to make sure that the manual release bracket is installed correctly, so that release is possible in both directions (the bevel on the manual release bracket must be on the side of the armature plate)!

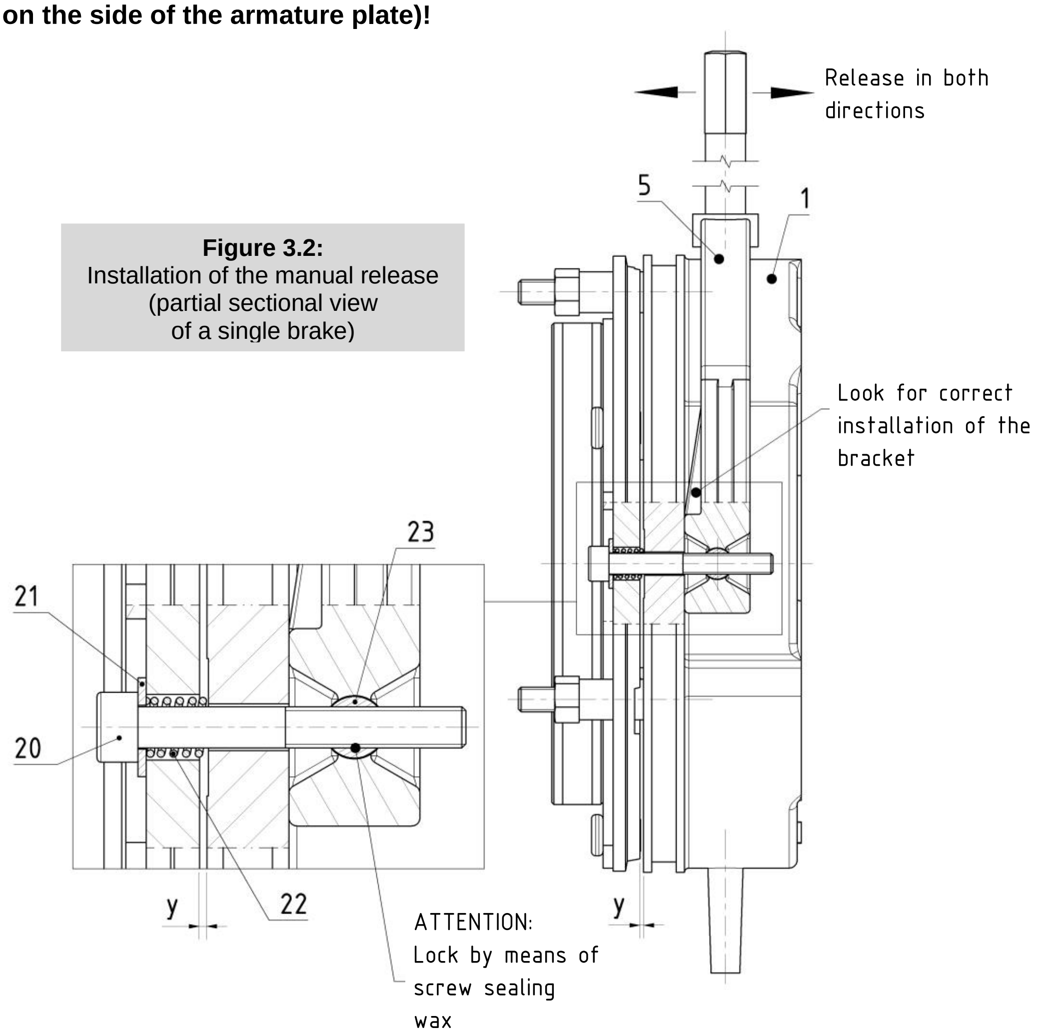


Figure 3.2:
Installation of the manual release
(partial sectional view
of a single brake)

4. Operation

4.1 Brake in operation

4.1.1 Commissioning

Before commissioning the brake, a **functional test** must be carried out first. This can normally and readily be done together with the motor to which the brake is attached. In order to check the **redundancy of the system**, it is necessary to switch brake 1 and brake 2 separately and to determine for each of them whether they meet the requirements relevant to the installation situation. For possible malfunctions, see: 4.2.

➔Stop!

The full braking torque is only effective after the brake pads on the rotor have run in! ➔ Deviation values to M_{bN}: see 2.2.3.1

4.1.2 Ongoing operation

Ongoing operation requires no special measures without malfunctions. Only the **size of the air gap a** (increasing because of the wear of the friction lining on the rotor) must be checked as part of the regular testing determined and carried out by TÜV.

Furthermore, after a number of adjustments of the air gap a (see 4.1.3), the **rotor thickness s** must be checked. A reasonable control interval results from the ratio between the difference $s_{new} - s_{min}$ and the difference $a_{nominal} - a_{max}$, taking into account the respective tolerances.

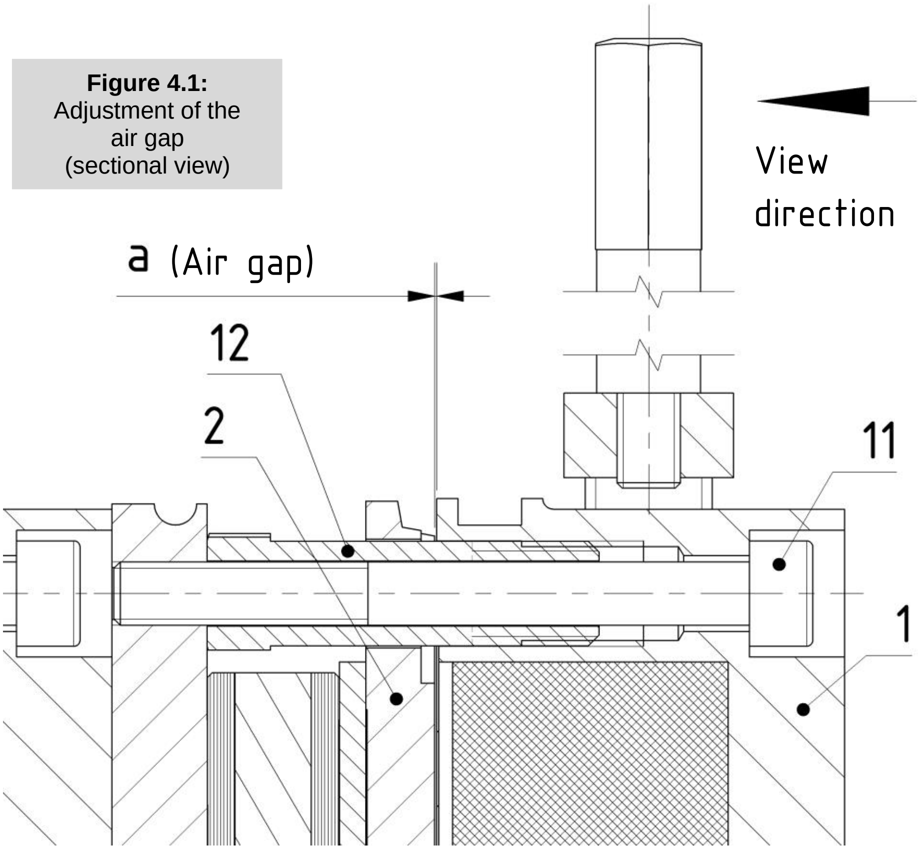
4.1.3 Maintenance

4.1.3.1 Adjusting the air gap (Figure 4.1)

The spring-applied brake is substantially maintenance-free. When the **maximum air gap a_{max}** specified in **2.2.3.3** is reached, an **adjustment (readjustment) of the air gap a** is necessary for the brake to work safely. If the functionality of the brake exceeds the maximum air gap just in individual cases, this does not change the above statement; **proper use is then no longer available**. In any case, as the wear progresses, the functionality and safety function of the brake are impaired.

How to readjust the air gap:
- Facing the brake (see **Figure 4.1**), loosen all fixing screws (item **11**) by half a turn *counterclock*wise.
- Screw the hollow screws (item **12**) into the magnetic body also by a *counterclock*wise rotation
- Screw the fixing screws *(clock*wise*)* into the (motor) flange until the *nominal* air gap (measured by means of feeler gauges) of three points on the circumference is available.
- Reposition the hollow screws, i.e. unscrew them from the magnetic body (*clock*wise) until they make firm contact with the counter friction surface
- Tighten the fixing screws with the **tightening torque according to 2.2.3.2**
- Check the air gap between the housing (item **1**) and the armature plate (item **2**); if necessary, readjust the setting

Figure 4.1:
Adjustment of the air gap (sectional view)



4.1.3.1 Replacing the rotor

When the minimum rotor thickness $\mathbf{s_{min}}$ according to **2.2.3.3** is reached, it is no longer possible to adjust the air gap a and the rotor must be replaced. Functionality of the brake that falls below the minimum rotor thickness just in individual cases does not change the above statement; **proper use is then no longer available**.

➔Stop!

Even after the rotor has been replaced, the full braking torque is only effective again after the brake linings on the rotor have run in!
➔ Deviation values to M_{bN}: see 2.2.3.1

➔Attention!

When replacing the rotor, the mechanical components involved in the build-up and transmission of the braking torque must be checked for excessive wear (armature plate, hollow screws) or integrity (springs) and replaced if necessary!

4.2 Brake out of operation (malfunctions)

The table below shows typical malfunctions during ongoing operation (in some cases also during commissioning), their possible causes and instructions for their correction.

Malfunction	Possible cause	Remedy
Brake does not release	Air gap too large	Check air gap and readjust
	Brake is not supplied with voltage	Check electrical connection
	Voltage at the magnetic coil too low	Check magnetic coil supplied voltage
	Armature plate mechanically blocked	Remove mechanical blockage
Brake releases with delay	Air gap too large	Check and readjust air gap
	Voltage at the magnetic coil too low	Check magnetic coil supplied voltage
Brake is not applied	Voltage at the magnetic coil too high	Check supply voltage of the magnetic coil
	Armature plate mechanically blocked	Remove mechanical blockages
Brake is applied with delay	Voltage at the magnetic coil too high	Check supply voltage of the magnetic coil

5. Disassembly / Replacement

5.1 Dismantling of the brake

Dismantling of the brake shall be carried out analogous to the assembly, but in reverse order, and only when the brake and the motor are **switched off, de-energized and torque-free**.

➔Danger!
The disassembly of the brake will result in a suspension of its passive braking function. There are no risks associated with this suspension!

5.2 Component replacement

The only component that can be regularly replaced on site is the **rotor** when it reaches the wear limit (see 4.1.3.1); when the **hub** shows signs of noticeable wear, it can be replaced if necessary. Furthermore, all other components listed in ***5.4 Spare parts*** can also be generally replaced.

➔Attention!
Before reassembling a brake, the fastening elements must be checked for proper functionality and replaced if necessary!

5.3 Brake replacement / disposal

The components of our spring-applied brakes have to be recycled separately due to the presence of different materials. The official regulations must also be observed.
Important code numbers of the Waste Catalogue Ordinance (German designation: AAV) are given below. Depending on the material composition and the type of disassembling process, other key numbers may also apply to the components made from these materials.

- Ferrous metals (key no.160117)
- Non-ferrous metals (key no.160118)
- Brake pads (key no.160112)
- Plastics (key no. 160119)

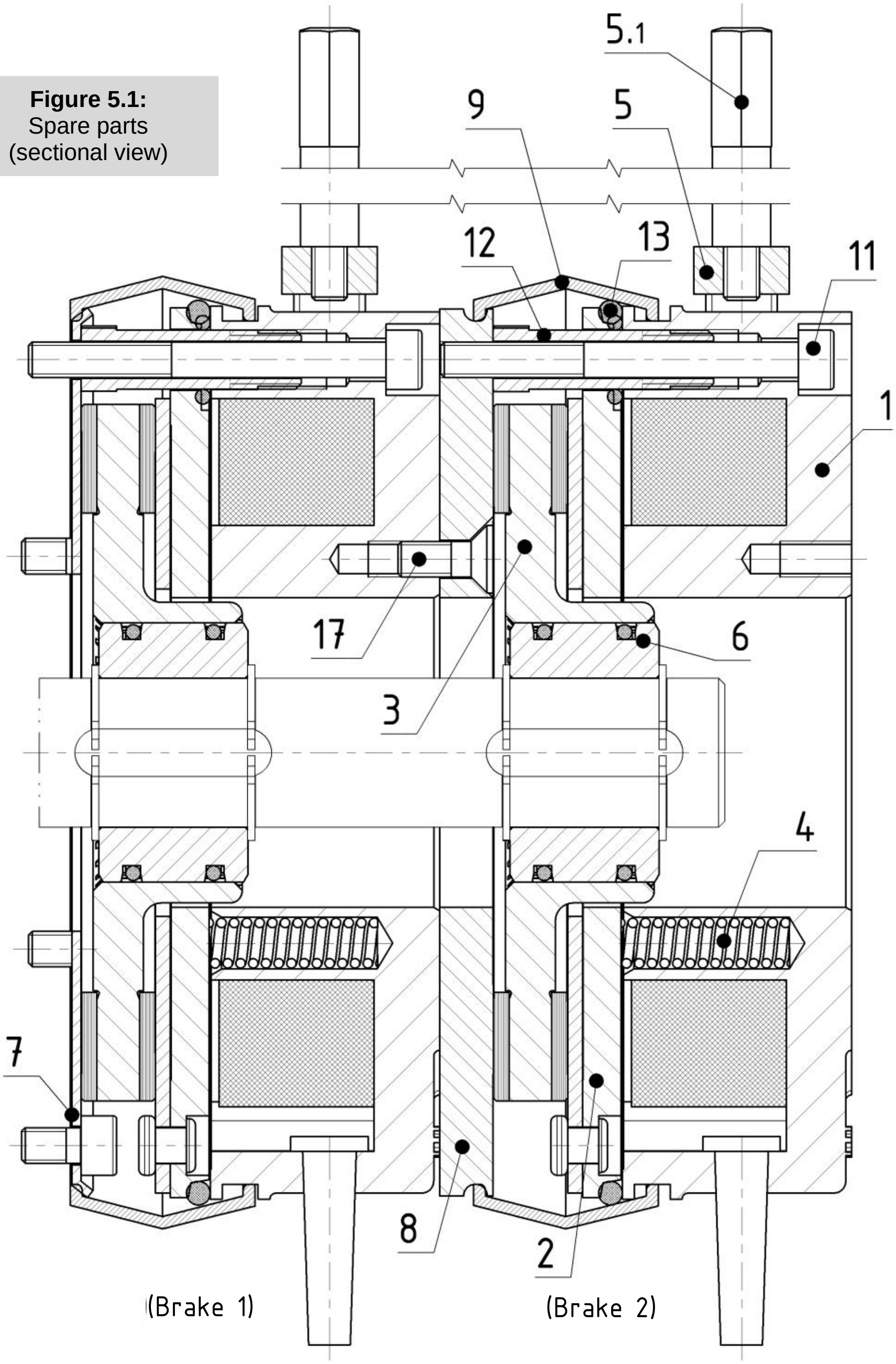
5.4 Spare parts

Figure 5.1 shows all the spare parts that can be ordered for the FDD and FDT spring-applied brakes, which are listed below. Except for items 7, 8 and 17, which are used to complete the two single brakes in order to assemble the double brake, the parts listed are used separately and independently for the single brakes and also for the FDT.

When ordering spare parts, please provide the brake lettering data (see 2.1.1)!

➔Attention!
PRECIMA Magnettechnik GmbH excludes any liability and warranty for damage resulting from the use of non-original spare parts and accessories (cf. 2.3.3 in the *General Introduction (…) PRECIMA Spring-applied Brakes*).

Figure 5.1:
Spare parts
(sectional view)



Position	Designation	Position	Designation
1	Magnetic body	8	Intermediate flange
2	Armature plate	9	Dust protection ring
3	Rotor complete		
4	Spring	11	Fixing screw
5	Manual release complete	12	Hollow screw
5.1	Manual release lever	13	O-ring
6	Hub complete		
7	Friction plate / flange	17	Countersunk screws (intermediate flange)

Document history

Issue	Version	Description
05.2020	*0.0*	Created
11.2021	*1.0*	General: FDD and (new) FDT as general brake **type** designation, BR6..BR1200 as NORD-specific brake **size** designation (instead of BRE...) 2.1.3: Adaptation of Getriebebau NORD nomenclature 2.2.3.1: Definition of nominal braking torques added; tolerance values revised.