

**Operating and Assembly Instructions**  
for the electromagnetically released  
**Spring-Applied Brakes FDB / BRE 5...1000**  
— Protection Class IP55 —



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# 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:



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## 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 FDB 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<sup>-1</sup>** 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 (possible from FDB 10 / BR 10)

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*

## 2. Product Description

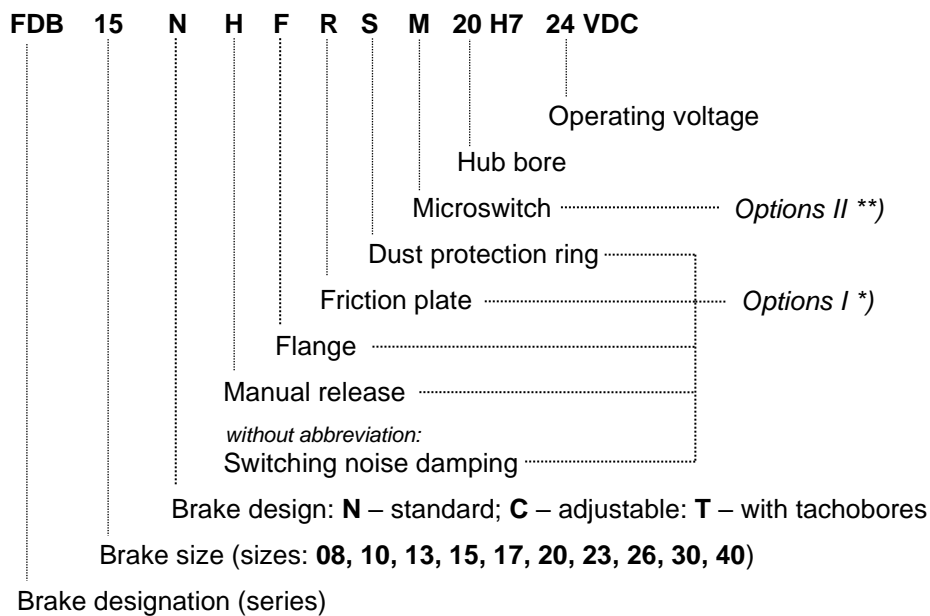
### 2.1 Marking

#### 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 FDB brakes (PRECIMA)

Example:



\*) *Options I* are taken into account in these operating and assembly instructions, but, if desired, must be specified when placing the order. Except for the *switching noise damping* option, this can be done simply by entering the needed abbreviation.

\*\*) *Options II* are *not* taken into account in these instructions. The M option (= microswitch), which is the only one included, 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.

#### 2.1.3 FDB brake nomenclature (Getriebebau NORD)

The following two diagrams show how an FDB brake is designated by Getriebebau Nord. Pos.1 to Pos.8 must be listed in any case, Positions 9 ff only when the corresponding option is used, but then always in the sequence shown.

Pos.1	Pos.2	Pos.3	Pos.4	Pos.5	Pos.6	Pos.7	Pos.8
Brake size	Application	Coil voltage	Supplier	Type	Hub type	Friction lining	Brake design
BR5	W	...V	P	FDB	6K	HT	N
BR10	H	...	P = Precima	FDB Type	PZ1	HT2	C
BR20	W = Working brake; H = Holding brake		...		VZ1	HD	T
BR40		... = Coil voltage in Volts			VZ2	HS	N = Standard C = adjustable torque T = with tachometers
BR60	6K = Hexagonal hub				HT and HT2: high holding torque HD: high friction work HS: high rotational speeds		
BR100	PZ1 = Hub with PRECIMA toothing						
BR150	VZ1 = Hub with DIN 5480 toothing						
BR250	VZ2 = Hub with DIN 5480 toothing [greater reference Ø]						
BR400							
BR1000	Numerical value brake size = Nominal braking torque [Nm]						

Pos.9 ff [Options]							
Deviating torque	Micro switch / Sensor	Ø Hub	Manual release	Heating	Protection	Low-noise brake	Special design
A...	MF...	D...	HL	BSH230	SR	NRB1	S
... = deviating torque in Nm (cf. 2.2.2.1)	MV...	... = Diameter in mm (cf. 2.2.2.3)	FHL	BSH115	RG	NRB2	NRB1 = Switching noises NRB2 = Running noises NRB12 = Switching and running noises
	MFF...		HL = Standard FHL = lockable	Numerical value = Connection voltage in VAC	SR = against dust and rust; RG = against rust		
	MFV...						
	IF...		M = Micro switch; I = Inductive sensor; F = Function monitoring; V = Wear monitoring; ... = No. of dimension sheet [T90-...]				
	IV...						
	IFF...						
	IFV...						

XXX
XXX

= Selection fields of the corresponding position

--

= Selection field empty, i.e. a corresponding entry is omitted in the brake description

**Example:** **BR400 W 180V P FDB VZ2 HD N A300 MFV322 D50 HL BSH230**  
 = Working brake FDB of size 400 (torque reduced to 300 Nm) in standard version with manual release, a 180 VDC coil, a rotor with HD friction lining and toothing according to DIN 5480 (VZ2), a hub Ø50, one microswitch each according to T90-322 for function and wear monitoring and a heater for a supply voltage of 230 VAC, 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), a distinction must be made between the designs N, T and C of the FDB spring-applied brakes: While in the **designs N** and **T** the braking torque can only be adjusted through the spring configuration (number and type of springs), in the **design C** it can also be modified by **screwing an adjustment ring in and out** (cf. Figure 2.1). 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 FDB brake as such.

### 2.2.2 Technical data

#### 2.2.2.1 Nominal braking torques and number of springs

- 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	BR5 FDB 08	BR10 FDB 10	BR20 FDB 13	BR40 FDB 15	BR60 FDB 17	BR100 FDB 20 N/C	BR150 FDB 23 N/C	BR250 FDB 26	BR400 FDB 30	BR1000 FDB 40
Nominal braking torques	<b>5</b>	<b>10</b>	<b>20</b>	<b>40</b>	<b>60</b>	<b>100/100</b>	<b>150/150</b>	<b>250</b>	<b>400</b>	<b>1000</b>
$M_{bN}$	3.5	7	14	28	43	70/80	107/105	187	300	850
[Nm]	3	6	12	23	34	57/50	85/63	125	200	675
	2	4	8	17	26	42/--	65/--			500

— 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\*) —

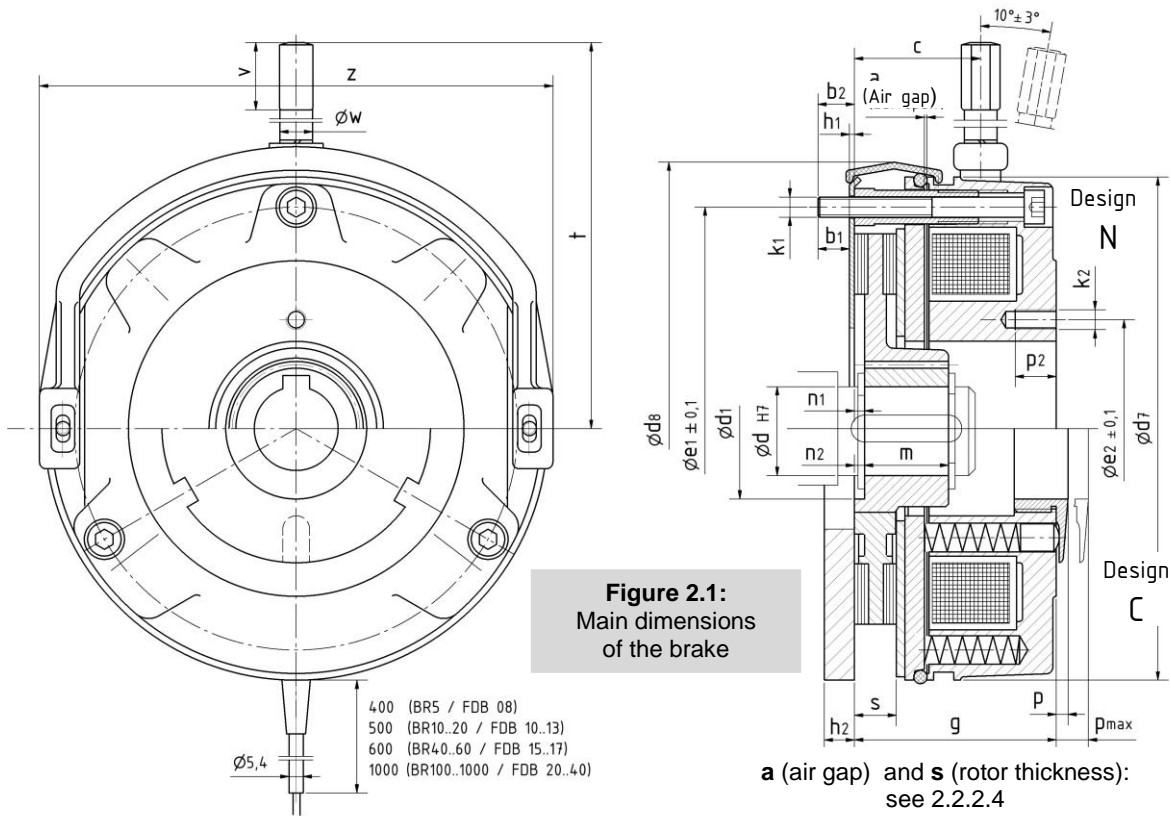
\* For explanation see: *General introduction (...)* *PRECIMA spring-applied brakes* / Chapter 5

Size	BR5 FDB 08	BR10 FDB 10	BR20 FDB 13	BR40 FDB 15	BR60 FDB 17	BR100 FDB 20 N/C	BR150 FDB 23 N/C	BR250 FDB 26	BR400 FDB 30	BR1000 FDB 40
Number of springs for the above $M_{bN}$	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7/8</b>	<b>7/8</b>	<b>8</b>	<b>8</b>	<b>12</b>
	5	5	5	5	5	5/6	5/6	6	6	10
	4	4	4	4	4	4/4	4/4	4	4	8
	3	3	3	3	3	3/--	3/--			6

#### 2.2.2.2 Torque reduction (design C)

Size	BR5 FDB 08	BR10 FDB 10	BR20 FDB 13	BR40 FDB 15	BR60 FDB 17	BR100 FDB 20	BR150 FDB 23	BR250 FDB 26	BR400 FDB 30	BR1000 FDB 40
Torque reduction / rest position [Nm]	0.2	0.2	0.3	1	1.3	1.5	2	<i>not a standard design C</i>		
Number of usable rest positions = maximum permissible unscrewing of the threaded ring	<b>6</b>	<b>12</b>	<b>12</b>	<b>9</b>	<b>12</b>	<b>18</b>	<b>24</b>			

2.2.2.3 Dimensions, masses, fastening (Figure 2.1)



**Figure 2.1:**  
Main dimensions  
of the brake

a (air gap) and s (rotor thickness):  
see 2.2.2.4

Size	Hub dimensions [mm]						General brake dimensions [mm]						Tachometer bores dimensions [mm] - only design N -		
	Hex hub Ød <sup>H7</sup>	Toothed hub Ød <sup>H7</sup>	Mounting dimensions				With/without dust protection ring	Brake in new condition	Brakes with manual release			Bolt circle Øe <sub>2</sub> ±0.1	(Number of holes) x thread nominal Ø	Thread depth	
	d	d	d <sub>1</sub>	m	n <sub>1</sub>	n <sub>2</sub>	d <sub>7</sub> / d <sub>8</sub>	g / h <sub>1</sub> / h <sub>2</sub>	c	v / w	t / z	e <sub>2</sub>	k <sub>2</sub>	p <sub>2</sub>	
BR5 FDB 08	11/14/15	11/14*/15*	20	18	1.5	0.5	85 / 89	40 / 1.5 / 6	22	15 / 8	100 / 89	34	(3 x) M4	8	
BR10 FDB 10	15/19/20*	14/15	25	20	2.5	1	105 / 109	48 / 1.5 / 7	21	15 / 8	110 / 111	40	(3 x) M5	12	
BR20 FDB 13	15/20/25	15/20	33	20	3.5	1.5	130 / 135	54 / 1.5 / 9	33	20 / 10	130 / 132	54	(3 x) M6	12	
BR40 FDB 15	20/25/30	20/25	42	25	3	2	150 / 155	60 / 1.5 / 9	38	20 / 10	140 / 151	65	(3 x) M6	12	
BR60 FDB 17	-	25/30/35*	-	30	3	-	170 / 175	70 / 2 / 11	42	25 / 12	165 / 172	75	(3 x) M8	15	
BR100 FDB 20	-	30/35/40	-	30	3	-	195 / 201	80 / 2 / 11	48	25 / 12	220 / 196	85	(3 x) M8	15	
BR150 FDB 23	-	35/40/45	-	35	4	-	225 / 231	90 / 2 / 11	51	25 / 12	250 / 224	95	(3 x) M8	15	
BR250 FDB 26	-	40/45/50/55*	-	40	4	-	258 / 264	99** / 2 / 11	57	35 / 19	330 / 258	110	(6 x) M10	25	
BR400 FDB 30	-	50/55/60/65*	-	50	4	-	306 / 312	105 / 2 / 12.5	59	35 / 19	357 / 304	138	(6 x) M10	25	
BR1000 FDB 40	-	65/70/75/80*	-	70	4	-	400 / 408	120.6 / 18**	69	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 // \*\* no version with friction plate; dimension h<sub>2</sub> for flange

\*\*\* separate internal pole: 15 mm without thread // \*\* screw heads protrude for 1 mm (overall dim. = 100)

Size	Masses [kg]			Mounting dimensions [mm]			Tightening torque [Nm]	Adjustment dimensions [mm]	
	Brake without manual release and flange	Manual release	Flange	Bolt circle $\varnothing e_1 \pm 0.1$	(Number of holes) x thread nominal $\varnothing$	Screw-in depth without / with friction plate	Fixing screws	Threaded ring (Design C)	Manual release
				$e_1$	$k_1$	$b_2 / b_1$	$M_A$	$p \dots p_{max}$	$y$
<b>BR5</b> FDB 08	1.10	0.05	0.20	72	(3 x) M4	10.5 / 9	<b>3</b>	3...6	1
<b>BR10</b> FDB 10	1.90	0.08	0.34	90	(3 x) M5	10.5 / 9	<b>6</b>	3...9	1
<b>BR20</b> FDB 13	3.10	0.10	0.68	112	(3 x) M6	9 / 12.5	<b>10</b>	3.5...9.5	1
<b>BR40</b> FDB 15	4.60	0.13	0.90	132	(3 x) M6	9 / 12.5	<b>10</b>	3.5...8	1
<b>BR60</b> FDB 17	6.30	0.17	1.40	145	(3 x) M8	11 / 14	<b>25</b>	4.5...10.5	1
<b>BR100</b> FDB 20	10.00	0.24	1.90	170	(3 x) M8	10 / 13	<b>25</b>	7...14	1.2
<b>BR150</b> FDB 23	14.70	0.29	2.50	196	(3 x) M8	11 / 14	<b>25</b>	8...17	1.2
<b>BR250</b> FDB 26	21.50	0.80	3.50	230	(3 x) M10	11 / 19	<b>50</b>	-	1.5
<b>BR400</b> FDB 30	35.00	0.90	5.20	278	(6 x) M10	18.5 / 16.5	<b>50</b>	-	1.5
<b>BR1000</b> FDB 40	60.00	0.90	13.10	360	(6 x) M12	17 / 19**	<b>85</b>	-	1.5

\*\* no version with friction plate; screw-in depth for version with flange

Dimension y see 3.3.2 or Figure 3.2

#### 2.2.2.4 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 [kgm <sup>2</sup> ]	Max. rotor speed [min <sup>-1</sup> ]	
						$n_{max}$ Working brake	$n_{max}$ Holding brake**
<b>BRE 5</b> FDB 08	0.2	0.60	7.5 <sup>-0.1</sup>	4.5	0.015 x 10 <sup>-3</sup>	<b>6000</b>	
<b>BRE 10</b> FDB 10	0.2	0.70	8.5 <sup>-0.1</sup>	5.5	0.045 x 10 <sup>-3</sup>	<b>6000</b>	
<b>BRE 20</b> FDB 13	0.3	0.80	10.3 <sup>-0.1</sup>	7.5	0.173 x 10 <sup>-3</sup>	<b>6000</b>	
<b>BRE 40</b> FDB 15	0.3	0.90	12.5 <sup>-0.1</sup>	9.5	0.45 x 10 <sup>-3</sup>	<b>6000</b>	
<b>BRE 60</b> FDB 17	0.3	1.00	14.5 <sup>-0.1</sup>	11.5	0.86 x 10 <sup>-3</sup>	<b>3600</b>	4500 (6000+)
<b>BRE 100</b> FDB 20	0.4 **	1.10	16.0 <sup>-0.1</sup>	12.5	1.22 x 10 <sup>-3</sup>	<b>3600</b>	4500 (6000+)
<b>BRE 150</b> FDB 23	0.4 **	1.10	18.0 <sup>-0.1</sup>	14.5	2.85 x 10 <sup>-3</sup>	<b>3600</b>	4500 (6000+)
<b>BRE 250</b> FDB 26	0.5	1.20	20.0 <sup>-0.1</sup>	16.5	6.65 x 10 <sup>-3</sup>	<b>1800</b>	3000 (4500+)
<b>BRE 400</b> FDB 30	0.5	1.20	20.0 <sup>-0.1</sup>	16.5	19.5 x 10 <sup>-3</sup>	<b>1800</b>	3000 (4500+)
<b>BRE 1000</b> FDB 40 **	0.6	1.20	22.0 <sup>-0.1</sup>	18.5	44.5 x 10 <sup>-3</sup>	<b>1800</b>	3000 (4500+)

\* switched with fast-acting rectifier (overexcitation) \*\* for options RG and SR: 0.6

+ for max. 5 seconds \*\* at high speeds a damping should be provided between rotor and hub (NRB2 version, see 2.1.3)



2.2.2.5 Friction work, friction power

Size	Max. permissible friction power** [J/h]	Max. permissible friction work / braking [J]	Max. permissible friction power** [J/h]	Max. permissible friction work / braking [J]	Friction work / 0.1 mm wear [J]
	<i>P<sub>Rmax</sub></i>	<i>W<sub>Rmax</sub></i>	<i>P<sub>Rmax</sub></i>	<i>W<sub>Rmax</sub></i>	<i>Q<sub>r 0.1</sub></i>
<b>BR5 / FDB 08</b>	144 x 10 <sup>3</sup>	1,5 x 10 <sup>3</sup>	144 x 10 <sup>3</sup>	1,5 x 10 <sup>3</sup>	16 x 10 <sup>6</sup>
<b>BR10 / FDB 10</b>	180 x 10 <sup>3</sup>	3 x 10 <sup>3</sup>	180 x 10 <sup>3</sup>	3 x 10 <sup>3</sup>	30 x 10 <sup>6</sup>
<b>BR20 / FDB 13</b>	234 x 10 <sup>3</sup>	6 x 10 <sup>3</sup>	234 x 10 <sup>3</sup>	6 x 10 <sup>3</sup>	42 x 10 <sup>6</sup>
<b>BR40 / FDB 15</b>	288 x 10 <sup>3</sup>	12 x 10 <sup>3</sup>	288 x 10 <sup>3</sup>	12 x 10 <sup>3</sup>	70 x 10 <sup>6</sup>
<b>BR60 / FDB 17</b>	720 x 10 <sup>3</sup>	35 x 10 <sup>3</sup> *	360 x 10 <sup>3</sup>	17 x 10 <sup>3</sup>	85 x 10 <sup>6</sup>
<b>BR100 / FDB 20</b>	900 x 10 <sup>3</sup>	50 x 10 <sup>3</sup> *	450 x 10 <sup>3</sup>	25 x 10 <sup>3</sup>	140 x 10 <sup>6</sup>
<b>BR150 / FDB 23</b>	1080 x 10 <sup>3</sup>	75 x 10 <sup>3</sup> *	540 x 10 <sup>3</sup>	37 x 10 <sup>3</sup>	170 x 10 <sup>6</sup>
<b>BR250 / FDB 26</b>	1260 x 10 <sup>3</sup>	105 x 10 <sup>3</sup>	630 x 10 <sup>3</sup>	52 x 10 <sup>3</sup>	230 x 10 <sup>6</sup>
<b>BR400 / FDB 30</b>	1440 x 10 <sup>3</sup>	150 x 10 <sup>3</sup>	720 x 10 <sup>3</sup>	75 x 10 <sup>3</sup>	310 x 10 <sup>6</sup>
<b>BR1000 / FDB 40</b>	1620 x 10 <sup>3</sup>	200 x 10 <sup>3</sup>	810 x 10 <sup>3</sup>	100 x 10 <sup>3</sup>	400 x 10 <sup>6</sup>

\* when using a **friction plate** (R option): **50% of the indicated value**; friction plate optional for sizes 08...23 / BR5... 150, flange optional for larger brakes only

\*\* with a uniform timely distribution of the braking

2.2.2.6 Electrical parameters

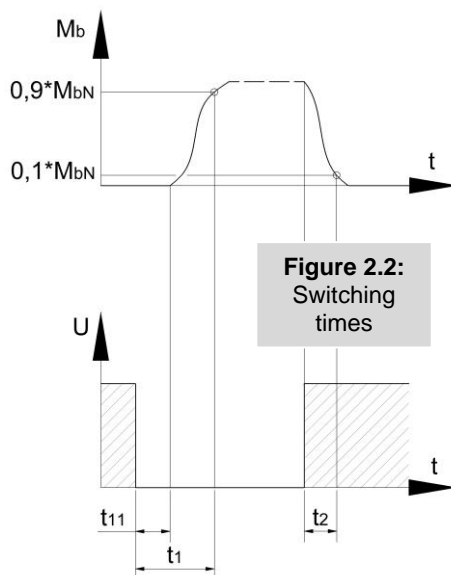
Size	Electrical power (average value) [W]	Voltage [VDC]	Rated current (benchmark) [A]	Size	Electrical power (average value) [W]	Voltage [VDC]	Rated current (benchmark) [A]
	<i>P<sub>20°C</sub></i>	<i>U</i>	<i>I<sub>N</sub></i>		<i>P<sub>20°C</sub></i>	<i>U</i>	<i>I<sub>N</sub></i>
<b>BR5</b> <i>FDB 08</i>	22	24	0.92	<b>BR100</b> <i>FDB 20</i>	85	24	3.30
		103	0.25			103	0.86
		180	0.12			180	0.46
		205	0.11			205	0.44
<b>BR10</b> <i>FDB 10</i>	28	24	1.17	<b>BR150</b> <i>FDB 23</i>	76	24	3.20
		103	0.31			103	0.86
		180	0.16			180	0.40
		205	0.13			205	0.34
<b>BR20</b> <i>FDB 13</i>	34	24	1.42	<b>BR250</b> <i>FDB 26</i>	105	24	4.17
		103	0.38			103	1.12
		180	0.19			180	0.60
		205	0.15			205	0.54
<b>BR40</b> <i>FDB 15</i>	45	24	1.69	<b>BR400</b> <i>FDB 30</i>	140	24	5.90
		103	0.46			103	1.36
		180	0.25			180	0.78
		205	0.24			205	0.68
<b>BR60</b> <i>FDB 17</i>	55	24	2.18	<b>BR1000</b> <i>FDB 40</i>	144	—	—
		103	0.59			—	—
		180	0.30			180	0.77
		205	0.28			205	0.73

2.2.2.7 Switching times

Size	Nominal braking torque [Nm]	Disconnection time [ms]	Response delay [ms]	Connection time [ms]	Response delay [ms]	Connection time [ms]
			<i>switched on the DC side</i>		<i>Switched on the AC side</i>	
	$M_{bN} =$	$t_2 =$	$t_{11 DC} =$	$t_{1 DC} =$	$t_{11 AC} =$	$t_{1 AC} =$
<b>BR5</b> FDB 08	<b>5</b>	35	18	38	60	90
<b>BR10</b> FDB 10	<b>10</b>	60	20	50	100	145
<b>BR20</b> FDB 13	<b>20</b>	85	25	65	220	280
<b>BR40</b> FDB 15	<b>40</b>	100	20	70	150	225
<b>BR60</b> FDB 17	<b>60</b>	120	22	82	200	290
<b>BR100</b> FDB 20	<b>100</b>	150	35	115	300	420
<b>BR150</b> FDB 23	<b>150</b>	270	45	145	320	570
<b>BR250</b> FDB 26	<b>250</b>	300	58	178	400	600
<b>BR400</b> FDB 30	<b>400</b>	400	65	195	550	900
<b>BR1000</b> FDB 40 *	<b>1000</b>	320	160	320	3000	3450

\*\* switched with fast-acting rectifier (overexcitation)

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



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

– 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 ( $M_b \geq 0.9 \cdot M_{bN}$ )

$t_{1 AC}$  = 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 response delays ( $t_2$ ,  $t_{1 DC}$ ,  $t_{1 AC}$ ) 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

- 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 Flange, friction plate

- If the counter friction surface is supplied in the form of a flange (item **7**, **Fig. 3.1**) or a friction plate (item **8**), 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)

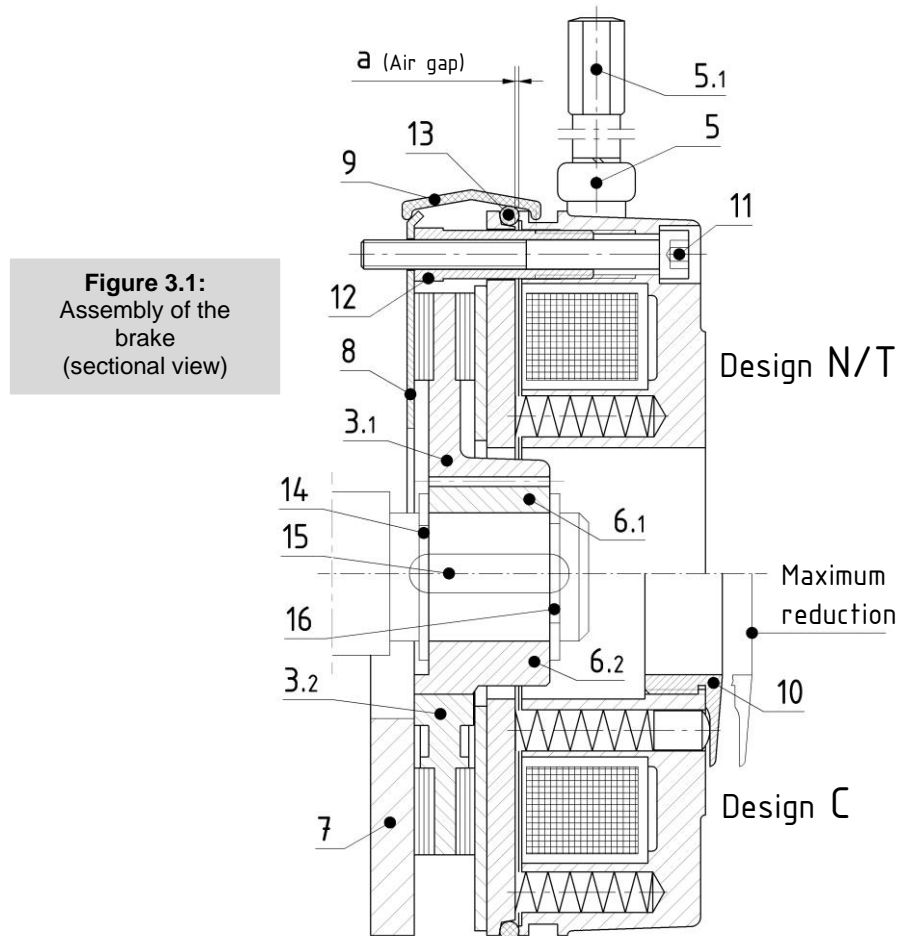
#### →Stop!

Before the assembly, check the thickness of the rotor according to the information in 2.2.2.4.  $s_{new}$  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 rear radial groove of the shaft
- Insert the feather key (item **15**) into the axial groove of the shaft
- Push the toothed hub (item **6.1**) or the hex hub (item **6.2**) onto the shaft and over the feather key
- Fix the hub axially by inserting the second circlip (item **16**) into the front radial groove of the shaft
- If necessary, mount the counter friction surface (flange or friction plate; item **7** or item **8**)
- Push the rotor (item **3.1** or **3.2**) onto the hub, the rotor should still be axially displaceable

→ **Attention!** Make sure that the rotor/hub pair runs smoothly!



### 3.1.4 Brake (Figure 3.1)

The brake is attached to the motor flange (possibly with the interposition of a flange or friction plate). The air gap is checked and the brake may be supplemented with additional components:

- Place the brake 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 **2.2.2.4**).  
 → For the procedure to correct the air gap cf. **4.1.3.1**.

- Tighten the fixing screws with the tightening torque according to **2.2.2.3**
- Insert the O-ring (item **13**; *only with option "switching noise damping"*)
- Mount the dust protection ring (item **9**; *only for brakes with S option*)
- Screw the manual release lever (item **5.1**) into the manual release bracket (item **5**) with the attached washer and tighten it on the hexagonal surfaces ( *only for brakes with manual release = H option* ).

→ **Screw-in torque:**

Size	Thread lever	Screw-in torque [benchmark in Nm]
08 / 10	M5	<b>5</b>
13 / 15	M6	<b>8</b>
17 / 20 / 23	M8	<b>18</b>
26 / 30 / 40	M10	<b>25</b>

- Adjust the braking torque through the threaded ring (item **10**). Adjustment values: see **2.2.2.2** ( *only for brakes of the design C* )

### 3.2 Electrical installation

The electrical connection must only 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 of the braking torque

The braking torque can be changed (for design C in addition to the variation via the adjustment ring according to 2.2.2.2) by modifying the spring configuration according to **2.2.2.1**. Make sure that at least the springs arranged on the outside are evenly distributed.

#### 3.3.2 Retrofitting of the manual release (Figure 3.2)

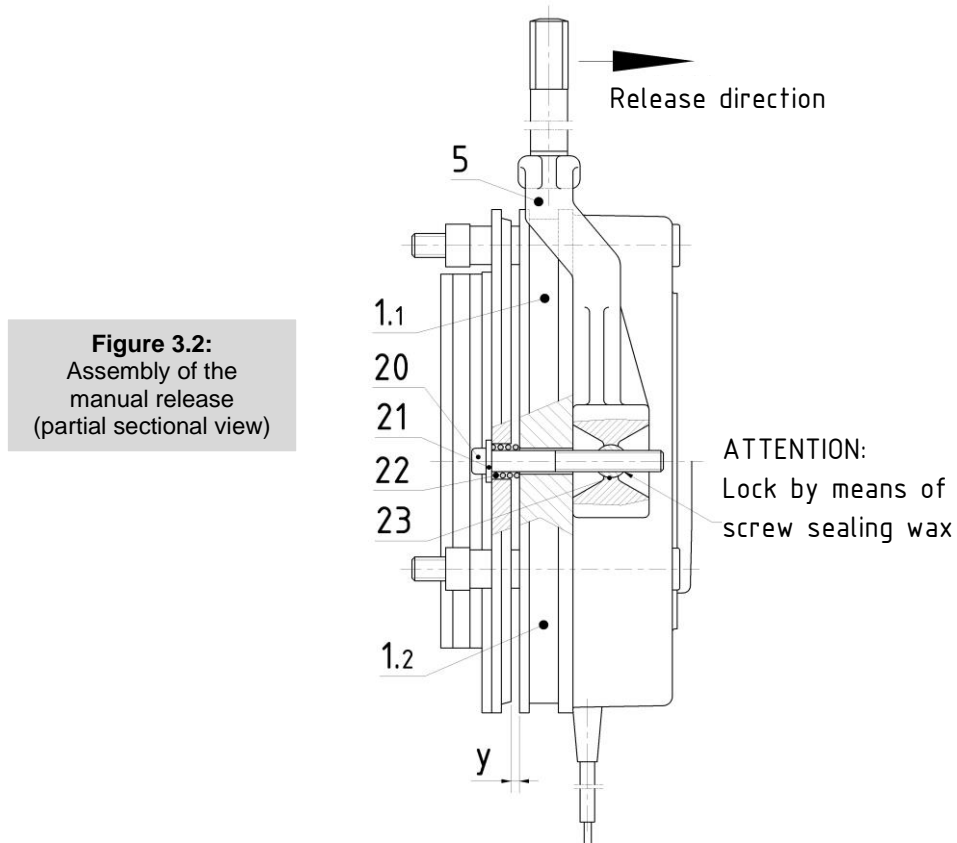
For brakes that have been ordered as such with manual release (H option), the latter is already installed and its setting must not be changed (see below).

However, it is also possible to retrofit a manual release:

- Place the manual release bracket (item **5**) on the magnetic body (item **1.1 / 1.2**) and insert the two bolts with a cross-threaded hole (item **23**) into the corresponding holes on 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 **2.2.2.3**. 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 not require any adaptation of dimension *y*!**



**Figure 3.2:**  
Assembly of the  
manual release  
(partial sectional view)

## 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. For possible malfunctions, see: 4.2.

#### → Stop!

**The different tolerances of the braking torque for new and run-in (working brake) or conditioned (holding brake) rotors must be observed!**

→ Deviation values to  $M_{bN}$ : see 2.2.2.1

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

#### 4.1.2 Ongoing operation

Ongoing operation requires no special measures without malfunctions. Only the **size of the air gap** (increasing because of the wear of the friction lining on the rotor) must be checked according to the following arrangement (see also: 4.1.3), unless a special sensor for wear monitoring has been installed on the brake. In case of malfunctions, proceed according to 4.2.

#### Control intervals:

**Working brake:**

- + according to tool life calculation
- + as per specification to be given by the customer

- Holding brake:**
- + at least once every two years
  - + as per specification to be given by the customer
  - + provide shorter intervals in case of frequent emergency stops

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  $s_{\text{new}} - s_{\text{min}}$  and the difference  $a_{\text{nominal}} - a_{\text{max}}$ , taking into account the respective tolerances.

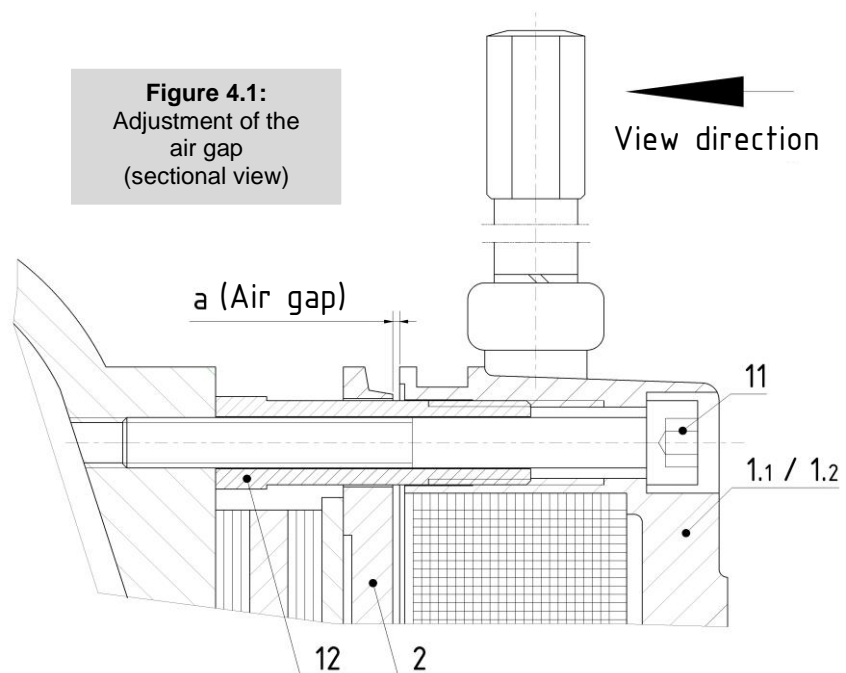
### 4.1.3 Maintenance

#### 4.1.3.1 Adjusting the air gap (Figure 4.1)

The spring-applied brake is substantially maintenance-free. When the **maximum air gap  $a_{\text{max}}$**  specified in 2.2.2.4 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 *counterclockwise*.
- Screw the hollow screws (item **12**) into the magnetic body also by a *counterclockwise* rotation
- Screw the fixing screws (*clockwise*) 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 (*clockwise*) until they make firm contact with the counter friction surface
- Tighten the fixing screws with the **tightening torque according to 2.2.2.3**
- Check the air gap; if necessary, readjust the settings



#### 4.1.3.2 Replacing the rotor

When the minimum rotor thickness  $s_{\min}$  according to 2.2.2.4 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 2.2.2.1

#### → 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, banjo bolts) 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
<b>Brake does not release</b>	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
<b>Brake releases with delay</b>	Air gap too large	Check and readjust air gap
	Voltage at the magnetic coil too low	Check magnetic coil supplied voltage
<b>Brake is not applied</b>	Voltage at the magnetic coil too high	Check supply voltage of the magnetic coil
	Armature plate mechanically blocked	Remove mechanical blockages
<b>Brake is applied with delay</b>	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

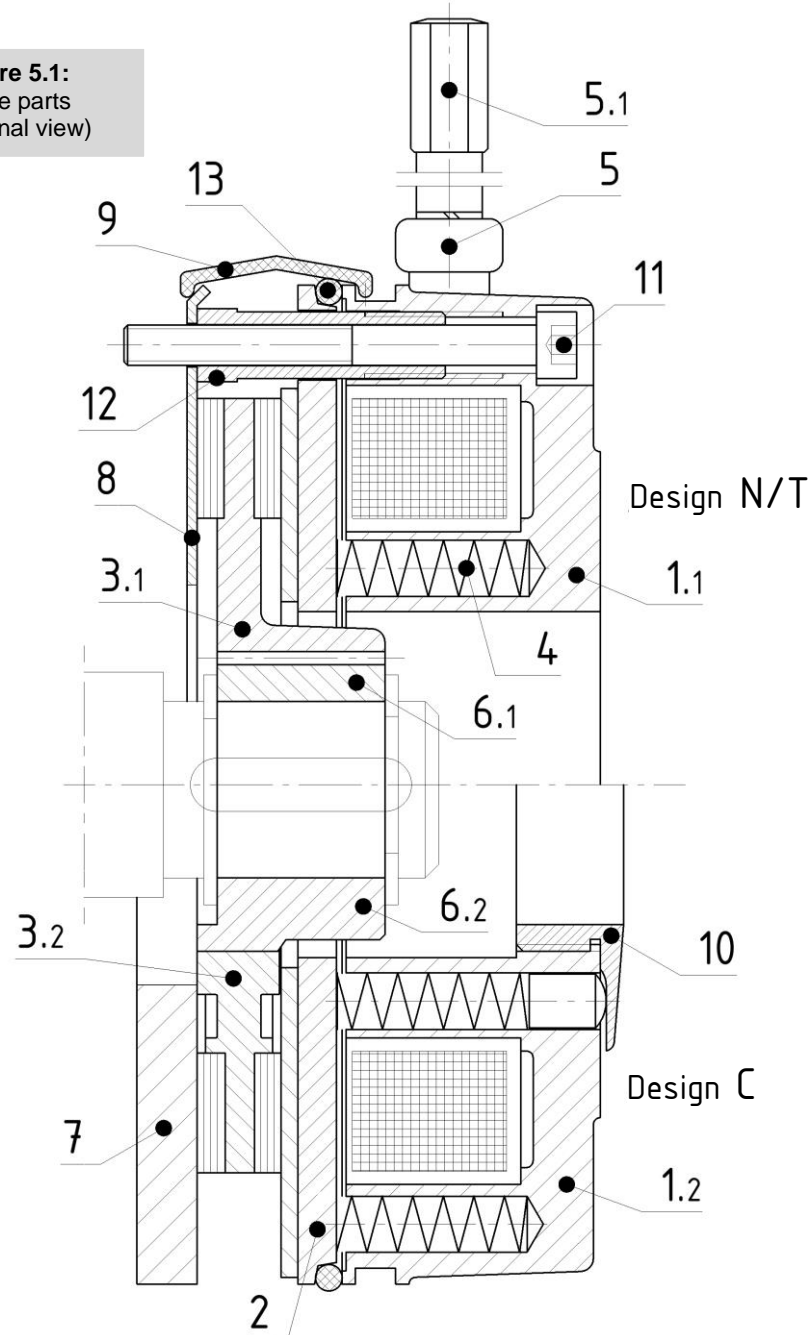
**Figure 5.1** shows all the spare parts that can be ordered for the FDB spring-applied brakes, which are listed below.

**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. 2.2.3 in the *General Introduction (...)* *PRECIMA Spring-Applied Brakes*).**

**Figure 5.1:**  
Spare parts  
(sectional view)



Position	Designation	Position	Designation
1.1	Magnetic body design N	6.2	Hub for rotor 3.2
1.2	Magnetic body design C	7	Flange
2	Armature plate	8	Friction plate
3.1	Rotor complete (aluminium version)	9	Dust protection ring
3.2	Rotor complete (plastic version)	10	Adjustment ring
4	Spring	11	Fixing screw
5	Manual release complete	12	Hollow screw
5.1	Manual release lever	13	O-ring
6.1	Hub for rotor 3.1		

## Document history

Issue	Version	Description
05.2020	0.0	Created
11.2021	1.0	General: FDB as general brake <b>type</b> designation, BR5..BR1000 as NORD-specific brake <b>size</b> designation (instead of BRE...) 2.1.3: Adaptation of Getriebebau NORD nomenclature 2.2.2: Table values for holding brakes/high braking torques omitted 2.2.2.1: Definition of nominal braking torques added; tolerance values revised.