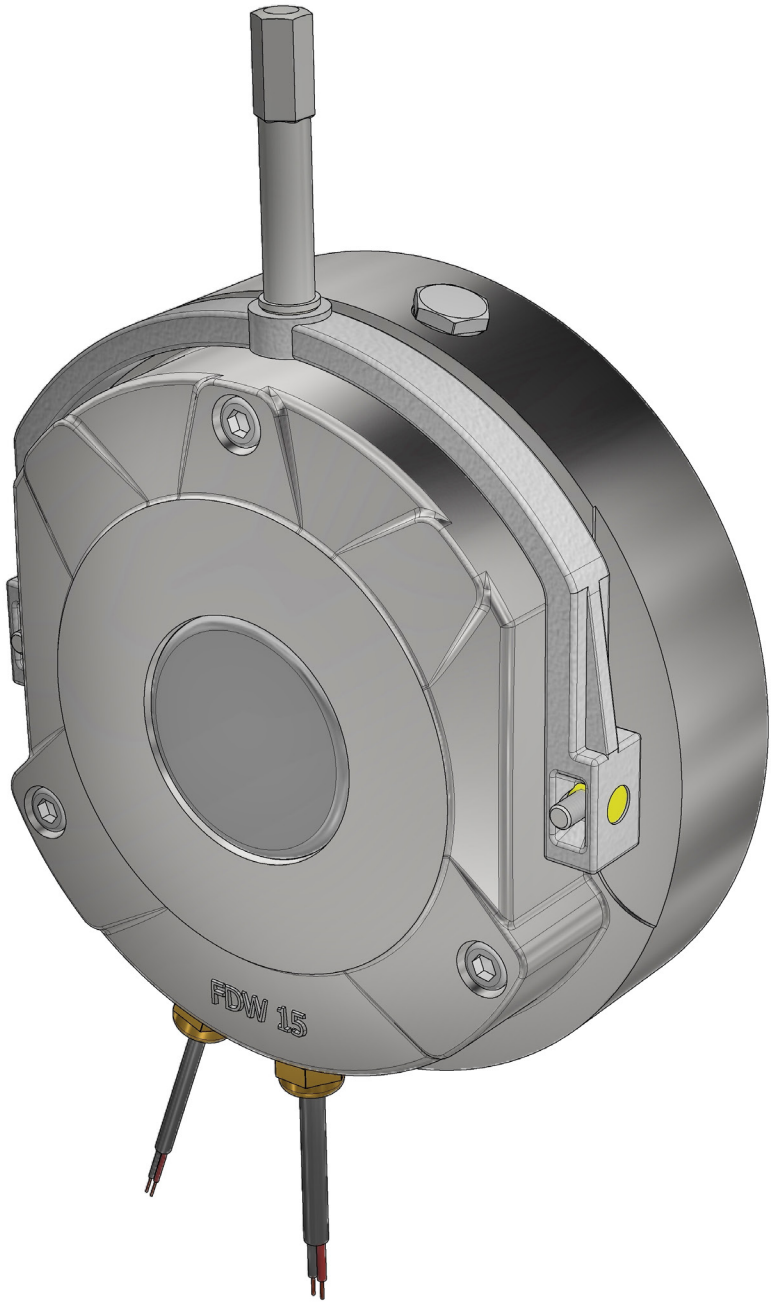
Operation and Installation Instructions

Version 02.2019

for the electromagnetically released

Spring-applied Brakes BRE 5 … BRE 400
— Protective Rating IP66 / ATEX Design —
(Precima FDW 08 … FDW 30)



Contents

Document history

Version	Release	Description
11.2018	*0.0*	*Initial version*
02.2019	*0.1*	*Page 12, 15, 21: ATEX Design only as holding brake; data tables updated*

1. Information on Operating and Assembly Instructions

1.1 Validity

On principle, these operating and assembly instructions are (as can be learned from their title) only apply to and are valid for the **ATEX designs of the electromagnetically released spring-applied brakes BRE 5 IP66 to BRE 400 IP66** ***(Precima FDW 08 to FDW 30)*** of M/s. PRECIMA Magnettechnik GmbH. Moreover, they are a necessary element of every brake delivery and generally only valid for such brakes having been delivered at the same time with the instructions. The operating and assembly instructions will even continue to be valid for such brakes, if a later version of the instructions exists, unless M/s. PRECIMA expressly declare towards the customer that the later version replaces the older one.

In individual cases (e.g. in case of special designs or repeated deliveries), the above mentioned principles may be deviated from. In any case, an indicative or supplementing information of M/s. PRECIMA will be required in this connection.

1.2 Purpose and Use

These operating and assembly instructions are to contribute to a safe and proper assembly and a similar operation of the spring-applied brake.

In order to meet this requirement and purpose, all the persons dealing with the assembly and the operation of the brake (qualified according to 2.1.2) have to **completely and thoroughly read** these instructions before carrying out their respective activities (assembly, commissioning, operation, maintenance, etc.). Furthermore, said persons of course have to **observe and implement the instructions given** when carrying out their respective activities. The instructions themselves must be accessible any time (even after completion of the respective activity) and within short time in a clean, complete and well legible condition.

Despite careful and thorough elaboration of the instructions, mistakes, defects and incompleteness in the operating and assembly instructions cannot be excluded. For this reason, please consult M/s. PRECIMA in justified cases of doubt. Other technical questions, notes and suggestions for improvement can be directed to the following address:

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1.3 Terms and Identification of Notices

Important notes in Chapter **4** (Assembly), Chapter **5** (Operation) and Chapter **6** (Disassembly / Exchange) referring to technical security as well as to industrial safety are particularly highlighted by the following **signal words**:

➔Danger! stands with processes and operation procedures which are to be thoroughly observed in order to exclude any **hazard to persons**.

➔Attention! indicates to safety measures which must absolutely be followed in order **to avoid brake failures**.

➔Stop! is to be found with instructions that have to be **particularly observed** when carrying out the work described.

In order to simplify the text of these operating and assembly instructions, certain longer and complicated terms are replaced by shorter ones which will have the following meanings when used within the scope of these instructions:

Instructions = Operating and assembly instructions

Working brake = Brake which implements friction work in regular operation, i.e. performs a braking function.
Please note: The ATEX Design is not offered as a working brake

ATEX Design = Dust-protected design for zone 22 (non-conducting dust)

Brake = Spring-applied brake = electromagnetically released spring-applied brake

Data sheet = Technical data sheet

Holding brake = Brake which does not implement friction work in regular operation but merely secures a position reached. In case of an emergency, however, it may also perform a braking function.
Please note: The ATEX Design is only offered as a holding brake

End plate = Motor end plate = end plate of an electric motor

Dimension sheet = Dimension drawing

PRECIMA = M/s. PRECIMA = PRECIMA Magnettechnik GmbH, Bückeburg

Shaft = Motor shaft = shaft of an electric motor

In the scope of these operating and assembly instructions, the spring-applied brake is considered to be a machine element to be connected to an electric motor since this combination represents the most frequently used variant. Accordingly, certain designations refer to said fact (motor shaft, motor end plate ➔ see above). However, this is no general limitation of the validity of these instructions to such combinations - just as there is no comparable limitation to the application of the spring-applied brake at all.

2. Conditions for Assembly and Operation

2.1 Persons

2.1.1 Operator

Operator is any natural person or legal entity using the spring-applied brake or instructing the spring-applied brake to be used. The operator and/or a person assigned by him must safeguard the **proper use according to 2.3** and the observance of relevant standards and provisions, regulations and laws. In particular, he has to take care of the fact that only **qualified personnel according to 2.1.2** are entrusted with work at the brake.

2.1.2 Personnel

Personnel to carry out work at the brake must exclusively be qualified personnel who - based upon their education, experience, instructions as well as knowledge concerning relevant standards and provisions, accident prevention regulations and operating conditions - have been authorised by the person being responsible for safety to carry out the activities described in these instructions and who - when doing so - are in a position to recognise possible risks early and to avoid them.

2.2 Product

2.2.1 Area of Application

The area of application of the brake is limited to plants and machines and is defined by the **general operating conditions** stated under **2.2.4** as well as the boundary conditions, performance data and dimensions indicated in the **technical data sheet** and on the **name plate of the brake** (refer to: **3.1**). Any deviation from these directives will require a particular agreement with PRECIMA. Particularly pay attention to the application as a **working** and an application as a **holding brake** (definition: see 1.3).
For ATEX design the special conditions of operation in acc. to 2.2.5 must be observed!

2.2.2 Environment of Application

The environment of application of the spring-operated brake must be designed such that after its proper assembly the brake may fulfil its function in perfect operation and will not pose any risk for persons and material assets. Changes in the environment of application (e.g. at the machine or plant which the brake is connected with) must only be carried out, if they have no influence on the first mentioned condition.

2.2.3 State of Application

The permissible state of application of the brake includes the operationally perfect state of all components (in case of wear parts: exchange in time) and the observance of the operating and assembly requirements specified in these instructions as well as the omission of any retrofits, changes or modification of the brake, unless authorised by PRECIMA. The latter also includes the use of not original spare and exchange parts. The latter also includes the use of not original spare and exchange parts.

➔Attention!

Friction surfaces and the friction lining should not under any circumstances be in contact with oil or grease since already small quantities reduce the braking torque considerably!

2.2.4 General Conditions of Operation

Operating time:	100%
Ambient temperature:	-20…+40°C

A different ambient temperature requires a structural adjustment or supplementation of the brake and calls for limiting operating conditions. In any such case, a coordination and agreement with M/s. PRECIMA will be required.

2.2.5 Special Conditions of Operation for ATEX Design

The dust-protected spring-loaded brakes are suited for the use in **zone 22** (non-conducting dust) and conform with the building regulations of **device group II, category 3D as per DIN EN60079 -31: 2014-12. Dust deposits must not exceed 5 mm**.

The spring-loaded brakes are suited to be connected with three-phase AC motors. In case of **voltage-operated three-phase AC motors** the operator has to ensure the ventilation of the brake. Furthermore external measures and actions have to safeguard that the braking command is simultaneously given with switching off the motor. The earthing has to be made at the device or machine which contains the spring-loaded brake as a component.

When the ambient temperature observe limits in acc. to 2.2.4 the **surface temperature of the spring- loaded brake will not** exceed 125 °C. In order to warrant the maximum admissible surface temperature, the spring-loaded brakes are equipped with a PTC thermistor detector (100 °C). In case of a malfunction, motor and brake have to be isolated from the power system through a commercial tripping unit.

Technical data thermistor:

Operating temperature:	-25°C … 120°C
Tolerance range:	± 5°C
Cold resistance:	< 100Ω
Max. operating voltage:	30 V
Max. measurement voltage:	7.5 V
Pill size:	Ø < 4mm
Pill insulation:	Kynar shrinkable tubing
Response time:	< 3s
Insulation:	PTFE
Nominal response temperature // Color code:	100°C // red/red
Test voltage:	2.5 kV

➔Attention!

The operator is responsible for controlling and testing the protective equipment as to its efficiency. Prior to commissioning, an evidence of the efficiency of the protective equipment is required

2.3 Proper Use

At the time of delivery, the spring-operated brake represents the state of the art and is generally considered to be reliable in operation. Only use it **appropriately and properly** in order to avoid any risk for persons and material assets caused by it!

The spring-operated brake is appropriately and properly used, if qualified personnel (according

to 2.1.2) by applying the valid operating and assembly instructions (as per 1.1, according to 1.2) **produces and maintains** a permissible state of application (according to 2.2.3) in an admissible environment of application (according to 2.2.1).

The inappropriate (improper) use includes hazards which could not be completely taken into account when designing and construction the brake and which are unforeseeable in this sense.
Especially for ATEX Design: When being ignited through hot or sparking objects, explosive dust concentrations can cause explosions which might result in serious or fatal injuries of persons as well as severe damage to property.

2.4 Legal Aspects

2.4.1 Liability

On the basis of the information, data and directions given and of the illustrations and descriptions included in these operating and assembly instructions, no claims for brakes outside the area of application of these instructions (compare 1.1) may be asserted.

In general, an inappropriate use of the brake (compare 2.3) will exclude the liability of M/s. PRECIMA.

2.4.2 Warranty

For the warranty terms refer to the General Terms of Sales and Delivery of M/s. PRECIMA (www.precima.de / AGB). In any case, warranty claims are to be asserted towards PRECIMA immediately after establishing a deficiency or a defect. The exclusion of liability according to 2.4.1 simultaneously means that no warranty claim exists.

2.4.3 Directives and Standards

The spring-operated brake was produced in accordance with the following EC directives and standards:

- EC Directive Machinery (2006/42 EC)
- EN ISO 12100: Safety of Machinery (Basic Concepts)
- EU Directive Electromagnetic Compatibility (2014/30/EU). Compliance with this directive has to be safeguarded with the appropriate switchgear of the user.

The spring-applied brake is no independently operable machine but intended to be installed in another machine. Its commissioning is prohibited until the establishment is reached that the machines comply with the provisions of the EC Directive.

2.5 Delivery Scope and State

- Check the delivery scope and state **immediately upon receipt of the brake**.
- M/s. Precima will not assume any warranty for subsequently claimed defects (refer to 2.4.2).
- Immediately report damage in transit to the forwarders and the incompleteness of the delivery and visible defects to the manufacturer plant.

➔Attention!

Should the checks result in any uncertainties or discrepancies or should the delivery be incomplete or defective, the brake must not be mounted and commissioned without prior consultation with PRECIMA.

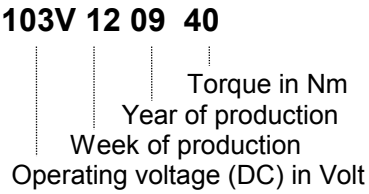
3. Product Description

3.1 Labelling

3.1.1 Lettering

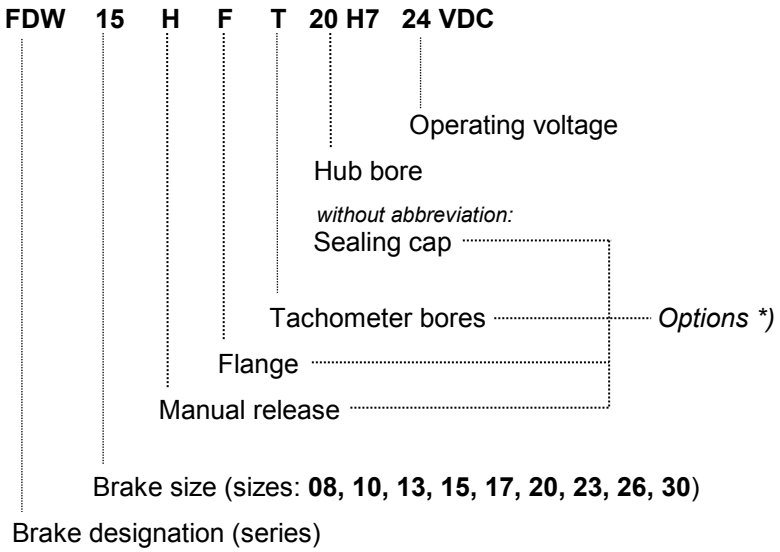
The lettering of the spring-pressure brake includes all important data.
These data and the contractual provisions for the brakes establish the limits of their use.

Lettering on the magnet housing:



3.1.2 Type Designation Code of Brakes FDW (PRECIMA)

Example:



*) *Options* have been taken into account in these operating and installations instructions.
Indicate them in your order (➔ abbreviation, if available).

3.1.3 Nomenclature of Brakes IP66 (Getriebebau NORD)

BRE 150 HL NRB2

- NRB2: Noise-reduced brake / Brake coupling
- HL: Manual release
- 150: Brake size / Braking torque (size: **5, 10, 20, 40, 60, 100, 150, 250, 400**) *)
  Example: 150
- BRE: Brake *)

*) BRE 5 … BRE 400: *Precima FDW 08 … 30*

3.1.4 Labeling of ATEX Design

The ATEX Design is marked with a special label.

Inscription of the label: **CE Ⓔx II 3D Ex tc IIIB T 125 °C Dc**

3.2 Technical Information

3.2.1 Operation of the Brake (Illustration 3.1)

The electromagnetically released spring-pressure brakes of the BRE IP66 (Precima FDW) series are fail-safe brakes, this means that the braking torque is generated by means of spring force in closed-loop operation and revoked by magnetic force.

During **braking**, the incorporated pressure springs (item **4, illustration 3.1**) through the axially movable armature disk (item **2**) press the rotor (item **3.1 / 3.2**) which is radially positively connected with the machine shaft against the counter-friction surface (flange (item **7**) or motor flange). The two-sided friction between the linings of the rotor and the armature disk and/or the counter-friction surface produces the braking torque.

During **releasing**, a magnetic force is produced through applying a direct voltage at the magnet body (item **1**) via the field winding. Said magnetic force draws the armature disk (item **2**) to the magnet body and the brake rotor is released.

During **manual release** (*only in case of designs with manual release*), the armature disk is mechanically drawn against the magnet body by swivelling the manual release lever (item **5**, with screwed-down manual release lever (item **5.1**)) and the rotor is released. This enables you to release the brake, for example, even if there is a power failure.

➔Attention!
For safety reasons, the adjustment of the manual release must not be changed!

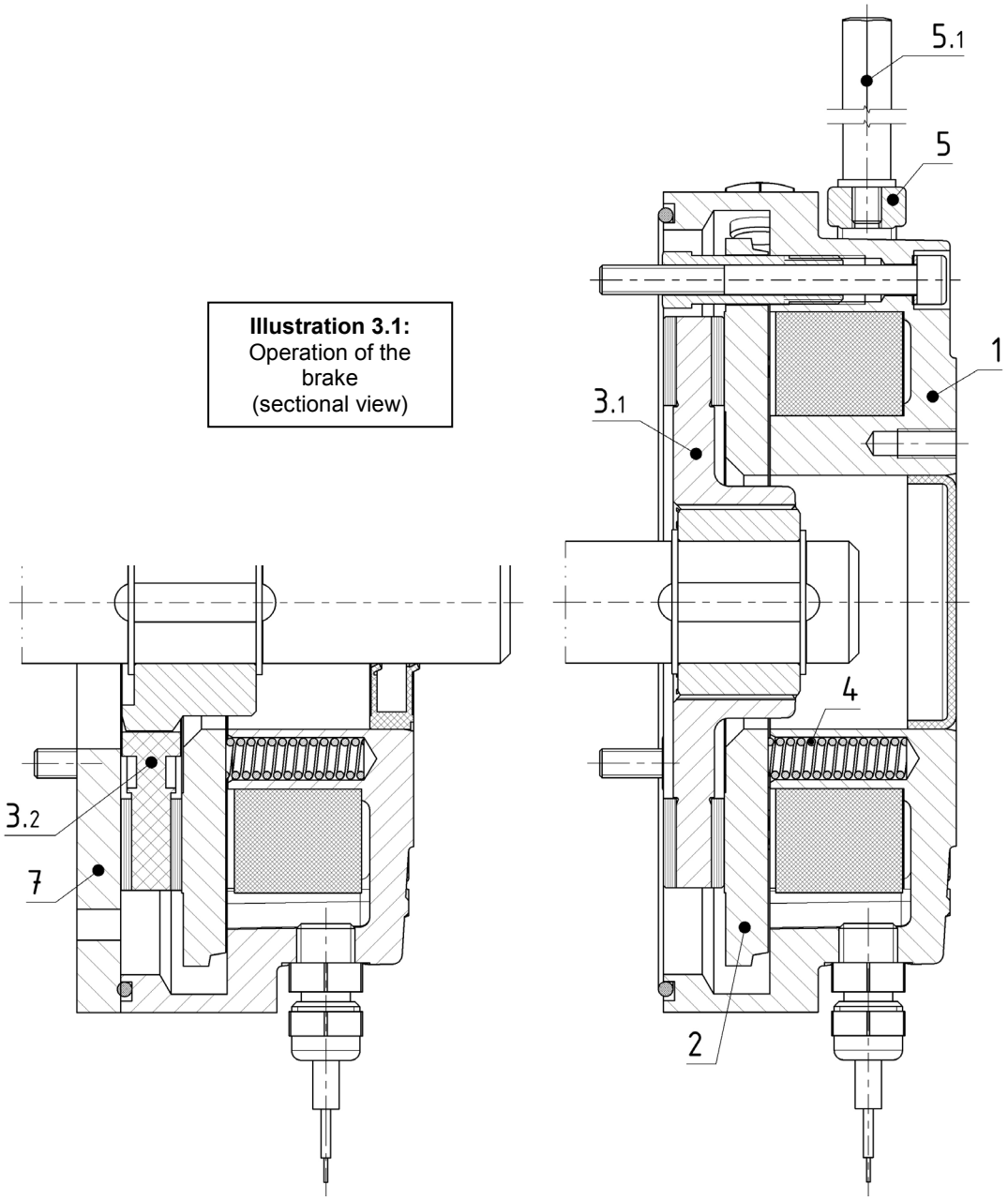


Illustration 3.1:
Operation of the brake
(sectional view)

The standard type of the spring-pressure brake is delivered with a firmly adjusted braking torque M_{bN}. Via the number of springs (item **4**), this torque can be varied as per **3.2.2.1**, a reduction, however, may only be carried out upon consultation with PRECIMA.

➔To be noted:

Because of their enclosed housing and the dust- and water-tight cable screw connections, spring-applied brakes of series FDW meet the type of protection IP66. With a continuous shaft and/or the use of a flange, however, sealing always has to performed by the customer (refer to 4.1 Mechanical Installation).

3.2.2 Technical Data

3.2.2.1 Nominal braking torques and number of springs

Size	**BRE 5** *FDW 08*	**BRE 10** *FDW 10*	**BRE 20** *FDW 13*	**BRE 40** *FDW 15*	**BRE 60** *FDW 17*	**BRE 100** *FDW 20*	**BRE 150** *FDW 23*	**BRE 250** *FDW 26*	**BRE 400** *FDW 30*
Nominal braking torques M_{bN} [Nm]	**5**	**10**	**20**	**40**	**60**	**100**	**150**	**250**	**400**
	3,5	7	14	28	43	70	107	187	300
	3	6	12	23	34	57	85	125	200
	2	4	8	17	26	42	65		

— Permissible deviations of the real braking torque (ATEX-Design = Holding brake)**:**
Holding brake: ±20% (new) or -10/+30% (run-in) —

Size	**BRE 5** *FDW 08*	**BRE 10** *FDW 10*	**BRE 20** *FDW 13*	**BRE 40** *FDW 15*	**BRE 60** *FDW 17*	**BRE 100** *FDW 20*	**BRE 150** *FDW 23*	**BRE 250** *FDW 26*	**BRE 400** *FDW 30*
Number of springs for the above M_{bN}	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**8**	**8**
	5	5	5	5	5	5	5	6	6
	4	4	4	4	4	4	4	4	4
	3	3	3	3	3	3	3		

3.2.2.2 Dimensions, masses, attachment (illustration 3.2)

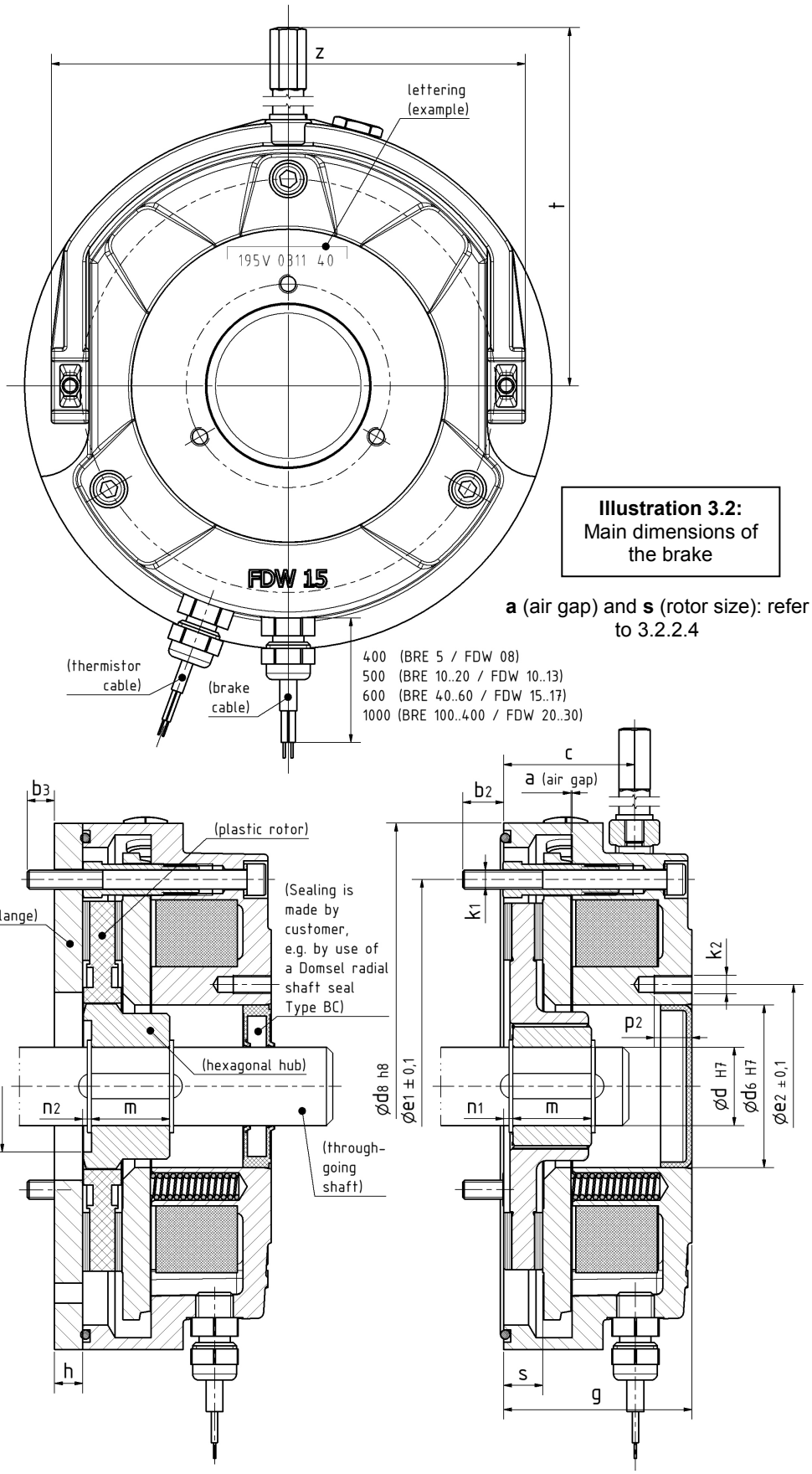


Illustration 3.2:
Main dimensions of the brake

a (air gap) and **s** (rotor size): refer to 3.2.2.4

Size	Hub dimensions [mm]						General brake dimensions [mm]					Dimensions tachometer bores [mm]		
	Hexagon hub Ød H7	Toothed hub Ød H7	Mounting dimensions				Brake Ø internal/ external	Brake / flange	Brake with manual release			Hole circle Øe2 ±0,1	(number of bores) x nom. thread-Ø	Thread depth
	d	***d***	d_1	***m***	n_1	n_2	d_6 / d_8	***g / h***	***c***	***t***	***z***	e_2	k_2	p_2
BRE 5 *FDW 08*	11/14/15	11/14*/15*	20	18	1.5	0.5	26** / 98	40 / 6	30	100	89	34	(3 x) M4	8
BRE 10 *FDW 10*	15/19/20*	14/15	25	20	2.5	1	32 / 120	48 / 7	43.5	110	111	40	(3 x) M5	12
BRE 20 *FDW 13*	15/20/25	15/20	33	20	3.5	1.5	42 / 145	53 / 9	39	130	132	54	(3 x) M6	12
BRE 40 *FDW 15*	20/25/30	20/25	42	25	3	2	52 / 168	60 / 11	42	140	151	65	(3 x) M6	12
BRE 60 *FDW 17*	-	25/30/35*	-	30	3	-	62 / 188	70 / 11	46	165	172	75	(3 x) M8	15
BRE 100 *FDW 20*	-	30/35/40	-	30	3	-	72 / 213	80 / 11	51.5	220	196	85	(3 x) M8	15
BRE 150 *FDW 23*	-	35/40/45	-	35	4	-	80 / 245	90 / 8	58	250	224	95	(3 x) M8	15
BRE 250 *FDW 26*	-	40/45/50/55*	-	40	4	-	90 / 276	99 / 12.5	62	330	258	110	(6 x) M10	25
BRE 400 *FDW 30*	-	50/55/60/65*	-	50	4	-	115 / 324	105 / 12.5	64	357	304	138	(6 x) M10	25

Standard feather key groove of the hub as per DIN 6885/1-JS9

* deviating feather key groove as per DIN 6885/3-JS9 // ** can be made with Ø30 (7 mm deep)

Size	Masses [kg]			Dimensions tachometer bores [mm]			Tightening torque [Nm]
	Brake without manual release and flange	Manual release	Flange	Hole circle Øe1 ±0,1	(number of bores) x nom. thread-Ø	Penetration depth without / with friction plate	Fastening screws
				e_1	k_1	b_2 / b_3	M_A
BRE 5 *FDW 08*	1.60	0.05	0.28	72	(3 x) M4	6 / 10	**3**
BRE 10 *FDW 10*	2.00	0.08	0.49	90	(3 x) M5	8.5 / 6.5	**6**
BRE 20 *FDW 13*	3.60	0.10	0.92	112	(3 x) M6	12 / 8	**10**
BRE 40 *FDW 15*	5.20	0.13	1.22	132	(3 x) M6	13 / 12	**10**
BRE 60 *FDW 17*	7.20	0.17	1.34	145	(3 x) M8	14 / 13	**25**
BRE 100 *FDW 20*	11.00	0.24	2.35	170	(3 x) M8	24 / 13	**25**
BRE 150 *FDW 23*	16.30	0.29	2.30	196	(3 x) M8	15 / 14	**25**
BRE 250 *FDW 26*	25.00	0.80	4.10	230	(3 x) M10	23.5 / 16	**50**
BRE 400 *FDW 30*	37.50	0.90	6.20	278	(6 x) M10	17 / 14	**50**

3.2.2.3 Air gaps, rotor values

Size	Nominal braking torques [Nm]	Nominal air gap [mm]	Rotor size (new condition) [mm]	Max. air gap [mm]	Min. rotor size [mm]	Mass moment of inertia rotor [kgm²]	Max. speed rotor [min⁻¹]	
	M_{bN}	a_{nom}	s_{new}	a_{max}	s_{min}	J	n_{max}	n_{max} Rotor weighed heavy
BRE 5 *FDW 08*	**5**	0.2 $^{+0.2}$	7.5 $^{-0.1}$	0,5	7,2	0.015 x 10^{-3}	6000	
	3,5							
	3							
	2							
BRE 10 *FDW 10*	**10**	0.2 $^{+0.2}$	8.5 $^{-0.1}$	0,6	8,1	0.045 x 10^{-3}	6000	
	7							
	6							
	4							
BRE 20 *FDW 13*	**20**	0.3 $^{+0.2}$	10.3 $^{-0.1}$	0,8	9,8	0.173 x 10^{-3}	6000	
	14							
	12							
	8							
BRE 40 *FDW 15*	**40**	0.3 $^{+0.2}$	12.5 $^{-0.1}$	0,8	12,0	0.45 x 10^{-3}	6000	
	28							
	23							
	17							
BRE 60 *FDW 17*	**60**	0.3 $^{+0.2}$	14.5 $^{-0.1}$	0,8	14,0	0.86 x 10^{-3}	3600	**6000**
	43							
	34							
	26							
BRE 100 *FDW 20*	**100**	0.4 $^{+0.2}$	16 $^{-0.1}$	0,9	15,5	1.22 x 10^{-3}	3600	**6000**
	70							
	57							
	42							
BRE 150 *FDW 23*	**150**	0.4 $^{+0.2}$	18 $^{-0.1}$	0,9	17,5	2.85 x 10^{-3}	3600	**6000**
	107							
	85							
	65							
BRE 250 *FDW 26*	**250**	0.5 $^{+0.2}$	20 $^{-0.1}$	1,0	19,5	6.65 x 10^{-3}	1800	**6000**
	187							
	125							
BRE 400 *FDW 30*	**400**	0.5 $^{+0.2}$	20 $^{-0.1}$	1,0	19,5	19.5 x 10^{-3}	1800	**6000**
	300							
	200							

3.2.2.4 Friction work, friction capacity

Size	Max. permissible friction capacity** [J/h]	Max. permissible friction work / braking [J]	Friction work / 0.1 mm wear [J]
			***
	P_{Rmax}	W_{Rmax} *	Qr 0,1
BRE 5 / *FDW 08*	144 x 10^3	1.5 x 10^3	16 x 10^6
BRE 10 / *FDW 10*	180 x 10^3	3 x 10^3	30 x 10^6
BRE 20 / *FDW 13*	234 x 10^3	6 x 10^3	42 x 10^6
BRE 40 / *FDW 15*	288 x 10^3	12 x 10^3	70 x 10^6
BRE 60 / *FDW 17*	360 x 10^3	17 x 10^3	85 x 10^6
BRE 100 / *FDW 20*	450 x 10^3	25 x 10^3	140 x 10^6
BRE 150 / *FDW 23*	540 x 10^3	37 x 10^3	170 x 10^6
BRE 250 / *FDW 26*	630 x 10^3	52 x 10^3	230 x 10^6
BRE 400 / *FDW 30*	720 x 10^3	75 x 10^3	310 x 10^6

W_{Rmax} is the friction work which must not be exceeded with any braking operation from **max. 1800 min^{-1}**. At braking operations from a speed of **> 1800 min^{-1}** the max. admissible friction work / braking is considerably **reduced** in some cases. For this please contact the manufacturer for advice.

P_{Rmax} as the max. permissible friction capacity is an additional limitation of **periodic uniform brakings**. The existing friction work / braking W_R ($\leqq W_{Rmax}$) allows to specify a permissible switching frequency (number of brakings / h) for the actual case of application.

** in case of an uniform timely distribution of brakings

*** with sizes 08... 13: Lining **HT**; with sizes 15... 40: Lining **HD**

3.2.3.5 Electrical specific values

Size	Electric power (*average*) [W]	Voltage [VDC]	Nominal current (*guide value*) [A]	Size	Electric power (*average*) [W]	Voltage [VDC]	Nominal current (*guide value*) [A]
	$P_{20°C}$ =	U =	I_N =		$P_{20°C}$ =	U =	I_N =
BRE 5 *FDW 08*	29	24	1.14	**BRE 100** *FDW 20*	110	24	4.30
		103	0.30			103	1.05
		180	0.16			180	0.59
		205	0.14			205	0.59
BRE 10 *FDW 10*	40	24	1.67	**BRE 150** *FDW 23*	101	24	4.00
		103	0.39			103	0.94
		180	0.22			180	0.58
		205	0.20			205	0.53
BRE 20 *FDW 13*	49	24	1.78	**BRE 250** *FDW 26*	140	24	5.70
		103	0.56			103	1.40
		180	0.26			180	0.78
		205	0.23			205	0.68
BRE 40 *FDW 15*	59	24	2.67	**BRE 400** *FDW 30*	189	24	7.27
		103	0.55			103	1.11
		180	0.33			180	1.16
		205	0.28			205	0.89
BRE 60 *FDW 17*	87	24	3.69				
		103	0.82				
		180	0.46				
		205	0.44				

3.2.2.6 Switching times

Size	Nominal braking torque [Nm]	Separating time [ms]	Response delay[ms]	Interlinking time [ms]	Response delay[ms]	Interlinking time [ms]
			*switched on **D.C.** side*		*switched on **A.C.** side*	
	M_{bN} =	t_2 =	t_{11DC} =	t_{1DC} =	t_{11AC} =	t_{1AC} =
BRE 5 *FDW 08*	**5**	35	18	38	60	90
BRE 10 *FDW 10*	**10**	60	20	50	100	145
BRE 20 *FDW 13*	**20**	85	25	65	220	280
BRE 40 *FDW 15*	**40**	100	20	70	150	225
BRE 60 *FDW 17*	**60**	120	22	82	200	290
BRE 100 *FDW 20*	**100**	150	35	115	300	420
BRE 150 *FDW 23*	**150**	270	45	145	320	570
BRE 250 *FDW 26*	**250**	300	58	178	400	600
BRE 400 *FDW 30*	**400**	400	65	195	550	900

— The switching times indicated are to be understood as tolerance-afflicted guide values with nominal air gap —

t_2 = separating time = time from switching on the current to cessation of braking torque ($M_b \leq 0.1 * M_{bN}$)

- Over-excitation by fast acting rectifier results in approx. half the separating times -

t_1DC = interlinking time = response time during braking with interruption by mechanical switches on DC side = time from switching off power to reaching a full braking torque ($M_b \geq 0.9 * M_{bN}$)

t_1AC = interlinking time = response time during braking with disconnection on AC side, i.e. by interruption of a *separately* fed rectifier

$t_{11}DC$ / $t_{11}AC$ = response delay = time from switching off the power to the increase of braking torque (included in the respective interlinking time)

- Depending on operating temperature and wear of the brake disks, the real response times (t_2, t_1DC, t_1AC) may deviate from the guide values indicated here. There will be reduced interlinking times in case of a voltage reduction by way of a fast acting rectifier -

4. Assembly

4.1 Mechanical Installation

4.1.1 Prerequisites and Preparation

- Check the unpacked spring-applied brake as to being undamaged and to the completeness of the parts (according to delivery note). Complaints regarding visible damages in transit have to be immediately made with the supplier, complaints of visible deficiencies and incompleteness have to be made with PRECIMA (also refer to 2.5).
- Compare the name plate of the brake with the agreed characteristics and the real data

➔Attention!

Should the checks result in any uncertainties or discrepancies, the brake must not be mounted and commissioned without prior consultation with PRECIMA.

4.1.2 Counter-Friction Surface

4.1.2.1 Motor storage plate, etc. as counter-friction surface

- Check whether the existing counter-friction surface meets the relevant requirements (material: steel, steel casting, grey cast iron - *no aluminium / stainless steel with limitations* - surface quality **Rz 6.3**) and whether it is free from grease and oil. In addition there must be a level connection and sealing surface in the area of the surrounding O-ring (in the magnet housing groove).

4.1.2.2 Flange

- If the counter friction surface ís supplied in the form of a flange (item **7**, **illustration 4.1**), this part will be mounted together with the brake at the motor endshield (see also 4.1.3, 4.1.4 and illustration 4.1). The brake is sealed against the flange by way of an O-ring (item **13**) (analogous with the motor storage plate with brakes without a flange). **The flange itself will not contain any further sealing element and generally has to be sealed against its screw-down surface by the customer.**

➔Attention!

If the counter-friction surface does not meet the relevant requirements, the brake must not be mounted and commissioned without prior consultation with PRECIMA. Completely remove grease and oil from the counter-friction surface before processing the brake further!

4.1.3 Hub and Rotor (illustration 4.1)

➔Stop!

Before actually mounting the rotor, its thickness has to be checked in accordance with 3.2.2.3**. S_{new} is the value for a new rotor** (tolerance = 0/-0.1 mm)**, s_{min} is the minimum permissible rotor thickness. When installing a new rotor, s = s_{new} must be guaranteed. In case of a reassembly (e.g. after a dismounting caused by maintenance work), s > s_{min} must be guaranteed, otherwise the rotor has to be replaced.**

The rotor is fixed as a revolving machine part of the engine to be braked via the hub and on its shaft:

- Insert the first locking ring (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 hexagon hub (item **6.2**) onto the shaft and over the feather key
- Axially fix the hub by inserting the second locking ring (item **16**) into the front radial groove of the shaft
- If necessary attach the counter friction surface (= flange (item **7**))
- Push the rotor (item **3.1 or 3.2**) onto the hub with the rotor remaining axially displaceable

➔**Attention!** **Take care that the rotor/hub pair will remain smooth-running!**

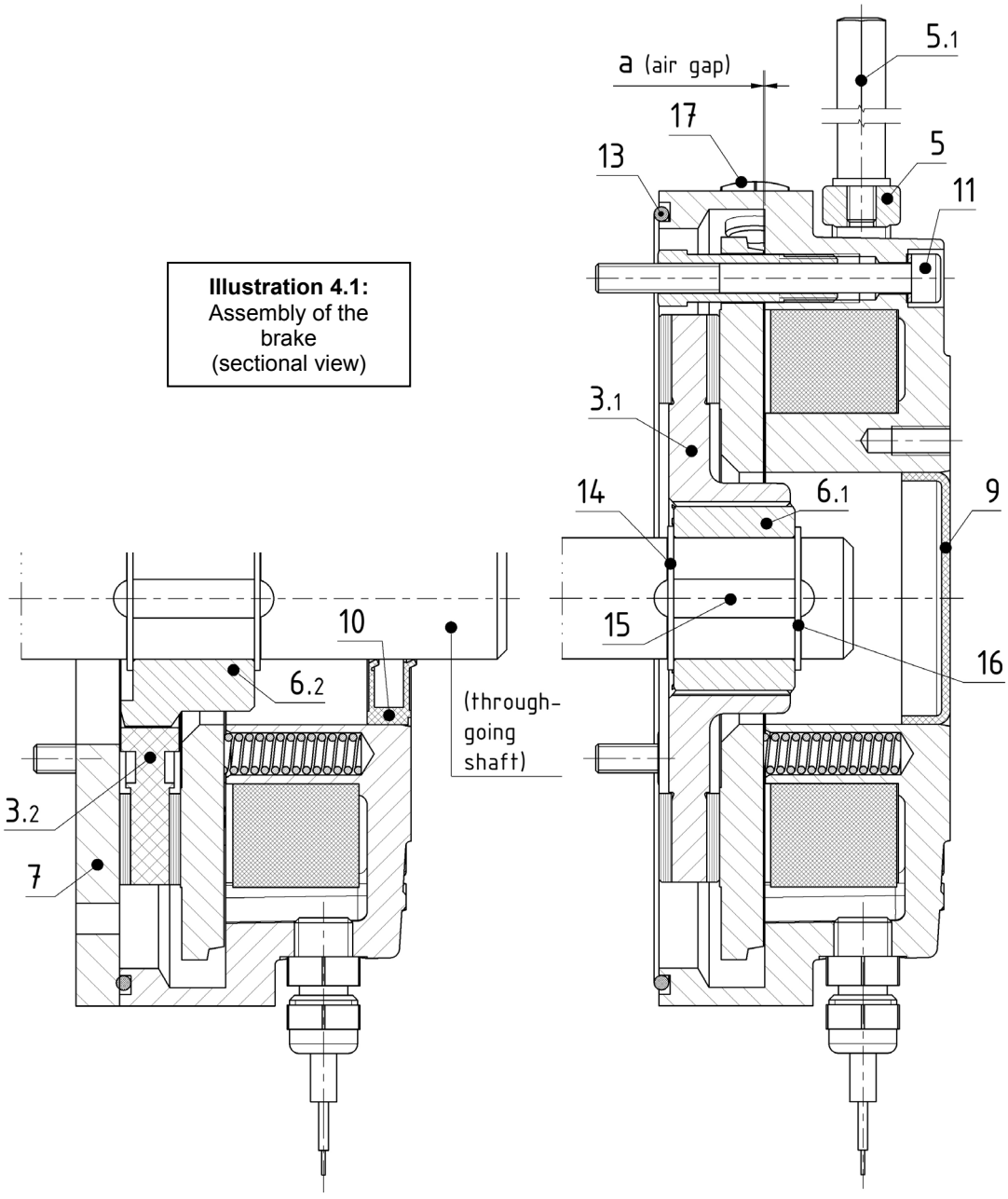


Illustration 4.1: Assembly of the brake (sectional view)

4.1.4 **Brake** (illustration 4.1)

The brake is attached at the motor (if necessary by way of the bores of intermediate flange) and may be supplemented by additional component parts:

- Position the brake on the rotor, insert and screw down the fastening screws **with Cu washers** (item **11**) until the magnet housing rests on the counter-friction surface.
- Tighten the fastening screws with the **tightening torque according to 3.2.2.2**
- Screw the manual release lever (item **5.1**) with the washer in position into manual release bracket (item **5**) and tighten it at the hexagon faces (*only with brakes with manual release = option H)*

➔Attention!

Only use the Cu washers under the fastening screws once for sealing and replace them by new ones with every repeated assembly!
Manual release (option H): No changes with regard to its adjustment (made by PRECIMA) are allowed!

4.1.5 **Sealing** (illustration 4.1)

Depending on whether the brake is mounted over a continuous shaft or not, some sealing measures have to be taken still:

- In case of a non-continuous shaft the pre-mounted sealing cap (item **9**) will close the central opening of the brake and no further measures will be required to be taken.
- In case of a **continuous shaft** the **sealing has to be made by customer** in such a way that the **protective rating IP 66** is ensured — e.g. by use of a Domsel radial shaft seal / Type BC (item **10**)

4.2 Electrical Installation

Carry out the electrical connection in a de-energized state only.
The operating voltage (DC) of the brake is indicated on the magnet housing (see 3.1.1 and illustration 3.2).

5. Operation

5.1 Brake in Operation

5.1.1 Commissioning

Before commissioning the brake, first of all a **functional test** has to be carried out. This can normally and readily be carried out together with the motor the brake is attached to. For possible malfunctions refer to 5.2.
For **ATEX design** an evidence of the **efficiency of the protective equipment** is required.
(refer to 2.2.5)

➔Stop!

The complete braking torque will only be effective after the brake linings at the rotor have run in! ➔ For deviation values to M_{bN}: refer to 3.2.2.1

5.1.2 Running Operation / Inspection

Without any malfunctions occurring, the running operation does not require any particular measures. Merely the **size of the air gap** (growing because of the wear at the rotor's friction lining) will have to be checked according to the following arrangement (also refer to 5.1.3), unless a particular sensor has been installed to monitor the wear in the brake. For this purpose, temporarily remove the locking screw (item **17**, illustration 4.1) in the control bore. In case of malfunctions proceed as indicated in 5.2. For **ATEX design** the **function of the PTC thermistor** has to be controlled: The resistance at 20°C must be **lower than 100 Ω** (Thermistor cable Ø3.7 mm; Configuration: see Ill.3.2).

Check intervals (ATEX design = Holding brake)**:**

+ every two years at least
+ as per specification to be given by customer
+ provide for shorter intervals in case of frequent emergency stops

➔Danger!

De-energise motor and brake and protect them from an accidental reclosure. The brake must not be opened for inspection in an explosive atmosphere

5.1.3 Maintenance

5.1.3.1 Replace the rotor

Adjusting the air gap in closed brake systems of the series BRE IP66 *(Precima FDW)* is impossible. As soon as the minimum rotor size s_{min} according to **3.2.2.3** has been reached, replace the rotor. An operative readiness of the brake in individual cases falling below the minimum rotor size does not change the above statement; **in such a case a proper use is no longer existing**.

➔Stop!

Even after an exchange of the rotor, the complete braking torque will only be effective after the brake linings at the rotor have run in!
➔ For deviation values to M_{bN}: refer to 3.2.2.1

➔Attention!

In the course of replacing the rotor, the mechanical component parts contributing to the build-up and the transmission of the braking torque have to checked for excessive wear (armature disk, hollow screws) and/or integrity (springs) and, if required, to be replaced!

5.2 Brake out of Operation (Malfunctions)

The following table includes typical malfunctions during running operation (partly even during commissioning), their possible causes and instructions on removing them.

Malfunction	Possible cause	Remedy
Brake does not release	Air gap too big	Replace rotor
	Brake is not supplied with voltage	Electrical connection to be controlled
	Voltage at the coil too low	Supply voltage of to be controlled
	Armature disk mechanically blocked	Remove mechanical blocking
Brake releases with delay	Air gap too big	Replace rotor
	Voltage at the coil too low	Supply voltage of to be controlled
Brake is not activated	Voltage at the coil to high	Supply voltage of to be controlled
	Armature disk mechanically blocked	Remove mechanical blocking
Brake is activated with delay	Voltage at the coil to high	Supply voltage of to be controlled

6. Disassembly / Exchange

6.1 Dismounting the Brake

Dismounting the brake is achieved analogous to the assembly in reverse order and must only be effected with the brake and motor being **switched off, de-energised and torque-free**.

➔Danger!

The disassembly of the brake will result in a suspension of its passive braking functions. No risks must be connected with said suspension! This disassembly must not be done in an explosive atmosphere.

6.2 Exchange of Components

The only component to be regularly exchanged on site is the **rotor** when it reaches the wear limit (see 5.1.3.1); if the **hub** shows signs of noticeable wear, it may be exchanged as well. Furthermore, however, all the other components indicated under ***6.4 Spare Parts*** may generally be exchanged.

➔Attention!

Before any re-assembly of a brake, check the fastening elements as to their unlimited functional capability and, if necessary, exchange them! In particular, the Cu washers underneath the screws have to be replaced since their sealing function will no longer be maintained when they are used repeatedly.

6.3 Exchange/Disposal of Brakes

Because of the different material components, the components of our spring-applied brakes have to be disposed of for recycling separately. Moreover, pay attention to the official regulations.
Important AAV (List of Wastes Ordinance) key numbers are indicated below. Depending on the material connection and the kind of separation, other key numbers may apply to components made of such materials.

- Ferrous metals (key number 160117)
- Non-ferrous metals (key number 160118)
- Brake linings (key number 160112)
- Plastics (key number 160119)

6.4 Spare Parts

Illustration 6.1 shows all the spare parts that you can order for the spring-applied brakes BRE IP66 *(Precima FDW)* series indicated in the list below it.

When ordering spare parts, please always state the data from the brake lettering (see 3.1.1)!

➔Attention!

For damage caused by other than original spare parts and accessories, any liability and warranty on behalf of PRECIMA Magnettechnik GmbH shall be excluded (refer to 2.2.3).

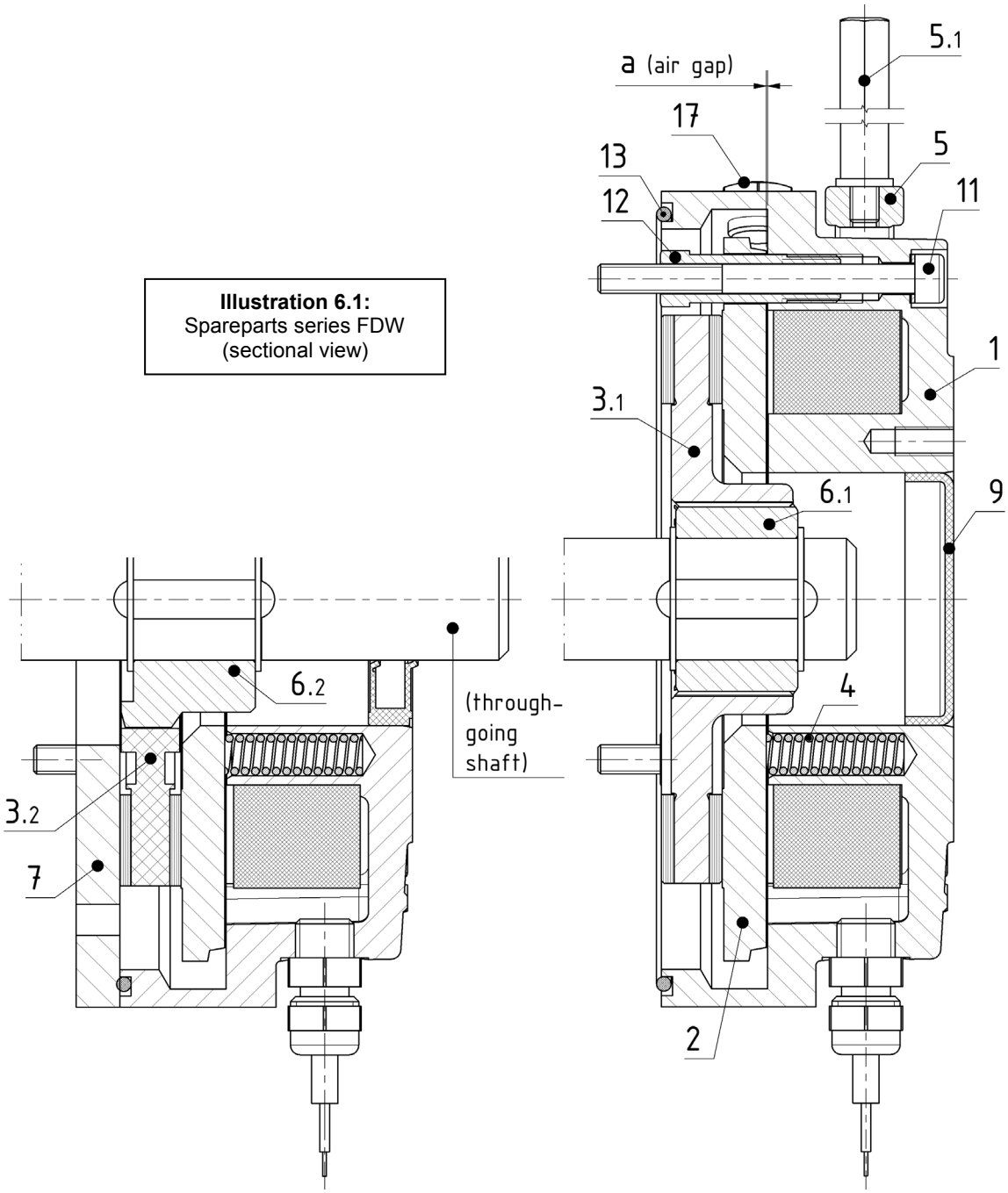


Illustration 6.1:
Spareparts series FDW
(sectional view)

Item	Designation	Item	Designation
1	Magnet part cpl.	6.2	Hub for rotor 3.2
2	Armature plate	7	Flange
3.1	Rotor cpl. (aluminium design)	9	Sealing cap
3.2	Rotor cpl. (plastic design)	11	Fastening screw including Cu washer
4	Springs	12	Hollow screws
5	Manual release cpl.	13	O-ring (magnet housing)
5.1	Manual release lever	17	Locking screw with O-ring
6.1	Hub for rotor 3.1		