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Adjusting the air gap of motor brakes

SIEMENS

Low Voltage Motors

Item-ID: 29108503

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Item-ID: 29108503

Table of Contents

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Beitrags-ID: 29108503

1 Overview

Low-voltage motors are equipped with a brake when motor option G26 is specified when the motor is ordered.

The air gap between the coil and the armature increases as a result of brake pad wear (brake frictional surface). In order to ensure that the brake reliably functions, this air gap must be re-adjusted. This is described in the following text.

1.1 Brake types used

The spring-operated 2LM8 disk-type brakes are mounted as standard on 1LA5 and 1LA7 motors, frame sizes 63 to 225. These spring-operated brakes are also mounted onto 1LG motors, frame sizes 180 to 200.

The KFB spring-operated disk-type brake is the standard brake for 1LG motors in frame sizes 225 to 315.

The individual brake types and detailed technical data are subsequently listed below:

Beitrags-ID: 29108503

		Admissible speeds			Changing the braking torque			Readjusting the air gap		
For motor frame size	Brake type	Max. operating rpm if max. operating energy utlised	Max. no-load rpm with emergency stop function		Reduction per notch	Dim. "O_1"	Min. braking torque	Rated air gap $S_{Gap\ Rated}$	Max. air gap $S_{Gap\ max.}$	Min. rotor thickness $h_{min.}$
			Horizontal mounting	Vertical mounting						
		rpm	rpm	rpm	Nm	mm	Nm	mm	mm	mm
63	**2LM8 005-1NA . .**	3000	6000	6000	0.17	7.0	3.7	0.2	0.4	4.5
71	**2LM8 005-2NA . .**	3000	6000	6000	0.17	7.0	3.7	0.2	0.4	4.5
80	**2LM8 010-3NA . .**	3000	6000	6000	0.35	8.0	7.0	0.2	0.45	5.5
90	**2LM8 020-4NA . .**	3000	6000	6000	0.76	7.5	18.2	0.2	0.55	7.5
100	**2LM8 040-5NA . .**	3000	6000	6000	1.29	12.5	21.3	0.3	0.65	8.0
112	**2LM8 060-6NA . .**	3000	6000	6000	1.66	11.0	32.8	0.3	0.75	7.5
132	**2LM8 100-7NA . .**	3000	5300	5000	1.55	13.0	61.1	0.3	0.75	8.0
160	**2LM8 260-8NA . .**	1500	4400	3200	5.6	17.0	157.5	0.4	1.2	12.0
180	**2LM8 315-0NA . .**	1500	4400	3200	5.6	17.0	178.4	0.4	1.0	12.0
200, 225	**2LM8 400-0NA . .**	1500	3000	3000	6.15	21.0	249.7	0.5	1.5	15.5

Overview of brake selection for 1LG motors		For motor Frame size 180 [1]	200 [1]	225 [1]	250 [2]	280 [2]	315 [2]
Number of poles		2 to 8	2 to 8	2 to 8	2 to 8	4 to 8	4 to 8
NDE bearing		6310C3	6312C3	6313C3	6215C3	6317C3	6319C3
Flange bearing plate for NDE brake mounting		A300	A350	A350	A400	A450	A550
Max. diameter for 2nd. shaft extension		48k6	55m6	55m6	49m6	65m6	70m6
Brake type		**KFB 25**	**KFB 40**	**KFB 40**	**KFB 63**	**KFB 100**	**KFB 160**
Braking torque	Nm	250	400	400	630	1000	1600
n_{max} – IM B3	rpm	6000	5500	5500	4700	4000	3600
n_{max} – IM V1	rpm	6000	5500	5500	4700	4000	3600
Output at 110 V DC	W	158	196	196	220	307	344
Current at 230 V AC (207 V coil voltage)	A	0.77	0.91	0.91	1	1.53	1.64
Current at 400 V AC (180 V coil voltage)	A	0.9	1.18	1.18	1.25	1.9	2.1
Current at 110 V DC	A	1.44	1.78	1.78	2	2.79	3.13
Current at 24 V DC	A	5.21	6.92	9.62	8.17	12.2	12.8
Application time t_2	ms	70	80	80	110	125	180
Release time	ms	240	250	250	340	370	500
Brake moment of inertia	Kg m^2	0.0048	0.0068	0.0068	0.0175	0.036	0.050
Lifetime of brake lining L	Nm · 10^6	3600	3110	3110	4615	7375	10945
Air gap adjustment required after braking energy L_N	Nm · 10^6	810	935	935	1185	2330	3485

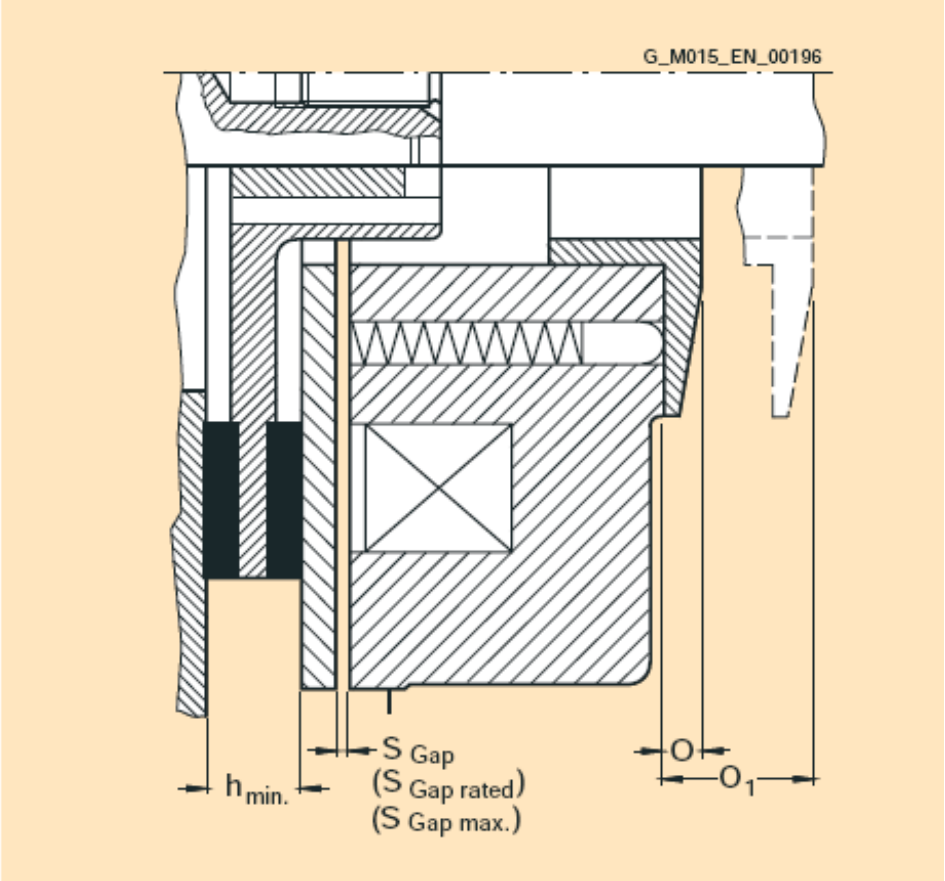
[1] The standard brake for frame sizes 180 to 225 is the 2LM8 brake. A KFB brake on request.

[2] The standard brake for frame sizes 250 to 315 is the KFB brake.

Item-ID: 29108503

1.2 Spring-operated 2LM8 disk-type brake

Principle of operation



When in the no-current condition, the brake is electromagnetically released. When braking operation starts, the rotor - that can axially move along the shaft - is pressed onto the mating frictional surfaces using springs that act on the armature disk. In the braked state there is a defined air gap between the armature disk and the solenoid assembly. This air gap can increase as the brake pads wear.

For normal applications, this disk-type brake is practically maintenance-free. The air gap only has to be checked at certain time intervals for those applications where considerable amount of frictional work takes place does. A check should be made at the latest when the maximum permissible air gap is reached. The air gap should then be reset back to the nominal air gap.

Please refer to the table above for the values for the nominal air gap and the maximum permissible air gap.

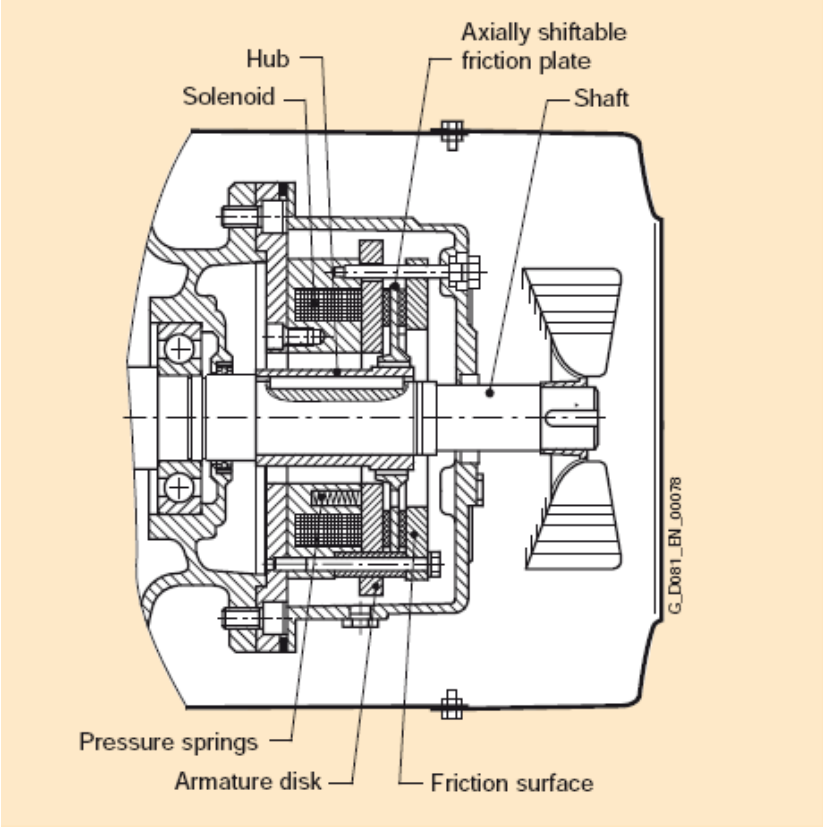
The air gap is checked using a feeler gauge.

For deviations, the adjustment is made as follows:

- Disconnect the power, the brake must then go into a no-torque condition.
- Slightly release the outer/external retaining screws of the brake flange.
- Uniformly rotate the adjusting screws for the air gap using an open-ended wrench.
- 1/6 of a revolution changes the air gap by approx. 0.15 mm.
- Re-tighten the retaining screws and carefully check the new air gap.
- Repeat the re-adjustment until the nominal air gap has been reached.

1.3 3. Spring-operated KFB disk-type brakes

Principle diagram



Item-ID: 29108503

The electro-magnet (solenoid) two-surface KFB spring-operated disk brake is a safety brake. When the current is disconnected, the armature disk and the support for the friction pads are pressed against the mating frictional surface. This is what causes the braking effect.

In order to guarantee correct operation of the brake, the air gap between the coil assembly group and the armature disk must have the specified size. The minimum and maximum air gap size is stamped on the type plate of the brake. When shipped from the factory the brake is set to the minimum air gap.

Check the air gap through the open thread holes as follows:

- Unscrew the screws together with sealing rings (sealing gaskets) from the housing
- Introduce the feeler gauge at three locations around the open thread holes
- Measure the air gap between the armature disk and the coil assembly group.

If the air gap does not correspond to the specified values then adjust the air gap as follows:

- Disconnect the power, the brake must then go into a no-torque condition.
- Remove the housing.
- Slightly release the retaining screws of the brake flange.
- Turn the adjusting screws uniformly using an open-ended wrench.
- Reduce the air gap: Rotate the adjusting screws clockwise (when viewing the brake flange).
- Increase the air gap: Rotate the adjusting screws in an anti-clockwise direction (when viewing the brake flange).
- Re-tighten the retaining screws of the brake flange.
- Re-check the air gap and if required, continue to adjust as described above.

The air gap can be continuously re-adjusted several times.

If this is no longer possible then the friction pad support assembly can be simply replaced after opening the housing (three screws). It is not necessary to disassembly the complete brake.

2 Appendix

2.1 History

Table 2-1 History

Version	Date	Changes
V1.0	March 2008	First issue