

Spring-Applied Single-Disc Brake

Ready for fitting
for D.C. operation
for dry running

This spring-operated brake is ready for fitting and intended for dry running, where the dynamic effect of an electromagnetic field is exploited to compensate the braking effect produced by the spring. The brake grips in absence of current and releases under current. If necessary, it is possible to eliminate the braking effect mechanically by means of an additional hand release.

The products have been manufactured and tested to DIN VDE 0580. When using the brakes, please observe the "General Technical Information" (please refer to current BINDER catalogue regarding Drive Engineering) and the "Operating Instructions 76 431 .. H00".

Standard Nominal Voltage:

24 V—, 102 V—, 178 V—, 205 V—. Other nominal voltages are available at extra cost.

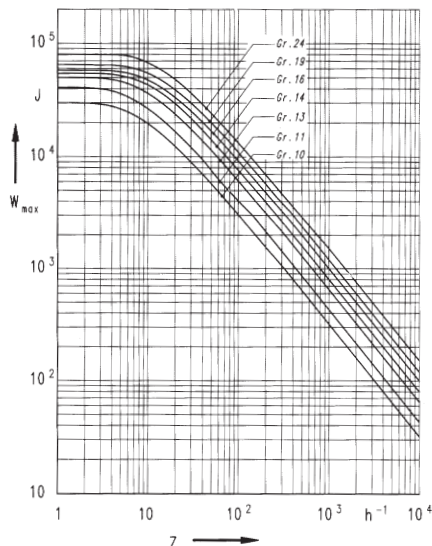
Insulation Class: F

Protection Standard:

IP 55 (mounting in electromotors under fan cowl)

With accessories: IP 65 (mounting in electromotors under fan cowl)

Maximum switching effort per switching operation W_{max} in relation to the switching number per hour Z (values valid for $n = 1500 \text{ min}^{-1}$)



Accessories: Fixing bolts, hand release, static friction disc, sealing cover, sealing washers, plug.



Type 76 43113H00
with hand release, static friction disc, hub

Subject to design modifications.

Please observe ordering data.

Technical Data

The response times are valid for D.C.-controlled switching under operating temperature, nominal tension, nominal torque and nominal air gap. The values indicated are average values, underlying straying. In case of A.C.-controlled switching, the coupling time t_1 will increase its value approx. by six.

The time from the switching on of the current up to the reduction of the torque to 10% of the nominal torque M_2 represents the disconnection time t_2 .

The coupling time t_1 is the time starting with the disconnection of the current up to reaching the nominal torque M_2 .

The maximum switching energy P_{max} is the switching effort W that can be achieved by the brake within one hour. Please refer to the diagram for the values of the maximum switching effort per switching operation W_{max} . The values of P_{max} and W_{max} are reference values and are valid for the integration of the brake between the B-end shield and the motor fan.

The values indicated for the nominal torque M_2 will be reached in a run-in state at operating temperature and

during dry running. The values of the switching moment M_1 depend on the speed.

The torque will be reduced on oily or greasy friction surfaces.

The switching torque M_1 can possibly be 20% lower than the nominal torque M_2 if the brake is not run-in.

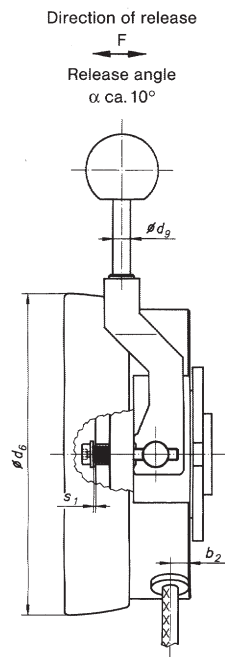
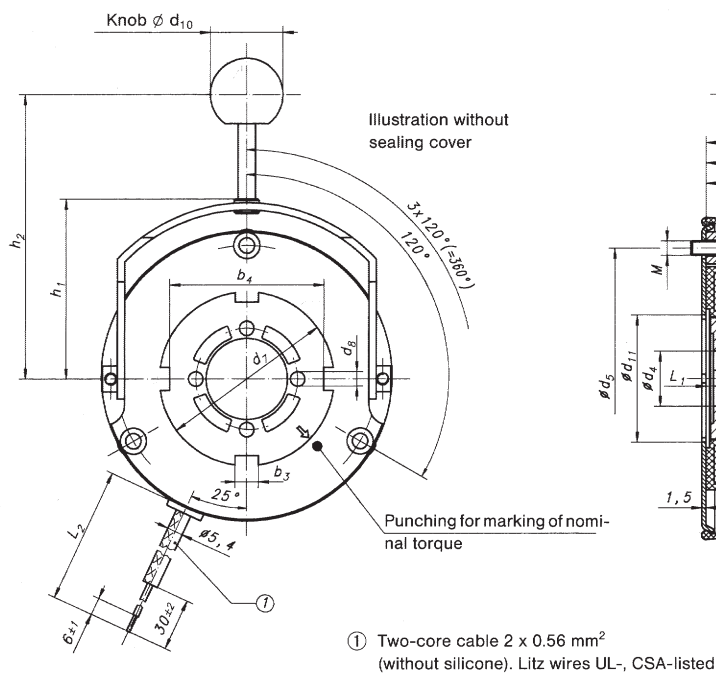
It is possible to adjust the torque by modifying the clearance of the adjustment ring (please refer to diagram).

All data are valid for mounting on horizontal shafts. In case of vertical mounting, please contact manufacturer.

| Size | Range of nominal torque (standard) | Max. nominal torque to be attained with adjustment ring completely screwed | Max. rotation | Max. switching energy | Nominal energy | Response times | | Inertia torque Hub and friction disc | Weight | Service life (Reference value) |
|------|---|--|-------------------|-----------------------|----------------|----------------|--------------------|--------------------------------------|--------|--------------------------------|
| | | | | | | Coupling time | Disconnection time | | | |
| | M_2 ($n = 250 \text{ min}^{-1}$) | $M_{2 \text{ max}}$ ($n = 250 \text{ min}^{-1}$) | n_{max} | P_{max} | P_N | t_1 | t_2 | J | m | W_{tot} |
| | Nm | Nm | min^{-1} | kJ/h | W | ms | ms | kgcm^2 | kg | MJ |
| 10 | 4– 8 | 10 | 3500 | 320 | 26 | 20 | 95 | 1.2 | 1.3 | 127 |
| 11 | 8– 16 | 20 | 3500 | 430 | 30 | 30 | 80 | 2 | 2.8 | 210 |
| 13 | 16– 32 | 40 | 3500 | 650 | 40 | 45 | 90 | 6 | 3.7 | 210 |
| 14 | 30– 60 | 65 | 3500 | 800 | 53 | 86 | 84 | 8 | 5.7 | 310 |
| 16 | 40– 80 | 100 | 3500 | 1000 | 55 | 90 | 190 | 16 | 8.4 | 410 |
| 19 | 80– 150 | 170 | 3000 | 1200 | 80 | 130 | 270 | 38 | 13.1 | 550 |
| 24 | 150– 240 | 300 | 3000 | 1400 | 110 | 225 | 236 | 108 | 22 | 1200 |

The service life value (W_{tot}) listed in the table refers to the highest mentioned standard nominal torque.

Dimensions (mm)



| Sz. | d | d ₁ | d ₂ | d ₃ | d ₄ (H7) | d ₅ | d ₆ | d ₇ | d ₈ | d ₉ | d ₁₀ | d ₁₁ | b | b ₁ | b ₂ | b ₃ | b ₄ | b ₅ | h ₁ | h ₂ | L | L ₁ | L ₂ | s | s _{max} ³⁾ | s ₁ | M | E | F N | |
|-----|-----|----------------|----------------|----------------|---------------------|------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----|----------------|----------------|----------------|-----------------|-----------------|----------------|----------------|-------|----------------|----------------|-----|--------------------------------|----------------|------|-------|----------|---------|
| 10 | 100 | 35 | 24 | 9 | 11 ¹⁾ | 20 ²⁾ | 90 | ca. 111 | 60 | 5 | 6 | 25 | 44 | 42 | 38.5 | 7 | 8 | 53 | 18 | 62 | 98 | 20 | 2.5 | 400 | 0.2 | 0.8 | 1 | 3×M 5 | 3.5– 6.5 | ca. 25 |
| 11 | 127 | 40 | 30 | 11 | 13 ¹⁾ | 23 ²⁾ | 112 | ca. 136 | 68 | 4.2 | 8 | 25 | 58 | 52 | 47.5 | 8 | 8 | 61 | 25 | 78 | 116.5 | 20 | 3.5 | 400 | 0.2 | 0.95 | 1 | 3×M 6 | 4.0– 8.0 | ca. 30 |
| 13 | 147 | 50 | 35 | 11 | 18 ¹⁾ | 30 ²⁾ | 132 | ca. 159 | 82 | 5.2 | 8 | 32 | 70 | 55.5 | 52 | 8 | 10 | 74 | 22 | 86 | 128 | 25 | 3 | 400 | 0.25 | 0.8 | 1.25 | 3×M 6 | 5.0–10.0 | ca. 60 |
| 14 | 164 | 50 | 35 | 15 | 18 ¹⁾ | 30 ²⁾ | 145 | ca. 179 | 82 | 5.2 | 10 | 40 | 61 | 61.5 | 55.5 | 8 | 10 | 74 | 28.5 | 96.5 | 152.5 | 30 | 3 | 400 | 0.3 | 0.9 | 1.5 | 3×M 8 | 5.0–10.0 | ca. 110 |
| 16 | 188 | 60 | 45.5 | 15 | 25 ¹⁾ | 40 ²⁾ | 170 | ca. 203 | 102 | 5 | 10 | 40 | 61 | 70 | 65 | 8 | 10 | 94 | 25 | 110 | 166 | 30 | 3 | 600 | 0.35 | 1.2 | 1.5 | 3×M 8 | 5.5–11.5 | ca. 130 |
| 19 | 215 | 75 | 51 | 15 | 30 ¹⁾ | 45 ²⁾ | 196 | ca. 230 | 116 | 6 | 10 | 40 | 74 | 83 | 70.5 | 13 | 10 | 108 | 29 | 134 | 210 | 35 | 4 | 600 | 0.35 | 1.5 | 1.5 | 6×M 8 | 6.0–14.5 | ca. 200 |
| 24 | 252 | 124 | 69.5 | 18 | 35 ¹⁾ | 60 ²⁾ | 230 | ca. 268 | 156 | 10.1 | 14 | 40 | 139 | 97 | 89 | 17 | 4 ¹⁾ | 4 ¹⁾ | 36 | 148 | 230 | 40 | 5 | 750 | 0.4 | 1.5 | 2 | 6×M10 | 7.0–15.0 | ca. 270 |

¹⁾ Min. Bore, with key groove according to DIN 6885, Sheet 1. Groove JS 9

²⁾ Max. Bore, with key groove according to DIN 6885, Sheet 3. Groove JS 9, feather key supporting full length, shaft ISO-tolerance k 6. (¹) + ²⁾)

³⁾ Max. air gap with regard to highest mentioned standard nominal torque up to exchange of friction disc

4) Not on size 24

Ordering Example

Spring-applied single-disc brake

76 431 [] H00/ [] V/ [] / [] / [] Nm/ []

Size according to table

Coil tension (standard 24, 102, 178, 205)_____

1 = with optional hand release

2 = without optional hand release

3 = with protection against corrosion

4 = without protection against corrosion

Nominal torque

Size 10: $M_2 = 4-8$

Size 11: $M_2 = 8-16$

Size 13: $M_2 = 16-32$ Size 14: $M_2 = 30-60$ Size 16: $M_2 = 40-80$
Size 18: $M_2 = 80-150$ Size 24: $M_c = 150-240$

5 = Adjustment ring for oil seal (for IP 65)

Size 10: ϕ 28 H8: Size 11: ϕ 35 H8: Size 13: ϕ 40 H8

Size 14: \varnothing 52 H8: Size 19: \varnothing 62 H8: Size 24: \varnothing 70 H8 (in mm)

Ordering Example

Hub

76 431 . . H0090 . / . . H7/ . .

Size according to table.

1 = without protection against corrosion

2 = with protection against corrosion____

Bore diameter in mm (standard)

Size 10: \varnothing 15, \varnothing 18, \varnothing 20

Size 11: Ø 13, Ø 20, Ø 22
Size 12: Ø 20, Ø 25, Ø 28

Size 14: ϕ 20 ϕ 25 ϕ 30

Size 16: \varnothing 25, \varnothing 30, \varnothing 35

Size 19: \varnothing 30, \varnothing 40, \varnothing 45

Size 24: \varnothing 40, \varnothing 45, \varnothing 50

Groove DIN 6885 Sheet 1 .

or primary bore = GB _____

Accessories

| Size | Static friction disc ¹⁾ (X6 Cr 17) | Hand release | Fixing bolts | | | | Increased protection IP 65 | | Sealing washer | |
|------|--|----------------|--------------|-----------|-----------|------------------|----------------------------|--------------------|----------------|------------------|
| | | | Screw | Tightness | Order no. | Number per brake | Sealing cover | Plug ²⁾ | Order no. | Number per brake |
| 10 | 76 43110H00004 | 76 43110H00940 | M 5 x 45 | 6 Nm | 304 065 | 3 | 76 43110H00005 | 412 859 | 326 005 | 3 |
| 11 | 76 43111H00004 | 76 43111H00940 | M 6 x 55 | 10 Nm | 304 051 | 3 | 76 43111H00005 | 412 842 | 326 006 | 3 |
| 13 | 76 43113H00004 | 76 43113H00940 | M 6 x 60 | 10 Nm | 304 052 | 3 | 76 43113H00005 | 412 843 | 326 006 | 3 |
| 14 | 76 43114H00004 | 76 43114H00940 | M 8 x 70 | 25 Nm | 304 078 | 3 | 76 10116A3013 | 412 860 | 326 007 | 3 |
| 16 | 76 43116H00004 | 76 43116H00940 | M 8 x 75 | 25 Nm | 304 079 | 3 | 76 43116H00005 | 412 860 | 326 007 | 3 |
| 19 | 76 43119H00004 | 76 43119H00940 | M 8 x 80 | 25 Nm | 304 080 | 6 | 76 43119H00005 | 412 841 | 326 007 | 6 |
| 24 | 76 43124H00004 | 76 43124H00940 | M10 x 100 | 40 Nm | 304 117 | 6 | 76 43124H00005 | 412 880 | 326 008 | 6 |

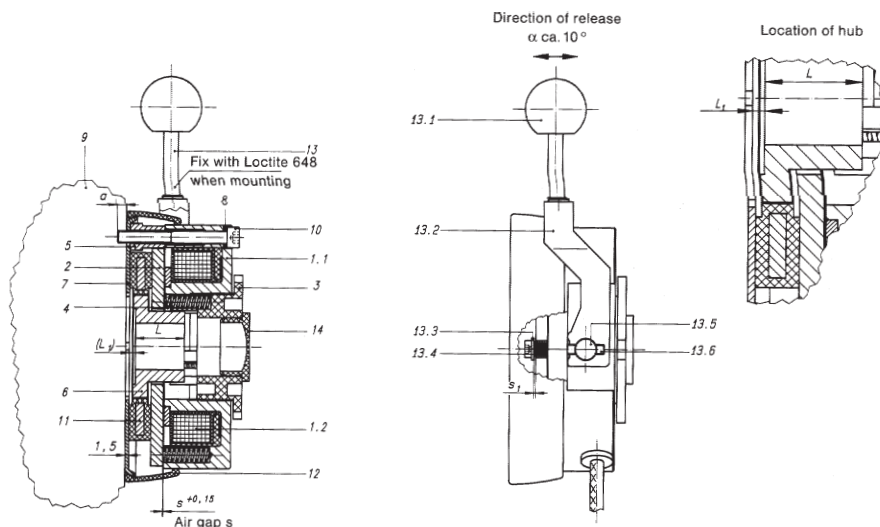
¹⁾ Size 10 to 16: Static friction disc; Size 19 and 24: Mounting flange

²⁾ For shafts not crossing full length

Operating Instructions

With list of piece parts
for spring-applied single-disc brakes
for D.C. operation

76 431 .. H00



- 1.1 Magnet housing
- 1.2 Energising coil
- 2 Armature
- 3 Adjustment ring
- 4 Pressure spring
- 5 Sleeve
- 6 Hub
- 7 Static friction disc (optional)
- 8 Sealing washer (accessory for protection type IP 65)
- 9 Motor flange
- 10 Fixing bolt (optional)
- 11 Friction disc
- 12 Sealing cover (optional)
- 13 Hand release (optional)
- 13.1 Knob with pin
- 13.2 Clip
- 13.3 Disc
- 13.4 Pressure spring
- 13.5 Tie bolt
- 13.6 Cheese head screw
- 14 Plug (optional)
- a ≙ Depth of thread
- L1 ≙ Clearance between friction and hub surface
- L ≙ Length of hub

Construction and Operating Principle

The magnet housing (1.1) of the spring-applied brake contains the permanently fitted energising coil (1.2) with its supply lead protruding from the brake periphery. In the adjustment ring (3) are fitted the pressure springs (4) (Sizes 10 to 19), which push the friction disc (11) via the armature (2) against the static friction disc (7) and thus against the motor flange (9). The braking effect is achieved thereby. Pressure springs in magnet housing on size 24. The air gap 's' is adapted by means of sleeves (5). The air gap 's' cannot be re-adjusted. It is recommended to replace the friction disc (11) when it is worn (end of wear). The friction disc (11) has a star-shaped bore (size 10, 11 and 14) or a square bore (size 13 and 16 to 24) and can thus be glided axially on the hub (6). When applying a D. C. current to the energising coil (1.2), a magnetic force is induced, compensating the effect of the spring, lifting the armature (2) and thereby releasing the brake. No axial load is applied by the brake to the shaft that is to be decelerated.

Condition upon Delivery

The brake is supplied ready for fitting, i.e. the air gap 's' is pre-set to the specified value at the factory by means of the sleeves (5). The required nominal torque M_2 is also adjusted at the factory. The tightly fitted and secured sleeves (5) limit the movement of the armature and retain the latter (2) in position. Accessories ordered are delivered with the brake.

Dimensions (mm)

| Size | a | L | L1 |
|------|----|----|-----|
| 10 | 6 | 20 | 2.5 |
| 11 | 7 | 20 | 3.5 |
| 13 | 7 | 25 | 3 |
| 14 | 12 | 30 | 3 |
| 16 | 9 | 30 | 3 |
| 19 | 10 | 35 | 4 |
| 24 | 10 | 40 | 5 |

Assembly

Slip hub (6) onto shaft equipped with feather key according to DIN 6885, Sheet 1, and secure axially (by means of shaft shoulder, circlip or something similar). Take care that the hub (6) is set off by the measure 'L1' behind the friction surface of the friction disc (11).

The mounting (flange) surface (9) must comply to the following:

- Axial run-out with regard to the shaft < 0.1 mm (measuring radius = hole circle radius)
- Surface roughness max. R_z 16
- Surface hardness min. 100 HB
- Material: steel, cast iron. In case of other materials, static friction disc (7) is to be used.
- Absolutely free of oil and grease
- Material must be a good heat conductor.

The brake is now mounted to the flange (9) by means of the fixing bolts (10). They must be tightened evenly on all sides. Please make sure that the resting surface of the spacing bolts (5) as well as the friction lining of the friction disc (11) are free of oil and grease. Please refer to the Technical Information Sheet 76431 .. H00 for the torque settings of the fixing bolts (10).

The fixing bolts (10) amply secure the centring of the brake.

Setting the Nominal Torque M_2

The brakes are delivered with the nominal torque M_2 as per Technical Information Sheet and/or as ordered. Please refer to the nameplate for the nominal torque M_2 of the brake set at the factory. It is marked by means of an arrow on the adjustment ring (3) and punching on the magnet housing. The length of the adjustment ring (3) can be modified by using a pin or sickle spanner in order to alter the nominal torque (refer to Technical Information Sheet) accordingly. Make sure that the maximum clearance of the adjustment ring (refer to measure 'E') is not exceeded.

| | Size | | | | | | |
|------------------|------|----|-----|----|----|------|----|
| | 10 | 11 | 13 | 14 | 16 | 19 | 24 |
| ΔM_2 /mm | 2 | 3 | 4.8 | 7 | 10 | 10.5 | 24 |

Alteration of nominal torque M_2 , axial clearance of adjustment ring modified by 1 mm.

Mechanical Release Facility

For brakes fitted with a mechanical release via a hand release lever (13), slots must be provided in the enclosure of the brake (e. g. fan cowl). The hand release (13) allows the brake to be released manually (for example in the event of a power failure). Refer to the Technical Information Sheet 76 431 . . H00 for the release power F , which is valid in case of maximum standard nominal torque (M_2). The hand release (13) can only be released in the opposite direction of the motor when a sealing cover (12) is mounted.

Assembly of Hand Release

Stick the tie bolts (13.5) into the clip (13.2). Both pre-assembled parts are to be slipped into the slots of the spring-operated brake (only available for brakes with option 'hand release'). The cheese head screws (13.6), pressure springs (13.4), and the discs (13.3) (two of each) are to be assembled as indicated on the figure and slid through the bores of the magnet housing (1.1). Then fasten the cheese head screws (13.6) tightly to the tie bolts (13.5). The clearance s_1 , measured when the brake is released (with armature attracted), is to be adjusted using a thickness gauge. Make sure thereby not to exceed the measure s_1 and to adjust both cheese head screws evenly.

Important

When using a mechanical release facility, the fail-safe function of the brake is eliminated as it is possible to release it "intentionally" or "unintentionally", thereby cancelling the braking effect.

Maintenance

Maintenance of the brake, apart from checking/adjusting the air gap 's', is negligible. It does become necessary when – due to wear of the friction disc (11) – the clearance between armature (2) and magnet housing (1.1) has reached such a size that the magnetic force is no longer sufficient to attract the armature (2), i.e. that the brake is no longer released. The friction disc (11) must be replaced. To this effect, unscrew the brake from the motor flange (9). Replace the worn disc (11) with a new one. There is no need for any kind of adjustment of the air gap 's'. The fixing bolts (10) must be re-tightened to the torques specified in the Technical Information Sheet 76 431 . . H00.

Protection IP 65

The IP 65 protection is only attained if the brake is mounted correctly to the flange (9) by the customer with the relevant accessories (static friction disc (7), sealing cover (12), plug (14), and sealing washers (8) for fixing bolts (10)).

The accessory static friction disc (7) and/or flange for size 19 and 24 is a pre-requisite for the mounting of the sealing cover (12). Assembly advice (protection IP 65):

In order to achieve the protection IP 65, the assembly procedure described overleaf must be complemented as follows:

1. Place sealing washers (8) (accessories) under the heads of the fixing bolts (10).
2. Mount brake according to assembly instructions overleaf.
3. Fit sealing cover (12).
4. Mount plug (14) on shaft not crossing full length or oil seal on shaft crossing full length (order brake with appropriate adjustment ring). Oil seal is not supplied automatically and must be mounted individually.