

ROBA-stop[®]-Z

Dual Circuit Safety Brake



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- *Patented low-noise operation*
- *Cost-effective dual circuit brake*
- *Unique double rotor design*
- *Easy installation and maintenance*



EN 81

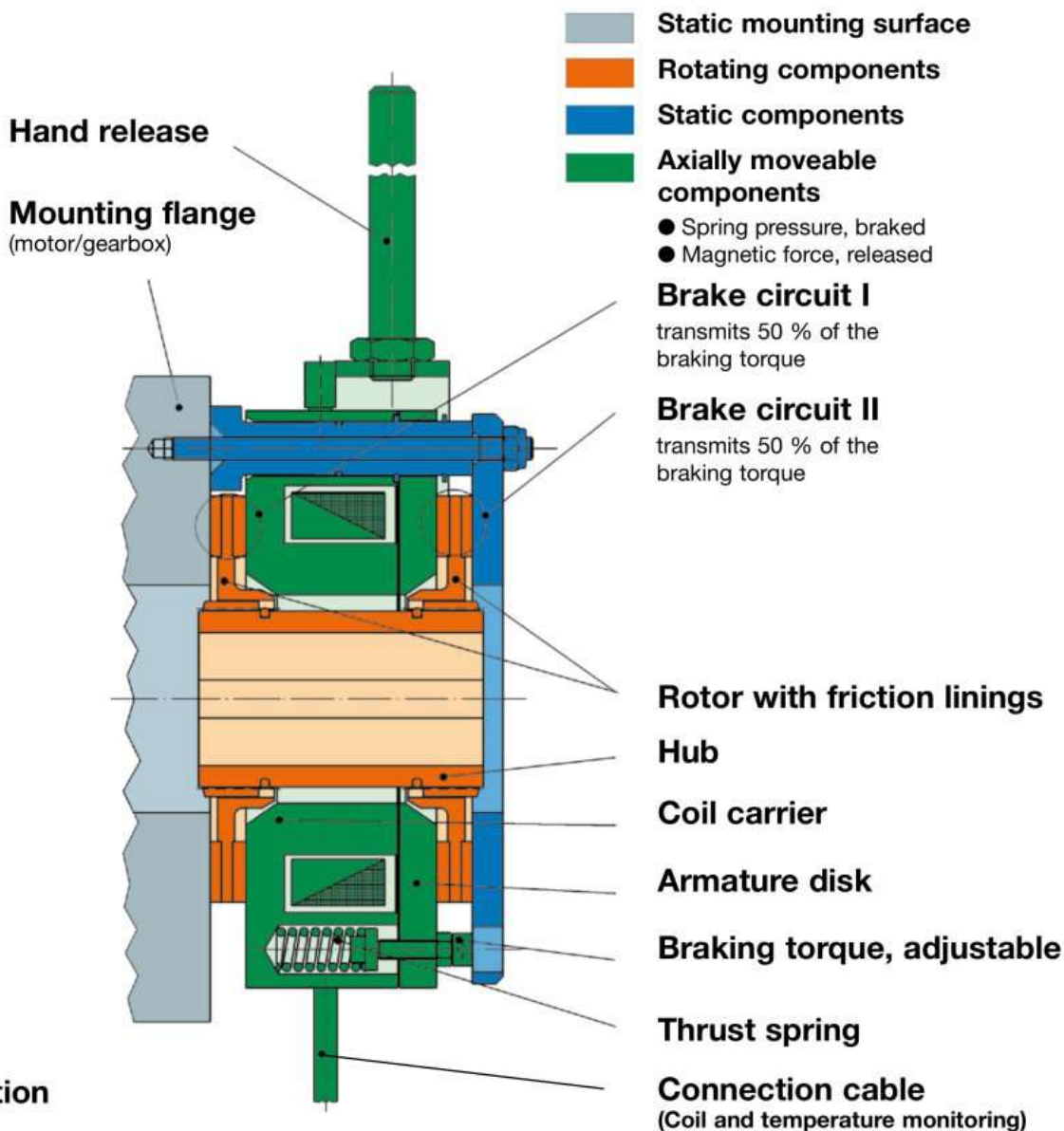
P.892.V09.GB

mayr[®]
your reliable partner

Declaration of Conformity

A conformity evaluation for the applicable EU directives has been carried out for this product. The conformity evaluation is set out in writing in a separate document and can be requested if required. It is forbidden to start use of the product until the machine or system into which it should be built is operating in accordance with all applicable EU directives.

Without a conformity evaluation, this product is not suitable for use in areas where there is a high danger of explosion. This statement is based on the ATEX directive.



Function

Brake released:

Magnetic coil is energized. Coil carrier and armature disk attract each other magnetically. Both rotors with friction linings are free.

Brake applied:

Magnetic coil is de-energized. Coil carrier and armature disk are forced apart via the thrust springs. Both rotors with friction linings are braked.

Electronic monitoring

- Temperature monitoring
- Release monitoring (option)
- Wear monitoring (option)

Use

As a holding brake for **EMERGENCY STOP** braking actions

(Number of braking actions according to diagram below)

- in closed buildings with clean surroundings
- in dry-running operation

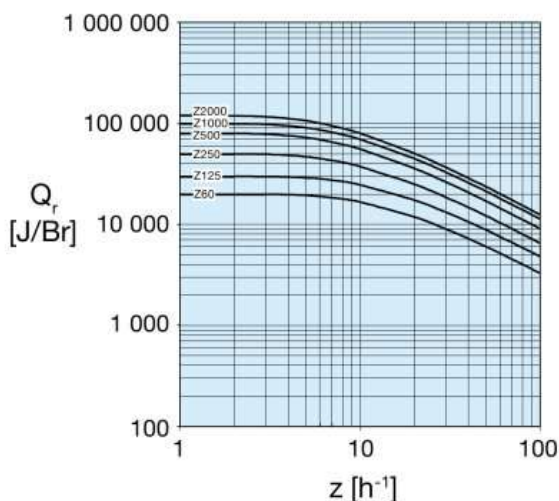
Please Observe!

Special measures are necessary for use in tropical areas, sea climate with increased humidity and for longer downtimes.

Friction-Power Diagram:

(Nominal speed on sizes 60 – 500 n = 1500 rpm)

1000 – 2000 n = 750 rpm)



Fields of Application

In passenger elevators as a holding brake

(see Fig. 1).

In passenger elevators as a holding brake and as protection against crashes when the elevator is moving in an upwards direction

(see Figs. 2 and 3).

Electric brake function monitoring via release monitoring and temperature monitoring is required. Wear monitoring is recommended.

Brake attachment on the motor bearing shield or own mounting flange with effect on the drive sheave shaft (see Figs. 2 and 3).

Mounting position horizontal (vertical on request).

In theatre and stage drives according to **BGV C1 (previously VBG 70), DIN 56925 and DIN 56921-11**

Electric brake function monitoring via release monitoring and, if necessary, temperature monitoring is required.

Important Guideline!

Choosing the respective brake types according to the Type key (page 5) mainly depends on the given application and the resulting legal regulations or requirements.

Drive with gearbox

- Brake on the motor shaft (ABV No. 547 is not valid in this installation situation)

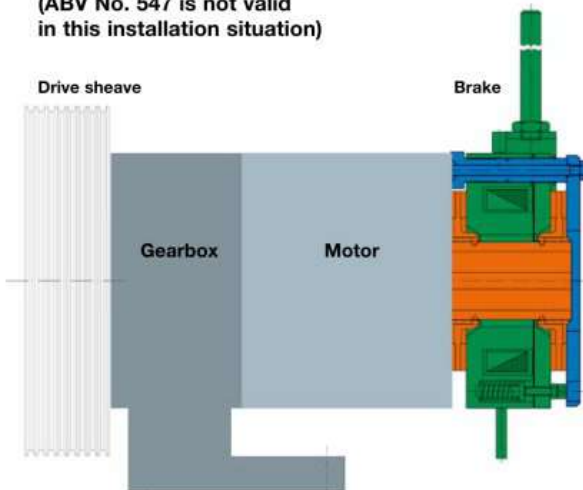


Fig. 1

Drive without gearbox

- Brake on the motor shaft (= drive sheave shaft)

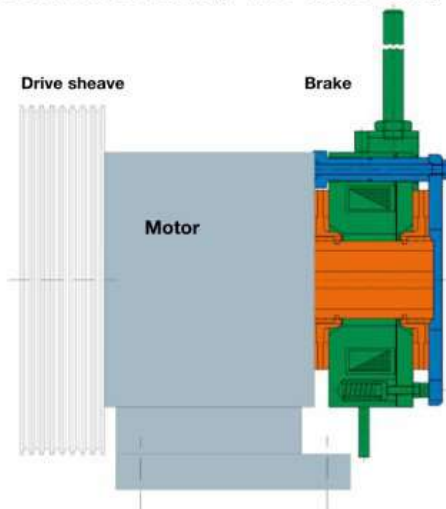


Fig. 2

Drive with

- Brake on the drive sheave shaft**

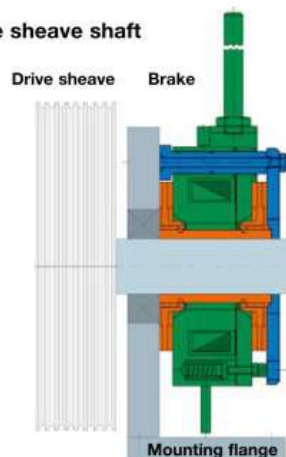


Fig. 3

Sizes 60 – 2000

Type 892.10_0

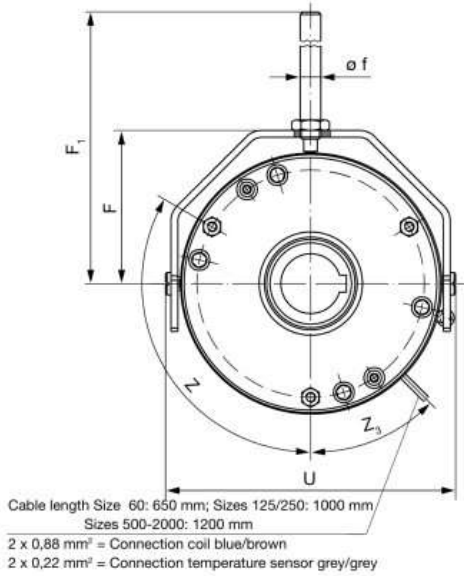


Fig. 4

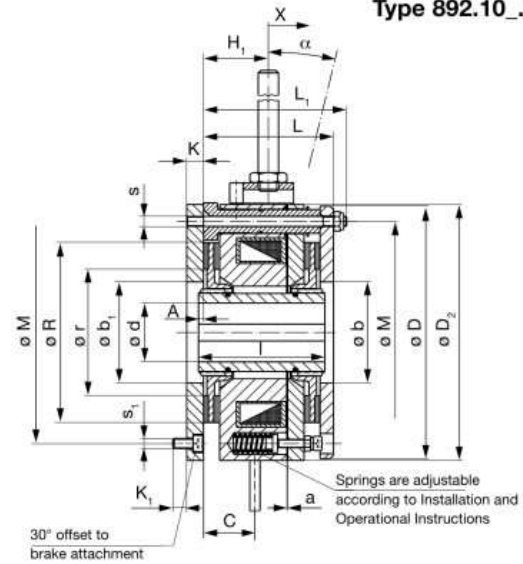


Fig. 5

Technical Data and Dimensions

Size ¹⁾	Braking torque/ max. speed 892.10_0		Electrical performance P ₂₀ [W]	Moment of inertia rotor/hub for d _{max} . I [10 ⁻⁴ kgm ²]	Tightening torque hexagon nut [Nm]	Weight [kg]	Hand release		
	M ₂ ²⁾ [Nm]	n _{max} [rpm]					α [°]	Release force X [N]	Holding force X [N]
60	70 (2 x 35)	3000	49	5,7	12	7,4	17	150	100
125	140 (2 x 70)	3000	76	17	29	12	19	220	100
250	280 (2 x 140)	3000	91	34,4	58	20	16	220	170
500	540 (2 x 270)	1500	129	99	98	43	18	260	200
1000	1100 (2 x 550)	750	180	254	250	77	21	300	200
2000	2380 (2 x 1190)	750	304	617	650	155	21	550	220

Size	A	a	b	b ₁	C	D	D ₂	d _{min} ³⁾	d _{max}	F	F ₁	f	H ₁
60	3	0,45 ^{+0,25}	60	60	30,5	150	152	20	32	89	258	12	38,5
125	3	0,50 ^{+0,25}	78	78	32,5	180	182	25	45 ⁴⁾	106	322	16	37
250	3	0,60 ^{+0,25}	78	78	37,5	214	216	25	42 ⁵⁾	124	418	16	48,5
500	3	0,7 ^{+0,3}	101	100	45,5	258	265	42	55 ⁶⁾	157	548	24	56,5
1000	6	0,8 ^{+0,3}	136	136	63,5	316	322	51	75	185	676	24	84
2000	7	1,1 ^{+0,4}	140	160	77,5	400	400	70	95 ⁷⁾	226	717	24	90,5

Size	K	K ₁	L	L ₁	I ³⁾ _{0,2}	M	R	r	3 x 120°		6 x 60°		U	Z	Z ₃
									s	s ₁	s	s ₁			
60	10	8,2	76,9	86	75	132	107	75	M 6	M 6	168	3 x 120°	52°		
125	10	11,5	83,4	99	80	160	130	94	M 8	M 8	206	3 x 120°	45°		
250	12	15	99,0	118	93	190	154	106	M 10	M 10	240	3 x 120°	47°		
500	15	18	133,5	153	120	230	190	125	M 12	M 12	307	3 x 120°	45°		
1000	20	21	171,7	195	155	280	232	150	M 16	M 16	364	3 x 120°	45°		
2000	30	34	216,8	230	200	330	253	162	M 24	M 24	449	3 x 120°	-45°		

1) Smaller sizes on demand
 2) Braking torque tolerance = + 40 % / - 20 %
 Braking torque reduction possible by 50 %
 3) Please observe shaft or key!!!

4) Over ø 42 keyway according to DIN 6885/3
 5) Over ø 40 keyway according to DIN 6885/3
 6) Over ø 52 keyway according to DIN 6885/3
 7) Over ø 90 keyway according to DIN 6885/3
 8) 24 V not possible on size 2000

Standard voltage 24⁸⁾; 104; 180; 207 V.
 Permitted voltage tolerance according to DIN IEC
 60038; + / - 10 %
 We reserve the right to make dimensional and
 constructional alterations.

Technical Explanations (Selection)

1. Determine the required braking torque (M_A) of the system
2. Determine the safety factor (S_A) of the system
3. Determine the braking torque (M_2) of the brake

$$M_2 = 2 \times M_A \times S_A \times T_{Br} \text{ [Nm]}$$

4. Retardation time on EMERGENCY STOP

$$t_v = \frac{I_{tot} \times n}{9,55 \times M_v} \text{ [sec]}$$

$$M_v = M_2 + (-) M_6$$

5. Inspection of the thermic load:

$$Q_r = \frac{I_{tot} \times n^2}{182,4} \times \frac{M_2}{M_v} \text{ [J/braking]}$$

$$Q_r < Q_{r \max} \text{ see Table 1}$$

Key:

- M_2 [Nm] = Braking torque brake
- M_A [Nm] = Required torque system (calculation to be made by user)
- M_v [Nm] = Retardation torque
- M_6 [Nm] = Load torque
- S_A [-] = Safety factor system (to be determined by user)
- n [rpm] = Speed (brake)
- T_{Br} [-] = **Tolerance factor brake 1,2 with M = -20 % (Please observe during dimensioning)**
- t_v [sec] = Retardation time during braking action (to be determined by user)
- I_{tot} [kgm²] = Mass moment of inertia on the brake
- Q_r [J/braking] = Existing friction work per braking action
- $Q_{r \max}$ [J] = Max. friction work per braking action (see Table 1)
- M_1 = Switching torque
- M_2 = Braking torque (characteristic torque)
- M_3 = Transmittable torque
- M_6 = Load torque
- t_1 = Connection time
- t_{11} = Response delay on connection
- t_2 = Separation time
- t_{21} = Response delay on separation

Z-brake Size	$Q_{r \max}$ (J)	t_{11} [ms]	t_1 [ms]	t_{11-} [ms]	t_{1-} [ms]	t_2 [ms]
60	20000*	17	70	140	350	100
125	30000*	35	85	350	680	240
250	50000*	40	110	390	800	400
500	80000*	85	240	770	1450	550
1000	100000	110	260	1000	1700	850
2000	120000	-	340	-	1450	1100

Table 1 (Average value for nominal air gap and nominal torque)
* Calculation basis n = 1500 rpm

Please observe wear values:

Due to operational parameters such as e.g. sliding speed, pressing or temperature, wear values can only be approximate values.

Switching Times (also see Table 1)

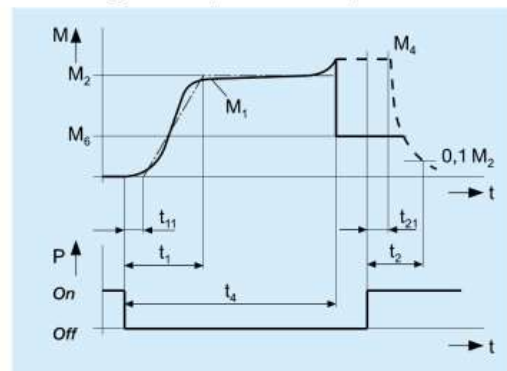


Fig. 6

mayr® electronic components:

Half-wave rectifier	Type	024.000.6
Bridge rectifier	Type	025.000.6
ROBA®-switch	Type	017._.0.2
ROBA®-multiswitch	Type	019.100.2
Spark quenching unit	Type	070.000.0

Order Number *

_ / 8 9 2 . 1 0 _ . 0 / _ / _ / _					
Sizes 60 to 2000	Without accessories Release monitoring Release and wear monitoring ** Flange plate Flange plate and release monitoring Flange plate/release and wear monitoring Wear monitoring Flange plate and wear monitoring	0 1 2 3 4 5 6 7	Coil voltage [VDC] ± 10 % 24 ⁴⁾ 104 180 207	Bore Hub Ø d ¹⁷⁾ (Dimensions page 4)	Keyway DIN 6885/1 or DIN 6885/3

Example: 250 / 892.100.0 / 104 / 30 / 6885/1

* see also Guideline on page 3

** Contact material silver, min. switch capacity 0,12 VA (>12 V, >10 mA)

Electrical Connection

DC current is necessary for the operation of the brake. The coil voltage is indicated on the Type tag as well as on the brake body and is designed according to the DIN IEC 60038 ($\pm 10\%$ tolerance). Operation is possible both via alternating voltage in connection with a rectifier or with another suitable DC supply. Dependent on the brake equipment, the connection possibilities can vary. Please follow the exact connections according to the Wiring Diagram. The manufacturer and the user must observe the applicable directives and standards (e.g. DIN EN 60204-1 and DIN VDE 0580). Their observance must be guaranteed and double-checked!

Earthing Connection

The brake is designed for Protection Class I. This protection covers not only the basic insulation but also the connection of all conductive parts to the PE conductor on the fixed installation. If the basic insulation fails, no contact voltage will remain. Please carry out a standardized inspection of the PE conductor connections to all contactable metal parts!

Device Fuses

To protect against damage from short circuits, please add suitable device fuses to the mains cable.

Switching Behaviour

The operational behaviour of a brake is to a large extent dependent on the switching mode used. Furthermore, the switching times are influenced by the temperature and the air gap between the armature disk and the coil carrier (dependent on the wear condition of the linings).

Magnetic Field Build-up

When the voltage is switched on, a magnetic field is built up in the brake coil, which attracts the armature disk to the coil carrier and releases the brake.

Field Build-up with Normal Excitation

If we energize the magnetic coil with nominal voltage, the coil voltage does not immediately reach its nominal value. The coil inductivity causes the current to rise slowly as an exponential function. Accordingly, the build-up of the magnetic field happens more slowly and the braking torque drop (curve 1) is also delayed.

Field Build-up with Overexcitation

A quicker drop in braking torque is achieved if the coil is temporarily placed under a higher voltage than the nominal voltage, as the current then increases more quickly. Once the brake is released, it is possible to switch to the nominal voltage (curve 2). The relationship between the overexcitation and the switching time is roughly proportional at up to four times the nominal voltage; this means that at doubled nominal voltage, the switching time for brake release is halved. The effective capacity must, however, not be larger than the nominal capacity of the coil. Both, the ROBA[®]-(multi) switch fast acting rectifier as well as the phase demodulator work according to this principle.

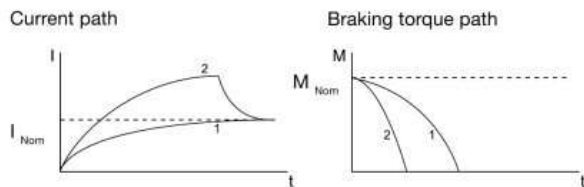
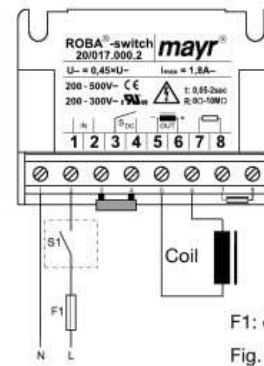


Fig. 7

Magnetic Field Removal

AC-side switching



The power circuit is interrupted before the rectifier. The magnetic field slowly reduces. This delays the rise in braking torque.

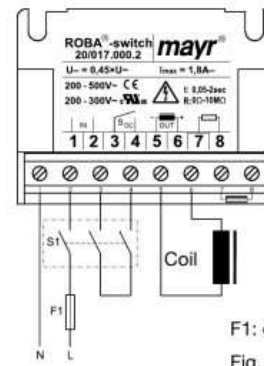
When switching times are not important, please switch AC-side, as no protective measures are necessary for coil or switching contacts.

F1: external fuse

Fig. 8

→ **Low-noise switching**; however, the brake engagement time is longer (c. 6-10 times longer than with DC-side switching). Use for non-critical brake times.

DC-side switching



The power circuit is interrupted between the rectifier and the coil as well as mains-side. The magnetic field reduces very rapidly, resulting in a rapid rise in braking torque.

When switching DC-side, high voltage peaks are produced in the coil, which lead to wear on the contacts from sparks and to destruction of the insulation.

F1: external fuse

Fig. 9

→ **Short brake engagement time (e.g. for EMERGENCY STOP)**; however, louder switching noises

Protective Circuit

When using DC-side switching, the coil must be protected by a suitable protective circuit according to VDE 0580, which is integrated in mayr[®] rectifiers. To protect the switching contact from consumption when using DC-side switching, additional protective measures are necessary (e.g. series connection of switching contacts). The switching contacts used should have a minimum contact opening of 3 mm and should be suitable for inductive load switching. Please make sure on selection that the rated voltage and the rated operation current are sufficient. Depending on the application, the switching contact can also be protected by other protective circuits (e.g. mayr[®] spark quenching unit), although this may of course then alter the switching times.

Please Observe:

According to German notation, decimal points in this document are represented with a comma (e.g. 0,5 instead of 0.5).

We reserve the right to make dimensional and constructional alterations.

Technical Explanations

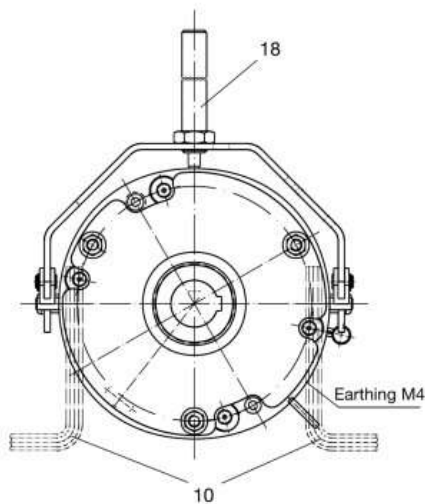


Fig. 10

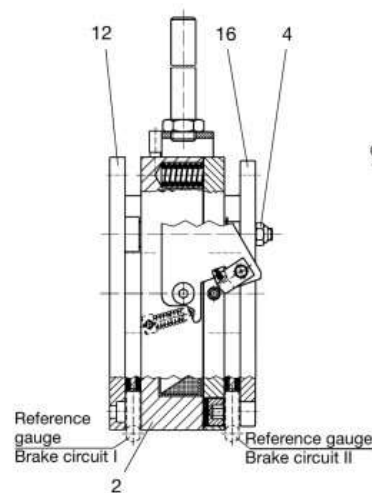


Fig. 11

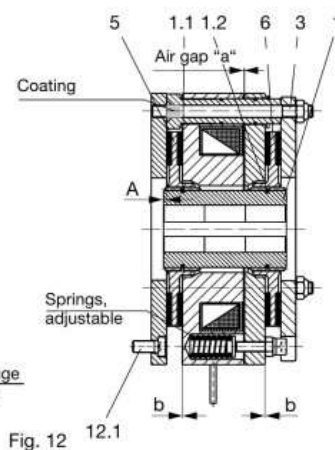


Fig. 12

Parts List

1	Gear hub assembly	6	Rotor 2
1.1	O-ring 1	10	Reference gauge (2x)
1.2	O-ring 2	12	Flange plate (option dependent on Type or machine wall (customer-side))
2	Brake body assembly	12.1	Cap screw
3	Double end stud	16	Brake plate
4	Hexagon nut	18	Hand release assembly
5	Rotor 1		

Installation Conditions

- ❑ The eccentricity of the shaft end in relation to the mounting pitch circle must not exceed 0,2 mm.
- ❑ The position tolerance of the threaded holes for the double end studs (3) must not exceed 0,2 mm.
- ❑ The axial run-out deviation of the screw-on surface to the shaft must not exceed the permitted axial run-out tolerance according to DIN 42955 R of
 - 0,05 mm**, on sizes 60 – 500
 - 0,063 mm**, on sizes 1000 – 2000

The related diameter is the pitch circle diameter to the brake attachment. Larger deviations can lead to a drop in torque, to continuous slipping on the rotor and to overheating.

- ❑ The tolerances of the hub and the shaft are to be chosen so that the hub toothings is not widened; toothings widening leads to the rotor clamping on the hub and therefore to brake malfunctions (recommended hub – shaft tolerance H7/k6).
- ❑ Dimension "A" (Fig. 12) must be kept to.
- ❑ Rotors and brake surfaces must be oil and grease-free. A suitable counter friction surface (steel or cast iron) must be used. Sharp-edged interruptions on the friction surface are to be avoided.
Recommended surface quality in the friction surface area:
Ra = 1,6 µm. In particular customer-side mounting surfaces made of grey cast iron are to be additionally rubbed down with fine sandpaper (grain ~ 400).

Short Description Installation (Figs. 10 – 12)

For a detailed installation description, please see the Installation and Operational Instructions corresponding to the respective product.

1. Mount the gear hub assembly (1) onto the shaft according to Fig. 12, **please observe dimension "A" according to Fig. 12; please observe the entire carrying length of the key**, and secure axially (e.g. using a locking ring).
2. If necessary, mount the flange plate (12) using the cap screws (12.1) (please observe the tightening torque).
3. Using light pressures, push rotor 1 (5) by hand over the O-rings (1.1 and 1.2) onto the gear hub (1) (Rotor collar faces away from machine wall or flange plate). Please make sure that the toothings runs smoothly.
Do not damage the O-rings.
4. Manually screw in the double end studs (3) **with coating thread-side** until reaching the coating (screw-in limitation) in the threaded holes of the brake screw-on surface (machine wall) or on the flange plate, screw in by hand up to its limit (secure with LOCTITE 243).
5. Push brake body (2) over double end studs (3).
6. Manually push rotor 2 (6) onto the gear hub (1) (over O-ring (1.2)) (**Rotor collar faces away from machine wall or flange plate**). Please make sure that the toothings runs smoothly.
Do not damage the O-rings.
7. Push brake plate (16) over double end studs (3).
8. Screw on brake evenly all around using the hexagon head nut (4). (**Tighten hexagon nuts with a torque wrench**). **Observe tightening torque.**
9. **Check total air gap "a"**. Nominal air gap must be given.
10. **Check single circuit air gap "b" on rotors 1 and 2**. The corresponding air gap **must** be given.

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