NIIKA®

Since 1989

NIIKA Corp.

www.niika.com

Tel: 886-2 -8201 5821 Fax: 886-2 – 8201 5822

E-mail: niika.n2@msa.hinet.net ; export@niika.com

The electrically released SAB system

The electrically released *SAB* system

quality standards for development, material, selection, production and assembly mean that the new spring-operation brakes fulfill the highest requirements. These electro-magnetically released, spring-operated brakes can be used in all cases where movable masses have to be brakes in the shortest possible time or have to be hold in defined position.

The braking force is provided by compression springs. This means that the frictional brake torque is produced in the non-current state, i.e. also in event of a supply failure. The brakes are released electro-magnetically.

The new **SAB** range replaces the spring-operated brakes types from 2 Nm to 400 Nm is standard design. The main components of the new modular system consist of the modules P (adjustable brake torque) and N (brake torque not adjustable). This offers flexibility by combining the basic modules with further modular elements to cover the widest possible range of applications.

ORDER TYPE CODE:

SAB □□□-□-□□□

Spring-Operated Disc Brake
Type
Stator Design
Supply Voltage

- Type is braking rated torque (Nm) refer to speed at 100 r.p.m.
  2, 5, 10, 20, 40, 60, 100, 160, 250, 400.
- Stator Design
  P – adjustable (brake torque can be reduced using adjuster nut)
  N – not adjustable
- Supply Voltage
  standard 24, 96, 190, 205. VDC
  Other voltage on request

Encoded

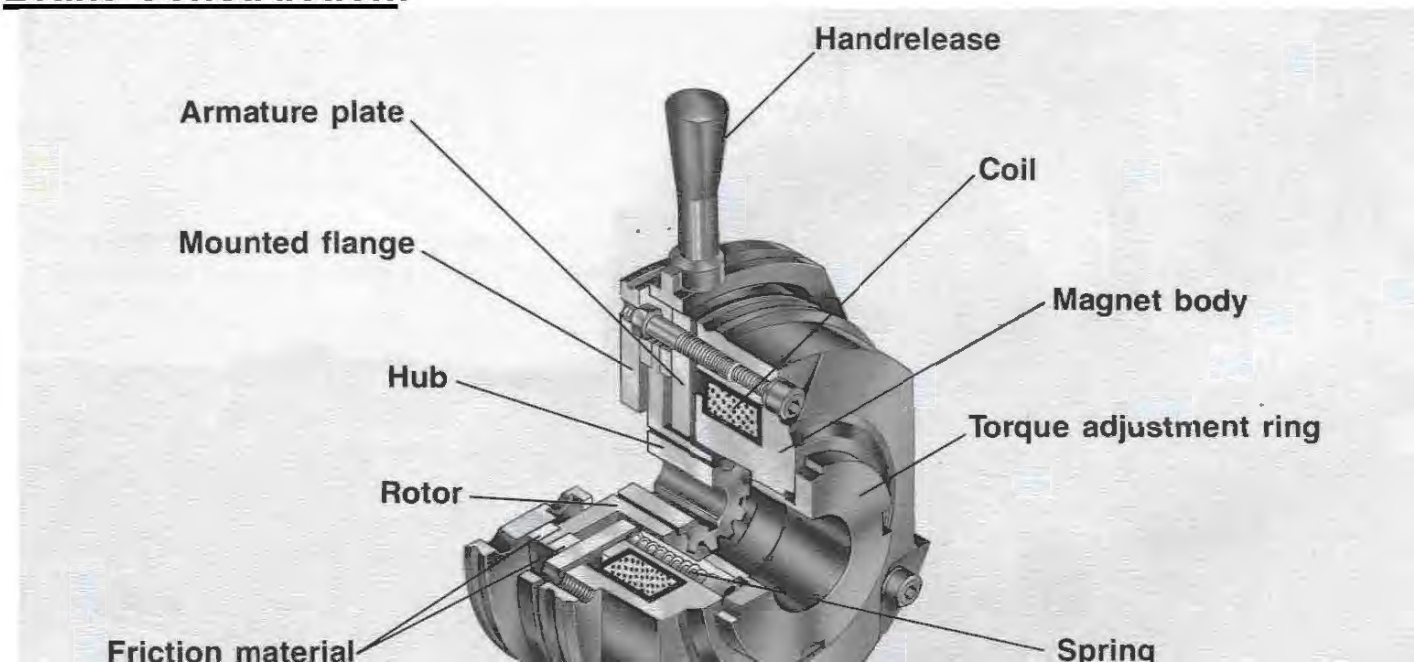
Hub bore (see table), Options.

Other Special Type on request

Other combinations or other adjusted braking torque are possible on request.

All brake friction linings are ***asbestos-free***.

Brake Construction:



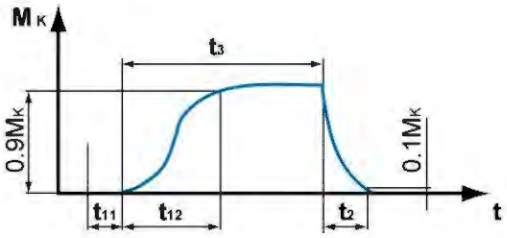
Explanation of Symbols

Symbols and definitions used:

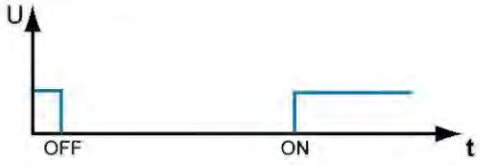
Symbol	Unit	Description
P	kW	Power
$\mathbf{M}_k$	Nm	Rated brake torque
$\mathbf{M}_L$	Nm	Load torque
$\mathbf{M}_r$	Nm	Required brake torque
$\mathbf{M}_a$	Nm	Deceleration torque
$\Delta \mathbf{n}_o$	min^{-1}	Initial relative speed of the brake
$\mathbf{J}_L$	kgm^2	Moment of inertia of all driven parts referred to the shaft to be braked
t_1	s	Engaging time, $t_1 = t_{11} + t_{12}$
t_2	s	Disengaging time (Time from the beginning of the torque reduction to 0.1 x $\mathbf{M}_k$ is reached)
t_3	s	Slipping time (Time during which there is a relative motion between input and output with brake engaged)
t_{11}	s	Delay time (Time from switching on the voltage to the beginning of the torque rise)
t_{12}	s	Torque rise time (Time from the beginning of the torque rise to 0.9 $\mathbf{M}_k$ is reached)
S_f		Safety factor
Q	J	Calculated friction work per operation
Q_p	J	Max. permissible friction work per operation
S_h	h^{-1}	Operation frequency, that is number of periodical brakings
a	mm	Normal air gap

Definition of operation times (VDI 2241)

Rated torque



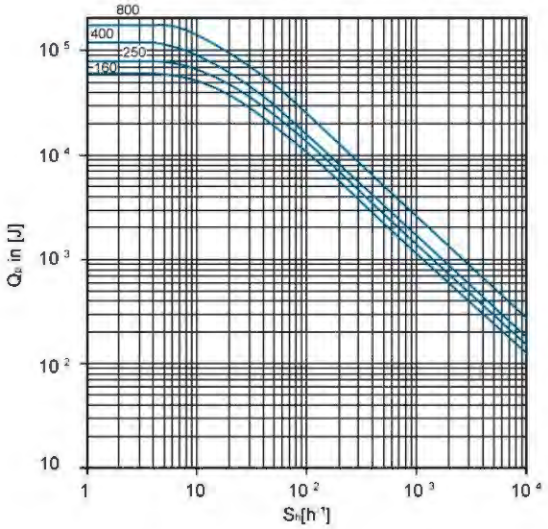
Excitation



For shortening of engaging space-of-time by factor 6 about, without additional relay contacts and leads, integral switching devices are available. Detail is on request.

Permissible friction work Q_p depending on the operating frequency S_h

Permissible friction work



Operating frequency

Calculation example

The following technical data are known:

1) P = 2.2 kW
2) Δn_o = 1450 min^{-1}
3) J_L = 0.58 kgm^2 (total)
4) t_3 = 2 s
5) M_L = 18 Nm
6) S_h = 15 operations/h

1. Approximate determination of the required brake torque and brake type:

$$M_r = 9550 \cdot \frac{P}{\Delta n_o} \cdot S_f$$

$$M_r = 9550 \cdot \frac{2.2}{1450} \cdot 2 = 28.9 \text{ Nm}$$

Assume SAB – 60

2. Calculation of the required brake torque

$$M_r = \left[\frac{J_L \cdot \Delta n_o}{9.55 \cdot \left(t_3 - \frac{t_{12}}{2}\right)} \pm M_L \right] \cdot S_f \leq M_k$$

t_{12} = 0.025 s (see technical table)

$$M_r = \left[\frac{0.58 \cdot 1450}{9.55 \cdot \left(2 - \frac{0.05}{2}\right)} - 18 \right] \cdot 2 \fallingdotseq 53$$

Therefore, type **SAB – 60** is chosen

SO M_k = 60 Nm > M_r = 53 Nm ---- OK

3. Thermal load checking

$$Q = \frac{J_L \cdot \Delta n_o^2}{182.5} \times \frac{M_K}{M_K \pm M_L}$$

$$Q = \frac{0.58 \cdot 1450^2}{182.5} \times \frac{60}{(60+18)} = 5140 \text{ J}$$

Calculated friction work Q = 5140 / operation. The diagram on page 2 shows for type 60 at S_h = 15 h^{-1} a permissible energy of 25000 J.

SO Q = 5140 J < Q_p = 25000 J ---- OK

The brake has therefore been correctly selected.

Ordering example:

A brake type **SAB** – 60 P or design N (with or without adjuster nut) with additional hand release and seal. Supply voltage 190 V and shaft (hub bore) diameter 25 mm H7. Standard design parallel key accordance to **DIN** 6885.

SAB – 60 P 190 + H (d=25)

- Technical Data and Operating Times

Ratings

Type SAB	P 1)	Air gap		Rotor thickness 2)		Moment inertia	Operating time for normal air gap			
	20℃	a	a_{max}	Max.	Min.	Aluminum rotor	t_{11}	t_{12}	t_1	t_2
	[W]	[mm]	[mm]	[mm]	[mm]	[Kgcm²]	[ms]	[ms]	[ms]	[ms]
2	16	0.2	0.5	7	5.0	0.15	5	10	15	30
5	20	0.2	0.5	7	5.0	0.21	7	10	17	35
10	25	0.2	0.5	9	6.0	0.6	10	10	20	50
20	30	0.2	0.6	12	7.0	1.8	10	20	30	90
40	40	0.3	0.8	12	7.0	4.4	15	25	40	120
60	50	0.3	0.8	12	7.0	6.3	15	50	65	150
100	65	0.3	0.8	14	8.0	14.1	20	70	90	180
160	85	0.4	1.0	15	8.0	26	30	80	110	300
250	110	0.4	1.0	18	12	60	50	150	200	400
400	120	0.5	1.2	24	14	200	70	200	270	500

1) Coil power at 20℃ in watt, difference up to + 10% is possible, depending on the selected connecting voltage.
2) The friction lining is dimensioned such that the brake can be readjusted at least five times.

Technical Data and Operating Times

NIKA

Operating

Type SAB	Brake torque rated value at $\Delta n = 100\ min^{-1}$	Maximum permissible friction work per one operation only	Transition operating frequency	Maximum speed in aluminum rotor	Reduction per notches in twist position	Excess end of torque adjuster ring
	M_k [Nm]	Q_E [J]	S_h [h^{-1}]	[min^{-1}]	[Nm]	[mm]
2	2	1000	95	3600	0.2	4.0
5	5	3000	80	3600	0.2	5.0
10	10	7500	50	3600	0.4	5.0
20	20	12000	40	3600	0.8	7.5
40	40	24000	30	3600	1.3	9.5
60	60	30000	28	3600	1.7	11.0
100	100	36000	26	3600	1.6	10.0
160	160	60000	20	1800	3.6	15.0
250	250	80000	18	1800	5.6	17.0
400	400	120000	16	1800	6.2	20.0

- *Product information*

☆ Efficient, complete range

1. Ten type.
2. Standard voltages 24 V, 96 V, 190 V, 205V.
3. Graduated torques from 2 to 800 Nm (with double rotor linings).
4. Short delivery times for the complete rang because of optimized logistics.
5. CSA-NRTL design as a standard, which the product complies with the applicable UL and CSA requirement.

☆ Versatile

1. Modular design for almost all application.
2. Replacement product for the double brake, suitable for stage machinery or double lining brake.

☆ Torque transmission

1. By friction in dry running.
2. The brakes is Spring-loaded with electro-magnetic release.

☆ Immediately ready to operate

1. Preset air gap, simple and fast mounting.
2. The rated torque is achieved by machining of the friction faces already after a few operations without running-in procedure.
3. Fixed bearing not required at the brake side.

☆ Long life

1. The magnet wires are polyester overcoat insulation class F (155℃) ensures a long life of the winding.
2. The brakes are dimensioned for 100 % duty time (current applied to the brake).

☆ Low maintenance

1. Long, low-wear rotor/hub connection with proven evolving too thing.
2. Low-wear, asbestos-free friction lining.
3. Air gap must be checked depending on the friction work,

☆ Reliable

1. The continually high product quality is based on the certified quality assurance system according to ISO 9002
2. Manufacturing and testing according to DIN VDE 0580.

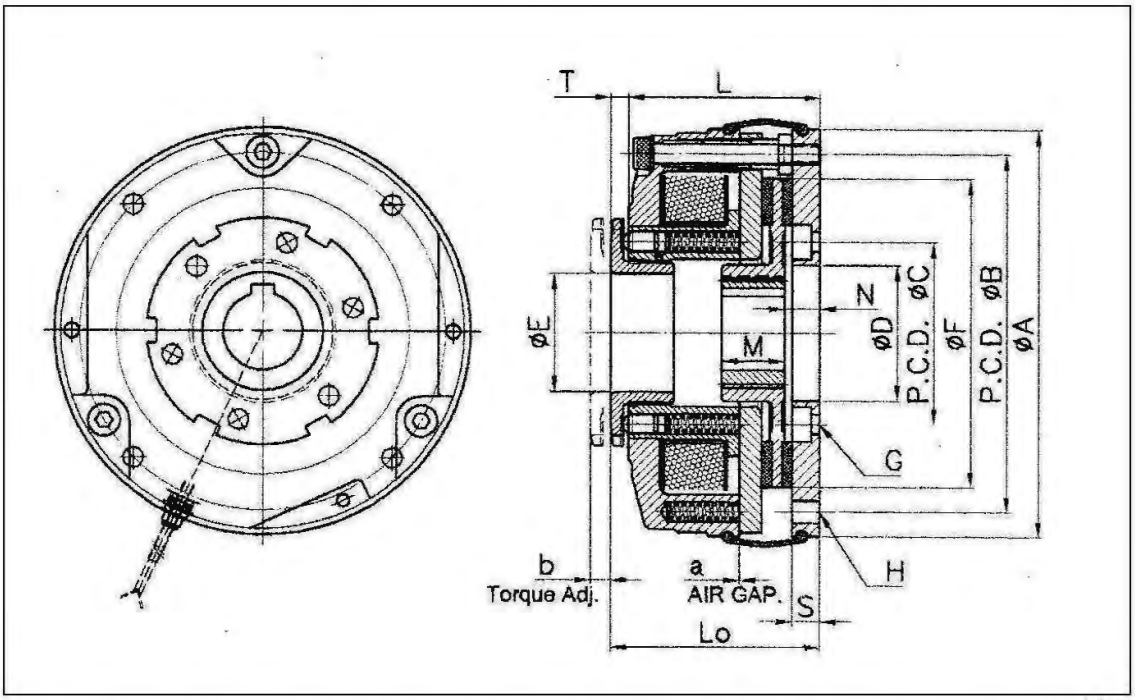
☆ Options

1. Hand release for the manual release is available for all type; direction of release and mounting at both sides.
2. Low-noise designs.
3. Different type of corrosion protection and the enclosure.
4. Seal and Cover for IP 65
5. Air gap and wear monitoring by micro-switch (as from type 60).
6. Special mounting flange.
7. Special voltages and hub bores on request.

☆ Typical applications

1. Vehicles (for lifters, solid propellant)
2. Warehouse equipment (conveyors, transport system, telpher line drives)
3. Cranes (trolley, hoist, travelling, slewing)
4. Wood working
5. Power plants
6. Steel mill, Paper mill
7. Automation

Dimensions Sheet



Unit in mm

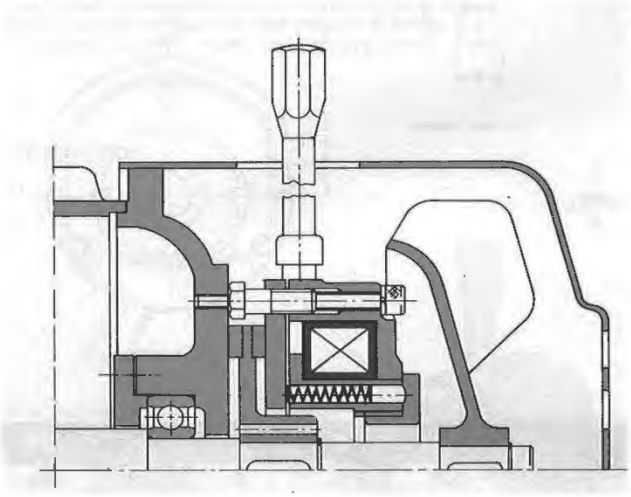
Type SAB		2	5	10	20	40	60	100	160	250	400
Dynamical [2] [Nm]		2	5	10	20	40	60	100	160	250	400
Hub bore [1]	d_{max}	10	14	15	20	24	28	35	45	55	70
Hub bore	d_{min}	8	8	10	10	16	20	25	30	35	40
	ϕ A	73	84	102	127	147	162	188	215	252	302
	ϕ B	60	72	90	112	132	145	170	196	230	278
	ϕ C	x	30	45	56	62	74	84	100	120	150
	ϕ D	25	20	30	40	45	55	65	75	90	120
	ϕ E	27	19	24	35	40	48	55	62	73	90
	ϕ F	49	61	76	96	115	125	150	175	208	254
	G	x	3xM4	3xM5	3xM6	3xM6	3xM8	3xM8	3xM8	6xM8	6XM10
	H	3x ϕ 4.5	3x ϕ 4.5	3x ϕ 5.5	3x ϕ 6.5	3x ϕ 6.5	3x ϕ 9.0	3x ϕ 9.0	6x ϕ 9.0	6x ϕ 11	6x ϕ 11
	L	42.5	44	49	59	66	76	85	95	109	120
	M	16	18	20	20	25	30	30	35	40	50
	N	8	8	9.5	12.5	12	14	14.5	15	15	20
	S	5.8	5.8	6.8	8.8	8.8	11	11	11	11	14
	T	0	5	6	6	7	7	8	9	10	13
	Lo	x	49	55	65	73	83	93	104	119	133
	b	x	5.0	5.0	7.5	9.5	11.0	10.0	15.0	17.0	20
Air gap a		0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5
Air gap a_{max}		0.5	0.5	0.5	0.6	0.8	0.8	0.8	1.0	1.0	1.2
Weight [kg]		1.0	1.2	1.8	3.0	4.8	7.3	12.2	18.5	27.6	35.9
Micro-switch		No	No	No	No	No	Yes	Yes	Yes	Yes	Yes

1) Standard parallel keyway accordance to DIN 6885/1 P9.
The Hub bore tolerances is ISO H7. Recommended ISO shaft tolerances up to ϕ 50 mm = k 6
Over ϕ 50 mm = m 6.

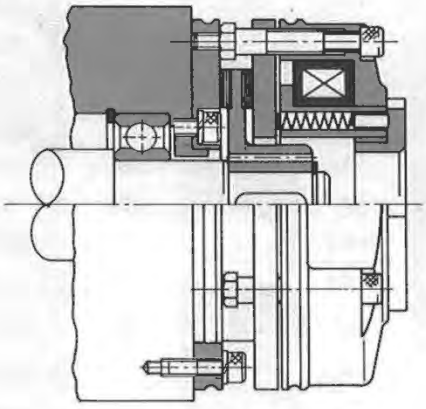
2) Braking torque dynamical (Δ n = 100 r.p.m.)

Mounting Examples

1. The **SAB** brake with optional hand release as an integral part of an electric induction brake motor.



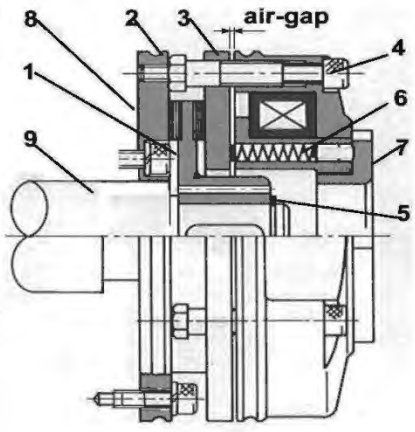
2. The **SAB** brake may be integrated into the design of many machines, and performs well in both dynamic and static applications.



- Brake Installation and Adjusting the brake Torque

If no suitable opposing surface is available, a mounting flange (8) or a special mounting flange can be used.

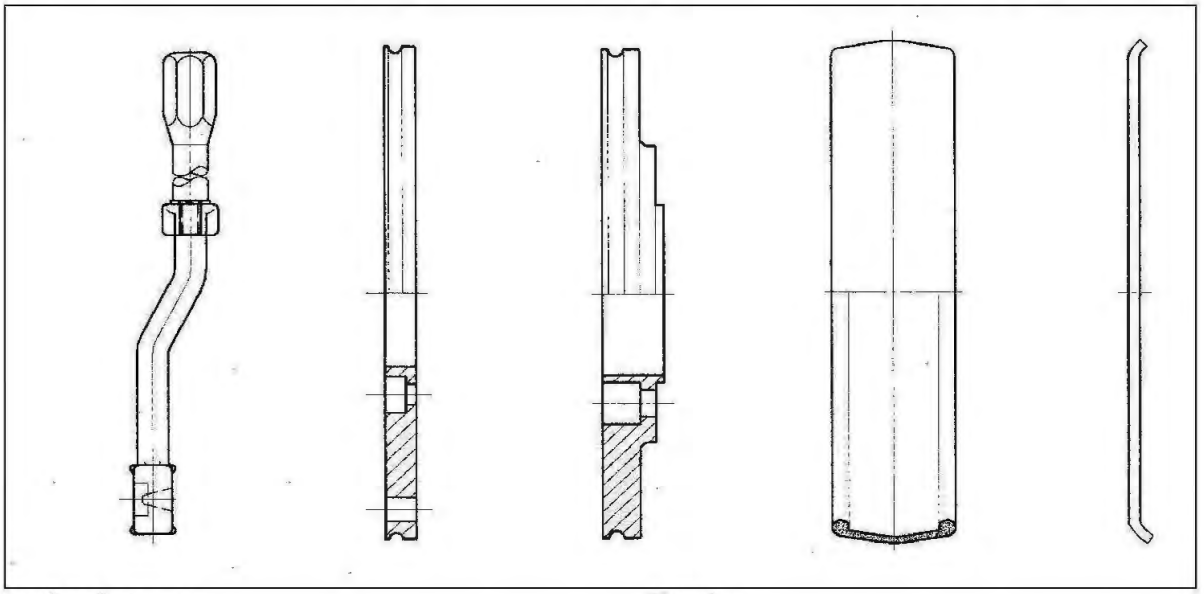
1. Fit the hub (5) onto the shaft (9) and secure axially.
2. Now fit rotor (1) onto hub (5).
3. Insert armature plate (3) and spring (6) & magnet body.
4. Insert the fixing screws (4) through the holes provided in the stator and fit those to the counter friction surface.
5. Remove transport clips.
6. Check the air-gap between the magnet body and the anchor (the brake operational clearance).
7. Measure the air-gap with a feeler gauge and find out. If the air-gap needs to be reduced, rotate the adjustment screw (2) counter-clockwise. Loosen them evenly.
8. Tighten the screws (see table) and measure the air-gap again.
9. The friction surfaces must be kept from oil and grease.
10. Connect electrically.
11. The brakes have been adjusted to rate load torque by the manufacture.
12. The torque can be adjusted by the rotating the adjustment ring (7) in the back of the brake.
13. The torque is reduced when the adjustment ring is rotated counter-clockwise and increased when rotated clocked.
14. It is possible to equip brakes with hand release levers so that the brake can be pried open without electricity.
15. If the brake has a hand lever the air-gap has to be checked frequently otherwise holding the hand lever could obstruct the anchor and prevent normal braking.



Remark : **SAB 2** can't adjust torque.

Options

Hand Release	Mounting Flange	Special Mounting Flange	Seal	Friction plate (Type 2 – 60)



Hand release :

The hand release serves to release the brake manually. It can also be retrofitted. The hand release goes back to its base position automatically after operation. The release screws are carried in ball joints and are only tensioned. When assembling the hand release the distance between armature plate and screw dimension must be maintained.

Caution :

Even with a reduced rated torque, a readjustment of the working air gap reaching the dimension is necessary for reasons of safety.

Friction plate :

If plain-machined counter-face is available but can't be used as a friction, for example in the case of aluminum, we recommend using a friction plate, which can also be combined with a seal. The friction plate is made of non-corroding material. It can be supplies up to type 60.

Special mounting flange :

The special mounting flange can be used to adapt a second basic module to the basic module N; the resulting double brake is suitable for stage machinery or other applications with increased safety requirements. (See accessories other design)

Seal :

The seal prevents to a large extent exit or penetration of dust, humidity, dirt, etc. into the braking area. The seal is pulled. If no suitable groove is available at the output side, we recommend using a mounting flange or other friction plate (surface).

Micro-switch :

The micro-switch is used when a monitoring of the air gap required and is available from the type 60 to 400. If the armature plate is in contact with the magnet body the electric contactor is controlled via the micro-switch. The machine can only start, if the brake is released. If the maximum air gap is reached, the magnet body no longer attracts the armature plate. The electric contactor is not activated, the electric does not start. The air gap of basic module P and basic module N can be readjusted. The micro-switch can be adjusted such that a signal is output before the wear reserve is reached (wear monitoring).

Mounting flange :

If no suitable friction surface is available, the mounting flange can be used, which at the same time is able to carry the seal.

※ Basic module P, N + Cover

As an option, a cover can be mounted to the basic module P and N to product the brake from water and dust (enclosure accordance to IP 65). It's encapsulated design. And it's installation dimension please on option.

※ Full Wave Bridge Rectifiers and Half Wave Rectifiers

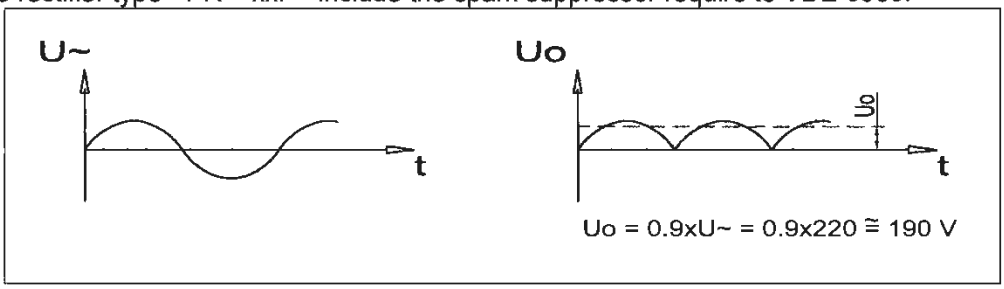
We have a description of **SAB** series brakes electrical accessories as follow.

1. 6-pole full wave bridge rectifier **order is " PR – 10 F "**. It's cable connection.
   6-pole half wave rectifier **order is " PR – 10 H "**. It's cable connection.
2. 6-pole full wave bridge rectifier **order is " PR – 15 F "**. It's terminal block connection.
   6-pole half wave rectifier **order is " PR – 15 H "**. It's terminal block connection.
3. 4-pole full wave bridge rectifier **order is " PR – 20 F "**. It's cable connection with fast switching devices.
4. 4-pole half-wave rectifier **order is " PR – 20 H "**. It's cable connection with fast switching devices

☆ full wave bridge rectifier " PR – xx F "

Application

Current supply of spring-operated brakes from the AC mains (for normal excitation).
Example: 190 V coil at 220 V mains.
The rectifier type " PR – xxF " include the spark suppressor require to VDE 0580.



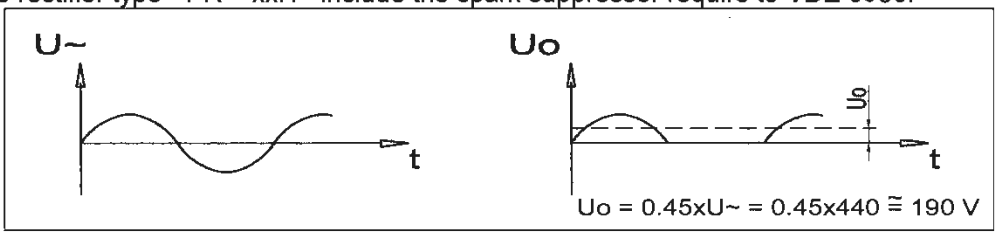
Technical data :

Max. connecting voltage U~= 270 V~ Max. DC current at 60℃ I = 0.75 A
Max. ambient temperature T= 80℃ Other current on request
The rectifiers are protected against over-voltage by variations in the input and output.

☆ half wave rectifier " PR – xxH "

Application :

Current supply of spring-operated brakes from the AC mains (for normal excitation).
Example: 190 V coil at 440 V mains.
The rectifier type " PR – xxH " include the spark suppressor require to VDE 0580.



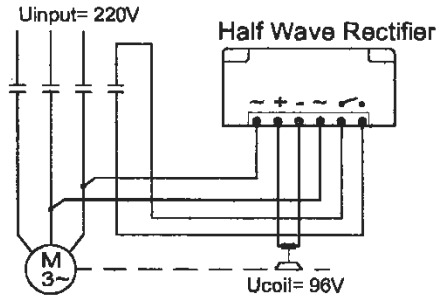
Technical data :

Max. connecting voltage U~= 550 V~ Max. DC current at 60℃ I = 0.75 A
Max. ambient temperature T= 80℃ Other current on request
The rectifiers are protected against over-voltage by variations in the input and output.

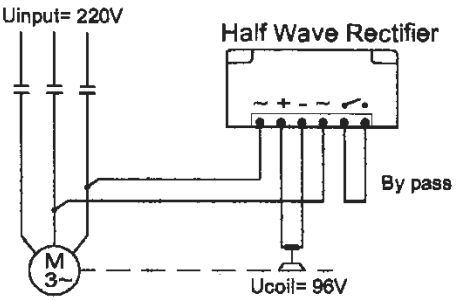
Connecting Diagrams

☆ AC switching parallel to the motor :

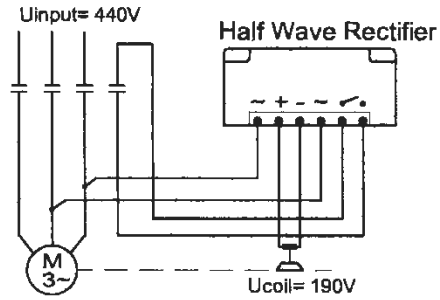
AC switching Parallel to the motor



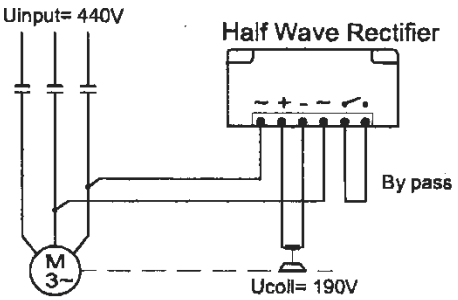
AC switching Parallel to the motor



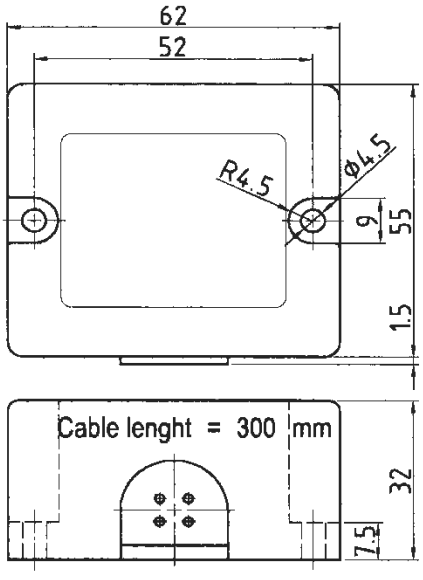
AC switching Parallel to the motor



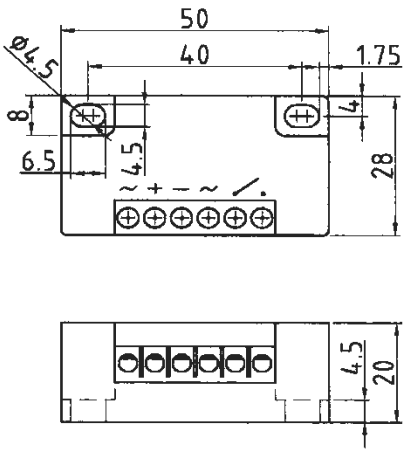
AC switching Parallel to the motor



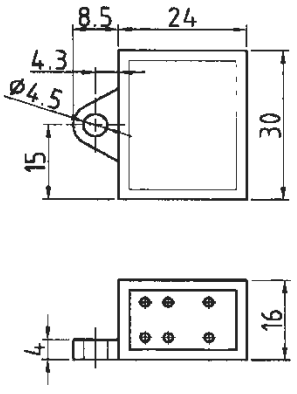
☆ Rectifiers dimensions :



PR - 20



PR - 15



PR - 10

Adjustment of braking torque :

The brake is supplied with a set braking torque T_N .All type can be reduced by unscrewing the adjusting ring using a hook spanner can reduce this. Per notch of the adjusting ring, the braking torque T_N is reduced by the amounts of following table.

Description Type	2	5	10	20	40	60	100	160	250	400
Torque reduction per notch [Nm]	—	0.2	0.4	0.8	1.2	1.8	2.5	3.6	5.6	6.3
Excess end of adjuster nut [Mm]	—	5	5	7.5	9.5	11	10	15	17	20
Twist notch of adjusting ring [Deg]	—	90°	90°	90°	90°	60°	60°	60°	45°	45°

- Order Form Accessories

Hub bore
- ϕ _____ mm (H7) " for bore diameter see dimensions "
- ☐ No need keyway " standard hole "
- ☐ Special keyway " b_2 =_____mm ; t_2 =_____mm "

Hand release
- ☐ as mounting kit
- ☐ No need

Mounting flange
- ☐ Friction plate " up to type 60 including "
- ☐ Standard mounting flange
- ☐ Special mounting flange
- ☐ No need

Seal
- ☐ Standard seal
- ☐ No need

Bridge rectifier
- ☐ PR-10F " cable connection "
- ☐ PR-15F " terminal block connection "
- ☐ PR-20F "cable connection with fast switching devices.
- ☐ No need

Half wave rectifier
- ☐ PR-10H " cable connection "
- ☐ PR-15H " terminal block connection "
- ☐ PR-20H "cable connection with fast switching devices "
- ☐ No need

Micro-switch
- ☐ Standard Type "cable connection ".
- ☐ No need

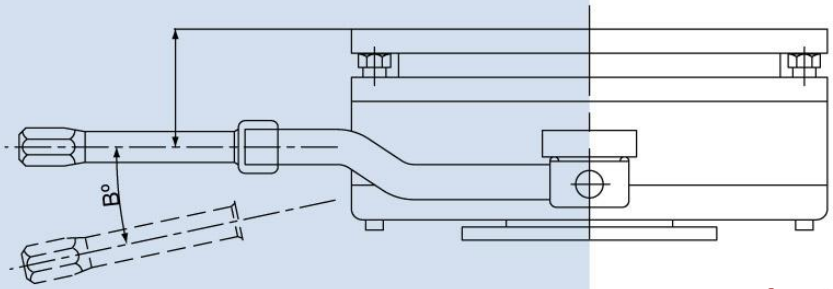
Spark suppressor
- ☐

Special voltage
- ☐ _____ VDC

NIIKA®
www.niika.com

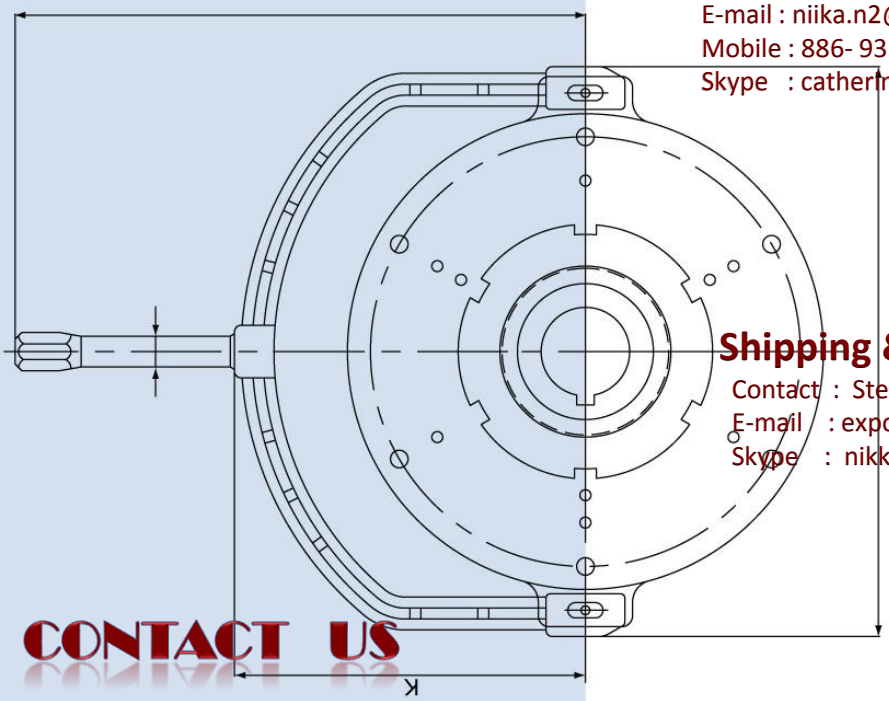
NIIKA CORP.

No.17, Lane 187, Qiong- Lin S. Rd., Xin- Zhuang City, New Taipei 242 Taiwan
Tel : 886- 2-8201 5821 Fax : 886-2-8201 5822 http//www.airtek-niika.com



Marketing & Sales Dept.

Contact : Catherine Wei
E-mail : niika.n2@msa.hinet.net
Mobile : 886- 932 240 685
Skype : catherinewei10



Shipping & Order Dept.

Contact : Stella Lin
E-mail : export@niika.com
Skype : nikka-stella

CONTACT US