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Installation and maintenance

of Ortlinghaus electromagnetically released spring applied multi plate brakes

Instruction No. 116
Series 0-028

The Ortlinghaus spring applied electromagnetically released brake is designed as a safety brake, releasing when the coil is energized and actuated by compression springs when the coil is de-energized.

1. Description

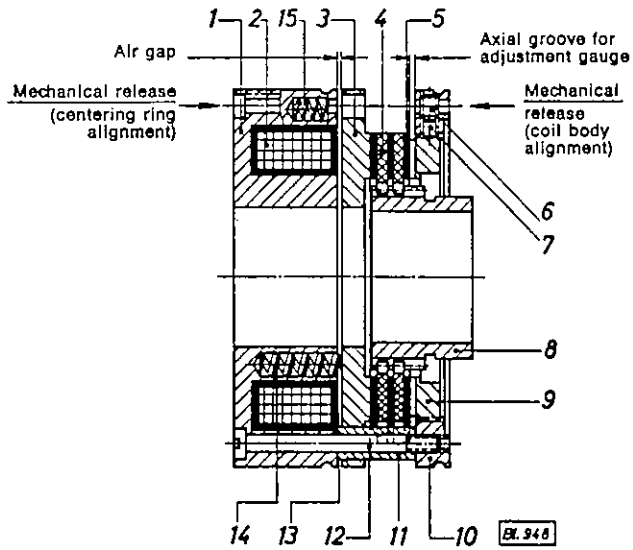
The brake consists of a stationary coil body (1) in which the compression springs (14) are accommodated.

The springs act on the armature plate (3) which compresses the plate stack, which consists of internally splined plates (4) and externally spined plates (5), counteracted by the threaded support ring (9) and the centering ring (10). The support ring is secured against rotation by a grub screw (6) and a clamping insert (7). The centering ring is firmly connected to the coil body by cheeseheaded screws (12) and bushes (11).

The externally splined plates together with the armature plate are carried on the spacer bushes. The internally splined plates slide on the hub (8).

When the coil (2) is energized the magnetic force overcomes the spring pressure and the armature plate is drawn against the stop washers (13). Frictional brake contact between the plates is thus severed and the brake released.

The non-magnetic stop washers prevent the armature plate from sticking to the coil body and effect a rapid engagement.



2. Available versions

2.1 The braking torque is constant.

2.2 The brake is aligned by means of the coil body or the centering ring. In the event of power failure the brake can be mechanically released by two screws or an optional hand lever. This can be done from either end (see section 7), depending on mounting method.
Brakes are normally supplied for dry running with dust protection sleeve. For wet running applications they are supplied without dust protection sleeve and with suitable friction lining. The electrical connection can be made in various ways — see section 4, Accessories.

2.3 The size of brake can be established from following dimensions:

Outer diameter of coil body	mm	100	115	135	165	190	220	250
Brake size		03	07	11	15	23	31	43

3. Spare parts

When ordering spare parts, please state the factory number given on the coil body or plate carrier. Please ensure that all spare parts orders are given in writing or by telex to avoid incorrect deliveries.

4. Accessories

4.1 Brakes can be supplied as follows:

4.1.1 Fitted with connection terminal for 24 Volt DC in conjunction with a wall-mounted rectifier 220 Volt DC (see 4.2.5).

4.1.2 Fitted with closed connection box (P 44) for 24 Volt DC in conjunction with rectifier as above (4.2.5). On request the brake can be supplied with built-in rectifier for 190 Volt DC (input 220 Volt AC, 50 Hertz).

4.2 Rectifiers

4.2.1 The rectifiers are normally supplied for 220 Volt AC, 50 Hz. The transformer is provided with three alternative primary connections: 0-200, 0-220 and 0-242, i. e. 220 Volt ± 10 %. Unless otherwise stated the transformers are connected for 220 Volt when supplied. If variations in the mains supply occur, the transformer can be reconnected accordingly. Please, ensure that the applied voltage does not exceed the corresponding nominal rating on the terminal by more than 10 %.
Rectifiers are safeguarded by a fuse in the DC circuit. Details of fuses see 4.2.5. Transformers for other voltages can be supplied on request.

4.2.2 Idling voltage
An unloaded rectifier has an idling voltage of approx. 28 Volts, this dropping to approx. 25 Volts under full load. When several brakes or clutches are operated simultaneously it is essential that the rectifier is capable of providing the sum of all individual currents (brakes, clutches and protection resistors).

4.2.3 Operating conditions
Rectifiers of this range are exclusively intended for wall-mounting. Only in this position is adequate air circulation for cooling assured and thus in turn operational reliability. The room in which the rectifier is mounted should not exceed 35 °C in temperature and be dry and free from corrosive atmosphere. The rectifier should not be mounted above radiators or other sources of heat.

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4.2.4 Starting up
Rectifiers are ready for operation after connection to the AC mains supply.

4.2.5 Rectifiers for Wall-mounting

Brake size	Rectifier		D. C. fuse	Protection resistor	
03	0—085—. . .—24—018	(1,8 A)	F 2/250 G	0—085—400—25—150	(0,25 A)
07	0—085—. . .—24—032	(3,2 A)	F 4/250 G	0—085—400—45—070	(0,45 A)
11	0—085—. . .—24—032	(3,2 A)	F 4/250 G	0—085—400—45—070	(0,45 A)
15	0—085—. . .—24—032	(3,2 A)	F 4/250 G	0—085—400—70—040	(0,70 A)
23	0—085—. . .—24—050	(5 A)	F 5/250 G	0—085—400—70—040	(0,70 A)
31	0—085—. . .—24—090	(9 A)	F 10/250 G	0—085—400—70—040	(0,70 A)
43	0—085—. . .—24—090	(9 A)	F 10/250 G	0—085—401—50—020	(1,50 A)

Rectifier of closed version: 0—085—020—24— . . .
Rectifier of open version: 0—085—050—24— . . .

4.2.6 Failure

1. No output current from the rectifier:
   a. No mains supply voltage
   b. Interruption in AC or DC connections
   c. Rectifier fuse burnt out
2. Rectifier not delivering full voltage:
   a. Low mains voltage, Use 200 Volt terminal

4.3 Protection resistors
The use of protection resistors (see section 10.6, Circuit 1) is recommended to protect the magnet coil against the high induction voltage at disengagement.

5. Installation of brake

5.1 The brake hub must be securely connected to the shaft and safeguarded against axial displacement. Bearings should be placed as close to the hub as possible. The shaft with the hub must be running true with the centre of the brake.

5.2 Brakes are supplied ready for installation, i. e. the air gap is adjusted for minimum travelling distance of the armature plate (see section 6.1.4). After a large number of brake engagements plate wear will occur and the air gap between the armature plate and the de-energized coil body will increase.
The air gap should be re-adjusted before the air gap exceeds the critical value where the power of the magnet is no longer adequate to overcome the spring pressure.

6. Adjustment, assembly and dismantling

6.1 Re-adjustment of air gap to compensate for wear

6.1.1 The magnet coil must be energized to facilitate air gap adjustment.

6.1.2 After the grub screw (6) has been released the support ring (9) can be rotated. If dust protection sleeve is fitted this must be removed.

6.1.3 Insert the resetting key into one of the radial grooves and turn the support ring to the right until the key can be smoothly withdrawn. This automatically resets the correct air gap.
Note: Wet running brakes need a larger air gap which, after adjustment, should be checked with a feeler gauge. The checking operation is carried out with the coil de-energized, and in accordance with following table.

6.1.4 The approx. min. air gap on new or reset brakes should be as follows

Brake size	03	07	11	15	23	31	43
Appr. min. air gap (mm) dry running	0,7	0,7	0,7	0,7	0,8	0,9	1,1
Appr. min. air gap (mm) wet running	1	1	1	1	1,2	1,4	1,7

6.1.5 After completed adjustment the grub screw (6) must be securely tightened.

6.2 Torque setting
If no specific torque setting is requested when ordering, the brake is set for max. torque, i. e. nominal (catalogue) torque plus safety factor.

6.3 Torque adjustment
If required the brake torque can be reduced by removing compression springs at equal spaces. For this purpose the brake must be dismantled.
Caution! The entire spring pressure is held by the cheeseheaded screws when the coil is de-energized.

6.3.1 Dismantling
To dismantle the brake the armature plate is retracted against the coil body by two auxiliary screws (for screw dimensions see table in section 7). The cheeseheaded screws are then relieved of pressure and can be removed. Compression springs can be removed after the auxiliary screws have been released.

6.3.2 When assembling the brake, the armature plate is centered by means of the cheeseheaded screws and the bushes and retracted against the coil body with two auxiliary screws. The plates and the centering ring can now be positioned and secured with the cheeseheaded screws. The auxiliary screws can now be removed and the air gap set as described in section 6.1 to 6.1.4.

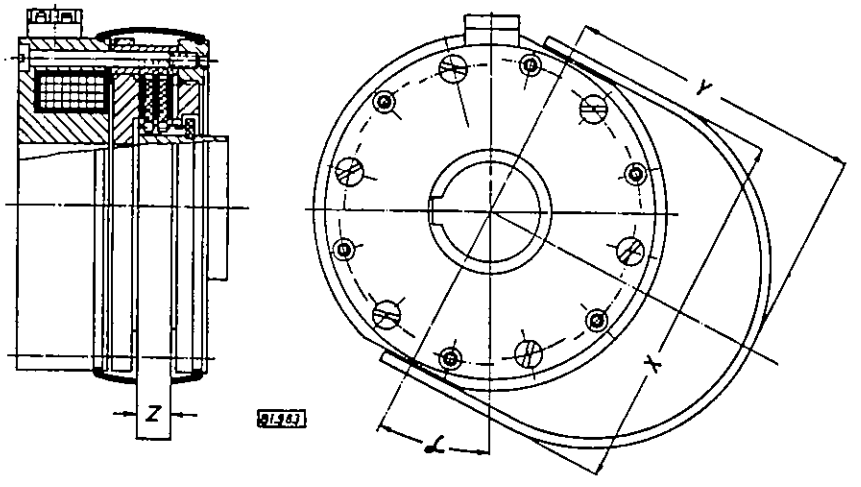
7. Mechanical brake release in the case of power failure

7.1 Mechanical release by jack screws in the centering ring.
Insert two screws into the tapped holes in the centering ring (see Fig. section 1) and tighten them, which presses the armature plate towards the coil body and releases the brake.

7.2 Mechanical release by tensioning screws through coil body.
Insert two screws through the holes in the coil body and engage in the tapped holes of the armature plate. The armature plate can now be retracted and the brake releases.

	Brake size	2 screws to DIN 933 threaded up to head (for 7.1)	2 screws to DIN 933 (for 7.2)
Auxiliary screw dimensions	03	M 5 x 25	M 5 x 40
	07	M 6 x 30	M 5 x 40
	11	M 6 x 35	M 5 x 45
	15	M 8 x 45	M 6 x 55
	23	M 8 x 50	M 6 x 60
	31	M 8 x 55	M 8 x 70
	43	M 10 x 65	M 10 x 80

7.3 **Mechanical brake release by hand lever**
On request brakes for both centering positions can be fitted with hand lever for mechanical release. The lever is acting on the armature plate via to two pressure blocks and rapidly releases the brake.



Size	α°	X	Y	Z
03	29	111	90	12
07	28	127	100	12
11	26	149	120	15
15	27	179	145	15
23	27	206	200	16
31	27	236	265	16
43	26	270	290	18

8. Brake lubrication

8.1 Brakes for dry running must not be lubricated. Bearings etc. in the immediate proximity of the brake must be sealed so that no grease or oil can reach the plates.

8.2 Brakes for wet running should be lubricated in accordance with following data.
For medium speeds use a thin oil with a viscosity of approx. 3,3 °E/50 °C (23,8 cSt/50 °C), e. g. Shell Tellus Oil 127.

At very low or very high speeds an oil of lower viscosity is more suitable, i. e. an oil of approx. 1,56 °E/50 °C (7,0 cSt/50 °C) viscosity, such as Shell Tellus Oil 15.

Normally oil mist or splash lubrication is sufficient. If the brake is running in an oil bath it should not be submerged more than apporx. 1/10 of the inner plate diameter.

9. Operating data

9.1 The brakes are designed for 100 % engagement duration.

9.2 Depending on heat dissipation and cooling conditions a sustained temperature of up to 80 °C is acceptable without risk of damage.

9.3 Rapid and accurate release of the brake requires a DC voltage of 24 Volt (+ 10 %).

9.4 Wet running brakes need a larger air gap because of the SINUS outer plates. This may cause a sligth increase in release time as well as reduce the allowable wear between re-settings. If required this can be counteracted by the use of a temporary higher voltage to release the brake (overexitation).

9.5 If a clutch and a brake are working in conjunction from the same supply circuit, overlap may occur. This can be prevented by delaying the energizing of the clutch as shown in circuit diagram 2, section 10.6.

9.6 To eliminate damage to the switch contacts by spark erosion, it is recommended to use a spark quenching condenser in parallel with the contacts. Following table shows the recommended capacities for different brake sizes.

Condenser size:

Brake size	Condenser model No.	µF
03 to 23	0—085—500—02—000	2
31 and 43	0—085—500—04—000	4

10. Installation and maintenance faults and their rectification

10.1 Brake acting too harshly
The brake torque is too high and should be reduced by removal of a suitable number of springs (Section 6.3).

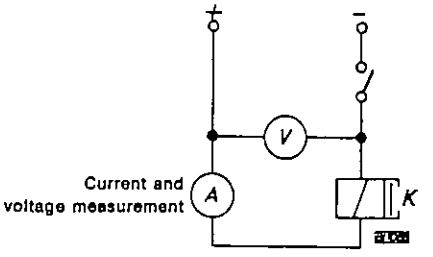
10.2 Idling drag with resulting rise in temperature
The air gap is too small and the plates cannot rotate freely. Reset the air gap as described in section 6.1.4.
In the case of wet running brakes the oil may be too thick or the oil flow may be too high.

10.3 Increased brake release time or overlap with clutch
Check supply voltage as well as current according to the table in section 10.5.

10.4 Brake does not release
Check as under section 10.3.

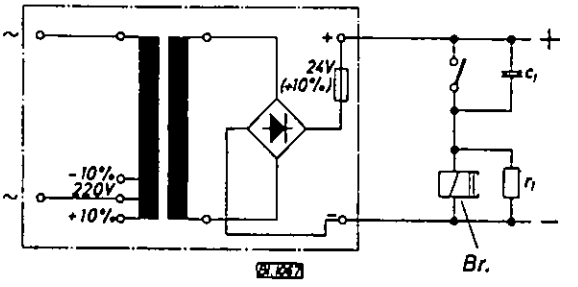
10.5 Ammeter readings in the brake circuit should be as follows:

Brake size	03	07	11	15	23	31	43	
at 20 °C	1,2	1,62	1,84	2,28	4,60	5,35	5,91	Amp.
at 80 °C	0,97	1,32	1,50	1,85	3,72	4,33	4,79	Amp.

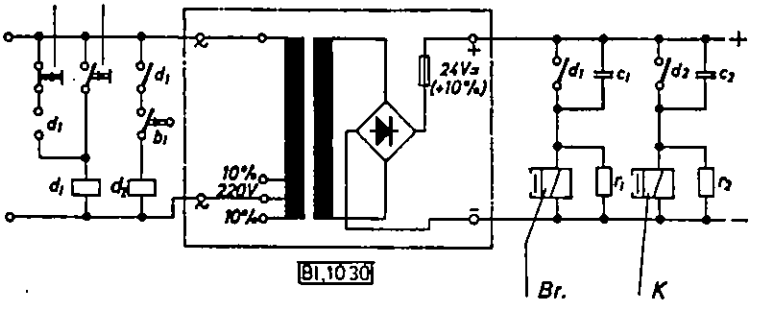


10.6 Circuits

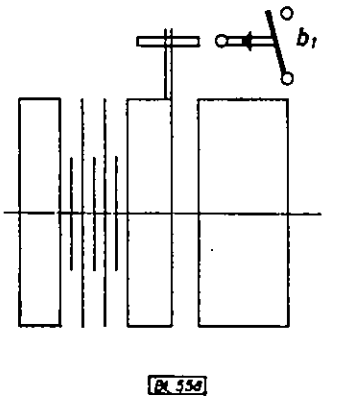
Circuit No. 1
Basic circuit for connecting a brake with wall-mounted rectifier.



Circuit No. 2
Circuit for connecting an electro-magnetic clutch together with a brake.



Brake with micro switch
To prevent the clutch engaging against active brake (more sluggish brake release due to spring pressure), a micro switch is fitted to the brake. When the armature plate moves towards the coil body, the micro switch transmits an impulse to the clutch actuator. (The micro switch can also be replaced by a time relais).



Key to abreviations:
b_1 = limit switch, c_1—c_2 = spark quench condensers, d_1—d_2 = protection resistors, Br = electromagnetic spring-applied multi-plate brake, K = electromagnetic multi-plate clutch.

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