Stromag Dessau
safety in motion

Service Instructions

NFF

Electromagnetic - Double - Face Spring - Applied Brake

These operating instructions are intended to enable the user to operate the Stromag Dessau product safely and effectively, to use it sensibly and to maintain it properly so as to exclude the possibility of any damage or incorrect operation.

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Service Instructions NFF **IP 66**

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Electromagnetic Double Face Spring – Applied Brake

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Contents

1 Technical data

1.1 Nameplate data

The following data is stated on the nameplate (73). It is provided on the front side of the brake.

Series / Size	
Order – Ref. – No.	
Delivery date month /year	
Nominal voltage	V DC
Nominal wattage	W
Nominal current	A
Brake torque	Nm
Connexion on	V AC
Airgap “off” norm.	mm
max.	mm

This data must comply with the identifications of the order acknowledgement.

1.2 Torque, speed, and other technical data

Table 1

size	M_{dyn}	M_{stat}	n_0	n_{zn}	U_n *	P_k	Airgap	W	P_{VN}	J	m
NFF	Nm	Nm	min^{-1}	min^{-1}	V-DC	W	min/max	KJ	kW	kgm^2	kg
2	20	22	5300	3000	103	89,9	0,6/1,0	25	0,080	0,00040	6,3
4	40	44	4900	3000	103	90,7	0,6/1,0	30	0,067	0,00043	10,4
6,3	63	70	4500	3000	103	113,9	0,6/1,2	65	0,103	0,00080	13
10	100	110	4100	2500	103	110,4	0,6/1,2	75	0,110	0,00125	14
16	160	175	3800	2400	103	115,8	0,6/1,2	120	0,124	0,00340	21
25	250	275	3500	2100	103	136,6	0,6/1,2	150	0,149	0,00430	30
40	400	440	3200	1800	103	212,9	0,6/1,3	250	0,170	0,01212	40
63	630	700	3000	1600	103	227,3	0,6/1,5	320	0,249	0,01463	68
100	1000	1100	2800	1300	103	277,6	0,6/1,6	450	0,270	0,04171	85,5
160	1600	1750	2200	1000	103	353,5	0,6/1,6	450	0,325	0,14821	133
250	2500	2750	1900	900	207	367,0	0,6/1,8	700	0,400	0,23515	176
400	4000	4400	1600	**	207	400,9	0,6/1,8	**	0,482	0,43412	278
630	6300	7000	1400	**	207	489,6	0,6/1,6	**	0,601	1,01607	367
1000	10000	11000	1200	**	207	535,5	0,6/1,6	**	0,587	1,56099	491

* other voltages on request

** on request

M_{dyn}	dynamic torque (friction torque, nominal value for working brake) applies to dry operation with an oil- and grease-free friction lining after running-in
M_{stat}	static torque (torque of adhesion)
n_o	maximum idling speed
n_{zn}	nominal switching speed
P_k	excitation output at 20°C
P_{vn}	nominal breaking capacity (S4-40% I.O.)
W	switch work per switching operation for z = 1-5 h^{-1}
J	mass moment of inertia of rotating parts
m	weight
Protection class	IP 66 in accordance with DIN 40050
Mode of operation	S1, S4 - 40% I.O.
thermical class	155 'F' in accordance with DIN VDE 0580
The main parameters are also given on the nameplate	
AC control	via rectifier

The max. admissible speed as well as the other technical data are stated on the dimensional drawing which is binding for the pertinent order and can be inquired at our after-sales service; address is given in chap. 10.3.

1.3 Bore and keyway dimensions, connections

The binding dimensions for the bore, keyway and connections are stated on the dimensional drawing as mentioned in chap. 1.2.

1.4 Application range and utilization as per specification

in docks:
in harbour cranes, container loading facilities for crane, hoisting and trolley travel gears.

Operating conditions:

Protection class IP 66 in accordance with DIN 40050 (VDE 0470). Electrical design of brakes in accordance with DIN VDE 0580 in thermical class 155 (F). The brake corresponds to Directive 93/68/EEC (Low Voltage Directive).
The Directive 89/336/EEC (EMC) must be ensured by the user, taking into account the instructions given by the manufacturer.
The products are marked accordingly.
Mode of operation S1, S4.
Horizontal installation. Vertical operation after consultation with manufacturer.
With the friction combination steel/ organic friction lining the brake may only be used for dry running under the conditions described in chapters 7.1 and 7.3
In addition, compliance with the assembly, dismantling, commissioning and maintenance conditions specified by the manufacturer must be ensured.
Non-compliance with these conditions or any use beyond this shall be deemed use not in accordance with the specification.
The manufacturer shall not be liable for any such use, the risk shall be exclusively borne by the user.

If the brake is to be used outside this contractual scope of operation, contact Stromag Dessau for further details (Address see Chapter 10.3).

2 Safety guidelines

2.1 Symbol for safety at work

This symbol denotes all the safety instructions in this manual which deal with danger to life and limb of personnel. These instructions must be adhered to and particular caution exercised in these cases. All users must be familiarised with the safety instructions.

2.2 Instructions **Caution!**

The term "Caution!" denotes those sections in this manual which require special attention, in order that the guidelines, recommendations and correct procedures are complied with to prevent damaging or destroying the brake.

2.3 Safety instructions for working

The following recommendations are of particular importance:
The brake has been manufactured to the highest up to date standard and is operationally safe. However, the brake can become a risk to safety when used improperly by untrained personnel or for an application it is not designed for.
Every person involved in assembling, disassembling, commissioning, operating and maintaining (inspecting, servicing and repairing) the brake must be authorised, adequately trained and instructed. Each such person must have read and understood this instruction manual, especially in respect to the safety instructions.
We do not accept liability for damage or malfunctioning, resulting from non - adherence to this manual.

Repair and maintenance works must be carried - out by skilled and trained workmen only meeting the minimum requirements for aptitude and qualification according to DIN VDE 1000-10.
Any work process involving the brake which impairs safety is to be avoided.
The user is obliged to inform the supplier immediately of any change occurring to the brake which adversely affects safety; address see chap. 10.3.
The user is obliged to only operate the brake when it is functioning correctly.
Unauthorised changes and modifications which impair safety, as well as the use of non - authentic components is not permitted.
To exclude any danger to people, domestic animals and goods by parts in motion, the user has to take protective measures according to DIN 31000 / VDE 1000.
As protection against hazardous shock currents, the user has to take protective measures according to DIN VDE 0100 - 410 and DIN EN 50274.
To avoid dangerous influences due to heating of the units and in case of a failure, the user has to take suitable protective measures according to DIN 31000 / VDE 1000 and DIN VDE 0100 - 420.
To exclude any danger to people, domestic animals and goods by direct or indirect effect of electromagnetic fields, the user has to take suitable measures according to DIN V VDE V 0848-4/A3.

Caution! In every case the local safety and accident prevention regulations are also applicable, the user must ensure that these are complied with.

We reserve the right to make modifications of a technical nature to this manual if required for brake development.
We recommend that these instructions are incorporated into the service manual of the user (machine manufacturer).

2.4 Electromagnetic Compatibility

The Electromagnetic Compatibility of Equipment Act (EMVG) demands to meet defined protective requirements when using electrical equipment so that this equipment can operate in its electromagnetic environment without mutual impairment of function.
Machine manufacturers, system and plant constructors must assure that the product is installed as required and that the installation of the pertinent current supply is made correctly in order to adhere to the protective requirements of the EMVG.
Please inquire our leaflet "EMC - notes", No. 900 - 00001 at Stromag Dessau GmbH; address as per chap. 10.3.

3 Transportation

3.1 Packing

The type of packing complies with the agreements with the orderer as stated in the order acknowledgement. If no type of packing has been agreed, it depends on the transportation route. The symbols marked on the packing must be adhered to.

3.2 Pre-mounting conditions

The brakes will be supplied completely mounted and with all settings made. The pinion (15) is supplied as a loose part. If a hand lever is required (4) it is loosely attached and has to be mounted.

3.3 Sensitivity

Caution!

Make sure to avoid damage as a result of shocks or impacts during transportation. Special care should be exercised with regard to the radial connecting cable (version without terminal box). For **direct transportation** or assembly of the brake, from size 16 there are threaded bores provided in the coil body (1) for screwing of supporting eyes, see figure 1.

Caution!

The support eye shall **not** be used for transport and for mounting of the unit motor with mounted brake.
Make sure to avoid the generation of condensation water as a result of strong temperature fluctuations.

3.4 In - process stocking

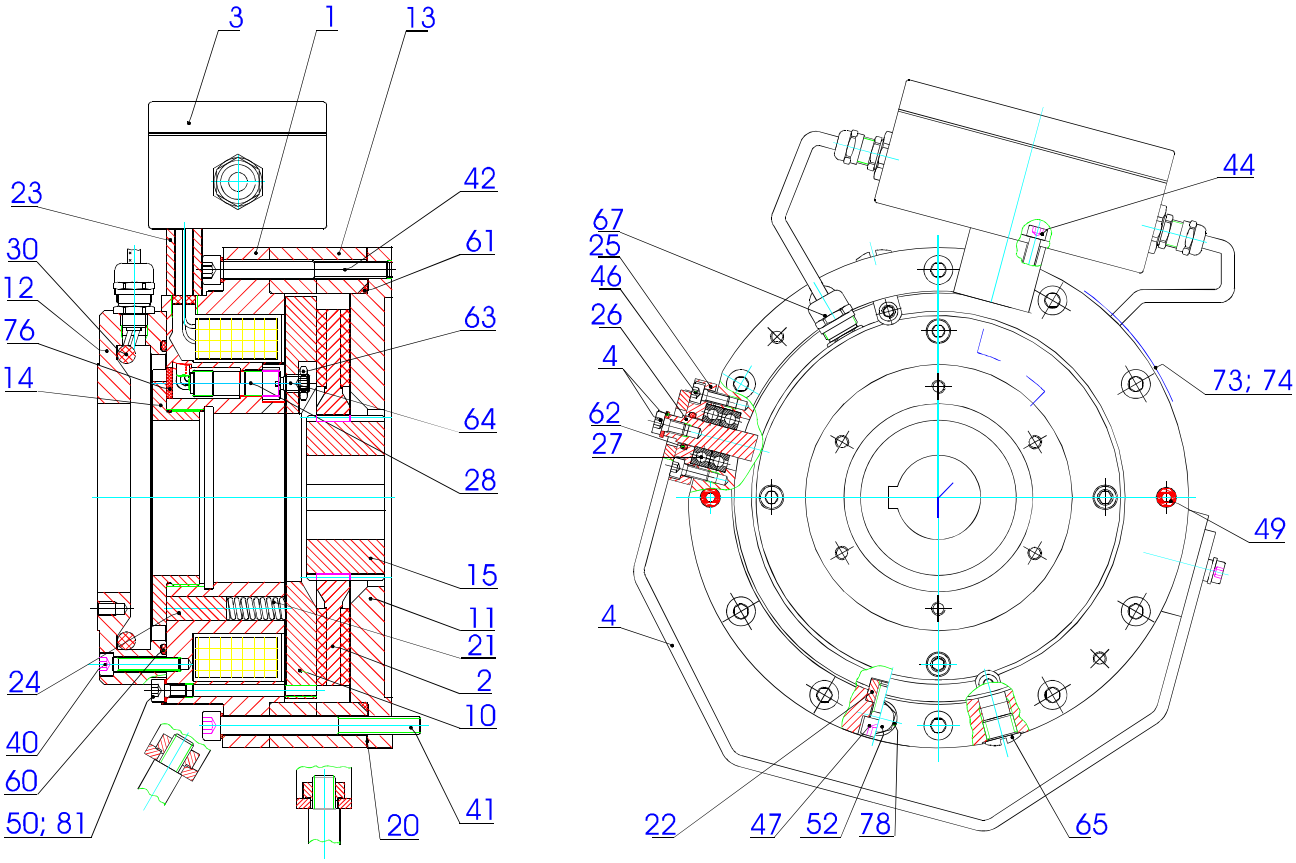
All parts are made of stainless material or are provided with a surface protection by gas nitrocarburizing. In addition they are prined with a zinc phosphate painting.
Bore and keyway of the driving hub (15) are supplied greased.
Should it be intended to stock the brake in - process, another protection against corrosion has to be provided. Please consult our after - sales service (address given in chapter 10.3).

3.5 Delivery extent

On receipt check the consignment for completeness (see packing list).
Possible damage during transportation and/or missing parts must be advised immediately and in writing.

4 Construction, functioning, construction characteristics

Fig. 1



4.1 Designation of individual components
(shown size NFF 16 with option speedometer installation)

1 Coil body with coil
2 friction lining assy.
3 terminal box assy.
4 hand lever assy.
10 armature disc
11 brake flange
12 tacho flange
13 outer body
14 adjusting ring
15 hub
20 shim
21 compression spring
22 locating doc
23 terminal box spacer
24 brass pin
25 hand release end cap
26 hand release pivot pin
27 grooved ball bearing
28 micro switch
30 condensation heater
40 screw for tacho flange
41 brake mounting screw
42 cylindric screw
46 mounting screw for hand release end cap
47 screw for locating dog
49 emergency release screw
50 cap screw for emergency release
52 screw for lockable hand release
60 seal ring for tacho
61 seal ring for brake flange
63 counter nut for micro switch
64 set screw (micro switch)
65 cap screw for airgap measurement
67 gland
73 nameplate
74 metal tack (to mount identification plate)
76 adhesive
78 washer for pos. 52
81 seal ring for pos. 50

4.2 Functioning and design characteristics of the standard version

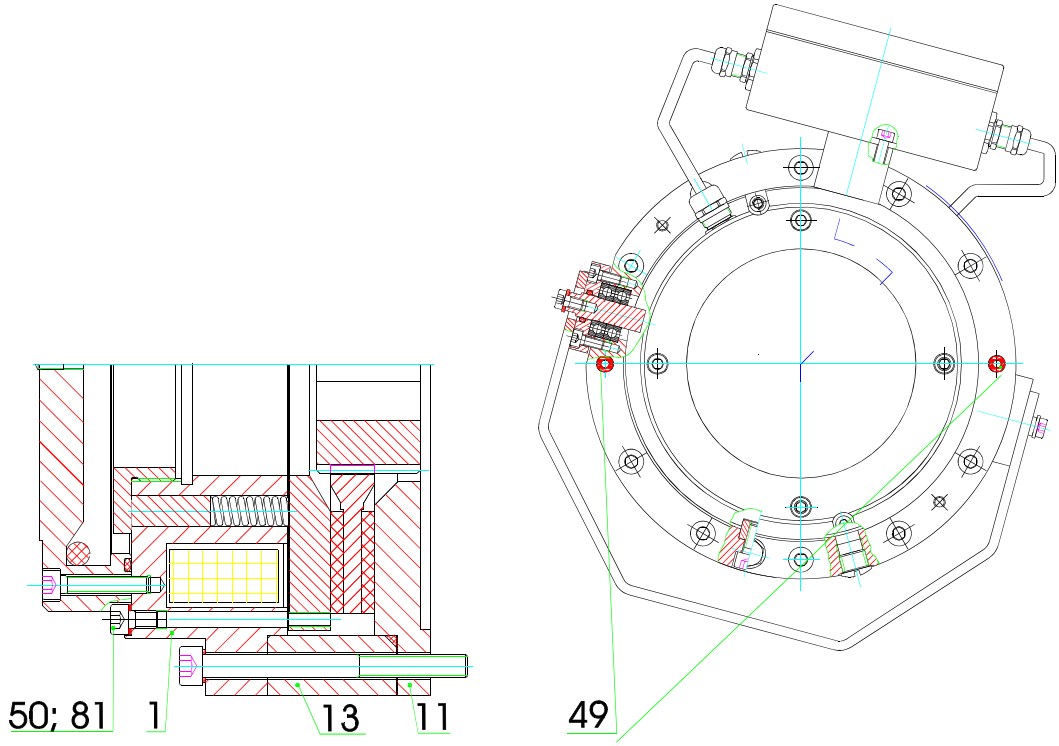
The brake **NFF** is a spring-loaded electromagnetic double-face brake which brakes without current and is released electromagnetically.
The brake type **NFF** meets highest requirements with regard to fatigue strength and robustness and is seawater-proof. The brakes are manufactured and tested in accordance with DIN VDE 0580.
The brake is screwed to a motor or any other machine part by means of cyl. screws (mounting screws pos. 41).

The coil body contains a coil which is potted with a synthetic resin compound in accordance with thermical class 155 (F), (max. limit of temperature 155°C).

If the coil is not excited, the springs (21) press the armature disc (10) against the friction disc (2), which is firmly clamped between the torsion-protected armature disc (10) and the brake disc (11) and thus prevented from rotating. The braking effect is transmitted from the geared friction disc (2) via the hub (15) and a fitting key to the shaft. If the coil is connected to a direct voltage as specified on the identification plate (73), the magnetic force will draw the armature disc (10) to the coil body (1) overcoming the spring pressure. The friction disc (2) is released, the braking effect is cancelled and the brake is released.

4.3 Mechanical release by means of emergency release screws

Fig. 2



1 coil body with coil
11 brake flange
13 outer body
49 emergency release screw
50 cap screw for axial emergency release
81 seal ring

For the mechanical release in case of emergency of the system use red marked screws (49) which have to be removed of its position (coil body (1) – outer body (13) – brake flange (11)) (up to size NFF 10 loosely attached) – up to size NFF 63-2 screws, up size NFF 100 –3 screws).
For release, unscrew the cap screws (50) from the coil body (1). In the now free holes, screw in the release screws (49). The release is made by alternating clockwise turning of the screws until the braking effect is cancelled.

Caution!

The emergency release is self-locking; for normal operation it must be re-turned into the initial position, i.e. the screws (49) are re-turned counter-clockwise. Then re-screw the release screws (49) into the original threaded hole (coil body (1) – outer body (13) – brake flange (11)). Then screw the cap crews (50) into the coil body (1). We recommend to seal the threaded holes with hylomar.

Take care that the seal rings (81) are also re-fitted. This is necessary to assure the full electrical operation and **sealing effect (IP 66).**


Manual emergency release shall **not** be used to maintain temporary operation!

4.4 Mechanical release by means of hand lever (optional)

By pulling the hand lever (4) at approx. 30° towards the back of the brake the armature disc (10) is moved axially until it is lying against the coil body (1) thus the friction disc lining (2) may rotate freely.


Manual emergency release shall **not** be used to maintain temporary operation!

4.5 Current supplies and electrical connections

Make sure that the electrical connection is performed by expert personnel taking into account the installation regulations (such as DIN IEC 92).

The coil has been designed for 100% duty factor and connection to D.C. supply only, given on the identification plate (residual ripple< 0.5).
According to DIN VDE 0580 the permanently admissible voltage change is +5% to –10% of the nominal voltage.
To protect the coil or the power supply unit it is recommended to connect a varistor of the corresponding operating A.C. voltage range and with the required power to the rectifier output.

5 Assembly and dismantling

(individual parts with Item-No. see chap. 4.1)

Caution! The brake must only be operated, maintained and repaired by accordingly authorized, trained and instructed people. Each such person must have read and understood the complete instruction manual and must have been informed in particular about possible risks and danger.

5.1 Assembly

The assembly to the motor is simple, no dismantling of the brake is required.

- Check the connecting dimensions for compatibility with the brake.
- Remove any existing transportation or bearing protections devices, as well as any burr or impact damage.
- Check face run out of the flange mounting surface relative to the shaft to be braked (tolerance class N in accordance with DIN 42955 should not be exceeded).
- Slightly grease shaft and fitting key with assembly paste. Mount pinion (15) and secure it axially.
- Use suitable slings (shackles or equivalent) to move the brake cautiously across the pinion (15) and turn the shaft or swivel the brake to engage pinion teeth with the mating teeth of the friction disc (2). (The friction disc is pre-centered during the final acceptance of the brake).

Caution!

Do not use force! Do not tilt! Pay attention of the cable!

- offer brake onto the motor in the position specified
- tighten the mounting screws (41) to correct bolt tightening torque (as specified on the drawing)
- To prevent mechanical blocking of the stainless steel screws (41) we recommend to grease these screws with Klüber paste HEL 46-54
- Make sure that the electrical connection is performed by expert personnel taking into account the installation regulations (such as DIN IEC 92).

Caution!

When mounting always assure that all seal rings and sealings are properly lying in the accordingly provided positions (IP 66).

5.2 Mounting accuracy

The concentric run of the shaft piece on which the driving hub (15) is fixed as well as the coaxiality and the run - out of the fixing flange must comply with tolerance class "N" of DIN 42955.

5.3 Dimensions, space requirement and mass

The binding dimensions, the mass (weight) and the other technical data are stated on the dimensional drawing which is binding for the pertinent order. This drawing can be inquired at our after - sales service; address is given in chap. 10.3.

5.4 Dismantling

Dismantling is subject to the same instructions and regulations as installation. Carry out the operations in inversed order of succession!

Important note!

Check up: The brake must be torque-free on the output side.
Before removing the brake, disconnect it from the mains and secure with slings.

6 Initial setting into service

(Single parts with item designation as per chap. 4.1)

Before the initial setting into service, the following test measures are necessary:

- As the new friction lining does not yet dispose of optimum friction characteristics, some electric releases have to be carried - out to smooth the friction face pinpoints.
- The electric connection values on the nameplate (73), see chap. 1.1, must comply with the values at site
- The brake must be undamaged, i.e. it must not have any damage generated during transportation, stocking, etc.
- The prescribed service conditions (chap. 7.1) must comply with those ones at site
- Not only the emergency manual release as per chap. 4.3 but also the hand lever emergency release as per chap. 4.4 or 9.3 must not be active.

7 Operation

Notwithstanding any instructions given below, operation of the brake must always comply with local mandatory safety and accident prevention rules. Compliance with these rules shall be ensured by the user.

7.1 Operating conditions

The operating conditions to be maintained for a faultless operation of the brake are given below:

- The operating temperature should not be below **–30°C** and not above **+50°C**.

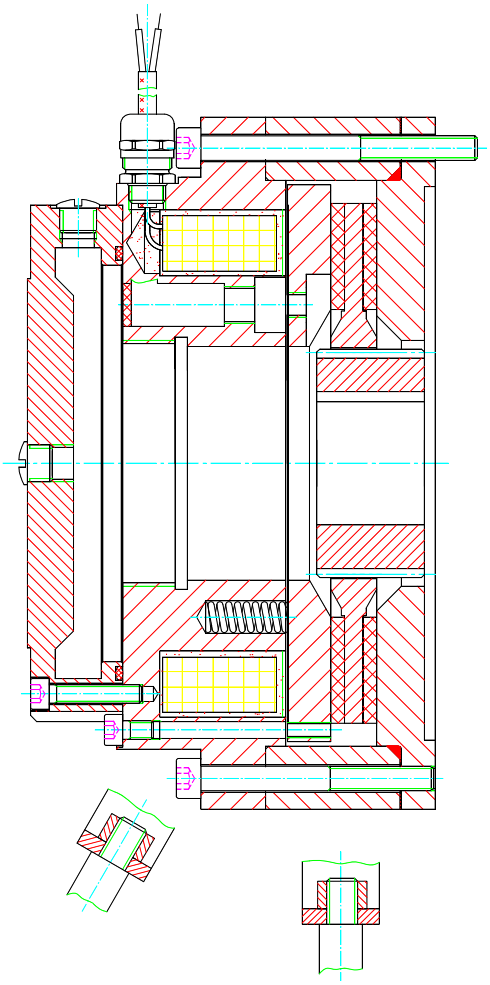
- In the case of higher and/or lower ambient temperatures, please contact our after-sales service (for address see Chapter 10.3).

- Air humidity may be 100%.

7.2 Protection classes

In completely mounted condition and under consideration of the following hints assembled, the brake as standard execution (as shown in fig 3) complies with protection class IP 66, in accordance with DIN 40050 and DIN VDE 0530.
When using original Stromag accessory, such as terminal box, cable glands (see Fig. 1) the type of protection is maintained. The same applies when the speed encoder is rigidly connected to the cover by means of a flange gland which is sealed by round ring.
Sealings of through-shafts (by means of shaft seal ring), reduce the type of protection in relation to the execution. Please consult the manufacturer.

Fig. 3



Important note!

The contact surfaces of the brake to the motor, as well as the surfaces of the "speedometer connection" option shall be sealed with suitable means (e.g. Hylomar or sealing ring) to guarantee the protection class.

The user has to provide a sealing element on the shaft in direction to the motor side in order to prevent the penetration of grease from the motor bearing.

7.3 Duty cycle, switching frequency

The design as well as admissible loads on brakes as per braking torque, speed, switching capacity are given under „Technical Data“ (see Chapter 1) and the dimensional drawing (appendix). If any of these data are exceeded consult the manufacturer.

7.4 Trouble shooting (individual parts with Item-No. see chapter 4)

Störungen	Mögliche Ursachen	Erforderliche Maßnahmen
Insufficient braking effect	Friction surfaces are not free from grease	replace friction disc (2)
	Max. Air gap “off” exceeded due to wear of friction lining	re-adjust brake (chapter 8.3.), if necessary replace friction disc (2)
	Brake not completely run-in	Let brake run in
	Brake has been overloaded	Replace brake
	Spring rupture	Dismantling of brake contact manufacturer
No braking effect	Manual release (4) has been actuated and not re-set	See Chapter 4.3
Brake does not release	Max. Air gap „off“ too large due to wear of friction lining	Re-adjust brake (chapter 8.3.) if necessary replace friction disc (2)
	Friction disc (2) is stuck on pinion (15)	Replace friction disc (2) and pinion (15) (chapter 8.4.)
	Armature disc (10) distorted	Replace brake (chapter 5)
	Coil connecting voltage too low	Check DC voltage supply
	Coil defective	Replace brake (chapter 5)
	Feed line defective	Renew feed line
	Contact points loose	Re-tighten contact points
	foreign particles in the air gap (e.g. spring rupture)	Dismantling of brake, contact manufacturer
when micro switch is used:	Armature plate is not being attracted against the coil body because of:	Re-adjust brake (chapter 8.3.) if necessary replace friction disc (2)
No operational switch indication	- max. air gap has been exceeded	Check position of micro switch under consideration of adjustment procedure of micro switch
	- foreign particles in the air gap	Dismantle and clean the brake

8 Maintenance

8.1 Maintenance and inspection work

 Make sure to comply with Chapter 2 "Safety guidelines" during all maintenance and inspection work.

As the brakes work under varying operating conditions, it is not possible to pre-define wear check, inspection, maintenance and repair intervals.
Higher loads on the brake (e.g. as a result of torque, speed, switching frequency, ambient temperature etc.) require shorter maintenance intervals.
Therefore it is first of all necessary to observe the brake with regard to safety and wear, and then adapt the maintenance intervals in accordance with the observations made.
Wear of the friction lining will result in a greater air gap „off“.
Depending on the load on the brake, the air gap must be checked from time to time. This will be done by measuring the air gap according to chapter 8.2.
If the max. air gap as determined in chap. 1.1. is reached please readjust the air gap described in chap.8.3.

Caution!

If wear re-adjustment is not carried out early enough, both the transmission of the rated load torque and the lifting of the brake will not be ensured.

8.2 Measurement of the air gap

The measurement of the air gap between coil body (1) and armature disc (10) can only be done when the coil is currentless.
The measurement of the air gap must be taken on two places be opposited 180°. Therefore remove the two cap screws (65) in the outer body and control with a finger gauge. The air gap between the armature disc (10) and coil body (1) must be between „off min.“ and „off max.“ described in chap.1.1.
After the measurement the thread hole must be closed with cap screw (65) and sealing ring for protection of IP 66.

8.3 Wear re-adjustment

When the maximum ‘air gap off’ has been reached in brakes (chap.1.1) a onetime wear re-adjustment is possible.

 **Important! Check up: the brake must be torque-free on the output side.**

Disconnect the brake from current.

Proceed as follows (fig. 1)

- Remove the mounting screws (41) and (42)
- dismantle the complete coil body assembly with outer body (13) from the brake flange (11) taking care not to damage armature disc (10)
- remove shim (20) and re-assemble in inversed order coil body assembly and outer body.
- offer brake onto the motor in the position specified
- tighten the mounting screws (41) to correct bolt tightening torque (as specified on the drawing)

To simplify maintenance works the armature disc (10) may be retained in position by using the emergency release screws (49). Ensure these are removed before setting into operation.

Note: If the shim (29) has previously been removed, a new friction disc (2), see chap. 8.4., together with shim (20) has to be fitted.

Attention: On assembling the brake or replacing the friction disc, care should be taken that the linings do not come in contact with grease etc. Greasy substances if any, can be removed by suitable degreasing agents. Never use petrol or paraffin.

8.4 Replacement of the friction disc

Proceed as follows:


Important ! Check up: The brake must be **torque-free on the output side.**

- Remove the mounting screws (41) and (42)
- dismantle the complete coil body assembly with outer body (13) from the brake flange (11) taking care not to damage armature disc (10)
- take the friction disc (2) from the pinion (15)
- clean the brake
- push the friction disc (2) onto the toothing of the pinion (15)
- fit the shim (20)
- mount in inversed order coil body assembly (1) and outer body (13)
- offer brake onto the motor in the position specified
- tighten the mounting screws (41) to correct bolt tightening torque (as specified on the drawing)

To simplify maintenance works the armature disc (10) may be retained in position by using the emergency release screws (49). Ensure these are removed before setting into operation.


The new friction linings on the friction disc will transmit the full braking torque only after a certain run-in period.

9 Variants (optional)

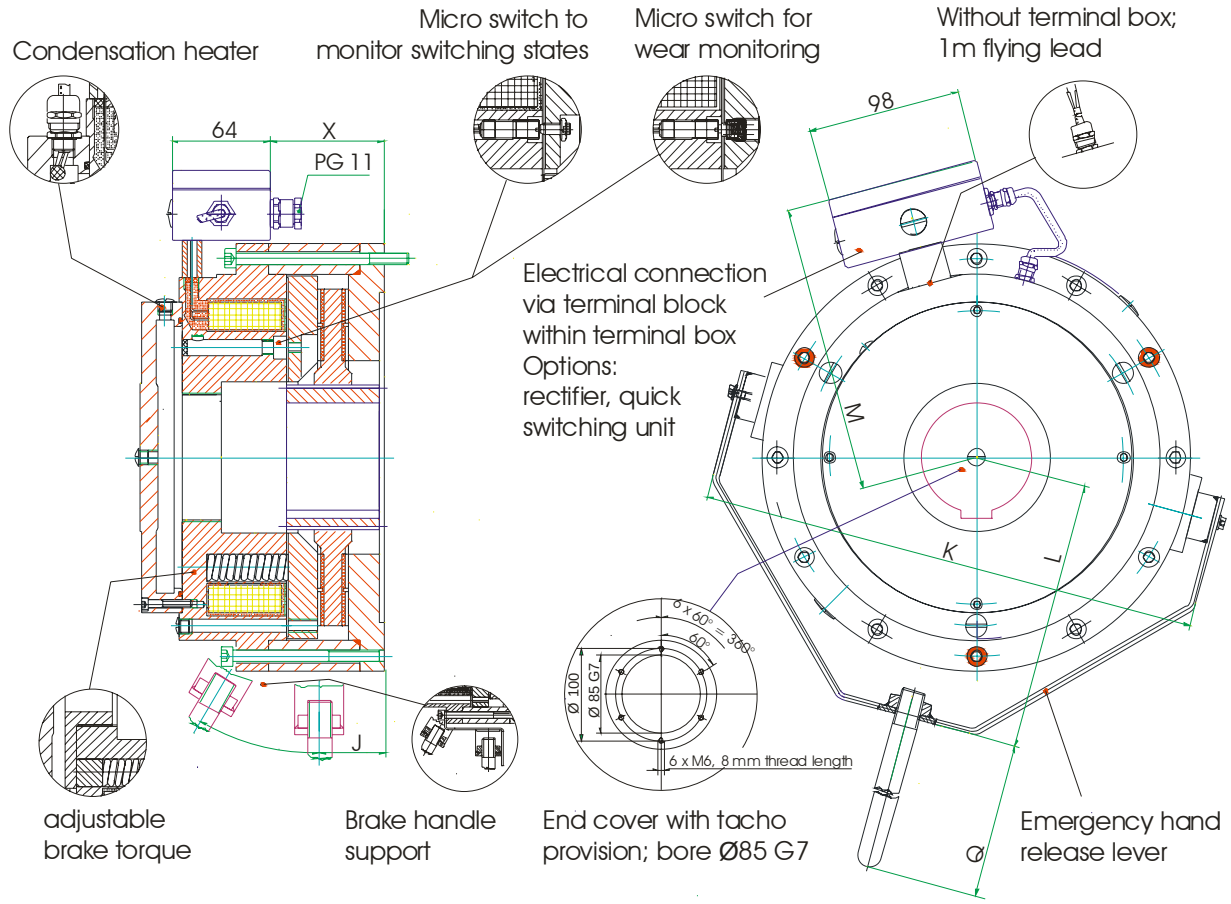


Fig. 4

Brake Size	2	4	6.3	10	16	25	40	63	100	160	250	400	630	1000
M	115.5	128.5	128	125	151	165	179	196	238	260	290	327	364	420
K	179.5	198	201	216	251	276	300	343	408	Refer to Stromag Dessau				
J	20.9	28	29	29	32	39	40	45	54					
L	95	110	110	123	140	150	170	200	220					
X	19	33.75	33.75	38	48	62	83	86	113	125.5	133.5	168	172	182
Q	110	110	110	110	110	150	150	250	500					

9.1 Execution with micro switch

If the switching condition of the brake should be controlled, a micro switch (28) could be used. When the armature disc (10) is moved against the coil body (1) as a result of the electromagnetic force of the coil or the actuation of the mechanical emergency release device, (chap. 4.3), it will operate a micro switch (28) via set screw (64). The micro switch (28) may be included in the control circuit of the motor contactor as a normally open or normally closed contact.

The micro switch is preset in our works and should not require adjustment. If replacement of the micro switch is required this must be done by our agreed procedure (096-701:181)

9.2 Execution with adjusting ring to reduce the brake torque

The torques given in the technical data (chap. 1.1.) were obtained only by fully tightening the adjusting ring (14). By turning the adjusting ring (14) this changes the pre-load of the cylindrical pressure springs (21) and the brake torque is altered accordingly.

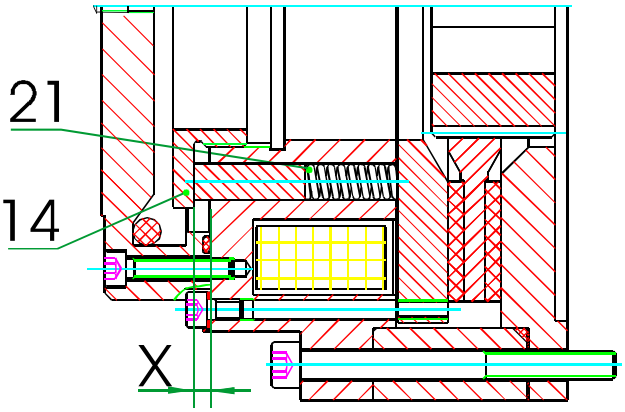


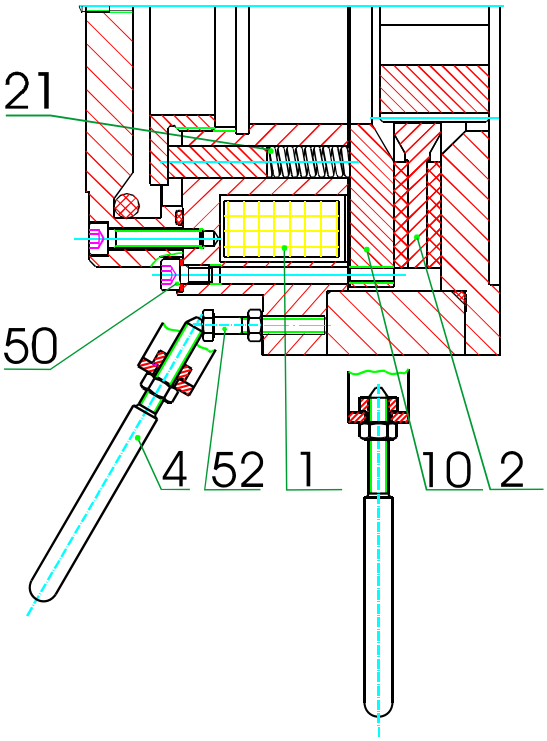
Fig. 5

The table shown here below indicates the dimension X and the respective torque rating.

These are approx. figures only

Brake size	100% X(mm)	90% X(mm)	80% X(mm)	70% X(mm)	60% X(mm)	50% X(mm)	40% X(mm)	30% X(mm)	20% X(mm)	10% X(mm)
2	0	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3
4	0	1.1	2.2	3.3	4.4	5.5	6.6	7.7	8.8	9.9
6.3	0	0.95	1.9	2.85	3.8	4.75	5.7	6.65	7.6	8.55
10	0	1.3	2.6	3.9	5.2	6.5	7.8	9.1	10.4	11.7
16	0	1.3	2.6	3.9	5.2	6.5	7.8	9.1	10.4	11.7
25	0	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3
40	0	0.55	1.1	1.65	2.2	2.75	3.3	3.85	4.4	4.95
63	0	2.2	4.4	6.6	8.8	11.0	13.2	15.4	17.6	19.8
100	0	1.03	2.06	3.09	4.12	5.15	6.18	7.21	8.24	9.27
160	0	1.05	2.10	3.15	4.20	5.25	6.3	7.35	8.4	9.45

9.3 Hand lever emergency with self locking



Optionally the brake can be equipped with a self - locking hand lever release allowing the manual release in case of emergency, e.g. current failure. By pulling the hand lever (4) at approx. 30° towards the back of the brake the armature disc (10) is moved axially until it is lying against the coil body (1) thus the friction disc lining may rotate freely. The handle (4) must be screwed in at this position to operate the locking mechanism. Please ensure brake is fully released. Then screwed out to release.

Please note: the cap screws (50) can be removed and the emergency release screws can be fitted (see chapt. 4.3) to release brake (this is recommended method of brake release).

Fig. 6

Manual emergency release shall <u>not</u> be used to maintain temporary operation!
Please note: this is a Fail Safe Brake and "fails to safety" when there is a power failure. When locking handles are used this disables the Fail Safe system and we do not recommend using them.

9.4 Execution with condensation heater

If strong temperature fluctuations are expected, a condensation heater (30) may be used to prevent the generation of condensation water. A special feed line will be provided accordingly. In case of questions please contact the manufacturer.

9.5 Speedometer installation

If a speedometer connection is required for the brake, the brake is provided with a tacho flange (12) with connecting bores in accordance with „Euro dimensions" (Diameter 85/100).

It is recommended to connect the tachometer or the encoder to the shaft through a plug-type coupling.

Caution!

The type of protection only maintains when the speed encoder is rigidly connected to the cover by means of a flange gland which is sealed by round ring.

10 Spare parts stocking, after-sales service

10.1 Spare parts stocking

Stocking of spare and parts subject to wear is an important precondition for permanent and reliable functioning of the brake.
Friction disc (2), armature disc (10), brake flange (11) and pinion (15) (for item see Chapter 4.1) are parts subject to wear.

Warranty will be provided only for the original spare parts supplied by us. We expressly state that the installation or use of spare parts other than the original ones supplied by us will negatively affect the design characteristics of the brake and thus have an impact on active and/or passive safety.
Stromag Dessau GmbH shall have no warranty obligations for any damage caused by the use of spare parts or accessories other than the original ones supplied by us.
Please bear in mind that often particular manufacturing and delivery specifications exist for parts manufactured by us or bought from others, and that we offer spare parts to the up-dated technical conditions and the up-dated legal prescriptions.

10.2 Data for spare parts orders

Please specify the following details when ordering spare parts:
- Series and size of brake
- article code
- Location and designation of spare part (see chapt. 4.1. and fig. 1)
- Number of pieces

10.3 Address of after-sales service

This is our address for after-sales service and spare parts distribution:

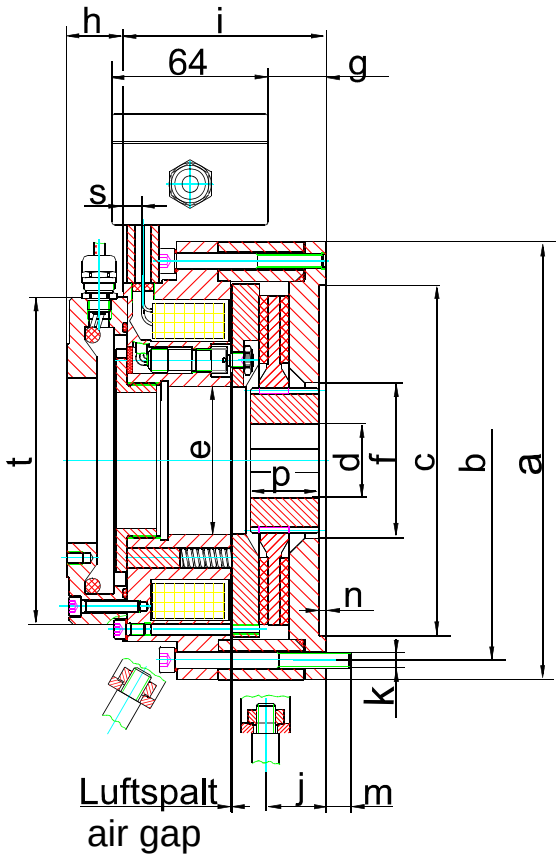
Stromag Dessau GmbH
Dessauer Str. 10
D-06844 Dessau-Roßlau

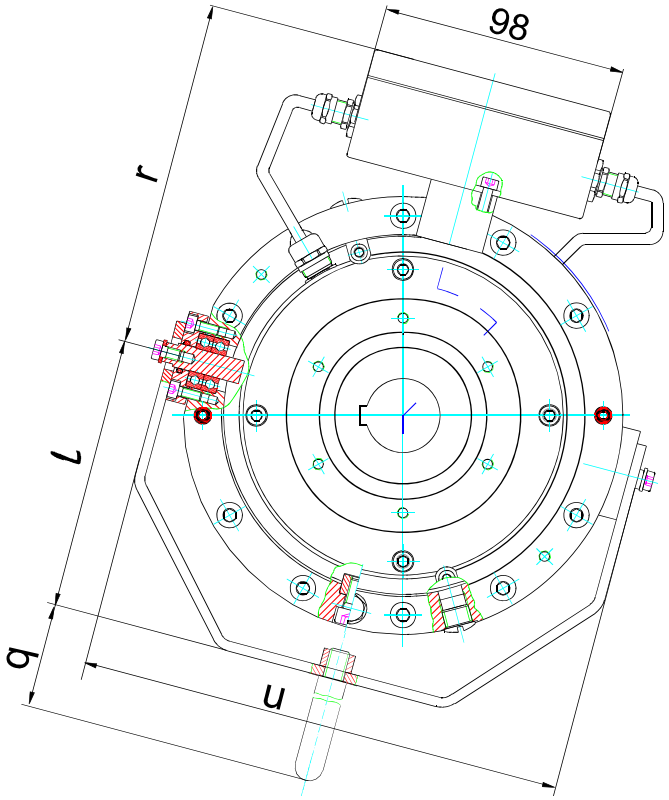
Telefon : +49 (340) 2190-203
Telefax : +49 (340) 2190-201
E-Mail : vertrieb.dessau@stromag.com
Internet : http://www.stromag-dessau.de

If you require a service engineer, please contact our "Technical after-sales service" under the above address.

11 Listed standards and regulations

DIN 6885	Sheet 1 Fitting keys
DIN 40050	(VDE 0470) Protection classes
DIN 42948	Fastening flanges for electrical machines
DIN 42955	Concentricity of shaft ends, co-axial and true running of fastening flanges of rotating electrical machines
DIN IEC 92	Electrical equipment on ships
DIN VDE 0530	Rotating electrical machines
DIN VDE 0580	Regulations for electrical devices
VDE 0660 T 200/09.82,	Section 4.2.4, Table 1 - Inductive load
89/336/EEC (EMC)	Electromagnetic compatibility
93/68/EEC	Low Voltage Directive





Brake size		2	4	6.3	10	16	25	40	63	100	160	250	400	630	1000
Brake torque	Nm	20	40	63	100	160	250	400	630	1000	1600	2500	4000	6300	10000
Nom. speed	min^{-1}	5300	4900	4500	4100	3800	3500	3200	3000	2800	2200	1900	1600	1400	1200
Moment of Inertia B side	kgm^2	0.0004	0.00043	0.00080	0.00125	0.00340	0.00430	0.01212	0.01463	0.04171	0.14821	0.23515	0.43412	1.0161	1.5610
Weight	kg	6.3	10.4	13	14	21	30	40	68	85,5	133	167	278	367	491
Nom. voltage	V DC	103	103	103	103	103	103	103	103	103	103	207	207	207	207
Nom. power	W	89,9	90,7	113,9	110,4	115,8	136,6	212,9	227,3	277,6	353,5	367	400,9	489,6	535,5
Nom. current	A	0,87	0,88	1,11	1,07	1,12	1,37	2,07	2,21	2,70	3,43	357	3,89	4,75	5,2
Air gap norm.	mm	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Air gap max.	mm	1	1	1.2	1.2	1.2	1.2	1.3	1.5	1.6	1.6	1.8	1.8	1.6	1.6
a	mm	150	165	175	190	225	250	270	314	350	440	500	560	650	750
b	mm	135	152	162	175	205	225	250	292	325	418	472	530	620	710
c H8	mm	120	140	140	160	180	200	220	240	270	340	390	460	530	600
d max H7	mm	25	30	40	40	45	50	60	60	80	110	120	130	140	160
e	mm	53	55	55	65	76	78.5	90	96	100	200	215	240	270	300
f	mm	47	80	80	65	80	90	105	120	158	220	255	280	320	330
g	mm	19	33,7	33,75	38	48	62	83	86	113	125,5	133,5	168	172	182
h	mm	30	33	31	26	29	30	32	32	32	33	33	33	33	33
i	mm	73.5	89.6	92.8	95.3	104	121	141	145	168	182.6	191	226	225	265
j	mm	20,9	28	29	29	32	39	40	45	54	On request				
6 screws k	mm	M5	M6	M6	M6	M8	M8	M8	M10	M10	M12	M16	M16	M16	M20
l	mm	95	110	110	123	140	150	170	200	220	On request				
m	mm	10.5	7.8	13	14	14	13	14.2	19.5	19	24.4	21.4	26.3	30	30
n	mm	2.5	2.5	2.5	3.5	3.5	3.5	4	4	5	5.5	5	5	6	6
p	mm	24	28	30	30	35	45	45	55	75	125	130	150	185	210
q	mm	110	110	110	110	110	150	150	250	500	On request				
r	mm	115,5	128,5	128	125	151	165	179	196	238	260	290	327	364	420
s	mm	8.5	10.5	10	10	10	10	10	12	10	10	10	10	10	10
t	mm	123	140	150	146	168	172	184	230	255	270	280	320	340	380
u	mm	179,5	198	201	216	251	276	300	343	408	On request				