

Pressure released and spring operated multiple disk brakes

Series LB

$T_{brakes} = 35 \text{ Nm} - 23000 \text{ Nm}$ (dry operating)

$T_{brakes} = 20 \text{ Nm} - 11500 \text{ Nm}$ (wet operating)

Installation and Operating Instructions

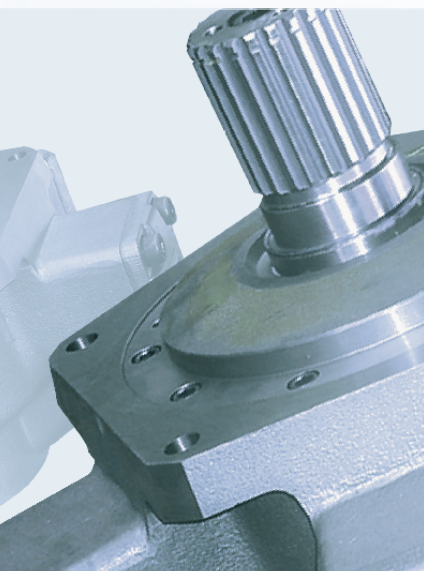


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1 Technical Data

1.1 The following data is embossed on the outer diameter of the brake:

Typ with item number, brake torque, min. and max. opening pressure, year of manufactured

1.2 Torque, speed and other technical data

The brake type and size as well as the occurring torques, the max. admissible speed, the wrench torque of the fastening screws and other technical data are stated on the dimensional drawing which is binding for the pertinent order.

This drawing is attached to the order acknowledgement.

1.3 Bore and keyway dimensions, connections

When using the brake without gear the mandatory dimensions are shown in the drawing as mentioned in chapter 1.2.

1.4 Application range and utilization as per specification



The spring-applied multi-disc brake, by hydraulically released, is designed only to be used in compliance with the corresponding technical data (as per chapter 1.2). It must only be used for the prescribed service conditions (chapter 7.11). The brake can be used as holding brake or as working brake. If the brake is used as working brake to brake torsional motions, pay attention to chapter 7.5.

The instructions for mounting, dismantling, setting into service and maintenance given by the manufacturer must be adhered to.

The non-observance of these instructions or any utilization exceeding these instructions will be considered as „not according to specification“. The manufacturer will not be liable for any possibly resulting damage; the user will bear sole responsibility in such cases.

Should the brake be used outside the contracted application range, consult DÜSTERLOH Fluidtechnik GmbH; otherwise the warranty will no longer apply.

2 Safety Guide Lines

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 Reference Note **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, ser-



vice 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.

Any work process involving the product which impairs safety is to be avoided.

The user is obliged to inform the supplier immediately of any change occurring to the product which adversely affects safety.

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.

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).

3 Transportation

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

3.1 Packing

The type of packing depends on whether the brake is supplied loose, mounted on a motor or on a motor-gear unit.

3.2 Delivery condition

The brake is supplied in mounted condition.

3.3 Sensitivity

Be particularly careful on transportation of the brake in order to avoid damage due to external force or careless loading and unloading. In relation to the type and duration of transportation provide corresponding transportation devices. During transportation avoid shocks as well as the generation of condensation water due to temperature fluctuations.

3.4 In-process stocking

Piston (2) and cylinder (4) are permanently protected against corrosion by a surface refinement. All other parts are provided with a preventive against corrosion. The store for in-process stocking must be dry and not subject to high temperature fluctuations. When properly stored, the spring operated multiple disk brake can be stocked up to 12 months. Should it be intended to stock the brake for a period exceeding 1 year, another protection against corrosion has to be provided. Please consult us.

Caution! The friction faces and the seal running faces must not be treated with any preventive against corrosion.

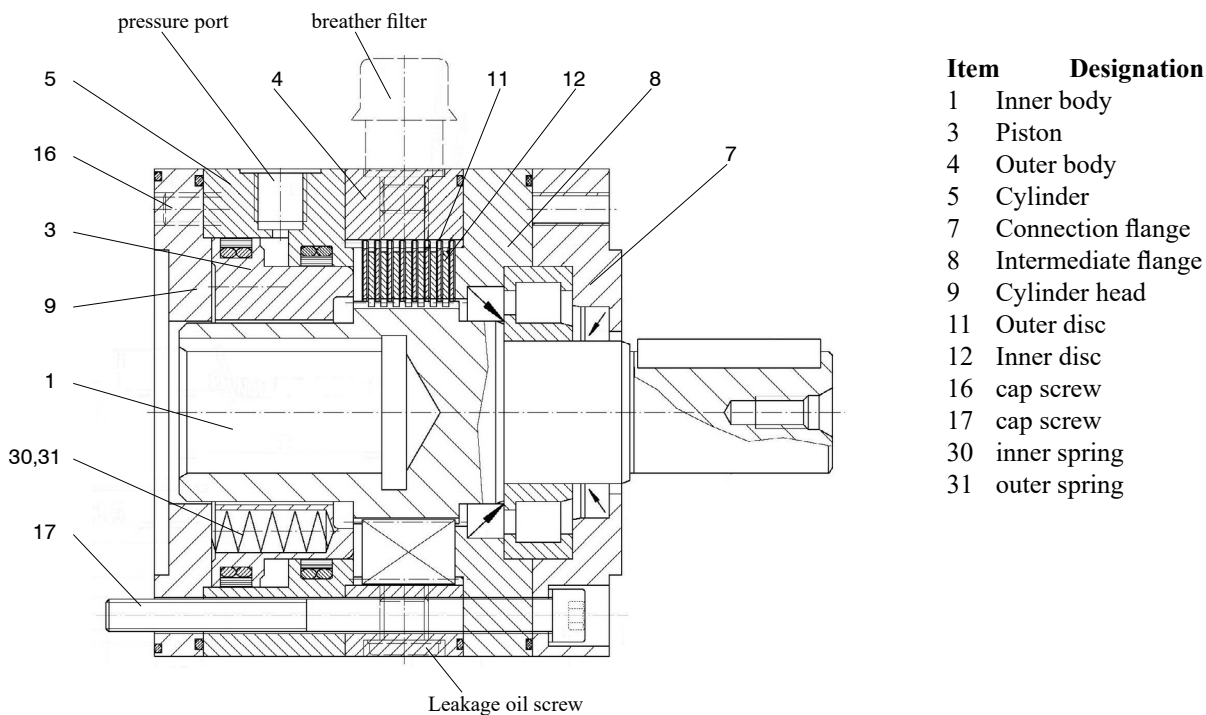


3.5 Delivery extent

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 and constructional characteristics

4.1 Figure with item numbers and designation of the single parts (also spare parts list)



4.2 Functioning and constructional characteristics

The spring-applied multi-disk brake is suitable for dry as well as for wet operation.

The multi-disk brake is actuated by spring force and released by hydraulic pressure.

The pressure springs (30,31) are compressing the outer discs (11) and the inner discs (12).

Thereby a spring-forced locking is achieved between outer body (4) and inner body (1).

Connection flange (7), intermediate flange (8), outer body (4), cylinder (5) and cylinder head (9) are assembled to form an unit by means of the screws (16).

The completely assembled brake is screwed to the machine housing by the screws (17).

The inner body (1) is connected to the shaft, which shall be braked, by means of fitting keys or involute spline.

With actuated pressure oil the piston (3) moves up to limit stop against the cylinder cover (9).

The outer and the inner discs are no longer frictionally connected and the brake is released.

4.3 Supply connections

The brakes are provided with a pressure oil and a leakage oil pipe. The pressure oil pipe for the pressure oil conduct is made as per DIN 3852 sheet 1. The nominal diameters are stated on the dimensional drawing.



The pressure oil conduct for brake opening is connected to the pressure oil pipe. The pressure oil conducts must be short and free from sharp bends or cross section contractions. To protect the brake against inadmissible pressure peaks, a pressure relief valve has to be provided. Place the manometer as close as possible to the brake.



The stated brake torque is only achieved with unpressurized feed line.

When providing an oil leakage pipe, it must be arranged vertically to bottom allowing the leakage oil to drain unpressurized to the oil tank.

5 Assembly and dismantling

(Single parts with item numbers 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

Push the inner body (1) on the shaft end to be braked and secure it axially. Avoid hammer blows. Screw the brake to the component by the fastening screws (17) (wrench torque as per dimensional drawing or VDI-regulation 2230).

When mounting the brake place the leakage oil pipe showing to bottom.

Caution! The brake shall only be exerted to pressure when the fastening screws (17) have been tightened with the prescribed wrench torque!

5.2 Mounting accuracy

The tolerances of shaft extension (on which the inner body (1) is mounted) run out and of mounting flanges must comply with tolerance class „N“ of DIN 42955.

5.3 Dimensions, space requirement and weight

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 is attached to the order acknowledgement and can also be inquired by Düsterloh Fluidtechnik.

5.4 Dismantling

Loosen the supply lines in unpressurized condition. The brake is dismantled in inversed order of succession than the assembly described in chap. 5.1.

Caution! When dismantling the brake, pay at tention to oil outlet.



6 Setting into service

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

Before setting into service check whether the emergency release screws have been removed and the bores are locked by locking screws (18), see chap. 4.3.

7 Operation



Independent from the following hints, the legal safety prescriptions for prevention of accident prescribed for the particular application case apply to the operation of the coupling. The user is held responsible to adhere to these prescriptions.

7.1 Service conditions

The service conditions which are to be adhered to in order to maintain the faultless operation of the brake, are listed below: When using standard sealings, the service temperature must not exceed +100°C and must not fall below -30°C.

When using sealings made of FKM (Viton), operation is admissible in a service temperature range from -20° to +150°C.

In case of any other temperature ranges, please consult us. The relative humidity of the ambient air shall not exceed 50% with 40°C. With lower temperatures higher air humidities are admissible, e.g. 90% at 20°C.

The ambient air should not be polluted strongly by dust, vapour, aggressive gas and fume or salt content.

7.2 Wet and dry operation

With wet operation, i.e. oil in the disc space, the faultless operation depends on the utilization of suitable oils. These oils should be non-ageing and non-foaming, they must assure a good protection against corrosion and their behaviour over against sintered linings must be neutral.

Their additives must not affect the frictional behaviour. Mineral oils with solid additives, such as graphite or MoS₂, are not suitable and must not be used.

The range of viscosity as per DIN 51519 should be within ISO VG 15 to ISO VG 100. If required, please inquire the table of lubricants TM 000.327 from us.

Hardly inflammable hydraulic oils such as HFC, HFB must not be used for lubrication.

Caution! When using the brake in dry operation, oil or grease must not get in touch with the discs, see chap. 8.1. Provide an oil leakage pipe, if necessary, see chap. 4.4.

7.3 Hydraulic oils

To release the brake, preferably use mineral oils to DIN 51524. The ISO viscosity range to DIN 51519 should be within ISO VG 15 to ISO VG 100.

In relation to application, the lubricating oils listed in the table of lubricants TM 000.327 can also be used to release the brake. Inquire that table from us.

Hardly inflammable liquids HFC, HFB must be used only to release the brake. It is necessary, however, to adapt the service conditions to the characteristics of the hydraulic oil.

Therefore we recommend to consult us before using hardly inflammable liquids.



7.4 Filterin

Pay very special attention to cleanness and good filtering in the hydraulic system in order to exclude faulty operation. Recommended filter mesh width: 10 to 25 μm .

7.5 Duty cycle, switching frequency and switching times

When the brake is used as working brake, it is absolutely necessary to determine and select the brake in compliance with the admissible switching work, friction face load, heat accumulation etc.

Please consult us.

7.6 Trouble shooting

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

Trouble	Possible causes	Required measures
Braking effect insufficient	Inner discs not degreased when replaced (for dry operation only)	Degrease the frictional faces (see chapter 8.1 and 8.2)
	Admissible wear exceeded	Replace the disc pack (see chapter 8.2.2)
	Leakage oil pipe not connected or choked (for dry operation only)	With strongly oiled discs, replace the disc pack (see chapter 8.2.2)
	Residual pressure available in the pressure oil pipe for opening of the brake	Check the cause and eliminate the fault
Brake is getting too hot	The min. excessive release pressure for opening of the brake not available	Check by the dimensional drawing (see chapter 1.2)
	Lubricating oil too thick, idle-run heat occurs	Provide lubricating oil as per chapter 7.2

8 Maintenance

8.1 Maintenance and inspection works (Single parts with item designation as per chap. 4.1)

When carrying-out maintenance and inspection works pay attention to chapter 2 „Safety guide-lines“. Because of the varying service ratios it cannot be fixed in advance the exact intervals for inspection, maintenance or repair. Higher charges of the brake (e.g. by torque, switching frequency, ambient temperature etc.) require shorter maintenance intervals.

Therefore observe the brake for its functional safety and adapt the maintenance intervals accordingly (experience). With dry operation, it is absolutely necessary to keep the discs free from grease. Even dry lubricants must not reach the friction faces. Slight greasy spots can be eliminated by a suitable degreasing agent. Leakage oil losses at the sealings cannot be avoided. When no leakage oil pipe is provided, drain the leakage oil losses by loosening the leakage oil screw (18) and catch it. The time intervals for draining the leakage oil losses can only be detected on the basis of proven maintenance intervals.



8.2 Dismantling and mounting the pressure released and spring operated multiple disk brake

8.2.1 Safety instructions for working

Caution! The cylinder cover (9) and the connection flange (7) are subject to high spring pressure! To avoid accidents and resulting hurt and injury, we recommend urgently to ask the manufacturer or an after-sales engineer to carry-out the dismantling.

When it is absolutely necessary to replace the disc pack and/or the sealings, proceed as described in the chap. 8.2.2 or 8.2.3.

8.2.2 Dismantling of the disk brake and exchange of the disc pack (Single parts with item designation as per chap. 4.1) For security reasons, we received around the same time as replacing the seals as complete unit.

Loosen the unpressurized supply conducts, the screws (17) and remove the disk brake.

Loosen the holding screws (16) and remove the cylinder head. Attention: the cylinder head is under high spring pressure. Miscellaneous items, disc pack and all seals remove carefully.

Before re-assembly, the inner body and outer body teeth should be checked for wear.

At switching marks of more than 0,1mm depth toothed parts are replaced.

8.2.3 Assembly of the disc brake

Remove carefully any dust, dirt, chips and other foreign particles. Do not use sharp tools.

Mounting position of the seals observed according to the parts list. To simplify the mounting, the seal rings can be heated to approx. 80°C in oil or water.

Caution! Before continuing with the mounting, the seal rings must cool down to room temperature!

Starting with the connection flange are next the radial shaft seal, cylindrical roller bearing and intermediate flange to mount. Next, the assembly of the outer body is made with the disk set.

Assemble the brake as described in chap. 5.1. Remove the emergency release screws.

Caution! Before installing, the steel plates must both for dry- and wet running necessarily be degreased.

Starting and ending with an outer disk mount the new disk pack. Compare the amount of the removed discs with the to be assembled. Before mounting the inner body align the toothing of the inner disks. After fitting of the seal rings into the keyways, oil carefully the sealing faces and the seal rings by hydraulic oil.

Mount the piston (3) and cylinder (6) with new cylinder and rod seal. Insert the inner and outer spring. Complete the disk brake with the cylinder head and with the two holding screws (16) again to a new unit. Install disk brake as described in chapter 5.1.

9 Spare parts stocking and after-sales service

9.1 Spare parts stocking

To assure the continuous functioning and readiness for operation of the unit, it is necessary to keep on stock the most important spare parts as well as parts subject to normal wear.

Parts subject to wear are the inner discs (12), outer discs (11), seal rings (P1) and cyl. pressure springs.(30,31) (Item numbers as per chapter 4.1).

We only accept liability for the original spare parts supplied by ourselves.

We express clearly that the assembly and/or utilisation of other parts than the original spare parts supplied by ourselves, can change unfavourably the characteristics of the brake prescribed by the construction and that therefore the direct and/or indirect safety can be affected.



For damage caused by the utilisation of not original spare parts and accessories, any liability of the DÜSTERLOH Fluidtechnik GmbH is excluded.

Please bear in mind that often special manufacturing and delivery specifications apply to own as well as to foreign parts and that we always offer spare parts to the up-dated technical conditions and the up-dated legal prescriptions.

9.2 Data for spare parts orders

When ordering spare parts please refer to the spare parts list in chap. 4.1.

The following information is required:	
Order-Ref.-No.	see chapter 1.1
Series and size of the brake	see chapter 1.1
Item and designation of the spare part	see chapter 1.1
Quantity	

10 Listed standards and regulations

The brakes comply with the usual standards and regulations, in particular with:

Titel	DIN	VDI
Screwed plugs and tapped holes	3852	---
Parallel keys and keyways	6885	---
Tolerances of shaft extension run-out and of mounting flanges	42955	---
ISO viscosity classification	51519	---
Hydraulic oils	51524	---
Systematic calculation of high-duty bolted joints		2230





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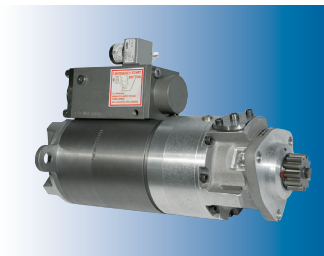
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Düsterloh Fluidtechnik GmbH
Im Vogelsang 105
D-45527 Hattingen

Tel.: +49 2324 709-0
Fax: +49 2324 709-110



e-mail: info@duesterloh.de
Internet: www.duesterloh.de