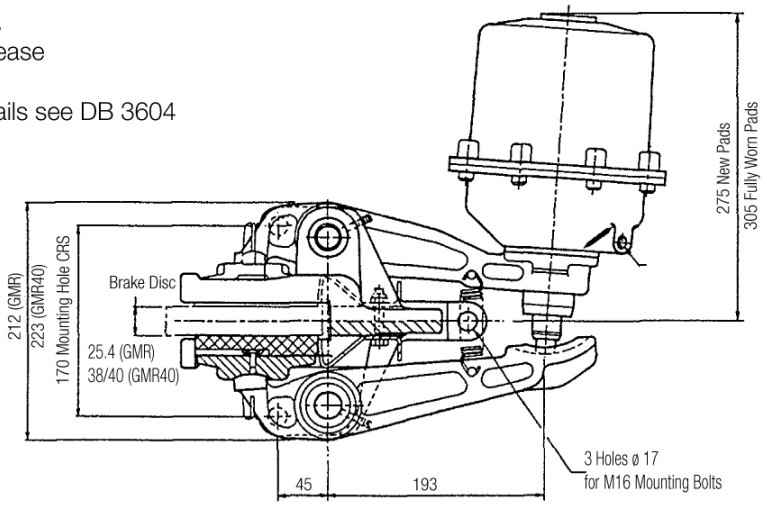
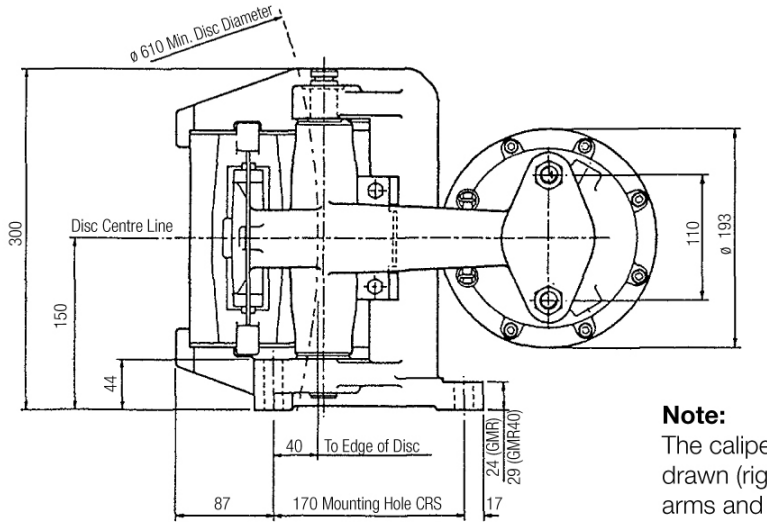
Twiflex Limited

GMR-SH & GMR40-SH Disc Brake Caliper - Spring Applied, Hydraulically Released

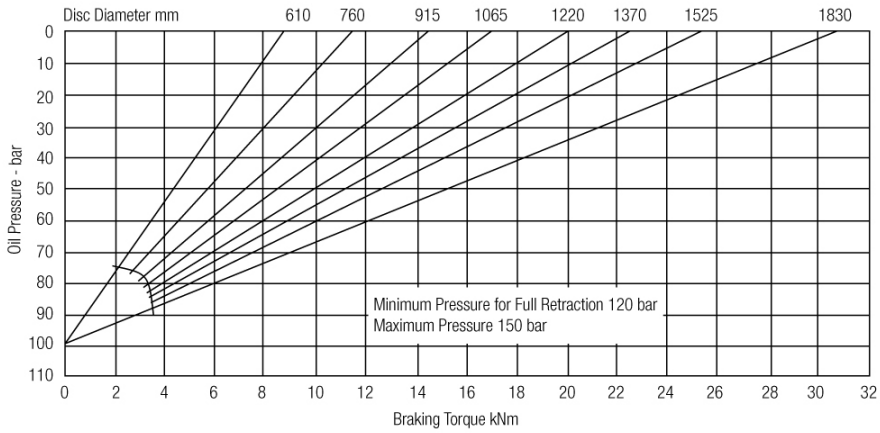
DB4605

Nominal dimensions given.
For specific dimensions please contact Twiflex Limited.
For GMR Mk 2 caliper details see DB 3604





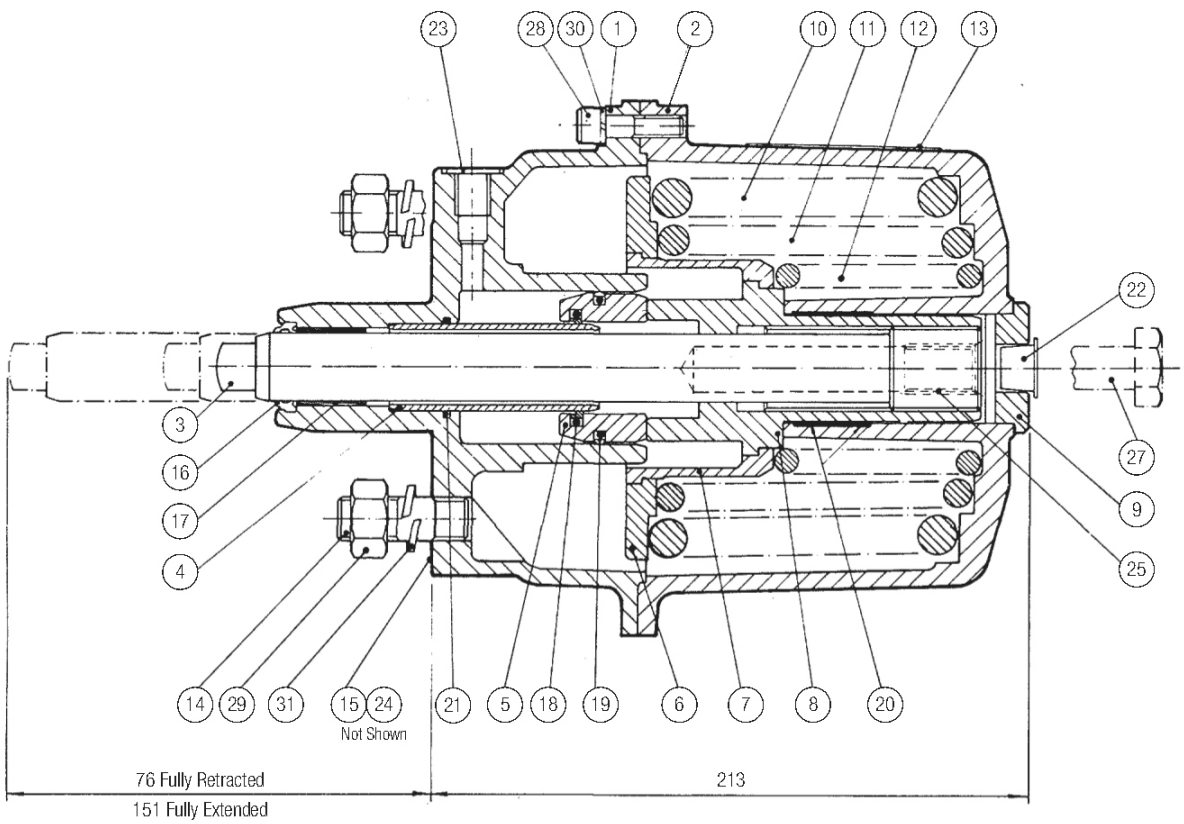
Note:
The caliper may be assembled as drawn (right hand assembly) or with arms and thruster oppositely handed.



The ratings shown on the above graph are based on fully bedded and conditioned brake pads. For bedding in and conditioning procedures see Publication M1060.
Braking Force is defined as the Tangential Force acting on the brake disc at the Effective Disc Radius.
Braking Torque (Nm) = Braking Force (N) x Effective Disc Radius (m)
where Effective Disc Radius = Actual Disc Radius- 0.06

Twiflex Limited

GMR-SH & GMR40-SH Disc Brake Caliper - Spring Applied, Hydraulically Released



Thruster Type-SH

Maximum Displacement Volume 56 ml

Parts List

Item	Component	Part No.	Qty.
1	Front Cap		1
2	Rear Cap		1
3	Push rod		1
4	Barrel		1
5	Piston		1
6	Spring Plate		1
7	Spring carrier		1
8	Sleeve		1
9	Thrust Collar		1
10	Main Spring		1
11	Centre Spring		1
12	Inner Spring		1
13	Label		1
14	Stud		1
15	G 1/4 Plug		1
16	Wiper Seal	6000242	1

Item	Component	Part No.	Qty.
17	Bush	1800372	1
18	Rod Slip Seal	6000491	1
19	Piston Slip Seal	6000492	1
20	Bush	1800376	1
21	'0'-Ring	6000207	
22	Red Cap		1
23	G 1/4 Redcap		1
24	G 1/4 Bonded Seal		1
25	Helicoil Insert		1
26			
27	Retraction Screw		1
28	M8 x 30 Skt. Hd. Screw		8
29	M16 Nut		2
30	M8 Spring Washer		8
31	M16 Spring Washer		2

Twiflex Limited

GMR-SH & GMR40-SH Disc Brake Caliper - Spring Applied, Hydraulically Released

The GMR-SH and GMR40-SH calipers are available in various ratings, as shown on the performance charts. Part numbers are given below. These are typical performance figures for bedded and conditioned brake pads having a friction coefficient of 0.4.

When used with standard Twiflex discs an appropriate 'service factor' should be applied when designing the braking system and in the case of brakes used for holding duties or in wet conditions this should be not less than 2.0.

Marinised versions are available to special order.

A monitoring unit is also available (Part No. 7700212) which is fitted to the back of the thruster. The unit incorporates two microswitches, of which one indicates full retraction of the pushrod (i.e. brake off) and the other indicates the need for adjustment due to pad wear.

Thruster Type	Thruster Part No.	Thruster Weight Kg	Max. Braking Force kN	Retraction Oil Pressure Bar	Caliper Part No.	
					GMR	GMR 40
SH 2.5	7500112	13·9	6	21	6780971	6781006
SH 4·5	7500111	14·7	10·5	38	6780971	6781006
SH 7	7500110	15·7	16·5	59	6780971	6781006
SH 8·4	7500105	16·2	19·5	65	6780971	6781006
SH 11	7500108	17·2	25	92	6780971	6781006
SH 12·9	7500104	18·0	30	100	6780971	6781006
SH 15	7500106	19·0	35	120	6780971	6781006

Installation, Operation and Maintenance

1. Installation

1.1 The caliper must be mounted on a suitably rigid support, upon which braking forces of up to 35kN will be imposed.

1.2 The caliper should be positioned symmetrically with respect to the disc, as shown on the drawing.

1.3 Three fixing bolts are required, M16 grade 8.8. The bolts should be tightened to a torque of 150Nm.

1.4 If the caliper is to be mounted on an inclined surface, the caliper should be fitted with adjustable stop screw and bias springs, included in the inclined mounting kit (Part number 6700554, drawing numbers A11074, A21183).

1.5 Calipers are normally supplied assembled 'right-handed', as shown on the drawing, unless otherwise specified.

1.6 The thruster is normally supplied separately from the caliper, and with the retraction screw fitted to hold it in the 'off' position (see section 2.2) until it has been fitted on the caliper arm. Nuts and washers for this purpose are supplied and should be tightened to 45Nm torque.

1.7 The two ports on the thruster are tapped G 1/4 (1/4" BSP). Either port may be used for the hydraulic supply or blanking plug (15). However the blanking plug should be at the highest possible position to facilitate bleeding. A flexible high pressure (150 bar) hose should be used to connect the thruster to the hydraulic supply to accomodate movement during operation. Only use mineral based hydraulic fluids, (e.g. Shell Tellus 37, or Castrol Hyspin AWS 32). The volume displacement of hydraulic fluid required for 20mm stroke is 32ml. Vegetable based fluids MUST NOT BE USED.

2. Operation

2.1 The brake is applied by the thruster springs and released hyraulically. The required supply pressure varies with the caliper rating and is given on the performance charts. Variable braking torque can be achieved by regulating the oil pressure as shown on the charts.

2.2 Thrusters are supplied with the retraction screw (M16 x 130 part number 5350249) fitted; this is used as a safety screw during assembly and maintenance and as a means of brake release in the event of hydraulic supply failure. The screw is fitted through the thrust collar (9) in the centre of the rear cap and screws into the push rod; adequate access to the back of the thruster is required.

2.3 THE RETRACTION SCREW SHOULD BE REMOVED COMPLETELY WHEN THE BRAKE IS IN SERVICE, and the red plastic cap (22) supplied fitted in the hole. (The brake should be off i.e. pressurised, when removing the retraction screw).

2.4 THE THRUSTER STROKE SHOULD BE MAINTAINED AT ABOUT 20mm BY UNSCREWING THE PUSHROD. To adjust, the brake must be off (i.e. hydraulic pressure on). Pull the caliper arm away from the pushrod and turn the rod as required; one turn gives 2mm adjustment. Release the caliper arm, ensuring that the flats on

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GMR-SH & GMR40-SH Disc Brake Caliper - Spring Applied, Hydraulically Released

the pushrod are engaged in the slot in the caliper arm. (A 17mm A/F spanner will fit the flats on the push rod).

N.B. Keep fingers clear of the space between push rod and caliper arm at all times.

If an inclined mounting kit is fitted, the stop screw should be re-adjusted to maintain equal pad clearance on either side of the disc.

2.5 Pad wear can be monitored by observing the gap between the lugs on the pads pressure plates and the machined surfaces on the caliper frame, when the brake is applied. Pads must be replaced (see 3.2) before the gap is reduced to zero. (The maximum allowable wear on a pad is 10mm).

3. Maintenance

CALIPER

3.1 Ensure that the brake pad and disc remain free from oil and grease. Clean the disc as required. If the pads become contaminated they should be replaced. Carry out any periodic statutory testing that is required, or otherwise check for satisfactory performance.

3.2 Pad replacement is carried out from the rear of the caliper; DO NOT release the spring clips which attach the pressure plates to the caliper arms. With the brake off (retraction screw may be fitted as a safety screw) remove the caliper return springs and the keep plates. If an inclined mounting kit is fitted, remove this also. Withdraw the pads to the rear and lift out. (The hole in the end of the pad retaining plates is provided to assist in withdrawing the pad). Fit the new pads, ensuring that the slotted retaining plate is located around the keep disc on the pressure plate; the pads should slide freely into position. Replace remaining parts. Re-adjust the pushrod, as in (2.4), and the stop screw if fitted.

3.3 The surface of the caliper arm on which the thruster pushrod bears should be kept well greased. The knuckle joints between the caliper arms and the pressure plates should be cleaned occasionally, and a small amount of grease applied; the joints may be levered apart slightly against the pressure of the spring clip.

Occasionally, or if caliper is not operating freely, inject a small amount of grease via grease nipples to lubricate the pivot pins, then rotate pins to distribute the grease. Any grease exuding past the '0'-rings should be wiped off. The pins may be turned by gripping the knurled end at the top of the caliper.

After extended (one million operations or three years) use, the pivot pins should be withdrawn, cleaned, replaced and regreased, or replaced if badly worn.

In order not to damage the 0-ring seals on the pins, use the following procedure. Remove the top circlip, push pin down until the lower circlip and '0'-ring can be removed, then withdraw the pin upwards. To refit, reverse this procedure.

THRUSTER

3.4 Clean the pushrod as required, and inspect hydraulic connections and hoses.

3.5 In the event of leakage or malfunction of the thruster, the following parts can be inspected and replaced if necessary, using the procedures described below, without decompressing the spring pack:-

Piston Seal	(19)
Rod Seal	(18)
Bush	(17)
Wiper Seal	(16)
Pushrod	(3)

Replacement of any other components, such as rear bush (20) and springs, requires the spring pack to be decompressed. This is not covered in these instructions, and should only be carried out by Twiflex or their Agents. If the push rod is damaged, replace it first, as in 3.11. Otherwise proceed as below.

WARNING:- DO NOT ATTEMPT TO DECOMPRESS THE SPRINGS BY UNSCREWING THE RETRACTION SCREW.

Thruster Servicing

3.6 With the brake off, remove red cap (22), insert retraction screw and screw it fully in; finger tight is sufficient. (If the thruster will not retract, the brake should be released using the retraction screw, which should be well lubricated). Disconnect the hydraulic supply and remove thruster from caliper.

The surface of the pushrod should be smooth and free from serious scoring or bruising which could damage the bush. Note that the pushrod cannot be removed while the thruster is dismantled. For removal and replacement of the push rod see 3.11.

Withdraw the screws (28), and remove the front cap (1), and piston (5).

3.7 Leakage of hyraulic fluid may be caused by damage to the piston seals or to the housing. The piston may

be extracted from the front cap by application of low fluid pressure to the inlet port. The piston and rod seals each have two parts, (a P.T.F.E. sealing ring and an 0-ring) which may be extracted using a small screwdriver or similar tool, taking care not to damage the grooves. Once removed the seal should not be re-used.
When fitting a new rod seal (after fitting the 0-ring) the P.T.F.E. ring must be carefully collapsed into a kidney shape (avoid sharp bends), inserted into the internal groove and then expanded into a circle again. Note that the stepped side of the ring is the pressure side (as shown on the drawing). The piston seal must be stretched into position by sliding it up the long taper on the piston. This requires some force; take care not to damage the surfaces of the P.T.F.E. ring.

3.8 The wiper seal (16) serves both to retain grease and to exclude dirt. The section of the pushrod which moves through the wiper seal should be cleaned with a very slight lubricant film.
The wiper seal is of all rubber construction and is easily replaced without tools.

3.9 The bush (17), which is pressed into the front cap, has a number of shallow circular indentations in its surface, which retain grease. The limit of acceptable wear on the bush is 0.2mm, approximately half the depth of the indentations in a new bearing.
A worn bush can be withdrawn (after removal of the wiper seal which may be re-used unless damaged) using a suitable extractor. The new bush, should be pressed in until flush with the base of the wiper seal recess.

3.10 Re-assembly of the thruster is the reverse of dismantling. Seals should be lightly oiled with mineral based fluids to ease assembly and the indentations in the front cap bush should be filled with grease. Tighten the cap screw to 15Nm torque.
After re-assembly, pressurise the thruster and check for leaks. Using the retraction screw to maintain full retraction, refit the thruster to the caliper. Apply hydraulic pressure and remove the retraction screw and replace place plastic cap in its place. Adjust thruster stroke to 20mm as described in 2.4 above.

Push rod removal/replacement Re-Lubrication of Thruster

3.11 With the thruster removed from the caliper (as in 3.6), remove the retraction screw, so that the thruster operates through its full stroke, and the spring load is supported on the front cap. Remove the thrust collar (9) from the rear cap (2). This is a light press fit.

Unscrew the pushrod until it can be withdrawn through the rear of the thruster. Clean and examine the push rod, replace if damaged. Clean other parts.

Re-lubricate the front cap bearing, the internal thread of the sleeve (8), the rear cap bore adjacent to the end of the sleeve, and the threads (internal and external) of the push rod, with grease.

Re-fit the pushrod into the thruster and replace the thrust collar (9) (if it is loose, use a low-strength grade of 'Loctite' to retain it).

Pressurise the thruster, check for leaks and fit the retraction screw. Re-fit the thruster to the caliper. (After removing the retraction screw, replace the red plastic cap into the hole).

4. Recommended Lubricants

4.1 Caliper: Medium grease containing Molybdenum disulphide.

e.g. Castrol LMM
Shell Alvania 2 + M_OS_2

4.2 Thruster: Medium lithium based grease with rust inhibitors

e.g. Duckham's Keenomax L2
Castrol AP 2
Shell Alvania R2

5. Spares

5.1 A spare set of brake pads, and a set of seals, should be kept in a cool, dry, dark place where there is no chance of contamination.

5.2 For caliper spares see Data Sheet DB 3604.

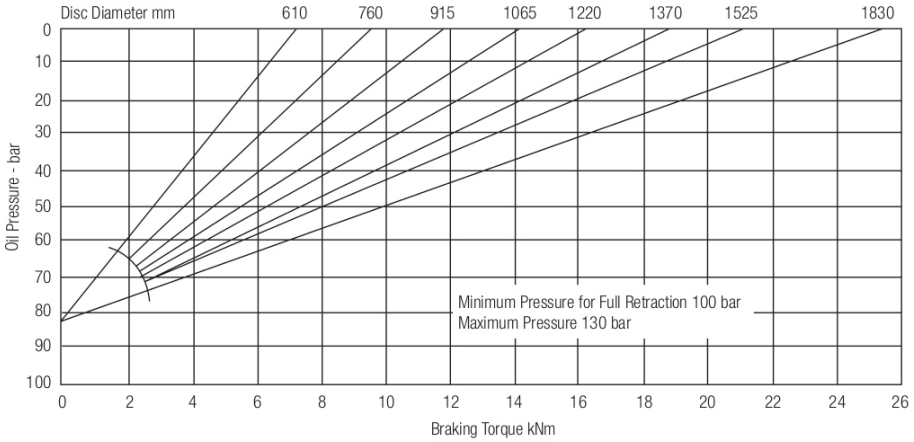
6. Service

Address all enquiries regarding this equipment to your Twiflex agent or direct to Twiflex Limited.

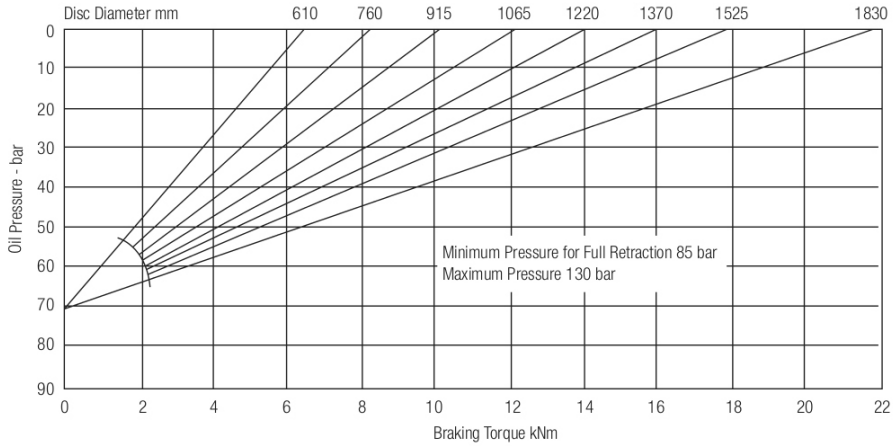
Agent

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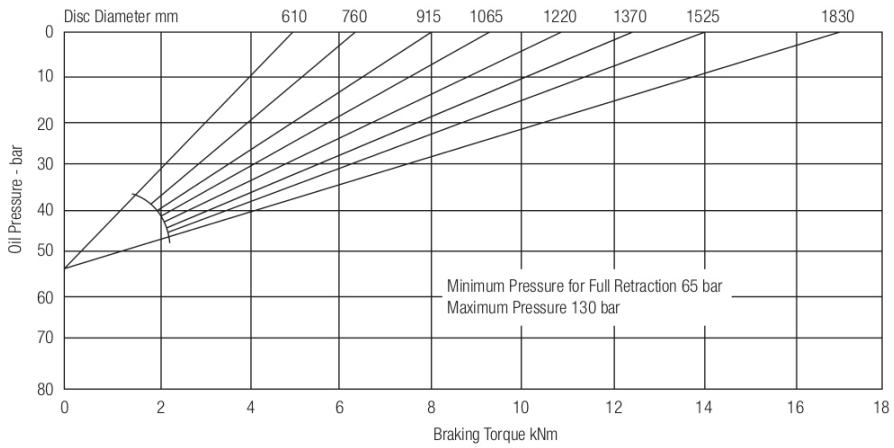
GMR-SH & GMR40-SH Disc Brake Caliper - Spring Applied, Hydraulically Released



Brake performance at 30 kN braking force



Brake performance at 25 kN braking force



1 kNm = 736·6 lbf-ft 1 bar = 14·5 psi

Brake performance at 19.5 kN braking force