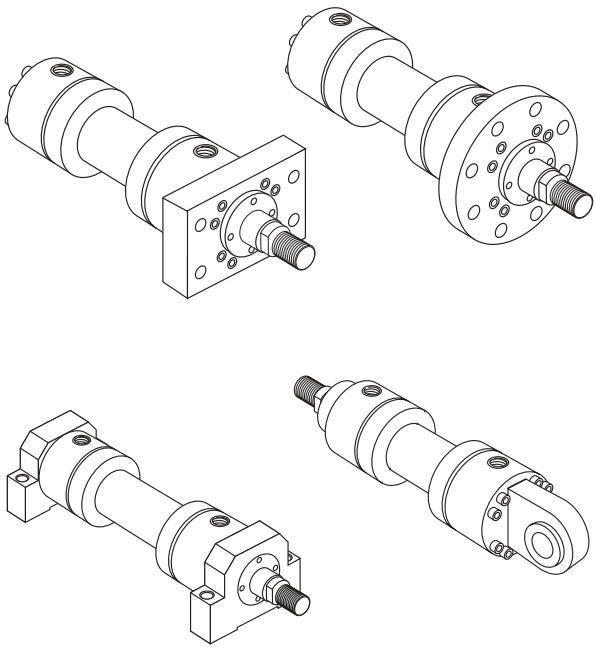
Parker Hydraulics

Bulletin HY07-1215-M2/UK

Maintenance Bulletin MMB Series

Effective : April 2001

Roundline Hydraulic Cylinders



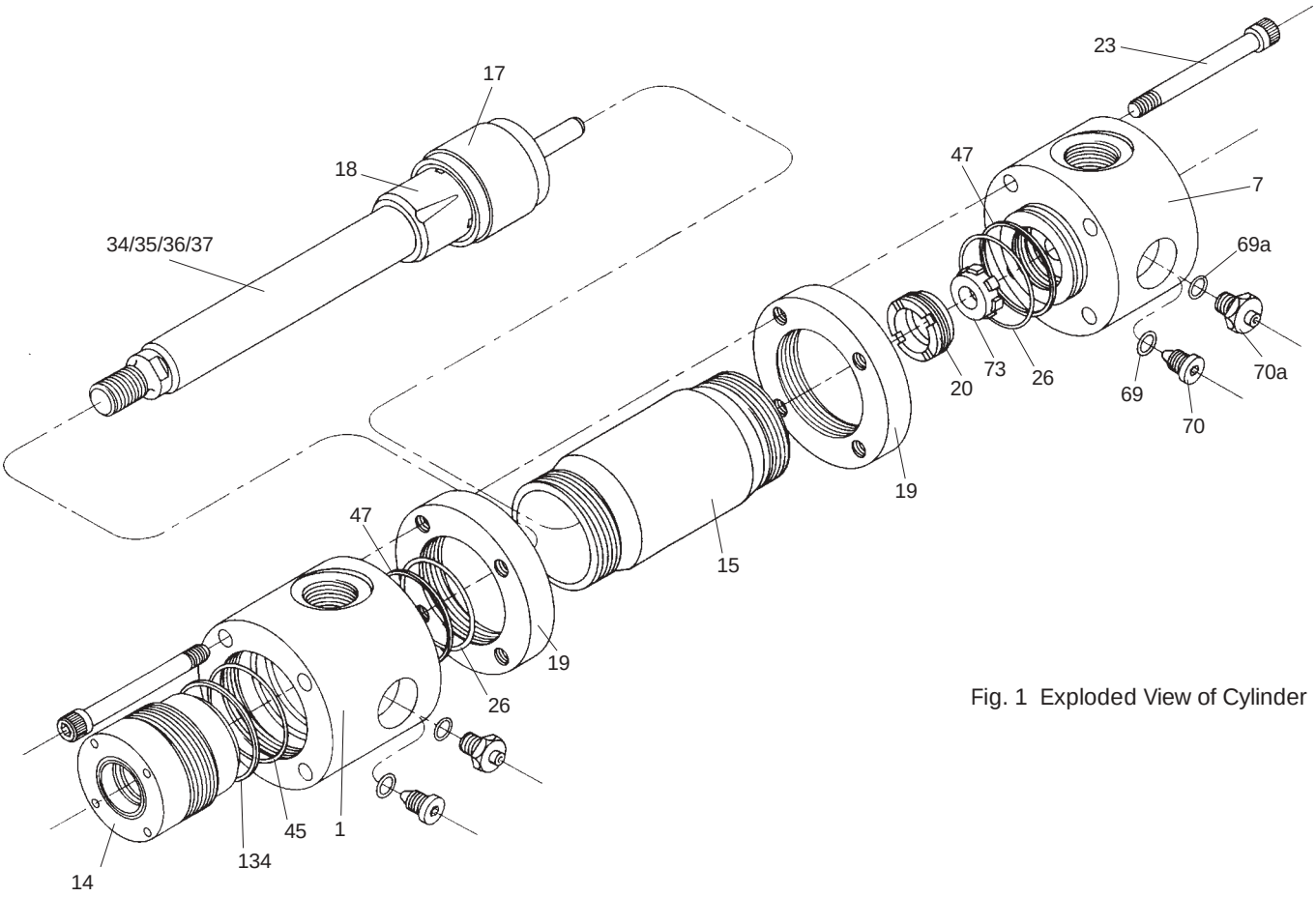


Fig. 1 Exploded View of Cylinder

WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

Parker Hydraulics

Parker Hannifin Plc
Cylinder Division
Watford, Herts.

RG Kits contain a Standard gland cartridge complete with seals – items 14, 40, 41, 45, 134, 140a, 140b
RGL Kits contain a Chevron gland cartridge complete with seals – items 14, 40, 45, 134, 137, 139a, 139b
RK Kits contain seals for the Standard gland cartridge – items 40, 41, 45, 134, 140a, 140b
RKL Kits contain seals for the Chevron gland cartridge – items 4, 5, 26, 30, 31, 32, 33, 34
CB Kits contain cylinder body end seals and back-up washers – items 26, 47
PN Kits contain piston lipseals and cylinder body end seals – items 26, 46, 47, 125, 126, 127
PL Kits contain a Chevron piston locking pin and cylinder body end seals – items 26, 46, 47, 55, 142, 143
Cushion Screw / Cartridge Kits: screw type – items 69, 70; cartridge type – items 69a, 70a

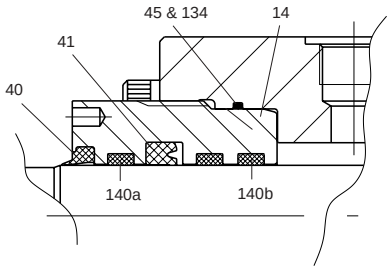

Fig. 2 Standard Gland

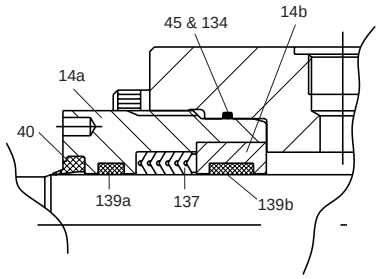

Fig. 3 Chevron Gland

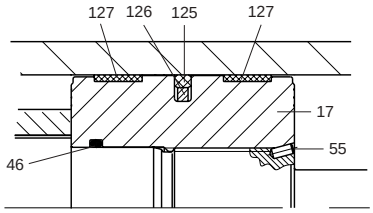

Fig. 4 Standard Piston

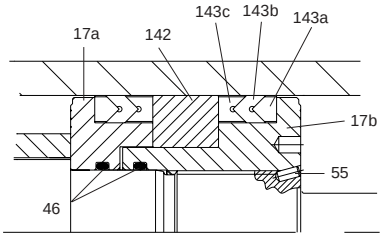

Fig. 5 Chevron Piston

Key (all figures):

1 Head
7 Cap
14 Standard gland
14a Chevron gland
14b Gland bearing
15 Cylinder tube
17 Standard piston
17a Chevron piston – head end
17b Chevron piston – cap end
18 Cushion sleeve
19 Front/rear flange
20 Cushion bush retaining ring
23 Head/cap securing screw
26 O-ring (cylinder body)
34 Piston rod – single rod, no cushion
35 Piston rod – single rod, cushion at head end
36 Piston rod – single rod, cushion at cap end
37 Piston rod – single rod, cushion at both ends
40 Gland wiperseal
41 Lipseal
45 O-ring (gland/head)
46 O-ring, piston/rod (2 off – chevron piston)
47 Back-up washer (cylinder body)
55 Piston locking pin
69 O-ring, cushion needle valve
69a O-ring, cartridge-type needle valve
70 Cushion needle valve
70a Cartridge-type needle valve
73 Floating cushion bush
125 Standard piston seal
126 Energising ring for standard seal 125
127 Wear ring for standard piston
134 Back up washer (gland/head)
137 Chevron rod seal assembly
139a Wear ring for chevron gland
139b Wear rings for chevron gland
140a Wear ring for standard gland
140b Wear rings for standard gland
142 Chevron piston bearing ring
143 Chevron piston seal assembly

Service Kit Numbers for Group 1 Gland Seals

Bore Ø	Rod Ø	RG Kit – Standard Rod Seals & Gland	RGL Kit – Chevron Rod Seals & Gland	RK Kit – Standard Rod Seals	RKL Kit – Chevron Rod Seals
40	22	RG04MMB0221	RGL04MMB0221	RK04MMB0221	RKL04MMB0221
	28	RG04MMB0281	RGL04MMB0281	RK04MMB0281	RKL04MMB0281
50		RG05MMB0281	RGL05MMB0281	RK05MMB0281	RKL05MMB0281
	36	RG05MMB0361	RGL05MMB0361	RK05MMB0361	RKL05MMB0361
63		RG06MMB0361	RGL06MMB0361	RK06MMB0361	RKL06MMB0361
	45	RG06MMB0451	RGL06MMB0451	RK06MMB0451	RKL06MMB0451
80		RG08MMB0451	RGL08MMB0451	RK08MMB0451	RKL08MMB0451
	56	RG08MMB0561	RGL08MMB0561	RK08MMB0561	RKL08MMB0561
100		RG10MMB0561	RGL10MMB0561	RK10MMB0561	RKL10MMB0561
	70	RG10MMB0701	RGL10MMB0701	RK10MMB0701	RKL10MMB0701
125		RG12MMB0701	RGL12MMB0701	RK12MMB0701	RKL12MMB0701
	90	RG12MMB0901	RGL12MMB0901	RK12MMB0901	RKL12MMB0901
160		RG16MMB0901	RGL16MMB0901	RK16MMB0901	RKL16MMB0901
	110	RG16MMB1101	RGL16MMB1101	RK16MMB1101	RKL16MMB1101
200		RG20MMB1101	RGL20MMB1101	RK20MMB1101	RKL20MMB1101
	140	RG20MMB1401	RGL20MMB1401	RK20MMB1401	RKL20MMB1401
250		RG25MMB1401	RGL25MMB1401	RK25MMB1401	RKL25MMB1401
	180	RG25MMB1801	RGL25MMB1801	RK25MMB1801	RKL25MMB1801
320		RG32MMB1801	RGL32MMB1801	RK32MMB1801	RKL32MMB1801
	220	RG32MMB2201	RGL32MMB2201	RK32MMB2201	RKL32MMB2201

Service Kit Numbers for Group 1 Piston Seal Kits and Cylinder Body Seals

Bore Ø	CB Kit Body End Seals	PN Kit Standard Piston Seals	PL Kit Chevron Piston Seals
40	CB040MMB01	PN040MMB01	PL040MMB01
50	CB050MMB01	PN050MMB01	PL050MMB01
63	CB063MMB01	PN063MMB01	PL063MMB01
80	CB080MMB01	PN080MMB01	PL080MMB01
100	CB100MMB01	PN100MMB01	PL100MMB01
125	CB125MMB01	PN125MMB01	PL125MMB01
160	CB160MMB01	PN160MMB01	PL160MMB01
200	CB200MMB01	PN200MMB01	PL200MMB01
250	CB250MMB01	PN250MMB01	PL250MMB01
320	CB320MMB01	PN320MMB01	PL320MMB01

Flange Bolts	
Torque Load (Nm)	Bolt Size
36	M8
123	M12
196	M14
305	M16
595	M20
1030	M24

Service Kit Numbers for Cushion Needle Valves

Bore Ø	Cartridge Type Needle Valve Assembly – Thread Size	Torque Nm	Cushion Needle Valve Kit
40	M8	9-10	70C-M08F-02 Nitrile (-05 FPM) 70C-M10F-02 Nitrile (-05 FPM)
50	M10	25-30	
63	M10		
80	M14	60-65	70C-M14F-02 Nitrile (/05 FPM)
100			
125			
160	Screw Type – Cushion Needle Valve	Not applicable – See page 4	70P-60-ALH/01 Nitrile (/05 FPM)
200	M18	95-105	70C-2MMA-01 (-05 FPM)
250	M27	300-330	70C-3MMA-01 (-05 FPM)
320	M36	456-480	70C-4MMA-01 (-05 FPM)

Service Kit Numbers – Non-Group 1 Seals

The part numbers shown in the tables for piston and gland seals are for Group 1 seals, denoted by the last character of each part number. For Group 2, 5, 6 or 7 seals, substitute a '2', '5', '6' or '7' for the '1' at the end of the number sequence.

How to Order Service Kits

Service kits for Parker cylinders are stocked in all major industrial countries throughout the world. Please contact your nearest Parker office for information and prompt delivery.

Group	Seal Materials – a combination of:	Fluid Medium to ISO 6743/4-1982	Temperature Range
1	Nitrile (NBR), PTFE, enhanced polyurethane (AU)	Mineral Oil HH, HL, HLP, HLP-D, HM, HV, MIL-H 5606 oil, air, nitrogen	-20°C to +80°C
2	Nitrile (NBR), PTFE	Water glycol (HFC)	-20°C to +60°C
5	Fluorocarbon elastomer (FPM), PTFE	Fire resistant fluids based on phosphate esters (HFD-R). Also suitable for hydraulic oil at high temperatures or in hot environments. **Not suitable for use with Skydrol.** See fluid manufacturer's recommendations.	-20°C to +150°C
6	Various compounds including nitrile, enhanced polyurethane, fluorocarbon elastomers and PTFE	Water Oil in water emulsion 95/5 (HFA)	+5°C to +55°C
7		Water in oil emulsion 60/40 (HFB)	+5°C to +60°C

Operating Fluids and Temperature Ranges

The table shows the main types of fluid used with hydraulic cylinders. If the operating conditions of the particular application cannot be met by the groups described, please consult the factory and supply complete application details.

Servicing Cylinder Gland Seals

Fluid leakage from the piston rod at the gland normally indicates worn gland seals. The cylinder should, if possible, be removed for overhaul, or the piston rod disconnected.

Both standard and chevron types of gland seals/wear strips are housed within a removeable gland, threaded into the head of the cylinder. The chevron-type gland employs an additional steel ring, which houses the inner wear strip and clamps the chevron rod seals in place when assembled.

Removal Ref. Figs. 1, 2 & 3

1 Inspect the piston rod to make sure it is free from burrs or damage which would prevent the gland sliding off the rod.

2 Using a suitable face-type pin wrench, unscrew the gland and slide it off the piston rod. Where a chevron-type gland is fitted, the steel ring housing the wear strip may remain on the piston rod and must be removed separately. On certain bore sizes, access to the steel ring can be gained through the head end port, after which the ring can be hooked out from the rod end. Alternatively, the head port may be pressurized using a hand pump, forcing the ring forward sufficiently to allow a hook to be inserted behind it.

3 Remove the seals and wear strips using a sharp pointed instrument, taking care not to damage the gland and steel ring, where fitted.

4 Clean and inspect the gland bore and seal grooves. If any wear is present, replace with a gland cartridge kit containing seals of the correct group – see table above.

Installation Ref. Figs. 1, 2 & 3

Inspect the surface of the piston rod for damage which could cause early seal failure.

When fitting the gland over the rod thread, a slight rotary motion will help prevent damage to the seals. In addition, shim stock or similar thin, tough material can be wrapped around the threads to protect the seal lips.

Standard Gland Wiper/Lip Seals Figs. 1 & 2

1 Ensure that the kit contains seals of the correct group. Lubricate the gland, seals and wear strips, and fit the lipseal (41) into the deep central groove, **with the lip facing the pressure (cylinder) side of gland.**

2 Identify the thinner of the three wear strips (140a), compress it lightly with finger pressure, and insert it into the groove on the outer side of the lipseal.

3 Fit the wiperseal (40) into the groove closest to the outside face of the gland, **with the lip facing outwards.**

4 Lightly compress and insert one of the two identical remaining wear strips (140b) into the inner wear strip groove, and repeat the procedure for the outer wear strip.

5 Each gland cartridge kit contains an O-ring (45) which acts as a seal and torque prevailing lock between the gland and head. This is a static seal, and may be left in place unless faulty. If damaged, the old O-ring and back-up washer (134) – if fitted – should be removed from the head using a sharp pointed instrument, and the groove thoroughly cleaned. Lubricate the replacement parts, and fit the O-ring into the groove, followed by the back-up washer.

6 Ensure that all seals and wear strips are pressed fully into their grooves in the gland. Lubricate the gland and seals and slide onto the piston rod.

Note: In some cases, harder O-rings are supplied in place of the O-ring/back-up washer combination.

7 Using hand pressure, screw the gland assembly into the head and tighten securely using the face-type pin wrench.

Gland seals are pressure activated and do not need adjustment.

Chevron Gland with Rod Seals/Wiper Seal Figs. 1, 3 & 6
Ensure that the kit contains seals of the correct group. Note that the chevron seal assembly comprises a header ring (137a), several chevrons (137b) and a back-up ring (137c), as shown.

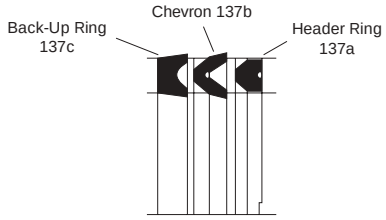

Fig. 6 Assembly Sequence of Chevron Seal Components

1 Lubricate the gland, seals and wear strips.

2 Identify the thinner of the two wear strips (139a), compress it lightly with finger pressure, and insert it into the shallow middle groove of the gland (14a).

3 Fit the wiperseal (40) into the groove closest to the outside face of the gland, **with the lip facing outwards.**

4 Lightly compress and insert the remaining wear strip into the wear strip groove in the separate gland bearing (14b).

5 Referring to figure 6, identify the back-up ring (137c) from the set of chevron seals and insert it into the gland from the cylinder end, closed end first, as shown in figure 3. Insert all the chevrons (137b) in the same manner, **with the lips of the seals facing the inner (cylinder) end of the gland.** When all the chevrons have been fitted, install the header ring (137a) with its angled face against the last chevron, as shown.

6 Each gland cartridge kit contains an O-ring (45) which acts as a seal and torque prevailing lock between the gland and head. This is a static seal, and may be left in place unless faulty. If damaged, the old O-ring and back-up washer (134) – if fitted – should be removed from the head using a sharp pointed instrument, and the groove thoroughly cleaned. Lubricate the replacement parts, and fit the O-ring into the groove, followed by the back-up washer.

Note: In some cases, harder O-rings are supplied in place of the O-ring/back-up washer combination.

7 Ensure that all seals and wear strips are pressed fully into their grooves in the gland and the separate gland bearing. Lubricate the gland, seals, wear strips and ring.

8 Press the gland bearing into the open end of the gland and slide onto the piston rod.

9 Using hand pressure, screw the gland assembly into the head and tighten securely using the face-type pin wrench.

Gland seals are pressure activated and do not need adjustment.

Servicing Cushion Needle Valves

MMB cylinders with bore diameters up to and including 125mm are fitted with a cartridge-type cushion needle valve adjuster – see Fig. 7. 160mm diameter bore cylinders have a screw-type adjuster as shown in Fig. 8, while 200mm diameter bores and above are fitted with the heavy duty cartridge-type adjuster illustrated in Fig 9.

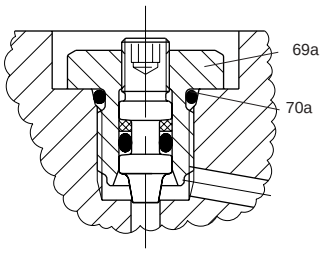

Fig. 7 Cushion Needle Valve – Cartridge Type

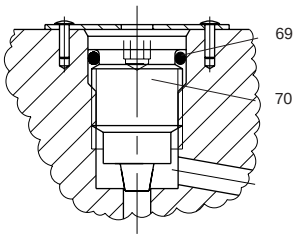

Fig. 8 Cushion Needle Valve – Screw Type

Leakage from cushion needle valves indicates that the assembly must be replaced. The replacement assembly includes a new O-ring.

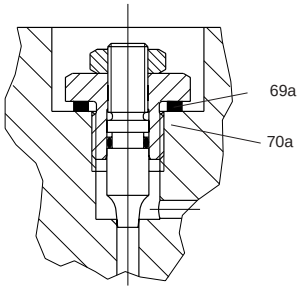

Fig. 9 Cushion Needle Valve – Heavy Duty Cartridge

Removal

1 Where fitted, rivets should be drilled out to allow removal of the protective cover plate.

2 Unscrew the needle valve assembly and clean the mounting hole, paying close attention to the surface on which the O-ring seals.

Installation

1 **Cartridge-type Adjuster (69a)** Lightly lubricate the screw threads and O-ring (70a), and torque to the figures shown in the table. Adjust the hex-headed screw to provide the required cushioning performance. **Note:** on heavy duty cartridge-type needle valves, the lock nut must be released before adjustment and securely retightened afterwards.

2 **Screw-type Adjuster (70)** Lightly lubricate the screw threads and O-ring (69), and thread directly into the mounting hole.

3 Where originally fitted, replace cover plates using the rivets supplied.

Servicing Piston Seals

When a cylinder is overhauled, a new set of piston seals is required. Cylinders should always be reassembled with new cylinder body O-rings and back-up washers (26 and 47). O-rings and back-up washers are available as a CB kit, and are included in the piston seal kits described below.

Removal Figs. 1, 4 & 5

When piston seals show signs of wear, it is likely that the gland seals will also require replacement. If the gland is to be serviced while the cylinder is disassembled, the gland assembly should be loosened, as described on page 5, but left in place to support the piston rod during disassembly.

The cylinder should be removed for overhaul.

1 Remove the hex socket-headed cap screws which secure the head assembly to the front threaded flange, and slide the head/gland assembly from the piston rod. The gland may now be removed from the head and serviced separately, as described on pages 5 and 6.

2 Taking care not to bruise the piston rod against the edge of the cylinder tube, pull the rod/piston assembly from the tube. Prise the cylinder body O-rings from the groove in the head assembly.

3 If the joint between the cylinder tube and cap at the rear flange is to be disturbed, the cylinder body O-ring seal (26) and back-up washer (47) at the cap end should be replaced. Prise the O-ring and washer from the groove in the cap and clean the groove thoroughly.

Standard Piston Seals – PN Kits Ref. Fig. 4

1 Remove the old seals, back-up washers and wear rings from the piston, taking care not to damage the seal grooves. Carefully clean all parts.

2 Examine the cylinder bore and piston for signs of scoring. If either is damaged, it must be replaced.

Chevron Piston Seals – PL Kits Ref. Fig 5

Note: Piston/rod assemblies are accurately trued during manufacture using factory jigs and measuring equipment. Parker Hannifin cannot accept responsibility for any failure or damage that results from reassembly by unauthorised personnel.

1 The chevron-type piston is made in two parts and assembled on the piston rod, with the chevron seals and bearing ring clamped between the two parts. Drill out the locking pin between the piston and rod.

2 During disassembly, the piston rod must be prevented from turning, either by locking the rod end thread or by clamping the piston rod in a soft-jawed vice.

Warning: any damage to the polished surface of the piston rod will lead to early failure of the gland seals.

Using a face-type pin wrench located in the holes in the rear face of the piston, unscrew and remove the outer part of the piston from the piston rod.

3 Noting the quantities and sequence in which the old seals and bearing ring are assembled, remove them from the piston. Remove the exposed O-ring and back-up washer from the piston rod and slide the inner part of the piston from the rod. The second piston rod O-ring and back-up washer may now be removed.

4 With the piston assembly removed from the piston rod, the cushion sleeve should be examined for signs of damage or wear. Note that the cushion sleeve must be free to move on the piston rod.

5 Thoroughly clean and inspect both parts of the piston, the piston rod and the cylinder bore. If any wear or damage is present, the affected parts must be replaced.

Reassembly – Piston and Seals Fig. 1

Standard Piston Seals – PN Kits Fig. 4

PN kits contain a step-cut filled polyamide seal (125), an energising ring (126) and two wear rings (127).

1 Install the energising ring (126) followed by the step-cut seal (125). Position the wear rings (127) in their grooves.

2 Lubricate the cylinder body with light oil and insert the piston.

Chevron Piston Seals – PL Kits Fig. 5

PL kits comprise a bearing ring (142), two each of the chevron header rings (143a) and back-up rings (143c), and a number of chevrons (143b). In addition, a pair of rod/piston O-rings (46) and a pair of cylinder body O-rings (26) and back-up washers (47) are also included. The number of chevrons supplied varies with cylinder bore size.

From the contents of the chevron piston seal kit, identify the chevrons and divide into two equal sets to fit on either side of the central bearing ring. Confirm from the notes made during disassembly (step 3 above) that the correct number of chevrons is available.

1 Ensure that the cushion sleeve is correctly positioned on the piston rod, with its tapered face towards the cylinder's head end, and that it is free to move.

2 Lubricate and install a new rod/piston O-ring (46) to the inner groove on the piston rod, and slide the inner part of the piston over the O-ring until it abuts against the rod shoulder. Lubricate and install the second rod/piston O-ring into the outer groove of the piston rod.

3 During assembly of the piston to the piston rod, the rod must be prevented from turning, either by locking the rod end thread or by clamping the piston rod in a soft-jawed vice.

Warning: any damage to the polished surface of the piston rod will lead to early failure of the gland seals.

4 Note, from figure 5, that the lips of the chevron seals face outwards from the centre of the piston. Lubricate and install, in order, a header ring (143a), chevrons (143b) and a back-up ring (143c) onto the shoulder of the inner piston.

5 Referring to figure 5, repeat step 4 on the outer part of the piston. Slide the bearing ring (142) onto the outer piston until it abuts the back-up ring. Ensuring that the seals and bearing ring do not become dislodged during assembly, slide the outer part of the piston onto the rod and tighten using the face-type pin wrench, until the original locking pin hole between the piston and rod is fully aligned. Drive the replacement locking pin into the pin hole and peen the end to secure.

6 Lubricate the piston and cylinder bore with light oil. Insert the piston into the bore, ensuring that the forward-facing lips of the chevron seals do not become twisted on entering the tube.

Cylinder Assembly Figs. 1, 4 & 5

The cylinder should be reassembled as follows:

1 If the cylinder cap/body joint has been disturbed (see 'Removal', page 7), the body O-ring back-up washer (47), followed by the body O-ring (26), should be lightly oiled and pressed into the groove in the cap, without twisting.

2 Fit the cylinder body, complete with piston and rod, to the cap by 'rocking' it down over the O-ring until the body is in contact with the cap.

3 Insert the hex socket-headed cap screws from the outer face of the cap and tighten in a diagonal sequence to the appropriate torque figure, shown in the table on page 4.

4 When fitting the head/gland assembly over the rod thread, a slight rotary motion will help prevent damage to the seals. In addition, shim stock or similar thin, tough material should be wrapped around the threads to protect the seal lips.

5 Lubricate the cylinder body O-ring (26) and back-up washer (47) and fit the back-up washer, followed by the O-ring, to the head/gland assembly. Lubricate the gland and seals and, taking care not to damage the seal lips, slide the head/gland assembly over the threaded end of the piston rod. Slide the head/gland assembly along the piston rod into contact with the cylinder body and, using a soft-faced hammer, tap around the edge of the head assembly until the body and head are in metal-to-metal contact. Insert the hex socket-headed cap screws from the outer face of the head and tighten in a diagonal sequence to the appropriate torque figure, shown in the table on page 4.

6 If the gland seals have been serviced, the gland assembly will be hand tight in the head – see 'Removal', page 7. Tighten the gland cartridge firmly against the head, using the face-type pin wrench.

Storage

If the cylinder is to be stored before use, the following precautions should be taken.

1 Cylinders should be stored in an upright position, with the piston rod end uppermost.

2 A vapour phase inhibitor should be introduced through both ports. The cylinder should be thoroughly flushed with clean system fluid before being put into use.

Before first use, all seals should be replaced if the cylinder has been in storage for more than five years.

Repairs

For further information or repairs, please contact:

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Fax: 01923 248557
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