

INSTALLATION AND SERVICE INSTRUCTIONS

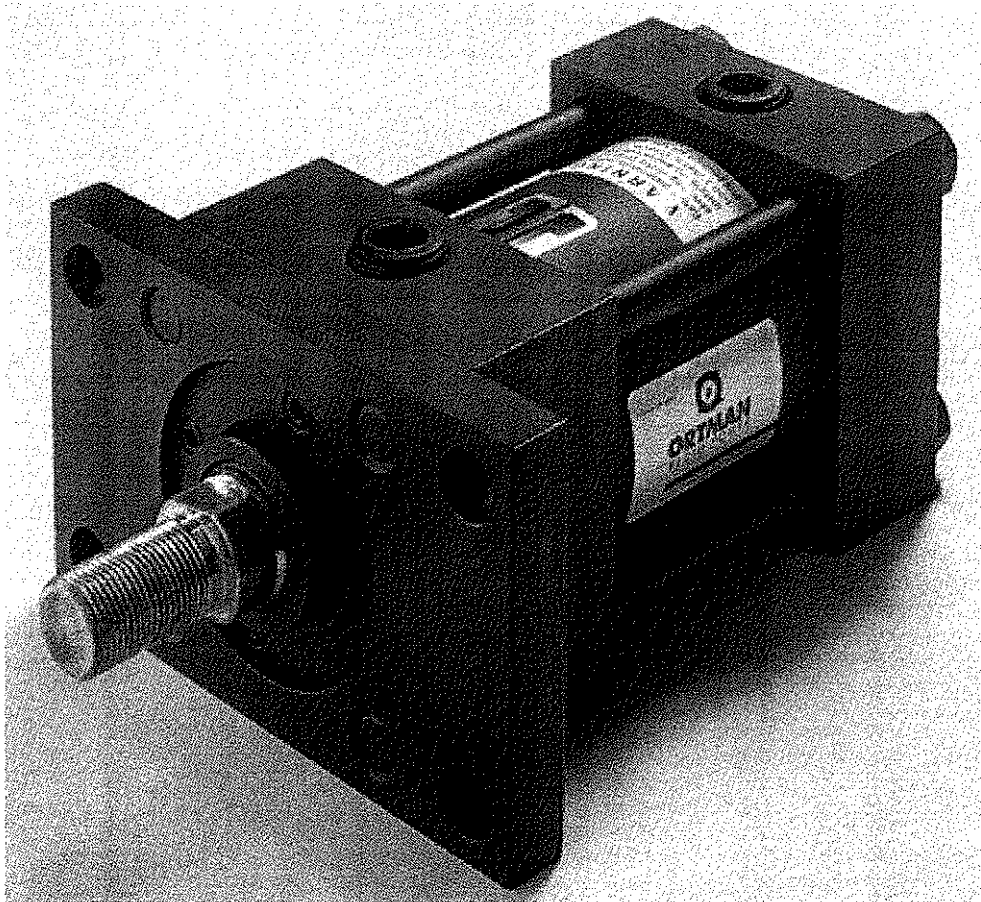
NOTICE

DISASSEMBLY OF
THIS PRODUCT
WILL VOID
WARRANTY

ORTMAN

Series "3TH" Heavy Duty Hydraulic Cylinders

FORM 105-800105
SUPERCEDES 106-780603



CAUTION

CHECK MAXIMUM
OPERATING PRESSURE ON CYLIN-
DER END COVER STAMPING BEFORE
APPLYING PRESSURE TO CYLINDER.
EXCEEDING PRESSURE RATING AS
SHOWN ON THE SERIAL NUMBER
STAMPING OF THE CYLINDER MAY
CAUSE FAILURE WHICH WILL ENDAN-
GER EQUIPMENT AND PERSONNEL.

1.50 TO 20.00 Bores

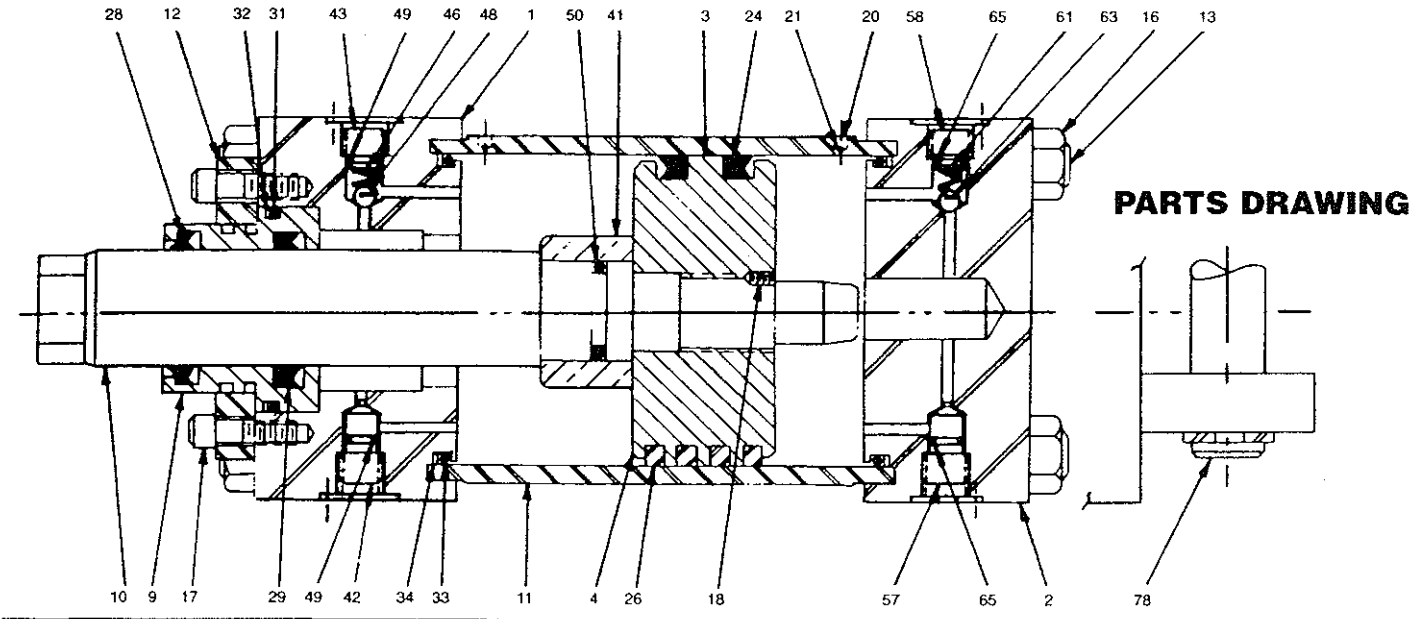
WARNING
READ INSTALLATION SERVICE
INSTRUCTIONS AND GENERAL
PARTS BREAKDOWN BEFORE
INSTALLATION OPERATION, OR
SERVICING



Ortmán Fluid Power

1400 N. 30th Street, Suite 20
Quincy IL 62301
(844) 759-4922
sales@ortmanfp.com

GENERAL PARTS BREAKDOWN INSTALLATION AND SERVICE INSTRUCTIONS FOR SERIES 3TH CYLINDERS



PARTS

ITEM	PART NAME	ITEM	PART NAME	ITEM	PART NAME	USE ITEM	CYLINDERS
1	Head End Cover	21	Bleeder Ball	(1)43	H'D Ball Ch'k Screw	1-34	Non-Cush
2	Cap End Cover	24	Poly U-Cup Piston Pkg.	(1)46	H'D Ball Ch'k Spring	1-50	Cush. H'D End
3	Poly U-Cup Piston	26	SCR Piston Pkg.	(1)48	H'D Ball Ch'k Ball	1-34 &	
4	SCR Piston	28	Rod Wiper	(1)49	H'D N'dle & Ch'k O-Ring	57-65	Cush. Cap End
9	Rod Bearing Cart	29	Rod Pkg. Poly-U Cup	50	Cush. Nose O-Ring	1-65	Cush. Both Ends
10	Piston Rod	31	Rod Cart. O-Ring	57	Cap Cush. Adj. N'dle		
11	Tube	32	Rod Cart. Non-Ext. Ring	58	Cap Ball Ch'k Screw		
12	Cart. Ret. Plate	33	End Cover O-Ring	61	Cap Ball Ch'k Spring		
13	Tie Rod	34	End Cover Non-Ext. Ring	63	Cap Ball Ch'k Ball		
16	Tie Rod Nut	41	H'D End Cush. Nose	65	Cap N'dle & Ch'k O-Ring		
17	Cart. Ret. Plate Screw	(1)42	H'D Cush. Adj. N'dle	78	Clevis Pin Ass'y		
18	Piston Lock Screw						
20	Bleeder Screw						

(1) Not used in 1.50, 2.00, and 2.50 bores with max. rod sizes

KITS

Seal Kits are stocked by our distributors, the factory and satellites

ROD DIA.	RG ROD GLAND KIT INCLUDES KIT RS	RS ROD SEAL KIT
5/8	RG003530010	RS003540010
1	RG003530020	RS003540020
1 3/8	RG003530030	RS003540030
1 3/4	RG003530040	RS003540040
2	RG003530050	RS003540050
2 1/2	RG003530060	RS003540060
3	RG003530070	RS003540070
3 1/2	RG003530080	RS003540080
4	RG003530090	RS003540090
4 1/2	RG003530100	RS003540100
5	RG003530110	RS003540110
5 1/2	RG003530120	RS003540120

ORDERING INFORMATION

- Order standard Seal Kits by appropriate number listed in the table.
- When ordering Viton Seal Kits change last digit to a one (1).

Example:
RG003530011
RS003540011
TS523510001

NOTE: RG and RS Kits are for cylinder bore diameters 1 1/2" thru 8" only. For larger cylinders consult factory.

CYL BORE	TS TUBE SEAL KIT POLYURETHANE PISTON SEALS	TS TUBE SEAL KIT FOR RING TYPE PISTON
1 1/2	TS523511000	TS523610000
2	TS533511000	TS533510000
2 1/2	TS543511000	TS543510000
3 1/4	TS563511000	TS563510000
4	TS583511000	TS583510000
5	TS593511000	TS593510000
6	TS603511000	TS603510000
7	TS613511000	TS613510000
8	TS623511000	TS623510000

KIT NAME	KIT TYPE	ITEM NUMBERS
ROD SEAL KIT	RS	28,29,31,32
ROD GLAND KIT	RG	9,28,29,31,32

KIT NAME	KIT TYPE	ITEM NUMBERS
TUBE SEAL (POLY)	TS	24 (2), 33 (2), 34 (2)
TUBE SEAL (RING)	TS	33 (2), 34 (2)

INSTALLATION AND SERVICE INSTRUCTIONS

3TH CYLINDERS

1. **GENERAL:** The parts drawing on Page 2 shows a complete listing of parts and is applicable to all standard Series 3TH hydraulic cylinders, (1½ thru 8.00 bores only.) (For kits on 10 thru 20 inch bore contact your nearest Distributor). This parts drawing, when used in conjunction with the listed parts and kits, should facilitate the ordering of any replacement parts or kits by specifying; (1) cylinder serial number, as it appears on the name plate; and (2) item number and part name or kit type and name.

2. **INSTALLATION OF CYLINDER:** Standard cylinders are furnished with seals compatible with petroleum base fluids. These seals work best within the temperature range of -40°F. to 200°F. For fluids other than petroleum base, different seal material may have been used. (Contact your nearest Distributor.) (Reference Series 3THT (High Temperature), 3THW (Water), and 3THG (Water Glycols)).

For the cylinder to perform well, it must be properly installed. Alignment of the cylinder with load is most important. Forcing rod, clevis pins, or mounting bolts into position indicates that the cylinder is not properly aligned, and permanent damage may result from such installation.

Protective port covers should not be removed before installing piping, as dirt or other foreign particles may enter the cylinder. All pipe and fittings must be clean before making final connections.

3. **PROCEDURE FOR REPLACEMENT OF ROD SEALS AND CARTRIDGE:**

- A. Disconnect cylinder and drain oil from head end port.
- B. In cases of circular cartridge retainer (12), remove socket head screws (17). In cases of square retainer (12), remove tie rod nuts (16), (See cylinder bore/rod combinations using square retainer, Page 4).
- C. Remove circular or square retainer.
- D. Remove rod bearing cartridge (9) from head (1). To facilitate removal, a screwdriver can be used to pry in the external groove.
- E. Remove rod wiper (28), rod seal (29), rod cartridge O-ring (31) and rod cartridge non-extrusion ring (32).
- F. Reassemble the cartridge with corresponding replacement parts, cleaning all parts thoroughly. Swelling, shrinking, wear, nicks, cuts, and indentations are all signs of defective seals. Such seals should be replaced.
- G. Prior to installation, all rubber parts must be well coated with lubricant. Place the cartridge with new replacement parts on the rod end, and use a twisting motion in starting it onto the rod.
- H. Guide the cartridge over the rod and carefully insert it into the head end cover (1); replace cartridge retainer plate (12) and screws (17). Tighten the screws with a hexagon key. In tightening the socket head screws for circular retainers, use the following torque:

SCREW SIZE NO.	10-32	.25-28	.31-24	.50-20	.62-11
TORQUE (Ft.-Lbs)	6	15	30	130	230

I. Square retainer (re-installation), see tie rod torque, Page 4.

4. **PROCEDURE FOR REPACKING CYLINDERS:**

- A. Disconnect cylinder and drain oil from head and cap end ports
- B. Remove the tie rod nuts (16) and tie rods (13).
- C. Remove cap end (2) and then head end (1). The rod bearing cartridge (9) and cartridge retainer plate (12) will come off with the head end.
- D. Remove piston and rod assembly from tube (11).
- E. Remove cartridge retainer plate screws (17) and rod bearing cartridge (9) from head end (1).
- F. To disassemble piston rod (10), clamp in soft jaws, remove piston lock screw item (18) and proceed as follows:

CAUTION

Both piston types (SCR and POLY U-CUP) are also retained to the piston rod with "Loctite" retaining compound RC-40.

Heat (approximately 500°F. - 550°F. for 30 minutes) must be applied to the piston in order to remove the piston from the rod.

*Registered Trademark Loctite Corp.

NOTE: The piston and rod assembly should not require disassembly unless replacement of pistons (3) or (4), the piston rod (10) or head end cushion nose (41) is required.

- (1) SCR Type Piston
 - a. Heat piston to required temperature
 - b. The piston (4) is threaded onto the piston rod (10) and can be removed once the loctited assembly has broken loose. Use the pin spanner holes provided in the rear face of the piston.
 - c. Remove head end cushion nose (41) and cush. nose O-ring (50) as applicable.
 - d. Remove piston packing rings (26).
- (2) Poly U-cup Type Piston
 - a. Remove Poly U-Cup Packings (24).
 - b. Heat piston to required temperature.
 - c. Loosen piston (3) and remove from the piston rod. Use pin spanner holes provided in rear face of piston
 - d. Remove head end cushion nose (41), and cushion nose O-ring (50) as applicable.

G. Re-assemble each type piston with the corresponding replacement parts, cleaning all parts thoroughly.

CAUTION

Re-assemble piston type (SCR and POLY U-CUP) with the proper grade Loctite as noted above and tighten securely.

NOTE: Assembly with Loctite is per the manufacturer's recommendations.

- H. To disassemble cap end cover (2):
 - (1) Remove end cover O-ring (33) and non-ext. ring (34)
 - (2) Remove ball check screw (58), spring (61), ball (63), and O-ring (65). Note: Some ball checks are not equipped with O-rings.
 - (3) Remove cush. adj. needle (57) and O-ring (65).
- I. To disassemble head end cover (1):
 - (1) Remove end cover O-ring (33) and non-ext. ring (34)
 - (2) Remove ball check screw (43), spring (46), ball (48), and O-ring (49). Note: Some ball checks are not equipped with O-rings.
 - (3) Remove cush. adj. needle (42) and O-ring (49).

5. **CLEANING:** Clean all parts thoroughly. The packings and seals in this cylinder are compatible with hydraulic oils, air and neutral fluids. The cleaning agent must also be compatible to avoid damage to packings and seals. Whenever a particular lubricant is specified for an installation, do not deviate from this specification without checking for compatibility.

6. **INSPECTION:**

- A. Inspect all packings, seals, and non-extrusion rings for swelling, shrinking, wear, nicks, cuts, and indentations. Discard all damaged packings, seals, and non-extrusion rings.
- B. Check and inspect bore of tube for scratches, excessive wear, and any other defect that might damage piston packing or cause piston bypass.
- C. Inspect piston rod for signs of wear, nicks, dents, scratches, or anything that may damage rod packings or rod bearings. Excessive wear on one side of piston rod or rod bearing usually indicates misalignment in installation and should be corrected.
- D. Inspect all remaining items for evidence of damage or wear. In most cases, a little polishing of the various parts will restore them to like-new condition.

7. **REPLACEMENT:** Replace all damaged packings, seals, rod wipers, and non-extrusion rings.

8. **REASSEMBLY:** The procedure for reassembly is essentially the reverse of disassembly. However, the following exceptions and considerations should be noted:
- A. All O-rings should be well coated with lubricant after they are installed in their respective grooves and prior to reassembly with the mating part. Care must be taken when assembling O-rings and packings that they are not damaged, as this will cause leakage.
 - B. Tie rod threads and nut bearing faces should be well lubricated to allow tightening the nuts evenly for proper pre-stressing. To avoid twisting of the tie rods during tightening, hold with vise grip or clamp. To assure equal pre-stressing of the tie rods, first turn on nuts even and snug to align assembly, then the nuts are to be tightened alternately. For proper tie-rod pre-stressing, they should be torqued as recommended:
 - C. On ball check screws not equipped with an O-ring clean threads thoroughly and replace screw using "Loctite" RC-40 retaining compound as a sealant.

Cylinder Bore	1½	2-2½	3¼-4	5	6	7	8	10-12	14	16	18-20
TORQUE											
FT. LB	18	43	93	240	364	530	690	374	1260	690	

9. **TESTING:**
- A. After the cylinder has been completely reassembled, it should be tested, either on a test bench or in the regular installation. Watch for the following as the cylinder is cycled at rated pressures:
 - (1) Rod cartridge leakage.
 - (2) Leakage at end cover O-rings.
 - (3) Leakage at cushion adjusting needle.
 - (4) Leakage at ball check plug.

NOTE: If cylinders are to be stored for prolonged periods, contact Ortman Fluid Power for instructions.

CAUTION

Cushion Adjustment Valve (Identified with C.A. on End Covers)

Cushion adjustment valve is provided for controlling cushioning effect of the cylinder.

It contains a safety feature in that backing off of the screws, leakage will occur prior to thread-disengagement. On later designs the cushion adjusting screws were retained to prevent thread disengagement. Do not continue to turn the cushion adjusting screw if leakage or resistance to turning occurs to prevent the possibility of blow out.

Ball Check Screw (identified with B.C. on End Covers) is not adjustable.

- B. Final adjustment of cushion adjusting needle must be made after cylinder is installed in system, as applicable.

10. Cylinders with the following bore/rod combinations have non-bolted square retainers. Cartridge removal requires removal of tie rod nuts/tie rods:

- A. All Mounts:
 - 1.50" bore with 1.00" rod
 - 2.00" bore with 1.38" rod
 - 2.50" bore with 1.75" rod
- B. Additional Bore/Rod Combinations in "B" and "BB" Mounting Styles Only:
 - 1.50" bore with .62" rod
 - 2.00" bore with 1.00" rod
 - 2.50" bore with 1.00" and 1.38" rods
 - 3.25" bore with 1.75" and 2.00" rods
 - 4.00" bore with 2.50" rod

12. Removability or Rod Cartridge in Style "CC" - Foot Mount

Foot lugs interface with cartridge removal in the following sizes:

- 1.50" and 2.00" bores with all rod sizes
- 2.50" bore with 1.38" and 1.75" rods
- 3.25" bore with 1.75" and 2.00" rods
- 4.00" bore with 2.50" rods
- 5.00" bore with 3.00" and 3.50" rods
- 6.00" bore with 4.00" rods
- 7.00" bore with 4.50" and 5.00" rods
- 8.00" bore with 5.50" rod

"This information should be used as a guide for your consideration, investigation, and verification. This information does not constitute a warranty or representation and we assume no legal responsibility or obligation with respect thereto, and the use to which such information may be put."

WARRANTY—Seller warrants that any product of its manufacture, which upon examination is found by a Seller's representative to be defective in either workmanship or material under normal use and service, will, at Seller's option, be repaired or replaced free of charge including lowest transportation charges but not cost of installation or removal or have the purchase price refunded, provided that SELLER receives written claim specifying the defect within two (2) years or 4,000 hours of use in normal service applications, whichever arrives first after Seller ships the product. Modified or special products shall be subject to special written warranty depending upon application of products. In no event shall Seller be liable for any claims, whether arising from breach of contract or warranty or claims of negligence or negligent manufacture, in excess of the purchase price. ALL OTHER WARRANTIES EXPRESSED AND IMPLIED INCLUDING ANY WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR USE ARE HEREBY DISCLAIMED. The foregoing expresses all of Seller's obligations and liabilities with respect to the quality of items furnished by it and it shall under no circumstances be liable for consequential, collateral or special losses or damages.

NOTE: DISASSEMBLY OF THIS PRODUCT VOIDS WARRANTY