

## 9XXX-8009-XX0 CYLINDERS



**READ THIS MANUAL CAREFULLY BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.**

It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.

### SERVICE KITS

- Use only genuine ARO® replacement parts to assure compatible pressure rating and longest service life.
- RANAXX-XX-XX0 for replacement of the reciprocating assembly (see page 4).
- RKNAXX-BB for general repair of the cylinder (see page 2).

### CYLINDER DATA

<b>Models</b> .....	see "Model Description Chart"
<b>Cylinder Type</b> .....	Aluminum, repairable, square head, double-acting light to medium duty
<b>Bore Sizes</b> .....	see "Model Description Chart"
<b>Stroke Length</b> .....	see "Model Description Chart"
<b>Maximum Air Inlet Pressure</b> ....	250 p.s.i.g. (17.2 bar)
<b>Operating Pressure</b> (pneumatic) .	250 p.s.i.g. (17.2 bar)
<b>Thrust Range</b> .....	Up to 3,142 lbs
<b>Wear Strip</b> .....	standard
<b>Options</b> .....	Cushioned and non-cushioned
	Reed switches

### AIR SUPPLY REQUIREMENTS

ARO Cylinders are pneumatic devices which convert compressed air into linear motion. Cylinders are widely used for such things as: clamping, pushing or pulling motion, product assembly, stamping and tensioning. The product offering ranges from light to heavy duty industrial applications operating on air pressures up to 250 p.s.i.g. (17.2 bar).

### AIR AND LUBE REQUIREMENTS

**AIR PRESSURE: Limited to 250 p.s.i.g. (17.2 bar).**

Proper moisture removal and filtration of contaminants will promote good service life and operation. Install an air regulator to control the operating pressure, insure smooth operation and conserve energy.

### LUBRICATION

ARO pneumatic cylinders are lubricated at the factory. This lubrication should provide satisfactory operation and cycle life. The use of lubricated air will however help to extend the cycle life.

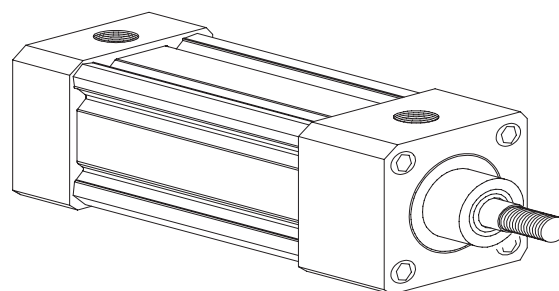


Figure 1

### MODEL DESCRIPTION CHART

**9 X XX - 8009 - XX 0**

#### CUSHIONS

- 8 - No cushions
- 9 - Cushioned

#### BORE SIZE (see note below)

- 15 - 1-1/2"
- 20 - 2"
- 25 - 2-1/2"
- 32 - 3-1/4"
- 40 - 4"

#### STROKE LENGTH

- |         |          |
|---------|----------|
| 01 - 1" | 05 - 5"  |
| 02 - 2" | 06 - 6"  |
| 03 - 3" | 08 - 8"  |
| 04 - 4" | 10 - 10" |

NOTE: Models 9X15-X, 9X20-X and 9X25-X use 5/8" diameter piston rod with 1/2 - 20 UNF - 2A rod ends.  
Models 9X32-X and 9X40-X use 1" diameter piston rod with 3/4 - 16 UNF - 2A rod ends.

### WARNINGS AND PRECAUTIONS

**⚠ WARNING EXCESSIVE AIR PRESSURE.** Do not exceed maximum working pressure which can result in serious injury or property damage. Use an air regulator to limit pressure to the cylinder.

**⚠ WARNING PRESSURIZED CYLINDERS CAN CAUSE INJURY.** De-pressurize the system before cleaning, inspection, re-lubrication, servicing or disassembly to prevent injury from accidental cycling.

**⚠ WARNING PINCH HAZARD.** Keep clear of moving cylinders and fixtures to avoid injury.

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# ARO

**IR Ingersoll Rand**  
Industrial Technologies

## INSTALLATION

Cylinders must only be installed by a competent technician who understands the system requirements, mechanical principles and equipment involved. NOTE: Improper alignment of the cylinder can cause excessive wear on the rod seals. Check rod alignment to the machine parts in both the retracted and extended positions.

- Install the air regulator as close as practical to the cylinder.
- Keep cylinder ports plugged or covered prior to assembly to prevent contamination which can contribute to premature failure.
- Use PTFE tape on the air fittings to prevent leakage.

## OPERATION

Improper application, installation, service or maintenance of ARO Cylinders can cause bodily injury or shortened product life. Contact the ARO Corporation for questions concerning special applications.

### CYLINDER MODELS WITH CUSHIONS

This feature can increase cylinder life. However, it should not be used exclusively to decelerate heavy loads. Cushioned cylinder models are equipped with adjustable needle valves in the end cap(s) for easy, precise adjustment of the cushion effect.

**Theory of Operation:** The cushion seal is a “floating” “O” ring which seals on a cushion boss, a part of the piston assembly. As the cushion boss enters the cushion “O” ring located in the head or cap, the main air exhaust flow is blocked and forced through a bypass passage containing the needle valve. The cushion effect is created by the resulting back pressure. The cushion needle is used to vary the restriction (back pressure) and control the degree of cushioning. Upon application of the air in the opposite direction, the incoming air forces the “O” ring cushion seal towards the inside of the cylinder and acts as a check valve in the free flow direction. Incoming air flows around the o.d. of the seal providing full flow to the piston face with little or no pressure drop for quick stroke reversal.

### CUSHION ADJUSTMENT NEEDLE

- Turn **CLOCKWISE TO INCREASE** cushion effect.
- Turn **COUNTERCLOCKWISE TO DECREASE** cushion effect.

**ADJUSTMENT NOTE:** DO NOT ROTATE CUSHION ADJUSTMENT NEEDLE COMPLETELY CLOCKWISE; Complete shutoff of the cushion adjustment needle valve will prevent the cylinder from completely extending or retracting.

## MAINTENANCE

Periodic cylinder maintenance should be performed to insure maximum service life.

- Clean the air filter / regulator bowl regularly. Relieve system pressure, empty the contents of the bowl and clean or replace the filter element.
- Check the fluid level in the lubricator regularly, replenish with the appropriate air line lubricant.
- Filtered air should be used to operate cylinders. Dirty air will damage

seals and reciprocating parts.

## SERVICE

- Metallic parts should be cleaned with a non-flammable solvent.
- Rubber parts should be cleaned with soap and water.
- Cleaned parts should be rinsed and dried using low pressure air.
- Replace any parts which are worn or damaged. Selected parts and seals are available in repair kit form.
- Lubricate moving parts and seals.
- Do not attempt to disassemble pistons from rods. High heat is required and piston and / or piston rod damage will result.

**NOTE:** Do not attempt to grip the piston rod with pliers or wrenches which can cause scouring. Nicks or scratches on the piston rod will damage the rod seals.

## ASSEMBLY

Verify that all seals are in the correct position and that the rod and piston seals have been properly lubricated with Accrolube or Magnalube grease.

Torque Specifications:

	Female Bolts
1-1/2"	6 ft lbs (8.1 Nm)
2"	10 ft lbs (13.6 Nm)
2-1/2"	10 ft lbs (13.6 Nm)
3-1/4"	20 ft lbs (27.1 Nm)
4"	20 ft lbs (27.1 Nm)

The assembled cylinder can now be tested for leaks and proper operation.

1. Alternately apply 90 p.s.i.g. (6.2 bar) air pressure to each of the cylinder ports and test for internal leaks across the piston and external leaks at the barrel seals and the rod seal.
2. Test for proper cycling at 20 p.s.i.g. (1.4 bar) supply.

## SEAL KIT

<b>RKNA X X - B B</b>	
<b>BORE SIZE</b> Q - 1-1/2" S - 2" T - 2-1/2" W - 3-1/4" 4 - 4"	
<b>ROD DIAMETER</b> K - 5/8" M - 1"	
<b>SEALS</b> B - Nitrile	
<b>CUSHIONS</b> B - Cushions both ends	
NOTE: All seal kits include wear strips and cushion seals.	

## PARTS LIST

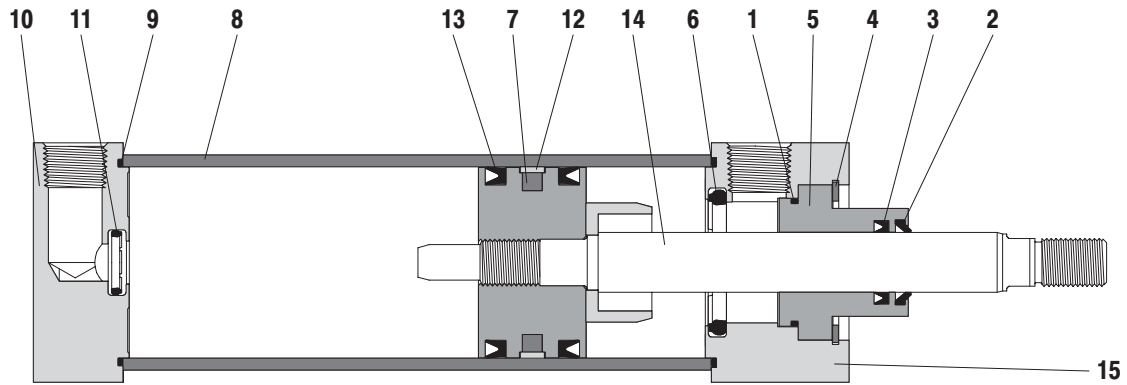


Figure 2

## PARTS LIST

Item	Description (size)	Qty	Part No.	Item	Description (size)	Qty	Part No.
1	"O" Ring	(1)		10	Cap (models 9815-8009-XX0)	(1)	119836
2	Wiper	(1)			(models 9915-8009-XX0)	(1)	119878
3	Rod Seal	(1)			(models 9820-8009-XX0)	(1)	119840
4	Retaining Ring (models 9X15-8009-XX0)	(1)	119549-125		(models 9920-8009-XX0)	(1)	119880
	(models 9X20-8009-XX0)	(1)	119549-162		(models 9825-8009-XX0)	(1)	119844
	(models 9X25-8009-XX0)	(1)	119549-162		(models 9925-8009-XX0)	(1)	119882
	(models 9X32-8009-XX0)	(1)	119549-212		(models 9832-8009-XX0)	(1)	119848
	(models 9X40-8009-XX0)	(1)	119549-212		(models 9932-8009-XX0)	(1)	119884
5	Bushing (models 9X15-8009-XX0)	(1)	119454		(models 9840-8009-XX0)	(1)	119852
	(models 9X20-8009-XX0)	(1)	119455		(models 9940-8009-XX0)	(1)	119886
	(models 9X25-8009-XX0)	(1)	119455	11	Cushion Seal	(1)	
	(models 9X32-8009-XX0)	(1)	119457	12	Wear Strip	(1)	
	(models 9X40-8009-XX0)	(1)	119457	13	Piston Seal	(2)	
6	Cushion Seal	(1)		14	Reciprocating Assembly (see page 4)	(1)	
7	Magnet (models 9X15-8009-XX0)	(1)	119681-150	15	Head (models 9815-8009-XX0)	(1)	119835
	(models 9X20-8009-XX0)	(1)	119681-200		(models 9915-8009-XX0)	(1)	119877
	(models 9X25-8009-XX0)	(1)	119681-250		(models 9820-8009-XX0)	(1)	119839
	(models 9X32-8009-XX0)	(1)	119681-325		(models 9920-8009-XX0)	(1)	119879
	(models 9X40-8009-XX0)	(1)	119681-400		(models 9825-8009-XX0)	(1)	119843
8	Barrel (models 9X15-8009-XX0)	(1)	119572-(XX)		(models 9925-8009-XX0)	(1)	119881
	(models 9X20-8009-XX0)	(1)	119573-(XX)		(models 9832-8009-XX0)	(1)	119847
	(models 9X25-8009-XX0)	(1)	119574-(XX)		(models 9932-8009-XX0)	(1)	119883
	(models 9X32-8009-XX0)	(1)	119575-(XX)		(models 9840-8009-XX0)	(1)	119851
	(models 9X40-8009-XX0)	(1)	119576-(XX)		(models 9940-8009-XX0)	(1)	119885
9	"O" Ring	(2)			Items included in seal kit (see page 2)		RKNAXX-BB

NOTE: (8) Barrel part number, -(XX) refers to the cylinder stroke length.

NOTE: (4) Retaining ring must be replaced when replacing (5) bushing.

NOTE: (7) Magnet resides under (12) wear strip.

## RECIPROCATING ASSEMBLY

### RANA XX - XX - XX 0

#### BORE SIZE

Q - 1-1/2"  
S - 2"  
T - 2-1/2"  
W - 3-1/4"  
4 - 4"

#### ROD DIAMETER

K - 5/8"  
M - 1"

#### ROD END

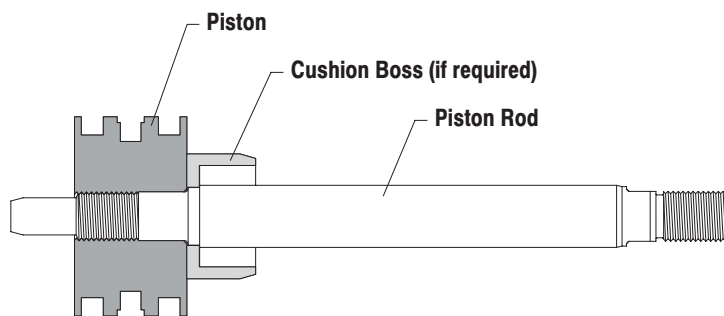
A - 3/4" - 16 UNF - 2A  
B - 1/2" - 20 UNF - 2A

#### CUSHIONS

X - No cushions  
B - Cushions both ends

#### STROKE LENGTH

01 - 1"	05 - 5"
02 - 2"	06 - 6"
03 - 3"	08 - 8"
04 - 4"	10 - 10"



**NOTE:** Reciprocating assemblies are furnished assembled with all required components, less seals. It is recommended that new seal kits be used when replacing reciprocating assemblies. See page 2 for seal kit requirements.

Figure 3

## PISTON ROD BUSHING REPLACEMENT PROCEDURE

Using a small spade (flat) screwdriver, locate the end of the spiral retaining ring holding the rod bushing in its cavity. Pick the end of the spiral retaining ring, easily pry upwards to begin removal of the spiral ring from the retaining groove.

When the spiral retaining ring is free from its retaining groove, slide the rod bushing off the end of the piston rod. The rod bushing retains three replaceable seals. Remove the "O" ring located at the base (o.d.) of the bushing. The other two seals are internal to the bushing. Using the same screwdriver, pick the rod wiper from its retaining groove. Next, remove the rod seal in the same manner.

Before attempting to replace seals, it is advisable to coat them with a film of standard grease to ease installation.

Replace the rod seal (it is a "U" cup seal) by squeezing the seal to position one end into its retaining groove and then pressing the seal downwards inside the bushing until the seal seats in its retaining groove. Gently use the screwdriver if necessary, being careful not to cut the seal.

The seal "lip" should face the base of the bushing, as illustrated.

Replace the rod wiper by squeezing it to position one end into its retaining groove. Press downwards on the wiper to seat it into its retaining groove. Gently use the screwdriver if necessary, being careful not to damage the rod wiper. The "lip" of the rod wiper should face up (toward you), as illustrated.

Place the "O" ring into the cylinder head cavity.

Place the bushing over the end of the piston rod and slide it into its cavity. Press the bushing into its cavity. Using the small screwdriver, push the end of the spiral retaining ring into its groove. Work counterclockwise around the bushing with the screwdriver to press the spiral retaining ring into its groove.

**WARNING** Make certain the spiral retaining ring is completely seated in its retaining groove before pressurizing the cylinder.

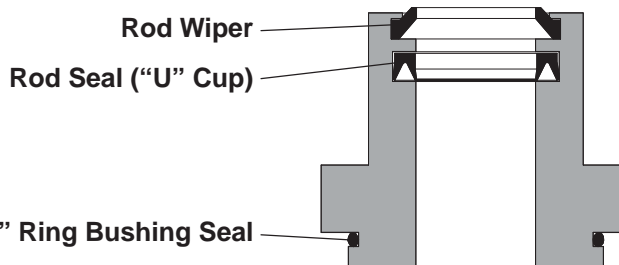
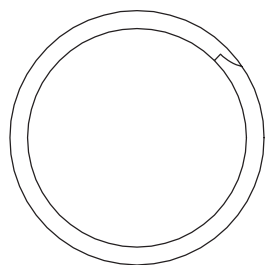


Figure 4