RK Series Pumps

Plunger Pumps

Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

Model

Description

RK 1450 rpm N Version

Plunger Pumps are designed for a wide variety of high pressure washing applications. They are constructed of die-cast bodies and feature a forged brass head. Internal components include special thick solid ceramic plungers for long life and durability. Precision cast cooling fins are anodized for maximum heat dissipation. Oversized tapered roller bearings and the precision supports assure proper shaft alignment and maximum life. Valve cages of special designed Ultra-Form provide positive seating and extended life. One-piece connecting rods are either a special alloy aluminum or bronze oversized for strength and load disbursement. These pumps are designed for gearbox , belt drive, or coupling drive systems, electric motor 182-184 frame driven systems, or gasoline engine driven systems.





Figure 2 - RK-F17



Max GPM

Figure 3 - RK-F24

Max PSI

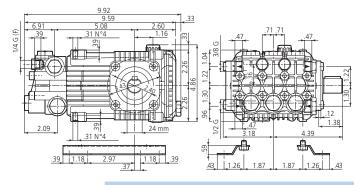
KK 1450 rpm N	<i>leision</i>	
Model	Max GPM	Max PSI
RK11.14N	2.9	2000
RK11.20HN	2.9	2900
RK13.12N	3.43	1740
RK13.20HN	3.43	2900
RK14.16N	3.7	2300
RK15.15N	3.96	2200
RK15.20HN	3.96	2900
RK15.28HN	3.96	4000
RK18.20HN	4.75	2900
RK18.28H	4.75	4000
RK21.20HN	5.55	2900
RKA 1750 rpm N	Version	
Model	Max GPM	Max PSI
RKA3.5G25N	3.5	2500
RKA3.5G25N RKA3.5G30N	3.5 3.5	2500 3000
RKA3.5G30N	3.5	3000
RKA3.5G30N RKA3.5G40HN	3.5 3.5	3000 4000
RKA3.5G30N RKA3.5G40HN RKA4G20N	3.5 3.5 4.0	3000 4000 2000
RKA3.5G30N RKA3.5G40HN RKA4G20N RKA4G30N	3.5 3.5 4.0 4.0	3000 4000 2000 3000
RKA3.5G30N RKA3.5G40HN RKA4G20N RKA4G30N RKA4G30HN	3.5 3.5 4.0 4.0 4.0	3000 4000 2000 3000 3000
RKA3.5G30N RKA3.5G40HN RKA4G20N RKA4G30N RKA4G30HN RKA4G35N RKA4G40HN RKA4.5G17N	3.5 3.5 4.0 4.0 4.0 4.0 4.0 4.0 4.5	3000 4000 2000 3000 3000 3500 4000 1700
RKA3.5G30N RKA3.5G40HN RKA4G20N RKA4G30N RKA4G30HN RKA4G35N RKA4G40HN RKA4.5G17N RKA4.5G25HN	3.5 3.5 4.0 4.0 4.0 4.0 4.0 4.0 4.5 4.5	3000 4000 2000 3000 3500 4000 1700 2500
RKA3.5G30N RKA3.5G40HN RKA4G20N RKA4G30N RKA4G30HN RKA4G35N RKA4G40HN RKA4.5G17N RKA4.5G25HN RKA4.5G35HN	3.5 3.5 4.0 4.0 4.0 4.0 4.0 4.5 4.5 4.5	3000 4000 2000 3000 3500 4000 1700 2500 3500
RKA3.5G30N RKA3.5G40HN RKA4G20N RKA4G30N RKA4G30HN RKA4G30HN RKA4G35N RKA4G40HN RKA4.5G17N RKA4.5G25HN RKA4.5G35HN RKA5.5G13N	3.5 3.5 4.0 4.0 4.0 4.0 4.0 4.5 4.5 4.5 5.5	3000 4000 2000 3000 3500 4000 1700 2500 3500 1300
RKA3.5G30N RKA43.5G40HN RKA4G20N RKA4G30N RKA4G30HN RKA4G35N RKA4G35N RKA4.5G17N RKA4.5G25HN RKA4.5G35HN RKA4.5G35HN RKA5.5G13N RKA5.5G20HN	3.5 3.5 4.0 4.0 4.0 4.0 4.0 4.5 4.5 5.5 5.5	3000 4000 2000 3000 3500 4000 1700 2500 3500 1300 2000
RKA3.5G30N RKA3.5G40HN RKA4G20N RKA4G30N RKA4G30HN RKA4G30HN RKA4G35N RKA4G40HN RKA4.5G17N RKA4.5G25HN RKA4.5G35HN RKA5.5G13N	3.5 3.5 4.0 4.0 4.0 4.0 4.0 4.5 4.5 4.5 5.5	3000 4000 2000 3000 3500 4000 1700 2500 3500 1300

WOUEI		IVIAN F JI
RKA6.5G20HN	6.6	2000
RKA7G20HN	7.1	2000
RKA 1750 rpm E Ve	rsion 1-1/8"	,
Model	Max GPM	Max PSI
RKA3.5G30E-F17	3.5	3000
RKA3.5G30HE-F17	3.5	3000
RKA3.5G40HE-F17	3.5	4000
RKA4G20E-F17	4.0	2000
RKA4G30E-F17	4.0	3000
RKA4G30HE-F17	4.0	3000
RKA5.5G13E-F17	5.5	1300
RKA6.5G20HE-F17	6.6	2000
RKA7G20HE-F17	7.1	2000
RKV 3400 rpm D	lersion - 1'	7
Model	Max GPM	Max PSI
	Max GPM	
Model	Max GPM	Max PSI
Model RKV3.5G30AD-F24	Max GPM 3.5 3.5	Max PSI 3000
Model RKV3.5G30AD-F24 RKV3.5G35D-F24	Max GPM 3.5 3.5	Max PSI 3000 3500
Model RKV3.5G30AD-F24 RKV3.5G35D-F24 RKV3.5G40HD-F24	Max GPM 3.5 3.5 3.5 3.5	Max PSI 3000 3500 4000
Model RKV3.5G30AD-F24 RKV3.5G35D-F24 RKV3.5G40HD-F24 RKV4037	Max GPM 3.5 3.5 3.5 3.5 3.5	Max PSI 3000 3500 4000 3700
Model RKV3.5G30AD-F24 RKV3.5G35D-F24 RKV3.5G40HD-F24 RKV4037 RKV4G30AD-F24	Max GPM 3.5 3.5 3.5 3.5 3.5 4.0	Max PSI 3000 3500 4000 3700 3000
Model RKV3.5G30AD-F24 RKV3.5G35D-F24 RKV3.5G40HD-F24 RKV4G30AD-F24 RKV4G32D-F24	Max GPM 3.5 3.5 3.5 3.5 4.0 4.0	Max PSI 3000 3500 4000 3700 3000 3200
Model RKV3.5G30AD-F24 RKV3.5G35D-F24 RKV3.5G40HD-F24 RKV4G30AD-F24 RKV4G32D-F24 RKV4G35HD-F24	Max GPM 3.5 3.5 3.5 4.0 4.0 4.0 4.0	Max PSI 3000 3500 4000 3700 3000 3200 3500
Model RKV3.5G30AD-F24 RKV3.5G35D-F24 RKV3.5G40HD-F24 RKV4G30AD-F24 RKV4G30AD-F24 RKV4G32D-F24 RKV4G35HD-F24 RKV4G40HD-F24	Max GPM 3.5 3.5 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.5	Max PSI 3000 3500 4000 3700 3000 3200 3500 4000
Model RKV3.5G30AD-F24 RKV3.5G35D-F24 RKV3.5G40HD-F24 RKV4G30AD-F24 RKV4G30AD-F24 RKV4G35HD-F24 RKV4G35HD-F24 RKV4G40HD-F24 RKV4.5G22D-F24	Max GPM 3.5 3.5 4.0 4.0 4.0 4.0 4.0 4.5 4.5 5.0	Max PSI 3000 3500 4000 3700 3000 3200 3500 4000 2200
Model RKV3.5G30AD-F24 RKV3.5G35D-F24 RKV3.5G40HD-F24 RKV4G30AD-F24 RKV4G32D-F24 RKV4G32D-F24 RKV4G35HD-F24 RKV45G2D-F24 RKV4.5G22D-F24	Max GPM 3.5 3.5 4.0 4.0 4.0 4.0 4.0 4.5 4.5 5.0	Max PSI 3000 3500 4000 3700 3200 3500 4000 2200 4000



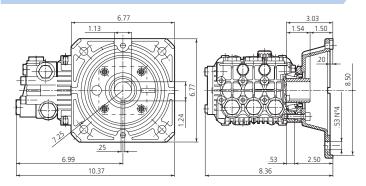


N version Solid shaft pump / ø 24 mm



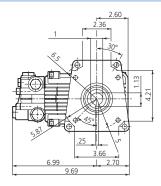
RKA

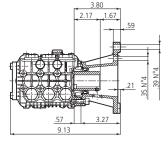
E version + F17 Hollow shaft pump ø1"1/8



RKV

D version + F24 Hollow shaft pump ø 1"







Manual
Parts
and
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Instri
Operating

RK Series Pumps

SPRAY NOZZLE CHART

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5000	PSI	2.40	2.52	2.80	3.07	3.35	3.63	3.91	4.47	5.03	5.59	6.15	6.71	7.27	7.83	8.39	8.94	9.50	10.06	10.62	11.18	12.30	13.42	13.98	14.53
4800	PSI	2.19	2.46	2.74	3.01	3.29	3.56	3.83	4.38	4.93	5.48	6.02	6.57	7.12	7.67	8.22	8.76	9.31	9.86	10.41	10.95	12.05	13.15	13.69	14.24
4600	PSI	2.14	2.41	2.68	2.95	3.22	3.49	3.75	4.29	4.83	5.36	5.90	6.43	6.97	7.51	8.04	8.58	9.12	9.65	10.19	10.72	11.80	12.87	13.40	13.94
4400	PSI	2.10	2.36	2.62	2.88	3.15	3.41	3.67	4.20	4.72	5.24	5.77	6.29	6.82	7.34	7.87	8.39	8.91	9.44	9.96	10.49	11.54	12.59	13.11	13.63
4200	PSI	2.05	2.31	2.56	2.82	3.07	3.33	3.59	4.10	4.61	5.12	5.64	6.15	6.66	7.17	7.69	8.20	8.71	9.22	9.73	10.25	11.27	12.30	12.81	13.32
4000	PSI	2.00	2.25	2.50	2.75	3.00	3.25	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50	10.00	11.00	12.00	12.50	13.00
3700	PSI	1.92	2.16	2.40	2.64	2.89	3.13	3.37	3.85	4.33	4.81	5.29	5.77	6.25	6.73	7.21	7.69	8.18	8.66	9.14	9.62	10.58	11.54	12.02	12.50
3600	PSI	1.90	2.13	2.37	2.61	2.85	3.08	3.32	3.79	4.27	4.74	5.22	5.69	6.17	6.64	7.12	7.59	8.06	8.54	9.01	9.49	10.44	11.38	11.86	12.33
3400	PSI	1.84	2.07	2.30	2.54	2.77	3.00	3.23	3.69	4.15	4.61	5.07	5.53	5.99	6.45	6.91	7.38	7.84	8.30	8.76	9.22	10.14	11.06	11.52	11.99
3200	PSI	1.79	2.01	2.24	2.46	2.68	2.91	3.13	3.58	4.02	4.47	4.92	5.37	5.81	6.26	6.71	7.16	7.60	8.05	8.50	8.94	9.84	10.73	11.18	11.63
3000	PSI	1.73	1.95	2.17	2.38	2.60	2.81	3.03	3.46	3.90	4.33	4.76	5.20	5.63	6.06	6.50	6.93	7.36	7.79	8.23	8.66	9.53	10.39	10.83	11.26
2800	PSI	1.67	1.88	2.09	2.30	2.51	2.72	2.93	3.35	3.76	4.18	4.60	5.02	5.44	5.86	6.27	6.69	7.11	7.53	7.95	8.37	9.20	10.04	10.46	10.88
2600	PSI	1.61	1.81	2.02	2.22	2.42	2.62	2.82	3.22	3.63	4.03	4.43	4.84	5.24	5.64	6.05	6.45	6.85	7.26	7.66	8.06	8.87	9.67	10.08	10.48
2400	PSI	1.55	1.74	1.94	2.13	2.32	2.52	2.71	3.10	3.49	3.87	4.26	4.65	5.03	5.42	5.81	6.20	6.58	6.97	7.36	7.75	8.52	9.30	9.68	10.07
2200	PSI	1.48	1.67	1.85	2.04	2.22	2.41	2.60	2.97	3.34	3.71	4.08	4.45	4.82	5.19	5.56	5.93	6.30	6.67	7.05	7.42	8.16	8.90	9.27	9.64
2000	PSI	1.41	1.59	1.77	1.94	2.12	2.30	2.47	2.83	3.18	3.54	3.89	4.24	4.60	4.95	5.30	5.66	6.01	6.36	6.72	7.07	7.78	8.49	8.84	9.19
1800	PSI	1.34	1.51	1.68	1.84	2.01	2.18	2.35	2.68	3.02	3.35	3.69	4.02	4.36	4.70	5.03	5.37	5.70	6.04	6.37	6.71	7.38	8.05	8.39	8.72
1600	PSI	1.26	1.42	1.58	1.74	1.90	2.06	2.21	2.53	2.85	3.16	3.48	3.79	4.11	4.43	4.74	5.06	5.38	5.69	6.01	6.32	6.96	7.59	7.91	8.22
1200 1400 1	PSI	1.18	1.33	1.48	1.63	1.77	1.92	2.07	2.37	2.66	2.96	3.25	3.55	3.85	4.14	4.44	4.73	5.03	5.32	5.62	5.92	6.51	7.10	7.40	7.69
1200	PSI	1.10	1.23	1.37	1.51	1.64	1.78	1.92	2.19	2.46	2.74	3.01	3.29	3.56	3.83	4.11	4.38	4.66	4.93	5.20	5.48	6.02	6.57	6.85	7.12
1000																									
Nozzle	#	2.0	2.25	2.5	2.75	3.0	3.25	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	0.6	9.5	10.0	11.0	12.0	12.5	13.0



Gallons Per Minute

Formulas

Nozzles: Impact Force (lbs.) = .0526 x GPM x \sqrt{PSI} Nozzle # = GPM x 4000 √ PSI GPM= Nozzle # x PSI **√4000** $PSI = (GPM/Nozzle \#)^2 \times 4000$ Horse Power: GPM x PSI = Hydraulic HP 1714 GPM x PSI = EBHP 1457 EBHP x 1457 = GPM PSI EBHP x 1457 = PSIGPM HP loss due to altitude = 3% per 1000 FT above sea level Pump Speed and Flow: Rated GPM = Desired GPM

Conversions

Gallons x 3.785412 = Liters Gallons x 128 = Oz. PSI x .06896 = BarBar x 14.5038 = PSI 1 inches = 25.4 millimeters Liters x .2642 = Gallons (US)Ft. Lbs. x 1.356 = Newton Meters Inch Lbs. x .11298 = Newton Meters Newton Meters x .737562 = Ft. Lbs. (force) Newton Meters x 8.85 = In. Lbs. (force) Temperature = 1.8(C° + 17.78) = F°,.555(F° - 32) = C° 1 U.S. Gallon of freshwater = 8.33 lbs. 1 PSI = 2.31 feet of water 1 PSI = 2.04 inches of mercury 1 Foot of water = .433 PSI 1 Foot of water = .885 inches of mercury 1 Meter of water = 3.28 feet of water Kilograms x 2.2 = Lbs.

General Safety Information

Motor RPM

A WARNINGS

Rated RPM Desired RPM Motor Pulley \emptyset = Pump Pulley \emptyset

Pump RPM

Gasoline Drive Pumps



The pump is designed to pump nonflammable or non-explosive fluids. These pumps are intended to pump clean filtered water only.



Do not operate in or around an explosive environment.



Always wear safety glasses or goggles and appropriate clothing.



Do not alter the pump from the manufacturers design.



Do not allow children to operate the pump.



Never point the high-pressure discharge at a person, any part of the body or animals.

Do not operate gasoline engines in a confined area; always have adequate ventilation.

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Do not exceed the pump specifications in speed or pressure.



General Safety Information (continued)

🗩 Maximum water temperature is 🗐 140°F.

All positive displacement plunger pumps must have a safety relief valve installed on the discharge side of the pump, this valve could be either an unloader or regulator and must be of adequate flow and pressure for the pump.

Adequate protective guards must cover all moving parts. Perform routine maintenance on the pump and components.

Use only components that are rated for the flow and pressure of the pump, this would include hose, fittings, safety valves, spray guns etc.

Electric Drive Pumps

Your power supply must conform to the system requirements.



The motor must be grounded. Use 4Δ GFCI plugs and receivers.



Do not handle the pump/motor with wet hands.



Only use power cords that are in good condition.



Never pull the unit by the power $\frac{4}{1}$ cord.

Never spray or clean the unit with water

Failure to follow these warnings may result in personal injury or damage to property.

Special Features

Wet End

Manifold: Forged Brass: Strength and no porosity – long life, higher hydrostatic pressures – safety, performance.

Inlet and Discharge Ports: Heavy bosses for added strength. Offset Discharge Ports: High efficiency, smooth flow. Bolts: Eight bolts, 8mm, grade 8.8.

Valves: Valve Caps: Stainless steel on pumps rated at 3200 PSI and higher, better hydrostatic loads. Machined brass on pumps <3200 PSI. Ultra Form Cages: Durable, strength, and long life. Poppets, Seat and Spring: 303 and 400 series stainless steel.

Packing and Plungers: High Pressure Packing: "V" style (D-1) Buna-N (cotton duct weave base) strong and tightens under load. Low Pressure Seals: "U" cup double lip Buna-N for a good positive seat. Support and Guides: Machined brass, 1-piece construction to assure proper plunger alignment and to maximize packing and seal life. **Plungers:** Are a special aluminum oxide blend, solid ceramic for long life, strong durability and more resilient.

Drive End

Bearings: Oversized tapered roller bearing for maximum life and load disbursement.

Bearing Support: Precision die-cast and machined to assure concentricity and alignment.



Special Features (continued)

Crankcase: Precision die-cast, large cooling fins and anodized (for maximum heat dissipation).

Rear Cover: Precision die-cast, O-ring sealed and bayonet style sight glass for positive sealing and locking (no threads to loosen).

Plunger Rods: Stainless steel construction for strength (no plating to scrape off), back-up and O-ring plunger sealing system.

Rod Pins: Precision ground and hardened steel, oversized for load disbursement.

Connecting Rods: One-piece special allow aluminum (3XU51, 3XU60 and 3XU68) or bronze (3XU52, 3XU54, 3XU61and 3XU62) for higher pressure, oversized for maximum strength, load disbursement, and life. Heavy pin area construction, for added load strength.

Crankshaft: Forged, precision ground and hardened for extremely long life and durability.

Oil Seals and O-rings: Triple lip oil seals, long life and much less leak prone. All are constructed of Buna-N rubber. The O-rings have stainless steel garder springs to assure constant tension on the sealing surface.

Oil Drains: Quantity of two (2). One in the rear cover and one in the bottom of the crankcase.

Oil Capacity: 15.5 oz.

Extra Features

Dyno Proven: All pumps are dyno tested to assure the theoretical design meets the actual design.

Valve Design: Each pump series has a valve design that optimizes its highest efficiency.

Installation

Direct Drive Electric and Gasoline Pumps

- Install the shaft key into the keyway and apply a light coating of anti-seize on the engine shaft.
- 2. Align the two key ways and push the pump completely onto the engine. (See Figure 4 & 5)
- 3. Install all four (4) bolts and tighten evenly.
- Remove the red shipping oil cap and install the black crankcase vent cap. (See Figure 6)
- 5. Install the appropriate unloader valve and other accessories.
- 6. Install the appropriate water inlet and discharge fittings.
- Connect the water supply hose and high-pressure discharge hose/spray gun.
- 8. Turn on the water supply.





Figure 5





Installation (continued)

- 9. Open the spray gun to purge the system of any air.
- 10. Start the engine.
- 11. Adjust the engine speed and unloader valve.

Belt Drive Systems

1. Mount the pump securely to the base plate. (See Figure 7) For new installation a mounting rail kit is required, refer to parts breakdown.



Figure 7

2. Install the pump pulley on the crankshaft. It should be as far onto the shaft as possible.



Align the pulleys so they 3. are in line. (See Figure 8)

Figure 8

Use a belt tension 4. gauge to assure proper tension (too much tension can cause bearing failure or damage the belts as well as cause other problems). (See Figure 9)



5. Installation complete.

Winter or Long Time Storage

- Drain all of the water out of the 1. pump.
- 2. Run a 50% solution of a RV or non-toxic/biodegradable antifreeze through the pump.

- Flush the pump with fresh water 3. before the next use.
- 4. In freezing conditions failure to do this may cause internal pump damage.
- For long periods of storage in 5. non-freezing areas the solution will keep the seals and O-rings lubricated.

Service Pumps

Servicing the Valves

The inlet and discharge valves in this series pumps are all the same. The valves are located under the six 24mm hex plugs. The inlet valves are located on the lower row and the discharge valves are located on the top row of the pump head.

Tools required: 24mm socket, ratchet, needle nose pliers, mechanics pick and torque wrench.

Valve Removal:

- Remove the valve cap. 1.
- 2. Inspect the valve cap Oring for any damage, replace if necessary. (See Figure 10)
- 3. Use the needle nose pliers to remove the valve. (See Figure 11)







Service Pumps (continued)

 Use a small probe to move the poppet up and down to assure that the valve is functioning properly and that no debris is stuck in the valve. (See Figure 12)



Figure 12

Figure 13

Using the mechanics pick remove the valve seat O-ring and inspect for any damage, replace if necessary. (See Figure 13)

Valve Assembly:

 Install the valve seat O-ring squarely into the bottom of the manifold. (See Figure 14)



- 2. Insert the valve assembly squarely into the port pushing it into the O-ring. (See Figure 15)
- Install the valve cap and torque to the proper specification. (See Figure 16) (See parts breakdown)

Servicing the Packings/Seals

To access the water seals for inspection or replacement, you will first need to remove the head of the pump.



Figure 15



Figure 16

Tools required: 6mm hex socket, ratchet, (2) long screwdrivers, reversible pliers, mechanics pick and torque wrench.

Disassembly:

- 1. First remove the eight 6mm head bolts. (See Figure 17)
- Place the screwdrivers as shown between the head and crankcase of the pump, lifting one up and the other down. The head should start to lift off of the plungers. (See Figure 18)
- When you remove the head you may notice that some of the water seals have stayed on the plungers and some in the head. (See Figure 19) To

Figure 19) To remove the seals from the plungers simple turn the assemblies and

pull off.

Figure 19

4. If the seal assemblies are in the head use the reversible pliers to grab the seal retainer on the inside bore

(**NOTE:** Use a rag so you do not mar the piston guide area), twist the retainer in either direction







Service Pumps (continued)

(**NOTE:** This is done to free the retainer O-ring which is stuck to the manifold) and lift out. (See Figure 20 & 21)

- With your fingers pull the high pressure seal and head ring out of the head. (See Figure 22)
- 6. The low-pressure seal is located in the brass seal retainer. Using the mechanics pick go in between the seal and retainer, twist and pull, the seal will come out of the gland. (See Figure 23 & 24)
- Remove the seal retainer O-ring with the mechanics pick. (See Figure 25)

Assembly:

- Install the plastic head ring into the head (the flat side is on the bottom). (See Figure 26)
- Install the highpressure seal. Place the seal so the open "V" portion is toward the head ring. You need to place the









seal at an angle and pull and push to work the seal into position with your fingers (do not use and tools you may damage the seal). Make sure the seal is totally seated against the head ring. (See Figure 27 & 28)

 Installing the low-pressure seal. You want the open side of the seal to be pointed toward the water side of the head (toward the high-pressure seal) and the flat side toward the drive end of the pump.

> Place the seal into the gland at an angle, with your finger push the exposed side of the seal towards the center and work the seal (See Figure 29, 30 & 31) into position. After the seal is in the gland you can work it into it proper position.

4. Install the retainer O-ring. (See Figure 32)



Figure 27





Figure 29



Figure 30



Figure 31



Figure 32



Service Pumps (continued)

5. Squarely seat the retainer into the head and push with even pressure until it snaps into position. (See Figure Figure 33 33)

Servicing the Plungers

If the plungers are not damaged they do not need any servicing.

Tools required: 16mm socket, ratchet, mechanics pick, taper blade gasket scraper, thread sealant and torque wrench.

NOTE: Be very careful when working with the plungers, they are made from ceramic which is brittle and can be damaged.

Any time you remove a plunger it is recommended you replace the slinger washer, O-ring and top plunger washer. The washers are a cushion for the ceramic plunger and compress when first used and the O-ring will take a set to create a seal and usually will not spring back to its original shape. By not replacing these parts you run the risk of breaking a plunger or having a

water leak.

Disassembly:

- 1. Remove the plunger retainer nut. (See Figure 34)
- 2. Insert the gasket scraper between the copper washer and plunger to remove the washer. (See Figure 35)



Figure 35

- Twist and pull the plunger 3. off the plunger rod.
- 4. Remove the plunger rod O-ring seal and split back-up ring with the mechanics pick. (See Figure Figure 36 36 & 37)
- Remove brass slinger. 5. At this point clean any thread locker that is left on the plunger rod and retaining nut threads. (See Figure 38)

Assembly:

- 1. Install the slinger washer. (See Figure 39)
- Install the plunger 2. rod O-ring and split back-up ring. Place a light film of oil on the Oring and back-up ring. (See Figure 40)

NOTE: The O-ring is closest to the threaded end of the rod.

Install the plunger by 3. pushing straight down and twisting slightly in either direction (See Figure 41)



Figure 41

(NOTE: Be sure that the back-up ring is fully seated). Make sure you fully seat the plunger.









Figure 39

Service Pumps (continued)

Install the small copper washer on top of the plunger and place a small quantity of thread sealant in the thread. Install the plunger nut and tighten to the required torque. (See Figure 42 & 43) (See parts breakdown)

Oil Change

Change oil after first 50 hours of use. Then every 500 hours. Refer to parts breakdown for oil type.

Pump head to drive end Figure 43 Installation

- 1. Turn the crankshaft to align the plungers as shown. (See Figure 44)
- 2. Place the head evenly onto the plungers and push it until it makes contact with the drive end of the pump. (See Figure 45)
- Torque the head bolt as shown in the tightening sequence diagram. (See Figure 46 & 47) (See parts breakdown).









Figure 47



Troubleshooting

Symptom		Possible Cause(s)		Corrective Action
Oil leak between crankcase and pump- ing section		Worn rod oil seals		Replace crankcase piston rod seals
Frequent or prema- ture failure of the packing	1	Cracked, damaged or worn plunger	1	Replace plungers
	2	Overpressure to inlet manifold	2	Reduce inlet pressure
	3	Material in the fluid being pumped	3	Install proper filtration on pump inlet plumbing
	4	Excessive pressure and/or temperature of fluid being pumped	4	Check pressures and fluid inlet temperature; be sure they are within specified range
	5	Running pump dry	5	Do not run pump without water
Pump runs but pro- duces no flow		Pump is not primed		Flood suction then restart pump
Pump fails to prime		Air is trapped inside pump		Disconnect discharge hose from pump. Flood suction hose, restart pump and run pump until all air has been evacuated
Pump looses prime, chattering noise, pressure fluctuates	1	Air leak in suction hose or inlet	1	Remove suction line and inspect it for a loose liner or debris lodged in hose. Avoid all unnec- essary bends. Do not kink hose
	2	Clogged suction strainer	2	Clean strainer
Low pressure at nozzle	1	Unloader valve is by-pass- ing	1	Make sure unloader is adjusted property and by-pass seat is not leaking
	2	Incorrect or worn nozzle	2	Make sure nozzle is matched to the flow and pressure of the pump. If the nozzle is worn, replace
	3	Worn packing or valves	3	Replace packing or valves
Pressure gauge fluc- tuates	1	Valves worn or blocked by foreign bodies	1	Clean or replace valves
	2	Packing worn	2	Replace packing
Low pressure	1	Worn nozzle	1	Replace with nozzle of proper size
	2	Belt slippage	2	Tighten or replace with correct belt

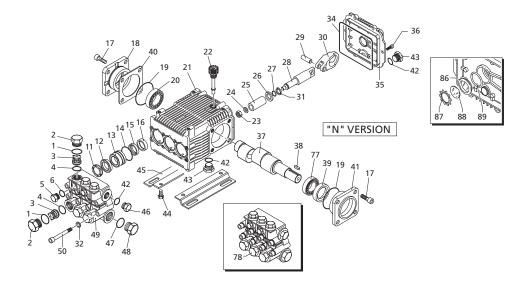


Troubleshooting (cont.)

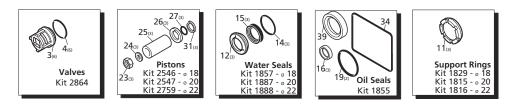
Symptom		Possible Cause(s)		Corrective Action
Low pressure (cont.)	3	Air leak in inlet plumbing	3	Disassemble, reseal and reas- semble
	4	Relief valve stuck, partially plugged or improperly adjusted valve seat worn	4	Clean and adjust relief valve; check for worn or dirty valve seats
	5	Worn packing. Abrasive in pumped in cavitation. Inadequate water	5	Install proper filter suction at inlet manifold must be limited to lifting less than 20 feet of water or 8.5 psi vacuum
	6	Worn inlet, discharge valve blocked or dirty	6	Replace inlet and discharge valve
Pump runs extremely rough, pressure very low	1	Inlet restrictions and/or air leaks.	1	Clean out foreign material
	2	Stuck inlet or discharge valve	2	Replace worn valves
Water leakage from under manifold		Worn packing or cracked plunger		Install new packing or plunger
Slight leak, oil leak- ing in the area of crankshaft	1	Worn crankshaft seal or improperly installed oil seal o-ring	1	Remove oil seal retainer and replace damaged 0-ring and/or seals
	2	Bad bearing	2	Replace bearing
Excessive play in the end of the crankshaft pulley		Worn main bearing from excessive tension on drive belt		Replace crankcase bearing and/or tension drive belt
Water in crankcase	1	Humid air condensing into water inside the crankcase	1	Change oil intervals
	2	Worn packing and/or cracked plunger	2	Replace packing. Replace plunger
Loud knocking noise in pump	1	Cavitation or sucking air	1	Check water supply is turned on
	2	Pulley loose on crankshaft	2	Check key and tighten set screw
	3	Broken or worn bearing	3	Replace bearing



RK 1450 RPM



Repair Kits



Special Parts / Kits

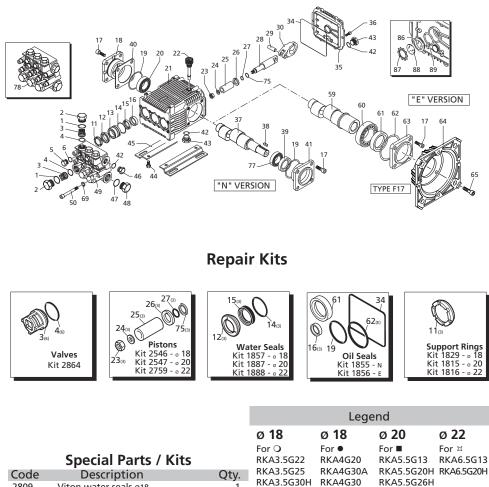
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Code	Description	Qty.
2809	Viton water seals Ø18	1
2810	Viton water seals ø20	1
2811	Viton water seals ø22	1
2819	Kit for up to 180° F ø18 High Temp	1
2820	Kit for up to 180° F ø20 High Temp	1
1837	Rail Kit 5/8" - 2 Rails & 4 Bolts	1
2633	Rail Kit 1-3/4" - 2 Rails & 4 Bolts	1
2633H	Rail Kit 2-5/8" - 2 Rails & 4 Bolts	1



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RKA 1750 RPM



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2810	Viton water seals ø20	1
2811	Viton water seals Ø22	1
2819	Kit for up to 180° F ø18 High Temp	1
2820	Kit for up to 180° F ø20 High Temp	1
1837	Rail Kit 5/8" - 2 Rails & 4 Bolts (N only)	1
2633	Rail Kit 1-3/4" - 2 Rails & 4 Bolts (N only)	1
2633H	Rail Kit 2-5/8" - 2 Rails & 4 Bolts (N only)	1

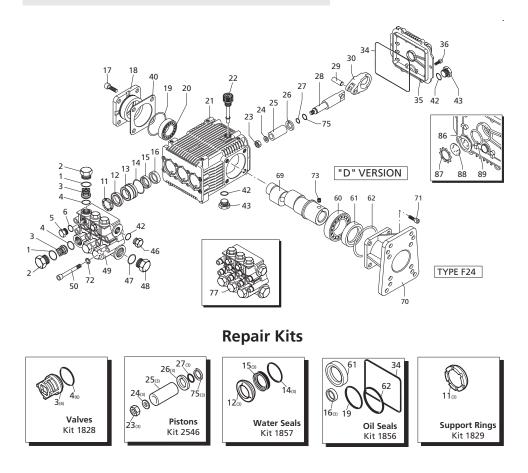
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∞Over 3600psi			



Ро	s. Code	Description	Qty.	Ро	s. Code	Description	Qty.
1	960160	O-Ring Ø17.86x2.62	6	41	1380040	Open bearing sup	oport (217 in/lbs) 1
1	960090	Valve cap - Brass	(478 in/lbs) 6	42	740290	O-Ring Ø14x1.78	3
	960850	Valve cap - ss	(478 in/lbs)∞ 6	43	1980740	Plug 3/8″ G	2
	1380740	Valve cap - NP	(478 in/lbs) 6	44	1260470	Bolt M8x10	4
	960090T	Valve cap - 1/4" threaded - I		/ 🗖	1380141	Rail 5/8"	(N Version only) 2
	960850T	Valve cap - 1/4" threaded -		47	Z-Bracket 1-3/4	Rail 1-3/4"	(N Version only) 2
3	1389051	Complete valve	6		Z-Bracket	Rail 2-5/8"	(N Version only) 2
4	880830 880581	O-Ring Ø15.54x2.62	6 2	46	1980740	Plug 3/8" G	1
5	1380690	Plug 1/4" G - Brass Plug 1/4" G NP	ے چ 2	47	1981180	Plug 3/8" G NP	∞ 1 1
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1Ĭ	960110	Support ring	ø18 ○ □●♦ 3	48	960870	Plug 1/2″ G Plug 1/2″ G NP	ا ح 1
11	840300	Support ring	ø20 ■ 3	i i i i i i i i i i i i i i i i i i i	1381071	Pump head - Bras	
	840320	Support ring	ø22 ¤★ 3	IN	1381070	Pump head - NP	ø18 ∞ 1
11	880320	High pressure packing		///	1380020	Pump head - Bras	
	840290	High pressure packin		// 1	1380680	Pump head - NP	ø20 1
14	840330	High pressure packin		₩	1383010	Pump head - Bras	
11	1380090	Piston guide	ø18 ○ □●♦ 3		1383310	Pump head -NP	ø22 1
15	1380150	Piston guide	ø20 🔳 3	50	820150	Head bolt м8x70	(217 in/lbs) 8
IJ	1380160	Piston guide	ø22 ¤ ★ 3	F۸	2280260	Hollow shaft ø1-	1/8″ 01
14	961240	O-Ring ø31.47x1.78	3	hU	2280200	Hollow shaft ø1-	•1/8" •♦ 1
15	880330	Low pressure seal	ø18 ⊖ ∎●♦ 3]	2280270	Hollow shaft ø1-	•1/8″ ∎¤ 1
1	840280	Low pressure seal	ø20 🔳 3	JJ	2280280	Hollow shaft ø1-	·1/8″ * 1
-	840340	Low pressure seal		60	1380320	Bearing	1
16	1383130	Oil seal	3	61	621170	Oil seal	1
17	850370	Bolt M8x16	(217 in/lbs) 8	62	1380220	O-Ring ø72.75x1.7	8 1
18	1380050	Closed bearing su		63	1380210	Compete cover	1
19	640030	O-Ring Ø59.99x2.62	2	64	1591	Electric Flange F	
20 21	2280240 1382770	Bearing Pump housing	1	65 69	620610 1381850	Bolt Washer	4
22	880130	Vented oil cap	1		1389270	Complete pump h	
23	962010	Nut M8	(106in/lbs) 3		1389272	Complete pump h	
24	962000	Washer Ø8.1	3	11	1389271	Complete pump h	
25	1380940	Ceramic piston	ø18 ◯□●♦ 3	- 11	1389208	Complete pump h	
1	1380930	Ceramic piston	ø20 = 3		1389212	Complete pump h	
LJ	1382360	Ceramic piston	ø22 ¤★ 3	- 11	1389268	Complete pump h	
26	1380950	Slinger	3	- 11	1389269	Complete pump h	
27	600180	O-Ring Ø7.66x1.78	3	75	1080401	Back-up ring	3
28	1380920	Guiding piston	3	77	840370	Bearing	1
29	1380060	Piston pin	3	86	1260250	Oil sight glass	1
30	1383020	Con rod - Bronze > 3		87	1260430	Snap ring	1
	1383050	Con rod - Aluminum		88	1780690	Contrast disc	1
34	1780510	O-Ring	1	89	1140450	O-Ring Ø20.24x2.6	2 1
35	1789010	Complete cover	1			0.1	
36	1343510	Bolt M6x14	(89 in/lbs) 6		AR64516	Oil	1
17	2280100 2280090	Crankshaft 24mm Crankshaft 24mm	o 1 ● 1		OIL CAPA	сіту - 15 ог	
11	2280090	Crankshaft 24mm	■¤ 1				
11	2280070	Crankshaft 24mm	⊥∎≞⊥ ★ 1				
	2280000	Crankshaft 24mm -					
38	1380520	Key	1				
39	180340	Oil seal	1				
1	1380120	Shim 0.10 mm	1-3				
ΛN	1380130	Shim 0.20 mm	1-3				
411	1380530	Shim 0.25 mm	1-3				
TV	1382810	Shim 0.05 mm	1-3				



RKV 3400 RPM



Special Parts / Kits

Code	Description Q	Qty.
2809	Viton water seals Ø18	1
2819	Kit for up to 180° F ø18 High Temp) 1



RK Series Pumps

1 960160 O-Ring $017.86x2.62$ 6 960090 Valve cap - Brass (478 in/lbs) $x = x + E = 6$ 960090T Valve cap - 14" threaded - Brass (478 in/lbs) 1 960850T Valve cap - 14" threaded - Brass (478 in/lbs) 1 960850T Valve cap - 14" threaded - Brass (478 in/lbs) 1 3 889052 Complete valve 6 4 880830 O-Ring 015.54x2.62 6 5 880581 Plug 1/4" G - Brass 0== 2 1 960110 Support ring 3 1 960110 Support ring 3 1 960120 O-Ring 031.47x1.78 3 1 960120 O-Ring 059.99x2.62 2 2880130 Vented oil cap 1 1 1382770 Pump housing 1 2 962000 Washer 08.1 3 2 880130 Ceramic piston 3 2 880130 Vented oil cap 1 2 880130 Vented oil cap 1 2 880130 Ceramic piston	Pos. Code	Description Qty.	
960850Valve cap - SS (478 in/lbs) $= # ★ ★ I \le 6$ 960900TValve cap - 1/4" threaded - Bross (478 in/lbs) 1960850TValve cap - 1/4" threaded - SS (478 in/lbs) 13889052Complete valve6880581Plug 1/4" G - Brass9608501Valve cap - 1/4" threaded - SS (478 in/lbs) 13889052Complete valve6880581Plug 1/4" G - Brass9608501O-Ring ø10.82x1.781960110Support ring31380690Piston guide31380090Piston guide31380090Piston guide31380090Piston guide31380090Piston guide31380090O-Ring ø31.47x1.78316 1383130Oil seal31380050Closed bearing support19 640030O-Ring ø59.99x2.62202280240Bearing111382770Pump housing121380940Ceramic piston324962000Washer ø8.13251380940Ceramic piston3138020Guiding piston3138020Con rod - Bronze3138020Con rod - Aluminum3138050Con rod - Aluminum3138050Con rod - Aluminum3138050Con rod - Bronze3138010O-Ring Ø14x1.78441980740Plug 3/8" G - Brass251380740Plug 3/8" G - Brass <td>1 960160</td> <td>O-Ring Ø17.86x2.62 6</td> <td></td>	1 960160	O-Ring Ø17.86x2.62 6	
	960090	Valve cap - Brass (478 in/lbs) ○● 6	
4960850TValve cap - 1/4" threaded-SS(478 in/lbs) 13889052Complete valve64880830O-Ring Ø15.54x2.6265880581Plug 1/4" G - BrassO=211380690Plug 1/4" G - NP $\# ★ ★ \boxtimes 2$ 6820510O-Ring Ø10.82x1.78211960110Support ring312880320High pressure packing3131380090Piston guide314961240O-Ring Ø31.47x1.78315880330Gasket3161383130Oil seal317850370Bolt M8x16(217in/bs) 8181380050Closed bearing support119640030O-Ring Ø59.99x2.622202280240Bearing1211382770Pump housing122880130Vented oil cap123962010Nut M8(106 in/lbs) 324962000Washer Ø8.13251380940Ceramic piston3261380950Slinger327600180O-Ring Ø7.66x1.783281380920Guiding piston329138020Con rod - Aluminum3341780510O-Ring131380120Shim 0.25 mm1-331380130Shim 0.25 mm1-33431980740Plug 3/8" G - Brass244	960850	Valve cap - ss (478 in/lbs) ¤∎★♦⊠ 6	
3889052Complete valve64880830O-Ring $015.54x2.62$ 65880581Plug 1/4" G - BrassO = 21380690Plug 1/4" G - NP $\# ★ • \boxtimes 2$ 6820510O-Ring $010.82x1.78$ 211960110Support ring312880320High pressure packing3131380090Piston guide314961240O-Ring $031.47x1.78$ 315880330Gasket3161383130Oil seal317850370Bolt M8x16(217in/bs) 8181380050Closed bearing support119640030O-Ring $059.99x2.62$ 2202280240Bearing1211382770Pump housing123962010Nut M8(106 in/bs) 324962000Washer 08.1 3251380940Cerramic piston3261380950Slinger327600180O-Ring $07.66x1.78$ 3281380060Piston pin3341780510O-Ring1351383050Con rod - Aluminum3341780510O-Ring $014x1.78$ 3341780510O-Ring $014x1.78$ 334180130Shim 0.05 mm1-3351383050Shim 0.05 mm1-3361343510Bolt M6x14(89 in/bs) 641 <t< td=""><td>960090T</td><td>Valve cap - 1/4" threaded - Brass (478 in/lbs) 1</td><td></td></t<>	960090T	Valve cap - 1/4" threaded - Brass (478 in/lbs) 1	
4 880830 O-Ring $@15.54x2.62$ 6 5 880581 Plug 1/4" G - Brass O=2 1380690 Plug 1/4" G - NP $\# ★ • \boxtimes 2$ 6 820510 O-Ring $@10.82x1.78$ 2 11 960110 Support ring 3 12 880320 High pressure packing 3 13 1380090 Piston guide 3 14 961240 O-Ring $@31.47x1.78$ 3 15 880330 Gasket 3 16 1383130 Oil seal 3 17 850370 Bolt M8x16 (217in/bs) 8 18 1380050 Closed bearing support 1 19 640030 O-Ring $@59.99x2.62$ 2 20 2280240 Bearing 1 21 1382770 Pump housing 1 23 962010 Nut M8 (106 in/bs) 3 24 962000 Washer $@8.1$ 3 25 1380920 Guiding piston 3 26 138050 Con rod - Aluminum 3 <td>960850T</td> <td>Valve cap - 1/4" threaded - SS (478 in/lbs) 1</td> <td></td>	960850T	Valve cap - 1/4" threaded - SS (478 in/lbs) 1	
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J1380690Plug 1/4" G - NP	4 880830	O-Ring Ø15.54x2.62 6	
J1380690Plug 1/4" G - NP	880581	Plug 1/4" G - Brass O• 2	
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62 1380220 O-Ring Ø72 75x1 78 1	61 621170	Oil seal 1	
	62 1380220	O-Ring Ø72.75x1.78 1	

Pos. Code	Description	Qty.
A 2280140	Hollow shaft ø1	о¤ 1
2280130	Hollow shaft ø1	●∎★ 1
2280590	Hollow shaft ø1	◆ 1
2280600	Hollow shaft ø1	⊠ 1
70 1597	Gas engine flange F24	1
72 1381850	Washer	8
73 820440	Set screw M6x6	1
75 1080401	Back-up ring	3
2289208	Complete pump head	⊙● 1
2289209	Complete pump head	■ 1
2289221	Complete pump head ¤	★ ♦⊠ 1
86 1260250	Oil sight glass	1
87 1260430	Snap ring	1
88 1780690	Contrast disc	1
89 1140450	O-Ring Ø20.24x2.62	1
AR64516	Oil	1
Oil Capa	сіту - 15 оz	

Legend					
ø 18	ø 18	ø 18	ø 18		
For O	For	For 🔶	For 🗵		
RKV3.5G25	RKV4G30A	RKA4.5G32	RKV5.5G40H		
RKV3.5G30	RKV4G30	RKV4.5G40H			
	RKV4G36				
	RKV4G37				
For	For ¤	For ★			
RKV4G32	RKV3.5G35H				
	RKV3.5G40H	RKV4G40H			



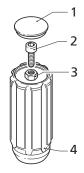
Instructions for Adjusting Gymatic Unloader Valves

Please follow these easy steps to adjust the pressure:

- Step 1: Remove black cap (pos. #1) from knob.
- Step 2: Loosen bolt (pos. #2) with 6mm hex wrench.
- Step 3: Loosen nut (pos. #3) to top of (pos. #2) bolt.
- Step 4: Turn the black knob (pos. #4) clockwise until it stops.
- Step 5: Start machine hold trigger on open position and turn (pos. #2) bolt until no further increase of pressure is noticed, continue to hold trigger open and turn counterclockwise until a slight drop in pressure is felt.
- Step 6: Spin (pos. #3) nut down. While holder (pos. #2) bolt in place with hex wrench, use special tool (AR1560590) Or extended 13mm socket wrench to hand tighten (pos. #3) nut against (pos. #4) black knob.

Step 7: Replace (pos. #1) black cap.

NOTE: Now pressure can be decreased by turning black knob (pos. #4) counterclockwise, but the pressure cannot be increased to a rating higher than what max is set at by technician.



Mounting Bolt Torque SpecificationsInlet354 in/lbs 30 ft/lbsDischarge221 in/lbs 19 ft/lbs



AR1560590 Nut holder for adjusting Gymatic Unloader



Torg	jue Speci	fications	in/lbs:(ft/lb	os)				
	Oil Capacity	Manifold (Head)	Piston Nut	Rear Cover	Side Cover	Valve Cap	Connecting Rods	
		(
RK	15	217/(18)	106/(8.8)	89/(7.5)	217/(18)	478/(40)	N/A	

LIMITED WARRANTY

Annovi Reverberi (A.R.) Cam Shaft Plunger Pumps are warranted for a period of five years and Axial Radial Pumps are warranted for a period of one year to the original purchaser. Electric Pressure Washers are warranted for a period of one year to the original purchaser. This is from the date shipped from factory or U.S. Warehouse. *AR, ArrowLine* and *GF* accessories are warranted for a period of 90 days.

Warranty covers manufacturing defects or workmanship; that may develop under normal use and service in a manner up to the directions and usage recommended by the manufacturer.

Warranty does not apply to misuse or when pump or accessory is altered or used in excess of recommended speeds, pressures, temperatures or handling fluids not suitable for pump or accessory material construction. Warranty does not apply to normal wear (*such as but not limited to: seals/packings, valves, plungers and sealing o-rings*), freight damage, freezing damage or damage caused by parts or accessories not supplied by AR North America, Inc.

Liability of manufacturer for warranty is limited to repair or replacement of parts only at the option of the manufacturer when such products are found to be of original defect or workmanship at the time it was shipped from factory. This warranty is in lieu of all other warranties, expressed or implied, including any warranty of merchantability and of any and all other obligations or liabilities on the part of the manufacturers or equipment.

WARRANTY **R**ETURNS

Items returned for warranty consideration must have a **Returned Merchandise Authorization (RMA)** number. All unauthorized returns will be refused and shipped back to sender. Please fax requests to: 763-398-2009 or e-mail to shop@arnorthamerica.com.

