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.

Description

This plunger pump produces 2.2 GPM up to 2600 PSI. It spins at 3400 RPM in a direct drive system coupled with a gasoline engine. The matching flange provides convenient connection to most 7/8" shaft 5.5 HP engines. The hollow shafted pump includes a built-in pressure control valve, chemical injector, thermal valve and EZ start valve.



Figure 1 - RQW

RQW 3400 rpm D V	ersion	
Model	Max GPM	Max PSI
RQW22G26D-EZ	2.2	2600





Dimensions are in metric

(conversion mm x 0.03922 = in.)



Operating Instructions and Parts Manual

RQW Series Pumps

SPRAY NOZZLE CHART

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
1400	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	PSI	1.00	1.13	1.25	1.38	1.50	1.63	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.50	6.00	6.25	6.50
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	9.0	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 = PSI GPM

HP loss due to altitude = 3% per 1000 FT above sea level

Pump Speed and Flow:

Rated GPM = Desired GPM Rated RPM Desired RPM

Motor Pulley \emptyset = Pump Pulley \emptyset Pump RPM Motor RPM

General Safety Information

MARNINGS

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.

Conversions

Gallons x 3.785412 = Liters Gallons x 128 = Oz. $PSI \times .06896 = Bar$ Bar 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 = $1.8(C^{\circ} + 17.78) = F^{\circ}_{,.555}(F^{\circ} - 32) =$ 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.



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.



Do not exceed the pump specifications 🖭 in speed or pressure.



Maximum water temperature is 140°F.



General Safety Information (continued)

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. (This pump has an unloader already built in).

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.

Special Features

Wet End

Manifold: Die-Cast Aluminum: Strength and no porosity - long life. Higher hydrostatic pressures - safety. Unloader: Integral trap pressure, fixed chemical injector. Simple repair using a cartridge replacement kit. Bolts: Three bolts, 6mm grade 8.8.

Valves: *Poppet and Spring:* 303 series stainless steel. *Valve Seat:* Brass with an external sealing o-ring on both inlet and discharge valves. *Valve Caps:* Machined aluminum.

Packing and Plungers: Single seal system. Seals: "U" cup Buna-N. Support and Guides: Special anti-wear plastic, 1-piece construction to assure proper plunger alignment, maximize packing and seal life and prevent plunger wear and damage. Plungers: Solid hardened stainless steel, strong and durable.

Drive End

Bearings: Oversized ball bearing stabilizes the crankshaft and one needle style thrust bearing absorbs the plunger load and assures long radial plate life.

Crankcase: Precision die-cast. The housing retains the crankshaft bearing, oil seal and rear wobble plate bearing support washer.

Crankshaft/Wobble Plate: Precision diecat to assure proper stroke, duration and alignment.

Oil Seals and O-rings: All are constructed of Buna-N rubber. The oil seals have stainless steel garder springs to assure constant tension on the sealing surface.

Oil Capacity: Sealed system.

Ports: *Inlet Port:* Is supplied with a standard garden hose connection with inlet strainer. *Discharge Port:* Is supplied with M22M connection.

Extra Features

Wet End Repair: Very simple no special tools required.

Design: Using advanced fluid handling design programs. Overall pump efficiency is increased.



Installation

- 1. Install the shaft key into the keyway and apply a light coating of anti-seize on the engine shaft and key.
- 2. Align the two key ways and push the pump completely onto the engine.
- 3. Install all three (3) bolts and tighten evenly.
- 4. Install the appropriate water inlet and discharge fittings.
- 5. Connect the water supply hose and high-pressure discharge hose/spray gun.
- 6. Turn on the water supply.
- 7. Open the spray gun to purge the system of any air.
- 8. Start the engine.
- 9. If necessary adjust the engine speed and unloader valve.

NOTE: When replacing the pump or unloader on a system the unloader will need to be set. A liquid filled pressure gauge is required.

Service Pumps

Servicing the Valves

Discharge Valves: Disassembly:

 Remove the valve cap (See figure 2) (6mm hex socket.



Figure 2

- Inspect the valve cap O-ring for any damage, replace if necessary.
- 3. Using a needle nose pliers remove the valve. pull straight up. (See figure 3)
- Use a small probe Figure 3 to move the poppet up and down to assure that it is functioning properly. Inspect for any debris that may be lodged between the poppet and seat and inspect the valve seat O-ring for any damage.

Assembly:

- 1. Insert the valve assembly squarely into the port pushing down until seated.
- 2. Install the valve cap and torque to the proper specifications.



Service Pumps (Continued)

Inlet Valves: Disassembly:

- 1. Using a 6mm hex socket remove the 3 head bolts.
- 2. Grasp the head and lift straight up to remove. (See figure 4)



NOTE: The packings will not always stay in the head of the pump when it is removed. Sometimes a seal will come out of the head and stay on the plunger. (See figure 5)

Figure 5

- To remove a seal that stay on 3. the plungers simply twist back and forth while pulling up.
- 4. To remove the seals in the head insert screwdriver under seal lip and lift up.
- 5. Using a needle nose pliers remove the valve. Pull straight up. (See figure 6)



6. Use a small probe to move the poppet up and down to assure that it is functioning properly.

Inspect for any debris that may be lodged between the poppet and seat and inspect the valve seat O-ring for any damage..

Assembly:

- 1. Insert the valve assemble squarely into the pump pushing down until seated.
- 2. Place the seal into the head at an angle with the flat side pointed at you. Work the seal into place until completely seated.
- Place the plastic piston guide over the Figure 4 3. piston with the smooth side up..
 - Carefully install the manifold and torque the bolt to the proper specifications. (See Table C or parts breakdown)

Valve life is dependant on many variables. Hard water, cavitation, corrosion, chemicals and equipment care. The valves are a wear item and need periodic replacement. Worn O-rings or damaged valves will cause pressure loss and pulsations.



Servicing the Packings/Seals

Packings: Disassembly:

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

NOTE: It is important to make note of the order in which the components of the packing stack are arranged and facing during disassembly.

- 1. Using a 6mm hex socket remove the 3 head bolts.
- 2. Grasp the head and lift straight up to remove. (See figure 7)



NOTE: The packings will not always stay in the head of the pump when it is removed. Sometimes a seal will come out of the head and stay on the plunger. (See figure 8)



Figure 7

- 3. To remove a seal that stay on the plungers simply twist back and forth while pulling up.
- 4. Remove the seals insert screwdriver under seal lip and lift up.

NOTE: Damage to the piston guides and or the seals may occur during removal. Inspect carefully before reusing any components of the packing stack.

Assembly:

- 1. Install the seal into the head.
- 2. Place the seal into the head at an angle with the flat side pointed at you. Work the seal into place until completely seated.
- 3. Place the plastic piston guide over the piston smooth side up.
- 4. Carefully install the manifold and torque the bolt to the proper specifications.

EZ-Start Valve Service

Disassembly:

1. Remove the 8mm brass plug. (See figure 9)



- Figure 9
- 2. Remove the ball and spring (See figure 10) by turning the head upside down and lighlt tapping on a work surface.



 Clean the ball, spring and head seat (you can use a cotton swab to clean the head seat).

Assembly:

1. Insert the spring followed by the ball, install the brass plug and torque to 35 in. lbs.



Valve life is dependant on many variables. Hard water, cavitation, corrosion, chemicals and equipment care. The valves are a wear item and need periodic replacement. Worn O-rings or damaged valves will cause pressure loss and pulsations.

NOTE: Water seals are wear items. Life of the seals is dependent on many factors. Water seals should be replaced when water leak or a loss of performance is noticed. Prompt replacement of worn seals will insure peak operating performance and trouble free operation. The water seals and their respective components sometimes referred to as the packing stack, will vary slightly between models. The consistancy between models is that the packing stack will consist of the following items:

Piston Guides Low-Pressure Seals High-Pressure Seals

Service Pumps (Continued)

Winter or Long Time Storage

- 1. Drain all of the water out of the pump.
- 2. Run a 50% solution of a RV or nontoxic/biodegradable antifreeze through the pump.
- 3. Flush the pump with fresh water before the next use.

- 4. In freezing conditions failure to do this may cause internal pump damage.
- 5. For long periods of storage in nonfreezing areas the solution will keep the seals and O-rings lubricated.

Torque Ratings Inch Pounds (ft.lbs.)

Head	177 (14)
Valve Cap	177 (14)



Troubleshooting

Symptom		Possible Cause(s)		Corrective Action
Oil leak between crankcase and pumping section		Worn rod oil seals		Replace crankcase piston rod seals
Frequent or premature 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 produces 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, pres- sure 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 unnecessary bends. Do not kink hose
	2	Clogged suction strainer	2	Clean strainer
Low pressure at nozzle	1	Unloader valve is by-passing	1	Make sure unloader is adjusted prop- erty 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 fluctu- ates	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
Low pressure (cont.)	3	Air leak in inlet plumbing	3	Disassemble, reseal and reassemble
	4	Relief valve stuck, partially plugged or improperly ad- justed valve seat worn	4	Clean and adjust relief valve; check for worn or dirty valve seats



Troubleshooting	0			
Symptom		Possible Cause(s)		Corrective Action
	5	Worn packing. Abrasive in pumped in cavitation. Inad- equate 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 leaking 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 ex- cessive 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

Troubleshooting (cont.)



RQW 3400 RPM





Operating Instructions and Parts Manual

RQW Series Pumps

Pos	Code	Description	Qty	Pos	Code	Description	Qty
1	380410	Head bolt TCEI M8x40	(177 in/lbs) 3	37	2840250	Discharge fitting	(221 in/lbs) 1
2	3720770	Head	1	39	2200141	Water seal	3
3	3720750	O-ring Ø 4x1	1	40	770590	O-ring Ø 21.95x1.78	3
4	3720740	Seat	1	41	3720410	Piston guide	3
5	3720760	Spring	1	42	3660340	O-ring Ø 12x2	3
6	1250280	Ball	2	43	3720400	Seal retainer	3
7	1682800	O-ring Ø 6x1.5	1	44	1683500	Piston oil seal	3
8	3720730	Plug	(35 in/lbs) 1	45	3720800	Pump body	1
9	1470210	O-ring Ø 9x1	1	46	3720340	Piston Ø 12	3
10	3720500	Seat	1	47	3720380	Spring	3
11	3720520	Piston	(26.5 in/lbs) 1	48	3720360	Spring retainer	3
12	3720570	O-ring Ø 9x1.5	1	49	3720390	Ring	3
13	394280	O-ring Ø 12.42x1.78	1	50	1980130	Thrust plate	1
14	3720620	Piston guide	(177 lbs) 1	51	1980250	Thrust bearing	1
15	3720580	Back-up ring	1	52	1980240	Thrust washer	1
16	3720560	O-ring Ø 4.5x1.5	1	53	2840780	Wobble plate 13° mark	ied 3 1
17	660190	O-ring Ø 6.07x1.78	1	54	161060	Crankshaft bearing	1
18	3720540	Piston rod	1	55	161050	Circlip Øi 72	1
19	3720660	Spring support	2	56	2840310	Crankshaft oil seal	1
20	3720640	Spring	1	57	3700240	Hose barb Ø8	(35 in/lbs) 1
21	3720681	Adjusting cap	1	58	480480	O-ring Ø 4.48x1.78	1
22	1060120	Nut M6	1	60	1560520	Spring	1
23	392840	Adjusting screw M6x1	6 1	63	3201760	O-ring Ø 4x1.5	2
24	2849053	Complete valve (inlet/	'outlet) 6	64	3720720	Plug	(35 in/lbs) 2
25	770140	O-ring Ø 11.11x1.78	3	65	3720600	Back-up ring	1
26	3720441	Valve cap	(177 in/lbs) 3	66	3700250	O-ring Ø 8x1.1	1
27	2761380	Thermal valve	(141.6 in/lbs) 1	67	3720830	Plug rubber	1
28	2840260	Inlet tube (long)	(221 in/lbs) 1	68	3729201	Head assembly	1
29	1266330	Inlet filter	1	69	2841230	Inlet fitting (short)	1
31	1460431	O-ring Ø 4x2.5	1	70	2841220	Garden hose fitting	3/4"NH 1
32	3700210	Spring	1				
33	3700220	Shutter valve	1				
34	800560	O-ring Ø 8.73x1.78	2				
35	3700200	Chemical injector	1				
36	2840890	O-ring Ø 14x2	2				

Legend

RQW22G26-EZ RQW22G26-EZ-SX



Notes



Torque Specifications in/lbs:(ft/lbs)										
	Oil Capacity	Manifold (Head)	Piston Nut	Side Cover	Valve Cap	EZ Start Cap				
RQW	N/A	177(14)	N/A	N/A	177(14)	35/(2.9)				

LIMITED WARRANTY

Annovi Reverberi (A.R.) Cam Shaft Plunger Pumps are warranted for a period of five (5) years and Axial Radial Pumps are warranted for a period of one (1) year to the original purchaser. Electric Pressure Washers are warranted for a period of one (1) year to the original purchaser. This is from the date shipped from factory or U.S. Warehouse. All 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.

This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

WARRANTY RETURNS

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.





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