

SPRAGUE PRODUCTS AIR DRIVEN HYDRAULIC PUMPS

A variety of hydraulic pumps is offered for various liquid output pressure up to 33,500 psi (2311 bar). Sprague Products pumps service water, oil and most corrosive chemicals, and are rugged, service-proven and virtually maintenance-free.

The Sprague Products positive-displacement type pump converts air inlet pressure to hydraulic output pressure. The pump uses low pressure air to act on a large area piston to produce high hydraulic pressure with a small area piston.

In operation, the pump reciprocates rapidly until the system liquid pressure nears the desired level, then slows to a stop when the liquid pressure equals or balances the air pressure. This liquid-air pressure balance is maintained indefinitely in a holding condition with minimal energy consumption and with no increase in fluid temperature or parts movement.

In contrast, a motor driven pump in a holding condition must continue to operate to maintain a pressure level. Excess liquid must be bypassed or recirculated back to the reservoir, resulting in energy loss, heat build-up, and the need for bypass components and a larger reservoir.

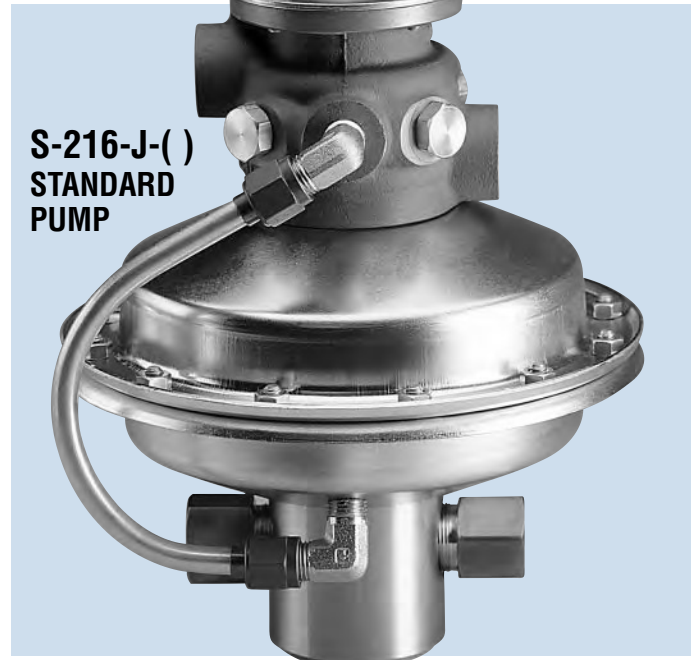
The Sprague Products pump is efficient in operation and simple in design. Compared to other types of hydraulic pumps, it provides cost effective and energy saving benefits for many industrial and research applications.

HYDROSTATIC TESTING APPLICATIONS

The Sprague Products air driven pump offers economical advantages for the pressure testing of hoses, pipes, valves, fittings and other hydraulic vessels and products. The time-saving and performance advantages offered by these pumps allow routine production testing to be converted from tedious hand-pump methods to automatic and precision testing methods.

PRODUCTION MACHINERY APPLICATIONS

The Sprague Products air driven pump delivers high pressure liquids required by production machinery for holding, clamping, forming, shearing, punching, etc. An application example: a hydraulic press where long holding cycles are necessary or where the work stroke is short and a high force is required. High and low volume pumps can be combined to produce a combination of high speed and high force at low cost.



**S-216-J()
STANDARD
PUMP**

NO NEED FOR CENTRAL POWER SOURCE

Because Sprague Products air driven pumps are relatively small, they can be installed directly on individual machines or test equipment in separate locations as direct power sources. Pumps so mounted eliminate need for a central power system, long plumbing runs and excess hydraulic power capacity.

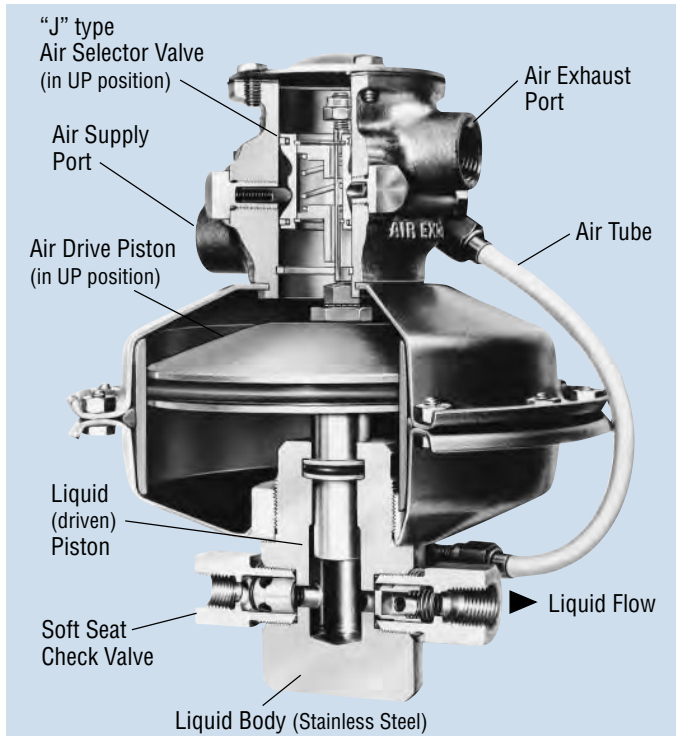
SAFE OPERATION

Unlike motor driven pumps, Sprague Products air driven pumps are non-arcing and non-sparking, and can be used safely in hazardous or confined areas.

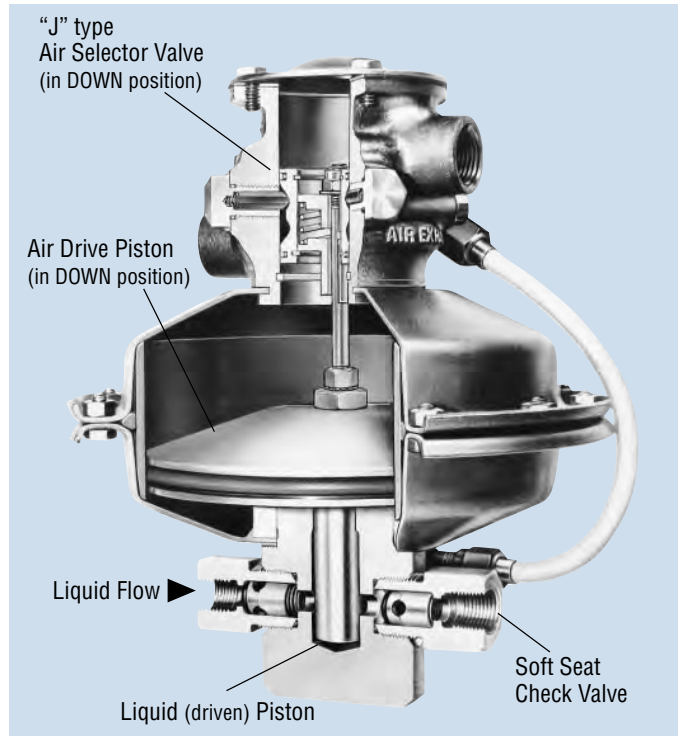
SIMPLER MAINTENANCE

When compared to other air driven pumps, Sprague Products pumps do the same job, but with fewer parts and seals for simpler maintenance.

HOW THE S-216-J AIR DRIVEN PUMP WORKS



PUMP AIR PISTON IN UP POSITION



PUMP AIR PISTON IN DOWN POSITION

HOW THE PUMP WORKS

The Sprague Products pump develops high output pressures by applying the principle of differential areas. The pump has a large area air piston, air driven at low pressures. This air piston drives a small area liquid piston that in turn pumps liquids at high pressures.

The liquid output pressure is determined by the ratio between the area of the air drive piston, the area of the liquid driven piston and the applied operating air pressure.

The area relationship of the air piston to the liquid piston is referred to as the pump ratio. This pump ratio is indicated in the dash number which follows the pump model basic number.

Example: S-216-J-10 pump has an approximate ratio of 10 to 1 or 10 psi liquid pressure for each 1 psi of operating air pressure

In operation, an S-216-J-10 pump using 100 psi of input air pressure will produce a maximum liquid output pressure of

1000 psi; 80 psi air will produce an output pressure of 800 psi; 60 psi air . . . 600 psi output, and 40 psi air . . . 400 psi output.

By regulating the incoming air supply at the pressure regulator, the liquid output can be infinitely adjusted through the pump's pressure range.

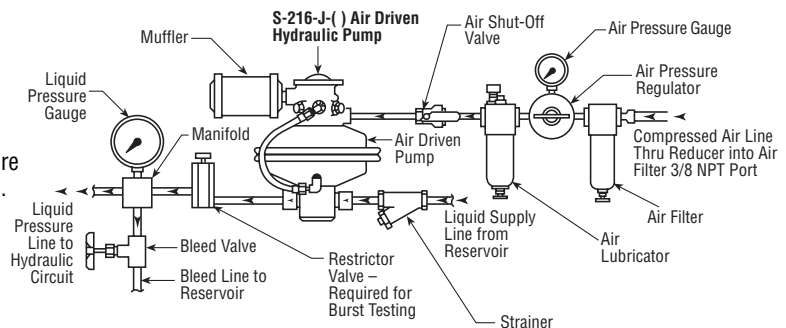
WETTED SECTION MATERIALS

The materials used in the wetted section of the Sprague Products basic pump are compatible to most liquids to be serviced. Pump components and materials include:

Liquid Body	303 Stainless steel
Liquid (driven) Piston	416 Stainless steel chrome plated
Piston O-ring	Nitrile
Piston Back-up Ring	Teflon® or equivalent compound
Check Valve Body	416 Stainless steel
Check Valve Poppet	17-4ph Stainless steel
Check Valve Spring	302 Stainless steel
Check Valve Seal	Nitrile

ACCESSORIES

For optimum efficiency, certain accessories are recommended for use with pump. Noise can be dampened by installing muffler at pump's air exhaust port. For "J" type lubricated pumps, install an air control unit (filter, pressure regulator with air gauge and lubricator) in the supply line. For "JN" type non-lubricated pumps and boosters, install an air control unit (without lubricator) in the air supply line. These and other related accessory items are available from Sprague Products.

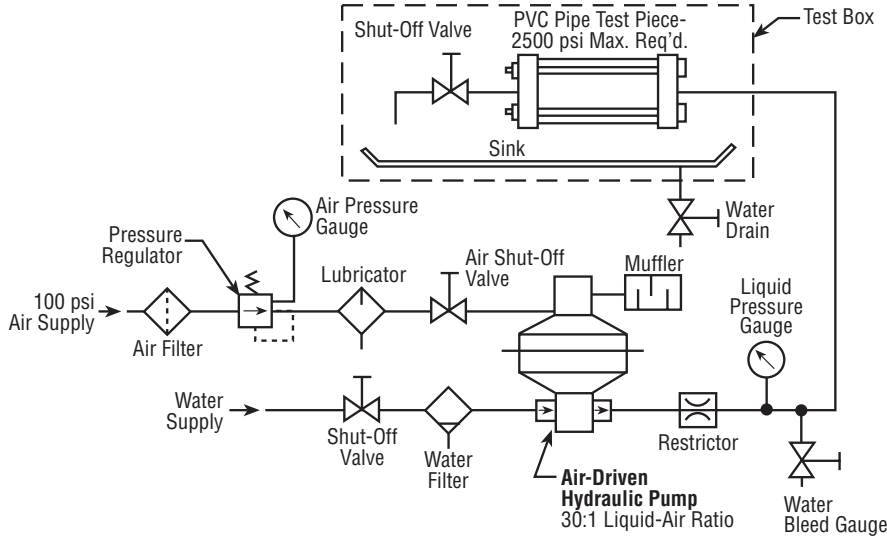
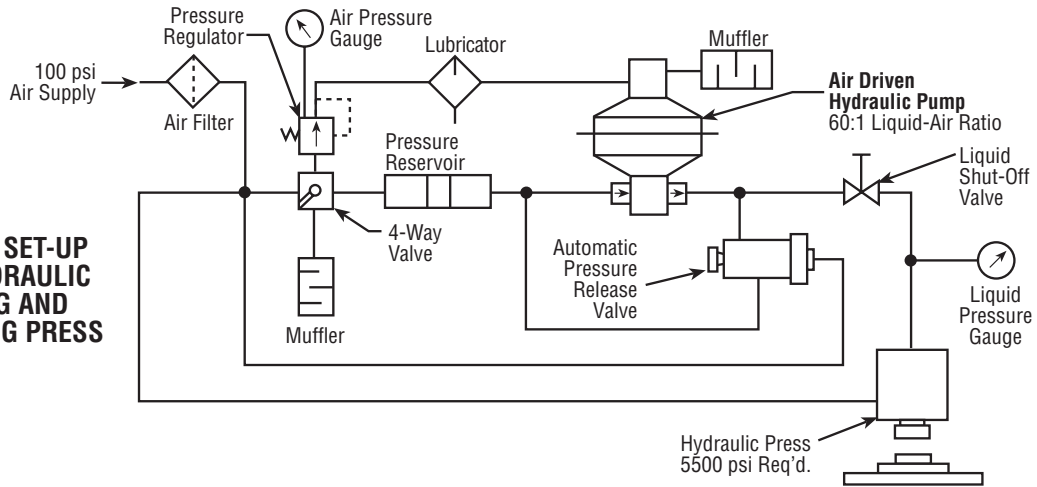


PUMP AND ACCESSORIES — TYPICAL ARRANGEMENT

TYPICAL CIRCUITS FOR SPRAGUE PRODUCTS

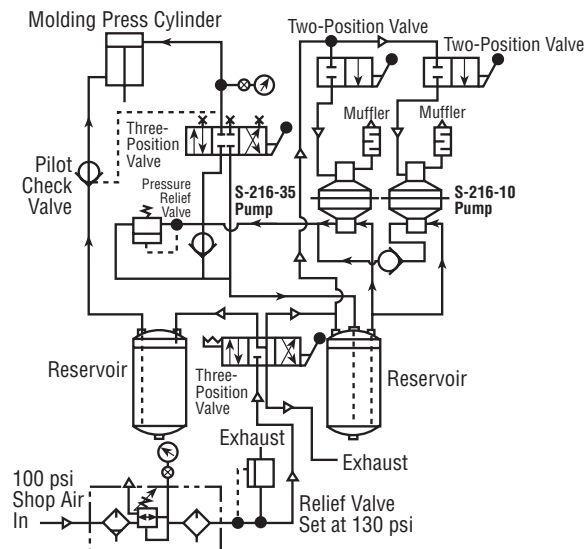
AIR DRIVEN HYDRAULIC PUMPS

TYPICAL SET-UP FOR HYDRAULIC SWAGING AND CRIMPING PRESS



TYPICAL PUMP SET-UP FOR HYDROSTATIC TEST

HIGH-LOW PUMP SYSTEM FOR MOLDING PRESS



HOW TO ORDER PUMPS - MODEL PART NUMBER CODING

MODEL PART NUMBER CODING

The letter “S” preceding the basic part number refers to the manufacturer’s name, Sprague Products. The letter or letters following the part number refer to the model configuration. These letters include:

- J = Standard, lubricated air
- JN = Standard, non-lubricated air
- JD = Double-acting, lubricated air
- JDN = Double-acting, non-lubricated air
- JR = Standard with reservoir, lubricated air
- JNR = Standard with reservoir, non-lubricated air
- JS = Non-contaminating, separated, lubricated air
- JSN = Non-contaminating, separated, non-lubricated air
- S = De-ionized water service, lubricated air
- SN = De-ionized water service, non-lubricated air
- GJC = S-218 pumps

The dash number following the configuration letter or letters refers to the pump or booster nominal pump ratio.

Example: S-216-J-60 = 60:1 pump nominal ratio.

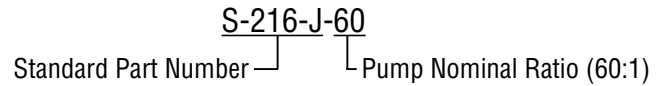
HOW TO ORDER PUMPS

To order a hydraulic pump or power unit, the nominal ratio of the pump must be determined. Knowing the liquid pressure and flow requirements of the application as well as the available air pressure to operate the pump, refer to the Pump Ratio Selection Charts on page 5.

As an example, if the air supply is 100 psi and system requirement is for 1000 psi liquid discharge pressure with a 170 cubic inch per minute flow rate or capacity, the pump nominal ratio indicated on the Chart will be 60:1.

Selection of the “-60” pump means that by adjusting the driving air supply at the pressure regulator, the pump will develop any adjusted liquid output pressure ranging anywhere between 1500 psi and 6100 psi.

Use this pump ratio number as a dash number and add it to the end of the pump model number:

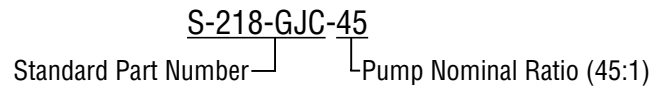


When ordering, specify the quantity required and the liquid service. The standard S-216-J pump has a stainless steel (at no added cost) liquid body and is furnished with nitrile O-rings.

Sprague Products pumps can be furnished with other O-ring materials: Viton®, Neoprene, EPR and other compounds. For questions regarding liquid/seal compatibility, contact Sprague Products for recommendations for the seal compound suited to the application.

Also, when ordering, specify operating temperature range (if known) and any other special conditions applicable.

The “GJC” letter combination is part of the S-218-GJC-() pump basic part number. The dash number, -45 or -65, refers to the pump nominal ratio. **Example:**



PUMPS FOR FREON® SERVICE

Sprague Products pumps can be ordered with minor modifications from the factory to service most liquid Freon refrigerants, solvents and fire extinguishing agents. Suitable seals, compatible to these liquids, are installed in the liquid body and in the inlet and outlet check valves. The pump may require other minor modifications.

When ordering a pump for this special service, specify the exact Dupont designation to be used (i.e., 12, 22, etc.) or the specific designations of other liquids.

PUMP RATIO SELECTION CHART

for the following pump models: S-216-J, S-216-JN, S-216-JS, and S-216-JSN

100 psi Driving Air Supply																		
NOM. RATIO	MAXIMUM OUTPUT PRESSURE	DISPLACEMENT PER STROKE CU. IN.	LIQUID DISCHARGE PRESSURE - psi															
			0	250	500	750	1000	1500	2000	2500	3000	4000	5000	7500	10M	15M	20M	30M
			Capacities - Cubic Inches Per Minute Approximate															
10:1	1000	3.26	485	560	484	324												
20:1	1850	1.75	485	440	400	364	320	212										
30:1	3100	1.04	332	284	268	256	236	208	174	125	42							
35:1	4600	.708	297	238	225	214	200	185	164	142	122	69						
60:1	6100	.527	213	190	186	177	170	154	140	123	107	86	60					
100:1	8800	.366	172	138	132	128	126	118	111	106	98	88	76	53				
125:1	12500	.266	130	122	115	112	110	104	99	94	88	85	75	57	40			
150:1	16000	.205	78	77	76	74	72	68	66	63	60	56	53	44	38	20		
200:1	23750	.132	53	52	50	49	48	47	46	45	43	41	38	34	30	20	9	
300:1	33500	.092	37	36	35	34	33	33	32	31	30	30	29	26	23	18	14	6

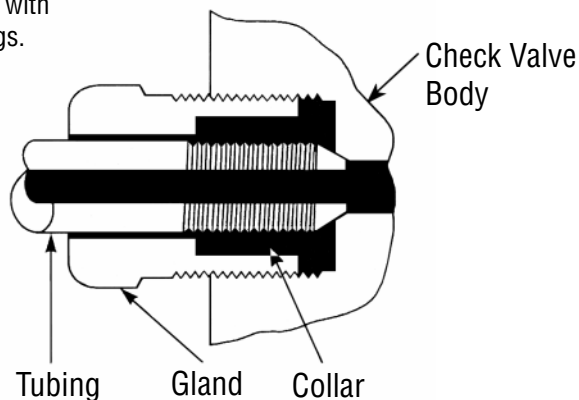
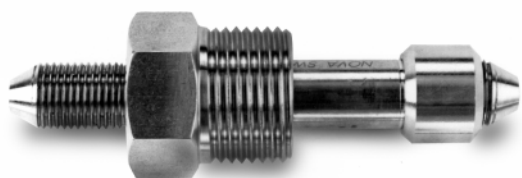
NOMINAL PERFORMANCE (BASED ON OPERATING AIR SUPPLY OF 50 STANDARD CUBIC FEET PER MINUTE @ 100 psi)

6.9 bar Driving Air Supply		METRIC SCALE (equivalent to 100 psi Driving Air Supply)															
NOM. RATIO	V MAXIMUM OUTPUT PRESSURE	LIQUID DISCHARGE PRESSURE - bar															
		0	17	34	48	69	103	138	172	207	276	345	517	689	1034	1379	2068
		Capacities - Liters Per Minute Approximate															
10:1	69	7.9	9.1	7.5	5.3												
20:1	128	7.9	7.2	6.6	6	5.2	3.5										
30:1	214	5.4	4.7	4.4	4.2	3.9	3.4	2.9	2	.7							
35:1	317	4.9	3.9	3.7	3.5	3.3	3	2.7	2.3	2	1.1						
60:1	420	3.5	3.1	3	2.9	2.8	2.5	2.3	2	1.8	1.4	1					
100:1	607	2.8	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.4	1.2	.9				
125:1	862	2.1	2.0	1.7	1.8	1.8	1.7	1.6	1.5	1.4	1.3	1.2	.9	.7			
150:1	1103	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1	1	.9	.9	.7	.6	.3		
200:1	1637	.9	.9	.8	.8	.8	.8	.8	.7	.7	.7	.6	.6	.5	.3	.15	
300:1	2310	.6	.6	.6	.6	.5	.5	.5	.5	.5	.5	.5	.4	.4	.3	.2	.1

NOMINAL PERFORMANCE (BASED ON 1.4 STD. CU. METERS OF DRIVING AIR AT 6.9 bar)

High Pressure Connections

All pumps that are capable of pressures exceeding 10,000 psi are equipped with 9/16-18 NBS outlet check valves that accept coned and threaded tube fittings.



THE S-216-J STANDARD HYDRAULIC PUMP

and S-216-JN Non-Lubricated Pump



S-216-J()

S-216-J() STANDARD PUMP, LUBRICATED

This general use, air driven pump produces medium to high liquid pressures and services oil, water and compatible chemicals.

The Model S-216-J standard pump is offered in ten ratios (area of large air piston to area of small liquid piston) ranging from the 10:1 ratio pump which develops up to 1000 psi (69 bar) to the 300:1 ratio which develops up to 33,500 psi (2311 bar). By regulating the driving air pressure, the pump's liquid output can be adjusted through its pressure range.

The pump's wetted section components are stainless steel, compatible with most non-abrasive liquids.

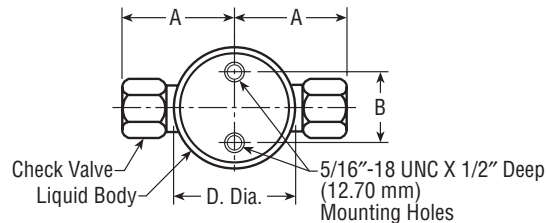
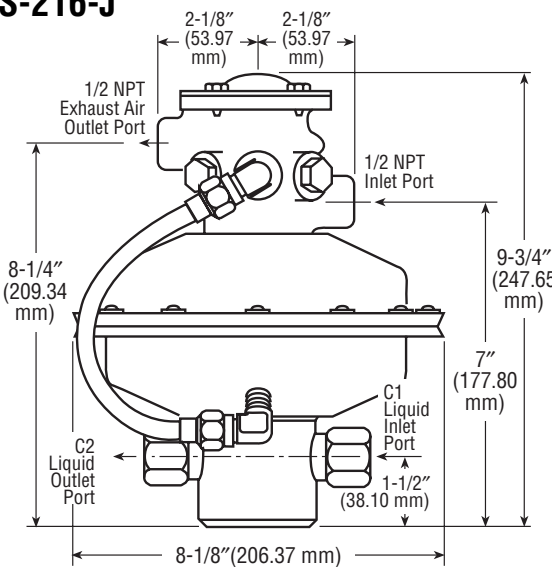
Being air driven, the pump is safe for use in hazardous areas.

The S-216-J standard pump requires lubricated driving air to lubricate the pump's dynamic air seals and other internal parts within the air portion of the pump.

When determining the appropriate pump nominal ratio to order, refer to page 4 & 5, How To Order Pumps and Pump Ratio Selection Chart.

Example: S-216-J-60
 Pump Model Number ——— Pump Nominal Ratio

S-216-J



Nominal Ratio	A		B		C1 Inlet	C2 Outlet	D/Dia.	
	Inch	mm	Inch	mm			Inch	mm
10:1	2-29/32	73.82	2-7/16	61.90	3/8 NPT	3/8 NPT	3-1/2	88.86
20:1	2-29/32	73.82	2-7/16	61.90	3/8 NPT	3/8 NPT	3-1/4	82.51
30:1	2-29/32	73.82	2-7/16	61.90	3/8 NPT	3/8 NPT	3-1/4	82.51
35:1	2-1/4	57.15	1-1/2	38.10	3/8 NPT	3/8 NPT	2-1/2	63.47
60:1	2-1/4	57.15	1-1/2	38.10	3/8 NPT	3/8 NPT	2-1/2	63.47
100:1	2-1/4	57.15	1-1/2	38.10	3/8 NPT	3/8 NPT	2-1/2	63.47
125:1	2-1/4	57.15	1-1/2	38.10	1/4 NPT	9/16-18 NBS	2-1/2	63.47
150:1	2-1/4	57.15	1-1/2	38.10	1/4 NPT	9/16-18 NBS	2-1/2	63.47
200:1	2-1/4	57.15	1-1/2	38.10	1/4 NPT	9/16-18 NBS	2-1/2	63.47
300:1	2-1/4	57.15	1-1/2	38.10	1/4 NPT	9/16-18 NBS	2-1/2	63.47

Pump Model No.	Reference Number	Maximum Output - See Note		Driving Air	Port Threads Liquid		Actual Weight		Shipping Weight	
		psi	bar		Inlet	Outlet	lbs.-oz.	kg	lbs.-oz.	kg
S-216-J-10 S-216-JN-10	79293-11 89842-11	1000	69	1/2 NPT	3/8 NPT	3/8 NPT	16-4	7.4	19	8.6
S-216-JR-10 S-216-JNR-10	91612-11 91613-11	1000	69	1/2 NPT	3/8 NPT	3/8 NPT	24-4	11.0	27-4	12.
S-216-J-20 S-216-JN-20	77894-11 89842-21	1860	128	1/2 NPT	3/8 NPT	3/8 NPT	14-8	6.6	17	7.7
S-216-JR-20 S-216-JNR-20	91612-21 91613-21	1860	128	1/2 NPT	3/8 NPT	3/8 NPT	22-8	10.2	25-8	11.6
S-216-J-30 S-216-JN-30	77894-21 89842-31	3100	214	1/2 NPT	3/8 NPT	3/8 NPT	14-8	6.6	17	7.7
S-216-JR-30 S-216-JNR-30	91612-31 91613-31	3100	214	1/2 NPT	3/8 NPT	3/8 NPT	22-8	10.2	25-8	11.6
S-216-J-35 S-216-JN-35	77895-81 89842-41	4600	317	1/2 NPT	3/8 NPT	3/8 NPT	12-8	5.7	15	6.8
S-216-JR-35 S-216-JNR-35	91612-41 91613-41	4600	317	1/2 NPT	3/8 NPT	3/8 NPT	20-8	9.3	23-8	10.7
S-216-J-60 S-216-JN-60	77895-11 89842-51	6100	420	1/2 NPT	3/8 NPT	3/8 NPT	12-8	5.7	15	6.8
S-216-JR-60 S-216-JNR-60	91612-51 91613-51	6100	420	1/2 NPT	3/8 NPT	3/8 NPT	20-8	9.3	23-8	10.7
S-216-J-100 S-216-JN-100	77895-21 89842-61	8800	607	1/2 NPT	3/8 NPT	3/8 NPT	12-8	5.7	15	6.8
S-216-JR-100 S-216-JNR-100	91612-61 91613-61	8800	607	1/2 NPT	3/8 NPT	3/8 NPT	20-8	9.3	23-8	10.7
S-216-J-125 S-216-JN-125	77895-61001 89842-01001	12500	862	1/2 NPT	1/4 NPT	9/16-18 NBS	12-8	5.7	15	6.8
S-216-JR-125 S-216-JNR-125	90612-01001 91613-01001	12500	862	1/2 NPT	1/4 NPT	9/16-18 NBS	12-8	5.7	15	6.8
S-216-J-150 S-216-JN-150	77895-31001 89842-71001	16,000	1103	1/2 NPT	1/4 NPT	9/16-18 NBS	12-8	5.7	15	6.8
S-216-JR-150 S-216-JNR-150	91612-71001 91613-71001	16,000	1103	1/2 NPT	1/4 NPT	9/16-18 NBS	20-8	9.3	23-8	10.7
S-216-J-200 S-216-JN-200	77985-41001 89842-81001	23,750	1637	1/2 NPT	1/4 NPT	9/16-18 NBS	12-8	5.7	15	6.8
S-216-JR-200 S-216-JNR-200	91612-81001 91613-81001	23,750	1637	1/2 NPT	1/4 NPT	9/16-18 NBS	20-8	9.3	23-8	10.7
S-216-J-300 S-216-JN-300	77985-51001 89842-91001	33,500	2310	1/2 NPT	1/4 NPT	9/16-18 NBS	12-8	5.7	15	6.8
S-216-JR-300 S-216-JNR-300	91612-91001 91613-91001	33,500	2310	1/2 NPT	1/4 NPT	9/16-18 NBS	20-8	9.3	23-8	10.7

NOTE: -125 ratios also offered with 3/8 NPT liquid connections for working pressures under 10,000 psi.

NOTE: Pump maximum output pressure is based on 100 psi (6.9 bar) driving air pressure.

S-216-JN-() STANDARD PUMP, NON-LUBRICATED

Mechanically the same as the S-216-J standard pump, this S-216-JN-() pump is suitable for use in cleanrooms or laboratories. The pump uses normal shop compressed air without lubrication to actuate the pump. Its dynamic air seals are self-lubricating. The pump's exhaust air is identical to the driving air supply, so no additional contaminants are added to the exhaust air. Order in the same manner as the S-216-J and add an "N" to model number.

Example: S-216-JN-60

Pump Model Number ——— Pump Nominal Ratio

S-216-J-()HO HIGH OUTPUT PUMP, LUBRICATED

S-216-JN-()HO HIGH OUTPUT PUMP, NON-LUBRICATED

Mechanically the same as the S-216-J-() or S-216-JN-() pumps, the S-216-()-()HO pumps utilize larger air passageways

to dramatically increase pump speeds. Flows of up to double the standard published flow rates are available with the high output pumps.

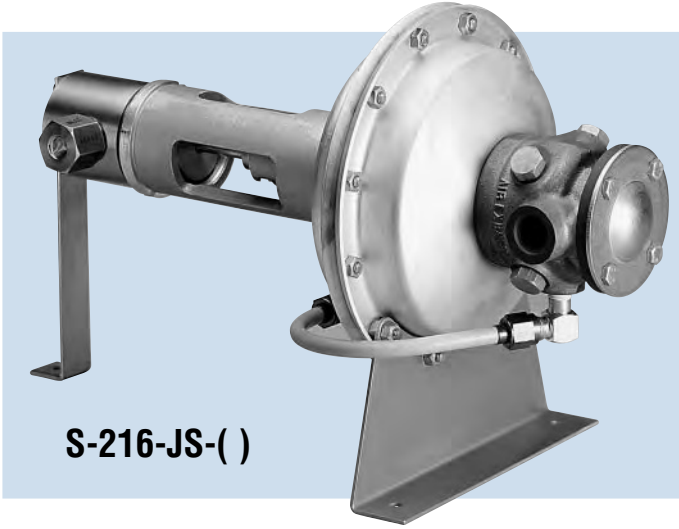
S-216-JR-() STANDARD PUMP/RESERVOIR, LUBRICATED

This pump assembly combines the S-216-J standard pump (lubricated air type) with a one-gallon (3.8 liters) steel reservoir. Readily adaptable to portable power pack use or suitable for stationary use to provide hydraulic power for production machinery or for hydrostatic testing. Available in ten pump ratios.

S-216-JNR-() PUMP/RESERVOIR, NON-LUBRICATED

Same as S-216-JR-() assembly except that the S-216-JN-() standard pump (non-lubricated air type) is used. No additional contaminants are exhausted from the pump. Available in ten pump ratios.

NON-CONTAMINATING PUMPS



S-216-JS-(-)

S-216-JS-(-)—The design feature of this “JS” type pump is the mechanical separation of the liquid portion from the air driven portion of the pump. This allows the pump to service contaminate-free fluids or fluids for human consumption.

Other applications may include liquids for food processing, liquids for atomic energy use, proof testing of pressure vessels such as oxygen and nitrogen bottles, injecting corrosive inhibitors into pipe lines or for other specialized uses.

The mechanical separation prevents undesirable elements or contaminants, normally present in compressed air or lubricants, from contacting the contaminate-free liquid being pumped. The separation also permits removal of the stainless steel liquid body (same body as S-216-J pump) for service or substitution with optional liquid bodies and liquid pistons to change the rated output pressure without disturbing the pump’s driving side. Refer to the Pump Ratio Selection Charts, page 5.

Like the “J” type basic pump, this “JS” pump uses lubricated driving air for the air driven portion of the pump. Mounting brackets are included as part of the pump assembly.

S-216-JSN-(-)—This pump is suitable for cleanroom or laboratory use. It has the same mechanical separation features as the model S-216-JS pump. Additionally, the “JSN” pump uses clean, dry air; thus no contaminants are added to the pump’s exhaust air. The air section of the pump has self-lubricating seals.

	S-216-JS-(-)	S-216-JSN-(-)
<i>Length:</i>	16-1/4 in. (41.3 cm)	16-1/4 in. (41.3 cm)
<i>Width:</i>	8-1/4 in. (21.0 cm)	8-1/4 in. (21.0 cm)
<i>Height:</i>	9 in. (22.8 cm)	9 in. (22.8 cm)
<i>Shipping Weight:</i>		
-10, -20, -30	39 lbs. (17.7 kg)	39 lbs. (17.7 kg)
-35 thru -300	36 lbs. (16.3 kg)	36 lbs. (16.3 kg)

Pump Model Number	Reference Number	Pump Maximum Output (see Note)		Ports		
		psi	bar	Driving Air	Liquid Inlet	Liquid Outlet
S-216-JS-10 S-216-JSN-10	79557-21 90067-11	1000	69	1/2 NPT	3/8 NPT	3/8 NPT
S-216-JS-20 S-216-JSN-20	77896-61 90067-21	1850	128	1/2 NPT	3/8 NPT	3/8 NPT
S-216-JS-30 S-216-JSN-30	77896-71 90067-31	3100	214	1/2 NPT	3/8 NPT	3/8 NPT
S-216-JS-35 S-216-JSN-35	77896-81 90067-41	4600	317	1/2 NPT	3/8 NPT	3/8 NPT
S-216-JS-60 S-216-JSN-60	77896-11 90067-51	6100	420	1/2 NPT	3/8 NPT	3/8 NPT
S-216-JS-100 S-216-JSN-100	77896-21 90067-61	8800	607	1/2 NPT	3/8 NPT	3/8 NPT
S-216-JS-125 S-216-JSN-125	77896-91001 90067-01001	12500	862	1/2 NPT	1/4 NPT	9/16-18 NBS
S-216-JS-150 S-216-JSN-150	77896-31001 90067-71001	16000	1103	1/2 NPT	1/4 NPT	9/16-18 NBS
S-216-JS-200 S-216-JSN-200	77896-41001 90067-81001	23750	1637	1/2 NPT	1/4 NPT	9/16-18 NBS
S-216-JS-300 S-216-JSN-300	77896-51001 90067-91001	33500	2310	1/2 NPT	1/4 NPT	9/16-18 NBS

Note: Pump maximum output pressures at 100 psi (6.9 bar) input driving air. For lower input driving air pressures, refer to Pump Ratio Selection Chart, page 5.

Note: 125 ratios also offered with 3/8 NPT liquid connections for working pressures under 10,000 psi.

