



## **APCO AUTOMATIC PRIMING SYSTEMS FOR CENTRIFUGAL PUMPS**



V-APCO Primer

# V-APCO® Automatic Priming Systems For Centrifugal Pumps

## How the Primer Works

The V-APCO Primer has automatic stop and start to maintain a minimum tank vacuum at all times whether the centrifugal pumps are operating or not.

A vacuum header runs from the V-APCO Primer to the centrifugal pump and a connection made to the Priming Valve mounted on each pump. (See Fig.2).

The vacuum in the primer tank removes air from the pump and suction line via the vacuum header and Priming Valve. Water rises in the suction line and fills the pump. When water reaches the priming valve, the float mechanism closes, preventing water from entering the header.

Should the water level in the pump drop, the priming valve opens and the vacuum function restores the water level. Therefore, the pumps are continuously primed.



## Typical V-APCO Simplex Primer System

One vacuum pump with one driver (electric motor or gas engine). Duplex drive system also available.

## No.1 V-APCO Simplex Primer

One vacuum pump with one driver (electric motor or gas engine). 18" x 36" (457 x 914 mm) Vertical Tank.

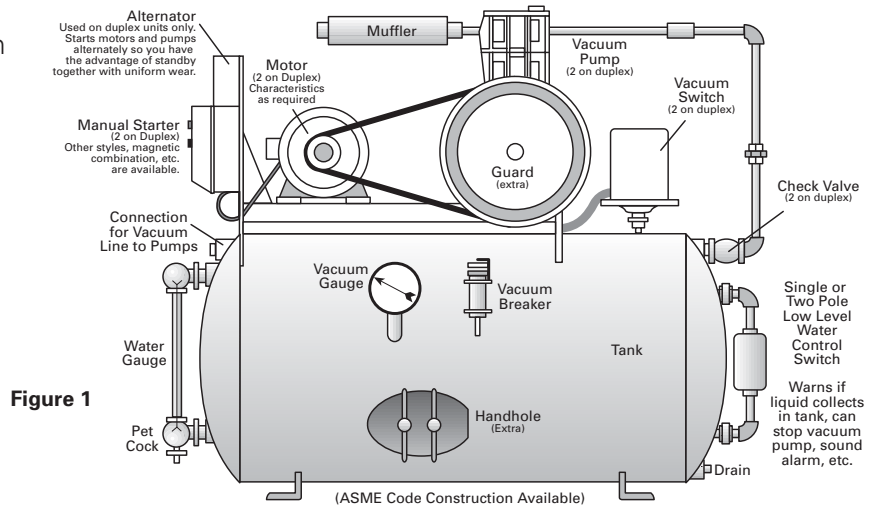


Figure 1

Standard V-APCO Priming System														
Primer Size	Vacuum Pump Displ. ft <sup>3</sup> /m <sup>3</sup> (2 on duplex)	Motor hp/watts (2 on duplex)	Vacuum Tank Size	Apprx. Cap. gal/ltr	Approx. Weight lbs/kg		Approximate Overall Dimensions Add 10" (254 mm) to length for water control switch				Anchor Bolt Plan		Priming Valve Size	Anchor Bolts No.-Size
					Simplex	Duplex	Length	Width Simplex	Width Duplex	Height	A	B		
0	2.5 .07	.25* 186	16x30" 406x762	25 95	150 68	190 86	40" 1016	16" 406	22" 559	30" 762	16" 406	10.25" 260	1" 200AP 25	4 - .5" 4 - 13
1	6 .17	.5 373	18x36" 457x914	40 151	300 136	400 181	36" 914	20" 508	30" 762	58" 1473	14.5" 368	14.5" 368	1" 200AP 25	4 - .5" 4 - 13
2	10 .28	1 746	24x42" 610x1067	80 303	550 249	650 295	55" 1397	28" 711	32" 813	45" 1143	33.5" 851	24" 610	1" 200AP 25	4 - .5" 4 - 13
3	18 .51	1.5 1119	24x42" 610x1067	80 303	600 272	700 318	55" 1397	28" 711	32" 813	45" 1143	33.5" 851	24" 610	2" 200P 50	4 - .5" 4 - 13
3A	30 .85	2 1491	30x48" 762x1219	140 530	900 408	1100 499	60" 1524	30" 762	44" 1118	58" 1473	39.5" 1003	26" 660	2" 200P 50	4 - .5" 4 - 13
4A	45 1.27	3 2237	30x48" 762x1219	140 530	950 431	1150 522	60" 1524	30" 762	44" 1118	62" 1575	39.5" 1003	26" 660	2" 200P 50	4 - .5" 4 - 13
5	60 1.70	5 3728	36x48" 914x1219	200 757	1000 454	1300 590	60" 1524	36" 914	48" 1219	60" 1524	45.5" 1156	26" 660	2" 200P/200P 50	4 - .5" 4 - 13
6	100 2.83	7.5 5593	48x72" 1219x1829	550 2082	1500 680	1800 816	85" 2159	48" 1219	54" 1372	76" 1930	66.5" 1689	36" 914	2" 200P/200P 50	4 - .5" 4 - 13

Inch  
Millimeter

\* Only available in 120 volt

Note: Primer price does not include priming valve. Each pump to be primed requires one priming valve. When sewage is pumped, the #400P Valve is recommended. Use Duplex 200AP or Duplex 200P Priming Valve on the suction manifold if more than four pumps are to be served by primer.

# Priming Valves



1" (25 mm) #200AP V-Apco Single Priming Valve



2" (50 mm) #200P V-Apco Single Priming Valve



2" (50 mm) #200P/200P or 200AP Duplex Priming Valve



1" (25 mm) #2123P Pump Protector

\* Priming Valve with water level control switch

## Location of Primer with Respect to Pumps

The primer may be installed in any position relative to the pumps to be primed — above or below; near or distant.

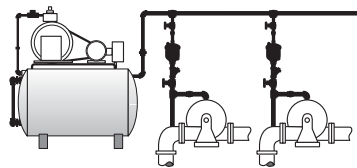
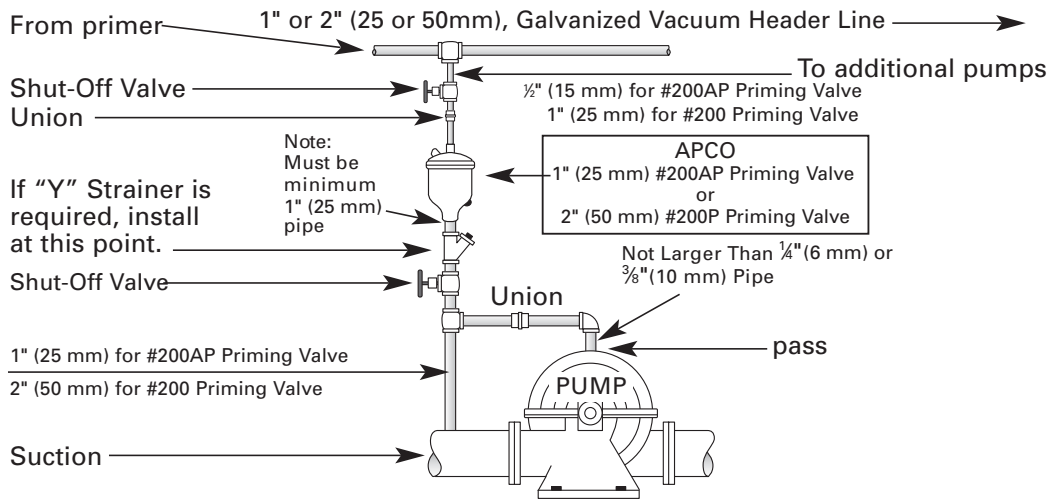


Figure 2



### Installation:

Mount a Priming Valve on top of each pump to be primed, per Fig. 2. Run a vacuum line, 1" (25 mm) if #200AP or 2" (51 mm) if #200P, from the V-APCO primer tank to the pumps with a connection, 1/2" (13 mm) for #200AP and 1" (25 mm) for #200P, to each Priming Valve. Connect power wires to starter on primer. Primer is now ready for operation.

\* Above, Far Right: This arrangement, which is shipped completely assembled as shown, is used to break the motor circuit and prevent the pumps from running if not primed or sound an alarm or light a warning lamp if a pump should lose its prime.

# How to Select a V-APCO Primer

## 1. Table A

Determine the approximate volumetric content in cubic feet of the suction line and pump to be primed. The table below will help you determine the content of the line. The pump content can be estimated.

## 2. Table B

Enter Table B with the volumetric content and select the correct size Primer. If there are five or more pumps on the system, use the next larger size.

## 3. Is a Standby Necessary?

- (a) As protection against mechanical failure, select a Duplex Primer (one with duplicate vacuum pumps, motors and controls) one size smaller than the one selected in Step 2.
- (b) As protection against power failure, select one of the following: A Duplex Primer (same size as found in Step 2) with two vacuum pumps. One driven by an electric motor and one driven by a gasoline engine with a centrifugal clutch, OR a Dual-Drive Primer (same size found in Step 2) with one vacuum pump having an alternate electric motor or gasoline engine drive. This unit takes approximately 15 minutes to start because the drive belt must change from electric-motor pulley to gas-engine pulley. Gas engine drivers are available for both manual and fully automatic stop-start.

## 4. Priming Valves

Each pump in the system requires a priming valve. See Standard V-APCO Priming Systems Table for correct priming valve. Larger systems with a suction manifold should have a Duplex Priming Valve installed on the manifold.

### Table A - Standard

Cubic Feet of Air in Suction Pipe													
Suction Pipe Dia. (inches)	Total Linear Feet of Suction Pipe												
	10	20	30	40	50	75	100	150	200	300	400	500	1000
2	0.23	0.47	0.70	0.93	1.17	1.75	2.33	3.50	4.66	6.99	9.32	11.65	23.30
3	0.51	1.03	1.54	2.05	2.57	3.85	5.13	7.70	10.27	15.40	20.54	25.67	51.34
4	0.88	1.77	2.65	3.54	4.42	6.63	8.84	13.26	17.68	26.52	35.36	44.20	88.40
6	2.01	4.01	6.02	8.03	10.03	15.05	20.06	30.09	40.13	60.19	80.25	100.31	200.63
8	3.47	6.95	10.42	13.90	17.37	26.06	34.74	52.11	69.48	104.22	138.96	173.70	347.41
10	5.48	10.95	16.43	21.90	27.38	41.07	54.76	82.14	109.52	164.28	219.04	273.80	547.60
12	7.85	15.71	23.56	31.42	39.27	58.90	78.64	117.81	157.08	235.62	314.16	392.70	785.40
14	9.58	19.15	28.73	38.30	47.88	71.82	95.75	143.63	191.51	287.26	383.02	478.77	957.54
16	12.68	25.37	38.05	50.74	63.42	95.13	126.84	190.26	253.69	380.53	507.37	634.22	1268.43
18	16.23	32.46	48.69	64.92	81.15	121.72	162.30	243.44	324.59	486.89	649.18	811.48	1622.95
20	20.21	40.42	60.63	80.84	101.06	151.58	202.11	303.17	404.22	606.33	808.44	1010.55	2021.10
24	29.48	58.97	88.45	117.93	147.42	221.12	294.83	442.25	589.66	884.49	1179.32	1474.15	2948.31
30	45.87	91.74	137.61	183.48	229.35	344.02	458.69	688.04	917.39	1376.08	1834.78	2293.47	4586.94
36	64.92	129.84	194.75	259.67	324.59	486.89	649.18	973.77	1298.36	1947.54	2596.72	3245.90	6491.80
42	96.21	192.42	288.63	384.84	481.06	721.58	962.11	1443.17	1924.22	2886.34	3848.45	4810.56	9621.12
48	125.66	251.84	377.99	502.65	628.32	942.48	1256.64	1884.95	2513.27	3769.91	5026.54	6286.18	12566.36
54	159.04	318.09	477.13	636.17	795.21	1192.82	1590.43	2385.64	3180.86	4771.29	6361.72	7952.15	15904.30
60	196.35	392.70	589.05	785.40	981.75	1472.62	1963.49	2945.24	3926.99	5890.48	7853.98	9817.47	19634.94
66	237.58	475.17	712.75	950.33	1187.91	1781.87	2375.83	3563.74	4751.65	7127.48	9503.31	11879.14	23758.27
72	282.74	565.49	848.23	1130.97	1413.72	2120.57	2827.43	4241.15	5654.86	8482.29	11309.72	14137.16	28274.31
84	384.84	769.69	1154.53	1539.38	1924.22	2886.34	3848.45	5772.67	7696.90	11545.34	15393.79	19242.24	38484.48
96	502.65	1005.31	1507.96	2010.62	2513.27	3769.91	5026.54	7539.82	10053.09	15079.63	20106.18	25732.72	50265.44
108	636.17	1272.34	1908.52	2544.69	3180.86	4771.29	6361.72	9542.58	12723.44	19085.16	25446.88	31808.60	63617.20

# Table A - Metric

Cubic Meters of Air in Suction Pipe													
Suction Pipe Dia. (mm)	Total Linear Meters of Suction Pipe												
	3	6	9	12	15	23	30	46	61	91	122	152	305
51	.007	.013	.020	.026	.033	.050	.066	.099	.132	.198	.264	.330	.660
76	.014	.029	.044	.058	.073	.109	.145	.218	.291	.436	.582	.727	1.45
102	.025	.050	.075	.100	.125	.188	.250	.375	.501	.751	1.00	1.25	2.50
152	.057	.114	.170	.227	.284	.426	.568	.852	1.14	1.70	2.27	2.84	5.68
203	.098	.197	.295	.394	.492	.738	.984	1.48	1.97	2.95	3.93	4.92	9.84
254	.155	.310	.465	.620	.775	1.16	1.55	2.33	3.10	4.65	6.20	7.75	15.51
305	.222	.445	.667	.890	1.11	1.67	2.23	3.34	4.45	6.67	8.90	11.12	22.24
356	.271	.542	.814	1.08	1.36	2.03	2.71	4.07	5.42	8.13	10.85	13.56	27.11
406	.359	.718	1.08	1.44	1.80	2.69	3.59	5.39	7.18	10.78	14.37	17.96	35.92
457	.460	.919	1.38	1.84	2.30	3.45	4.60	6.89	9.19	13.79	18.38	22.98	45.96
508	.572	1.14	1.72	2.29	2.86	4.29	5.72	8.58	11.45	17.17	22.89	28.62	57.23
610	.835	1.67	2.50	3.34	4.17	6.26	8.35	12.52	16.70	25.05	33.39	41.74	83.49
762	1.30	2.60	3.90	5.20	6.49	9.74	12.99	19.48	25.98	38.97	51.96	64.94	129.89
914	1.84	3.68	5.51	7.35	9.19	13.79	18.38	27.57	36.77	55.15	73.53	91.91	183.83
1067	2.72	5.45	8.17	10.90	13.62	20.43	27.24	40.87	54.49	81.73	108.98	136.22	272.44
1219	3.56	7.13	10.68	14.23	17.79	26.69	35.58	53.38	71.17	106.75	142.34	178.00	355.84
1372	4.50	9.01	13.51	18.01	22.52	33.78	45.04	67.55	90.07	135.11	180.14	225.18	450.36
1524	5.56	11.12	16.68	22.24	27.80	41.70	55.60	83.40	111.20	166.80	222.40	278.00	556.00
1676	6.73	13.46	20.18	26.91	33.64	50.46	67.28	100.91	134.55	201.83	269.10	336.38	672.76
1829	8.01	16.01	24.02	32.03	40.03	60.05	80.06	120.10	160.13	240.19	320.26	400.32	800.64
2134	10.90	21.80	32.69	43.59	54.49	81.73	108.98	163.46	217.95	326.93	435.90	544.88	1089.76
2438	14.23	28.47	42.70	56.93	71.17	106.75	142.34	213.50	284.67	427.01	569.34	728.67	1423.36
2743	18.01	36.03	54.04	72.06	90.07	135.11	180.14	270.22	360.29	540.43	720.58	900.72	1801.44

# Table B

Volumetric Content of System Cubic Feet/Cubic Meters	Size of Primer
10 - 25 .28 - .71	0
25 - 50 .71 - 1.4	1
50 - 100 1.4 - 2.8	2
100 - 200 2.8 - 5.7	3
200 - 350 5.7 - 9.9	3A
350 - 500 9.9 - 14.2	4A
500 - 1000 14.2 - 28.3	5
over 1000 over 28.3	6

## Priming Pumps Handling Volatiles, Acids, Sea Water, Etc.

**Volatiles:** V-APCO Primers are available with explosion proof equipment for handling volatile liquids

**ACIDS, Sea Water, Etc:** A standard V-APCO Primer is perfect. The priming valve must be furnished with proper trim for the liquid involved. We keep a wide variety of trim in stock.

**Outdoor locations:** Weatherproof V-APCO Primers are available.

**Sewage:** The standard V-APCO Primer can be used for sewage, however #400P sewage priming valves must be used instead of standard priming valves.

# Specifications for Typical V-APCO Priming System

The following specification is recommended for the Priming System: Primer and Priming Air Valves to be one source of manufacture to guarantee start-up, spare parts and future operational maintenance.

The design engineer is invited to furnish APCO the pump station profile and our engineering department will recommend the correct size V-APCO Priming System.

## Example:

The Priming System complete with Priming Air Valves must be from one manufacturer to guarantee single source responsibility to the engineer/owner for start-up, spare parts and future operational maintenance.

Furnish a complete size \_\_\_\_\_ V-APCO Priming System, Simplex or Duplex (select one), to automatically prime a quantity of \_\_\_\_\_ centrifugal pumps, as shown on the plan drawings. The priming system shall be constructed for continuous use, and include a heavy steel tank, designed to withstand collapse from a perfect vacuum. The vacuum tank shall have minimum  $\frac{3}{16}$ " (5mm) thick shell and heads including a  $\frac{1}{16}$ " (2 mm) corrosion allowance.

The Priming System shall include: dry reciprocating piston type vacuum pump(s), motor(s), vacuum switches, priming air valves, vacuum gauge, water gauge, automatic vacuum relief valve, water level control switch, warning horn or light (select one), magnetic starters with H.O.A. switches and 110V transformer and alternator (for Duplex only). The priming system will be a single tank, mounted unit, complete with OSHA belt guards. It includes assembly, wiring and priming air valves. The unit(s) will be pre-tested at our factory and shipped for immediate installation. The vacuum pump shall have a rated displacement of \_\_\_\_\_ cubic feet of air. One Automatic Priming Air Valve shall be furnished for each pump to be primed, as shown on submittal drawings.

The Priming Air Valves shall be installed in strict accordance with APCO specifications. The complete system including the Priming Air Valves are to be APCO. An operating instruction and maintenance manual published by APCO will be submitted to the design engineers for approval prior to bidding.

Priming System must include field inspection of the installation and witness of start-up by APCO.

The following optional features are available (Engineer to specify):

Gasoline engine for power failure protection, explosion proof equipment for hazardous area, ASME Code constructed vacuum tank, galvanized tank with hand holes.

The Priming System shall be V-APCO as manufactured by DeZURIK, Inc., Sartell, Minnesota, U.S.A.



## **Sales and Service**

For information about our worldwide locations, approvals, certifications and local representative:

Web Site: [www.dezurik.com](http://www.dezurik.com) E-Mail: [info@dezurik.com](mailto:info@dezurik.com)



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