

Fluid Power Products, Including Aerospace: 2002

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SUMMARY OF FINDINGS

In 2002, fluid power product manufacturers, including aerospace, had shipments of \$10,101.9 million, a decrease of 5.2 percent, from \$10,652.3 million reported in 2001.

Hydraulic and pneumatic valves decreased 6.2 percent to \$2,736.4 million in 2002, from \$2,918.6 million in 2001. Fittings and assemblies for tubing and hose, excluding plumbers' brass goods, decreased 9.1 percent to \$2,148.4 million in 2002, from \$2,364.6 million in 2001. Hydraulic and pneumatic cylinder, actuators, accumulators, cushions, and nonvehicular shock absorbers decreased by 3.4 percent to \$2,725.4 million in 2002, from \$2,822.5 million in 2001. Compressed air and gas dryers and lubricators increased 14.0 percent to \$67.0 million in 2002, from \$77.9 million in 2001. Filters of hydraulic and pneumatic systems decreased 3.34 percent to \$531.4 million in 2002, from \$549.9 million in 2001. Hydraulic and pneumatic pumps, motors, and hydrostatic transmission components decreased 1.3 percent to \$1,893.3 million in 2002, from \$1,918.7 million in 2001.

For general CIR information, explanation of general terms and historical note, see the appendix.

Address inquiries concerning these data to Primary Goods Industries Branch, Manufacturing and Construction Division (MCD), Washington, DC 20233-6900, or call Jazmin Rose, 301-763-6210.

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Table 1. Value of Shipments of Fluid Power Products, Including Aerospace: 2002 and 2001
 [Value in thousands of dollars]

Product code	Product description	2002		2001
	Fluid power products, including aerospace.....	10,101,871		10,652,281
3329125	Nonaerospace-type hydraulic directional control valves.....	384,094		421,651
3329127	Nonaerospace-type hydraulic valves (except directional control).....	667,884	r/	752,394
3329129	Nonaerospace-type pneumatic directional control valves.....	503,584		470,301
332912B	Nonaerospace-type pneumatic valves (except directional control).....	215,888		214,266
3329121	Aerospace-type hydraulic fluid power valves.....	381,848	r/	405,251
3329123	Aerospace-type pneumatic fluid power valves.....	335,380	r/	401,406
332912D	Parts for fluid power valves.....	247,747	r/	253,355
332912H	Nonaerospace-type flared (metal) fittings and couplings for, and assemblies of tubing used in fluid power transfer systems.....	243,578		246,257
332912J	Nonaerospace-type flareless fittings and couplings, including non- metal fittings, used in fluid power transfer systems.....	367,869	r/	415,966
332912L	Nonaerospace-type hydraulic and pneumatic fittings and couplings for hose, and manifolds.....	708,570		776,698
332912N	Nonaerospace-type hydraulic and pneumatic assemblies of hose.....	311,207		325,782
332912F	Aerospace-type hydraulic and pneumatic hose or tube end fittings and assemblies and manifolds.....	517,134		599,886
3339993	Nonaerospace-type filters for hydraulic fluid power systems.....	302,236	r/	325,305
3339994	Nonaerospace-type filters for pneumatic fluid power systems.....	138,436		133,733
3339996	Aerospace-type hydraulic and pneumatic filters.....	90,761		90,863
3339998 pt.	Compressed air and gas dryers, and lubricators.....	67,030		77,969
3339951	Nonaerospace-type hydraulic fluid power cylinders and actuators, linear and rotary.....	925,514		992,427
3339953	Nonaerospace-type pneumatic fluid power cylinders and actuators, linear and rotary.....	427,734	r/	428,298
3339955	Parts for nonaerospace-type hydraulic and pneumatic fluid power cylinders, actuators, and related items, n.e.c.	323,426		370,333
3339957	Aerospace-type fluid power cylinders and actuators, hydraulic and pneumatic.....	1,048,698		1,031,402
3339961	Nonaerospace-type reciprocating pumps.....	573,093		534,791
3339963	Nonaerospace-type rotary and other fluid power pumps.....	297,438		310,448
3339965	Nonaerospace-type fluid power motors.....	446,627	r/	471,604
3339967	Aerospace-type fluid power pumps and motors.....	205,940		217,783
3339969	Parts for fluid power pumps, motors, and hydrostatic transmissions.....	370,155		384,112

n.e.c. Not elsewhere classified. pt. Part. r/Revised by 5 percent or more from previously published data.

Table 2. Manufacturers' Shipments of Fluid Power Products, Including Aerospace by Type: 2002 and 2001
 [Quantity in units. Value in thousands of dollars]

Product code	Product description	No. of cos.	2002		No. of cos.	2001	
			Quantity	Value		Quantity	Value
	Fluid power products, including aerospace.....	(X)	(X)	10,101,871	(X)	(X)	10,652,281
3329125	Nonaerospace-type hydraulic directional control valves.....	(X)	8,477,419	384,094	(X)	9,629,669	421,651
	Manual:						
3329125110	3- and 4-way monoblock.....	26	709,583	64,364	28 r/	727,389 r/	62,791
3329125120	3- and 4-way sectional.....	16	(D)	(D)	17	(D)	(D)
3329125130	Other manual.....	8	(D)	3,095	8	(D)	8,007
	Solenoid:						
3329125140	2-way types.....	12	(D)	(D)	12	(D)	(D)
3329125150	3- and 4-way types.....	21	656,845	80,003	22 r/	689,439 r/	79,034
3329125160	Other directional control.....	31	(D)	53,109	33	2,998,466 r/	68,853
3329127	Nonaerospace-type hydraulic valves (except directional control).....	(X)	17,096,463	667,884	(X)	19,018,706 r/	752,394
	Pressure control:						
3329127110	Relief valves.....	25	2,122,330	26,451	26	2,369,007	27,788
3329127120	Other, including load sensing and manual types.....	13	(D)	20,934	15	(D)	23,274
	Flow control:						
3329127130	Manual types.....	17	1,934,602	27,059	19 r/	2,022,614	29,655
3329127140	Other flow control valves.....	17	1,125,800	38,153	19 r/	902,778 r/	44,129
3329127150	Cartridge valves (all types).....	21	8,895,378	216,630	24	10,385,789	256,296
	Electrohydraulic valves:						
3329127160	Pilot-operated, torque motor servovalves.....	7	(D)	80,560	6	(D)	99,124
3329127170	Other types, including proportional.....	12	223,947	74,756	12 r/	212,939	60,156
3329127180	Other nonaerospace-type hydraulic valves, including stack and logic.....	17	1,041,682	183,341	19 r/	1,117,404	211,972
3329129	Nonaerospace-type pneumatic directional control valves.....	(X)	18,174,753	503,584	(X)	17,337,426	470,301
3329129110	Manual.....	32 b/	4,561,398 b/	84,691	34 b/	4,041,677 a/	71,464
	Solenoid:						
3329129120	Under 1/8 inch port diameter.....	12	4,294,492	94,206	11	3,817,532	76,317
	1/8 inch up to and including 1/4 inch port diameter:						
3329129130	3-way types.....	20 a/	2,213,746 a/	50,886	22 a/	2,374,383 a/	53,137
3329129140	4-way types.....	21	3,379,911	119,974	22	3,097,934	111,505
	Over 1/4 inch port diameter:						
3329129150	3-way types.....	18	602,599	38,251	20	(D)	r/ 39,810
3329129160	4-way types.....	18	1,253,845	73,594	19	1,205,917	r/ 69,522
3329129170	All other types.....	4	58,899	5,991	4	(D)	r/ 5,625
3329129180	Mechanical, remote pilot, and all other types.....	23 b/	1,809,863 a/	35,991	25 b/	2,221,485 a/	42,921
3329129	Nonaerospace-type pneumatic directional control valves.....	(X)	10,527,712	215,888	(X)	10,638,911	214,266
332912B110	Filter-regulator combination units, integral types.....	10	1,109,323	22,293	12	961,570 r/	18,021
332912B120	Other FRs and filter-regulator-lubricator combo units.....	10	124,062	8,249	12 r/	192,919 r/	10,523
332912B130	Regulators, sold separately.....	15	2,602,021	56,436	16	2,655,854	57,559
332912B140	Flow control valves.....	23	3,997,156	86,944	25	4,013,315	83,136
332912B150	Check, shuttle, exhaust, needle, and all other types.....	28 a/	2,695,150 a/	41,966	29 r/	2,815,253	45,027
3329121	Aerospace-type hydraulic fluid power valves.....	(X)	1,553,783	381,848	(X)	1,580,876 r/	405,251
	2-, 3-, and 4-way directional control valves:						
3329121110	Manually or mechanically operated.....	16	(D)	90,857	16	(D)	85,546
3329121120	Solenoid operated.....	21 b/	118,421 b/	69,839	21 r/	118,630	71,965
3329121130	Motor operated.....	8	(D)	9,623	7	(D)	10,712
3329121140	Electrohydraulic servovalves.....	7	90,038	108,818	8 r/	101,050 r/	117,094
3329121150	Flow, pressure, and other types of hydraulic valves.....	25	384,854	102,711	25 r/	470,369 r/	119,934
3329123	Aerospace-type pneumatic fluid power valves.....	(X)	345,776	335,380	(X)	427,039 r/	401,406
3329123110	Pneumatic valves (all types).....	22 a/	345,776 a/	335,380	22 a/r/	427,039 r/	401,406
332912D	Parts for fluid power valves.....	(X)	(X)	247,747	(X)	(X)	r/ 253,355
332912D110	Parts for nonaerospace-type hydraulic and pneumatic valves, sold separately.....	58	(X) b/	193,646	58	(X)	r/ 198,358

Continued

Table 2. Manufacturers' Shipments of Fluid Power Products, Including Aerospace by Type: 2002 and 2001
 [Quantity in units. Value in thousands of dollars]

Product code	Product description	No. of cos.	2002		2001		
			Quantity	Value	Quantity	Value	
332912D120	Parts for aerospace type hydraulic and pneumatic valves, sold separately.....	21	(X) a/	54,101	22	(X) r/	54,997
332912H	Nonaerospace-type flared (metal) fittings and couplings for, and assemblies of tubing used in, fluid power transfer systems.....	(X)	(X)	243,578	(X)	(X)	246,257
	Flared fittings:						
332912H110	Brass and bronze (SAE 45 degrees and 37 degrees).....	13	(X)	57,896	13	(X)	52,396
332912H120	Carbon steel (JIC 37 degrees).....	13	(X)	85,377	12	(X)	86,423
332912H130	Other, including alloy steel.....	15	(X) c/	44,139	15	(X) r/	47,522
332912H140	Assemblies of tubing.....	12	(X)	31,337	11	(X)	32,514
332912H150	Assemblies of tubing and hose.....	7	(X)	24,829	7	(X)	27,402
332912J	Nonaerospace-type flareless fittings and couplings, including nonmetal fittings, used in fluid power transfer systems.....	(X)	(X)	367,869	(X)	(X) r/	415,966
	Metal types:						
332912J110	Brass and bronze.....	21	(X)	82,089	21	(X)	86,197
332912J120	Carbon steel.....	14	(X)	68,378	13	(X)	67,852
332912J130	Stainless steel.....	12	(X) (D)	(D) 14	(X)	(X) (D)	(D)
332912J140	Other, including alloy steel.....	7	(X) (D)	(D) 7	(X)	(X) (D)	(D)
332912J150	Nonmetal fittings, including plastic.....	10	(X)	3,317	10	(X)	3,832
332912L	Nonaerospace-type hydraulic and pneumatic fittings and couplings for hose, and manifolds.....	(X)	(X)	708,570	(X)	(X)	776,698
332912L110	Permanent hose end fittings (crimped and swaged).....	24	(X)	313,792	25	(X)	330,555
332912L120	Hydraulic and pneumatic reusable end fittings.....	29	(X)	102,693	30	(X) r/	111,427
332912L130	Hydraulic quick connect and disconnect couplings.....	20	(X)	120,891	21	(X) r/	138,630
332912L140	Pneumatic quick connect and disconnect couplings.....	24	(X) a/	67,818	27	(X) r/	74,032
332912L150	Manifolds and manifold assemblies for fluid power systems.....	22	(X)	65,019	21	(X) r/	75,171
332912L160	All other, including steel adaptor, swivel, rotating, and extension fittings.....	22	(X)	38,357	23	(X)	46,883
332912N	Nonaerospace-type hydraulic and pneumatic assemblies of hose.....	(X)	(X)	311,207	(X)	(X)	325,782
332912N110	Assemblies with permanent end fittings.....	22	(X)	262,493	23	(X)	271,503
332912N120	Assemblies with reusable end fittings.....	10	(X)	48,714	10	(X) r/	54,279
332912F	Aerospace-type hydraulic and pneumatic hose or tube end fittings and assemblies and manifolds.....	(X)	(X)	517,134	(X)	(X)	599,886
332912F110	Assemblies of hose and/or tubing.....	15	(X) (D)	(D) 15	(X)	(X) (D)	(D)
332912F120	Quick connect, rotating, swivel, and extension fittings.....	11	(X)	166,787	11	(X)	200,429
332912F130	Manifolds for aerospace hydraulic systems.....	4	(X) (D)	(D) 5	(X)	(X) (D)	(D)
332912F140	Aerospace hose and tube fittings, n.e.c.	16	(X)	163,429	15	(X)	185,207
3339993	Nonaerospace-type filters for hydraulic fluid power systems.....	(X)	(X)	302,236	(X)	(X) r/	325,305
	Hydraulic fluid filter assemblies, with or without filter element installed:						
3339993010	Low pressure (below 301 psi).....	20 b/	676,513 a/	21,876	20	706,157	25,239
3339993020	Medium pressure (301 to 2,999 psi).....	14 c/	605,782 c/	27,036	15	628,680 r/	29,138
3339993030	High pressure (3,000 psi and above).....	12	139,581	27,209	12	141,570 r/	30,510
	Filter replacement elements:						
3339993040	Reusable (cleanable) type.....	12 b/	592,571 b/	14,553	13	927,840 r/	17,082
3339993050	Nonreusable type.....	24 b/	15,720,160 b/	175,203	25	16,827,321	183,679
3339993060	Strainers and separators, filter parts, and accessories.....	16	(X) a/	36,359	18	(X) r/	39,657
3339994	Nonaerospace-type filters for pneumatic fluid power systems.....	(X)	(X)	138,436	(X)	(X)	133,733

Continued

Table 2. Manufacturers' Shipments of Fluid Power Products, Including Aerospace by Type: 2002 and 2001
 [Quantity in units. Value in thousands of dollars]

Product code	Product description	No. of cos.	2002		No. of cos.	2001	
			Quantity	Value		Quantity	Value
3339994010	Air supply filter assemblies and filter replacement elements, excluding those shipped as part of a FR or FRL combo unit: Coalescing types, including elements sold separately.....	18	(X) c/	66,705	18	(X)	61,430
3339994020	Other types, including elements sold separately.....	11	(X)	31,004	12	(X) r/	35,573
3339994030	Air exhaust mufflers, diffusers, filter parts, and air preparation accessories.....	16	(X)	40,727	19	(X)	36,730
3339996	Aerospace-type hydraulic and pneumatic filters.....	(X)	(X)	90,761	(X)	(X)	90,863
3339996010	Hydraulic.....	8	(X) a/	67,104	8	(X)	(D)
3339996020	Pneumatic.....	7	(X)	23,657	5	(X)	(D)
3339998 pt.	Compressed air and gas dryers, and lubricators.....	(X)	318,017	67,030	(X) r/	589,460	77,969
3339998872	Compressed air and gas dryers: Refrigerated dryers.....	3	(D)	(D)	4	(D)	(D)
3339998874	Dessicant dryers.....	5	13,809	26,381	5 r/	14,675 r/	27,025
3339998879	Other compressed air and gas dryers.....	3	(D)	(D)	4	(D)	(D)
3339998880	Lubricators for pneumatic systems, sold separately.....	7	223,012	(D)	8	461,965	12,211
3339951	Nonaerospace-type hydraulic fluid power cylinders and actuators, linear and rotary.....	(X)	3,817,611	925,514	(X)	4,720,078	992,427
	Hydraulic cylinders, excluding electrohydraulic: Tie-rod types:						
	Standard NFPA and JIC tie-rod types:						
3339951110	Less than 1,500 psi.....	20	200,866	(D)	21	227,120	46,125
3339951120	1,500 to 3,000 psi.....	18	193,939	67,478	19	253,452	76,713
3339951130	Greater than 3,000 psi.....	6 c/	(D) c/	(D)	6 c/	(D)	(D)
3339951140	Other tie-rod types.....	14	249,914	27,370	15	286,074 r/	31,985
3339951150	Threaded/weld fused combination.....	45	2,488,893	506,024	46	2,606,619 r/	569,135
3339951160	Telescoping.....	22	345,960	106,176	23 r/	329,138 r/	121,272
3339951170	Mill type.....	11	(D)	20,542	11	(D)	23,552
3339951180	Other, including those threaded at both ends.....	16	229,832 a/	32,135	16 r/	226,749 a/r	32,876
3339951190	Electrohydraulic types.....	8	5,260	(D)	9	(D)	(D)
33399511A0	Hydraulic rotary actuators.....	12	51,870	55,008	12	61,231 r/	58,113
3339953	Nonaerospace-type pneumatic fluid power cylinders and actuators, linear and rotary.....	(X)	5,747,327	427,734	(X)	5,431,801 r/	428,298
	NFPA interchangeable cylinders:						
3339953110	Steel.....	15	233,045	59,207	17	274,107	66,109
	Aluminum:						
3339953120	Less than 1-1/2 inch bore size.....	6	31,671	2,437	6	30,819	2,547
3339953130	1-1/2 inch bore size and over.....	16	293,533	41,401	18	351,512	61,012
3339953140	Rodless cylinders.....	10 a/	107,590 a/	36,833	10	108,525	38,859
	Other pneumatic cylinders:						
3339953150	Less than 1-1/2 inch bore size.....	23	3,767,631	170,601	24 a/r/	3,345,270	145,363
3339953160	1-1/2 inch bore size and over.....	34	1,217,588	88,417	35 r/	1,215,325 r/	82,905
3339953170	Pneumatic rotary actuators.....	12 b/	96,269 b/	28,838	13 b	106,243 b/	31,503
3339955	Parts for nonaerospace-type hydraulic and pneumatic fluid power cylinders, actuators, and related items, n.e.c.	(X)	(X)	323,426	(X)	(X)	370,333
3339955110	Accumulators (bladder, piston, and other types).....	19	144,627	46,387	19 r/	189,446	54,742
3339955120	Shock absorbers, not for vehicle suspension, and cushions (hydraulic and pneumatic).....	15	1,464,690	65,744	15	2,091,236	71,656
3339955130	Reservoirs, intensifiers, and other devices for fluid energy absorption and/or storage.....	11	(D)	1,779	13 r/	23,735 r/	2,307
3339955140	Parts for nonaerospace-type hydraulic and pneumatic cylinders, actuators, accumulators, cushions, and nonvehicular shock absorbers, sold separately.....	56	(X)	209,516	59	(X)	241,628
3339957	Aerospace-type fluid power cylinders and actuators, hydraulic and pneumatic.....	(X)	(X)	1,048,698	(X)	(X)	1,031,402

Continued

Table 2. Manufacturers' Shipments of Fluid Power Products, Including Aerospace by Type: 2002 and 2001
 [Quantity in units. Value in thousands of dollars]

Product code	Product description	No. of cos.	2002		No. of cos.	2001	
			Quantity	Value		Quantity	Value
	Hydraulic servo-actuator assemblies (linear and rotary):						
3339957110	Mechanical input.....	10	26,280	363,958	9	22,302	r/ 364,306
3339957120	Electrical input.....	7	31,286	(D)	8	22,432	248,469
3339957130	Combination input.....	4	(D)	(D)	4	(D)	(D)
	Hydraulic utility actuators:						
3339957140	Linear actuators (cylinders).....	11 a/	23,687 a/	93,327	11 a/	22,892	a/ 102,911
3339957150	Rotary actuators (limited rotation).....	2	(D)	(D)	2	(D)	(D)
3339957160	Shock absorbers, snubbers, and cushions, all types, excluding oleo strut assemblies.....	5	(D)	(D)	6	(D)	a/ 22,394
3339957170	Pneumatic actuators (linear and rotary).....	8	54,157	83,643	8	60,199	88,878
3339957180	Accumulators (bladder, piston, and other types).....	10	(D)	19,578	11	(D)	19,604
3339957190	Reservoirs, intensifiers, and other devices for fluid energy absorption and/or storage.....	7 b/	2,030 a/	17,631	7 b/	1,716	a/ 15,392
33399571A0	Other aerospace-type fluid power cylinders, rotary actuators, cushions, and related items, n.e.c.	4	(X)	2,301	4	(X)	2,486
3339955150	Parts for aerospace-type hydraulic and pneumatic cylinders, actuators, accumulators, cushions, and related items, sold separately.....	12	(X)	52,216	12	(X)	r/ 53,438
3339961	Nonaerospace-type reciprocating pumps.....	(X)	3,012,549	573,093	(X)	2,755,017	534,791
	Axial piston:						
	Variable displacement types:						
3339961110	Closed loop.....	11	2,365,844	353,830	11	2,102,297	r/ 327,432
3339961120	Open loop.....	10	197,669	137,148	10	190,129	r/ 125,136
3339961130	Fixed displacement types.....	7	(D)	(D)	7	(D)	(D)
3339961140	Radial piston types.....	3	(D)	(D)	3	(D)	(D)
3339963	Nonaerospace-type rotary and other fluid power pumps.....	(X)	2,185,044	297,438	(X)	2,093,808	310,448
	Gear type:						
3339963110	Internal gear type, including gerotors.....	12	764,275	85,061	11	800,951	85,987
3339963120	External gear type.....	13 a/	1,362,621	167,716	16	1,215,278	166,426
	Vane type:						
3339963130	Fixed displacement.....	3	(D)	(D)	3	(D)	(D)
3339963140	Variable displacement.....	4	(D)	(D)	5	(D)	(D)
3339965	Nonaerospace-type fluid power motors.....	(X)	(X)	446,627	(X)	(X)	r/ 471,604
3339965110	Pneumatic (air) motors.....	2	(D)	(D)	2	(D)	(D)
	Hydraulic motors:						
	Gear type:						
3339965120	Internal types, excluding gerotors.....	10	(D)	57,300	11	(D)	54,832
3339965130	Gerotor types.....	5	1,228,493	199,263	5	1,246,888	193,580
3339965140	External.....	6	73,028	8,352	6	82,137	18,152
3339965150	Vane types, fixed and variable.....	5	8,339	7,615	6	9,157	r/ 9,274
3339965160	Radial piston types, fixed and variable.....	4	(D)	17,304	4	(D)	(D)
	Axial piston types:						
3339965170	Fixed displacement.....	9	(D)	43,649	9	(D)	r/ 49,568
3339965180	Variable displacement.....	8	187,110	90,456	8	205,078	101,637
3339965190	Prime movers shipped with pumps or sold separately.....	3	(X)	(D)	5	(X)	(D)
3339967	Aerospace-type fluid power pumps and motors.....	(X)	104,822	205,940	(X)	109,187	217,783
	Hydraulic pumps:						
3339967110	Fixed and variable displacement types.....	8	27,967	96,156	8	30,726	(D)
3339967120	Pump/electric motor assemblies, fixed and variable displacement types.....	10	43,305	(D)	10	39,915	(D)
3339967130	Other pump packages, n.e.c.	7	24,989	10,563	7	29,662	a/r 11,483
	Motors:						
3339967140	Pneumatic (air) motors and motor packages.....	2	(D)	(D)	2	(D)	(D)
3339967150	Hydraulic motors, fixed and variable displacement types.....	3	(D)	(D)	3	a/ (D)	(D)
3339967160	Hydraulic motor packages, including motor/gearbox, motor/valve, motor/generator, and similar combination units.....	2	(D)	(D)	2	(D)	(D)

Table 2. Manufacturers' Shipments of Fluid Power Products, Including Aerospace by Type: 2002 and 2001
 [Quantity in units. Value in thousands of dollars]

Product code	Product description	No. of cos.	2002			2001	
			Quantity	Value	No. of cos.	Quantity	Value
3339969	Parts for fluid power pumps, motors, and hydrostatic transmissions.....	(X)	(X)	370,155	(X)	(X)	384,112
	Hydraulic:						
3339969110	Nonaerospace.....	31	(X)	301,450	35	(X)	318,348
3339969120	Aerospace.....	6	(X)	(D)	6	(X)	(D)
	Pneumatic:						
3339969130	Nonaerospace.....	4	(X)	(D)	3	(X)	(D)
3339969140	Aerospace.....	2	(X)	(D)	2	(X)	(D)

D Withheld to avoid disclosing data for individual companies. FR Filter replacement. FRL Filter regulator lubricator.
 n.e.c. Not elsewhere classified. pt. Part. r/Revised by 5 percent of more from previously published data. X Not applicable.

Note: Percent of estimation for each item is indicated as follows: a/10 to 25 percent of this item is estimated. b/26 to 50 percent of this item estimated. c/Over 50 percent of this item is estimated.

Table 3. Manufacturers' Shipments of Fluid Power Products, Including Aerospace by Use: 2002
 [Quantity in units. Value in thousands of dollars]

Product code	Product description	No. of cos.	Mobile Shipments				Industrial Shipments			
			Quantity	Percent	Value	Percent	Quantity	Percent	Value	Percent
	Fluid power products, including aerospace.....	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)	(X)
3329125	Nonaerospace-type hydraulic directional control valves.....	(X)	5,696,654	67	296,865	77	2,780,765	33	87,229	23
	Manual:									
3329125110	3- and 4-way monoblock.....	26	596,753	84	59,370	92	112,830	16	4,994	8
3329125120	3- and 4-way sectional.....	16	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3329125130	Other manual.....	8	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
	Solenoid:									
3329125140	2-way types.....	12	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3329125150	3- and 4-way types.....	21	215,386	33	41,105	51	441,459	67	38,898	49
3329125160	Other directional control.....	31	(D)	(D)	29,042	55	(D)	(D)	24,067	45
3329127	Nonaerospace-type hydraulic valves (except directional control).....	(X)	11,848,929	69	470,307	70	5,247,534	31	197,577	30
	Pressure control:									
3329127110	Relief valves.....	25	(D)	(D)	11,802	45	(D)	(D)	14,649	55
3329127120	Other, including load sensing and manual types.....	13	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
	Flow control:									
3329127130	Manual types.....	17	1,098,019	57	14,961	55 a/	836,583	43	12,098	45
3329127140	Other flow control valves.....	17	417,615	37	16,328	43	708,185	63	21,825	57
3329127150	Cartridge valves (all types).....	21	6,365,462	72	138,534	64	2,529,916	28	78,096	36
	Electrohydraulic valves:									
3329127160	Pilot-operated, torque motor servovalves.....	7	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3329127170	Other types, including proportional.....	12	199,551	89	64,996	87	24,396	11	9,760	13
3329127180	Other nonaerospace-type hydraulic valves, including stack and logic.....	17	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3339993	Nonaerospace-type filters for hydraulic fluid power systems.....	(X)	(X)		154,559	51	(X)		147,677	49
	Hydraulic fluid filter assemblies, with or without filter element installed:									
3339993010	Low pressure (below 301 psi).....	20	379,376	56 a/	9,225	42	297,137	44 a/	12,651	58
3339993020	Medium pressure (301 to 2,999 psi).....	14	(D)	(D) c/	8,825	33	(D)	(D) b/	18,211	67
3339993030	High pressure (3,000 psi and above).....	12	61,448	44	11,114	41	78,133	56	16,095	59
	Filter replacement elements:									
3339993040	Reusable (cleanable) type.....	12 c/	185,711	31 b/	3,537	24 a/	406,860	69 a/	11,016	76
3339993050	Nonreusable type.....	24 b/	8,748,045	56 b/	105,120	60 b/	6,972,115	44 b/	70,083	40
3339993060	Strainers and separators, filter parts, and accessories.....	16	(X)	b/	16,738	46	(X)	a/	19,621	54
3339951	Nonaerospace-type hydraulic fluid power cylinders and actuators, linear and rotary.....	(X)	2,942,470	77	625,478	68	875,141	23	300,036	32
	Hydraulic cylinders, excluding electrohydraulic:									
	Tie-rod types:									
	Standard NFPA and JIC tie-rod types:									
3339951110	Less than 1,500 psi.....	20 b/	12,683	6	(D)	(D)	188,183	94	(D)	(D)
3339951120	1,500 to 3,000 psi.....	18 c/	7,541	4 c/	3,026	4	186,398	96	64,452	96
3339951130	Greater than 3,000 psi.....	6	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3339951140	Other tie-rod types.....	14	235,165	94	21,117	77	14,749	6	6,253	23
3339951150	Threaded/weld fused combination.....	45	2,132,002	86	432,325	85	356,891	14 a/	73,699	15
3339951160	Telescoping.....	22	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3339951170	Mill type.....	11	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3339951180	Other, including those threaded at both ends..	16	192,272	84 a/	22,088	69 a/	37,560	16 b/	10,047	31
3339951190	Electrohydraulic types.....	8	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
33399511A0	Hydraulic rotary actuators.....	12	41,784	81	34,576	63 a/	10,086	19 a/	20,432	37
3339961	Nonaerospace-type reciprocating pumps.....	(X)	1,679,570	56	420,230	73	1,332,979	44	152,863	27
	Axial piston:									
	Variable displacement types:									
3339961110	Closed loop.....	11	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3339961120	Open loop.....	10	142,045	72	91,125	66	55,624	28	46,023	34
3339961130	Fixed displacement types.....	7	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3339961140	Radial piston types.....	3	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3339963	Nonaerospace-type rotary and other fluid power pumps.....	(X)	1,559,208	71	226,370	76	625,836	29	71,068	24
	Gear type:									
3339963110	Internal gear type, including gerotors.....	12	(D)	(D)	45,839	54	(D)	(D)	39,222	46
3339963120	External gear type.....	13	1,204,119	88	147,456	88	158,502	12	20,260	12
	Vane type:									
3339963130	Fixed displacement.....	3	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3339963140	Variable displacement.....	4	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3339965pt.	Nonaerospace-type fluid power motors.....	(X)	(X)		362,830	86	(X)		61,109	14
	Hydraulic motors:									
	Gear type:									
3339965120	Internal types, excluding gerotors.....	10	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3339965130	Gerotor types.....	5	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3339965140	External.....	6	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3339965150	Vane types, fixed and variable.....	5	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3339965160	Radial piston types, fixed and variable.....	4	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
	Axial piston types:									
3339965170	Fixed displacement.....	9	(D)	(D)	42,062	96	(D)	(D) b/	1,587	4
3339965180	Variable displacement.....	8	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)

D Withheld to avoid disclosing data for individual companies. pt Part. X Not applicable.

Note: Percent of estimation for each item is indicated as follows: a/10 to 25 percent of this item is estimated. b/26 to 50 percent of this item is estimated. c/Over 50 percent of this item is estimated.

Table 4. Shipments, Exports, and Imports of Fluid Power Products: 2002
 [Quantity in units. Value in thousands of dollars]

Product code	Product description	Manufacturers' shipments		Export shipments 1/		Import shipments 2/	
		Quantity	Value	Quantity	Value	Quantity	Value
3329121, 125, 127	Hydraulic fluid power valves.....	27,127,665	1,433,826	2,849,098	203,332	25,555,682	190,389
3329123, 129, 12B	Pneumatic fluid power valves.....	29,048,241	1,054,852	2,621,697	120,663	27,766,553	255,907
332912D	Parts for fluid power valves: hydraulic, pneumatic, all types.....	(X)	247,747	(X)	109,634	(X)	123,097
3339951 pt., 957 pt.	Hydraulic cylinders and hydraulic actuators (except electrohydraulic types).....	3,898,589	1,750,877	466,671	95,642	1,697,305	236,964
3339953 pt.	Pneumatic cylinders (tie-rod types).....	558,249	103,045	914	1,397	10,952	3,066
3339953 pt., 957 pt.	Pneumatic cylinders (except tie-rod types).....	5,243,235	408,332	226,089	35,345	676,593	39,478
3339951 pt., 957 pt.	Fluid power accumulators, hydraulic and pneumatic, and other hydraulic, pneumatic or combination devices for fluid energy absorption and/or storage, all types.....	(X)	110,070	179,231	63,974	302,137	77,304
3339965 pt., 967 pt.	Pneumatic (air) motors and motor packages, all types.....	(D)	(D)	16,289	4,881	6,441	1,191
3339965 pt., 967 pt.	Hydraulic motors, all types.....	2,282,923	445,381	411,703	81,632	243,672	123,700
3339961, 963, 967 pt.	Hydraulic pumps, all types.....	5,293,854	977,250	4,528,719	373,813	2,993,470	295,509
3339969	Parts for fluid power pumps and motors.....	(X)	370,155	(X)	210,626	(X)	338,496

D Withheld to avoid disclosing data for individual companies. pt. Part. X Not applicable.

1/Source: Census Bureau report, EM 545, U.S. Exports.
 2/Source: Census Bureau report, IM 145, U.S. Imports for Consumption.

Note: For comparison of North American Industry Classification System (NAICS)-based product codes, Schedule B export codes and HTSUSA import codes, see contact named at the beginning of this report.

Table 5. Comparison of North American Industry Classification System (NAICS)-Based Product Codes with Schedule B Export Codes and HTSUSA Import Codes: 2002

Product code	Product description	Export code 1/	Import code 2/
3329121, 125, 127	Hydraulic fluid power valves.....	8481.10.0020	8481.10.0020
		8481.20.0010	8481.20.0010
		8481.20.0020	8481.20.0020
		8481.20.0030	8481.20.0030
		8481.20.0040	8481.20.0040
		8481.20.0050	8481.20.0050
3329123, 129, 12B	Pneumatic fluid power valves.....	8481.10.0040	8481.10.0040
		8481.10.0060	8481.10.0060
		8481.20.0060	8481.20.0060
		8481.20.0070	8481.20.0070
		8481.20.0080	8481.20.0080
332912D	Parts for fluid power valves: hydraulic, pneumatic, all types.....	8481.90.9010	8481.90.9020 8481.90.9040
3339951 pt., 957 pt.	Hydraulic cylinders and hydraulic actuators (except electrohydraulic types).....	8412.21.0015	8412.21.0015
		8412.21.0030	8412.21.0030
		8412.21.0045	8412.21.0045
		8412.21.0060	8412.21.0060
		8412.21.0075	8412.21.0075
3339953 pt.	Pneumatic cylinders (tie-rod types).....	8412.31.0040	8412.31.0040
3339953 pt., 957 pt.	Pneumatic cylinders (except tie-rod types).....	8412.31.0080	8412.31.0080
3339955 pt., 957 pt.	Fluid power accumulators, hydraulic and pneumatic, and other hydraulic, pneumatic or combination devices for fluid energy absorption and/or storage, all types.....	8412.29.8075	8412.29.8075
		8412.39.0080	8412.39.0080
		8479.89.9765	8479.89.9765
3339965 pt., 967 pt.	Pneumatic (air) motors and motor packages, all types.....	8412.39.0040	8412.39.0040
3339965 pt., 967 pt.	Hydraulic motors, all types.....	8412.29.8015	8412.29.8015
		8412.29.8030	8412.29.8030
		8412.29.8045	8412.29.8045
		8412.29.8060	8412.29.8060
3339961, 963, 967 pt.	Hydraulic pumps, all types.....	8413.50.0070	8413.50.0070
		8413.50.0080	8413.50.0080
		8413.60.0020	8413.60.0020
		8413.60.0030	8413.60.0030
		8413.60.0040	8413.60.0040
3339969	Parts for fluid power pumps and motors.....	8412.90.9005	8412.90.9005
		8412.90.9015	8412.90.9015
		8412.90.9025	8412.90.9025
		8412.90.9035	8412.90.9035
		8413.91.9050	8413.91.9050

pt. Part.

1/Source: 2002 edition, Harmonized System-based Schedule B, Statistical Classification of Domestic and Foreign Commodities Exported from the United States.

2/Source: Harmonized Tariff Schedule of the United States, Annotated (2002).

Appendix.

General CIR Survey Information, Explanation of General Terms and Historical Note

GENERAL

The CIR program has been providing monthly, quarterly, and annual measures of industrial activity for many years. Since 1904, with its cotton and fats and oils surveys, the CIR program has formed an essential part of an integrated statistical system involving the quinquennial economic census, manufacturing sector, and the annual survey of manufactures. The CIR surveys, however, provide current statistics at a more detailed product level than either of the other two statistical programs.

The primary objective of the CIR program is to produce timely, accurate data on production and shipments of selected products. The data are used to satisfy economic policy needs and for market analysis, forecasting, and decision making in the private sector. The product-level data generated by these surveys are used extensively by individual firms, trade associations, and market analysts in planning or recommending marketing and legislative strategies, particularly if their industry is significantly affected by foreign trade. Although production and shipments information are the two most common data items collected, the CIR program collects other measures also such as inventories, orders, and consumption. These surveys measure manufacturing activity in important commodity areas such as textiles and apparel, chemicals, primary metals, computer and electronic components, industrial equipment, aerospace equipment, and consumer goods.

The CIR program uses a unified data collection, processing, and publication system. The U.S. Census Bureau updates the survey panels for most reports annually and reconciles the estimates to the results of the broader-based annual survey of manufactures and the economic census, manufacturing sector. The manufacturing sector provides a complete list of all producers of the products covered by the CIR program and serves as the primary source for CIR sampling. Where a small number of producers exist, CIR surveys cover all known producers of a product. However, when the number of producers is too large, cutoff and random sampling techniques are used. Surveys are continually reviewed and modified to provide the most up-to-date information on products produced. The CIR program includes a group of mandatory and voluntary surveys. Typically the monthly and quarterly surveys are conducted on a voluntary basis. Those companies that choose not to respond to the voluntary surveys are required to submit a mandatory annual counterpart corresponding to the more frequent survey.

NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS), 1997

The adoption of the North American Industry Classification System (NAICS) in the 1997 Economic Census has had a major impact on the comparability of current and historic data. Approximately half of the industries in the manufacturing sector of NAICS do not have comparable industries in the Standard Industrial Classification (SIC) system that was used in the past.

While most of the change affecting the manufacturing sector was change within the sector, some industries left manufacturing and others came into manufacturing. Prominent among those that left manufacturing are logging and portions of publishing. Prominent among the industries that came into the manufacturing sector are bakeries, candy stores where candy is made on the premises, custom tailors, makers of custom draperies, and tire retreading. The net effect of the classification changes are such that if the 1997 value of shipments data for all manufacturers were tabulated on an SIC basis, it would be approximately 3 percent higher.

Listed below are the NAICS sectors:

- 21 Mining
- 22 Utilities
- 23 Construction
- 31-33 Manufacturing
- 42 Wholesale Trade
- 44-45 Retail Trade
- 48-49 Transportation and Warehousing
- 51 Information
- 52 Finance and Insurance
- 53 Real Estate and Rental and Leasing
- 54 Professional, Scientific, and Technical Services
- 55 Management of Companies and Enterprises
- 56 Administrative and Support and Waste Management and Remediation Services
- 61 Educational Services
- 62 Health Care and Social Assistance
- 71 Arts, Entertainment, and Recreation
- 72 Accommodation and Food Services
- 81 Other Services (except Public Administration)

(Not listed above are the Agriculture, Forestry, Fishing, and Hunting sector (NAICS 11), partially covered by the census of agriculture conducted by the U.S. Department of Agriculture, and the Public Administration sector (NAICS 92), covered by the census of governments conducted by the Census Bureau.)

The 20 NAICS sectors are subdivided into 96 subsectors (three-digit codes), 313 industry groups (four-digit codes), and, as implemented in the United States, 1170 industries (five- and six-digit codes).

FUNDING

The Census Bureau funds most of the surveys. However, a number of surveys are paid for either fully or partially by other Federal Government agencies or private trade associations. A few surveys are mandated, but all are authorized by Title 13 of the United States Code.

RELIABILITY OF DATA

Survey error may result from several sources including the inability to obtain information about all cases in the survey, response errors, definitional difficulties, differences in the interpretation of questions, mistakes in recording or coding the reported data, and other errors of collection, response, coverage, and estimation. These nonsampling errors also occur in complete censuses. Although no direct measurement of the biases due to these nonsampling errors has been obtained, precautionary steps were taken in all phases of the collection, processing, and tabulation of the data in an effort to minimize their influence.

A major source of bias in the published estimates is the imputing of data for nonrespondents, for late reporters, and for data that fail logic edits. Missing figures are imputed based on period-to-period movements shown by reporting firms. A figure is considered to be an impute if the value was not directly reported on the questionnaire, directly derived from other reported items, directly available from supplemental sources, or obtained from the respondent during the analytical review phase. Imputation generally is limited to a maximum of 10 percent for any one data cell. Figures with imputation rates greater than 10 percent are suppressed or footnoted. The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse, because the actual yearly movements for nonrespondents may or may not closely agree with the imputed movements. The range of difference between the actual and imputed figures is assumed to be small. The degree of uncertainty regarding the accuracy of the published data increases as the percentage of imputation increases. Figures with imputation rates above 10 percent should be used with caution.

DATA REVISIONS

Statistics for previous years may be revised as the result of corrected figures from respondents, late reports for which imputations were originally made, or other corrections. Data that have been revised by more than 5 percent from previously published data are indicated by footnotes.

DISCLOSURE

The Census Bureau collects the CIR data under the authority of Title 13, United States Code, which specifies that the information can only be used for statistical purposes and cannot be published or released in any manner that would identify a person, household, or establishment. "D" indicates that data in the cell have been suppressed to avoid disclosure of information pertaining to individual companies.

EXPLANATION OF GENERAL TERMS

Capacity. The maximum quantity of a product that can be produced in a plant in 1 day if operating for 24 hours. Includes the capacity of idle plants until the plant is reported to be destroyed, dismantled, or abandoned.

Consumption. Materials used in producing or processing a product or otherwise removing the product from the inventory.

Exports. Includes all types of products shipped to foreign countries, or to agents or exporters for reshipment to foreign countries.

Gross shipments. The quantity or value of physical shipments from domestic establishments of all products sold, transferred to other establishments of the same company, or shipped on consignment, whether for domestic or export sale or use. Shipments of products purchased for resale are omitted. Shipments of products made under toll arrangements are included.

Interplant transfers. Shipments to other domestic plants within a company for further assembly, fabrication, or manufacture.

Inventories. The quantity or value of finished goods, work in progress, and materials on hand.

Machinery in place. The number of machines of a particular type in place as of a particular date whether the machinery was used for production, prototype, or sampling, or was idle. Machinery in place includes all machinery set up in operating positions.

Net receipts. Derived by subtracting the materials held at the end of the previous month from the sum of materials used during the current month.

Production. The total volume of products produced, including: products sold; products transferred or added to inventory after adjustments for breakage, shrinkage, and obsolescence, plus any other inventory adjustment; and products that undergo further manufacture at the same establishment.

Quantities produced and consumed. Quantities of each type of product produced by a company for internal consumption within that same company.

Quantity and value of new orders. The sales value of orders received during the current reporting period for products and services to be delivered immediately or at some future date. Also represents the net sales value of contract change documents that increase or decrease the sales value of the orders to which they are related, when the parties concerned are in substantial agreement as to the amount involved. Included as orders are only those that are supported by binding legal documents such as signed contracts or letter contracts.

Quantity and value of shipments. The figures on quantity and value of shipments represent physical shipments of all products sold, transferred to other establishments of the same company, or shipped on consignment, whether for domestic or export sale. The value represents the net sales price, f.o.b. plant, to the customer or branch to which the products are shipped, net of discounts, allowances, freight charges, and

returns. Shipments to a company's own branches are assigned the same value as comparable appropriate allocation of company overhead and profit. Products bought and resold without further manufacture are excluded.

Stocks. Total quantity of ending finished inventory.

Unfilled orders (backlog). Calculated by adding net new orders and subtracting net sales from the backlog at the end of the preceding year.

HISTORICAL NOTE

Data on fluid power products have been collected by the Census Bureau since 1981. Historical data may be obtained from Current Industrial Reports available at your local Federal Depository Library.