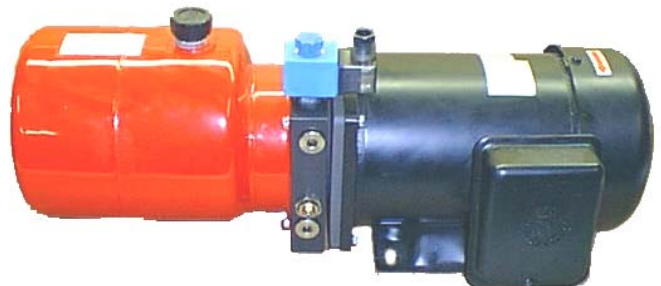


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Standard Hydraulic Power Units V-PAK & Horizontal Series 1 To 10 Horsepower Phone: 888-284-3016



BASIC HYDRAULIC THEORY

The basis for all hydraulic systems is expressed by Pascal's law which states the pressure exerted anywhere upon an enclosed liquid is transmitted undiminished, in all directions, to the interior of the container. This principle allows large forces to be generated with relatively little effort. A 5-pound force exerted against a 1-inch square area creates an internal pressure of 5 psi. This pressure, acting against the 10 square inch area develops 50 pounds of force.

In a basic hydraulic circuit, the force exerted by a cylinder is dependent upon the cylinder bore size and the pump pressure. (There is no force generated unless there is resistance to the movement of the piston). With 1000 psi pump pressure exerted against a 12 square inch piston area (approximately 4" dia.), a force of 12,000 pounds is developed by the cylinder. The speed at which the piston will move is dependent upon the flow rate (gpm) from the pump and the cylinder area. Hence, if pump delivery is 1 gallon per minute (231 cu.in./min.) the cylinder piston will move at a rate of 20 in./min. (231 cu.in./12 cu.in./min.).

The simplest hydraulic circuit consists of a reservoir, pump, relief valve, 3-way directional control valve, single acting cylinder, connectors and lines. This system is used where the cylinder piston is returned by mechanical force. With the control valve in neutral, pump flow passes through the valve and back to the reservoir. With the valve shifted, oil is directed to the piston side of the cylinder, causing the piston to move, extending the rod. If the valve is returned to neutral, the oil is trapped in the cylinder, holding it in a fixed position, while the pump flow is returned to the reservoir. Shifting the valve in the opposite direction permits the oil to pass through the valve back to the reservoir. The relief valve limits the system pressure to a pre-set amount.

A hydraulic system using a double acting cylinder and a 4-way valve differs from the single acting cylinder system in that the cylinder can exert force in both directions. With the control valve in neutral, flow is returned to the reservoir. When shifted in one direction, oil is directed to the piston side of the cylinder, causing the cylinder to extend. Oil from the rod side passes through the valve back to the reservoir. If the valve is shifted to neutral, oil in the cylinder is trapped, holding it in a fixed position. When the valve is shifted in the opposite position, oil is directed to the rod side of the cylinder, causing the cylinder to retract. Oil from the piston side passes through the valve back to the reservoir. Cylinder extend force is a result of the pressure (psi) times the piston area. Retract force is a result of the pressure (psi) times the area difference between the piston minus the rod diameter.

Rotary hydraulic motor circuits are basically the same as cylinder circuits. Systems may be uni-directional or bi-directional. The amount of rotary force (torque) available from the motor is a function of pressure (psi) and motor size. Speed is a function of flow and motor size.

All the systems described above are open center systems due to the oil flowing through the control valve back to tank. Most systems are this type. Closed center systems use control valves with the inlet port blocked and variable displacement pumps. With the control valve in neutral, the pump is "de-stroked" to zero flow.

Standard Vertical Power Units

Standard vertical hydraulic power units offer standard systems complete with:

- Reservoir, Gear pump, Pump motor adapter, 1800 RPM TEFC Electric motor, Flexible coupling, Pressure control relief valve, Suction strainer.
- Pressure gauge, Air breather/filler assembly, Sight gauge w/thermometer, Drain plug
- Pressure and return connections, Return line filter.
- Noise levels below 90db.
- All units include operation manuals.

Optional Accessories Include:

- Aluminum parallel or series directional control manifolds with/without cartridge relief valve in “D03” and “D05” sizes with AC, DC, or pilot actuation..
- Pressure and flow control modular valves in “D03” and “D05” sizes.
- Oil coolers available in air and water designs.

How to come up with a part number....

Step 1 – Pump / Motor Selection

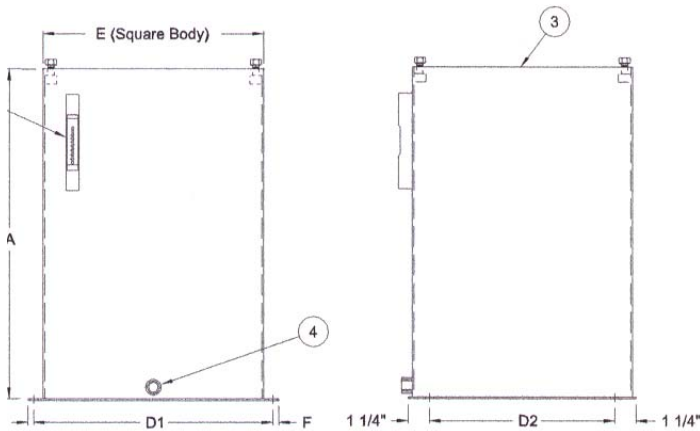
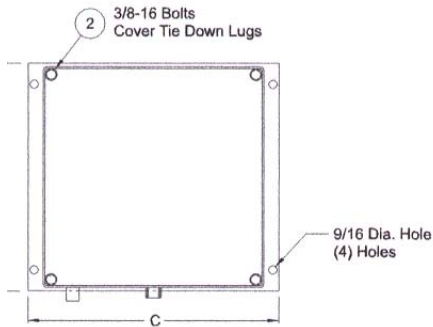
HP GPM	1 GPM	3.2 GPM	5 GPM	7 GPM	10 GPM	12 GPM
1 HP 1 PHASE	1S1	1S3	1S5	1S7		
1 HP 3 PHASE	1T1	1T3	1T5	1T7		
3 HP 1 PHASE	3S1	3S3	3S5	3S7	3S10	
3 HP 3 PHASE	3T1	3T3	3T5	3T7	3T10	
5 HP 1 PHASE	5S1	5S3	5S5	5S7	5S10	5S12
5 HP 3 PHASE	5T1	5T3	5T5	5T7	5T10	5T12
7.5 HP 1 PHASE		7S3	7S5	7S7	7S10	7S12
7.5 HP 3 PHASE		7T3	7T5	7T7	7T10	7T12
10 HP 1 PHASE			10S5	10S7	10S10	10S12
10 HP 3 PHASE			10T5	10T7	10T10	10T12

Note: Maximum operating pressure = (1714 x HP / FLOW) *.85

Step 2 – Reservoir Selection

Size	3 gal.	5 gal.	10 gal.	20 gal.	30 gal.
Code	A	B	C	D	E

Note: Typical systems require reservoirs equal to 2.5 times the flow rate.



Each Vertical Non-J.I.C.

Reservoir includes:

1. (1) Oil Level & Temp. Gage
2. (4) Cover Mounting Bolts
3. Channel gasket for cover plate seal
4. 1/2" NPT Drain
5. Steel construction with customer choice of top
6. Exterior of reservoir prime painted
7. Interior of Reservoir coated with rust preventive oil

Sight Gage

5 to 30 gallon - 5" sight gage (ALG5T)

Capacity Gallons	A	B	C	D1	D2	E	F
3	12"	10"	11"	10"	10"	10"	1/2"
5	10	12-1/2"	14-1/2"	13-1/2"	10"	12"	1/2"
10	12	16-1/2"	19"	17-1/2"	14"	16"	3/4"
20	24"	16-1/2"	19"	17-1/2"	14"	16"	3/4"
30	36"	16-1/2"	19"	17-1/2"	14"	16"	3/4"

Step 3 – Options

Options	Air Cooler	Water Cooler	Relief valve	Priority Flow Control
Code	V	W	X	Y

* Place options in alphabetical order.....

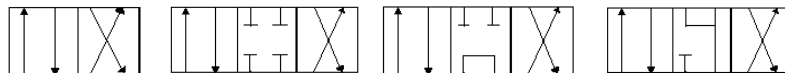
Step 4 – Manifold

Size / Style	Series	Parallel
D03	F	G
D05	H	I

Step 5 – Number of Manifold Stations

Number of Stations	1 to 4 ? <u> </u>
--------------------	----------------------------

Step 6 – Directional Valve Selection (Valve #1 is closest to reservoir lid)



	2 Position P to A B to T	3 Position All Ports blocked	3 Position P to T A & B Blocked	3 Position P Blocked A & B to T
Manual – Detented	M1A	M1B	M1C	M1F
Manual – Spring Ctr.	M2A	M2B	M2C	M2F
Solenoid – 115 VAC	S1A	S1B	S1C	S1F
Solenoid – 230 VAC	S2A	S2B	S2C	S2F
Solenoid – 12 VDC	D1A	D1B	D1C	D1F
Solenoid – 24 VDC	D2A	D2B	D2C	D2F
Air Pilot	A1A	A1B	A1C	A1F
Hydraulic Pilot	H1A	H1B	H1C	H1F

Step 7 - Modular Valve Stack Options
(Stack #1 is closest to reservoir lid)

	Station 1	Station 2	Station 3	Station 4
Flow Control – Meter out	A	D	G	J
Flow Control – Meter in	B	E	H	K
Pilot check valve	C	F	I	L

* List in alphabetical order

Model Selection

	-			-				-9	-	
S T E P #1		S T E P #2	S T E P #3		S T E P #4	S T E P #5	S T E P #6 List stations 1 through 4	D E S I G N		S T E P #7 List stations 1 through 4

Example

3S1-C-GP1-M2C-9

3 HP / Single Phase

10 gallon reservoir

Parallel / NPT 1–station D03 manifold

Valve # 1- Manual spring ctr. P to T

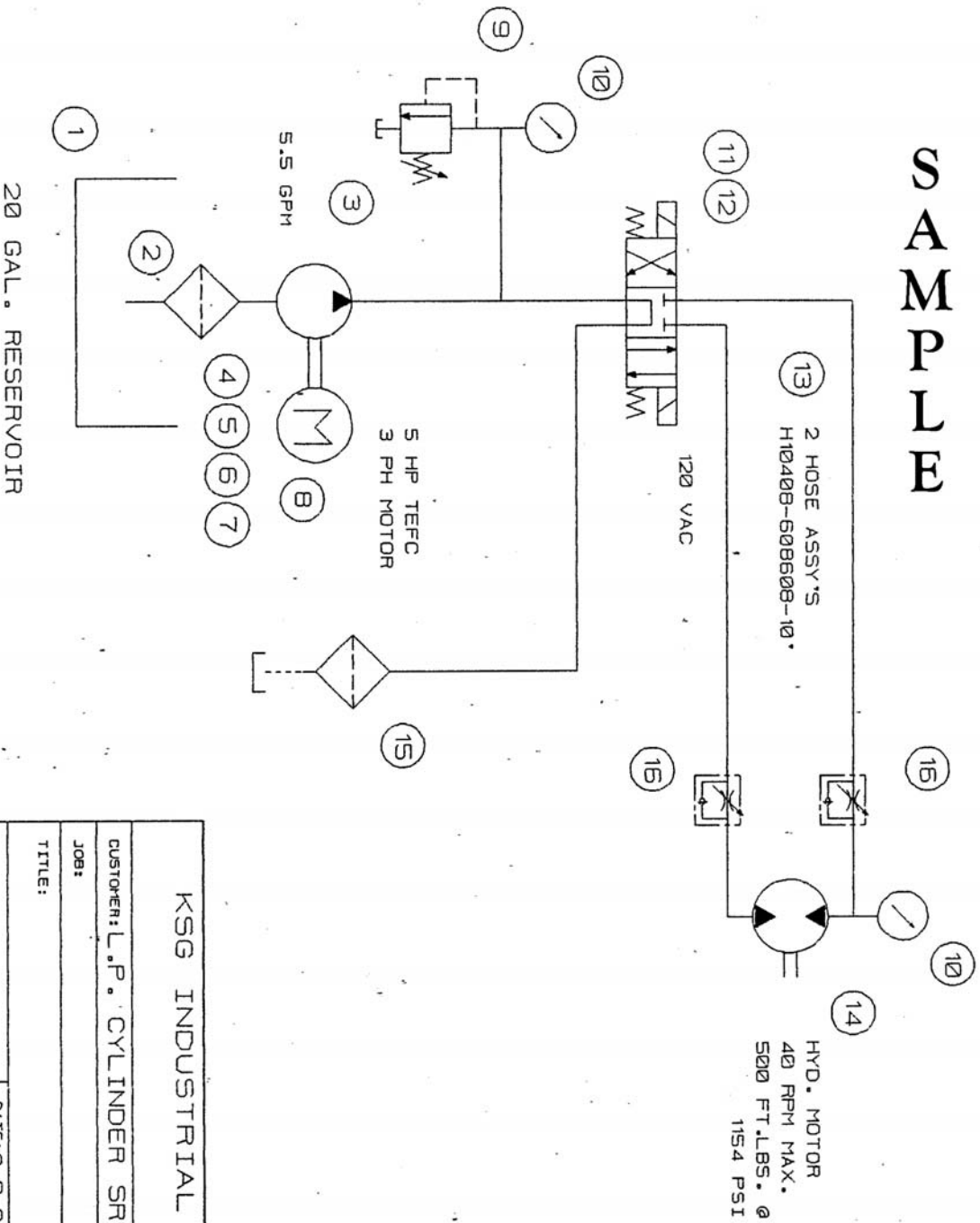


Hydraulic Cylinder Force

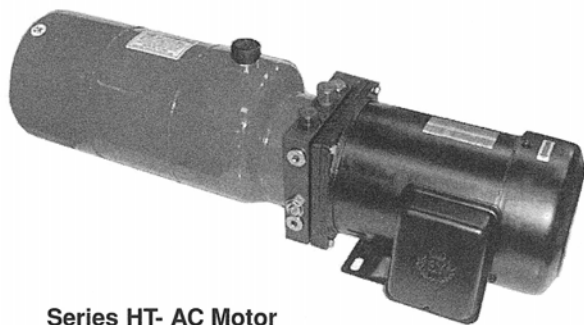
Pressure Differential across Cylinder Ports

Bore Dia., Ins.	Rod Dia., Ins.	Effect. Area Sq. Ins.	500 PSI	750 PSI	1000 PSI	1250 PSI	1500 PSI	2000 PSI	2500 PSI	3000 PSI
1.5"	None	1.77	884	1325	1767	2209	2651	3534	4418	5301
	5/8	1.46	730	1095	1460	1825	2190	2921	3651	4381
	1	.982	491	736	982	1227	1473	1963	2454	2945
2	None	3.14	1571	2356	3142	3927	4712	6283	7854	9425
	1	2.36	1178	1767	2356	2945	3534	4712	5890	7069
	1-3/8	1.66	828	1243	1657	2071	2485	3313	4142	4970
2-1/2	None	4.91	2454	3682	4909	6136	7363	9817	12271	14726
	1	4.12	2062	3092	4123	5154	6188	8247	10308	12370
	1-3/8	3.42	1712	2568	3424	4280	5136	6848	8560	10271
	1-3/4	2.50	1252	1878	2503	3129	3755	5007	6259	7510
3-1/4	None	8.30	4148	6222	8296	10370	12444	16592	20740	24837
	1-3/8	6.81	3405	5108	6811	8514	10216	13622	17027	20433
	1-3/4	5.89	2945	4418	5891	7363	8836	11781	14726	17672
	2	5.15	2577	3866	5154	6443	7731	10308	12886	15463
4	None	12.57	6284	9425	12567	15709	18851	25134	31418	37701
	1-3/4	10.16	5081	7621	10162	12702	15243	20323	25404	30485
	2	9.43	4713	7069	9425	11782	14138	18851	23564	28276
	2-1/2	7.66	3829	5744	7658	9573	11487	15317	19146	22975
5	None	19.64	9818	14726	19635	24544	29453	39270	49088	58905
	2	16.49	8247	12370	16493	20617	24740	32987	41234	49480
	2-1/2	14.73	7363	11045	14726	18408	22089	29453	36816	44179
	3	12.57	6283	9425	12566	15708	18850	25133	31416	37699
	3-1/2	10.01	5007	7510	10014	12517	15021	20028	25035	30042

SAMPLE

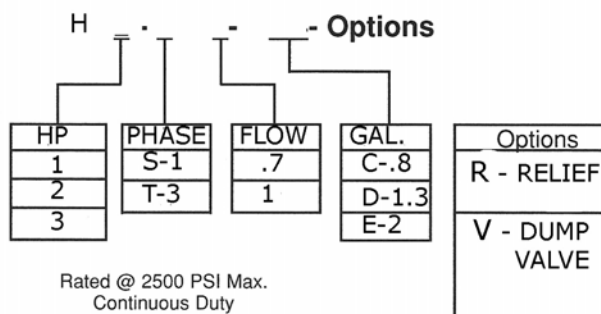


KSG INDUSTRIAL	
CUSTOMER: L.P. CYLINDER SRVC	
JOB:	
TITLE:	
OWG: P0909991	DATE: 9-9-99 BY: KSG-BJS

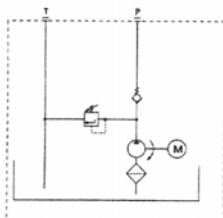


Series HT- AC Motor

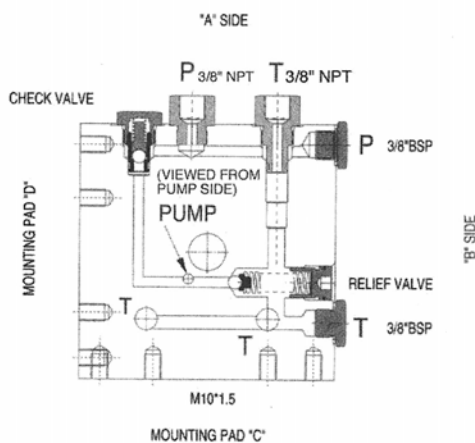
POWER UNIT PART NUMBERING SYSTEM:



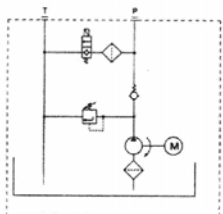
Standard Configuration



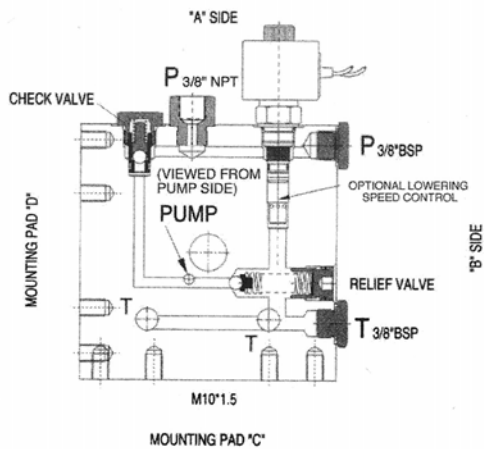
Hyd. Schematic



With Lowering Valve- DV



Hyd. Schematic

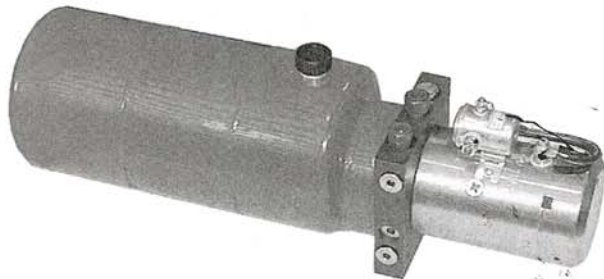


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HYDRAULIC POWER UNITS

DC HORIZONTAL TANK

HT SERIES



Series HT- DC Motor

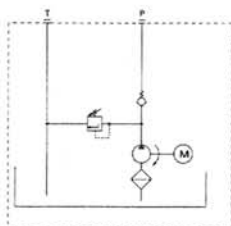
DC POWER UNIT PART NUMBERING SYSTEM:

HT 2 - 12VDC- G.7- DVP

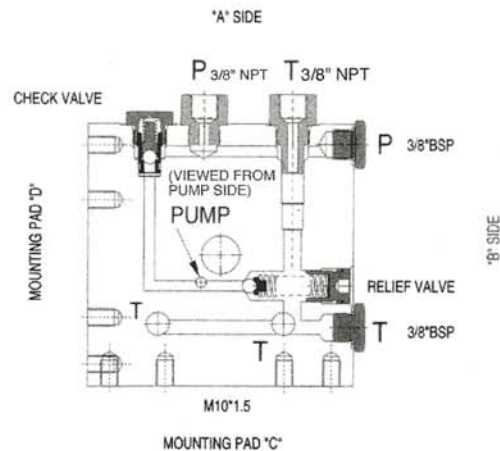
Gallons	Volts	Flow	Option
0.8	12	.7	DV
1.3	24	(GPM@1800)	Dump Valve
2			DVP
			Dump Valve w/ Pendant

Rated @ 2500 PSI Max.
Intermittent Duty

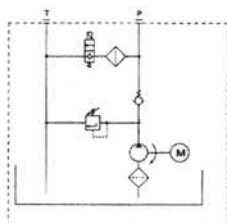
Standard Configuration



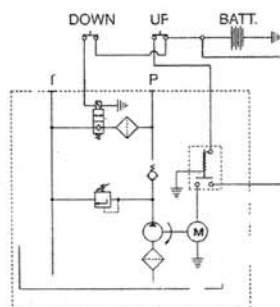
Hyd. Schematic



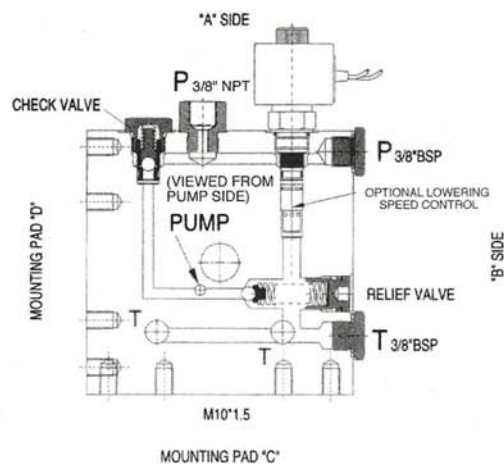
With Lowering Valve- DV



Hyd. Schematic



Hyd. Schematic & Electric Schematic



DVP Option
Unit supplied with 2 button
pendant w/ 4 meter cable.

