Table A-1 DDV Hydraulic Servo Pump Selection Guide
-Listing of the Constant & Optional choice

For the detailed guide of application, contact Opton .

OPTON

DDV Spec. (Bi-directtional pump+AC serv o motor)			GA-0.4/0.2	GA-0.4/0.4	GA-3/1.0	GA-3/1.5	GA-3/2.0	GD-8/2.5	GD-8/3.5	GD-8/5.5	GD-15/2.5	GD-15/3.5	GD-15/5.5	GD-15/7.5	HM-30/7.5	HM-30/11	HM-30/15	HL-50/15	HL-50/25	HL-50/30	HL-70/15	HL-70/25	HL-70/30	SP-15/3.5	SP-40/7.5	SP-50/15	SP-70/15	SP-70/25	SP-70/35
1. Hyd-pum	Bi-directional pump capacity	cc/rev	0.4	0.4	3	3	3	8	8	8	15	15	15	15	30	30	30	50	50	50	70	70	70	15	40	50	70	70	70
2. 〃	*1. Rated discharging pressure	MPa	13.5	14.0	8.6	12.9	17.3	8.4	11.8	21.0	4.5	6.3	13.2	18.0	9.0	13.2	18.0	10.8	18.0	21.0	7.7	12.9	15.4	6.3	6.8	10.8	7.7	12.9	15.4
3. 〃	*2. Max discharge pressure	MPa	14	14	21	21	21	21.0	21.0	21.0	11.3	18.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	19.4	21.0	21.0	18.5	21.0	21.0	19.4	21.0	21.0
4. 〃	Rated discharge flow rate	L/min	0.8	0.8	6.3	6.3	6.3	16	16	12	30	30	22.5	22.5	45	45	45	75	75	75	105	105	105	30	60	75	105	105	105
5. 〃	Max discharge flow rate	L/min	—	—	9.4	9.4	9.4	—	—	16	—	—	30	30	60	60	60	100	100	100	140	140	140	—	80	100	140	140	140
6. 〃	〃 許容 時間	sec	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7. AC Servo motor	Motor capacity	kW	0.2	0.4	1.0	1.5	2.0	2.5	3.5	5.5	2.5	3.5	5.5	7.5	7.5	11.0	15.0	15.0	25.0	30.0	15.0	25.0	30.0	3.5	7.5	15.0	15.0	25.0	30.0
8. 〃	Rated RPM	min^{-1} (rpm)	2000	2000	2000	2000	2000	2000	2000	1500	2000	2000	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	2000	1500	1500	1500	1500	1500
9. 〃	Max RPM	min^{-1} (rpm)	—	—	3000	3000	3000	—	—	2000	—	—	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	—	2000	2000	2000	2000	2000
10. 〃	−〃− Max time allowed	sec	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11. 〃	Rated torque	N･m	0.96	1.91	4.8	7.2	9.6	12.0	16.7	35.0	11.9	16.7	35.0	47.8	47.8	70.1	95.5	95.5	159.2	191.1	95.5	159.2	191.1	16.7	47.8	95.5	95.5	159.2	191.1
12. 〃	Max allowance torque (Max discharge pressı	N･m	0.99	1.91	11.6	11.6	11.6	19.9	29.7	35.0	29.9	49.2	55.7	55.7	111.4	111.4	111.4	185.7	185.7	191.1	239.8	259.9	259.9	49.2	148.5	185.7	239.8	259.2	259.9
13. 〃	−〃− Max time allowed	sec	10.5	—	4.0	7.0	15.0	10.0	11.0	—	4.0	4.0	12.0	150.0	6.5	11.5	80	11	50	—	4	8	50	4.0	4.0	11	4	8	50
14. Tank capacity		L	0.14	0.14	0.46	0.46	0.46	6.2	6.2	6.2	6.2	6.2	6.2	9.1	9.2	9.2	9.2	13.1	13.1	13.1	13.1	13.1	13.1	40.0	75.0	75.0	100.0	100.0	100.0
15. Service capacity		L	0.14	0.14	0.36	0.36	0.36	4.0	4.0	4.0	4.0	4.0	4.0	6.1	6.0	6.0	6.0	7.3	7.3	7.3	7.3	7.3	7.3	30	65	65	90	90	90
16. Total weight (Hydraulic media included)		kg	8.4	8.8	32.2	33.7	35.0	100.7	103.7	120.7	100.7	103.7	120.7	149.0	159.0	183.4	220.5	281.5	303.5	307.5	281.5	303.5	307.5			403.0			
17. Overall size		mm	271×172 ×118	292×172 ×118	443×204 ×193	461×204 ×193	478×204 ×193	502×310 ×370	550×310 ×370	590×310 ×370	502×310 ×370	550×310 ×370	590×310 ×370	712×350 ×415	741×350 ×415	761×350 ×415	809×390 ×455	875×390 ×455	934×390 ×455	959×390 ×455	875×390 ×455	934×390 ×455	959×390 ×455			910×730 ×610			
18. Aux. air pressure (for supporting sharp start of the pump		MPa	All models for 0.1～0.2 (Due to the intrinsic starting-behavior of servo motor, low oil suction at motor start disturbes starting performance of DDV. By applying minimal air-pressureto the oil tank the starting of DDV can be remarkablly improved.)																										

No. of the option available	Option is available either on-charge basis or free-of-cost. Standard cables are shipped with the products of either case.	
② DDV Main frame color	Opton stand color (free of charge) : S Custom color (On-charge) : C	Standard color is grey (color code No. DIC-514 by Japan Paint Manufacturers Association) For other color, the code numbre of this association or color sample needs be presented toOton.
③ **Direction of the motor terminals**	Option (at free cost) : Up (standard) : S Right(R) or Left (L) in view from discharging port :	Standard is "upward" (S). Rightward ® or Leftward(L) is also avaiable upon request.
④ **Oil level gauge**	Option (at free cost) : Right (Stadard) or Left (L) in view from discharing port	Standard is Right (S). Left (L) is also available upon request.
⑤ **Hydraulic oil**	Slugeless hydraulic oil ISO 32 (at free of charge) : S Hydrogrecole : W and other types (on-charge) : A	Standard is the slugeless oil #32. (S) Speficy W for hydrogrecole or brand name and code for other type (A).
⑥ **Power cable for motor**	Nil=0 3m=3 5m=5 10m=10 20m=20 30m=30 free length m= ie.,2.5 (all length at on-charge bssis)	Standard is "nil". Specify if needed the length between motor and servo pack inside the power board. No connector supplied for "Nil">.
⑦ **ECD cable for motor**	Nil=0 3m=3 5m=5 10m=10 20m=20 30m=30 free-m=ie2.5 (all length at on-charge bssis)	Standard is "nil". Specify if needed the length between motor ECD and servo pack inside the power board. No connector supplied for "Nil">.
⑧ PC interface cable	Nil : S Yes : A (on-charge)	No supply for "Nil". This is needed for servo pack parameter change･Jog-mode run･wave-monitor tuning. Ask us if neeed.
⑨ PP board	Nil : S Yes : A (on-charge)	No supply for "Nil". Helpful as the direct interfaceto sequencer for DDV control of position and presure control by sequencer.
⑩ PP board cable	Nil : S Yes : A (on-charge)	No supply for "Nil". Epcecial cable to interface the PP board to the ampliefier.
⑪ PPボード operation terminal	Nil=0 0.5m=0.5 1m=1 3m=3(All lengths at on-charge.	No supply for "Nil". Pendant box for changing PP board parameter change. Specify the lenngth needed on order.

＊1 The feature of DDV Type G* and H*: Hyd-pump stored inside the round-designed hydr-tank to connect the axis directly to AC servo motor. This is a solution to the intrinsic behavior behavior in sharpt starting of AC servo motor where vibration and accuracy- degradation follow due to cavitation in the suction area of the pump. Applying low-pressured air in the tank helps for speedy- and accurate control of the hydraulic cyliner.

＊2 The features of DDV Type SP : One tank can work for DDV and the hydraulic pump, enabling two cylinders co-existing for functioning NC and On/Off. Pipe-desinged Air-tank is bilt-in inside squared hydraulic tank to achieve the same starting performnce as that of the type G and H.

A : Note for DDV application

*1. In the table above, the 2nd item [Rated discharging pressure] refers. ①No time limit applied when the cylinder stop positioning is maintained at rated torque if it is numericaly controled.
②Time limit applied when the stop positioning is maintained at rated torque by the cylinder force.(witin 3 minutes)

*2. In the table above, the 3rd item [Max discharge pressure] refers. ①The cylinder can not keep forcing the stop positioing at max allowance torque.
② The cylinder stop positioning can be maintained at max allowance torque if it is numerically controlled but within the time duration as specified in the table.

B : Processing formula for finding suitable DDV

①Cylinder velocity

Rated speed $^{mm}/_{sec}$: (Rated discharge flow rate $^{L}/_{min}$ × 1000÷60) / Cylinder cross section area cm^2 × 10 (for continuous run)

Example : For the cylinder of ID φ80mm/Rod dia φ45/stroke200mm to be operated by DDV type GD-15/5.5, the thrust force and speed are lead by ;

Extension side (22.5×1000/60)÷50.3×10=74.6 $^{mm}/_{sec}$ Retruction side (22.5×1000/60)÷34.4×10=109 $^{mm}/_{sec}$

Max speed $^{mm}/_{sec}$: (Max discharge flow rate $^{L}/_{min}$ × 1000÷60) / cylinder cross section area cm^2 × 10
(for use within the Max continous time allowed at max speed of the motor)

Extension side (30×1000/60)÷50.3×10=99.4 $^{mm}/_{sec}$ Retruction side (30×1000/60)÷34.4×10=145.3 $^{mm}/_{sec}$

Note: Max allowance motor speed shall be the speed allowed at half of the rated load applied.モータの最大速度は定格負荷の1/2のときの許容

②Cylinder thrust force

Rated thrust force kN : Cylinder pressurized area cm^2 × Rated discharging pressureMPa (For continuos run)

Extension side 50.3×13.2×0.0981＝65.1kN Retruction side 34.4×13.2×0.0981＝44.5kN

Max thrust forcekN : Cylinder pressurized area cm^2 × Max discharge pressureMPa
(To appplied for positioning by NC : for use within the Max continous time allowed at max speed of the motor)

Extension side 50.3×21×0.0981＝103.6kN Retruction side 34.4×21×0.0981＝70.9kN

Note:Tte shut-off valve also needs be used when mechanical stop positioning is applied,

③Oil volume

Volume needed for funtion ＞Bore cubic volume cm^3＝(cylinder pressurized area cm2 × stroke mm)

Note: Refer the table above for the volume needed.

D : The features of DDV

①DDV is of high power-saving efficiency. Saving of electricity by DDV application goes as high s 50 to 70% comparing to those with NC conventional hydraulic servo and cylinder.

②DDV does not need hydraulic coolant. Low energy consumption of DDv leads to low heat generation and lower hyraulic temperature. Cooling by air is good enough.

③Large power loss by conventional servo valve : conventioonal throttle type servo valve causes large heating and power loss about 1/2 of the generated power. Larger-than needed bore-sized cylinder becomes unavoidale to employ.

④Big noise by conventional servo valve: Conventional throtle type servo valve requires pulsated distribution of hydraulics in the small channels, causing unavoidable large operation noise.

⑤Small noise by DDV: DDV harbors the servo motor, pump and hydraulic tank all in the inegrated system. Hydraulic flow is made by the turning speed of the piston pump with no small disribution channel needed. Free from prssure loss and pump heat generation, the high 95% of the rull performance efficiency is achieved.

⑥Simpliefied hydraulic circuitry of DDV : Conventional serv valve system needs many electro magnetic vales causing complicated distribton channels. DDV sysytem required no such valve leading to low-cost ssimplified circuitry.

⑦Small installation space : As a geeral idea, space needed is 1/3 to 1/10 comparing to that of conventional hydro-cooling type with tank and complicated disribution channels.

E : DDV Contoller (TIF)

Feature① Cost- and time-saving application : TIF-built-in NC realizes advantageous application in time and cost comparing to the case by sequencers being sourced in the market where heavy procurement costs are unavoidable in purchasing and developing of

Feature②TIF Controller already containes 2000 plus software parts for controlling of sequence and N/C device. The necessary software are automatically selected upon the characteristics appeared in the time chart prepared by the operator.

Feature③ Easier development of software by techical engineers of sequence and mechanical desgining.

C : Upon the type of DDV being found, refer the above table A-1 item ①～⑪ for selection specification needed, and fil the space below to order to Opton.

DDV発注仕様型式 ① _____ - ② ____ - ③ ____ - ④ ____ - ⑤ ____ - ⑥ ____ - ⑦ ____ - ⑧ ____ - ⑨ ____ - ⑩ ____ - ⑪ ____