金聖泰實業股份有限公司
KINGSTONE COMPONENT INC.

ECKERLE VOITH

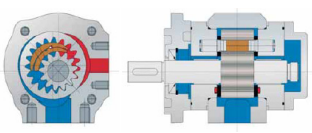
TOSHIBA MACHINE

SDP Servo Driving Pump

Servo Driving Pump System (For Injection Molding Especially)

TOSHIBA MACHINE

200V、400V Series



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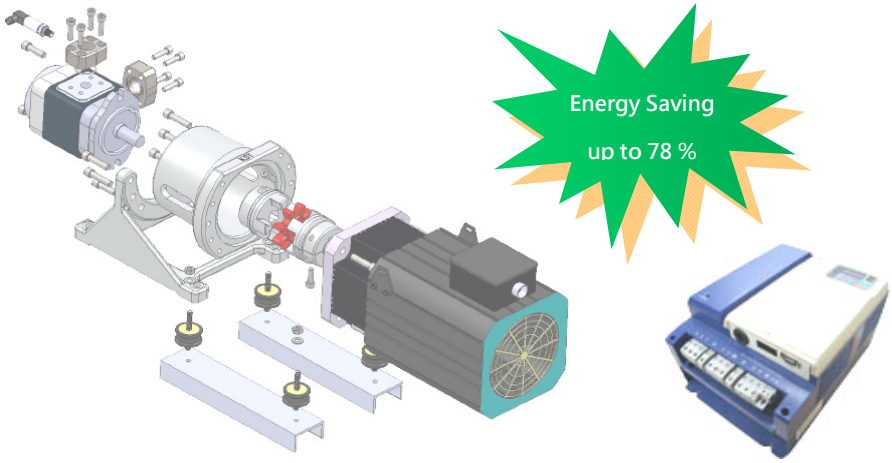
Servo Driving Pump System
- For Injection Molding Only

General Description :

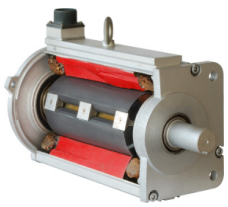
This series, **SDP** is mainly applied in the fields as injection which requires efficiency, accuracy and energy saving. In recent years, the power control unit of various injection machines is generally composed of fixed displacement pumps plus normal inverter motor or variable pump plus normal asynchronous motor, which presents the performance limitation therein and can hardly avoid the defaults of traditional hydraulic power control system, such as low efficiency, poor accuracy, energy wasting, heating, low stability and noise. So a control project of fluency and pressure double close-loop drove by special servo driver and servo motor was put forward against all those problems. The control project has been proved ideal in practice.



SDP System Features:

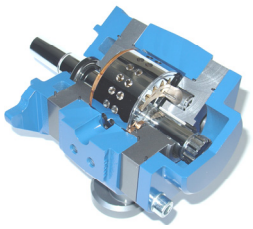
▲High Energy Saving

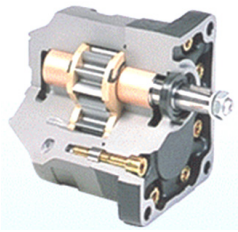
Under ideal state, it consumes 35%-80% less energy than traditional hydraulic power control system , servo driving pump system which can eliminate energy lost at idle work, calculate and control the speed of servo motor and pump according to the requested pressure and flow rate of injection execution unit. **SDP** servo pump system realizes speed and pressure double closed loop control by AC servo drive and SPM synchronic servo motor (super low Rotor-inertia) driving internal pump. The output flow rate is determined by servo motor speed and ration internal gear pump's output volume. The system pressure real-time measured by another pressure sensor.
Compared with constant rate pump or variable pump, it can obviously reduce the electric power charge, saving cooling water and reduce the heat created by wasted water, normally it reduce70% water Consumption.



▲High Effectiveness

The adapted ECKERLE- EIPS/EIPC/EIPH series (internal gear pump with axial and radial gap compensation) guarantee high effectiveness (volumetric efficiency up to 95% to 98%) low leakage and low noise (less than 62~70 dB), quieter when running with low speed at high speed (super low ripple 1.5%~2.0%).





▲High Precision

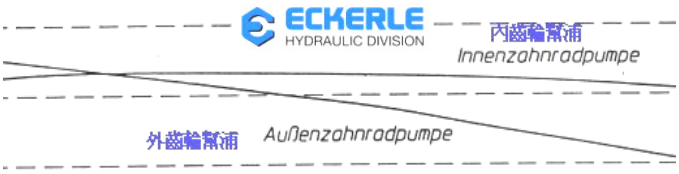
HITACHI CPU and high precision pressure sensor (Measurement) are adapted to control-inspect system current (under 0.2% at oil temperature under0~70℃) and pressure. Resolver is selected as feedback component of servo motor. The **SDP**'s inspection precision to pressure reference and feedback can reach 16 bits; the inspection precision to resolver can reach 65536 P/R. The system control cycle can reach 0.1ms, which can match the request of high precision production.

- Repeatability : under 0.2%
- Accelerated Response : 40ms Ex: foe system flow of 80LPM
- Pressure Holding : ±1kg

▲High Dynamic Performance

SDP series AC servo system generation is adapted which has high overload capacity, and ensures the fast responsiveness of system.
KTR-Aluminum-Flexible Coupling is applied in the **SDP** .Its non-clearance and low inertia advantage, giving full torque transmission and shock-absorption.





▲Super Stability and Reliability :

This servo drive with close-loop control is infinitely superior in repeatability comparing to traditional hydraulic power control system. Different from the often used of Optical Encoder, SDP adopts of Japanese Shockproof, dustproof, waterproof, anti-oil, anti-gas and high resolution TAMAGAWA Resolver to ensure its long life.



▲Small heat-production :

Servo drive can put out hydraulic oil by portions thus avoids the production of unnecessary heat and temperature climb. Meanwhile, it can save lots of water because there is no need to cool down hydraulic oil.

▲CAN chief cable control :

Besides the basic PC control system through voltage/current analog signal, pressure and flow of **SDP** can be controlled by high-speed correspondence (1MHz) through CAN chief cable, avoiding thoroughly external disturbance occurring to the transportation of analog signal. Meanwhile, real-time monitoring of pressure, flow, motor output current, load factor and other signals can be realized through this technology.

▲Cooperation of multiple servo oil pumps :

Considering the economic feasibility of **SDP** on medium and large injection machines, it is suggested to use two or more **SDP** together and apply CAN chief cable control and the special technology of servo pumps control (multi-machine control) to realize the cooperation of multiple servo oil pumps.

▲Dual displacement hydraulic pump control :

Using **SDP** to control the switch of the two outlets of hydraulic pumps contributes to the capacity protection and keeps the injection machine work under an ideal condition without alarm. Meanwhile, pressurization with small displacement ensures precision, stability and low energy consumption.

KINGSTONE has concentrated on R/D of AC servo system for many years. **SDP** has owned many AC servo system key technologies. The power range of servo system for injection machine application is from 1.5kW to 75kW so that it can be used in most application. The company can also customize and develop for clients to match the special request of different clients.

KINGSTONE owns many years' experience hydraulic pressure relevant product's R/D. They can offer whole solution project according to the request of different clients.

Note:

For special configuration (how to choose proper servo motor, hydraulic pump, pressure sensor for your own machine's parameter), please contact us directly.

Features of plastic injection molding machine when using Toshiba Hybrid Digital Servo

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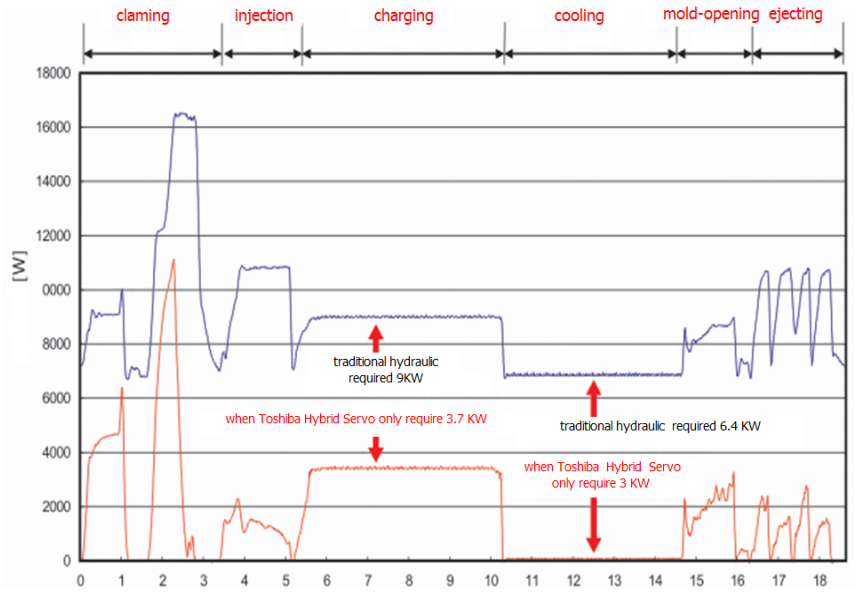
- Pressure transducers are adopted as a feedback element for close loop control, which results in higher injection accuracy. Better stability of products. Minimum rejects and less wasted material.
- Excellent energy saving performance. Saving up to 70% of power in average. For larger machines saving even up to 80% of power consumption which leads to lower cost of production, and better position in competition.
- Power of motors equipped on each machine is tremendously reduced, that will leave you some freedom to increase quantity of machines without further application for higher power supply from the power company.
- Oil temperature increase is minimized due to minimized power loose in the hydraulic systems. A fan cooler will easily take the excessive heat away which helps to increase the life of hydraulic oil, reduce heat generated in the factory as well as the noise. Improve the working environment. and lower the maintenance cost.
- Lowering cost make you be more competitive at the market placed. In the meantime you did your contribution to the environment control. To choose Toshiba hybrid digital servo motor you kill two birds with two stone.

Comparison of Traditional Hydraulic v.s. Toshiba Hybrid Servo



▲Traditional hydraulic required 12.7 KW

▼Toshiba Hybrid Servo only require 3.7 KW

★ **Energy saving up to 71%**

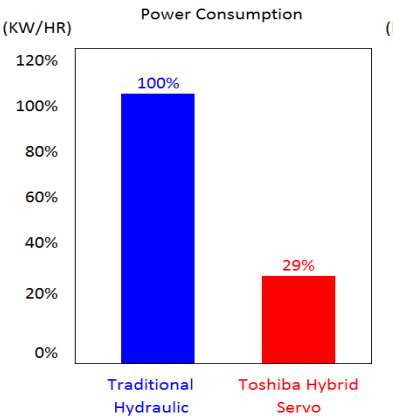
(Blue Curve) Traditional hydraulic

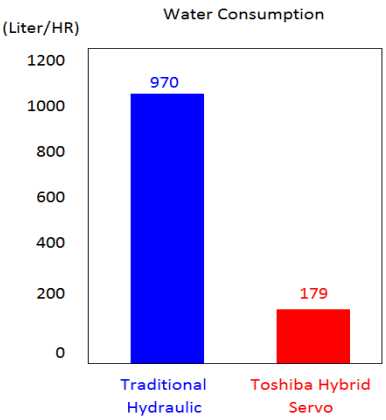
(Red Curve) Toshiba Hybrid Servo

Power Consumption Field Test

Data shown are actual measurement of using traditional hydraulic system and Toshiba Hybrid Servo system on the same machine, same mold, and same material. It was also found that in case of thicker or heavier products, longer pressure maintaining time or longer cooling time, energy saving effect is even better.

Item No. -- Field Test Machine Motor Power		Toshiba Hybrid Servo 11 KW	Traditional Hydraulic 15KW	Difference KW
Power Consumption Overview	KWH/HR	3.7	12.7	9
	KW/Per Day	89	309	220
	KW/Per Month	2570	9050	6480
	KW/Per Year	31050	99800	68750





200V Servo Driving Pump (TOSHIBA MACHINE Origin) -2012FEB04

				TOSHIBA MACHINE-T2-													
				048-06K	065-08K	075-08K	080-10K	096-12K	129-15K	150-15K	160-22K	198-22K	200-25K	260-25K	300-30K	350-30K	400-37K
System Spec.	System Flow Control Features	Max. Flow	L /min	48	65	75	80	96	129	150	160	198	200	260	300	350	400
		Pumps Displacement	c.c/rev	16	22	25	28	32	43	50	64	50+16	80	64+40	80+40	100+40	100+64
		Linearity	%	Under 1% F.S.以下													
		Hysteresis	%	Under 1% F.S.以下													
		Repeatability	%	Under 1% F.S.以下													
		Accelerated Response	sec	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.06	0.06	0.08	0.08	0.08	0.08	0.08
	Pressure Control Features	Max. Pressure	Mpa	19.0	18.0	16.0	17.6	18.0	17.5	17.6	17.0	28.0	18.4	28.0	21.0	28.0	28.0
		Min. Control Pressure	Mpa	Under 0.1MPa													
		Linearity	%	Under 1% F.S.以下													
		Hysteresis	%	Under 1% F.S.以下													
		Repeatability	%	Under 1% F.S.以下													
		Pressure Response	sec	Under 0.09													
		Unloading Response	sec	Under 0.07													
	Hydraulic Fluid Required	Fluid		ISO VG32C 或 #46 石油系作動油 (Mineral Oil)													
		Viscosity		10-2000㎟/s													
		Filtration		NAS1638, classe8, 濾網(Filter)β10>100													
	System Weight	Body	Kg	34.0	38.0	39.0	51.0	60.0	83.0	93.0	95.0	103.0	158.0	160.0	185.0	188.0	203.0
		Controller	Kg	7.0	14.0	14.0	14.0	12.0	21.0	21.0	41.0	21.0	41.0	41.0	41.0	41.0	41.0
Servo Motor Spec.	Power		KW	5.5	8.0	8.0	10.0	12.0	15.0	15.0	22.0	22.0	25.0	25.0	30.0	30.0	37.0
	Insulation Class			F Class													
	Cooling Mode			全閉強冷 (Air Cooled)													
	Ambient Temperature			0~40 ℃ (But not frozen)													
	Ambient Humidity			80%RH以下 (But not dewed)													
Driver Spec.	Model of Driver			X100P3	M122P3	M122P3	M122P3	X200P3	M169P3	M199P3	M199P3	M199P3	M271P3	M271P3	M325P3	M389P3	M389P3
	Contorl Method			PWM 3相正弦波 (3 Phases sine wave)													
	Main Circuit	Power Source		3相(3Phases) AC200 ~ 230V · -15% ~ +10 · 50/60Hz													
			KW	5.0	11.0	11.0	11.0	11.0	18.5	22.0	22.0	22.0	30.0	30.0	37.0	45.0	45.0
			kVA	8.0	19.0	19.0	19.0	18.0	32.0	38.0	38.0	38.0	52.0	52.0	64.0	78.0	78.0
	Voltage			AC 1相 220V DC24V ±10%													
	Continued Max. Current		A	28.3	54.0	54.0	54.0	56.6	75.0	88.0	88.0	88.0	120.0	120.0	144.0	176.0	176.0
	Momentary Max. Current (10S)		A	71.0	86.4	86.4	86.4	141.0	120.0	141.0	141.0	141.0	192.0	192.0	230.4	281.6	281.6
	Impedance of Regenerative Resistor		Ω	10.0	5.0	5.0	5.0	6.0	3.3	3.3	3.3	3.3	2.5	2.5	1.7	1.7	1.7
	Capacity of Regenerative Resistor		KW	0.2	0.7	0.7	0.7	0.8	0.9	1.8	1.8	1.8	1.8	1.8	2.2	2.2	2.2
	Mode of Regenerative Resistor			外接 (External)													
	Speed Senior			檢角器 (Resolver)													
	Speed Commending			DC 0~10 V													
	Pressure Commending			DC 0~10 V													
	General Input Signal			8 ch DC24V 8mA													
	General Output Signal			5 ch DC24V 50mA													
	Analog Output Signal			2ch DC 0~10 V (選購品 Optional)													
	Cooling Mode			強冷開放 (Air Cooled)													
	Ambient Temperature			0~55℃ (但不結冰 But not frozen)													
	Ambient Humidity			10 ~ 80%RH以下 (但不結露 But not dewed)													
	Protection Function			過電流 、 過電壓 、電壓太低 、 馬達過載 、 感測器異常、斷線。 { All interfaces (CN1. CN2. CN5. CN9.) are protected by insulation from the primary power supply)													

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400V Servo Driving Pump (TOSHIBA MACHINE Origin) -2012FEB04

Model				TOSHIBA MACHINE-T4-													
				048-06K	066-08K	075-08K	080-10K	096-12K	120-15K	129-15K	150-15K	160-22K	198-22K	200-25K	260-25K	300-30K	350-30K	400-37K
System Spec.	System Flow Control Features	Max. Flow	L /min	48	66	75	84	96	120	129	150	160	198	200	260	300	350	400
		Pumps Displacement	c.c/rev	16	22	25	28	32	40	43	50	64	50+16	80	64+40	80+40	100+40	100+64
		Linearity	%	Under 1% F.S.以下														
		Hysteresis	%	Under 1% F.S.以下														
		Repeatability	%	Under 1% F.S.以下														
		Accelerated Response	sec	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.06	0.06	0.08	0.08	0.08	0.08	0.08	0.08
	Pressure Control Features	Max. Pressure	Mpa	19.0	17.6	15.5	18.0	18.0	19.0	17.5	17.6	17.0	28.0	18.5	28.0	28.0	28.0	21.0
		Min. Control Pressure	Mpa	Under 0.1MPa														
		Linearity	%	Under 1% F.S.以下														
		Hysteresis	%	Under 1% F.S.以下														
		Repeatability	%	Under 1% F.S.以下														
		Pressure Response	sec	Under 0.09														
		Unloading Response	sec	Under 0.07														
	Hydraulic Fluid Required	Fluid		ISO VG32C 或 #46, #68 石油系作動油(Mineral Oil)														
		Viscosity		10-2000m㎡/s														
		Filtration		NAS1638, classe8, 濾網(Filter)β10>100														
	System Weight	Body	Kg	34.0	38.0	38.0	51.0	60.0	83.0	93.0	93.0	95.0	103.0	158.0	160.0	185.0	188.0	203.0
		Controller	Kg	5.5	8.0	8.0	8.0	13.0	15.0	15.0	21.0	28.0	28.0	28.0	28.0	28.0	48.0	48.0
Servo Motor Spec.	Power		KW	5.5	8.0	8.0	10.0	12.0	15.0	15.0	15.0	22.0	22.0	25.0	25.0	30.0	30.0	37.0
	Insulation Class			F Class														
	Cooling Mode			全閉強冷 (Air Cooled)														
	Ambient Temperature			0~40 ℃ (但不結冰But not frozen)														
	Ambient Humidity			10~80%RH以下 (但不結露 But not dewed)														
Driver Spec.	Model of Driver			H040P4	H050P4	H050P4	H063P4	H075P4	H093P4	H093P4	H109P4	H109P4	H150P4	H150P4	H179P4	H179P4	H213P4	H262P4
	Contorl Method			PWM 3相正弦波 (3 Phases sine wave)														
	Main Circuit	Power Source		3 Phase AC380 ~ 480V · -15% ~ +10 · 50/60Hz														
			KW	7.5	8.5	8.5	11.0	15.0	18.5	18.5	22.0	22.0	30.0	30.0	37.0	37.0	45.0	55.0
			kVA	13.0	16.5	16.5	21.0	26.0	32.0	32.0	38.0	38.0	52.0	52.0	64.0	64.0	78.0	95.0
	Voltage			DC 24V 1A 外部提供 (External supply)														
	Continued Max. Current		A	17.6	22.2	22.2	27.7	33.0	41.0	41.0	48.0	48.0	66.0	66.0	79.0	79.0	94.0	116.0
	Momentary Max. Current(10S)		A	28.5	35.4	35.4	44.3	52.8	65.6	65.6	76.8	76.8	105.6	105.6	126.4	126.4	150.4	185.6
	Impedance of Regenerative Resistor		Ω	30.0	20.0	20.0	20.0	20.0	24.0	24.0	13.3	13.3	10.0	10.0	6.7	6.7	5.0	5.0
	Capacity of Regenerative Resistor		KW	0.4	0.7	0.7	0.7	0.9	0.9	0.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	Mode of Regenerative Resistor																	
	Speed Senior			檢角器(Resolver)														
	Speed Commending			DC 0~10 V														
	Pressure Commending			DC 0~10 V														
	General Input Signal			8 ch DC24V 8mA														
	General Output Signal			5 ch DC24V 50mA														
	Analog Output Signal			2ch DC 0~10 V (選購品 Optional)														
	Cooling Mode			強冷開放(Air Cooled)														
	Ambient Temperature			0~55 ℃ (但不結冰 But not frozen)														
	Ambient Humidity			10 ~ 80%RH以下 (但不結露 But not dewed)														
	Protection Function			過電流、過電壓、電壓太低、馬達過載、感測器異常、斷線、 { All interfaces (CN1. CN2. CN5. CN9.) are protected by insulation from the primary power supply}														

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