MS-LxP Series Hybrid Servo Driver

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一、Product Introduction

1、Description

MS-LxP series of high voltage hybrid servo drivers are YAKO's latest fruit, which apply 32 bits of DSP motor control and power-angle control technology to conquer the problem "lose step" and improve machines' processing efficiency and precision, and reduce energy consumption. It's in lower cost than traditional AC servo.

2、Features

- 32 bits of motor control DSP IC;;
- Analogue & digital hybrid and power-angle close-loop control technology;
- Intelligently adjust current by load;
- Match motors in flange size of 86mm;
- Photoelectricity isolation differential signal input;
- Pulse frequency up to 200khz;
- Micro step subdivision can be any value between 400-60000;
- Protection of over-current, over-voltage, under voltage and trace error, etc.
- 6 bits of digital tube display, which is easy to set parameters and monitor motor's running state.

3、Applications

Suitable for all kinds of automation equipments which require big holding torque, such as robot, engraving machine, laser marking machine, cutting machine, wire-stripping machine, pattern-sewing machine and automatic assembly equipments and so on.

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4、Naming Rules

MS- L 3 P-xx

① ②③④ ⑤

①	Series symbol	Hybrid Servo Driver MS Series
②	Power	L: large power S: small power
③	Motor Flange	**3**：86 Motor **4**:110 Motor **5**:130 Motor
④		**P**：Version No.
⑤	Customized No.	1——99

二、Electrical, Mechanical and Environmental Indicators

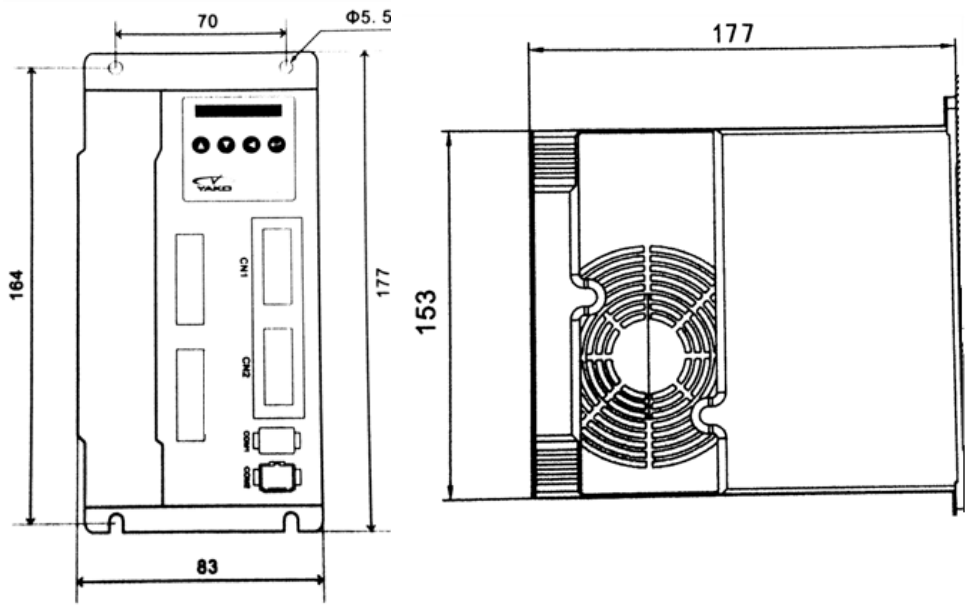
1. Electrical Indicators

Parameter	MS-LxP			
	Min. value,	Typical value,	Max. value	Unit
Continuous output current	0	-	7.0	A
Input power voltage	110	220	-	Vac
Logic input current	7	10	20	mA
Pulse frequency	0	-	200	kHz
Insulation resistance	500			MΩ

2. Application environment and parameters

Cooling way	Natural cooling or radiator	
Application environment	workplace	Avoid dust, grease and corrosive gas
	Temperature	0℃－50℃
	Humidity	40－90%RH
	Vibration	5.9 m/s^2 Max
Save temperature	-20℃－+80℃	
Weight	≈1500 克	

3. Installation size



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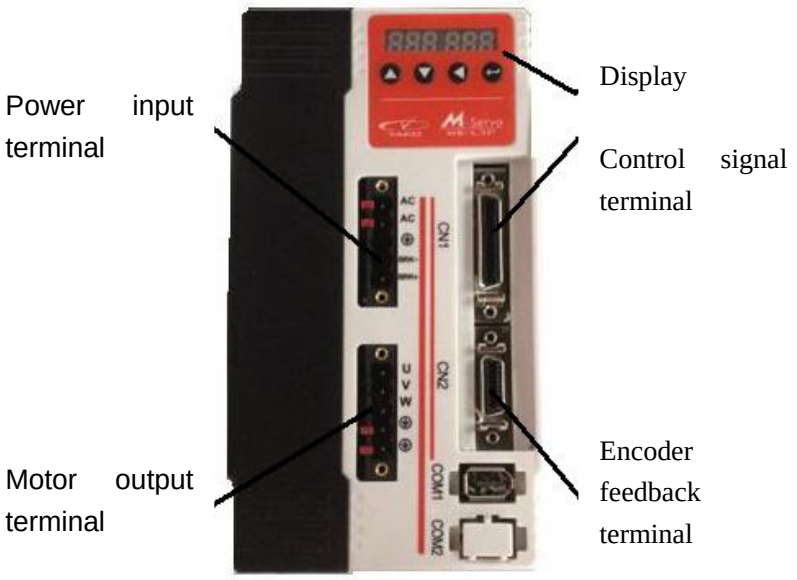
4. Strengthen cooling ways

（1） The suitable temperature for driver is within 60℃, while the suitable temperature for motor is 80℃;

（2） When installing the driver, please use vertical profiles, which can form strong cross-ventilation; if necessary, install a fan near the driver to make sure the driver works in suitable temperature.

三、Introduction of driver's terminals and wiring

1. Terminals



2. Terminal definition

1）. Power input terminal

Terminal No	Name	Instruction	Instruction
1	AC	Power input terminal	Connect with 220V AC
2	AC		
3	NC	NC	Don't connect
4	BRK-	Brake resistor terminal	Externally connect with brake resistor or don't connect
5	BRK+		

2）Motor output terminals

The driver outputs power to motor through U, V, and W terminals. The driver's U,V and W can only connect with motor's U,V,W resistance, cannot connect with AC. And the motor's U,V,W must connect with driver's U,V,W one by one, or the motor can't work normally.

Cable color	Terminal name	Instruction	Instruction
Brown	U	Driver output	Connect with motor's U, V, W.
Blue	V		
Black	W		
NO	PE	GND terminal	Don't connect
	PE		

3）Encoder feedback terminal

Connect motor's encoder with driver through encoder cable

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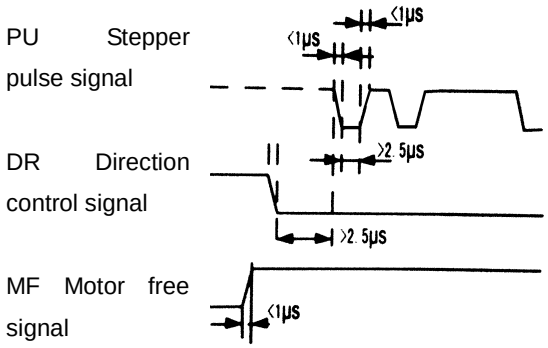
4） Definition of control signal terminal

Connection of cables and signals as below:

Cable color	Terminal No.	Terminal name	Terminal instruction	Instruction
Orange	1	5DR＋	Direction input 5+	Direction input signal
Orange-white	5	DR－	Negative direction input	
Deep yellow	17	24DR＋	Direction input 24V+	
Purple	3	5PU+	Pulse input 5V+	Pulse input signal
Purple-white	2	PU-	Negative pulse input	
Light purple	19	24PU+	Pulse input 24+	
Deep brown	12	5MF+	Motor free 5V+	Motor free input signal
Deep brown-white	11	MF-	Negative motor free input,	
Deep blue	13	24MF+	Motor free 24V+	
Black	10	5CLR_A+	over-error alarm clear input 5V+	Over-error alarm clear signal
Black-white	27	CLR_A-	Negative over-error alarm clear input	
Deep-green	29	24CLR_A+	Over-error alarm clear input 24V+	
Deep grey	7	PEND+	Positive arrival signal output	Arrival output signal
Deep grey-white	6	PEND-	Negative arrival signal output	
Red	9	ALM+	Positive alarm signal output	Alarm output signal
Red-white	8	ALM-	Negative alarm signal	

			output	
Green	15	NC	NC	NC
Green-white	14	NC		
Pink	16	A+	Encoder A output+	Encoder pulse differential output signal
Light blue	18	A-	Encoder A output-	
White	35	B+	Encoder B output+	
Light green	33	B-	Encoder B output-	

In order to avoid some mistake and deviation, PU,DR and MF should meet requirements as below:



5）Communication terminal

Not open to users

6) Instruction

MS-LxP has one 6-bit digital tube display, the driver will stop work and display the error code when the driver encounter some problem; and if several errors happen at the same time, it will display one by one, and it can save 10 latest errors in the driver' EEPROM.

四、Menu display

1. Display interface

MS-LxP display interface has 4 keys, they are "up, down, move &cancel and Enter. As following:

Key	Name	Function
▲	Up	Move up or add the value
▼	Down	Move down or reduce the value
◄	Move	Short press this key means move
	Cancel	Long press this key means back or cancel
←	Enter	Enter next menu or confirm

2. Menu introduction

The system menu has 3 levels, level 1 menu includes 5 items, use key "Up" and "Down" to shift those 5 items.

				▼	dP -
			▼	dE-	▲
		▼	Sr -	▲	
	▼	EE-	▲		
▼	PA -	▲			
dP -	▲				

1）System Monitor dP –

There are 14 pcs of level 2 menus under Dp-, which can monitor system's 11 kinds of status. Under level 1 menu, use "Up" and "Down" to choose Dp-, and then press ← to enter in level 2 menus as below:

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Level 1 menu	Level 2 menu	Meaning	Remarks
dP -	dP – SPd	Motor true speed（r/min）	
	dP – SPr	rated speed (r/min)	
	dP – PoS	Current position low 4 bits(encoder pulse number)	
	dP – PoS.	Current position high 4 bits(encoder pulse number)	
	dP – CPo	Position order low 4 bits(order pulse number)	
	dP – CPo.	Position order high 4 bits(order pulse number)	
	dP – EPo	Position deviation low 4 bits(encoder pulse number)	
	dP – EPo.	Position deviation high 4 bits(encoder pulse number)	
	dP – I	Motor current(mA)	
	dP – t	Driver temperature (℃)	
	dP – rn	Running state	
	dP – Cnt	Current running mode	
	dP – Err	alarm code	00——No alarm
			01——Memory read error
			02——Over-voltage protection
			03——Under-voltage protection
			04——Encoder error
			05——IPM error
			06——Driver's over-temperature protection
			07——Position over-error protection
	dP – VEr	Software version	

After entering level 2 menu, please press ▲and ▼ to choose the items you want to see, then press ← to display the content. And then long press key ◄ to back.

2）Parameter setting PA-

There are 77 pcs of level 2 menus under PA-, each menu points one parameter. Among those parameters, 26 pcs can be adjusted. Press ▲and ▼ to choose the parameter you want to set, press ← to enter the setting interface.

When setting parameters, short press ◄means move, press ▲and ▼ can change the parameter value, and the new value won't be used till you press ←. If you want to exit, please long press ◄, then you will be out of parameter setting interface.

PA parameters:

No.	Name	Function	Default value	范围

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PA-0	set password		315	0~60000
PA-1	Motor coefficient	Different motor different default value. When use function of restoring default value, users must make sure that the parameter is right.		0~3
PA-2	Running mode	0（Position control mode）	0	0~2
		1（Self-test mode）		
		2（Open-loop mode）		
PA-4	Positioning done scope	Set the pulse scope when complete positioning work	2 encoder pulse	1~20
PA-5	Initial display status	0 Motor speed	0(hen errors happen, it will show“Err” and the errors’ code.）	0~13
		1Rated speed		
		2 Current position(high 4 bits)		
		3 current position(low 4 bits)		
		4 position order(high 4 bits)		
		5 position order(low 4 bits)		
		6 position deviation(high 4 bits)		
		7 Position deviation(low 4 bits)		
		8 motor current		
		9 driver temperature		
		10 Running state		
		11 current running mode		
		12 error code		
		13 driver version		
PA-6	Molecules of electronic gear		4000	1~60000
PA-7	Denominator of electronic gear(pulse no per ring)	When the molecules of electronic gear is 4000, this value is the motor’s subdivision.	4000	1~60000
PA-8	Encoder resolution		4000	4000 ~10000
PA-9	Trace error alarm		1000	0~60000 encoder pulse
PA-10	Maintain the current percentage		20	0~100
PA-11	Close-loop current percentage		30	0~100

PA-12	Maintain time		10	0~200
PA-13	Choice of delete the level signal of tracing error alarm		1	0/1
PA-15	Choice of MF level		1	0/1
PA-16	alarm signal output level		0	0/1
PA-17	Single and double pulse choice	0 Pulse direction mode 1 double pulse mode	0	0/1
PA-18	Pulse effective choice		0	0/1
PA-19	Choice of motor rotation direction		1	0/1
PA-23	Position ratio	Set the proportion of the position loop controller gain, the larger the value, the bigger the stiffness.	5	0~10
PA-24	Feedforward coefficient of speed	Set the position loop feedforward gain, the larger the value, the bigger the stiffness.	1000	0~1000

PA-71	speed section 1	In different speed section, the adjustments on resonance suppression help to eliminate vibration.	942	0~60000
PA-72	resonance suppression coefficient 1		50	0~200
PA-73	speed section 2		5024	0~60000
PA-74	resonance suppression coefficient 2		50	0~200
PA-75	speed section 3		6280	0~60000
PA-76	resonance suppression coefficient 3		50	0~200

3）Parameter management EE-

There are 6 level 2 menus under EE as below:

Level 1 menu	Level 2 menu	Function
EE-（parameter management）	EE-SEt	Parameter write-in, means write the parameters of driver’s memory in EEPROM. If users don’t do this operation, the parameters you changed will restore.
	EE-rd	Parameter read-in, means read the parameters of EEPROM in memory.
	EE-bA	Parameter backup, means write the parameters of memory in EEPROM.

	EE-rS	Restore the backup, means read the data of EEPROM'S backup zone in memory. This operation doesn't execute the action of reading parameters in EEPROM. If users want to use the data in backup of EEPROM, you need to write-in once again.
	EE-dEF	To restore the default parameters, means reading all parameters default in memory and write in EEPROM.
	EE-ACL	Clear fault history

When save parameters, you need to：

① Find out level 1 menu EE,
② Enter level 2 menu EE-SET,
③ Long press ←, the screen will show StArt, 2 seconds later, show "Finish", which means save successfully.

Note: If you change parameter PA-2, PA-6 and PA-7, please save and then restart the driver. For other parameters, don't need to restart the driver after changing.

4） Test & Run Sr-

You can only use this menu when parameter PA-2 is 1.

Level 1 menu	Level 2 menu	Function
Sr-(Test-run mode）	Sr-On	Start to run, the motor moves in fixed speed.
	Sr-Off	Finish, the motor stop.

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5） Fault history display dE-

Query for the latest 10 historical errors：

Level 1 menu	Level 2 menu	Function
dE-（Historical fault query）	dE-1	dE-01 display the latest error code, dE-02 display the last second error code,De-03……
	dE-2	
	dE-3	
	dE-4	
	dE-5	
	dE-6	
	dE-7	
	dE-8	
	dE-9	
	dE-10	

五、YAKO Product Warranty Terms

1、One-year warranty

All YAKO products have one year warranty. In warranty period, we provide free maintenance service for defective product.

2、oes not belong to the warranty as below:

- Wrong wring
- Change internal parts without agreement
- Beyond the requirements on electrical and environment
- The cooling environment is bad.