

MS-Sx Series Easy Servo Driver User Manual

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【Please read it carefully before installing the driver.】

I. Product Introduction

1. Description

MS-Sx series of high voltage easy 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 57/60/86mm;
 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.

4. Naming Rules

MS- S 3 -xx

① ② ③ ④

①	Series symbol	Easy Servo Driver MS Series
②	Power	L: large power S: small power
③	Motor flange	1: 57mm motor 2: 60mm motor 3: 86mm motor
④	Customized no.	1——99

II. Electrical, Mechanical and Environmental Indicators

1. Electrical Indicators

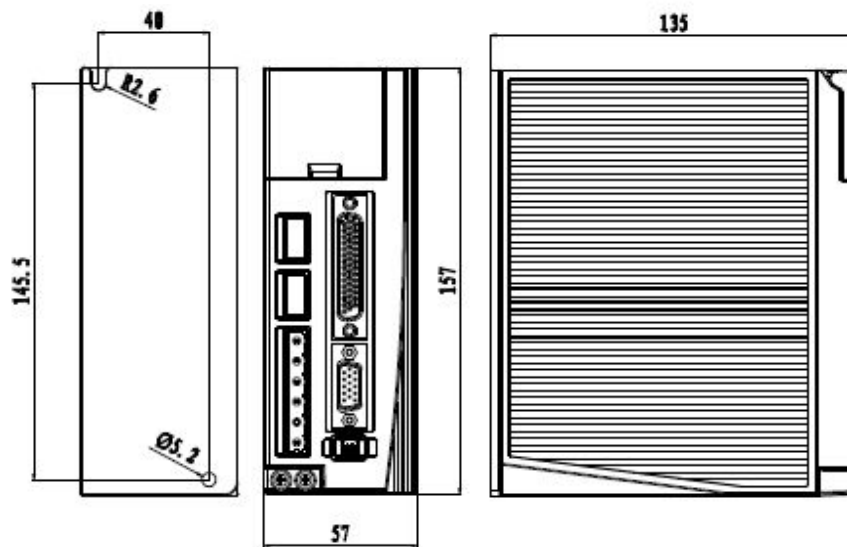
Parameter	MS-Sx			
	Min. value	Typical value	Max. value	Unit
Continuous output current	0	-	6.0	A
Input power voltage	24	70	80	Vac
Logic input current	7	10	20	mA
Pulse frequency	0	-	200	kHz
Insulation resistance	500			MΩ

2. Application environment and parameters

Cooling way	Natural cooling or radiator
-------------	-----------------------------

Application environment	workplace	Avoid dust, grease and corrosive gas.
	Temperature	0°C – 50°C
	Humidity	40–90%RH
	Vibration	5.9 m/s ² Max
Save temperature	-20°C – +80°C	
Weight	About 1000g	

3. Installation size



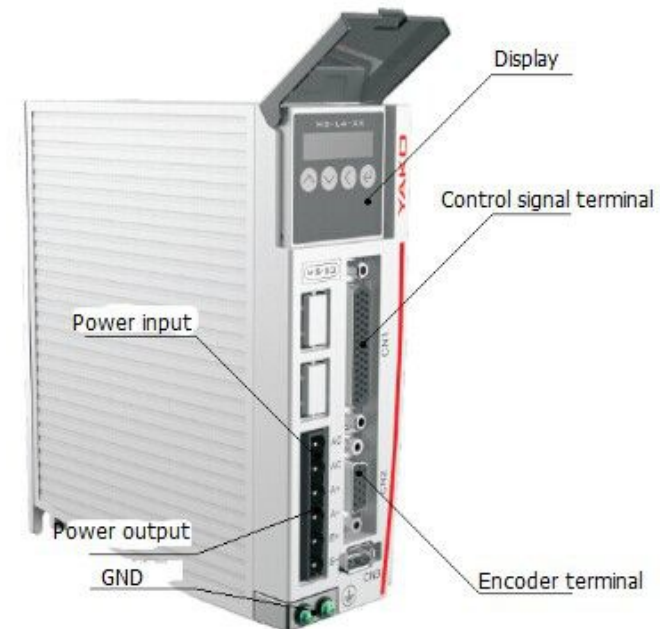
4. Strengthen cooling ways

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

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.

III. Introduction of driver's terminals and connection

1. Terminals



2. Terminal definition

1) Power input and motor output terminals

Terminal No.	Symbol	Name	Instruction
1	AC	Power input	Connect with 24V~80VAC
2	AC		
3	A+	Motor current cable	With red cable
4	A-		With blue cable
5	B+		With green cable
6	B-		With black cable

2) Encoder feedback terminal

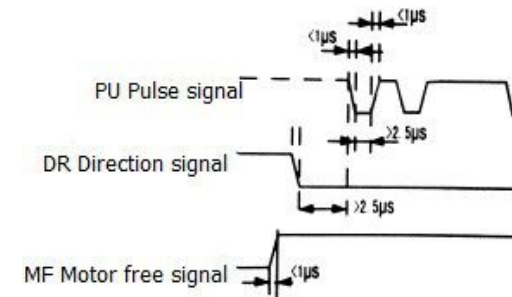
YAKO offers the encoder cable, users only need to connect the encoder extending line with motor encoder and driver.

3) Control signal terminals

Terminal No.	Terminal name	Terminal instruction	Instruction
3	5PU+	Pulse input 5V+	Pulse input signal
4	PU-	Negative pulse input	
19	24PU+	Pulse input 24V+	
5	5DR+	Direction input 5V+	Direction input signal
6	DR-	Negative direction input	
21	24DR+	Direction input 24V+	
11	5MF+	Motor free 5V+	Motor free input signal
12	MF-	Negative motor free input,	
27	24MF+	Motor free 24V+	
13	5CLR_A+	over-error alarm clear input 5V+	Over-error alarm clear signal
14	CLR_A-	Negative over-error alarm clear input	

29	24CLR_A+	Over-error alarm clear input 24V+	
9	PEND+	Positive arrival signal output	Arrival output signal
10	PEND-	Negative arrival signal output	
7	ALM+	Positive alarm signal output	Alarm output signal
8	ALM-	Negative alarm signal output	
16	A+	Encoder A output+	Encoder pulse differential output signal
31	A-	Encoder A output-	
18	B+	Encoder B output+	
32	B-	Encoder B output-	

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



4) RS232 Communication terminal

Not open to users now.

5) Status Instruction

MS-Sx 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.

IV. Menu display

1. Display interface

MS-Sx 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:

Leve 1 menu	Level 2 menu	Definition	Remark
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(°C)	
	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.

No.	Name	Function	Default	Range
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
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 encode r pulse	1~20
PA-5	Initial display status	0 Motor speed	0(When errors happen, it will show "Err" and the errors' code.)	0~13
		1 Rated 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 status		
		11 current running mode		
		12 error code		
13 driver version				
PA-6	Molecules of electronic gear		4000	1~60000
PA-7	Denominator of electronic	When the molecules of electronic gear is 4000, this value is the	1600 ⁽¹⁾	1~60000

	gear(pulse no. per ring)	motor's subdivision.		
PA-8	Encoder resolution		4000	4000 ~1000 0
PA-9	Trace error alarm value		1000	0~60 000e ncod er pule s
PA-10	Maintain the current percentage		65 ⁽¹⁾	0~10 0
PA-11	Close-loop current percentage		100 ⁽¹⁾	0~10 0
PA-12	Maintain time		10	0~20 0
PA-13	Choice of clearing the level signal of tracing error alarm (CLR_A)		1	0/1
PA-15	Choice of MF level		1	0/1
PA-16	Alarm signal	1 alarm output normally open	1 ⁽¹⁾	0/1

	output level	0 alarm output normally close		
PA-17	Single and double pulse choice	0 DR+PU 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.	4 ⁽¹⁾	0~10
PA-24	Feedforward coefficient of speed	Set the position loop feedforward gain, the larger the value, the bigger the stiffness.	950 ⁽¹⁾	0~100 0
PA-25	MF signal function setting ⁽²⁾	1 common MF signal 0 pulse blocking function	1	0/1
PA-71	speed section 1	In different speed section, the adjustments on resonance suppression help to eliminate vibration.	942	0~600 00
PA-72	resonance suppression coefficient 1		50	0~200
PA-73	speed section 2		5024	0~600 00

PA-74	resonance suppression coefficient 2		50	0~200
PA-75	speed section 3		6280	0~600 00
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- (para. 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, PA-7 and PA-25, 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 the value of 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.

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	

V. YAKO Product Warranty Terms

1. All YAKO products have one year warranty. In warranty period, we provide free maintenance service for defective product.
2. Does not belong to the warranty as below:
 - A. Wrong wiring
 - B. Change internal parts without agreement
 - C. Beyond the requirements on electrical and environment
 - D. The cooling environment is bad.