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AS210

Series Servo System - Precision, Accuracy, Efficiency, Environment Friendly



iAStar

With Creative Science and Technology You Will find Such is The World

Company culture

Enterprise spirit: global concentration, always striving to be the best

Enterprise value: honesty, creation, excellence

Enterprise principle: customer satisfaction, employee pride and social benefits

Enterprise mission: provide the best control, drive and energy saving products

Enterprise vision: become a world famous high-tech electric company

Company profile

Shanghai Sigriner Step Motor Co., Ltd is a subsidiary of Shanghai Step Electric Co. Ltd. As a group enterprise, Shanghai Step Electric Co. Ltd was established in 1995, with its registered trademark STEP, which is mainly engaged in the development, manufacturing and marketing of control and drive products. There are 4 domestic and 2 oversea companies subordinated to it.

On Dec. 24 of 2010, with the ring of Shenzhen Securities Exchange, STEP firstly issued A shares in public and was successfully listed.

The stock is referred to as Xinshida, stock code: 002527

In 2006, Shanghai Step Electric Co., Ltd invested to set up Shanghai Sigriner Step Electric Co., Ltd, and have built a modernized R & D and manufacturing base covering 30000m² for drive products, equipped with the world class testing instrument and production facilities. The company implements the advanced management system and strict quality control system, to ensure to provide the high quality drive products and services for users. Now the company provides HV and LV fan water pump inverter, HV and LV vector inverter, quadrant inverter, special inverter for elevator, shared DC bus inverter, integrated drive controller, energy feedback device, door inverter and AC servo system.

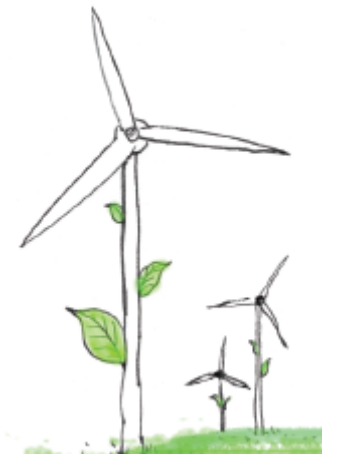
STEP implements globalization strategy, and the products have been sold to more than 30 countries and regions in Europe, North America and Asia. In China, STEP has set up office and liaison office in 18 cities such as Beijing, Shanghai and Guangzhou, with its marketing and service network all over the country.

STEP adheres to the enterprise spirit of global concentration, always striving to be the best, and tries the best to provide the excellent control, drive and energy saving products for users. Now it is realizing its vision of becoming a world famous high-tech electric company step by step.



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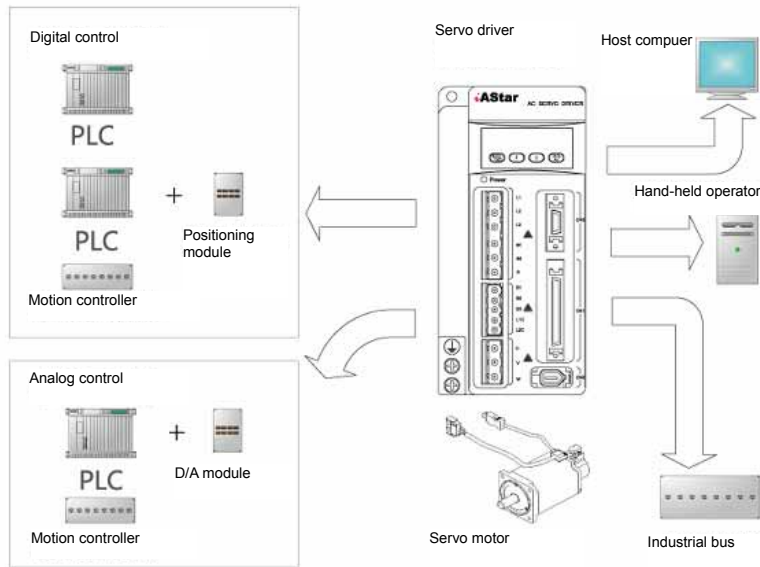
I. System overview

Product description



1. AS201 series servo system
2. AS160 series special inverter for fan and water pump
3. AS500 series high performance general vector inverter
4. AS320 series special inverter for elevator
5. Energy feedback device
6. AS300 series special door inverter
7. AS700 series port machinery cabinet inverter
8. AS8000 series HV inverter

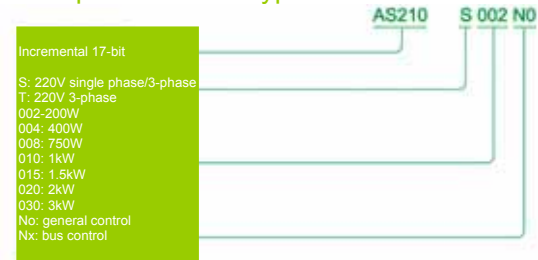
System description



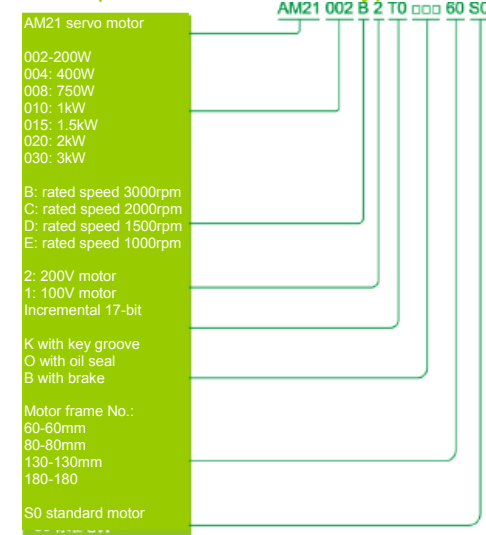
II. Selection guide

Naming rules of the drivers and motors

Description of driver type



Description of servo motor type



Combination of servo motor and servo driver

parameter	Unit	AM21-002B2T06 0S0	AM21-004B2T06 0S0	AM21-008B2T08 0S0	AM21-010C2T01 30S0	AM21-015C2T01 30S0	AM21-020C2T01 30S0	AM21-030C2T01 30S0
Motor power	kW	0.2kW	0.4kW	0.75kW	1kW	1.5kW	2kW	3kW
Rated torque	N-m	0.64	1.27	2.39	4.77	7.16	9.55	14.3
Maximum torque	N-m	1.91	3.82	7.17	14.3	21.5	28.6	42.9
Rated speed	rpm	3000	3000	3000	2000	2000	2000	2000
Maximum speed	rpm	5000	5000	5000	3000	3000	3000	3000
Rated current	A	1.9	2.6	4	6.2	8.4	10.5	13.9
Maximum current	A	5.7	7.8	12	18.6	25.2	31.5	41.7
Moment of inertia	Kg-m ² *10 ⁻⁴	0.42	0.67	1.51	4.6	6.7	8.72	12.9
Operating voltage	V	200	200	200	200	200	200	200
Matching driver		AS210-S0 02NO	AS210-S0 04NO	A210-S008 NO	AS210-S0 10NO	AS210-S0 15NO	AS210-S0 20NO	AS210-S0 30NO



III. Function overview

Highly intelligent, highly precise and networking, AS210 series servo system is used by the system which has high requirements for static performance and high dynamic response, such as numerical control machine and robot. AS210 series servo system has the following features:

Dual DSP control:

High operation speed of dual DSP can be taken to full potential via reasonable task allocation, making the system have higher frequency response.

Flexible control mode:

Torque control, speed control, location control and mixed control mode can be flexibly chosen via parameter setting.

Parameter self-setting:

Automatically identify the speed controller via moment of inertia and optimize the identified parameters based on speed step response. Setting method is simple and feasible, with good flexibility, stability and efficiency, which can greatly shorten the system adjusting time.

High precision encoder:

The 17-bit incremental / absolute photoelectric encoder is used as position feedback unit, to achieve faster precise positioning and ensure the minimum error in speed and position of the system.

Support multiple bus network:

RS232, RS485, modbus, *Profibus, *CANopen (under development).

All sorts of software functions:

Software functions such as dynamic execution of built-in point, origin point look and electronic gear.

IV. Operation description

AS210 series servo driver

01 Power indicator

It lights when the control power is power on.

02 Battery box

Standby batter can be used when absolute encoder is applied.

03 Panel display

Show servo status, warning number and constant input of users via 5-bit 7-strip LED.

04 Panel switch

Used when the user constant is set.

05 Communication connector

The connectors for command input signal, sequence input and output signal

06 Connector for I/O signal (CN1)

The connectors for instruction input signal or sequential I/O signal



07 Nameplate

The nameplate where the type and rated technical parameters of the servo unit are marked.

08 Encoder connector (CN2)

The encoder connectors which are connected and mounted on servo motor.

09 Grounding terminals (FG)

In order to prevent the terminals against electric shock, be sure to ground.

10. Connecting terminals of servo motor

Connect the terminals of power wire of servo motor.

11 Terminals of control power

Connect the terminals of control power supply and external braking resistor.

12. Power terminals of the main circuit

Terminals for power input of the main circuit.



Overview of terminals arrangement of driver interface connector (CN1)

Terminal arrangement and specification of CN1 are shown as follows:

1	I_SEN_COM	Initial signal grounding for absolute encoder
2	I_SEN	Initial signal for absolute encoder
3	O_TGON	Motor rotation detection output +
4	O_TGON	Motor rotation detection output -
5	O_S-RDY	Servo ready output +
6	O /S-RDY	Servo ready output-
7	O_ALM	Servo alarm output +
8	O /ALM	Servo alarm output -
9	I /PULS	Position pulse input-
10	I_PULS	Position pulse input+
11	I_S-RUN	Servo ON
12	I_P-CON	Servo control switching
13	I_POT	No forward
14	I_NOT	No reverse
15	+12VOUT	Internal power
16	+12VOUT	Internal power
17	+12VOUT	Internal power
18	I_ALM-RST	Alarm remove
19	I_PCL	Forward current limiting
20	I_NCL	Reverse current limiting
21	O_ALM01	Alarm encode output
22	O_ALM02	Alarm encode output
23	O_ALM03	Alarm encode output
24	O_COIN	Servo reaching output +
25	O /COIN	Servo reaching output -
26	O_PBO	Encoder frequency dividing output phase B+
27	O_PZO	Encoder frequency dividing output phase Z+
28	O_/PBO	Encoder frequency dividing output phase B-
29	O_/PZO	Encoder frequency dividing output phase Z-
30	O_PSO	Output signal+ from encoder S
31	O_/PSO	Output signal- from encoder S
32	GND	Internal reference ground
33	O_/PAO	Encoder frequency dividing output phase A-
34	O_PAO	Encoder frequency dividing output phase A+
35	GND	Internal reference ground
36	GND	Internal reference ground
37	I_SIGN	Position pulse direction +
38	I_/SIGN	Position pulse direction -
39	-	-
40	-	-
41	I_CLR	Pulse error clear +
42	I_/CLR	Pulse error clear -
43	I_SPE_REF	Speed command input
44	I_TOR_REF	Torque command input
45	VB	Absolute encoder battery
46	VBGND	Absolute encoder battery-
47	GND	Internal reference ground
48	O_ALM_COM	Alarm code output ground
49	+24VIN	External input power
50	+24VIN	External input power

Operation mode

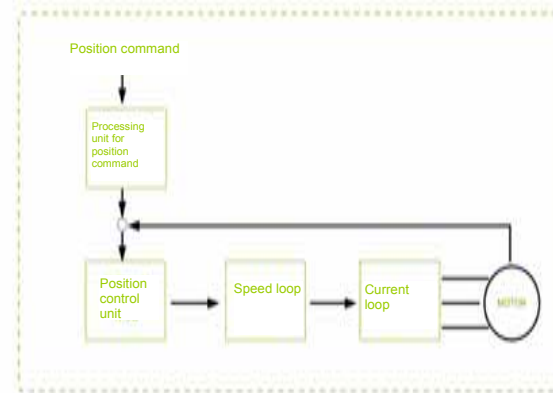
Selection of control mode

The driver provides 3 basic operation modes, i.e. position, speed and torque, with 12 control modes as follows.

Setting of Pn000.1	Control mode
0	Speed control (analog command)
1	Position control (pulse train command)
2	Torque control (analog command)
3	Selection of internally set speed (contact command)
4	Selection of internally set speed (contact command)<->speed control (analog command)
5	Selection of internally set speed (contact command)<->position control (pulse train command)
6	Selection of internally set speed (contact command)<->torque control (analog command)
7	Position control (pulse train command)<->speed control (analog command)
8	Position control (pulse train command)<->torque control (analog command)
9	Torque control (analog command)<->speed control (analog command)
A	Speed control (analog command)<->zero speed control
B	Position control (pulse train command)<->position control (prohibited)

Position control mode

The basic control framework is shown as follows:

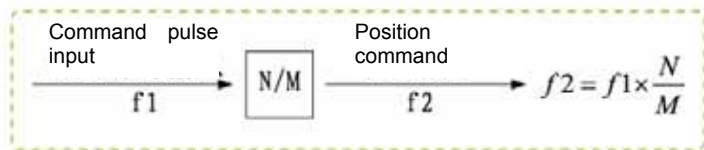


Electronic gear ratio switching

Electronic gear provides a simple and easy stroke ratio change. The bigger electronic gear usually will cause position command step. When electronic gear is set as 4, external output pulse frequency will be 10kHz, indicating that 1 pulse input from outside corresponds to 4 pulses of the motor.

Please set the electronic gear under the condition of SERVO OFF. If any error appears, the servo motor will experience sudden unintended acceleration, therefore please set it according to the following rules:

Setting of command pulse input ratio



Electronic gear ratio = $\frac{N}{M} = \frac{Pn203}{Pn204}$ and must satisfy the limit of $10.01 \leq \frac{N}{M} \leq 100$

Speed mode

Speed mode applies to the precise speed control. The device is provided with two command input modes: analog input and menu input. The former can be used to control the motor speed via the voltage from outside; while the latter is that the user shall input three different speed values prior to application, then make the choice and switchover by SPD0 and SPD1 during operation.

Selection of speed command

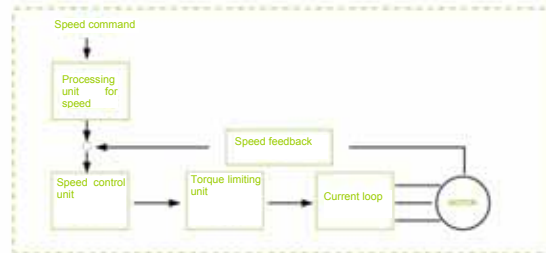
Source of speed command is divided into two types, one is analog voltage from external input and the other is menu input. Selection mode can be determined according to D1 signal of CN1.

Status of PDA-D: 0 (OFF, H level), 1 (ON L level).

When SPD-A=SPD-B=0, the command will be 0. Therefore if the user doesn't take analog voltage as speed command, and the command isn't 0, the command will be analog voltage difference between V-RER and GND, and the input voltage scope will be -10V-+10V. In addition, the corresponding rotation speed of the voltage can be adjusted (Pn300).

Control structure of speed mode

The basic control framework is shown as the following diagram:



Speed command count

Speed command of the motor is controlled by analog voltage difference between V_REF and VGND, which adjusts the speed control slope and scope as well in connection with Pn300.

Torque mode

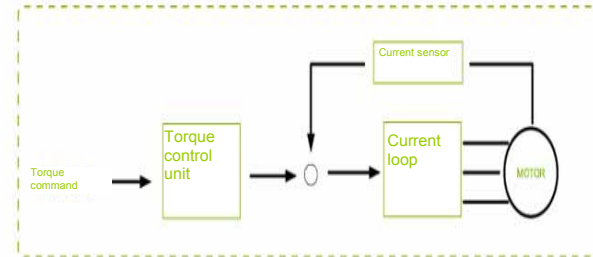
Torque control mode applies to the occasions which needs torque control. The Input mode of the device is external analog input. Analog command input can control the motor torque via the voltage from outside.

Selection of torque command

The Source of torque command is the analog voltage input from the outside.

Control structure of torque mode

The basic control framework is shown as follows:



Where, processing unit for torque command contains Pn400 to set the command magnitude represented by the analog voltage.

Torque command count

Torque command of the motor is controlled by the analog voltage difference between T-REF and GND, which adjusts the speed control slope and scope as well in connection of Pn300.

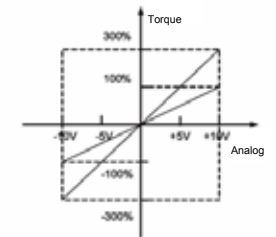
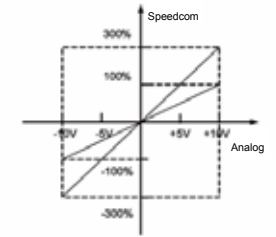
Analog monitoring

Various signals can be monitored with analog voltage. Please observe the analog monitoring signals via J6 port. Analog monitoring signal can be changed by setting the user constant Pn003.0 and Pn003.1.

Pn003.0	analog signal 1	factory setting 2	speed, torque and position control
Pn003.1	analog signal 2	factory setting 0	speed, torque and position control

The following monitoring signals can be observed:

Setting of Pn003.0 and Pn003.1	Content	
	Monitoring signal	observe gain
0	motor speed	1V/1000 min-1
1	speed command	1V/1000 min-1
2	torque command	1V/100% rated torque
3	position deviation	0.05V/1 command unit
4	position deviation	0.05V/100 command unit
5	command pulse frequency	1V/1000 min-1
6	motor speed	1V/250 min-1
7	motor speed	1V/125 min-1
8-E	appointed monitor signal	



Note: when the motor is in torque control and speed control, monitor signal of position deviation will be changed into unsteady 不安定.

V. Technical parameters

Characteristic parameters of the motor

Basic specifications	Time rating	continuous
	Ambient temperature	0~+40
	Ambient humidity	20-90%RH (without condensation)
	Vibration level	V15
	Protection level	IP65 (excluding spindle opening or joint)
	Seismic resistance	vibration acceleration 24.5m/s ²
	Heat-resistant class	Class B
	Excitation mode	permanent magnet type
	Installation type	flange type

Parameters of driver

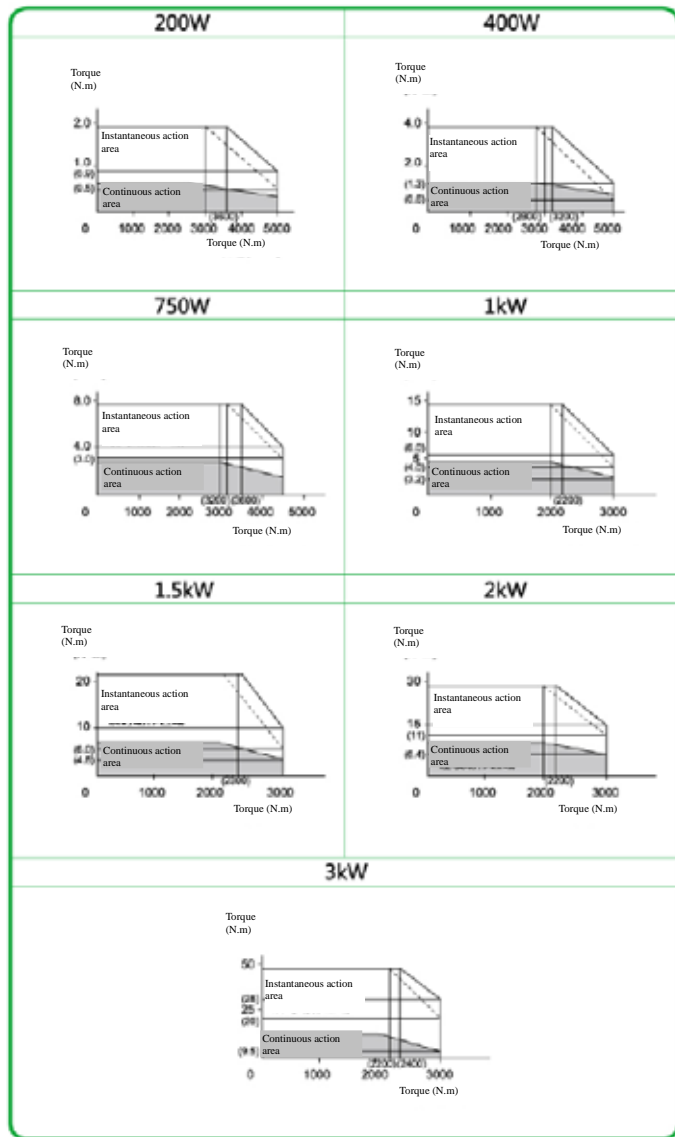
Power scope		Parameters
		AS210 - S002N0 AS210 - S004N0 AS210 - S008N0 AS210 - S010N0 AS210 - S015N0 AS210 - S020N0 AS210 - S030N0
Torque control	torque control scope	1:100
	torque cycle period	minimum 125us
	overload time	rated output 200% 8s
	command control mode	external analog command control/internal register control
	command smoothing mode	low pass smoothing filtering
	torque control repeatability	±1%
Speed control	dynamic response time	1ms
	range of speed regulation	1:5000
		load fluctuation ratio: maximum 0.01% under 0%-100% (during rated torque) voltage fluctuation ratio: 0% under rated voltage±10% (during rated torque) temperature fluctuation ratio: maximum ±0.1 % under 0-50 (during rated torque)
	speed wave	$\Delta n/n_{max}=0.3\%$
Position control	maximum input pulse frequency	differential transmission mode: 500KPPS. Open collector transmission mode: ≥200KPPS
	pulse command mode	pulse + symbol, phase A + phase B, CCW pulse + CW pulse
	command control mode	external pulse control/internal register control
	command smoothing mode	low pass and P curve smoothing filtering
	electronic gear ratio	N/M times: 1-32767/M, 1:32767 (1/50<N/M<200)
	torque limit	parameter setting mode
	forward-feed compensation	parameter setting mode
Other control modes: 1) mixed control mode of position and speed; 4) torque limit; 7) setting of speed and acceleration forward-feed parameter; Note: the specific index of the above control modes will be determined in the development		2) mixed control mode of position and torque; 5) alarm of too mush position deviation; 8) setting of null drift compensation parameter; 3) mixed control mode of speed and torque; 6) setting of speed PID parameter; 9) setting of accelerating and decelerating time, etc.

(continued)

pulse connection	pulse input	two-way, phase difference 90°, maximum pulse frequency 500kHz
	pulse output	two-way, phase difference 90°, maximum pulse frequency 500kHz
speed setting precision	analog input	$n_{max}/2^{11}$
	digital quantity	$n_{max}/10000$
feedback value resolution	speed	16 bits+1 symbol bit
	position	17
input and output	analog input	More than 2 ways
	analog output	More than 2 ways
	digital input	More than 5 ways: such as servo start, abnormal reset, gain switching, pulse clear counter, emergency stop, rotation in clockwise/counterclockwise direction banned; internal register control command, torque limit command, speed limit command, selection of position/speed mixed mode command; selection of speed/torque mixed mode command; selection of position/torque mixed mode command.
	digital output	More than 4 ways: output of A, B and Z line drive; servo start preparation, servo start, zero speed detection, speed arrive, position arrive, in torque limit, servo alarm output, electromagnetic brake control output, completion of digital input & output and homing output
analog monitoring output	set by parameter	
frequency characteristic of the driver	500Hz (when the load and moment of inertia is the same)	
braking mode	energy consumption braking	
dynamic brake	built-in	
feedback	incremental, absolute and rotary transformer	
start/stop	linear and S curve, start/stop time 0-999.99s	
chopper frequency	automatic noise reduction or consumption reduction & optimization can be realized	
operating panel	hot plug support, used for parameter setting, data transmission and status display.	
communication	RS232, RS485, modbus, *Profibus, *CANopen (* under development)	
protective measures	undervoltage, overvoltage, overcurrent, overheat, overload, over speed, position feedback fault, regenerative braking, etc.	
host computer software	parameter setting, modification, control and monitor are available for the software based on PC Windows.	



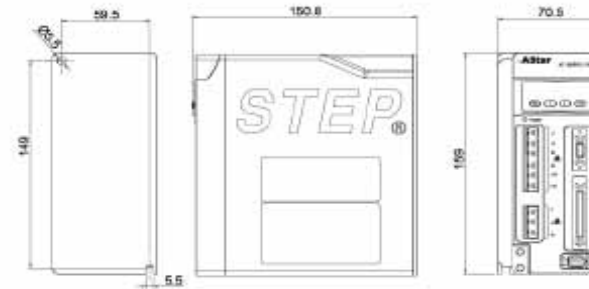
Characteristic curve of the motor



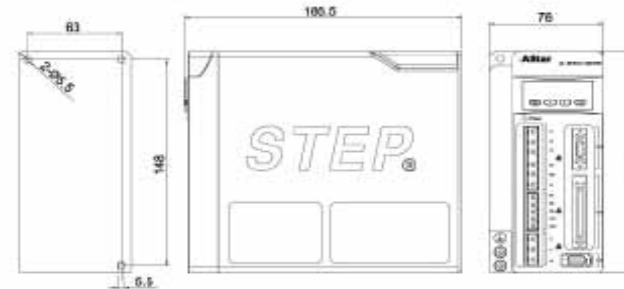
VI. Dimensional drawing

Dimensional drawing of the driver

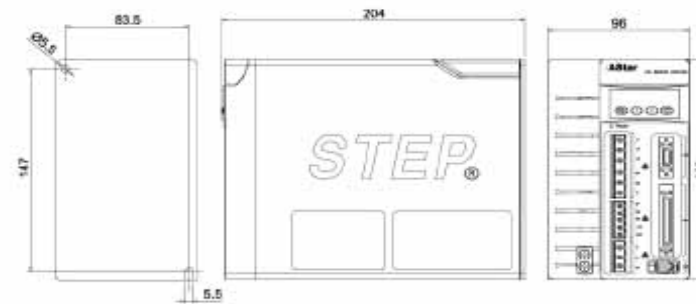
AS210-S002N0, AS210-S004N0



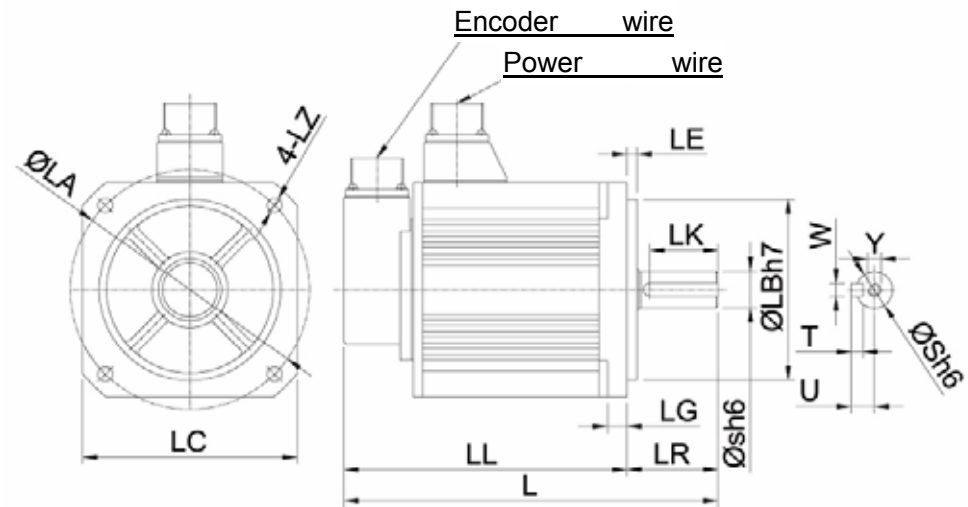
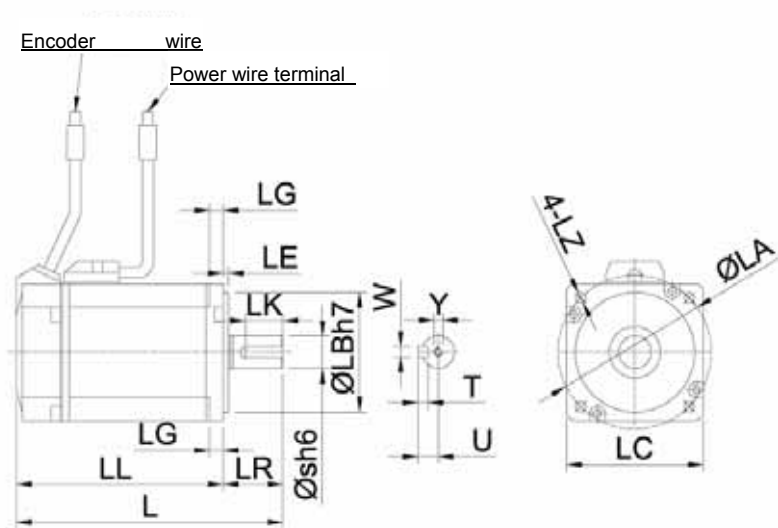
AS210-S008N0



AS210-S010N0, AS210-S015N0



➔ Dimensional drawing of the servo motor



Type	Output	L	LL	LR	LE	LG	LC	LA	LZ	S	LB	T	U	W	LK	Y	Weigh
AM21002B2T0KO60S0	200W	120	90	30	3	6.5	60	70	4.5	11	50	4	7	4	20	M4X8L	0.85
AM21004B2T0KO60S0	400W	140	110	30	3	6.5	60	70	4.5	14	50	5	9	5	25	M5X10L	1.25
AM21006B2T0KO60S0	750W	156	121	35	3	8	80	90	6	19	70	6	12	6	25	M5X10L	2.5
AM21010C2T0KO130S0	1kW	184.5	129.5	55	6	12	130	145	9	22	110	7	14	8	25	M8X15L	4.9
AM21015C2T0KO130S0	1.5kW	202	147	55	6	12	130	145	9	22	110	7	14	8	45	M8X15L	6.3
AM21020C2T0KO130S0	2kW	226.5	171.5	55	6	12	130	145	9	22	110	7	14	8	45	M8X15L	7.95
AM21030C2T0KO130S0	3kW	282.5	217.5	65	6	12	130	145	9	24	110	7	15	8	45	M8X15L	12

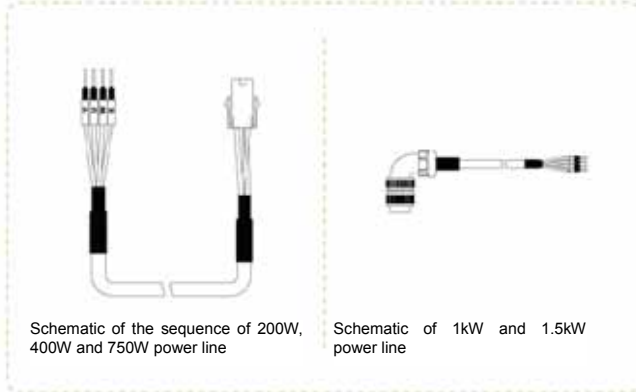


VII. Connecting line

Supporting cables

The terminal arrangement and type of the connector for power line

The length of the cable is 3-20m (maximum distance between the servo driver and servo motor is 50m).



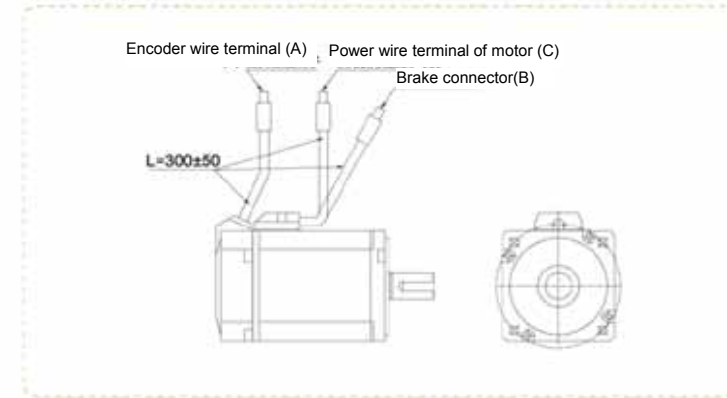
Cable specifications

Power	Type	Length (L)
200W	T-750-P-3	3M
400W		
750W		
1kW	T-1500-P-3	3M
1.5kW		



Terminal definition and leading wire

Sequence of power wire on motor side
200W, 400W, 750W

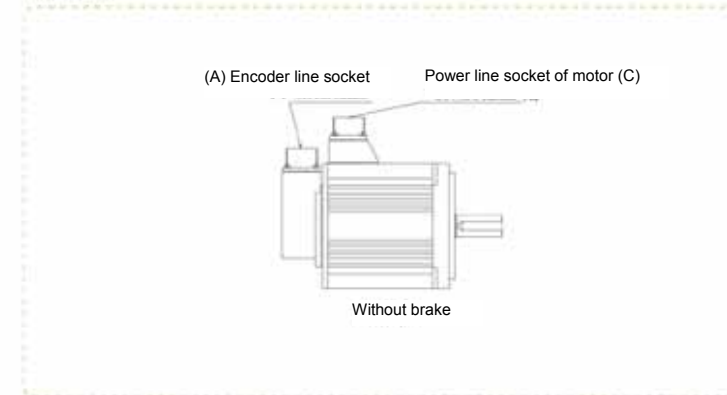


(C)

No.	Name	Color
1	U	red
2	V	white
3	W	black
4	⊕	green or yellowish green

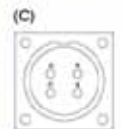


1kW, 1.5kW



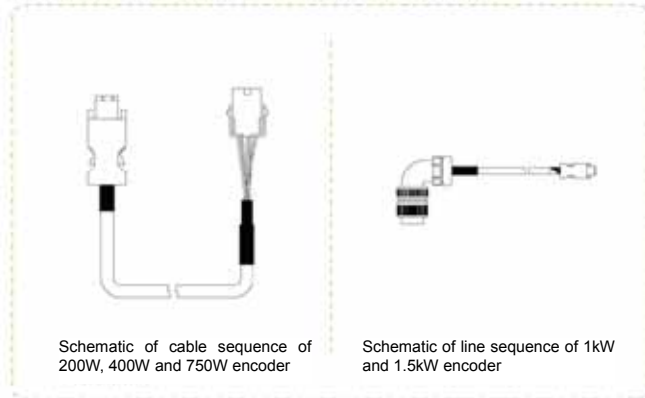
(C)

No.	Name
A	U
B	V
C	W
D	⊕



Encoder cables

The length of the cable is 3-20m (maximum distance between the servo driver and servo motor is 50m).



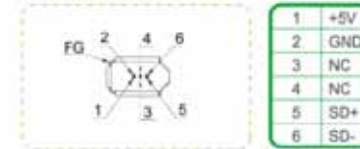
Cable specifications

Power	Type	Length (L)
200W	T-750-E-3	3M
400W		5M
750W		5M
1kW	T-1500-E-3	3M
1.5kW		5M

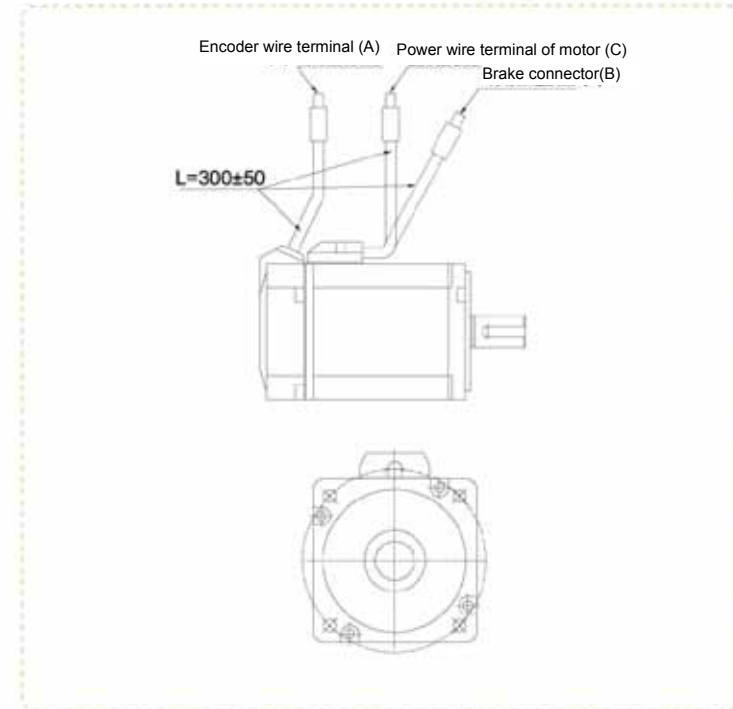


Terminal definition and leading wire

Line sequence of CN2 port on driver side



Line sequence of the encoder on motor side
200W, 400W and 750W



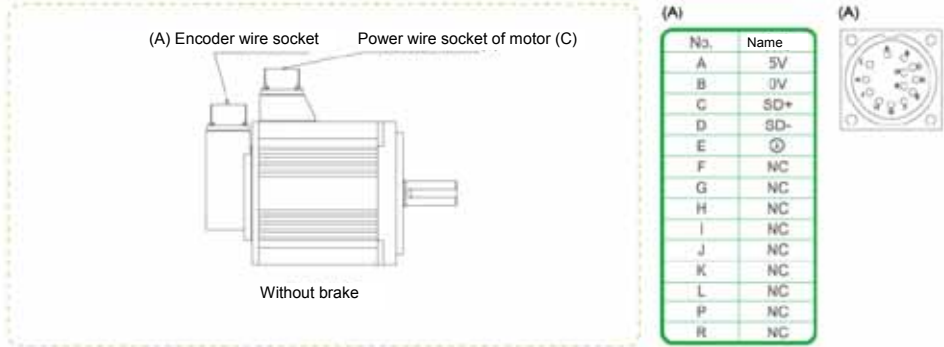
(A)

No.	Name	Color
1	5V	red
2	0V	black
3	SD+	blue
4	SD-	blue white
5	Ⓢ	green
6	NC	

(A)

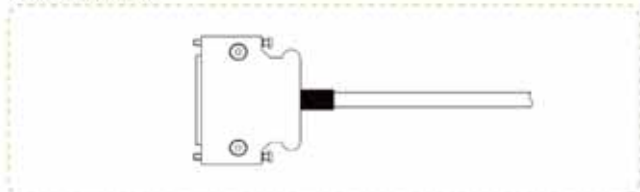
1	2	3
6	5	4

1kW and 1.5kW



Input/output cables

Input/output cables are used for I/O terminal interface CN1 of the servo driver. Connection schematic and outline dimensions

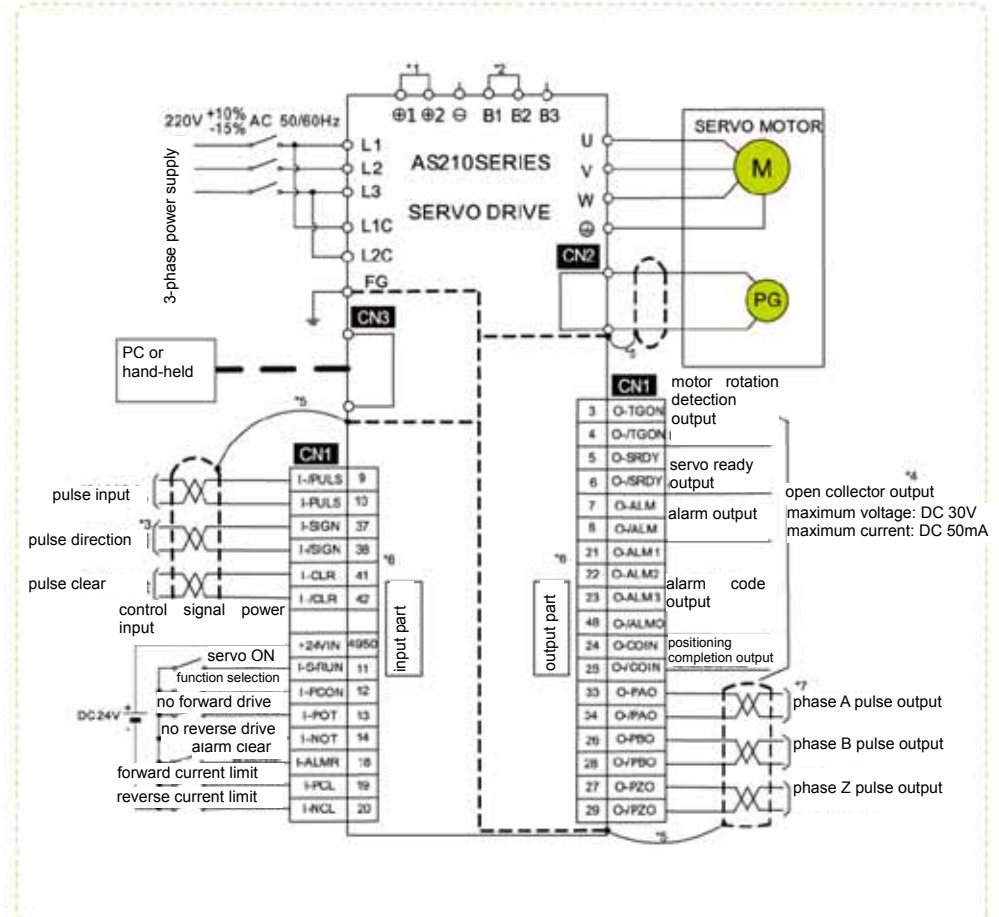


Cable specifications

Type	Length
T-CPS-1	1m
T-CPS-2	2m

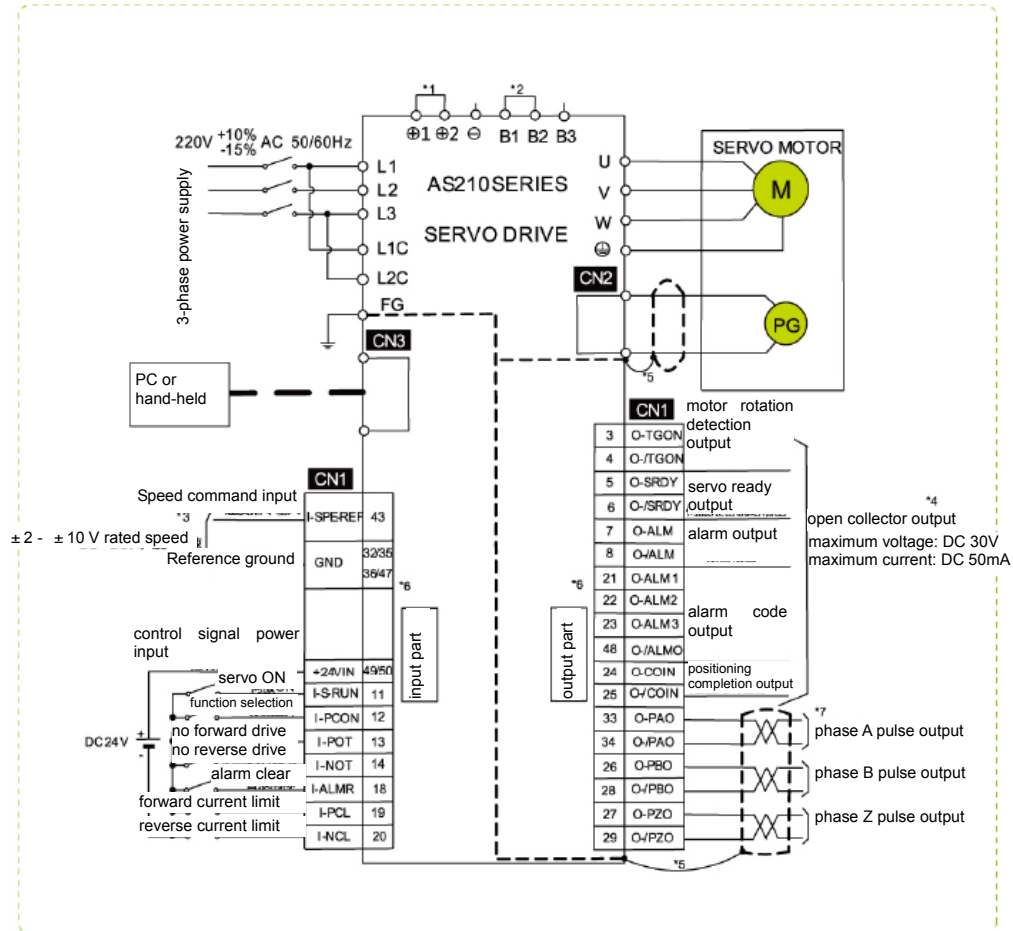
System wiring

Position control



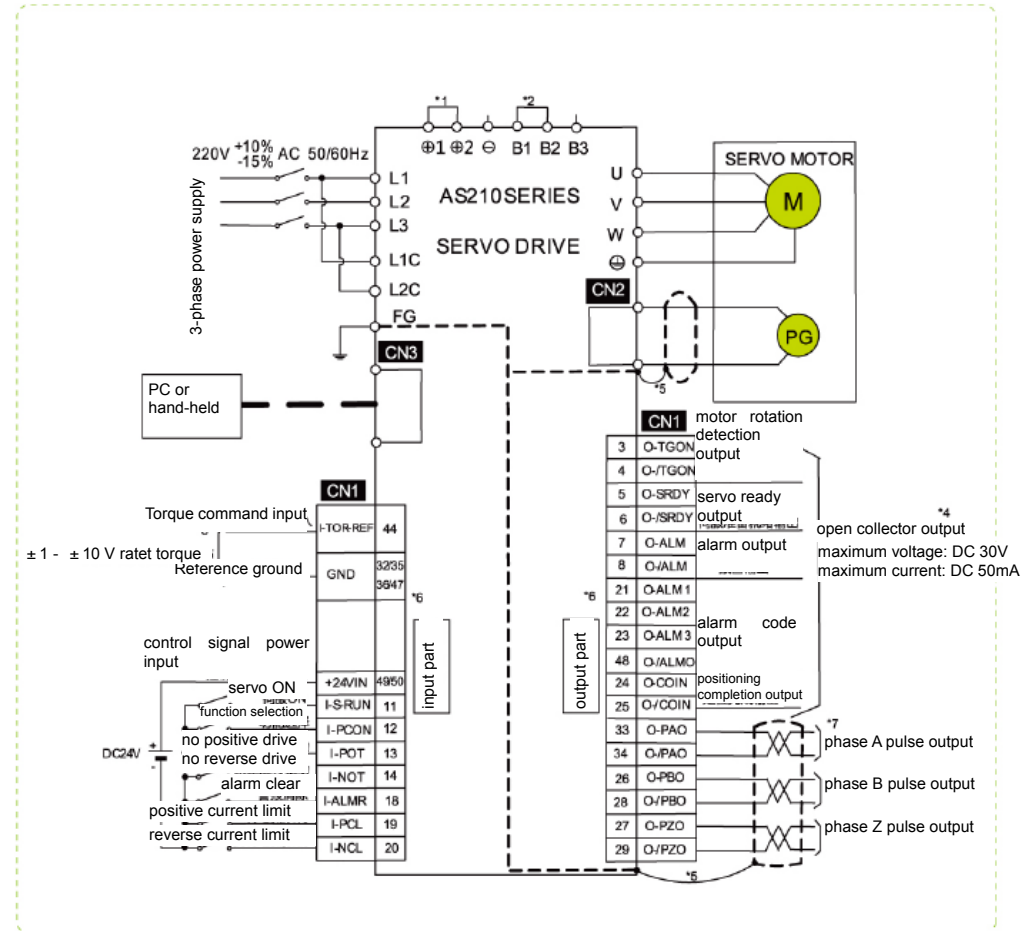
- *1. When it is required to inhibit higher harmonic of the power, DC reactor can be connected between +1 and +2.
- 2*. When capacity of the built-in regenerative resistance is inadequate, external regenerative resistance can be connected (prepared by user).
- 3*. Input gain can be changed via user parameter.
- 4* Refer to wiring instructions for connecting mode of open collector output.
- 5* Twisted pair shielded cable shall be used and grounded via FG. The cable should be far away from the power wire and other wire possibly causing electric interference.
- 6* Control signal can be used with selectivity. Port number shall be noticed, and wiring error may damage the drive.
- 7* Pulse output signal is differential mode, which can be received with line receiving circuit.

Speed control



- *1. When it is required to inhibit higher harmonic of the power, DC reactor can be connected between +1 and +2.
- *2. When capacity of the built-in regenerative resistance is inadequate, external regenerative resistance can be connected (prepared by user).
- *3. Input gain can be changed via user parameter.
- *4. Refer to wiring instructions for connecting mode of open collector output.
- *5. Twisted pair shielded cable shall be used and grounded via FG. The cable should be far away from the power wire and other wire possibly causing electric interference.
- *6. Control signal can be used with selectivity. Port number shall be noticed, and wiring error may damage the drive.
- *7. Pulse output signal is differential mode, which can be received with line receiving circuit.

Torque control



- *1. When it is required to inhibit higher harmonic of the power, DC reactor can be connected between +1 and +2.
- *2. When capacity of the built-in regenerative resistance is inadequate, external regenerative resistance can be connected (prepared by user).
- *3. Input gain can be changed via user parameter.
- *4. Refer to wiring instructions for connecting mode of open collector output.
- *5. Twisted pair shielded cable shall be used and grounded via FG. The cable should be far away from the power wire and other wire possibly causing electric interference.
- *6. Control signal can be used with selectivity. Port number shall be noticed, and wiring error may damage the drive.
- *7. Pulse output signal is differential mode, which can be received with line receiving circuit.



VIII. Service and promise

You will find the difference when you use Sigriner Step product for the first time. Our experts have the enough experience in choosing the satisfied servo products that meet your requirements. From the initial technical specifications to production, delivery and installation, we will operate completely according to your requirements.

Service and support network of Sigriner Step is not just limited to telephone. Our representatives provide service for you 24h a day and 7 days a week, so as to provide the immediate technical support in different phase such as installation, start-up, maintenance and troubleshooting.

Our services include:

- All day service 24/7/365
- Preventive maintenance
- Training
- Spare parts marketing
- Product revamp
- Updating
- Maintenance and replacement
- Professional service (harmonic analysis and study, power quality study, electric system application and remote diagnosis, etc).

Our promise

Sigriner Step is proud of the reputation obtained from the long-term product service. We promise to provide the support during the entire life cycle. We never give up the responsibilities in product service regardless of the service life, to satisfy you completely. In order to lengthen the service life of drive and enhance its functions, Sigriner Step updates the procedure ceaselessly, making you have the opportunity to take advantage of the new technology update.

Convenient local service

We provide site service for all customers for long-time, therefore we have a professional service team with a lot of staff. Each service representative of us has received complete and professional training.

XI. After service network



Domestic service network

Domestic market
5 offices
14 liaison offices

Offices

Beijing, Shanghai, Guangzhou, Wuhan, Jinan

Liaison offices

Dalian, Shenyang, Tianjin, Shijiazhuang, Zhengzhou, Chongqing, Xi'an, Hangzhou, Wuxi, Nanxun, Wujiang, Changsha, Shenzhen, Fuzhou, etc.



Overseas network

Overseas company

Germany and Hong Kong

The products have been sold to

Germany, England, Denmark, Scotland, Canada, Japan, Brazil, Chile, Singapore, Australia, India, Pakistan, Turkey, Saudi Arabia, Korea, Hong Kong, Macao and Taiwan, etc.

