

Servo Tech Middle East Co. Ltd.

AC Servo Drives User's Manual

SR , TSDA , SD Series

سازنده انواع ماشین آلات صنعتی و ماشین مخصوص

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1. Introduction

Thank you for choosing SR series AC servo Drivers. SR series Drivers use the digital servo technology to provide high-precision and versatile functions for driving servo motors.

Many safety-related features have been built in the Driver design. However, erroneous operation may result in unpredictable accident and cause damage to the Driver or severe personal injury. It is highly recommended that the user is familiar with this manual and performs all setup and operations with caution.

This manual provides the information you need to install and configure SR series Driver. This manual is intended for use by vendors who are responsible for installing and setting up SR series Driver; consequently, it assumes a basic working knowledge of AC servo Motors.

In this manual, the installation related information such as **Dimensions and Specifications** are described in Chapter 1. **Wiring information** is shown in Chapter 2. Procedures for **Panel Operation** are described in Chapter 3. Finally, the **Alarm Codes** are given in Chapter 4.

1.1. Unpacking

After receiving the shipment from your supplier, please verify the following:

1. The motor (s) and driver(s) are the same as ordered.
2. The capacity of the driver matches with the motor to be driven. (Please see the Driver Specification for correct driver.)
3. No damage to the packaging material occurred during transportation.

1.2. Relocation

Please use the original packaging for driver relocation and handle with care.

1.3. Safety Precautions

1. Many high volume capacitors are used in the Driver circuit; these capacitors remain charged even if the unit power is been shut off. If it is necessary to touch the terminal or open the driver chassis, **please wait at least 10 minutes** before continuing.
2. While power on the Driver and/or motor, stand clear from the unit to prevent personal injury caused from erroneous operation.
3. Disconnect the power if the Driver/Motor unit is not used for a prolonged period.
4. To prevent electric leakage, connect the motor ground to the **FG** terminal of the Driver and connect this **FG** to Class 3 grounding. The machine, which the Driver and motor are installed must be **single-point grounded**.

1.4. Installation

1. Location

- (1) If installed in a confined chassis, please provide necessary ventilation system to maintain the environmental temperature of the Driver below +55 deg. Celsius.
- (2) Use rubber pad or shock absorber to insulate vibration if there is vibrating equipment nearby.
- (3) The Driver shall not be installed in an environment where corrosive gases, excess dust, or metal powder is present. Insulation from water, water moist, or cutting fluid is required.
- (4) If there is a big magnet switch or welding equipment, which may generate electronic noise, near the Driver installation, then a line filter is required. Recommend filter: For single-phase power source: DELTA 06DPCW5
For three-phase power source: DELTA 08TDS4W4
- (5) If a line filter is not allowed for the reason of excess leakage current, then an insulating transformer is required at the input of the Driver.

2. Orientation

The Driver must be installed vertically.

3. Mounting Screw

Use four (4) M5 screws to mount the Driver securely.

4. Spacing

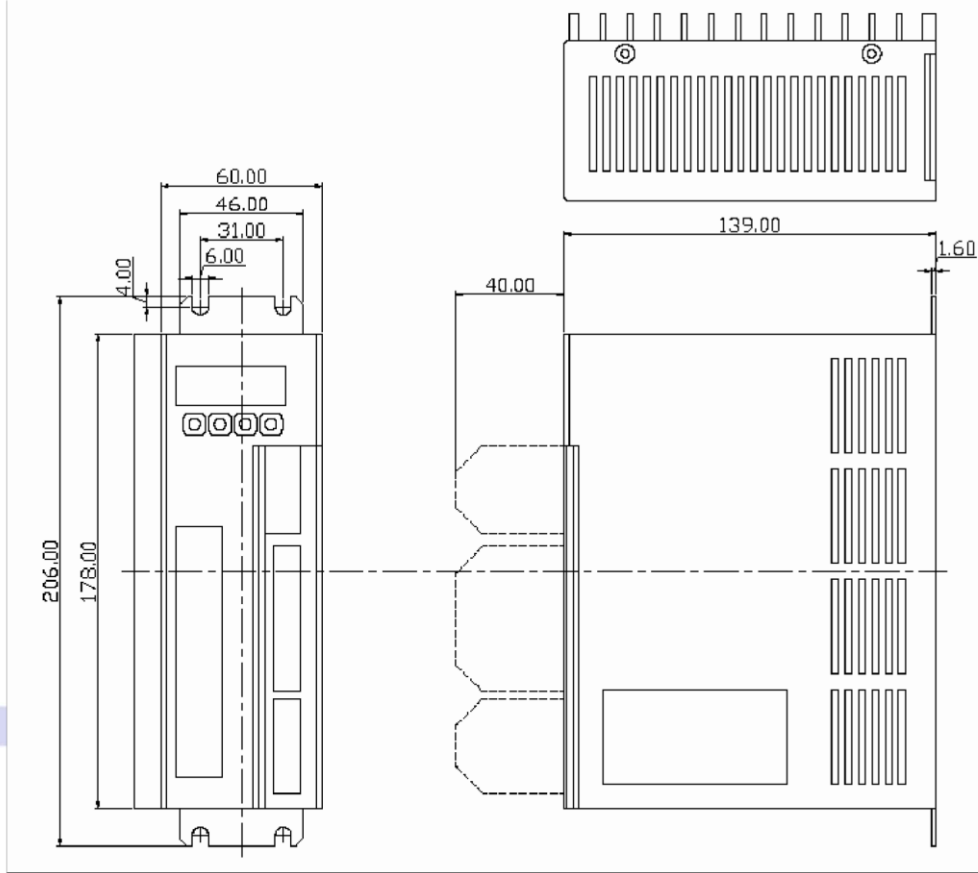
Maintain **at least 2 cm** spacing around the Driver unit.

5. Foreign objects

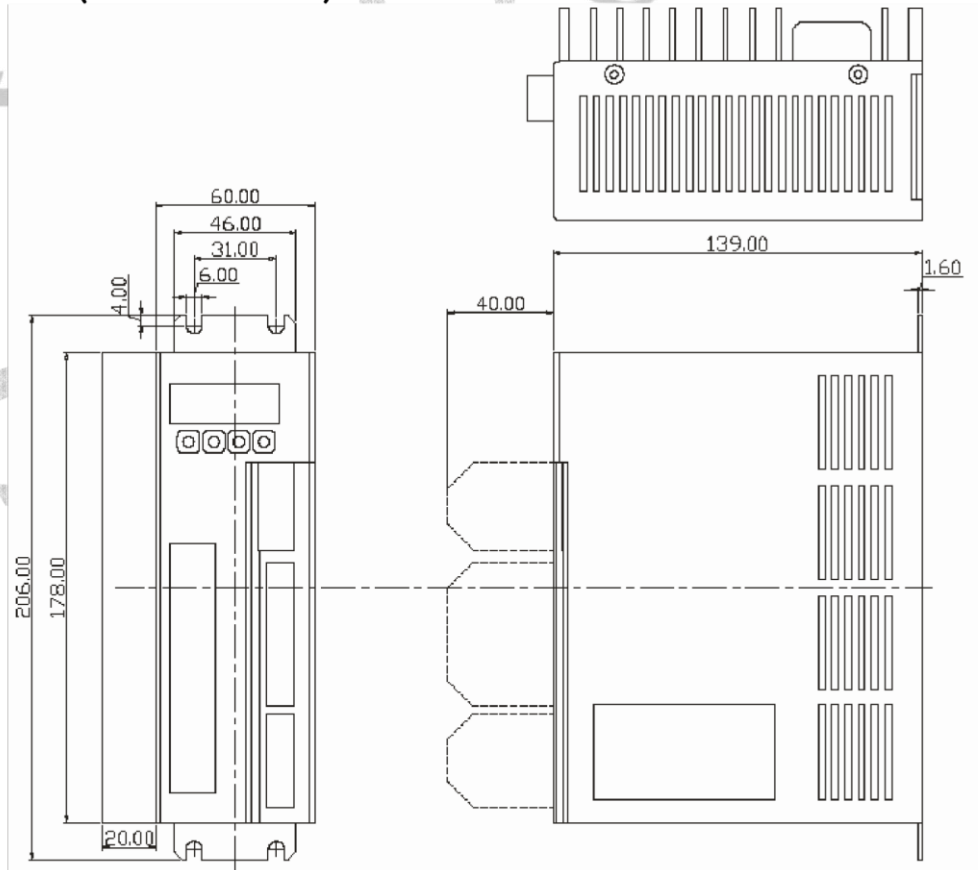
During and after installation, any foreign object such as cutting chips, small screw, or washer which may fall into the opening of the Driver unit must be prevented.

1.5. Dimensions

Model SR15B: (with heat sink)



Model SR20B: (with heat sink)

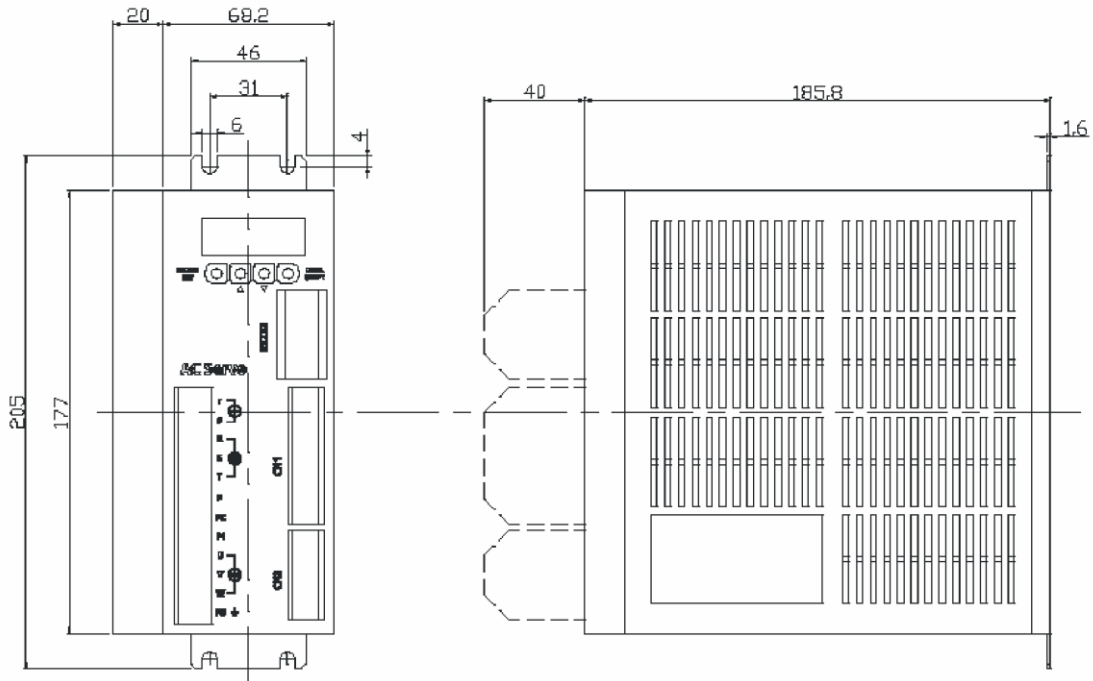




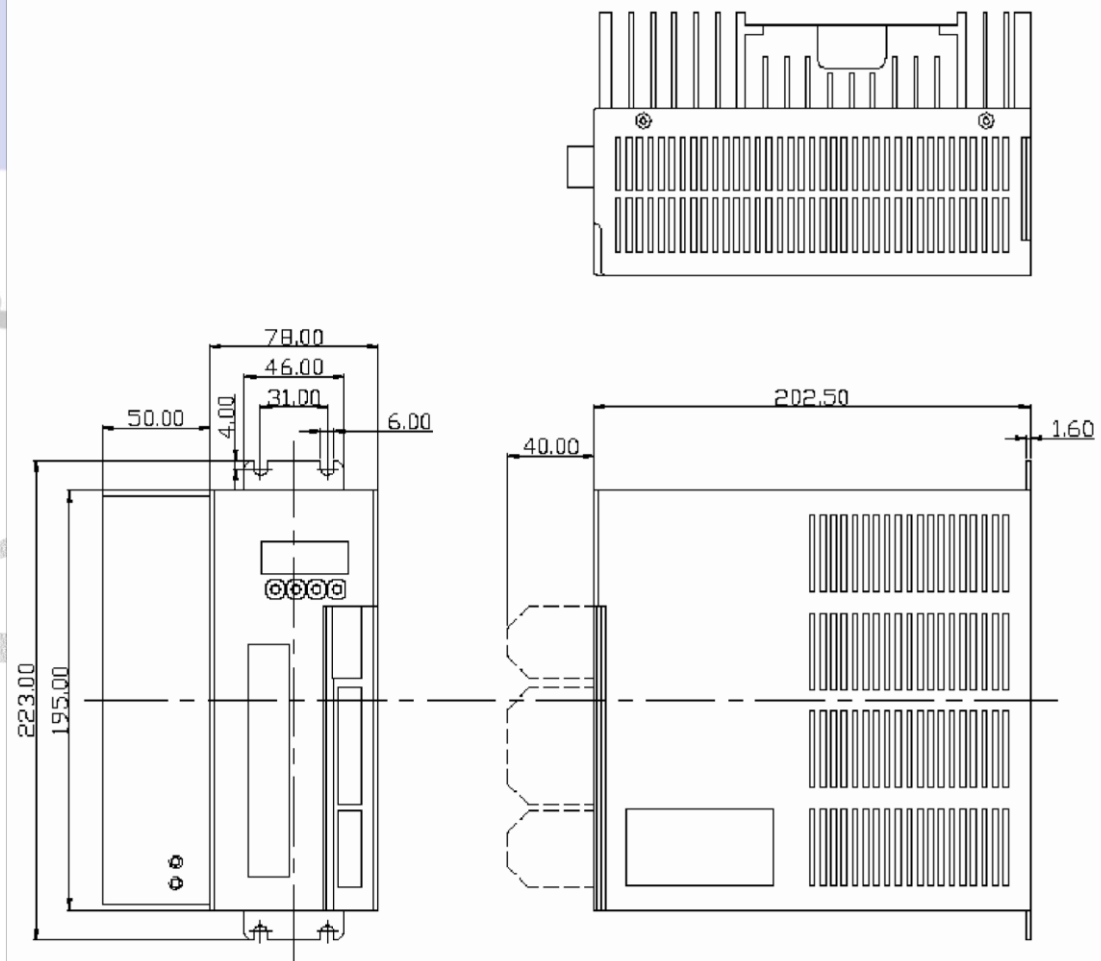
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Model SR30C: (with heat sink)



Model SR50, SR75: (with heat sink)



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1.6. Technical Specifications

Item	Description				
	Model No.	SD15 B	SD20 B	SD30 C	SD50 C
Maximum Peak Current (A)	8.4A	11.4A	17.0A	28.2A	42.3A
Input supply	AC180V~240V Single-Phase 50 / 60 Hz		AC180V~240V Three-Phase 50 / 60 Hz		
Encoder			Incremental type		
Environment Temperature	Operation: 0 ~ 50°C , Storage: -20 ~ 80°C				
Humidity	Operation/Storage: < 85% RH				
Vibration	< 0.5G				
Manual Operation	Defined by User's Parameter. Error Message		10 error messages are stored.		
Over-Travel inhibit	Positive or Negative Over-Travel inhibit (If over-travel is occurred, the servo power is disabled or put on hold.)				
Analog Monitoring Output	Speed and Torque (-10V ~ +10V)				
Encoder Output	A, B, Z Phase line driver output				
Encoder dividing Ratio	1/N : N=1 ~ 16				
Display	5-digit LED display , 4 button				
Digital Inputs	Servo ON , Reset , Reverse Inhibit , Control Mode , External Torque Limit , Emergency				
Digital Outputs	Stop, Pulse Input Inhibit , etc.				
Digital Outputs Communication	Servo Ready, Error, In Position, Zero Speed, Encoder Output. RS-232C for User's Parameter setting and status monitoring				
Control Mode	Position / Speed / Torque				
<u>Position</u>	Input type:	A&B phase pulse , Up-Down pulse (2 pulse) , Direction & pulse (1 pulse).			
Max. Input Freq.	500kpps				
Electronic Gear Ratio	1/50 < A/B < 50 (A&B : 1 ~ 10000) Input Ripple Filtering Time Constant = 0 ~ 10000ms In position range 0 ~ 32767 Pulses.				
<u>Speed</u>	Input type:	0 ~ ±10V (Looking at the motor shaft, +V = CCW)			
Preset speeds	Three preset speeds available through defining User's Parameter.				
Linear Acceleration / Deceleration	Enable/Disable: defined by Parameter.				
Zero Speed determination	When enabled, the slope is defined by User's Parameter between 10ms ~ 10000ms. 0 ~ 255rpm.				
Specified speed reached	Specified by User's Parameter, (0 ~ Rated Speed).				
Servo Lock	Enable/Disable: may be defined by User's Parameter.				
Torque output	0 ~ 300% rated torque of motor.				
<u>Torque</u>	Input type:	0 ~ ±10V (Positive voltage for positive torque).			
Input Ripple Filtering	Time Constant : 0 ~ 10000ms				
Speed Limit (External)	Externally adjustable by POT	0 ~ 10V (Max. Rated Speed)		Speed Limit (Internal)	0 ~
Rated Speed (adjusted by Parameters).					

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2. System Wiring

2.1. Unit Overview

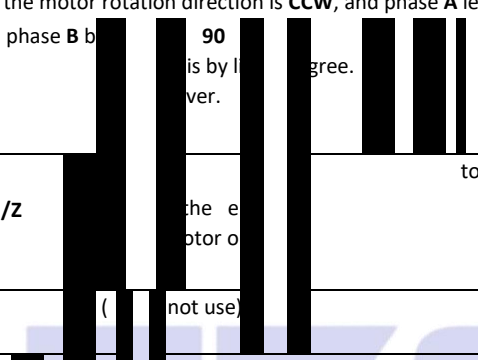


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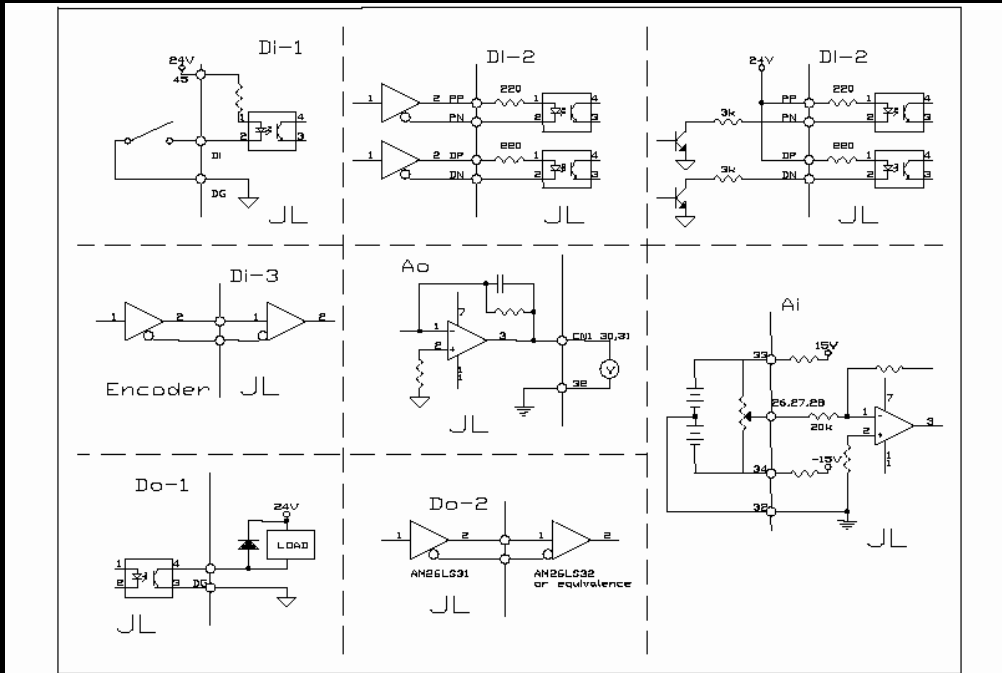
2.2. CN1 Connector

Pin no	Name	Symbol	I/O*	Mode	Function
1	Servo on	SON	Di-1	A	SON connects to DG means servo "ON" or servo system ready, open circuit means servo "OFF".
2	Alarm reset	ALRS	Di-1	A	If ALRS is short to DG, then the alarm signal is cleared. However, the alarm persists if the reason, which caused the alarm, is not resolved.
3	P/PI switch	PCNT	Di-1	PS	Connect to DG will switch the control mode from "proportional + integral" mode to "pure proportional" mode
4	CCW inhibit	FSTP	Di-1	A	Connect to a CCW over-travel sensor / switch / detector. (Normally closed contact)
5	CW inhibit	RSTP	Di-1	A	Connect to a CW over-travel sensor / switch / detector. (Normally closed contact)
6	External torque limit	TLMT	Di-1	PS	Connect this signal to DG
	External speed limit			T	Connect this signal to DG
7	Clear error counter	CLR	Di-1	P	
	Servo lock	LOK		S	
8	Reserved				
9	Emergency stop	EMC	Di-1	A	Connect to DG. (Normally closed contact)
10	Internal speed 1	SPD1	Di-1	ST	Speed mode 1 (pin 26)
					Torque mode 1
11	Internal speed 2	SPD2	Di-1	ST	Speed mode 2 (pin 26)
					Torque mode 2

						1	1	Internal speed 3	Speed limit 3	
12	Control mode	MDC	Di-1	A				Please refer to PN10-1		
13	Command pulse inhibit	INH	Di-1	P				Ignores the input command pulses, if connected to DG.		
14	Pulse +	PP	Di-2	P			PN10-2 value	Pin 14,15	Pin 16,17	
15	Pulse -	/PN					0		CW Pulse	CCW Pulse
16	Direction +	DP					1		Pulse	Direction
17	Direction -	/DN					2		Phase A	Phase B
18	Servo ready	REDY	Do-1	A			REDY connects to DG if Power source is in normal condition and no alarm.			
19	Alarm	ALM	Do-1	A			ALM connects to DG normally; it is opened when any abnormal condition is detected.			
20	Zero speed	ZS	Do-1	S			ZSP connects to DG if PN11- 4 is 0 , and the motor speed is lower than the speed set in PN7.			
	Brake	BI					This signal is used as a control signal for external brake if PN11- 4 is 1. BI connects to DG to release the brake at servo "ON", and opened at servo "OFF". The timing can be adjusted by the value set in PN32.			
21	In position Speed checked	INP	Do-1	P			When the pulses difference between the command pulses and the feedback pulses is less than the value set in the PN20, The INP signal connects to DG.			
		INS		S			When the motor speed exceeds the RPM value set in PN8, the INS signal connects to DG.			
22	Alarm bit 0		Do-1	PS			Binary representation of the alarm codes. The alarm code output from these ports is the same as the code shown on the 7-segment display.			
23	Alarm bit 1									
24	Alarm bit 2									
25	Alarm bit 3									
26	Speed / torque command	SIN	Ai	ST			A +10V to -10V speed-command input or torque-command input. PN3 is used to scale the input value. If the rated speed is 3000RPM and PN3 is 8, that means an 8 V speed command input is interpreted as a 3000 rpm speed command. Please refer to PN10-3 which is used to change the direction.			
27	Speed limit	PIC	Ai	T			0~+10V External speed limit. +10V gives a speed limit the same as rated speed			
	CCW torque limit			PS			0~+10V External torque limit. +10V input voltage gives a 3 times rated torque limit in positive direction.			
28	CW torque limit	NIC	Ai	PS			0~-10V External torque limit, -10V input voltage gives a 3 time rated torque limit in negative direction.			

Pin no	Name	Symbol	/O*	Mode	Function	
30	Speed monitor	TG	Ao	PS	+10V represent ±4500rpm , offset can be adjusted from PN34 .	
31	Torque monitor	CUR	Ao	PS	±10V represent ±3.5 times of rated torque output. The offset can be adjusted from PN35 .	
29	Analog ground	AG	Ao	PS	Analog ground	
32						
33	Voltage out	+15		A	+15V DC, 10mA MAX out. power source for SIN, PIC, NIC test.	
34	Voltage out	-15		A	- 15V DC, 10mA MAX out. power source for SIN, PIC, NIC test.	
35	Encoder phase A output	PA	D0-2	PS	Encoder output pulses after frequency division with PN0 . When PN10-3 is 1 , the motor rotation direction is CCW , and phase A lead phase B by 90 degree. 	
36	Encoder phase /A output	/PA	D0-2	PS		
37	Encoder phase B output	PB	D0-2	PS		
38	Encoder phase /B output	/PB	D0-2	PS		
39	Encoder phase Z output	PZ	D0-2	PS		Transfer the Z and /Z to line driver
40	Encoder phase /Z output	/PZ	D0-2	PS		the e motor o
41	Reserved				() (not use)	
42	Reserved				() (not use)	
43	Encoder phase Z output	Zo	D0-1	PS	output for encoder phase Z .	
44	Encoder ground	EG		PS	r ground	
45	24V External Voltage	+24V		A	ect to external +24V (300mA) for I/O use. Regulated power supply is recommended.	
46	Digital ground	DG		PS	ground for digital input and output ports.	
47						
48						
49	Shielding	FG		PS	Connect to the shielding of the cable.	
50						

* In mode column, 'P' means for **POSITION** mode, 'S' means for **SPEED** mode, 'T' means for **TORQUE** mode, 'A' means for **ANALOG** mode.



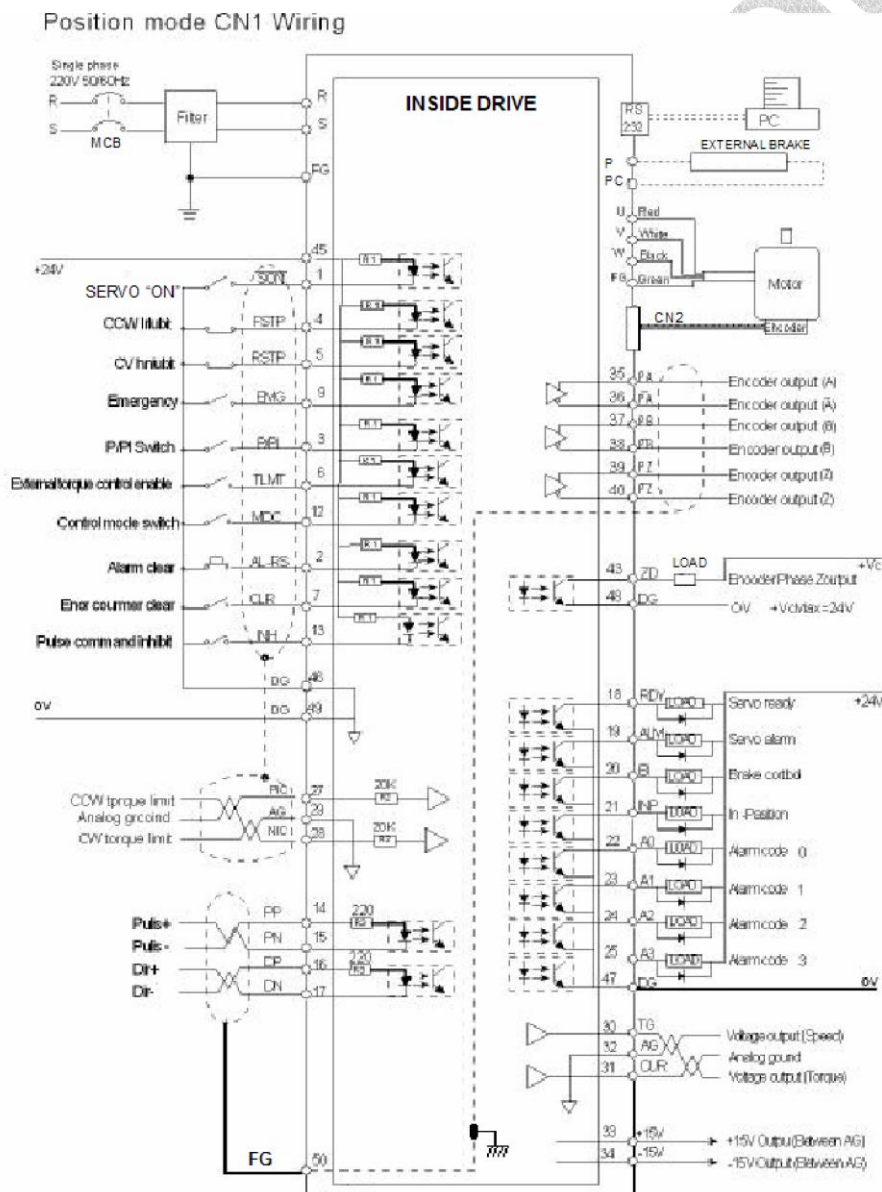
2.3. CN2 encoder connector

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Pin no	Name	Symbol	I/O*	ENCODER		Function
				WIRE COLOR	TERMINAL NO.	
1,2	5V	+5V	Di-3	white	B	If the wire length for the encoder is longer than 20m , please use double wire to minimize voltage drop. If longer than 30m , please consult with your supplier .
3,4	0V	0V		black	I	
5	A	A		Green	A	Encoder phase A
6	/A	/A		Blue	C	Encoder phase / A
7	B	B		Red	H	Encoder phase B
8	/B	/B		Pink	D	Encoder phase / B
9	Z	Z		Yellow	G	Encoder phase Z
10	/Z	/Z		Orange	E	Encoder phase / Z
11 ~ 19	Reserved					Not used.
20	Shielding	FG			Shielding	F

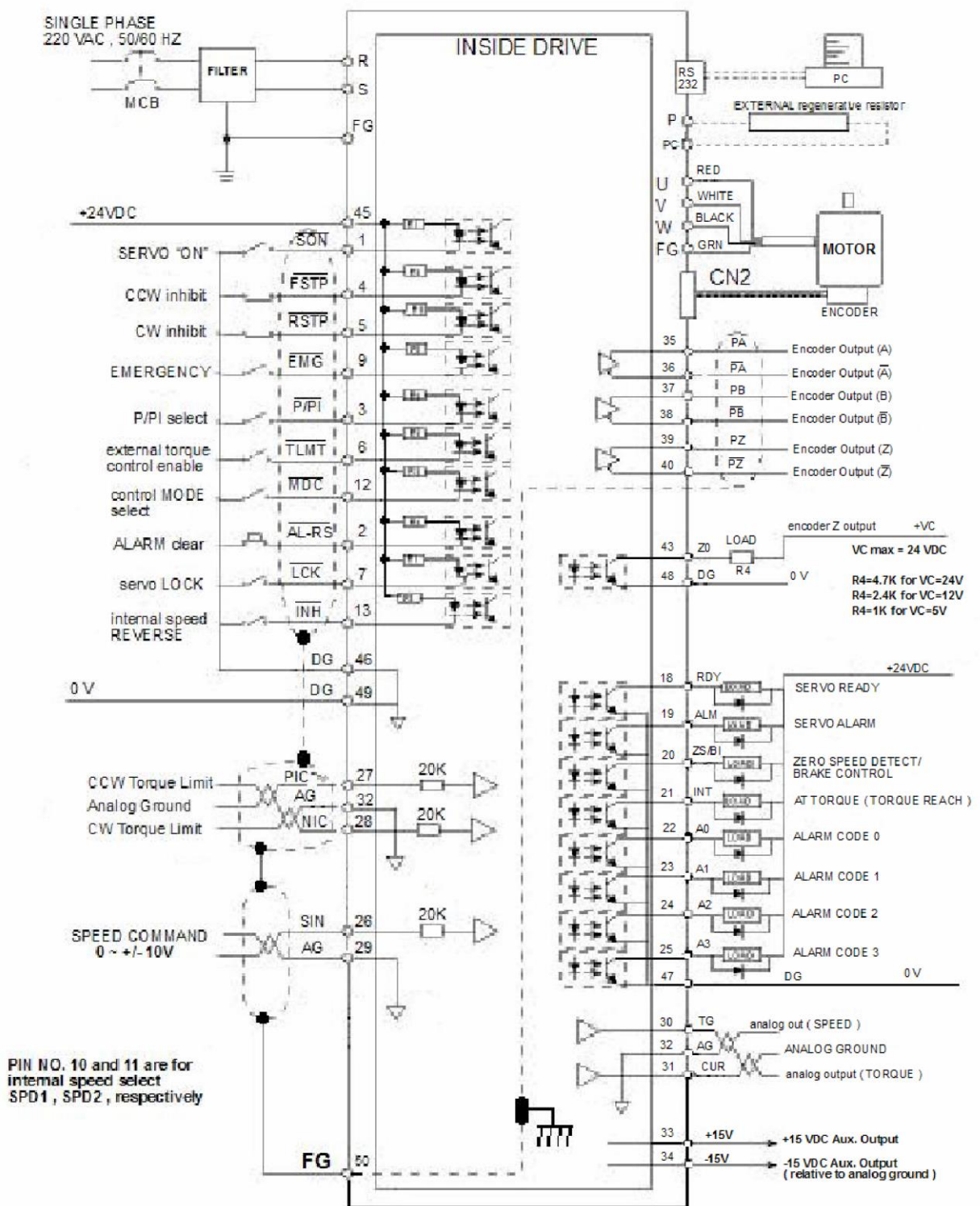
* Note: Please see the chart shown on Page 9 for Di-3 characteristics.

2.4. Position mode :



2.5. Speed mode :

SPEED MODE CN1 WIRING



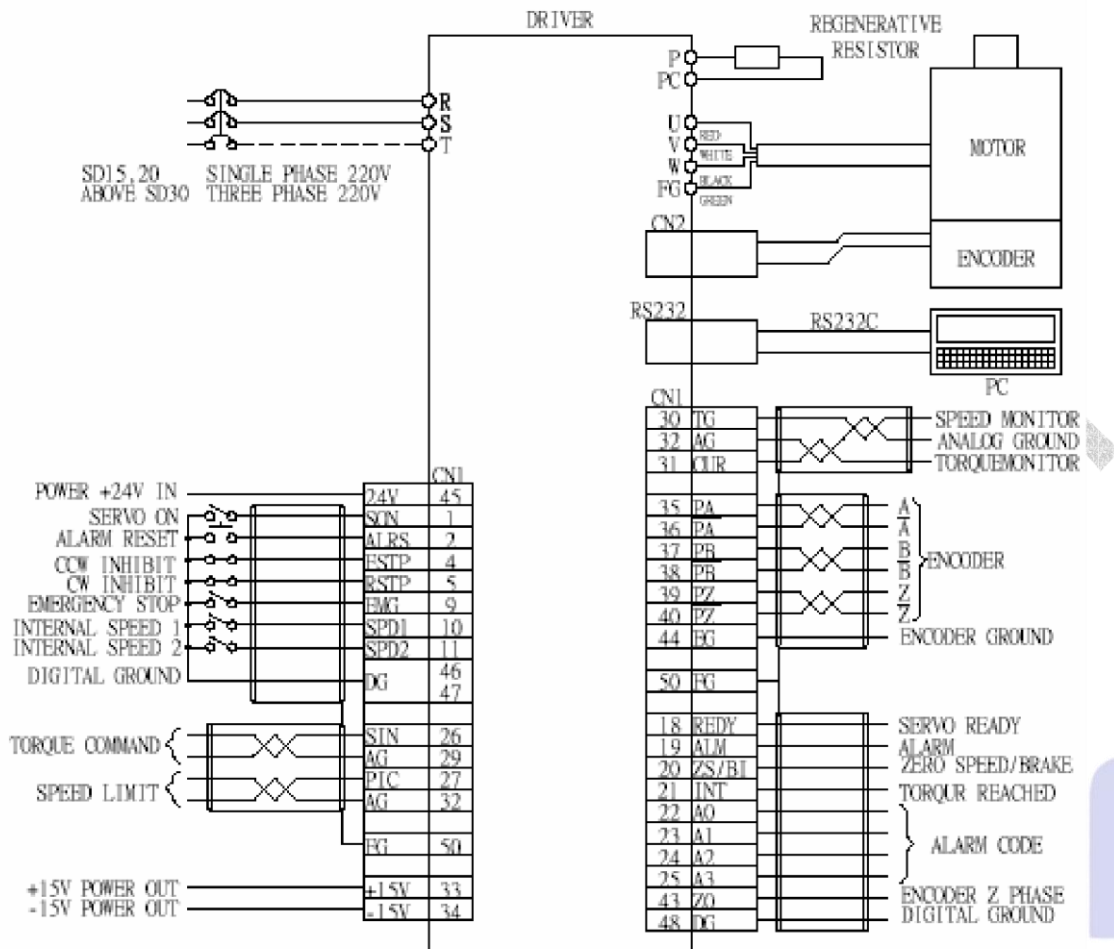
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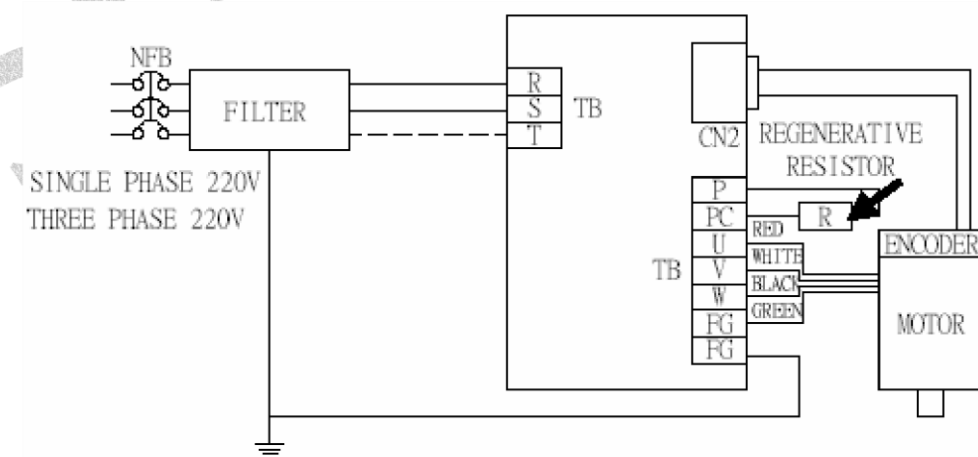
2.6. Torque mode :



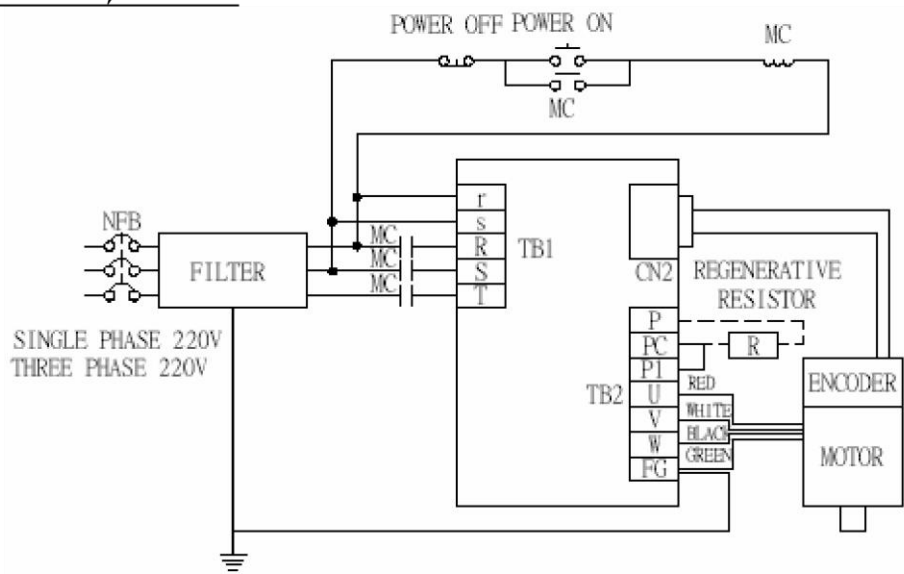
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2.7. Power and motor diagram :

FOR SR 15 B, SR 20 B :



FOR SR 30 C, SR 50 C, SR 75 C:



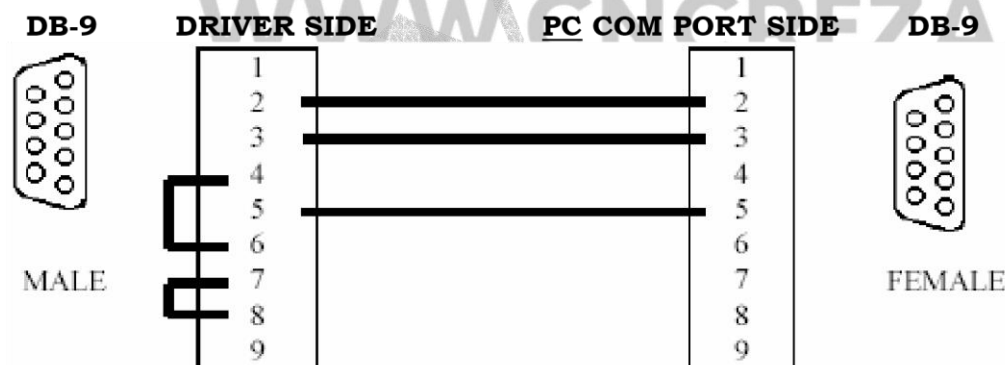
Recommended line filter:

15A, 20A: DELTA 06DPCW5 , **30A:** DELTA 08TDS4W4 , **50A:** DELTA 16TDS4W4 , **75A:** DELTA 24TDS4W4

EXTERNAL Regenerative Resister:

When the inertia presented on the motor is heavy, a regenerative resister is required. The value of the resister may be obtained by dividing the wattage of the motor from 2500. For example, a 50 Ohm resister may be used for a 50W motor. If "error02" (Chapter4) persists, then adjusting the regeneration duty cycle is also required (Pn40, Section 3.3). Select suitable wattage for the resister, forced cooling (by fan) may be required for proper heat dissipation.

2.8. RS232



Please use the cable described above to connect the servo driver to a PC for retrieving the system data and setting up the operation parameter.

2.8.1. PC Communication port setting

Baud rate: **9600** bps ,
 Parity: **None** ,
 Data bit: **8** ,

Stop bit: 1 ,
Flow Control: None .

2.8.2. Read data from driver

⇒ To read a SINGLE-WORD from driver

Syntax: **R5XxSs**

The read command must be started with "R5" and the command string length must be "6".

Where: R5 = This is a single-word read command.

Xx = the address of the data to be read.

Ss = Check Sum = 'R'+5+'X'+x'

Example :

Read the data stored in 30H.

Check Sum = 52H + 35H + 33H + 30H = EAH

R 5 3 0

Thus, the reading command is "R530EA" : R(52H) , 5(35H) , 3(33H) , 0(30H) , E(45H) , A(41H).

Drive's response: %XxYySs

Where: % = This is a response.

Xx = High word of data

Yy = Low word of data

Ss = Check Sum = '%'+X'+x'+Y'+y'

If the data stored in the address 30H is 0008H, then

Check Sum = 25H + 30H + 30H + 30H + 38H = EDH

% 0 0 0 8

Thus, the driver's response is

"%0008ED" = %(25H) , 0(30H) , 0(30H) , 0(30H) , 8(38H) , E(45H) , D(44H).

If there is a Check Sum error in the read command, then the driver returns "! (21H)"

To read a DOUBLE-WORD from driver

Syntax : **L5NnSs**

The read command must be started with "L5" and the command string length must be "6".

Where: L5 = This is a double-word read command.

Nn = the address of the data to be read.

Ss = Check Sum = 'L'+5+'N'+n'

Driver's response : **%XxYyAaBbSs**

Where: % = This is a response.

XxYy = data stored in Nn+1

AaBb = data stored in Nn

Ss='%'+X'+x'+Y'+y'+A'+a'+B'+b'

If there is a Check Sum error in the read command, then the driver returns "! (21H)"

2.8.3. Write data to driver

To write a SINGLE-WORD to driver

Syntax : **W5XyYzZsS**

The write command must be started with “W5” and the command string length must be “8”.

Where: W5 = This is a single-word write command.

Xx = the address of the data to be written.

Yy = The high word of the data

Zz = The low word of the data

Ss = 'W'+ '5'+ 'X'+ 'x'+ 'Y'+ 'y'+ 'Z'+ 'z'



Example:

Write "8" to address "30H".

Check Sum = 57H + 35H + 33H + 30H + 30H + 30H + 30H + 38H = 1B7H
W 5 3 0 0 0 0 8

Thus, the write command is W5300008B7:

W(57H) , 5(35H) , 3(33H) , 0(30H) , 0(30H) , 0(30H) , 0(30H) , 8(38H) , B(42H) , 7(37H) Please note that only the last two digits of the Check Sum are used.

⇒ **Driver's response: %(25H)**

If there is a Check Sum error in the read command, then the driver returns "! (21H)" .

For Monitor Mode Address 128(80H) ~ 157(9DH), the data sent to the driver is the number of times, which the driver will respond with the content stored in the specified address.

For example : Sending a string of "**W5800008BC**" will cause the driver to respond with the content stored in address 80H for **eight times**. The format of the response string is the same as "R5" read command.

This function can be used to monitor a certain data **such as speed or torque continuously**. Writing a "zero" to one of these addresses will clear the content store at that address.

⇒ **To write a DOUBLE-WORD to driver**

Syntax : **M5NnXxYyAaBbSs**

The write command must be started with "M5" and the command string length must be "14".

Where : M5 = This is a double-word write command.

Nn = the address of the data to be written.

Xx = The high word of the data to stored in Nn+1

Yy = The Low word of the data to stored in Nn+1

Aa = The high word of the data to stored in Nn

Bb = The Low word of the data to stored in Nn

Ss = 'M'+5+'N'+n+'X'+x+'Y'+y+'A'+a+'B'+b'

⇒ **Driver's response: %(25H)**

If there is a Check Sum error in the read command, then the driver returns "! (21H)" .

For Monitor Mode Address 128(80H) ~ 157(9DH), the data sent to the driver is the number of times, which the driver will respond with the content stored in the specified address.

For example : Sending a string of "**M58000080008Ss**" will cause the driver to respond with the content stored in address 81H and 80H for **eight times**.

The format of the response string is the same as "L5" read command.

This function can be used to monitor a double-word data **such as accumulated pulses continuously**. Writing a "zero" to one of these addresses will clear the content store at that address.

2.8.4. Memory map

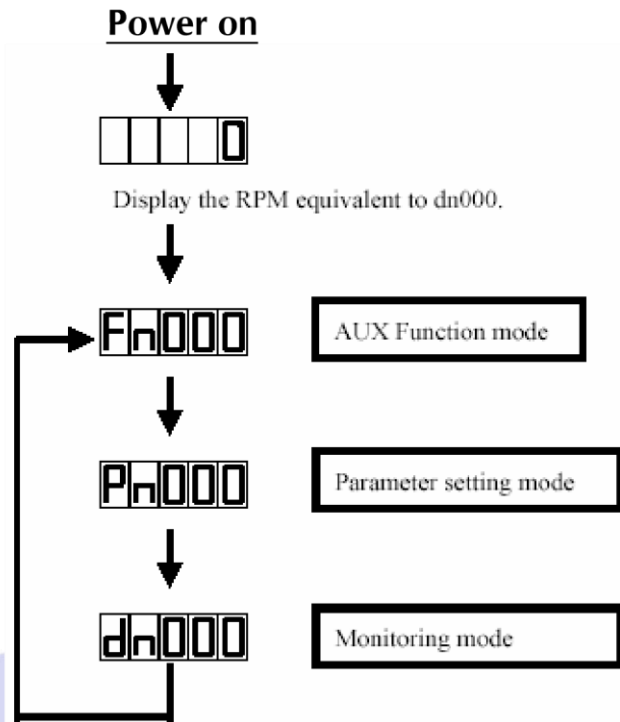
Address	Descriptions
0~9	Historical alarm codes (no.0~no.9)
10	Address of the last alarm (0~9)
11	User parameter check sum (no.0~no.51, XOR)
12~63	User parameter (no.0~no.51), read/write, unsigned.
64~79	Reserved for user as the motor model
80~93	Reserved
94	Backup copy of address 11
95~127	Default values for user parameters (no.32~no.0)
128~147	Monitor mode (no.0~no.19), read only, signed.
148~157	Monitor mode data area. See section 2.8.3 for detailed information.
158~191	Reserved
192(C0H)	<ol style="list-style-type: none"> address 11 is the check sum of address 12~63 . any value change in address 12~63 will cause address 11 to be changed accordingly. writing a "0" to this address (192) will disable the updating function of the address 11. writing a "1" to this address (192) will enable the updating function. The system default is "enable". during the "disable" state , writing any value to address 11 will cause the check sum to be regenerated. if there are many user parameters need to be changed, disabling the check sum updating function is highly recommended to prevent excessive writing of EEPROM. After changing all the user parameters, a write operation to address 11 may then be executed.
193(C1H)	Clear historical alarm codes, the content in address 0~10 are cleared.
194(C2H)	Writing a "1" to this address will initialize the driver with the setting stored in the address 12~63; the block, where a user is not allowed to change , is excluded.
195(C3H)	Firmware version. The format is similar to that of Fn003. for the numbering of year , 0~9 stands for year 2000~2009; A~Z stands for year 2010~2035, respectively.
196(C4H)	RESET
197(C5H)	Input status, the description of each bit is shown in section 3.2.6.
198(C6H)	Output status, the description of each bit is shown in section 3.2.7.
199(C7H)	Current alarm code, "0" means no alarm.

3. Panel operation

Name	Function
MODE	Mode selection, press this key for more than 1 second to confirm the flashing function.
^	Increase the flashing digit by 1.
v	Decrease the flashing digit by 1. Press (^) and (v) simultaneously to clear the alarm.
DATA	Shift the cursor (the flashing digit) left by 1 position. Press this key for more than 1 second to select or store the data into the EEPROM (PN).

3.1. Mode selection:

There are 3 modes to select from: **Auxiliary function, Parameter setting, and Monitoring**. Press the MODE key repeatedly to cause the displays to scroll in the following sequence:



3.2. Auxiliary functions

Press the MODE key repeatedly until the following pattern is displayed.



3.2.1. Historical alarm code

The last 10 alarm codes are stored in the EEPROM. Use the following procedures to retrieve the stored alarm codes.

1. Select the auxiliary function mode.
2. Press the DATA key for more than 1 second.
3. Press the (^) key or the (v) key to scroll up and down among the previous alarm codes. The leftmost number is the alarm sequence, where "9" means the oldest.
4. Press the DATA key for more than 1 second to return to the auxiliary function mode.

3.2.2. Clear the historical alarm codes

1. Press the (^) key or the (v) key to select function 1.
2. Press the DATA key for more than 1 second until the following message appears.
3. Press the MODE key to clear the memory. Flash for 1 second :
4. Press the DATA key more than 1 second to return to the auxiliary function mode.

3.2.3. Jog

Jog uses the speed specified in the PN29 and the acceleration time specified in the PN28.

1. Press the (^) key or the (v) key to select the jog function "Fn002".
2. Press the DATA key for more than 1 second.

Jog--

3. Press the **(^)** key or the **(v)** key to jog in positive or negative direction.

Jog-P

For Jog in positive direction.

Jog-n

For Jog in negative direction.

Jog--

For Hold.

4. Press the DATA key for more than 1 second to return to the auxiliary function mode and close the jog function.

Fn002=

3.2.4. Firmware version

1. Press the **(^)** key or the **(v)** key to select the function 3.

Fn003=

2. Press the DATA key for more than 1 second to display the firmware release date: **00126** represents the date:

26 JAN 2000 .

Counting from left to right, the first and second digit represents **YEAR**. The third digit represents the month. **1, 2, 3, 4, 5, 6, 7, 8, 9, A, b, c**, represent **JAN** to **DEC** respectively. The figures are shown as following:

123456789Abc

The fourth and fifth digits represent the **Date**.



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4. Press the DATA key for more than 1 second to return to the auxiliary function mode.



3.2.5. Reset – Warm start

1. Press the (^) key or the (v) key to select the function 4.



2. Press the DATA key for more than 1 second, and the following pattern is displayed.



3. Press the MODE key to confirm the reset. Press the DATA key for more than 1 second to abort the reset.

3.2.6. Input ports status (address : 197(C5H))

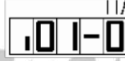
PIN Number	Bit number	Definition
1	9	Servo on
2	10	Alarm reset
3	2	P/PI switching
4	3	CCW inhibit
5	4	CW inhibit
6	5	External torque limit
7	1	Clear error counter
8	11	Reserve
9	8	Emergence stop
10	6	Internal speed 1
11	7	Internal speed 2
12	0	Control mode
13	12	Pulse command inhibit

1. Press the (^) key or the (v) key to select the function 5.



2. Press the DATA key for more than 1 second, the display will show the pin number in **left 3 characters** and show the status in rightmost digit. **If the status digit is 1, which means the pin is connected to DG or 0V or close.**

which means the pin is connected to 24V or open.



3. Press the (^) key or the (v) key to scroll up and down to view all the input ports.

4. Press the DATA key for more than 1 second to return to the auxiliary function mode.

3.2.7. Output ports status (address : 198(C6H))

PIN Number	Bit number	Definition
18	3	Ready
19	0	Alarm
20	1	Zero speed
21	2	In Position
22	4	Alarm code bit0
23	5	Alarm code bit1
24	6	Alarm code bit2
25	7	Alarm code bit3

1. Press the (^) key or the (v) key to select the function 6.



2. Press the DATA key for more than 1 second, then the display will show the pin number in the **left 3 characters** and show the status in **rightmost digit**. **If the status digit is 1, which means the pin is connected to DG or**

0V or close. If the status digit is 0, which means the pin connect to 24V or open.



3. Press the (^) key or the (v) key to scroll up and down to view all output ports.

4. Press the DATA key for more than 1 second to return to the auxiliary function mode.

3.2.8. Scaling the positive speed input :

This is a special function for final calibration.

Please don't perform this action without a precision Voltage generator. Procedure of this function : Fn010 -> Fn007 -> Fn008.

1. Press the (^) key or the (v) key to select the function 7 (Fn007).
2. Press DATA for more than 1 second. The driver will ask you to present a +2 Volt signal in the speed reference input pin.
3. Press MODE key to indicate that a +2 volt signal is connected.

While scaling, **2 End** is flashing.

This function is locked to prevent unintentionally activation. If this function was activated before unlocking, a **Loc** message is displayed.

If this function is done successfully, a **donE** message flashes for 1 second before the confirmation. After confirmation, **in 2** is displayed and indicating that the result has been written into the EEPROM.

4. Press the DATA key for more than 1 second to return to the auxiliary function mode (Fn007). Unless a "donE" is displayed, the result is stored in the memory temporary to wait for negative data.

3.2.9. Scaling the negative speed input :

This is a special function for final calibration.

Please don't perform this action without a precision Voltage generator. Procedure of this function : Fn010 -> Fn008 -> Fn007.

1. Press the (^) key or the (v) key to select the function 8 (Fn008).
2. Press DATA for more than 1 second. The driver will ask you to present a -2 Volt signal in the speed reference input pin.
3. Press MODE key to indicate that a -2 volt signal is connected.

While scaling, **-2 End** is flashing.

This function is locked to prevent unintentionally activation. If this function was activated before unlocking, a **Loc** message is displayed.

If this function is done successfully, a **donE** message flashes for 1 second before the confirmation. After confirmation, **in -2** is displayed and indicating that the result has been written into the EEPROM.

4. Press the DATA key for more than 1 second to return to the auxiliary function mode (Fn008). Unless a "donE" is displayed, the result is stored in the memory temporary to wait for positive data.

3.2.10. Reload the default values (Factory SETTING Reload)

Function: reload the default values for Pn0 ~ Pn32 **Procedure of this function:**

Fn010 ⇄ Fn009.

Fn009

1. Press the (^) key or the (v) key to select the function 9.
2. Press the DATA key for more than 1 second to request for a parameter initialization function. **PinIt**
3. Press the MODE key to confirm the request.

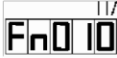



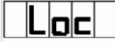

PinIt flashes while reloading. ⇄ **donE** flashes for 1 Sec. ⇄ **PinIt**

This function is **locked** to prevent unintentionally activation. If this function was activated before unlocking, a **Loc** message is displayed.


4. Press the DATA key for more than 1 second to return to the auxiliary function mode. **Fn009**

3.2.11. Lock & Unlock

Functions 7, 8 and 9 are locked normally to prevent unintentionally activation. The following procedures can be used to unlock these functions.



1. Press the (^) key or the (v) key to select the function 10. 
2. Press the DATA key for more than 1 second to request the unlock function. 
3. Press the MODE key to confirm the request
 flashes while unlocking →  Flashes for 1 second → 
Press the MODE key again will lock the function again.
4. Press the DATA key for more than 1 second to return to the auxiliary function mode. 
After unlocking, the function 9 or the function 7 and 8 can only executed once.
Functions 7, 8 and 9 will be locked after execution.

3.3. User Parameters

1. Press the MODE key repeatedly until **PN000** is displayed. 
press the (^) key or the (v) key to get the desired parameter number.
2. Press the DATA key for more than 1 second to retrieve the content of the listed parameter number.



If there is a leading 'H', then it is a Hexadecimal number.

3. To edit the number, press the DATA key to shift the flashing digit left. Press the (^) key or the (v) key to increase or decrease the flashing digit.
4. Press the DATA key for more than 1 second to store the new data into the **EEPROM**. The number entered will flash for 1 second while recording. 
5. Press the DATA key for more than 1 second to return to the parameter setting mode. 

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User Parameter Table

No.	Definition		Range	Unit
0	MPG(Manual Pulse Generator) multiplying ratio		1~16	
1	Speed loop proportional gain		5~500	
2	Speed loop integration time (integral gain)		1~1000	ms
3	Speed scale. The motor speed at SIN pin = 10V.		200~ 3000	rpm
4	Speed reference offset		±63	rpm
5	Positive torque limit		0~300	%
6	Negative torque limit		0~300	%
7	Zero speed detection. Below this speed, pin20 will be connected to DG . Also refer to Parameter 11-4, 12-2.		0~255	rpm
8	Reach the specified speed. If the current speed is greater than the specified speed, pin21 will be connected to DG .		0~rated speed	rpm
9	PWM sampling time		90~125	μs
10-1	Hxxxn,	Pin 12 open	Pin 12 short	0
		speed	speed	
		position	position	
		torque	torque	
		speed	position	
		position	torque	
torque	speed			
10-2	Hxxxn, n=0:	direction, n=1: CW / CCW, n=2:	0	2
10-3	Hxxxn, n=0:	for positive command, n=1: CW for positive command.	0	1
10-4	Hxxxn, n=0:	automatic current feedback, n=1: current feedback offset to 0.	0	1
11-1	Hxxxn, n=0:	dynamic brake "ON" while servo "OFF", n=1: "OFF" while servo "OFF". Dynamic brake always "ON" while power "OFF".	0	1
11-2	Hxxxn, n=0:	increase the MAX. speed by 10~20%, n=1:	0	1
11-3	Hxxxn, n=0:	external inhibit signal from input ports. n=0: enables positive inhibit signal, n=1: enables negative inhibit signal, n=2: enables both signals. n=3: inhibits both signals. refer to parameter 12-3 for more information.	0~3	
11-4	Hxxxn, n=0:	output signal 'ZSP/BI' means zero speed. output signal 'ZSP/BI' means zero speed. external brake.	0~1	
12-1	Hxxxn, n=0: time =0; n=1: parameter number 1; n=3: parameter number 28. n=4: Parameter number 28.	Acceleration and Deceleration time for speed mode. The ratio of acceleration and deceleration time is set in the parameter number 28.	0,1,3,4	
12-2	Hxxxn, n=0:	acceleration time is influenced by ZSP	0,1	
12-3	Hxxxn, n=0:	while external inhibit is activated, refer to parameter 11-3.	0,1	
12-4	Hxxxn, n=0:	external speeds not effective. n=1: internal speeds effective. selected from input port. Speeds are defined in parameters 29~31.	0,1	


14	smoothing time	0~10000	ms
15	gain, e.g. 300 means 300% rated torque output when torque command is 10 Volts. rated torque output when command is 10V.	30~300	%
16	Torque command offset, e.g. if offset is 100(1V), a 2.5V command from input port is executed only as a 1.5V command input.	-1000 ~+1000	0.01
No.	Definition	Range	Unit
17	Speed Limit 1. Activated while the pin 10 of the CN1 is connected to DG , and the pin 11 of the CN1 is open.	0~rated speed	rpm
18	Speed Limit 2. Activated while the pin 10 of the CN1 is open, and the pin 11 of the CN1 is connected to DG .	0~rated speed	rpm
19	Speed Limit 3. Activated while the pin 10 and the pin 11 of the CN1 are both connected to DG .	0~ rated speed	rpm
20	In Position. Sets range of positioning completion signal output (INP).	0~32767	pulse
21	Molecule of electronic gear ratio. Indicates the number of encoder pulses per reference unit. The input pulses will multiply this number to form an actual calculation number. $1/50 < [21] / [22] < 50$.	1~10000	
22	Denominator of electronic gear ratio. Indicates the number of encoder pulses per reference unit. The input pulses will divide this number to form an actual calculation number. $1/50 < [21] / [22] < 50$. If encoder pulse of the motor is 2000ppr and $[21] / [22] = 1$, motor needs 8000 pulses to be input to drive, for one complete revolution.	1~10000	
23	Positioning proportional gain	10~500	1/sec
24	Positioning smoothing time (integral gain)	0~10000	msec
25	Error counter length	1~500	kpulse
26	Feed forward gain	0~100	%
27	Deceleration time. The time elapsed from rated speed to stop. Parameter number 12-1 is used to disable or enable this function.	10~10000	msec
28	Acceleration time and deceleration time. The time elapsed from standstill to rated speed or from rated speed to standstill. Parameter number 12-1 is used to disable or enable this function.	10~10000	msec
29	Internal speed 1. Activated while pin10 of the CN1 is connected to DG , and pin11 of the CN1 is open.	± rated speed	rpm
30	Internal speed 2. Activated while pin10 of the CN1 is open, and pin 11 of the CN1 is connected to DG .	± rated speed	rpm
31	Internal speed 3. Activated while both pin10 and pin 11 of the CN1 are connected to DG .	± rated speed	rpm
32	Brake timing. Waiting time or delay time around servo "ON" and servo "OFF". Brake will be released before servo and held after servo "OFF" if this constant is negative, servo "ON" command will be postponed. Brake will be released after servo "ON" before servo "OFF" if this constant is positive, servo "OFF" command is postponed.	±2000	msec
34	Speed monitor offset	-10~+10	0.02
35	Torque monitor offset	-10~+10	0.02
36	Speed command offset	-199~+199	0.02
37	Speed command scale	10000 ~ 20000	1/163
38	Speed command offset (4 times precision)	-199~+199	5mV
39	Speed command scale (4 times precision)	10000 ~ 20000	1/163

40	360 Internal regeneration resistor : 15 50 (N , 75A driver dissipation (V of the heat resistors are in paralle 33R, and top proportion inductance feedback gain	generation in external resist ets divergent, e is resistance It means that if the voltage river 50R/10W , 30A driver .[40] = R x P / 134). the driver, please watch the temperature	0~250	0.19
41			0~10	
42			0~400	%
43			0~300	
44 ~50	Reserved			

Remarks:

1. **Reset** means the number is effective after reset from panel, CN1 or power off -on.
2. **Enter** means effective after value set.
3. **PC** means the value must be transferred in from of the RS232 communication port.
4. **Mode(A)**: effective for all control modes. (P): effective in position mode, only. (S): effective in speed mode, only. (T): effective in torque mode, only.
5. Default value of Pn0~Pn32 can be reload by function 9. Pn 33~ Pn 43 can be set from panel or from communication port.
Pn50 and up, can only be set from the RS232 communication port.

3.4. Monitor mode

1. Press the MODE key repeatedly until the monitor mode is reached. 
2. Press the (▲) key or the (▼) key to get the desired parameter number.
3. Press the DATA key for more than 1 second to display the content of the DN.
4. Press the DATA key again for more than 1 second to return to the monitor mode.

The monitor mode information list

Numl	Mode	Definition
0	PST	Speed (rpm) , 120 means current motor speed is 120 rpm , this value is the average rpm in 0.1 second.
1	PST	Torque : the value is the percentage of the rated torque of the motor. 120 current torque output is 120% of the rated torque of the motor
2	PST	Actual load : the value is the average torque output percentage in 26
3	PST	Maximum load : the value is the maximum value appeared in N

4	P	Error: the difference between command pulses and encoder feedback pulses. The command pulse number multiplied by electronic gear ratio. The display value is clamped between
5	S	PIC: torque limit for positive direction in percent.
6	S	NIC: torque limit for negative direction in percent.
7	T	PIC: speed limit (rpm), A value of 4000 indicates 4000 rpm. A value of 3000 indicates 3000 rpm.
8	PST	Regeneration rate 100 represents 1%.
9	PST	Maximum regeneration rate 100 represents 1%.
10	PST	Maximum torque 100 represents 100% of the output torque.
11	PST	Driver capacity: 150 means 15A, 200 means 20A, 300 means 30A.
12	PST	Speed command 1000 means 1 rpm, 12000 means 3000 rpm.
13	ST	Stop detect 975 means 10V, 97 means 1V.
14	S	Stop detect 975 means 2.5V.
15	PST	Mode (ID NUMBER).
16	PST	Mode "0" means "servo on", "1" means "servo off".
17	PST	Mode "0" means "speed mode", "1" means "position mode", "2" means "torque mode".
X	P	Encoder feedback 32 bit counter has a range from -500,000 to 500,000.
X	P	Encoder feedback High word of error counter.
X	P	Encoder feedback Low word of accumulated input pulse.
X	P	Encoder feedback High word of accumulated input pulse.
X	P	Encoder feedback Low word of accumulated encoder feedback pulses.
X	P	Encoder feedback High word of accumulated encoder feedback pulses.
X	PST	RPM: 400 means 1 RPM. 480 means current motor speed is 120 rpm, this is a sampled value in 1 of 50 samples taken in 10 milliseconds.
X	PST	Torque: output percentage of the rated torque. 120 means the torque output now is 120% of the rated torque. This is a sampled value in 1 of 50 samples taken in 10 milliseconds.

DN number X : these values can only be read / written via the RS232 communication port.

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4. Alarm code

A message such as **E1-01** is indicating that an error has occurred. The message will stay until any key is pressed.

Error code	To remove	Definition
1	reset	Low voltage (DC voltage below 224V , or AC voltage below 160V , see note 1, 2).
2	reset	Over voltage (DC voltage over 390V , note 1, 2), in most cases is happened on a large inertia. Please check DN9 while running. If this value becomes bigger and never return to 0 , please add an external resistor for regeneration. Please refer to PN40 .The alarm also happens on high AC line voltage.
3	reset	Over load , a 200% rated load can last for about 10 seconds, a 300% load can last for about 4 seconds.
4	Power off	IPM error , due to high temperature, short-circuit, over current or IPM, which provides the device
5	reset	Encoder error , the signal from encoder is erroneous, please check the encoder.
6	reset	An abnormal value was read from the current sensor when power on.
7	reset	Parameter error , the electronic gear rate is not in the range (0.02~50).
8	reset	Parameter checksum error , The data stored in EEPROM is corrupted.
9	reset	Emergency stop.
10	reset	1) Over current (300%) 2) Specify a longer acceleration time
11	reset	Error-counter overflow
12	reset	Over speed
13	reset	600kpps.
14	reset	Pin 3 and pin 4 of CN1 simultaneously normally both pins must be connected to DG .
15	reset	Due to the setting in PN 12-3 of 2 service switches (pin3 OR pin4) is activated and cause "OFF".
16	reset	CPU error , watch dog time out. The CPU already lost control. To prevent H/W damage, CPU reset is automatically issued.

Note 2: If the rated voltage of the motor is **100V**, the voltage level to alarm will be half of the value listed (DC**112V** for low voltage, DC**195V** for over voltage).

Note 3: There are 3 parameters for the power cycle.
1) Power cycle (Power off then on),

2.02%.

2) Fn0
3)

nal f

1. However, the cause of alarm must be resolved first.

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