

# **OPERATION MANUAL**

## **AC Servo Drive**

**NDA7000 Series**

**Ver 1.1 (Soft. Ver. 6.01 ~)**

**NDA7000 Series**

**Servo Drive User Manual**

**HIDEN**

## Essential notes before use

### A. Checking Motor ID certainly.

: Enter the motor ID indicated on the motor name plate to the parameter of "P01-01".

For details on the motor ID, refer to Chapter 3 of this manual.

### B. Checking Drive AMP-Type certainly.

AMP-Type [ NDA70- ]	01	02	04	05	10	15	20	30	45
P01-11 [Drive ID]	1	2	4	5	10	15	20	30	45

### C. Checking Encoder ID certainly.

Encoder type	INC 8192 PPR	INC 17 bit
P01-12 [Encoder ID]	Enc-H	Enc-P

### D. Operate servo system after autotuning is off. (P02-17)

: Always cancel the autotuning during normal operation after gain setting using autotuning.

### E. Motor handling

: Avoid impacting to the encoder in connecting coupling to the Motor shaft or operating.

### F. Recommended specification of Encoder wiring.

Encoder type	Page of wiring explanation
Incremental encoder	2-13
Incremental encoder 17bit	2-12

### G. Separate GND24 and GND

: When connect commonness, malfunction of servo drive and burnout can occur.

### H. Treatment of the servo motor attached holding brake .

: The brake built in the servo motor is a normal closed type brake. Which is used only to hold and can not be used for braking. Use the holding brake only to hold a stopped servo motor.

### I. Do not supply AC at N, P connector when connect the power line to Small and Medium capacity servo drive.

: If main power is DC power, because N connector (-) voltage and P connector (+) voltage, burnout of servo drive when N, P connector is supplied AC power. Choose positively necessary AC and DC power, and use.

### J. Recommended specification of Lan Cable

: Use upper spec. of CAT .5 STP(Shield Twisted-Pair)

### K. Can not use the parameter shown in diagonal line(☒). It is used only for FDA7000.

# **Contents**

---

## **Essential notes before use**

### **Chapter 1 Model check and handling**

1.1 Model check .....	1-1
1.2 Servo drive specification .....	1-2
1.3 Combination table of servo drive and motor .....	1-3
1.4 Installation .....	1-4
1.5 Handling .....	1-7

### **Chapter 2 Wiring and connection**

2.1 Main circuit and peripheral device connection .....	2-1
2.2 Main circuit terminal .....	2-3
2.3 CN1 I/O signal explanation .....	2-8
2.4 ENC wiring and signal explanation .....	2-12
2.5 COM wiring and signal explanation .....	2-14
2.6 IN, OUT wiring and signal explanation .....	2-15

### **Chapter 3 Parameter setting**

3.1 Basics of loader .....	3-2
3.2 Operation of internal mount loader .....	3-3
3.3 Operation of Digital loader .....	3-8
3.4 Status display parameter .....	3-11
3.5 Motor and operating device setting .....	3-13
3.6 General control parameter setting .....	3-17
3.7 Speed control parameter setting .....	3-22
3.8 Input contact point Digital speed and Torque setting .....	3-24
3.9 Position control parameter setting .....	3-27

---

---

3.10 Torque control parameter setting .....	3-28
3.11 Input contact point function setting .....	3-29
3.12 Output contact point function setting .....	3-29
3.13 Analog monitor function setting .....	3-29
3.14 Jog operation parameter setting .....	3-30
3.15 Alarm display setting .....	3-33
 <b>Chapter 4 Servo using method and Gain adjustment</b>	
4.1 Gain adjustment for position control mode .....	4-1
4.2 Autotuning .....	4-7
 <b>Chapter 5 Troubleshooting and check</b>	
5.1 Troubleshooting .....	5-1
5.2 Check .....	5-4
 <b>Chapter 6 External View</b>	
6.1 External view of servo drive .....	6-1
 <b>Appendix I MotionNET System</b>	
I .1 MotionNET System .....	I -1
I .2 MotionNET System S/W flowchart.....	I -3
 <b>Appendix III Parameter table</b>	
III.1 Parameter table .....	III-1

# **Chapter 1**

---

## **Model check and handling**

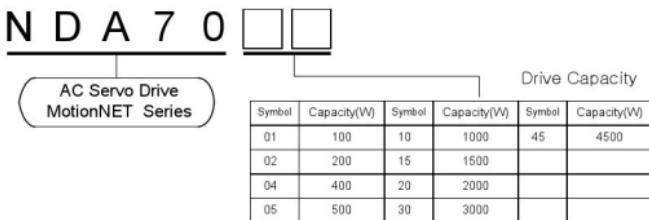
Chapter 1 explains the details to check before using the servo drive and motor that you have purchased. Before assembling the product, check whether name plate is as ordered. Mishandling can disable normal operation or can significantly reduce the operating life depending on the situation. Because it can damage the servo in the worst case, please read the details and precautions of each article for handling.

1.1 Model check .....	1-1
1.2 Servo drive specification.....	1-2
1.3 Combination table of servo drive and motor .....	1-3
1.4 Installation .....	1-4
1.5 Handling .....	1-7

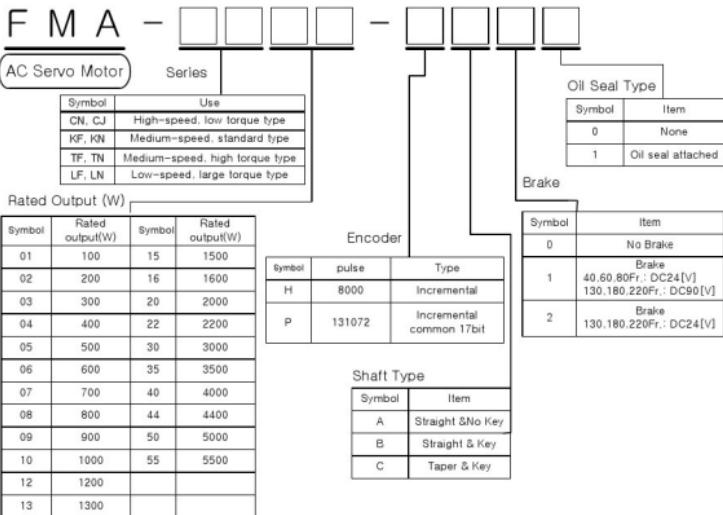


## 1.1 Model check

## 1.1.1 Servo drive model classification



## 1.1.2 Servo motor model classification



(Note) Please check the brake type and input power into brake.

## 1.2 Servo drive specification

Servo Drive [ NDA70- ]		01	02	04	05	10	15	20	30	45					
Main circuit power	Input voltage, frequency (Note) 1	Single phase AC230V, 50/60Hz ± 5%						3 phase AC200~230V, 50/60Hz ± 5%							
	Permitted voltage variance rate	2 phase AC207 ~ 253V (Input voltage range +10/-10%)				3 phase AC170 ~ 253V (Input voltage range +10/-15%)									
Control circuit power	Input voltage, frequency	Single phase AC200~230V, 50/60Hz ± 5%													
	Permitted voltage variance rate	Single phase AC170 ~ 253V (Input voltage range +10/-15%)													
Detector	Detector type	Incremental 17 bit serial encoder, incremental 8192 [ppr] 9 line type													
	Output signal type	Differential Line Driver output													
	Detector accuracy	Maximum of 131072 [pulse] per 1 encoder revolution													
	Detector power	DC 5[V], 0.3 [A] or below													
Drive system		Sine wave PWM control ( IPM use )													
Position control specific -ation	Max Position input frequency	6.5 [Mpps]													
	Position input type	MotionNET method													
	Position input method	MotionNET method													
Internal function	Protection function	Over-current, recovery over-voltage, over-load, motor mis-wiring, Encoder problem, insufficient voltage, over-speed, over-tolerance etc.													
	Regenerated resistance(W/Ω)	50/50			70/50		250/ 25	500/12.5							
	Monitor output	Speed, torque (-5 ~ +5 [V])													
	Dynamic brake	Built in													
	Additional function	Test function (Jog and no motor operation), alarm record, CW/CCW revolution, encoder signal division output													
Master Controller		Industrial PC, MotionNET Center board, MotionNET Support Unit													
Lan Cable		Upper CAT.5 STP(Shielded Twisted-pair)													
Option		Motor power cable, Encoder cable, CN1 connector, CN2 connector, Lan cable													
Environ -mental specific -ation	Operating ambient temperature	0 ~ 50 [°C] (There should be no freezing)													
	Ambient humidity	90[%] or below (There should be no steam)													
	Storage temperature	-20 ~ +80 [°C]													
	Insulating resistance	DC 500[V] 10 [MΩ] or above													
중량		1.0	1.0	1.5	1.9	1.9	4.3	4.4	4.5	4.6					

(Note) 1 This indicates the input voltage and frequency range that assures the motor rated output and rated revolution speed. This is not assured during voltage drops.

## 1.3 Combination table of servo drive and motor

Drive [NDA70-]	Motor						
	CN/CJ Series 3000/6000 [rpm]	KN Series 2000/3000 [rpm]	TN Series 1500/3000 [rpm]	LN Series 1000/2000 [rpm]	KF Series 2000/3000 [rpm]	TF Series 1500/3000 [rpm]	LF Series 1000/2000 [rpm]
01	CJZ5 CN01 CJ01	-	-	-	-	-	-
02	CN02 CJ02	-	-	-	-	-	-
04	[CN03] [CN04] [CJ04] [CN04A] CN05	[KN03] KN05	-	[LN03]	-	-	[LF03]
05	[CN06] CN08 CN09	[KN06] [KN06A]	[TN05]	LN06	-	[TF05]	LF06
10	-	KN07 KN11	TN09	LN09	-	TF09	LF09
15	CN15	KN16	TN13	LN12 LN12A	KF15	TF13	LF12
20	CN22	KN22 KN22A	TN17 TN20	LN20	KF22	TF20	LF20
30	CN30 CN30A	KN35	TN30	LN30	KF35	TF30	LF30
45	CN50 CN50A	KN55	TN44	LN40	KF50	TF44	-

## 1.4 Installation

### 1.4.1 Installation of servo drive

#### 1) Operating environment

Ambient temperature	0-50°C (There should be no freezing) Note)
Ambient humidity	90% RH or lower (There should be no vapor)

**Note)** Inside control panel temperature specifications : To ensure maximum operating life and reliability of the drive, maintain the average control panel temperature at 40°C or lower.

#### 2) Installation direction and intervals

- Install NDA7000 can be seen from the front.
- If the drives are installed in a closed control panel, maintain an interval of more than 10 mm between drives and more than 40 mm between top and bottom. If multiple number of control panels are installed in parallel, about 100 mm space is required on the upper side. In case of installing fans, avoid heat.
- Regenerative resistor, heating source, away from the drive.

#### 3) Prevention of ingress of dust

- Exercise caution when drilling control panels to prevent chips produced by drilling from getting into the drive.
- Take appropriate measures to prevent oils, water and metal powder from getting into the drive from openings in the control panels and the fan installed on the ceiling.
- If the drive is used in a place with large amount of toxic gases and dust, protect the drive with an air purge.

### 1.3.2 Servo motor installation

#### 1) Operating environment

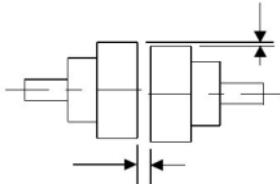
Ambient temperature	0-40°C (There should be no freezing)
Ambient humidity	80% RH or lower (There should be no vapor)
External vibration	X, Y = 19.6 m/s <sup>2</sup> (2G)

#### 2) Caution when assembling load system (Prevent impact on shaft)

It is important to accurately match the motor shaft with the shaft center of the connecting machine. Mismatched shaft center causes vibration, and may cause damage to the bearing. Use a rubber hammer to install couplings to prevent excessive force from being applied to the

shaft and bearing.

Check 4 places in turn. The difference between maximum and minimum should be 0.03 or lower.



### 3) Load tolerance on shaft

- Use flexible couplings, and maintain the shaft center deviations within the specified tolerance.
- Use pulleys and sprockets with the allowable load.

MOTOR MODEL		RADIAL LOAD		AXIAL LOAD		REFERENCE DIAGRAM
Series	Type	N	Kgf	N	kgf	
CN	CN01~CN05	196	20	68	7	
	CN06~CN08	245	25	98	10	
	CN09~CN15	490	50	196	20	
	CN20~CN30	686	70	343	35	
	CN30A~CN50A	1470	150	490	50	
KN	KN03~KN07	245	25	98	10	
	KF08~KN11	490	50	196	20	
	KF15~KN22	686	70	343	35	
	KN22A~KN55	1470	150	490	50	
TN	TN05~TN09	490	50	196	20	
	TN13~TN17	686	70	343	35	
	TN20~TN75	1470	150	490	50	
LN	LN03~LN06	490	50	196	20	
	LN09~LN12	686	70	343	35	
	LN12A~LN40	1470	150	490	50	
KF	KF08~KF10	490	50	196	20	
	KF15	686	70	343	35	
	KF22~KF50	1470	150	490	50	
TF	TF05~TF09	490	50	196	20	
	TF13	686	70	343	35	
	TF20~TF44	1470	150	490	50	
LF	LF03~LF06	490	50	196	20	
	LF09	686	70	343	35	
	LF12~LF30	1470	150	490	50	

## 4) Accuracy of attachments

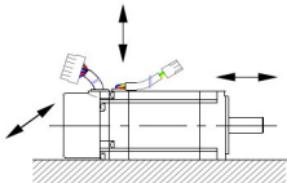
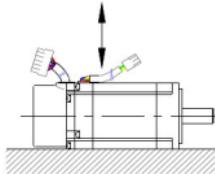
The accuracies of the shaft and attachments of the AC servo motor are shown on the following table.

Item	Accuracy (T.I.R.)	Reference Diagram
Perpendicularity of flange attachment plane and output shaft (A)	0.04mm	
Eccentricity of flange fitting outer diameter (B)	0.04mm	
Vibration of shaft end (C)	0.02mm	

(Note) T.I.R : Total Indicator Reading

## 5) Impact resistance

The AC servo motor withstands two times of impacts with an acceleration of 10G when up-and-down impacts are applied after setting the motor shaft horizontally. However, a precision detector is attached to the end of the shaft on the opposite side of the load, take caution not to apply impact directly to this end.



## 6) Vibration resistance

The AC servo motor withstands a vibration acceleration of 2.0G when vibration is applied in up and down, left and right, and front and back directions after setting the motor shaft horizontally.

## 7) Vibration grade

The vibration grade of the AC servo motor is V15 at the rated rpm.

## 8) Direction of installation

- Motor can be installed horizontally or at the top or bottom of the shaft.
- Keep the motor cable downward.
- If the motor is installed vertically, install a cable trap so that oils or water do not flow into the motor.

- 6) Cable disconnection
- Take caution not to stress or damage to the cables.
  - If the motor is used as a mobile motor, use flexible cables.

## 1.5 Handling

### 1.5.1 Handling precaution

: Mishandling can lead to unexpected accidents or damage. The key items are listed as follows. Reference the related details and use the drive correctly.

#### 1) Handling

- Do not apply any pressure to the encoder which is the motor detector.  
Hitting the shaft with a hammer or falling can cause damages.
- Do not directly connect commercial power (AC220V) to the motor. Over-current can reduce the magnetic efficiency of the motor. Always connect to the defined servo drive for operation.

#### 2) Wiring

- Connect the grounding terminal of the drive and motor to the drive side and ground all at once to the closest point. Use the class-3 earth ( $100\Omega$  or below) to prevent electric shock and mis-operation.
- The U, V, W and FG terminal of the drive and motor must be aligned. Because the 2 lines are replaced with the commonly used motor, the rotating direction cannot be changed.
- If you connect the commercial power to the U, V, W and FG terminal of the drive, it can be damaged.
- Connect the 200V level power to the L1, L2 and L3 terminal and the power besides the 200V level must be installed with a transformer.
- Always connect the standard regenerated resistance to the P and B terminal of the drive.

# **Chapter 2**

---

## **Wiring and connection**

Chapter 2 explains the main circuit wiring, I/O signal connection examples and connection to peripheral devices of the servo drive.

2.1 Main circuit and peripheral device connection .....	2-1
2.2 Main circuit terminal .....	2-3
2.3 CN1 I/O signal explanation.....	2-8
2.4 ENC wiring and signal explanation .....	2-12
2.5 COM wiring and signal explanation .....	2-14
2.6 IN, OUT wiring and signal explanation.....	2-15

## 2.1 Main circuit and peripheral device connection

This part explains the peripheral device and main circuit wiring. Keep the following danger and caution details during wiring.



### Danger

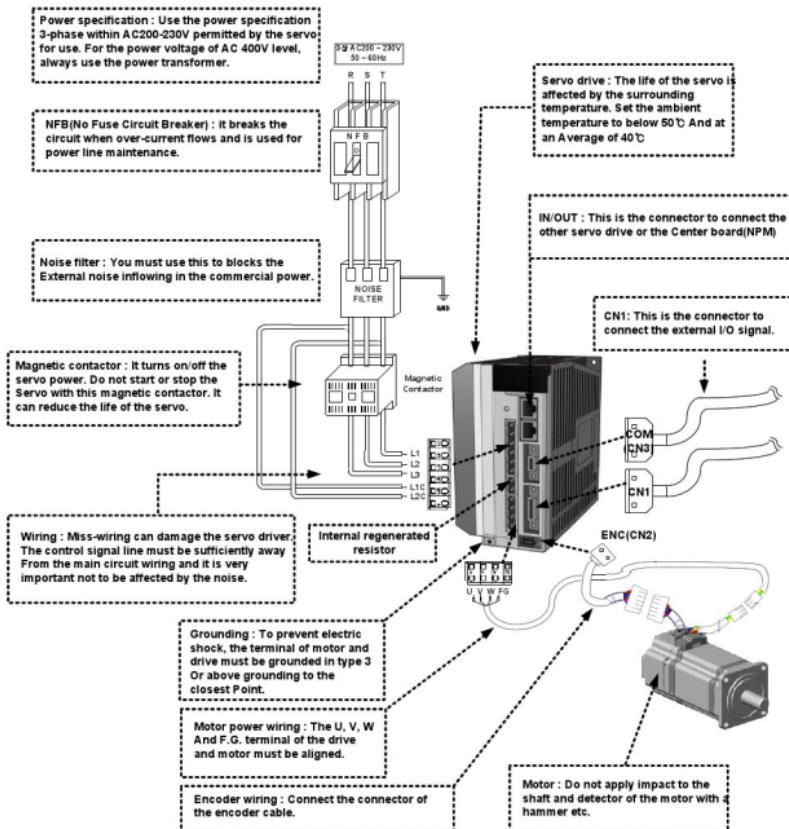
- Do not open the surface cover when connecting the power or during operation. It can cause electric shock.  
It can cause electric shock because the high voltage terminal and charge part are exposed.
- Even when the power is turned off, do not remove the surface cover unless it is for wiring or periodic check.  
It can cause electric shock because the inside of the servo drive is charged.
- Execute the wiring work and check more than 10 minutes after the power has been disconnected and checked of the voltage with tester etc.
- Ground the grounding terminal of the drive and motor both to the drive side and ground at once in the closest point.  
To protect electric shock and mis-operation, use at least class-3 ground (100 Ω max.).
- The wiring work and checking work must be executed by specialized technician.
- The wiring must be done after the main unit is installed. It can cause electric shock or injury.
- Do not operate the key with wet hands. It can cause electric shock or injury.
- Make sure you do not damage the wire, apply excessive stress on the wire, put heavy object on top of the wire or have the wire pressed again an object. It can cause electric shock or injury.



### Caution

- Use wiring that complies with the standard. Otherwise, the servo motor may not operate.
- Do not install power condenser, surge absorber or radio noise filter on the output side of the servo drive.
- Correctly connect the output side (Terminal U,V,W,FG), or the motor can operate abnormally.
- When attaching the DC relay for control output signal on the control output signal part, be careful of the diode direction for surge absorption. The signal may not be outputted due to problems and the protection circuit will not operate during emergency stop. For diode direction, refer to the user manual.

## 2.1.1 Main circuit and peripheral device connection



- ◆ At the U, V and W terminal, connect the U, V and W phase of the servo motor.
- ◆ Ground the FG terminal. Connect the grounding wire of the servo motor with this terminal.
- ◆ Do not input AC Power at the “P”, “N”terminal, in case of NDA7005, 7010. If you input AC Power at two terminal, drive would be broken.

## 2.2 Main circuit terminal

## 2.2.1 Small type terminal connection



[ NDA7001 ~ NDA7004 connection terminal ]

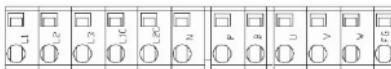
The usage and wiring method of NDA7001~NDA7002 are as follows.

- 1) As the main power of the power circuit, connect the L1 and L2 terminal to 2 phase AC 200 ~ 230[V]**
- 2) As the auxiliary power of the power circuit, connect the L1C and L2C terminal to single phase AC200 ~ 230[V].**
- 3) Connect the regenerated resistance between the terminals P and B.**
- 4) At the U, V and W terminal, connect the U, V and W phase of the servo motor.**
- 5) Ground the FG terminal. Connect the grounding wire of the servo motor with this terminal.**

AC SERVO Operating device	NDA7001	NDA7002	NDA7004
Wire thickness	AWG #16(1.25mm <sup>2</sup> )		
Open/close device	GMC-12(13A) level product		
Breaker	ABS33b(5A) level product		
Noise filter	NFZ-4030SG(30A)		
External regenerated resistance	50W 50Ω		

- ♥ Open/close device and breaker : LS Industrial Systems, <http://www.lsis.biz>
- ♥ Noise filter : Samil Components, <http://www.samilemc.com>, OKY (<http://www.oky.co.kr>), Suntronic (<http://www.suntronic.com>)

## 2.2.2 Medium type terminal connection



[ NDA7005 ~ NDA7010 connection terminal ]

The usage and wiring method of NDA7005~NDA70010 are as follows.

- 1) As the main power of the power circuit, connect the L1,L2 and L3 terminal to 3 phase AC200~230[V].
- 2) As the auxiliary power of the power circuit, connect the L1C and L2C terminal to single phase AC200 ~ 230[V].
- 3) Connect the recovery resistance of internal type during shipment between the terminals P and B.
- 4) At the U, V and W terminal, connect the U, V and W phase of the servo motor.
- 5) Ground the FG terminal. Connect the grounding wire of the servo motor with this terminal.

AC SERVO Operating device	NDA7005	NDA7008	NDA7010		
Wire thickness	AWG #16(1.25mm <sup>2</sup> )	AWG #12 (3.5mm <sup>2</sup> )			
Open/close device	GMC-12(13A) level product	GMC-40(35A) level product			
Breaker	ABS33b(5A) level product	ABS33b (10A) level product			
Noise filter	NFZ-4030SG(30A)				
Regenerated resistance	70W 50Ω Internal resistor				

♥ Open/close device and Breaker : LS Industrial Systems, <http://www.lsis.biz>

♥ Noise filter : Samil Components, <http://www.samilemc.com>, OKY (<http://www.oky.co.kr>), Suntronix (<http://www.suntronix.com> )

\* For the wiring of small/medium capacity socket, execute in the following order.

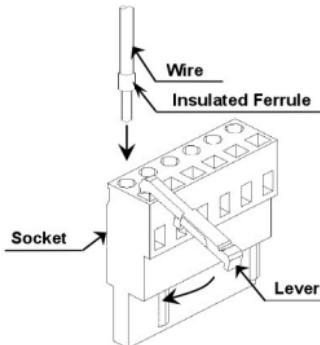
- ⑥ After checking the wire thickness indicated in 2.2.1, remove the wire coating.

- The coating of the wire to be used should be 8 ~ 9mm or less.
- The thickness of the wire permitted by the socket is as follows.

Wire type	Permitted wire thickness
Single wire	φ0.5 ~ φ0.8[mm]
Twisted wire	AWG28 ~ AWG12

- ⑦ Even though you can use the wire as is after removing the coating, for safety purposes put a ferrule end to press with the crimping tool for ferrules insulated.

- ⑧ Open the terminal (plug) wire inserting hole with the lever as shown in the following picture.

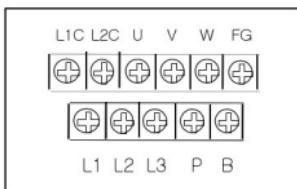


- ⑨ Insert the core part of the wire to the opening part. Release the lever after inserting the wire.

- ⑩ Lightly pull it out to see whether there is any problem in the connected condition of the socket and the wire.

- ⑪ When the coating of the wire is not completely inserted, it can cause electric shock. Therefore check whether there are any exposed core wires.

## 2.2.3 Large type terminal connection



[ NDA7015 ~ NDA7045 connection terminal ]

The usage and wiring method of NDA7015~NDA7045 are as follows.

- 1) As the main power of the power circuit, connect the L1,L2 and L3 terminal to 3 phase AC200~230[V].
- 2) As the auxiliary power of the power circuit, connect the L1C and L2C terminal to single phase AC200 ~ 230[V].
- 3) Connect the regenerated resistance between the terminals P and B.
- 4) At the U, V and W terminal, connect the U, V and W phase of the servo motor.
- 5) Ground the FG terminal. Connect the grounding wire of the servo motor with this terminal.

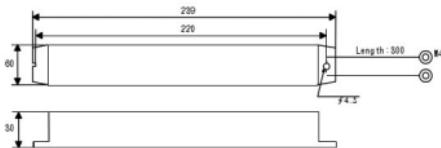
## 2. Wiring and connection

HIDEN®

AC SERVO operating device	NDA7015	NDA7020	NDA7030	NDA7045
Wire thickness	AWG #12(3.5mm <sup>2</sup> )		AWG #10 (5.5mm <sup>2</sup> )	
Open/close device	GMC-40(35A)		GMC-50(50A) level product	
Breaker	ABS33b (10A)	ABS33b (20A)	ABS33b (30A) Level product	
Noise filter	NFZ-4030SG (30A)		NFZ-4040SG (40A)	
External regenerated resistance	250W 25Ω (External diagram A)	250W 25Ω parallel 2 units (External diagram A)		

♥ Open/close device and Breaker : LS Industrial Systems, <http://www.lsisc.biz>

♥ Noise filter : Samil Components, <http://www.samilemc.com>, OKY (<http://www.oky.co.kr>), Suntronix (<http://www.suntronix.com> )



<External view A>

## 2.3 CN1 I/O signal explanation

## 2.3.1 CN1 terminal arrangement

CN1 is the connector located on the top right part of the front side of the servo device. This connector is used for connecting the host controller that commands the operating device and the operation.

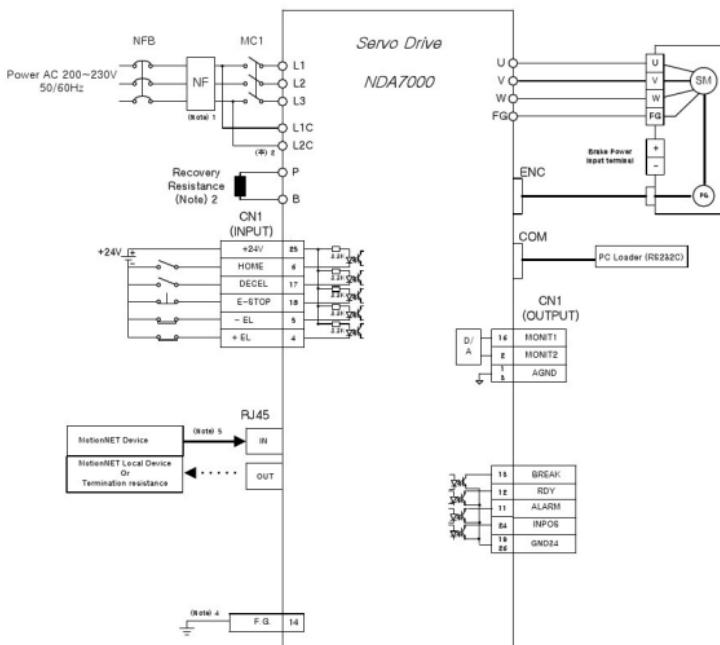
The pin arrangement and name of the CN1 connector are as shown in the following picture.

2	MONIT2	1	AGND	15	NONE	14	F.G.
4	+ EL	3	AGND	17	DECCEL	16	MONIT1
6	HOME	5	- EL	19	GND24	18	ESTOP
8	NONE	7	NONE	21	NONE	20	NONE
10	NONE	9	NONE	23	NONE	22	NONE
12	RDY	11	ALARM	25	+24VIN	24	INPOS
		13	BREAK			26	GND24

## ◆ The connector for CN1 is optional.

- Manufacturer: 3M, CASE product name: 10350-52F0-008
- Connector (for soldering) : 10150-3000VE

## 2.3.2 CN1 I/O wiring



(Note) 1: NF stands for Noise Filter and it must be used to prevent the noise from intruding from the outside.

(Note) 2: For the NDA7002~45 type, connect the single phase AC220V[V] to the L1C, L2C terminal, auxiliary power.

(Note) 3: The recovery resistances of NDA7004~NDA7010 are installed inside the driver as an internal type. The regenerated resistance of the NDA7001, 7002, NDA7015 type or above is the separately installed type, check the capacity and apply accordingly.

(Note) 4: Connect the ground wire of CN1 cable to the F.G. (Frame Ground) terminal.

(Note) 5: Use the cable than upper CAT .5 STP cable

## 2.3.3 Fixed input signal function table (Based on manufactured default)

Signal content	Term	Pin No.	Function and usage explanation
Upper signal/ + END Limit	+EL LIMIT	4	When motor return to origin point, it is used for upper signal. Limit signal input on CCW You can select the ON/OFF contact point in parameter P1-24
Under signal/ - END Limit	-EL LIMIT	5	When motor return to origin point, it is used for under signal. Limit signal input on CW You can select the ON/OFF contact point in parameter P1-24
Speed deceleration	SD	17	This signal can be used as a deceleration signal or a deceleration stop signal, according to the software setting.
Origin return	ORG	6	Input signal for an origin return operation.
Emergency stop	ESTOP	18	In case of external emergency, it overrides all input condition of the servo drive and quickly decelerates the motor to free run the motor.

## 2.3.4 Fixed output signal function table (Based on manufactured default)

Signal content	Term	Pin number	Function and usage explanation
Brake operation	BRAKE	13	This is the output signal to operate the external brake. When on, the brake power is supplied to enable motor operation.
Position reach completion	INPOS	24	It goes on when it reaches the commanded position.
Alarm condition	ALARM	11	When the alarm is detected, it goes off. During normal operation, it goes on.
Servo Ready	RDY	12	No alarm, power good condition when the power is on.

## 2.3.5 The onther output signal function table (Based on manufactured default)

Signal content	Term	Pin number	Function and usage explanation
Monitor output1	MONIT1	16	Designed variable value is outputted in 0~±5[V] range through the DA converter.
Monitor output2	MONIT2	2	[Monitor selection] 0: Speed, 1: Speed command, 2: Torque, 3: Torque command, 4: Pulse, 5: Command pulse.
+24[V] Power input	+24VIN	25	As the external I/O contact point power, enter +24[VDC] ±10% 1.0[A] or above for the external power. (User preparation) ◆ When using the I/O contact point power simultaneously, recalculate the power capacity according to the output contact points.
+24[V] GND	GND24	26	Connect the ground of power +24[VDC] ±10% for the external I/O contact point(User preparation)
0[V]	AGND	1,3	Common power ground terminal of monitor output.
Frame Ground	FG	14	Ground the cable ground wire of CN1.

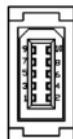
## 2.4 ENC wiring and signal explanation

ENC is the connector located on the bottom right side of the front cover of the servo device. This connector is used for connecting the servo drive and the encoder of the servo motor. The PIN arrangement shown from the connector in the user's point of view is as follows. The encoder signals may differ depending on the type of encoder.

### 2.4.1 17bit incremental encoder

(Note) Do Not connect 10 pin and the body of connector socket.

1	
3	
5	GND
7	
9	VCC
10	FG/Shield



PIN	Term
1	-
2	-
3	-
4	-
5	GND
6	/SD
7	-
8	SD
9	VCC
10	FG/Shield

[Based on soldering side of user connector]

[ Encoder cable of drive side ]



AMP 172161-1 CAP  
(9 Circuits)

Motor Frame  
Frangie 40, 60, 80

PIN	Term
1	SD
2	/SD
3	-
4	-
5	VCC
6	GND
7	FG
8	Shield
9	-



MS 3108A/B20-29S  
MS Connector

Motor Frame  
Frangie 130, 180, 220

PIN	Term	PIN	Term
A	-	K	-
B	-	L	-
C	-	M	-
D	-	N	FG
E	-	P	SD
F	-	R	/SD
G	GND	S	-
H	VCC	T	-
J	Shield		

[ Encoder cable of motor side ]

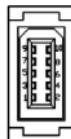
◆ The connector for ENC is optional.

- Manufacturer : 3M, CASE product name : 36210-0100FD, Connector (for soldering) : 36310-3200-008
- Manufacturer : Molex, CASE product name : 54593-1019, Connector (for soldering) : 54599-1019
- ♥ Connect the grounding wire of the encoder wiring cable for F.G, do not connect frame of Drive side connector.
- ♥ Applied cable specification: AWG24 x 5Pair TWIST,SHIELD CABLE (Maximum length 20m)

## 2.4.2 Incremental encoder 8192 [ppr]

(Note) Do Not connect 10 pin and the body of connector socket.

1	A
3	/A
5	GND
7	VCC
9	-
2	/B
4	B
6	/Z
8	Z
10	FG

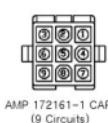


PIN	Term
1	A
2	/B
3	/A
4	B
5	GND
6	/Z
7	VCC
8	Z
9	-
10	FG/Shield

[Based on soldering side of user connector]

[Connector of drive]

[ Encoder cable of drive side ]



AMP 172161-1 CAP  
(9 Circuits)

Motor Frame  
Frangie 40, 60, 80

PIN	Term
1	A
2	/A
3	B
4	/B
5	Z
6	/Z
7	VCC
8	GND
9	Shield



MS 3108A/B20-29S  
MS Connector

Motor Frame  
Frangie 130, 180, 220

PIN	Term	PIN	Term
A	A	K	-
B	/A	L	-
C	B	M	-
D	/B	N	FG
E	Z	P	-
F	/Z	R	-
G	GND	S	-
H	VCC	T	-
J	Shield		

[ Encoder cable of motor side ]

◆ The connector for ENC is optional.

- Manufacturer : 3M, CASE product name : 36210-0100FD, Connector (for soldering) : 36310-3200-008
- Manufacturer : Molex, CASE product name : 54593-1019, Connector (for soldering) : 54599-1019
- ♥ Connect the grounding wire of the encoder wiring cable for F.G, do not connect frame of Drive side connector.
- ♥ Applied cable specification: AWG24 x 5Pair TWIST,SHIELD CABLE (Maximum length 20m)

## 2.5 COM wiring and signal explanation

## 2.5.1 COM terminal arrangement

COM is the connector located on the middle right side of the front cover of the servo device. This connector is used for connecting the servo drive and the RS-232C unit.(master, peripherals etc..) The PIN arrangement shown from the connector in the user's point of view is as follows.

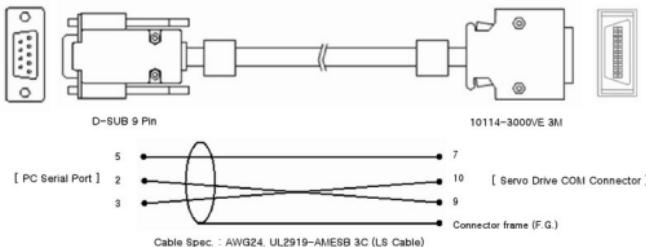
1	
3	
5	+12V
7	DGND
9	TXD-232
11	
13	
2	
4	-12V
6	+5V
8	
10	RXD-232
12	
14	

[Based on soldering side of user connector]

◆ The connector for COM is optional.

- Manufacturer : 3M, CASE product name : 10314-52F0-008, Connector (for soldering) : 10114-3000VE

## 2.5.2 COM wiring



◆ Do not connect Shield of Cable to D-SUB 9Pin Connector frame.

## 2.6 IN, OUT wiring and signal explanation

## 2.6.1 IN, OUT terminal arrangement

IN, OUT are the connectors located on the top right side of the front cover of the servo device. IN connector is used for connecting the servo drive and the center board or other NDA 7000 drives. OUT connector is used for connecting the servo drive and servo drive or termination resistance connector.

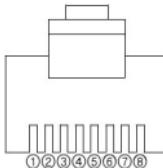
The PIN arrangement shown from the connector in the user's point of view is as follows.

1		2	
3	RS485+	4	
5		6	RS485-
7		8	

[ IN connector of drive side ]

1	TR1	2	
3	RS485+	4	
5		6	RS485-
7		8	TR2

[ OUT connector of drive side ]

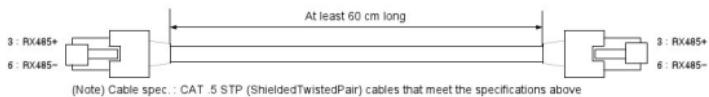


[ Front of the RJ45 connector ]

## ◆ The connector for COM is optional.

- Connector standard spec. : RJ-45 connector above STP spec.
- Cable : Upper CAT .5 STP (The shortest cable must be at least 60 cm long.)
- If you are using shielded cables, do not connect the shield on both ends to the FG terminals. Connecting only one end of the shield on each cable will improve noise immunity.
- 1 pin and 8 pin are used for only connection of terminal resistance. Please do not use for connecting NDA7000 and center board or the other NDA7000.

## 2.6.2 IN, OUT wiring



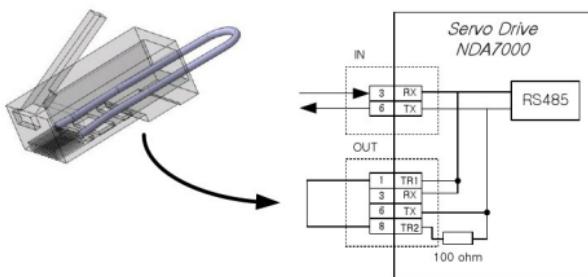
## 2.6.3 Termination resistance connector terminal arrangement

1	<b>TR1</b>	2	
3	RS485+	4	
5		6	RS485-
7		8	<b>TR2</b>

[ OUT connector of drive side ]

- ◆ Termination resistance connector is into NDA7000 product package.
- Connector standard spec. : RJ-45 connector

## 2.6.4 Termination resistance connector wiring



- ◆ Termination resistance connector is linked 1 pin and 8 pin.
- ◆ Please insert the connector into the OUT connector of last NDA7000 drive in MotionNET.

# Chapter 3

## Parameter setting

Chapter 3 explains the individual servo parameter setting according to the usage. The parameter setting can be executed with the internal mount loader and digital loader, and refer to Chapter 5 for details on how to use the internal mount load and digital loader. The parameter NO. with the symbol (\*) marked indicates that the value can only be corrected when the SVONEN input contact point is "OFF".

3.1 Basics of loader.....	3-2
3.2 Operation of internal mount loader .....	3-3
3.3 Operation of Digital loader .....	3-8
3.4 Status display parameter .....	3-11
3.5 Motor and operating device setting.....	3-13
3.6 General control parameter setting .....	3-17
3.7 Speed control parameter setting.....	3-22
3.8 Input contact point Digital speed and Torque setting.....	3-24
3.9 Position control parameter setting .....	3-27
3.10 Torque control parameter setting .....	3-28
3.11 Input contact point function setting.....	3-29
3.12 Output contact point function setting.....	3-29
3.13 Analog monitor function setting.....	3-29

3.14 Jog operation parameter setting .....	3-30
3.15 Alarm display setting .....	3-33

The menu setting can be executed with the digital and internal mount loader. Refer to Chapter 5 for details on how to use the internal mount load and digital loader.

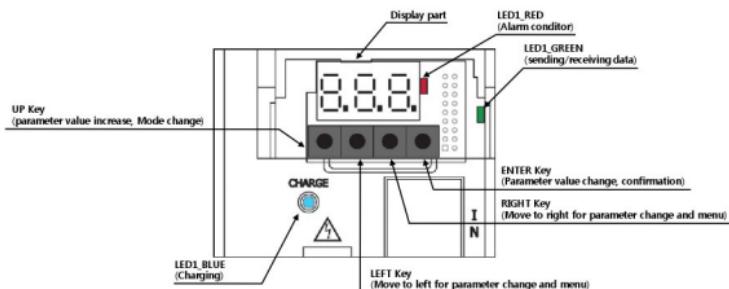
Can not use the parameter shown in diagonal line(☒). It is used only for FDA7000.

The acronym and meaning used in this manual are as follows.

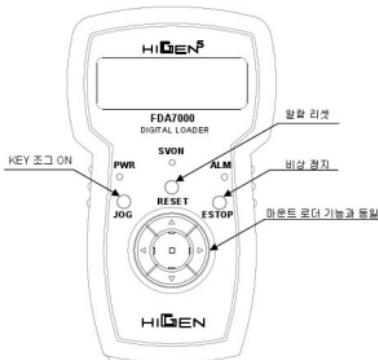
Acronym	Meaning
PC	Position Controller
CC	Current Controller
SC	Speed Controller
LMT	Limit
ENB	Enable
INIT	Initialize
PROG	Program
CMD	Command
ACCEL	Acceleration
DECCEL	Deceleration
SPD	Speed
POS	Position
COMPEN	Compensation
ABS	Absolute
REV	Revolution
ADJ	Adjustment
MAX	Maximum
TRQ	Torque
MULTI	Multiple
NF	Notch Filter
COM	Communication
TC	Time Constant
FF	Feedforward
ERR	Error
ELCTR	Electric
NUM	Numerator
DEN	Denominator
PEL	Plus end limit
MEL	Minus end limit
ELL	End limit logic
NET	Motionnet

### 3.1 Basics of loader

You should install the servo motor and drive according to the installation condition. After connect the power supply circuit and motor wiring. You should check the motor parameter (P01-  
-). Use the loader to check that motor parameter is set to normal running condition. This parameter show to you the basic information for the servo motor which is connected to the drive. Then you must monitor the group indicating the motor status (STE-) to check whether various commands and limits values are properly set. And if this is your first time operating the unit, you must verify the stability through autotuning or test operation of Jog and Auto Jog. Autotuning operation can be done online and you do not need to execute this operation when the gain of stable control system is ensured offline.



[ Overview diagram of internal mounter loader]

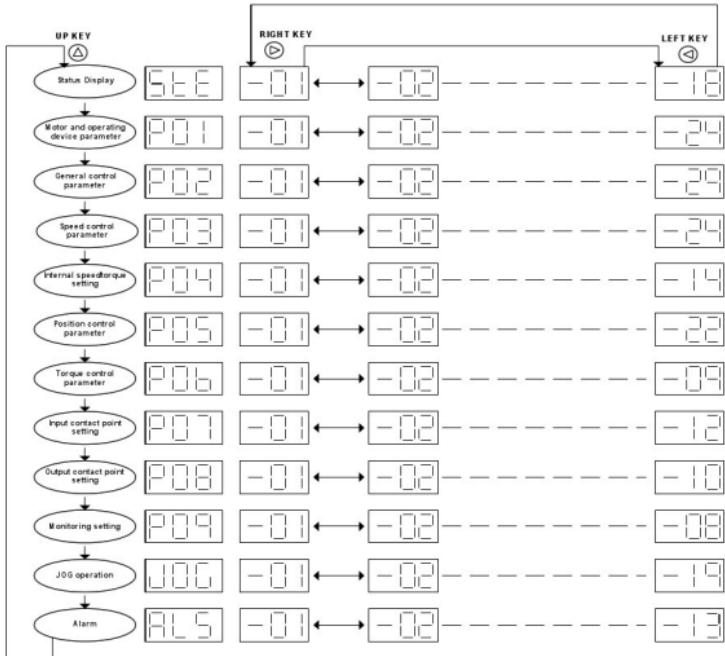


[ Overview diagram of digital loader]

### 3.2 Operation of internal mount loader

#### 3.2.1 Display flow

If the power is correctly supplied, the mount loader display on the front panel of the servo drive a message. The internal mount loader is composed of 7 segment LED and 3 digits. You can set the parameter, display the status, check the sequence and alarm record by the loader. The key function of the loader is composed of X-Y coordination system which have vertical axis (Up button) and horizontal axis (Right and Left button). The following diagram shows an overview aspect for loader menu.



- ♥ When the power is initially connected, the displayed screen differs depending on the coordinate (StE-01) parameter. For example, if StE -01 = 1203, 12 refers to the StE menu and 03 to the StE -03.

[ 1<sup>st</sup> and 2<sup>nd</sup> digit value ]

Name of higher menu	P01 mode	P02 mode	P03 mode	P04 mode	P05 mode	P06 mode	P07 mode	P08 mode	P09 mode	JOG mode	ALS mode	StE mode
1 <sup>st</sup> and 2 <sup>nd</sup> digit value	01	02	03	04	05	06	07	08	09	10	11	12

Refer to each parameter item for the menu number of 3<sup>rd</sup> and 4<sup>th</sup> digit.

### 3.2.2 Parameter change

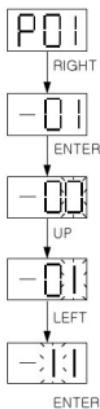
### 1) Parameter change

**UP** : Positive direction mode change, increase in blinking value

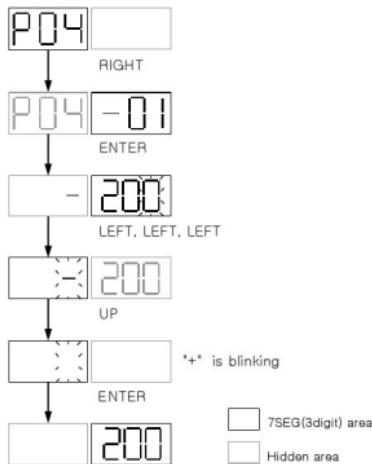
**LEFT : Move blinking value to left**

**ENTER** : Display parameter value, start and end of parameter change

\* Enter motor ID (00 → 11)



\* Enter digital input speed 1 (-200 → +200)

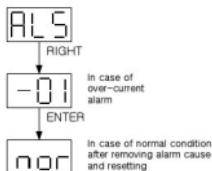


- ◆ When changing the parameter “-“ sign indicates the blinking value but “+” sign does not indicate anything.
  - ◆ When you change the digit of value from the 3<sup>rd</sup> to 4<sup>th</sup> using LEFT key, 7SEG(3 digits) area is shown 4<sup>th</sup> ~ 6<sup>th</sup> digits. On the other hand, if you change from the 4<sup>th</sup> digit to 3<sup>rd</sup> digit using RIGHT key, it is shown 1<sup>st</sup> ~ 3<sup>rd</sup> digits.

### 3.2.3 Alarm related processing part

#### 1) Currently generated alarm display menu

**ENTER** : Indicated generated alarm value



Currently generated alarm display menu shows the currently generated alarms. Even though it is free to move to the next menu, the alarm cannot be reset and the motor cannot be operated.

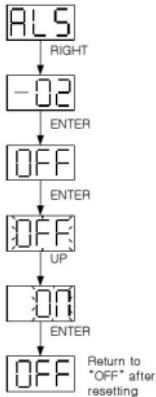
#### 2) Alarm reset menu

**UP** : ON/OFF change

**LEFT** : Move menu

**RIGHT** : Move menu

**ENTER** : Start and end of parameter change (Current alarm cancel function operation)

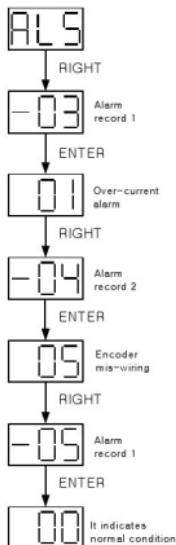


As the function to reset the alarm generated in the current system, the alarm reset menu is the same function as external input reset.

## 3) Alarm record display menu

Alarm record display menu saves the latest 10 alarms in each menu in the sequence of ALS-03 ~ ALS-12. The following diagram is the case assuming that the over-current (01) alarm is generated after the encoder mis-wiring (05) alarm is generated during servo operation.

Emergency stop alarm (emc\_stop) is not saved in the alarm record and each alarm record menu value is "00" for normal operation.



## 3.2.4 Jog operation

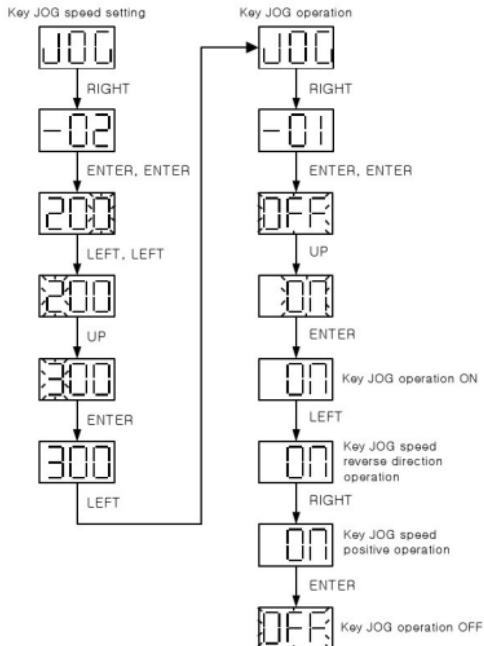
## 1) Key jog mode setting (JOG-01)

**UP** : Positive direction mode change, increase blinking value

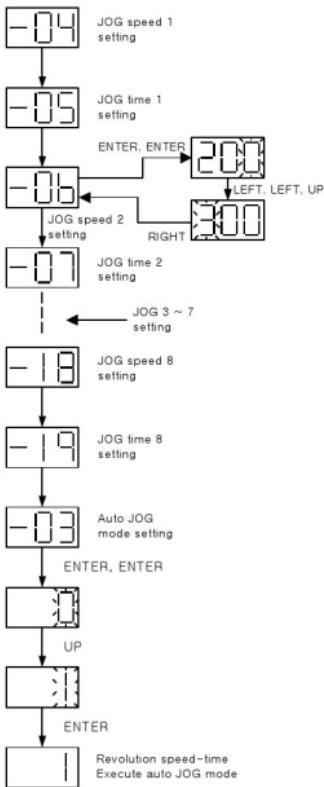
**LEFT** : Command reverse direction revolution, move blink to left when entering key jog speed (JOG-02)

**RIGHT** : Command positive direction revolution, move blink to left when entering key jog speed (JOG-02)

**ENTER** : Indicates parameter value, start and end of parameter change



## 2) Auto jog mode setting



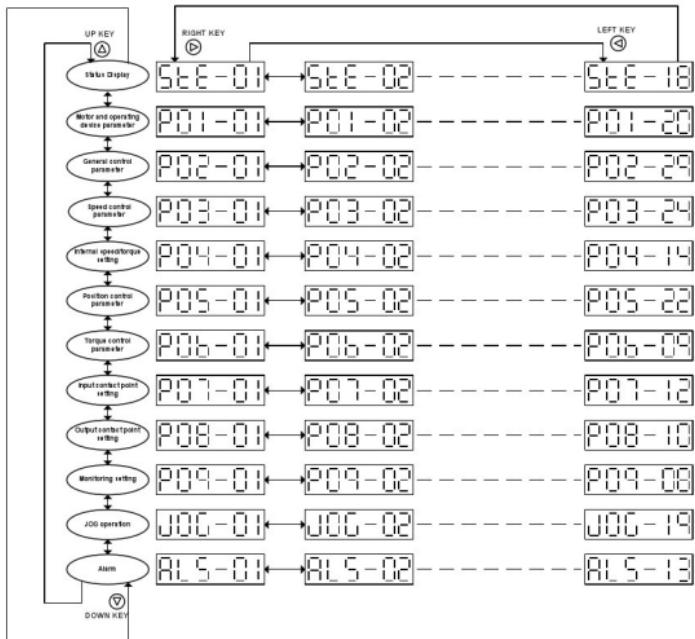
Auto jog mode supports 8-steps repeated pattern operations, and the 1<sup>st</sup> auto jog mode that sets the revolution speed [rpm] and revolution time [sec] and 2<sup>nd</sup> auto jog mode that sets the revolution time [rpm] and revolutions [rev] are supported.

JOG-03 Set value	Operation explanation
0	Do not use auto jog mode
1	<b>Use auto jog mode for revolution speed – revolution time</b>
2	Use auto jog mode for revolution speed – revolutions

### 3.3 Operation of Digital loader

#### 3.3.1 Display flow

If the power is correctly supplied, the mount loader display on the front panel of the servo drive a message. The internal mount loader is composed of 7 segment LED and 6 digits. You can set the parameter, display the status, check the sequence and alarm record by the loader. The key function of the loader is composed of X-Y coordination system which have vertical axis (Up and Down button) and horizontal axis (Right and Left button). The following diagram shows an overview aspect for loader menu.



- ♥ When the power is initially connected, the displayed screen differs depending on the coordinate (StE-01) parameter. For example, if StE -01 = 1203, 12 refers to the StE menu and 03 to the StE -03.

[ 1<sup>st</sup> and 2<sup>nd</sup> digit value ]

Name of higher menu	P01 mode	P02 mode	P03 mode	P04 mode	P05 mode	P06 mode	P07 mode	P08 mode	P09 mode	JOG mode	ALS mode	SIE mode
1 <sup>st</sup> and 2 <sup>nd</sup> digit value	01	02	03	04	05	06	07	08	09	10	11	12

Refer to each parameter item for the menu number of 3<sup>rd</sup> and 4<sup>th</sup> digit.

## 3.3.2 Parameter change

## 1) Parameter change

UP : Positive direction mode change, increase in blinking value

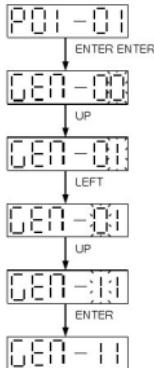
DOWN : Negative direction mode change, decrease in blinking value

LEFT : Move blinking value to left

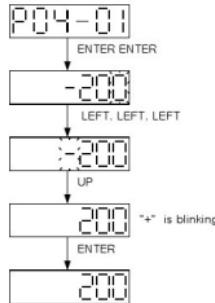
RIGHT : Move blinking value to right

ENTER : Display parameter value, start and end of parameter change

※ Enter motor ID (00 → 11)



※ Enter digital input speed 1 (-200 → +200)



◆ When changing the parameter “-“ sign indicates the blinking value but “+” sign does not indicate anything.

### 3.4 Status display parameter

StE-01	Display Select	Unit -	Display range 100~1230	Manufactured default 1203	Speed/Torque/ Position control
--------	----------------	--------	---------------------------	------------------------------	-----------------------------------

When the power of the servo drive is turned on, this sets the menu to display on the display window. The first and second space indicates the upper menu number of each menu, and third and fourth space indicates the lower menu number. For example, if it is set as StE-01 = 1203, the "12" means the StE menu and "03" refers to the StE-03.

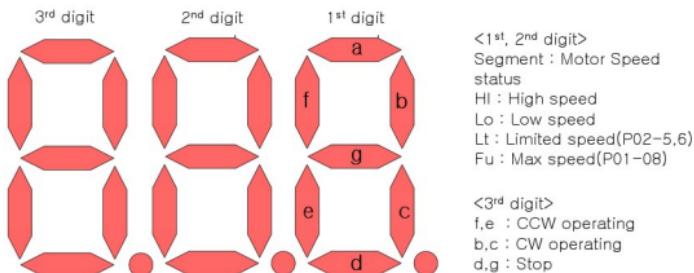
#### [First and second space value]

Upper menu name	P01	P02	P03	P04	P05	P06	P07	P08	P09	JOG	ALS	StE
1 <sup>st</sup> and 2 <sup>nd</sup> value	01	02	03	04	05	06	07	08	09	10	11	12

#### [Mount Loader]

(note) StE parameters are different between mount loader and digital loader.

StE-02	MotionNET Address	Unit -	Display range 0 ~ 63	Manufactured default -	Mount loader
StE-03	Motionnet Speed	Unit Mbps	Display range 0.0 ~ 20.0	Manufactured default -	Mount loader
StE-04	Motionnet Group	Unit -	Display range 0 ~ 7	Manufactured default -	Mount loader
StE-05	Motor Direction & Speed info	Unit -	Display range -	Manufactured default -	Mount loader



<b>StE-06</b>	Servo ON/OFF	Unit -	Display range 0 ~ 1	Manufactured default -	Mount loader
<b>StE-07</b>	Program Version	Unit -	Display range 0.0 ~ 99.99	Manufactured default -	Mount loader

(note) \_- : NDA7001 ~ 7004, = . : NDA7005 ~ 7010, ≡ . : NDA7015 ~ 7045

**[Digital Loader]**

(note) STE parameters are different between mount loader and digital loader.

<b>StE-02</b>	Command Speed	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default -	Digital loader/ P-DORI
<b>StE-03</b>	Motor Speed	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default -	Digital loader/ P-DORI
<b>StE-04</b>	CCW Speed Limit	Unit rpm	Display range 0.0 ~ 9999.9	Manufactured default -	Digital loader/ P-DORI
<b>StE-05</b>	CW Speed Limit	Unit rpm	Display range -9999.9 ~ 0.0	Manufactured default -	Digital loader/ P-DORI
<b>StE-06</b>	Command Pulse	Unit pulse	Display range -99999 ~ 99999	Manufactured default -	Digital loader/ P-DORI
<b>StE-07</b>	Feedback Pulse	Unit pulse	Display range -99999 ~ 99999	Manufactured default -	Digital loader/ P-DORI
<b>StE-08</b>	Error Pulse	Unit pulse	Display range -99999 ~ 99999	Manufactured default -	Digital loader/ P-DORI
<b>StE-09</b>	Command Torque	Unit %	Display range -300.0 ~ 300.0	Manufactured default -	Digital loader/ P-DORI
<b>StE-10</b>	Load Rate	Unit %	Display range -300.0 ~ 300.0	Manufactured default -	Digital loader/ P-DORI
<b>StE-11</b>	Max Load Rate	Unit %	Display range -300.0 ~ 300.0	Manufactured default -	Digital loader/ P-DORI
<b>StE-12</b>	CCW TRQ LMT	Unit %	Display range 0.0 ~ 300.0	Manufactured default -	Digital loader/ P-DORI
<b>StE-13</b>	CW TRQ LMT	Unit %	Display range -300.0 ~ 0.0	Manufactured default -	Digital loader/ P-DORI
<b>StE-14</b>	Inertia Ratio	Unit -	Display range 0.0 ~ 60.0	Manufactured default 2.0	Digital loader/ P-DORI

<b>StE-15</b>	MULTI Turns	Unit rev	Display range 0 ~ 99999	Manufactured default -	Digital loader/ P-DORI
<b>StE-16</b>	Single Turn	Unit -	Display range 0 ~ 999999	Manufactured default -	Digital loader/ P-DORI
<b>StE-17</b>	I/O Status	Unit -	Display range 0 ~ 999999	Manufactured default -	Digital loader/ P-DORI
<b>StE-18</b>	PROG Version	Unit -	Setting range 0.0 ~ 99.99	Manufactured default -	Digital loader/ P-DORI
<b>StE-19</b>	Single Turns DEG	Unit -	Setting range 0.000 ~ 359.999	Manufactured default -	Digital loader/ P-DORI

17bit 시리얼 엔코더 사용 시 모터 측의 원점 위치에서 현재 모터 측 위치까지 위치값을 Degree 단위로 표시 합니다.

## 3.5 Motor and operating device setting

P01-01*	Motor ID	Unit -	Setting range GEN - 00 ~ 99	Manufactured default By capacity	Speed/Torque/ Position control
---------	----------	--------	--------------------------------	--	-----------------------------------

Set the motor ID to use. P01-02 ~ P01-10 (Except P01-07 and P01-08), the motor parameter, masked.

ID	형 명	ID	형 명	ID	형 명	ID	형 명	ID	형 명
00	User	20	TF05	40	LF03	60	KN03	80	LN03
01		21	TF09	41	LF06	61	KN05	81	LN06
02		22	TF13	42	LF09	62	KN06	82	LN09
03		23	TF20	43	LF12	63	KN07	83	LN12
04		24	TF30	44	LF20	64	KN06A	84	LN12A
05	CJZ5	25	TF44	45	LF30	65	KN11	85	LN20
06	CJ01	26		46		66	KN16	86	LN30
07		27		47		67	KN22	87	LN40
08	CJ02	28		48	CN40	68	KN22A	88	
09	CJ04	29		49	CN50	69	KN35	89	
10		30	KF08	50	CN04A	70	TN05	90	
11	CN01	31	KF10	51	CN06	71	TN09	91	
12	CN02	32	KF15	52	CN08	72	TN13	92	LN55
13	CN03	33	KF22	53	CN10	73	TN17	93	
14	CN04	34	KF35	54	CN09	74	TN20	94	
15	CN05	35	KF50	55	CN15	75	TN30	95	
16		36		56	CN22	76	TN44	96	
17		37		57	CN30	77		97	LN10
18		38		58	CN30A	78	TN55	98	
19		39		59	CN50A	79	KN55	99	

P01-02	Inertia	Unit gfcms <sup>2</sup>	Display range 0.01 ~ 999.99	Manufactured default By motor type	Speed/Torque/ Position control
P01-03	TRQ Constant	Unit kgfcm/A	Display range 0.1 ~ 999.99	Manufactured default By motor type	Speed/Torque/ Position control
P01-04	Phase Inductance	Unit mH	Display range 0.001 ~ 99.999	Manufactured default By motor type	Speed/Torque/ Position control
P01-05	Phase Resistance	Unit $\Omega$	Display range 0.01 ~ 99.999	Manufactured default By motor type	Speed/Torque/ Position control
P01-06	Rated Current	Unit A(rms)	Display range 0.01 ~ 999.99	Manufactured default By motor type	Speed/Torque/ Position control
P01-07	Rated Speed	Unit rpm	Display range 0.0 ~ 9999.0	Manufactured default By motor type	Speed/Torque/ Position control

<b>P01-08</b>	MAX Speed	Unit rpm	Display range 0.0 ~ 9999.0	Manufactured default By motor type	Speed/Torque/ Position control
<b>P01-09</b>	Rated TRQ	Unit kgfcm	Display range 0.0 ~ 9999.0	Manufactured default By motor type	Speed/Torque/ Position control
<b>P01-10</b>	Pole Number	Unit Pole	Display range 2 ~ 98	Manufactured default By motor type	Speed/Torque/ Position control
<b>P01-11*</b>	Drive ID	Unit -	Display range 0 ~ 45	Manufactured default By drive type	Speed/Torque/ Position control

Enter the setting value in the following table depending on the servo drive capacity.

Drive capacity [ NDA70- ]	01	02	04	05	08	10	15	20	30	45
P01-11 [ Drive ID ]	1	2	4	5	8	10	15	20	30	45

<b>P01-12*</b>	Encoder ID	Unit -	Display range Enc – P~H	Manufactured default Enc - P	Speed/Torque/ Position control
<b>P01-13*</b>	Encoder Pulse	Unit ppr	Display range 1 ~ 32768	Manufactured default 8192	Speed/Torque/ Position control
<b>P01-14</b>	Pulse Out Rate	Unit pulse	Display range 1 ~ 131072	Manufactured default By model	Speed/Torque/ Position control

Divide the encoder pulse on A and B feed back from the motor, and set the encoder pulse out rate in line driver method.

Encoder type	Encoder ID (P01-12)	Encoder Pulse (P01-13)	Pulse Out Rate (P01-14)
Incremental 17bit	Enc-P	32768[ppr]	32768[ppr]
Incremental 8192	Enc-H	8192[ppr]	8192[ppr]

<b>P01-15*</b>	COM Baud Rate	Unit -	Display range 0 ~ 15	Manufactured default 0	Speed/Torque/ Position control
----------------	---------------	--------	-------------------------	---------------------------	-----------------------------------

Select the communication speed. Set the communication speed of the transmitting side

P01-15	RS232	RS485	P01-15	RS232	RS485
00	9600	9600	08	38400	9600
01	9600	19200	09	38400	19200
02	9600	38400	10	38400	38400
03	9600	57600	11	38400	57600
04	19200	9600	12	57600	9600
05	19200	19200	13	57600	19200
06	19200	38400	14	57600	38400
07	19200	57600	15	57600	57600

<b>P01-16*</b>	Serial Select	Unit -	Display range 0 ~ Z	Manufactured default 0	Speed/Torque/Position control
<b>P01-17*</b>	Serial I/O	Unit -	Display range 0 ~ Z	Manufactured default 0	Speed/Torque/Position control
<b>P01-18*</b>	Serial ID	Unit -	Display range 1 ~ 31	Manufactured default 1	Speed/Torque/Position control
<b>P01-19</b>	Parameter Lock	Unit -	Display range ON/OFF	Manufactured default OFF	Speed/Torque/Position control
<b>P01-20*</b>	Absolute Origin	Unit -	Display range ON/OFF	Manufactured default OFF	Speed/Torque/Position control
<b>P01-21</b>	ABS Protocol	Unit -	Display range 1~3	Manufactured default 2	Speed/Torque/Position control
<b>P01-22 *</b>	Modbus Protocol	Unit -	Display range 0~1	Manufactured default 0	Speed/Torque/Position control

(note) Set protocol for serial communication.

Set value	Content
0	Extension modbus(HIGEN) : Data Field 4bytes
1	Standard modbus : Data Field 2bytes

(Note) You can download modbus manual in web. (<http://www.higenmotor.co.kr>)

<b>P01-23</b>	Motionnet Address	Unit -	Display range 0~64	Manufactured default 0	Position control
<b>P01-24</b>	END LIMIT LOGIC	Unit -	Display range ON/OFF	Manufactured default OFF	Position control

(Note) This parameter is used to set the input logic of the +EL and -EL signals. When this parameter is OFF, the respective signal is set for positive logic.

<b>P01-25</b>	Motionnet Speed	Unit -	Display range 0~3	Manufactured default 2	Position control
---------------	-----------------	--------	-------------------	------------------------	------------------

(Note) Set the communication speed All of the devices on the same communication line must be set to be same speed.

Set value	MotionNET communication speed
0	2.5Mbps
1	5Mbps
2	10Mbps
3	20Mbps

<b>P01-26</b>	Motionnet Group	Unit -	Display range 0~7	Manufactured default 0	Position control
---------------	-----------------	--------	-------------------	------------------------	------------------

## 3.6 General control parameter setting

P02-01	Central Mode	Unit %	Display range 0 ~ 5	Manufactured default 2	Speed/Torque/Position control
P02-02	Mode Change Time	Unit ms	Display range 100.0 ~ 10000.0	Manufactured default 500.0	Speed/Torque/Position control
P02-03	CCW TRQ LMT	Unit %	Display range 0.0 ~ 300.0	Manufactured default 300.0	Speed/Torque/Position control
P02-04	CW TRQ LMT	Unit %	Display range -300.0 ~ 0.0	Manufactured default -300.0	Speed/Torque/Position control
P02-05	CCW Speed Limit	Unit rpm	Display range 0.0 ~ 6000.0	Manufactured default Maximum value of applied motor	Speed/Torque/Position control
P02-06	CW Speed Limit	Unit rpm	Display range -6000.0 ~ 0.0	Manufactured default -Maximum value of applied motor	Speed/Torque/Position control
P02-07	Brake Speed	Unit rpm	Display range 0.0 ~ 9999.9	Manufactured default 50.0	Speed/Torque/Position control
P02-08	Brake Time	Unit ms	Display range 0.0 ~ 10000.0	Manufactured default 50.0	Speed/Torque/Position control

## ◆ Operating conditions brake (P02-07, P02-08)

- 1) In case of SERVO OFF by ALARM occurrence.
- 2) In case that SERVO OFF that do not use STOP contact point of CN1 connector.

Which of the operating speed (P02-07) and operating time (P02-08) of the user menu is satisfied, the brake will operate.

(NOTE) Brake action that use STOP in SERVO ON state refers P02-30 of user menu.

P02-09	DB Mode	Unit -	Display range 0 ~ 3	Manufactured default 2	Speed/Torque/Position control
--------	---------	--------	---------------------	------------------------	-------------------------------

DB mode control is to stop the servo motor abruptly during an emergency stop. The user menu P02-09 sets the stop operation of the servo motor when the servo is turned off or during an emergency stop. (Caution !) However, this function is not available in Large type drive.

Set value	Operation explanation
0	Maintain by decelerating the dynamic brake when the servo is off.
1	Free-run operation at set zero speed (P03-14) decelerating the dynamic brake when the servo is off.
2	Maintain free-run operation by decelerating in free-run condition when the servo is off
3	Maintain dynamic brake at set zero speed (P03-14) decelerating in free-run condition when the servo is off

<b>P02-10</b>	Notch Filter 1	Unit -	Display range 0 ~ 2	Manufactured default 0	Speed/Torque/ Position control
---------------	----------------	--------	------------------------	---------------------------	-----------------------------------

The operation of the notch filter is set to operate the notch filter to reduce the resonance of the machinery.

Set value	Operation explanation
0	Do not use the notch filter 1.
1	Operate the notch filter 1 in the set resonance frequency and resonance bandwidth.
2	This is the method of reducing the resonance after automatically detecting the resonance frequency, it automatically detects the frequency of which the vibration is generated and reduces the resonance (Automatically switches from mode 2 → 1).

<b>P02-11</b>	NF Frequency 1	Unit Hz	Display range 50.0 ~ 2000.0	Manufactured default 300.0	Speed/Torque/ Position control
---------------	----------------	---------	--------------------------------	-------------------------------	-----------------------------------

This sets the notch filter frequency 1 to reduce the resonance of the machinery.

<b>P02-12</b>	NF Bandwidth 1	Unit %	Display range 10.0 ~ 99.9	Manufactured default 95.0	Speed/Torque/ Position control
---------------	----------------	--------	------------------------------	------------------------------	-----------------------------------

It shows the certain gain bandwidth where the notch filter 1 operate to reduce the resonance of machinery.

<b>P02-13</b>	Notch Filter2	Unit -	Display range 0 ~ 1	Manufactured default 0	Speed/Torque/ Position control
---------------	---------------	--------	------------------------	---------------------------	-----------------------------------

Set the notch filter 2 to reduce the resonance of the machinery.

Set value	Operation explanation
0	Do not use the notch filter 2.
1	Operate the notch filter 2 in the set resonance frequency and resonance bandwidth.

<b>P02-14</b>	NF Frequency 2	Unit Hz	Display range 50.0 ~ 2000.0	Manufactured default 500.0	Speed/Torque/ Position control
---------------	----------------	---------	--------------------------------	-------------------------------	-----------------------------------

This sets the notch filter frequency 2 to reduce the resonance of the machinery.

<b>P02-15</b>	NF Bandwidth 2	Unit %	Display range 10.0 ~ 99.9	Manufactured default 95.0	Speed/Torque/ Position control
---------------	----------------	--------	------------------------------	------------------------------	-----------------------------------

### 3. Parameter setting

HIDEN®

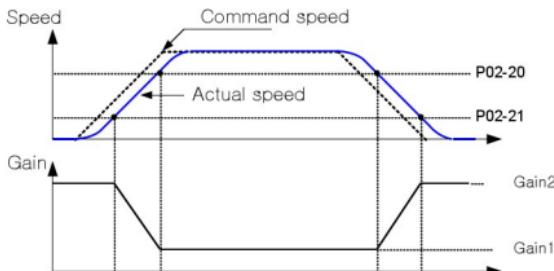
<b>P02-16</b>	TRQ Filter TC	Unit ms	Display range 0.0 ~ 1000.0	Manufactured default By capacity	Speed/Torque/ Position control
<b>P02-17</b>	Auto Tuning	Unit -	Display range 0 ~ 1	Manufactured default 0	Speed/Torque/ Position control
<b>P02-18</b>	System Response	Unit -	Display range 1 ~ 19	Manufactured default By capacity	Speed/Torque/ Position control

The system response setting is to set the response to the target of the machine system.

P02-18 (System response setting)	P05-05 (Position loop gain 1)	P05-06 (Position loop gain 2)	P03-05 (Speed control loop gain 1)	P03-06 (SC TC1)	P03-07 (Speed control loop gain 2)	P03-08 (SC TC2)	P02-16 (Command torque filter TC)
1	2.0	5.0	2.0	200.0	5.0	120.0	4.5
2	5.0	10.0	5.0	120.0	10.0	80.0	3.5
3	10.0	15.0	10.0	80.0	15.0	60.0	3.0
4	15.0	20.0	15.0	60.0	20.0	45.0	2.5
5	20.0	25.0	20.0	45.0	25.0	40.0	2.0
6	25.0	30.0	25.0	40.0	30.0	30.0	1.5
7	30.0	35.0	30.0	30.0	35.0	25.0	1.3
8	35.0	45.0	35.0	25.0	45.0	18.0	1.2
9	45.0	55.0	45.0	18.0	55.0	17.0	0.9
10	55.0	70.0	55.0	17.0	70.0	13.0	0.8
11	70.0	85.0	70.0	13.0	85.0	11.0	0.6
12	85.0	105.0	85.0	11.0	105.0	10.0	0.5
13	105.0	130.0	105.0	10.0	130.0	8.0	0.4
14	130.0	160.0	130.0	8.0	160.0	6.0	0.25
15	160.0	200.0	160.0	6.0	200.0	5.4	0.2
16	200.0	240.0	200.0	5.4	240.0	5.0	0.15
17	240.0	300.0	240.0	5.0	300.0	3.5	0.1
18	300.0	350.0	300.0	3.5	350.0	3.2	0.0
19	350.0	360.0	350.0	3.2	360.0	3.1	0.0

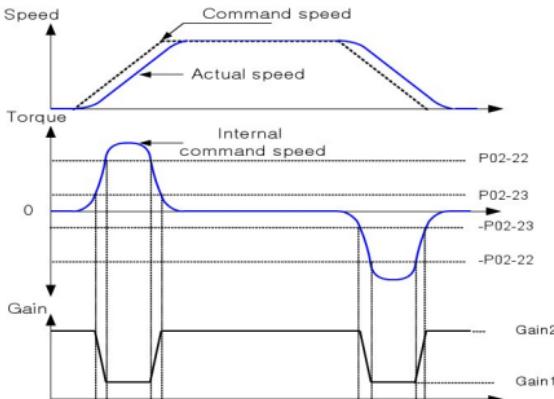
<b>P02-19</b>	Inertia Ratio	Unit -	Display range 1.0 ~ 50.0	Manufactured default 2.0	Speed/Torque/ Position control
<b>P02-20</b>	Gain ADJ Speed 1	Unit rpm	Display range 100.0 ~ 5000.0	Manufactured default 800.0	Speed/Torque/ Position control
<b>P02-21</b>	Gain ADJ Speed 2	Unit rpm	Display range 10.0 ~ 500.0	Manufactured default 100.0	Speed/Torque/ Position control

When executing the control gain conversion by operation speed of the servo motor, it decides the speed converted by the control gain.



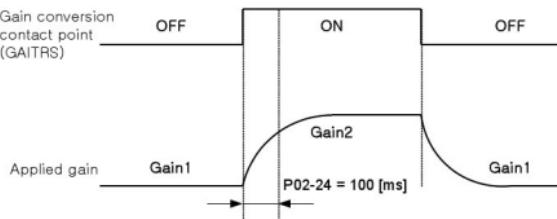
<b>P02-22</b>	Gain ADJ TRQ 1	Unit %	Display range 50.0 ~ 300.0	Manufactured default 150.0	Speed/Torque/Position control
<b>P02-23</b>	Gain ADJ TRQ 2	Unit %	Display range 0.0 ~ 300.0	Manufactured default 50.0	Speed/Torque/Position control

When executing the control gain conversion by operating torque of the servo motor, it decides the torque converted by the control gain.



<b>P02-24</b>	Contact Gain TC	Unit ms	Display range 0.0 ~ 10000.0	Manufactured default 100.0	Speed/Torque/Position control
---------------	-----------------	---------	-----------------------------	----------------------------	-------------------------------

When executing the control gain conversion by the external input contact point, it decides the control gain conversion time.



<b>P02-25</b>	Temporary Stop	Unit -	Display range ON / OFF	Manufactured default OFF	Speed/Torque/Position control
---------------	----------------	--------	------------------------	--------------------------	-------------------------------

As the stop function, it sets the operation type of the set input contact point. Depending on the menu value, the stop operation is converted.

<b>P02-26</b>	Emergency Stop	Unit -	Display range ON / OFF	Manufactured default ON	Speed/Torque/Position control
---------------	----------------	--------	------------------------	-------------------------	-------------------------------

<b>P02-27</b>	Direction Select	Unit -	Display range ON / OFF	Manufactured default OFF	Speed/Torque/Position control
---------------	------------------	--------	------------------------	--------------------------	-------------------------------

As the direction function, it sets the operation of the set input contact point. Depending on the menu value, the direction select is converted.

<b>P02-28</b>	Ripple COMPEN	Unit -	Display range ON / OFF	Manufactured default OFF	Speed/Torque/Position control
---------------	---------------	--------	------------------------	--------------------------	-------------------------------

In case of speed ripple during operation, this function can reduce the speed ripple. You can select from the following set values.

ON	Use speed ripple compensation function
OFF	Do not use speed ripple compensation function

<b>P02-29*</b>	Parameter INIT	Unit -	Display range ON/OFF	Manufactured default OFF	Speed/Torque/ Position control
<b>P02-30</b>	Servo OFF Delay time	Unit ms	Display range 0.0 ~ 1000.0	Manufactured default 10.0	Speed/Torque/ Position control

When using the servo motor to control a vertical movement machine, the structure movable part may be moved toward the downward depending on brake timing due to the gravity or external force. By using this parameter to delay turning the servo off that movement can be protect.

<b>P02-31</b>	CW Limit	Unit -	Display range ON / OFF	Manufactured default ON	Speed/Torque/ Position control
<b>P02-32</b>	CCW Limit	Unit -	Display range ON / OFF	Manufactured default ON	Speed/Torque/ Position control
<b>P02-33</b>	Servo ON/OFF	Unit -	Display range ON / OFF	Manufactured default OFF	Speed/Torque/ Position control

As the Servo ON/OFF function, it sets the operation type of the set input contact point. Depending on the menu value, the Servo ON/OFF operation is converted.

(note) After this parameter alteration selects motor ID (P01-01), drive ID (P01-11), Encoder ID (P01-12), use. If execute SERVO ON when parameter does not conform, there is damage danger servo motor and drive.

### 3.7 Speed control parameter setting

<b>P03-01</b>	Speed Gain Mode	Unit -	Display range 1 ~ 4	Manufactured default	Speed control
<b>P03-02</b>	PI-IP Control %	Unit %	Display range 0.0 ~ 100.0	Manufactured default 100.0	Speed/position control
<b>P03-03</b>	Friction COMPEN	Unit %	Display range 0.0 ~ 100.0	Manufactured default 0.0	Speed/position control

When the servo motor is attached on the machinery with severe friction with ball screw etc., this sets the friction compensation coefficient to reduce the dead zone that occurs during conversion of turning direction.

<b>P03-04</b>	Load COMPEN	Unit %	Display range 0.0 ~ 100.0	Manufactured default 0.0	Speed/position control
---------------	-------------	--------	------------------------------	-----------------------------	------------------------

This sets the external load compensation coefficient to improve the response of the servo motor for the sudden load change.

<b>P03-05</b>	SC Loop Gain 1	Unit Hz	Display range 0.0 ~ 1000.0	Manufactured default By capacity	Speed/position control
<b>P03-06</b>	SC TC 1	Unit ms	Display range 0.0 ~ 10000.0	Manufactured default By capacity	Speed/position control
<b>P03-07</b>	SC Loop Gain 2	Unit Hz	Display range 0.0 ~ 1000.0	Manufactured default By capacity	Speed/position control
<b>P03-08</b>	SC TC 2	Unit ms	Display range 0.0 ~ 10000.0	Manufactured default By capacity	Speed/position control
<b>P03-09</b>	Analog CMD TC	Unit ms	Display range 0.0 ~ 2000.0	Manufactured default 0.0	Speed control
<b>P03-10</b>	ACCEL Time	Unit ms	Display range 0.1 ~ 99999.0	Manufactured default 0.0	Speed control
<b>P03-11</b>	DECEL Time	Unit ms	Display range 0.0 ~ 99999.0	Manufactured default 0.0	Speed control
<b>P03-12</b>	G-Mode TC	Unit ms	Display range 0.0 ~ 99999.0	Manufactured default 0.0	Speed control
<b>P03-13</b>	In Speed Range	Unit rpm	Display range 0.0 ~ 9999.9	Manufactured default 10.0	Speed control
<b>P03-14</b>	Zero Speed Range	Unit rpm	Display range 0.0 ~ 9999.9	Manufactured default 10.0	Speed control
<b>P03-15</b> *	>10PV RPM	Unit rpm	Display range 0.0 ~ 9999.9	Manufactured default ( <small>즉시 모터 회전수</small> )	Speed/Torque control
<b>P03-16</b> *	>1DVI RPM	Unit rpm	Display range -9999.9 ~ 0.0	Manufactured default ( <small>즉시 모터 회전수</small> )	Speed/Torque control
<b>P03-17</b>	Auto Offset	Unit	Display range ON / OFF	Manufactured default OFF	Speed/Torque control
<b>P03-18</b>	Manual Offset	Unit mV	Display range -1000.0 ~ 1000.0	Manufactured default 0.0	Speed/Torque control
<b>P03-19</b> *	Override ENB	Unit	Display range ON / OFF	Manufactured default OFF	Speed control

P03-20	Clamp Mode	Unit -	Display range 0 ~ 2	Manufactured default 0	Speed control
P03-21	Clamp Voltage	Unit mV	Display range 1000.0 ~ 1000.0	Manufactured default 0.0	Speed control
P03-22*	F/Back TC	Unit ms	Display range 0.0 ~ 2000.0	Manufactured default 0.0	Speed control
P03-23	Zero SPD VIB REJ	Unit rpm	Display range 0.0 ~ 1000.0	Manufactured default 0.1	Speed/position control
P03-24*	Feedforward TRQ	Unit -	Display range 0 ~ 2	Manufactured default 0	Speed/position control

When torque command operation mode is set to “2”, the feedforward TRQ can be used. The feedforward TRQ input enables fast decision making during speed control. But if the feed forward input is too high, it can cause an overshoot or undershoot. Apply appropriately.

Set value	Operation explanation
0	The function by analog torque command is operated by input contact point (SPDLIM/TLIM).
1	<b>The analog torque command continually operates in torque limit value irrelevant from the contact point input.</b>
2	The analog torque command operates as feedforward torque item. (Precision control)

### 3.8 Input contact point Digital speed and Torque setting

P04-01*	Speed1	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default 10.0	Speed/Torque control
P04-02*	Speed2	Unit rpm	Display range 9999.9 ~ -9999.9	Manufactured default 100.0	Speed/Torque control
P04-03*	Speed3	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default 500.0	Speed/Torque control
P04-04*	Speed4	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default 500.0	Speed/Torque control

P04-05 +	Speed5	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default 1000.0	Speed/Torque control
P04-06 +	Speed6	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default 2000.0	Speed/Torque control
P04-07 +	Speed7	Unit rpm	Display range 9999.9 ~ -9999.9	Manufactured default 3000.0	Speed/Torque control
P04-08 +	Torque1	Unit %	Display range -300.0 ~ 300.0	Manufactured default 0.0	Torque control
P04-09 +	Torque2	Unit %	Display range -300.0 ~ 300.0	Manufactured default 2.0	Torque control
P04-10 +	Torque3	Unit %	Display range -300.0 ~ 300.0	Manufactured default 20.0	Torque control
P04-11 +	Torque4	Unit %	Display range -300.0 ~ 300.0	Manufactured default 50.0	Torque control
P04-12 +	Torque5	Unit %	Display range -300.0 ~ 300.0	Manufactured default 75.0	Torque control
P04-13 +	Torque6	Unit %	Display range -300.0 ~ 300.0	Manufactured default 100.0	Torque control
P04-14 +	Torque7	Unit %	Display range -300.0 ~ 300.0	Manufactured default 125.0	Torque control

## 3.9 Position control parameter setting

P05-01*	POS Gain Mode	Unit -	Display range 1 ~ 5	Manufactured default 1	Position control
---------	---------------	-----------	------------------------	------------------------------	------------------

When the servo drive is set to position control mode, this parameter sets the position control gain type.

Set value	Operation explanation
1	Use the position loop gain 1. (P05-05).
2	Use the position loop gain 2. (P05-06).
3	Apply variable gain using gain 1 (P05-05) and gain 2 (P05-06) according to set speed (P02-20, P02-21) for the position controller gain.
4	Apply variable gain using gain 1 (P05-05) and gain 2 (P05-06) according to set speed (P02-22, P02-23) for the position controller gain.
5	Select gain 1 (P05-05) or gain 2 (P05-06) according to external contact point signal of the position controller gain.

P05-02*	POS Pulse Type	Unit -	Display range 0 ~ 5	Manufactured default 1	Position control
---------	----------------	-----------	------------------------	------------------------------	------------------

Set the position command pulse mode.

[Pulse Logic]	Command pulse row mode		Remark
	In CCW direction	In CW direction	
Negative logic	PF		A phase + B phase
	PR		
	PF		CCW pulse CW pulse
	PR		
	PF		Direction + Pulse
	PR	L H	
Positive logic	PF		A phase + B phase
	PR		
	PF		CCW pulse CW pulse
	PR		
	PF		Direction + Pulse
	PR	H L	

P05-03	Position control Speed Mode	Unit	Display range OK / OFF	Manufactured default OFF	position/speed control
P05-04	Feedforward	Unit %	Display range 0.0 ~ 100.0	Manufactured default 0.0	Position control
P05-05	PC P Gain 1	Unit Hz	Display range 0.0 ~ 500.0	Manufactured default By capacity	Position control
P05-06	PC P Gain 2	Unit Hz	Display range 0.0 ~ 500.0	Manufactured default By capacity	Position control
P05-07	PI-P Pulse ERR	Unit pulse	Display range 0 ~ 99999	Manufactured default 0	Position control

In position control mode, when the error between command pulse and actual movement pulse exceeds the set value of P05-07, it converts to P control mode to reduce the overshoot.

P05-08	In Position	Unit pulse	Display range 0 ~ 99999	Manufactured default 100	Position control
P05-09	Follow ERR	Unit pulse	Display range 0 ~ 99999	Manufactured default 30000	Position control
P05-10	POS CMD TC	Unit ms	Display range 0.0 ~ 2000.0	Manufactured default 0.0	Position control
P05-11	FF TC	Unit ms	Display range 0.0 ~ 2000.0	Manufactured default 0.0	Position control
P05-12*	ELCTR Gear NUM 1	Unit -	Display range 1 ~ 99999	Manufactured default 1	Position control
P05-13*	ELCTR Gear DEN 1	Unit -	Display range 1 ~ 99999	Manufactured default 1	Position control
P05-14*	ELCTR Gear NUM 2	Unit -	Display range 1 ~ 99999	Manufactured default 1	Position control
P05-15*	ELCTR Gear DEN 2	Unit -	Display range 1 ~ 99999	Manufactured default 2	Position control
P05-16*	ELCTR Gear NUM 3	Unit -	Display range 1 ~ 99999	Manufactured default 1	Position control
P05-17*	ELCTR Gear DEN 3	Unit -	Display range 1 ~ 99999	Manufactured default 4	Position control
P05-18*	ELCTR Gear NUM 4	Unit -	Display range 1 ~ 99999	Manufactured default 1	Position control

<b>P05-19*</b>	ELCTR Gear DEN 4	Unit -	Display range 1 ~ 99999	Manufactured default 8	Position control
<b>P05-20</b>	Bias SPD COMPEN	Unit rpm	Display range -1000.0 ~ 1000.0	Manufactured default 0.0	Position control

To reduce the position decision time in position control mode, it adds the internal compensated speed of the servo drive.

<b>P05-21</b>	Bias Pulse Band	Unit pulse	Display range 0 ~ 500	Manufactured default 10	Position control
---------------	-----------------	------------	--------------------------	----------------------------	------------------

The bias pulse band is the value of bias compensation speed (P05-20), when the error pulse exceeds the set value of P05-21. It adds the internal compensated speed (P05-20).

<b>P05-22</b>	Backlash Pulse	Unit pulse	Display range 0 ~ 99999	Manufactured default 0	Position control
---------------	----------------	------------	----------------------------	---------------------------	------------------

### 3.10 Torque control parameter setting

<b>P06-01*</b>	Analog TRQ Tc	Unit ms	Display range 0.0 ~ 2000.0	Manufactured default 0.0	Torque control
<b>P06-02</b>	TRQ ACCEL Time	Unit ms	Display range 0.0 ~ 9000.0	Manufactured default 0.0	Torque control
<b>P06-03</b>	TRQ DECEL Time	Unit ms	Display range 0.0 ~ 8000.0	Manufactured default 0.0	Torque control
<b>P06-04*</b>	TRQ S-Mode	Unit ms	Display range 0.0 ~ 2000.0	Manufactured default 0.0	Torque control
<b>P06-05</b>	In TRQ Range	Unit %	Display range 0.0 ~ 100.0	Manufactured default 10.0	Torque control
<b>P06-06</b>	Stop TRQ Range	Unit %	Display range 0.0 ~ 100.0	Manufactured default 10.0	Torque control
<b>P06-07</b>	10% TRQ	Unit %	Display range 0.0 ~ 500.0	Manufactured default 100.0	Speed/Torque control
<b>P06-08</b>	Auto Offset	Unit -	Display range ON / OFF	Manufactured default OFF	Speed/Torque control
<b>P06-09</b>	Manual Offset	Unit mV	Display range -1000.0 ~ 1000.0	Manufactured default 0.0	Speed/Torque control

### 3.11 Input contact point function setting

**Do not use “Input contact point function setting”, it is only used for FDA7000**

### 3.12 Output contact point function setting

**Do not use “Output contact point function setting”, it is only used for FDA7000**

### 3.13 Analog monitor function setting

The internal speed, command speed, torque, command torque, feedback pulse and command pulse of the servo can be monitored externally through analog monitor 1 and monitor 2. The output voltage range is -5 ~ +5[V]. The following are the parameters related to the monitor use.

P09-01	Monitor 1	Unit -	Display range 0 ~ 5	Manufactured default 0	Speed/Torque/Position control
P09-05	Monitor 2	Unit -	Display range 0 ~ 5	Manufactured default 1	Speed/Torque/Position control

This sets the parameter to monitor the internal variable of the servo drive in analog output.

Set value	0	1	2	3	4	5
Monitoring variable	Actual speed [ rpm ]	Command speed [ rpm ]	Actual torque [ % ]	Command torque [ % ]	Feedback pulse [ pulse ]	Command pulse [ pulse ]

When the monitoring scale value is 1, the maximum speed output is +5[V] and maximum torque (3\*Rated torque) is +5[V].

P09-02	Monitor ABS 1	Unit -	Display range ON / OFF	Manufactured default OFF	Speed/Torque/Position control
P09-06	Monitor ABS 2	Unit -	Display range ON / OFF	Manufactured default OFF	Speed/Torque/Position control

OFF : Output by distinguishing the sign

ON : Output in absolute value without distinguishing the sign

P09-03	Monitor Scale 1	Unit -	Display range 0.1 ~ 2000.0	Manufactured default 1.0	Speed/Torque/Position control
--------	-----------------	--------	----------------------------	--------------------------	-------------------------------

P09-07	Monitor Scale 2	Unit -	Display range 0.1 ~ 2000.0	Manufactured default 1.0	Speed/Torque/ Position control
--------	-----------------	--------	-------------------------------	-----------------------------	-----------------------------------

[ Basic ratio ]

**Actual speed, command speed : Maximum speed / 5[V]**

**Actual torque, command torque : 3\*Rated torque / 5[V]**

**Feedback pulse, command pulse : 20000[pulse] / 5[V]**

P09-04	Monitor Offset 1	Unit mV	Display range -1000.0 ~ 1000.0	Manufactured default 0.0	Speed/Torque/ Position control
P09-08	Monitor Offset 2	Unit mV	Display range -1000.0 ~ 1000.0	Manufactured default 0.0	Speed/Torque/ Position control

### 3.14 Jog operation parameter setting

JOG-01	Key Jog Mode	Unit -	Display range ON / OFF	Manufactured default OFF	Speed/Torque/ Position control
--------	--------------	--------	---------------------------	-----------------------------	-----------------------------------

This sets the key jog operation mode by left and right key. If you set JOG-01 to ON, it switches to the jog mode without external command to turn on the servo. At this time, press the left or right button to turn in the CCW direction or CW direction at the speed set in JOG-02.

JOG-02	Key Jog Speed	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default 100.0	Speed/Torque/ Position control
--------	---------------	----------	-----------------------------------	-------------------------------	-----------------------------------

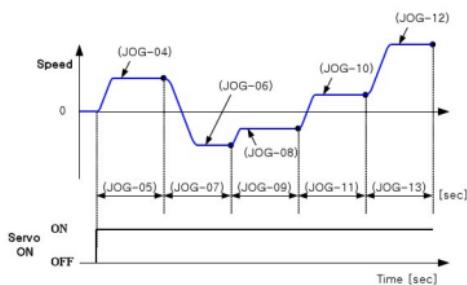
This sets the operation speed of the key jog mode.

JOG-03	Auto Jog Mode	Unit -	Display range 0 ~ 2	Manufactured default 0	Speed/Torque/ Position control
--------	---------------	--------	------------------------	---------------------------	-----------------------------------

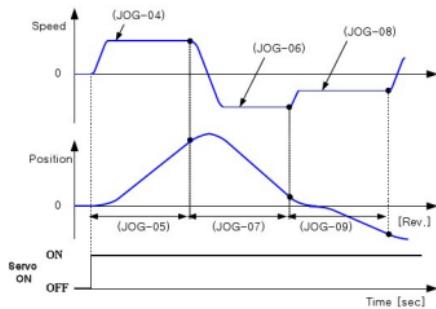
This sets auto jog mode operation. Auto jog mode supports 8-step repeated pattern operation and the patterns support the No. 1 Auto jog mode that sets the revolution speed [rpm] and revolution time [sec] and No. 2 Auto jog mode that supports the revolution speed [rpm] and revolution [rev].

Set value	Operation explanation
0	Do not use auto jog mode
1	<b>Revolution speed-Use revolution time auto jog mode</b>
2	Revolution speed –Use revolution auto jog mode

JOG-04	Jog Speed 1	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default 100.0	Speed/Torque/Position control
JOG-05	Jog Time1/REV1	Unit [sec]/[rev]	Display range 0.00 ~ 5000.00	Manufactured default 1.00	Speed/Torque/Position control
JOG-06	Jog Speed 2	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default -100.0	Speed/Torque/Position control
JOG-07	Jog Time2/REV2	Unit [sec]/[rev]	Display range e 0.00 ~ 5000.00	Manufactured default 1.00	Speed/Torque/Position control
JOG-08	Jog Speed 3	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default 200.0	Speed/Torque/Position control
JOG-09	Jog Time3/REV3	Unit [sec]/[rev]	Display range 0.00 ~ 5000.00	Manufactured default 1.00	Speed/Torque/Position control
JOG-10	Jog Speed 4	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default -200.0	Speed/Torque/Position control
JOG-11	Jog Time4/REV4	Unit [sec]/[rev]	Display range 0.00 ~ 5000.00	Manufactured default 1.00	Speed/Torque/Position control
JOG-12	Jog Speed 5	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default 400.0	Speed/Torque/Position control
JOG-13	Jog Time5/REV5	Unit [sec]/[rev]	Display range 0.00 ~ 5000.00	Manufactured default 1.00	Speed/Torque/Position control
JOG-14	Jog Speed 6	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default -400.0	Speed/Torque/Position control
JOG-15	Jog Time6/REV6	Unit [sec]/[rev]	Display range 0.00 ~ 5000.00	Manufactured default 1.00	Speed/Torque/Position control
JOG-16	Jog Speed 7	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default 800.0	Speed/Torque/Position control
JOG-17	Jog Time7/REV7	Unit [sec]/[rev]	Display range 0.00 ~ 5000.00	Manufactured default 1.00	Speed/Torque/Position control
JOG-18	Jog Speed 8	Unit rpm	Display range -9999.9 ~ 9999.9	Manufactured default -800.0	Speed/Torque/Position control
JOG-19	Jog Time8/REV8	Unit [sec]/[rev]	Display range 0.00 ~ 5000.00	Manufactured default 1.00	Speed/Torque/Position control



[ Auto jog mode 1(Speed - time) ]



[ Auto jog mode 2 (Speed - revolution) ]

## 3.15 Alarm display setting

<b>ALS-01</b>	Current Alarm	Unit -	Display range -	Manufactured default nor	Speed/Torque/Position control
---------------	---------------	--------	-----------------	--------------------------	-------------------------------

This parameter indicates the current alarm. ALS-01 menu is not the user input parameter but the menu to notify the alarm condition of the servo drive.

Alarm number	Alarm acronym	Alarm content
-	Normal	Normal condition
00	EMER STOP	Emergency stop alarm
01	OVER CURNT	Servo over-current alarm
02	OVER VOLT	Servo over-voltage alarm(Auto clear)
03	OVER LOAD	Overload alarm
04	POWER FAIL	Servo insufficient voltage alarm
05	LINE FAIL	Encoder missed operation alarm
06	OVER SPEED	Over-speed alarm
07	FOLLOW ERR	Location following error alarm
08	OUTPUT NC	Output NC alarm
09	PPR ERROR	Encoder pulse rate setting alarm
10	ABS DATA	Absolute encoder data error alarm
11	ABS BATT	Absolute encoder battery low alarm
12	ABS MDER	Absolute encoder multi turns data transmission error alarm
13	OUTPUT EC	Output mis-wiring alarm
16	DIS COM	MotionNET communication offline alarm(Auto clear)

<b>ALS-02</b>	Alarm Reset	Unit -	Display range ON/OFF	Manufactured default OFF	Speed/Torque/Position control
---------------	-------------	--------	----------------------	--------------------------	-------------------------------

It resets and initializes the occurred alarm. Check and remove the cause of the alarm before resetting the alarm and then reset.

This is the parameter that the occurred alarm history resets and initializes.

<b>ALS-03 ~ ALS-12</b>	Alarm History 1 ~ Alarm History 10	Unit -	Indicated range 0 ~ 32	Manufactured default 0	Speed/Torque/Position control
----------------------------	---------------------------------------	--------	------------------------	------------------------	-------------------------------

This is the menu that stores and shows the alarm history. The user cannot set this arbitrarily.

<b>ALS-13</b>	History Reset	Unit -	Display range ON/OFF	Manufactured default OFF	Speed/Torque/Position control
---------------	---------------	--------	----------------------	--------------------------	-------------------------------

It resets and initializes the occurred alarm history.

# **Chapter 4**

---

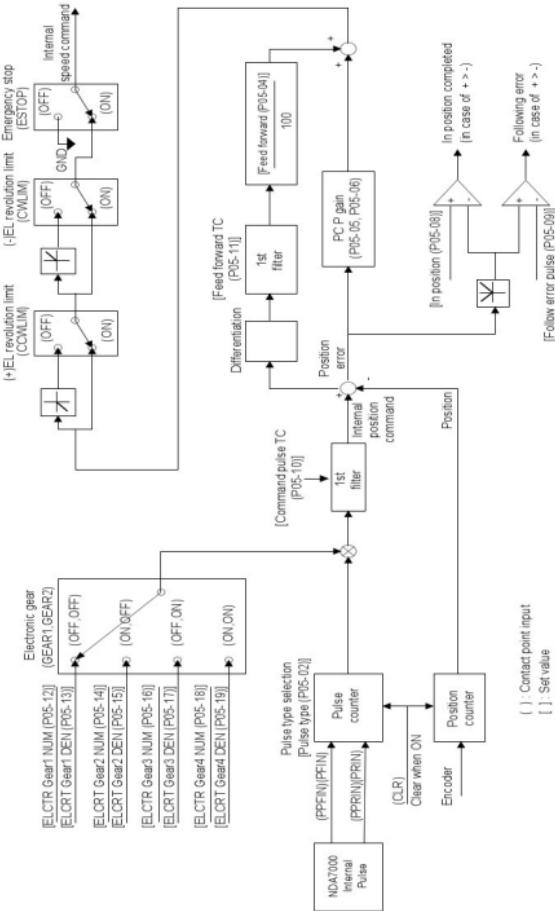
## **Servo using method and Gain adjustment**

Chapter 4 explains the servo using method and gain adjustment by position control mode.

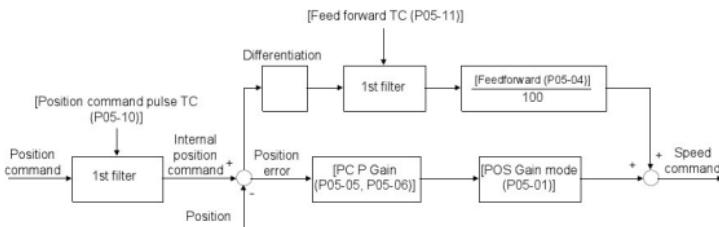
4.1 Gain adjustment for position mode.....	4-1
4.2 Autotuning .....	4-7

## 4.1 Gain adjustment method for position control mode

This explains the position servo control mode and gain adjustment method. The following diagram shows the generating sequence of the speed command for position control.



## 4.1.2 Position servo gain adjustment



(Note) In this control mode, Error pulse should be cleared according to the servo condition.

Before the stop function release, the error pulse is cleared by PLSCLR action.

- 1) This sets the position control gain mode.

P05-01	POS Gain Mode	Unit	Display range 1 ~ 5	Manufactured default 1	Position control
--------	---------------	------	------------------------	------------------------------	------------------

When the servo drive set to position control mode, this sets the position control gain mode.

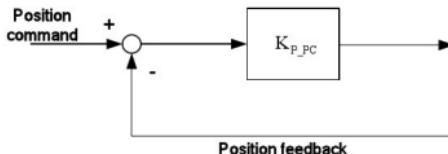
Set value	Operation explanation
1	Use PC P gain 1 (P05-05).
2	Use PC P gain 2 (P05-06).
3	Apply variable gain using gain 1 (P05-05) and gain 2 (P05-06) according to set speed (P02-20, P02-21) for the position controller gain.
4	Apply variable gain using gain 1 (P05-05) and gain 2 (P05-06) according to set torque (P02-22, P02-23) for the position controller gain.
5	Select gain 1 (P05-05) or gain 2 (P05-06) by the external contact point signal for the position controller gain.

#### 4. Servo using method and gain adjustment

HIDEN®

- 2) This sets the PC P gain applied by the set value of P05-01

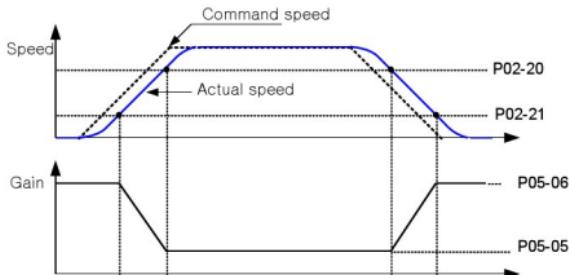
<b>P05-05</b>	PC P Gain1	Unit Hz	Display range 0.0 ~ 500.0	Manufactured default By capacity	Position control
<b>P05-06</b>	PC P Gain2	Unit Hz	Display range 0.0 ~ 500.0	Manufactured default By capacity	Position control



$$K_{P,PC} = \text{PC P Gain}$$

- 3) When P05-01="3", the variable gain is applied based on the following gain adjustment speed 1 and 2.

<b>P02-20</b>	Gain ADJ Speed1	Unit rpm	Display range 100.0 ~ 5000.0	Manufactured default 800.0	Speed/Torque/ Position control
<b>P02-21</b>	Gain ADJ Speed2	Unit rpm	Display range 10.0 ~ 500.0	Manufactured default 100.0	Speed/Torque/ Position control

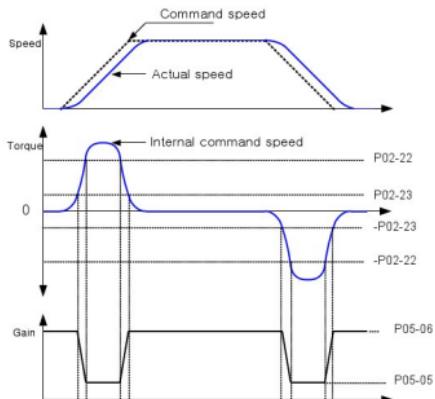


- 4) When P05-01="4", the variable gain is applied based on the following gain adjustment torque1 and 2.

#### 4. Servo using method and gain adjustment

HIDEN®

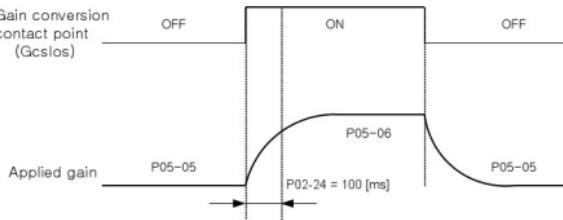
<b>P02-22</b>	Gain ADJ TRQ1	Unit %	Display range 0.0 ~ 300.0	Manufactured default 150.0	Speed/Torque/Position control
<b>P02-23</b>	Gain ADJ TRQ2	Unit %	Display range 0.0 ~ 300.0	Manufactured default 50.0	Speed/Torque/Position control



- 5) When P5-01="5", the variable gain is applied based on the ON/OFF status of the external control gain conversion contact point. At this time, the conversion time of the control gain is decided.

<b>P02-24</b>	Contact Gain TC	Unit ms	Display range 0.0 ~ 10000.0	Manufactured default 100.0	Speed/Torque/Position control
---------------	-----------------	---------	-----------------------------	----------------------------	-------------------------------

If you want to execute smooth gain conversion, set the Contact Gain TC to long. Enter the Contact Gain TC in (ms) unit.



## 6) Feed forward ratio setting

P05-04	Feedforward	Unit %	Display range 0.0 ~ 100.0	Manufactured default 0.0	Position control
--------	-------------	--------	------------------------------	-----------------------------	------------------

Enter the feedforward ratio for the position command speed in [%] unit. When this value increases it can reduce the position decision time but if set to high, it can cause an overshoot or vibration to the machine. If this value is set "0", the position controller becomes simple position loop control mode.

Refer to the Max\_Value [Feedforward] according to the following  $R = [\text{Speed loop gain}] / [\text{Position loop gain}]$ .

$R = [\text{Speed loop gain}] / [\text{Position loop gain}]$	Max_Value [Feedforward]
5	70 or below
7	80 or below
10	85 or below
20	90 or below

P05-11	FF TC	Unit ms	Setting range 0.0 ~ 2000.0	Manufactured default 0.0	Position control
--------	-------	---------	-------------------------------	-----------------------------	------------------

Enter the 1<sup>st</sup> filter TC in [ms] unit of the feedforward input of the position command speed. The entered position command is divided and processed through the 1<sup>st</sup> filter before being used as the feedforward input, the TC of this filter can be adjusted. In the applied field where the position command changes abruptly, set this value high and in applied field where the position command changes smoothly, set this value low. If you do not want to use this filter, input "0".

## [ Recommended setting condition ]

$$P05-11(\text{Feedforward TC}) \leq 1000 \times (\text{Max_Value[Feedforward]} - [\text{Feedforward}]) / 100 / [\text{PC P Gain}]$$

## 7) Position command pulse TC setting

P05-10	POS CMD TC	Unit ms	Display range 0.0 ~ 2000.0	Manufactured default 0.0	Position control
--------	------------	---------	-------------------------------	-----------------------------	------------------

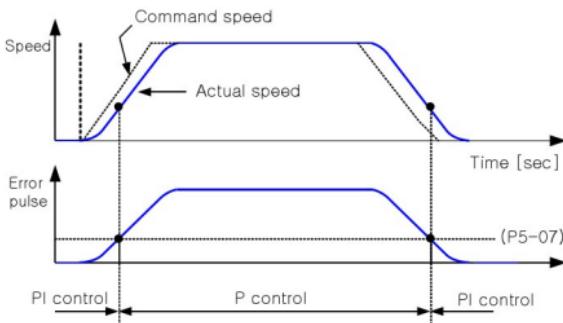
Set the filter TC on the position command pulse input for smoothing operation in the position

control mode. If you would like to execute smoothing operation without setting the position command filter TC, set the position decision mode setting of Position control speed mode (P05-03) to ON. It permits the acceleration/deceleration (P03-10, P03-11) and S mode operation (P03-12) set in user menu P03 of speed command. The smoothing operation is advantageous when reaching position decision in position control mode.

- 8) This sets the PI-P mode pulse error.

<b>P05-07</b>	PI-P Pulse ERR	Unit pulse	Display range 0 ~ 99999	Manufactured default 0	Position control
---------------	----------------	------------	----------------------------	---------------------------	------------------

If the error between command pulse and actual movement pulse exceeds the set value of P05-07, it switches to P control mode to suppress overshoot.



## 4.2 Autotuning

For the autotuning applied to NDA7000 series, the servo drive estimates the inertia of the load attached to the servo motor during operation and has the function of adjusting the speed control gain and position control gain.

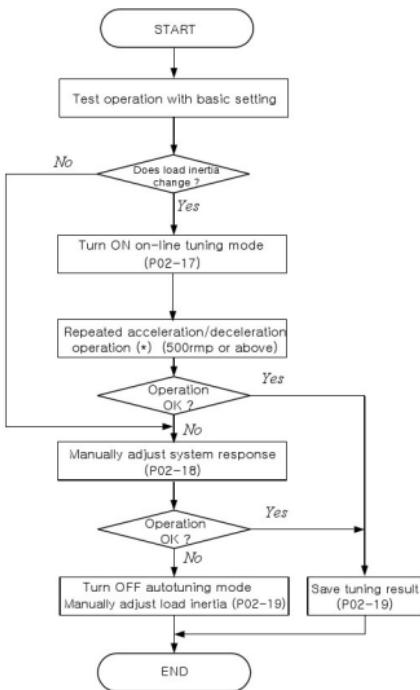
### 4.2.1 System response setting

The system response is set (P02-18) manually before using autotuning. The following P05-05, P05-06, P03-05, P03-06, P03-07, P03-08 and P02-16 automatically changes and when the autotuning function is set to "ON", the tuning operation is executed with the target of manually set value.

P02-18 (System response setting)	P05-05 (Position loop gain 1)	P05-06 (Position loop gain 2)	P03-05 (Speed control loop gain 1)	P03-06 (SC TC 1)	P03-07 (Speed control loop gain 2)	P03-08 (SC TC 2)	P02-16 (Command torque filter TC)
1	2.0	5.0	2.0	200.0	5.0	120.0	4.5
2	5.0	10.0	5.0	120.0	10.0	80.0	3.5
3	10.0	15.0	10.0	80.0	15.0	60.0	3.0
4	15.0	20.0	15.0	60.0	20.0	45.0	2.5
5	20.0	25.0	20.0	45.0	25.0	40.0	2.0
6	25.0	30.0	25.0	40.0	30.0	30.0	1.5
7	30.0	35.0	30.0	30.0	35.0	25.0	1.3
8	35.0	45.0	35.0	25.0	45.0	18.0	1.2
9	45.0	55.0	45.0	18.0	55.0	17.0	0.9
10	55.0	70.0	55.0	17.0	70.0	13.0	0.8
11	70.0	85.0	70.0	13.0	85.0	11.0	0.6
12	85.0	105.0	85.0	11.0	105.0	10.0	0.5
13	105.0	130.0	105.0	10.0	130.0	8.0	0.4
14	130.0	160.0	130.0	8.0	160.0	6.0	0.25
15	160.0	200.0	160.0	6.0	200.0	5.4	0.2
16	200.0	240.0	200.0	5.4	240.0	5.0	0.15
17	240.0	300.0	240.0	5.0	300.0	3.5	0.1
18	300.0	350.0	300.0	3.5	350.0	3.2	0.0
19	350.0	360.0	350.0	3.2	360.0	3.1	0.0

- ◆ If you set the system response to high, it increases the servo system gain to increase the response. But if the set value is too high, it can cause noise and vibration in the motor. In this case, appropriately lower the set value.

## 4.2.2 Autotuning setting sequence



- ♥ Autotuning is set by system response setting (P02-18) manual part, by position loop gain, speed control loop gain, SC TC and torque command filter and the system inertia ratio (P02-19) is set by the autotuning mode (P02-17).

#### 4.2.3 Precaution during autotuning

- 1) Operate at 500[rpm] or higher speed.
- 2) Manually set the acceleration/deceleration time setting of speed shortly [ms]. If the acceleration/deceleration time is set too long, the speed deviation during the algorithm processing time is too small to make estimation.
- 3) Avoid using autotuning when operating weak belt with lower mechanical strength.
- 4) Avoid using autotuning for system with load inertia abruptly changing.
- 5) When the P02-18 (System response setting) is too low, increase the value.
- 6) It does not apply when using the torque control mode.

# **Chapter 5**

---

## **Troubleshooting and check**

Chapter 6 explains the method of action and check for the issues that can occur during servo operation.

5.1 Troubleshooting.....	6-1
5.2 Check.....	6-4

## 5.1 Troubleshooting

### 5.1.1 Servo motor

Symptom	Cause	Inspection	Corrective Actions
Motor does not start.	Parameter mis-setting	Check the parameter of motor, encoder, encoder type, control mode etc.	Reset parameter. (Refer to Chapter 3)
	Overload	Check the revolution condition of the machine.	Readjust the machine device.
	Motor defect	Measure the motor lead terminal with a tester.	For normal voltage, replace the motor.
	Loose screw	Check the connection part with drive.	Tighten loose parts.
	External mis-wiring Cable disconnection	Check motor and encoder wiring.	Rework on the wiring. Replace the cable.
	Encoder defect	Check the output wave shape.	Replace the encoder. (Request for repair)
Motor revolution is unstable	Wiring connection defectiveness	Check the connection of the motor lead terminal.	Correct the wiring.
	Low input voltage	Check the drive input voltage.	Correct the power.
	Overload	Check the machine condition.	Remove any particle on the revolution part and supply lubricant (or grease)
Motor is overheated.	High ambient temperature	Check the surrounding temperature of the motor installation part. (40°C or below)	Reduce ambient temperature to 40 °C max.
	Contamination on motor surface	Check whether there are any alien particles on the motor surface.	Clean dust and oil dirt.
	Overload	Check the load rate of the drive. Check the acceleration/deceleration frequency.	Reduce load. Increase acceleration/deceleration time.
	Low magnetic power of magnet	Check the comparator voltage and voltage wave shape.	Replace the motor.
Abnormal noise is generated.	Coupling defect	Check the screw condition of the coupling and copper core of the connection part etc.	Readjust the coupling.
	Bearing problem	Check the bearing vibration and abnormal noise.	Contact our company.
	Parameter mis-setting(Motor/encoder ID, inertia ratio, gain, TC)	Check the control parameter.	Refer to parameter setting method in chapter 3.

## 5.1.2 Servo drive

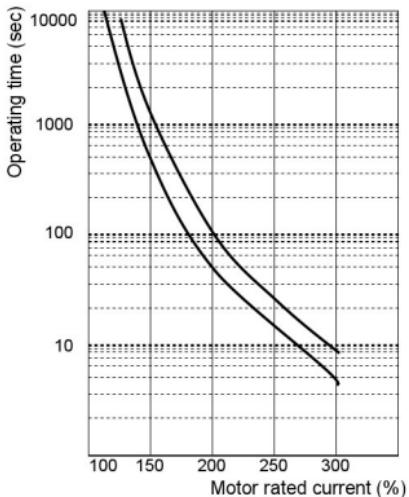
When an alarm occurs in servo drive and error signal output contact point (ALARM) goes OFF and the motor is stopped by dynamic brake.

Display	Content	Cause	Corrective Actions
nor	Normal condition		
Ano-00 EMER STOP	Emergency stop	Turn external ESTOP contact point input OFF.	Check external DC 24V power. Check ESTOP contact point ON status
Ano-01 OVER CURNT	Over-current	Servo drive output terminal (U, V, W) short circuit, output over-current	Check output terminal wiring, re-operate after resetting, replace drive when O.C continues
Ano-02 OVER VOLT	AC link over-voltage	Input over-voltage (280V or above) Regenerated resistance burnt, Overload GD <sup>2</sup>	Use input voltage of 230V or below Replace brake resistance, increase acceleration/deceleration time, replace servo drive
Ano-03 OVER LOAD	Overload	Mechanical overload Motor mis-wiring	Check load condition, check motor and encoder wiring
Ano-04 POWER FAIL	Main power issue	Main power blocked when SERVO is ON	Check 3 phase main power (R, S, T) input condition
Ano-05 LINE FAIL	Mis-wiring of motor and encoder	Motor and encoder related set value error, motor and encoder mis-wiring, encoder defect, mechanical overload	Check motor, encoder, wiring and set value, remove overload
Ano-06 OVER SPEED	Over-speed	Over-gain, parameter set value error, over gravity load	Adjust gain Check parameter (P03-15, P03-16) Remove over gravity load
Ano-07 FOLLOW ERR	Over-error of position tracking	Abrupt acceleration/deceleration, gain set value error, command pulse over-frequency (300kpps or above), mis-wiring, mechanical overload	Adjust position gain, increase menu (P05-09) set value, adjust command pulse frequency, check motor and encoder wiring.
Ano-08 Output NC	Output(U,V,W) missing	Output (U, V, W) missing	Check motor wiring, replace servo drive
Ano-09 PPR ERROR	Encoder pulse rate setting error	Encoder ID setting error	Accurately set the encoder ID (P01-12)
Ano-10 ABS DATA	Absolute value encoder data transmission error	Absolute value encoder data transmission error	Re-transmit the absolute value encoder data after resetting
Ano-11 ABS BATT	Battery Alarm	Battery voltage is 2.8V or below	Replace battery (3.6V)
Ano-12 ABS MODE	ABS encoder multi-turn data transmission error	ABS encoder multi-turn data transmission error	Re-transmit the absolute value encoder data after resetting

## 5. Troubleshooting and check

HIDEN®

Ano-13 Output EC	Output U,V,W Mis-wiring	Output U, V, W mis-wiring (Error Connection)	Check motor wiring, replace servo drive
Ano-14 ABS LOW BATT	Battery LOW Voltage Alarm	Voltage of Battery under than 3.1V (at P02-35x1)	Replace the Battery(3.6V)
Ano-16 DIS NET	MotionNET Communication error	Not connected between center-board and drive (If it's connection is good, his alarm is clear automatic- matically)	Check communication speed(P1- 25), and connection of IN, OUT connector, center-board is opened.
Err - 01	Set value input error	Trial of entry of parameter that cannot be changed when servo is ON, change in parameter locking condition	Change the set value after servo is OFF, cancel parameter lock setting menu (P01-19)
Err - 02	Set value error	Parameter setting error	Input value within set range.
Err - 03	Access value error	Locked parameter access	Do not change set value of locked parameter



Rated current (%)	Overload operation time		
	Min.	Max.	Set value
100			$\infty$
120			$\infty$
150	300	1500	760
200	60	150	107
250	20	40	30
300	6	15	7

[Servo drive overload characteristics curve]

(note) If Ano-03 (OVER LOAD) happens often, refer servo drive overload characteristic-  
curve and re-establish suitable load of servo motor.

## 5.2 Check



## Caution

- When checking the unit, always turn off the power and wait for more than 10 minutes to pass before checking the unit because charged voltage can remain in DC Link capacitor to cause an accident.

- Check any pieces of wire, dust, particles accumulated inside and clean appropriately.
- Check whether the screw of the terminal is loose and check whether they are tightened.
- Check if there are problems of parts (discoloration, damage, disconnection).

For the connection test of the control circuit, use the high resistance range on the tester, and do not use a megger or buzzer.

- Check whether the cooling fan is operating normally.
- Check if there are any abnormal sounds (motor bearing, brake part).
- Check whether there are any damages or cracks to the cables (Especially detector cable).

Especially during operation, execute periodical checks according to the using condition during operation.

- Check and correct any misalignment of center of load connecting axis.

# **Chapter 6**

---

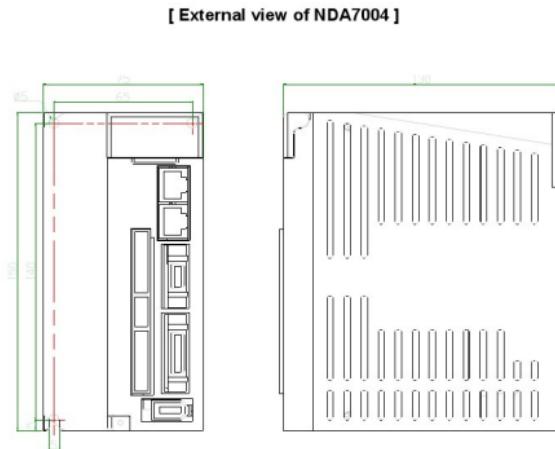
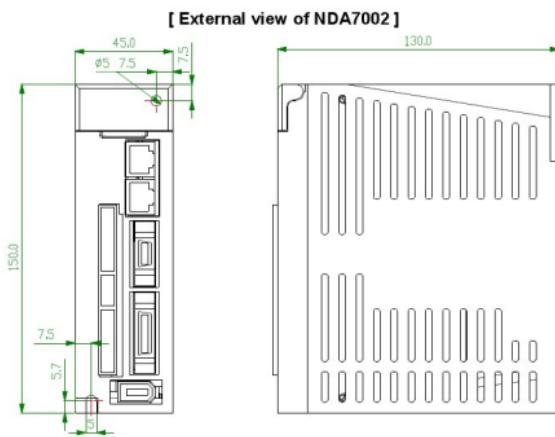
## **External View**

Chapter 8 displays the external view of the servo drive.

6.1 External view of servo drive..... 6-1



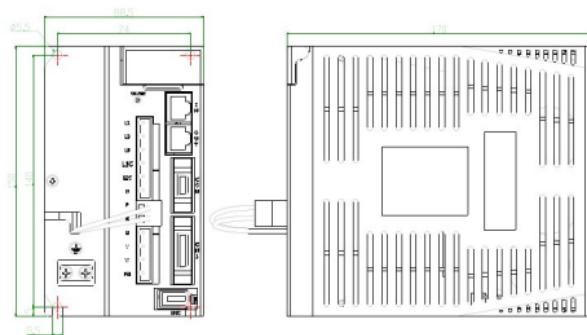
**6.1 External view of servo drive**



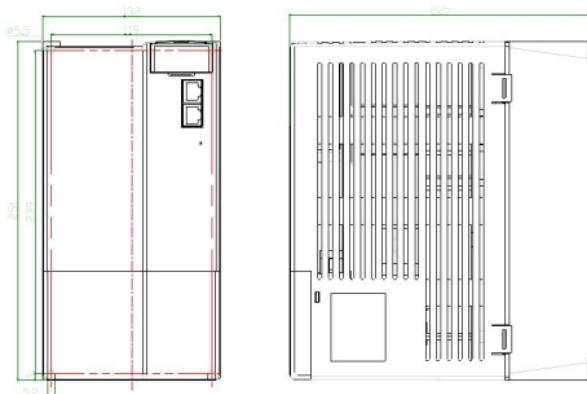
## 6. External view

HIDEN®

[ External view of NDA7010 ]



[ External view of NDA7045 ]



# **Appendix I**

---

## **MotionNET System**

Appendix I explains the MotionNET system.

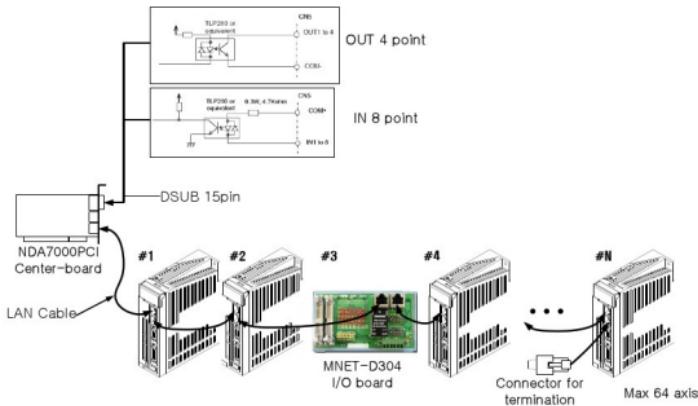
I .1 MotionNET System ..... I -1

I .2 MotionNET System S/W flowchart ..... I -3



## I.1 MotionNET System

### I.1.1 MotionNET System using NDA7000PCI



[ The schematic of MotionNET system using NDA7000PCI ]

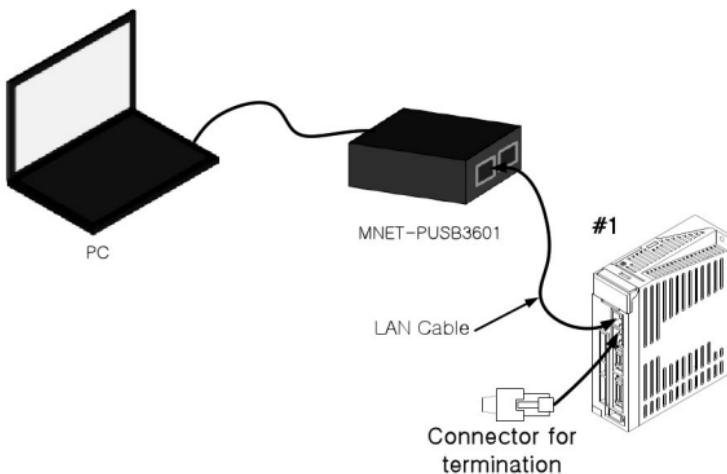
### I.1.2 NDA7000PCI Spec.

- 1) Data transfer rate : Max 20Mbps
- 2) Data transfer cycle : When connecting up to 64 axis, 0.97msec per 1 cycle
- 3) Max 64 axis
- 4) Multi-drop using LAN cable(RJ 45)
- 5) I/O Port : Input 8 point, Output 4 point (Isolated I/O using photo-coupler)

◆ For detailed product spec. and usage, please see the manual on our website.

[www.higenmotor.com](http://www.higenmotor.com)

## I.1.2 MotionNET System using MNET-PUSB3601



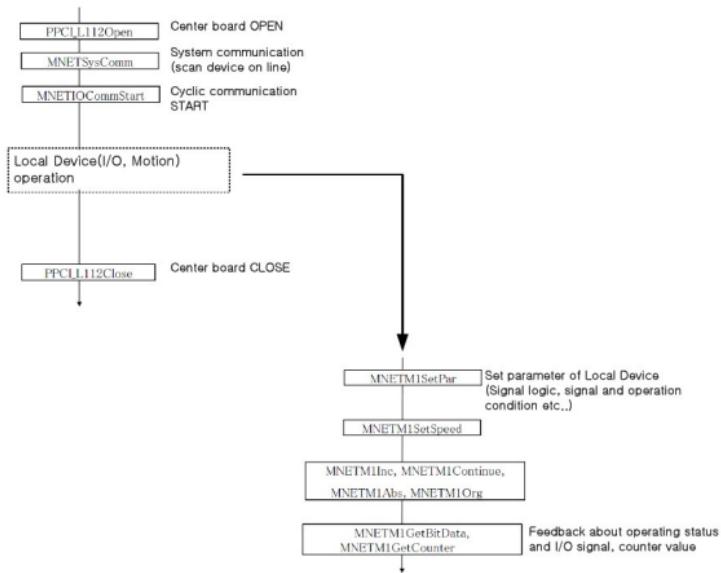
[The schematic of MotionNET system using MNET-PUSB3601 ]

## I.1.2 MNET-PUSB3601 Spec.

- 1) Data transfer rate : Max 20Mbps
- 2) Data transfer cycle : When connecting up to 1 axis,  $15.1\mu s$  per 1unit
- 3) USB 1.0 Interface
- 4) Multi-drop using LAN cable(RJ 45)

◆ For detailed product spec. and usage, please see the manual on our website.  
[www.higenmotor.com](http://www.higenmotor.com)

## I.2 MotionNET System S/W Flowchart



◆ For detailed usage, please see the DLL reference on our website.

[www.higenmotor.com](http://www.higenmotor.com)

# **Appendix II**

---

## **Parameter table**

Appendix II shows the full table of parameters mentioned in the manual.

II.1 Parameter table..... III -1

---

## II.1 Parameter table

(note) Mount = Mount loader, Digital = Digital loader, PC = P-dori

Parameter No.	Menu explanation	Unit	Setting range	Default set value	Display type
<b>StE-01</b>	Display select	-	100 ~ 1330	1203	Mount/Digital/PC
<b>StE-02</b>	MotionNET Address	-	0 ~ 63	0	Mount Loader
<b>StE-03</b>	Motionnet Speed	Mbps	0.0 ~ 20.0	10	Mount Loader
<b>StE-04</b>	Motionnet Group	-	0 ~ 7	0	Mount Loader
<b>StE-05</b>	Motor Direction& Speed info	-	-	-	Mount Loader
<b>StE-06</b>	Servo ON/OFF	-	0 ~ 1	-	Mount Loader
<b>StE-07</b>	Program Version	-	0.00 ~ 99.99	-	Mount Loader
<b>StE-02</b>	Command Speed	rpm	-9999.9 ~ 9999.9	-	Digital/PC Loader
<b>StE-03</b>	Motor Speed	rpm	-9999.9 ~ 9999.9	-	Digital/PC Loader
<b>StE-04</b>	CCW Speed Limit	rpm	0.0 ~ 9999.9	-	Digital/PC Loader
<b>StE-05</b>	CW Speed Limit	rpm	-9999.9 ~ 0.0	-	Digital/PC Loader
<b>StE-06</b>	Command Pulse	pulse	-99999 ~ 99999	-	Digital/PC Loader
<b>StE-07</b>	Feedback Pulse	pulse	-99999 ~ 99999	-	Digital/PC Loader
<b>StE-08</b>	Error Pulse	pulse	-99999 ~ 99999	-	Digital/PC Loader
<b>StE-09</b>	Command Torque	%	-300.0 ~ 300.0	-	Digital/PC Loader
<b>StE-10</b>	Load Rate	%	-300.0 ~ 300.0	-	Digital/PC Loader
<b>StE-11</b>	Max Load Rate	%	-300.0 ~ 300.0	-	Digital/PC Loader
<b>StE-12</b>	CCW TRQ LMT	%	0.0 ~ 300.0	-	Digital/PC Loader
<b>StE-13</b>	CW TRQ LMT	%	-300.0 ~ 0.0	-	Digital/PC Loader
<b>StE-14</b>	Inertia Ratio	-	0.0 ~ 50.0	2.0	Digital/PC Loader
<b>StE-15</b>	MULTI Turns	rev	0 ~ 999999	-	Digital/PC Loader
<b>StE-16</b>	Single Turn	-	0 ~ 999999	-	Digital/PC Loader
<b>StE-17</b>	I/O Status	-	0 ~ 999999	-	Digital/PC Loader
<b>StE-18</b>	PROG Version	-	0.0 ~ 99.99	-	Digital/PC Loader
<b>StE-19</b>	Single Turn angle	DEG	0.000 ~ 359.999	-	Digital/PC Loader
<b>P01-01*</b>	Motor ID	-	GEN ~ 00 ~ 99	By capacity	Mount/Digital/PC
<b>P01-02</b>	Inertia	gfcm <sup>2</sup>	0.01 ~ 999.99	By motor type	Mount/Digital/PC
<b>P01-03</b>	TRQ Constant	Kgfm/A	0.1 ~ 999.99	By motor type	Mount/Digital/PC
<b>P01-04</b>	Phase Inductance	mH	0.001 ~ 99.999	By motor type	Mount/Digital/PC
<b>P01-05</b>	Phase Resistance	Ω	0.01 ~ 99.999	By motor type	Mount/Digital/PC
<b>P01-06</b>	Rated Current	A(rms)	0.01 ~ 999.99	By motor type	Mount/Digital/PC
<b>P01-07</b>	Rated Speed	rpm	0.0 ~ 9999.0	By motor type	Mount/Digital/PC
<b>P01-08</b>	MAX Speed	rpm	0.0 ~ 9999.0	By motor type	Mount/Digital/PC
<b>P01-09</b>	Rated TRQ	kgfcm	0.0 ~ 9999.0	By motor type	Mount/Digital/PC
<b>P01-10</b>	Pole Number	Pole	2 ~ 98	By motor type	Mount/Digital/PC
<b>P01-11*</b>	Drive ID	-	0 ~ 45	By drive type	Mount/Digital/PC
<b>P01-12*</b>	Encoder ID	-	Enc-0 ~ R	Enc-A	Mount/Digital/PC
<b>P01-13*</b>	Encoder Pulse	ppr	1 ~ 32768	2000	Mount/Digital/PC
<b>P01-14</b>	Pulse Out Rate	ppr	1 ~ 131072	2000	Mount/Digital/PC
<b>P01-15*</b>	COM Baud Rate	-	0 ~ 15	0	Mount/Digital/PC
<b>P01-16*</b>	Serial Select	-	0 ~ 2	0	Mount/Digital/PC
<b>P01-17*</b>	Serial I/O	-	0 ~ 2	0	Mount/Digital/PC
<b>P01-18*</b>	Serial ID	-	1 ~ 31	1	Mount/Digital/PC
<b>P01-19</b>	Parameter Lock	-	ON/OFF	OFF	Mount/Digital/PC
<b>P01-20*</b>	Absolute Origin	-	ON/OFF	OFF	Mount/Digital/PC
<b>P01-21 *</b>	ABS Protocol	-	1~3	3	Mount/Digital/PC
<b>P01-22 *</b>	Modbus Protocol	-	0~1	0	Mount/Digital/PC
<b>P01-23</b>	MotionNET ID	-	0~63	0	Mount/Digital/PC
<b>P01-24</b>	CW/CCW LIMIT	통작설정	ON/OFF	OFF	Mount/Digital/PC
<b>P01-25</b>	모션넷 통신 속도	-	0~3	2	Mount/Digital/PC
<b>P01-26</b>	모션넷 그룹 설정	-	0~7	0	Mount/Digital/PC
<b>P02-01*</b>	Control Mode	-	0 ~ 5	1	Mount/Digital/PC

**Appendix II Parameter table**

HIDEN®

P02-02	Mode Change Time	ms	100.0 ~ 10000.0	500.0	Mount/Digital/PC
P02-03	CW TRQ LMT	%	0.0 ~ 300.0	300.0	Mount/Digital/PC
P02-04	CW TRQ LMT	%	-300.0 ~ 0.0	-300.0	Mount/Digital/PC
P02-05	Ccw Speed Limit	rpm	0.0 ~ 6000	Max. motor speed	Mount/Digital/PC
P02-06	CW Speed Limit	rpm	-6000.0 ~ 0.0	Max. motor speed	Mount/Digital/PC
P02-07	Brake Speed	rpm	0.0 ~ 9999.9	50.0	Mount/Digital/PC
P02-08	Brake Time	ms	0.0 ~ 10000.0	50.0	Mount/Digital/PC
P02-09	DB Mode	-	0 ~ 3	2	Mount/Digital/PC
P02-10	Notch Filter 1	-	0 ~ 2	0	Mount/Digital/PC
P02-11	NF Frequency 1	Hz	50.0 ~ 2000.0	300.0	Mount/Digital/PC
P02-12	NF Bandwidth 1	%	10.0 ~ 99.9	95.0	Mount/Digital/PC
P02-13	Notch Filter 2	-	0 ~ 1	0	Mount/Digital/PC
P02-14	NF Frequency 2	Hz	50.0 ~ 2000.0	500.0	Mount/Digital/PC
P02-15	NF Bandwidth 2	%	10.0 ~ 99.9	95.0	Mount/Digital/PC
P02-16	TRQ Filter TC	ms	0.0 ~ 1000.0	By capacity	Mount/Digital/PC
P02-17	Auto Tuning	-	0 ~ 1	0	Mount/Digital/PC
P02-18	System Response	-	1 ~ 19	By capacity	Mount/Digital/PC
P02-19	Inertia Ratio	-	1.0 ~ 50.0	2.0	Mount/Digital/PC
P02-20	Gain ADJ Speed 1	rpm	100.0 ~ 5000.0	800.0	Mount/Digital/PC
P02-21	Gain ADJ Speed 2	rpm	10.0 ~ 500.0	100.0	Mount/Digital/PC
P02-22	Gain ADJ TRQ 1	%	50.0 ~ 300.0	150.0	Mount/Digital/PC
P02-23	Gain ADJ TRQ 2	%	0.0 ~ 300.0	50.0	Mount/Digital/PC
P02-24	Contact Gain TC	ms	0.0 ~ 10000.0	100.0	Mount/Digital/PC
P02-25	Temporary Stop	-	ON/OFF	OFF	Mount/Digital/PC
P02-26	Emergency Stop	-	ON/OFF	OFF	Mount/Digital/PC
P02-27	Direction Select	-	ON/OFF	OFF	Mount/Digital/PC
P02-28	Ripple COMPEN	-	ON/OFF	OFF	Mount/Digital/PC
P02-29*	Parameter INIT	-	ON/OFF	OFF	Mount/Digital/PC
P02-30	Servo OFF delay time	ms	0.0 ~ 1000.0	10.0	Mount/Digital/PC
P02-31	CW Limit	-	ON/OFF	OFF	Mount/Digital/PC
P02-32	CCW Limit	-	ON/OFF	OFF	Mount/Digital/PC
P02-33	Servo ON/OFF	-	ON/OFF	OFF	Mount/Digital/PC
P03-01*	Speed Gain mode	-	1 ~ 5	1	Mount/Digital/PC
P03-02	PI-IP control %	%	0.0 ~ 100.0	100.0	Mount/Digital/PC
P03-03	Friction COMPEN	%	0.0 ~ 100.0	0.0	Mount/Digital/PC
P03-04	Load COMPEN	%	0.0 ~ 100.0	0.0	Mount/Digital/PC
P03-05	SC Loop Gain 1	Hz	0.0 ~ 1000.0	By capacity	Mount/Digital/PC
P03-06	SC TC 1	ms	0.0 ~ 10000.0	By capacity	Mount/Digital/PC
P03-07	SC Loop Gain 2	Hz	0.0 ~ 1000.0	By capacity	Mount/Digital/PC
P03-08	SC TC 2	ms	0.0 ~ 10000.0	By capacity	Mount/Digital/PC
P03-09	Analog CMD TC	ms	0.0 ~ 2000.0	0.0	Mount/Digital/PC
P03-10	ACCEL Time	ms	0.0 ~ 90000.0	0.0	Mount/Digital/PC
P03-11	DECCEL Time	ms	0.0 ~ 90000.0	0.0	Mount/Digital/PC
P03-12*	S-Mode TC	ms	0.0 ~ 9000.0	0.0	Mount/Digital/PC
P03-13	In Speed Range	-	0.0 ~ 9999.9	10.0	Mount/Digital/PC
P03-14	Zero Speed Range	Hz	0.0 ~ 9999.9	10.0	Mount/Digital/PC
P03-15*	+ 10[V] RPM	rpm	0.0 ~ 9999.9	Max. motor speed	Mount/Digital/PC
P03-16*	-10[V] RPM	rpm	-9999.9 ~ 0.0	Max. motor speed	Mount/Digital/PC
P03-17	Auto Offset	-	ON/OFF	OFF	Mount/Digital/PC
P03-18	Manual Offset	ms	-1000.0 ~ 1000.0	0.0	Mount/Digital/PC
P03-19*	Override ENB	-	ON/OFF	OFF	Mount/Digital/PC
P03-20	Clamp Mode	-	0 ~ 2	0	Mount/Digital/PC
P03-21	Clamp Voltage	mV	-1000.0 ~ 1000.0	0.0	Mount/Digital/PC
P03-22*	F/Back TC	ms	0.0 ~ 2000.0	0.0	Mount/Digital/PC
P03-23	Zero SPD VIB REJ	rpm	0.0 ~ 1000.0	0.1	Mount/Digital/PC
P03-24*	Feedforward TRQ	-	0 ~ 2	0	Mount/Digital/PC
P04-01	Digital input speed 1	rpm	-9999.9 ~ 9999.9	10.0	Mount/Digital/PC
P04-02	Digital input speed 2	rpm	-9999.9 ~ 9999.9	100.0	Mount/Digital/PC

**Appendix II Parameter table**

HIDDEN<sup>®</sup>

<b>P04-03</b>	Digital input speed 3	rpm	-9999.9 ~ 9999.9	200.0	Mount/Digital/PC
<b>P04-04</b>	Digital input speed 4	rpm	-9999.9 ~ 9999.9	500.0	Mount/Digital/PC
<b>P04-05</b>	Digital input speed 5	rpm	-9999.9 ~ 9999.9	1000.0	Mount/Digital/PC
<b>P04-06</b>	Digital input speed 6	rpm	-9999.9 ~ 9999.9	2000.0	Mount/Digital/PC
<b>P04-07</b>	Digital input speed 7	rpm	-9999.9 ~ 9999.9	3000.0	Mount/Digital/PC
<b>P04-08</b>	Digital input torque 1	%	-300.0 ~ 300.0	0.0	Mount/Digital/PC
<b>P04-09</b>	Digital input torque 2	%	-300.0 ~ 300.0	2.0	Mount/Digital/PC
<b>P04-10</b>	Digital input torque 3	%	-300.0 ~ 300.0	20.0	Mount/Digital/PC
<b>P04-11</b>	Digital input torque 4	%	-300.0 ~ 300.0	50.0	Mount/Digital/PC
<b>P04-12</b>	Digital input torque 5	%	-300.0 ~ 300.0	75.0	Mount/Digital/PC
<b>P04-13</b>	Digital input torque 6	%	-300.0 ~ 300.0	100.0	Mount/Digital/PC
<b>P04-14</b>	Digital input torque 7	%	-300.0 ~ 300.0	120.0	Mount/Digital/PC
<b>P05-01*</b>	POS Gain Mode	-	1 ~ 5	1	Mount/Digital/PC
<b>P05-02*</b>	POS Pulse Type	-	0 ~ 5	1	Mount/Digital/PC
<b>P05-03</b>	Speed Mode	-	ON/OFF	OFF	Mount/Digital/PC
<b>P05-04</b>	Feedforward	%	0.0 ~ 100.0	0.0	Mount/Digital/PC
<b>P05-05</b>	PC P Gain1	Hz	0.0 ~ 500.0	By capacity	Mount/Digital/PC
<b>P05-06</b>	PC P Gain2	Hz	0.0 ~ 500.0	By capacity	Mount/Digital/PC
<b>P05-07</b>	PI-P Pulse ERR	pulse	0 ~ 99999	0	Mount/Digital/PC
<b>P05-08</b>	In Position	pulse	0 ~ 99999	100	Mount/Digital/PC
<b>P05-09</b>	Follow ERR	pulse	0 ~ 99999	30000	Mount/Digital/PC
<b>P05-10</b>	POS CMD TC	ms	0.0 ~ 2000.0	0.0	Mount/Digital/PC
<b>P05-11</b>	FF TC	ms	0.0 ~ 2000.0	0.0	Mount/Digital/PC
<b>P05-12*</b>	ELCTR Gear NUM 1	-	1 ~ 99999	1	Mount/Digital/PC
<b>P05-13*</b>	ELCTR Gear DEN 1	-	1 ~ 99999	1	Mount/Digital/PC
<b>P05-14*</b>	ELCTR Gear NUM 2	-	1 ~ 99999	1	Mount/Digital/PC
<b>P05-15*</b>	ELCTR Gear DEN 2	-	1 ~ 99999	2	Mount/Digital/PC
<b>P05-16*</b>	ELCTR Gear NUM 3	-	1 ~ 99999	1	Mount/Digital/PC
<b>P05-17*</b>	ELCTR Gear DEN 3	-	1 ~ 99999	4	Mount/Digital/PC
<b>P05-18*</b>	ELCTR Gear NUM 4	-	1 ~ 99999	1	Mount/Digital/PC
<b>P05-19*</b>	ELCTR Gear DEN 4	-	1 ~ 99999	8	Mount/Digital/PC
<b>P05-20</b>	Bias SPD COMPEN	rpm	-1000.0 ~ 1000.0	0.0	Mount/Digital/PC
<b>P05-21</b>	Bias Pulse Band	pulse	0 ~ 500	10	Mount/Digital/PC
<b>P05-22</b>	Backlash Pulse	pulse	0 ~ 99999	0	Mount/Digital/PC
<b>P06-01*</b>	Analog TRQ TC	ms	0.0 ~ 2000.0	0.0	Mount/Digital/PC
<b>P06-02</b>	TRQ ACCEL Time	ms	0.0 ~ 9000.0	0.0	Mount/Digital/PC
<b>P06-03</b>	TRQ DECEL Time	ms	0.0 ~ 9000.0	0.0	Mount/Digital/PC
<b>P06-04*</b>	TRQ S-Mode	ms	0.0 ~ 2000.0	0.0	Mount/Digital/PC
<b>P06-05</b>	In TRQ Range	%	0.0 ~ 100.0	10.0	Mount/Digital/PC
<b>P06-06</b>	Stop TRQ Range	%	0.0 ~ 100.0	10.0	Mount/Digital/PC
<b>P06-07</b>	10[V] TRQ	%	0.0~300.0	100.0	Mount/Digital/PC
<b>P06-08</b>	Auto Offset	-	ON/OFF	OFF	Mount/Digital/PC
<b>P06-09</b>	Manual Offset	mV	-1000.0 ~ -1000.0	0.0	Mount/Digital/PC
<b>P07-01*</b>	Digital INPUT 1	-	0 ~ 30	1	Mount/Digital/PC
<b>P07-02*</b>	Digital INPUT 2	-	0 ~ 20	9	Mount/Digital/PC
<b>P07-03*</b>	Digital INPUT 3	-	0 ~ 20	10	Mount/Digital/PC
<b>P07-04*</b>	Digital INPUT 4	-	0 ~ 20	11	Mount/Digital/PC
<b>P07-05*</b>	Digital INPUT 5	-	0 ~ 20	3	Mount/Digital/PC
<b>P07-06*</b>	Digital INPUT 6	-	0 ~ 20	4	Mount/Digital/PC
<b>P07-07*</b>	Digital INPUT 7	-	0 ~ 20	13	Mount/Digital/PC
<b>P07-08*</b>	Digital INPUT 8	-	0 ~ 20	14	Mount/Digital/PC
<b>P07-09*</b>	Digital INPUT 9	-	0 ~ 20	12	Mount/Digital/PC
<b>P07-10*</b>	Digital INPUT 10	-	0 ~ 20	16	Mount/Digital/PC
<b>P07-11*</b>	Digital INPUT 11	-	0 ~ 20	15	Mount/Digital/PC
<b>P07-12*</b>	Digital INPUT 12	-	0 ~ 20	19	Mount/Digital/PC
<b>P08-01*</b>	Digital OUTPUT 1	-	0 ~ 30	0	Mount/Digital/PC

**Appendix II Parameter table**

HIDEN®

<b>P08-02*</b>	Digital OUTPUT 2	-	0 ~ 18	3	Mount/Digital/PC
<b>P08-03*</b>	Digital OUTPUT 3	-	0 ~ 18	6	Mount/Digital/PC
<b>P08-04*</b>	Digital OUTPUT 4	-	0 ~ 18	5	Mount/Digital/PC
<b>P08-05*</b>	Digital OUTPUT 5	-	0 ~ 18	7	Mount/Digital/PC
<b>P08-06*</b>	Digital OUTPUT 6	-	0 ~ 18	9	Mount/Digital/PC
<b>P08-07*</b>	Digital OUTPUT 7	-	0 ~ 18	14	Mount/Digital/PC
<b>P08-08*</b>	Digital OUTPUT 8	-	0 ~ 18	15	Mount/Digital/PC
<b>P08-09*</b>	Digital OUTPUT 9	-	0 ~ 18	16	Mount/Digital/PC
<b>P08-10*</b>	Digital OUTPUT 10	-	0 ~ 18	17	Mount/Digital/PC
<b>P09-01</b>	Monitor1	-	0 ~ 5	0	Mount/Digital/PC
<b>P09-02</b>	Monitor ABS 1	-	ON/OFF	OFF	Mount/Digital/PC
<b>P09-03</b>	Monitor Scale 1	-	0.1 ~ 2000.0	1.0	Mount/Digital/PC
<b>P09-04</b>	Monitor Offset 1	mV	-1000.0 ~ 1000.0	0.0	Mount/Digital/PC
<b>P09-05</b>	Monitor 2	-	0 ~ 5	1	Mount/Digital/PC
<b>P09-06</b>	Monitor ABS 2	-	ON/OFF	OFF	Mount/Digital/PC
<b>P09-07</b>	Monitor Scale 2	-	0.1 ~ 2000.0	1.0	Mount/Digital/PC
<b>P09-08</b>	Monitor Offset 2	mV	-1000.0 ~ 1000.0	0.0	Mount/Digital/PC
<b>JOG-01</b>	Key Jog Mode	-	ON/OFF	OFF	Mount/Digital/PC
<b>JOG-02</b>	Key Jog Speed	rpm	-9999.9 ~ 9999.9	100.0	Mount/Digital/PC
<b>JOG-03</b>	Auto Jog Mode	-	0 ~ 2	0	Mount/Digital/PC
<b>JOG-04</b>	Jog Speed 1	rpm	-9999.9 ~ 9999.9	100.0	Mount/Digital/PC
<b>JOG-05</b>	Jog Time1/REV1	[sec]/[rev]	0.00 ~ 5000.00	1.00	Mount/Digital/PC
<b>JOG-06</b>	Jog Speed 2	rpm	-9999.9 ~ 9999.9	-100.0	Mount/Digital/PC
<b>JOG-07</b>	Jog Time2/REV2	[sec]/[rev]	0.00 ~ 5000.00	1.00	Mount/Digital/PC
<b>JOG-08</b>	Jog Speed 3	rpm	-9999.9 ~ 9999.9	200.0	Mount/Digital/PC
<b>JOG-09</b>	Jog Time3/REV3	[sec]/[rev]	0.00 ~ 5000.00	1.00	Mount/Digital/PC
<b>JOG-10</b>	Jog Speed 4	rpm	-9999.9 ~ 9999.9	-200.0	Mount/Digital/PC
<b>JOG-11</b>	Jog Time4/REV4	[sec]/[rev]	0.00 ~ 5000.00	1.00	Mount/Digital/PC
<b>JOG-12</b>	Jog Speed 5	rpm	-9999.9 ~ 9999.9	400.0	Mount/Digital/PC
<b>JOG-13</b>	Jog Time5/REV5	[sec]/[rev]	0.00 ~ 5000.00	1.00	Mount/Digital/PC
<b>JOG-14</b>	Jog Speed 6	rpm	-9999.9 ~ 9999.9	-400.0	Mount/Digital/PC
<b>JOG-15</b>	Jog Time6/REV6	[sec]/[rev]	0.00 ~ 5000.00	1.00	Mount/Digital/PC
<b>JOG-16</b>	Jog Speed 7	rpm	-9999.9 ~ 9999.9	800.0	Mount/Digital/PC
<b>JOG-17</b>	Jog Time7/REV7	[sec]/[rev]	0.00 ~ 5000.00	1.00	Mount/Digital/PC
<b>JOG-18</b>	Jog Speed 8	rpm	-9999.9 ~ 9999.9	-800.0	Mount/Digital/PC
<b>JOG-19</b>	Jog Time8/REV8	[sec]/[rev]	0.00 ~ 5000.00	1.00	Mount/Digital/PC
<b>ALS-01</b>	Current Alarm	-	-	nor	Mount/Digital/PC
<b>ALS-02</b>	Alarm Reset	-	ON/OFF	OFF	Mount/Digital/PC
<b>ALS-03</b>	Alarm History 1	-	0 ~ 32	0	Mount/Digital/PC
<b>ALS-04</b>	Alarm History 2	-	0 ~ 32	0	Mount/Digital/PC
<b>ALS-05</b>	Alarm History 3	-	0 ~ 32	0	Mount/Digital/PC
<b>ALS-06</b>	Alarm History 4	-	0 ~ 32	0	Mount/Digital/PC
<b>ALS-07</b>	Alarm History 5	-	0 ~ 32	0	Mount/Digital/PC
<b>ALS-08</b>	Alarm History 6	-	0 ~ 32	0	Mount/Digital/PC
<b>ALS-09</b>	Alarm History 7	-	0 ~ 32	0	Mount/Digital/PC
<b>ALS-10</b>	Alarm History 8	-	0 ~ 32	0	Mount/Digital/PC
<b>ALS-11</b>	Alarm History 9	-	0 ~ 32	0	Mount/Digital/PC
<b>ALS-12</b>	Alarm History 10	-	0 ~ 32	0	Mount/Digital/PC
<b>ALS-13</b>	History Reset	-	ON/OFF	OFF	Mount/Digital/PC

♥ The parameter with the (\*) symbol cannot be changed when the SVONEN input contact point is "ON".

**Homepage :** <http://www.higenmotor.com>

**Head office :**

TEL ► (82) 2-369-8213~4      FAX ► (82) 2-369-8229

**Branch office :**

TEL ► (82) 51-710-5032~3      FAX ► (82) 51-710-5034

**Factory :**

TEL ► (82) 55-600-3333      FAX ► (82) 55-600-3317

**Customer support :**

TEL ► (82) 2-369-8215  
(82) 55-281-8407

**Order NO : -**



\* This book is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of HIGEN Motor company.